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Liquid Chromatography in Biomedical Analysis

edited by **T. Hanai**, *International Institute of Technological Analysis, Health Research Foundation, Kyoto, Japan*

This book presents a guide for the analysis of biomedically important compounds using modern liquid chromatographic techniques. After a brief summary of basic liquid chromatographic methods and optimization strategies, the main part of the book focuses on the various classes of biomedically important compounds: amino acids, catecholamines, carbohydrates, fatty acids, nucleotides, porphyrins, prostaglandins and steroid hormones. The different chapters discuss specialized techniques pertaining to each class of compounds, such as sample pretreatment, pre- and post-column derivatization, detection and quantification.

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Bibliography Section

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1. REVIEWS AND BOOKS

- 1176 Berek, D. and Novak, I.: Silica gel and carbon column packings for use in high-performance liquid chromatography. *Chromatographia*, 30 (1990) 582-590 - a review with 39 refs.
- 1177 Bilz, J., Froelich, P. and Smith, S.: (Ion chromatographic analytical methods). *Wiss. Z. Martin-Luther-Univ. Halle-Wittenberg, Math.-Naturwiss. Reihe*, 39 (1990) 27-37; *C.A.*, 113 (1990) 144200q - a review with 30 refs.
- 1178 Buchberger, W.: Trends in the combination of high-performance liquid chromatography and electroanalytical methods. *Chromatographia*, 30 (1990) 577-581 - a review with 32 refs.
- 1179 Conway, W.D.: Counter-current chromatography. *J. Chromatogr.*, 538 (1991) 27-35 - a review with 29 refs.
- 1180 Dyson, N.: *Chromatographic Integration Methods*. Royal Society of Chemistry, Cambridge, 1990, 160 p.; *C.A.*, 113 (1990) 183930x.
- 1181 Giddings, J.C., Grushka, E. and Brown, P.R. (Editors): *Advances in Chromatography*. Vol. 30, Marcel Dekker, New York, 1989, 255 p.; *C.A.*, 113 (1990) 159698g.
- 1182 Horvath, C. and Nikelly, J.G. (Editors): *Analytical Biotechnology: Capillary Electrophoresis and Chromatography. Developed from a Symposium at the 196th National Meeting of the American Chemical Society, Los Angeles, September 25-30, 1990. ACS Symposium Series 434*, ACS, Washington, 1990, 213 p.; *C.A.*, 114 (1991) 2994y.
- 1183 Hubert, P., Mathis, R. and Dellacherie, E.: Polymer ligands for mild hydrophobic interaction chromatography - principles, achievements and future trends. *J. Chromatogr.*, 539 (1991) 297-306 - a review with 44 refs.
- 1184 Ito, Y.: Recent advances in counter-current chromatography. *J. Chromatogr.*, 538 (1991) 3-25 - a review with 56 refs.
- 1185 Kato, Y.: (Gel-, ion exchange-, reverse phase-, hydroxyapatite-, and metal chelate-chromatography). *Kagaku Zokan (Kyoto)*, (1990) 111-119; *C.A.*, 113 (1990) 227290v - a review with 19 refs.
- 1186 Kiuchi, K. and Nagatsu, T.: (Progress in HPLC ECD method). *Seibutsu Butsuri*, 30 (1990) 40-43; *C.A.*, 113 (1990) 148141u - a review with 12 refs.
- 1187 Lee, Y.W.: Dual counter-current chromatography - its applications in natural products research. *J. Chromatogr.*, 538 (1991) 37-44 - a review with 13 refs.
- 1188 Li, Z. and Dong, S.: (Liquid-solid extraction and its application to sample pretreatment). *Yaowu Fenxi Zazhi*, 10 (1990) 184-188; *C.A.*, 113 (1990) 184042w - a review with 63 refs.
- 1189 Schaufelberger, D.E.: Applications of analytical high-speed counter-current chromatography in natural products chemistry. *J. Chromatogr.*, 538 (1991) 45-57 - a review with 43 refs.
- 1190 Tanaka, N. and Kimata, K.: (Selection of column sorbents and elution conditions in reversed-phase chromatography). *Kagaku Zokan (Kyoto)*, (1990) 183-194; *C.A.*, 113 (1990) 227286y - a review with 22 refs.

- 1191 Tsuda, T.: (*Chromatography: Separation and Application*). Maruzen, Tokyo, 1989, 195 p.; *C.A.*, 113 (1990) 183931y.
- 1192 Varga, J.M., Wongyai, S., Fritsch, P. and Bonn, G.: Novel methods for introducing anchoring functions into a polystyrene matrix for the immobilization of ligands for high-performance affinity chromatography. *Chromatographia*, 30 (1990) 527-532 - a review with 18 refs.
- see also 1196, 1200, 1217, 1235, 1251, 1265, 1267, 1270, 1308, 1313, 1324, 1335, 1336, 1337, 1338, 1342, 1343, 1344, 1355, 1370, 1392, 1396, 1507, 1588, 1598, 1611, 1742, 1799, 1817, 1832, 1836, 1844, 1847, 1861, 1874, 1934, 2224, 2243, 2298, 2314, 2358, 2370, 2459, 2461, 2462, 2464, 2466, 2471, 2474, 2477, 2479, 2481, 2600, 2627, 2637, 2706, 2707, 2708, 2710, 2711, 2714, 2715, 2730, 2739, 2777, 2787.

2. FUNDAMENTALS, THEORY AND GENERAL

2a. General

- 1193 Afeyan, N.B., Fulton, S.P., Gordon, N.F., Mazsaroff, I., Varady, L. and Regnier, F.E.: Perfusion chromatography: an approach to purifying biomolecules. *Bio/Technology*, 8 (1990) 203-206; *C.A.*, 113 (1990) 187448u.
- 1194 Balke, S.T., Cheung, P., Lew, R. and Mourey, T.H.: Quantitative size exclusion chromatography: assessing new developments. *J. Liq. Chromatogr.*, 13 (1990) 2929-2955.
- 1195 Bonfichi, R. and Nicola, L.: (Analytical criteria for evaluation of suitable solvents for HPLC analysis). *Spectra 2000*, 143 (1989) 33-37; *C.A.*, 114 (1991) 16861q.
- 1196 Chang, Y.: (Progress in ion chromatography). *Fenxi Cesho Tongbao*, 9 (1990) 25-29; *C.A.*, 113 (1990) 223497v - a review with 74 refs.
- 1197 Dolan, J.W.: Problems in size-exclusion chromatography. *LC-GC*, 8 (1990) 290-294; *C.A.*, 114 (1991) 16845n - a review with 3 refs.
- 1198 Ettre, L.S.: Key moments in the evolution of liquid chromatography. *J. Chromatogr.*, 535 (1990) 3-12.
- 1199 Fornstedt, T., Westerlund, D. and Sokolowski, A.: Studies on system peaks in ion-pair adsorption chromatography. IV. Optimization of peak compression. *J. Chromatogr.*, 535 (1990) 93-110.
- 1200 Hatano, H.: (Advances of technological analysis in chemistry). *Bunseki*, (1990) 296-302; *C.A.*, 113 (1990) 223822x - a review with 15 refs.
- 1201 Jayasinghe, D.S.: The distribution of organic bases in reverse phase liquid chromatography: a study of mechanisms. Avail. *Univ. Microfilms Int.*, order No. DA9019346, 1989, 202 p.; *C.A.*, 114 (1991) 12774r.
- 1202 MacLeod, S.K.: Compensated delay volume as an approach to improve the inter-laboratory transferability of gradient high-performance liquid chromatographic assays. *J. Chromatogr.*, 540 (1991) 373-375.
- 1203 Newesely, H.: Friedrich Goppelsroeder - a protagonist of modern chromatography? *Chromatographia*, 30 (1990) 595-596.
- 1204 Rasmussen, H.T. and Mc Nair, H.M.: Effects of sample solvent strength and injection volume on band broadening and throughput in reversed phase Prep scale HPLC. *J. Liq. Chromatogr.*, 13 (1990) 3079-3089.
- 1205 Rozylo, J.K. and Janicka, M.: Some theoretical aspects of the use of TLC as a pilot technique for column liquid chromatography. *J. Planar Chromatogr.*, 3 (1990) 413-416.

- 1206 Segudovic, N., Karasz, F.E. and Mac Knight W.J.: Solvent effect on the separation mechanism in HPGPC of polyimide and polyethersulfone. *J. Liq. Chromatogr.*, 13 (1990) 2581-2591.
- 1207 Shaevich, A.B. and Muchnik, V.L.: (Reference data on chromatographic retention values: proof of acceptable accuracy). *Zh. Anal. Khim.*, 45 (1990) 1526-1532; *C.A.*, 113 (1990) 223624j.
- 1208 Shelly, D.C. and Antonucci, V.L.: Effects of solute focusing on zone shape in column - planar separations. *J. Liq. Chromatogr.*, 13 (1990) 2711-2725.
- 1209 Wieling, J., Hempenius, J., Jeurig, H.J., Jonkman, J.H.G., Coenegracht, P.M.J. and Doornbos, D.A.: Development of a laboratory robotic system for automated bioanalytical methods - II. A robot computer program for guarding totally automated bioanalytical methods. *J. Pharm. Biomed. Anal.*, 8 (1990) 577-582.

For additional information see:

- C.A.*, 113 (1990) 174648j;
114 (1991) 16622n, 16652x.

See also 1288, 1380.

2b. Thermodynamics and theoretical relationships

- 1210 Berdichevsky, A.L. and Neue, U.D.: Nature of the eddy dispersion in packed beds. *J. Chromatogr.*, 535 (1990) 189-198.
- 1211 Burr, C.M.: Retention prediction in RP-HPLC. Avail. *Univ. Microfilms Int.*, Order No. BRDX88177, 1988, 313 p.; *C.A.*, 113 (1990) 223856m.
- 1212 Czok, M. and Guiochon, G.: Pitfalls in the choice of isotherms for the calculation of band profiles in preparative chromatography. *J. Chromatogr.*, 537 (1991) 497-506.
- 1213 Garcia, R., Celda, B., Soria, V., Tejero, R. and Campos, A.: Non-exclusion phenomena in size exclusion chromatography with inorganic porous packing: a thermodynamic treatment. *Polymer*, 31 (1990) 1694-1704; *C.A.*, 113 (1990) 153423s.
- 1214 Gugliotta, L.M., Vega, J.R. and Meira, G.R.: Instrumental broadening correction in size exclusion chromatography. Comparison of several deconvolution techniques. *J. Liq. Chromatogr.*, 13 (1990) 1671-1708.
- 1215 Hayashi, Y. and Matsuda, R.: Information theory of optimization in chromatography: optimal peak separation for various data processings. *Fresenius' J. Anal. Chem.*, 338 (1990) 597-601.
- 1216 Hayashi, Y. and Matsuda, R.: Comparison of optimization based on information theory with optimization of R_s in column chromatography. *Anal. Lett.*, 23 (1990) 1765-1781.
- 1217 Jakus, V. and Miertus, S.: (Theoretical modeling of distribution between phases and chromatographic separation). *Chem. Listy*, 84 (1990) 468-483; *C.A.*, 113 (1990) 178764s - a review with 126 refs.
- 1218 Kaibara, A., Hirose, M. and Nakagawa, T.: Effect of the polar functional group of the solute on hydrophobic interaction with the stationary ligand in reversed-phase high-performance liquid chromatography. *Chromatographia*, 29 (1990) 551-556.
- 1219 Katti, A.M., Ma, Z. and Guiochon, G.: Prediction of binary overloaded elution profiles using the simple wave effect. *AIChE J.*, 36 (1990) 1722-1730; *C.A.*, 114 (1991) 8724g.
- 1220 Kowalska, T. and Kus, P.: On the mechanism of solute retention in reversed-phase HPLC systems with methanol-water eluent. *Chromatographia*, 29 (1990) 583-586.
- 1221 Lanin, S.N. and Nikitin, Yu.S.: Molecular interactions in liquid chromatography. *J. Chromatogr.*, 537 (1991) 33-49.

- 1222 Lin, Y.S. and Ma, Y.H.: Analysis of liquid chromatography with nonuniform crystallite particles. *AIChE J.*, 36 (1990) 1569-1576; *C.A.*, 113 (1990) 214450x.
- 1223 Ma, Z. and Guiochon, G.: Whole-column computer simulation in nonlinear liquid chromatography. The traveling characteristics of the concentration waves of a binary mixture. *Anal. Chem.*, 62 (1990) 2330-2338.
- 1224 McGreavy, C., Andrade, J.S., Jr. and Rajagopal, K.: Size exclusion chromatography in pore networks. *Chromatographia*, 30 (1990) 639-644.
- 1225 Miertus, S. and Moravek, R.: Interpretation of partition between phases and chromatographic retention for a series of oxygen compounds. *Collect. Czech. Chem. Commun.*, 55 (1990) 1943-1958; *C.A.*, 113 (1990) 199067g.
- 1226 Mohseni, R.M. and Hurtubise, R.J.: Changes in the enthalpy and entropy of hydroxyl aromatics in reversed-phase liquid chromatography with β -cyclodextrin in the mobile phase. *J. Chromatogr.*, 537 (1991) 61-71.
- 1227 Mokrosz, J.L. and Duszynska, B.: Topological indexes in correlation analysis. Part 2. Molecular shape indexes in modelling of the chromatographic retention parameters. *Quant. Struct.-Act. Relat.*, 9 (1990) 33-36; *C.A.*, 113 (1990) 223829e.
- 1228 Petho, A.: Contributions to the theory of linear multiphase chromatography. *Chem. Biochem. Eng. Q.*, 4 (1990) 67-72; *C.A.*, 113 (1990) 198765w.
- 1229 Radovanovi, P. and Thiel, S.W.: Partition coefficients at infinite dilution from Flory-Huggins theory. *J. Liq. Chromatogr.*, 13 (1990) 1571-1583.
- 1230 Snyder, L.R. and Cox, G.B.: Pitfalls in the choice of isotherms for the calculation of band profiles in preparative chromatography. *J. Chromatogr.*, 537 (1991) 507-513.
- 1231 Soria, V., Campos, A., Garcia, R. and Paretz, M.J.: Solution properties of polyelectrolytes. VI. Secondary effects in aqueous size-exclusion chromatography. *J. Liq. Chromatogr.*, 13 (1990) 1785-1808.
- 1232 Winkle, W.: Quantitative analysis in the V_0 zone. A chromatographic approach by coupling HPLC with GPC. *Chromatographia*, 29 (1990) 530-536.
- 1233 Yu, Q. and Do, D.: Computer simulations of displacement chromatography of systems with species-dependent saturation capacities. *J. Chromatogr.*, 538 (1991) 285-292.

For additional information see:

C.A., 113 (1990) 183766y.

See also 1240, 1250, 1314, 1317, 1318, 1323, 1325, 1373, 1830, 2449, 2478.

2c. Relationship between structure and chromatographic behaviour

See 1401, 1599, 1633, 2332.

2d. Measurement of physico-chemical and related values

- 1234 Berthod, A.: (Theoretical study of the octanol phase motion effect on the octanol-water partition coefficient determination by countercurrent chromatography). *Analusis*, 18 (1990) 352-357; *C.A.*, 113 (1990) 238937n.
- 1235 Brochard-Wyart, F., le Maire, M. and Ghazi, A.: Size exclusion chromatography and surface effects in porous fractals. In: Lee, L.-H. (Editor), *New Trends Phys. Phys. Chem. Polym., Proc. Int. Symp. 1988*, Plenum, New York, 1989, pp. 137-157; *C.A.*, 113 (1990) 192264k - a review with 33 refs.

- 1236 Funasaki, N., Hada, S. and Neya, S.: Concentration dependence of the micelle size of hexaoxyethylene glycol decyl ether as revealed by gel filtration chromatography. *J. Phys. Chem.*, 94 (1990) 8322-8325; *C.A.*, 113 (1990) 178810d.
- 1237 Gonzalez, C., Zamora, F., Rodriguez, M., Gonzalez, M. and Leon, L.M.: Determination of the monomeric unit projection length from gel permeation chromatography and viscometry. *J. Macromol. Sci. Phys.*, B29 (1990) 337-349; *C.A.*, 113 (1990) 192304y.
- 1238 Grinberg, N.: Relationship between thin-layer and column chromatography. *Chromatogr. Sci.*, 52 (1990) 453-463; *C.A.*, 113 (1990) 204186b.
- 1239 Jenke, D.R., Hayward, D.S. and Kenley, R.A.: Liquid chromatographic measurement of solute solvent/solvent partition coefficients: application to solute/container interactions. *J. Chromatogr. Sci.*, 28 (1990) 609-612.
- 1240 Prochazka, K., Mandak, T., Bednar, B., Trnena, J. and Tuzar, Z.: Behavior of reversibly associating systems in size exclusion chromatography. Interpretation of experimental data based on theoretical model. *J. Liq. Chromatogr.*, 13 (1990) 1765-1783.
- 1241 Shan, Z.L., Xiao, H. and Zhu, P.L.: Measurement of limiting ionic equivalent conductance by single-column ion chromatography. *J. Chromatogr.*, 535 (1990) 207-212.
- 1242 Szweczyk, P.: Remarks on the calibration of steric exclusion liquid chromatography by polymolecular standards. *J. Liq. Chromatogr.*, 13 (1990) 1709-1717.

For additional information see:

C.A., 113 (1990) 159547g, 198845x, 204187c, 223808x.

See also 1219, 1276, 1373, 1374, 1383, 1390, 1418, 1848, 2193, 2439, 2447, 2450, 2455, 2456, 2458, 2459.

3. GENERAL TECHNIQUES

3a. Apparatus and accessories

- 1243 Aleksandrov, M.L., Shevkunov, V.V. and Pavlov, A.Yu.: Device for preparing a gradient solution for a high-pressure liquid chromatograph. *U.S. US* 4,954,253 (Cl.210-198.2; B01D15/08), 04 Sep. 1990, US Appl. 332,932, 23 Jan. 1989; 6 p.; *C.A.*, 114 (1991) 16833g.
- 1244 Andreolini, F. and Trisciani, A.: Method and mixing devices for small volumes for chromatographs. *Eur. Pat. Appl. EP* 377,202 (Cl. G01N30/16), 11 Jul. 1990, IT Appl. 89/19,015, 04 Jan. 1989; 7 p.; *C.A.*, 113 (1990) 164749d.
- 1245 Anonymous: (Automatic sample preparation with extraction column (ASPEC)). *LaborPraxis*, 14 (1990) 608-611; *C.A.*, 113 (1990) 164704k.
- 1246 Cortes, H.J., Pfeiffer, C.D. and Richter, B.E.: On-line coupled liquid and gas chromatography system. *U.S. US* 4,935,145 (Cl. 210-656; B01D15/08), 19 Jun. 1990, US Appl. 695,038, 18 Jan. 1985; 11 p.; *C.A.*, 113 (1990) 154922r.
- 1247 Cortes, H.J., Pfeiffer, C.D., Martin, S.J., Smith, C.G. and Jewett, G.L.: Multidimensional online chromatograph arrangement. *Ger. Offen.* DE 3,930,654 (Cl. G01N30/88), 15 Mar. 1990, US Appl. 243,913, 13 Sep. 1988; 10 p.; *C.A.*, 113 (1990) 204148r.
- 1248 Ito, Y., Kitazume, E. and Slomp, J.L.: Improved high-speed counter-current chromatograph with three multilayer coils connected in series. IV. Evaluation of preparative capability with large multilayer coils. *J. Chromatogr.*, 538 (1991) 81-85.

- 1249 Ito, Y., Kitazume, E., Bhatnagar, M. and Trimble, F.D.: Cross-axis synchronous flow-through coil planet centrifuge (Type XXL). I. Design of the apparatus and studies on retention of stationary phase. *J. Chromatogr.*, 538 (1991) 59-66.
- 1250 Ito, Y.: Cross-axis synchronous flow-through coil planet centrifuge (Type XXL). II. Speculation on the hydrodynamic mechanism in stationary phase retention. *J. Chromatogr.*, 538 (1991) 67-80.
- 1251 Kubota, K.: (Simulation of separation using segmented injection chromatography apparatus. 2). *Kemikaru Enjiniyaringu*, 35 (1990) 376-380; *C.A.*, 113 (1990) 194068y - a review with 9 refs.
- 1252 Livingston, D.P., III. and Albert, E.K.: Zero dead volume flow diversion system for fraction collectors. *J. Chromatogr. Sci.*, 28 (1990) 497-500.
- 1253 Marchand, C. and von Landerberg, H.U.: (Chromatograph-column closure arrangement). *Ger. Offen.* DE 3,833,300 (Cl. G01N30/02), 05 Apr. 1990, Appl. 30 Sep. 1988; 6 p.; *C.A.*, 113 (1990) 223768j.
- 1254 Nickerson, M.A., Poole, J.S. and Frank, L.G.R.: Axially driven valve-controlled trapping assembly for chromatographs. *Eur. Pat.* Appl. EP 384,969 (Cl. G01N30/04), 05 Sep. 1990, US Appl. 316,383, 27 Feb. 1989; 8 p.; *C.A.*, 113 (1990) 244009c.
- 1255 Pohl, H.D., Hafner, K., Wondraczek, R. and Reusche, G.: Apparatus for preparative countercurrent liquid chromatography. *Ger. (East)* DD 278,687 (Cl. B01D15/08), 16 May 1990, Appl. 295,623, 27 Oct. 1986; 5 p.; *C.A.*, 114 (1991) 8652g.
- 1256 Poole, J.S. and Staats, L.T., III: Pre-injection chromatograph sample sequencer. *Eur. Pat.* Appl. EP 387,409 (Cl. G01N30/04), 19 Sep. 1990, US Appl. 324,362, 15 Mar. 1989; 13 p.; *C.A.*, 114 (1991) 16830d.
- 1257 Ray, A., Tonkovich, A.L., Aris, R. and Carr, R.W.: The simulated countercurrent moving bed chromatographic reactor. *Chem. Eng. Sci.*, 45 (1990) 2431-2437; *C.A.*, 113 (1990) 194240y.
- 1258 Risler, W. and Nagel, U.: Liquid piston pump for chromatographic analyzers. *Ger. Offen.* DE 3,837,325 (Cl. F04B11/00), 10 May 1990, Appl. 03 Nov. 1988, 8 p.; *C.A.*, 113 (1990) 223887x.
- 1259 Schomburg, G.: Problems and achievements in the instrumentation and column technology for chromatography and capillary electrophoresis. *Chromatographia*, 30 (1990) 500-508.
- 1260 Winefordner, J.D. and Jones, B.T.: Method and apparatus for analysis under low-temperature vacuum conditions involving a chromatograph or spectrometer. *U.S.* US 4,942,134 (Cl. 436-161; G01N1/00), 17 Jul. 1990, Appl. 157,788, 19 Feb. 1988; 13 p.; *C.A.*, 113 (1990) 164674a.

For additional information see:

C.A., 113 (1990) 174561a, 192924a, 204171t, 207667v, 223776k, 223777m, 223797t.

See also 1321, 1322, 1376, 1378, 1379, 1382.

3b. Detectors and detection reagents

- 1261 Blaffert, T.: (Spectrochemical analysis device for substances separated in high-performance liquid chromatography). *Ger. Offen.* DE 3,827,066 (Cl. G01N21/59), 15 Feb. 1990, Appl. 10 Aug. 1988; 7 p.; *C.A.*, 113 (1990) 223766g.
- 1262 Boussemart, M., Richou, M., Fevrier, G. and Benaim, J.: On the detection of low-weight natural organic molecules from marine interstitial waters in gel chromatography. *Environ. Technol.*, 11 (1990) 145-150; *C.A.*, 113 (1990) 197434a.

- 1263 Drogue, S., Rolet, M.-C., Thiebaut, D. and Rosset, R.: Improvement of on-line detection in high-speed counter-current chromatography: UV absorptiometry and evaporative light-scattering detection. *J. Chromatogr.*, 538 (1991) 91-97.
- 1264 Engelhardt, H., Klinkner, R. and Schöndorf, G.: Post-column reaction detection and flow injection analysis. *J. Chromatogr.*, 535 (1990) 41-53.
- 1265 Givens, R.S., Jencen, D.A., Riley, C.M., Stobaugh, J.F., Chokshi, H. and Hanaoka, N.: Chemiluminescence: a sensitive and versatile method for analyte detection. *J. Pharm. Biomed. Anal.*, 8 (1990) 477-491 - a review with 29 refs.
- 1266 Ji, H., He, J., Dong, S. and Wang, E.: Characterization of multiple carbon fiber microelectrodes in a flow-through cell and amperometric detection with dilute electrolyte for liquid chromatography. *J. Electroanal. Chem. Interfacial Electrochem.*, 290 (1990) 93-103; *C.A.*, 113 (1990) 180172r.
- 1267 Lingeman, H., van de Nesse, R.J., Brinkman, U.A.T., Gooijer, C. and Velthorst, N.H.: Laser-induced fluorescence as a detection mode in column liquid chromatography. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs Metab., Incl. Anti-Infect. Agents) (1990) 355-363; *C.A.*, 113 (1990) 204297p - a review with 16 refs.
- 1268 Nesse, R.J.V.D., Gooijer, C., Hoornweg, G.P., Brinkman, U.A.T. and Velthorst, N.H.: The combination of laser-induced fluorescence and intensified linear diode array detection in column liquid chromatography. *Anal. Lett.*, 23 (1990) 1235-1244.
- 1269 Richmond, M.D. and Hurtubise, R.J.: Solution interactions and solid-matrix interactions in β -cyclodextrin solid-matrix luminescence. *Talanta*, 37 (1990) 1057-1062; *C.A.*, 113 (1990) 240590n.
- 1270 Rossi, T.M.: Laser-based detectors in chromatographic analysis. *J. Pharm. Biomed. Anal.*, 8 (1990) 469-476 - a review with 34 refs.
- 1271 Schaufelberger, D.E., McCloud, T.G. and Beutler, J.A.: Laser-light-scattering detection for high-speed counter-current chromatography. *J. Chromatogr.*, 538 (1991) 87-90.
- 1272 Schultz, R. and Engelhardt, H.: The application of an evaporative light scattering detector in polymer analysis. *Chromatographia*, 29 (1990) 517-522.
- 1273 Slais, K.: Simultaneous conductivity and potentiometric detector for miniaturized liquid chromatography and flow analysis. *J. Chromatogr.*, 540 (1991) 41-51.
- 1274 Thornton, A.R.: Post-column photolysis HPLC detector for N-nitroso compounds. Avail. *Univ. Microfilms Int.*, Order No. BRDX88466, 1989, 226 p.; *C.A.*, 113 (1990) 223839h.
- 1275 Xu, M. and Tran, C.D.: Thermal lens - circular dichroism detector for high-performance liquid chromatography. *Anal. Chem.*, 62 (1990) 2467-2471.
- 1276 Yau, W. and Wen, C.: Viscosity detection method for liquid chromatography systems with carrier liquid having time-varying viscosity. *Eur. Pat. Appl. EP 380,864 (Cl. G01N11/08)*, 08 Aug. 1990, US Appl. 302,899, 30 Jan. 1989; 9 p.; *C.A.*, 113 (1990) 223909f.
- 1277 Zadeii, J.M., Mitchell, R. and Kuwana, T.: Glassy carbon microband electrochemical detector for high-performance liquid chromatography. *Electroanalysis (New York)*, 2 (1990) 209-215; *C.A.*, 114 (1991) 16628u.

For additional information see:

C.A., 113 (1990) 164580s, 183756v, 204156s, 243937s;
114 (1991) 16868x.

See also 1178, 1312, 1334, 1344, 1410, 1411, 1461, 1473, 1474, 1642, 1668, 1681, 1699, 1706, 1714, 1733, 1835, 1842, 2143, 2397, 2402, 2447, 2497, 2603, 2702, 2777.

3c. Sorbents and columns, packing procedures

- 1278 Anderson, L.S., Cooke, M.T. and Ley, D.A.: Surface-hydrated porous polyacrylonitrile substrates and their preparation and uses. *Eur. Pat. Appl. EP 371,258* (Cl. C08F8/00), 06 Jun. 1990, US Appl. 276,183, 23 Nov. 1988; 12 p.; *C.A.*, 113 (1990) 192219z.
- 1279 Basyuk, V.A. and Chuiko, A.A.: (Vapor-phase immobilization of azamacrocyclic ligands on the surface of silica). *Dokl. Akad. Nauk SSSR*, 310 (1990) 615-618; *C.A.*, 113 (1990) 218822t.
- 1280 Bonn, G.K., Kalghatgi, K., Horne, W.C. and Horvath, C.: Rapid metal-interaction chromatography of proteins and peptides on micropellicular sorbents. *Chromatographia*, 30 (1990) 484-488.
- 1281 Buszewski, B.: Properties and biomedical applications of packings with high-density coverage of C₁₈ chemically bonded phase for high-performance liquid chromatography and solid-phase extraction. *J. Chromatogr.*, 538 (1991) 293-301.
- 1282 Cabrera, K., Jost, W. and Krebs, K.F.: Silicon-carbide adsorption agent as support material for chromatography. *Ger. Offen. DE 3,837,614* (Cl. B01J20/02), 10 May 1990, Appl. 05 Nov. 1988; 12 p.; *C.A.*, 113 (1990) 243893z.
- 1283 Cox, G.B.: The design of large-diameter columns for preparative liquid chromatography. *LC-GC*, 8 (1990) 690-694; *C.A.*, 113 (1990) 194015d.
- 1284 Cserhati, T.: Retention characteristics of an aluminium oxide HPLC column. *Chromatographia*, 29 (1990) 593-596.
- 1285 Dolan, J.W.: Column and detector problems. *LC-GC*, 8 (1990) 358-360; *C.A.*, 114 (1991) 16853p.
- 1286 Ellingsen, T., Aune, O., Ugelstad, J. and Hagen, S.: Monosized stationary phases for chromatography. *J. Chromatogr.*, 535 (1990) 147-161.
- 1287 Evtimova, B. and Mikhailova, V.: (Tse use 2-(5-bromo-2-pyridylazo)-5-diethylaminophenol as stationary phase in extraction chromatography: copper preconcentration). *Dokl. Bolg. Akad. Nauk*, 42 (1989) 87-89; *C.A.*, 113 (1990) 144308f.
- 1288 Ge, H. and Wallace, G.G.: Electrochemically controlled liquid chromatography on conducting polymer stationary phases. *J. Liq. Chromatogr.*, 13 (1990) 3245-3260.
- 1289 Haky, J.E. and Vemulapalli, S.: Comparison of octadecyl-bonded alumina and other stationary phases for lipophilicity estimation by high performance liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3111-3131.
- 1290 Hetem, M.J.J., de Haan, J.W., Claessens, H.A., Cramers, C.A., Deege, A. and Schomburg, G.: Characterization and stability of silanized and polymer-coated octadecyl reversed phases. *J. Chromatogr.*, 540 (1991) 53-76.
- 1291 Hetem, M.J.J., de Haan, J.W., Claessens, H.A., van de Ven, L.J.M., Cramers, C.A. and Kinkel, J.N.: Influence of alkyl chain length on the stability of *n*-alkyl-modified reversed phases. I. Chromatographic and physical analysis. *Anal. Chem.*, 62 (1990) 2288-2296.
- 1292 Hetem, M.J.J., de Haan, J.W., Claessens, H.A., van de Ven, L.J.M., Cramers, C.A., Wijnen, P.W.J.G. and Kinkel, J.N.: Influence of alkyl chain length on the stability of *n*-alkyl-modified reversed phases. II. Model dissolution study. *Anal. Chem.*, 62 (1990) 2296-2300.
- 1293 Hjerten, S.: Chromatography on a continuous polymer. *PCT Int. Appl. WO 90 07,965* (Cl. B01D15/08) 26 Jul. 1990, US Appl. 297,501, 13 Jan. 1989; 11 p.; *C.A.*, 113 (1990) 174882f.
- 1294 Hyun, M.H. and Kim, M.H.: Preparation of a chiral stationary phase for the liquid chromatographic separation of enantiomers. *Bull. Korean Chem. Soc.*, 11 (1990) 189-190; *C.A.*, 113 (1990) 190858h.

- 1295 Kagedal, L., Engström, B., Ellegren, H., Lieber, A.-K., Lundström, H., Sköld, A. and Schenning, M.: Chemical, physical and chromatographic properties of Superdex 75 prep grade and Superdex 200 prep grade gel filtration media. *J. Chromatogr.*, 537 (1991) 17-32.
- 1296 Kearney, M.M. and Mumm, M.W.: Simulated moving bed process for the preparation sorbent beds for chromatographic separators. *PCT Int. Appl.* WO 90 06,796 (Cl. B01D15/08), 28 Jun. 1990, US Appl. 285,717, 16 Dec. 1988; 28 p.; *C.A.*, 113 (1990) 174876g.
- 1297 Koontz, S.L.: Microporous silica with layered interstitial surface treatment for chromatographic separation. *U.S. Pat. Appl.* US 429,739 01 Jun. 1990, Appl. 31 Oct. 1989; 24 p.; *C.A.*, 114 (1991) 16920h.
- 1298 Mannschreck, A. and Wernicke, R.: (Microcrystalline tribenzoyl cellulose. A versatile adsorbent for separation of enantiomers). *LaborPraxis*, 14 (1990) 730-738; *C.A.*, 113 (1990) 218852c.
- 1299 Martin-Hopkins, M.B.: Chromatographic studies of chemically modified porous carbon. Avail. *Univ. Microfilms Int.*, order No. DA9014831, 1989, 158 p.; *C.A.*, 113 (1990) 238672x.
- 1300 Mueller-Schulte, D.: Preparation of poly(vinyl alcohol) beads as carriers for chromatography and immobilization of biomolecules. *Ger. Offen.* DE 3,900,945 (Cl. C08L29/04), 19 Jul. 1990, Appl. 14 Jan. 1989; 4 p.; *C.A.*, 113 (1990) 192939j.
- 1301 Nasuto, R. and Kwietniewski, L.: Toluene polymer as a new stationary phase in reversed-phase column liquid chromatography. *Chromatographia*, 29 (1990) 597-602.
- 1302 Nishikaji, T., Kiniwa, H. and Kurata, T.: Adsorbents comprising graft copolymers for optical resolution and resolution method employing them. *Eur. Pat. Appl.* EP 366,042 (Cl. C08F291/00), 02 May 1990, JP Appl. 88/267,599, 24 Oct. 1988; 12 p.; *C.A.*, 113 (1990) 192996a.
- 1303 Okamoto, Y. and Kaida, Y.: Polysaccharide derivatives as chiral stationary phases in HPLC. *J. High Resolut. Chromatogr.*, 13 (1990) 708-712.
- 1304 Podzimek, S., Dobas, I., Svestka, S., Horalek, J., Tkaczyk, M. and Rubin, M.: Epoxy resins based on aromatic glycidylamines. I. Analysis of N,N-diglycidylaniline by GPC and HPLC. *J. Appl. Polym. Sci.*, 41 (1990) 1151-1160; *C.A.*, 113 (1990) 213158w.
- 1305 Shieh, K.J., Huang, C.C. and Den, T.G.: Stationary phases 21: a new polar substituted triazine stationary phase for HPLC. *J. Chin. Chem. Soc. (Taipei)*, 37 (1990) 231-236; *C.A.*, 113 (1990) 144571m.
- 1306 Shirota, O., Ohtsu, Y. and Nakata, O.: Characterization of polymer-coated C₁₈ packing materials for reversed-phase liquid chromatography. *J. Chromatogr. Sci.*, 28 (1990) 553-558.
- 1307 Suzuki, K. and Nakazato, K.: Effect of composition of polyacrylamide gels on exclusion limits. *J. Chromatogr.*, 535 (1990) 173-180.
- 1308 Tanaka, N. and Araki, M.: Polymer-based packing materials for reversed-phase liquid chromatography. *Adv. Chromatogr. (N.Y.)*, 30 (1989) 81-122; *C.A.*, 113 (1990) 178782w - a review with 115 refs.
- 1309 Trüdinger, U., Müller, G. and Unger, K.K.: Porous zirconia and titania as packing materials for high-performance liquid chromatography. *J. Chromatogr.*, 535 (1990) 111-125.

For additional information see:

C.A., 113 (1990) 94374b, 154674m, 164533d, 168509y, 174853x, 174863a,
184027v, 187594p, 187600n, 194428r, 207867k, 227554j,
233421e, 234032r, 234157k;
114 (1991) 3015s, 8433m, 9111s.

See also 1176, 1192, 1259, 1345, 1348, 1350, 1351, 1352, 1356, 1395,
1524, 1580, 1710, 1785, 1800, 2023, 2271, 2465, 2466, 2504,
2761, 2773.

3d. Quantitative analysis

1310 Bonate, P.L.: Chromatographic calibration revisited. *J. Chromatogr. Sci.*,
28 (1990) 559-562.

For additional information see:
C.A., 114 (1991) 16837m.

See also 1232, 2779.

3e. Preparative scale chromatography

1311 Bruns, A.: Applications of preparative high-performance liquid chromatography
in oleochemical research. *J. Chromatogr.*, 536 (1991) 75-84.

1312 Frey, D.D.: Minimum variance purity control of preparative chromatography with
simultaneous optimization of yield. An on-line species-specific detector. *ACS
Symp. Ser.*, 434 (1990) 141-152; *C.A.*, 113 (1990) 155089m.

1313 Ganetsos, G. and Barker, P.E.: Large-scale chromatography in industrial
processing. *J. Chem. Technol. Biotechnol.*, 50 (1991) 101-108; *C.A.*, 114
(1991) 8698b - a review with 20 refs.

1314 Golshan-Shirazi, S. and Guiochon, G.: Theoretical explanation of the displace-
ment and tag-along effects. *Chromatographia*, 30 (1990) 613-617.

1315 Golshan-Shirazi, S. and Guiochon, G.: Optimization of experimental conditions
in preparative liquid chromatography. Trade-offs between recovery yield and
production rate. *J. Chromatogr.*, 536 (1991) 57-73.

1316 Hill, D.A.: Frontal chromatography in large-scale separations. *Biochem. Soc.
Trans.*, 18 (1990) 1308; *C.A.*, 113 (1990) 150736k.

1317 Katti, A.M., Dose, E.V. and Guiochon, G.: Comparison of the performance of
overloaded elution and displacement chromatography for a given column. *J.
Chromatogr.*, 540 (1991) 1-20.

1318 Snyder, L.R., Dolan, J.W. and Cox, G.B.: Preparative high-performance liquid
chromatography based on reversed-phase gradient elution. Optimum experimental
conditions for heavily overloaded separation. *J. Chromatogr.*, 540 (1991)
21-40.

See also 1212, 1230, 1233, 1248, 1255, 1283, 1404, 1619, 1639, 1695,
1767, 1770, 1841, 1845, 2203, 2247, 2353, 2475, 2668, 2695,
2696, 2709.

3f. Programmed temperature, pressure, vapors, gradients

1319 Berry, V. and Rohwer, E.: Low-cost liquid chromatography (LC-LC). IV. "Pulsed
open tube gradient generation", a new approach for generating nanoliter volume
linear and tailored gradients for capillary electrophoresis and micro-LC. *J.
Liq. Chromatogr.*, 13 (1990) 1529-1558.

1320 McAleese, D.L.: Baseline stability in gradient ion chromatography with addi-
tion of a nonionic modifier. *U.S. US 4,925,567* (Cl. 210-656; B01D15/08), 15
May 1990, Appl. 317,766, 02 Mar. 1989; 7 p.; *C.A.*, 113 (1990) 183954h.

1321 Munk, M.N.: Packed-bed gradient generator for high-performance liquid chroma-
tographs. *U.S. US 4,942,018* (Cl. 422-70; G01N30/02), 17 Jul. 1990, US Appl.
13,124, 10 Feb. 1987; 24 p.; *C.A.*, 114 (1991) 16914j.

See also 1243.

4. SPECIAL TECHNIQUES

4a. Automation

- 1322 Colby, B.N. and Burns, E.A.: Automated PCB chromatograph analyzer system. *U.S. US 4,944,921* (Cl. 422-70; G01N27/62), 31 Jul. 1990, Appl. 586,665, 06 Mar. 1984; 29 p.; *C.A.*, 113 (1990) 184035w.

See also 1209, 1245.

4b. Computerization and modelling

- 1323 Bartha, A. and Stahlberg, J.: Retention prediction based on the electrostatic model of reversed-phase ion-pair high-performance liquid chromatography: effect of pairing ion concentration. *J. Chromatogr.*, 535 (1990) 181-187.
- 1324 Caslavsky, J.: (Systems for chromatography data processing). *Chem. Listy*, 84 (1990) 494-495; *C.A.*, 113 (1990) 164484p - a review with 46 refs.
- 1325 Dolan, J.W., Lommen, D.C. and Snyder, L.R.: High-performance liquid chromatographic computer simulation based on a restricted multi-parameter approach. I. Theory and verification. *J. Chromatogr.*, 535 (1990) 55-74.
- 1326 Hayashi, Y., Matsuda, R. and Nakamura, A.: Quantity and wavelength optimization based on information theory of chromatography. *J. Chromatogr. Sci.*, 28 (1990) 628-632.
- 1327 Schwedt, G.: (From the laboratory HPLC to process HPLC). *LaborPraxis*, 14 (1990) 486-490; *C.A.*, 113 (1990) 164701g.
- 1328 Skelly, N.E., Barr, S.W. and Zelinko, A.P.: Computer assisted internal standard selection for reversed-phase liquid chromatography. *J. Chromatogr.*, 535 (1990) 199-205.
- 1329 Snyder, L.R., Dolan, J.W. and Lommen, D.C.: High-performance liquid chromatographic computer simulation based on a restricted multi-parameter approach. II. Applications. *J. Chromatogr.*, 535 (1990) 75-92.

For additional information see:

C.A., 113 (1990) 223850e.

See also 1223, 1257, 2367.

4c. Combination with other physico-chemical techniques (MS, IR etc.)

- 1330 Baczynskyj, L.: Particle beam liquid chromatography-mass spectrometry on a double-focusing sector instrument. *J. Chromatogr.*, 562 (1991) 13-29.
- 1331 Balogh, M.P. and Stacey, C.C.: Chromatographic developments in low flow delivery for liquid chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 73-79.
- 1332 Bellar, T.A., Behymer, T.D. and Budde, W.L.: Investigation of enhanced ion abundances from a carrier process in high-performance liquid chromatography particle-beam mass spectrometry. *J. Am. Soc. Mass Spectrom.*, 1 (1990) 92-98; *C.A.*, 114 (1991) 16885a.
- 1333 Cappiello, A., Palma, P., Papayannopoulos, I.A. and Biemann, K.: Efficient introduction of HPLC fractions into a high performance tandem mass spectrometer. *Chromatographia*, 30 (1990) 477-483.
- 1334 Duryea, A.N.: Ion-detection apparatus with electron gun and ionizer. *U.S. US 4,952,802* (Cl. 250-288; H01J49/14), 28 Aug. 1990, Appl. 226,262, 29 Jul. 1988; 8 p.; *C.A.*, 113 (1990) 243913f.

- 1335 Esmans, E.L.: (Analysis of polar molecules. Coupling of liquid chromatography with mass spectrometry). *Chem. Mag. (Ghent)*, 16 (1990) 26-31; *C.A.*, 113 (1990) 183963k - a review with 22 refs.
- 1336 Hasnizume, T., Nelson, C.C., Pomerantz, S.C. and McCloskey, J.A.: Applications of LC/MS and tandem mass spectrometry to the characterization of nucleosides in mixtures. *Nucleosides Nucleotides*, 9 (1990) 355-359; *C.A.*, 113 (1990) 227295a - a review with 9 refs.
- 1337 Ito, Y. and Matsui, M.: (Mass spectrometry). *Shikizai Kyokaishi*, 63 (1990) 419-429; *C.A.*, 113 (1990) 223824z - a review with 38 refs.
- 1338 Iwado, A.: (Liquid chromatography/fast atom bombardment mass spectrometry). *Bunseki*, (1990) 371-373; *C.A.*, 113 (1990) 200189g - a review with 9 refs.
- 1339 Kaiser, R.E., Jr., Williams, J.D., Lammert, S.A., Cooks, R.G. and Zakett, D.: Thermospray liquid chromatography-mass spectrometry with a quadrupole ion trap mass spectrometer. *J. Chromatogr.*, 562 (1991) 3-11.
- 1340 Kokkonen, P., van der Greef, J., Schroeder, E., Niessen, W.M.A. and Tjaden, U.R.: A new target for continuous-flow fast-atom-bombardment liquid chromatography-mass spectrometry allowing higher flow rates. *Org. Mass Spectrom.*, 25 (1990) 566-568; *C.A.*, 113 (1990) 237953c.
- 1341 Millington, D.S., Norwood, D.L., Kodo, N., Moore, R., Green M.D. and Berman, J.: Biomedical applications of high-performance liquid chromatography-mass spectrometry with continuous-flow fast atom bombardment. *J. Chromatogr.*, 562 (1991) 47-58.
- 1342 Robinson, J.W.: Advances in atomic absorption and plasma emission spectrography. *J. Chin. Chem. Soc. (Taipei)*, 37 (1990) 313-319; *C.A.*, 113 (1990) 183758x - a review with 8 refs.
- 1343 Schmid, E.R.: Chromatography and mass spectrometry - an overview. *Chromatographia*, 30 (1990) 573-576 - a review with 43 refs.
- 1344 St. Luis, R.H. and Hill, H.H., Jr.: Ion mobility spectrometry in analytical chemistry. *Crit. Rev. Anal. Chem.*, 21 (1990) 321-355; *C.A.*, 113 (1990) 203936j - a review with 132 refs.

For additional information see:

C.A., 113 (1990) 168439s.

See also 1178, 1431, 1440, 1453, 1469, 1481, 1529, 1563, 1565, 1582, 1592, 1609, 1654, 1666, 1739, 1750, 1769, 1776, 1783, 1797, 1823, 1868, 2227, 2229, 2230, 2242, 2309, 2404, 2412, 2442, 2460, 2463, 2477, 2480, 2508, 2588, 2659, 2684.

4d. Affinity chromatography (advances)

- 1345 Champluvier, B. and Kula, M.-R.: Microfiltration membranes as pseudo-affinity adsorbents: modification and comparison with gel beads. *J. Chromatogr.*, 539 (1991) 315-325.
- 1346 Clonis, Y.D. and Lowe, C.R.: Monosized adsorbents for high-performance affinity chromatography. Application to the purification of calf intestinal alkaline phosphatase and human urine urokinase. *J. Chromatogr.*, 540 (1991) 103-111.
- 1347 Doulah, M.S. and Horn, C.S.: A method for the acquisition of data for the application of affinity chromatography to large-scale downstream processing. *DEHEMA Biotechnol. Conf.*, 3 (Pt. B, Biochem. Eng. Environ. Biotechnol., Recovery Bio-prod., Saf. Biotechnol.) (1989) 1117-1121; *C.A.*, 113 (1990) 150716d.
- 1348 Hulak, I., Nguyen, C., Girot, P. and Boschetti, E.: Immobilized Cibacron Blue - leachables, support stability and toxicity on cultured cells. *J. Chromatogr.*, 539 (1991) 355-362.

- 1349 Mayes, A.G., Hubble, J. and Eisenthal, R.: Investigation of liquid phase cooperative binding interactions on the capacity of insoluble affinity adsorbents. *J. Chromatogr.*, 539 (1991) 245-254.
- 1350 Ming, F. and Howell, J.A.: Kinetic behaviour of a novel matrix ion exchanger, carboxymethyl-HVFM operated at high flow-rate. *J. Chromatogr.*, 539 (1991) 255-266.
- 1351 Müller-Schulte, D., Manjini, S. and Vijayalakshmi, M.A.: Comparative affinity chromatographic studies using novel grafted polyamide and poly(vinyl alcohol) media. *J. Chromatogr.*, 539 (1991) 307-314.
- 1352 Solomon, B., Hadas, E., Koppel, R., Schwartz, F. and Fleminger, G.: Highly active enzyme preparations immobilized *via* matrix-conjugated anti-Fc antibodies. *J. Chromatogr.*, 539 (1991) 335-341.
- 1353 Wallace, G.G., Maxwell, K.E., Lewis, T.W., Hodgson, A.J. and Spencer, M.J.: New conducting polymer affinity chromatography stationary phases. *J. Liq. Chromatogr.*, 13 (1990) 3091-3110.
- 1354 Yvon, M. and Wal, J.M.: Tandem immunoaffinity and reversed-phase high-performance liquid chromatography for the identification of the specific binding sites of a hapten on a proteic carrier. *J. Chromatogr.*, 539 (1991) 363-371.
- See also 1183, 1524, 1762, 1789, 1829, 1840, 1855, 1887, 1891, 1892, 1901, 1908, 1928, 1935, 1960, 2002, 2009, 2110, 2130, 2148, 2157, 2174, 2182, 2217, 2271, 2341.

4f. Trace analysis and preseparation techniques

- 1355 Brinkman, U.A.T.: Precolumn sample handling for enhanced sensitivity and selectivity in high-performance liquid chromatography. *Anal. Proc. (London)*, 27 (1990) 114-116; *C.A.*, 113 (1990) 223490n - a review with 11 refs.

For additional information see:

C.A., 114 (1991) 16685k.

4g. Enantiomers, separation

- 1356 Armstrong, D.W., Chang, C.-D. and Lee, S.H.: (R)- and (S)-Naphthylethylcarbamate-substituted β -cyclodextrin bonded stationary phases for the reversed-phase liquid chromatographic separation of enantiomers. *J. Chromatogr.*, 539 (1991) 83-90.
- 1357 Cabrera, K. and Schwinn, G.: Cyclodextrins as mobile phase additives in the HPLC separation of enantiomers. *Am. Lab. (Fairfield)*, 22 (1990) 22-28; *C.A.*, 113 (1990) 204204f.
- 1358 Cabrera, K. and Schwinn, G.: (Separation of enantiomers by reversed-phase HPLC. Cyclodextrins as chiral selectors in the mobile phase). *GIT-Suppl.*, (1990) 52-55; *C.A.*, 113 (1990) 237934x.
- 1359 Duncan, J.D.: Chiral separations: a comparison of HPLC and TLC. *J. Liq. Chromatogr.*, 13 (1990) 2737-2755.
- 1360 Duprat, F., Coyard, V., Dolcerocca, P. and Gassend, R.: Resolution of (\pm)-2-aminoheptane enantiomers by inductive adsorption chromatography. *J. Chromatogr.*, 540 (1991) 157-168.
- 1361 Hargitai, T., Reinholdsson, P., Törnell, B. and Isaksson, R.: Polymer-bound chiral polymers for use in enantiomer separations. *J. Chromatogr.*, 540 (1991) 145-155.
- 1362 Hyun, M.H. and Kim, M.H.: (1S,2R)-N-(3,5-Dinitrobenzoyl)norephedrine bonded to silica gel as a chiral stationary phase for the liquid chromatographic separation of enantiomers. *J. Liq. Chromatogr.*, 13 (1990) 3229-3243.

- 1363 Lee, C.: Racemate resolution using chiral admicellar-enhanced chromatography and a two-site adsolubilization model for adsolubilized alcohols. Avail. *Univ. Microfilms Int.*, Order No. DA9014192, 1989, 130 p.; C.A., 113 (1990) 223862k.
- 1364 Oi, N., Kitahara, H. and Kira, R.: Elution orders in the separation of enantiomers by high-performance liquid chromatography with some chiral stationary phases. *J. Chromatogr.*, 535 (1990) 213-227.
- 1365 Siret, L., Tambuté, A., Caude, M. and Rosset, R.: Chiral recognition mechanisms on chiral stationary phases derived from tyrosine. Specific influence of the nature of the asymmetric centre vicinal functional group. *J. Chromatogr.*, 540 (1991) 129-143.
- 1366 Stalcup, A.M., Chang, S.-C. and Armstrong, D.W.: Effect of the configuration of the substituents of derivatized β -cyclodextrin bonded phases on enantioselectivity in normal-phase liquid chromatography. *J. Chromatogr.*, 540 (1991) 113-128.
- 1367 Weems, H.B. and Yang, S.K.: Resolution of enantiomeric triols, triol-hydroxyethylthioethers, and methoxy-triols derived from three benzo[a]pyrene diol-epoxides by chiral stationary phase high-performance liquid chromatography. *J. Chromatogr.*, 535 (1990) 239-253.
- 1368 Wulff, G. and Minarik, M.: Template imprinted polymers for HPLC separation of racemates. *J. Liq. Chromatogr.*, 13 (1990) 2987-3000.

For additional information see:

C.A., 113 (1990) 171120v, 204205g, 243953u;
114 (1991) 6003x.

See also 1269, 1294, 1298, 1302, 1303, 1689, 1699, 1700, 1708, 1710,
1716, 1721, 1735, 2027, 2355, 2423, 2464, 2492, 2504, 2627,
2689.

4h. Other special techniques

- 1369 Abbott, T.P. and Kleiman, R.: Solvent selection guide for counter-current chromatography. *J. Chromatogr.*, 538 (1991) 109-118.
- 1370 Andreolini, F. and Borra, C.: Introduction to microchromatography. *Bull. Singapore Natl. Inst. Chem.*, 17 (1989) 5-19; C.A., 113 (1990) 204179b - a review with 14 refs.
- 1371 Conway, W.D.: Pseudo-two-component notation for heptane/alcohol/water systems in countercurrent chromatography. *J. Liq. Chromatogr.*, 13 (1990) 2409-2419.
- 1372 Foucault, A. and Nakanishi, K.: Comparison of several aqueous two phase solvent systems (ATPS) for the fractionation of biopolymers by centrifugal partition chromatography (CPC). *J. Liq. Chromatogr.*, 13 (1990) 2421-2440.
- 1373 Foucault, A. and Nakanishi, K.: Gradient elution centrifugal partition chromatography: comparison with HPLC gradients and use of ternary diagrams to build gradients. *J. Liq. Chromatogr.*, 13 (1990) 3583-3602.
- 1374 Gluck, S.J. and Martin, E.J.: Extended octanol-water partition coefficient determination by dual-mode centrifugal partition chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3559-3570.
- 1375 Gluck, S.J. and Martin, E.J.: Assessment of centrifugal partition chromatography for determination of octanol-water partition coefficients. *J. Liq. Chromatogr.*, 13 (1990) 2529-2551.
- 1376 Hanbauer, I., Wright, A.G., Jr. and Ito, Y.: Purification of an endogenous modulator for voltage-sensitive calcium channels using the eccentric multi-layer coil planet centrifuge. *J. Liq. Chromatogr.*, 13 (1990) 2363-2372.
- 1377 Heo, G.S. and Suh, J.K.: New on-line concentrator for LC-GC: analysis of PAHs with LC-GC. *J. High Resolut. Chromatogr.*, 13 (1990) 748-753.

- 1378 Ito, Y., Oka, H., Kitazume, E., Bhatnagar, M. and Lee, Y.W.: Improved high-speed countercurrent chromatograph with three multilayer coils connected in series. III. Evaluation of semianalytical column with various biological samples and inorganic elements. *J. Liq. Chromatogr.*, 13 (1990) 2329-2349.
- 1379 Knight, M. and Gluch, S.: Use of the multi-coil countercurrent chromatograph. *J. Liq. Chromatogr.*, 13 (1990) 2351-2362.
- 1380 Menges, R.A., Bertrand, G.L. and Armstrong, D.W.: Direct measurement of octanol-water partition coefficients using centrifugal partition chromatography with a back-flushing technique. *J. Liq. Chromatogr.*, 13 (1990) 3061-3077.
- 1381 Oka, F., Oka, H. and Ito, Y.: Systematic search for suitable two-phase solvent systems for high-speed counter-current chromatography. *J. Chromatogr.*, 538 (1991) 99-108.
- 1382 Oka, H., Ikai, Y., Kawamura, N., Yamada, M., Harada, K.-I., Suzuki, M., Chou, F.E., Lee, Y.-W. and Ito, Y.: Evaluation of analytical countercurrent chromatographs: high-speed countercurrent chromatograph-4000 vs. analytical toroidal coil centrifuge. *J. Liq. Chromatogr.*, 13 (1990) 2309-2328.
- 1383 Tsai, R.-S., el Tayar, N., Testa, B. and Ito, Y.: Toroidal coil centrifugal partition chromatography, a method for measuring partition coefficients. *J. Chromatogr.*, 538 (1991) 119-123.
- 1384 Urbanková, E. and Janca, J.: An attempt at experimental elutriation focusing field-flow fractionation. *J. Liq. Chromatogr.*, 13 (1990) 1877-1895.

For additional information see:

C.A., 114 (1991) 2874j.

See also 1179, 1184, 1187, 1189, 1248, 1249, 1250, 1259, 1263, 1271, 1288, 1417, 1425, 1426, 1572, 1654, 1658, 1695, 1701, 1726, 1766, 1954, 2233, 2352, 2353, 2379, 2427, 2428, 2693, 2695, 2697, 2698, 2699, 2740, 2743, 2744, 2756, 2760, 2766.

5. HYDROCARBONS AND HALOGEN DERIVATIVES

5a. Aliphatic hydrocarbons

See 1604.

5b. Cyclic hydrocarbons

- 1385 Bao, Z. and Yang, S.K.: Liquid chromatographic separation of isomeric phenanthrols on monomeric and polymeric C₁₈ columns. *J. Chromatogr.*, 536 (1991) 245-249.
- 1386 Chapman, D.E., Moore, T.J., Michener, S.R. and Powis, G.: Metabolism and covalent binding of [¹⁴C]toluene by human and rat liver microsomal fractions and liver slices. *Drug Metab. Disp.*, 18 (1990) 929-936.
- 1387 Choudhury, S., Karara, A.H., Ace, L.N. and McFarland, V.A.: High-performance liquid chromatographic method for the determination of 3-methylcholanthrene in channel catfish plasma. *J. Chromatogr.*, 534 (1990) 208-213.
- 1388 Davis, I.L.: Analysis of polycyclic aromatic compounds by multidimensional chromatography. Avail. *Univ. Microfilms Int.*, order No. BRD-88338, 1989, 206 p.; *C.A.*, 113 (1990) 175207b.
- 1389 Diack, M., Gruber, R., Cagniant, D., Mariadassou, G.D. and Brodzky, D.: Catalytic hydrogenation of benzo[a] and benzo[e]pyrenes. Analysis of the hydrogenated products by charge transfer chromatography and HPLC on amino bonded phase. *Chromatographia*, 30 (1990) 24-34.

- 1390 El'tekov, Yu.A., El-zed, H., Akasa, S. and Aveisi, F.: (Frontal chromatography of aromatic compounds on 13X zeolite). *Zh. Fiz. Khim.*, 64 (1990) 1948-1951; *C.A.*, 113 (1990) 243961v.
- 1391 Grosse-Rhode, C., Kicinski, H.G. and Kettrup, A.: Column switching technique for group-type separation of different PAH classes by use of C₁₈-modified silica and polystyrene packings. *J. Liq. Chromatogr.*, 13 (1990) 3415-3438.
- 1392 Jinno, K.: Retention behavior of large polycyclic aromatic hydrocarbons in reversed-phase liquid chromatography. *Adv. Chromatogr. (N.Y.)*, 30 (1990) 123-165; *C.A.*, 113 (1990) 178783x - a review with 48 refs.
- 1393 Lee, S.W.: Initial validation of a new procedure for determining aromatics in petroleum distillates. *J. Liq. Chromatogr.*, 13 (1990) 3211-3227.
- 1394 Liu, T.-Y. and Robbat, A., Jr.: High-performance liquid chromatography retention index and detection of nitrated polycyclic aromatic hydrocarbons. *J. Chromatogr.*, 539 (1991) 1-14.
- 1395 Maslowska, J. and Bazyłak, G.: Separation characteristics of various commercial silica gel HPLC columns for some polycyclic aromatic hydrocarbon mixtures. *Chem. Anal. (Warsaw)*, 3 (1988) 727-734; *C.A.*, 113 (1990) 183982r.
- 1396 Onuska, F.I.: Analysis of polycyclic aromatic hydrocarbons in environmental samples. In: Afgan, B.K. and Chau, A.S.Y. (Editors), *Anal. Trace Org. Aquat Environ.*, CRC, Boca Raton, 1989, pp. 205-241; *C.A.*, 113 (1990) 204177z - a review with 118 refs.
- 1397 Sliwiok, J. and Kocjan, B.: TLC and HPLC investigation of the hydrophobicity of isomeric benzopyrenes. *J. Planar Chromatogr.*, 3 (1990) 433-434.
- 1398 Vater, S.T., Baldwin, D.M. and Warshawsky, D.: Hepatic metabolism of 7,12-dimethylbenz(a)anthracene in male, female, and ovariectomized Sprague-Dawley rats. *Cancer Res.*, 51 (1991) 492-498.
- 1399 Yoshikawa, M., Arashidani, K. and Kodama, Y.: Analysis of 3-hydroxybenzo[a]pyrene by high-performance liquid chromatography using a post-column method. *J. Chromatogr.*, 532 (1990) 155-161.

For additional information see:

C.A., 113 (1990) 204221j.

See also 1268, 1301, 1374, 1412, 1724.

5c. Halogen derivatives

- 1400 Hale, R.C., Bush, E., Gallagher, K., Gundersen, J.L. and Mothershead, R.F.: Separation of polychlorinated terphenyls from lipoidal material by preparative gel permeation chromatography and gas chromatography. *J. Chromatogr.*, 539 (1991) 149-156.
- 1401 Hasan, M.N. and Jurs, P.C.: Prediction of gas and liquid chromatographic retention indices of polyhalogenated biphenyls. *Anal. Chem.*, 62 (1990) 2318-2323.

5d. Complex hydrocarbon mixtures (incl. analysis of tars, bitumens and mineral oils)

- 1402 Boenigk, W., Haenel, M.W. and Zander, M.: Structural features and mesophase formation of coal-tar pitch fractions obtained by preparative size exclusion chromatography. *Fuel*, 69 (1990) 1226-1232; *C.A.*, 113 (1990) 234400j.
- 1403 Branthaver, J.F., Catalfomo, M.W. and Petersen, J.C.: Separation of SHRP asphalts by ion exchange chromatography. *Prepr.-Am. Chem. Soc., Div. Pet. Chem.*, 35 (1990) 376-381; *C.A.*, 113 (1990) 236684d.
- 1404 Branthaver, J.F., Duvall, J.J. and Petersen, J.C.: Separation of SHRP asphalts by preparative size exclusion chromatography. *Prepr.-Am. Chem. Soc., Div. Pet. Chem.*, 35 (1990) 407-414; *C.A.*, 113 (1990) 236688h.

- 1405 Jennings, P.W., Pribanic, J.A.S., Mendes, T.M. and Smith, J.A.: High-pressure gel-permeation chromatography in the characterization of self assemblies in asphalt. *Prepr.-Am. Chem. Soc., Div. Pet. Chem.*, 35 (1990) 382-388; *C.A.*, 113 (1990) 236685e.
- 1406 McCaffrey, G.: Chromatographic analysis of paving-grade asphalts. *Prepr.-Am. Chem. Soc., Div. Pet. Chem.*, 35 (1990) 389-395; *C.A.*, 113 (1990) 236686f.
- 1407 Rovere, C.E., Crisp, P.T., Ellis, J. and Korth, J.: Chemical class separation of shale oils by low-pressure liquid chromatography on thermally-modified adsorbent. *Fuel*, 69 (1990) 1099-2104; *C.A.*, 113 (1990) 155530y.

For additional information see:

C.A., 113 (1990) 234289e.

See also 1377, 1393.

6. ALCOHOLS

- 1408 Grob, K., Lanfranchi, M. and Mariani, C.: Evaluation of olive oils through the fatty alcohols, the sterols and their esters by coupled LC-GC. *J. Am. Oil Chem. Soc.*, 67 (1990) 626-634.
- 1409 Jaumann, G., Keck, E., Köhler, M., Uphues, G., Wilsch-Irrgang, A. and Winkle, W.: Analytik von Phosphorsäurepartialestern. *Fat Sci. Technol.*, 92 (1990) 389-392.
- 1410 Tagliaro, F., Schiavon, G., Dorizzi, R. and Marigo, M.: Development of post-column enzymic reactors with immobilized alcohols oxidase for use in the high-performance liquid chromatographic assay of alcohols with electrochemical detection. *J. Chromatogr.*, 563 (1991) 11-21.
- 1411 Tagliaro, F., de Leo, D., Marigo, M., Dorizzi, R. and Schiavon, G.: Use of enzymatic reactors in the high performance liquid chromatographic determination of ethanol and methanol with electrochemical detection. *Biomed. Chromatogr.*, 4 (1990) 224-228.

See also 1226, 1285, 1363, 1366, 1367, 1373, 2441, 2693, 2721.

7. PHENOLS

- 1412 Brage, C. and Sjöström, K.: Separation of phenols and aromatic hydrocarbons from biomass tar using aminopropylsilane normal-phase liquid chromatography. *J. Chromatogr.*, 538 (1991) 303-310.
- 1413 Brega, A., Prandini, P., Amaglio, C. and Pafumi, E.: Determination of phenol, *m*-, *o*- and *p*-cresol, *p*-aminophenol and *p*-nitrophenol in urine by high-performance liquid chromatography. *J. Chromatogr.*, 535 (1990) 311-316.
- 1414 Bruce, I.E., Long, A., Payne, P.B. and Tyman, J.H.P.: Preparative HPLC separation of the unsaturated constituents of cardanol and cardol. *J. Liq. Chromatogr.*, 13 (1990) 2103-2111.
- 1415 Dawson, J., Knowles, R.G. and Pogson, C.I.: Determination of glucuronidation in isolated rat liver cells by incorporation of carbon-14 from fructose. *Biochem. Soc. Trans.*, 18 (1990) 1205; *C.A.*, 113 (1990) 187568h.
- 1416 Legaz, M.E., Garcia-Junceda, E., Martin-Pedrosa, M. and Vicente, C.: (Analysis of phenolic compounds in complex biologically mixtures). *Tec. Lab.*, 12 (1989) 538-542; *C.A.*, 113 (1990) 187534u.

- 1417 Okuda, T., Yoshida, T., Hatano, T., Mori, K. and Fukuda, T.: Fractionation of pharmacologically active plant polyphenols by centrifugal partition chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3637-3650.
- 1418 Park, J.H., Jang, M.D. and Kim, S.T.: Study of retention of mono-substituted phenols in reversed-phase liquid chromatography based on the linear solvation energy relationships using the solvatochromic parameters for mobile phases, π_m^* , α_m and β_m . *Bull. Korean Chem. Soc.*, 11 (1990) 297-302; *C.A.*, 113 (1990) 204211f.
- 1419 Ye, M. and Schuler, R.H.: Determination of oxidation products in radiolysis of halophenols with pulse radiolysis, HPLC, and ion chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3369-3387.

See also 1189, 1220, 1226, 1301, 1455, 1545, 1548, 1724, 2444.

8. SUBSTANCES CONTAINING HETEROCYCLIC OXYGEN

8a. Flavonoids

- 1420 Ficarra, P., Ficarra, R., Villari, A., de Pasquale, A., Monteforte, M.T. and Calabro, M.L.: High-performance liquid chromatography and diffuse reflectance spectroscopy of flavonoids in *Crataegus oxyacantha* L. III. Analysis of 2-phenylchroman derivatives and caffeic acid. *Farmaco*, 45 (1990) 237-245; *C.A.*, 114 (1991) 12269e.
- 1421 Ficarra, P., Ficarra, R., de Pasquale, A., Monteforte, M.T. and Calabro, M.L.: High-performance liquid chromatography of flavonoids in *Crataegus oxyacantha* L. IV. Reversed-phase high-pressure liquid chromatography in flower, leaf and bud extractives of *Crataegus oxyacantha* L. *Farmaco*, 45 (1990) 247-255; *C.A.*, 114 (1991) 12270y.
- 1422 Geibel, M., Treutter, D. and Meier, N.: Characterization of sour cherries by HPLC-analysis of the bark-flavonoids combined with multivariate statistics. *Euphytica*, 45 (1990) 229-235; *C.A.*, 113 (1990) 94140x.
- 1423 Heisig, W. and Wichtl, M.: Bestimmung pflanzlicher Glykoside. Methodenkombination von zweidimensionaler DC und HPLC. I. Inhaltsstoffe aus *Calendula officinalis* flos. *Dtsch. Apoth.-Ztg.*, 130 (1990) 2058-2062.
- 1424 Huang, M. and Shen, Y.: (Determination of naringin contents in pummelo (*Citrus grandis*) by reversed-phase HPLC). *Zhongcaoyao*, 21 (1990) 207-210; *C.A.*, 113 (1990) 150987t.
- 1425 Kubo, I., Vieira, P.C. and Fukuhara, K.: Efficient isolation of the insect growth inhibitory flavone glycoside rutin from two tropical medicinal plants by rotation locular countercurrent chromatography (RLCC). *J. Liq. Chromatogr.*, 13 (1990) 2441-2448.
- 1426 Kubo, I.: Recent applications of counter-current chromatography to the isolation of bioactive natural products. *J. Chromatogr.*, 538 (1991) 187-191.
- 1427 L'vova, M.Sh., Cheburkov, Yu.A., Makarova, S.P., Pavlova, V.P., Litvak, Zh.I., Veresotskaya, L.N., Rudakova, I.P. and Kozlov, E.I.: (Development of a method for purification and quality control of benzaflavin). *Khim.-Farm. Zh.*, 24 (1990) 58-62; *C.A.*, 113 (1990) 198111e.
- 1428 Mareck, U., Galensa, R. and Herrmann, K.: Identification of kiwi in fruit products by HPLC. *Z. Lebensm.-Unters. Forsch.*, 19 (1990) 194-198; *C.A.*, 113 (1990) 229819y.
- 1429 Marzo, A., Arrigoni, Martelli, E., Bruno, G., Martinelli, E.M. and Pifferi, G.: Assay of hydroxyfarrerol in biological fluids. *J. Chromatogr.*, 535 (1990) 255-261.

- 1430 Pietta, P., Mauri, P., Gardana, C., Facino, R.M. and Cariani, M.: High-performance liquid chromatographic determination of flavonoid glucosides from *Helichrysum italicum*. *J. Chromatogr.*, 537 (1991) 449-452.
- 1431 Qimin, L., van den Heuvel, H., Delorenzo, O., Corthout, J., Pieters, L.A.C., Vlietinck, A.J. and Claeys, M.: Mass spectral characterization of C-glycosidic flavonoids isolated from a medicinal plant (*Passiflora incarnata*). *J. Chromatogr.*, 562 (1991) 435-446.
- 1432 Vogt, T. and Gülz, P.-G.: Isocratic column liquid chromatographic separation of a complex mixture of epicuticular flavonoid aglycones and intracellular flavonol glycosides from *Cistus laurifolius* L. *J. Chromatogr.*, 537 (1991) 453-459.
- 1433 Wang, Y.Q., Matsuzaki, K., Takahashi, K. and Okuyama, T.: (Studies on the constituents of *Scutellaria* species. (II). High performance liquid chromatography of glucuronylflavonoids and seasonal variation of their contents in *Scutellaria ikonnikovii* Juz). *Shoyakugaku Zasshi*, 44 (1990) 63-65; *C.A.*, 114 (1991) 12271z.

See also 1189, 1542, 2006.

8b. Aflatoxins and other mycotoxins

- 1434 Beaver, R.W.: Degradation of aflatoxins in common HPLC solvents. *J. High Resolut. Chromatogr.*, 13 (1990) 833-835.
- 1435 Bennett, G.A. and Shotwell, O.L.: Criteria for determining purity of *Fusarium* mycotoxins. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 270-275.
- 1436 Gordon, W.C. and Gordon, L.J.: Rapid screening method for deoxynivalenol in agricultural commodities by fluorescent minicolumn. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 266-270.
- 1437 Huang, H., Zhao, Z., Sun, H. and Niu, Z.: (Determination of ochratoxin A in chicken liver by high-performance liquid chromatography). *Sepu*, 8 (1990) 189-190; *C.A.*, 113 (1990) 96233d.
- 1438 Jarvis, B.B., Armstrong, C.A. and Zeng, M.: Use of resins for trichothecene production in liquid cultures. *J. Antibiot.*, 43 (1990) 1502-1504.
- 1439 Kostiaainen, R., Matsuura, K. and Nojima, K.: Identification of trichothecenes by frit-fast atom bombardment liquid chromatography-high-resolution mass spectrometry. *J. Chromatogr.*, 538 (1991) 323-330.
- 1440 Kostiaainen, R.: Identification of trichothecenes by thermospray, plasmaspay and dynamic fast-atom bombardment liquid chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 555-562.
- 1441 Panalaks, T. and Scott, P.M.: Sensitive silica gel-packed flowcell for fluorometric detection of aflatoxins by high pressure liquid chromatography. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 341.
- 1442 Park, D.L., Nesheim, S., Trucksess, M.W., Stack, M.E. and Newell, R.F.: Liquid chromatographic method for determination of aflatoxins B₁, B₂, G₁, and G₂ in corn and peanut products: collaborative study. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 260-266.
- 1443 Patev, A.L., Sharman, M. and Gilbert, J.: Determination of aflatoxin B₁ levels in peanut butter using an immunoaffinity column clean-up procedure inter-laboratory study. *Food Addit. Contam.*, 7 (1990) 515-520; *C.A.*, 113 (1990) 229784h.
- 1444 Pons, W.A., Jr.: Resolution of aflatoxins B₁, B₂, G₁, and G₂ by high-pressure liquid chromatography. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 341.
- 1445 Pons, W.A., Jr.: High pressure liquid chromatographic determination of aflatoxins in corn. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 342.

- 1446 Seiber, J.N. and Hsieh, D.P.H.: Application of high-speed liquid chromatography to the analysis of aflatoxins. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 341.
- 1447 Shephard, G.S., Sydenham, E.W., Thiel, P.G. and Gelderblom, W.C.A.: Quantitative determination of fumonisins B₁ and B₂ by high-performance liquid chromatography with fluorescence detection. *J. Liq. Chromatogr.*, 13 (1990) 2077-2087.
- 1448 Suemitsu, R., Horiuchi, K., Ohnishi, K., Hidaka, T. and Horiuchi, M.: High-performance liquid chromatographic determination of tentoxin in fermentation of *Alternaria porri* (Ellis) Ciferri. *J. Chromatogr.*, 539 (1991) 211-214.
- 1449 Tutelyan, V.A., Sobolev, V.S., Rybakova, N.V. and Eller, K.I.: A survey using normal phase HPLC of aflatoxins in domestic and imported foods and dairy products in the USSR. *J. Toxicol. Toxin Rev.*, 8 (1989) 375-387; *C.A.*, 113 (1990) 210207a.
- 1450 Vail, R.B. and Homann, M.J.: Rapid and sensitive detection of citrinin production during fungal fermentation using high-performance liquid chromatography. *J. Chromatogr.*, 535 (1990) 317-323.
- 1451 Van Egmond, H.P. and Wagstaffe, P.J.: Aflatoxin B₁ in compound-feed reference materials: an intercomparison of methods. *Food Addit. Contam.*, 7 (1990) 239-251; *C.A.*, 113 (1990) 96210u.
- 1452 Visconti, A., Sibilila, A. and Palmisano, F.: Selective determination of altertoxins by high-performance liquid chromatography with electrochemical detection with dual "in-series" electrodes. *J. Chromatogr.*, 540 (1991) 376-382.

For additional information see:

C.A., 113 (1990) 225860g.

8c. Other compounds with heterocyclic oxygen (incl. tannins)

- 1453 De Vries, J.X. and Kymber, K.A.: Thermospray and particle beam liquid chromatographic-mass spectrometric analysis of coumarin anticoagulants. *J. Chromatogr.*, 562 (1991) 31-38.
- 1454 Goiffon, J.-P., Brun, M. and Bourrier, M.-J.: High-performance liquid chromatography of red fruit anthocyanins. *J. Chromatogr.*, 537 (1991) 101-121.
- 1455 Gu, Z., Zhang, D., Yang, X., Hattori, M. and Namba, T.: Isolation of two new coumarin glycosides from *Notopterygium forbesii* evaluation of a Chinese crude drug, Qiang-huo, the underground parts of *N. incisum* and *N. forbesii*, by high-performance liquid chromatography. *Chem. Pharm. Bull.*, 38 (1990) 2498-2502.
- 1456 Kaneda, H., Kano, Y., Osawa, T., Kawakishi, S. and Kamimura, M.: Effect of free radicals on haze formation in beer. *J. Agric. Food Chem.*, 38 (1990) 1909-1912.
- 1457 Makki, S., Muret, P., Renaud, A., Agache, P. and Magnin, P.: Simple equilibrium dialysis-high-performance liquid chromatographic method for the *in vitro* assessment of 5-methoxypsoralen bound to human albumin. *J. Chromatogr.*, 539 (1991) 443-448.
- 1458 Rigaud, J., Perez-Illzarbe, J., da Silva, J.M.R. and Cheynier, V.: Micro method for the identification of proanthocyanidin using thiolysis monitored by high-performance liquid chromatography. *J. Chromatogr.*, 540 (1991) 401-405.
- 1459 Rosenberg, D.W., Roque, H. and Kappas, A.: A fluorometric method for measuring ethoxycoumarin O-deethylase activity by reversed-phase high performance liquid chromatography. *Anal. Biochem.*, 191 (1990) 354-358.

1460 Zimmerman, C.L., Ratna, S., Leboeuf, E. and Pang, K.S.: High-performance liquid chromatographic method for the direct determination of 4-methylumbelliferone and its glucuronide and sulfate conjugates. Application to studies in the single-pass *in situ* perfused rat intestine-liver preparation. *J. Chromatogr.*, 563 (1991) 83-94.

See also 2422, 2691, 2716.

9. OXO COMPOUNDS, ETHERS, EPOXIDES AND QUINONES

1461 Uzu, S., Kanda, S., Imai, K., Nakashima, K. and Akiyama, S.: Fluorogenic reagents: 4-aminosulphonyl-7-hydrazino-2,1,3-benzoxadiazole, 4-(N,N-dimethylaminosulphonyl)-7-hydrazino-2,1,3-benzoxadiazole and 4-hydrazino-7-nitro-2,1,3-benzoxadiazole hydrazine for aldehydes and ketones. *Analyst (London)*, 115 (1990) 1477-1482.

1462 Voronov, P.P. and Khokha, A.M.: (Ethanol-metabolizing enzymes of human testes). *Biokhimiya (Moscow)*, 55 (1990) 1451-1460.

For additional information see:

C.A., 113 (1990) 178350d, 178358n, 193721u.

See also 1178, 1189, 1225, 1490, 1535, 2430, 2478, 2693.

10. CARBOHYDRATES

10a. Mono and oligosaccharides. Structural studies

1463 Adachi, S., Watanabe, T. and Kohashi, M.: Effects of the divinylbenzene content and ionic form of cation-exchange resin on the chromatographic separation of maltooligosaccharides. *Agric. Biol. Chem.*, 53 (1989) 3193-3201; *C.A.*, 113 (1990) 227346t.

1464 Asada, M., Furukawa, K., Kantor, C., Gahnberg, C.G. and Kobata, A.: Structural study of the sugar chains of human leukocyte cell adhesion molecules CD11/CD18. *Biochemistry*, 30 (1991) 1561-1571.

1465 Campos, Maria da Graca, R.: (Detection of melibiose in sugars of honey using high-pressure liquid chromatography). *Rev. Port. Farm.*, 39 (1989) 101-103; *C.A.*, 113 (1990) 170555d.

1466 Endo, T., Kasahara, M. and Kobata, A.: Structures of the asparagine-linked sugar chain of glucose transporter from human erythrocytes. *Biochemistry*, 29 (1990) 9126-9134.

1467 Hernandez, L.M., Ballou, L. and Ballou, C.E.: Separation of yeast asparagine-linked oligosaccharides by high-performance anion-exchange chromatography. *Carbohydr. Res.*, 203 (1990) 1-11; *C.A.*, 113 (1990) 207693a.

1468 Ingham, K.C., Brew, S.A. and Atha, D.H.: Interaction of heparin with fibronectin and isolated fibronectin domains. *Biochem. J.*, 272 (1990) 605-611.

1469 Kato, Y. and Numajiri, Y.: Chloride attachment negative-ion mass spectra of sugars by combined liquid chromatography and atmospheric pressure chemical ionization mass spectrometry. *J. Chromatogr.*, 562 (1991) 81-97.

1470 Kiba, N., Shitara, K., Furusawa, M. and Takata, Y.: Post-column oligosaccharide dehydrogenase reactor for coulometric detection of malto-oligosaccharides in a liquid chromatographic system. *J. Chromatogr.*, 537 (1991) 443-448.

- 1471 Kusche, M. and Lindahl, U.: Biosynthesis of heparin. O-Sulfation of D-glucuronic acid units. *J. Biol. Chem.*, 265 (1990) 15403-15409.
- 1472 Maimone, M.M. and Tollefsen, D.M.: Structure of a dermatan sulfate hexasaccharide that binds to heparin cofactor II with high affinity. *J. Biol. Chem.*, 265 (1990) 18263-18271.
- 1473 Marko-Varga, G., Dominguez, E., Hahn-Hägerdal, B. and Gorton, L.: Selective determination of carbohydrates in fermentation broths with on-line sample clean-up and catalytic reaction detection. *Chromatographia*, 30 (1990) 591-594.
- 1474 Martens, D.A. and Frankenberger, W.T., Jr.: Determination of glycuronic acids by high-performance anion chromatography with pulsed amperometric detection. *Chromatographia*, 30 (1990) 651-656.
- 1475 Mash, E.A., Arterburn, J.B. and Fryling, J.A.: Homochiral acetals in organic synthesis. A general enantioselective entry to carbohydrate derivatives from non-carbohydrate precursors. *Tetrahedron Lett.*, 30 (1989) 7145-7148; *C.A.*, 113 (1990) 97906n.
- 1476 Mizuochi, T., Hamako, J., Titani, K., Matsushita, M. and Okada, H.: Structures of the asparagine-linked oligosaccharides of guinea-pig Factor B of the alternative complement pathway. *Biochem. J.*, 272 (1990) 533-535.
- 1477 Nakamura, T., Majima, M., Kubo, K., Takagaki, K., Tamura, S. and Endo, M.: Hyaluronidase assay using fluorogenic hyaluronate as a substrate. *Anal. Biochem.*, 191 (1990) 21-24.
- 1478 Nesterenko, P.N. and Savel'ev, V.I.: (HPLC of a mixture of mono-, di- and trisaccharides using acetone-ethyl acetate-water mobile phases). *Zh. Anal. Khim.*, 45 (1990) 1134-1139; *C.A.*, 113 (1990) 164736x.
- 1479 Nishikawa, Y.: An FM3A mutant, G258, with a mutation that affects both cell growth and oligosaccharide-lipid synthesis. *Biochim. Biophys. Acta*, 1091 (1991) 135-140.
- 1480 Oetjen, E., Schweickhardt, C., Unthan-Fechner, K. and Probst, I.: Stimulation of glucose production from glycogen by glucagon, noradrenaline and non-degradable adenosine analogues is counteracted by adenosine and ATP in cultured rat hepatocytes. *Biochem. J.*, 271 (1990) 377-344.
- 1481 Reid, S., Shackleton, C., Wu, K., Kaempfer, S. and Hellerstein, M.K.: Liquid chromatography/mass spectrometry of plasma glucose and secreted glucuronate for metabolic studies in humans. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 535-540; *C.A.*, 113 (1990) 227491m.
- 1482 Ruggieri, G., Jirillo, R., Ruggeri, P. and Vinci, G.: (Sugar determination in soft drinks by HPLC). *Rass. Chim.*, 41 (1989) 271-276; *C.A.*, 113 (1990) 229790g.
- 1483 Shigeta, S., Okamura, M., Tsutsumi, M., Ono, K., Ohta, M., Matsuura, F., Takao, T. and Oka, S.: Structure of an allergenic pentasaccharitol, Gp-1 β -b6, isolated from a sea squirt antigen, Gi-rep, as a minimum structural unit responsible for its allergenicity. *J. Biochem. (Tokyo)*, 108 (1990) 47-52.
- 1484 Swallow, K.W. and Low, N.H.: Analysis and quantitation of the carbohydrates in honey using high-performance liquid chromatography. *J. Agric. Food Chem.*, 38 (1990) 1828-1832.
- 1485 Wang, W.T., Erlansson, K., Lindh, F., Lundgren, T. and Zopf, D.: High-performance liquid chromatography of sialic acid-containing oligosaccharides and acidic monosaccharides. *Anal. Biochem.*, 190 (1990) 182-187.
- 1486 White, D.R., Jr. and Widmer, W.W.: Application of high-performance anion-exchange chromatography with pulsed amperometric detection to sugar analysis in citrus juices. *J. Agric. Food Chem.*, 38 (1990) 1918-1921.

For additional information see:

C.A., 113 (1990) 151035t, 152961d, 209970n, 244014a;
114 (1991) 3016t.

See also 1178, 1259, 1500, 1504, 1550, 2114, 2270, 2721.

10b. Polysaccharides, mucopolysaccharides, lipopolysaccharides

- 1487 Baker, J.R., Christner, J.E. and Ekborg, S.L.: An unsulphated region of the rat chondrosarcoma chondroitin sulphate chain and its binding to monoclonal antibody 3B3. *Biochem. J.*, 273 (1991) 237-239.
- 1488 Bussat, B., Schulz, D., Arminion, F., Valentin, C. and Armand, J.: Molecular size characterization of bacterial capsular polysaccharide vaccines by high performance liquid chromatography. *Biologicals*, 18 (1990) 117-121; C.A., 113 (1990) 228995r.
- 1489 Dickenson, J.M., Morris, H.G., Nieduszynski, I.A. and Huckerby, T.N.: Skeletal keratan sulfate chain molecular weight calibration by high-performance gel-permeation chromatography. *Anal. Biochem.*, 190 (1990) 271-275.
- 1490 Galletti, G.C. and Chiavari, G.: Size-exclusion chromatography of lignocelluloses in wheat straw. *J. Chromatogr.*, 536 (1991) 303-308.
- 1491 Lepers, A., Shaw, L., Schneckenburger, P., Calan, R., Verbert, A. and Schauer, R.: A study on the regulation of N-glycolylneuraminic acid biosynthesis and utilization in rat and mouse liver. *Eur. J. Biochem.*, 193 (1990) 715-723.
- 1492 Motohashi, N., Nakamichi, Y., Mori, I., Nishikawa, H. and Umamoto, J.: Concentration and degradation of hyaluronic acid in knee synovial fluid from carrageenin-induced rabbit arthritis. *Chem. Pharm. Bull.*, 38 (1990) 1953-1956.
- 1493 Ohkuma, K., Matsuda, I., Katta, Y. and Hanno, Y.: (Pyrolysis of starch and its digestibility by enzymes. Characterization of indigestible dextrin). *Denpun Kagaku*, 37 (1990) 107-114; C.A., 114 (1991) 4919b - a review with 15 refs.
- 1494 Pereira, A.N., Kohlmann, K.L. and Ladisch, M.R.: Analysis of sub-microgram quantities of cellodextrins by aqueous liquid chromatography using a differential refractometer. *Biomass*, 23 (1990) 307-317; C.A., 113 (1990) 154542s.
- 1495 Quemener, B. and Thibault, J.F.: Assessment of methanolysis for the determination of sugars in pectins. *Carbohydr. Res.*, 206 (1990) 277-287; C.A., 113 (1990) 227356w.
- 1496 Ströcker, G., Haubeck, H.-D., Wagener, C. and Greiling, H.: Purification and immunochemical characterization of heparan sulphate proteoglycans from human tissues. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 795.
- 1497 Stöcker, G., Fischer, A.-C., Haubeck, H.-D., Wagener, C., Stuhlsatz, H.W. and Greiling, H.: Isolation and characterization of dermatan sulphate and keratan sulphate proteoglycans from human aorta. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 795.
- 1498 Suortti, T. and Pessa, E.: Gel permeation chromatographic determination of starches using alkaline eluents. *J. Chromatogr.*, 536 (1991) 251-254.
- 1499 Sutton, K.H. and Mouat, C.L.: Determination of damaged starch in wheat flours by reversed-phase high-performance liquid chromatography. *J. Cereal Sci.*, 11 (1990) 235-242; C.A., 113 (1990) 189863z.
- 1500 Takagaki, K., Nakamura, T., Kawasaki, H., Kon, A., Ohishi, S. and Endo, M.: Determination of the reducing terminal sugars of glycosaminoglycans using 2-aminopyridine. *J. Biochem. Biophys. Methods*, 21 (1990) 209-215; C.A., 114 (1991) 2865g.
- 1501 Takayama, K., Din, Z.Z., Mukerjee, P., Cooke, P.H. and Kirkland, T.N.: Physicochemical properties of the lipopolysaccharide unit that activates B lymphocytes. *J. Biol. Chem.*, 265 (1990) 14023-14029.

For additional information see:

C.A., 113 (1990) 152907r.

See also 1471, 2694.

10c. Glycoproteins and their constituents

- 1502 Akasaki, K., Yamaguchi, Y., Ohta, M., Matsuura, F., Furuno, K. and Tsuji, H.: Purification and characterization of a major glycoprotein in rat liver lysosomal membrane. *Chem. Pharm. Bull.*, 38 (1990) 2766-2770.
- 1503 Anagnostides, S.T., Aletras, A.J., Lymberi, P. and Tsiganos, C.P.: Isolation and characterization of two glycoproteins from hyaline cartilage. *Eur. J. Biochem.*, 193 (1990) 905-912.
- 1504 Barr, J.R., Anumula, K.R., Vettese, M.B., Taylor, P.B. and Carr, S.A.: Structural classification of carbohydrates in glycoproteins by mass spectrometry and high-performance anion-exchange chromatography. *Anal. Biochem.*, 192 (1991) 181-192.
- 1505 Blake, D.A. and McLean, N.V.: High-pressure, anion-exchange chromatography of proteoglycans. *Anal. Biochem.*, 190 (1990) 158-164.
- 1506 Elias, C. and Diwan, A.M.: Behaviour of concanavalin A on DEAE-Sephadex and CM-Sephadex. *J. Chromatogr.*, 537 (1991) 460-463.
- 1507 Endo, T., Furukawa, K. and Kobata, A.: (Isolation of the sugar chains of glycoproteins). *Saibo*, 22 (1990) 313-318; *C.A.*, 113 (1990) 227305d - a review with 15 refs.
- 1508 Fujimura, Y., Titani, K., Usami, Y., Suzuki, M., Oyama, R., Matsui, T., Fukui, H., Sugimoto, M. and Ruggeri, Z.M.: Isolation and chemical characterization of two structurally and functionally distinct forms of botrocetin, the platelet coagglutinin isolated from the venom of *Bothrops jararaca*. *Biochemistry*, 30 (1991) 1957-1964.
- 1509 Geyer, H., Kempf, R., Schott, H.-H. and Geyer, R.: Glycosylation of the envelope glycoprotein from a polytropic murine retrovirus in two different host cells. *Eur. J. Biochem.*, 193 (1990) 855-862.
- 1510 Gleeson, P.A. and Dias, V.: N-Linked oligosaccharides of the murine transferrin receptor from a plasmacytoma cell line. Comparison with total cellular N-glycans. *Biochim. Biophys. Acta*, 1036 (1990) 47-54.
- 1511 Hard, K., Mekking, A., Dammm, J.B.L., Kamerling, J.P., de Boer, W., Wijnands, R.A. and Vliegthart, J.F.G.: Isolation and structure determination of the intact sialylated N-linked carbohydrate chains of recombinant human follitropin expressed in Chinese hamster ovary cells. *Eur. J. Biochem.*, 193 (1990) 263-271.
- 1512 Hronowski, L.J.J. and Anastassiades, T.P.: Nonspecific interaction of proteoglycans with chromatography media and surfaces: effect of this interaction on the isolation efficiencies. *Anal. Biochem.*, 191 (1990) 50-57.
- 1513 Jerve, F., Duche, J.-C., Sportes, N. and Tillement, J.-P.: High-performance anion-exchange chromatographic study of desialylated human α -acid glycoprotein variants. Development of a fractionation method for the protein slow variants. *J. Chromatogr.*, 539 (1991) 405-416.
- 1514 Kaartinen, V. and Mononen, I.: Detection of aspartylglycosaminuria using urine specimens recovered from absorbent filter paper. *Clin. Chim. Acta*, 191 (1990) 15-20.
- 1515 Kluge, M., Mann, K., Dziadek, M. and Timpl, R.: Characterization of a novel calcium-binding 90-kDa glycoprotein (BM-90) shared by basement membranes and serum. *Eur. J. Biochem.*, 193 (1990) 651-659.
- 1516 Koshte, V.L., van Dijk, W., van der Stelt, M.E. and Aalberse, R.C.: Isolation and characterization of BanLec-I, a mannoside-binding lectin from *Musa paradisica* (banana). *Biochem. J.*, 272 (1990) 721-726.

- 1517 Lee, N., Wang, W. and Fukuda, M.: Granulocytic differentiation of HL-60 cells is associated with increase of poly-N-acetyllactosamine in Asn-linked oligosaccharides attached to human lysosomal membrane glycoproteins. *J. Biol. Chem.*, 265 (1990) 20476-20487.
- 1518 Matsui, T., Sugino, H., Miura, M., Bousfield, G.R., Ward, D.N., Titani, K. and Mizuochi, T.: β -Subunits of equine chorionic gonadotropin and lutenizing hormone with an identical amino acid sequence have different asparagine-linked oligosaccharide chains. *Biochem. Biophys. Res. Commun.*, 174 (1991) 940-945.
- 1519 Midura, R.J., Hascall, V.C., MacCallum, D.K., Meyer, R.F., Thonar, E.J.-M.A., Hassell, J.R., Smith, C.F. and Klintworth, G.K.: Proteoglycan biosynthesis by human corneas from patients with types 1 and 2 macular corenal dystrophy. *J. Biol. Chem.*, 265 (1990) 15947-15955.
- 1520 Neame, P.J., Young, C.N. and Treep, J.T.: Isolation and primary structure of PARP, a 24-kDa proline- and arginine-rich protein from bovine cartilage closely related to the NH₂-terminal domain in collagen α 1(XI). *J. Biol. Chem.*, 265 (1990) 20401-20408.
- 1521 Sandy, J.D., Flannery, C.R., Boynton, R.E. and Neame, P.J.: Isolation and characterization of disulfide-bonded peptides from the three globular domains of aggregating cartilage proteoglycan. *J. Biol. Chem.*, 265 (1990) 21208-21213.
- 1522 Severin, A.I., Il'chenko, V.Ya. and Kulaev, I.S.: (Hydrolysis by lysoamidase of *Staphylococcus aureus* 209 P cell wall peptidoglycan). *Biokhimiya (Moscow)*, 55 (1990) 2078-2089.
- 1523 Severin, A.I., Valiakmetov, A.Ya., Ilchenko, V.Ya., Plotnikova, Z.S. and Kulaev, I.S.: (Hydrolysis of peptidoglycan from *Micrococcus luteus* BKM B-1314 cell walls by lysoamidase). *Biokhimiya (Moscow)*, 55 (1990) 1319-1327.
- 1524 Sinniger, V., Tapon-Brethaudiere, J., Zhou, F.L., Bros, A., Muller, D., Jozefonvicz, J. and Fischer, A.M.: Immobilization of dermatan sulphate on a silica matrix and its possible use as an affinity chromatography support for heparin cofactor II purification. *J. Chromatogr.*, 539 (1991) 289-296.
- 1525 Smith, K.D., Harbin, A.-M., Carruthers, R.A., Lawson, A.M. and Hounsell, E.F.: Enzyme degradation, high performance liquid chromatography and liquid secondary ion mass spectrometry in the analysis of glycoproteins. *Biomed. Chromatogr.*, 4 (1990) 261-266.
- 1526 Yang, X.-J., Blajchman, M.A., Craven, S., Smith, L.M., Anvari, N. and Oforu, F.A.: Activation of Factor V during intrinsic and extrinsic coagulation. Inhibition by heparin, hirudin and D-Phe-Pro-Arg-CH₂Cl. *Biochem. J.*, 272 (1990) 399-406.

For additional information see:

C.A., 114 (1991) 3014r.

see also 1997, 2095, 2266, 2341.

11. ORGANIC ACIDS AND LIPIDS

11a. Organic acids and simple esters

- 1527 Bianco, L., and Marucchi, M.: (Salicylic acid and its homologs as food additives. Determination by HPLC of methyl esters and confirmation by GC/MS of TMS derivatives). *Ind. Aliment. (Pinerolo)*, 29 (1990) 449-455; *C.A.*, 113 (1990) 170550y.

- 1528 Bieganowska, M.L., Petruczynik, A. and Doraczynska, A.: The retention of some organic acids in ion-pair HPLC systems. *J. Liq. Chromatogr.*, 13 (1990) 2661-2676.
- 1529 Buchanan, D.N., Muenzer, J. and Thoene, J.G.: Positive-ion thermospray liquid chromatography-mass spectrometry: detection of organic acidurias. *J. Chromatogr.*, 534 (1990) 1-11.
- 1530 Buckee, G.K.: Estimation of iso-alpha-acids in beer by HPLC-collaborative trial. *J. Inst. Brew.*, 96 (1990) 143-148; *C.A.*, 113 (1990) 170350h.
- 1531 Cartoni, G.P., Coccioli, F., Pontelli, L. and Quattrucci, E.: Separation and identification of free phenolic acids in wines by high-performance liquid chromatography. *J. Chromatogr.*, 537 (1991) 93-99.
- 1532 Chamkasem, N., Hill, K.D. and Sewell, G.W.: Use of ion-exclusion chromatography for monitoring fatty acids produced by bacterial anaerobic degradation of tetrachloroethene in ground water. *J. Chromatogr.*, 536 (1991) 193-201.
- 1533 Charles, D., Mustafa, J. and Osman, S.M.: Reaction of long chain triol acids with hydrogen bromide. *J. Am. Oil Chem. Soc.*, 67 (1990) 597-598.
- 1534 Chaudhry, A., Kleiman, R. and Carlson, K.D.: Minor components of *Lesquerella fendleri* seed oil. *J. Am. Oil Chem. Soc.*, 67 (1990) 863-866.
- 1535 Cilliers, J.J.L. and Singleton, V.L.: Autoxidative phenolic ring opening under alkaline conditions as a model for natural polyphenols in food. *J. Agric. Food Chem.*, 38 (1990) 1797-1798.
- 1536 Cilliers, J.J.L. and Singleton, V.L.: Caffeic acid autoxidation and the effects of thiols. *J. Agric. Food Chem.*, 38 (1990) 1789-1796.
- 1537 Cucurou, C., Battioni, J.P., Daniel, R. and Mansuy, D.: Peroxidase-like activity of lipoxygenases: different substrate specificity of potato 5-lipoxygenase and soybean 15-lipoxygenase and particular affinity of vitamin E derivatives for the 5-lipoxygenase. *Biochim. Biophys. Acta*, 1081 (1991) 99-105.
- 1538 Das, D.K., Cordis, G.A., Rao, P.S., Liu, X. and Maity, S.: High-performance liquid chromatographic detection of hydroxylated benzoic acids as an indirect measure of hydroxyl radical in heart: its possible link with the myocardial reperfusion injury. *J. Chromatogr.*, 536 (1991) 273-282.
- 1539 ElKhatib, E.A.: Simultaneous determination of low-molecular weight organic acids in soil solution by ion chromatography. *Z. Pflanzenernaehr. Bodenkd.*, 153 (1990) 201-205; *C.A.*, 113 (1990) 151280u.
- 1540 Gaber, C., Löhmar, K. and Maier, H.G.: Determination of main acids of chicory roots by HPLC. *Fresenius' J. Anal. Chem.*, 338 (1990) 300-301.
- 1541 Gardner, D.R. and Sanders, R.A.: Isolation and characterization of polymers in heated olestra and an olestra/triglyceride blend. *J. Am. Oil Chem. Soc.*, 67 (1990) 788-796.
- 1542 Goupy, P.M., Varoquaux, P.J.A., Nicolas, J.J. and Macheix, J.J.: Identification and localization of hydroxycinnamoyl and flavanol derivatives from endive (*Cichorium endivia* L. cv. Geante Maraichere) leaves. *J. Agric. Food Chem.*, 38 (1990) 2116-2121.
- 1543 Grechkin, A.N., Kuramshin, R.A., Safonova, E.Y., Yefremov, Y.J., Latypov, S.K., Ilyasov, A.V. and Tarchevsky, I.A.: Double hydroperoxidation of α -linolenic acid by potato tuber lipoxygenase. *Biochim. Biophys. Acta*, 1081 (1991) 79-84.
- 1544 Hu, M., Liu, J., He, X., Wu, H., Chao, C., He, L. and Liu, J.: (Ion chromatographic determination of oxalate in vegetables). *Yingyang Xuebao*, 12 (1990) 73-78; *C.A.*, 113 (1990) 150951b.
- 1545 Kaphalia, B.S.: Fatty acid conjugates of chlorinated phenols and their high-performance liquid chromatographic analysis. *J. Chromatogr.*, 537 (1991) 85-92.
- 1546 Kim, H.-Y., Sawazaki, S. and Salem, N., Jr.: Lipoxygenation in rat brain? *Biochem. Biophys. Res. Commun.*, 174 (1991) 729-734.

- 1547 Kühn, H., Sprecher, H. and Brash, A.R.: On singular or dual positional specificity of lipoxygenases. The number of chiral products varies with alignment of methylene groups at the active site of the enzyme. *J. Biol. Chem.*, 265 (1990) 16300-16305.
- 1548 König, H. and Strobel, W.: Separation, identification and determination of alkyl- and alkylphenol ether carboxylates by HPLC. *Fresenius J. Anal. Chem.*, 338 (1990) 728-731.
- 1549 Marce, R.M., Calull, M., Olucha, J.C., Borrull, F. and Rius, F.X.: Optimization of the derivatization method for the liquid-chromatographic determination of carboxylic acids in wines. *Anal. Chim. Acta*, 242 (1991) 25-30.
- 1550 Masson, S., Sciaky, M., Desmoulin, F., Fontanarava, E. and Cozzone, P.J.: Simple cation-exchange high-performance liquid chromatography optimized to the measurement of metabolites in the effluents from perfused rat livers using refractive index and ultraviolet detectors. *J. Chromatogr.*, 563 (1991) 231-242.
- 1551 Mathur, S.N., Albright, E. and Field, F.J.: 12-Hydroxyeicosatetraenoic acid is metabolized by β -oxidation in mouse peritoneal macrophages. Identification of products and proposed pathway. *J. Biol. Chem.*, 265 (1990) 21048-21055.
- 1552 Nakahara, T., Ishida, J., Yamaguchi, M. and Nakamura, M.: Determination of α -keto acids including phenylpyruvic acid in human plasma by high-performance liquid chromatography with chemiluminescence detection. *Anal. Biochem.*, 190 (1990) 309-313.
- 1553 Petrarulo, M., Bianco, O., Cosseddu, D., Marangella, M., Pellegrino, S. and Linari, F.: Improved high-performance liquid chromatographic determination of urinary glycolic acid. *J. Chromatogr.*, 532 (1990) 130-134.
- 1554 Petrarulo, M., Marangella, M., Bianco, O. and Linari, F.: Ion-chromatographic determination of L-tartrate in urine samples. *Clin. Chem. (Winston-Salem)*, 37 (1991) 90-93.
- 1555 Rogalska, E., Ransac, S. and Verger, R.: Stereoselectivity of lipases. II. Stereoselective hydrolysis of triglycerides by gastric and pancreatic lipases. *J. Biol. Chem.*, 265 (1990) 20271-20276.
- 1556 Sala, A., Voelkel, N., Maclouf, J. and Murphy, R.C.: Leukotriene E₄ elimination and metabolism in normal human subjects. *J. Biol. Chem.*, 265 (1990) 21771-21778.
- 1557 Schwartz, D.P. and Rady, A.H.: Determination of occurrence of oxofatty acids in fats and oils. *J. Am. Oil Chem. Soc.*, 67 (1990) 635-641.
- 1558 Sudyina, G.F., Kobel'kov, G.M., Barsky, O.A. and Varfolomeev, S.D.: (A kinetic scheme of action of human neutrophil 5-lipoxygenase). *Biokhimiya (Moscow)*, 55 (1990) 1795-1811.
- 1559 Toppino, P.M., Volpato, R., Amelotti, G. and Contarini, G.: (Determination of sorbic acid and benzoic acid in dairy products by HPLC). *Sci. Tec. Latt.-Casearia*, 41 (1990) 137-152; *C.A.*, 113 (1990) 229788n.
- 1560 Venkatesan, S., Rideout, J.M. and Simpson, K.J.: Microsomal Δ^9 , Δ^6 and Δ^5 desaturase activities and liver membrane fatty acid profiles in alcohol-fed rats. *Biomed. Chromatogr.*, 4 (1990) 234-238.
- 1561 Wainwright, S., Falck, J.R., Yadagiri, P. and Powell, W.S.: Metabolism of 12(S)-hydroxy-5,8,10,14-eicosatetraenoic acid and other hydroxylated fatty acids by the reductase pathway in porcine polymorphonuclear leukocytes. *Biochemistry*, 29 (1990) 10126-10135.
- 1562 Wilder, P.J., Overman, D.K., Tenenholz, T.C. and Guterrez, P.L.: Differences in myristic acid synthesis and in metabolic rate for P388 cells resistant to doxorubicin. *J. Lipid Res.*, 31 (1990) 1973-1982.

For additional information see:

C.A., 113 (1990) 96170f, 186189y, 229793k, 244016c.

See also 1366, 1456, 1566, 1569, 1577, 1584, 1585, 1593, 1599, 1600, 2011, 2184, 2297, 2691, 2693, 2720, 2721, 2723, 2724, 2775.

11b. *Prostaglandins*

- 1563 Abian, J. and Gelpi, E.: Characteristic fragmentation of thromboxane B₂ in thermospray high-performance liquid chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 153-168.
- 1564 Cordis, G.A. and Das, D.K.: High-performance liquid chromatographic detection of myocardial prostaglandins and thromboxanes. *J. Chromatogr.*, 536 (1991) 309-317.
- 1565 Ishibashi, M., Watanabe, K., Ohyama, Y., Mizugaki, M., Hayashi, Y. and Takasaki, W.: Novel derivatization and immunoextraction to improve microanalysis of 11-dehydrothromboxane B₂ in human urine. *J. Chromatogr.*, 562 (1991) 613-624.
- 1566 Sporn, P.H.S., Marshall, T.M. and Peters-Golden, M.: Differential dependence on protein kinase C of arachidonic acid metabolism stimulated by hydrogen peroxide and by zymosan in the alveolar macrophage. *Biochim. Biophys. Acta*, 1047 (1990) 187-191.
- 1567 Tordjman, C., Serkiz, B., Rambaud, F., Bonnet, J. and Volland, J.P.: High-performance liquid chromatographic quantitation of cyclooxygenase and lipoxygenase metabolites of arachidonic acid from rat polymorphonuclear leukocytes. *J. Chromatogr.*, 532 (1990) 135-143.
- 1568 Urade, Y., Watanabe, K., Eguchi, N., Fujii, Y. and Hayashi, O.: 9 α ,11 β -Prostaglandin F₂ formation in various bovine tissues. Different isozymes of prostaglandin D₂ 11-ketoreductase, contribution of prostaglandin F synthetase and its cellular localization. *J. Biol. Chem.*, 265 (1990) 12029-12035.
- 1569 Von Schacky, C., Fahrer, C. and Fischer, S.: Catabolism of leukotriene B₅ in humans. *J. Lipid Res.*, 31 (1990) 1831-1838.
- 1570 Yoneda, M. and Ohkawa, Y.: Degradation and isomerization of nileprost, 5-cyano-16-methyl-prostacyclin, in aqueous solution. *Chem. Pharm. Bull.*, 38 (1990) 2507-2512.

11c. *Lipids and their constituents*

- 1571 Adlof, R.: Fractionation of egg and soybean phosphatidylcholines by silver resin chromatography. *J. Chromatogr.*, 538 (1991) 469-473.
- 1572 Alvarez, J.G., Cazes, J., Touchstone, J.C. and Grob, R.L.: Isolation and purification of lipids by centrifugal partition chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3603-3614.
- 1573 Bouhours, D., Bouhours, J.-F., Larson, G., Karlsson, H., Pimlott, W. and Hansson, G.C.: Transient expression of type 2 chain in A-active hexaglycosylceramide of rat small intestine at weaning time. Demonstration by affinity chromatography and ceramide glycanase hydrolysis of A-active glycosphingolipids followed by gas chromatography and mass spectrometry of permethylated hexasaccharides. *Arch. Biochem. Biophys.*, 282 (1990) 141-146.
- 1574 Brami, B.A., Leli, U. and Hauser, G.: Influence of lithium on second messenger accumulation in NG108-15 cells. *Biochem. Biophys. Res. Commun.*, 174 (1991) 606-612.
- 1575 Castilho, M.C., Noronha da Silveira, M.I. and Pena, A.: (Olive oil characterization. Triacylglycerol composition by reverse-phase high-performance liquid chromatography). *Rev. Port. Farm.*, 39 (1989) 95-100; C.A., 113 (1990) 170554c.

- 1576 Chen, S., Kirschner, G. and Traldi, P.: Positive ion fast atom bombardment mass spectrometric analysis of the molecular species of glycerophosphatidylserine. *Anal. Biochem.*, 191 (1990) 100-105.
- 1577 Cho, S.Y., Kwon, T.W. and Yoon, S.H.: Selective removal of free fatty acids in oils using a microorganism. *J. Am. Oil Chem. Soc.*, 67 (1990) 558-560.
- 1578 Chu, J.W.K. and Sharom, F.J.: Interleukin-2 binds to gangliosides in micelles and lipid bilayers. *Biochim. Biophys. Acta*, 1028 (1990) 205-214.
- 1579 Cunningham, T.W., Lips, D.L., Bansal, V.S., Caldwell, K.K., Mitchell, C.A. and Majerus, P.W.: Pathway for the formation of D-3 phosphate containing inositol phospholipids in intact human platelets. *J. Biol. Chem.*, 265 (1990) 21676-21683.
- 1580 Federici, F., Lionetti, P., Messina, A., Nicoletti, I. and Sinibaldi, M.: High performance liquid chromatographic separation of phospholipids on cobalt(III) complex bonded silica gel. *Anal. Lett.*, 23 (1990) 1265-1277.
- 1581 Fishman, J.B., Cahill, M., Morin, P., McCrory, M., Bucher, N.L.R. and Ullman, M.D.: Specific gangliosides increase rapidly in rat liver following partial hepatectomy. *Biochem. Biophys. Res. Commun.*, 174 (1991) 638-646.
- 1582 Gasser, H., Strohmaier, W., Schlag, G., Schmid, E.R. and Allmaier, G.: Characterization of phosphatidylcholines in rabbit lung lavage fluid by positive and negative ion fast-atom bombardment mass spectrometry. *J. Chromatogr.*, 562 (1991) 257-266.
- 1583 Glass, R.L.: Separation of phosphatidylcholine and its molecular species by high-performance liquid chromatography. *J. Agric. Food Chem.*, 38 (1990) 1684-1686.
- 1584 Hallberg, M.L.: The liberation of free fatty acids in potato slices at low temperature. *J. Am. Oil Chem. Soc.*, 67 (1990) 784-787.
- 1585 Hullin, F., Bossant, M.-J. and Salaem, N., Jr.: Aminophospholipid molecular species asymmetry in the human erythrocyte plasma membrane. *Biochim. Biophys. Acta*, 1061 (1991) 15-25.
- 1586 Itabashi, Y., Kuksis, A. and Myher, J.J.: Determination of molecular species of enantiomeric diacylglycerols by chiral phase high performance liquid chromatography and polar capillary gas-liquid chromatography. *J. Lipid Res.*, 31 (1990) 2119-2126.
- 1587 Itabashi, Y., Kuksis, A., Marai, L. and Takagi, T.: HPLC resolution of diacylglycerol moieties of natural triacylglycerols on a chiral phase consisting of bonded (R)-(+)-1-(1-naphthyl)ethylamine. *J. Lipid Res.*, 31 (1990) 1711-1717.
- 1588 Iwamori, M. and Nagai, Y.: (Isolation and analyses of glycolipids). *Kagaku Zokan (Kyoto)*, (1990) 273-289; *C.A.*, 113 (1990) 227283v - review with 31 refs.
- 1589 Kiss, Z., Chattapodhyay, J. and Pettit, G.R.: Stimulation of phosphatidylcholine synthesis by activators of protein kinase C is dissociable from increased phospholipid hydrolysis. *Biochem. J.*, 273 (1991) 189-194.
- 1590 Kobayashi, T. and Goto, I.: A sensitive assay of lysogangliosides using high-performance liquid chromatography. *Biochim. Biophys. Acta*, 1981 (1991) 159-166.
- 1591 Kuriyama, M., Yoshida, H., Suzuki, M., Fujiyama, J. and Igata, A.: Lysosomal acid lipase deficiency in rats: lipid analyses and lipase activities in liver and spleen. *J. Lipid Res.*, 31 (1990) 1605-1612.
- 1592 Kuypers, F.A., Bütikofer, P. and Shackleton, C.H.L.: Application of liquid chromatography-thermospray mass spectrometry in the analysis of glycerophospholipid molecular species. *J. Chromatogr.*, 562 (1991) 191-206.
- 1593 Kühn, H., Heydeck, D. and Sprecher, H.: On the mechanistic reasons for the dual positional specificity of the reticulocyte lipoxigenase. *Biochim. Biophys. Acta*, 1081 (1991) 129-134.

- 1594 Lazarowski, E.R., Winegar, D.A., Nolan, R.D., Oberdisse, E. and Lapetina, E.G.: Effect of protein kinase A on inositide metabolism and rap 1 G-protein in human erythroleukemia cells. *J. Biol. Chem.*, 265 (1990) 13118-13123.
- 1595 Lutzke, B.S. and Braugher, J.M.: An improved method for the identification and quantitation of biological lipids by HPLC using laser light - scattering detection. *J. Lipid Res.*, 31 (1990) 2127-2130.
- 1596 Mounts, T.L. and Nash, A.M.: HPLC analysis of phospholipids in crude oil for evaluation of soybean deterioration. *J. Am. Oil Chem. Soc.*, 67 (1990) 757-760.
- 1597 Myers, R.L., Ullman, M.D., Ventura, R.F. and Yates, A.J.: A high performance liquid chromatography method for the analysis of glycosphingolipids using galactose oxidase/ NaB^3H_4 labeling of intact cells and synaptosomes. *Anal. Biochem.*, 192 (1991) 156-164.
- 1598 Nakagawa, Y.: (Phospholipids analysis by high performance liquid chromatography). *Bunseki*, (1990) 363-370; *C.A.*, 113 (1990) 148156c - a review with 50 refs.
- 1599 Netting, A.G. and Rhodes, S.H.: Partition and adsorption in the separation of long chain lipids by normal phase high performance liquid chromatography. *J. High Resolut. Chromatogr.*, 13 (1990) 817-825.
- 1600 Nissen, H.P. and Kreysel, H.W.: The use of HPLC for the determination of lipids in biological materials. *Chromatographia*, 30 (1990) 686-690.
- 1601 Nolan, R.D. and Lapetina, E.G.: The production of phosphatidylinositol triphosphate is stimulated by thrombin in human platelets. *Biochem. Biophys. Res. Commun.*, 174 (1991) 524-528.
- 1602 Payraastre, B., Plantavid, M., Breton, M., Chambaz, E. and Chap, H.: Relationship between phosphoinositide kinase activities and protein tyrosine phosphorylation in plasma membranes from A431 cells. *Biochem. J.*, 272 (1990) 665-670.
- 1603 Precht, D.: (Rapid extraction of milk fat). *Kiel, Milchwirtsch. Forschungsber.*, 42 (1990) 119-128; *C.A.*, 114 (1991) 4952g.
- 1604 Renn, C.N. and Synovec, R.E.: Refractive index gradient detection of biopolymers separated by high-temperature liquid chromatography. *J. Chromatogr.*, 536 (1991) 289-301.
- 1605 Sasakawa, N., Nakaki, T. and Kato, R.: Stimulus-responsive and rapid formation of inositol pentakisphosphate in cultured adrenal chromaffin cells. *J. Biol. Chem.*, 265 (1990) 17700-17705.
- 1606 Schick, P.K. and He, X.: Composition and synthesis of glycolipids in megakaryocytes and platelets: differences in synthesis in megakaryocytes at different stages of maturation. *J. Lipid Res.*, 31 (1990) 1645-1654.
- 1607 Schlame, M. and Rüstow, B.: Lysocardiolipin formation and reacylation in isolated rat liver mitochondria. *Biochem. J.*, 272 (1990) 589-595.
- 1608 Sestak, T.L., Subbaiah, P.V., Jaskowiak, N.T. and Bagdade, J.D.: A high-performance liquid chromatographic procedure for the determination of disaturated phosphatidylcholine in human plasma. *Anal. Biochem.*, 191 (1990) 156-159.
- 1609 Suzuki, M., Yamakawa, T. and Suzuki, A.: High-performance liquid chromatography-mass spectrometry of glycosphingolipids: II. Application to neutral glycolipids and monosialogangliosides. *J. Biochem. (Tokyo)*, 108 (1990) 92-98.
- 1610 Takagi, T. and Ando, Y.: Enantiomer separations of mixtures of monoacylglycerol derivatives by HPLC on a chiral column. *Lipids*, 25 (1990) 398-400; *C.A.*, 113 (1990) 168293y.
- 1611 Takamura, H. and Kito, M.: (Isolation and analyses of phospholipids). *Kagaku Zokan (Kyoto)*, (1990) 263-272; *C.A.*, 113 (1990) 227284w - a review with 13 refs.

- 1612 Van der Meeren, P., Vanderdeelen, J., Huys, M. and Baert, L.: Optimization of the column loadability for the preparative HPLC separation of soybean phospholipids. *J. Am. Oil Chem. Soc.*, 67 (1990) 815-820.
- 1613 Wilson, K.M. and Minneman, K.P.: Different pathways of [³H]inositol phosphate formation mediated by α_{1a} - and α_{1b} -adrenergic receptors. *J. Biol. Chem.*, 265 (1990) 17601-17606.
- 1614 Yamamoto, K., Graziani, A., Carpenter, C., Cantley, L.C. and Lapetina, E.G.: A novel pathway for the formation of phosphatidylinositol 3,4-bisphosphate. Phosphorylation of phosphatidylinositol 3-monophosphate by phosphatidylinositol-2-monophosphate 4-kinase. *J. Biol. Chem.*, 265 (1990) 22086-22089.
- 1615 Yokochi, T., Usita, M.T., Kamisaka, Y., Nakahara, T. and Suzuki, O.: Increase in the γ -linolenic acid content by solvent winterization of fungal oil extracted from *Mortierella* genus. *J. Am. Oil Chem. Soc.*, 67 (1990) 846-851.

For additional information see:
C.A., 113 (1990) 227349w.

See also 1311, 1408, 1414, 1541, 1567, 1640, 2273, 2279.

11d. Lipoproteins and their constituents

- 1616 Leighton, J.K., Joyner, J., Zamarripa, J., Deines, M. and Davis, R.A.: Fasting decreases apolipoprotein B mRNA editing and the secretion of small molecular weight apoB by rat hepatocytes: evidence that the total amount of apoB secreted is regulated post-transcriptionally. *J. Lipid Res.*, 31 (1990) 1663-1668.
- 1617 Meyer, B., Kecorius, E., Barter, P., Fidge, N. and Tetaz, T.: Application of reversed-phase high-performance liquid chromatography to the separation of apolipoproteins A-IV, A-I and E from rat high-density lipoprotein. *J. Chromatogr.*, 540 (1991) 386-391.
- 1618 Mora, R., Simionescu, M. and Simionescu, N.: Purification and partial characterization of extracellular liposomes isolated from the hyperlipidemic rabbit aorta. *J. Lipid Res.*, 31 (1990) 1793-1807.
- 1619 Sigalov, A., Alexandrovich, O. and Strizevskaya, E.: Large-scale isolation and purification of human apolipoproteins A-I and A-II. *J. Chromatogr.*, 537 (1991) 464-468.
- 1620 Takizawa, A., Komoda, T., Hokari, S., Sakagishi, Y., Tanaka, A. and Hara, I.: Evaluation of the particle size distribution of plasma lipoprotein in a patient with Tangier disease by high performance liquid chromatography. *Clin. Chim. Acta*, 193 (1990) 85-88.

For additional information see:
C.A., 113 (1990) 168304c.

12. ORGANIC PEROXIDES

See 2708.

13. STEROIDS

13a. General techniques

- 1621 Hines, G.A., Watts, S.A., Sower, S.A. and Walker, C.W.: Sex steroid extraction from echinoderm tissues. *J. Liq. Chromatogr.*, 13 (1990) 2489-2498.

- 1622 Itagaki, E., Matushita, H. and Hatta, T.: Steroid transhydrogenase activity of 3-ketosteroid- Δ^1 -dehydrogenase from *Nocardia corallina*. *J. Biochem. (Tokyo)*, 108 (1990) 122-127.
- 1623 Matlin, S.A., Jiang, L.-X., Roshdy, S. and Zhou, R.-H.: Resolution and identification of steroid oxime syn and anti isomers by HPLC. *J. Liq. Chromatogr.*, 13 (1990) 3455-3463.
- 1624 Olsson, M., Sander, L.C. and Wise, S.A.: Comparison of the liquid chromatographic behaviour of selected steroid isomers using different reversed-phase materials and mobile phase compositions. *J. Chromatogr.*, 537 (1991) 75-83.

13b. *Pregnane and androstane derivatives*

- 1625 Cannell, G.R., Mortimer, R.H., Maguire, D.J. and Addison, R.S.: Liquid chromatographic analysis of prednisolone, prednisone and their 20-reduced metabolites in perfusion media. *J. Chromatogr.*, 563 (1991) 341-347.
- 1626 Delahaut, P., Dubois, M. and Maghuin-Rogister, G.: Synthetic androgen anabolic agents in cattle feces: radioimmunoassay after purification by high performance liquid chromatography. *Ann. Rech. Vet.*, 21 (1990) 13-22; *C.A.*, 113 (1990) 229779k.
- 1627 Huang, M.-L. and Jusko, W.J.: Nonlinear pharmacokinetics and interconversion of prednisolone and prednisone in rats. *J. Pharmacokin. Biopharm.*, 18 (1990) 401-421.
- 1628 Korzekwa, K.R., Trager, W.F., Nagata, K., Parkinson, A. and Gillette, J.R.: Isotope effect studies on the mechanism of the cytochrome P-450I1A1-catalyzed formation of Δ^6 -testosterone from testosterone. *Drug Metab. Disp.*, 18 (1990) 974-979.
- 1629 Mayberry, D.O., Kowblansky, M., Lane, P.A. and Wray, P.E.: Determination of norethindrone stability on Red Delicious apples. *J. Pharm. Sci.*, 79 (1990) 746-749; *C.A.*, 113 (1990) 237913q.
- 1630 Numazawa, M., Konno, T., Furihata, R. and Ishikawa, S.: Determination of aromatization of 19-oxygenated 16 α -hydroxyandrostenedione with human placental microsomes by high-performance liquid chromatography coupled with coulometric detection. *J. Steroid Biochem.*, 36 (1990) 369-375; *C.A.*, 113 (1990) 165521k.
- 1631 Prokhorov, B.S., Rylin, A.F. and Titova, A.V.: (Study of testosterone enanthate purity). *Khim.-Farm. Zh.*, 24 (1990) 84-85; *C.A.*, 113 (1990) 158769u.
- 1632 Simonella, A. and Torreti, L.: (Solid-phase extraction and HPLC determination of anabolic hormones in bovine biological samples). *Lab. 2000*, 4 (1990) 35-44; *C.A.*, 113 (1990) 91505j.
- 1633 Sliwiokk, J., Podgorny, A., Siwek, A. and Witkowska, B.: Chromatographic investigation of the hydrophobicity of selected cortisone derivatives. *J. Planar Chromatogr.*, 3 (1990) 410-412.
- 1634 Xu, D. and Yuan, Y.: (Determination of cortisol and corticosterone in serum by high performance liquid chromatography). *Sepu*, 8 (1990) 123-124; *C.A.*, 113 (1990) 91512j.

See also 2659.

13c. *Estrogens*

- 1635 Jacobsohn, M.K., Byler, D.M. and Jacobsohn, G.M.: Isolation of estradiol-2,3-quinone and its intermediary role in melanin formation. *Biochim. Biophys. Acta*, 1073 (1991) 1-10.
- 1636 Nadjem, B., Guermouche, M.H. and Chaker, M.: Determination of free estrogens in serum using HPLC and electrochemical detector. *Analisis*, 18 (1990) 319-322; *C.A.*, 113 (1990) 145399y.

See also 1624, 1982.

13d. Sterols

- 1637 Nourooz-Zadeh, J.: Determination of the autoxidation products from free or total cholesterol: a new multistep enrichment methodology including the enzymatic release of esterified cholesterol. *J. Agric. Food Chem.*, 38 (1990) 1667-1673.
- 1638 Shimada, K. and Oe, T.: Dienophilic reagent for precolumn derivatization of 7-dehydrocholesterol in high-performance liquid chromatography. *Anal. Sci.*, 6 (1990) 461-463; *C.A.*, 113 (1990) 168290v.
- 1639 West, R.R. and Cardellina, J.H.: Semi-preparative separation of polyhydroxylated sterols using a β -cyclodextrin high-performance liquid chromatography column. *J. Chromatogr.*, 539 (1991) 15-23.

For additional information see:

C.A., 113 (1990) 94137b, 227368b.

See also 1408, 1600, 1640, 2338.

13e. Bile acids and alcohols

- 1640 Cohen, D.E. and Carey, M.C.: Rapid (1 hour) high performance gel filtration chromatography resolves coexisting simple micelles, mixed micelles, and vesicles in bile. *J. Lipid Res.*, 31 (1990) 2103-2112.
- 1641 Kuramoto, T., Furukawa, Y., Nishina, T., Sugimoto, T., Mahara, R., Tohma, M., Kihira, K. and Hoshita, T.: Identification of short side chain bile acids in urine of patients with cerebrotendinous xanthomatosis. *J. Lipid Res.*, 31 (1990) 1895-1902.
- 1642 Yu, B., Zhang, Y. and Hong, W.: Miniaturization of a liquid membrane sensor for the determination of bile acids. *Biosens. Bioelectron.*, 5 (1990) 215-222; *C.A.*, 113 (1990) 168244h.

For additional information see:

C.A., 113 (1990) 218333j;
114 (1991) 12281c.

13f. Ecdysones and other insect steroid hormones

For additional information see:

C.A., 113 (1990) 227347u.

13g. Other steroids

- 1643 Ikekawa, N.: The analysis of brassinosteroids - plant growth-promoting substances. *TrAC*, 9 (1990) 337-342.

See also 2367.

14. STEROID GLYCOSIDES AND SAPONINS

- 1644 Embree, L. and McErlane, K.M.: Comparison of digoxin analysis by high-performance liquid chromatography/postcolumn derivatization and fluorescence polarization immunoassay. *Xenobiotica*, 20 (1990) 635-643; *C.A.*, 113 (1990) 90834d.

- 1645 Goto, A., Ishiguro, T., Yamada, K., Ishii, M., Yoshioka, M., Eguchi, C., Shimora, M. and Sugimoto, T.: Isolation of a urinary digitalis-like factor indistinguishable from digoxin. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1093-1101.
- 1646 Karikura, M., Miyase, T., Tanizawa, H., Takino, Y., Taniyama, T. and Hayashi, T.: Studies on absorption, distribution, excretion and metabolism of ginseng saponins. V. The decomposition products of ginsenoside Rb₂ in the large intestine of rats. *Chem. Pharm. Bull.*, 38 (1990) 2859-2861.
- 1647 Kiuchi, F., Liu, H.-M. and Tsuda, Y.: Two new gymmemic acid congeners containing a hexulopyranoside moiety. *Chem. Pharm. Bull.*, 38 (1990) 2326-2328.
- 1648 Kopp, B., Krenn, L. and Jurenitsch, J.: Bufadienolide in Meerzwiebeln. Bestimmung mittels Spektralphotometrie und HPLC. *Dtsch. Apoth.-Ztg.*, 130 (1990) 2175-2180.
- 1649 Niikawa, M., Sakai, Y., Ose, Y., Sato, T., Nagase, H., Kito, H., Sato, M. and Mizuno, M.: Enhancement of the mutagenicity of Trp-P-1, Trp-P-2 and benzo[a]pyrene by Bupleri radix extract. *Chem. Pharm. Bull.*, 38 (1990) 2035-2039.
- 1650 Oleszek, W., Price, K.R., Colquhoun, I.J., Jurzysta, M., Ploszynski, M. and Fenwick, G.R.: Isolation and identification of alfalfa (*Medicago sativa* L.) root saponins: their activity in relation to a fungal bioassay. *J. Agric. Food Chem.*, 38 (1990) 1810-1817.

For additional information see:

C.A., 113 (1990) 158754k.

See also 1423, 2699.

15. TERPENES AND OTHER VOLATILE AROMATIC COMPOUNDS

15a. Terpenes

- 1651 Agnew, M.P. and Lauren, D.R.: Determination of ptaquiloside in bracken fern (*Pteridium esculentum*). *J. Chromatogr.*, 538 (1991) 462-468.
- 1652 Diliberto, J.J., Srinivas, P., Overstreet, D., Usha, G., Burka, L.T. and Birnbaum, L.S.: Metabolism of citral, an α,β -unsaturated aldehyde, in male F344 rats. *Drug Metab. Disp.*, 18 (1990) 866-875.
- 1653 Hayashi, T., Okamura, K., Kakemi, M., Asano, S., Mizutani, M., Takeguchi, N., Kawasaki, M., Tezuka, Y., Kikuchi, T. and Morita, N.: Scopadulcic acid B, a new tetracyclic diterpenoid from *Scoparia dulcis* L. Its structure, H⁺,K⁺-adenosine triphosphatase inhibitory activity and pharmacokinetic behaviour in rats. *Chem. Pharm. Bull.*, 38 (1990) 2740-2745.
- 1654 Lee, Y.-W., Pack, T.W., Voyksner, R.D., Fang, Q.C. and Ito, Y.: Application of high speed countercurrent chromatography/thermospray mass spectrometry for the analysis of bio-active triterpenic acids from *Boswellia carterii*. *J. Liq. Chromatogr.*, 13 (1990) 2389-2398.
- 1655 Monsarrat, B., Mariel, E., Cros, S., Gares, M., Guenard, D., Gueritte-Voegelein, F. and Wright, M.: Taxol metabolism. Isolation and identification of three major metabolites of taxol in rat bile. *Drug Metab. Disp.*, 18 (1990) 895-901.
- 1656 Satoh, T., Hidaka, Y. and Kamei, T.: Regulation of squalene epoxidase activity in rat liver. *J. Lipid Res.*, 31 (1990) 2095-2101.

For additional information see:

C.A., 113 (1990) 243950r;

114 (1991) 9248s.

15b. *Essential oils*

See 2680.

15c. *Bitter substances*

- 1657 Herman, Z., Fong, C.H., Ou, P. and Hasegawa, S.: Limonoid glucosides in orange juices by HPLC. *J. Agric. Food Chem.*, 38 (1990) 1860-1861.
- 1658 Jaziri, M., Diallo, B. and Vanhaelen, M.: Separation of quassinoids from *Ailanthus altissima* by high-speed counter-current chromatography. *J. Chromatogr.*, 538 (1991) 227-229.
- 1659 Verzele, M., Steenbeke, G., Dewaele, C., Verhagen, L.C. and Strating, J.: Advances in the liquid chromatography of hop bitter compounds. *J. High Resolut. Chromatogr.*, 13 (1990) 737-741.
- 1660 Verzele, M., Steenbeke, G., Verhagen, L.C. and Strating, J.: Improved analysis by liquid chromatography of iso-alpha acids. *J. High Resolut. Chromatogr.*, 13 (1990) 826-831.

See also 2693.

16. NITRO AND NITROSO COMPOUNDS

- 1661 Havery, D.C.: Determination of N-nitroso compounds by high-performance liquid chromatography with postcolumn reaction and a thermal energy analyzer. *J. Anal. Toxicol.*, 14 (1990) 181-185; *C.A.*, 113 (1990) 92891u.
- 1662 Schmid, P., Mooser, A.E. and Koch, H.: (Determination of nitrofurans derivatives and their cyanometabolites in the tissues of swine). *Mitt. Geb. Lebensmittelunters. Hyg.*, 81 (1990) 461-483; *C.A.*, 114 (1991) 4961j.

For additional information see:

C.A., 113 (1990) 206286h.

See also 1274, 1284, 1394, 1669, 2249, 2696.

17. AMINES, AMIDES AND RELATED NITROGEN COMPOUNDS

17a. *Amines and polyamines*

- 1663 Bakthavachalam, J., Abdel-Baky, S. and Giese, R.W.: Release of 2-aminofluorene from N-(deoxyguanosin-8-yl)-2-aminofluorene by hydrazinolysis. *J. Chromatogr.*, 538 (1991) 447-451.
- 1664 Gennaro, M.C. and Bertolo, P.L.: Separation of N-containing species by means of a new versatile ion interaction RP-HPLC methodology. *J. Liq. Chromatogr.*, 13 (1990) 2059-2075.
- 1665 Hunter, K.J. and Fairlamb, A.H.: Separation and quantitation of the polyamine biosynthesis inhibitor D,L- α -difluoromethylarginine and other guanidine-containing compounds by high-performance liquid chromatography. *Anal. Biochem.*, 190 (1990) 281-285.
- 1666 Lu, Z., Veening, H. and Coutant, J.E.: Liquid chromatography-mass spectrometry studies of 9-fluorenylmethyl chloroformate derivatives of polyamines. *J. Chromatogr.*, 540 (1991) 199-206.

- 1667 Maeno, Y., Takabe, F., Inoue, H. and Iwasa, M.: A study on the vital reaction in wounded skin: simultaneous determination of histamine and polyamines in injured rat skin by high-performance liquid chromatography. *Forensic Sci. Int.*, 46 (1990) 255-268; *C.A.*, 114 (1991) 1845p.
- 1668 Nakajima, R., Yamamoto, A. and Hara, T.: Thienylpyridines as a new fluorescent reagent. I. Determination of primary alkylamines with 5-(4-pyridyl)-2-thio-phenecarbaldehyde using HPLC. *Bull. Chem. Soc. Jpn.*, 63 (1990) 1968-1972; *C.A.*, 113 (1990) 164710j.
- 1669 Nakao, M., Goto, Y., Matuski, Y., Hiratsuka, A. and Watabe, T.: Regioselective N-acetylation as a route of nitro-*p*-phenylenediamine metabolism by rat liver cytosol. *Chem. Pharm. Bull.*, 38 (1990) 2561-2566.
- 1670 Nic a' Bhaird, N., McCrodden, J.M., Wheatley, A.M., Harrington, M.C., Sullivan, J.P. and Tipton, K.F.: Determination of amines, amine metabolites and some amine metabolizing enzymes by high-performance liquid chromatography. *Biomed. Chromatogr.*, 4 (1990) 229-233.
- 1671 Pichugina, T.N., Remizova, L.A. and Favorskaya, I.A.: (Ligand-exchange chromatographic fractionation of a synthetic mixture of mono-, di-, and triethanolamines). *Zh. Prikl. Khim. (Leningrad)*, 63 (1990) 1598-1599; *C.A.*, 113 (1990) 214212w.

For additional information see:

C.A., 113 (1990) 210216c, 218344p.

See also 1284, 1304, 1366, 1672, 1699.

17b. Catecholamines and their metabolites

- 1672 Barbato, G.F.: A fast HPLC analysis of catecholamines and indoleamines in avian brain tissue. *J. Liq. Chromatogr.*, 13 (1990) 2553-2560.
- 1673 Feenstra, M.G.P., van der Velden, T.J.A.M. and Hommes, O.R.: Separation of dopamine and serotonin from their formaldehyde-derived tetrahydroisoquinoline and tetrahydro-beta-carboline condensation products on different reversed-phase LC columns. *Biog. Amines*, 7 (1990) 265-273; *C.A.*, 113 (1990) 91499k.
- 1674 Flachaire, E., Beney, C., Berthier, A., Salandre, J., Quincy, C. and Renaud, B.: Determination of reference values for serotonin concentration in platelets of healthy newborns, children, adults, and elderly subjects by HPLC with electrochemical detection. *Clin. Chem. (Winston-Salem)*, 36 (1990) 2117-2120.
- 1675 Hiramatsu, M., Kumagai, Y., Unger, S.E. and Cho, A.K.: Metabolism of methylenedioxymethamphetamine: formation of dihydroxymethamphetamine and a quinone identified as its glutathione adduct. *J. Pharmacol. Exp. Ther.*, 254 (1990) 521-527.
- 1676 Husek, P. and Malikova, J.: The influence of mobile phase acidity and counterion type and concentration on the retention behaviour of urinary catecholamines and sample impurities in ion-pair reversed-phase liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3351-3361.
- 1677 Kumar, A.M., Kumar, M., Deepika, K., Fernandez, J.B. and Eisdorfer, C.: A modified HPLC technique for simultaneous measurement of 5-hydroxytryptamine and 5-hydroxyindoleacetic acid in cerebrospinal fluid, platelet and plasma. *Life Sci.*, 47 (1990) 1751-1759; *C.A.*, 113 (1990) 224625x.
- 1678 Morgadinho, M.T., Macedo, T.R.A., Teixeira, F.J. and Ribeiro, C.A.F.: (Conditions for the collection, preparation and preservation of blood specimens for the determination of catecholamines and indoleamines by high-resolution liquid chromatography with an electrochemical detector (HPLC-EC)). *Rev. Port. Farm.*, 39 (1989) 85-89. *C.A.*, 113 (1990) 91506k.

- 1679 Nakai, T. and Isobe, K.: (Urinary and plasma catecholamines measurements by using high performance liquid chromatography). *Med. Technol. (Tokyo)*, 18 (1990) 365-370; *C.A.*, 113 (1990) 165484a.
- 1680 O'Neill, S.K., McKay, D.W., Campbell, N., Trigg, C.R., Crowley, M. and Bolger, G.T.: Comparative behavioral, neurochemical and pharmacological activities of dihydropyridine calcium channel activating drugs. *J. Pharmacol. Exp. Ther.*, 253 (1990) 905-912.
- 1681 Pagliari, R., Cottet-Emard, J.M. and Peyrin, L.: Determination of free and conjugated normetanephrine and metanephrine in human plasma by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 563 (1991) 23-36.
- 1682 Rizzo, V., d'Eril, G.M., Achilli, G. and Cellerino, G.P.: Determination of neurochemicals in biological fluids by using an automated high-performance liquid chromatographic system with a coulometric array detector. *J. Chromatogr.*, 536 (1991) 229-236.
- 1683 Shimizu, T., Mihara, M. and Takeda, N.: High-performance liquid chromatography of biogenic amines in the corpus cardiacum of the American cockroach, *Periplaneta americana*. *J. Chromatogr.*, 539 (1991) 193-197.
- 1684 Titus, D.C., August, T.F., Yeh, K.C., Eisenhandler, R., Bayne, W.F. and Musson, D.G.: Simultaneous high-performance liquid chromatographic analysis of carbidopa, levodopa and 3-O-methyldopa in plasma and carbidopa, levodopa and dopamine in urine using electrochemical detection. *J. Chromatogr.*, 534 (1990) 87-100.
- 1685 Umegae, Y., Nohta, H., Lee, M. and Ohkura, Y.: 1,2-Diarylethylenediamines as pre-column fluorescence derivatization reagents in high-performance liquid chromatographic determination of catecholamines in urine and plasma. *Chem. Pharm. Bull.*, 38 (1990) 2293-2295.
- 1686 Van der Hoorn, F.A.J., Boomsma, F., Man in 't Veld, A.J. and Schalekamp, M.A.D.H.: Improved measurement of urinary catecholamines by liquid-liquid extraction, derivatization and high-performance liquid chromatography with fluorimetric detection. *J. Chromatogr.*, 563 (1991) 348-355.
- 1687 Xiang, C.: (Determination of catecholamines in plasma by high performance liquid chromatography with electrochemical detection). *Sepu*, 8 (1990) 196-197; *C.A.*, 113 (1990) 91508n.
- 1688 Yudaev, A.D. and Titov, V.N.: (Determination of free catecholamines in human urine by high-pressure liquid chromatography with electrochemical detection). *Lab. Delo*, (1990) 34-38; *C.A.*, 113 (1990) 165517p.

17c. Urea and guanidine derivatives

See 1665.

17d. Other amine derivatives and amides (excl. peptides)

- 1689 Gasparrini, F., Misiti, D., Villani, C. and la Torre, F.: Chromatographic resolution of 1,2-amino alcohols on a chiral stationary phase containing N,N'-(3,5-dinitrobenzoyl)-*trans*-1,2-diaminocyclohexane. *J. Chromatogr.*, 539 (1991) 25-36.
- 1690 George, G.D. and Stewart, J.T.: HPLC determination of trace hydrazine levels in phenelzine sulfate drug substance. *Anal. Lett.*, 23 (1990) 1417-1429.
- 1691 Haen, E., Hagenmaier, H. and Remien, J.: Detection of choline and acetylcholine by high-performance liquid chromatography. Limitations, pitfalls, sample preparation. *J. Chromatogr.*, 537 (1991) 514-519.

- 1692 Mutlib, A.E., Talaat, R.E., Slatter, J.G. and Abbott, F.S.: Formation and reversibility of S-linked conjugates of N-(1-methyl-3,3-diphenylpropyl)isocyanate, an *in vivo* metabolite of N-(1-methyl-3,3-diphenylpropyl)formamide, in rats. *Drug Metab. Disp.*, 18 (1990) 1038-1045.
- 1693 Riley, R.J., Leeder, J.S., Dosch, H.-M. and Spielberg, S.P.: Interactions between N-acetyl-p-benzoquinone imine and fluorescent calcium probes: implications for mechanistic toxicology. *Anal. Biochem.*, 191 (1990) 253-261.
- 1694 Wang, L. and Su, X.: (Analysis of N-(2,2-dichlorovinyl) salicylamide by high performance liquid chromatography). *Sepu*, 8 (1990) 124-125; *C.A.*, 113 (1990) 94172j.

See also 1733, 1735, 2588, 2590.

18. AMINO ACIDS AND PEPTIDES; CHEMICAL STRUCTURE OF PROTEINS

18a. Amino acids and their derivatives

- 1695 Armstrong, D.W., Menges, R. and Wainer, I.W.: Use of centrifugal partition chromatography and proteins in the preparative separation of amino acid enantiomers. *J. Liq. Chromatogr.*, 13 (1990) 3571-3581.
- 1696 Baydoun, A.R., Emery, P.W., Pearson, J.D. and Mann, G.E.: Substrate-dependent regulation of intracellular amino acid concentrations in cultured bovine aortic endothelial cells. *Biochem. Biophys. Res. Commun.*, 173 (1990) 940-948.
- 1697 Beving, H., Olsson, U., Bengard, A., Kristensson, J., Palmberg, J. and Sollenberg, J.: High-performance liquid chromatographic analysis of hippuric acid in human blood plasma. *J. Chromatogr.*, 532 (1990) 45-53.
- 1698 Birwe, H. and Hesse, A.: Trennung von Aminosäuren im Harn mit HPLC. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 698.
- 1699 Bourque, A.J. and Krull, I.S.: Solid-phase reagent containing the 3,5-dinitrophenyl tag for the improved derivatization of chiral and achiral amines, amino alcohols and amino acids in high-performance liquid chromatography with ultraviolet detection. *J. Chromatogr.*, 537 (1991) 123-152.
- 1700 Brückner, H. and Keller-Hoehl, C.: HPLC separation of DL-amino acids derivatized with N²-(5-fluoro-2,4-dinitrophenyl)-L-amino acid amides. *Chromatographia*, 30 (1990) 621-629.
- 1701 Cahnmann, H.J., Goncalves, E., Ito, Y., Fales, H.M. and Sokoloski, E.A.: Synthesis and characterization of N-bromoacetyl-3,3',5-triiodo-L-thyronine. *J. Chromatogr.*, 538 (1991) 165-175.
- 1702 Chase, G.W., Jr., Landen, W.O., Jr. and Soliman, A.-G.M.: Hypoglycin A content in the aril, seeds, and husks of ackee fruit at various stages. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 318-319.
- 1703 Chenais, B., Yapo, A., Lepoivre, M. and Tenu, J.P.: High-performance liquid chromatographic analysis of the unusual pathway of oxidation of L-arginine to citrulline and nitric oxide in mammalian cells. *J. Chromatogr.*, 539 (1991) 433-441.
- 1704 Cowan, R. and Whittaker, R.C.: Hydrophobicity indexes for amino acid residues as determined by high-performance liquid chromatography. *Pept. Res.*, 3 (1990) 75-80; *C.A.*, 113 (1990) 147418c.
- 1705 Cross, R. and Cunico, R.: (Determination of aspartate in beverages and beverage powders by reversed-phase HPLC). *Lab. 2000*, 3 (1989) 15-17; *C.A.*, 113 (1990) 150937b.
- 1706 Dou, L. and Krull, I.S.: Post-column detection by on-line photolysis-electrochemistry in liquid chromatography: application to the determination of phenylalanine in human urine. *J. Pharm. Biomed. Anal.*, 8 (1990) 493-498.

- 1707 Dunn, J.A., Ahmed, M.U., Murtiashaw, M.H., Richardson, J.M., Walla, M.D., Thorpe, S.R. and Baynes, J.W.: Reaction of ascorbate with lysine and protein under autoxidizing conditions: formation of N^ε-(carboxymethyl)lysine by reaction between lysine and products of autoxidation of ascorbate. *Biochemistry*, 29 (1990) 10964-10970.
- 1708 Federici, F., Girelli, A.M., Messina, A., Nicoletti, I. and Sinibaldi, M.: Enantiomeric resolution of amino acids by reversed phase high performance liquid chromatography using a new chiral mobile phase. *Anal. Lett.*, 23 (1990) 1565-1579.
- 1709 Fermo, I., de Vecchi, E., Diomede, L. and Paroni, R.: Serum amino acid analysis with pre-column derivatization: comparison of the *o*-phthaldialdehyde and N,N-diethyl-2,4-dinitro-5-fluoroaniline methods. *J. Chromatogr.*, 534 (1990) 23-35.
- 1710 Fujimura, K., Suzuki, S., Hayashi, K. and Masuda, S.: Retention behavior and chiral recognition mechanism of several cyclodextrin-bonded stationary phases for dansyl amino acids. *Anal. Chem.*, 62 (1990) 2198-2205.
- 1711 Gandini, C., Caccialanza, G., Kitsos, M., Massolini, G. and de Lorenzi, E.: Determination of 5-aminosalicylic acid and related compounds in raw materials and pharmaceutical dosage forms by high-performance liquid chromatography. *J. Chromatogr.*, 540 (1991) 416-421.
- 1712 Green, T.R., Fellman, J.H., Eicher, A.L. and Pratt, K.L.: Antioxidant role and subcellular location of hypotaurine and taurine in human neutrophils. *Biochim. Biophys. Acta*, 1073 (1991) 91-97.
- 1713 Haynes, P.A., Sheumack, D., Kibby, J. and Redmond, J.W.: Amino acid analysis using derivatization with 9-fluorenylmethyl chloroformate and reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 540 (1991) 177-185.
- 1714 Hsieh, Y.Z., Beale, S.C., Wiesler, D. and Novotny, M.: 3-Benzoyl-2-naphthaldehyde, a new fluorogenic reagent for microcolumn liquid chromatography-laser-induced fluorescence detection of amino acids. *J. Microcol. Sep.*, 1 (1989) 96-100; *C.A.*, 113 (1990) 164706n.
- 1715 Inman, E.L., Clemens, R.L. and Olsen, B.A.: Determination of EDTA in vancomycin by liquid chromatography with absorbance ratioing for peak identification. *J. Pharm. Biomed. Anal.*, 8 (1990) 513-520.
- 1716 Jegorov, A., Matha, V., Trnka, T. and Cerny, M.: Enantiomeric separation of leucines. *J. High Resolut. Chromatogr.*, 13 (1990) 718-720.
- 1717 Koshiishi, I., Kobori, Y. and Imanari, T.: Determination of citrulline and homocitrulline by high-performance liquid chromatography with post-column derivatization. *J. Chromatogr.*, 532 (1990) 37-43.
- 1718 Lalla, J.K. and Haeems, A.D.: Preparation of protein hydrolyzates. II. Amino acid analysis of prepared vs market samples. *Indian Drugs*, 27 (1990) 385-389; *C.A.*, 113 (1990) 198089d.
- 1719 Libera, L.D.: Determination of 3-methylhistidine in hydrolysed proteins by fluorescamine derivatization and high-performance liquid chromatography. *J. Chromatogr.*, 536 (1991) 283-288.
- 1720 Lichy, A., Macek, J. and Adam, M.: Determination of hydroxylysylpyridinoline in tissues and urine by high-performance liquid chromatography. *J. Chromatogr.*, 563 (1991) 153-157.
- 1721 Lin, S.-L., Chen, S.-T., Wu, S.-H. and Wang, K.-T.: Separation of aspartame and its precursor stereoisomers by chiral chromatography. *J. Chromatogr.*, 540 (1991) 392-396.
- 1722 Lundsjö, A., Hagelberg, S., Palmer, K. and Lindblad, B.S.: Amino acid profiles by HPLC after filter paper sampling: "appropriate technology" for monitoring of nutritional status. *Clin. Chim. Acta*, 191 (1990) 201-210.
- 1723 Müller-Michel, T. and Böhlen, P.: A method for the unambiguous identification of tryptophan in automated protein sequence analysis. *Anal. Biochem.*, 191 (1990) 169-173.

- 1724 Nerland, D.E. and Pierce, W.W., Jr.: Identification of N-acetyl-S-(2,5-dihydroxyphenyl)-L-cysteine as a urinary metabolite of benzene, phenol, and hydroquinone. *Drug Metab. Disp.*, 18 (1990) 958-961.
- 1725 Prieto, J.A., Collar, C. and de Barber, C.B.: Reversed-phase high-performance liquid chromatographic determination of biochemical changes in free amino acids during wheat flour mixing and bread baking. *J. Chromatogr. Sci.*, 28 (1990) 572-577.
- 1726 Ruban, V.F.: Rapid determination of phenylalanine in plasma by capillary high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 563 (1991) 134-141.
- 1727 Sarwar, G. and Botting, H.G.: Rapid analysis of nutritionally important free amino acids in serum and organs (liver, brain, and heart) by liquid chromatography of precolumn phenylisothiocyanate derivatives. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 470-475.
- 1728 Scott, P.H., Sandham, S., Balmer, S.E. and Wharton, B.A.: Diet-related reference values for plasma amino acids in newborns measured by reversed-phase HPLC. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1922-1927.
- 1729 Thoma, R.S. and Crimmins, D.L.: Automated phenylthiocarbonyl amino acid analysis of carboxypeptidase/aminopeptidase digests and acid hydrolysates. *J. Chromatogr.*, 537 (1991) 153-165.
- 1730 Ueno, S.-i., Kotani, K., Sano, A. and Kakimoto, Y.: Isolation and identification of α -(β -alanyl)hypusine from bovine brain. *Biochim. Biophys. Acta*, 1073 (1991) 233-235.
- 1731 Van der Meer, J.M.: Amino acid analysis of feeds in the Netherlands: four-year proficiency study. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 394-398.
- 1732 Varshney, K.G., Khan, A.A. and Maheshwari, S.M.: Adsorption behavior of antimony(V) phosphate for α -amino acids: some binary separations of its column. *Environ. Prot.*, 9 (1989) 574-576; *C.A.*, 113 (1990) 243955w.
- 1733 Voelter, W., Grübler, G., Gutjahr, F. and Echner, H.: An HPLC system for use in the development of new arginine protecting groups. *Chromatographia*, 30 (1990) 719-723.
- 1734 Weissbach, F., Siegler, K., Kreibich, G., Henrion, R. and Henrion, G.: (Comparison of methods for L-lysine determination in amino acid mixtures - Multivariate evaluation of data from similar samples). *Nahrung*, 34 (1990) 527-537; *C.A.*, 114 (1991) 4941c.
- 1735 Yamazaki, S., Takeuchi, T. and Tanimura, T.: Direct enantiomeric separation of β -amino acids and β -amino alcohols by ligand-exchange chromatography. *J. Chromatogr.*, 540 (1991) 169-175.
- 1736 Zanol, M. and Gastaldo, L.: High-performance liquid chromatographic separation of the three stereoisomers of diaminopimelic acid in hydrolysed bacterial cells. *J. Chromatogr.*, 536 (1991) 211-216.
- 1737 Zu Hoene, T. and Tondock, K.: (Analysis of amino acids in food and feed by HPLC). *GIT Fachz. Lab.*, 34 (1990) 732-734; *C.A.*, 113 (1990) 170558g.

For additional information see:

C.A., 113 (1990) 148197s, 168469k, 170739s, 178389y, 198090x, 209964p,
227355v, 229700c;
114 (1991) 2792f.

See also 1330, 1366, 1378, 1665, 1682, 1774, 1832, 1835, 2064, 2251,
2269, 2326.

18b. Peptides, peptidic and proteinous hormones, growth factors

- 1738 Badamchian, M., Strickler, M.P., Stone, M.J. and Goldstein, A.L.: Rapid micro isolation of thymosin β_4 from human thymus by reversed-phase high performance liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3439-3453.
- 1739 Bayne, S., Hoogerbrugge, C.M., Thomsen, J., Skriver, L., van Buul-Offers, S.C. and van den Brande, J.L.: Primary sequences of insulin-like growth factors 1 and 2 isolated from porcine plasma. *J. Chromatogr.*, 562 (1991) 391-402.
- 1740 Beaubien, B.C., Collins, P.D., Jose, P.J., Totty, N.F., Hsuan, J., Waterfield, M.D. and Williams, T.J.: A novel neutrophil chemoattractant generated during an inflammatory reaction in the rabbit peritoneal cavity *in vivo*. Purification, partial amino acid sequence and structural relationship to interleukin 8. *Biochem. J.*, 271 (1990) 797-801.
- 1741 Benzi, L., Cecchetti, P., Ciccarone, A.M., di Cianni, G., Iozzi, L.C., Caricato, F. and Navalesi, R.: Insulin degradation *in vivo*: a high-performance liquid chromatographic analysis. *J. Chromatogr.*, 534 (1990) 37-46.
- 1742 Braunsteinova, M., Svoboda, I. and Sabartova, J.: (Evaluation of insulin by HPLC. I.) *Cesk. Farm.*, 39 (1990) 223-226; *C.A.*, 113 (1990) 218321d - a review with 77 refs.
- 1743 Brown, M.R., Vaughan, J., Walsh, J., Jimenez, L., Hexum, T.D., Baird, A. and Vale, W.: Endothelin releasing activity in calf serum and porcine follicular fluid. *Biochem. Biophys. Res. Commun.*, 173 (1990) 807-815.
- 1744 Buckley, M.G., Sagnella, G.A., Markandu, N.D., Singer, D.R.J. and MacGregor, G.A.: Concentrations of N-terminal ProANP in human plasma: evidence for ProANP (1-98) as the circulating form. *Clin. Chim. Acta*, 191 (1990) 1-14.
- 1745 Burke, G.T., Hu, S.Q., Ohta, N., Schwartz, G.P., Zong, L. and Katsoyannis, P.G.: Superactive insulins. *Biochem. Biophys. Res. Commun.*, 173 (1990) 982-987.
- 1746 Chicheportiche, D., Darquy, S., Lepeintre, J., Capron, F., Halban, P.A. and Reach, G.: High-performance liquid chromatography analysis of circulating insulins distinguishes between endogenous insulin production (a potential pitfall with streptozotocin diabetic rats) and islet xenograft function. *Diabetologia*, 33 (1990) 457-461; *C.A.*, 113 (1990) 204912k.
- 1747 Cho, K.W., Seul, K.H., Kim, S.H., Koh, G.Y., Seul, K.M. and Hwang, Y.H.: Sequential mechanism of atrial natriuretic peptide secretion in isolated perfused rabbit atria. *Biochem. Biophys. Res. Commun.*, 172 (1990) 423-431.
- 1748 Chu, F.S., Huang, X. and Wei, R.D.: Enzyme-linked immunosorbent assay for microcystins in blue-green algal blooms. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 451-456.
- 1749 Codini, M., Palmerini, C.A., Fini, C., Lucarelli, C. and Floridi, A.: High-performance liquid chromatographic method for the determination of prolyl peptides in urine. *J. Chromatogr.*, 536 (1991) 337-341.
- 1750 Cole, S.M., Macrae, P.V., Merson, J.R., Pullen, F.S. and Rance, D.J.: Micro-bore liquid chromatography coupled to a flow fast atom bombardment probe for the on-line detection of the Tyr-Pro cleavage of a nonapeptide by recombinant HIV-1 protease. *J. Chromatogr.*, 562 (1991) 67-72.
- 1751 Di Bello, C., Lucchiari, A., Buso, O. and Coldani, R.: HPLC purification of solid-phase generated synthetic bombesin. *J. Liq. Chromatogr.*, 13 (1990) 3289-3311.
- 1752 Eng, J., Andrews, P.C., Kleinman, W.A., Singh, L. and Raufman, J.-P.: Purification and structure of exendin-3, a new pancreatic secretagogue isolated from *Heloderma horridum* venom. *J. Biol. Chem.*, 265 (1990) 20259-20262.
- 1753 Fell, A.F., Castledine, J.B., Sellberg, B., Modin, R. and Weinberger, R.: Post-column continuous-flow analysis combined with reversed-phase liquid chromatography and computer-aided detection for the characterisation of peptides. *J. Chromatogr.*, 535 (1990) 33-39.

- 1754 Forsberg, G., Palm, G., Ekebacke, A., Josephson, S. and Hartmanis, M.: Separation and characterization of modified variants of recombinant human insulin-like growth factor I derived from a fusion protein secreted from *Escherichia coli*. *Biochem. J.*, 271 (1990) 357-363.
- 1755 Freeman, T.C., Davies, R. and Calam, J.: Interactions of pancreatic secretory trypsin inhibitor in small intestinal juice: its hydrolysis and protection by intraluminal factors. *Clin. Chim. Acta*, 195 (1990) 27-40.
- 1756 Gao, S., Duan, H. and Zhou, H.: Study of the reaction of glutathione with 2,2,6,6,-tetramethyl-4-hydroxy piperidine nitroxide by RP-HPLC. *J. Liq. Chromatogr.*, 13 (1990) 3261-3268.
- 1757 Glauner, B. and Hölzje, J.-V.: Growth pattern of the murein sacculus of *Escherichia coli*. *J. Biol. Chem.*, 265 (1990) 18988-18996.
- 1758 Hammond, J.W., Potter, M., Truscott, R. and Wilcken, B.: γ -Glutamylglutamine identified in plasma and cerebrospinal fluid from hyperammonaemic patients. *Clin. Chim. Acta*. 194 (1990) 173-184.
- 1759 Hanssens, M., Veirse, M.J.N.C., Lijnen, P.J., Kucharski, M.J., Luyten, C. and van Assche, F.A.: Measurement of individual angiotensin peptides by HPLC-RIA. *J. Biochem. Biophys. Methods*, 21 (1990) 103-113; *C.A.*, 113 (1990) 204906m.
- 1760 Hayashi, H., Nakano, M., Shibanaka, Y. and Fujita, N.: Expression of a silkworm eclosion hormone gene in yeast. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1065-1071.
- 1761 Hermann, K., Ring, J. and Phillips, M.I.: High-performance liquid chromatography for the separation of angiotensin and its metabolites in human plasma and sweat. *J. Chromatogr. Sci.*, 28 (1990) 524-528.
- 1762 Hortin, G.L.: Isolation of glycopeptides containing O-linked oligosaccharides by lectin affinity chromatography on jacalin-agarose. *Anal. Biochem.*, 191 (1990) 262-267.
- 1763 Hrubey, T.W. and Roach, P.J.: Phosphoserine in peptide substrates can specify casein kinase II action. *Biochem. Biophys. Res. Commun.*, 172 (1990) 190-196.
- 1764 Izzo, R.S., Pellecchia, C., Weinstein, M.I. and Massimillo, A.J.: Preparation and characterization of a fully active biotinylated probe of cholecystokinin. *Prepar. Biochem.*, 20 (1990) 205-217.
- 1765 Keefer, J.F. and Mong, S.: Identification and characterization of the substance P receptor in sheep intestinal smooth muscle membranes. *J. Pharmacol. Exp. Ther.*, 255 (1990) 120-127.
- 1766 Knight, M., Gluch, S., Takahashi, K., Dang, T. and Kahn, R.A.: Purification of a synthetic myristylated peptide by counter-current chromatography. *J. Chromatogr.*, 538 (1991) 141-147.
- 1767 Komoda, Y., Honda, K. and Inoue, S.: SPS-B, a physiological sleep regulator, from the brainstems of sleep-deprived rats, identified as oxidized glutathione. *Chem. Pharm. Bull.*, 38 (1990) 2057-2059.
- 1768 Krystek, S.R., Jr., Dias, J.A. and Andersen, T.T.: Identification of subunit contact sites on the α -subunit of lutropin. *Biochemistry*, 30 (1991) 1858-1864.
- 1769 Kusai, A., Matsuura, K. and Tanaka, K.: (Peptide monitoring by FRIT-FAB LC/MS (liquid chromatography/mass spectrometry)). *Nippon Iyo Masu Supekutoru Gakkai Koenshu*, 14 (1990) 225-228; *C.A.*, 113 (1990) 148313b.
- 1770 Ladisch, M.R., Hendrickson, R.L. and Firouztale, E.: Analytical- and preparative-scale chromatographic separation of phenylalanine from aspartame using a new polymeric sorbent. *J. Chromatogr.*, 540 (1991) 85-101.
- 1771 Laethem R. and Zull, J.E.: Characterization of the interaction of parathyroid hormone with the mitochondrial ATPase. *Arch. Biochem. Biophys.*, 282 (1990) 161-169.

- 1772 Le Greves, P., Sundqvist, C. and Nyberg, F.: Enzymatic and radioimmunoassay procedures combined with electrophoresis and HPLC for the recovery and characterization of substance P in human brain. *Prepar. Biochem.*, 20 (1990) 145-161.
- 1773 Linde, S. and Welinder, B.S.: Non-ideal behaviour of silica-based stationary phases in trifluoroacetic acid-acetonitrile-based reversed-phase high-performance liquid chromatographic separations of insulins and proinsulins. *J. Chromatogr.*, 536 (1991) 43-55.
- 1774 Linnekin, D. and Farrar, W.L.: Signal transduction of human interleukin 3 and granulocyte-macrophage colony-stimulating factor through serine and tyrosine phosphorylation. *Biochem. J.*, 271 (1990) 317-324.
- 1775 Liu, D. and Mc Adoo, D.J.: High-performance liquid chromatography of arginine-containing neuropeptides by precolumn derivatization and fluorimetric detection. *J. Liq. Chromatogr.*, 13 (1990) 2049-2957.
- 1776 Lovelace, J.L., Kusmierz, J.J. and Desiderio, D.M.: Analysis of methionine enkephalin in human pituitary by multi-dimensional reversed-phase high-performance liquid chromatography, radioreceptor assay, radioimmunoassay, fast atom bombardment mass spectrometry, and mass spectrometry-mass spectrometry. *J. Chromatogr.*, 562 (1991) 573-584.
- 1777 Machida, R., Tokumura, T., Sasaki, A., Tsuchiya, Y. and Abe, K.: High-performance liquid chromatographic determination of (Me)Arg-Lys-Pro-Trp-tert.-Leu-Leu in plasma. *J. Chromatogr.*, 534 (1990) 190-195.
- 1778 Mayer, W.J., Long, D.A. and Parikh, D.K.: Phosphate-gradient high-performance liquid chromatographic method for the analysis of synthetic salmon calcitonin. *J. Chromatogr.*, 536 (1991) 131-135.
- 1779 Mindroiu, T., Carretero, O.A., Walz, D. and Scicli, A.G.: Tissue kallikrein processes small proenkephalin peptides. *Biochim. Biophys. Acta*, 1076 (1991) 9-14.
- 1780 Munera, M.E., Borger, F.R., Flanigan, E. and Parikh, D.K.: Cation-exchange high-performance liquid chromatography of synthetic salmon calcitonin. *J. Chromatogr.*, 536 (1991) 123-129.
- 1781 Patel, H.B., Stobaugh, J.F. and Riley, C.M.: Reversed-phase ion-pair liquid chromatography of the angiotensins. *J. Chromatogr.*, 536 (1991) 357-370.
- 1782 Poll, D.J. and Harding, D.R.K.: Column-friendly reversed-phase high-performance liquid chromatography of peptides and proteins using formic acid with sodium chloride and dynamic column coating with crown ethers. *J. Chromatogr.*, 539 (1991) 37-45.
- 1783 Pramanik, B.N., Tsarbobopoulos, A., Labdon, J.E., Trotta, P.P. and Nagabhusan, T.L.: Structural analysis of biologically active peptides and recombinant proteins and their modified counterparts by mass spectrometry. *J. Chromatogr.*, 562 (1991) 377-389.
- 1784 Rao, P.S., Weinstein, G.S., Wilson, D.W., Rujikarn, N. and Tyras, D.H.: Isocratic high-performance liquid chromatography-photodiode-array detection method for determination of lysine- and arginine-vasopressins and oxytocin in biological samples. *J. Chromatogr.*, 536 (1991) 137-142.
- 1785 Reh, E. and Kapfer, U.: Examination of new stationary phases for the reversed-phase chromatography of peptides. *Chromatographia*, 30 (1990) 663-674.
- 1786 Robitzki, A., Schröder, H.C., Ugarkovic, D., Gramzow, M., Fritsche, U., Batel, R. and Müller, W.E.G.: cDNA Structure and expression of calpactin, a peptide involved in Ca^{2+} -dependent cell aggregation in sponges. *Biochem. J.*, 271 (1990) 415-420.
- 1787 Sakakibara, R., Miyazaki, S. and Ishiguro, M.: A nicked β -subunit of human chorionic gonadotropin purified from pregnancy urine. *J. Biochem. (Tokyo)*, 107 (1990) 858-862.

- 1788 Sawamura, T., Shinmi, O., Kishi, N., Sugita, Y., Yanagisawa, M., Goto, K., Masaki, T. and Kimura, S.: Analysis of big endothelin-1 digestion by cathepsin D. *Biochem. Biophys. Res. Commun.*, 172 (1990) 883-889.
- 1789 Scanff, P., Yvon, M. and Pelissier, J.P.: Immobilized Fe³⁺ affinity chromatographic isolation of phosphopeptides. *J. Chromatogr.*, 539 (1991) 425-432.
- 1790 Shai, Y., Bach, D. and Yanovsky, A.: Channel formation properties of synthetic pardaxin and analogues. *J. Biol. Chem.*, 265 (1990) 20202-20209.
- 1791 Sherry, B., Jue, D.-M., Zentella, A. and Cerami, A.: Characterization of high molecular weight glycosylated forms of murine tumor necrosis factor. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1072-1078.
- 1792 Simpson, R.C., Emary, W.B., Lys, I., Cotter, R.J. and Fenselau, C.C.: High-performance liquid chromatography-time-of-flight mass spectrometry and its application to peptide analyses. *J. Chromatogr.*, 536 (1991) 143-153.
- 1793 Slonina, P. and Seidel, A.: Breakthrough curves of insulin, [D-Phe⁶]-gonadotropin-releasing hormone and phenylalanine methyl ester on copolymers of acrylacrylate and divinylbenzene. *J. Chromatogr.*, 537 (1991) 167-180.
- 1794 Smedsrod, B., Melkko, J., Risteli, L. and Risteli, J.: Circulating C-terminal propeptide of type I procollagen is cleared mainly via the mannose receptor in liver endothelial cells. *Biochem. J.*, 271 (1990) 345-350.
- 1795 Stone, B.A., Quinn, P. and Marrs, R.P.: Between-lot variability in chromatographic and biochemical properties of hMG. *Acta Endocrinol.*, 123 (1990) 161-166; *C.A.*, 113 (1990) 218039t.
- 1796 Stuting, H.H. and Krull, I.S.: Determination of pituitary and recombinant human growth hormone molecular weights by modern high-performance liquid chromatography with low angle laser light scattering detection. *J. Chromatogr.*, 539 (1991) 91-109.
- 1797 Svoboda, M., Przybylski, M., Schreurs, J., Miyajima, A., Hogeland, K. and Deinzer, M.: Mass spectrometric determination of glycosylation sites and oligosaccharide composition of insect-expressed mouse interleukin-3. *J. Chromatogr.*, 562 (1991) 403-419.
- 1798 Tagliaro, F., Schiavon, G., Bontempelli, G., Carli, G. and Marigo, M.: Improved high-performance liquid chromatographic determination with amperometric detection of α -amanitin in human plasma based on its voltammetric study. *J. Chromatogr.*, 563 (1991) 299-311.
- 1799 Takio, K. and Chitani, K.: (Microanalysis of peptides). *Kagaku Zokan (Kyoto)*, (1990) 161-171; *C.A.*, 113 (1990) 227287z - a review with 8 refs.
- 1800 Tanaka, N., Kimata, K., Mikawa, Y., Hosoya, K., Araki, T., Ohtsu, Y., Shiojima, Y., Tsuboi, R. and Tsuchiya, H.: Performance of wide-pore silica- and polymer-based packing materials in polypeptide separation: effect of pore size and alkyl chain length. *J. Chromatogr.*, 535 (1990) 13-31.
- 1801 Toki, Y., Ito, T., Shiono, S., Siegel, N.G., Gierse, J.K., Wilkins, M.R. and Needleman, P.: Alternative mechanisms for atriopeptin prohormone processing by isolated perfused rat hearts. *J. Pharmacol. Exp. Ther.*, 254 (1990) 228-235.
- 1802 Uchida, K. and Kawakishi, S.: Formation of the 2-imidazolone structure within a peptide mediated by a copper(II) ascorbate system. *J. Agric. Food Chem.*, 38 (1990) 1896-1899.
- 1803 Varro, A., Nemeth, J., Bridson, J., Lee, C., Moore, S. and Dockray, G.J.: Processing of the gastrin precursor. Modulation of phosphorylated, sulfated, and amidated products. *J. Biol. Chem.*, 265 (1990) 21476-21481.
- 1804 Warden, B.A., Sentissi, A., Ehrat, M., Cecchini, D.J., Alam, K. and Giese, R.W.: Chromatographic enzyme immunoassay for T-2 toxin. *J. Immunol. Methods*, 131 (1990) 77-82; *C.A.*, 113 (1990) 225859p.
- 1805 Westcott, J.Y., Johnston, K., Batt, R.A. and Wenzel, S.E.: Measurement of peptidoleukotrienes in biological fluids. *J. Appl. Physiol.*, 68 (1990) 2640-2648; *C.A.*, 113 (1990) 148289y.

- 1806 Wilce, M.C.J., Aguilar, M.I. and Hearn, M.T.W.: High-performance liquid chromatography of amino acids, peptides and proteins. CVII. Analysis of group retention contributions for peptides separated with a range of mobile and stationary phases by reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 536 (1991) 165-183.
- 1807 Wolz, R.L. and Bond, J.S.: Phe⁵(4-nitro)-bradykinin: a chromogenic substrate for assay and kinetics of the metalloendopeptidase meprin. *Anal. Biochem.*, 191 (1990) 314-320.
- 1808 Yasui, T. and Saruta, T.: Radioimmunoassay of kinins and its application to purification of kininogens. *Adv. Exp. Med. Biol.*, 247 (Kinins 5, Pt. B) (1989) 325-330; *C.A.*, 113 (1990) 165511g.
- 1809 Yoshihara, A., Kozawa, H., Minamino, N., Kangawa, K. and Matsuo, H.: Isolation and sequence determination of frog C-type natriuretic peptide. *Biochem. Biophys. Res. Commun.*, 173 (1990) 591-598.
- 1810 Zardeneta, G., Chen, D., Weintraub, S.T. and Klebe, R.J.: Synthesis of phosphotyrosyl-containing phosphopeptides by solid-phase peptide synthesis. *Anal. Biochem.*, 190 (1990) 340-347.
- 1811 Zhang, G.Q., Kai, M. and Ohkura, Y.: Determination of seven opioid peptides in rat brain by high-performance liquid chromatography with on-line postcolumn fluorescence derivatization. *Anal. Sci.*, 6 (1990) 671-676; *C.A.*, 114 (1991) 649r.

For additional information see:

C.A., 113 (1990) 145393s, 185393y, 224563a, 227553h;
114 (1991) 2873h.

See also 1280, 1304, 1333, 1341, 1373, 1379, 1696, 1721, 1832, 1834,
1835, 1843, 1850, 1852, 1863, 1897, 1923, 1944, 2005, 2040,
2049, 2064, 2218, 2670.

18c. Elucidation of structure of proteins and enzymes

- 1812 Barra, D., Fioretti, E., Angeletti, M., Maras, B., Bossa, F. and Ascoli, F.: Proteinase isoinhibitors from bovine spleen: primary structure of an intermediate in the processing of the precursor. *Biochim. Biophys. Acta*, 1076 (1991) 143-147.
- 1813 Baumann, M.: Comparative gas phase and pulsed liquid phase sequencing on a modified Applied Biosystems 477A sequencer. *Anal. Biochem.*, 190 (1990) 198-208.
- 1814 Calaycay, J., Rusnak, M. and Shively, J.E.: Microsequence analysis of peptides and proteins. *Anal. Biochem.*, 192 (1991) 23-31.
- 1815 Jiao, J.-a., Podesta, F.E., Chollet, R., O'Leary, M.H. and Andreo, C.S.: Isolation and sequence of an active-site peptide from maize leaf phosphoenolpyruvate carboxylase inactivated by pyridoxal 5'-phosphate. *Biochim. Biophys. Acta*, 1041 (1990) 291-295.
- 1816 Kamiya, Y., Oyama, F., Oyama, R., Sakakibara, F., Nitta, K., Kawauchi, H., Takayanagi, Y. and Titani, K.: Amino acid sequence of a lectin from Japanese frog (*Rana japonica*). *J. Biochem. (Tokyo)*, 108 (1990) 139-143.
- 1817 Miyata, T.: (Peptide mapping by high-performance liquid chromatography). *Kagaku Zokan (Kyoto)*, (1990) 153-160; *C.A.*, 113 (1990) 227288a - a review with 11 refs.
- 1818 Mizioroko, H.M., Behnke, C.E. and Wang, H.-H.L.: Mapping of reactive sulfhydryls in avian liver 3-hydroxy-3-methylglutaryl coenzyme A synthase. *Biochim. Biophys. Acta*, 1041 (1990) 273-278.
- 1819 Narahashi, Y.: The amino acid sequence of zinc-carboxypeptidase from *Streptomyces griseus*. *J. Biochem. (Tokyo)*, 107 (1990) 879-886.

- 1820 Oyama, R., Suzuki, M., Matsuzawa, T. and Titani, K.: Complete amino acid sequence of rat kidney ornithine aminotransferase: identity with liver ornithine aminotransferase. *J. Biochem. (Tokyo)*, 108 (1990) 133-138.
- 1821 Pikuleva, I.A., Turko, I.V., Adamovich, T.B. and Chashchin, V.L.: (Chemical modification of rabbit IgG with N-dansylaziridine. Investigation of properties of dansylated antibodies). *Biokhimiya (Moscow)*, 55 (1990) 2200-2210.
- 1822 Scheibe, R., Kampfenkel, K., Wessels, R. and Tripiet, D.: Primary structure and analysis of the location of the regulatory disulfide bond of pea chloroplast NADP-malate dehydrogenase. *Biochim. Biophys. Acta*, 1076 (1991) 1-8.
- 1823 Shackleton, C.H.L., Falick, A.M., Green, B.N. and Witkowska, H.E.: Electro-spray mass spectrometry in the clinical diagnosis of variant hemoglobins. *J. Chromatogr.*, 562 (1991) 175-190.
- 1824 Sottrup-Jensen, L., Hansen, H.F., Pedersen, H.S. and Kristensen, L.: Localization of ϵ -lysyl- γ -glutamyl cross-links in five human α_2 -macroglobulin-proteinase complexes. Nature of the high molecular weight cross-linked products. *J. Biol. Chem.*, 265 (1990) 17727-17737.
- 1825 Tsao, F.H.C., Hull, W.M., Strickland, M.S., Whitsett, J.A., Foo, T.K.F., Zografis, G. and DeLuca, P., Jr.: Lung calcium-dependent phospholipid-binding proteins: structure and function. *Biochim. Biophys. Acta*, 1981 (1991) 141-150.
- 1826 Wajcman, H., Kister, J., Marden, M., Bohn, B., Blouquit, Y., Descamps, J., Goudemand, M., Poyart, C. and Galacteros, F.: Hemoglobin Calais [β 76 (E20) Ala \rightarrow Pro]: a hemoglobin variant with decreased intrinsic oxygen affinity. *Biochim. Biophys. Acta*, 1096 (1990) 60-66.
- 1827 Yannoukakos, D., Vasseur, C., Piau, J.-P., Wajcman, H. and Bursaux, E.: Phosphorylation sites in human erythrocyte band 3 protein. *Biochim. Biophys. Acta*, 1061 (1991) 253-266.

For additional information see:

C.A., 113 (1990) 231989x.

See also 1354, 1871, 1883, 1886, 1888, 1896, 1897, 1904, 1905, 1910, 1912, 1940, 1948, 1949, 1974, 1975, 1979, 1988, 2004, 2014, 2026, 2031, 2050, 2057, 2077, 2126, 2139, 2140, 2154, 2159, 2161, 2176.

19. PROTEINS

19a. General techniques

- 1828 Ackland, C., Berndt, W.G., Frezza, J.E., Landgraf, B., Pritchard, K.W. and Ciardelli, T.L.: Monitoring of protein conformation by high-performance size-exclusion liquid chromatography and scanning diode array second-derivative UV absorption spectroscopy. *J. Chromatogr.*, 540 (1991) 187-198.
- 1829 Birkenmeier, G., Vijayalakshmi, M.A., Stigbrand, T. and Kopperschlager, G.: Immobilized metal ion affinity partitioning, a method combining metal-protein interaction and partitioning of proteins in aqueous two-phase systems. *J. Chromatogr.*, 539 (1991) 267-277.
- 1830 Blanco, R.: Kinetic and equilibrium studies of protein adsorption in hydrophobic interaction chromatography. Avail. *Univ. Microfilms Int.*, Order No. DA9007718, 1989, 190 p.; *C.A.*, 113 (1990) 238685d.
- 1831 Dion, D.M., O'Connor, K., Phillips, D., Vella, G.J. and Warren, W.: New family of high-resolution ion exchangers for protein and nucleic acid purifications from laboratory to process scales. *J. Chromatogr.*, 535 (1990) 127-145.

- 1832 Dou, L., Mazzeo, J. and Krull, I.S.: Determination of amino acids, peptides and proteins by HPLC combined with electrochemical detection. *BioChromatography*, 5 (1990) 74-96; *C.A.*, 113 (1990) 187371p - a review with 139 refs.
- 1833 Dutta, P.K., Hammons, K., Willibey, B. and Haney, M.A.: Analysis of protein denaturation by high-performance continuous differential viscometry. *J. Chromatogr.*, 536 (1991) 113-121.
- 1834 Eckert, H. and Koller, M.: Derivatizing reagents based on ferrocene for HPLC-ECD determination of peptides and proteins. *J. Liq. Chromatogr.*, 13 (1990) 3399-3414.
- 1835 Engelhardt, H., Krämer, M. and Waldhoff, H.: Enhancement of protein detection by microwave-induced hydrolysis and OPA derivatization. *Chromatographia*, 30 (1990) 523-526.
- 1836 Gonnet, C. and Gonot, G.: (Chromatographic behavior of proteins. Physicochemical aspects and reversed phase chromatography of proteins). *Analisis*, 18 (1990) 381-398; *C.A.*, 113 (1990) 207660n - a review with 166 refs.
- 1837 Huisden, R.E., Kraak, J.C. and Poppe, H.: Method for the characterization of stationary phases for the separation of proteins by high-performance liquid chromatography. *J. Chromatogr.*, 537 (1991) 1-16.
- 1838 Hutchens, T.W. and Yip, T.-T.: Protein interactions with immobilized transition metal ions: quantitative evaluations of variations in affinity and binding capacity. *Anal. Biochem.*, 191 (1990) 160-168.
- 1839 Ivanov, A.E., Verkhovskaya, L.V., Khil'ko, S.N. and Zubov, V.P.: (Rigid, macroporous adsorbents for hydrophobic-interaction chromatography of proteins). *Bioorg. Khim.*, 16 (1990) 1028-1039; *C.A.*, 113 (1990) 227361u.
- 1840 Johansson, G. and Joelsson, M.: Protein-ligand interactions studied on bovine serum albumin with free and polymer-bound Cibacron Blue F3G-A as ligand with reference to affinity partitioning. *J. Chromatogr.*, 537 (1991) 219-233.
- 1841 Katti, A., Huang, J.X. and Guiochon, G.: Prediction of the profiles of the elution bands of proteins in preparative liquid chromatography. *Biotechnol. Bioeng.*, 36 (1990) 288-292; *C.A.*, 113 (1990) 94169p.
- 1842 Mathis, R., Hubert, P. and Dellacherie, E.: Mild hydrophobic interaction chromatography: prediction of chromatographic behaviour by preliminary analysis by "partition between aqueous two-phase systems". *J. Chromatogr.*, 538 (1991) 456-461.
- 1843 Nagae, N., Itoh, H., Nimura, N., Kinoshita, T. and Takeuchi, T.: Rapid separation of proteins and peptides by reversed-phase microcolumn liquid chromatography. *J. Microcol. Sep.*, 3 (1991) 5-9.
- 1844 Omichi, K.: (Isolation and analyses of proteins in clinical medicine). *Kagaku Zokan (Kyoto)*, (1990) 141-151; *C.A.*, 113 (1990) 227289b - a review with 35 refs.
- 1845 Phillips, D.J., Bell-Alden, B., Cava, M., Grover, E.R., Mandeville, W.H., Mastico, R., Sawlivich, W., Vella, G. and Weston, A.: Purification of proteins on an epoxy-activated support by high-performance affinity chromatography. *J. Chromatogr.*, 536 (1991) 95-106.
- 1846 Regnier, F.E., Hearn, M.T.W., Unger, K.K., Janson, J.C. and DeStetano, J.J. (Editors): (*Ninth International Symposium on High-Performance Liquid Chromatography of Proteins, Peptides, and Polynucleotides, Philadelphia, November 6-8, 1989*). *J. Chromatogr.*, Vol. 512, Elsevier, Amsterdam, 1990, 448 p.; *C.A.*, 113 (1990) 227524z.
- 1847 Sasagawa, T., Sakamoto, Y., Kawakami, N. and Kobayashi, Y.: (Application of high-performance liquid chromatography computer expert system to protein chemistry). *Kagaku Zokan (Kyoto)*, (1990) 195-207; *C.A.*, 113 (1990) 227285x - a review with 11 refs.
- 1848 Tashiro, Y., Kataoka, K. and Sakurai, Y.: Frontal chromatographic analysis on dynamic behavior of protein adsorption at polymer surface. *J. Colloid. Interface Sci.*, 140 (1990) 66-74; *C.A.*, 113 (1990) 237810d.

- 1849 Van Osa, C.J.: Polar interfacial interactions in RPLC. *Isr. J. Chem.*, 30 (1990) 251-255; *C.A.*, 113 (1990) 94168n.
- 1850 Welinder, B.S. and Sorensen, H.H.: Alternative mobile phases for the reversed-phase high-performance liquid chromatography of peptides and proteins. *J. Chromatogr.*, 537 (191) 181-199.

For additional information see:

C.A., 113 (1990) 94138c, 94139d, 187592m, 187598t, 207717m.

See also 1280, 1295, 1372, 1718, 1753, 1782, 1800.

19b. Proteins of cells, viruses and subcellular particles

- 1851 Cachia, C., Flamion, P.-J. and Schreiber, J.-P.: Purification of *E. coli* 30S ribosomal proteins by high-performance liquid chromatography under non-denaturing conditions. *J. Chromatogr.*, 539 (1991) 343-353.
- 1852 Dennis, P.B., Brandon, S.D. and Masaracchia, R.A.: Site-specific phosphorylation of a synthetic peptide derived from ribosomal protein S6 by human placenta protein kinases. *Biochem. Biophys. Res. Commun.*, 173 (1990) 673-679.
- 1853 Herwig, S.: Preparation and comparison of RP-HPLC of crosslinked ribosomal protein pairs by chromatography on PLRP- and Vydac-columns. *Chromatographia*, 30 (1990) 696-702.
- 1854 Idziorek, T. and Klatzmann, D.: Functional expression of the CD4 protein after cross-linking to red blood cells with a bifunctional reagent. *Biochim. Biophys. Acta*, 1062 (1991) 39-45.
- 1855 Jacquot-Dourges, M.A., Zhou, F.L., Muller, D. and Jozefonvicz, J.: Affinity chromatography of fibroblast growth factors on coated silica supports grafted with heparin. *J. Chromatogr.*, 539 (1991) 417-424.
- 1856 Meiklejohn, B., Nagle, R.B. and McDaniel, K.M.: Improved methods for separation of human cytokeratins. *Life Sci.*, 47 (1990) 637-645; *C.A.*, 113 (1990) 148217y.
- 1857 Munoz, S.M., Caldera, M., Canevari, S., Tosi, E., Cogliati, T., Colnaghi, M.I. and Conde, F.P.: Fractionation of the ribosome inactivating protein preparations with triazine dyes. *Biochem. Biophys. Res. Commun.*, 173 (1990) 554-560.
- 1858 Seo, Y. and Galloway, D.R.: Purification of the pyocin S2 complex from *Pseudomonas aeruginosa* PA01: analysis of DNase activity. *Biochem. Biophys. Res. Commun.*, 172 (1990) 455-461.
- 1859 Verkhovskaya, L.V., Ulasov, V.I., Kiseleva, E.K., Khilko, S.N. and Tikhonenko, T.I.: (Purification and properties of the hexon antigen from canine adenovirus serotype CAV-1). *Biokhimiya (Moscow)*, 55 (1990) 1996-2001.
- 1860 Wun, T., Huang, M.D., Kretzmer, K.K., Palmier, M.O., Day, K.C., Bullock, J.W., Fok, K.F. and Broze, G.J., Jr.: Immunoaffinity purification and characterization of lipoprotein-associated coagulation inhibitors from Hep G2 hepatoma, Chang liver, and SK hepatoma cells. A comparative study. *J. Biol. Chem.*, 265 (1990) 16096-16101.

For additional information see:

C.A., 113 (1990) 210139e.

See also 1873, 1983.

19c. Proteins synthesized by genetic manipulation, monoclonal antibodies

- 1861 Bailon, P. and Roy, S.K.: Recovery of recombinant proteins by immunoaffinity chromatography. *ACS Symp. Ser.*, 427 (Protein Purif.: Mol. Mech. Large-Scale Processes) (1990) 150-167; *C.A.*, 113 (1990) 148148b - a review with 36 refs.

- 1862 Carr, C., Aykent, S., Kimack, N.M. and Levine, A.D.: Disulfide assignments in recombinant mouse and human interleukin 4. *Biochemistry*, 30 (1991) 1515-1523.
- 1863 Cruz, N., Antonio, S., de Anda, R., Gosset, G. and Bolivar, F.: Preparative isolation by high performance liquid chromatography of human insulin B chain produced in *Escherichia coli*. *J. Liq. Chromatogr.*, 13 (1990) 1517-1528.
- 1864 Deistung, J., Forde, D.M., O'Connell, J.P., Proudfoot, K.A., Eaton, D., Willenbrock, F., Kingaby, R.O., Hughes, B., Angal, S., Catterall, C. et al.: Purification of a hybrid plasminogen activator protein. *J. Chromatogr.*, 539 (1991) 485-492.
- 1865 Favre, E., Pugeaud, P., Raaboud, J.P. and Peringer, P.: Automated HPLC monitoring of broth components on bioreactors. *J. Autom. Chem.*, 11 (1989) 280-283; *C.A.*, 113 (1990) 189693u.
- 1866 George-Nascimento, C., Lowenson, J., Borissenko, M., Calderon, M., Medina-Selby, A., Kuo, J., Clarke, S. and Randolph, A.: Replacement of a labile aspartyl residue increases the stability of human epidermal growth factor. *Biochemistry*, 29 (1990) 9584-9591.
- 1867 Krotkiewski, H., Grönberg, G., Krotkiewska, B., Nilsson, B. and Svensson, S.: The carbohydrate structure of a mouse monoclonal IgG antibody OKT3. *J. Biol. Chem.*, 265 (1990) 20195-20201.
- 1868 Maftouh, M., Ponthus, C., Tuong, A. and Ficard, C.: Liquid secondary ion mass spectrometry applied to structural confirmation of enzymically prepared C-terminal-truncated derivatives of recombinant hirudin. *J. Chromatogr.*, 562 (1991) 421-434.
- 1869 Smith, M.C., Cook, J.A., Furman, T.C., Gesellchen, P.D., Smith, D.P. and Hsiung, H.: Chelating peptide-immobilized metal for affinity chromatography. *ACS Symp. Ser.*, 427 (Protein Purif.: Mol. Mech. Large-Scale Processes) (1990) 168-180; *C.A.*, 113 (1990) 189690r.
- 1870 Tomita, M. and Tsong, T.Y.: Selective production of hybridoma cells: antigenic-based pre-selection of B lymphocytes for electrofusion with myeloma cells. *Biochim. Biophys. Acta*, 1055 (1990) 199-206.
- 1871 Winant, R.C., Lazar, J.B. and Johnson, P.H.: Chemical modifications and amino acid substitutions in recombinant hirudin that increase hirudin-thrombin affinity. *Biochemistry*, 30 (1991) 1271-1277.
- 1872 Yamada, K., Nakajima, Y. and Natori, S.: Production of recombinant sarcotoxin IA in *Bombyx mori* cells. *Biochem. J.*, 272 (1990) 633-636.

For additional information see:

C.A., 113 (1990) 189791z.

See also 1783, 1797, 1911, 1958.

19d. Microbial and plant proteins

- 1873 Bergmann, U. and Wittmann-Liebold, B.: Purification of ribosomal proteins from the extreme halophilic archaeobacterium *Halobacterium marismortui* by high-performance liquid chromatography. *Chromatographia*, 30 (1990) 707-712.
- 1874 Bietz, J.A.: HPLC of cereal endosperm storage proteins. *Chromatogr. Sci.*, 51 (HPLC Biol. Macromol.) (1990) 429-455; *C.A.*, 113 (1990) 96177p - a review with 55 refs.
- 1875 Blinnikova, E.I., Dyng, L.O. and Briko, N.I.: (Heterogeneity of protein components of group A streptococcus cell wall). *Biokhimiya (Moscow)*, 55 (1990) 2031-2037.

- 1876 Bolognesi, A., Barbieri, L., Abbondanza, A., Falasca, A.I., Carnicelli, D., Battelli, M.G. and Stirpe, F.: Purification and properties of new ribosome-inactivating proteins with RNA N-glycosidase activity. *Biochim. Biophys. Acta*, 1087 (1990) 293-302.
- 1877 Eriksson, J.E., Toivela, D., Meriluoto, J.A.O., Karaki, H., Han, Y.-G. and Hartshorne, D.: Hepatocyte deformation induced by cyanobacterial toxins reflects inhibition of protein phosphatases. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1347-1353.
- 1878 Froehlich, J.E., Poorman, R., Reardon, E., Barnum, S.R. and Jaworski, J.G.: Purification and characterization of acyl carrier protein from two cyanobacteria species. *Eur. J. Biochem.*, 193 (1990) 817-825.
- 1879 Johansson, H.J., Pettersson, T.N. and Bergloef, J.H.: Development of a chromatographic process for large-scale purification of staphylococcal enterotoxin B. *J. Chem. Technol. Biotechnol.*, 49 (1990) 233-241; *C.A.*, 113 (1990) 210000c.
- 1880 Kajiwara, T., Horie, N., Tsutsumi, E., Miura, R., Ebina, K. and Yokota, K.: (Molecular weight determination of Asp-hemolysin by high-performance liquid chromatography). *Annu. Rep. Tohoku, Coll. Pharm.*, (1989) 161-164; *C.A.*, 113 (1990) 206943v.
- 1881 Levinson, B.L.: High-performance liquid chromatography analysis of two β -exotoxins produced by some *Bacillus thuringiensis* strains. *ACS Symp. Ser.*, 432 (*Anal. Chem. Bacillus thuringiensis*) (1990) 114-136; *C.A.*, 113 (1990) 207965r.
- 1882 Maslenskova, L., Kurbanova, I.M., Kyurdov, B.A., Dadasheva, S.B., Gadzhieva, R.M., Zanev, Yu. and Gasanov, R.A.: (The role of extrinsic polypeptides of oxygen-evolving Photosystem II particles functioning in higher plants). *Bio-khimiya (Moscow)*, 55 (1990) 2122-2128.
- 1883 Nakaya, K., Omata, K., Okahashi, I., Nakamura, Y., Kolkenbrock, H. and Ulbrich, N.: Amino acid sequence and disulfide bridges of an antifungal protein isolated from *Aspergillus giganteus*. *Eur. J. Biochem.*, 193 (1990) 31-38.
- 1884 Roychowdhury, H.S. and Kapoor, M.: Heat shock response in *Neurospora crassa*: purification and some properties of HSP 80. *Biochem. Cell Biol.*, 68 (1990) 1218-1221.
- 1885 Wittwer, L., Colburn, D., Hickie, L.A. and Sambandan, T.G.: Development of a high-performance liquid chromatography assay for *Bacillus thuringiensis* var. *san diego* δ -endotoxin. *ACS Symp. Ser.*, 432 (*Anal. Chem. Bacillus thuringiensis*) (1990) 70-77; *C.A.*, 113 (1990) 209956n.
- 1886 Yamashita, H., Theerasilp, S., Aiuchi, T., Nakaya, K., Nakamura, Y. and Kurihara, Y.: Purification and complete amino acid sequence of a new type of sweet protein with taste-modifying activity, curculin. *J. Biol. Chem.*, 265 (1990) 15770-15775.

For additional information see:

C.A., 113 (1990) 168312d, 188307g.

See also 2181.

19e. Proteins of blood, serum and blood cells

- 1887 Blank, G.S. and Vetterlein, D.: Quantification of monoclonal antibodies in complex mixtures by protein G high-performance liquid affinity chromatography. *Anal. Biochem.*, 190 (1990) 317-320.
- 1888 Chang, J.: Production, properties, and thrombin inhibitory mechanism of hirudin amino-terminal core fragments. *J. Biol. Chem.*, 265 (1990) 22159-22166.

- 1889 Chen, F.-M., Liu, C.-Z., Gaffar, S.A. and Epstein, A.L.: Chromatographic methods for large-scale preparation of immunoglobulin G_{2a} monoclonal antibodies Lym-1 and TNT-1 F(ab')₂ fragments. *J. Chromatogr.*, 563 (1991) 243-255.
- 1890 Dalgleish, D.G.: Denaturation and aggregation of serum proteins and caseins in heated milk. *J. Agric. Food Chem.*, 38 (1990) 1995-1999.
- 1891 Dandeu, J.P., Rabillon, J., Guillaume, J.L., Camoin, L., Lux, M. and David, B.: Isolation and purification of cat albumin from cat serum by copper ion affinity chromatography: further analysis of its primary structure. *J. Chromatogr.*, 539 (1991) 475-484.
- 1892 Dyr, J.E. and Suttner, J.: Affinity high-performance liquid chromatography on heparin-Glc-Spheron. *J. Chromatogr.*, 563 (1991) 124-128.
- 1893 Gardella, J.E., Ghiso, J., Gorgone, G.A., Marratta, D., Kaplan, A.P., Frangione, B. and Gorevic, P.D.: Intact Alzheimer amyloid precursor protein (APP) is present in platelet membranes and is encoded by platelet mRNA. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1292-1298.
- 1894 Gorchakov, V.D., Sakodynskii, K.I., Lebedin, Yu.S. and Chuchalin, A.G.: Immunoabsorbents for clinical use: *ex vivo* immunoglobulin E removal in allergy. *J. Chromatogr.*, 563 (1991) 166-171.
- 1895 Hatsuzawa, K., Kim, W.-S., Murakami, K. and Nakayama, K.: Purification of mouse Ren 2 prorenin produced in Chinese hamster ovary cells. *J. Biochem. (Tokyo)*, 107 (1990) 854-857.
- 1896 Hirayama, K., Akashi, S., Furuya, M. and Fukuhara, K.-i.: Rapid confirmation and revision of the primary structure of bovine serum albumin by ESIMS and Frit-FAB LC/MS. *Biochem. Biophys. Res. Commun.*, 173 (1990) 639-646.
- 1897 Hughes, G.J., Frutiger, S., Paquet, N. and Jaton, J.-C.: The amino acid sequence of rabbit J chain in secretory immunoglobulin A. *Biochem. J.*, 271 (1990) 641-647.
- 1898 Lihme, A. and Heegaard, P.M.H.: Thiophilic adsorption chromatography: the separation of serum proteins. *Anal. Biochem.*, 192 (1991) 64-69.
- 1899 Nielsen, R.G., Rickard, E.C., Santa, P.F., Sharknas, D.A. and Sittampalam, G.S.: Separation of antibody-antigen complexes by capillary zone electrophoresis, isoelectric focusing and high-performance size-exclusion chromatography. *J. Chromatogr.*, 539 (1991) 177-185.
- 1900 Osada, J., Gea, T., Sanz, C., Millan, I. and Botella, J.: Evaluation of dialysis treatment in uremic patients by gel filtration of serum. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1906-1910.
- 1901 Planques, Y., Pora, H. and Menozzi, F.D.: Affinity purification of plasminogen by radial-flow affinity chromatography. *J. Chromatogr.*, 539 (1991) 531-533.
- 1902 Porstmann, T., Schmechta, H., Hentschel, C., Doepel, H., Pas, P., Becker, J., Pergande, M., Jung, K. and Nugel, E.: Development of an immunoenzymometric assay for α_1 -microglobulin and measurement of its serum concentration in normal and HIV-infected persons. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 669-675.
- 1903 Schröder, J.-M., Sticherling, M., Persoon, N.-L.M. and Christophers, E.: Identification of a novel platelet-derived neutrophil-chemotactic polypeptide with structural homology to platelet-factor 4. *Biochem. Biophys. Res. Commun.*, 172 (1990) 898-904.
- 1904 Sobel, J.H., Thibodeau, C.A., Gawinowicz Kolks, M.A. and Canfield, R.E.: Isolation and partial structural characterization of an equine fibrinogen CNBR fragment that exhibits immunologic cross-reactivity with an A α -chain cross-linking region of human fibrinogen. *Biochemistry*, 29 (1990) 8907-8916.
- 1905 Speziale, M.V. and Detwiler, T.C.: Free thios of platelet thrombospondin. Evidence for disulfide isomerization. *J. Biol. Chem.*, 265 (1990) 17859-17867.
- 1906 Toulon, P., Chadeuf, G. and Aïach, M.: Purification of heparin cofactor II from human plasma. *J. Chromatogr.*, 539 (1991) 493-500.

- 1907 Van Liedekerke, B.M., Nelis, H.J., Kint, J.A., Vanneste, F.W. and de Leenheer, A.P.: Quality control of albumin solutions by size-exclusion high-performance liquid chromatography, isoelectric focusing and two-dimensional immunoelectrophoresis. *J. Pharm. Sci.*, 80 (1991) 11-16.
- 1908 Wongyai, S., Varga, J.M. and Bonn, G.K.: High-performance affinity chromatography of immunoglobulin E on a column of dinitrophenylamino acids covalently bound to a highly cross-linked polymeric micropellicular support. *J. Chromatogr.*, 536 (1991) 155-164.
- 1909 Yada, Y., Okano, Y. and Nozawa, Y.: Enhancement of GTP γ S-binding activity by cAMP-dependent phosphorylation of a filamin-like 250 kDa membrane protein in human platelets. *Biochem. Biophys. Res. Commun.*, 172 (1990) 256-261.

For additional information see:

C.A., 113 (1990) 147708x, 150878h, 187578m, 187597s, 209901r.

See also 1354, 1526, 1821, 1825, 1840, 1854, 1871, 1960, 1967, 1971, 1977, 1979, 1989, 2061.

19f. Structural and muscle proteins

- 1910 Cole, D.G. and Yount, R.G.: Photolabeling of the 6 and 10 S conformations of gizzard myosin with 3'(2')-O-(4-benzoyl)benzoyl-ATP. Proline 324 is near the active site. *J. Biol. Chem.*, 265 (1990) 22537-22546.
- 1911 Ferraz, C., Widada, J.S. and Liautard, J.-P.: Purification and characterization of recombinant tropomyosins. *J. Chromatogr.*, 539 (1991) 465-473.
- 1912 Garabedian, T.E. and Yount, R.G.: Direct photoaffinity labeling of gizzard myosin with [³H]uridine diphosphate places Glu¹⁸⁵ of the heavy chain at the active site. *J. Biol. Chem.*, 265 (1990) 22547-22553.
- 1913 Kalasz, H., Horvath, C. and Vaghy, P.L.: Purification of functionally intact 1,4-dihydropyridine receptor from rabbit skeletal muscle by HPLC. *Chromatographia*, 30 (1990) 533-536.
- 1914 Labbe, J.-P., Mejean, C., Benyamin, Y. and Roustan, C.: Characterization of an actin-myosin head interface in the 40-113 region of actin using specific antibodies as probes. *Biochem. J.*, 271 (1990) 407-413.
- 1915 Onishi, H., Maita, T., Matsuda, G. and Fujiwara, K.: Lys-65 and Glu-168 are the residues for carbodiimide-catalyzed cross-linking between the two heads of rigor smooth muscle heavy meromyosin. *J. Biol. Chem.*, 265 (1990) 19362-19368.
- 1916 Suzuki, M., Uchiyama, A., Kushida, K., Horiuchi, K., Takahashi, M. and Inoue, T.: A 60-kDa phosphorylated protein from fetal human bone. *Biochem. Biophys. Res. Commun.*, 174 (1991) 439-445.
- 1917 Takagi, T. and Cox, J.A.: Primary structure of the target of calcium vector protein of amphioxus. *J. Biol. Chem.*, 265 (1990) 19721-19727.
- 1918 Vorotnikov, A.V. and Gusev, N.B.: Some properties of duck gizzard caldesmon. *Biochem. J.*, 273 (1991) 161-163.

See also 1999, 2085, 2089.

19g. Protamines, histones and other nuclear proteins

- 1919 Banchev, T., Srebrevna, L. and Zlatanova, J.: Purification of histone H1⁰ and its subfractions under non-denaturing conditions. *Biochim. Biophys. Acta*, 1073 (1991) 230-232.
- 1920 Gatewood, J.M., Cook, G.R., Balhorn, R., Schmid, C.W. and Bradbury, E.M.: Isolation of four core histones from human sperm chromatin representing a minor subset of somatic histones. *J. Biol. Chem.*, 265 (1990) 20662-20666.

- 1921 Lindner, H. and Helliger, W.: Effects of eluent composition, ion-pair reagent and temperature on the separation of histones by high performance liquid chromatography. *Chromatographia*, 30 (1990) 518-522.
- 1922 Marvin, K.W., Yau, P. and Bradbury, E.M.: Isolation and characterization of acetylated histones H3 and H4 and their assembly into nucleosomes. *J. Biol. Chem.*, 265 (1990) 19839-19847.
- 1923 Thorne, A.W., Kmiciek, D., Mitchelson, K., Sautiere, P. and Crane-Robinson, C.: Patterns of histone acetylation. *Eur. J. Biochem.*, 193 (1990) 701-713.
- 1924 Waterborg, J.H.: Sequence analysis of acetylation and methylation in two histone H3 variants of alfalfa. *J. Biol. Chem.*, 265 (1990) 17157-17161.

19h. *Chromoproteins and metalloproteins*

- 1925 Bartfeld, N.S. and Law, J.H.: Isolation and molecular cloning of transferrin from the tobacco hornworm, *Manduca sexta*. Sequence similarity to the vertebrate transferrins. *J. Biol. Chem.*, 265 (1990) 21684-21691.
- 1926 Engbaek, F., Sorensen, G.H., MacIntyre, B., Clausen, I., Lund, H.T. and Jastrup, B.: Interference of abnormal hemoglobins on the measurement of hemoglobin A_{1c} by ion-exchange chromatography. *Clin. Chim. Acta*, 191 (1990) 239-244.
- 1927 Fishman, R.M., Moore, G.L., Zegna, A. and Marini, M.A.: High-performance liquid chromatographic evaluation of pyridoxyl 5'-phosphate hemoglobin derivatives produced by different reduction procedures. *J. Chromatogr.*, 532 (1990) 55-64.
- 1928 Hutchens, T.W. and Yip, T.-T.: Metal ligand-induced alterations in the surface structures of lactoferrin and transferrin probed by interaction with immobilized copper(II) ions. *J. Chromatogr.*, 536 (1991) 1-15.
- 1929 Imaoka, S. and Funae, Y.: Purification and characterization of rat pulmonary cytochrome P-450. *J. Biochem. (Tokyo)*, 108 (1990) 33-36.
- 1930 Kiselev, P.A., Garda, G., Finch, C.A.E., Stier, A., Khatyleva, S.Yu. and Akhrem, A.A.: (Regulation of the catalytic activity of a monooxygenase enzyme system in relation to the substrate structure and the phospholipid composition of the model membrane). *Biokhimiya (Moscow)*, 55 (1990) 2058-2071.
- 1931 Koga, N., Ariyoshi, N., Nakashima, H. and Yoshimura, H.: Purification and characterization of two forms of 2,3,4,7,8-pentachlorodibenzofuran-inducible cytochrome P-450 in hamster liver. *J. Biochem. (Tokyo)*, 107 (1990) 826-833.
- 1932 Manca, L., Masala, B., Ledda, S. and Naitana, S.: Separation of caprine globin chains by reversed-phase high-performance liquid chromatography: evidence for the presence of a silent β_B -globin allele in sardinian sheep. *J. Chromatogr.*, 563 (1991) 158-165.
- 1933 Masala, B. and Manca, L.: High-performance liquid chromatography of globin chains in the identification of human globin gene abnormalities. *Biophys. Chem.*, 37 (1990) 225-230; *C.A.*, 113 (1990) 227360t.
- 1934 Sugiura, M. and Maruyama, S.: (Determination of glycosylated hemoglobin with high performance liquid chromatography). *Med. Technol. (Tokyo)*, 18 (1990) 467-472; *C.A.*, 113 (1990) 207626f - a review with 11 refs.
- 1935 Usanov, S.A., Honkakoski, P., Lang, M. and Hanninen, O.: (Interaction of coumarin-specific cytochrome P-450_{och} from pyrazole-treated mice with cytochrome b₅). *Biokhimiya (Moscow)*, 55 (1990) 995-1007.

For additional information see:

C.A., 113 (1990) 146778h, 229709n.

See also 1515, 1823.

19i. *Proteins of glands, gland products, various zymogens (incl. milk proteins)*

- 1936 Banyai, L., Trexler, M., Koncz, S., Gyenes, M., Sipos, G. and Patthy, L.: The collagen-binding site of type-II units of bovine seminal fluid protein PDC-109 and fibronectin. *Eur. J. Biochem.*, 193 (1990) 801-806.
- 1937 Brignon, G., Mahe, M.-F., Ribadeau-Dumas, B., Mercier, J.-C. and Grosclaude, F.: Two of the three genetic variants of goat α_{B1} -casein which are synthesized as a reduced level have an internal deletion possibly due to altered RNA splicing. *Eur. J. Biochem.*, 193 (1990) 237-241.
- 1938 Chiancone, E. and Gattoni, M.: Selective extraction of native β -lactoglobulin from whey. *J. Chromatogr.*, 539 (1991) 455-463.
- 1939 Gainutdinov, M.Kh., Zakharova, T.N., Ishmukhamedov, R.N., Konov, V.V. and Safarov, K.S.: (Isolation of low molecular weight cytoplasmic regulators from rat liver capable of inducing electrophoretic transport of K^+ and phosphate across the inner mitochondrial). *Biokhimiya (Moscow)*, 55 (1990) 1257-1265.
- 1940 Kageyama, T., Tanabe, K. and Koiwai, O.: Structure and development of rabbit pepsinogens. Stage-specific zymogens, nucleotide sequences of cDNAs, molecular evolution, and gene expression during development. *J. Biol. Chem.*, 265 (1990) 17031-17038.
- 1941 Lin, S., Oroszlan, P. and Karger, B.L.: Effect of metal ions on the unfolding kinetics of α -lactalbumin on weakly hydrophobic surfaces. *J. Chromatogr.*, 536 (1991) 17-30.
- 1942 Loret, E.P., Martin-Eauclaire, M.-F., Mansuelle, P., Sampieri, F., Granier, C. and Rochat, H.: An anti-insect toxin purified from the scorpion *Androctonus australis* Hector also acts on the α - and β -sites of the mammalian sodium channel: sequence and circular dichroism study. *Biochemistry*, 30 (1991) 633-640.
- 1943 Nikolaev, A.A. and Karasev, V.S.: (Isolation and properties of organospecific trypsin inhibitor from human seminal plasma). *Biokhimiya (Moscow)*, 55 (1990) 1065-1072.
- 1944 Rand-Weaver, M., Noso, T., Muramoto, K. and Kawauchi, H.: Isolation and characterization of somatolactin, a new protein related to growth hormone and prolactin from atlantic cod (*Gadus morhua*) pituitary glands. *Biochemistry*, 30 (1991) 1509-1515.
- 1945 Welinder, B.S. and Linde, S.: Reversed-phase high-performance liquid chromatographic characterization of acetic acid extracts of the normal and the diabetic human pancreas. *J. Chromatogr.*, 537 (1991) 201-217.

For additional information see:

C.A., 113 (1990) 151280u, 207866j, 229836b.

See also 1890, 1985, 2272.

19j. *Proteins of brain, cerebrospinal fluid and eye*

- 1946 Farr, G.W., Yaffe, M.B. and Sternlicht, H.: α -Tubulin influences nucleotide binding to β -tubulin: an assay using picomoles of unpurified protein. *Proc. Natl. Acad. Sci. U.S.A.*, 87 (1990) 5041-5045; *C.A.*, 113 (1990) 93402x.
- 1947 Hackney, D.D., Levitt, J.D. and Wagner, D.D.: Characterization of $\alpha\beta_2$ and α_2 forms of kinesin. *Biochem. Biophys. Res. Commun.*, 174 (1991) 810-815.
- 1948 Kuo, M., Oda, Y., Huang, J.S. and Huang, S.S.: Amino acid sequence and characterization of a heparin-binding neurite-promoting factor (p18) from bovine brain. *J. Biol. Chem.*, 265 (1990) 18749-18752.
- 1949 Lee, R.H., Fowler, A., McGinnis, J.F., Lolley, R.N. and Craft, C.M.: Amino acid and cDNA sequence of bovine phosducin, a soluble phosphoprotein from photoreceptor cells. *J. Biol. Chem.*, 265 (1990) 15867-15873.

- 1950 Slingsby, C. and Bateman, O.A.: Rapid separation of bovine. *Exp. Eye Res.*, 51 (1990) 21-26; *C.A.*, 113 (1990) 94175n.

For additional information see:

C.A., 113 (1990) 94290w, 148286v.

See also 1980.

19k. Proteins of neoplastic tissue and transformed cells

- 1951 Doyle, L.A., Goldstein, L.H., Clingroth, C.J. and Cuttitta, F.: Identification of conditioned medium proteins from human cancer cells adapted to serum-free conditions. *Anal. Biochem.*, 190 (1990) 238-243.
- 1952 Fujimoto, K., Kawakita, M., Kato, K., Yonemura, Y., Masuda, T., Matsuzaki, H., Hirose, J., Isaji, M., Sasaki, H., Inoue, T. and Takatsuki, K.: Purification of megakaryocyte differentiation activity from A human fibrous histiocytoma cell line: N-terminal sequence homology with activin A. *Biochem. Biophys. Res. Commun.*, 174 (1991) 1163-1168.
- 1953 Yazawa, S., Kochibe, N. and Asao, T.: A simple procedure for isolation of tumor-associated antigens by affinity chromatography using fucose-specific *Aleuria aurantia* lectin. *Immunol. Invest.*, 19 (1990) 319-327; *C.A.*, 113 (1990) 209431n.

See also 1991.

19l. Specific binding and receptor proteins

- 1954 Apud, J.A. and Ito, Y.: Semi-preparative purification of an endogenous ligand for brain serotonin-2 receptors by coil planet centrifuge counter-current chromatography. *J. Chromatogr.*, 538 (1991) 177-185.
- 1955 Backlund, P.S., Jr., Simonds, W.F. and Spiegel, A.M.: Carboxyl methylation and COOH-terminal processing of the brain G-protein γ -subunit. *J. Biol. Chem.*, 265 (1990) 15572-15576.
- 1956 Bubis, J. and Khorana, H.G.: Sites of interaction in the complex between β - and γ -subunits of transducin. *J. Biol. Chem.*, 265 (1990) 12995-12999.
- 1957 Couvineau, A., Voisin, T., Guijarro, L. and Laburthe, M.: Purification of vasoactive intestinal peptide receptor from porcine liver by a newly designed one-step affinity chromatography. *J. Biol. Chem.*, 265 (1990) 13386-13390.
- 1958 Crettaz, M., Baron, A., Siegenthaler, G. and Hunziker, W.: Ligand specificities of recombinant retionic acid receptors RAR α and RAR β . *Biochem. J.*, 272 (1990) 391-397.
- 1959 Denner, L.A., Schrader, W.T., O'Malley, B.W. and Weigel, N.L.: Hormonal regulation and identification of chicken progesterone receptor phosphorylation sites. *J. Biol. Chem.*, 265 (1990) 16548-16555.
- 1960 Doddema, H.J.: Separation of fibronectin from blood plasma by affinity chromatography on immobilized gelatin. *Eur. Pat. Appl. EP 355,882 (Cl. C07K3/20)*, 28 Feb. 1990, NL Appl. 88/2,003, 11 Aug. 1988; 5 p.; *C.A.*, 113 (1990) 158672g.
- 1961 Gray, S.R., Batstone, F.R., Santiapillai, N.F. and Richardson, P.J.: Solubilization and purification of a putative quisqualate-sensitive glutamate receptor from crustacean muscle. *Biochem. J.*, 273 (1991) 165-171.
- 1962 Hashizume, K., Suzuki, S., Ichikawa, K. and Takeda, T.: Purification of cytosolic 3,5,3'-triiodo-L-thyronine (T₃)-binding protein (CTBP) which regulates nuclear T₃ translocation. *Biochem. Biophys. Res. Commun.*, 174 (1991) 1084-1089.

- 1963 Hayakawa, N., Morita, T., Yamaguchi, T., Mitsui, H., Mori, K.J., Saisu, H. and Abe, T.: The high affinity receptor for ω -conotoxin represents calcium channels different from those sensitive to dihydropyridines in mammalian brain. *Biochem. Biophys. Res. Commun.*, 173 (1990) 483-490.
- 1964 Hoke, G.D., Pavco, P.A., Ledwith, B.J. and van Tuyle, G.C.: Structural and functional studies of the rat mitochondrial single strand DNA binding protein P16. *Arch. Biochem. Biophys.*, 282 (1990) 116-124.
- 1965 Howard, K.J., Holley, S.J., Yamamoto, K.R. and Distelhorst, C.W.: Mapping the HSP90 binding region of the glucocorticoid receptor. *J. Biol. Chem.*, 265 (1990) 11928-11935.
- 1966 Im, M., Riek, K.P. and Graham, R.M.: A novel guanine nucleotide-binding protein coupled to the α_1 -adrenergic receptor. II. Purification, characterization, and reconstitution. *J. Biol. Chem.*, 265 (1990) 18952-18960.
- 1967 Jhun, B.H., Rampal, A.L., Berenski, C.J. and Jung, C.Y.: Chromatographic characterization of nitrobenzylthioinosine binding proteins in band 4.5 of human erythrocytes: purification of a 40 kDa truncated nucleoside transporter. *Biochim. Biophys. Acta*, 1028 (1990) 251-260.
- 1968 Kalafatis, M., Jenny, R.J. and Mann, K.G.: Identification and characterization of a phospholipid-binding site of bovine factor Va. *J. Biol. Chem.*, 265 (1990) 21580-21589.
- 1969 Kelly, L.E.: Purification and properties of a 23 kDa Ca^{2+} -binding protein from *Drosophila melanogaster*. *Biochem. J.*, 271 (1990) 661-666.
- 1970 Kittelberger, R. and Neale, T.J.: Isolation and characterization of an unique kidney antigen of relevance in human renal disease. *Biochem. Biophys. Res. Commun.*, 172 (1990) 439-445.
- 1971 Lagrost, L., Gambert, P., Dangremont, V., Athias, A. and Lallemand, C.: Role of cholesteryl ester transfer protein (CETP) in the HDL conversion process as evidenced by using anti-CETP monoclonal antibodies. *J. Lipid Res.*, 31 (1990) 1569-1575.
- 1972 Loetscher, H., Schlaeger, E.J., Lahm, H.-W., Pan, Y.E., Lesslauer, W. and Brockhaus, M.: Purification and partial amino acid sequence analysis of two distinct tumor necrosis factor receptors from HL60 cells. *J. Biol. Chem.*, 265 (1990) 20131-20138.
- 1973 Marie, J., Seyer, R., Lombard, C., Desarnaud, F., Aumelas, A., Jard, S. and Bonnafous, J.-C.: Affinity chromatography purification of angiotensin II receptor using photoactivable biotinylated probes. *Biochemistry*, 29 (1990) 8943-8950.
- 1974 Marks, A.R., Fleischer, S. and Tempst, P.: Surface topography analysis of the ryanodine receptor/junctional channel complex based on proteolysis sensitivity mapping. *J. Biol. Chem.*, 265 (1990) 13143-13149.
- 1975 Mimura, C.S., Admon, A., Hurt, K.A. and Ames, G.F.-L.: The nucleotide-binding site of HisP, a membrane protein of the histidine permease. Identification of amino acid residues photoaffinity labeled by 8-azido-ATP. *J. Biol. Chem.*, 265 (1990) 19535-19542.
- 1976 Morishita, R., Kobayashi, T., Kato, K. and Asano, T.: Isolation of three types of G_i from bovine spleen. *Biochem. Biophys. Res. Commun.*, 172 (1990) 249-255.
- 1977 Morton, R.E. and Steinbrunner, J.V.: Concentration of neutral lipids in the phospholipid surface of substrate particles determines lipid transfer protein activity. *J. Lipid Res.*, 31 (1990) 1559-1567.
- 1978 Mourey, R.J., Verma, A., Supattapone, S. and Snyder, S.H.: Purification and characterization of the inositol 1,4,5-trisphosphate receptor protein from rat vas deferens. *Biochem. J.*, 272 (1990) 383-389.
- 1979 Namkung, P.C., Kumar, S., Walsh, K.A. and Petra, P.H.: Identification of lysine 134 in the steroid-binding site of the sex steroid-binding protein of human plasma. *J. Biol. Chem.*, 265 (1990) 18345-18350.

- 1980 Pang, I. and Sternweis, P.C.: Purification of unique α subunits of GTP-binding regulatory proteins (G proteins) by affinity chromatography with immobilized $\beta\gamma$ subunits. *J. Biol. Chem.*, 265 (1990) 18707-18712.
- 1981 Parish, C.R., Jakobsen, K.B., Coombe, D.R. and Bacic, A.: Isolation and characterization of cell adhesion molecules from the marine sponge, *Ophlitaspongia tenuis*. *Biochim. Biophys. Acta*, 1073 (1991) 56-64.
- 1982 Pavlik, E.J., Nelson, K., Gallion, H.H., van Nagel, J.R., Jr., Donaldson, E.S., Shih, W.J., Spicer, J.A., Preston, D.F., Baranczuk, R.J. and Kenady, D.E.: Characterization of high specific activity [^{125}I]iodo- 17β -estradiol as an estrogen receptor-specific radioligand capable of imaging estrogen receptor-positive tumors. *Cancer Res.*, 50 (1990) 7799-7805.
- 1983 Sweeney, P.J., Walker, J.M., Reid, D.G. and Elshourbagy, N.: Purification of cloned trypanosomal calmodulin and preliminary NMR studies. *J. Chromatogr.*, 539 (1991) 501-505.
- 1984 Taylor, S.J., Smith, J.A. and Exton, J.H.: Purification from bovine liver membranes of a guanine nucleotide-dependent activator of phosphoinositide-specific phospholipase C. Immunologic identification as a novel G-protein α subunit. *J. Biol. Chem.*, 265 (1990) 17150-17156.
- 1985 Terpening, C.M. and Haussler, M.R.: *In vitro* transcription and translation of the human 1,25-dihydroxyvitamin D₃ receptor cDNA. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1129-1136.
- 1986 Ueda, T., Takeyama, Y., Ohmori, T., Ohyanagi, H., Saitoh, Y. and Takai, Y.: Purification and characterization from rat liver cytosol of a GDP dissociation inhibitor (GDI) for liver 24K G, a ras p21-like GTP-binding protein, with properties similar to those of smg p25A GDI. *Biochemistry*, 30 (1991) 909-917.
- 1987 Unterberg, C., Borchers, T., Hojrup, P., Roepstorff, P., Knudsen, J. and Spener, F.: Cardiac fatty acid-binding proteins. Isolation and characterization of the mitochondrial fatty acid-binding protein and its structural relationship with the cytosolic isoforms. *J. Biol. Chem.*, 265 (1990) 16255-16261.
- 1988 Vandekerckhove, J., van Damme, J., Vancompernelle, K., Bubb, M.R., Lambooy, P.K. and Korn, E.D.: The covalent structure of *Acanthamoeba* actobindin. *J. Biol. Chem.*, 265 (1990) 12801-12805.

For additional information see:

C.A., 113 (1990) 187593n.

See also 1515, 1854, 1878, 1913, 1936, 1991, 2048, 2272.

19m. Urinary proteins

See 1897, 1902.

19n. Other proteins (incl. proteinous inhibitors of enzymic activity)

- 1989 Aulak, K.S. and Harrison, R.S.: Rapid and sensitive techniques for identification and analysis of reactive-centre mutants of C1-inhibitor proteins contained in type II hereditary angio-oedema plasmas. *Biochem. J.*, 271 (1990) 565-569.
- 1990 Erikaku, T., Zenno, S. and Innouye, S.: Bioluminescent immunoassay using a monomeric Fab'-photoprotein aequorin conjugate. *Biochem. Biophys. Res. Commun.*, 174 (1991) 1331-1336.

- 1991 Hnatowich, D.J., Rusckowski, M., Brill, A.B., Siebecker, D.A., Misra, H., Mardirossian, G., Bushe, H., Rescigno, A. et al.: Pharmacokinetics in patients of an anti-carcinoembryonic antigen antibody radiolabeled with indium-111 using a novel diethylenetriamine pentaacetic acid chelator. *Cancer Res.*, 50 (1990) 7272-7278.
- 1992 Kapel, N., Meillet, D., Iscaki, S., Bouvet, J.P., Gobert, J.G. and Raichvarg, D.: Characterisation of the main molecular forms of human fecal immunoglobulin A. *Clin. Chim. Acta*, 195 (1990) 67-76.
- 1993 Knight, P.G., Castillo, R.J., Glencross, R.G., Beard, A.J. and Wrathall, J.H.M.: Isolation of bovine ovarian inhibin, its immunoneutralization *in vitro* and immunolocalization in bovine ovary. *Domest. Anim. Endocrinol.*, 7 (1990) 299-313; *C.A.*, 113 (1990) 165524p.
- 1994 Lesauvage, M., Pora, H. and Planques, Y.: Linear extrapolation of the purification of ovalbumin by radial chromatography. *Spectra 2000*, 143 (1989) 39-41; *C.A.*, 113 (1990) 231979u.
- 1995 Martzen, M.R., McMullen, B.A., Smith, N.E., Fujikawa, K. and Peannasky, R.J.: Primary structure of the major pepsin inhibitor from the intestinal parasitic nematode *Ascaris suum*. *Biochemistry*, 29 (1990) 7366-7372.
- 1996 McCannel, A.A. and Nakai, S.: Separation of egg yolk immunoglobulins into subpopulations using DEAE-ion exchange chromatography. *Can. Inst. Food Sci. Technol. J.*, 23 (1990) 42-46; *C.A.*, 113 (1990) 95746m.
- 1997 Morimoto, S., Yamamoto, Y., O'Brien, J.S. and Kishimoto, Y.: Determination of saposin proteins (sphingolipid activator proteins) in human tissues. *Anal. Biochem.*, 190 (1990) 154-157.
- 1998 Nupenko, E.V., Panchenko, M.P., Starikova, M.G., Grishin, A.V. and Tkachuk, V.A.: Apparent activation of rabbit lung membrane adenylate cyclase by cytosolic proteins possessing adenylate kinase activity. *Biochim. Biophys. Acta*, 1991 (1991) 213-221.
- 1999 Petrovsky, G.G. and Titovets, E.P.: (Isolation, purification and structure of the vasoactive component of rabbit muscle). *Biokhimiya (Moscow)*, 55 (1990) 2138-2147.
- 2000 Uhlrich, S., Tiollier, J., Tardy, M. and Tayot, J.-L.: Isolation and characterization of two different molecular forms of basic fibroblast growth factor extracted from human placental tissue. *J. Chromatogr.*, 539 (1991) 393-403.

See also 1812, 1872.

20. ENZYMES AND ENZYME ACTIVITY ESTIMATION

- 2001 Tsygankov, A.Yu., Motorin, Yu.A., Vol'fson, A.D. and Kirpotin, D.B.: Adaptation of an HPLC system for transient-state enzyme kinetic experiments: pulse-flow method. *J. Biochem. Biophys. Methods*, 21 (1990) 145-153; *C.A.*, 113 (1990) 167762p.

20a. Oxidoreductases

- 2002 Adami, P., Nasser, B. and Latruffe, N.: Interactions of the mitochondrial membrane rat liver D-3-hydroxybutyrate dehydrogenase with glass beads during adsorption chromatography. Relationships with the activation of the enzyme by phospholipids. *J. Chromatogr.*, 539 (1991) 279-287.
- 2003 Arthur, J.R., Nicol, F. and Beckett, G.J.: Hepatic iodothyronine 5'-deiodinase. The role of selenium. *Biochem. J.*, 272 (1990) 537-540.
- 2004 Axley, M.J., Grahame, D.A. and Stadtman, T.C.: *Escherichia coli* formate-hydrogen lyase. Purification and properties of the selenium-dependent formate dehydrogenase component. *J. Biol. Chem.*, 265 (1990) 18213-18218.

- 2005 Blatter, E.E., Tasayco, M.L., Prestwich, G. and Pietruszko, R.: Chemical modification of aldehyde dehydrogenase by a vinyl ketone analogue of an insect pheromone. *Biochem. J.*, 272 (1990) 351-358.
- 2006 Britsch, L.: Purification and characterization of flavone synthase I, a 2-oxoglutarate-dependent desaturase. *Arch. Biochem. Biophys.*, 282 (1990) 152-160.
- 2007 Capo, C.R., Polticelli, F., Calabrese, L., Schinina, M.E., Carri, M.T. and Rotilio, G.: The Cu,Zn superoxide dismutase isoenzymes of *Xenopus laevis*: purification, identification of a heterodimer and differential heat sensitivity. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1186-1193.
- 2008 Casteels, M., Schepers, L., van Veldhoven, P.P., Eysen, H.J. and Mannaerts, G.P.: Separate peroxisomal oxidases for fatty acyl-CoAs and trihydroxycoprostanoyl-CoA in human liver. *J. Lipid Res.*, 31 (1990) 1865-1872.
- 2009 Costa-Ferreira, M. and Duarte, J.C.: Use of dye pseudo-affinity chromatography in the purification of homoserine dehydrogenase. *J. Chromatogr.*, 539 (1991) 507-510.
- 2010 Frias, I., Siverio, J.M., Gonzales, C., Trujillo, J.M. and Perez, J.A.: Purification of a new peroxidase catalysing the formation of lignan-type compounds. *Biochem. J.*, 273 (1991) 109-113.
- 2011 German, J.B. and Creveling, R.K.: Identification and characterization of a 15-lipoxygenase from fish gills. *J. Agric. Food Chem.*, 38 (1990) 2144-2147.
- 2012 Gupta, R.P., Lapadula, D.M. and Abou-Donia, M.B.: Purification and characterization of cytochrome P450 isozymes from β -naphthoflavone-induced adult hen liver. *Arch. Biochem. Biophys.*, 282 (1990) 170-182.
- 2013 Hedderich, R., Berkessel, A. and Thauer, R.K.: Purification and properties of heterodisulfide reductase from *Methanobacterium thermoautotrophicum* (strain Marburg). *Eur. J. Biochem.*, 193 (1990) 255-261.
- 2014 Huang, Y. and Colman, R.F.: Subunit location and sequences of the cysteinyl peptides of pig heart NAD-dependent isocitrate dehydrogenase. *Biochemistry*, 29 (1990) 8266-8273.
- 2015 Iwata, N., Inazu, N., Takeo, S. and Satoh, T.: Carbonyl reductases from rat testis and vas deferens. Purification, properties and localization. *Eur. J. Biochem.*, 193 (1990) 75-81.
- 2016 James, M.O.: Isolation of cytochrome P450 from hepatopancreas microsomes of the spiny lobster, *Panulirus argus*, and determination of catalytic activity with NADPH cytochrome P450 reductase from vertebrate liver. *Arch. Biochem. Biophys.*, 282 (1990) 8-17.
- 2017 Kaiser, R., Nussrallah, B., Dam, R., Wagner, F.W. and Jörnvall, H.: Avian alcohol dehydrogenase. Characterization of the quail enzyme, functional interpretations, and relationships to the different classes of mammalian alcohol dehydrogenase. *Biochemistry*, 29 (1990) 8365-8371.
- 2018 Kiryukhin, M.Yu., Chistoserdov, A.Yu. and Tsygankov, Yu.D.: (Purification and properties of methylamine dehydrogenase of the obligate methylotroph *Methylobacillus flagellatum* KT). *Biokhimiya (Moscow)*, 55 (1990) 1668-1674.
- 2019 Kitamura, S. and Tatsumi, K.: Purification of NADPH-linked α,β -ketoalkene double bond reductase from rat liver. *Arch. Biochem. Biophys.*, 282 (1990) 183-187.
- 2020 Krungkrai, J., Cerami, A. and Henderson, G.B.: Purification and characterization of dihydroorotate dehydrogenase from the rodent malaria parasite *Plasmodium berghei*. *Biochemistry*, 30 (1991) 1934-1939.
- 2021 Li, F., Lim, C.K. and Peters, T.J.: Coproporphyrinogen oxidase, protoporphyrinogen oxidase and ferrochelatase activities in iron-overloaded and ethanol-treated rats. *Biomed. Chromatogr.*, 4 (1990) 253-256.
- 2022 Li, J., Christensen, B.M. and Tracy, J.W.: Electrochemical determination of diphenol oxidase activity using high-pressure liquid chromatography. *Anal. Biochem.*, 190 (1990) 354-359.

- 2023 Li, J.-P., Eriksson, K.-O. and Hjerten, S.: High-performance liquid chromatography of proteins on deformed nonporous agarose beads. Affinity chromatography of dehydrogenases based on Cibacron Blue-derivatized agarose. *Prepar. Biochem.*, 20 (1990) 107-121.
- 2024 Li, N.G., Ponomarev, A.G., Bubyakina, V.V. and Osakovsky, V.L.: (Aldehyde dehydrogenase of mitochondria of the mung bean roots). *Biokhimiya (Moscow)*, 55 (1990) 1590-1598.
- 2025 Maehara, M., Kajita, M., Kitoh, M. and Watanabe, K.: A reversed-phase high-performance liquid chromatographic method for the determination of pyruvate dehydrogenase complex activity in human platelets and cultured skin fibroblasts. *Clin. Chim. Acta*, 191 (1990) 233-238.
- 2026 Mitchell, J.P., Hardie, D.G. and Vulliet, P.R.: Site-specific phosphorylation of tyrosine hydroxylase after KCl depolarization and nerve growth factor treatment of PC12 cells. *J. Biol. Chem.*, 265 (1990) 22358-22364.
- 2027 Naganuma, H., Kondo, J.-I. and Kawahara, Y.: Enantiospecific assay for mammalian carbonyl reductase by liquid chromatography with fluorescence detection. *J. Chromatogr.*, 532 (1990) 65-74.
- 2028 Narimatsu, S., Akutsu, Y., Matsunaga, T., Watanabe, K., Yamamoto, I. and Yoshimura, H.: Purification of a cytochrome P450 isozyme belonging to a subfamily of P450IIB from liver microsomes of guinea pig. *Biochem. Biophys. Res. Commun.*, 172 (1990) 607-613.
- 2029 Ninfali, P., Orsenigo, I., Baronciani, L. and Rapa, S.: Rapid purification of glucose-6-phosphate dehydrogenase from mammal's erythrocytes. *Prepar. Biochem.*, 20 (1990) 297-309.
- 2030 Nolasco, H. and Moreno, O.: Rapid detection and quantification of peroxidase activity in liquid chromatography. *J. Chromatogr.*, 539 (1991) 198-206.
- 2031 Oyama, R., Katoh, S., Sueoka, T., Suzuki, M., Ichinose, H., Nagatsu, T. and Titani, K.: The complete amino acid sequence of the mature form of rat sepiapterin reductase. *Biochem. Biophys. Res. Commun.*, 173 (1990) 627-631.
- 2032 Peiffer, W.E., Ingle, R.T. and Ferguson-Miller, S.: Structurally unique plant cytochrome c oxidase isolated from wheat germ, a rich source of plant mitochondrial enzymes. *Biochemistry*, 29 (1990) 8696-8701.
- 2033 Sannia, G., Limongi, P., Cocca, E., Buonocore, F., Nitti, G. and Giardina, P.: Purification and characterization of a veratryl alcohol oxidase enzyme from the lignin degrading basidiomycete *Pleurotus ostreatus*. *Biochim. Biophys. Acta*, 1073 (1991) 114-119.
- 2034 Sheldon, P.S., Kekwick, R.G.O., Sidebottom, C., Smith, C.G. and Slabas, A.R.: 3-oxoacetyl-(acyl-carrier protein) reductase from avocado (*Persea americana*) fruit mesocarp. *Biochem. J.*, 271 (1990) 713-720.
- 2035 Shylaja, N., Maehara, M. and Watanabe, K.: Measurement of α -ketoglutarate dehydrogenase activity in tissue extracts and human platelets using reversed-phase high-performance liquid chromatography. *Anal. Biochem.*, 191 (1990) 223-227.
- 2036 Sloane, D.L., Browner, M.F., Dauter, Z., Wilson, K., Fletterick, R.J. and Sigal, E.: Purification and crystallization of 15-lipoxygenase from rabbit reticulocytes. *Biochem. Biophys. Res. Commun.*, 173 (1990) 507-513.
- 2037 Sone, N. and Takagi, T.: Monomer-dimer structure of cytochrome-c oxidase and cytochrome bc₁ complex from the thermophilic bacterium PS3. *Biochim. Biophys. Acta*, 1020 (1990) 207-212.
- 2038 Taylor, K.L., Guzman, G.S., Pohl, J. and Kinkade, J.M., Jr.: Distinct chromatographic forms of human hemi-myeloperoxidase obtained by reductive cleavage of the dimeric enzyme. Evidence for subunit heterogeneity. *J. Biol. Chem.*, 265 (1990) 15938-15946.

- 2039 Van der Donk, E.M.M., Verhagen, J., Veldink, G.A. and Vliegthart, J.F.G.: 12-Lipoxygenase from rat basophilic leukemia cells: separation from 5-lipoxygenase and temperature-dependent inactivation by hydroperoxy fatty acid. *Biochim. Biophys. Acta*, 1981 (1991) 135-140.
- 2040 Vanfleteren, J.R., Evers, E.A.I., van de Werken, G. and van Beeumen, J.J.: The primary structure of cytochrome c from the nematode *Caenorhabditis elegans*. *Biochem. J.*, 271 (1990) 613-620.
- 2041 Vartanov, S.S., Pavlov, A.R. and Yaropolov, A.I.: (Regulation of lens aldose reductase activity. Non-hyperbolic kinetics of NADPH oxidation by glucose). *Biokhimiya (Moscow)*, 55 (1990) 2046-2057.
- 2042 Wang, Y., Darnay, B.G. and Rodwell, V.W.: Identification of the principal catalytically important acidic residue of 3-hydroxy-3-methylglutaryl coenzyme A reductase. *J. Biol. Chem.*, 265 (1990) 21634-21641.
- 2043 Wickwire, B.M., Wagner, C. and Broquist, H.P.: Pipecolic acid biosynthesis in *Rhizoctonia leguminicola*. II. Saccharopine oxidase: a unique flavin enzyme involved in pipecolic acid biosynthesis. *J. Biol. Chem.*, 265 (1990) 14748-14753.
- 2044 Wu, P., Fritzo, M. and Tai, H.-H.: Purification and characterization of an NAD⁺-dependent dehydrogenase that catalyzes the oxidation of thromboxane B₂ at C-11 from porcine liver. Development and application of 11-dehydro-thromboxane B₂ radioimmunoassay to enzyme assay. *Biochim. Biophys. Acta*, 1036 (1990) 55-63.
- 2045 Yanagawa, M., Maeda-Nakai, E., Yamakawa, K., Yamamoto, I., Kawamura, J., Tada, S. and Ichiyama, A.: The formation of oxalate from glycolate in rat and human liver. *Biochim. Biophys. Acta*, 1036 (1990) 24-33.
- 2046 Zhang, W.-W., Redman, K., Churchill, S. and Churchill, P.: Comparison of D-β-hydroxybutyrate dehydrogenase from rat liver and brain mitochondria. *Biochem. Cell Biol.*, 68 (1990) 1225-1230.

For additional information see:

C.A., 113 (1990) 168049y.

See also 1670, 1822.

20b. *Transferases (excl. E.C. 2.7.-.-)*

- 2047 Beckett, G.J., Howie, A.F., Hume, R., Matharoo, B., Hiley, C., Jones, P. and Strange, R.C.: Human glutathione S-transferases: radioimmunoassay studies on the expression of alpha-, mu- and pi-class isoenzymes in developing lung and kidneys. *Biochim. Biophys. Acta*, 1036 (1990) 176-182.
- 2048 Brophy, P.M. and Barrett, J.: Detoxification of secondary products of lipid peroxidation in the cytosol of a mouse fibroblast cell line. *Biochem. Cell Biol.*, 68 (1990) 1288-1291.
- 2049 Coussons, P.J., Kelly, S.M., Price, N.C., Johnson, C.M., Smith, B. and Sawyer, L.: Selective modification by transglutaminase of a glutamine side chain in the hinge region of the histidine-388→glutamine mutant of yeast phosphoglycerate kinase. *Biochem. J.*, 273 (1991) 73-78.
- 2050 Everett, E.A., Falick, A.M. and Reich, N.O.: Identification of a critical cysteine in EcoRI DNA methyltransferase by mass spectrometry. *J. Biol. Chem.*, 265 (1990) 17713-17719.
- 2051 Fazi, A., Piacentini, M.P., Piatti, E. and Accorsi, A.: Purification and partial characterization of the phosphoglucomutase isozymes from human placenta. *Prepar. Biochem.*, 20 (1990) 219-240.
- 2052 Fu, D. and Robyt, J.F.: A facile purification of *Leuconostoc mesenteroides* B-512FM dextran-sucrase. *Prepar. Biochem.*, 20 (1990) 93-106.

- 2053 Herold, M. and Leistler, B.: Unfolding of truncated and wild type aspartate aminotransferase studied by size-exclusion chromatography. *J. Chromatogr.*, 539 (1991) 383-391.
- 2054 Hiratsuka, A., Sebata, N., Kawashima, K. Okuda, H., Ogura, K., Watabe, T., Satoh, K., Hatayama, U., Tsuchida, S., Ishikawa, T. and Sato, K.: A new class of rat glutathione S-transferase Yrs-Yrs inactivating reactive sulfate esters as metabolites of carcinogenic arylmethanols. *J. Biol. Chem.*, 265 (1990) 11973-11981.
- 2055 Khoo, B.Y., Sit, K.H. and Wong, K.P.: An HPLC-ECD procedure for measuring total phenolsulfotransferase (PST) activity in human liver, platelets and blood. *Clin. Chim. Acta*, 194 (1990) 219-228.
- 2056 Kim, H.C., Lewis, M.S., Gorman, J.J., Park, S.C., Girard, J.E., Folk, J.E. and Chung, S.I.: Protransglutaminase E from guinea pig skin. Isolation and partial characterization. *J. Biol. Chem.*, 265 (1990) 21971-21978.
- 2057 Koike, G., Maki, H., Takeya, M., Hayakawa, H. and Sekiguchi, M.: Purification, structure, and biochemical properties of human O⁶-methylguanine-DNA methyltransferase. *J. Biol. Chem.*, 265 (1990) 14754-14762.
- 2058 McIntosh, C.A., Latachinian, L. and Mansell, R.L.: Flavanone-specific 7-O-glucosyltransferase activity in *Citrus paradisi* seedlings: purification and characterization. *Arch. Biochem. Biophys.*, 282 (1990) 50-57.
- 2059 Munch, S.L. and Croteau, R.: Purification and characterization of the sesquiterpene cyclase patchoulol synthase from *Pogostemon cablin*. *Arch. Biochem. Biophys.*, 282 (1990) 58-64.
- 2060 Radomska, A., Comer, K.A., Zimniak, P., Falany, J., Iscan, M. and Falany, C.N.: Human liver steroid sulphotransferase sulphates bile acids. *Biochem. J.*, 272 (1990) 597-604.
- 2061 Sarnesto, A., Köhlin, T., Thurin, J. and Blaszczyk-Thurin, M.: Purification of H gene-encoded β -galactoside α 1 \rightarrow 2 fucosyltransferase from human serum. *J. Biol. Chem.*, 265 (1990) 15067-15075.
- 2062 Schultz, E.: L-dopa as substrate for human duodenal catechol-O-methyltransferase and aromatic L-amino acid decarboxylase. *Biomed. Chromatogr.*, 4 (1990) 242-244.
- 2063 Smit, N.P.M., Pavel, S., Kammeyer, A. and Westerhof, W.: Determination of catechol O-methyltransferase activity in relation to melanin metabolism using high-performance liquid chromatography with fluorimetric detection. *Anal. Biochem.*, 190 (1990) 286-291.
- 2064 Tilgmann, C. and Kalkkinen, N.: Purification and partial sequence analysis of the soluble catechol-O-methyltransferase from human placenta: comparison to the rat liver enzyme. *Biochem. Biophys. Res. Commun.*, 174 (1991) 995-1002.
- 2065 Trinidad, A., Hein, D.W., Rustan, T.D., Ferguson, R.J., Miller, L.S., Bucher, K.D., Kirilin, W.G., Ogolla, F. and Andrews, A.F.: Purification of hepatic polymorphic arylamine N-acetyltransferase from homozygous rapid acetylator inbred hamster: identity with polymorphic N-hydroxyarylamine-O-acetyltransferase. *Cancer Res.*, 50 (1990) 7942-7949.
- 2066 Visvikis, A., Goergen, J.-L., Oster, T., Bagrel, D., Wellman, M., Marc, A., Engasser, J.-M. and Siest, G.: γ -Glutamyltransferase from human hepatoma cell lines: purification and cell culture of HepG2 on microcarriers. *Clin. Chim. Acta*, 191 (1990) 221-232.
- 2067 Yamada, R. and Bradshaw, R.A.: Rat liver polysome N^{ac}-acetyltransferase: isolation and characterization. *Biochemistry*, 30 (1991) 1010-1016.

See also 1670.

20c. *Transferases transferring phosphorus containing groups (E.C. 2.7.-.-)*

- 2068 Akita, Y., Ohno, S., Yajima, Y. and Suzuki, K.: Possible role of Ca^{2+} -independent protein kinase C isozyme, nPKC ϵ , in thyrotropin-releasing hormone-stimulated signal transduction: differential down-regulation of nPKC ϵ in GH₄C₁ cells. *Biochem. Biophys. Res. Commun.*, 172 (1990) 184-189.
- 2069 Baron, G., Madec-Baron, A., Samperez, S. and Jouan, P.: A rapid two-step purification of rat liver fetal thymidine kinase. *Prepar. Biochem.*, 20 (1990) 241-256.
- 2070 Bernard, D., Moyret, C. and Maurizis, J.C.: Purification on poly(U)-Sephacrose 4B of human breast cancer cell line T-47D DNA polymerases. *J. Chromatogr.*, 539 (1991) 511-516.
- 2071 Chambers, T.C. and Langan, T.A.: Purification and characterization of growth-associated H1 histone kinase from Novikoff hepatoma cells. *J. Biol. Chem.*, 265 (1990) 16940-16947.
- 2072 Chen, J., Kirchner, G., Aebi, M. and Martin, N.C.: Purification and properties of yeast ATP (CTP):tRNA nucleotidyltransferase from wild type and overproducing cells. *J. Biol. Chem.*, 265 (1990) 16221-16224.
- 2073 Endemann, G.C., Graziani, A. and Cantley, L.C.: A monoclonal antibody distinguishes two types of phosphatidylinositol 4-kinase. *Biochem. J.*, 273 (1991) 63-66.
- 2074 Farkas, G., Buday, L., Antoni, F. and Farago, A.: The 38 kDa Ca^{2+} /membrane-binding protein of pig granulocytes needs a high Ca^{2+} concentration to be phosphorylated by protein kinase C. *Biochim. Biophys. Acta*, 1091 (1991) 81-86.
- 2075 Gotoh, Y., Nishida, E. and Sakai, H.: Okadaic acid activates microtubule-associated protein kinase in quiescent fibroblastic cells. *Eur. J. Biochem.*, 193 (1990) 671-674.
- 2076 Gotoh, Y., Nishida, E., Yamashita, T., Hoshi, M., Kawakami, M. and Sakai, H.: Microtubule-associated-protein (MAP) kinase activated by nerve growth factor and epidermal growth factor in PC12 cells. Identity with the mitogen-activated MAP kinase of fibroblastic cells. *Eur. J. Biochem.*, 193 (1990) 661-669.
- 2077 Harris, W.R., Malencik, D.A., Johnson, C.M., Carr, S.A., Roberts, G.D., Byles, C.A., Anderson, S.R., Heilmeyer, L.M.G., Jr., Fischer, E.H. and Crabb, J.W.: Purification and characterization of catalytic fragments of phosphorylase kinase γ subunit missing a calmodulin-binding domain. *J. Biol. Chem.*, 265 (1990) 11740-11745.
- 2078 Ikebe, M., Reardon, S., Scott-Woo, G.C., Zhou, Z. and Koda, Y.: Purification and characterization of calmodulin-dependent multifunctional protein kinase from smooth muscle: isolation of caldesmon kinase. *Biochemistry*, 29 (1990) 11242-11248.
- 2079 Khomich, T.I., Moiseenok, A.G. and Voskoboyev, A.I.: (Purification and some properties of rat liver pantothenate kinase). *Biokhimiya (Moscow)*, 55 (1990) 1468-1473.
- 2080 Leibersperger, H., Gschwendt, M. and Marks, F.: Purification and characterization of a calcium-unresponsive, phorbol ester/phospholipid-activated protein kinase from porcine spleen. *J. Biol. Chem.*, 265 (1990) 16108-16115.
- 2081 Miwa, I., Mitsuyama, S., Toyoda, Y., Murata, T. and Okuda, J.: High-yield purification of glucokinase from rat liver. *Prepar. Biochem.*, 20 (1990) 163-178.
- 2082 Orr, N., Yavin, E., Shinitzky, M. and Lester, D.S.: Application of high-pressure to subfractionate membrane protein-lipid complexes: a case study of protein kinase C. *Anal. Biochem.*, 191 (1990) 80-85.
- 2083 Persaud, S.J., Jones, P.M. and L. Howell, S.L.: Activation of protein kinase C is essential for sustained insulin secretion in response to cholinergic stimulation. *Biochim. Biophys. Acta*, 1091 (1991) 120-122.

- 2084 Peterson, J.E., Larew, J.S.-A. and Graves, D.J.: Purification and partial characterization of arginine-specific ADP-ribosyltransferase from skeletal muscle microsomal membranes. *J. Biol. Chem.*, 265 (1990) 17062-17069.
- 2085 Sarcevic, B., Robinson, P.J., Pearson, R.B. and Kemp, B.E.: The smooth muscle 132 kDa cyclic GMP-dependent protein kinase substrate is not myosin light chain kinase or caldesmon. *Biochem. J.*, 271 (1990) 493-499.
- 2086 Sauvage, C., Cash, C.D. and Maitre, M.: Isolation of human brain protein kinase C: evidence for kinase C catalytic fragment modulating G protein-GTPase activity. *Biochem. Biophys. Res. Commun.*, 174 (1991) 593-599.
- 2087 Simpson, H.D., Coolbear, T., Vermue, M. and Daniel, R.M.: Purification and some properties of a thermostable DNA polymerase from a *Thermotoga* species. *Biochem. Cell Biol.*, 68 (1990) 1292-1296.
- 2088 Stathopoulos, V.M., Coco-Maroney, A., Wei, C.-W., Goth, M., Zariczyj, C. and Macara, I.G.: Identification of two-cytosolic diacylglycerol kinase isoforms in rat brain, and in NIH-3T3 and ras-transformed fibroblasts. *Biochem. J.*, 272 (1990) 569-575.
- 2089 Tan, J.L. and Spudich, J.A.: *Dictyostelium* myosin light chain kinase. Purification and characterization. *J. Biol. Chem.*, 265 (1990) 13818-13824.
- 2090 Teissere, M., Sergi, I., Job, C. and Job, D.: Analysis of wheat-germ RNA polymerase II by trypsin cleavage. The integrity of the two largest subunits of the enzyme is not mandatory for basal transcriptional activity. *Eur. J. Biochem.*, 193 (1990) 913-919.
- 2091 Terentyev, L.L., Terentyeva, N.A., Zakharova, L.A. and Rasskazov, V.A.: (Thymidine kinase from sea urchin oocytes). *Biochimiya (Moscow)*, 55 (1990) 2293-2299.
- 2092 Wyss, M., Schlegel, J., James, P., Eppenberger, H.M. and Wallimann, T.: Mitochondrial creatine kinase from chicken brain. Purification, biophysical characterization, and generation of heterodimeric and heterooctameric molecules with subunits of other creatine kinase isoenzymes. *J. Biol. Chem.*, 265 (1990) 15900-15908.
- 2093 Yokota, E. and Mabuchi, I.: The cAMP-dependent protein kinase in sea urchin sperm tails: association of the enzyme with the flagellar axonemes. *J. Biochem. (Tokyo)*, 108 (1990) 1-3.
- 2094 Zhang, Q.-J. and Liu, Z.-Y.: A novel method for isolation and concentration of ribonuclease T₁ from Taka-Diastase. *Prepar. Biochem.*, 20 (1990) 257-262.

For additional information see:
C.A., 113 (1990) 148013d.

See also 1964.

20d. *Hydrolases, acting on ester bonds (E.C. 3.1.--)*

- 2095 Balestrieri, C., Castaldo, D., Giovane, A., Quagliuolo, L. and Servillo, L.: A glycoprotein inhibitor of pectin methylsterase in kiwi fruit (*Actinidia chinensis*). *Eur. J. Biochem.*, 193 (1990) 183-187.
- 2096 Bennett, C.F., McCarte, A. and Crooke, S.T.: Purification and characterization of a soluble phospholipase A₂ from guinea pig lung. *Biochim. Biophys. Acta*, 1047 (1990) 271-283.
- 2097 Chang, G.-G., Shiao, M.-S., Lee, K.-R. and Wu, J.-J.: Modification of human placental alkaline phosphatase by periodate-oxidized 1,N⁶-ethenoadenosine monophosphate. *Biochem. J.*, 272 (1990) 683-690.
- 2098 Chou, M.-Y. and Liao, T.-H.: Shrimp hepatopancreatic deoxyribonuclease - purification and characterization as well as comparison with bovine pancreatic deoxyribonuclease. *Biochim. Biophys. Acta*, 1036 (1990) 95-100.

- 2099 Dissing, J. and Svensmark, O.: Human red cell acid phosphatase: purification and properties of the A, B and C isozymes. *Biochim. Biophys. Acta*, 1041 (1990) 232-242.
- 2100 Huang, K.-S., Li, S., Fung, W.-J.C., Hulmes, J.D., Reik, L., Pan, Y.-C.E. and Low, M.G.: Purification and characterization of glycosyl-phosphatidylinositol-specific phospholipase D. *J. Biol. Chem.*, 265 (1990) 17738-17745.
- 2101 Inoue, K., Sohma, H. and Morita, F.: Ca^{2+} -Dependent protein phosphatase which dephosphorylates regulatory light chain-a in scallop smooth muscle myosin. *J. Biochem. (Tokyo)*, 107 (1990) 872-878.
- 2102 Morris, A.J., Waldo, G.L., Downes, C.P. and Harden, T.K.: A receptor and G-protein-regulated polyphosphoinositide-specific phospholipase C from turkey erythrocytes. I. Purification and properties. *J. Biol. Chem.*, 265 (1990) 13501-13507.
- 2103 Ragougy-Sengler, C., Rolland, H. and Pileire, B.: HPLC separation of alkaline phosphatase isoenzymes. Application to the amniotic fluid. *Clin. Chim. Acta*, 192 (1990) 207-212.
- 2104 Saboori, A.M. and Newcombe, D.S.: Human monocyte carboxylesterase. Purification and kinetics. *J. Biol. Chem.*, 265 (1990) 19792-19799.
- 2105 Schoenau, E., Herzog, K.H. and Michalk, D.: Particulate (high-molecular-mass) soluble alkaline phosphatase in urine determined by high-performance liquid chromatography. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1934-1936.
- 2106 Severini, G., Malaguti Aliberti, L.M. and di Giovannandrea, R.: Diagnostic aspects of alkaline phosphatase: separation of isoenzymes in normal and pathological human serum by high-performance liquid chromatography. *J. Chromatogr.*, 563 (1991) 147-152.
- 2107 Thomas, M.K., Francis, S.H. and Corbin, J.D.: Characterization of a purified bovine lung cGMP-binding cGMP phosphodiesterase. *J. Biol. Chem.*, 265 (1990) 14964-14970.
- 2108 Toyoshima, S., Matsumoto, N., Wang, P., Inoue, H., Yoshioka, T., Hotta, Y. and Osawa, T.: Purification and partial amino acid sequences of phosphoinositide-specific phospholipase C of *Drosophila* eye. *J. Biol. Chem.*, 265 (1990) 14842-14848.
- 2109 Verhoeven, A.J.M. and Jansen, H.: Secretion of rat hepatic lipase is blocked by inhibition of oligosaccharide processing at the stage of glucosidase I. *J. Lipid Res.*, 31 (1990) 1883-1893.
- 2110 Vlatakis, G. and Bouriotis, V.: Affinity partitioning of restriction endonucleases. Application to the purification of EcoR I and EcoR V. *J. Chromatogr.*, 538 (1991) 311-321.
- 2111 Yamazaki, A., Hayashi, F., Tatsumi, M., Bitensky, M.W. and George, J.S.: Interactions between the subunits of transducin and cyclic GMP phosphodiesterase in *Rana catesbiana* rod photoreceptors. *J. Biol. Chem.*, 265 (1990) 11539-11548.
- 2112 Yamazaki, Y., Truong, V.L. and Lowenstein, J.M.: 5'-Nucleotidase I from rabbit heart. *Biochemistry*, 30 (1991) 1503-1509.
- 2113 Zhang, Z.-Y. and van Etten, R.L.: Purification and characterization of a low-molecular weight acid phosphatase - a phosphotyrosyl-protein phosphatase from bovine heart. *Arch. Biochem. Biophys.*, 282 (1990) 39-49.

See also 1346, 2152.

20e. *Hydrolases, acting on glycosyl compounds (E.C. 3.2.-.-)*

- 2114 Fan, J.-Q., Kanatani, K., Andoh, N., Yamamoto, K., Kumagai, H. and Tochikura, T.: Release of T-antigen, a carcinoma marker from native human cells, by endo- α -N-acetylgalactosaminidase of *Alcaligenes* sp. *Biochem. Biophys. Res. Commun.*, 172 (1990) 341-347.

- 2115 Kaushal, G.P., Pastuszak, I., Hatanaka, K. and Elbein, A.D.: Purification to homogeneity and properties of glucosidase II from mung bean seedlings and suspension-cultured soybean cells. *J. Biol. Chem.*, 265 (1990) 16271-16279.
- 2116 Liao, A. and Horvath, C.: Purification of β -galactosidase by combined frontal and displacement chromatography. *Ann. N.Y. Acad. Sci.*, 589 (Biochem. Eng. 6) (1990) 182-191; *C.A.*, 113 (1990) 207167g.
- 2117 Nader, H.B., Porcionatto, M.A., Tersariol, I.L.S., Pinhal, M.A.S., Oliveira, F.W., Moraes, C.T. and Dietrich, C.P.: Purification and substrate specificity of heparitinase I and heparitinase II from *Flavobacterium heparinum*. Analyses of the heparin and heparan sulfate degradation products by ^{13}C NMR spectroscopy. *J. Biol. Chem.*, 265 (1990) 16807-16813.
- 2118 Nakano, H., Takenishi, S., Kitahata, S., Kinugasa, H. and Watanabe, Y.: Purification and characterization of an exo-1,4- β -galactanase from a strain of *Bacillus subtilis*. *Eur. J. Biochem.*, 193 (1990) 61-67.
- 2119 Pace, M., Agnellini, D., Lippoli, G., Pietta, P.G., Mauri, P.L. and Cinquanta, S.: Purification of NAD glycohydrolase from *Neurospora crassa* conidia by a polyclonal immunoadsorbent. *J. Chromatogr.*, 539 (1991) 517-523.
- 2120 Pocsí, I., Taylor, S.A., Richardson, A.C., Aamlid, K.H., Smith, B.V. and Price, R.G.: "VRA-GlcNAc": Novel substrate for N-acetyl- β -D-glucosaminidase applied to assay of this enzyme in urine. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1884-1888.
- 2121 Safarik, I.: Rapid detection of dextranases in liquid samples. *Biomed. Biochim. Acta*, 49 (1990) 625-628; *C.A.*, 113 (1990) 186970w.
- 2122 Santos Zimmermann, A., Terenzi, H.F. and Jorge, J.A.: Purification and properties of an extracellular conidial trehalase from *Humicola grisea* var. *thermoidea*. *Biochim. Biophys. Acta*, 1036 (1990) 41-46.
- 2123 Scudder, P., Neville, D.C.A., Butters, T.D., Fleet, G.W.J., Dwek, R.A., Rademacher, T.W. and Jacob, G.S.: The isolation by ligand affinity chromatography of a novel form of α -L-flucosidase from almond. *J. Biol. Chem.*, 265 (1990) 16472-16477.
- 2124 Sengupta, S., Ghosh, A.K. and Sengupta, S.: Purification and characterisation of a β -glucosidase (cellobiase) from a mushroom *Termitomyces clypeatus*. *Biochim. Biophys. Acta*, 1076 (1991) 215-220.
- 2125 Shpanchenko, O.V., Ermolova, O.V. and Chernoglazov, V.M.: (Isolation, purification and properties of cellobiohydrolase from *Trichoderma longibrachiatum*). *Biohimiya (Moscow)*, 55 (1990) 2268-2273.
- 2126 Taniyama, Y., Seko, C. and Kikuchi, M.: Secretion in yeast of mutant human lysozymes with and without glutathione bound to cysteine 95. *J. Biol. Chem.*, 265 (1990) 16767-16771.
- 2127 Thomassin, H., Jacobson, M.K., Guay, J., Verreault, A., Aboul-Ela, N., Menard, L. and Poirier, G.G.: An affinity matrix for the purification of poly(ADP-ribose) glycohydrolase. *Nucleic Acids Res.*, 18 (1990) 4691-4694; *C.A.*, 113 (1990) 207175h.
- 2128 Waksman, G., Keon, J.P.R. and Turner, G.: Purification and characterization of two endopolygalacturonases from *Sclerotinia sclerotiorum*. *Biochim. Biophys. Acta*, 1073 (1991) 43-48.
- 2129 Waksman, G.: Purification and characterization of two endo- β -1,4-D-glucanases from *Sclerotinia sclerotiorum*. *Biochim. Biophys. Acta*, 1073 (1991) 49-55.
- 2130 Wang, H.J. and Thomas, R.L.: High-performance liquid chromatography for the assessment of glucoamylase, immobilized on metallic membranes. *J. Chromatogr.*, 536 (1991) 107-111.
- 2131 Zapater, I.G., Ullah, A.H.J. and Wodzinsky, R.J.: Extracellular α galactosidase (E.C. 3.2.1.22) from *Aspergillus ficuum* NRRL 3135 purification and characterization. *Prepar. Biochem.*, 20 (1990) 263-296.

See also 1477.

20f. Other hydrolases

- 2132 Abraham, C.R., Driscoll, J., Potter, H., van Nostrand, W.E. and Tempst, P.: A calcium-activated protease from Alzheimer's disease brain cleaves at the N-terminus of the amyloid β -protein. *Biochem. Biophys. Res. Commun.*, 174 (1991) 790-796.
- 2133 Aran, J.M., Canela, E.I. and Franco, R.: Preparative purification of adenosine deaminase from human erythrocytes by affinity chromatography. *J. Chromatogr.*, 532 (1990) 75-85.
- 2134 Barrett, A.J. and Brown, M.A.: Chicken liver Pz-peptidase, a thiol-dependent metallo-endopeptidase. *Biochem. J.*, 271 (1990) 701-706.
- 2135 Behrens, R., Hütter, H.-J. and Sohar, I.: Isolierung und Charakterisierung einer enutralen Aminopeptidase aus humanen Myokard. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 696.
- 2136 Belozersky, M.A., Dunaevsky, Y.E. and Voskoboynikova, N.E.: Isolation and properties of a metalloproteinase from buckwheat (*Fagopyrum esculentum*) seeds. *Biochem. J.*, 272 (1990) 677-682.
- 2137 Brown, E.D. and Yada, R.Y.: A kinetic and equilibrium study of the denaturation of aspartic proteinases from the fungi, *Endothia parasitica* and *Mucor miehei*. *Biochim. Biophys. Acta*, 1076 (1991) 406-415.
- 2138 Chang, Y., Teichert, U. and Smith, J.A.: Purification and characterization of a methionine aminopeptidase from *Saccharomyces cerevisiae*. *J. Biol. Chem.*, 265 (1990) 19892-19897.
- 2139 Chen, Y.P. and Riordan, J.F.: Identification of essential tyrosine and lysine residues in angiotensin converting enzyme: evidence for a single active site. *Biochemistry*, 29 (1990) 10493-10498.
- 2140 Cole, K.R., Kumar, S., Trong, H.L., Woodbury, R.G., Walsh, K.A. and Neurath, H.: Rat mast cell carboxypeptidase: amino acid sequence and evidence of enzyme activity within mast cell granules. *Biochemistry*, 30 (1990) 648-655.
- 2141 Exterkate, F.A., Alting, A.C. and Slangen, C.J.: Specificity of two genetically related cell-envelope proteinases of *Lactococcus lactis* subsp. *cremoris* towards α_{s1} -casein-(1-23)-fragment. *Biochem. J.*, 273 (1991) 135-139.
- 2142 Hioki, Y., Okada, K., Ito, H., Matsuyama, K. and Yano, M.: Endothelin converting enzyme of bovine carotid artery smooth muscles. *Biochem. Biophys. Res. Commun.*, 174 (1991) 446-451.
- 2143 Hiraoka, B.Y. and Harada, M.: Use of L-prolyl-L-leucylglycinamide (MIF-1) for the high-performance liquid chromatographic determination of proline iminopeptidase activity in rat liver. *J. Chromatogr.*, 563 (1991) 142-146.
- 2144 Jacob, F., Joris, B., Lepage, S., Dusart, J. and Frere, J.-M.: Role of the conserved amino acids of the 'SDN' loop (Ser¹³⁰, Asp¹³¹ and Asn¹³²) in a class A β -lactamase studied by site-directed mutagenesis. *Biochem. J.*, 271 (1990) 399-406.
- 2145 Juliano, L., Chagas, J.R., Hirata, I.Y., Carmona, E., Sucupira, M., Oliveira, E.S., Oliveira, E.B. and Camargo, A.C.M.: A selective assay for endooligopeptidase A based on the cleavage of fluorogenic substrate structurally related to enkephalin. *Biochem. Biophys. Res. Commun.*, 173 (1990) 647-652.
- 2146 Kageyama, T. and Takahashi, S.Y.: Purification and characterization of a cysteine proteinase from silkworm eggs. *Eur. J. Biochem.*, 193 (1990) 203-210.
- 2147 Kato, I., Yonekura, H., Tajima, M., Yanagi, M., Yamamoto, H. and Okamoto, H.: Two enzymes concerned in peptide hormone α -amidation are synthesized from a single mRNA. *Biochem. Biophys. Res. Commun.*, 172 (1990) 197-203.
- 2148 Khaidarova, N.V., Rudenskaya, G.N., Revina, L.P., Stepanov, V.M. and Egorov, N.S.: (Thiol-dependent serine proteinase of *Streptomyces thermovulgaris*). *Biokhimiya (Moscow)*, 55 (1990) 1110-1119.

- 2149 Kost, O.A., Lamzina, N.A., Sharafutdinov, T.Z., Tsuprun, V.L. and Kazanskaya, N.F.: (Physico-chemical properties of the angiotensin-converting enzyme from bovine lung). *Biokhimiya (Moscow)*, 55 (1990) 974-981.
- 2150 Krestyanova, I.N., Uvarov, N.N., Rudenskaya, G.N., Tsibanov, V.V., Vasilyeva, L.I. and Stepanov, V.M.: (Intracellular aminopeptidase from *Xanthomonas rubrilineans* capable to hydrolyze α -amino acid esters and cephalixin). *Biokhimiya (Moscow)*, 55 (1990) 2226-2238.
- 2151 Lopez, R., Cabre, F., Franco, R., Cascante, M. and Canela, E.I.: Purification of adenosine deaminase from chicken-egg yolk by affinity column chromatography. *Prepar. Biochem.*, 20 (1990) 199-204.
- 2152 Minami, M., Ohishi, N., Mutoh, H., Izumi, T., Bito, H., Wada, H., Seyama, Y., Toh, H. and Shimizu, T.: Leukotriene A₄ hydrolase is a zinc-containing aminopeptidase. *Biochem. Biophys. Res. Commun.*, 173 (1990) 620-626.
- 2153 Miyazaki, K., Hattori, Y., Umenishi, F., Yasumitsu, H. and Umeda, M.: Purification and characterization of extracellular matrix-degrading metalloproteinase, matrin (pump-1), secreted from human rectal carcinoma cell line. *Cancer Res.*, 50 (1990) 7758-7764.
- 2154 Muta, T., Hashimoto, R., Miyata, T., Nishimura, H., Toh, Y. and Iwanaga, S.: Proclotting enzyme from horseshoe crab hemocytes. cDNA cloning, disulfide locations, and subcellular localization. *J. Biol. Chem.*, 265 (1990) 22426-22433.
- 2155 Omatsu-Kanbe, M. and Kitasato, H.: Insulin stimulates the translocation of Na⁺/K⁺-dependent ATPase molecules from intracellular stores to the plasma membrane in frog skeletal muscle. *Biochem. J.*, 272 (1990) 727-733.
- 2156 Payne, D.J., Hood, J., Marriott, M.S. and Amyes, S.G.B.: Separation of plasmid-mediated extended spectrum β -lactamases by fast protein liquid chromatography (FPLC system). *FEMS Microbiol. Lett.*, 69 (1990) 195-200; *C.A.*, 113 (1990) 147707w.
- 2157 Peter, K. and Fittkau, S.: Affinity chromatography of proteases using peptide methyl ketones as ligands. *Biomed. Biochim. Acta*, 49 (1990) 173-178; *C.A.*, 113 (1990) 93703w.
- 2158 Rucklidge, G.J., Lund-Johansen, M., Milne, G. and Bjerkvig, R.: Isolation and characterization of a metalloproteinase secreted by rat glioma cells in serum-free culture. *Biochem. Biophys. Res. Commun.*, 172 (1990) 544-550.
- 2159 Scarborough, G.A. and Hennessey, J.P., Jr.: Identification of the major cytoplasmic regions of the *Neurospora crassa* plasma membrane H⁺-ATPase using protein chemical techniques. *J. Biol. Chem.*, 265 (1990) 16145-16149.
- 2160 Shaginyan, K.A., Alekhina, I.A. and Denisova, N.P.: (Serine proteinase from the higher basidiomycete genus *Coprinus*). *Biokhimiya (Moscow)*, 55 (1990) 1387-1395.
- 2161 Vestling, M.M., Murphy, C.M. and Fenselau, C.: Recognition of trypsin autolysis products by high-performance liquid chromatography and mass spectrometry. *Anal. Chem.*, 62 (1990) 2391-2394.
- 2162 Yanagisawa, K., Resnick, D., Abeijon, C., Robbins, P.W. and Hirschberg, C.B.: A guanosine diphosphatase enriched in Golgi vesicles of *Saccharomyces cerevisiae*. Purification and characterization. *J. Biol. Chem.*, 265 (1990) 19351-19355.

For additional information see:

C.A., 113 (1990) 94001c, 94005g.

see also 1346, 1779, 1824, 1895.

20g. Lyases

- 2163 Bastone, A., Diomede, L., Parini, R., Carnevale, F. and Salmona, M.: Determination of argininosuccinate lyase and arginase activities with an amino acid analyzer. *Anal. Biochem.*, 191 (1990) 384-389.
- 2164 Busygina, O.G. and Severina, I.S.: (An endogenous regulator of the guanylate cyclase activity of human platelets). *Biokhimiya (Moscow)*, 55 (1990) 1812-1818.
- 2165 Böhmer, L.H., Pitout, M.J., Steyn, P.L. and Visser, L.: Purification and characterization of a novel heparinase. *J. Biol. Chem.*, 265 (1990) 13609-13617.
- 2166 Elfarra, A.A. and Hwang, I.Y.: *In vivo* metabolites of S-(2-benzothiazolyl)-L-cysteine as markers of *in vivo* cysteine conjugate β -lyase and thiol glucuronosyl transferase activities. *Drug Metab. Disp.*, 18 (1990) 917-922.
- 2167 Ito, K., Tanaka, T., Tsutsumi, R., Ishikawa, K. and Tsutsumi, K.-i.: The different HNF1-like transcription activators in the liver bind to the same region of the rat aldolase B promoter. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1337-1343.
- 2168 Kawata, Y., Tsujimoto, N., Tani, S., Mizobata, T. and Tokushige, M.: Role of tryptophan 248 in the active site of tryptophanase from *Escherichia coli*. *Biochem. Biophys. Res. Commun.*, 173 (1990) 756-762.
- 2169 Mizuguchi, H., Yabumoto, M., Imamura, I., Fukui, H. and Wada, H.: Immuno-cross-reactivity of histidine and dopa decarboxylases. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1299-1303.
- 2170 Ohmori, E., Fukui, T., Imanishi, N., Yatsunami, K. and Ichikawa, A.: Purification and characterization of L-histidine decarboxylase from mouse mastocytoma P-815 cells. *J. Biochem. (Tokyo)*, 107 (1990) 834-839.
- 2171 Romana, L.K., Santiago, F.S. and Reeves, P.R.: High level expression and purification of α Thymidine diphospho-D-glucose 4,6-dehydratase (rfbB) from *Salmonella* serovar typhimurium LT2. *Biochem. Biophys. Res. Commun.*, 174 (1991) 846-852.
- 2172 Vlahos, C.J. and Dekker, E.E.: Active-site residues of 2-keto-4-hydroxyglutamate aldolase from *Escherichia coli*. Bromopyruvate inactivation and labeling of glutamate 45. *J. Biol. Chem.*, 265 (1990) 20384-20389.
- 2173 Wright, D.J., Lim, C.K. and Peters, T.J.: High performance liquid chromatographic studies of erythrocyte haem biosynthetic enzyme activities in alcoholic macrocytosis. *Biomed. Chromatogr.*, 4 (1990) 249-252.

For additional information see:

C.A., 113 (1990) 226810c.

See also 1453, 2021, 2062.

20h. Isomerases

- 2174 Markauskas, A., Tiknius, V. and Marcisauskas, R.: Use of immobilized triazine dyes in the purification of DNA topoisomerase I (Topo I) and terminal deoxynucleotidyl transferase (TdT) from calf thymus. *J. Chromatogr.*, 539 (1991) 525-529.
- 2175 Pieper, D.H., Stadler-Fritzsche, K., Knackmuss, H.-J., Engesser, K.H., Bruce, N.C. and Cain, R.B.: Purification and characterization of 4-methylmuconolactone methylisomerase, a novel enzyme of the modified 3-oxoadipate pathway in the Gram-negative bacterium *Alcaligenes eutrophus* JMP 134. *Biochem. J.*, 271 (1990) 529-534.

- 2176 Tamura, J.K. and Gellert, M.: Characterization of the ATP binding site on *Escherichia coli* DNA gyrase. Affinity labeling of Lys-103 and Lys-110 of the B subunit by pyridoxal 5'-diphospho-5'-adenosine. *J. Biol. Chem.*, 265 (1990) 21342-21349.

See also 1183.

20i. *Ligases*

- 2177 Katz, E.D. and Dong, M.W.: Rapid analysis and purification of polymerase chain reaction products by high-performance liquid chromatography. *BioChromatography*, 5 (1990) 149-154; *C.A.*, 113 (1990) 206177y.
- 2178 Sabaliauskiene, V., Kiss, L. and Juodka, B.: (The role of the tyrosine residue hydroxyl group in the RNA-ligase enzyme activity). *Biokhimiya (Moscow)*, 55 (1990) 1182-1191.
- 2179 Senichak, V.I., Kaush, M.V., Toma, S.I., Evstigneeva, Z.G. and Kretovich, W.L.: (Glutamine synthetase from plant tissue cytosol of soya, alfalfa and pea tubercular cells). *Biokhimiya (Moscow)*, 55 (1990) 1299-1303.
- 2180 Zakharova, O.D., Kotenko, Yu.G. and Lavrik, O.I.: (Phenylalanyl-tRNA synthetase from human placenta: isolation and properties). *Biokhimiya (Moscow)*, 55 (1990) 1025-1031.

For additional information see:

C.A., 113 (1990) 168051t, 226799f.

20j. *Complex mixtures and incompletely identified enzymes*

- 2181 Siegmund, K.-D., Plattner, H.J. and Diekmann, H.: Purification of ferrichrome synthetase from *Aspergillus quadricinctus* and characterisation as a phosphopantetheine containing multienzyme complex. *Biochim. Biophys. Acta*, 1076 (1991) 123-129.
- 2182 Van Faassen, H., van den Berg, I.E.T. and Berger, R.: Purification of human liver fumarylacetoacetase using immunoaffinity chromatography. *J. Biochem. Biophys. Methods*, 20 (1990) 317-324; *C.A.*, 113 (1990) 93727g.

For additional information see:

C.A., 113 (1990) 93784y.

21. PURINES, PYRIMIDINES, NUCLEIC ACIDS AND THEIR CONSTITUENTS

21a. *Purines, pyrimidines, nucleosides, nucleotides*

- 2183 Alders, D., Hoefnagel, R.M. and Rhemrev-Boom, M.M.: Determination of nucleosides and their adducts with RP-HPLC and (laser-)fluorescence detection. *Nucleosides, Nucleotides*, 9 (1990) 395-405; *C.A.*, 113 (1990) 227353t.
- 2184 Arin, M.J., Diez, M.T., Resines, J.A. and Alemany, M.T.: Quantitative estimation of urinary metabolites in ruminants by high-performance liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 2465-2473.
- 2185 Baldwin, J.E., Dreisbach, J.H. and Veca, A.: Biosynthetic preparation of [riboflavin-2-¹⁴C]flavin adenine dinucleotide using *Clostridium kluyveri*. *Prepar. Biochem.*, 20 (1990) 179-185.
- 2186 Benistant, C., Thomas, A.P. and Rubin, R.: Effect of guanine nucleotides on polyphosphoinositide synthesis in rat liver plasma membranes. *Biochem. J.*, 271 (1990) 591-597.

- 2187 Boos, K.S., Wilmers, B., Schlimme, F. and Sauerbrey, R.: An automated coupled-column HPLC-system for the direct analysis of ribonucleosides and ribonucleotides in biological fluids. *Nucleosides Nucleotides*, 9 (1990) 389-393; *C.A.*, 113 (1990) 187431h.
- 2188 Bottiglieri, T.: Isocratic high performance liquid chromatographic analysis of S-adenosylmethionine and S-adenosylhomocysteine in animal tissues: the effect of exposure to nitrous oxide. *Biomed. Chromatogr.*, 4 (1990) 239-241.
- 2189 Brooke, J., Szabados, E., Lyons, S.D., Goordridge, R.J., Harsanyi, M.C., Poiner, A. and Christopherson, R.I.: Cytotoxic effects of dihydroorotase inhibitors upon human CCRF-CEM leukemia. *Cancer Res.*, 50 (1990) 7793-7798.
- 2190 Deshpande, M.V., Dhume, S.T., Vyas, P.R. and Bhave, M.R.: Determination of 5-methylcytosine content of four cucurbitaceae species using high-performance liquid chromatography. *J. Chromatogr.*, 540 (1991) 397-400.
- 2191 Fathi, M., Tsacopoulos, M., Raverdino, V. and Porthault, M.: Separation of nucleotides in homogenates of octopus retina by ion-pair reversed-phase liquid chromatography and identification by mass spectrometry. *J. Chromatogr.*, 563 (1991) 356-362.
- 2192 Frijus-Plessen, N., Michaelis, H.C., Foth, H. and Kahl, G.F.: Determination of 3'-azido-3'-deoxythymidine, 2',3'-dideoxycytidine, 3'-fluoro-3'-deoxythymidine and 2',3'-dideoxyinosine in biological samples by high-performance liquid chromatography. *J. Chromatogr.*, 534 (1990) 101-107.
- 2193 Galushko, S.V., Shishkina, I.P. and Alekseeva, A.: (Reversed-phase HPLC of N⁴- and O'-derivatives of 6-azacytidine). *Zh. Anal. Khim.*, 45 (1990) 984-989; *C.A.*, 113 (1990) 243960u.
- 2194 Gayden, R.H., Watts, B.A., Beach, R.E. and Benedict, C.R.: Quantitation of adenosine, inosine and hypoxanthine in biological samples by microbore-column isocratic high-performance liquid chromatography. *J. Chromatogr.*, 536 (1991) 265-272.
- 2195 Grune, T., Siems, W., Gerber, G., Tikhonov, Y.V., Pimenov, A.M. and Toguzov, R.T.: Changes of nucleotide patterns in liver, muscle and blood during the growth of Ehrlich ascites cells: application of the reversed-phase and ion-pair reversed-phase high-performance liquid chromatography with radial compression column. *J. Chromatogr.*, 563 (1991) 53-61.
- 2196 Higuchi, H., Endo, T. and Kaji, A.: Enzymic synthesis of oligonucleotides containing methylphosphonate internucleotide linkages. *Biochemistry*, 29 (1990) 8747-8753.
- 2197 Hjerten, S.: High-performance electrophoresis including separation of nucleic acids and their degradation products. Interplay between theory and practical experiments. *Nucleosides Nucleotides*, 9 (1990) 319-330; *C.A.*, 113 (1990) 187566f.
- 2198 Kadam, A.L. and Koide, S.S.: Identification of hypoxanthine in bovine follicular fluid. *J. Pharm. Sci.*, 79 (1990) 1077-1082.
- 2199 Kock, R., Delvoux, P. and Greiling, H.: Eine HPLC-Methode für die simultane Bestimmung von Harnsäure und Kreatinin in Serum. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 745.
- 2200 Lebedev, A.V., Riker, A.I., Rife, J.P. and Wickstrom, E.: Separation of 5'-dimethoxytrityl-2'-deoxynucleoside-3'-O-methylphosphonamidite diastereomers by normal phase chromatography. *Tetrahedron Lett.*, 31 (1990) 3673-3576; *C.A.*, 113 (1990) 231902p.
- 2201 Lin, K.T., Varin, F., Rivard, G.E. and Leclerc, J.-M.: Isolation of 6-mercaptopurine in human plasma by aluminum ion complexation for high-performance liquid chromatographic analysis. *J. Chromatogr.*, 536 (1991) 349-355.
- 2202 Molloy, A.M., Weir, D.G., Kennedy, G., Kennedy, S. and Scott, J.M.: A new high performance liquid chromatographic method for the simultaneous measurement of S-adenosylmethionine and S-adenosylhomocysteine. *Biomed. Chromatogr.*, 4 (1990) 257-260.

- 2203 Morgan, R.L. and Celebuski, J.E.: Large-scale purification of haptenated oligonucleotides using high-performance liquid chromatography. *J. Chromatogr.*, 536 (1991) 85-93.
- 2204 Newman, P.C., Nwosu, V.U., Williams, D.M., Cosstick, R., Seela, F. and Connolly, B.A.: Incorporation of a complete set of deoxyadenosine and thymidine analogues suitable for the study of protein nucleic acid interactions into oligodeoxynucleotides. Application to the EcoRV restriction endonuclease and modification methylase. *Biochemistry*, 29 (1990) 9891-9901.
- 2205 Olashaw, N.E., Rhee, S.G. and Pledger, W.J.: Cyclic AMP agonists induce the phosphorylation of phospholipase C- α and of a 76 kDa protein co-precipitated by anti-(phospholipase C- α) monoclonal antibodies in BALB/c3T3 cells. Relationship to inositol phosphate formation. *Biochem. J.*, 272 (1990) 297-303.
- 2206 Perrett, D. and Simmonds, H.A.: The high performance liquid chromatography of enzyme systems relating to purine and pyrimidine metabolism: a overview. *Biomed. Chromatogr.*, 4 (1990) 267-272 - a review with 26 refs.
- 2207 Sato, E., Suzuki, A., Kanaoka, Y. and Kimura, K.: Heterocycles related to nucleotides. XI. An organomercurial column chromatography for thiouridine. *J. Pharmacobio-Dyn.*, 13 (1990) 487-492; *C.A.*, 114 (1991) 2851z.
- 2208 Schlimme, E., Boos, K.S., Schwarzenau, E., Frister, H., Ott, F.G., Raezke, K.P. and Wilmers, B.: Dual column HPLC analysis of modified ribonucleosides as urinary pathobiochemical markers in clinical research. *Nucleosides Nucleotides*, 9 (1990) 407-410; *C.A.*, 113 (1990) 168310b.
- 2209 Shields, P.G., Povey, A.C., Wilson, V.L., Weston, A. and Harris, C.C.: Combined high-performance liquid chromatography/ 32 P-postlabeling assay of N⁷-methyldeoxyguanosine. *Cancer Res.*, 50 (1990) 6580-6584.
- 2210 Sodum, R.S. and Chung, F.: Stereoselective formation of *in vitro* nucleic acid adducts by 2,3-epoxy-4-hydroxynonanal. *Cancer Res.*, 51 (1991) 137-143.
- 2211 Stribling, R.: High-performance liquid chromatography of oligoguanylates at high pH. *J. Chromatogr.*, 538 (1991) 474-479.
- 2212 Umegae, Y., Nohta, H. and Ohkura, Y.: High-performance liquid chromatographic determination of ribonucleotides by postcolumn derivatization involving oxidation followed by fluorescence reaction, and its application to human erythrocyte sample. *Anal. Sci.*, 6 (1990) 519-522; *C.A.*, 113 (1990) 227364x.
- 2213 Wientjes, M.G. and Au, J.L.-S.: High-performance liquid chromatographic analysis of 2',3'-dideoxyinosine in biological samples. *J. Chromatogr.*, 563 (1991) 400-406.
- 2214 Ziegler, M., Dubiel, W., Henke, W., Gerber, G., Pimenov, A.M., Tikhonov, Y.V. and Roguzov, R.T.: Application of ion-pair high-performance liquid chromatography with radioisotope detection to *in vitro* studies of nucleoside metabolism in mitochondria. *J. Chromatogr.*, 563 (1991) 172-177.

For additional information see:

C.A., 113 (1990) 187458x, 206294j;
114 (1991) 7183t.

See also 1480, 2274, 2275, 2280, 2281, 2282, 2285, 2288, 2651, 2660.

21b. Nucleic acids, RNA

- 2215 Clarke, P.A., Sharp, N.A. and Clemens, M.J.: Translational control by Epstein-Barr virus small RNA EBER-1. Reversal of the double-stranded RNA-induced inhibition of protein synthesis in reticulocyte lysates. *Eur. J. Biochem.*, 193 (1990) 635-641.
- 2216 Hancock, K. and Hajduk, S.L.: The mitochondrial tRNAs of *Trypanosoma brucei* are nuclear encoded. *J. Biol. Chem.*, 265 (1990) 19208-19215.

- 2217 Ruby, S.W., Goelz, S.E., Hostomsky, Z. and Abelson, J.N.: Affinity chromatography with biotinylated RNAs. *Methods Enzymol.*, 181 (RNA Process., Pt. B) (1990) 97-121; *C.A.*, 113 (1990) 146701c.
- 2218 Sorimachi, H., Tsukahara, T., Kawasaki, H., Ishiura, S., Emori, Y., Sugita, H. and Suzuki, K.: Molecular cloning of cDNAs for two subunits of rat multicatalytic proteinase. Existence of N-terminal conserved and C-terminal diverged sequences among subunits. *Eur. J. Biochem.*, 193 (1990) 775-781.

For additional information see:

C.A., 114 (1991) 2966r.

See also 2220.

21c. Nucleic acids, DNA

- 2219 Attal, J., Puissant, C. and Houdebine, L.M.: An improvement of a rapid method using Qiagen columns to purify plasmids. *BioTechniques*, 8 (1990) 269-271; *C.A.*, 113 (1990) 187449v.
- 2220 Colote, S., Ferraz, C., Sri Widada, J. and Liautard, J.P.: (Use of high-performance liquid chromatography in genetic engineering). *Bio-Sciences*, 8 (1989) 42-45; *C.A.*, 113 (1990) 92795r.
- 2221 Held, K.D., Mirro, J., Melder, D.C., Blakely, W.F., Oleinick, N.L. and Chiu, S.M.: Radiation-induced binding of DNA from irradiated mammalian cells to hydroxyapatite columns. *Radiat. Res.*, 123 (1990) 268-274; *C.A.*, 113 (1990) 168115s.
- 2222 Hirabayashi, J., Ito, N., Noguchi, K. and Kasai, K.: Slalom chromatography: size-dependent separation of DNA molecules by a hydrodynamic phenomenon. *Biochemistry*, 29 (1990) 9515-9521.
- 2223 Lutze, L.H. and Winegar, R.A.: A quick and efficient method for the recovery of plasmid or viral DNA from mammalian cells. *Nucleic Acids Res.*, 18 (1990) 6150; *C.A.*, 114 (1991) 1749k.
- 2224 Makino, K. and Murakami, A.: (Purification of a single-stranded DNA). *Kagaku Zokan (Kyoto)*, (1990) 255-262; *C.A.*, 113 (1990) 94090f - a review with 10 refs.
- 2225 Polverelli, M., Voituriez, L., Odin, F., Mouret, J.-F. and Cadet, J.: Purification of DNA and group separation of normal and modified DNA components by size-exclusion chromatography. *J. Chromatogr.*, 539 (1991) 373-381.
- 2226 Yoshimura, T., Takeya, M. and Takahashi, K.: Molecular cloning of rat monocyte chemoattractant protein-1 (MCP-1) and its expression in rat spleen cells and tumor cell lines. *Biochem. Biophys. Res. Commun.* 174 (1991) 504-509.

See also 2218.

21d. Structural studies on RNA and RNA mapping

- 2227 Takeda, N., Pomerantz, S.C. and McCloskey, J.A.: Detection of ribose-methylated nucleotides in enzymatic hydrolysates of RNA by thermospray liquid chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 225-235.

21e. Structural studies on DNA and DNA mapping

- 2228 DuBose, R.F. and Hartl, D.L.: Rapid purification of PCR products for DNA sequencing using Sepharose LC-6B spin columns. *BioTechniques*, 8 (1990) 271-274; *C.A.*, 113 (1990) 168437y.

22. ALKALOIDS

- 2229 Abdulrahman, S., Harrison, M.E., Welham, K.J., Baldwin, M.A., Phillipson, J.D. and Roberts, M.F.: High-performance liquid chromatographic-mass spectrometric assay of high-value compounds for pharmaceutical use from plant cell tissue culture: *Cinchona* alkaloids. *J. Chromatogr.*, 562 (1991) 713-721.
- 2230 Auriola, S., Martinsen, A., Oksman-Caldentey, K.-M. and Naaranlahti, T.: Analysis of tropane alkaloids with thermospray high-performance liquid chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 737-744.
- 2231 Bidlingmeyer, B.A. and Ekmanis, J.L.: Sequential analysis. *LC-GC*, 8 (1990) 352-356; *C.A.*, 114 (1991) 16848r.
- 2232 Blanchard, J., Weber, C.W. and Shearer, L.-E.: HPLC analysis of methylxanthines in human breast milk. *J. Chromatogr. Sci.*, 28 (1990) 640-642.
- 2233 Cai, D.-G., Gu, M.-J., Zhang, J.-D., Zhu, G.-P., Zhang, T.-Y., Li, N. and Ito, Y.: Separation of alkaloids from *Datura meto* L. and *Sophora flavescens* Ait by high-speed countercurrent chromatography. *J. Liq. Chromatogr.*, 13 (1990) 2399-2408.
- 2234 De Roche, G.M., Portz, B.S., Rector, W.G. and Everson, G.T.: Simultaneous determination of caffeine and antipyrine in plasma and saliva using high-performance liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3493-3505.
- 2235 Dufay, C., Lecron, J.C., Daudon, F. and Gombert, J.: Rapid and simple procedure for the determination of salsolinol in urine using high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 563 (1991) 224-227.
- 2236 Fuhr, U., Wolff, T., Harder, S., Schymanski, P. and Staib, A.H.: Quinolone inhibition of cytochrome P-450-dependent caffeine metabolism in human liver microsomes. *Drug Metab. Disp.*, 18 (1990) 1005-1010.
- 2237 Kano, Y., Yasuda, M., Saito, K. and Komatsu, K.: Simultaneous and quantitative analysis of alkaloids in Evodia fruit (Wuzhuya). *Shoyakugaku Zasshi*, 43 (1989) 339-342; *C.A.*, 113 (1990) 138588f.
- 2238 Kumagai, Y., Todaka, T. and Toki, S.: A new metabolic pathway of morphine: *in vivo* and *in vitro* formation of morphinone and morphinone-glutathione adduct in guinea pig. *J. Pharmacol. Exp. Ther.*, 255 (1990) 504-510.
- 2239 Lau, C.E., Ma, F. and Falk, J.L.: Simultaneous determination of cocaine and its metabolites with caffeine in rat serum microsomes by high-performance liquid chromatography. *J. Chromatogr.*, 532 (1990) 95-103.
- 2240 Lee, H.J. and Chiou, W.L.: Marked heterogeneity in the intrahepatic distribution of quinidine in rats: implications in pharmacokinetics. *J. Pharm. Sci.*, 79 (1990) 778-781.
- 2241 McCalley, D.V.: Quantitative analysis of alkaloid from *Cinchona* bark by high-performance liquid chromatography. *Analyst (London)*, 115 (1990) 1355-1358.
- 2242 McManus, K.T., deBethizy, J.D., Garteiz, D.A., Kyerematen, G.A. and Vessell, E.S.: A new quantitative thermospray LC-MS method for nicotine and its metabolites in biological fluids. *J. Chromatogr. Sci.*, 28 (1990) 510-516.
- 2243 Popl, M., Faehrich, J. and Tatar, V.: *Chromatographic Science Series: Chromatographic Analysis of Alkaloids*. Vol. 53, Dekker, New York, 1990, 667 p.; *C.A.*, 113 (1990) 223881r.
- 2244 Vavilin, V.A., Grishanova, A.Yu., Gulyaeva, L.F., Mishin, V.M. and Lyakhovich, V.V.: (Theophylline metabolism by microsomal monooxygenases of rat liver). *Biokhimiya (Moscow)*, 55 (1990) 1786-1794.
- 2245 Whelpton, R. and Hurst, P.R.: HPLC-EC analysis of hyoscine (scopolamine) in urine. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs. Metab., Incl. Anti-Infect. Agents) (1990) 279-284; *C.A.*, 113 (1990) 204335z.

For additional information see:

C.A., 113 (1990) 146804p, 146805q, 152874c, 223849m.

See also 1426, 2467.

23. OTHER SUBSTANCES CONTAINING HETEROCYCLIC NITROGEN

23a. Porphyrins and other pyrroles

- 2246 Hahn, M.E. and Gasiewicz, T.: Determination of individual porphyrins in rodent urine using high-performance liquid chromatography following clean-up by anion-exchange chromatography. *J. Chromatogr.*, 563 (1991) 363-368.
- 2247 Johnson, A.L. and Freeman, D.H.: Systematic preparative methods for petroporphyrin purification. *Energy Fuels*, 4 (1990) 695-699; C.A., 113 (1990) 194612w.
- 2248 Matsumoto, H. and Duke, S.O.: Acifluorfen-methyl effects on porphyrin synthesis in *Lemna paucicostata* Hegelm. 6746. *J. Agric. Food Chem.*, 38 (1990) 2066-2071.
- 2249 Sen, N.P., Seaman, S.W. and Weber, D.: Mass spectrometric confirmation of the presence of N-nitrosopyrrolidine in instant coffee. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 325-327.

See also 2294, 2695.

23b. Bile pigments

For additional information see:

C.A., 113 (1990) 158764p.

23c. Indole derivatives and plant hormones (gibberelins)

- 2250 Adachi, J., Mizoi, Y., Naito, T., Yamamoto, K., Fujiwara, S. and Ninomiya, I.: Determination of β -carbolines in foodstuffs by high-performance liquid chromatography and high-performance liquid chromatography-mass spectrometry. *J. Chromatogr.*, 538 (1991) 331-339.
- 2251 Chuang, C.-Z., Ragan, F.A., Jr. and Prasad, C.: Optimization of conditions for the simultaneous separation of ten tryptophan metabolites using reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 534 (1990) 13-21.
- 2252 Niola, I., Stefanelli, C. and Azzi, A.: (Indole as an indicator of freshness in sole). *Ind. Aliment. (Pinerolo)*, 29 (1990) 553-556; C.A., 113 (1990) 210238m.
- 2253 Rosano, T.G., Ambrose, R.T., Wu, A.H.B., Swift, T.A. and Yadegari, P.: Candidate reference method for determining creatinine in serum: method development and interlaboratory validation. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1951-1955.
- 2254 Steinbach, I., Müller, T. and Kapp, S.: Die Bestimmung der 5-Hydroxyindol-essigsäure aus Urin ohne Probenvorbereitung mit HPLC und elektrochemischer Detektion. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 793-794.

For additional information see:

C.A., 113 (1990) 148202q.

See also 1672, 1673, 1674, 1677, 1678, 1682, 2063.

23d. *Pyridine derivatives*

- 2255 Husain, S., Sarma, P.N., Swami, G.Y.S.K. and Narsimha, R.: Determination of chloropyridine isomers by gas chromatography and high-performance liquid chromatography in chlorpyrifos process development. *J. Chromatogr.*, 540 (1991) 331-341.

See also 2251.

23e. *Other N-heterocyclic compounds*

- 2256 Budvári-Bárány, Zs., Szász, G., Takács-Novák, K., Vámos, J., Kökösi, J. and Józán, M.: Investigation of structure-property relationships for imidazoquinolone derivatives. I. Relation between partition coefficient and chromatographic retention. *J. Liq. Chromatogr.*, 13 (1990) 1485-1497.
- 2257 Gross, G.A.: Simple methods for quantifying mutagenic heterocyclic aromatic amines in food products. *Carcinogenesis (London)*, 11 (1990) 1597-1603; *C.A.*, 114 (1991) 4951f.
- 2258 Karangwa, E., Mitchell, G.E., Jr. and Tucker, R.E.: High-performance liquid chromatographic determination of 4-methylimidazole in sheep plasma and in ammoniated tall fescue hay. *J. Chromatogr.*, 532 (1990) 105-113.
- 2259 Leino, L., Juhakoski, A. and Lauren, L.: The determination of histamine in challenged human leukocyte preparations by high-performance liquid chromatography. *Agents Actions*, 31 (1990) 178-182; *C.A.*, 113 (1990) 229017k.
- 2260 Mauk, C.S., Unrath, C.R. and Blankenship, S.M.: Development of a strong cation exchange method for purification and HPLC assay of gibberellin-sterol inhibitors in plant tissue. *J. Chromatogr. Sci.*, 28 (1990) 621-623.
- 2261 Pasto, M. and Sabria, J.: Separation and quantification of histamine and N^f-methylhistamine in brain extracts. *Biomed. Chromatogr.*, 4 (1990) 245-248.

See also 1667, 2199, 2362.

24. ORGANIC SULPHUR COMPOUNDS (INCL. GLUCOSINOLATES)

- 2262 Kershaw, S.J. and Johnstone, R.A.W.: Modification of a mini-column method for rapid routine determination of total glucosinolate content of rapeseed by glucose release. *J. Am. Oil Chem. Soc.*, 67 (1990) 821-826.
- 2263 Koetz, J., Dautzenberg, H., Rother, G., Philipp, B., Schiene, R. and Fischer, K.: (Investigations of lignosulphonates of spent liquors from spruce and beech sulphite cooks). *Papier (Darmstadt)*, 44 (1990) 333-339; *C.A.*, 113 (1990) 154559c.
- 2264 Maiorino, R.M., Akins, J.M., Blaha, K., Carter, D.E. and Aposhian, H.V.: Determination and metabolism of dithiol chelating agents: X. In humans, meso-2,3-dimercaptosuccinic acid is bound to plasma proteins *via* mixed disulfide formation. *J. Pharmacol. Exp. Ther.*, 254 (1990) 570-577.
- 2265 Marzo, A., Martelli, E.A., Bruno, G., Nava, D., Mignot, A., Vidal, R. and Lefebvre, M.A.: High-performance liquid chromatographic evaluation of 2-(α -thenoylthio)propionylglycine and its two metabolites in biological fluids. *J. Chromatogr.*, 536 (1991) 327-335.
- 2266 Pasquali, F., Oldani, C., Ruggiero, M., Magnelli, L., Chiarugi, V. and Vannucchi, S.: Interaction between endogenous circulating sulfated-glycosaminoglycans and plasma proteins. *Clin. Chim. Acta*, 192 (1990) 19-28.
- 2267 Shenfield, G.M., Boutagy, J.S. and Webb, C.: A screening test for detecting sulfonylureas in plasma. *Ther. Drug Monit.*, 12 (1990) 393-397; *C.A.*, 113 (1990) 144753x.

- 2268 Singer, E. and Möckel, H.J.: RPLC retention of oxygen containing non-ionic organic sulfur compounds. *J. Liq. Chromatogr.*, 13 (1990) 149-1516.
- 2269 Suiko, M., Fernando, P.H.P., Arino, Y., Terada, M., Nakatsu, S. and Liu, M.-C.: Quantitation of tyrosine-O-sulfate in human urine by ion-pair reverse-phase high-performance liquid chromatography. *Clin. Chim. Acta*, 193 (1990) 193-198.
- 2270 Vos, J.N., Kat-van den Nieuwenhof, M.W.P., Basten, J.E.M. and van Boeckel, C.A.A.: HPLC detection of sulphated carbohydrates with a new detection method based on measurement of optical activity by a polarized laser (Chiramonitor). *J. Carbohydr. Chem.*, 9 (1990) 501-505; *C.A.*, 113 (1990) 198112f.

For additional information see:

- C.A.*, 113 (1990) 146779j, 193937u;
114 (1991) 5937t.

See also 1220, 2166, 2201, 2291, 2601.

25. ORGANIC PHOSPHORUS COMPOUNDS (INCL. SUGAR PHOSPHATES)

- 2271 Andersson, L.: Recognition of phosphate groups by immobilized aluminium(III) ions. *J. Chromatogr.*, 539 (1991) 327-334.
- 2272 Barnett, J.V., Shamah, S.M., Lassegue, B., Griendling, K.K. and Galper, J.B.: Development of muscarinic-cholinergic stimulation of inositol phosphate production in cultured embryonic chick atrial cells. Evidence for a switch in guanine-nucleotide-binding protein coupling. *Biochem. J.*, 271 (1990) 443-448.
- 2273 Da Torre, S.D., Corr, P.B. and Creer, M.H.: A sensitive method for the quantification of the mass of inositol phosphates using gas chromatography-mass spectrometry. *J. Lipid Res.*, 31 (1990) 1925-1934.
- 2274 Du, H., Lu, H., Luo, C., Li, Z. and Zao, H.: (Determination of inosine 5'-monophosphate in muscle by high-performance liquid chromatography). *Sepeu*, 8 (1990) 116-117; *C.A.*, 113 (1990) 9417lh.
- 2275 Dutta, I., Dutta, P.K., Smith, D.W. and O'Donovan, G.A.: High-performance liquid chromatography of deoxyribonucleoside di- and triphosphates in tomato roots. *J. Chromatogr.*, 536 (1991) 237-243.
- 2276 Entwistle, G. and ap Rees, T.: Lack of fructose-1,6-bisphosphate in a range of higher plants that store starch. *Biochem. J.*, 271 (1990) 467-472.
- 2277 Iwasa, K.H., Ehrenstein, G., DeFelice, L.J. and Russell, J.T.: High concentration of inositol 1,4,5-trisphosphate in sea urchin sperm. *Biochem. Biophys. Res. Commun.*, 172 (1990) 932-938.
- 2278 MacNulty, E.E., Plevin, R. and Wakelam, M.J.O.: Stimulation of the hydrolysis of phosphatidylinositol 4,5-bisphosphate and phosphatidylcholine by endothelin, a complete mitogen for Rat-1 fibroblasts. *Biochem. J.*, 272 (1990) 761-766.
- 2279 Poyner, D.R., Hawkins, P.T., Benton, H.P. and Hanley, M.R.: Changes in inositol lipids and phosphates after stimulation of the MAS-transfected NG115-401L-C3 cell line by mitogenic and non-mitogenic stimuli. *Biochem. J.*, 271 (1990) 605-611.
- 2280 Ragg, E., Scaglioni, L., Mondelli, R., Carelli, V., Carelli, I., Casini, A., Finazzi-Agro, A., Liberatore, F. and Tortorella, S.: $^1\text{H-NMR}$ study and structure determination of 4,4- and 4,6-dimers from electrochemical reduction of NADP^+ . *Biochim. Biophys. Acta*, 1076 (1991) 37-48.
- 2281 Rotllan Pascual, P.R., Ramos Carrillo, A.R. and Rodriguez del Castillo, A.R.: Reversed-phase high-performance liquid chromatography of dinucleoside polyphosphates. *J. Chromatogr.*, 563 (1991) 37-52.

- 2282 Sarin, M., Buinevicius, Z., Levitsky, S. and Feinberg, H.: Isocratic high-performance liquid chromatographic analysis of myocardial creatine phosphate and adenine nucleotides. *J. Chromatogr.*, 563 (1991) 129-133.
- 2283 Schäfer, R., Nehls-Sahabandu, M., Grabowsky, B., Dehlinger-Kremer, M., Schulz, I. and Mayr, G.W.: Synthesis and application of photoaffinity analogues of inositol 1,4,5-trisphosphate selectively substituted at the 1-phosphate group. *Biochem. J.*, 272 (1990) 817-825.
- 2284 Szwergold, B.S., Kappler, F., Cohen, L.H., Nanavati, D. and Brown, T.R.: Identification of a naturally occurring methyl-ester of phosphate, methyl-phosphorylcholine (methyl-2-(N,N,N-trimethylamino)ethyl phosphate), in the eggs of the sea urchin *S. purpuratus*. *Biochem. Biophys. Res. Commun.*, 172 (1990) 855-861.
- 2285 Thalmann, E. and Blaas, D.: Synthesis of γ -[4-(benzoylphenyl)methylamido]-7-methylguanosine 5'-triphosphate, a photoaffinity-label for cap-binding proteins. *Biochim. Biophys. Acta*, 1088 (1991) 301-304.
- 2286 Trembacz, H. and Jezewska, M.M.: The route of non-enzymic and enzymic breakdown of 5-phosphoribosyl 1-pyrophosphate to ribose 1-phosphate. *Biochem. J.*, 271 (1990) 621-625.
- 2287 Woodcock, E.A., Little, P.J. and Tanner, J.K.: Inositol phosphate release and steroidogenesis in rat adrenal glomerulosa cells. Comparison of the effect of endothelin, angiotensin II and vasopressin. *Biochem. J.*, 271 (1990) 791-796.
- 2288 Yang, W. and Qiu, J.: (Determination of ATP, ADP and AMP in cotton seeds by HPLC). *Sepu*, 8 (1990) 126; *C.A.*, 113 (1990) 94173k.

See also 1409, 1601, 1602, 1789, 1916, 1978, 2205.

26. ORGANOMETALLIC AND RELATED COMPOUNDS

See 2270.

26a. Organometallic compounds

- 2289 Andre, M., Schottenberger, H., Tessadri, R., Ingram, G., Jaitner, P. and Schwarzans, K.E.: Synthesis and preparative HPLC-separation of heteronuclear oligometalloenes. Isolation of cations of rhodocenylferrocene, 1,1'-dirhodocenylferrocene, and 1-cobaltocenyl-1'-rhodocenylferrocene. *Chromatographia*, 30 (1990) 543-545.
- 2290 Ang, H.G., Kwik, W.L. and Leong, W.K.: High-performance liquid chromatography of substituted trinuclear osmium carbonyl clusters, $Os_3(CO)_{12-n}[P(C_6F_5)_3]_n$ ($n=0, 1, 2$). *J. Chromatogr.*, 537 (1991) 475-481.
- 2291 Basova, E.M., Bol'shova, T.A., Polyakova, I.I. and Shapovalova, E.N.: (Separation of certain metal diethyldithiocarbamates by high-performance liquid chromatography). *Vestn. Mosk. Univ., Ser. 2: Khim.*, 31 (1990) 373-378; *C.A.*, 114 (1991) 16691j.
- 2292 Careri, M., Casoli, A., Mangia, A., Mori, G. and Predieri, G.: Extraction and chromatographic determination of organotin compounds as complexes with 2,6-diacetylpyridine bis(benzolhydrazone). *Ann. Chim. (Rome)*, 80 (1990) 243-253; *C.A.*, 113 (1990) 204237u.
- 2293 Cullen, W.R. and Dodd, M.: Determination of arsenic compounds by high-pressure liquid chromatography-graphite furnace atomic absorption spectrometry and thermospray mass spectrometry. *Appl. Organomet. Chem.*, 3 (1990) 401-409; *C.A.*, 114 (1991) 1815d.

- 2294 Del Paggio, A.A., Kamla, G.J., Forster, A.R. and Shepherd, M.A.: Characterization of metal-containing molecules in various hydrotreated atmospheric tower bottoms. *Prepr.-Am. Chem. Soc., Div. Pet. Chem.*, 35 (1990) 603-613; *C.A.*, 113 (1990) 215032z.
- 2295 Lim, K.B.H., Phang, L.-T., Khan, M.R., Hor, T.S.A. and Lee, H.K.: High-performance liquid chromatographic separation of heterometallic, 1,1'-bis(diphenylphosphino)ferrocene-substituted metal carbonyls. *J. Chromatogr.*, 538 (1991) 492-496.
- 2296 Row, I.L., Liu, Y.L. and Whang, C.W.: Determination of dialkyltin compounds in poly(vinylchloride) by high-performance liquid chromatography. *J. Chin. Chem. Soc. (Taipei)*, 37 (1990) 203-209; *C.A.*, 113 (1990) 213195f.

For additional information see:

C.A., 113 (1990) 210203w.

See also 2752.

26b. Boranes, silanes and related non-metallic compounds

- 2297 Allender, W.J.: The determination of sodium monofluoroacetate (compound 1080) in formulation and technical samples by high pressure liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3465-3471.

26c. Coordination compounds

- 2298 Belikov, V.A., Shats, V.D. and Lukevics, E.: Chromatography of organic derivatives of Group IVA elements. *Appl. Organomet. Chem.*, 4 (1990) 77-89; *C.A.*, 113 (1990) 212036t - a review with 163 refs.
- 2299 Khuhawar, M.Y., Khaskhali, G.Q. and Talpur, A.K.: The separation of copper(II), nickel(II), and palladium(II) complexes of new tetradentate Schiff bases using normal phase HPLC. *J. Chem. Soc. Pak.*, 12 (1990) 34-40; *C.A.*, 113 (1990) 183799m.
- 2300 Ruane, R.J., Roberts, D.W. and Wilson, I.D.: Problems in the HPLC of some metal-chelating compounds. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs Metab., Incl. Anti-Infect. Agents) (1990) 343-345; *C.A.*, 113 (1990) 204337b.
- 2301 Speirs, R.J. and Boyer, G.L.: Analysis of ⁵⁵Fe-labeled hydroxamate siderophores by high-performance liquid chromatography. *J. Chromatogr.*, 537 (1991) 259-267.
- 2302 Timerbaev, A.R., Malykhin, A.Yu., Bol'shova, T.A. and Petrukhin, O.M.: (Liquid adsorption chromatography of metal chelates. Model of the chromatographic behavior of 8-hydroxyquinolinates in HPLC). *Zh. Anal. Khim.*, 45 (1990) 1113-1126; *C.A.*, 113 (1990) 159572m.

27. VITAMINS AND VARIOUS ANIMAL GROWTH FACTORS (NON-PEPTIDIC)

- 2303 Albrecht, J.A. and Schafer, H.W.: Comparison of two methods of ascorbic acid determination in vegetables. *J. Liq. Chromatogr.*, 13 (1990) 2633-2641.
- 2304 Badcock, N. and Pinnock, C.: The determination of vitamin E in buccal mucosal cells. *Int. J. Vitam. Nutr. Res.*, 60 (1990) 298-299; *C.A.*, 114 (1991) 2866h.
- 2305 Biesalski, H.K., Weiser, H. and Weiser, H.: Microdetermination of retinyl esters in guinea pig tissues under different vitamin-A-status conditions. *J. Micronutr. Anal.*, 7 (1990) 97-116; *C.A.*, 114 (1991) 2850y.

- 2306 Bonomi, A., Lucchelli, L., Anghinetti, A. and Bonomi, A.: (Determination of ascorbic acid, folic acid, pantothenic acid, and biotin in feed additives by HPLC). *Riv. Soc. Ital. Sci. Aliment.*, 19 (1990) 67-72; *C.A.*, 113 (1990) 210233f.
- 2307 Brokken, K.: Determining ascorbic acid in aquaculture and animal feeds by reversed phase HPLC and UV detection. *Chromatogram*, 11 (1990) 5; *C.A.*, 113 (1990) 170547c.
- 2308 Dal Pozzo, A., Donzelli, G., Liggeri, E. and Rodriguez, L.: Percutaneous absorption of nicotinic acid derivatives *in vitro*. *J. Pharm. Sci.*, 80 (1991) 54-57.
- 2309 Eckhoff, C., Wittfoht, W., Nau, H. and Seikker, W., Jr.: Characterization of oxidized and glucuronidated metabolites of retinol in monkey plasma by thermospray liquid chromatography/mass spectrometry. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 428-433; *C.A.*, 113 (1990) 148205t.
- 2310 Ford, S.H., Gallery, J., Nichols, A. and Shambee, M.: High-performance liquid chromatographic analysis of the (cyanoaquo) stereoisomers of several putative vitamin B₁₂ precursors. *J. Chromatogr.*, 537 (1991) 235-247.
- 2311 Ford, S.H., Nichols, A. and Gallery, J.M.: Separation and study of corrinoid cobalt-ligand isomers by high-performance liquid chromatography. *J. Chromatogr.*, 536 (1991) 185-191.
- 2312 Gadde, R.R. and Burton, F.W.: Purity determination by a combination of spectrophotometric and liquid chromatographic methods: application to 13-*cis*-retinoic acid. *J. Chromatogr. Sci.*, 28 (1990) 543-546.
- 2313 Hahn, A., Stein, J., Rump, U. and Rehner, G.: Optimized high-performance liquid chromatographic procedure for the separation and quantification of the main folacins and some derivatives. I. Chromatographic system. *J. Chromatogr.*, 540 (1991) 207-215.
- 2314 Hauenstein, B.: Vitamins. Part 1. *Schweiz. Lab.-Z.*, 47 (1990) 224-228; *C.A.*, 113 (1990) 96416r - a review without refs.
- 2315 Hirauchi, K., Notsumoto, S., Nagaoka, T., Fujimoto, K. and Suzuki, Y.: (Measurement of vitamin K₃ in foods by high-performance liquid chromatography with fluorometric detection). *Bitamin*, 64 (1990) 183-186; *C.A.*, 113 (1990) 96227e.
- 2316 Hogarty, C.J., Ang, C. and Eitenmiller, R.R.: Tocopherol content of selected foods by HPLC/fluorescence quantitation. *J. Food Compos. Anal.*, 2 (1989) 100-109; *C.A.*, 113 (1990) 96216a.
- 2317 Hou, W. and Wang, W.: Determination of water-soluble vitamins by liquid chromatography with a parallel dual-electrode electrochemical detector. *Talanta*, 37 (1990) 841-844; *C.A.*, 113 (1990) 218338q.
- 2318 Ito, Y., Ochiai, J., Sasaki, R., Suzuki, S., Kusahara, Y., Morimitsu, Y., Otani, M. and Aoki, K.: Serum concentrations of carotenoids, retinol, and α -tocopherol in healthy persons determined by high-performance liquid chromatography. *Clin. Chim. Acta*, 194 (1990) 131-144.
- 2319 Leeming, R.J., Pollock, A., Melville, L.J. and Hamon, C.G.B.: Measurement of 5-methyltetrahydrofolic acid in man by high-performance liquid chromatography. *Metab., Clin. Exp.*, 39 (1990) 902-904; *C.A.*, 113 (1990) 148206u.
- 2320 Lewis, K.C., Green, M.H., Green, J.B. and Zech, L.A.: Retinol metabolism in rats with low vitamin A status: a compartmental model. *J. Lipid Res.*, 31 (1990) 1535-1548.
- 2321 Liu, S.S., Sandri, R. and Tang-Liu, D.D.-S.: Systemic pharmacokinetics of acetylenic retinoids in rats. *Drug Metab. Disp.*, 18 (1990) 1071-1077.
- 2322 Mc Chrisley, B., McNair, H.M. and Driskell, J.A.: Separation and quantification of the B₆ vitamers in plasma and 4-pyridoxic acid in urine of adolescent girls by reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 563 (1991) 369-378.

- 2323 Micali, G., Lanuzza, F. and Curro, P.: (Simultaneous determination of β -carotene, retinol retinyl esters and tocopherols in butter and margarine by HPLC). *Riv. Ital. Sostanze Grasse*, 67 (1990) 409-412; *C.A.*, 114 (1991) 4969t.
- 2324 Murthi, T.N., Devdhara, V.D. and Jacob, G.: Determination of vitamin A in vanaspati by high pressure liquid chromatographic method using UV detector. *J. Food Sci. Technol.*, 27 (1990) 96201s; *C.A.*, 113 (1990) 96201s.
- 2325 Olmedilla, B., Granado, F., Rojas-Hidalgo, E. and Blanco, I.: A rapid separation of ten carotenoids, three retinoids, alpha-tocopherol and d-alpha-tocopherol acetate by high performance liquid chromatography and its application to serum and vegetable samples. *J. Liq. Chromatogr.*, 13 (1990) 1455-1483.
- 2326 Pourfarzam, M. and Bartlett, K.: Products and intermediates of the β -oxidation of [U - ^{14}C]hexadecanedionoyl-mono-CoA by rat liver peroxisomes and mitochondria. *Biochem. J.*, 273 (1991) 205-210.
- 2327 Quick, T.C. and Ong, D.E.: Vitamin A metabolism in the human intestinal Caco-2 cell line. *Biochemistry*, 29 (1990) 11116-11123.
- 2328 Rushin, W.G., Catignani, G.L. and Schwartz, S.J.: Determination of β -carotene and its *cis* isomers in serum. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1986-1989.
- 2329 Sawamura, M., Ooishi, S. and Li, Z.F.: Reduction of dehydroascorbic acid by sodium hydrosulfide and liquid chromatographic determination of vitamin C in citrus juices. *J. Sci. Food Agric.*, 53 (1990) 279-281; *C.A.*, 114 (1991) 4979w.
- 2330 Schofield, D., Guyan, P.M. and Braganza, J.M.: Problems with the quantitative analysis of dehydroascorbic acid and ascorbic acid in plasma by HPLC. *Biochem. Soc. Trans.*, 18 (1990) 1179-1190; *C.A.*, 113 (1990) 148221v.
- 2331 Selhub, J., Seyoum, E., Pomfret, E.A. and Zeisel, S.H.: Effects of choline deficiency and methotrexate treatment upon liver folate content and distribution. *Cancer Res.*, 51 (1991) 16-21.
- 2332 Sliwiok, J., Podgorny, A. and Siwek, A.: Chromatographic comparison of the hydrophobicity of vitamin A derivatives. *J. Planar Chromatogr.*, 3 (1990) 429-430.
- 2333 Staroverov, V.M., Deineka, V.I. and Krichkovskaya, L.V.: (Normal phase micro-column HPLC. Simultaneous determination of vitamins A, E and K_3 in oily solutions). *Khim.-Farm. Zh.*, 24 (1990) 85-86; *C.A.*, 113 (1990) 237925v.
- 2334 Thorpe, V.A.: Liquid chromatography and fluorescence detection of vitamin A in animal feeds, finished feeds, and premixes. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 463-466.
- 2335 Tyler, T.A. and Genzale, J.A.: Liquid chromatographic determination of total niacin in beef, semolina, and cottage cheese. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 467-469.
- 2336 Ujiie, T., Iida, E., Kodaka, K., Shindo, H. and Ueno, T.: (Rapid and reproducible determination of retinol in foods by ethyl acetate/*n*-hexane extraction-reversed phase high-performance liquid chromatography). *Bitamin*, 64 (1990) 187-191; *C.A.*, 113 (1990) 96228f.
- 2337 Vidal-Valverde, C. and Reche, A.: Reliable system for the analysis of riboflavin in foods by high performance liquid chromatography and UV detection. *J. Liq. Chromatogr.*, 13 (1990) 2089-2101.
- 2338 Warner, K. and Mounts, T.L.: Analysis of tocopherols and phytosterols in vegetable oils by HPLC with evaporative light-scattering detection. *J. Am. Oil Chem. Soc.*, 67 (1990) 827-831.

For additional information see:

C.A., 113 (1990) 187456v, 197638v, 198104e, 204250t, 227373z, 237938b;
114 (1991) 5076m.

See also 1527, 1958, 2185, 2429.

28. ANTIBIOTICS

- 2339 Agarwal, V.K.: High performance liquid chromatographic determination of neomycin in milk using a HISEP column. *J. Liq. Chromatogr.*, 13 (1990) 2475-2487.
- 2340 Bano, M.C., Braco, L. and Abad, C.: Conformational transitions of gramicidin A in phospholipid model membranes. A high-performance liquid chromatography assessment. *Biochemistry*, 30 (1991) 886-894.
- 2341 Bernareggi, A., Danese, A., Cometti, A., Buniva, G. and Rowland, M.: Pharmacokinetics of individual components of teicoplanin in man. *J. Pharmacokin. Biopharm.*, 18 (1990) 525-543.
- 2342 Bonomi, A., Anghinetti, A. and Lucchelli, L.: (Flavomycin determination in mixed feeds by HPLC). *Riv. Soc. Ital. Sci. Aliment.*, 19 (1990) 85-88; C.A., 113 (1990) 210234g.
- 2343 Bowers, L.D., Norman, D.D., Yan, X.-X., Scheeler, D. and Carlson, K.L.: Isolation and structural identification of hydroxy-desmethyl-cyclosporine. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1875-1879.
- 2344 Erdman, G.R., Walker, K., Giebink, G.S. and Canafax, D.M.: High performance liquid chromatographic analysis of amoxicillin in microliter volumes of chinchilla middle ear effusion and plasma. *J. Liq. Chromatogr.*, 13 (1990) 3339-3350.
- 2345 Ferrari, P., Edwards, D.M.F., Gallo, G.G. and Selva, E.: Antibiotic SB22484: a novel complex of the aurodox group. II. Structure elucidation of the four factors. *J. Antibiot.*, 43 (1990) 1359-1366.
- 2346 Fiedler, H.-P. and Wachter, J.: High-performance liquid chromatographic determination of bleomycins. *J. Chromatogr.*, 536 (1991) 343-347.
- 2347 Fletouris, D.J., Psomas, J.E. and Botsoglou, N.A.: Trace analysis of oxytetracycline and tetracycline in milk by high-performance liquid chromatography. *J. Agric. Food Chem.*, 38 (1990) 1913-1917.
- 2348 Fredenhagen, A., Fendrich, G., Märki, F., Märki, W., Gruner, J., Raschdorf, F. and Peter, H.H.: Duramycins B and C, two new lanthionine containing antibiotics as inhibitors of phospholipase A₂. Structural revision of duramycin and cinnamycin. *J. Antibiot.*, 43 (1990) 1403-1412.
- 2349 Fujioka, H., Yamamoto, H., Annoura, H., Miyazaki, M. and Kita, Y.: Asymmetric synthesis of anthracyclines: regio- and stereoselective synthesis of (-)-7-deoxy-daunomycinone through direct asymmetric introduction of an alkenyl unit into C9 ketone. *Chem. Pharm. Bull.*, 38 (1990) 1872-1876.
- 2350 Gorski, R.J., Morgan, D.K., Sarocka, C. and Plasz, A.C.: Estimation and identification of non-polar compounds in clarithromycin bulk drug by high-performance liquid chromatography. *J. Chromatogr.*, 540 (1991) 422-429.
- 2351 Haginaka, J. and Nishimura, Y.: Simultaneous determination of ampicillin and sulbactam by liquid chromatography: post-column reaction with sodium hydroxide and sodium hypochlorite using an active hollow-fibre membrane reactor. *J. Chromatogr.*, 532 (1990) 87-94.
- 2352 Harada, K.-I., Ikai, Y., Yamazaki, Y., Oka, H., Suzuki, M., Nakazawa, H. and Ito, Y.: Isolation of bacitracins A and F by high-speed counter-current chromatography. *J. Chromatogr.*, 538 (1991) 203-212.

- 2353 Harada, K.-I., Kimura, I., Yoshikawa, A., Suzuki, M., Nakazawa, H., Hattori, S., Komori, K. and Ito, Y.: Structural investigation of the antibiotic sporaviridin. XV. Preparative-scale preparation of sporaviridin components by HSCCC. *J. Liq. Chromatogr.*, 13 (1990) 2373-2388.
- 2354 Hasson, H. and Warshawsky, A.: HPLC analysis of adriamycine as N-2,4-dinitrophenyladriamycine. *J. Liq. Chromatogr.*, 13 (1990) 1637-1649.
- 2355 Hayashi, F., Nagashima, K., Terui, Y., Kawamura, Y., Matsumoto, K. and Itazaki, H.: The structure of PA48009: the revised structure of duramycin. *J. Antibiot.*, 43 (1990) 1421-1430.
- 2356 Holt, D.E., de Louvois, J., Hurley, R. and Harvey, D.: A high performance liquid chromatography system for the simultaneous assay of some antibiotics commonly found in combination in clinical samples. *J. Antibiot. Chemother.*, 26 (1990) 107-115; *C.A.*, 113 (1990) 144750u.
- 2357 Horie, M., Saito, K., Hoshino, Y., Nose, N., Nakazawa, H. and Yamane, Y.: Simultaneous determination of residual synthetic antibacterials in fish by high-performance liquid chromatography. *J. Chromatogr.*, 538 (1991) 484-491.
- 2358 Horton, R.: A comparison of HPLC and bioassay for β -lactam antibiotics. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 93-101; *C.A.*, 113 (1990) 223953r - a review with 23 refs.
- 2359 James, C.A., Simmonds, R.J. and Wood, S.A.: Development of an efficient HPLC analysis for lincomycin for use in contract laboratories. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs Metab., Incl. Anti-Infect. Agents) (1990) 117-122; *C.A.*, 114 (1991) 62u.
- 2360 Katagiri, Y., Naora, K., Ichikawa, N., Hayashibara, M. and Iwamoto, K.: High-performance liquid chromatographic determination of ciprofloxacin in rat brain and cerebrospinal fluid. *Chem. Pharm. Bull.*, 38 (1990) 2884-2886.
- 2361 Kimura, K.-I., Nakayama, S., Nakajima, N., Yoshihama, M., Miyata, N. and Kawanishi, G.: A new piericidin rhamnoside, 3'-rhamnopericidin A₁. *J. Antibiot.*, 43 (1990) 1341-1343.
- 2362 Knübel, G., Larsen, L.K., Moore, R.E., Levine, I.A. and Patterson, G.M.L.: Cytotoxic, antiviral indolocarbazoles from a blue-green alga belonging to the *Nostocaceae*. *J. Antibiot.*, 43 (1990) 1236-1239.
- 2363 Kubes, J., Olesova, M., Pospisilova, B., Sabatova, J. and Vyskovska, M.: (Verification of the microbiological determination of rolitetracycline in substances and injections by the HPLC method). *Cesk. Farm.*, 39 (1990) 215-219; *C.A.*, 113 (1990) 218341k.
- 2364 Kuhnt, D., Anke, T., Besl, H., Bross, M., Herrmann, R., Mocek, U., Steffan, B. and Steglich, W.: Antibiotics from basidiomycetes. XXXVII. New inhibitors of cholesterol biosynthesis from cultures of *Xerula melanotricha* Dörfelt. *J. Antibiot.*, 43 (1990) 1413-1420.
- 2365 Long, A.R., Hsieh, L.C., Malbrough, M.S., Short, C.R. and Barker, S.A.: Matrix solid-phase dispersion (MSPD) isolation and liquid chromatographic determination of oxytetracycline, tetracycline, and chlortetracycline in milk. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 379-384.
- 2366 Martin-Villacorta, J. and Mendez, R.: Effect of temperature and mobile phase composition on RP-HPLC separation of cephalosporins. *J. Liq. Chromatogr.*, 13 (1990) 3269-3288.
- 2367 Miyashita, Y., Terabe, S. and Nishi, H.: Separation of some antibiotics and corticosteroids by micellar electrokinetic capillary chromatography using P/ACE System 2000. *Chromatogram*, 11 (1990) 7-8; *C.A.*, 113 (1990) 198099g.
- 2368 Miyauchi, M., Nakayama, E., Fujimoto, K., Kawamoto, I. and Ide, J.: Studies on orally active cephalosporin esters. V. A prodrug approach for oral delivery of 3-thiazoliomethyl cephalosporin. *Chem. Pharm. Bull.*, 38 (1990) 1906-1910.
- 2369 Mo, C.-J., Shin-Ya, K., Furihata, K., Furihata, K., Shimazu, A., Hayakawa, Y. and Seto, H.: Isolation and structural elucidation of antioxidative agents, antiostatins A₁ to A₄ and B₂ to B₅. *J. Antibiot.*, 43 (1990) 1337-1340.

- 2370 Moats, W.A.: Liquid chromatographic approaches to antibiotic residue analysis. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 343-346 - a review with 50 refs.
- 2371 Molina, F., Jehl, F., Gallion, C., Penner, F. and Monteil, H.: Determination of the third generation oral cephalosporin, cefpodoxime, in biological fluids by high-speed high-performance liquid chromatography. *J. Chromatogr.*, 563 (1991) 205-210.
- 2372 Moore, C.M., Sato, K. and Katsumata, Y.: High-performance liquid chromatographic determination of cephalosporin antibiotics using 0.3 mm I.D. columns. *J. Chromatogr.*, 539 (1991) 215-220.
- 2373 Mori, H., Funayama, S., Sudo, Y., Komiyama, K. and Omura, S.: A new antibiotic, 13-hydroxyglucopiericidin A. Isolation, structure elucidation and biological characteristics. *J. Antibiot.*, 43 (1990) 1329-1331.
- 2374 Morris, S.J., Thurston, D.E. and Nevell, T.G.: Evaluation of the electrophilicity of DNA-binding pyrrolo[2,1-c][1,4]benzodiazepines by HPLC. *J. Antibiot.*, 43 (1990) 1286-1291.
- 2375 Nahata, M.C. and Jackson, D.S.: Liquid chromatographic method for the determination of cefadroxil in its suspension and in serum. *J. Liq. Chromatogr.*, 13 (1990) 1651-1656.
- 2376 Nakagawa, K., Torikata, A., Sato, K. and Tsukamoto, Y.: Microbial conversion of milbemycins: 30-oxidation of milbemycin A₄ and related compounds by *Amycolata autotrophica* and *Amycolatopsis mediterranei*. *J. Antibiot.*, 43 (1990) 1321-1328.
- 2377 Neely, F.I. and Parks, R.J.: High-performance liquid chromatographic determination of mycophenolic acid in fermentation broth. *J. Chromatogr.*, 540 (1991) 383-385.
- 2378 Nishimura, S., Yasuda, N., Sasaki, H., Sakane, K. and Takaya, T.: Synthesis and antibacterial activity of 7 β -[1-(2-aminothiazol-4-yl)-1-cyclopropano-carboxyamido]cephem derivatives. *J. Antibiot.*, 43 (1990) 1278-1285.
- 2379 Oka, H., Harada, K.-I., Suzuki, M., Nakazawa, H. and Ito, Y.: Foam counter-current chromatography of bacitracin. II. Continuous removal and concentration of hydrophobic components with nitrogen gas and distilled water free of surfactants or other additives. *J. Chromatogr.*, 538 (1991) 213-218.
- 2380 Oki, T., Kakushima, M., Nishio, M., Kamei, H., Hirano, M., Sawada, Y. and Konishi, M.: Water-soluble pradimicin derivatives, synthesis and antifungal evaluation of N,N-dimethylpradimicins. *J. Antibiot.*, 43 (1990) 1230-1235.
- 2381 Ondeyka, J.G., Geogelman, R.T., Schaeffer, J.M., Kelemen, L. and Zitano, L.: Novel antinematodal and antiparasitic agents from *Penicillium charlesii*. I. Fermentation, isolation and biological activity. *J. Antibiot.*, 43 (1990) 1375-1379.
- 2382 Plantikow, A. and Lohs, P.: (Determination of chloramphenicol residues in feeds for livestock). *Nahrung*, 33 (1989) 1021-1022; *C.A.*, 113 (1990) 150941y.
- 2383 Pou-Clave, L., Campos-Barreda, F. and Pascual-Mostaza, C.: Determination of ciprofloxacin in human serum by liquid chromatography. *J. Chromatogr.*, 563 (1991) 211-215.
- 2384 Puar, M.S. and Schumacher, D.: Novel macrolides from *Micromonospora rosaria*. *J. Antibiot.*, 43 (1990) 1497-1501.
- 2385 Reid, J.M., Pendergrass, T.W., Krailo, M.D., Hammond, G.D. and Ames, M.M.: Plasma pharmacokinetics and cerebrospinal fluid concentrations of idarubicin and idarubicinol in pediatric leukemia patients: a childrens cancer study group report. *Cancer Res.*, 50 (1990) 6525-6528.
- 2386 Rosenthaler, J. and Keller, H.P.: Comment on cyclosporin A assay techniques: an attempt for recommendations. *Transplant. Proc.*, 22 (1990) 1160-1165; *C.A.*, 113 (1990) 90723s.

- 2387 Rustum, A.M.: Estimation of cyclosporin-A in whole blood by simple and rapid reversed-phase HPLC utilizing a salting-out extraction procedure. *J. Chromatogr. Sci.*, 28 (1990) 594-598.
- 2388 Saab, A.N., Hussain, A.A., Patel, I.H. and Dittert, L.W.: Synthesis and mechanisms of decomposition of some cephalosporin prodrugs. *J. Pharm. Sci.*, 79 (1990) 802-805.
- 2389 Sakamoto, M., Yamamoto, K.-i., Isshiki, K., Ishikura, T., Fukagawa, Y. and Yoshioka, T.: Antibacterial activity and chemical modifications of PS-5 at the C-3 side chain. *J. Antibiot.*, 43 (1990) 1254-1270.
- 2390 Sawada, Y., Hatori, M., Yamamoto, H., Nishio, M., Miyaki, T. and Oki, T.: New antifungal antibiotics pradimicins FA-1 and FA-2: D-serine analogs of pradimicins A and C. *J. Antibiot.*, 43 (1990) 1223-1229.
- 2391 Sawada, Y., Tsuno, T., Yamamoto, H., Nishio, M., Konishi, M. and Oki, T.: Pradimicins M, N, O and P, new dihydrobenzo[*a*]naphthacenequinones produced by blocked mutants of *Actinomadura hibisca* P157-2. *J. Antibiot.*, 43 (1990) 1367-1374.
- 2392 Selva, E., Beretta, G., Pallanza, R., Goldstein, B.P., Berti, M., Edwards, D.M.F. and Denaro, M.: Antibiotic SB22484: a novel complex of the aurodox group. I. Taxonomy of the producing organism, isolation of the antibiotics and chemical and biological characterization. *J. Antibiot.*, 43 (1990) 1349-1359.
- 2393 Siegel, D., Gibson, N.W., Preusch, P.C. and Ross, D.: Metabolism of mitomycin C by DT-diaphorase: role in mitomycin C-induced DNA damage and cytotoxicity in human colon carcinoma cells. *Cancer Res.*, 50 (1990) 7483-7489.
- 2394 Stubbs, C. and Kanfer, I.: A stability-indicating high-performance liquid chromatographic assay of erythromycin estolate in pharmaceutical dosage forms. *Int. J. Pharm.*, 63 (1990) 113-119; *C.A.*, 113 (1990) 237956f.
- 2395 Sugioka, T., Asano, T., Chikaraishi, Y., Suzuki, E., Sano, A., Kuriki, T., Shiotsuka, M. and Saito, K.: Stability and degradation pattern of cefpirome (HR 810) in aqueous solution. *Chem. Pharm. Bull.*, 38 (1990) 1998-2002.
- 2396 Suzukake-Tsuchiya, K., Moriya, Y., Yamazaki, K., Hori, M., Hosokawa, N., Sawa, T., Iinuma, H., Naganawa, H., Imada, C. and Hamada, M.: Screening of antibiotics preferentially active against ras oncogene-expressed cells. *J. Antibiot.*, 43 (1990) 1489-1496.
- 2397 Targove, M.A. and Danielson, N.D.: High-performance liquid chromatography of clindamycin antibiotics using tris(bipyridine)-ruthenium(III) chemiluminescence detection. *J. Chromatogr. Sci.*, 28 (1990) 505-509.
- 2398 Taylor, R.B., Reid, R.G. and Gould, I.M.: Determination of teicoplanin in plasma using microbore high-performance liquid chromatography and injection-generated gradients. *J. Chromatogr.*, 563 (1991) 451-457.
- 2399 Trani, A., Malabara, A., Ferrari, P., Pallanza, R., Berti, M. and Ciabatti, R.: Carboxyhydrazides of the aglycone of teicoplanin. Synthesis and antibacterial activity. *J. Antibiot.*, 43 (1990) 1483-1488.
- 2400 Wood, S.A. and Simmonds, R.J.: Development of a sensitive and robust assay for the aminocyclitol antibiotic, trospectomycin. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 103-108; *C.A.*, 113 (1990) 224019c.
- 2401 Yamaoka, K., Kanba, M., Toyoda, Y., Yano, Y. and Nakagawa, T.: Analysis of enterohepatic circulation of cefixime in rat by fast inverse Laplace transform (FILT). *J. Pharmacokin. Biopharm.*, 18 (1990) 545-559.
- 2402 Yoo, G.S., Choi, K. and Stewart, J.T.: Second derivative ultraviolet spectrophotometry and high performance liquid chromatography with fluorometric detection of cycloserine using 9-chloro-10-methyl acridinium triflate as a new UV and fluorescent labeling agent. *Anal. Lett.*, 23 (1990) 1245-1263.

For additional information see:

C.A., 113 (1990) 90806w, 158763n, 210209c, 237922s;
114 (1991) 12275d, 12300h.

See also 1189, 2470, 2661.

29. INSECTICIDES, PESTICIDES AND OTHER AGROCHEMICALS

29a. General techniques

2403 Anonymous: Use of HPLC for determination of pesticides in food. *Lebensm.-Biotechnol.*, 7 (1990) 130-131; C.A., 113 (1990) 189872b.

2404 Durand, G., de Bertrand, N. and Barcelo, D.: Mobile phase variations in thermospray liquid chromatography-mass spectrometry of pesticides. *J. Chromatogr.*, 562 (1991) 507-523.

2405 Huber, L.: (HPLC-method for the determination of pesticides accoring to the drinking water regulations). *GIT-Suppl.*, (1990) 81-82; C.A., 113 (1990) 197448h.

See also 2231.

29b. Chlorinated insecticides

2406 Hong, C.S. and Bush, B.: Determination of mono- and non-ortho coplanar PCBs in fish. *Chemosphere*, 21 (1990) 173-181; C.A., 113 (1990) 206296m.

2407 Wagner, U., Schlebusch, H., van der Ven, K., Diedrich, K. and Krebs, D.: Accumulation of pollutants in the genital tract of sterility patients. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 683-688.

For additional information see:

C.A., 113 (1990) 150923u, 150923u.

29c. Phosphorus insecticides

2408 Cabras, P., Plumitallo, A. and Spanedda, L.: High-performance liquid chromatographic separation of fenthion and its metabolites. *J. Chromatogr.*, 540 (1991) 406-410.

2409 Slahck, S.C.: Liquid chromatographic method for determination of oxydemeton-methyl in formulated products: collaborative study. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 431-434.

See also 2410.

29d. Carbamates

2410 Leon-Gonzalez, M.E. and Townshend, A.: Determination of organophosphorus and carbamate pesticide standards by liquid chromatography with detection by inhibition of immobilized acetylcholinesterase. *J. Chromatogr.*, 539 (1991) 47-54.

See also 2420.

29e. Herbicides

2411 Alawi, M.A.: A high-performance liquid chromatographic approach for monitoring ethofumesate in plant, soil and water. *Anal. Lett.*, 23 (1990) 1695-1709.

- 2412 Barcelo, D.: Use of solvent adduct ions to confirm structure of selected herbicides with thermospray liquid chromatography/mass spectrometry. *ACS Symp. Ser.*, 420 (Liq. Chromatogr./Mass Spectrom.) (1990) 48-61; *C.A.*, 113 (1990) 186477r.
- 2413 Kawai, S., Uno, B. and Tomita, M.: Determination of glyphosate and its major metabolite aminomethylphosphonic acid by high-performance liquid chromatography after derivatization with *p*-toluenesulphonyl. *J. Chromatogr.*, 540 (1991) 411-415.
- 2414 Lydon, J., Engelke, B.F. and Helling, C.S.: Simplified high-performance liquid chromatography method for the simultaneous analysis of tebuthiuron and hexazinone. *J. Chromatogr.*, 536 (1991) 223-228.
- 2415 Miliadis, G.E., Siskos, P.A. and Vasilikiotis, G.S.: Simplified cleanup and liquid chromatographic ultraviolet determination of linuron and three metabolites in potatoes. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 435-437.
- 2416 Mueller, T.C., Banks, P.A., Bush, P.B. and Steen, W.C.: Liquid chromatographic determination of 5-(methylamino)-2-phenyl-4-[(3-trifluoromethyl)phenyl]-3-(2H)-furanone in soil. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 298-306.
- 2417 Rutherford, B.S.: Liquid chromatographic determination of the herbicide isoxaben and its soil metabolite in soil and soil-turf samples. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 287-289.

For additional information see:

C.A., 113 (1990) 147132e.

See also 2248.

29f. Fungicides

- 2418 Ando, T., Teclé, B., Toia, R.F. and Casida, J.E.: Tritritonikkomycin Z, (uracil-5-³H, pyridyl-2,4-³H₂): radiolabeling of a potent inhibitor of fungal and insect chitin synthetase. *J. Agric. Food Chem.*, 38 (1990) 1712-1715.
- 2419 Sanchez-Rasero, F., Romero, T.E. and Dios, C.G.: Liquid chromatographic determination of carbendazim in the presence of some normal soil constituents with photodiode-array detection. *J. Chromatogr.*, 538 (1991) 480-483.
- 2420 Singh, R.P., Brindle, I.D., Hall, C.D. and Chiba, M.: Kinetic study of the decomposition of methyl[1-(butylcarbamoyl)-1H-benzimidazol-2-yl]carbamate (benomyl) to methyl 1H-benzimidazol-2-ylcarbamate (MBC). *J. Agric. Food Chem.*, 38 (1990) 1758-1762.

29g. Other types of pesticides and various agrochemicals

- 2421 Bicchi, C., D'Amato, A., Tonutti, I and Cantamessa, L.: Simultaneous determination of clofentezine, fenoxycarb and hexythiazox by HPLC on apples, pears and their pulps. *Pestic. Sci.*, 30 (1990) 13-19; *C.A.*, 113 (1990) 229809v.
- 2422 Koppen, B.: Liquid chromatographic determination of bromadiolone in rodent baits. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 429-430.
- 2423 Lisseter, S.G. and Hambling, S.G.: Chiral high-performance liquid chromatography of synthetic pyrethroid insecticides. *J. Chromatogr.*, 539 (1991) 207-210.

See also 2297, 2418.

30. SYNTHETIC AND NATURAL DYES

30a. Synthetic dyes

- 2424 Allen, J.L. and Meinertz, J.R.: Post-column reaction for simultaneous analysis of chromatic and leuco forms of malachite green and crystal violet by high-performance liquid chromatography with photometric detection. *J. Chromatogr.*, 536 (1991) 217-222.
- 2425 Geeta, N. and Baggi, T.R.: Determination of phenolphthalein by reverse phase high-performance liquid chromatography. *Microchem. J.*, 42 (1990) 170-175; *C.A.*, 113 (1990) 184017s.
- 2426 Naga, S. and Koike, H.: Separation of food dyes by high-performance liquid chromatography using methylguanidine as an ion-pair reagent. *Anal. Sci.*, 6 (1990) 473-474; *C.A.*, 113 (1990) 96240d.
- 2427 Oka, H., Ikai, Y., Kawamura, N., Hayakawa, J., Yamada, M., Harada, K.-I., Murata, H., Suzuki, M., Nakazawa, H., Suzuki, S., Sakita, T., Fujita, M. et al.: Purification of Food Color Red No. 106 (Acid Red) using high-speed counter-current chromatography. *J. Chromatogr.*, 538 (1991) 149-156.
- 2428 Weisz, A., Langowski, A.J., Meyers, M.B., Thieken, M.A. and Ito, Y.: Preparative purification of tetrabromotetrachlorofluorescein and Phloxine B by centrifugal counter-current chromatography. *J. Chromatogr.*, 538 (1991) 157-164.

See also 2722.

30b. Chloroplast and other natural pigments

- 2429 Kim, Y., English, C., Reich, P., Gerber, L.E. and Simpson, K.L.: Vitamin A and carotenoids in human milk. *J. Agric. Food Chem.*, 38 (1990) 1930-1933.
- 2430 Palumbo, A., d'Ischia, M., Misuraca, G. and Prota, G.: Mechanism of inhibition of melanogenesis by hydroquinone. *Biochim. Biophys. Acta*, 1073 (1991) 85-90.
- 2431 Ubillas Sanchez, R. and Lock de Ugaz, O.: (Separation of pigments of *Amaranthus caudatus* L. var. *atropurpureus*). *Bol. Soc. Quim. Peru*, 55 (1989) 1-12; *C.A.*, 113 (1990) 213846u.

For additional information see:

C.A., 114 (1991) 4946h.

See also 1454, 1456, 2305.

31. PLASTICS AND THEIR INTERMEDIATES

- 2432 Bartels, H., Hallensleben, M.L., Pampous, G. and Scholz, G.: Molar mass distribution determination of natural rubber and masticated natural rubber by gel permeation chromatography. *Angew. Macromol. Chem.*, 180 (1990) 73-84; *C.A.*, 113 (1990) 154113c.
- 2433 Billiani, J. and Lederer, K.: Polypropylene characterization by high temperature SEC coupled with LALLS. *J. Liq. Chromatogr.*, 13 (1990) 3013-3025.
- 2434 Billiani, J., Amtmann, I., Mayr, T. and Lederer, K.: Calibration of separation and instrumental peak broadening in SEC coupled with light scattering of simple polymers. *J. Liq. Chromatogr.*, 13 (1990) 2973-2986.
- 2435 Chiantore, O.: Column liquid chromatography in polymer degradation studies. *J. Liq. Chromatogr.*, 13 (1990) 2957-2972.

- 2436 Chubarova, E.V. and Nesterov, V.V.: Study of the degradation of high molecular weight polystyrene in the course of size exclusion chromatography (SEC). *J. Liq. Chromatogr.*, 13 (1990) 1825-1847.
- 2437 Dawkins, J.V., Forrest, M.J. and Shepherd, M.J.: Separation of vinyl chloride oligomers by recycle high performance size exclusion chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3001-3011.
- 2438 Dekmezian, A.H., Morioka, T. and Camp, C.E.: Gel permeation chromatograph interface to collect solvent-free polymer fractions for composition drift analysis. *J. Polym. Sci., Part B: Polym. Phys.*, 28 (1990) 1903-1915; *C.A.*, 113 (1990) 173084k.
- 2439 Dmitrieva, E.E., Gur'yanova, V.V., Khrakovskaya, Yu.A., Karan'yan, O.M., Lyubimtseva, G.P., Dukor, A.A. and Pavlov, A.V.: (Application of the gel permeation chromatography method to evaluate the molecular mass distribution of aliphatic polyamides). *Vysokomol. Soedin., Ser. A*, 32 (1990) 1781-1785; *C.A.*, 113 (1990) 153422r.
- 2440 Eickhoff, W.M., Liversidge, G.G. and Mutharasan, R.: Liquid chromatographic analysis of a potential polymeric-pendant drug delivery system for peptides. Application of high-performance size-exclusion chromatography, reversed-phase high-performance liquid chromatography and ion chromatography to the evaluation of biodegradable poly[(chloromethoxytricalanine methyl ester) phosphazenes]. *J. Chromatogr.*, 536 (1991) 255-264.
- 2441 Harlbut, J.A. and Cummins, J.D.: Analysis of 2-hydroxyethyl methacrylate in soft contact lenses by high performance liquid chromatography with UV detection. *LC-GC*, 8 (1990) 478-479; *C.A.*, 113 (1990) 197888b.
- 2442 Hatada, K. and Ute, K.: On-line GPC/NMR analysis of polymer and oligomer. *Polym. Mater. Sci. Eng.*, 62 (1990) 332; *C.A.*, 113 (1990) 232403p.
- 2443 Hessefort, N.L.: Characterization of inhibitors in vinyl and acrylic monomers. *J. Liq. Chromatogr.*, 13 (1990) 2561-2579.
- 2444 Hlavackova, E., Mlejnek, O. and Berek, D.: Analysis of 4-*tert.*-butylpyrocatechol in styrene by solid phase extraction and high performance liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3053-3060.
- 2445 Huang, S.S.: Evaluation of chemical structural heterogeneity of cationic acrylamide copolymers by high-performance liquid chromatography. *J. Chromatogr.*, 536 (1991) 203-209.
- 2446 Keller, D.J. and Kolycheck, E.G.: New statistical treatment of the raw data from a gel permeation chromatography analysis with applications to thermoplastic polyurethanes. *J. Liq. Chromatogr.*, 13 (1990) 2035-2047.
- 2447 Kuo, C.-Y., Provder, T. and Koehler, M.E.: Evaluation and application of a commercial single capillary viscometer system for the characterization of molecular weight distribution and polymer chain branching. *J. Liq. Chromatogr.*, 13 (1990) 3177-3199.
- 2448 Lederer, K. and Amtmann, I.: Characterization of PVC by SEC. II. One shot chromatography of the organic components of PVC compounds. *J. Liq. Chromatogr.*, 13 (1990) 1865-1875.
- 2449 Lederer, K., Amtmann, I., Vijayakumar, S. and Billiani, J.: Characterization of polyvinylchloride by size exclusion chromatography. I. Concentration dependence of axial dispersion observed in size exclusion chromatography coupled with light scattering. *J. Liq. Chromatogr.*, 13 (1990) 1849-1863.
- 2450 Mori, S.: Conversion factors for polystyrene molecular weight into molecular weights of polymethacrylates in size exclusion chromatography. *J. Liq. Chromatogr.*, 13 (1990) 1719-1729.
- 2451 Mori, S.: Liquid chromatographic analysis of styrene-methacrylate and styrene-acrylate copolymers. *J. Liq. Chromatogr.*, 13 (1990) 3039-3052.
- 2452 Mrkvickova, L. and Danhelka, J.: Characterization of poly(*tert.*-butyl acrylate) by SEC. *J. Appl. Polym. Sci.*, 41 (1990) 1929-1931; *C.A.*, 113 (1990) 192322c.

- 2453 Papazian, L.A.: A pH effect in the HPSEC separation of polyacrylamide-based copolymers. *J. Liq. Chromatogr.*, 13 (1990) 3389-3398.
- 2454 Podzimek, S., Hanus, J., Klaban, J. and Kitzler, J.: Gel permeation chromatography of unsaturated polyester resins. Possibilities and limitations. *J. Liq. Chromatogr.*, 13 (1990) 1809-1824.
- 2455 Sadiku, E.R. and Peacock, N.: Variation in molecular weight and molecular weight distribution of aged isotactic polypropylene filaments as revealed by HTGPC (high-temperature gel permeation chromatography). *Angew. Macromol. Chem.*, 181 (1990) 67-74; *C.A.*, 113 (1990) 233240v.
- 2456 Schulz, G., Much, H., Krüger, H. and Wehrstedt, C.: Determination of functionality and molecular weight distribution by orthogonal chromatography. *J. Liq. Chromatogr.*, 13 (1990) 1745-1763.
- 2457 Trathnigg, B.: Determination of chemical composition of polymers by SEC with coupled density and RI detection. I. Polyethylene glycol and polypropylene glycol. *J. Liq. Chromatogr.*, 13 (1990) 1731-1743.
- 2458 Tsitsilianis, C. and Dondos, A.: Determination of polymer molecular weight by GPC in the low molecular weight region. *J. Liq. Chromatogr.*, 13 (1990) 3027-3037.
- 2459 Yan, J., Wang, A. and Xu, R.: (Current status of the study of wet pore structure of polymeric porous materials by inverse size-exclusion chromatography). *Lizi Jiaohuan Yu Xifu*, 5 (1989) 292-309; *C.A.*, 113 (1990) 173185u - a review with 62 refs.

For additional information see:

- C.A.*, 113 (1990) 173139g, 183947h, 232669e;
114 (1991) 7735z.

See also 1231, 1237, 1272.

32. DRUG ANALYSIS

32a. Drug analysis, general techniques

- 2460 Arai, Y., Hanai, T., Nosaka, A. and Yamaguchi, K.: Development of crude drug analysis by liquid chromatography, and UV and MS spectrometers. *J. Liq. Chromatogr.*, 13 (1990) 2449-2464.
- 2461 Buening-Pfaue, H.: (Topical HPLC-determination of residues from veterinary drugs). *GIT Fachz. Lab.*, 34 (1990) 739-740; *C.A.*, 113 (1990) 164772f - a review with 27 refs.
- 2462 Dolphin, R.J.: Some recent developments in HPLC and kindred techniques. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 247-256; *C.A.*, 113 (1990) 223957v - a review with 8 refs.
- 2463 Dulik, D.M., Kuo, G.Y., Davis, M.R. and Rhodes, G.R.: Analysis of xenobiotic conjugates by thermospray liquid chromatography/mass spectrometry. *ACS Symp. Ser.*, 420 (Liq. Chromatogr./Mass Spectrom.) (1990) 124-139; *C.A.*, 113 (1990) 90783m.
- 2464 Gübitz, G.: Separation of drug enantiomers by HPLC using chiral stationary phases - a selective review. *Chromatographia*, 30 (1990) 555-564 - a review with 152 refs.
- 2465 Haginaka, J., Wakai, J. and Yasuda, H.: Synthesis of mixed-functional-phase silica supports for liquid chromatography and their applications to assays of drugs in serum. *J. Chromatogr.*, 535 (1990) 163-172.

- 2466 Haginaka, J.: Drug determination in serum by liquid chromatography with restricted access stationary phases. *TrAC*, 10 (1990) 17-22 - a review with 30 refs.
- 2467 Hill, D.W.: Evaluation of alkyl bonded silica and solvent phase modifiers for the efficient elution of basic drugs on HPLC. *J. Liq. Chromatogr.*, 13 (1990) 3147-3175.
- 2468 Inman, E.L., Lantz, M.D. and Strohl, M.M.: Absorbance rationing as a screen for related substances of pharmaceutical products. *J. Chromatogr. Sci.*, 28 (1990) 578-583.
- 2469 Jackson, S.E. and Winterle, J.S.: Automated sunlight measurement using chromatography software and LIMS. *Am. Lab. (Fairfield)*, 22 (1990) 54-58; *C.A.*, 113 (1990) 218036q.
- 2470 Kenion, G.B., Carter, G.T., Ashraf, J., Siegel, M.M. and Borders, D.B.: Qualitative analysis of pharmaceuticals by thermospray liquid chromatography/mass spectrometry. *ACS Symp. Ser.*, 420 (1990) 140-165; *C.A.*, 113 (1990) 158760j.
- 2471 Kulinski, R.F.: Therapeutic drug monitoring by high performance liquid chromatography: the clinical challenge. *LC-GC*, 8 (1990) 370-376; *C.A.*, 113 (1990) 90714q - a review with 1 ref.
- 2472 Lambert, W.J., Wright, L.A. and Stevens, J.K.: Development of a preformulation lipophilicity screen utilizing a C-18-derivatized polystyrene-divinylbenzene high-performance liquid chromatographic (HPLC) column. *Pharm. Res.*, 7 (1990) 577-586; *C.A.*, 113 (1990) 204404w.
- 2473 Lampert, B.M.: Reversed-phase HPLC of basic, neutral, and acidic drugs on underivatized silica. Avail. *Univ. Microfilms Int.*, Order No. DA9018350, 1989, 146 p.; *C.A.*, 113 (1990) 218327k.
- 2474 Listov, S.A., Pakhomov, V.P. and Arzamastsev, A.P.: (State of the art and prospects for application of ion chromatography to pharmaceutical analysis (a review)). *Khim.-Farm. Zh.*, 24 (1990) 76-80; *C.A.*, 113 (1990) 158755m - a review with 33 refs.
- 2475 McKay, S.W.: Applications of high-performance liquid chromatography of compounds of pharmaceutical interest: development of semi-preparative methods of separation. Avail. *Univ. Microfilms Int.*, Order No. BRDX88282, 1983, 168 p.; *C.A.*, 113 (1990) 197948w.
- 2476 Murkitt, G.S., Pearce, J.C. and McDowall, R.D.: Concomitant sample preparation and HPLC analysis: logistics and mystics. *Lab. Rob. Autom.*, 2 (1990) 11-17; *C.A.*, 113 (1990) 204324v.
- 2477 Newton, P.: Liquid chromatography-mass spectrometry: Essential tool for drug research. *LC-GC*, 8 (1990) 706-714; *C.A.*, 113 (1990) 178341b - a review with 5 refs.
- 2478 Smith, R.M. and Finn, N.: Comparison of retention index scales based on alkyl aryl ketones, alkan-2-ones and 1-nitroalkanes for polar drugs on reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 537 (1991) 51-60.
- 2479 Szepesi, G. (Editor): *HPLC in Pharmaceutical Analysis, Vol. 1: General Considerations*. CRC Press, Boca Raton, 1990, 288 p.; *C.A.*, 113 (1990) 237969n.
- 2480 Voyksner, R.D., Smith, C.S. and Knox, P.C.: Optimization and application of particle beam high-performance liquid chromatography/mass spectrometry to compounds of pharmaceutical interest. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 523-534; *C.A.*, 113 (1990) 150962f.
- 2481 Wilson, I.D.: Observations on the usefulness of internal standards in the analysis of drugs in biological fluids. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 79-82; *C.A.*, 113 (1990) 223952q - a review with 5 refs.

See also 1340, 1356, 1690, 2440, 2688, 2706.

32b. Antirheumatics and antiinflammatory drugs

- 2482 Christensen, J.M. and Stalker, D.: Ibuprofen piconol hydrolysis *in vitro* in plasma, whole blood and serum using different anticoagulants. *J. Pharm. Sci.*, 80 (1991) 29-31.
- 2483 Kuwahara, S.K., Brubaker, W.F., Williams, E., Tripp, S., Douglas, F.L. and Kotake, A.: Determination of the 5-lipoxygenase inhibitor (CGS 8515) in plasma by high-performance liquid chromatography using reductive electrochemical detection. *J. Chromatogr.*, 534 (1990) 260-266.
- 2484 Lapicque, F., Jankowski, R., Netter, P., Bannwarth, B., Guillemin, C., Bene, M.-C., Monot, C. and Wayoff, M.: Drug assay in ground tissues: example of ketoprofen diffusion into tonsillar tissue. *J. Pharm. Sci.*, 79 (1990) 791-795.
- 2485 Mizuta, H., Kawazoe, Y. and Ogawa, K.: Effect of small intestinal transit time on gastrointestinal absorption of 2-{3-(3,5-di-*tert*-butyl-4-hydroxyphenyl)-1H-pyrazolo[3,4-*b*]pyridin-1-yl} ethyl acetate, a new non-steroidal anti-inflammatory agent. *Chem. Pharm. Bull.*, 38 (1990) 2825-2828.
- 2486 Pettersson, K.-J. and Olsson, A.: Liquid chromatographic determination of the enantiomers of ibuprofen in plasma using a chiral AGP column. *J. Chromatogr.*, 563 (1991) 414-418.
- 2487 Ravi, J., Jain, C.L. and Bansal, Y.K.: Simultaneous determination of acetaminophen and ibuprofen using reversed-phase HPLC in different drug dosage forms. *Indian Drugs*, 27 (1990) 615-617; *C.A.*, 113 (1990) 218389g.
- 2488 Sen, A.K., Bandyopadhyay, A., Podder, G. and Chowdhury, B.: Reversed-phase high performance liquid chromatographic determination of ibuprofen and ethambutol in pharmaceutical dosage form. *J. Indian Chem. Soc.*, 67 (1990) 443-444; *C.A.*, 113 (1990) 198129s.
- 2489 Volland, C., Sun, H. and Benet, L.Z.: Stereoselective analysis of fenoprofen and its metabolites. *J. Chromatogr.*, 534 (1990) 127-138.
- 2490 Vree, T.B., Martea, M. and Lewin, L.M.: High-performance liquid chromatography of sulfapyridine and its acetyl and glucuronide metabolites in rat and human urine. *J. Chromatogr.*, 534 (1990) 214-222.
- 2491 Wanwimolruk, S.: A simple isocratic high-performance liquid chromatographic (HPLC) determination of naproxen in human plasma using a microbore column technique. *J. Liq. Chromatogr.*, 13 (1990) 1611-1625.
- 2492 Yagi, M., Shibukawa, A. and Nakagawa, T.: Direct injection analysis of ketoprofen enantiomers in plasma using column-switching high-performance liquid chromatography. *Chem. Pharm. Bull.*, 38 (1990) 2513-2517.
- 2493 Yamaguchi, M., Ishida, J., Yoshitake, T. and Nakamura, M.: Determination of prednisolone and prednisone in plasma by liquid chromatography with fluorescence detection. *Anal. Chim. Acta*, 242 (1991) 113-116.

For additional information see:

C.A., 113 (1990) 158797b, 237678s.

See also 1625, 2467, 2584, 2683.

32c. Autonomic and cardiovascular drugs

- 2494 Agostini, O., Bonacchi, G., Dapporto, P., Paoli, P., Fedi, M. and Manzini, S.: Physico-chemical properties of the new antibronchospastic agent isbufylline. *Arzneim.-Forsch.*, 40 (1990) 1089-1092.
- 2495 Alessi-Severini, S., LeGatt, D.F., Pasutto, F.M., Jamali, F. and Coutts, R.T.: HPLC analysis of flecainide enantiomers in plasma: comparison with fluorescence polarization immunoassay. *Clin. Chem. (Winston-Salem)*, 37 (1991) 111-112.

- 2496 Alpertunga, B., Sungur, S., Ersoy, L. and Manav, S.Y.: Determination of some β -blockers as dabsyl derivatives by HPLC. *Arch. Pharm. (Weinheim)*, 323 (1990) 587-589; *C.A.*, 113 (1990) 178390s.
- 2497 Ayers, T.H., Metwally, M.E.-S. and Honigberg, I.L.: Chromatographic separation and photoelectrochemical detection of sodium nitroprusside and its degradative and metabolic products. *J. Pharm. Biomed. Anal.*, 8 (1990) 521-526.
- 2498 Belpaire, F.M., de Smet, F., Vynckier, L.J., Vermeulen, A.M., Rosseel, M.T., Bogaert, M.G. and Chauvelot-Moachon, L.: Effect of aging on the pharmacokinetics of atenolol, metoprolol and propranolol in the rat. *J. Pharmacol. Exp. Ther.*, 254 (1990) 116-122.
- 2499 Budvári-Bárány, Z., Szász, G., Radeczky, G., Simonyi, I. and Shalaby, A.: Some new data concerning the chromatographic purity test for nifedipine. *J. Liq. Chromatogr.*, 13 (1990) 3531-3551.
- 2500 Camus, P., Coudert, B., D'Athis, P., Dumas, M., Escousse, A. and Jeannin, L.: Pharmacokinetics of amiodarone in the isolated rat lung. *J. Pharmacol. Exp. Ther.*, 254 (1990) 336-343.
- 2501 Eastwood, R.J., Bhamra, R.K. and Holt, D.W.: High-performance liquid chromatographic method for the measurement of buflomedil in plasma and serum. *J. Chromatogr.*, 532 (1990) 187-192.
- 2502 Fernandez, C.V., Mira, D.F. and Luque, G.I.: Chromatographic purity and assay of nicardipine by HPLC. *J. High Resolut. Chromatogr.*, 13 (1990) 846-849.
- 2503 Garay, R.P., Labaune, J.-P., Mesangeau, D., Nazaret, C., Imbert, T. and Moinet, G.: CRE 10904 [2-(*p*-fluorophenoxy), 1-(*o*-hydroxyphenyl)-ethane]: a new diuretic and antihypertensive drug acting by *in vivo* sulfation. *J. Pharmacol. Exp. Ther.*, 255 (1990) 415-422.
- 2504 Haginaka, J., Wakai, J., Takahashi, K., Yasuda, H. and Katagi, T.: Chiral separation of propranolol and its ester derivatives on an ovomucoid-bonded silica: influence of pH, ionic strength and organic modifier on retention, enantioselectivity and enantiomeric elution order. *Chromatographia*, 29 (1990) 587-592.
- 2505 Hashem, A. and Lubczyk, B.: Determination of isoxsuprine in equine plasma by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 563 (1991) 216-223.
- 2506 Hempenius, J., Staal, B., Jeurings, H.J., Mensink, C.K. and Jonkman, J.H.G.: Determination of debrisoquine and 4-hydroxydebrisoquine in human urine by high-performance liquid chromatography and fluorescence detection. *J. Liq. Chromatogr.*, 13 (1990) 1627-1636.
- 2507 Hori, M., Satoh, S., Maibach, H.I. and Guy, R.H.: Enhancement of propranolol hydrochloride and diazepam skin absorption *in vitro*: effect of enhancer lipophilicity. *J. Pharm. Sci.*, 80 (1991) 32-35.
- 2508 Julien-Larose, C., Voirin, P., Mas-Chamberlin, C. and Dufour, A.: Use of particle beam liquid chromatography-electron impact mass spectrometry for structure elucidation of oxodipine and three of its metabolites. *J. Chromatogr.*, 562 (1991) 39-45.
- 2509 Kallio, J.: The effect of urine pH on debrisoquine phenotyping: application of an HPLC-method. *Int. J. Clin. Pharmacol., Ther. Toxicol.*, 28 (1990) 223-226; *C.A.*, 113 (1990) 90893x.
- 2510 Koch, R.L. and Palicharla, P.: The anaerobic metabolism of verapamil in rat cecal contents forms nor-verapamil and thiocyanate. *J. Pharmacol. Exp. Ther.*, 254 (1990) 612-615.
- 2511 Krukemyer, J.J., Boudoulas, H., Binkley, P.F. and Lima, J.J.: Comparison of single-dose and steady-state nadolol plasma concentrations. *Pharm. Res.*, 7 (1990) 953-956; *C.A.*, 113 (1990) 204379s.

- 2512 Kurono, M., Yoshida, K., Arakawa, S. and Naruto, S.: Determination of a novel calcium entry blocker, AJ-2615, in plasma using solid-phase extraction and high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 532 (1990) 175-180.
- 2513 Kwok, D.W.K., Pillai, G., Vaughan, R., Axelson, J.E. and McErlane, K.M.: Preparative high-performance liquid chromatography and preparative thin-layer chromatography isolation of tacainide carbamoyl- β -D-glucuronide: structural characterization by gas chromatography-mass spectrometry and fast atom bombardment-mass spectrometry. *J. Pharm. Sci.*, 79 (1990) 857-861.
- 2514 Lee, C.R., Porziemsky, J.-P., Aubert, M.-C. and Krstulovic, A.M.: Liquid and high-pressure carbon dioxide chromatography of β -blockers. Resolution of the enantiomers of nadolol. *J. Chromatogr.*, 539 (1991) 55-69.
- 2515 Lockemeyer, M.R. and Smith, C.V.: Analysis of pentoxifylline in rabbit plasma using a HisepTM high-performance liquid chromatography column. *J. Chromatogr.*, 532 (1990) 162-167.
- 2516 Michaelis, H.C.: Determination of pyridostigmine plasma concentrations by high-performance liquid chromatography. *J. Chromatogr.*, 534 (1990) 291-294.
- 2517 Mizuta, H., Kawazoe, Y. and Ogawa, K.: Gastrointestinal absorption of chlorothiazide: evaluation of a method using salicylazosulfapyridine and acetaminophen as the marker compounds for determination of the gastrointestinal transit time in the dog. *Chem. Pharm. Bull.*, 38 (1990) 2810-2813.
- 2518 Niebch, G., Borbe, H.O. and Besenfelder, E.: High-performance liquid chromatography of naftopidil, a novel antihypertensive drug, and two metabolites in human plasma. *J. Chromatogr.*, 534 (1990) 247-252.
- 2519 Parissi-Poulou, M., Ismailos, G. and Macheras, P.: Modified HPLC analysis of diltiazem in plasma for pharmacokinetic studies. *Int. J. Pharm.*, 62 (1990) R13-R16; *C.A.*, 113 (1990) 164873q.
- 2520 Pfeifer, S., Plonka, G.-R., Dobbrott, I., Franke, P. and Steenbeck, L.: Biotransformation und Ausscheidung von N,N'-Bis[3-(2-ethoxy-phenoxy)-2-hydroxy-propyl]ethylendiamin-dihydrochlorid (Falirytm[®]) bei der Ratte. *Pharmazie*, 45 (1990) 751-755.
- 2521 Poirier, J.-M., Lebot, M. and Cheymol, G.: Analysis of encainide and its three major metabolites in plasma by column liquid chromatography. *J. Chromatogr.*, 534 (1990) 223-227.
- 2522 Rau, H.L., Aroor, A.R. and Rao, P.: High-performance liquid chromatographic determination of salbutamol sulphate and theophylline in combined dosage forms. *Indian Drugs*, 27 (1990) 620-622; *C.A.*, 113 (1990) 218391b.
- 2523 Rinke, L., Meyer, H.H.D. and Rapp, M.: Electrochemical detection of β -agonist clenbuterol using HPLC. *Chromatogram*, 11 (1990) 6-7; *C.A.*, 113 (1990) 96218c.
- 2524 Rudolph, M., Volk, D. and Schmiedel, G.: Determination of saterinone enantiomers in plasma samples with an internal standard using a Chiralcel OD column, fractionation and reversed-phase chromatography. *J. Chromatogr.*, 535 (1990) 263-269.
- 2525 Salamoun, J. and Slais, K.: Elimination of peak splitting in the liquid chromatography of the proline-containing drug enalapril maleate. *J. Chromatogr.*, 537 (1991) 249-257.
- 2526 Sarati, S., Guiso, G., Spinelli, R. and Caccia, S.: Determination of pibibedil and its basic metabolites in plasma by high-performance liquid chromatography. *J. Chromatogr.*, 563 (1991) 323-332.
- 2527 Scypinski, S., Lanzano, R.L. and Soltero, R.A.: Determination of iloprost in 5% dextrose in water solution by reversed-phase high performance liquid chromatography. *J. Pharm. Sci.*, 79 (1990) 934-937.
- 2528 Szumilo, H. and Przyborowska, M.: (Determination of some β -adrenolytic drugs by high performance liquid chromatography). *Farm. Pol.*, 45 (1989) 304-307; *C.A.*, 113 (1990) 218352q.

- 2529 Urech, R., Chan, L. and Duffy, P.: High-performance liquid chromatographic assay of sotalol: improved procedure and investigation of peak broadening. *J. Chromatogr.*, 534 (1990) 271-278.
- 2530 Ververs, F.F.T., Schaefer, H.G., Lefevre, J.F., Lopez, L.M. and Derendorf, H.: Simultaneous assay of propranolol, diltiazem and metabolites of diltiazem in human plasma by liquid chromatography. *J. Pharm. Biomed. Anal.*, 8 (1990) 535-539.
- 2531 Wong, Y.W.J. and Ludden, T.M.: Determination of betaxolol and its metabolites in blood and urine by high-performance liquid chromatography with fluorimetric detection. *J. Chromatogr.*, 534 (1990) 161-172.
- 2532 Yamahara, H., Suzuki, T., Mizobe, M., Noda, K. and Samejima, M.: *In situ* perfusion system for oral mucosal absorption in dogs. *J. Pharm. Sci.*, 79 (1990) 963-967.
- 2533 Zhang, L., Aoki, K., Yoshida, T. and Kuroiwa, Y.: Simultaneous determinations of cinobufagin and its metabolites by reverse-phase high performance liquid chromatography in rat serum and urine. *J. Liq. Chromatogr.*, 13 (1990) 3515-3530.

For additional information see:

- C.A., 113 (1990) 164837f, 204325w, 218000y;
114 (1991) 80y, 81z.

See also 1453, 2232.

32d. Central nervous system drugs

- 2534 Aboul Enein, H.Y. and Rafiqul Islam, M.: Liquid chromatographic analysis of ranitidine hydrochloride in pharmaceutical preparations. *Toxicol. Environ. Chem.*, 29 (1990) 47-51; C.A., 114 (1991) 12312p.
- 2535 Adeishvili, L.V. and Klyuev, N.A.: (Determination of the structure of impurities in cyclodol). *Khim.-Farm. Zh.*, 24 (1990) 86-88; C.A., 113 (1990) 178371m.
- 2536 Beaulieu, N., Cyr, T.D. and Lovering, E.G.: Liquid chromatographic methods for the determination of albuterol (salbutamol), albuterol sulphate and related compounds in drug raw materials, tablets and inhalers. *J. Pharm. Biomed. Anal.*, 8 (1990) 583-589.
- 2537 Belliardo, F. and Lucarelli, C.: Micro-scale liquid chromatographic method for the determination of bamifylline and its major metabolite in human plasma. *J. Chromatogr.*, 535 (1990) 305-309.
- 2538 Bentrop, D., Warren, F.V., Jr., Schmitz, S. and Bidlingmeyer, B.A.: Analysis of carbamazepine in serum by liquid chromatography with direct sample injection and surfactant-containing eluents. *J. Chromatogr.*, 535 (1990) 293-304.
- 2539 Berry, D.J.: Determination of zonisamide (3-sulphamoylmethyl-1,2-benzisoxazole) in plasma at therapeutic concentrations by high-performance liquid chromatography. *J. Chromatogr.*, 534 (1990) 173-181.
- 2540 Billrfsu, D.M., Holder, C.L. and Getek, T.A.: High-performance liquid chromatography of the antihistamine pyrilamine and its N-oxide using electrochemical detection. *J. Chromatogr.*, 534 (1990) 151-159.
- 2541 Blad, R.E., Tanner, R.J.N., Chern, W.H., Lang, J.R. and Powell, J.R.: Determination of albuterol concentrations in human plasma using solid-phase extraction and high-performance liquid chromatography with fluorescence detection. *J. Pharm. Biomed. Anal.*, 8 (1990) 591-596.
- 2542 Brazeau, G.A. and Fung, H.-L.: Effect of organic cosolvent-induced skeletal muscle damage on the bioavailability of intramuscular [¹⁴C]diazepam. *J. Pharm. Sci.*, 79 (1990) 773-777.

- 2543 Brown, N.D., Phillips, L.R., Leader, H. and Chiang, P.K.: Isolation and identification of β -hydroxyethylapropfen: a urinary metabolite of aprophen in rats. *J. Chromatogr.*, 563 (1991) 466-471.
- 2544 Cahard, C., Rop, P.P., Conquy, T. and Viala, A.: High-performance liquid chromatographic analysis of haloperidol and hydroxyhaloperidol in plasma after solid-phase extraction. *J. Chromatogr.*, 532 (1990) 193-202.
- 2545 Camberini, G. and Ferioli, V.: (Separation and identification of benzo-diazepines and their hydrolysis products). *Atti Soc. Nat. Mat. Modena 1988*, 119 (1989) 9-17; *C.A.*, 114 (1991) 12288k.
- 2546 Chen, D. and Jia, H.: (Measurement of the content of clozapine leponex in human blood by HPLC). *Sepu*, 8 (1990) 63-64; *C.A.*, 113 (1990) 90823z.
- 2547 Damaj, M.I., Trouvin, J.H., Lambrey, B. and Jacquot, C.: Determination of a new 2-amino-2-oxazoline (COR 3224) in plasma and brain tissue of the rat by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 563 (1991) 476-479.
- 2548 Franz, P.M., Anliker, S.L., Callaghan, J.T., DeSante, K.A., Dhahir, P.H., Nelson, R.L. and Rubin, A.: Disposition in humans of racemic piconadol, and opioid analgesic. *Drug Metab. Disp.*, 18 (1990) 968-973.
- 2549 Gerding, T.K., Dreth, B.F.H., De Zeeuw, R.A., Tepper, P.G. and Horn, A.S.: Metabolism and disposition of the dopamine agonist 2-(N-propyl-N-2-thienyl-ethylamino)-5-hydroxytetralin in conscious monkeys after subsequent IV, oral, and ocular administration. *Drug Metab. Disp.*, 18 (1990) 923-928.
- 2550 Gilli, G., Pietrogrande, M.C. and Borea, P.A.: Normal phase HPLC as a model system of specific benzodiazepine-receptor binding. *J. Pharm. Pharmacol.*, 42 (1990) 401-404; *C.A.*, 114 (1991) 186n.
- 2551 Gupta, S.K. and Ellinwood, E.H.: Liquid chromatographic assay and pharmacokinetics of halazepam and its metabolite in humans. *J. Pharm. Sci.*, 79 (1990) 822-825.
- 2552 Hernandez-Gallegos, Z. and Lehmann, F., P.A.: Partition coefficients of three new anticonvulsants. *J. Pharm. Sci.*, 79 (1990) 1032-1033.
- 2553 Hikida, K., Inoue, Y., Kojima, N. and Ohkura, Y.: Determination of clozapramine and its metabolites in plasma by automated column-switching high-performance liquid chromatography. *Anal. Sci.*, 6 (1990) 367-370; *C.A.*, 113 (1990) 144740r.
- 2554 Hussain, M.A., Rakestraw, D., Rowe, S. and Aungst, B.J.: Nasal administration of a cognition enhancer provides improved bioavailability but not enhanced brain delivery. *J. Pharm. Sci.*, 79 (1990) 771-772.
- 2555 Imamura, T., Nagata, T., Kudo, K., Kimura, K. and Noda, M.: Sensitive detection and determination of cimetidine in human tissues with high-performance liquid chromatography. *J. Chromatogr.*, 534 (1990) 253-259.
- 2556 Ke, J., Tam, Y.K., Koo, W.W.K., Gray, M.R. and Coutts, R.T.: Effects of parenteral nutrition on hepatic elimination of lidocaine: a study using the isolated perfused rat liver. *J. Pharmacol. Exp. Ther.*, 255 (1990) 351-356.
- 2557 Kelly, D.W., Holder, C.L., Korfmacher, W.A. and Slikker, W., Jr.: Plasma elimination and urinary excretion of methapyrilene in the rat. *Drug Metab. Disp.*, 18 (1990) 1018-1024.
- 2558 Keswani, S.R., Edfort, M.J., Wilhelm, J.A., Kvalo, L.T. and Venturella, V.S.: Sensitive method for the determination of pentamorphone in serum by liquid chromatography-mass spectrometry with thermospray interface. *J. Chromatogr.*, 534 (1990) 77-86.
- 2559 Krause, W. and Mengel, H.: Pharmacokinetics of the anxiolytic β -carboline derivative abecarnil in the mouse, rat, rabbit, dog, cynomolgus monkey and baboon. *Arzneim.-Forsch.*, 40 (1990) 522-529.
- 2560 Kryger, S. and Helboe, P.: Determination of impurities in dextropropoxyphene hydrochloride by high-performance liquid chromatography on dynamically modified silica. *J. Chromatogr.*, 539 (1991) 186-192.

- 2561 Kysilka, R.: Determination of psilocin in rat urine by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 534 (1990) 287-290.
- 2562 Li, G. and Klotz, U.: Inhibitory effect of omeprazole on the metabolism of midazolam *in vitro*. *Arzneim.-Forsch.*, 40 (1990) 1105-1107.
- 2563 Lu, X.-L. and Yang, S.: Resolution of enantiomeric lorazepam and its acyl and o-methyl derivatives and racemization kinetics of lorazepam enantiomers. *J. Chromatogr.*, 535 (1990) 229-238.
- 2564 Lundgren, T.I., Sloerdal, L., Jaeger, R., Whist, J.E. and Aarbakke, J.: An automated method for the determination of nortriptyline and its isomeric 10-hydroxylated metabolites in plasma by high pressure liquid chromatography. *Pharmacol. Toxicol. (Copenhagen)*, 67 (1990) 132-135; *C.A.*, 113 (1990) 224036f.
- 2565 Mizura, H., Kawazoe, Y., Haga, K. and Ogawa, K.: Effects of meals on gastric emptying and small intestinal transit times of a suspension in the beagle dog assessed using acetaminophen and salicylazosulfapyridine as markers. *Chem. Pharm. Bull.*, 38 (1990) 2224-2227.
- 2566 Moneghini, M., Rubessa, F., Rupena, P. and Zingone, G.: Analysis of chlorcyclizine and related compounds by liquid chromatography for stability studies. *Int. J. Pharm.*, 63 (1990) R1-R3; *C.A.*, 113 (1990) 218375z.
- 2567 Okudzava, V.M., Chankvetadze, B.G. and Rukhadze, M.D.: (Simultaneous quantitative determination of halonal, benzonal, phenobarbital, benzobamil, pufemide, carbamazepine and halodiph in serum by microcolumn HPLC). *Zh. Anal. Khim.*, 45 (1990) 1647-1651; *C.A.*, 113 (1990) 204346d.
- 2568 Palette, C., Cordonnier, P., Naline, E., Advenier, C. and Pays, M.: High-performance liquid chromatographic method for the determination of the three main oxidative nad 3-carboxylic antipyrine metabolites in human urine. *J. Chromatogr.*, 563 (1991) 103-113.
- 2569 Rona, K., Foldes, K. and Gachalyi, B.: Determination of paracetamol and its conjugated metabolites in human urine by HPLC. *Chromatogram*, 11 (1990) 3-5; *C.A.*, 113 (1990) 224015y.
- 2570 Segatti, M.P., Nisi, G., Grossi, F., Mangiarotti, M. and Lucarelli, C.: Rapid and simple high-performance liquid chromatographic determination of tricyclic antidepressants for routine and emergency serum analysis. *J. Chromatogr.*, 536 (1991) 319-325.
- 2571 Segelman, A.B., Adusumalli, V.E. and Segelman, F.H.: Automated liquid chromatographic determination of ranitidine in microliter samples of rat plasma. *J. Chromatogr.*, 535 (1990) 287-292.
- 2572 Shields, B.J. and Mackichan, J.J.: High-performance liquid chromatographic method for the determination of metoclopramide in plasma. *J. Liq. Chromatogr.*, 13 (1990) 2643-2659.
- 2573 Shu, Y.-Z., Hubbard, J.W., McKay, G. and Midha, K.K.: Identification of phenolic doxepin glucuronides from patient urine and rat bile. *Drug Metab. Disp.*, 18 (1990) 1096-1099.
- 2574 St-Pierre, M.V., van den Berg, D. and Pang, K.S.: Physiological modeling of drug and metabolite: disposition of oxazepam and oxazepam glucuronides in the recirculating perfused mouse liver preparation. *J. Pharmacokin. Biopharm.*, 18 (1990) 423-448.
- 2575 Stark, K.L., Lee, Q.P., Namkung, M.J., Harris, C. and Juchau, M.R.: Dymorphogenesis elicited by microinjected acetaminophen analogs and metabolites in rat embryos cultured *in vitro*. *J. Pharmacol. Exp. Ther.*, 255 (1990) 74-82.
- 2576 Stevenson, P.J., Hamelijncck, M.A.F., Kadaba, P.K. and Damani, L.A.: Triazolines. XXIII. High-performance liquid chromatographic assay in rat blood for a novel triazoline acticonvulsant (ADD17014). *J. Chromatogr.*, 563 (1991) 419-426.

- 2577 Stiff, D.D. and Zemaitis, M.A.: Metabolism of the anticonvulsant agent zonisamide in the rat. *Drug Metab. Disp.*, 18 (1990) 888-894.
- 2578 Sung, C., Reader, J.E. and Merrill, E.W.: Drug partitioning and release characteristics of tricyclic antidepressant drugs using a series of related hydrophilic-hydrophobic copolymers. *J. Pharm. Sci.*, 79 (1990) 829-834.
- 2579 Szabo, G.K., Pylilo, R.J., Davoudi, H. and Browne, T.R.: Simultaneous determination of *p*-hydroxylated and dihydrodiol metabolites of phenytoin in urine by high-performance liquid chromatography. *J. Chromatogr.*, 535 (1990) 279-285.
- 2580 Szabo, G.K., Pylilo, R.J., Perchalski, R.J. and Browne, T.R.: Simultaneous separation and determination (in serum) of phenytoin and carbamazepine and their deuterated analogues by high-performance liquid chromatography-ultraviolet detection for tracer studies. *J. Chromatogr.*, 535 (1990) 271-277.
- 2581 Tan, S.T. and Boniface, P.J.: High-performance liquid chromatography of droperidol in whole blood. *J. Chromatogr.*, 532 (1990) 181-186.
- 2582 Thomas, B.F., Compton, D.R. and Martin, B.R.: Characterization of the lipophilicity of natural and synthetic analogs of Δ^9 -tetrahydrocannabinol and its relationship to pharmacological potency. *J. Pharmacol. Exp. Ther.*, 255 (1990) 624-630.
- 2583 Vyas, K.P., Kari, P.H., Ramjit, H.G., Pitzenberger, S.M. and Hichens, M.: Metabolism of antiparkinson agent dopazinol by rat liver microsomes. *Drug Metab. Disp.*, 18 (1990) 1025-1030.
- 2584 Wang, E. and Zhou, J.: Simultaneous determination of aminopyrine and anti-pyrene by liquid chromatography/electrochemistry with a parallel dual electrode. *Microchem. J.*, 42 (1990) 259-266; *C.A.*, 114 (1991) 12316t.
- 2585 Weston, S.I., Japp, M., Partridge, J. and Osselton, M.D.: Collection of analytical data for benzodiazepines and benzophenones. Appendix. *J. Chromatogr.*, 538 (1991) 277-284.
- 2586 Wildenberg, H.M., Delbressine, L.P.C., Kaspersen, F.M., Wagenaars, G.N. and Jacobs, P.L.: Biotransformation of *trans*-5-chloro-2-methyl-2,3,3a,12b-tetrahydro-1H-dibenz[2,3:6,7]oxepino[4,5-*c*]pyrrolidine maleate in rats. *Arzneim.-Forsch.*, 40 (1990) 540-544.
- 2587 Wong, F.A., Lloyd, J.R. and Graden, D.W.: The metabolism of etintidine in rat, dog, and human. *Drug Metab. Disp.*, 18 (1990) 949-953.
- 2588 Woollard, P.M., Salmon, J.A. and Padfield, A.D.: Use of high-performance liquid chromatography-thermospray mass spectrometry and gas chromatography-electron-impact mass spectrometry in the identification of the metabolites of α -methylacetohydroxamic acids, potential anti-asthmatic agents. *J. Chromatogr.*, 562 (1991) 249-256.
- 2589 Wu, A.T. and Massey, I.J.: Simultaneous determination of ketorolac and its hydroxylated metabolite in plasma by high-performance liquid chromatography. *J. Chromatogr.*, 534 (1990) 241-246.
- 2590 Yamada, I., Mizuta, H., Ogawa, K. and Tahara, T.: Comparative pharmacokinetics of sulpiride and N-[(1-butyl-2-pyrrolidinyl)methyl]-2-methyl-5-sulfamoyl-2,3-dihydrobenzofuran-7-carboxamide hydrochloride, a new lipophilic substituted benzamide in rats. *Chem. Pharm. Bull.*, 38 (1990) 2552-2555.
- 2591 Yu, A.B.C. and Portmann, G.A.: Oxidation kinetics of an antiasthmatic, 2-[(4-hydroxyphenyl)amino]-5-methoxybenzenemethanol, and stabilization with ascorbic acid. *J. Pharm. Sci.*, 79 (1990) 913-915.
- 2592 Zhong, W.Z.: Determination of 3-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-5-(1-methylethyl)imidazo[1,5-*a*]quinoxalin-4(5H)-one in serum by high-performance liquid chromatography. *J. Chromatogr.*, 563 (1991) 427-434.

For additional information see:

C.A., 113 (1990) 90808y, 158779x, 178365n, 178388x, 184121w, 218368z, 224033c.

See also 1684, 1711, 1889, 2234, 2245, 2467, 2483, 2505, 2507, 2687.

32e. *Chemotherapeutics (exc. cytostatics and antibiotics)*

- 2593 Agarwal, V.: Detection of sulfamethazine residues in milk by high performance liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3531-3539.
- 2594 Allenmark, S., Edebo, A. and Lindgren, K.: Determination of itraconazole in serum with high-performance liquid chromatography and fluorescence detection. *J. Chromatogr.*, 532 (1990) 203-206.
- 2595 Anderson, B.D. and Chiang, C.-Y.: Physicochemical properties of carbovir, a potential anti-HIV agent. *J. Pharm. Sci.*, 79 (1990) 787-790.
- 2596 Bauer, J.R., Elrod, L., Jr., Fornnarino, J.R., Heathcote, D.E., Krogh, S.K., Linton, C.L., Norris, B.J. and Quick, J.E.: Determination of temafloxacin, sarafloxacin, and difloxacin in bulk drug and dosage forms by high-performance liquid chromatography. *Pharm. Res.*, 7 (1990) 1177-1180; *C.A.*, 114 (1991) 12303m.
- 2597 Betto, P., Gianbenedetti, M., Ponti, F., Ferretti, R., Settini, G., Gargiulo, M. and Lorenzini, R.: Application of a high-performance liquid chromatography coulometric method for the estimation of mebendazole and its metabolites in human sera. *J. Chromatogr.*, 563 (1991) 115-123.
- 2598 Blanchflower, W.J., Kennedy, D.G. and Taylor, S.M.: Determination of raxoflanide in plasma using high performance liquid chromatography (HPLC) and in tissue using HPLC-thermospray mass spectrometry. *J. Liq. Chromatogr.*, 13 (1990) 1595-1609.
- 2599 Bondoc, L.L., Jr., Shannon, W.M., Secrist, III, J.A., Vince, R. and Fridland, A.: Metabolism of the carbocyclic nucleoside analogue carbovir, an inhibitor of human immunodeficiency virus, in human lymphoid cells. *Biochemistry*, 29 (1990) 9839-9843.
- 2600 Borner, K., Borner, E., Hartwig, H. and Lode, H.: HPLC of recent quinolone antimicrobials. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 131-144; *C.A.*, 113 (1990) 223954s - a review with 32 refs.
- 2601 Bugge, C.J.L., Gautam, S.R., Parke, L.E., Mason, J.T. and Garcia, D.B.: Simultaneous determination of sulfasalazine and its metabolites sulfapyridine and N-acetylsulfapyridine in human serum by ion-pair high-performance liquid chromatography using a polymer-based column. *J. Pharm. Sci.*, 79 (1990) 1095-1098.
- 2602 Chiu, S.H.L., Sestokas, E., Taub, R., Green, M.L., Baylis, F.P., Jacob, T.A. and Lu, A.Y.H.: Metabolic disposition of ivermectin in swine. *J. Agric. Food Chem.*, 38 (1990) 2079-2085.
- 2603 De Montigny, P., Shim, J.-S.K. and Pivnichny, J.V.: Liquid chromatographic determination of ivermectin in animal plasma with trifluoroacetic anhydride and N-methylimidazole as the derivatization reagent. *J. Pharm. Biomed. Anal.*, 8 (1990) 507-511.
- 2604 DeAngelis, D.V., Woolley, J.L. and Sigel, C.W.: High-performance liquid chromatographic assay for the simultaneous measurement of trimethoprim and sulfamethoxazole in plasma or urine. *Ther. Drug Monit.*, 12 (1990) 382-392; *C.A.*, 113 (1990) 144752w.
- 2605 Dua, V.K., Sarin, R. and Sharma, V.P.: Determination of sulfalene in plasma, red blood cells and whole blood by high-performance liquid chromatography. *J. Chromatogr.*, 563 (1991) 333-340.
- 2606 El Dareer, S.M., Tillery, K.F., Rose, L.M., Struck, R.F. and Hill, D.L.: Disposition and metabolism of carbovir in mice dosed intravenously or orally. *Drug Metab. Disp.*, 18 (1990) 842-845.
- 2607 El-Rabbat, N.A., Farag, H.H., El-Kommos, M.E. and Refaat, I.H.: HPLC determination of some antibilharzial antimonials by extraction of antimony. *Talanta*, 37 (1990) 951-954; *C.A.*, 113 (1990) 178392u.

- 2608 Ericsson, O. and Rais, M.: Determination of pentamidine in whole blood, plasma, and urine by high-performance liquid chromatography. *Ther. Drug Monit.*, 12 (1990) 362-365; *C.A.*, 113 (1990) 164848k.
- 2609 Gaitonde, C.D. and Pathak, P.V.: Determination of pyrazinamide and its metabolites from human plasma using rapid extraction by HPLC. *Indian Drugs*, 27 (1990) 436-437; *C.A.*, 113 (1990) 144728t.
- 2610 Galtier, P., Alvinerie, M., Steimer, J.L., Francheteau, P., Plusquellec, Y. and Houin, G.: Simultaneous pharmacokinetic modeling of a drug and two metabolites: application to albendazole in sheep. *J. Pharm. Sci.*, 80 (1991) 3-10.
- 2611 Good, S.S., Reynolds, D.J. and de Miranda, P.: The analysis of zidovudine and its glucuronide metabolite by HPLC. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs Metab., Incl. Anti-Infect. Agents) (1991) 173-183; *C.A.*, 113 (1990) 204334y.
- 2612 Hedaya, M.A. and Sawchuk, R.J.: A sensitive and specific liquid-chromatographic assay for determination of ganciclovir in plasma and urine and its application to pharmacokinetic studies in the rabbit. *Pharm. Res.*, 7 (1990) 1113-1118; *C.A.*, 114 (1991) 86e.
- 2613 Heizmann, P., Geschke, R. and Zinapold, K.: Determination of ornidazole and its main metabolites in biological fluids. *J. Chromatogr.*, 534 (1990) 233-240.
- 2614 Hoang, M., Moellmer, J.F. and Khan, M.A.: Separation of chlorhexidine breakdown products including 4-chloroaniline in surgical scrubs containing chlorhexidine. *J. Liq. Chromatogr.*, 13 (1990) 2677-2687.
- 2615 Horie, M., Saito, K., Hoshino, Y., Nose, N., Hamada, N. and Nakazawa, H.: (Identification and quantitation of residual sulfa drugs in meat by high-performance liquid chromatography with photodiode array detection). *Shokuhin Eiseigaku Zasshi*, 31 (1990) 171-176; *C.A.*, 113 (1990) 210213z.
- 2616 Ibrahim, S.S. and Boudinot, F.D.: Pharmacokinetics of 2',3'-dideoxycytidine after high-dose administration to rats. *J. Pharm. Sci.*, 80 (1991) 36-38.
- 2617 Larocque, L., Carignan, G. and Sved, S.: Sulfamethazine (sulfadimidine) residues in Canadian consumer milk. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 365-367.
- 2618 Miller, A.L., Mc Quinn, R.L., Carlson, G.L. and Chang, S.F.: Determination of ibafloxacin, a new quinolone antibacterial, in human and dog plasma and urine by high performance liquid chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3507-3514.
- 2619 Nangia, A., Lam, F. and Hung, C.-T.: Reversed-phase ion-pair high-performance liquid chromatographic determination of fluoroquinolones in human plasma. *J. Pharm. Sci.*, 79 (1990) 988-991.
- 2620 Okazaki, O., Aoki, H. and Hokusui, H.: High-performance liquid chromatographic determination of (S)-(-)-ofloxacin and its metabolites in serum and urine using a solid-phase clean-up. *J. Chromatogr.*, 563 (1991) 313-322.
- 2621 Patanella, J.E., Walsh, J.S., Unger, S.E., Miwa, G.T., Parry, P.S., Daniel, M.J. and Evans, G.L.: Identification of a glucuronide conjugate of the carbocyclic nucleoside, carbovir, isolated from marmoset urine. *Drug Metab. Disp.*, 18 (1990) 1092-1095.
- 2622 Peloquin, C.A., James, G.T. and McCarthy, E.: Improved high-performance liquid chromatographic assay for the determination of ethionamide in serum. *J. Chromatogr.*, 563 (1991) 472-475.
- 2623 Raju, N.R. and Rao, D.V.V.S.J.: Dual behavior of nitrile bonded silica packing in analysis of cotrimoxazole by high-performance liquid chromatography. *Indian Drugs*, 28 (1990) 26-29; *C.A.*, 114 (1991) 12307r.
- 2624 Ray, S.: Estimation of metronidazole and quiniodochlor in single and combined dosage forms by HPLC. *East Pharm.*, 33 (1990) 139-141; *C.A.*, 113 (1990) 218366x.

- 2625 Remmel, R.P., Huang, S.-H., Hoff, D. and Zimmerman, C.L.: Improved fluorometric high-performance liquid chromatographic assay for (-)-carbovir in rat blood and urine. *J. Chromatogr.*, 534 (1990) 109-118.
- 2626 Soliman, M.M., Long, A.R. and Barker, S.A.: Method for the isolation and liquid chromatographic determination of furazolidone in chicken muscle tissue. *J. Liq. Chromatogr.*, 13 (1990) 3327-3337.
- 2627 Subert, J. Simek, Z. and Vespalec, R.: (Enantioselective liquid column chromatography of drugs without their prior derivatization. Part I.) *Cesk. Farm.*, 39 (1990) 227-232; *C.A.*, 113 (1990) 218322e - a review with 90 refs.
- 2628 Tai, S.S.-C., Cargile, N. and Barnes, C.J.: Determination of thiabendazole, 5-hydroxythiabendazole, fenbendazole, and oxfendazole in milk. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 368-373.
- 2629 Tu, Y.H., Wang, Y., Allen, L.V., Jr., Albers, D.D. and Gorgin, M.K.: Pharmacokinetics of metronidazole administered intravenously to male rats. *Int. J. Pharm.*, 61 (1990) 119-125; *C.A.*, 113 (1990) 90901y.
- 2630 Varoquaux, O., Cordonnier, P., Advenier, C. and Pays, M.: Simultaneous HPLC determination of trimethoprim, sulfamethoxazole and its N⁴-acetyl metabolite in biological fluids. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs Metab., Incl. Anti-Infect. Agents) (1990) 123-130; *C.A.*, 114 (1991) 21e - a review with 35 refs.
- 2631 Vree, T.B., Beneken Kolmer, E.W.J., Hekster, Y.A., Shimoda, M., Ono, M. and Miura, T.: Pharmacokinetics, N₁-glucuronidation, and N₄-acetylation of sulfa-6-monomethoxine in humans. *Drug Metab. Disp.*, 18 (1990) 852-858.
- 2632 Walsh, J.S., Patanella, J.E., Unger, S.E., Brouwer, K.R. and Miwa, G.T.: The metabolism and excretion of carbovir, a carbocyclic nucleoside, in the rat. *Drug Metab. Disp.*, 18 (1990) 1084-1091.
- 2633 Wang, D.P. and Yeh, M.K.: (Stability-indicating method for caphalexin in capsules by high-performance liquid chromatography). *Chuang-hua Yao Hsueh Tsa Chih*, 42 (1990) 349-353; *C.A.*, 113 (1990) 218348t.
- 2634 Whitehouse, L.W., Menzies, A., Dawson, B., Zamecnik, J. and Sy, W.-W.: Deacetylated ketoconazole: a major ketoconazole metabolite isolated from mouse liver. *J. Pharm. Biomed. Anal.*, 8 (1990) 603-606.
- 2635 Winton, C.F., Fowles, S.E., Hodge, R.A.V. and Pierce, D.M.: Assay of famciclovir and its metabolites, including the antiherpes agent penciclovir, in plasma and urine of rat dog and man. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs Metab., Incl. Anti-Infect. Agents) (1990) 163-171; *C.A.*, 114 (1991) 64w.
- 2636 Winton, C.F., Fowles, S.E., Pierce, D.M. and Hodge, A.V.: Gradient high-performance liquid chromatographic method for the analysis of the prodrug famciclovir and its metabolites, including the active antiviral agent, penciclovir, in plasma and urine. *Anal. Proc. (London)*, 27 (1990) 181-182; *C.A.*, 113 (1990) 184115x.
- 2637 Woestenborghs, R. and Heykants, J.: Assay methods for imidazole- and triazole-like antifungals and some antihelminthics. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 153-156; *C.A.*, 113 (1990) 223955t - a review with 5 refs.
- 2638 Wong, F.A. and Flor, S.C.: The metabolism of ofloxacin in humans. *Drug Metab. Disp.*, 18 (1990) 1103-1104.
- 2639 Zoest, A.R., Wanwimolruk, S. and Hung, C.T.: Simple high-performance liquid chromatographic method for the analysis of quinine in human plasma without extraction. *J. Liq. Chromatogr.*, 13 (1990) 3481-3491.

For additional information see:

C.A., 113 (1990) 204327y, 204333x;
114 (1991) 4978v.

See also 2213, 2357, 2488, 2532, 2565, 2660.

32f. Cytostatics

- 2640 Amselem, S., Gabizon, A. and Barenholz, Y.: Optimization and upscaling of doxorubicin-containing liposomes for clinical use. *J. Pharm. Sci.*, 79 (1990) 1045-1055.
- 2641 Blaney, S.M., Balis, F.M., Hegedus, L., Heideman, R.L., McCully, C., Murphy, R.F., Kelley, J.A. and Poplack, D.G.: Pharmacokinetics and metabolism of cyclopentenyl cytosine in nonhuman primates. *Cancer Res.*, 50 (1990) 7915-7919.
- 2642 Budd, G.T., Jayaraj, A., Grabowski, D., Adelstein, D., Bauer, L., Boyett, J., Bukowski, R., Murthy, S. and Weick, J.: Phase I trial of dipyridamole with 5-fluorouracil and folinic acid. *Cancer Res.*, 50 (1990) 7206-7211.
- 2643 Chaney, S.G., Gibbons, G.R., Wyrick, S.D. and Pohdasky, P.: An unexpected biotransformation pathway for tetrachloro-(d,l-trans)-1,2-diaminocyclohexane-platinum(IV) (tetraplatin) in the L1210 cell line. *Cancer Res.*, 51 (1991) 969-973.
- 2644 Chatton, J.-Y., Odone, M., Besseghir, K. and Roch-Ramel, F.: Renal secretion of 3'-azido-3'-deoxythymidine by the rat. *J. Pharmacol. Exp. Ther.*, 255 (1990) 140-145.
- 2645 Dawson, C.M., Belcher, H.J.C.R., Rainbow, S.J. and Tickner, T.R.: Measurement of 4-hydroxyanisole in serum by direct injection high-performance liquid chromatography. *J. Chromatogr.*, 534 (1990) 267-270.
- 2646 De Vries, A.J. and Nooter, K.: Quantification of mitoxantrone in bone marrow by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 563 (1991) 435-442.
- 2647 Evdokimov, Yu.M., Skuridin, S.G., Salyanov, V.I., Damaschun, G., Damaschun, H., Misselwitz, R. and Kleinwachter, V.: Effect of platinum(II) chemotherapeutic agents on properties of DNA liquid crystals. *Biophys. Chem.*, 35 (1990) 143-153; *C.A.*, 113 (1990) 144953n.
- 2648 Foth, H., Kunellis, E.-M., Müseler, T. and Kahl, G.F.: Nonlinear elimination kinetics of 5-fluoro-2'-deoxyuridine in isolated perfused rat liver and isolated hepatocytes. *J. Pharmacol. Exp. Ther.*, 254 (1990) 427-432.
- 2649 Greenfield, R.S., Kaneko, T., Daues, A., Edson, M.A., Fitzgerald, K.A., Olech, L.J., Grattan, J.A., Spitalny, G.L. and Braslawsky, G.R.: Evaluation *in vitro* of adriamycin immunoconjugates synthesized using an acid-sensitive hydrazone linker. *Cancer Res.*, 50 (1990) 6600-6607.
- 2650 Greig, N.H., Stahle, P.L., Shetty, H.U., Genka, S., John, V., Soncrant, T.T. and Rapoport, S.I.: High-performance liquid chromatographic analysis of chlorambucil *tert*-butyl ester and its active metabolites chlorambucil and phenylacetic mustard in plasma and tissue. *J. Chromatogr.*, 534 (1990) 279-286.
- 2651 Joly, J.M. and Williams, W.M.: High-performance liquid chromatographic analysis of 5-ethylpyrimidines and 5-methylpyrimidines in plasma. *J. Chromatogr.*, 563 (1991) 392-399.
- 2652 Kaneo, Y., Tanaka, T. and Iguchi, S.: Preparation and properties of a mitomycin C-albumin conjugate. *Chem. Pharm. Bull.*, 38 (1990) 2614-2616.
- 2653 Ketchum, C.H., Robinson, C.A., Jr. and Huang, S.T.: Analysis of 8-methoxypsoralen by high-performance liquid chromatography. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1956-1957.
- 2654 Kuefner, U., Esswein, A., Lohrmann, U., Montejano, Y., Vitols, K.S. and Huennekens, F.M.: Occurrence and significance of diastereomers of methotrexate α -peptides. *Biochemistry*, 29 (1990) 10540-10545.
- 2655 Malecki, F. and Crawhall, J.C.: Determination of melphalan and chlorambucil in tablet dosage form using high-performance liquid chromatography and amperometric detection. *Anal. Lett.*, 23 (1990) 1685-1693.

- 2656 Martz, W., Oellerich, M. and Schumann, G.: Determination of methotrexate in serum: the aca MTHO immunoassay and HPLC compared. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 951-953.
- 2657 Newman, R.A. and Welch, M.: High pressure liquid chromatography assay for determination of 18- β -glycyrrhetic acid in plasma. *J. Liq. Chromatogr.*, 13 (1990) 1585-1594.
- 2658 Silvestro, L., Viano, I., Baiocchi, C., Saini, G., Marmont, F. and Ferro, R.: Quantitation of melphalan in plasma of patients by reversed-phase high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 563 (1991) 443-450.
- 2659 Sturm, G., Häberlein, H., Bauer, T., Plaum, T. and Stalker, D.J.: Mass spectrometric and high-performance liquid chromatographic studies of medroxyprogesterone acetate metabolites in human plasma. *J. Chromatogr.*, 562 (1991) 351-362.
- 2660 Tomankova, H. and Sabartova, J.: Determination of impurities in azidothymidine by HPTLC densitometry and HPLC. *Chromatographia*, 29 (1990) 562-570.
- 2661 Tsujibo, H., Sakamoto, T., Miyamoto, K., Kusano, G., Ogura, M., Hasegawa, T. and Inamori, Y.: Isolation of cytotoxic substance, kalafungin from an alkalophilic actinomycete, *Nocardioopsis dassonvillei* subsp. *prasina*. *Chem. Pharm. Bull.*, 38 (1990) 2299-2300.
- 2662 Von Hoff, D.D., Kuhn, J.G., Havlin, K.A., Langevin, A.-M., Brown, T.D., Weiss, G.R., Turner, J.N., Purvis, J., Lucas, V.S., Bair, K.W., Wargin, W. et al.: Phase I and clinical pharmacology trial of 502U83 using a monthly single dose schedule. *Cancer Res.*, 50 (1990) 7496-7500.
- 2663 Wong, B.K., Woolf, T.F., Chang, T. and Whitfield, L.R.: Metabolic disposition of trimetrexate, a nonclassical dihydrofolate reductase inhibitor, in rat and dog. *Drug Metab. Disp.*, 18 (1990) 980-986.

For additional information see:

C.A., 113 (1990) 218340j.

See also 2201, 2349.

32g. Other drug categories

- 2664 Abounassif, M.A., Abdel-Moety, E.M. and Gad-Kariem, E.A.: HPLC quantification of azintamide and papaverine hydrochloride simultaneously in pharmaceutical preparations. *J. Liq. Chromatogr.*, 13 (1990) 2689-2698.
- 2665 Azumaya, C.T.: Sensitive liquid chromatographic method for the determination of hydrochlorothiazide in human plasma. *J. Chromatogr.*, 532 (1990) 168-174.
- 2666 Beck, G.J., Kossak, D. and Saxena, S.J.: A simple, sensitive assay for the spermicide nonoxynol-9 in biological fluids by high-performance liquid chromatography. *J. Pharm. Sci.*, 79 (1990) 1029-1031.
- 2667 Berna, R.A. and Zacchei, A.G.: High-performance liquid chromatographic method for the determination of a novel leukotriene D₄ antagonist (MK-0571) in biological specimens. *J. Chromatogr.*, 563 (1991) 458-465.
- 2668 Black, D.B., Dawson, B.A., Ethier, J.-C. and Neville, G.A.: Preparative liquid chromatographic separation of the oligomers of nonoxynol-9 and their characterization by ¹H-NMR and mass spectroscopy. *J. Pharm. Biomed. Anal.*, 8 (1990) 527-533.
- 2669 Chen, I.-W., Hsieh, J.Y.-K., Lin, J.H. and Duggan, D.E.: High-performance liquid chromatographic determination of cilastatin and its major metabolite N-acetylcilastatin in rat plasma, urine, and bile. *J. Chromatogr.*, 534 (1990) 119-126.

- 2670 Coppi, G. and Barchielli, M.: Simple high-performance liquid chromatographic method for the determination of PGT/1A, a new immunostimulating drug, in biological fluids. *J. Chromatogr.*, 563 (1991) 385-391.
- 2671 Daniel, E.M., Krupnick, A.S., Heur, Y.H., Blinzler, J.A., Nims, R.W. and Stoner, G.D.: Extraction, stability, and quantitation of ellagic acid in various fruits and nuts. *J. Food Compos. Anal.*, 2 (1989) 338-349; *C.A.*, 113 (1990) 96343q.
- 2672 Elkin, R.G. and Rogler, J.C.: Reduction of the cholesterol content of eggs by the oral administration of lovastatin to laying hens. *J. Agric. Food Chem.*, 38 (1990) 1635-1641.
- 2673 Epemolu, R.O., Hider, R.C. and Damani, L.A.: HPLC analysis of 3-hydroxy-pyridin-4-ones: novel orally active iron chelators. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs Metab., Incl. Anati-Infect. Agents) (1990) 341-342; *C.A.*, 114 (1991) 67z.
- 2674 Farthing, D., Fakhry, I., Gehr, T.W.B. and Sica, D.A.: Quantitation of metolazone in urine by high-performance liquid chromatography with fluorescence detection. *J. Chromatogr.*, 534 (1990) 228-232.
- 2675 Jiang, L.-X., Wang, Z.-J. and Matlin, S.A.: HPLC analysis of injectable contraceptive preparation containing norethisterone enanthate and estradiol valerate. *J. Liq. Chromatogr.*, 13 (1990) 3473-3479.
- 2676 Kline, W.F., Matuszewski, B.K. and Bayne, W.F.: Determination of 4-amino-1-hydroxybutane-1,1-bisphosphonic acid in urine by automated pre-column derivatization with 2,3-naphthalene dicarboxyaldehyde and high-performance liquid chromatography with fluorescence detection. *J. Chromatogr.*, 534 (1990) 139-149.
- 2677 Koehn, S., Frey, F.J., Speck, R.F., Zeugin, T., Schaffner, T., Zimmermann, A. and Frey, B.M.: Pharmacokinetics and chronic toxicity of cyclosporine A in genetic hydroxylation-deficient dark Agouti rats. *J. Pharmacokin. Biopharm.*, 18 (1990) 381-399.
- 2678 Kwong, E., Chiu, A.M.Y., McClintock, S.A. and Cotton, M.L.: HPLC analysis of an amino bisphosphate in pharmaceutical formulations using postcolumn derivatization and fluorescence detection. *J. Chromatogr. Sci.*, 28 (1990) 563-566.
- 2679 Makki, S., Treffel, P., Humbert, P. and Agache, P.: High-performance liquid chromatographic determination of citropten and bergapten in suction blister fluid after solar product application in humans. *J. Chromatogr.*, 563 (1991) 407-413.
- 2680 Miething, H., Seger, V. and Haensel, R.: Determination of photoanethole from a stored essential oil of anise fruits as 4,4-dimethoxystilbene by high-performance liquid chromatography-ultraviolet coupling. *Phytother. Res.*, 4 (1990) 121-123; *C.A.*, 113 (1990) 177988f.
- 2681 Nishi, H., Fujimura, N., Yamaguchi, H. and Fukuyama, T.: Reversed-phase high-performance liquid chromatographic separation of the enantiomers of trimetoquinol hydrochloride by derivatization with 2,3,4,6-tetra-O-acetyl- β -D-glucopyranosyl isothiocyanate and application to the optical purity testing of drugs. *J. Chromatogr.*, 539 (1991) 71-81.
- 2682 Okaniwa, T., Echizen, H., Ishizaki, T., Kasao, M. and Iizuka, T.: Pharmacodynamic characterization of posture-related diuretic and saluretic responses to furosemide in humans. *J. Pharmacol. Exp. Ther.*, 255 (1990) 716-723.
- 2683 Santasania, C.T.: Direct injection analysis of diuretic and anti-inflammatory drugs on a shielded hydrophobic phase column. *J. Liq. Chromatogr.*, 13 (1990) 2605-2631.
- 2684 Ventura, R., Fraisse, D., Becchi, M., Paisse, O. and Segura, J.: Approach to the analysis of diuretics and masking agents by high-performance liquid chromatography-mass spectrometry in doping control. *J. Chromatogr.*, 562 (1991) 723-736.

- 2685 Zurth, C. and Kagels, F.: Determination of onapristone and its N-desmethyl metabolite in human plasma or serum by high-performance liquid chromatography. *J. Chromatogr.*, 532 (1990) 115-123.

For additional information see:

- C.A., 113 (1990) 178373p, 198102c;
114 (1991) 12277f.

- See also 1453, 1528, 1705, 1889, 1982, 2192, 2264, 2267, 2343, 2386, 2387, 2393, 2440, 2482, 2522, 2535, 2537, 2572, 2612, 2635, 2724.

32h. Toxicological and forensic applications

- 2686 Cherton, J.C., Ladjama, D. and Soyey, D.: (Direct monitoring of xenobiotics in locust or lobster hemolymph by HPLC on ISRP packing). *Analusis*, 18 (1990) 71-77; C.A., 113 (1990) 93234u.
- 2687 Dixit, V. and Dixit, V.M.: A unique solid phase extraction column for isolation of 11-nor- Δ -9-tetrahydrocannabinol-9-carboxylic acid in human urine. *J. Liq. Chromatogr.*, 13 (1990) 3313-3325.
- 2688 Nicolas, A., Leroy, P., Decolin, D. and Siest, G.: Improvements in the HPLC measurement of drug and metabolite levels in biological fluids. *Methodol. Surv. Biochem. Anal.*, 20 (Anal. Drugs Metab., Incl. Anti-Infect. Agents) (1990) 271-278; C.A., 114 (1991) 65x.
- 2689 Noggle, F.T., Jr., DeRuiter, J. and Clark, C.R.: Methods for the analysis and characterization of forensic samples containing amphetamines and related amines. *J. Chromatogr. Sci.*, 28 (1990) 529-536.
- 2690 Thomas, B.F. and Martin, B.R.: *In vitro* metabolism of (-)-*cis*-3-[2-hydroxy-4-(1,1-dimethylheptyl)phenyl]-*trans*-4-(3-hydroxypropyl)cyclohexanol, a synthetic bicyclic cannabinoid analog. *Drug Metab. Disp.*, 18 (1990) 1046-1054.

See also 1415, 1644, 1667, 2239, 2568.

32i. Plant extracts

- 2691 Bladt, S., Wagner, H. and Woo, W.S.: Taiga-Wurzel. DC- und HPLC-Analyse von Eleutherococcus- bzw. Acanthopanax-Extrakten und diese enthaltenden Phytopräparaten. *Dtsch. Apoth.-Ztg.*, 130 (1990) 1499-1508.
- 2692 Brisse-Le Menn, F., Duclos, M.P., Larpent, C., Mahe, C. and Patin, H.: (HPLC analysis of hederagenin and oleanolic acid *Ficaria ranunculoides* tubers). *Analusis*, 18 (1990) 250-254; C.A., 113 (1990) 168288a.
- 2693 Fischer, N., Weinreich, B., Nitz, S. and Drawert, F.: Applications of high-speed counter-current chromatography for the separation and isolation of natural products. *J. Chromatogr.*, 538 (1991) 193-202.
- 2694 Franz, G. and Madaus, A.: Stabilität von Polysacchariden. Untersuchungen am Beispiel des Eibischschleims. *Dtsch. Apoth.-Ztg.*, 130 (1990) 2194-2199.
- 2695 Glinski, J.A., Caviness, G.O. and Mikell, J.R.: Screening natural products. Bioassay-directed isolation of active components by centrifugal partition chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3625-3635.
- 2696 Kanazawa, H., Nagata, Y., Matsushima, Y., Tomoda, M. and Takai, N.: Preparative high-performance liquid chromatography on chemically modified porous glass. Isolation of acidic saponins from ginseng. *J. Chromatogr.*, 537 (1991) 469-474.

- 2697 Li, P., Zhang, T.-Y., Hua, X. and Ito, Y.: Studies on the preparative capability of the horizontal flow-through coil planet centrifuge and high-performance liquid chromatography in the separation of polar compounds from *Oxytropis ochrocephala* Bunge. *J. Chromatogr.*, 538 (1991) 219-225.
- 2698 Marston, A., Slacanin, I. and Hostettmann, K.: Some new developments in centrifugal partition chromatography and applications in the separation of natural products. *J. Liq. Chromatogr.*, 13 (1990) 3615-3624.
- 2699 Pauli, G. and Junior, P.: Auf der Fährte von Adonis aleppica. Eindrücke und Ergebnisse einer Reise nach Kurdistan. *Dtsch. Apoth.-Ztg.*, 130 (1990) 2170-2174.
- 2700 Picerno, N.: (Determination of active components in plant extracts and cosmetic products). *Cosmet. Toiletries, Ed. Ital.*, 11 (1990) 50-54; *C.A.*, 113 (1990) 158425d.
- 2701 Schilcher, H. and Hagels, H.: Carlinae radix. Verfälschung, Verwechslung oder Ersatzdroge? *Dtsch. Apoth.-Ztg.*, 130 (1990) 2186-2190.
- 2702 Svagrova, I., Stulik, K., Pacakova, V., Caliceti, P. and Veronese, F.M.: Determination of narciclasine in serum by reversed-phase high-performance liquid chromatography: comparison of amperometric, ultraviolet photometric and fluorescence detection. *J. Chromatogr.*, 563 (1991) 95-102.
- 2703 Tai, T., Idaka, K., Kondo, S. and Akahori, A.: (Determination of atractylenolide III in *Atractylodes japonica*). *Shoyakugaku Zasshi*, 44 (1990) 1-4; *C.A.*, 113 (1990) 138600d.
- 2704 Waksmundzka-Hajnos, M. and Wawrzynowicz, T.: Some methodological aspects of the separation of closely related compounds. *J. Planar Chromatogr.*, 3 (1990) 439-441.
- 2705 Woldemariam, T.Z., Linley, P.A. and Fell, A.F.: Phytochemical studies on male and female flowers of *Hagenia abyssinica* by column chromatography, thin-layer chromatography and high-performance liquid chromatography. *Anal. Proc. (London)*, 27 (1990) 178-179; *C.A.*, 113 (1990) 198093a.

For additional information see:

C.A., 113 (1990) 165256c, 178346g.

See also 1187, 1417, 1423, 1424, 1455, 1648, 2657.

33. CLINICO-CHEMICAL APPLICATIONS

33a. General papers and reviews

- 2706 Kaliszan, R.: High performance liquid chromatographic methods and procedures of hydrophobicity determination. *Quant. Struct.-Act. Relat.*, 9 (1990) 83-87; *C.A.*, 113 (1990) 187409g - a review with 43 refs.
- 2707 Papadoyannis, I.N.: *HPLC in Clinical Chemistry. Chromatographic Science Series*, Vol. 54, Dekker, New York, 1990, 488 p.; *C.A.*, 114 (1991) 2990u.
- 2708 Weber, G.F.: The measurement of oxygen-derived free radicals and related substances in medicine. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 569-603.

See also 2206.

33b. Complex mixtures and profiling (single compounds by cross-reference only)

- 2709 Gallice, P.M., Crevat, A.D. and Berland, Y.F.: Scaling up in isolation of medium-size uraemic toxins. *J. Chromatogr.*, 539 (1991) 449-453.

See also 1481, 1496, 1497, 1514, 1529, 1552, 1554, 1569, 1608, 1620, 1641, 1674, 1676, 1679, 1686, 1697, 1706, 1709, 1722, 1726, 1728, 1744, 1749, 1758, 1761, 1777, 1844, 1900, 1902, 1926, 1970, 1992, 2025, 2055, 2103, 2105, 2106, 2120, 2132, 2199, 2208, 2246, 2253, 2254, 2259, 2269, 2318, 2322, 2328, 2343, 2407, 2767, 2778, 2785.

34. FOOD ANALYSIS

34a. General papers and reviews

- 2710 Anonymous: (HPLC-instruments for food analysis). *LaborPraxis*, 14 (1990) 598-599; *C.A.*, 114 (1991) 4915x - a review with no refs.
- 2711 Kenney, B.F.: Applications of high-performance liquid chromatography for the flavor research and quality control laboratories in the 1990s. *Food Technol. (Chicago)*, 44 (1990) 76-84; *C.A.*, 113 (1990) 210184r - review with 10 refs.
- 2712 Khurana, A.L. and Ho, C.-T.: Determination of interaction of food components with modified guar gum by HPLC. *J. Liq. Chromatogr.*, 13 (1990) 1559-1569.
- 2713 Li, S.F.Y., Lee, H.K. and Liew, P.Y.: Optimization of mobile phase composition for the analysis of food additives by high-performance liquid chromatography. *Bull. Singapore Natl. Inst. Chem.*, 17 (1989) 55-62; *C.A.*, 113 (1990) 189858b.
- 2714 Lickl, E.: Novel applications of HPLC in food analysis. *Food Addit. Contam.*, 7 (1990) 433-454; *C.A.*, 113 (1990) 229748z - a review with 41 refs.
- 2715 Tibor, C.: (Application of high performance liquid chromatography in food analysis). *Élelmiszervizsgalati Kozl.*, 36 (1990) 5-26; *C.A.*, 113 (1990) 170536y - a review with 235 refs.

See also 1493, 2370.

34b. Complex mixtures (single compounds by cross-reference only)

- 2716 Glidden, R.M., Brown, P.J., Sittig, R.A., Syvertson, C.N. and Smith, P.V.: Determination of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin and 2,3,7,8-tetrachlorodibenzofuran in cow's milk. *Chemosphere*, 20 (1990) 1619-1624; *C.A.*, 113 (1990) 229803p.
- 2717 Luckas, B., Thielert, G. and Peters, K.: Selective determination of PSP toxins in mussels. *Z. Lebensm.-Unters. Forsch.*, 190 (1990) 491-495; *C.A.*, 113 (1990) 229794m.
- 2718 Marini, D. and Flori, A.: Detection of illegal chemical compounds added to wines. 1. HPLC determination of dehydroacetic acid. *Prod. Chim. Aerosol Sel.*, 31 (1990) 3-5; *C.A.*, 114 (1991) 4788h.
- 2719 Mueller, E. and Jork, H.: (Analysis of aspartame-containing colas by hydrophobic chromatography on Fractogel TSK). *Dtsch. Lebensm.-Rundsch.*, 86 (1990) 243-247; *C.A.*, 113 (1990) 189884g.
- 2720 Roggero, J.-P., Coen, S. and Archier, P.: Wine phenolics: optimization of HPLC analysis. *J. Liq. Chromatogr.*, 13 (1990) 2593-2603.
- 2721 Tomlins, K.I., Baker, D.M. and McDowell, I.J.: HPLC method for the analysis of organic acids, sugars, and alcohol in extract of fermenting cocoa beans. *Chromatographia*, 29 (1990) 557-561.
- 2722 Zhou, S. and Li, J.: (Simultaneous determination of preservatives, sweetening agents and synthetic colorants in soy sauce and soft drinks by ion-pair reversed-phase HPLC). *Sepu*, 8 (1990) 54-56; *C.A.*, 113 (1990) 96238j.

2723 Zhu, Y. and Yang, G.: (Beverage composition determination by ion chromatography). *Sepu*, 8 (1990) 43-45; *C.A.*, 113 (1990) 96237h.

2724 Zhu, Y., Yang, G. and Zhuang, X.: (Ion chromatographic determination of citrate saccharin and phosphoric acid in beverages). *Huaxue Shijie*, 31 (1990) 175-178; *C.A.*, 113 (1990) 96230a.

For additional information see:

C.A., 113 (1990) 170553b, 210200t.

See also 1408, 1428, 1437, 1439, 1440, 1442, 1443, 1445, 1449, 1451, 1456, 1465, 1482, 1484, 1486, 1499, 1527, 1530, 1531, 1544, 1549, 1557, 1559, 1575, 1577, 1603, 1626, 1629, 1657, 1660, 1662, 1670, 1702, 1705, 1725, 1731, 1734, 1737, 1890, 2232, 2249, 2250, 2252, 2303, 2306, 2307, 2315, 2316, 2323, 2324, 2329, 2334, 2335, 2336, 2337, 2339, 2342, 2347, 2357, 2365, 2382, 2421, 2426, 2429, 2523, 2617, 2628, 2672, 2680, 2729, 2770, 2771, 2776, 2783.

35. ENVIRONMENTAL ANALYSIS

35a. *General papers and reviews*

See 1387, 1396.

35b. *Air pollution (complex mixtures; single compounds by cross-reference only)*

2725 Ciccioli, P., Cecinato, A. and Brancaleoni, E.: (Methods for determination of atmospheric pollutants). *Lab. 2000*, 3 (1989) 19-28; *C.A.*, 113 (1990) 217112z.

35c. *Water pollution (complex mixtures; single compounds by cross-reference only)*

For additional information see:

C.A., 113 (1990) 96071z.

See also 1262, 1532, 2405, 2411, 2746, 2751, 2767, 2781, 2784.

35d. *Soil pollution (complex mixtures; single compounds by cross-reference only)*

For additional information see:

C.A., 114 (1991) 5305k.

See also 2411, 2416, 2417, 2746, 2759.

36. SOME TECHNICAL PRODUCTS AND COMPLEX MIXTURES

36a. *Surfactants*

2726 Funasaki, N., Hada, S. and Neya, S.: Micelle formation of a sulphobetaine derivative of cholic acid. *Chem. Lett.*, (1990) 1075-1078; *C.A.*, 113 (1990) 159272p.

- 2727 Sithole, B.B., Zvilichovsky, B., Lapointe, C. and Allen, L.H.: Adsorption of aqueous nonylphenol ethoxylate surfactants on metal sample loops: effect on quantitation by liquid chromatography. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 322-324.
- 2728 Zweigenbaum, J.: Separation of anionic surfactant components by capillary electrophoresis and micellar electrokinetic capillary chromatography using P/ACE System 2000. *Chromatogram*, 11 (1990) 9-10; *C.A.*, 113 (1990) 204210e.

See also 1232, 1236, 1671, 2666, 2763, 2775.

36b. Antioxidants and preservatives

- 2729 Vega, M., Saelzer, R., Mendoza, N. and Katalinic, J.: Analysis of ethoxyquin (6-ethoxy-1,2,4-trimethylquinoline) in fishmeal. Comparison between HPLC, GC, and HPTLC. *J. High Resolut. Chromatogr.*, 13 (1990) 854-855.

See also 2369.

36c. Complex mixtures, technical products and unidentified compounds

- 2730 Bartle, K.D.: Chromatographic techniques (for coal liquids). *Coal Sci. Technol.*, 12 (1989) 13-40; *C.A.*, 113 (1990) 214919g - a review with 51 refs.
- 2731 Caramao, E.B., Gomes, L.M.F., Oliveira, M.D., Bristoti, A. and Lancas, F.M.: Selective isolation and characterization of "Mina de Leao" coal tar bases. *Fuel Sci. Technol. Int.*, 8 (1990) 881-898; *C.A.*, 114 (1991) 9412r.
- 2732 Cumin, F., Schnell, C., Richert, P., Raschdorf, F., Probst, A., Schmid, K., Wood, J.M. and De Gasparo, M.: Pharmacokinetics and tissue distribution of the renin inhibitor N-(2-(R)-benzyl-3-tert.-butyl-sulfonyl-propionyl)-His-Cha⁺Val-n-butylamine in marmosets. *Drug Metab. Disp.*, 18 (1990) 831-835.
- 2733 Green, J.B., Yu, S.K.T., Green, J.A., Doughty, D.A., Vogh, J.W. and Grigsby, R.D.: Analysis of heavy oils: method development and application to Cerro Negro heavy petroleum detailed separation and analysis of acidic compounds. *Report*, NIPPER-322; Order No. DE89000769, 1989, 158 p.; *C.A.*, 113 (1991) 9250m.
- 2734 Lin, J.H., Chen, I.-W., Ulm, E.H., Gehret, J.R. and Duggan, D.E.: Dose-dependent pharmacokinetics of MK-417, a potent carbonic anhydrase inhibitor, in rabbits following single and multiple doses. *Drug Metab. Disp.*, 18 (1990) 836-841.
- 2735 Luginin, V.A., Kamentsev, Ya.S., Pozdnyakova, N.E. and Tokusheva, G.T.: (Analysis of high-temperature superconductor materials using extraction chromatography). *Zh. Anal. Khim.*, 45 (1990) 1848-1850; *C.A.*, 113 (1990) 236326p.
- 2736 Thrane, U.: Grouping *Fusarium* section *Discolor* isolates by statistical analysis of quantitative high performance liquid chromatographic data on secondary metabolite production. *J. Microbiol. Methods*, 12 (1990) 23-39; *C.A.*, 113 (1990) 227653r.

For additional information see:

- C.A.*, 113 (1990) 229699j, 233580f;
114 (1991) 9429b.

See also 1407.

37. CELLS, CELLULAR PARTICLES AND SUPRAMOLECULAR STRUCTURES

- 2737 Fernandez-Checa, J.C. and Kaplowitz, N.: The use of monochlorobimane to determine hepatic GSH levels and synthesis. *Anal. Biochem.*, 190 (1990) 212-219.
- 2738 Merlet, J.P. and Cambar, J.: (Human tubular proximal cell isolation by affinity chromatography, using *Lotus tetragonolobus* lectin). *C. R. Acad. Sci., Ser. 3*, 310 (1990) 565-570; *C.A.*, 113 (1990) 94156g.

38. INORGANIC COMPOUNDS

- 2739 Alimarin, I.P., Basova, E.M., Bol'shova, T.A. and Ivanov, V.M.: (High-performance liquid ion-pair chromatography in inorganic analysis). *Zh. Anal. Khim.*, 45 (1990) 1478-1504; *C.A.*, 113 (1990) 22352ly.
- 2740 Pavlenko, I.V., Bashlov, V.L., Spivakov, B.Ya. and Zolotov, Yu.A.: (Counter-current partition chromatography (liquid-liquid chromatography) with a free stationary phase, chromatographic extraction in inorganic analysis. Literature survey and experimental testing). *Zh. Anal. Khim.*, 44 (1989) 827-833; *C.A.*, 112 (1990) 171173u.

38a. Cations

- 2741 Adachi, M., Oguma, K. and Kuroda, R.: Reversed-phase chromatographic separation of the rare earth elements. *Chromatographia*, 29 (1990) 579-582.
- 2742 Al-Ammar, A.S., Hamid, H.A., Rashid, B.H. and Basheer, H.M.: Preseparation of uranium by reversed-phase partition chromatography. Application to the determination of trace elements in nuclear-grade uranium compounds by inductively coupled plasma atomic emission spectrometry. *J. Chromatogr.*, 537 (1991) 287-294.
- 2743 Araki, T., Asai, H., Ando, H., Tanaka, N., Kimata, K., Hosoya, K. and Narita, H.: Separating behaviors of heavier rare earth metal ions in centrifugal partition chromatography with di(2-ethylhexyl)phosphoric acid. *J. Liq. Chromatogr.*, 13 (1990) 3673-3687.
- 2744 Araki, T., Asai, H., Tanaka, N., Kimata, K., Hosoya, K. and Narita, H.: Liquid membrane transport of heavier rare earth metal ions based on CPC results with di(2-ethylhexyl)phosphoric acid. *J. Liq. Chromatogr.*, 13 (1990) 3689-3704.
- 2745 Astafurov, V.I., Kolyada, N.S., Frolova, V.N. and Pozdnyakova, L.T.: (Extraction-chromatographic separation of uranium from solutions using triisooamyl phosphate). *Khimiya Urana (Moscow)*, (1989) 429-434; *C.A.*, 113 (1990) 204010q.
- 2746 Basta, N.T.: Determination of metals in soils and sewage sludges by ion chromatography and the effect of cropping systems on metal adsorption by soils. Avail. *Univ. Microfilms Int.*, Order No. DA9014877, 1989, 286 pp.; *C.A.*, 113 (1990) 210669c.
- 2747 Betti, M. and Cavalli, S.: Determination of trace elements by ion chromatography. I. Beryllium. *J. Chromatogr.*, 538 (1991) 365-372.
- 2748 Bowles, C.J., Bader, L.W. and Jackson, K.W.: Ion chromatography of metals with post-column ion displacement. *Talanta*, 37 (1990) 835-840; *C.A.*, 113 (1990) 164542f.
- 2749 Brzyska, W., Soltysiak, I. and Cygan, J.: (Separation of heavy lanthanide and yttrium concentrates by the ion-exchange chromatography). *Przem. Chem.*, 69 (1990) 223-225; *C.A.*, 113 (1990) 203692b.
- 2750 Ficlin, W.H.: Extraaction and speciation of arsenic in lacustrine sediments. *Talanta*, 37 (1990) 831-834; *C.A.*, 113 (1990) 164642q.

- 2751 Goyal, S.S., Hafez, A. and Rains, D.W.: Simultaneous determination of arsenite, arsenate, selenite and selenate in waters using suppressed ion chromatography with ultraviolet absorbance detection. *J. Chromatogr.*, 537 (1991) 269-276.
- 2752 Haddad, P.R.: Method for determination of gold, platinum, or palladium in cyanide-complex solutions by liquid chromatography. *U.S. US 4,952,514* (Cl. 436-80; G01N33/20), 28 Aug. 1990, Appl. 172,797, 28 Mar. 1988; 9 p.; *C.A.*, 113 (1990) 243928q.
- 2753 Jones, E.A., Bezuidenhout, H.S. and van Staden, J.F.: Separation of lanthanides and yttrium as anionic complexes by isocratic ion-interaction chromatography. *J. Chromatogr.*, 537 (1991) 277-286.
- 2754 Kawada, K. and Oi, T., Hosoe, M. and Kakihana, H.: Fractionation of potassium isotopes in cation-exchange chromatography. *J. Chromatogr.*, 538 (1991) 355-364.
- 2755 Kawasaki, N., Tanimoto, T. and Tanaka, A.: Determination of non-protein-bound iron in rat tissue by ion chromatography with electrochemical detection. *Anal. Biochem.*, 192 (1991) 104-108.
- 2756 Kitazume, E., Bhatnagar, M. and Ito, Y.: Separation of rare earth elements by high-speed counter-current chromatography. *J. Chromatogr.*, 538 (1991) 133-140.
- 2757 Kremlyakova, N.Yu., Novikov, A.P., Myasoedov, B.F. and Katargin, N.V.: Extraction chromatographic behavior of americium(IV) in the system: sulphuric acid-potassium tungstophosphate ($K_{10}P_2W_{17}O_{61}$)-primene JMT. *J. Radioanal. Nucl. Chem.*, 145 (1990) 183-187; *C.A.*, 113 (1990) 183478f.
- 2758 Levakov, B.I., Nezgovorov, N.Yu., Timofeev, G.A. and Mishenev, V.B.: (Extraction-chromatographic separation of uranium and its spectrophotometric determination). *Khimiya Urana (Moscow)*, (1989) 396-399; *C.A.*, 113 (1990) 204056j.
- 2759 Morrisson, A.R., Park, J.S. and Sharp, B.L.: Application of high-performance size-exclusion liquid chromatography to the study of copper in waters extracted from sewage sludge treated soils. *Analyst (London)*, 115 (1990) 1429-1433.
- 2760 Muralidharan, S., Cai, R. and Freiser, H.: Improved separation of closely related metal ions by centrifugal partition chromatography. *J. Liq. Chromatogr.*, 13 (1990) 3651-3672.
- 2761 Nesterenko, P.N. and Bol'shova, T.A.: High performance liquid chromatography of metals on sorbents containing complexing functional groups). *Vest. Mosk. Univ., Ser. 2: Khim.*, 31 (1990) 167-169; *C.A.*, 113 (1990) 223610b.
- 2762 Nitsch, A., Kalcher, K. and Posch, V.: Ion chromatography of aluminium, gallium and indium using a complexing mobile phase. *Fresenius' J. Anal. Chem.*, 338 (1990) 618-621.
- 2763 Obrezkov, O.N., Slyamin, V.I. and Shpigun, O.A.: Ion chromatographic determination of some metals as anion complexes with EDTA. *Anal. Sci.*, 6 (1990) 617-618; *C.A.*, 113 (1990) 204137m.
- 2764 Ohashi, H., Uehara, N. and Shijo, Y.: Simultaneous determination of molybdenum, vanadium, gallium, copper, iron and indium as 8-quinolinolate complexes by high-performance liquid chromatography. *J. Chromatogr.*, 539 (1991) 225-231.
- 2765 Okamoto, Y., Sakamoto, N., Yamamoto, M. and Kumamaru, T.: Electrodialysis pretreatment system for ion chromatography of strongly acidic samples and its application to the determination of magnesium and calcium. *J. Chromatogr.*, 539 (1991) 221-224.
- 2766 Takeuchi, T., Kabasawa, Y. and Tanimura, T.: Continuous separation of lanthanides by counter-current fractional extraction. *J. Chromatogr.*, 538 (1991) 125-131.

- 2767 Van Suijlen, J.D.E., Berrevoets, C.A. and Leijnse, B.: A candidate reference method for coupled sodium-water determination in human serum. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 817-824.
- 2768 Xie, N., Huang, C. and Fu, H.: (Simultaneous determination of trace copper iron, nickel, zinc, cobalt and lead in human hair by ion chromatography). *Sepu*, 8 (1990) 114-116; *C.A.*, 113 (1990) 94170g.
- 2769 Yamada, H. and Hattori, T.: Determination of soluble selenium in soils. *Soil. Sci. Plant Nutr. (Tokyo)*, 36 (1990) 163-166; *C.A.*, 113 (1990) 210656w.

For additional information see:

- C.A.*, 113 (1990) 164530a, 164576v, 164577w, 164591w, 168286y, 183804j, 183805k, 183851x, 194434a, 204080n, 204125f, 223657x, 235107f, 243752c, 243831c, 243954v;
114 (1991) 5298k, 16719z;
1113 (1990) 183803h.

See also 1259, 1279, 1287, 1378, 2786, 2787.

38b. Anions

- 2770 Carniel, A., Franchin, L., Perin, R. and Pagani, E.: (Determination of nitrate in vegetables by ion chromatography). *Riv. Soc. Ital. Sci. Aliment.*, 18 (1989) 345-352; *C.A.*, 114 (1991) 4958p.
- 2771 Dennis, M.J., Key, P.E., Papworth, T., Pointer, M. and Massey, R.C.: The determination of nitrate and nitrite in cured meat by HPLC/UV. *Food Addit. Contam.*, 7 (1990) 455-461; *C.A.*, 113 (1990) 229782g.
- 2772 Fio, J.L. and Fujii, R.: Selenium speciation methods and application to soil saturation extracts from San Joaquin Valley, California. *Soil Sci. Soc. Am. J.*, 54 (1990) 363-369; *C.A.*, 113 (1990) 96543e.
- 2773 Ishikawa, T. and Nakamura, E.: Formation of boron-mannitol complex in hydrofluoric acid solution and a possibility for the use of acids in the separation of boron from natural rock samples. *Proc. Jpn. Acad., Ser. B*, 66 (1990) 91-95; *C.A.*, 113 (1990) 243794t.
- 2774 Jackson, P.E. and Jones, W.R.: Hollow-fibre membrane-based sample preparation device for the clean-up of brine samples prior to ion chromatographic analysis. *J. Chromatogr.*, 538 (1991) 497-503.
- 2775 Jandik, P., Li, J.B., Jones, W.R. and Gjerde, D.T.: New method of background eluent conductivity elimination in gradient ion chromatography. *Chromatographia*, 30 (1990) 509-517.
- 2776 Kim, H.-J.: Determination of sulfite in foods and beverages by ion exclusion chromatography with electrochemical detection: collaborative study. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 216-222.
- 2777 Langmaier, J.: (Electrochemical determination of nitrate and nitrite ions). *Chem. Listy*, 84 (1990) 697-715; *C.A.*, 113 (1990) 223503u - a review with 173 refs.
- 2778 Lippsmeyer, B.C., Tracy, M.L. and Möller, G.: Ion-exchange liquid chromatographic determination of nitrate and nitrite in biological fluids. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 457-462.
- 2779 Maki, S.A. and Danielson, N.D.: Indirect photometric chromatography of inorganic anions using naphtholdisulfonate. *J. Chromatogr. Sci.*, 28 (1990) 537-542.
- 2780 Matyukhina, T.V., Shpigun, O.A., Letunova, A.B. and Zolotov, Yu.A.: (Determination of antimony in the form of the oxoanion by ion chromatography). *Vestn. Mosk. Univ., Ser. 2: Khim.*, 31 (1990) 169-172; *C.A.*, 113 (1990) 223682b.

- 2781 Minarik, M., Kuzilek, V. and Opocensky, V.: (Simple ion liquid chromatograph for determination of nitrates and sulphates in water). *Vodni Hospod.*, 40 (1990) 125-127; *C.A.*, 113 (1990) 217637z.
- 2782 Okada, T.: Factors affecting selectivity in micelle exclusion chromatography of inorganic anions. *J. Chromatogr.*, 538 (1991) 341-354.
- 2783 Pizzoferrato, L., Quattrucci, E. and Di Lullo, G.: Evaluation of an HPLC method for the determination of sulfiting agents in foods. *Food Addit. Contam.*, 7 (1990) 189-195; *C.A.*, 113 (1990) 96209a.
- 2784 Spivakov, B.Ya., Maryutina, T.A., Shpigun, L.K., Shkinev, V.M., Zolotov, Yu.A., Ruseva, E. and Khavezov, I.: Determination of ortho- and pyrophosphates in waters by extraction chromatography and flow-injection analysis. *Talanta*, 37 (1990) 889-894; *C.A.*, 113 (1990) 177882s.
- 2785 Yan, D. and Schwedt, G.: (Analysis of kidney stones by ion-exchange chromatography). *LaborPraxis*, 14 (1990) 720-723; *C.A.*, 113 (1990) 207726p.

For additional information see:

C.A., 113 (1990) 150927y, 164678e, 183926a, 243932m;
114 (1991) 16687n.

See also 1554, 2724.

38c. Permanent and rare gases

See 2708.

39. RADIOACTIVE AND OTHER ISOTOPE COMPOUNDS

- 2786 Kimura, T.: Extraction chromatography in the TBP-nitric acid system. II. Characteristics of the TBP/XAD-4 resin on separation of actinide elements. *J. Radioanal. Nucl. Chem.*, 141 (1990) 307-316; *C.A.*, 113 (1990) 239885f.
- 2787 Seko, M., Takeda, K., Onitsuka, H. and Miyake, T.: Theoretical consideration and recent progress of chemical enrichment process for uranium enrichment. *J. Nucl. Sci. Technol.*, 27 (1990) 983-995; *C.A.*, 114 (1991) 13439x - a review with 22 refs.

For additional information see:

C.A., 113 (1990) 243777q.

See also 2745, 2758.

Gas Chromatography

1. REVIEWS AND BOOKS

- 591 Bobleter, O.: Professor Erica Cremer - a pioneer in gas chromatography. *Chromatographia*, 30 (1990) 471-476.
- 592 Gehrke, C.W. and Kuo, K.C.T. (Editors): *Chromatography and Modification of Nucleosides, Part A, Analytical Methods for Major and Modified Nucleosides - HPLC, GC, MS, NMR, UV and FT-IR. J. Chromatogr. Libr.*, Vol. 45A, Elsevier, Amsterdam, 1990, LIV + 400 pp.
- 593 Kawai, S.: (Gas chromatography.) *Pharm Tech Jpn.*, 6 (1990) 1045-1053; *C.A.*, 113 (1990) 207644k.
- 594 König, W.A.: *Enantioselective Gas Chromatography with Modified Cyclo-dextrins*. Hüthig, Heidelberg, 1991.
- 595 Poole, S.K., Dean, T.A., Oudsema, J.W. and Poole, C.F.: Sample preparation for chromatographic separations: An overview. *Anal. Chim. Acta*, 236 (1990) 3-42 - a review with 204 refs.
- 596 Tsubouchi, K.: (Gas chromatography.) *Shikizai Kyokaishi*, 63 (1990) 550-561; *C.A.*, 114 (1991) 55032q - a review with 21 refs.
- See also 626, 632, 664, 671, 704, 720, 727, 739, 744, 776, 804, 807, 810, 824, 928, 976, 1104, 1178, 1181, 1183, 1188, 1210, 1245, 1258.

2. FUNDAMENTALS, THEORY AND GENERAL

2a. General

- 597 Hayashi, Y. and Matsuda, R.: Comparison of optimization based on information theory with optimization of R_s in column chromatography. *Anal. Lett.*, 23 (1990) 1765-1781.
- See also 591, 793.

2b. Thermodynamics and theoretical relationships

- 598 Furton, K.G. and Morales, R.: Potential ambiguities in the use of McReynolds constants: apparent differences in stationary phase selectivities exclusively attributable to the hydrocarbon index standards. *J. High Resolut. Chromatogr.*, 14 (1991) 62-64.
- 599 Ignat, A.: (Prediction of specific retention volumes in GLC by using solution theory.) *Eesti Tead. Akad. Toim., Keem.*, 39 (1990) 150-154; *C.A.*, 114 (1991) 50114h.
- 600 Lanin, S.N., Nikitin, Yu.S., Polenova, T.V. and Sergeev, S.K.: (Zero retention indices in gas chromatography.) *Zh. Anal. Khim.*, 45 (1990) 2154-2160.
- 601 Olivé, J. and Grimalt, J.O.: Log-normal derived equations for the characterization of on-line acquired chromatographic peaks. *J. Chromatogr. Sci.*, 29 (1991) 70-77.

See also 724, 725, 754, 815.

2c. Relationship between structure and chromatographic behaviour

- 602 Engewald, W. and Máurer, T.: Enhanced possibilities for identification by the use of series-coupled capillary gas chromatographic columns. I. General exposition and application of the retention index concept. *J. Chromatogr.*, 520 (1990) 3-13.
- 603 Feltl, L., Tajovska, P. and Smolkova-Keulemansova, E.: Chromatographic study of the interactions of hydrocarbons with cyclodextrins and their derivatives in the gas-solid system. *J. Chromatogr.*, 520 (1990) 105-108.
- 604 Feng, W.: (Prediction of retention indexes of primary alcohols and carboxylic acid esters on OV-101.) *Shiyu Huagong*, 19 (1990) 484-487; *C.A.*, 114 (1991) 16874w.
- 605 Kuningas, K., Rang, S. and Kailas, T.: Relationship between the structure and retention of *n*-alkenes and *n*-alkynes on silicone phases. *J. Chromatogr.*, 520 (1990) 137-148.
- 606 Reddy, K.S. and Kovats, E.: Dependence of solution data at ideal dilution on solvent molecular size. *Chromatographia*, 30 (1990) 493-499.

See also 791, 808, 837, 844, 847, 865, 885, 906, 938, 1026, 1040, 1070, 1166.

2d. Measurement of physico-chemical and related values

- 607 Battin, F., Dzierzynski, M., Marquaire, P.M., Come, G.M. and Baronnet, F.: Contribution of GC-MS analyses to the determination of the self-ignition mechanism of 1,4-dioxane in chlorine. *Bull. Soc. Chim. Belg.*, 99 (1990) 483-489; *C.A.*, 113 (1990) 236920c.
- 608 Bemgard, A.K. and Colmsjö, A.L.: Gas chromatographic methods for the assessment of binary diffusion coefficients for compounds in the gas phase. *J. Chromatogr.*, 522 (1990) 277-284.
- 609 Berezkina, L.G., Souhodolova, V.I., Melnikova, S.V. and Saricheva, E.A.: Investigation of phase transitions in the $\text{CaSO}_4(\text{s})-\text{H}_2\text{O}(\text{g})$ system by chromatographic methods. *J. Chromatogr.*, 520 (1990) 157-162.
- 610 Choudhary, V.R. and Akolekar, D.B.: Evaluation of sorbate/reactant shape-selectivity of zeolites by GC pulse techniques. *J. Mol. Catal.*, 60 (1990) 173-188; *C.A.*, 113 (1990) 171431x.
- 611 Collazo-Lopez, H.: Characterization of sedimentary organic matter from the Florida Everglades by inverse gas chromatography and solid state carbon-13 NMR spectroscopy. Avail. *Univ. Microfilms Int.*, Order No. DA9014602, 1989, 251 p.; *C.A.*, 113 (1990) 216760x.
- 612 Dernovaya, L.I. and Eltekov, Yu.A.: Retention and heats of adsorption of *n*-alkanes, aromatic hydrocarbons, aliphatic alcohols and ketones on macroporous silicas. *J. Chromatogr.*, 520 (1990) 47-54.
- 613 Gavrilova, T.B., Roshchina, T.M., Topalova, I., Ivanov, S., Petsev, N. and Dimitrov, Kh.: (Gas-chromatographic properties of molybdenum diselenide treated with a high-frequency low-temperature plasma.) *Vestn. Mosk. Univ., Ser. 2: Khim.*, 31 (1990) 148-152; *C.A.*, 114 (1991) 35168k.
- 614 Jacobsson, S. and Hagman, A.: Characterization of polymers used as pharmaceutical excipients by dynamic headspace gas chromatography-mass spectrometry. *Drug Dev. Ind. Pharm.*, 16 (1990) 2547-2560; *C.A.*, 114 (1991) 49706w.
- 615 Jaroniec, M., Madey, R. and Lu, X.: Application of gas-solid adsorption chromatography for characterizing adsorbent heterogeneity. *Separ. Sci. Technol.*, 26 (1991) 269-277.

- 616 Larionov, O.G., Petrenko, V.V. and Platonova, N.P.: Determination of contributions of different types of solute-sorbent interactions in gas-adsorption chromatography by linear regression of adsorption energies. *J. Chromatogr.*, 537 (1991) 295-303.
- 617 Liska, M. and Nowakova, M.: (Kinetics of release of residual solvents from printed polypropylene films.) *Chem. Prum.*, 40 (1990) 371-379.
- 618 Liu, P., Zheng, G. and Zhou, X.X.: (Study on activity coefficients of finite concentration of solute in solvent by GLC.) *Huaxue Tongbao*, No. 7 (1990) 54-57; *C.A.*, 114 (1991) 50423h.
- 619 Ludwig, S. and Schmidt, H.-D.: Determination of heats of adsorption on graphite and on a microporous carbon black by gas-solid chromatography. *J. Chromatogr.*, 520 (1990) 69-74.
- 620 McCormack, A.J., McCann, J.M. and Bohler, R.J.: Determination of motor oil volatility using high-temperature gas chromatography. *LC-GC*, 4, No. 2 (1991) 28-32.
- 621 Schramm, J. and Sorenson, S.C.: Solubility of gasoline components in different lubricants for combustion engines determined by gas-liquid partition chromatography. *J. Chromatogr.*, 538 (1991) 241-248.
- 622 Silva, M.K., Michnick, M.J. and Willhite, G.P.: The use of statistical tools to estimate the uncertainty of phase composition measurements determined by gas chromatography for mixtures of 2-methyl-2-propanol, water, and n-tetradecane at 25°C. *Fluid Phase Equilib.*, 59 (1990) 247-262; *C.A.*, 113 (1990) 179173k.
- 623 Szabó, Z.G.: Classification of active centres on solid catalysts by gas chromatography. *Chromatographia*, 30 (1990) 597-599.
- 624 Thede, R., Below, E., Haberland, D. and Pscheidl, H.: Chromatograms of second-order reactions on chromatographic columns. *J. Chromatogr.*, 520 (1990) 109-119.
- 625 Tyukova, I.S., Tager, A.A., Morozov, E.V. and Lavrikova, Yu.G.: (Thermodynamic parameters of interaction of cellulose nitrate with solvents obtained by reversed gas chromatography method.) *Vysokomol. Soedin., Ser. A*, 32 (1990) 2002-2005; *C.A.*, 113 (1990) 233541u.
- 626 Williams, D.R.: Inverse gas chromatography of solid surfaces. *Eur. Chromatogr. Anal.*, No. 1 (1991) 9-11.

See also 732, 813, 816, 1091.

3. GENERAL TECHNIQUES

3a. Apparatus and accessories

- 627 Airapetyan, A.S.: (Gas chromatograph with increased stability for carrier-gas consumption.) *U.S.S.R. SU 1,233,647* (Cl. G01N30/30), 07 Jun. 1990, Appl. 3,605,331, 07 Jun. 1983; *C.A.*, 113 (1990) 223889z.
- 628 Apps, P.J. and Winterbach, H.: A "spliteless" conversion for the Hewlett Packard HP 19395 A automatic equilibrium headspace sampler. *J. High Resolut. Chromatogr.*, 14 (1991) 15-17.
- 629 Arnold, N.S., McClennen, W.H. and Meuzelaar, H.L.C.: Vapor sampling device for direct short column gas chromatography/mass spectrometry analyses of atmospheric vapors. *Anal. Chem.*, 63 (1991) 299-304.
- 630 Burger, B.V., le Roux, M. and Burger, W.J.G.: Headspace analysis: A novel method for the production of capillary traps with ultra-thick stationary phase layers. *J. High Resolut. Chromatogr.*, 13 (1990) 777-779.

- 631 Clausen, M.J.: Determining the temperature of injection ports, GC ovens, and temperature ramps in GC/MS systems. *J. Anal. Toxicol.*, 14 (1990) 320; *C.A.*, 113 (1990) 223840b.
- 632 Dimink, K.P.: The emergence of a commercial gas chromatograph. *LC-GC*, 3, No. 12 (1990) 24-28.
- 633 Fox, J.N. and Shaner, R.A.: A simple computerized gas chromatograph. *J. Chem. Educ.*, 67 (1990) 694-695.
- 634 Fullemann, J.S.: Injection septum with interlocking seals for gas chromatographs. *U.S.* US 4,954,149 (Cl. 55-386; B01D15/08), 04 Sep. 1990, Appl. 427,033, 25 Oct. 1989; 12 pp.; *C.A.*, 113 (1990) 223902y.
- 635 Gorbachuk, V.V., Smirnov, S.A., Vishnyakov, I.M., Solomonov, B.N. and Konovalev, A.I.: (Apparatus for taking and introducing samples of equilibrium steam into gas chromatographs.) *U.S.S.R.* SU 1,567,973 (Cl. G01N30/16), 30 May 1990, Appl. 4,289,979, 27 Aug. 1987; *C.A.*, 113 (1990) 223888y.
- 636 Hall, K.W., Valentin, J.R. and Phillips, J.B.: Development of a modulator to measure vapor selectively in a gaseous mixture. *J. High Resolut. Chromatogr.*, 13 (1990) 835-837.
- 637 Hancock, J.R., McAndless, J.M. and Hicken, R.P.: A solid adsorbent based system for the sampling and analysis of organic compounds in air: an application to compounds of chemical defense interest. *J. Chromatogr. Sci.*, 29 (1991) 40-45.
- 638 He, P.: (Computer-based multichannel temperature controller for gas chromatography.) *Fenxi Huaxue*, 18 (1990) 394-398; *C.A.*, 113 (1990) 223836e.
- 639 Helmig, D., Schwarzer, N. and Steinhanses, J.: Flame control accessory for GC-FID operation with autosampler injection. *J. High Resolut. Chromatogr.*, 13 (1990) 849-851.
- 640 Heo, G.S. and Suh, J.K.: New on-line concentrator for LC-GC: Analysis of PAHs with LC-GC. *J. High Resolut. Chromatogr.*, 13 (1990) 748-753.
- 641 Japp, M., Vinall, M. and Osselton, M.D.: Assessment of programmable temperature vaporising (PTV) injector and cold on-column injector for forensic analysis of drugs. *Eur. Chromatogr. Anal.*, No. 1 (1991) 5-7.
- 642 Kachi, H., Akiyama, K. and Sakamoto, K.: (Automatic auto exhaust sampler for the gas chromatographic analysis.) *Chem. Express*, 5 (1990) 913-916; *C.A.*, 114 (1991) 48615d.
- 643 Klein, K.J., Phillips, J.R., Feed, L.M. and Thompson, M.: Gas chromatograph having integrated pressure programmer. *Eur. Pat. Appl.* EP 396,884 (Cl. G01N30/36), 14 Nov. 1990, US Appl. 349,740, 09 May 1989; 15 pp.; *C.A.*, 114 (1991) 55066d.
- 644 Klein, K.J., Song, W.J. and Thompson, M.: Gas chromatograph having cryogenic blast coolings. *U.S.* US 4,948,489 (Cl. 55-20; B01D15/08), 14 Aug. 1990, Appl. 355,934, 22 May 1989; 9 pp.; *C.A.*, 113 (1990) 184036x.
- 645 Lapin, V.A., Chernov, M.P. and Leukhin, S.B.: (Gas chromatograph with increased reliability.) *U.S.S.R.* SU 1,578,642 (Cl. G01N30/20), 15 Jul. 1990, Appl. 4,432,989, 26 Apr. 1988; *C.A.*, 113 (1990) 223891u.
- 646 Malosse, C.: A simple and efficient fraction collector for micropreparative capillary gas chromatography. *J. High Resolut. Chromatogr.*, 13 (1990) 784-785.
- 647 Morabito, P.L., Melcher, R.G., Hiller, J.F. and McCabe, T.: Method for on-column injection gas chromatography. *U.S.* US 4,962,042 (Cl. 436-161; G01N31/08), 09 Oct. 1990, US Appl. 198,425, 25 May 1988; 9 pp.; *C.A.*, 114 (1991) 55075f.
- 648 Mouradian, R.F., Levine, S.P. and Sacks, R.D.: Evaluation of a nitrogen-cooled, electrically heated cold trap inlet for high-speed gas chromatography. *J. Chromatogr. Sci.*, 28 (1990) 643-648.

- 649 Mueller, F.: Process and device for controlling the carrier-gas pressure in a valveless separating-column circuit in gas chromatographs. *PCT Int. Appl.* WO 90 09,585 (Cl. G01N30/32), 23 Aug. 1990, Appl. 89/DE89, 16 Feb. 1989; 8 pp.; *C.A.*, 113 (1990) 223896z.
- 650 Mueller, K.P. and Rudolph, J.: Apparatus for the chromatographic analysis of trace matter in gas. *Eur. Pat. Appl.* EP 370,401 (Cl. G01N30/46), 30 May 1990, DE Appl. 8,814,619, 24 Nov. 1988; 5 pp.; *C.A.*, 114 (1991) 48747y.
- 651 Nickerson, M.A., Poole, J.S. and Frnak, L.G.R.: Axially driven valve-controlled trapping assembly for chromatographs. *Eur. Pat. Appl.* EP 384,969 (Cl. G01N30/04), 05 Sep. 1990, US Appl. 316,383, 27 Feb. 1989; 8 pp.; *C.A.*, 113 (1990) 144009c.
- 652 Oguri, N., Ohishi, A. and Hanai, T.: Development of a Curie-point headspace sampler for capillary gas chromatography. *J. High Resolut. Chromatogr.*, 14 (1991) 79-82.
- 653 Pawliszyn, J.B.: Apparatus and method for delivering supercritical fluid in extraction or chromatography without pumps. *PCT Int. Appl.* WO 90 09,233 (Cl. B01J3/04), 23 Aug. 1990, GB Appl. 89/35,209, 14 Feb. 1989; 30 pp.; *C.A.*, 113 (1990) 223897a.
- 654 Rankin, C. and Sacks, R.: Computer-controlled vacuum backflush for capillary GC. *J. High Resolut. Chromatogr.*, 13 (1990) 674-678.
- 655 Schaller, H. and Cornet, H.: (Sample preparation and injection systems for trace analysis of volatile organic components in water by capillary gas chromatography. Uses and automation concepts.) *Gewaesserschutz, Wasser, Abwasser*, 114 (1990) 1-18; *C.A.*, 114 (1991) 49021u.
- 656 Schlutow, G.: (Chromatographic method for analysis of a sample involving gas washing of capillaries.) *Ger.* DE 3,907,698 (Cl. G01N30/08), 23 May 1990, Appl. 10 Mar. 1989; 4 pp.; *C.A.*, 113 (1990) 244012y.
- 657 Straub, H.: (Metering device for a gas chromatograph.) *Ger. Offen.* DE 3,829,006 (Cl. G01N30/10), 01 Mar. 1990, Appl. 26 Aug. 1988; 3 pp.; *C.A.*, 113 (1990) 164742w.
- 658 Toth, T., Garay, F. and Lovasz, C.: Simple coupling device for flow tuning of serially coupled fused silica capillary columns. *J. High Resolut. Chromatogr.*, 13 (1990) 840-842.
- 659 Zelikman, A.M., Davydenkov, A.K. and Lipavskii, V.N.: (Industrial gas chromatograph.) *U.S.S.R.* SU 1,549,420 (Cl. G01N30/68), 23 Sep. 1990, Appl. 4,459,664, 12 Jul. 1988; *C.A.*, 114 (1991) 26307c.
- 660 Zelikman, A.M., Revel'skii, I.A., Karavaeva, V.G. and Volodin, V.N.: (Gas chromatograph with a second vaporizing chamber.) *U.S.S.R.* SU 1,599,761 (Cl. G01N30/38), 15 Oct. 1990, Appl. 4,488,412, 29 Sep. 1988; *C.A.*, 114 (1991) 55070a.

see also 683, 726, 727, 728, 730, 751, 752, 980, 1086, 1203.

3b. Detectors and detection reagents

- 661 Abdillahi, M.M.: Gas chromatography-microwave-induced plasma for the determination of halogenated hydrocarbons. *J. Chromatogr. Sci.*, 28 (1990) 613-616.
- 662 Alvarez Bolainez, R.M. and Boss, C.B.: Microwave-induced-plasma reflected-power detector for gas chromatography. *Anal. Chem.*, 63 (1991) 159-163.
- 663 Gallagher, M.M. and Hill, H.H.: Selectivity enhancement of a metal-sensitive flame ionization detector for capillary gas chromatography. *J. High Resolut. Chromatogr.*, 13 (1990) 694-696.

- 664 Hinshaw, J.V.: GC troubleshooting: Photoionization detectors. *LC-GC*, 3, No. 12 (1990) 21-23.
- 665 Hirose, K. and Murase, I.: (Flame-ionization detector using hydrogen.) *Jpn. Kokai Tokkyo Koho JP 02 51,056 [90 51,056]* (Cl. G01N27/62), 21 Feb. 1990, Appl. 88/200,068; 7 pp.; *C.A.*, 114 (1991) 16912g.
- 666 Huang, Y., Ou, Q. and Yu, W.: The effect of compound structure on the elemental responses in gas chromatography-microwave induced plasma atomic emission spectrometry. *J. Chromatogr. Sci.*, 28 (1990) 584-588.
- 667 Jia, C., Huang, Y. and Ou, Q.: (Study and optimization of the operating parameters of gas chromatography-atmospheric pressure helium microwave-induced plasma emission spectrometry.) *Fenxi Huaxue*, 18 (1990) 812-815; *C.A.*, 114 (1991) 35048w.
- 668 Jin, Q., Wang, F., Zhu, C., Chambers, D.M. and Hieftje, G.M.: Atomic emission detector for gas chromatography and supercritical fluid chromatography. *J. Anal. At. Spectrom.*, 5 (1990) 487-494; *C.A.*, 113 (1990) 204196e.
- 669 Jin, Q., Xu, X., Guo, Z. and Xu, W.: (Preliminary study on the ionization mechanism of microwave-induced plasma ionic detector for chromatography.) *Jilin Daxue Ziran Kexue Xuebao*, No. 2 (1990) 71-75; *C.A.*, 113 (1990) 243937s.
- 670 Jones, C.S.: Response and mechanisms of positive electron affinity molecules in the N₂ mode of the thermionic ionization detector and the electron capture detector. Avail. *Univ. Microfilms Int.*, order No. DA9019887, 1989, 159 p.; *C.A.*, 113 (1990) 243946u.
- 671 Lovelock, J.E.: The electron-capture detector and green politics. *LC-GC*, 4, No. 1 (1991) 26-35.
- 672 Murase, I.: (Flame-ionization detector with multiple detection electrode.) *Jpn. Kokai Tokkyo Koho JP 02 47,547 [90 47,547]* (Cl. G01N27/62), 16 Feb. 1990, Appl. 88/198,088; 5 pp.; *C.A.*, 114 (1991) 16913h.
- 673 Popp, P., Mother, S. and Hinneburg, D.: Radiofrequency detector for gas chromatography. *J. Chromatogr.*, 520 (1990) 97-103.
- 674 Quimby, B.D., Dryden, P.C. and Sullivan, J.J.: Selective detection of carbon-13-labeled compounds by gas chromatography/emission spectroscopy. *Anal. Chem.*, 62 (1990) 2509-2512.
- 675 Ravishankar, S., Tilotta, D.C., Busch, K.W. and Busch, M.A.: An element-specific, dual-channel, flame infrared emission, gas chromatography detector for chlorinated and fluorinated hydrocarbons. *Appl. Spectrosc.*, 44 (1990) 1247-1258.
- 676 Saito, H.: (Flame ionization detectors.) *Jpn. Kokai Tokkyo Koho JP 02,176,551 [90,176,551]* (Cl. G01N27/62), 09 Jul. 1990, Appl. 88/332,662, 28 Dec. 1988; 4 pp.; *C.A.*, 114 (1991) 8674r.
- 677 Simon, R.K., Jr.: Gas-chromatograph detector specific to nitrogen-containing compounds. *Eur. Pat. Appl. EP 387,041* (Cl. G01N30/64), 12 Sep. 1990, US Appl. 320,689, 07 Mar. 1989; 10 pp.; *C.A.*, 114 (1991) 35129y.
- 678 Story, W.C., Olson, L.K., Shen, W.L., Creed, J.T. and Caruso, J.A.: Reduced-pressure microwave-induced plasma mass spectrometric detection of phosphorus and sulfur in gas chromatographic eluates. *J. Anal. At. Spectrom.*, 5 (1990) 467-470; *C.A.*, 113 (1990) 223720n.
- 679 Wells, G.J. and Bolton, B.A.: Photodetector for gas chromatographs. *Eur. Pat. Appl. EP 397,467* (Cl. G01J3/42), 14 Nov. 1990, US Appl. 349,200, 09 May 1989; 10 pp.; *C.A.*, 114 (1991) 55067e.
- 680 Yarnitzky, C.N.: A sonar detector for gas chromatographs. *J. Chem. Educ.*, 67 (1990) 712-713.

- 681 Zakharov, Yu.N., Shevchenko, V.V., Vtorov, B.G., Kholodyukov, A.V., Dudko, V.A., Khovyakov, S.P., Sukhachev, Yu.P. and Borodin, V.Z.: (Method of detecting inorganic gases in gas chromatography involving heat fields.) *U.S.S.R. SU* 1,582,121 (Cl. G01N30/00), 30 Jul. 1990, Appl. 4,432,160, 27 May 1988; *C.A.*, 114 (1991) 16921j.

See also 639, 718, 740, 787, 789, 802, 805, 806, 818, 980, 1053.

3c. Sorbents and columns, packing procedures

- 682 Aripovskii, A.V. and Volkov, S.A.: (Solid support and liquid stationary phase modification for free carboxylic acid analysis.) *Zh. Anal. Khim.*, 45 (1990) 1774-1780.
- 683 Bemgard, A.K. and Colmsjö, A.L.: Influence of extra-column effects in capillary gas chromatography. *J. High Resolut. Chromatogr.*, 13 (1990) 689-693.
- 684 Berezkin, V.G., Gavrichev, V.S. and Voloshina, N.V.: Chromatographic characteristics of capillary packed columns with increased pressure drop. *J. Chromatogr.*, 520 (1990) 91-95.
- 685 Brunner, F., Crescentini, G. and Mangani, F.: Graphitized carbon black: a unique adsorbent for gas chromatography and related techniques. *Chromatographia*, 30 (1990) 565-572.
- 686 Chaney, C., Petsev, N., Topalova, I., Ivanov, S. and Gavrilova, T.B.: Short columns for gas chromatography packed with plasma-modified silica gels. *J. Chromatogr.*, 520 (1990) 33-40.
- 687 Dandeneau, R.D. and Zerenner, E.H.: The invention of the fused-silica column: an industrial perspective. *LC-GC*, 4, No. 1 (1991) 10-15.
- 688 Deng, S., Huang, M., Zhao, Z. and Yan, C.: (Synthesis of chloropropylpolysiloxanes and their application for gas chromatographic stationary phases.) *Gaodeng Xuexiao Huaxue Xuebao*, 11 (1990) 471-475; *C.A.*, 113 (1990) 243963x.
- 689 Dmitrenko, A.V., Shadrina, N.E., Ivanchev, S.S., Ulinskaya, N.N. and Volkov, A.M.: Polymer-inorganic selective adsorbents for gas chromatography produced by graft polymerization. *J. Chromatogr.*, 520 (1990) 21-31.
- 690 Engewald, W., Pörschmann, J. and Welsch, T.: Graphitized thermal carbon black as a shape-selective stationary phase in GC. *Chromatographia*, 30 (1990) 537-542.
- 691 Fedyanin, A.A., Litkovskaya, L.L. and Usova, L.G.: (Investigation and application of 4,4'-diethoxyazoxybenzene as a stationary phase in capillary chromatography.) *Neftekhimiya*, 30 (1990) 702-705.
- 692 Gavrilova, T.B., Daidakova, I.V., Petsev, N., Topalova, I., Ivanov, S. and Chaney, C.: Gas chromatographic properties of modified boron nitride. *J. Chromatogr.*, 520 (1990) 41-46.
- 693 Ghaoui, L. and Bonadies, J.: Polycarbonates as stationary phases for aqueous and acidic samples in capillary gas chromatography. *J. Microcol. Sep.*, 2 (1990) 266-269.
- 694 Grob, K. and Artho, A.: Distorted solvent peaks in capillary GC: a symptom of porous column surfaces. *J. High Resolut. Chromatogr.*, 13 (1990) 803-810.
- 695 Hahne, F., Kraus, G. and Zaszke, H.: Blended liquid crystalline stationary phases in capillary gas chromatography. *J. Chromatogr.*, 520 (1990) 85-90.
- 696 Hirata, Y.: Column technology for packed capillary columns. *J. Microcol. Sep.*, 2 (1990) 214-221.
- 697 Hu, X. and Su, T.: (Polymeric chromatographic stationary phase.) *Gaofenzi Tongbao*, No. 3 (1989) 54-61; *C.A.*, 114 (1991) 55031p.

- 698 Kirsh, S.E., Kozeeva, A.A., Fomicheva, T.N. and Karabanov, N.T.: (Treatment of active coal as adsorbent for gas chromatographic separation of gaseous hydrocarbons.) *Zh. Anal. Khim.*, 45 (1990) 1934-1938.
- 699 Kirsh, S.I., Fomicheva, T.N., Kozeeva, A.A. and Karabanov, N.T.: (Sorbsent for gas-chromatographic analysis of C₃ hydrocarbon gases.) *U.S.S.R. SU* 1,580,252 (Cl. G01N30/48), 23 Jul. 1990, Appl. 4,455,652, 06 Jul. 1988; *C.A.*, 113 (1990) 204248y.
- 700 Kovaleva, N.V. and Shcherbakova, K.D.: Carbon adsorbents in gas adsorption chromatography. *J. Chromatogr.*, 520 (1990) 55-68.
- 701 Lavrenova, A.S., Zel'venskii, V.Yu. and Leonov, I.K.: (Errors in quantitative gas chromatographic measurements carried out by the internal normalization method.) *Zh. Anal. Khim.*, 45 (1990) 2419-2424.
- 702 Okano, H., Kurosawa, Y. and Kuramochi, M.: (Quartz capillary for gas chromatographs.) *Jpn. Kokai Tokkyo Koho* JP 02,201,157 [90,201,157] (Cl. G01N30/60), 09 Aug. 1990, Appl. 89/20,484, 30 Jan. 1989; 3 pp.; *C.A.*, 114 (1991) 35128x.
- 703 Roshchina, T.M. and Vasil'eva, E.V.: Lead selenide as a polar adsorbent for gas chromatography. *J. Chromatogr.*, 520 (1990) 15-20.
- 704 Sakagami, S.: (Liquid crystal substances for gas chromatography.) *Hyomen*, 28 (1990) 264-273; *C.A.*, 113 (1990) 198589s - a review with 71 refs.
- 705 Surowiec, K. and Rayss, J.: The retention mechanism in poly(ethylene glycol) 20M layer on the surface of a silanized support. *Chromatographia*, 30 (1990) 630-634.
- 706 Suzuki, M. and Kojima, M.: (Adsorption evaluation in capillary columns of gas chromatographs.) *Jpn. Kokai Tokkyo Koho* JP 02 24,556 [90 24,556] (Cl. G01N30/60), 26 Jan. 1990, Appl. 88/173,514, 12 Jul. 1988; 3 pp.; *C.A.*, 114 (1991) 16917n.
- 707 Suzuki, M. and Kojima, M.: (Polarity evaluation in a capillary column of a gas chromatograph.) *Jpn. Koaki Tokkyo Koho* JP 02 24,555 [90 24,555] (Cl. G01N30/60), 26 Jan. 1990, Appl. 88/173,513, 12 Jul. 1988; 3 pp.; *C.A.*, 114 (1991) 16918p.
- 708 Wu, C., Zeng, Z. and Yue, W.: (Study on immobilized OV-1701 capillary column with azo-*tert*-butane as a crosslinking initiator.) *Fenxi Huaxue*, 18 (1990) 310-314; *C.A.*, 113 (1990) 183990s.
- 709 Wu, L., Yi, J. and Wang, R.: (Performance and applications of crosslinked capillary column with large diameter and thick coated film.) *Fenxi Ceshi Tongbao*, 8 (1989) 17-22; *C.A.*, 113 (1990) 223848k.
- 710 Wu, Q., Hetem, M., Cramers, C.A. and Rijks, J.A.: Preparation of thermally stable phenylpolysiloxane fused silica capillary columns. Optimization and evaluation of the deactivation by capillary GC and solid state ²⁹Si NMR. *J. High Resolut. Chromatogr.*, 13 (1990) 811-816.
- 711 Zhang, A., Ge, J., Guan, Z., Deng, J., Liu, H., Zhu, J., Fu, R., Huang, Z. and Zhang, B.: Poly(crown ether) stationary phase for open-tubular capillary column chromatography. *J. Chromatogr.*, 521 (1990) 128-133.
- 712 Zhang, O.W., Hathcock, L. and Bertsch, W.: Band broadening effects in capillary column recycle gas chromatography with valves. *J. High Resolut. Chromatogr.*, 13 (1990) 683-688.
- 713 Zhao, G.L. and Wang, G.Y.: Effect of adsorption on the retention values in glass capillary columns coated with poly(ethylene glycol) 20M. *Chromatographia*, 30 (1990) 635-638.
- 714 Zhou, C., Ding, G., Wu, Y. and Xie, M.: (Optimization of separation conditions in gas-liquid packed column chromatography.) *Jisuanji Yu Yingyong Huaxue*, 6 (1989) 286-289; *C.A.*, 113 (1990) 183988x.
- See also 598, 602, 603, 731, 768, 773, 779, 791, 800, 810, 826, 828, 859, 860, 877, 1215, 1232.

3d. Quantitative analysis

- 715 Bonate, P.L.: Chromatographic calibration revisited. *J. Chromatogr. Sci.*, 28 (1990) 559-562.
- 716 Faigle, J.F., Poppi, R.J., Scarminio, I.S. and Bruns, R.E.: Multi-component principal component regression and partial least-squares analyses of overlapped chromatographic peaks. *J. Chromatogr.*, 539 (1991) 123-132.
- 717 Garland, W.A., Crews, T. and Fukuda, E.K.: Effect of noise on peak heights calculated using an exponentially modified gaussian peak shape model. *J. Chromatogr.*, 539 (1991) 133-139.
- 718 Grandmaison, J.L.: Calcul de la composition, avec une constante de proportionnalité, de mélanges à partir du chromatogramme obtenu par détection partagée entre deux détecteurs. *J. Chromatogr.*, 519 (1990) 159-169.
- 719 Greenhouse, S. and Andrawes, F.: Generation of gaseous standards using exponential dilution flask in series. *Anal. Chim. Acta*, 236 (1990) 221-226.
- 720 Miller, J.N.: Basic statistical methods for analytical chemistry. Part 2. Calibration and regression methods. A review. *Analyst (London)*, 116 (1991) 3-14 - a review with 56 refs.
- 721 Nimura, Y. and Carr, M.R.: Reduction of the relative error in the standard addition methods. *Analyst (London)*, 115 (1990) 1589-1595.
- 722 Strife, R.J., Simms, J.R. and Lacey, M.P.: Combined capillary gas chromatography/ion trap mass spectrometry quantitative methods using labeled or unlabeled internal standards. *J. Am. Soc. Mass Spectrom.*, 1 (1990) 265-271; *C.A.*, 114 (1991) 12291f.
- 723 Wu, N. and Cai, C.: (Explanation of the relation between peak width at half height and capacity factor in gas chromatography.) *Zhongguo Kexue Jishu Daxue Xuebao*, 19 (1989) 528-532; *C.A.*, 113 (1990) 204184z.

See also 666, 728, 746, 756, 1004, 1060, 1077, 1104.

3e. Preparative scale chromatography

- 724 Goldshan-Shirazi, S. and Guiochon, G.: Dependence of the production rate on the relative retention of two components in preparative chromatography. *J. Chromatogr.*, 523 (1990) 1-10.

See also 646, 788.

3f. Programmed temperature, pressure, vapors, gradients

- 725 Zhang, J.Y., Wang, G.M. and Quian, R.: Theory of temperature-programmed gas chromatography. The method of moment analysis. *J. Chromatogr.*, 521 (1990) 71-87.

See also 1066.

4. SPECIAL TECHNIQUES

4a. Automation

- 726 Dorbon, M., Durand, J.P. and Boscher, Y.: On-line octane-number analyser for reforming unit effluents. Principle of the analyser and test of a prototype. *Anal. Chim. Acta*, 238 (1990) 149-160.

- 727 Guillemin, C.L.: Progress and prospects in on-line-process gas and liquid chromatography. *Anal. Chim. Acta*, 238 (1990) 17-33.
- 728 Marsman, J.H., van Ede, C.J., Breman, B.B., Stamhuis, E.J. and Beenackers, A.A.C.M.: Applications of the deferred standard techniques in process gas chromatography. *Anal. Chim. Acta*, 238 (1990) 129-137.
- 729 Pacak, P.: (Database of retention indices in gas chromatography. A programme for personal computer.) *Chem. Listy*, 85 (1991) 101.

See also 654, 730.

4b. Computerization and modelling

- 730 Pedersen, N.H. and Jorgensen, S.B.: Gas chromatographic subsystem for fast on-line concentration profile measurements for advanced distillation column control. *Anal. Chim. Acta*, 238 (1990) 139-148.
- 731 Villalobos, R. and Annino, R.: Computer-aided selection and optimization of chromatographic columns and conditions for multicolumn analysis procedures. *J. High Resolut. Chromatogr.*, 13 (1990) 764-773.

See also 633, 1036, 1097.

4c. Combination with other physico-chemical techniques (MS, IR etc.)

- 732 Bass, J.S. and Kevan, L.: Electron paramagnetic resonance and gas chromatographic study of ethene dimerization catalyzed by rhodium/silica: effect of silica pore size. *J. Chem. Soc., Faraday Trans.*, 86 (1990) 3015-3020; *C.A.*, 113 (1990) 230727y.
- 733 Baumeister, E.R., West, C.D., Ijames, C.F. and Wilkins, C.L.: Probe interface for supercritical fluid chromatography/Fourier transform mass spectrometry. *Anal. Chem.*, 63 (1991) 251-255.
- 734 BJORoy, M., Hall, K. and Jumeau, J.: Stable carbon isotope ratio analysis on single components in crude oils by direct gas chromatography-isotope analysis. *TrAC*, 9 (1990) 331-337.
- 735 Bourne, S., Haefner, A.M., Norton, K.L. and Griffiths, P.R.: Performance characteristics of a real-time direct deposition gas chromatography/Fourier transform infrared spectrometry system. *Anal. Chem.*, 62 (1990) 2448-2452.
- 736 Bourne, S., Hill, S.L., Powell, J.R., Prasad, D.R. and Krishnan, K.: High sensitivity Fourier transform infrared spectra of gas chromatographic fractions using a liquid-nitrogen cold-trapping technique. *Anal. Chem.*, 62 (1990) 124-129.
- 737 Chung, H.L., Aldridge, J.C. and Moore, D.S.: Electron impact mass spectra with supercritical fluid chromatography/mass spectrometry. *Anal. Instrum.*, 19 (1990) 99-111.
- 738 Erickson, E.D.: The characterization of gas chromatography-mass spectrometry using ion flight time and time-array detection. Avail. *Univ. Microfilms Int.*, Order No. DA9011983, 1989, 190 p.; *C.A.*, 113 (1990) 243939u.
- 739 Guinamant, J.L.: Le couplage chromatographie en phase gazeuse. *Anal. Chem.*, 62 (1990) 122-123.
- 740 Hill, H.H., Jr., Siems, W.F., Louis, R.H.S. and McMinn, D.G.: Ion mobility spectrometry. *Anal. Chem.*, 62 (1990) 1201A-1209A.
- 741 Ligon, W.V., Jr. and Grade, H.: Techniques for postcolumn derivatization in gas chromatography/mass spectrometry. *Anal. Chem.*, 63 (1991) 255-261.
- 742 Loo, J.F.: Quantitative analysis in gas chromatography/low power atmospheric-pressure helium microwave-induced plasma atomic emission interferometry and ion cyclotron resonance mass spectrometry. Avail. *Univ. Microfilms Int.*, Order No. DA9013360, 1990, 236 p.; *C.A.*, 113 (1990) 223739a.

- 743 Matsuura, K., Takeuchi, M., Nojima, K., Kobayashi, T. and Saito, T.: On-line combination of supercritical-fluid chromatography with fast-atom bombardment mass spectrometry. *Rapid Commun. Mass Spectrom.*, 4 (1990) 381-383; *C.A.*, 113 (1990) 243971y.
- 744 Schmid, E.R.: Chromatography and mass spectrometry - an overview. *Chromatographia*, 30 (1990) 573-576 - a review with 43 refs.
- 745 Young, D.C., Vouros, P. and Holick, M.F.: Gas chromatography-mass spectrometry of conjugated dienes by derivatization with 4-methyl-1,2,4-triazoline-3,5-dione. *J. Chromatogr.*, 522 (1990) 295-302.

See also 629, 674, 722, 748, 761, 795, 804, 878, 880, 890, 936, 952, 958, 960, 1003, 1010, 1133, 1142, 1145, 1146, 1253.

4e. Functional analysis

See 666, 741, 896.

4f. Trace analysis and preseparation techniques

- 746 Ashraf-Khorassani, M., Kumar, M.L., Koebler, D.J. and Williams, G.P.: Evaluation of coupled supercritical fluid extraction-cryogenic collection-supercritical fluid chromatography (SFE-CC-SFC) for quantitative and qualitative analysis. *J. Chromatogr. Sci.*, 28 (1990) 599-604.
- 747 Belardi, R.P. and Pawliszyn, J.B.: The application of chemically modified fused silica fibers in the extraction of organics from water matrix samples and their rapid transfer to capillary columns. *Water Pollut. Res. J. Can.*, 24 (1989) 179-191; *C.A.*, 113 (1990) 177866q.
- 748 Bishop, R.W. and Valis, R.J.: A laboratory evaluation of sorbent tubes for use with a thermal desorption gas chromatography-mass selective detection technique. *J. Chromatogr. Sci.*, 28 (1990) 589-593.
- 749 Blanch, G.P., Reglero, G., Herraiiz, M. and Tabera, J.: A comparison of different extraction methods for the volatile components of grape juice. *J. Chromatogr. Sci.*, 29 (1991) 11-15.
- 750 Dix, K.D. and Fritz, J.S.: Steam distillation with resin extraction for isolation and concentration of organic compounds from aqueous samples. *Anal. Chim. Acta*, 236 (1990) 43-49.
- 751 Foussard, T., Garrault, C., Thiault, B. and Morel, J.: Analyse de traces à l'aide d'un dispositif original d'injection dynamique en chromatographie en phase gazeuse. *Analusis*, 18 (1990) 553-559.
- 752 Houben, R.J., Janssen, H.-G.M., Leclercq, P.A., Rijks, J.A. and Cramers, C.A.: Supercritical fluid extraction-capillary gas chromatography on-line coupling with a programmed temperature vaporizer. *J. High Resolut. Chromatogr.*, 13 (1990) 669-673.
- 753 Hsu, J.P., Miller, G. and Moran, V., III: Analytical method for determination of trace organics in gas samples collected by canister. *J. Chromatogr. Sci.*, 29 (1991) 83-88.
- 754 Janák, J.: The role of adsorption in gas-liquid systems and its use for enrichment of trace amounts. *Chromatographia*, 30 (1990) 489-492.
- 755 Lancas, F.M., de Martinis, B.S. and da Matta, M.H.R.: Supercritical fluid extraction SFE using an inexpensive "home made" system. *J. High Resolut. Chromatogr.*, 13 (1990) 838-839.
- 756 Liu, Z., Zhang, M. and Phillips, J.B.: High-speed gas chromatographic analysis of a simulated process stream using on-column thermal desorption modulation for sample preconcentration and introduction. *J. Chromatogr. Sci.*, 28 (1990) 567-571.

- 757 Morgan, E.D.: Preparation of small-scale samples from insect for chromatography. *Anal. Chim. Acta*, 236 (190) 235-237.
- 758 Overton, E.B.: Development of real-time stack-gas analysis methods. *J. Hazard. Mater.*, 22 (1989) 187-194; *C.A.*, 114 (1991) 16846p.
- 759 Senf, L. and Frank, H.: Thermal desorption of organic pollutants enriched on activated carbon. V. Desorption behaviour and temperature profile. *J. Chromatogr.*, 520 (1990) 131-135.
- 760 Shetty, P.H., Poole, S.K. and Poole, C.F.: Applications of ethylammonium and propylammonium nitrate solvents in liquid-liquid extraction and chromatography. *Anal. Chim. Acta*, 236 (1990) 51-61.
- 761 Visser, T., Vredendregt, M.J. and Knecht, J.: Infrarot-Analytik im Picogramm-Bereich. *LaborPraxis*, 15 (1991) 26-31.
- 762 Zlatkis, A., Ranatunga, R.P.J. and Middleditch, B.S.: Concentration of organics from aqueous solutions using uncoated capillary columns. *Anal. Chem.*, 62 (1990) 2471-2478.
- See also 630, 640, 641, 650, 656, 817, 820, 846, 881, 928, 1044, 1050, 1062, 1081, 1082, 1101, 1103, 1182, 1189, 1194, 1196, 1197, 1201, 1202, 1213.

4g. Enantiomers, separation

- 763 Bernreuther, A., Lander, V., Huffer, M. and Schreier, P.: Enantioselective analysis of dec-2-en-5-olide (massolactone) from natural sources by multi-dimensional capillary gas chromatography. *Flavour Fragrance J.*, 5, No. 2 (1990) 71-73; *C.A.*, 113 (1990) 170557f.
- 764 Berthod, A., Li, W.Y. and Armstrong, D.W.: Chiral recognition of racemic sugars by polar and nonpolar cyclodextrin-derivative gas chromatography. *Carbohydr. Res.*, 201 (1990) 175-184; *C.A.*, 113 (1990) 231826s.
- 765 Brückner, H. and Langer, M.: Gas chromatographic separation of diastereomeric esters of α -alkyl- α -amino acids on dimethylpolysiloxane. *J. Chromatogr.*, 521 (1990) 109-121.
- 766 Celma, C. and Giralt, E.: Determination of the enantiomeric purity of synthetic peptides by gas chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 447-458.
- 767 Dougherty, W., Liotta, F., Mondimore, D. and Shum, W.: A convenient gas chromatographic method for the optical purity determination of chiral epoxy alcohols. *Tetrahedron Lett.*, 31 (1990) 4389-4390; *C.A.*, 113 (1990) 204207j.
- 768 Fellous, R., Lizzani-Couvelier, L. and Loiseau, A.-M.: Permethylated maltosyl cyclodextrin as chiral stationary phases in capillary gas chromatography: Enantiomer separation of chiral lactones. *J. High Resolut. Chromatogr.*, 13 (1990) 785-789.
- 769 Hoegberg, H.E., Hedenstroem, E., Wassgren, A.B., Hjalmarsson, M., Bergstroem, G., Loeffqvist, J. and Norin, T.: Synthesis and gas chromatographic separation of the eight stereoisomers of diprionol and their acetates, components of the sex pheromone of pine sawflies. *Tetrahedron*, 46 (1990) 3007-3018; *C.A.*, 113 (1990) 211619y.
- 770 Huffer, M. and Schreier, P.: High-resolution gas chromatographic resolution of chiral primary alcohols and acids as their diastereomeric 1-phenylethyl amides. *J. Chromatogr.*, 519 (1990) 263-267.
- 771 Knierzinger, A., Walther, W., Weber, B., Mueller, R.K. and Netscher, T.: (A new method for the stereochemical analysis of acyclic terpenoid carbonyl compounds.) *Helv. Chim. Acta*, 73 (1990) 1087-1107; *C.A.*, 114 (1991) 6880f.

- 772 Mosandl, A. and Schubert, V.: Stereoisomeric flavor compounds XXXVII: Enantiomer separation of 1-alken-3-yl esters and their chirality evaluation from essential oils using multidimensional gas chromatography (MDGC.) *J. Essent. Oil Res.*, 2 (1990) 121-132; *C.A.*, 113 (1990) 197619q.
- 773 Nesterova, I., Rekhter, B., Roshka, G. and Witkiewicz, Z.: Liquid crystals for the gas chromatographic determination of the stereochemistry of insect sex pheromones. *J. Chromatogr.*, 537 (1991) 482-488.
- 774 Rusinska-Roszak, D. and Lozynski, M.: Gas chromatographic and mass spectrometric studies on trimethylsilyl derivatives of hydroxyoximes. *J. Prakt. Chem.*, 332 (1990) 300-306; *C.A.*, 113 (1990) 164738z.
- 775 Schmidt, J., Kramell, R., Brueckner, C., Schneider, G., Sembdner, G., Schreiber, K., Stach, J. and Jensen, E.: Gas chromatographic/mass spectrometric and tandem mass spectrometric investigations of synthetic amino acid conjugates of jasmonic acid and endogenously occurring related compounds from *Vicia faba* L. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 327-338; *C.A.*, 113 (1990) 208319v.
- 776 Schurig, V. and Nowotny, H.P.: (Gas chromatographic separation of enantiomers on stationary phases without metal complexes. 2. Gas-chromatographic separation of enantiomers on cyclodextrin derivatives.) *Angew. Chem.*, 102 (1990) 969-986; *C.A.*, 113 (1990) 171108x - a review with 148 refs.
- 777 Schurig, V., Laderer, H., Wistuba, D., Mosandl, A., Schubert, V. and Hagenauer-Hener, U.: Enantiomer separation of *n*-1-alkenyl-3-acetates and of alkyl substituted 1,3-dioxolanes by complexation gas chromatography. *J. Essent. Oil Res.*, 1 (1989) 209-221; *C.A.*, 113 (1990) 177999k.
- 778 Stankov, J.J., Tarasov, S.N., Lysenko, V.V., Beresnev, A.N., Sakodynskii, K.J. and Shatulo, E.F.: (Enantioselective analysis of chiral compounds by use of a chiral bifunctional reagents.) *Zh. Fiz. Khim.*, 64 (1990) 2467-2472.
- 779 Walther, W. and Cereghetti, M.: Gas chromatographic enantiomer separation of some atropisomeric 6,6'-dimethyl-1,1'-biphenyl derivatives on permethylated β -cyclodextrin. *J. High Resolut. Chromatogr.*, 14 (1991) 57-58.

See also 594, 799, 811.

4h. Other special techniques

- 780 Snyder, A.P., McClennen, W.H., Dworzanski, J.P. and Meuzelaar, H.L.C.: Characterization of underivatized lipid biomarkers from microorganisms with pyrolysis short-column gas chromatography/ion trap mass spectrometry. *Anal. Chem.*, 62 (1990) 2565-2573.

4i. Supercritical fluid chromatography

- 781 Ashraf, S., Bartle, K.D., Clifford, A.A. and Moulder, R.: Trace analysis of agrochemicals by supercritical fluid chromatography. *J. High Resolut. Chromatogr.*, 14 (1991) 29-32.
- 782 Ashraf, S., Bartle, K.D., Clifford, A.A., Davies, I.L. and Moulder, R.: Solvent-vented injection in the analysis of agrochemicals by capillary supercritical fluid chromatography. *Chromatographia*, 30 (1990) 618-620.
- 783 Berger, T.A. and Deye, J.F.: Separation of hydroxybenzoic acids by packed column supercritical fluid chromatography using modified fluids with very polar additives. *J. Chromatogr. Sci.*, 29 (1991) 26-30.
- 784 Berger, T.A. and Deye, J.F.: Separation of phenols by packed column supercritical fluid chromatography. *J. Chromatogr. Sci.*, 29 (1991) 54-59.

- 785 Cammann, K. and Kleiböhmer, W.: Supercritical fluid chromatography of polychlorinated biphenyls on packed columns. *J. Chromatogr.*, 522 (1990) 267-275.
- 786 Caralp, M.H.M., Coleby, S.E., Bartle, K.D., Baulch, D.L., Clifford, A.A. and Shaw, B.L.: Effect of analyte reactivity on the capillary supercritical fluid chromatography of organophosphines. *J. High Resolut. Chromatogr.*, 14 (1991) 127-133.
- 787 Cocks, S. and Smith, R.M.: Analysis of fatty acid methyl esters by using supercritical fluid chromatography with mass evaporative light scattering detection. *Anal. Proc.*, 28 (1991) 11-12.
- 788 Cretier, G., Majdalani, R. and Rocca, J.L.: Solventless injection for preparative supercritical fluid chromatography. *Chromatographia*, 30 (1990) 645-650.
- 789 Di Maso, M., Purdy, W.C. and McClintock, S.A.: Electrochemical detection system for supercritical fluid chromatography. *J. Chromatogr.*, 519 (1990) 256-262.
- 790 Di Sanzo, F.P. and Yoder, R.E.: Determination of aromatics in jet and diesel fuels by supercritical fluid chromatography with flame ionization detection (SFC-FID): a quantitative study. *J. Chromatogr. Sci.*, 29 (1991) 4-7.
- 791 Engel, T.M. and Olesik, S.V.: Supercritical fluid solid chromatography using novel porous glassy carbon. Evaluation of retention mechanisms. *J. High Resolut. Chromatogr.*, 14 (1991) 99-102.
- 792 Engelhardt, H. and Gross, A.: Supercritical fluid extraction and chromatography: potential and limitations. *TRAC*, 10 (1991) 64-70.
- 793 Erkey, C. and Akgerman, A.: Chromatography theory: application to supercritical fluid extraction. *AIChE J.*, 36 (1990) 1715-1721; *C.A.*, 114 (1991) 8723f.
- 794 Fuhr, B.J., Klein, L.L., Reichert, C. and Lee, S.W.: Determination of aromatic types in middle distillates by supercritical fluid chromatography. *LC-GC*, 4, No. 1 (1991) 36-39.
- 795 Games, D.E., Berry, A.J., Hughes, S.Y., Mahatheeranont, S., Mylchreest, I.C., Perkins, J.R., Ramsey, E.D. and Pleasance, S.: (Bright prospects of SFC/MS.) *Lab. 2000*, 4, No. 3 (1990) 56-61; *C.A.*, 113 (1990) 204180v.
- 796 Hannan, R.M.: Capillary supercritical fluid chromatography and flame ionization detection for analysis of lipids from naturally and artificially aged seeds. Avail. *Univ. Microfilms Int.*, Order No. DA9015998, 1989, 183 p.; *C.A.*, 114 (1991) 2854c.
- 797 Huang, H.-P. and Morgan, E.D.: Analysis of azadirachtin by supercritical-fluid chromatography. *J. Chromatogr.*, 519 (1990) 137-143.
- 798 Kithinji, J.P.: Extraction and chromatography with supercritical fluids. Avail. *Univ. Microfilms Int.*, order No. BRD-88689, 1989, 204 p.; *C.A.*, 113 (1990) 234398q.
- 799 Lee, C.R., Porziemsky, J.-P., Aubert, M.-C. and Krstulovic, A.M.: Liquid and high-pressure carbon dioxide chromatography of β -blockers. *J. Chromatogr.*, 539 (1991) 55-69.
- 800 Liu, Y., Yang, F. and Pohl, C.: Microbore packed column supercritical fluid chromatography using a new polymer stationary phase. *J. Microcol. Sep.*, 2 (1990) 245-254.
- 801 Mapelli, G. and Trestianu, S.: A method for interfacing a system of supercritical-fluid extraction to a system of capillary gas chromatography and the related interface. *Eur. Pat. Appl.* EP 398,852 (Cl. G01N30/06), 22 Nov. 1990, IT Appl. 89/20,560, 19 May 1989; 7 pp.; *C.A.*, 114 (1991) 55077h.

- 802 Motley, C.B. and Long, G.L.: Examination of a helium highly efficient microwave-induced plasma as an element-selective detector for supercritical fluid chromatography. *J. Anal. At. Spectrom.*, 5 (1990) 477-482; *C.A.*, 113 (1990) 183796h.
- 803 Munder, A., Chesler, S.N. and Wise, S.A.: Capillary supercritical fluid chromatography of explosives. Investigations on the interactions between the analytes, the mobile phase and the stationary phase. *J. Chromatogr.*, 521 (1990) 63-70.
- 804 Olesik, S.V.: Recent advances in supercritical fluid chromatography/mass spectrometry. *J. High Resolut. Chromatogr.*, 14 (1991) 5-9 - a review with 50 refs.
- 805 Pekay, L.A. and Olesik, S.V.: Evaluation of sulfur chemiluminescence detection in supercritical fluid chromatography. *J. Microcol. Sep.*, 2 (1990) 270-277.
- 806 Raynor, M.W., Bartle, K.D., Clifford, A.A. and Cook, B.W.: Stopped-flow FTIR detection in capillary supercritical fluid chromatography. *J. Microcol. Sep.*, 2 (1990) 300-303.
- 807 Roberts, D.W. and Wilson, I.D.: Bioanalytical supercritical fluid chromatography. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 257-263; *C.A.*, 113 (1990) 223958w - a review with 2 refs.
- 808 Roth, M.: Relationship between solute retention in supercritical fluid chromatography and fluctuation integrals in dilute supercritical mixtures. *J. Phys. Chem.*, 95 (1991) 8-9.
- 809 Sanagi, M.M.: Selectivity and applications of supercritical fluid chromatography. Avail. *Univ. Microfilms Int.*, Order No. BRDX88172, 1988, 281 p.; *C.A.*, 113 (1990) 223831z.
- 810 Schoenmakers, P.J. and Uunk, L.G.M.: Mobile and stationary phases for supercritical fluid chromatography. *Adv. Chromatogr.*, 30 (1989) 1-80; *C.A.*, 113 (1990) 178781v - a review with 103 refs.
- 811 Schurig, V., Juvancz, Z., Nicholson, G.J. and Schmalzing, D.: Separation of enantiomers on immobilized polysiloxane-anchored permethyl- β -cyclodextrin (CHIRASIL-DEX) by supercritical fluid chromatography. *J. High Resolut. Chromatogr.*, 14 (1991) 58-62.
- 812 Shepherd, K.A.: Analysis of palm oil xanthophylls and β -carotene isomers by high performance liquid chromatography with diode array detection and supercritical fluid chromatography. Avail. *Univ. Microfilms Int.*, Order No. DA9011797, 1989, 242 p.; *C.A.*, 114 (1991) 4946h.
- 813 Shim, J.J. and Johnston, K.P.: Phase equilibria, partial molar enthalpies, and partial molar volumes determined by supercritical fluid chromatography. *J. Phys. Chem.*, 95 (1991) 353-360.
- 814 Skaar, H., Norli, H.R., Lundanes, E. and Greibrokk, T.: Group separation of crude oil by supercritical fluid chromatography using packed narrow bore columns, column switching, and backflushing. *J. Microcol. Sep.*, 2 (1990) 222-228.
- 815 Strubinger, J.R., Song, H. and Parcher, J.F.: High-pressure phase distribution isotherms for supercritical fluid chromatographic systems. 1. Pure carbon dioxide. *Anal. Chem.*, 63 (1991) 98-103.
- 816 Strubinger, J.R., Song, H. and Parcher, J.F.: High-pressure phase distribution isotherms for supercritical fluid chromatographic systems. 2. Binary isotherms of carbon dioxide and methanol. *Anal. Chem.*, 63 (1991) 104-108.
- 817 Taguchi, M., Hobo, T. and Maeda, T.: Evaluation and application of a supercritical fluid extraction system using capillary supercritical fluid chromatography. *J. High Resolut. Chromatogr.*, 14 (1991) 140-143.
- 818 Zhang, L., Carnahan, J.W., Winans, R.E. and Neill, P.H.: Supercritical fluid chromatography with a helium microwave-induced plasma for chlorine-selective detection. *Anal. Chem.*, 63 (1991) 212-216.

See also 668, 696, 733, 737, 740, 743, 746, 755, 1055.

5. HYDROCARBONS AND HALOGEN DERIVATIVES

5a. Aliphatic hydrocarbons

- 819 Batten, R.: Chromatographic analysis of natural gas liquids. *Proc. Int. Sch. Hydrocarbon Meas.*, 65 (1990) 189-191; *C.A.*, 113 (1990) 214984z.
- 820 Bianchi, A.P.: Determination of light hydrocarbon gases in sea water using three variations of static "equilibrium" head space analysis. *Analyst (London)*, 115 (1990) 1423-1428.
- 821 Brunnemann, K.D., Kagan, M.R., Cox, J.E. and Hoffmann, D.: Analysis of 1,3-butadiene and other selected gas-phase components in cigaret mainstream and sidestream smoke by gas chromatography-mass selective detection. *Carcinogenesis (London)*, 11 (1990) 1863-1868; *C.A.*, 113 (1990) 208546s.
- 822 Castello, G., D'Amato, G. and Nicchia, M.: Gas chromatographic determination of traces of light hydrocarbons and sulphur compounds in gases at low pressure by the simultaneous use of flame ionization and flame photometric detectors. *J. Chromatogr.*, 521 (1990) 99-107.
- 823 Fakhretdinov, R.N., Lyapina, N.K., Parfenova, M.A., Startseva, R.Kh., Daludenko, N.V., Glebov, G.A. and Gazarina, L.N.: (Composition of alkanes in residual crude oils.) *Neftekhimiya*, 30 (1990) 585-592.
- 824 Hall, K.R.: Determination of energy flow in national gas pipelines: direct measurement vs. chromatography. *Proc. Int. Sch. Hydrocarbon Meas.*, 65 (1990) 200-202; *C.A.*, 113 (1990) 214913a.
- 825 Koci, K.: (Isolation of pentacyclic triterpanes from crude oils by HPLC and their analysis by gas chromatography.) *Bul. Shkencave Nat.*, 44, No. 2 (1990) 23-30; *C.A.*, 114 (1991) 9248s.
- 826 Nayak, V.S. and Pandey, R.N.: Gas chromatographic separation of lower hydrocarbons and permanent gases using ammonium tungstosilicate as solid adsorbent. *J. Chromatogr. Sci.*, 28 (1990) 617-620.
- 827 Petrova, S., Meister, A. and Siimer, E.: (Catalytic hydrogenation of *n*-alkynes. 4. Analysis of mixtures of hydrocarbons of different degree of unsaturation.) *Eesti Tead. Akad. Toim., Keem.*, 39 (1990) 126-128; *C.A.*, 113 (1990) 223854j.
- 828 Sojak, L., Ostrovsky, I., Kubinec, R., Kraus, G. and Kraus, A.: High-resolution gas chromatography with liquid crystal glass capillaries. XII. Separation of isomeric C₁₇-C₁₈ *n*-alkenes. *J. Chromatogr.*, 520 (1990) 75-83.
- 829 Tutas, M., Ozkan, G., Kilic, Z. and Ok, T.: (Study of rose concrete hydrocarbons (stearoptene) using chromatographic techniques.) *Doga: Turk Muhendislik Cevre Bilimleri Derg.*, 14 (1990) 313-323; *C.A.*, 113 (1990) 217761k.

See also 602, 603, 605, 698, 1159, 1216, 1226.

5b. Cyclic hydrocarbons

- 830 Alexander, R., Ngo, S.H. and Kagi, R.I.: Identification and analysis of trimethylbiphenyls in petroleum. *J. Chromatogr.*, 538 (1991) 424-430.
- 831 Auer, W. and Malissa, H., Jr.: Determination of trace amounts of polycyclic aromatic hydrocarbons in soil. *Anal. Chim. Acta*, 237 (1990) 451-457.
- 832 Bundt, J., Herbel, W., Steinhart, H., Franke, S. and Francke, W.: Structure-type separation of diesel fuels by solid phase extraction and identification of the two- and three-ring aromatics by capillary GC-mass spectrometry. *J. High Resolut. Chromatogr.*, 14 (1991) 91-98.

- 833 Grob, K., Biedermann, M., Caramaschi, A. and Pacciarelli, B.: LC-GC analysis of the aromatics in a mineral oil fraction: batching oil for jute bags. *J. High Resolut. Chromatogr.*, 14 (1991) 33-39.
- 834 Janos, E. and Oros, G.: Reversed-phase thin-layer and gas chromatographic retention behaviour of triphenylmethane derivatives. *J. Chromatogr.*, 520 (1990) 217-222.
- 835 Jickells, S.M., Crews, C., Castle, L. and Gilbert, J.: Headspace analysis of benzene in food contact materials and its migration into foods from plastics cookware. *Food Addit. Contam.*, 7 (1990) 197-205; *C.A.*, 113 (1990) 96273s.
- 836 Kramer, R.: (Aromatic hydrocarbons in crude oil samples. A rapid method for gas chromatographic determination.) *Erdoel Kohle, Erdgas, Petrochem.*, 43 (1990) 389-390; *C.A.*, 114 (1991) 26855e.
- 837 Nabivach, V.M., Gerasimenko, V.A. and Vasil'ev, V.E.: (Correlation between gas-chromatographic retention indexes and the structural characteristics of aromatic hydrocarbons.) *Neftepererab. Neftekhim. (Kiev)*, 36 (1989) 48-52; *C.A.*, 113 (1990) 230698q.
- 838 Perlinger, J.A., Eisenreich, S.J., Capel, P.D., Carr, P.W. and Park, J.H.: Adsorption of a homologous series of alkylbenzenes to mineral oxides at low organic carbon content using headspace analysis. *Water Sci. Technol.*, 22 (1990) 7-14; *C.A.*, 113 (1990) 177832a.
- 839 Vorob'eva, N.S., Pekhk, T.I., Zemskova, Z.K. and Petkov, A.A.: (Dekadinanes - pentacyclic triterpanes of crude oil.) *Neftekhimiya*, 30 (1990) 435-439.
- 840 Vorob'eva, N.S., Zemskova, Z.K. and Petrov, A.A.: (Synthesis, stereochemistry and mass spectra of epimeric 9,10-seco-24-methylcholastanes.) *Neftekhimiya*, 30 (1990) 440-444.

See also 640, 794, 817, 1181, 1183, 1184, 1235.

5c. Halogen derivatives

- 841 Bertoni, G., Rotatori, M., Canepari, S. and Fratarcangeli, R.: (Determination of dichloromethane in industrial atmospheres and emissions by trapping on light adsorbents and thermal desorption.) *Ann. Chim. (Rome)*, 80 (1990) 357-367; *C.A.*, 114 (1991) 48621c.
- 842 Castello, G., Timossi, A. and Gerbino, T.C.: Analysis of haloalkanes on wide-bore capillary columns of different polarity connected in series. *J. Chromatogr.*, 522 (1990) 329-343.
- 843 Daft, J.L.: Recovery of 1,3-, 2,3-dichloropropenes, 1,2-dibromo-3-chloropropane, and *o*-, *p*-dichlorobenzenes from fatty and non-fat foods by the liquid extraction technique. *Arch. Environ. Contam. Toxicol.*, 19 (1990) 921-925; *C.A.*, 114 (1991) 4975s.
- 844 Erm, A., Muks, E., Kuningas, K., Loiveke, I. and Heinvali, M.: (Capillary gas chromatography of C₁₀-C₁₁ allyl chlorides.) *Eesti Tead. Akad. Toim., Keem.*, 39 (1990) 108-112; *C.A.*, 113 (1990) 223853h.
- 845 Freiria-Gandara, M.J., Alvarez-Devesa, A., Lorenzo-Ferreira, R.A. and Bermejo-Martinez, F.: Identification and determination of halogenated hydrocarbons in waters of Galicia (N.W. Spain) by headspace gas-chromatography. *Anal. Lett.*, 23 (1990) 1939-1958.
- 846 Fujita, M., Jung, W.T., Tatematu, H., Sonn, D. and Maeda, T.: Automated analysis of volatile halogenated hydrocarbons in rainwater and ambient air by purge and trap capillary gas chromatography. *J. High Resolut. Chromatogr.*, 14 (1991) 83-90.

- 847 Gerbino, T.C. and Castello, G.: Gas chromatographic identification of complex mixtures of halomethanes and haloethanes by using the correlation between their retention and vapour pressure. *J. Chromatogr.*, 537 (1991) 305-319.
- 848 Imagawa, T., Tanaka, T. and Miyazaki, A.: (Isomer specific analysis of trichloronaphthalenes.) *Kogai*, 24 (1989) 159-168; *C.A.*, 114 (1991) 5987j.
- 849 Janzen, E.G., Towner, R.A., Krygsman, P.H., Haire, D.L. and Poyer, J.L.: Structure identification of free radicals by ESR and GC/MS of PBN spin adducts from the *in vitro* and *in vivo* rat liver metabolism of halothane. *Free Radical Res. Commun.*, 9 (1990) 343-351; *C.A.*, 113 (1990) 125963z.
- 850 Jiang, C. and Zhang, X.: (Gas chromatographic analysis of the distillate of 1,3-dichloro-2-butene.) *Hecheng Xiangjiao Gongye*, 13 (1990) 274-276; *C.A.*, 113 (1990) 243962w.
- 851 Kitamura, M., Kanbayashi, J., Yamada, Y., Nagasawa, T. and Morimoto, H.: (Determination of chlordanes in water and sediment of river by GC/MS (gas chromatography/mass spectrometry).) *Kyoto-fu Eisei Kogai Kenkyusho Nenpo*, 34 (1989) 122-129; *C.A.*, 113 (1990) 197328u.
- 852 Sam, C.T. and Chua, T.H.: Chlorofluorocarbon (CFC) determination in styro-foam ware by headspace gas chromatography and GC-mass spectrometry. *Bull. Singapore Natl. Inst. Chem.*, 17 (1989) 65-70; *C.A.*, 113 (1990) 192596v.
- 853 Spadafora, G.: (Identification of polychlorobiphenyls (PCB) by gas chromatographic method: quantification and related problems.) *Chim. Ind. (Milan)*, 72 (1990) 700-706; *C.A.*, 114 (1991) 11660p.
- 854 Sun, S., Cai, S. and Zheng, B.: (Gas chromatographic analysis of PCBs in seawater.) *Haiyang Xuebao (Zhongwenban)*, 11 (1989) 586-593; *C.A.*, 113 (1990) 217642x.

See also 661, 675, 785, 818, 994, 1070, 1165, 1183, 1202, 1229.

5d. Complex hydrocarbon mixtures (incl. analysis of tars, bitumens and mineral oils)

- 855 Blanco, C.G., Blanco, J., Bernad, P. and Guillén, M.D.: Capillary gas chromatographic and combined gas chromatography-mass spectrometric study of the volatile fraction of a coal tar pitch using OV-1701 stationary phase. *J. Chromatogr.*, 539 (1991) 157-167.
- 856 Roberson, C.R.: Characterization of heavy components in NGL and natural gas (extended analysis). *Proc. Int. Sch. Hydrocarbon Meas.*, 65 (1990) 410-413; *C.A.*, 113 (1990) 214986b.
- 857 Sokolova, I.M., Makarov, V.V., Kul'dzaev, B.A. and Abryupina, N.N.: (Composition of hydrocarbons in the gaseous condensate from the Mollakyor deposit.) *Neftekhimiya*, 30 (1990) 723-727.
- 858 Szakasits, J.J. and Robinson, R.E.: Hydrocarbon type determination of naphthas and catalytically reformed products by automated multidimensional gas chromatography. *Anal. Chem.*, 63 (1991) 114-120.
- 859 Takeuchi, T., Watanabe, M., Haraguchi, H. and Ishii, D.: GC with LC-like packed capillary columns. *J. High Resolut. Chromatogr.*, 14 (1991) 123-125.

See also 621, 726, 790, 814, 1185, 1206, 1231, 1233, 1234.

6. ALCOHOLS

- 860 Avgul, T.V., Arystanbekova, S.A. and Rivina, Z.M.: (Use of modified polymer sorbents for gas-chromatographic determination of impurity components in glycols.) *Zh. Anal. Khim.*, 45 (1990) 2161-2165.

- 861 Kondakova, L.V.: (Gas chromatographic determination of isobutyl alcohol and dimethylacetamide in workplace air.) *Gig. Sanit.*, No. 1 (1990) 77-78; *C.A.*, 113 (1990) 196795g.
- 862 Sereda, I.P., Mikhailenko, V.P., Tulyupa, M.F. and Arkharov, A.V.: (Gas-liquid chromatographic determination of higher fatty alcohols in karmidol.) *Khim. Tekhnol. Vody*, 12 (1990) 530-533; *C.A.*, 114 (1991) 16901c.
- 863 Tao, D. and Ding, J.: (Determination of organic substances in water containing dead fish by GC/ITD method.) *Shanghai Huanjing Kexue*, 8, No. 9 (1989) 26-27; *C.A.*, 113 (1990) 197315n.
- 864 Ushkova, V.A., Titova, N.A. and Vagina, L.K.: (Gas chromatographic determination of butyl alcohols in atmospheric air.) *Gig. Sanit.*, No. 2 (1990) 68-69; *C.A.*, 113 (1990) 236791m.
- 865 Wang, F., Li, Y., Wang, J. and Yang, C.: (Prediction of retention indexes of aliphatic alcohols in gas chromatography.) *Shiyu Huagong*, 19 (1990) 251-256; *C.A.*, 113 (1990) 223851f.
- 866 Yang, X., Cai, M., Liu, X., Liu, L. and Chen, G.: (Determination of glycerol in serum by gas chromatography.) *Yingyang Xuebao*, 12, No. 1 (1990) 23-27; *C.A.*, 113 (1990) 168299e.

See also 604, 767, 769, 770, 890, 899, 900, 1160, 1162, 1231.

7. PHENOLS

- 867 Bruno, G.R., Rigod, J.F. and Tozer, T.N.: Simultaneous assay of pentachlorophenol and its metabolite, tetrachlorohydroquinone, by gas chromatography without derivatization. *J. Chromatogr.*, 533 (1990) 111-124.
- 868 Kosychenko, L.I., Izoriya, L.E., Stupchenko, L.V. and Bosova, T.S.: (Gas chromatographic determination of phenol in reservoir water.) *Gig. Sanit.*, No. 6 (1990) 71-73; *C.A.*, 113 (1990) 217644z.
- 869 Lian, T., Li, X. and Xian, Y.: (Determination of phenol in urine by GC (ordinary column).) *Gongye Weisheng Yu Zhiyebing*, 16 (1990) 100-102; *C.A.*, 113 (1990) 206283e.
- 870 MacNeil, J.D., Patterson, J.R., Fesser, A.C. and Martz, V.K.: Determination of pentachlorophenol in animal tissues: a Canadian perspective. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 838-841.
- 871 Verevkin, S.P., Belen'kaya, R.S., Rozhnov, A.M. and Matyushina, V.P.: (Investigation of the chromatographic behaviour of alkylnitrophenols.) *Zh. Anal. Khim.*, 45 (1990) 1786-1790.

See also 784, 1217, 1222.

8. SUBSTANCES CONTAINING HETEROCYCLIC OXYGEN

8a. Flavonoids

- 872 Greenaway, W. and Whatley, F.R.: Resolution of complex mixtures of phenolics in poplar bud exudate by analysis of gas chromatography-mass spectrometry data. *J. Chromatogr.*, 519 (1990) 145-158.
- 873 Ryu, K.S., Hong, N.D., Kim, N.J. and Kong, Y.Y.: (Studies on the coumarin constituents of the root of *Angelica gigas* Nakai. Isolation of decursinol angelate and assay of decursinol angelate and decursin.) *Saengyak Hakhoechi*, 21 (1990) 64-68; *C.A.*, 113 (1990) 237912p.

See also 987.

8b. *Aflatoxins and other mycotoxins*

- 874 Niwa, T., Yoshizumi, H., Tatematsu, A., Matsuura, S., Yoshida, M., Kawachi, M., Naoi, M. and Nagatsu, T.: Endogenous synthesis of N-methyl-1,2,3,4-tetrahydroisoquinoline, a precursor of N-methylisoquinolinium ion, in the brains of primates with parkinsonism after systemic administration of 1,2,3,4-tetrahydroisoquinoline. *J. Chromatogr.*, 533 (1990) 145-151.
- 875 Plasencia, J., Mirocha, C.J., Pawlosky, R.J. and Smith, J.F.: Analysis of zearalenone and α -zearalenol in urine of ruminants using gas chromatography-tandem mass spectrometry. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 973-980.
- 876 Tarter, E.J. and Scott, P.M.: Determination of patulin by capillary gas chromatography of the heptafluorobutyrate derivative. *J. Chromatogr.*, 538 (1991) 441-446.

8c. *Other compounds with heterocyclic oxygen (incl. tannins)*

- 877 Albrecht, I.D., Naikwadi, K.P. and Karasek, F.W.: A polymeric liquid crystal capillary column for GC-MS analysis of PCDD and PCDF. *J. High Resolut. Chromatogr.*, 14 (1991) 143-146.
- 878 Bergmann, M.: GC/MS-Bestimmung von Dioxinen und PCBs. *LaborPraxis*, 15 (1991) 50-52.
- 879 Glidden, R.M., Brown, P.J., Sittig, R.A., Syvertson, C.N. and Smith, P.V.: Determination of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin and 2,3,7,8-tetrachlorodibenzofuran in cow's milk. *Chemosphere*, 20 (1990) 1619-1624; *C.A.*, 113 (1990) 229803p.
- 880 Iida, J., Takeda, T., Takasuga, T., Moncur, J., Ireland, P. and Wright, B.: Approaches to dioxin analysis by HRGC-HRMS and hybrid HRGC-MS-MS. *J. High Resolut. Chromatogr.*, 14 (1991) 103-109.
- 881 Jimenez, B., Gonzales, M.J. and Hernandez, L.M.: Extraction and clean-up procedure for polychlorinated dibenzo-*p*-dioxins and dibenzofurans in fly ash from municipal solid waste incinerators. *J. Chromatogr.*, 523 (1990) 265-272.
- 882 Liem, A.K.D., de Jong, A.P.J.M., Marsman, J.A., den Boer, A.C., Groenemeijer, G.S., den Hartog, R.S., de Korte, G.A.L., Hoogerbrugge, R., Kootstra, P.R. et al.: A rapid clean-up procedure for the analysis of polychlorinated dibenzo-*p*-dioxins and dibenzofurans in milk samples. *Chemosphere*, 20 (1990) 843-850; *C.A.*, 113 (1990) 170567j.
- 883 Moore, C., Moncur, J., Jones, D. and Wright, B.: The analysis of smokestack samples for dioxins by gas chromatography/mass spectrometry and gas chromatography/tandem mass spectrometry. *Rapid Commun. Mass Spectrom.*, 4 (1990) 418-420; *C.A.*, 113 (1990) 236802r.
- 884 Naikwadi, K.P. and Karasek, F.W.: Development of GC capillary column for isomer-specific separation of toxic isomer of PCDDs and PCDFs in environmental samples. *Chemosphere*, 20 (1990) 1379-1384; *C.A.*, 114 (1991) 16864t.
- 885 Robbat, A., Jr. and Kalogeropoulos, C.: Prediction of gas chromatographic retention indexes for polychlorinated dibenzofurans. *Anal. Chem.*, 62 (1990) 2684-2688.
- 886 Takano, I., Yasuda, I., Hamano, T., Seto, T. and Akiyama, K.: (Determination of perilla ketone in *Perilla* herb by capillary gas chromatography/mass spectrometry.) *Eisei Kagaku*, 36 (1990) 320-325; *C.A.*, 114 (1991) 49675k.
- 887 Tarasov, V.V. and Usmanov, I.A.: (Gas chromatographic determination of furfuryl alcohol in reservoir water.) *Gig. Sanit.*, No. 6 (1990) 73-74; *C.A.*, 113 (1990) 197443c.

- 888 Tondeur, Y., Gorsich, R., Mazac, C., Freiberg, M., Haas, J. and McAllister, D.: Analytical protocol for the analysis of polybrominated dibenzodioxins and dibenzofurans: data quality objectives and single-laboratory evaluation. *Chemosphere*, 20 (1990) 1269-1276; *C.A.*, 114 (1991) 35196t.

See also 768, 1225.

9. OXO COMPOUNDS, ETHERS, EPOXIDES AND QUINONES

- 889 Chen, Q. and Zhang, G.: (Chromatographic (GC and HPLC) determination of anthraquinone in black liquors from soda-AQ pulping of wheat straw.) *Zhongguo Zaozhi*, 8, No. 6 (1989) 43-46; *C.A.*, 113 (1990) 193721u.
- 890 Day, B.W., Naylor, S., Gan, L.-S., Sahali, Y., Nguyen, T.T., Skipper, P.L., Wishnok, J.S. and Tannenbaum, S.R.: Gas chromatographic-mass spectrometric analysis of diols and tetrols from reactions of polycyclic aromatic hydrocarbon epoxides with hemoglobin. *J. Chromatogr.*, 562 (1991) 563-571.
- 891 Hazai, I. and Ledniczky, L.: Gas chromatographic-mass spectrometric identification of impurities in 1,2-diethoxybenzene. *J. Chromatogr.*, 520 (1990) 149-155.
- 892 Husmann, H., Schomburg, G., Müller, K.-D., Nalik, H.P. and von Recklinghausen, G.: Gas chromatographic FAME analysis for characterization of bacteria: Formation of aldehydes from 3-hydroxy fatty acid methyl esters during sample introduction. *J. High Resolut. Chromatogr.*, 13 (1990) 780-782.
- 893 Kennedy, E.R., O'Connor, P.F. and Grote, A.A.: Application of multidimensional gas chromatography-mass spectrometry to the determination of glycol ethers in air. *J. Chromatogr.*, 522 (1990) 303-313.
- 894 Kessler, W., Jiang, X. and Filser, J.G.: Direct determination of styrene-7,8-oxide in blood by gas chromatography with flame ionization detection. *J. Chromatogr.*, 534 (1990) 67-75.
- 895 Kezic, S. and Monster, A.C.: Determination of 2,5-hexanedione in urine and serum by gas chromatography after derivatization with O-(pentafluorobenzyl)hydroxylamine and solid-phase extraction. *J. Chromatogr.*, 563 (1991) 199-204.
- 896 Li, Q. and Dong, S.: Gas chromatographic analysis of norcantharidin and related compounds using derivatization to imides. *J. Pharm. Biomed. Anal.*, 7 (1989) 1635-1639; *C.A.*, 113 (1990) 144730n.
- 897 Na, S. and Sui, N.: (Determination of benzaldehyde in benzyl alcohol by gas chromatography.) *Zhongguo Yiao Gongye Zazhi*, 20 (1989) 515-516; *C.A.*, 113 (1990) 184006n.
- 898 Shiomi, K.: Determination of acetaldehyde, acetal and other volatile congeners in alcoholic beverages using multidimensional capillary gas chromatography. *J. High Resolut. Chromatogr.*, 14 (1991) 136-137.
- 899 Smolyar, N.Ya.: (Determination of 3-bromobenzaldehyde, 3-phenoxybenzaldehyde, and 3-phenoxybenzyl alcohol in workplace air.) *Gig. Sanit.*, No. 2 (1990) 69; *C.A.*, 113 (1990) 196796h.
- 900 Svoboda, M. and Musil, S.: Speciation of polyhydroxy compounds by gas chromatography-mass spectrometry with deuterium oxide chemical ionization. *J. Chromatogr.*, 520 (1990) 209-212.
- 901 Vincent, R., Cicolella, A. and Poirot, P.: Dosage des éthers de glycol dans les atmosphères de travail. *Analisis*, 18 (1990) 591-596.

See also 1161, 1231.

10. CARBOHYDRATES

10a. Mono and oligosaccharides. Structural studies

- 902 Bouhours, D., Bouhours, J.F., Larson, G., Karlsson, H., Pimlott, W. and Hansson, G.C.: Transient expression of type 2 chain in A-active hexaglycosylceramide of rat small intestine at weaning time. Demonstration by affinity chromatography and ceramide glycanase hydrolysis of A-active glycosphingolipids followed by gas chromatography and mass spectrometry of permethylated hexasaccharides. *Arch. Biochem. Biophys.*, 282 (1990) 141-146; *C.A.*, 113 (1990) 189325a.
- 903 Cai, M. and Chen, G.: (Gas chromatographic determination of serum mannitol.) *Zhongguo Yaoxue Zazhi*, 25 (1990) 160-161; *C.A.*, 114 (1991) 59y.
- 904 Holst, O., Brade, H., Dziewiszek, K. and Zamojski, A.: GLC-MS of partially methylated and acetylated derivatives of L-glycero-D-manno- and D-glycero-D-manno-heptopyranoses and -heptitols. *Carbohydr. Res.*, 204 (1990) 1-9; *C.A.*, 113 (1990) 212503t.
- 905 Hua, D. and Mao, Y.: (Determination of lactulose by gas chromatography.) *Zhongguo Yiyao Gongye Zazhi*, 21 (1990) 175-176; *C.A.*, 113 (1990) 158805c.
- 906 Kaziyama, K. and Tsuruoka, T.: (Relation of gas chromatographic retention values of aldonitrile acetates derived from O-methyl and O-ethyl glucose between heterogeneous liquid phases.) *Wayo Joshi Daigaku Kiyō, Kaseiki-hen*, 29 (1989) 107-114; *C.A.*, 114 (1991) 35173h.
- 907 Lapidot, A.: Inherited disorders of carbohydrate metabolism in children studied by carbon-13-labeled precursors, NMR and GC-MS. *J. Inherited Metab. Dis.*, 13 (1990) 466-475; *C.A.*, 114 (1991) 2958q.
- 908 Markku, D., Theander, O., Nordkvist, E. and Ternrud, I.E.: Multivariate calibration in the determination of acetylated aldoses by gas-liquid chromatography. *Carbohydr. Res.*, 207 (1990) 167-175; *C.A.*, 113 (1990) 243998n.
- 909 Molnar-Perl, I., Morvai, M., Pinter-Szakacs, M., Kovago, A. and Petroczy, J.: Gas-liquid chromatographic assay of the components of electrochemically reduced glucose solutions. Impurities in sorbitol samples. *J. Chromatogr.*, 520 (1990) 185-191.
- 910 Felton, Z.: (Separation of mono- and oligosaccharides by capillary gas chromatography.) *Lab. 2000*, 3, No. 3 (1989) 24-27; *C.A.*, 113 (1990) 170552a.

See also 764, 934, 941, 1154, 1155, 1156.

11. ORGANIC ACIDS AND LIPIDS

11a. Organic acids and simple esters

- 911 Adlof, R.: Fractionation of egg and soybean phosphatidylcholines by silver resin chromatography. *J. Chromatogr.*, 538 (1991) 469-473.
- 912 Bianco, L. and Marucchi, M.: (Salicylic acid and its homologs as food additives. Determination by HPLC of methyl esters and confirmation by GC/MS of TMS derivatives.) *Ind. Aliment. (Pinerolo)*, 29 (1990) 449-455; *C.A.*, 113 (1990) 170550y.
- 913 Brondz, I. and Carlsson, J.: Cellular fatty acids of *Bacteriodes forsythus*. *J. Chromatogr.*, 533 (1990) 141-144.
- 914 Brondz, I. and Olsen, I.: Fatty acid contents of the yeast and mycelial phase of *Candida albicans*. *J. Chromatogr.*, 533 (1990) 152-158.

- 915 Caruso, U., Fowler, B., Erceg, M. and Romano, C.: Determination of very-long-chain fatty acids in plasma by a simplified gas chromatographic-mass spectrometric procedure. *J. Chromatogr.*, 562 (1991) 147-152.
- 916 Catella, F., Lawson, J.A., Fitzgerald, D.J. and Fitzgerald, G.A.: Endogenous biosynthesis of arachidonic acid epoxides in humans: increased formation in pregnancy-induced hypertension. *Proc. Natl. Acad. Sci. U.S.A.* 87 (1990) 5893-5897; *C.A.*, 113 (1990) 189187g.
- 917 Ceccon, L.: Quantitative determination of free volatile fatty acids from dairy products on a Nukol capillary column. *J. Chromatogr.*, 519 (1990) 369-378.
- 918 Ciucanu, I. and Luca, C.: Avoidance of degradation during the methylation of uronic acids. *Carbohydr. Res.*, 206 (1990) 71-77; *C.A.*, 114 (1991) 7041v.
- 919 Du, J., Chen, J. and Yao, C.: (Determination of blood concentration of γ -linoleic acid by gas chromatography.) *Zhongcaoyao*, 21 (1990) 257-259; *C.A.*, 113 (1990) 184117z.
- 920 Fourche, J., Capdepu, M., Maugein, J. and le Moigne, F.: Analysis of cellular fatty acids and proteins by capillary gas chromatography and sodium dodecyl sulphate polyacrylamide gel electrophoresis to differentiate *Mycobacterium avium*, *Mycobacterium intracellulare* and *Mycobacterium scrofulaceum* (MAIS) complex species. *J. Chromatogr.*, 532 (1990) 209-216.
- 921 Frank, H., Vincen, A., Reiss, J. and Scholl, H.: Trichloroacetic acid in the foliage of forest trees. *J. High Resolut. Chromatogr.*, 13 (1990) 733-736.
- 922 Heitenfuss, S., Heine, A. and Seifert, H.S.H.: Detection of non-volatile organic acids by head-space gas chromatography. *J. Chromatogr.*, 532 (1990) 374-378.
- 923 Ji, N., Yu, R., Yang, Q. and Yu, P.: (Determination of 10-hydroxy-*trans*-2-decenoic acid (10-HDA) in royal jelly by capillary column gas chromatography.) *Zhongcaoyao*, 21 (1990) 399-400; *C.A.*, 114 (1991) 30223q.
- 924 Kien, C.L., Chang, D.H., Murray, R.D., Ailabouni, A. and Kepner, J.: Measurement of stable isotopic enrichment of underivatized acetate by gas chromatography/mass spectrometry: application to *in vivo* estimation of acetate production. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 554-558; *C.A.*, 113 (1990) 168472f.
- 925 Kim, K.R., Kim, J.H. and Park, H.K.: (Trace analysis as TBDMS (*tert*-butyldimethylsilyl) derivatives of organic acids in aqueous samples.) *Taehan Hwahakhoe Chi*, 34 (1990) 352-359; *C.A.*, 113 (1990) 184001g.
- 926 Le Quere, J.L., Sebedio, J.L., Henry, R., Couderc, F., Demont, N. and Prome, J.C.: Gas chromatography-mass spectrometry and gas chromatography-tandem mass spectrometry of cyclic fatty acid monomers isolated from heated fats. *J. Chromatogr.*, 562 (1991) 659-672.
- 927 Liang, L., Lai, A., Zhang, G. and Wu, W.: (Gas chromatographic determination of acetic, propionic, and acrylic acids in the air.) *Zhonghua Laodong Weisheng Zhiyebing Zazhi*, 8 (1990) 157-179; *C.A.*, 113 (1990) 236795r.
- 928 Liebich, H.M.: Sample preparation for organic acids in biological fluids. *Anal. Chim. Acta*, 236 (1990) 121-130 - a review with 92 refs.
- 929 Liu, X., Hou, W., Miao, J., Liu, L. and Wang, H.: Quantitative determination of free fatty acid profiles in body fluids. *Fenxi Huaxue*, 18 (1990) 705-709; *C.A.*, 113 (1990) 227493p.
- 930 Mallet, J.F., Gaydou, E.M. and Archavlis, A.: Determination of petroselinic acid in *Umbelliflorae* seed oils by combined GC and carbon-13 NMR spectroscopy analysis. *J. Am. Oil Chem. Soc.*, 67 (1990) 607-610.

- 931 Martinsen, A. and Huhtikangas, A.: Gas chromatographic analysis of tropic, benzoic and cinnamic acids, biosynthetic tropane alkaloid precursors. *J. Chromatogr.*, 539 (1991) 232-236.
- 932 Matsumoto, M., Kuhara, T., Inoue, Y., Shinka, T. and Matsumoto, I.: Abnormal fatty acid metabolism in patients in hopantenate therapy during clinical episodes. *J. Chromatogr.*, 562 (1991) 139-145.
- 933 Molnar-Perl, I., Morvai, M. and Pintér-Szakacs, M.: Gas chromatographic determination of isocitric and malic acid in the presence of a large excess of citric acid. *Anal. Chim. Acta*, 239 (1990) 165-170.
- 934 Morvai, M. and Molnar-Perl, I.: Simultaneous determination of organic acids and sugars in apples by gas-liquid chromatography. *J. Chromatogr.*, 520 (1990) 201-207.
- 935 Pitt, J.J.: Gas chromatographic-mass spectrometric characterisation of unsaturated dicarboxylic acids in urine. *J. Chromatogr.*, 534 (1990) 182-189.
- 936 Ramesha, C.S. and Taylor, L.A.: Measurement of arachidonic acid release from human polymorphonuclear neutrophils and platelets: comparison between gas chromatographic and radiometric assays. *Anal. Biochem.*, 192 (1991) 173-180.
- 937 Ratnayake, W.M.N. and Beare-Rogers, J.L.: Problems of analyzing C₁₈ *cis*- and *trans*-fatty acids of margarine on the SP-2340 capillary column. *J. Chromatogr. Sci.*, 28 (1990) 633-639.
- 938 Rojo, J.A. and Perkins, E.G.: Isomer identification and gas chromatographic retention studies of monomeric cyclic fatty acid methyl esters. *J. Chromatogr.*, 537 (1991) 329-344.
- 939 Shantha, N.C. and Ackman, R.G.: Nervonic acid *versus* tricosanoic acid as internal standards in quantitative gas chromatographic analyses of fish oil longer-chain *n*-3 polyunsaturated fatty acid methyl esters. *J. Chromatogr.*, 533 (1990) 1-10.
- 940 Stoev, G. and Velichkov, A.: Direct determination of acetic acid in strongly acidic hydrolysates of chitin and chitin-containing biological products by capillary gas chromatography. *J. Chromatogr.*, 538 (1991) 431-434.
- 941 Szczepanowska, E., Kusmierz, J., Szafranek, J. and Schramm, R.W.: Gas chromatography and mass spectrometry identification of sugar related hydroxy acids from kidney bean, alfalfa and clover. *Acta Physiol. Plant.*, 11 (1989) 97-109; *C.A.*, 113 (1990) 168942j.
- 942 Timmen, H.: (Determination of the hardness of milk fat in farm milk on the basis of fatty acid composition.) *Kiel. Milchwirtsch. Forschungsber.*, 42 (1990) 129-138; *C.A.*, 114 (1991) 4953h.
- 943 Vairavamurthy, A. and Mopper, K.: Determination of low-molecular-weight carboxylic acids in aqueous samples by gas chromatography and nitrogen-selective detection of 2-nitrophenylhydrazides. *Anal. Chim. Acta*, 237 (1990) 215-221.
- 944 Vanyukova, N.A., Frolov, E.B. and Sanin, P.I.: (Crude oil acids of Tuman-Pachorsky regions.) *Neftekhimiya*, 30 (1990) 579-584.
- 945 Weber, L.: Comparison of different sample preparation methods for bacteria identification by capillary gas chromatography. *J. High Resolut. Chromatogr.*, 13 (1990) 851-854.
- 946 Wretensjö, I., Svensson, L. and Christie, W.W.: Gas chromatographic-mass spectrometric identification of the fatty acids in forage oil using the picolinyl ester derivatives. *J. Chromatogr.*, 521 (1990) 89-97.
- 947 Wu, H. and Cheng, Z.: (Analysis of fatty acids in butter by capillary GC/MS/MSD.) *Fenxi Ceshi Tongbao*, 9, No. 2 (1990) 30-32; *C.A.*, 113 (1990) 189861x.
- 948 Xu, S., Wang, G. and Wang, Z.: (Determination of *n*-dibasic acid content in soap-making synthetic fatty acid by GC.) *Riyong Huaxue Gongye*, No. 2 (1990) 83-86; *C.A.*, 114 (1991) 26184k.

- 949 Yamamoto, I., Watanabe, K., Narimatsu, S., Matsunaga, T., Kijima, T., Hiraiwa, K. and Yoshimura, H.: (A GC-MS method for determination of Δ^9 -tetrahydrocannabinol-11-oic acid in human urine.) *Eisei Kagaku*, 36 (1990) 149-152; *C.A.*, 114 (1991) 1844n.
- 950 Yang, C., Bai, Y. and Zhang, Y.: (Determination of benzoic acid and sodium benzoate in syrups by gas chromatography.) *Zhongguo Yaoxue Zazhi*, 25 (1990) 348-349; *C.A.*, 113 (1990) 237947d.

See also 604, 682, 770, 783, 787, 892, 896, 1022, 1100, 1156, 1223.

11b. *Prostaglandins*

- 951 Clare, R.A., Huang, S., Doig, M.V. and Gibson, G.G.: Gas chromatographic-mass spectrometric characterisation of some novel hydroxyeicosatetraenoic acids formed on incubation of arachidonic acid with microsomes from induced rat livers. *J. Chromatogr.*, 562 (1991) 237-247.
- 952 Gelpi, E. and Abian, J.: Comparative evaluation of combined high performance liquid chromatography-mass spectrometry and GC-mass spectrometry methods for the study of eicosanoid metabolism. *LC-GC*, 3, No. 12 (1990) 30-38.
- 953 Ishibashi, M., Watanabe, K., Ohyama, Y., Mizugaki, M., Hayashi, Y. and Takasaki, W.: Novel derivatization and immunoextraction to improve microanalysis of 11-dehydrothromboxane B₂ in human urine. *J. Chromatogr.*, 562 (1991) 613-624.
- 954 Traitler, H., Richli, U., Kappeler, A.M., Winter, H., Munoz-Box, R. and Fournier, N.: Quantitative determination of prostanoids by stable isotope dilution gas chromatography/mass spectrometry. *NATO ASI Ser., Ser. A*, 171 (1989) 323-332; *C.A.*, 113 (1990) 210613e.
- 955 Weber, C., Höller, M., Beetens, J., de Clerck, F. and Tegtmeier, F.: Determination of 6-keto-PGF_{1 α} , 2,3-dinor-6-keto-PGF_{1 α} , thromboxane B₂, 2,3-dinor-thromboxane B₂, PGE₂, PGD₂ and PGF_{2 α} in human urine by gas chromatography-negative ion chemical ionization mass spectrometry. *J. Chromatogr.*, 562 (1991) 599-611.

11c. *Lipids and their constituents*

- 956 Evershed, R.P., Prescott, M.C. and Goad, L.J.: High-temperature gas chromatography/mass spectrometry of triacylglycerols with ammonia negative-ion chemical ionization. *Rapid Commun. Mass Spectrom.*, 4 (1990) 345-347; *C.A.*, 113 (1990) 204219q.
- 957 Levery, S.B., Roberts, C.E., Salyan, M.E.K., Bouchon, B. and Hakomori, S.: Strategies for characterization of ganglioside inner esters II-gas chromatography/mass spectrometry. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 311-318; *C.A.*, 113 (1990) 172577m.
- 958 Matsubara, T. and Hayashi, A.: Fragmentation pathways of O-trimethylsilyl ethers of dihydroxy long-chain bases analysed by linked-scan mass spectrometry. *J. Chromatogr.*, 562 (1991) 119-124.
- 959 Precht, D.: (Rapid gas chromatographic triglyceride analysis of milk fat.) *Kiel. Milchwirtsch. Forschungsber.*, 42 (1990) 139-154; *C.A.*, 114 (1991) 4954j.

See also 780, 796, 862, 1238.

11d. Lipoproteins and their constituents

- 960 Gasser, H., Strohmaier, W., Schlag, G., Schmid, E.R. and Allmaier, G.: Characterization of phosphatidylcholines in rabbit lung lavage fluid by positive and negative ion fast-atom bombardment mass spectrometry. *J. Chromatogr.*, 562 (1991) 257-266.

13. STEROIDS

13a. General techniques

- 961 Honour, J.W., Tsang, W.M. and Patel, H.: Gas chromatography of C₁₉ and 17-oxogenic steroids in urine. *Ann. Clin. Biochem.*, 27 (1990) 338-344; *C.A.*, 114 (1991) 1147n.

See also 966.

13b. Pregnane and androstane derivatives

- 962 Harrison, L.M. and Fennessey, P.V.: Methandrostenolone metabolism in humans: potential problems associated with isolation and identification of metabolites. *J. Steroid. Biochem.*, 36 (1990) 407-414; *C.A.*, 113 (1990) 224619y.
- 963 Ikekawa, N.: The analysis of brassinosteroids - plant grow-promoting substances. *TrAC*, 9 (1990) 337-342.
- 964 Kammerer, R.G., Merdink, J.L., Jagels, M., Catlin, D.H. and Hui, K.K.: Testing for fluoxymesterone (Halotestin) administration to man: identification of urinary metabolites by gas chromatography-mass spectrometry. *J. Steroid Biochem.*, 36 (1990) 659-666; *C.A.*, 114 (1991) 17619d.
- 965 Mallet, A.I., Holland, K.T., Rennie, P.J., Watkins, W.J. and Gower, D.B.: Applications of gas chromatography-mass spectrometry in the study of androgen and odorous 16-androstene metabolism by human axillary bacteria. *J. Chromatogr.*, 562 (1991) 647-658.
- 966 Masse, R., Bi, H., Ayotte, C., Du, P., Gelinas, H. and Dugal, R.: Studies on anabolic steroids. V. Sequential reduction of methandienone and structurally related steroid A-ring substituents in humans: gas chromatographic-mass spectrometric study of the corresponding urinary metabolites. *J. Chromatogr.*, 562 (1991) 323-340.
- 967 Vasil'eva, T.V., Zastavskaya, G.S., Nikishina, L.E. and Karpova, T.A.: (Identification of prolutestone and control of its quality.) *Farmatsiya (Moscow)*, 39, No. 4 (1990) 74-75; *C.A.*, 114 (1991) 12272a.

See also 961.

13d. Sterols

- 968 Al-Hasani, S.M., Shabany, H. and Hlavac, J.: Rapid determination of cholesterol in selected frozen foods. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 817-820.
- 969 Keiser, L.S., Retunskii, V.N. and Yazlovetskii, I.G.: (Gas chromatographic identification of sterols in insects. Estimation of retention data reproducibility.) *Zh. Anal. Khim.*, 45 (1990) 1767-1773.
- 970 Kovacs, M.I.P.: Determination of cholesterol in pasta products using gas-liquid chromatography. *J. Cereal. Sci.*, 11 (1990) 291-297; *C.A.*, 113 (1990) 189864a.

- 971 Oles, P., Gates, G., Kensinger, S., Patchell, J., Schumacher, D., Showers, T. and Silcox, A.: Optimization of the determination of cholesterol in various food matrixes. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 724-728.
- 972 Trzicka, E., Mares, P., Pisarikova, A., Novakovic, J. and Hrabak, P.: Simplified gas chromatographic method for the simultaneous determination of phytosterols and cholesterol. *J. Chromatogr.*, 563 (1991) 188-192.

13e. *Bile acids and alcohols*

- 973 Eguchi, T., Yanagisawa, J., Nakayama, F. and Miyazaki, H.: (Profile analysis of keto bile acids in biological materials by gas chromatography-mass spectrometry.) *Nippon Iyo Masu Supekutoru Gakkai Koenshu*, 14 (1989) 59-66; *C.A.*, 113 (1990) 187535v.
- 974 Ferreira, H.E.C.S. and Elliott, W.H.: Pre-column derivatization of free bile acids for high-performance liquid chromatographic and gas chromatographic-mass spectrometric analysis. *J. Chromatogr.*, 562 (1991) 697-712.
- 975 Iida, T., Komatsubara, I., Chang, F.C., Goto, J. and Nambara, T.: Capillary gas chromatographic behavior of stereoisomeric bile acids with a vicinal glycol structure by their "mixed" alkylboronate derivatives. *J. Chromatogr.*, 537 (1991) 345-356.

13f. *Ecdysones and other insect steroid hormones*

- 976 McCaffery, A.R. and Wilson, I.D.: *Chromatography and Isolation of Insect Hormones and Pheromones. Chromatogr. Sci. Symp. Ser.*, Plenum Publ. Corp., London, 1990.

13g. *Other steroids*

- 977 Daeseleire, E., de Guesquiere, A. and van Peteghem, C.: Derivatization and gas chromatographic-mass spectrometric detection of anabolic steroid residues isolated from edible muscle tissues. *J. Chromatogr.*, 562 (1991) 673-679.

15. TERPENES AND OTHER VOLATILE AROMATIC COMPOUNDS

15a. *Terpenes*

- 978 Cai, Z., Xu, X. and Li, X.: (Gas chromatography determination of eugenol in *Oleum ocimigratissimi*.) *Yaowu Fenxi Zazhi*, 10 (1990) 154-156; *C.A.*, 113 (1990) 198091y.
- 979 Okugawa, H., Moriyasu, M., Matsushita, S., Saiki, K., Hashimoto, Y., Matsumoto, K., Fujioka, A. and Kato, A.: Evaluation of crude drugs by a combination of enfleurage and chromatography. (V). Flavor components in rhizoma of *Notopterygium* sp., and in roots of *Angelica pubescens* and *Aralia cordata*. *Shoyakugaku Zasshi*, 44 (1990) 11-16; *C.A.*, 113 (1990) 178351e.
- 980 Rodriguez, P.A., Takigiku, R., Lehman-McKeeman, L.D., Fey, M.L., Eddy, C.L. and Caudill, D.: Design of a gas chromatograph with parallel radioactivity and mass spectrometric detection. Application to the identification of the major metabolite of *d*-limonene associated with α 2u-globulin. *J. Chromatogr.*, 563 (1991) 271-282.
- 981 Ruseva, N.: (Determination of terpenes by gas chromatography over Spheron.) *Biotekhnol. Khim.*, 1, No. 2 (1989) 29-31; *C.A.*, 113 (1990) 197618p.

See also 771.

15b. Essential oils

- 982 Cai, Z., Li, X. and Xingwen, X.: (Determination of eucalyptol in eucalyptus oil by gas chromatography.) *Zhongguo Zhongyao Zazhi*, 15 (1990) 298-299; *C.A.*, 113 (1990) 178352f. u posledniho autora nebylo uvedeno druhe jmeno.
- 983 Chamblee, T.S., Clark, B.C., Jr., Brewster, G.B., Radford, T. and Iacobucci, G.A.: Quantitative analysis of the volatile constituents of lemon peel oil. Effects of silica gel chromatography on the composition of its hydrocarbon and oxygenated fractions. *J. Agric. Food Chem.*, 39 (1991) 162-169.
- 984 Cu, J., Pu, F., Shi, Y., Perineau, F., Delmas, M. and Gaset, A.: The chemical composition of lovage headspace and essential oils produced by solvent extraction with various solvents. *J. Essent. Oil Res.*, 2 (1990) 53-59; *C.A.*, 113 (1990) 84609t.
- 985 Cu, J., Zhang, Z., Pu, F., Perineau, F., Delmas, M. and Gaset, A.: GC/MS and GC/FTIR analysis of the essential oil of celery seed. *J. Essent. Oil Res.*, 2, No. 1 (1990) 1-5; *C.A.*, 113 (1990) 120591s.
- 986 Cu, J.Q., Perineau, F. and Goepfert, G.: GC/MS analysis of star anise oil. *J. Essent. Oil Res.*, 2, No. 2 (1990) 91-92; *C.A.*, 113 (1990) 120590r.
- 987 Greenaway, W., Davidson, C.G., Scaysbrook, T., May, J. and Whatley, F.R.: Hybrid origin of *Populus x jackii* confirmed by gas chromatography-mass spectrometry analysis of its bud exudate. *Z. Naturforsch., C: Biosci.*, 45 (1990) 594-598; *C.A.*, 113 (1990) 169130e.
- 988 Hubert, C., Brunerie, P., le Quere, J.M. and Drilleau, J.F.: (Volatile aroma compounds of ciders: rapid extraction and analysis.) *Sci. Aliments*, 10 (1990) 603-618; *C.A.*, 113 (1990) 189696x.
- 989 Jirovetz, L., Buchbauer, G., Jäger, W., Raverdino, V. and Nikifiriv, A.: Determination of lavender oil fragrance compounds in blood samples. *Frese-nius' Z. Anal. Chem.*, 338 (1990) 922-923.
- 990 Kang, J.: Analysis of essential oils from geranium plants by gas chromatography/mass spectrometry and gas chromatography/Fourier transform infrared spectroscopy. Avail. *Univ. Microfilms Int.*, Order No. DA9019355, 1989, 128 p.; *C.A.*, 114 (1991) 11975v.
- 991 Sur, S.V., Tulyupa, F.M., Tolok, A.Ya. and Peresyphkina, T.N.: (Gas-liquid chromatographic determination of thymol and carvacrol in raw plant material and tinctures of *Thymus herb.*) *Khim.-Farm. Zh.*, 24, No. 10 (1990) 69-71; *C.A.*, 114 (1991) 30226t.
- 992 Talou, T., Delmas, M. and Gaset, A.: Direct capture of volatiles emitted from entire black perigord truffle. *J. Essent. Oil Res.*, 1 (1989) 281-286; *C.A.*, 113 (1990) 170549e.
- 993 Udarov, B.G., Vyglazov, O.G., Manukov, E.N., Chuiko, V.A. and Izutova, L.V.: (Capillary gas chromatography of oxygen-containing monoterpenoids.) *Gidroliz. Lesokhim. Prom-st.*, No. 7 (1989) 17-18; *C.A.*, 113 (1990) 204203e.
- See also 749, 1168, 1169, 1227.

16. NITRO AND NITROSO COMPOUNDS

- 994 Atlas, E. and Schauffler, S.: Analysis of alkyl nitrates and selected halocarbons in the ambient atmosphere using a charcoal preconcentration technique. *Environ. Sci. Technol.*, 25 (1991) 61-67; *C.A.*, 114 (1991) 29217j.

- 995 Blanchard, P., Shepson, P.B., So, K.W., Schiff, H.I., Bottenheim, J.W., Gallant, A.J., Drummond, J.W. and Wong, P.: A comparison of calibration and measurement techniques for gas chromatographic determination of atmospheric peroxyacetyl nitrate (PAN). *Atmos. Environ.*, 24A (1990) 2839-2846; *C.A.*, 114 (1991) 48628k.
- 996 Stransky, V.: (Determination of nitrobenzene in workplace atmosphere by gas chromatography after sampling on activated charcoal and polymeric sorbents.) *Prac. Lek.*, 41 (1989) 195-200.

See also 803, 871, 1107, 1114.

17. AMINES, AMIDES AND RELATED NITROGEN COMPOUNDS

17a. Amines and polyamines

- 997 Bailey, E., Brooks, A.G., Bird, I., Farmer, P.B. and Street, B.: Monitoring exposure to 4,4'-methylenedianiline by the gas chromatography-mass spectrometry determination of adduct to hemoglobin. *Anal. Biochem.*, 190 (1990) 175-181.
- 998 Hessels, J., Kingma, A.W., Sturkenboom, M.C.J.M., Elzinga, H., van den Berg, G.A. and Muskiet, F.A.J.: Gas chromatographic determination of N-acetyliso-putreanine- γ -lactam, a unique catabolite of N¹-acetylspermidine. *J. Chromatogr.*, 563 (1991) 1-9.
- 999 Jiang, X.: (Determination of polyamines in urine of cancer patients by capillary gas chromatography.) *Fenxi Huaxue*, 18 (1990) 731-736; *C.A.*, 113 (1990) 207836z.
- 1000 Karlsson, S., Banhidi, Z.G. and Albertsson, A.C.: Gas chromatographic detection of volatile amines found in indoor air due to putrefactive degradation of casein-containing building materials. *Mater. Struct.*, 22 (1989) 163-169; *C.A.*, 113 (1990) 177352u.
- 1001 Macfarlane, R.G., Midgley, J.M., Watson, D.G. and Evans, P.D.: Identification and quantitation of phenylalanine, tyrosine and dihydroxyphenylalanine in the thoracic nervous system of the locust, *Schistocerca gregaria*, by gas chromatography-negative-ion chemical ionisation mass spectrometry. *J. Chromatogr.*, 532 (1990) 1-11.
- 1002 Pfundstein, B., Tricker, A.R. and Preussmann, R.: Determination of primary and secondary amines in foodstuffs using gas chromatography and chemiluminescence detection with a modified thermal energy analyser. *J. Chromatogr.*, 539 (1991) 141-148.

17b. Catecholamines and their metabolites

- 1003 Chang, S.Y., Moore, T.A., Devaud, L.L., Taylor, L.C.E. and Hollingsworth, E.B.: Analysis of rat brain microdialysate by gas chromatography-high-resolution selected-ion monitoring mass spectrometry. *J. Chromatogr.*, 562 (1991) 111-118.

17d. Other amine derivatives and amides (excl. peptides)

- 1004 Malaiyandi, M. and Goddard, M.J.: Development of analytical methodology and a report on collaborative study on the determination of morpholine, cyclohexylamine, and diethylaminoethanol in aqueous samples by direct aqueous injection gas chromatography. *J. Test. Eval.*, 18 (1990) 87-97; *C.A.*, 113 (1990) 158289n.

- 1005 Momozono, Y., Eto, S. and Isshiki, K.: (Gas chromatographic determination of saccharin in foods by using trimethylsilyldiazomethane.) *Eisei Kagaku*, 36 (1990) 56-61; *C.A.*, 113 (1990) 210204x.
- 1006 Tsuchinashi, H., Tatsuno, M. and Nishikawa, M.: (The analysis of quaternary ammonium compounds by pyrolysis gas chromatography/mass spectrometry and thin-layer chromatography.) *Eisei Kagaku*, 36 (1990) 28-35; *C.A.*, 113 (1990) 167025a.

See also 861, 896, 1212.

18. AMINO ACIDS AND PEPTIDES; CHEMICAL STRUCTURE OF PROTEINS

18a. Amino acids and their derivatives

- 1007 Arends, J., Chiu, F. and Bier, D.M.: Analysis of plasma hippurate in humans using gas chromatography/mass spectrometry: concentration and incorporation of infused [¹⁵N]glycine. *Anal. Biochem.*, 191 (1990) 401-410.
- 1008 Campbell, J.A., Weimer, W.C., Chess, E.K. and Scully, F.E., Jr.: Study of the reaction of diazomethane with dansylated amino acid derivatives by gas chromatography/mass spectrometry. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 520-522; *C.A.*, 113 (1990) 204197f.
- 1009 Fabian, V., Pinter-Szakacs, M. and Perl-Molnar, I.: Gas chromatography of tryptophan together with other amino acids in hydrochloric acid hydrolysates. *J. Chromatogr.*, 520 (1990) 193-199.
- 1010 Furuta, T., Takahashi, H. and Kasuya, Y.: Reversible reaction via a carbanion intermediate in the elimination of ammonia from L-histidine catalysed by histidine ammonia-lyase. *J. Chromatogr.*, 562 (1991) 363-368.
- 1011 Greenaway, W., May, J., English, S. and Whatley, F.R.: Metabolism of [¹⁵N]glycine and [¹³C]glycine by *Dionaea muscipula* studied by gas chromatography-mass spectrometry. *New Phytol.*, 114 (1990) 581-588; *C.A.*, 113 (1990) 228016x.
- 1012 Longo, A., di Toro, M., Galimberti, C. and Carenzi, A.: Determination of N-acetylcysteine in human plasma by gas chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 639-645.
- 1013 Lynes, G.W. and Hjelm, M.: Phenylalanine in whole blood and plasma - a candidate reference method. *J. Chromatogr.*, 562 (1991) 213-224.
- 1014 Mabbott, G.A.: Qualitative amino acid analysis of small peptides by GC/MS. *J. Chem. Educ.*, 67 (1990) 441-445.
- 1015 Tomida, I., Tsuyama, Y. and Hatanaka, A.: Simple procedure for preparing trifluoroacetylpropyl amino acids, acyl components in the racemization test for peptide synthesis by GLC. *Agric. Biol. Chem.*, 54 (1990) 1293-1294; *C.A.*, 113 (1990) 191930n.
- 1016 Warner, C.D., Branch, S.K., Burke, J.F., Chambers, L.M. and Young, V.R.: Microderivatization of 4-[¹⁸O]hydroxyproline and quantitation with a benchtop mass spectrometer. *J. Chromatogr.*, 562 (1991) 625-637.
- 1017 Wong, J.T.F., Baker, G.B. and Coutts, R.T.: A rapid, sensitive assay for γ -aminobutyric acid in brain using electron-capture gas chromatography. *Res. Commun. Chem. Pathol. Pharmacol.*, 70 (1990) 115-124; *C.A.*, 113 (1990) 224624w.

See also 765, 766, 775, 1001, 1029, 1156.

20. ENZYMES AND ENZYME ACTIVITY ESTIMATION

20a. *Oxidoreductases*

See 1144.

21. PURINES, PYRIMIDINES, NUCLEIC ACIDS AND THEIR CONSTITUENTS

21a. *Purines, pyrimidines, nucleosides, nucleotides*

1018 Benchekroun, Y., Desage, M., Ribon, B. and Brazier, J.L.: Gas chromatographic-mass spectrometric quantitation of tri-, di- and monomethylxanthines and uric acids from hepatocyte incubation media. *J. Chromatogr.*, 532 (1990) 261-275.

1019 Fedtke, N., Boucheron, J.A., Turner, M.J., Jr. and Swenberg, J.A.: Vinyl chloride-induced DNA adducts. I: Quantitative determination of N²-ethenoguanine based on electrophore labeling. *Carcinogenesis (London)*, 11 (1990) 1279-1285; *C.A.*, 113 (1990) 186180p.

See also 592.

22. ALKALOIDS

1020 Feyerabend, C. and Russell, M.A.H.: A rapid gas-liquid chromatographic method for the determination of cotinine and nicotine in biological fluids. *J. Pharm. Pharmacol.*, 42 (1990) 450-452; *C.A.*, 113 (1990) 167023y.

See also 931, 1023, 1027, 1151.

23. OTHER SUBSTANCES CONTAINING HETEROCYCLIC NITROGEN

23a. *Porphyryns and other pyrroles*

See 1053.

23c. *Indole derivatives and plant hormones (gibberelins)*

1021 Halket, J.M., Watkins, P.J., Przyborowska, A., Goodwin, B.L., Clow, A., Glover, V. and Sandler, M.: Isatin (indole-2,3-dione) in urine and tissues. Detection and determination by gas chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 279-287.

1022 Li, H., Yun, Z., Yang, Y. and Zhang, L.: (Simultaneous determination of indole-3-acetic acid and abscisic acid as the pentafluorobenzyl derivatives by electron-capture gas chromatography.) *Zhiwu Xuebao*, 32 (1990) 205-209; *C.A.*, 113 (1990) 168287z.

See also 1164.

23d. Pyridine derivatives

- 1023 Degen, P.H. and Schneider, W.: Rapid and sensitive determination of low concentrations of nicotine in plasma by gas chromatography with nitrogen-specific detection. *J. Chromatogr.*, 563 (1991) 193-198.
- 1024 Dunaevskii, Yu.M., Tokarev, M.I., Kogan, L.O. and Polyakova, A.A.: (Mass spectroscopic and GC-mass spectroscopic studies of nitrogenous bases in middle distillates.) *Khim. Tekhnol. Topl. Masel*, No. 9 (1990) 16-19; *C.A.*, 114 (1991) 9323n.

See also 1129.

23e. Other N-heterocyclic compounds

- 1025 Kuo, C.T., Tanabe, K., Imamiya, S. and Matsushita, H.: (Determination of aza heterocyclic compounds by capillary column gas chromatography.) *Takai Osen Gakkaishi*, 24 (1989) 196-207; *C.A.*, 113 (1990) 196787f.
- 1026 Papp, O., Szasz, G., Kökösi, J. and Hermecz, I.: Correlation between structure and gas chromatographic behaviour of nitrogen-containing heterocyclic compounds. I. Methyl substitution of pyridopyrimidine derivatives. *J. Chromatogr.*, 537 (1991) 365-370.
- 1027 Papp, O., Szasz, G., Kökösi, J. and Hermecz, I.: Correlation between structure and gas chromatographic behaviour of nitrogen-containing heterocyclic compounds. III. Variation of ring size. *J. Chromatogr.*, 537 (1991) 377-383.
- 1028 Papp, O., Szasz, G., Örfi, L. and Hermecz, I.: Correlation between structure and gas chromatographic behaviour of nitrogen-containing heterocyclic compounds. II. Alkyl substitution of quinazolone derivatives. *J. Chromatogr.*, 537 (1991) 371-376.
- 1029 Tredget, E.E., Falk, N., Scott, P.G., Hogg, A.M. and Burre, J.F.: Determination of 4-hydroxyproline in collagen by gas chromatography/mass spectrometry. *Anal. Biochem.*, 190 (1990) 259-265.

See also 745, 1112, 1116, 1126, 1211.

24. ORGANIC SULPHUR COMPOUNDS (INCL. GLUCOSINOLATES)

- 1030 Drozd, J., Havlova, P. and Novak, V.: Quantitative evaluation of headspace determination of dimethyl sulfide in malt. *J. Inst. Brew.*, 96 (1990) 69-73; *C.A.*, 113 (1990) 38769x.
- 1031 Eglinton, T.I., Damste, J.S.S., Kohnen, M.E.L. and de Leeuw, J.W.: Rapid estimation of the organic sulfur content of kerogens, coals and asphaltenes by pyrolysis-gas chromatography. *Fuel*, 69 (1990) 1394-1404; *C.A.*, 114 (1991) 9356a.
- 1032 Howe, B. and Kersting, R.: (Sulfur compound in natural gas. Measurements with a process gas chromatograph.) *GWF, Gas-Wasserfach: Gas/Erdgas*, 131 (1990) 14-21; *C.A.*, 113 (1990) 194531u.
- 1033 Kayashima, M., Iwasaki, Y. and Tatsuichi, S.: (Determination of low-ppm sulfur-containing odorous substances by a simple GC-FPD method without pre-concentration.) *Tokyo-to Kankyo Kagaku Kenkyusho Nenpo*, (1990) 52-58; *C.A.*, 114 (1991) 11406k.
- 1034 Lang, R.F. and Brown, C.J.: Determination of dimethyl sulfoxide and dimethyl sulfone in air. *Anal. Chem.*, 63 (1990) 186-189.

- 1035 Shinbori, H., Shirakawa, M., Shiba, H., Hirakawa, M., Kawamura, K. and Okamoto, H.: (A study on analysis of volatile sulfur compounds in human breath by gas chromatography.) *Hiroshima Daigaku Shigaku Zasshi*, 22 (1990) 257-261; *C.A.*, 113 (1990) 209252e.
- 1036 Thornton, D.C., Bandy, A.R., Ridgeway, R.G., Driedger, A.R., III and Lalevic, M.: Determination of part-per-trillion levels of atmospheric dimethyl sulfide by isotope dilution gas chromatography/mass spectrometry. *J. Atmos. Chem.*, 11 (1990) 299-308; *C.A.*, 114 (1991) 29223h.
- 1037 Trehy, M.L., Gledhill, W.E. and Orth, R.G.: Determination of linear alkylbenzenesulfonates and dialkyltetralinsulfonates in water and sediment by gas chromatography/mass spectrometry. *Anal. Chem.*, 62 (1990) 2581-2586.
- 1038 Zou, G., Chen, Z., Zhu, Q. and Ou, Z.: (Gas chromatographic analysis of isoprothiolane.) *Huaxue Shijie*, 31 (1990) 224-225; *C.A.*, 113 (1990) 147140f.

See also 805, 822, 1012, 1136, 1175.

25. ORGANIC PHOSPHORUS COMPOUNDS (INCL. SUGAR PHOSPHATES)

- 1039 DaTorre, S.D., Corr, P.B. and Creer, M.H.: A sensitive method for the quantification of the mass of inositol phosphates using gas chromatography-mass spectrometry. *J. Lipid Res.*, 31 (1990) 1925-1934; *C.A.*, 114 (1991) 20570m.
- 1040 Gandhe, B.R., Purnanand, Prasad, R., Danikhel, R.K., Shinde, S.K., Srivastava, R.K., Batra, B.S. and Rao, K.M.: Use of gas chromatography retention indexes for quantitative structure-activity relationship studies of dialkyl phenyl phosphates. *Pestic. Sci.*, 29 (1990) 379-385; *C.A.*, 114 (1991) 2239f.
- 1041 Ghosh, S. and Sherman, W.R.: Synthesis of mixtures of 2H₆ myo-inositol monophosphates suitable as internal standards for quantitative GC/MS and a simple synthesis of DL-myo-inositol-1-phosphate. *J. Labelled Compd. Radiopharm.*, 28 (1990) 181-185; *C.A.*, 113 (1990) 191799b.
- 1042 Kuno, Y., Hina, T., Akiyama, T. and Matsui, M.: Simultaneous determination of tributyl phosphate and dibutyl phosphate in spent fuel reprocessing streams by gas chromatography. *J. Chromatogr.*, 537 (1991) 489-493.

See also 786.

26. ORGANOMETALLIC AND RELATED COMPOUNDS

26a. Organometallic compounds

- 1043 Aue, W.A., Millier, B. and Sun, X.-Y.: Determination of (methylcyclopentadienyl)manganese tricarbonyl in gasolines by gas chromatography with flame photometric detection. *Anal. Chem.*, 62 (1990) 2453-2457.
- 1044 Evans, O., Jacobs, B.J. and Cohen, A.J.: Liquid-solid extraction of tributyltin from marine samples. *Analyst (London)*, 116 (1991) 15-19.
- 1045 Hattori, Y., Yamamoto, H., Nagai, K., Nonaka, K., Hashimoto, H., Nakamura, S., Nakamoto, M., Annen, K., Sakamori, S., Shiraishi, H. and Morita, M.: (Determination of tributyltin and triphenyltin compounds in industrial waste water by GC.) *Bunseki Kagaku*, 40 (1991) 25-31.

- 1046 Hungerford, J.M., Walker, K.D., Torkelson, J.D., Steinbrecher, K. and Wekell, M.M.: Determination of tri-*n*-butyltin in oysters by reaction-gas chromatography of hydride derivatives. *Talanta*, 37 (1990) 975-979.
- 1047 Vainiotalo, S. and Häyri, L.: Gas chromatographic determination of airborne dialkyltin dichlorides as hydride derivatives. *J. Chromatogr.*, 523 (1990) 273-280.
- 1048 Wang, Z. and Cui, X.: Study on the determination of trace methyl mercury in seawater by gas chromatography. *Chin. J. Oceanol. Limnol.*, 8 (1990) 37-45; *C.A.*, 113 (1990) 237392u.

See also 663.

26b. *Boranes, silanes and related non-metallic compounds*

- 1049 Al-Attar, A.F. and Nickless, G.: Determination of selenium by gas chromatography and comparison with graphite furnace atomic absorption spectrometry. *Analyst (London)*, 115 (1990) 1441-1446.
- 1050 Aramata, M., Kawate, Y. and Noguchi, N.: (Determination of volatile polydimethylsiloxane by adsorption using a charcoal column and pyrolysis GC.) *Bunseki Kagaku*, 40 (1991) T37-T40.

26c. *Coordination compounds*

- 1051 Gershkokhen, S.L. and Zhilyaeva, G.S.: (Gas chromatographic method for determining aluminium.) *U.S.S.R.* SU 1,587,441 (Cl. G01N31/22), 23 Aug. 1990, Appl. 4,306,172, 14 Sep. 1987; *C.A.*, 114 (1991) 35233c.
- 1052 Khuahwar, M.Y., Vasandani, A.G.M. and Soomro, A.I.: Separation of copper(II), nickel(III), palladium(II), and vanadium(IV) oxide complexes of bis(isovalerylacetone)ethylenediimine using solvent extraction and gas chromatography. *J. Chem. Soc. Pak.*, 12 (1990) 119-124; *C.A.*, 113 (1990) 243611f.
- 1053 Quimby, B.D., Dryden, P.C. and Sullivan, J.J.: Selective detection of volatile nickel, vanadium, and iron porphyrins in crude oils by gas chromatography-atomic emission spectroscopy. *J. High Resolut. Chromatogr.*, 14 (1991) 110-116.

27. VITAMINS AND VARIOUS ANIMAL GROWTH FACTORS (NON-PEPTIDIC)

- 1054 Gribanova, S.V., Kharitonov, Yu.Ya., Dzhabarov, D.N., Rudenko, B.A. and Yanovskii, M.Ts.: (Determination of vitamin E in commercial samples by using capillary chromatography.) *Khim.-Farm. Zh.*, 24, No. 11 (1990) 77-81; *C.A.*, 114 (1991) 49679q.
- 1055 Nakajima, N. and Nishikawa, H.: Separation and concentration of vitamin E from vegetable oils. *Jpn. Kokai Tokkyo Koho* JP 02,157,274 [90,157,274] (Cl. C07D311/72), 18 Jun. 1990, Appl. 88/309,645, 07 Dec. 1988; 3 pp.; *C.A.*, 113 (1990) 197958z.
- 1056 Vecchi, M., Walther, W., Glinz, E., Netscher, T., Schmid, T., Lalonde, M. and Vetter, W.: (Separation and quantification of all eight stereoisomers of α -tocopherol by chromatography.) *Helv. Chim. Acta*, 73 (1990) 782-789; *C.A.*, 114 (1991) 49668k.

See also 812.

28. ANTIBIOTICS

- 1057 Niewiadowska, A. and Semeniuk, S.: (Gas chromatographic determination of chloramphenicol in milk and animal tissues.) *Rozc. Panstw. Zakl. Hig.*, 40 (1989) 230-234; *C.A.*, 113 (1990) 229796p.
- 1058 Van Ginkel, L.A., van Rossum, H.J., Zoontjes, P.W., van Blitterswijk, H., Ellen, G., van der Heeft, E., de Jong, A.P.J.M. and Zomer, G.: Development and validation of a gas chromatographic-mass spectrometric procedure for the identification and quantification of residues of chloramphenicol. *Anal. Chim. Acta*, 237 (1990) 61-69.

29. INSECTICIDES, PESTICIDES AND OTHER AGROCHEMICALS

29a. General techniques

- 1059 Becker, G. and Schug, P.: (A micromethod for the rapid determination of pesticide residues in plant-derived foods.) *Dtsch. Lebensm.-Rundsch.*, 86 (1990) 239-242; *C.A.*, 113 (1990) 229799s.
- 1060 Cortes, H.J., Oldering, E.L. and Wetters, J.H.: Multi-dimensional chromatography using on-line coupled microcolumn liquid chromatography-capillary gas chromatography for quantitative pesticide residue analysis. *Anal. Chim. Acta*, 236 (1990) 173-182.
- 1061 Ngan, F. and Toofan, M.: Modification of preparation of diazomethane for methyl esterification of environmental samples analysis by gas chromatography. *J. Chromatogr. Sci.*, 29 (1991) 8-10.
- 1062 Walters, S.M.: Clean-up techniques for pesticides in fatty foods. *Anal. Chim. Acta*, 236 (1990) 77-78.

See also 1101, 1163, 1197.

29b. Chlorinated insecticides

- 1063 Dogheim, S.M., El-Shafeey, M., Afifi, A.M.H. and Abdel-Aleem, F.E.: Levels of pesticide residues in Egyptian human milk samples and infant dietary intake. *J. Assoc. Off. Anal. Chem.*, 74 (1991) 89-91.
- 1064 Duebelbeis, D., Kapila, S., Clevenger, T.E. and Yanders, A.F.: Application of a two-dimensional reaction chromatography system for confirmatory analysis of chlordane constituents in environmental samples. *Chemosphere*, 20 (1990) 1401-1408; *C.A.*, 114 (1991) 16887c.
- 1065 Imre, Z.: A rapid method for the determination of organochlorine pesticide residues in milk. *Doga: Turk Saglik Bilimleri Derg.*, 14 (1990) 185-195; *C.A.*, 113 (1990) 210211x.
- 1066 Klee, M.S. and Chang, I.: Optimizing temperature program and flow rates for capillary GC analysis of EPA-608 pesticides. *J. High Resolut. Chromatogr.*, 14 (1991) 18-24.
- 1067 Linckens, A. and Meierjohann, S.: (Determination of pesticides by gas chromatography.) *Gewaesserschutz, Wasser, Abwasser*, 114 (1990) 271-288; *C.A.*, 114 (1991) 49189e.
- 1068 Rodriguez, P., Permanyer, J., Grases, J.M. and Gonzales, C.: Confirmation method for the identification and determination of some organophosphorus and organochlorine pesticides in cocoa beans by gas chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 547-553.

- 1069 Saady, J.J. and Poklis, A.: Determination of chlorinated hydrocarbon pesticides by solid-phase extraction and capillary GC with electron capture detection. *J. Anal. Toxicol.*, 14 (1990) 301-304; *C.A.*, 113 (1990) 206289m.
- 1070 Tessari, J.D. and Winn, D.T.: Relative retention ratios of 38 chlorinated pesticides and polychlorinated biphenyls of five gas-liquid chromatographic columns. *J. Chromatogr. Sci.*, 29 (1991) 1-3.

See also 1165, 1181, 1184.

29c. *Phosphorus insecticides*

- 1071 Hanika, G., Seifert, K. and Dorn, U.: (A simple and rapid gas chromatographic determination of dimethoate residues in fruit and vegetables.) *Nahrung*, 33 (1989) 1023-1024; *C.A.*, 113 (1990) 150942z.
- 1072 Jitsunari, F., Asakawa, F., Nakajima, T., Shimada, J. and Ogata, M.: Determination of 3,5,6-trichloro-2-pyridinol levels in the urine of termite control workers using chlorpyrifos. *Acta Med. Okayama*, 43 (1989) 299-306; *C.A.*, 114 (1991) 48717p.
- 1073 Lino, C. de M. and Noronha da Silveira, M.I.: (Development of a method for the determination of organophosphorus and carbamate pesticide residues in potatoes.) *Rev. Port. Farm.*, 39 (1989) 123-128; *C.A.*, 113 (1990) 170556e.
- 1074 Toyoda, M., Adachi, K., Ida, T., Noda, K. and Minagawa, N.: Simple analytical method for organophosphorus pesticide residues in milk. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 770-772.

See also 781, 1068.

29d. *Carbamates*

- 1075 Gabrio, T., Schlenkrich, H. and Ennet, D.: (Pyrethroid residues in cumin and fenchel fruits.) *Zentralbl. Pharm., Pharmakother. Laboratoriumsdiagn.*, 129 (1990) 755-756; *C.A.*, 114 (1991) 49680h.
- 1076 Ling, C.F., Melian, G.P., Jimenez-Conde, F. and Revilla, E.: Comparative study of some columns for direct determination of carbofuran by gas-liquid chromatography with nitrogen-specific detection. *J. Chromatogr.*, 519 (1990) 359-362.
- 1077 Müller, H.-M. and Stan, H.-J.: Thermal degradation observed with different injection techniques: Quantitative estimation by the use of thermolabile carbamate pesticides. *J. High Resolut. Chromatogr.*, 13 (1990) 759-763.
- 1078 Sanchez-Brunete, C., Salto, T., Garcia-Baudin, J.M. and Tadeo, J.L.: Analysis of triallate residues in cereals and soil by gas chromatography with ion-trap detection. *J. Chromatogr.*, 562 (1991) 525-530.

See also 1073, 1136, 1204.

29e. *Herbicides*

- 1079 Fitzpatrick, T.M. and Gehrig, C.C.: Simultaneous determination of benefin and trifluralin in pesticide formulations by gas chromatography. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 981-982.
- 1080 Ngan, F. and Ikesaki, T.: Determination of nine acidic herbicides in water and soil by gas chromatography using an electron-capture detector. *J. Chromatogr.*, 537 (1991) 385-395.

- 1081 Schuette, S.A., Smith, R.G., Holden, L.R. and Graham, G.J.A.: Solid-phase extraction of herbicides from well water for determination by gas chromatography-mass spectrometry. *Anal. Chim. Acta*, 236 (1990) 141-144.
- 1082 Stelluto, S., Marcomini, A., di Corcia, A., Marchetti, M., Capri, S. and Liberatori, A.: Method comparison for herbicide determination in water: GC-MS versus HPLC and liquid-liquid versus solid phase extraction. *Ann. Chim. (Rome)*, 80 (1990) 369-377; *C.A.*, 114 (1991) 19339m.

See also 870, 921, 1061, 1078, 1142.

29f. Fungicides

- 1083 Xiao, Y., Fan, D. and Chen, H.: Gas chromatographic determination of systemic fungicide tricyclazole in soil and water. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 761-763.

See also 870.

29g. Other types of pesticides and various agrochemicals

- 1084 Class, T.J.: Optimized gas chromatographic analysis of natural pyrethrins and pyrethroids. *J. High Resolut. Chromatogr.*, 14 (1991) 48-51.
- 1085 Hayakawa, S., Niinomi, J., Kato, S. and Kanamaru, T.: (Retention time and mass number of agrochemicals by capillary column GC/MS.) *Mie-ken Kankyo Kagaku Senta Kenkyu Hokoku*, No. 10 (1990) 53-56; *C.A.*, 114 (1991) 19335g.

See also 781, 782, 797.

31. PLASTICS AND THEIR INTERMEDIATES

- 1086 Ashraf-Khorassani, M. and Levy, J.M.: Quantitative analysis of polymer additives in low density polyethylene using supercritical fluid extraction/supercritical fluid chromatography. *J. High Resolut. Chromatogr.*, 13 (1990) 742-747.
- 1087 Edkins, T.J., Notorgiacomo, V.J. and Biesenberger, J.A.: A direct injection gas-liquid chromatographic method to monitor polymer melt devolatilization: methyl methacrylate in poly(methyl methacrylate). *Polym. Eng. Sci.*, 30 (1990) 1500-1503; *C.A.*, 114 (1991) 24954n.
- 1088 Fanska, C.B., Byerley, T.J. and Eick, J.D.: Indirect determination of isocyanates by gas chromatography. *J. Chromatogr.*, 537 (1991) 357-364.
- 1089 He, B., Guo, X., Yang, Z., He, D. and Shi, X.: (Studies on copolymers crosslinked with triallyl isocyanurate. (II). Preparation, structure and properties of saponified copolymer.) *Gaodeng Xuexiao Huaxue Xuebao*, 11 (1990) 873-876; *C.A.*, 114 (1991) 25186a.
- 1090 He, B., Guo, X., Yang, Z., Zhao, F. and Yu, Z.: (Synthesis and chromatography properties of copolymers crosslinked with triallyl isocyanurate. (I.)) *Gaodeng Xuexiao Huaxue Xuebao*, 11 (1990) 739-742; *C.A.*, 113 (1990) 213131g.
- 1091 Li, W. and Feng, Z.: (Study of inverse gas chromatography as a means for studying phase separation of polymer blends. III.) *Gaofenzi Cailliao Kexue Yu Gongcheng*, 5, No. 1 (1989) 48-53; *C.A.*, 113 (1990) 232392j.
- 1092 Liu, H., Fu, R., Zhu, P., Ye, M. and Shi, L.: Characterization of poly(styrene-dimethylsiloxane) block copolymer by high-resolution pyrolysis-gas chromatography/mass spectrometry. *J. Anal. Appl. Pyrolysis*, 18 (1990) 79-89.

- 1093 Negoescu, E., Nita, M., Chiriac, G. and Botea, M.: (Characterization of indigenous polyethylene glycols with 200, 400, 600 molecular weights by thin layer and gas chromatography.) *Rev. Chim. (Bucharest)*, 41 (1990) 173-177; *C.A.*, 113 (1990) 232404q.
- 1094 Rao, M.R. and Radhakrishnan, T.S.: Thermal degradation of functionally terminated polybutadienes: pyrolysis gas chromatography and thermogravimetric studies. *J. Appl. Polym. Sci.*, 41 (1990) 2251-2263; *C.A.*, 113 (1990) 232203y.
- 1095 Ryabikova, V.M., Tumina, S.D. and Zigel, A.N.: Probability method for pyrolysis gas chromatographic data treatment and elaboration of a computer system for the identification of polymers. *J. Chromatogr.*, 520 (1990) 121-129.
- 1096 Shapi, M.M. and Hesso, A.: Gas chromatographic-mass spectrometric analysis of some potential toxicants amongst volatile compounds emitted during large-scale thermal degradation of poly(acrylonitrile-butadiene-styrene) plastic. *J. Chromatogr.*, 562 (1991) 681-696.
- 1097 Watanabe, K. and Okumoto, T.: (Standardization and computer identification of pyrograms for high-resolution pyrolysis gas chromatography.) *Nippon Gomu Kyokaishi*, 63 (1990) 450-459; *C.A.*, 113 (1990) 173081g.
- 1098 Wetzel, H. and Haussler, K.G.: (Observation of epoxy resin curing by inverse gas chromatography.) *Plaste Kautsch.*, 37 (1990) 219-224; *C.A.*, 113 (1990) 173359d.
- 1099 Yamada, T.: (Structural characterization of ethylene-propylene-diene rubbers by high-resolution pyrolysis gas chromatography.) *Toyoda Gosei Giho*, 32 (1990) 35-41; *C.A.*, 113 (1990) 133956q.
- 1100 Zhang, Y. and Wu, L.: (Determination of residues of EA [ethyl acrylate] and MMA [methyl methacrylate] in aqueous acrylate copolymer emulsion.) *Zhongguo Fangzhi Daxue Xuebao*, 15, No. 5 (1989) 82-88; *C.A.*, 113 (1990) 232408u.

See also 614, 617, 1050.

32. DRUG ANALYSIS

32a. Drug analysis, general techniques

- 1101 Furton, K.G. and Rein, J.: Trends in techniques for the extraction of drugs and pesticides from biological specimens prior to chromatographic separation and detection. *Anal. Chim. Acta*, 236 (1990) 99-114.
- 1102 Rajan, R.: Application of gas chromatography (GC) in the management of the control of substances hazardous to health regulations (COSHH) 1988. *Anal. Proc.*, 27 (1990) 334-335.
- 1103 Rood, H.D.: Comparison of liquid-liquid and solid-phase extraction techniques for drugs in urine and effects on the lifetime and performance of fused-silica capillary columns. *Anal. Chim. Acta*, 236 (1990) 115-120.
- 1104 Wilson, I.D.: Observation on the usefulness of internal standards in the analysis of drugs in biological fluids. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 79-82; *C.A.*, 113 (1990) 223952q - a review with 5 refs.

See also 614, 641, 1149, 1257.

32b. Antirheumatics and antiinflammatory drugs

- 1105 Dawson, M., Smith, M.D. and McGee, C.M.: Gas chromatography/negative ion chemical ionization/tandem mass spectrometric quantification of indomethacin in plasma and synovial fluid. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 453-458; *C.A.*, 113 (1990) 144745w.

- 1106 Giachetti, C., Zanolò, G., Poletti, P. and Perovanni, F.: High resolution gas chromatography determination of twelve acidic non-steroidal anti-inflammatory drugs (NSAIDs) as methyl esters derivatives in plasma. *J. High Resolut. Chromatogr.*, 13 (1990) 789-792.

32c. *Autonomic and cardiovascular drugs*

- 1107 Booth, B.P., Bennett, B.M., Brien, J.F., Elliott, D.A., Marks, G.S., McCans, J.L. and Nakatsu, K.: Assay of glyceryl trinitrate, isosorbide dinitrate, and their metabolites in plasma by large-bore capillary column gas-liquid chromatography. *Biopharm. Drug Dispos.*, 11 (1990) 663-677; *C.A.*, 114 (1991) 91c.
- 1108 Hou, Y.: (The determination of cantharides by gas chromatography/mass spectrometry and gas chromatography/Fourier-transform infrared spectroscopy.) *Yaowu Fenxi Zazhi*, 10 (1990) 268-271; *C.A.*, 114 (1991) 49674j.
- 1109 Kwok, D.W.D., Pillai, G., Vaughan, R., Axelson, J.E. and McErlane, K.M.: Preparative high-performance liquid chromatography and preparative thin-layer chromatography isolation of tocainide carbamoyl-O- β -D-glucuronide: structural characterization by gas chromatography-mass spectrometry and fast atom bombardment-mass spectrometry. *J. Pharm. Sci.*, 79 (1990) 857-861.
- 1110 Lisi, A.M., Trout, G.J. and Kazlauskas, R.: Screening for diuretics in human urine by gas chromatography-mass spectrometry with derivatization by direct extractive alkylation. *J. Chromatogr.*, 563 (1991) 257-270.
- 1111 Maurer, H.H.: Identification of antiarrhythmic drugs and their metabolites in urine. *Arch. Toxicol.*, 64 (1990) 218-230; *C.A.*, 113 (1990) 164836e.
- 1112 Moore, C.M., Tebbett, I.R., Kalita, S. and Artemenko, M.: Rapid extraction and detection of mazindol in horse urine. *J. Pharm. Biomed. Anal.*, 8 (1990) 445-448; *C.A.*, 113 (1990) 204351b.
- 1113 Takagi, K., Watanabe, Y. and Shibuya, T.: (A neurochemical study on brain cholinergic neuron. A newly improved pyrolysis gas chromatography/mass spectrometry (PY/GC/MS) method and its application.) *Nippon Yakurigaku Zasshi*, 96 (1990) 275-288; *C.A.*, 114 (1991) 36112z.
- 1114 Torfgard, K., Ahlner, J. and Norlander, B.: Simultaneous determination of glyceryl trinitrate and its two dinitrate metabolites in plasma and tissues by capillary gas chromatography. *J. Chromatogr.*, 534 (1990) 196-201.
- 1115 Zarapkar, S.S. and Salunkhe, U.B.: Determination of pentoxifylline in pharmaceutical preparations using gas chromatography. *Indian Drugs*, 27 (1990) 622-624; *C.A.*, 114 (1991) 12298p.

See also 799, 1105, 1148.

32d. *Central nervous system drugs*

- 1116 Andriollo, O., Lartigue-Mattei, C., Chabard, J.L., Galmier, M.J., Bargnoux, H., Petit, J., Berger, J.A. and Pognat, J.F.: Assay of *m*-chlorophenyl-piperazine in plasma and brain of rat by capillary gas chromatography-mass spectrometry. *J. Chromatogr.*, 533 (1990) 215-223.
- 1117 Björk, M., Pettersson, K.-J. and Österlöf, G.: Capillary gas chromatographic method for the simultaneous determination of local anaesthetics in plasma samples. *J. Chromatogr.*, 533 (1990) 229-234.
- 1118 Dixit, V., Nguyen, H. and Dixit, V.M.: Solid-phase extraction of fluoxetine and norfluoxetine from serum with gas chromatography-electron-capture detection. *J. Chromatogr.*, 563 (1991) 379-384.
- 1119 Greenblatt, D.J., Javaid, J.I., Lochniskar, A., Harmatz, J.S. and Shader, R.I.: Gas chromatographic analysis of alprazolam in plasma: replicability, stability and specificity. *J. Chromatogr.*, 534 (1990) 202-207.

- 1120 Harvey, D.J., Samara, E. and Mechoulam, R.: Urinary metabolites of cannabidiol in dog, rat and man and their identification by gas chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1990) 299-322.
- 1121 Inoue, T., Tanaka, K. and Ohmori, T.: (Mass spectrometry of drugs and poisons. 9. Benzodiazepine drugs.) *Kagaku Keisatsu Kenkyusho Hokoku, Hokagaku-hen*, 43 (1990) 64-69; *C.A.*, 114 (1991) 12311n.
- 1122 Johansen, M., Rasmussen, K.E. and Christophersen, A.S.: Determination of pholcodine and its metabolites in urine by capillary gas chromatography. *J. Chromatogr.*, 532 (1990) 277-284.
- 1123 Kintz, P. and Mangin, P.: Rapid GC/MS analysis of metapramine in human fluids. *Fresenius' Z. Anal. Chem.*, 338 (1990) 303-304.
- 1124 Köppel, C. and Tenczer, J.: Mass spectral characterization of urinary metabolites of D,L-kawain. *J. Chromatogr.*, 562 (1991) 207-211.
- 1125 Lenchik, N.V., Rudenko, B.A., Dzhabarov, D.N. and Egorov, N.V.: (Gas chromatographic determination of nitrogen-containing anticonvulsant drugs.) *Farmatsiya (Moscow)*, 39, No. 5 (1990) 44-47; *C.A.*, 114 (1991) 88g.
- 1126 Lillsunde, P. and Seppälä, T.: Simultaneous screening and quantitative analysis of benzodiazepines by dual-channel gas chromatography using electron-capture and nitrogen-phosphorus detection. *J. Chromatogr.*, 533 (1990) 97-110.
- 1127 Rao, G.R., Avadhanulu, A.B., Pantulu, A.R.R. and Vatsa, D.K.: Gas liquid chromatographic determination of imipramine hydrochloride and diazepam in pharmaceutical dosage forms. *Indian Drugs*, 27 (1990) 582-585; *C.A.*, 113 (1990) 218371v.
- 1128 Rao, G.R., Avadhanulu, A.B., Vatsa, D.K. and Pantulu, A.R.R.: Gas liquid chromatographic determination of paracetamol and methocarbamol in single and combined dosage forms. *Indian Drugs*, 27 (1990) 576-580; *C.A.*, 113 (1990) 218369a.
- 1129 Rosseel, M.T., Bogaert, M.G. and Huyghens, L.: Determination of the calcium antagonist nimodipine in plasma by capillary gas chromatography and nitrogen detection. *J. Chromatogr.*, 533 (1990) 224-228.
- 1130 Uhrich, M. and Tillmans, U.: (Identification and quantification of amphetamine and methamphetamine.) *GIT-Suppl.*, No. 1 (1990) 47-51; *C.A.*, 113 (1990) 184122x.
- 1131 Watts, V.W. and Caplan, Y.H.: Evaluation of the Coat-A-Count ¹²⁵I fentanyl RIA: Comparison of ¹²⁵I RIA and GC/MS-SIM for quantification of fentanyl in case urine specimens. *J. Anal. Toxicol.*, 14 (1990) 266-272; *C.A.*, 114 (1991) 19041h.
- 1132 Weston, S.I., Japp, M., Partridge, J. and Osselton, M.D.: Collection of analytical data for benzodiazepines and benzophenones. Appendix. *J. Chromatogr.*, 538 (1991) 277-284.
- 1133 Woollard, P.M., Salmon, J.A. and Padfield, A.D.: Use of high-performance liquid chromatography-thermospray mass spectrometry and gas chromatography-electron-impact mass spectrometry in the identification of the metabolites of α -methylacetohydroxamic acids, potential anti-asthmatic agents. *J. Chromatogr.*, 562 (1991) 249-256.

See also 1104, 1149.

32e. *Chemotherapeutics (exc. cytostatics and antibiotics)*

- 1134 Macrae, P.V.: Quantitative analysis of the antifungal agent, fluconazole, by capillary gas chromatography with ion-trap detection. *Methodol. Surv. Biochem. Anal.*, 20 (1990) 145-152; *C.A.*, 114 (1991) 63v.

- 1135 Rao, G.R., Avadhanulu, A.B. and Pantulu, A.R.R.: Gas liquid chromatographic determination of sulfamethoxypyridazine and pyrimethamine in dosage forms. *Indian Drugs*, 28 (1990) 38-42; *C.A.*, 114 (1991) 12308s.
- 1136 Scappaticci, B., Soubeyrand, J., Rousseau-Tsangaris, M., Desage, M., Brazier, J.L. and Coquet, B.: Determination of sodium diethyldithiocarbamate (Imuthiol) and its S-methyl metabolite by gas chromatography-mass spectrometry. Use of deuteromethyl iodide derivatization. *J. Chromatogr.*, 534 (1990) 57-66.
- 1137 Sipahimalani, A.T., Fulzele, D.P. and Heble, M.R.: Rapid method for the detection and determination of artemisinin by gas chromatography. *J. Chromatogr.*, 538 (1991) 452-455.
- 1138 Tai, S.S.-C., Cargile, N., Barnes, C.J. and Kijak, P.: Determination of pyrantel in swine liver by flame ionization gas chromatography and confirmation by gas chromatography/mass spectrometry. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 883-886.
- 1139 Takatsuki, K. and Kikuchi, T.: Gas chromatographic-mass spectrometric determination of six sulfonamide residues in egg and animal tissues. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 886-892.
- 1140 Takatsuki, K.: Gas chromatographic-mass spectrometric determination of oxolinic acid in fish using selected ion monitoring. *J. Chromatogr.*, 538 (1991) 259-267.
- 1141 Tapanes, R.D., Ramos, F., Avila, J.P., Rosado, A. and Fajardo, D.: Identification of a chloroquine artifact by gas chromatography-mass spectrometry. *J. Chromatogr.*, 532 (1990) 400-404.
- 1142 Wilson, R.T., Groneck, J.M., Henry, A.C. and Rowe, L.D.: Multiresidue assay for benzimidazole anthelmintics by liquid chromatography and confirmation by gas chromatography/selected-ion monitoring electron impact mass spectrometry. *J. Assoc. Off. Anal. Chem.*, 74 (1991) 56-67.

32g. Other drug categories

- 1143 Brownsill, R., Wallace, D., Taylor, A. and Campbell, B.: Study of human urinary metabolism of fenfluramine using gas chromatography-mass spectrometry. *J. Chromatogr.*, 562 (1991) 267-277.
- 1144 Takano, T., Abe, S. and Hata, S.: A selected ion monitoring method for quantifying simvastatin and its acid form in human plasma, using the ferroceneboronate derivative. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 577-581; *C.A.*, 113 (1990) 184127c.

See also 1110.

32h. Toxicological and forensic applications

- 1145 Burkhard, L.P., Durhan, E.J. and Lukasewycz, M.T.: Identification of nonpolar toxicants in effluents using toxicity-based fractionation with gas chromatography/mass spectrometry. *Anal. Chem.*, 63 (1991) 277-283.
- 1146 Clatworthy, A.J., Oon, M.C.H., Smith, R.N. and Whitehouse, M.J.: Gas chromatographic-mass spectrometric confirmation of radioimmunoassay results for cannabinoids in blood and urine. *Forensic Sci. Int.*, 46 (1990) 219-230; *C.A.*, 113 (1990) 206280b.
- 1147 Harvey, D.J. and Brown, N.K.: Metabolites of the 1',2'-dimethylheptyl analog of delta-8-tetrahydrocannabinol in the mouse and their identification by gas chromatography/mass spectrometry. *Biomed. Environ. Mass Spectrom.*, 19 (1990) 619-627; *C.A.*, 114 (1991) 35346s.

- 1148 Köppel, C., Tenczer, J. and Peixoto-Menezes, K.M.: Formation of formaldehyde adducts from various drugs by use of methanol in a toxicological screening procedure with gas chromatography-mass spectrometry. *J. Chromatogr.*, 563 (1991) 73-81.
- 1149 Phillips, A.M., Logan, B.K. and Stafford, D.T.: Further application for capillary gas chromatography in routine quantitative toxicological analyses. *J. High Resolut. Chromatogr.*, 13 (1990) 754-758.
- 1150 Schep, R.A.: Precision and accuracy in the quantitation of carboxytetrahydrocannabinol by isotope dilution gas chromatography/mass spectrometry. *J. Anal. Toxicol.*, 14 (1990) 296-300; *C.A.*, 113 (1990) 206308s.
- 1151 Sperling, A.: Determination of heroin and some common adulterants by capillary gas chromatography. *J. Chromatogr.*, 538 (1991) 269-275.
- 1152 Wimbish, G.H. and Johnson, K.G.: Full spectral GC/MS identification of Δ^9 -carboxytetrahydrocannabinol in urine with the Finnigan ITS40. *J. Anal. Toxicol.*, 14 (1990) 292-295; *C.A.*, 113 (1990) 206307r.

32i. Plant extracts

- 1153 Nho, K.B. and Sohn, H.J.: (Determination of the concentration of panaxynol, panaxydol and panaxytriol by capillary-GC(FID)[gas chromatographic method (flame ionization detector)].) *Koryo Insam Hakhoechi*, 13 (1989) 183-188; *C.A.*, 113 (1990) 178355j.

33. CLINICO-CHEMICAL APPLICATIONS

33b. Complex mixtures and profiling (single compounds by cross-reference only)

- 1154 Haga, H., Horie, Y., Ikeda, H., Oka, H. and Nakajima, T.: Urinary polyol profiles in patients with chronic liver diseases and their correlation with severity, as obtained by capillary gas chromatography. *Anal. Sci.*, 6 (1990) 667-670.
- 1155 Haga, H., Kamei, S., Ohkubo, A. and Nakajima, T.: Diagnostic profiling analysis of polyols in urine samples of patients with various diseases performed by capillary gas chromatography. *Anal. Sci.*, 6 (1990) 657-666.
- 1156 Shoemaker, J.D. and Elliott, W.H.: Automated screening of urine samples for carbohydrates, organic and amino acids after treatment with urease. *J. Chromatogr.*, 562 (1991) 125-138.

See also 866, 907, 916, 924, 929, 932, 935, 936, 957, 973, 997, 999, 1007, 1010, 1013, 1035, 1140.

34. FOOD ANALYSIS

34b. Complex mixtures (single compounds by cross-reference only)

- 1157 Baloga, D.W., Reineccius, G.A. and Miller, J.W.: Characterization of ham flavor using an atomic emission detector. *J. Agric. Food Chem.*, 38 (1990) 2021-2026.
- 1158 Chirtulov, V.G., Vas'kina, V.A. and Aref'eva, S.V.: (Reverse gas chromatography.) *Pishch. Prom-st. (Moscow)*, No. 8 (1990) 66-67; *C.A.*, 113 (1990) 210253n.

- 1159 Loeliger, J.: Headspace gas analysis of volatile hydrocarbons as a tool for the determination of the state of oxidation of foods stored in sealed containers. *J. Sci. Food Agric.*, 52 (1990) 119-128; *C.A.*, 113 (1990) 076868m.
- 1160 Lu, J. and Hu, G.: (Determination of alcohol content in beer by gas chromatography.) *Shipin Yu Fajiao Gongye*, No. 3 (1990) 55-57; *C.A.*, 114 (1991) 22392d.
- 1161 Mitsuhashi, T. and Kaneda, Y.: Gas chromatographic determination of total iodine in foods. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 790-792.
- 1162 Montano, A., Sanchez, A.H. and Rejano, L.: Rapid quantitative analysis of headspace components of green olive brine. *J. Chromatogr.*, 521 (1990) 153-157.
- 1163 Müller, H.-M. and Stan, H.-J.: Pesticide residue analysis in food with CGS - study of long-term stability by the use of different injection techniques. *J. High Resolut. Chromatogr.*, 13 (1990) 697-701.
- 1164 Suzuki, T., Nemoto, S. and Saito, Y.: (Determination of a plant growth regulator, daminozide, and 1,1-dimethylhydrazine in fruits and fruit juice by gas chromatography.) *Shokuhin Eiseigaku Zasshi*, 31 (1990) 177-181; *C.A.*, 113 (1990) 210219f.
- 1165 Tuinstra, L.G.M.T., van Rijn, J.A., Roos, A.H., Traak, W.A., van Mazijk, R.J. and Kolkman, R.J.W.: Determination of planar chlorobiphenyls in animal fat. *J. High Resolut. Chromatogr.*, 13 (1990) 797-802.

See also 833, 835, 843, 879, 882, 898, 910, 912, 917, 926, 934, 937, 942, 947, 950, 959, 968, 971, 1005, 1046, 1059, 1062, 1063, 1064, 1065, 1068, 1071, 1073, 1074, 1075, 1138, 1139, 1173, 1176, 1211, 1249.

34c. *Organoleptically important compounds (flavors, odors, volatiles)*

- 1166 Anker, L.S., Jurs, P.C. and Edwards, P.A.: Quantitative structure-retention relationship studies of odor-active aliphatic compounds with oxygen-containing functional groups. *Anal. Chem.*, 62 (1990) 2676-2684.
- 1167 Boison, J.O.K. and Tomlinson, R.H.: New sensitive method for the examination of the volatile flavor fraction of cabernet sauvignon wines. *J. Chromatogr.*, 522 (1990) 315-327.
- 1168 Ding, D., Zhu, M., Huang, Z. and Song, Z.: Headspace analysis of *Osmanthus fragrans* Lour. *J. Essent. Oil Res.*, 1 (1989) 295-297; *C.A.*, 113 (1990) 14872h.
- 1169 Dubrova, M.A., Mindlin, L.O., Shchedrina, M.M., Belfer, A.G., Nikitina, M.A. and Rudenko, B.A.: Headspace gas chromatography with open-tubular columns for determining the evaporation rate of essential oils, perfumery compositions and perfumes. *J. Chromatogr.*, 520 (1990) 169-174.
- 1170 Kempfert, K.D.: (Analysis of aroma compounds by combined GC-FTIR.) *Lebensm.-Biotechnol.*, 7 (1990) 132-133; *C.A.*, 114 (1991) 4938g.
- 1171 Loughrin, J.H., Hamilton-Kemp, T.R., Andersen, R.A. and Hildebrand, D.F.: Volatiles from flowers of *Nicotiana glauca*, *N. glauca* and *malus x domestica*: headspace components and day/night changes in their relative concentrations. *Phytochemistry*, 29 (1990) 2473-2477; *C.A.*, 113 (1990) 148951h.
- 1172 Martin, B. and Etiévant, P.: Quantitative determination of solerone and sotolon in flor sherries by two-dimensional-capillary. *J. High Resolut. Chromatogr.*, 14 (1991) 133-135.
- 1173 Mazza, G. and Petrzak, E.: Headspace volatiles and sensory characteristics of earthy, musty flavored potatoes. *Food Chem.*, 36 (1990) 97-112; *C.A.*, 113 (1990) 22404p.

- 1174 Salles, C., Jallageas, J.-C. and Crouzet, J.: Chromatographic separation and partial identification of glycosidically bound volatile components of fruit. *J. Chromatogr.*, 522 (1990) 255-265.
- 1175 Skapska, S. and Karwowska, K.: (Method for garlic evaluation with respect to usefulness in flavor extracts production. Part I. Preliminary results.) *Pr. Inst. Lab. Badaw. Przem. Spozyw.*, 41 (1990) 91-104; *C.A.*, 114 (1991) 22602x.
- 1176 Yasumara, A. and Shibamoto, T.: Headspace volatiles from heated pork fat. *Food Chem.*, 37 (1990) 13-20; *C.A.*, 113 (1990) 22400j.

See also 1030, 1033.

35. ENVIRONMENTAL ANALYSIS

35a. General papers and reviews

- 1177 Mouradian, R.F.: Fast gas chromatography for industrial hygiene analysis and monitoring. Avail. *Univ. Microfilms Int.*, Order No. DA9013979, 1989, 258 p.; *C.A.*, 114 (1991) 11414m.
- 1178 Namiesnik, J., Gorecki, T., Biziuk, M. and Torres, L.: Isolation and preconcentration of volatile organic compounds from water. *Anal. Chim. Acta*, 237 (1990) 1-60 - a review with 695 refs.
- 1179 Rajagopal, R.: Economics of screening in the detection of organics in ground water. *Chemometrics Intel. Lab. Systems*, 9 (1990) 261-272.
- 1180 Rudolph, J., Müller, K.P. and Koppman, R.: Sampling of organic volatiles in the atmosphere at moderate and low pollution levels. *Anal. Chim. Acta*, 236 (1990) 197-211 - a review with 108 refs.
- 1181 Schantz, M.M., Benner, B.A., Jr., Chesler, S.W., Koster, B.J., Hehn, K.E., Stone, S.F., Kelly, N.R., Zeisler, R. and Wise, S.A.: Preparation and analysis of a marine sediment reference material for the determination of trace organic constituents. *Fresenius' Z. Anal. Chem.*, 338 (1990) 501-504 - a review with 43 refs.
- 1182 Schlegelmilch, F.: Erfassung flüchtiger Schadstoffe in Umweltproben (3). Dynamische Headspace-GC. *LaborPraxis*, 14 (1990) 958-964.
- 1183 Velapoldi, R.A. and Dorko, W.D.: Standards for atmospheric measurements. *Fresenius' Z. Anal. Chem.*, 338 (1990) 479-485 - a review with 19 refs.
- 1184 Visse, T. and Vredenburg, M.J.: Cryotrapping gas chromatography-Fourier transform infrared spectrometry in environmental analysis: a pilot study. *Anal. Chim. Acta*, 240 (Vibr. Spectr., Vol. 1) (1990) 205-210.

See also 884, 1145.

35b. Air pollution (complex mixtures; single compounds by cross-reference only)

- 1185 Bailey, J.C.: Gas chromatography applied to emissions from current and low emission technology vehicles. *Anal. Proc.*, 27 (1990) 272-274.
- 1186 Lyashenko, V.I., Rusakova, L.T. and Chekal, V.N.: (Comparative capillary chromatography and its application to the analysis of polluted air.) *Gig. Sanit.*, No. 1 (1990) 74-76; *C.A.*, 113 (1990) 196794f.
- 1187 Ramsey, R.S., Moneyhun, J.H. and Jenkins, R.A.: Generation, sampling and chromatographic analysis of particulate matter in dilute sidestream tobacco smoke. *Anal. Chim. Acta*, 236 (1990) 213-220.

1188 Rao, M.V.R.K.: Application of GC-MS technique in indoor air pollution. *Indian J. Environ. Prot.*, 9 (1989) 89-91; *C.A.*, 113 (1990) 177296d - a review with 15 refs.

See also 629, 637, 841, 846, 861, 864, 893, 899, 901, 921, 927, 994, 995, 996, 1000, 1034, 1036, 1047, 1050, 1180, 1183.

35c. *Water pollution (complex mixtures; single compounds by cross-reference only)*

- 1189 Avgul, T.V., Gudyno, T.V. and Senyavin, M.M.: (Sorbptive preconcentration of regulated organic compounds from water prior to gas chromatography.) *Probl. Anal. Khim.*, 10 (1990)=211-220; *C.A.*, 114 (1991) 29811y.
- 1190 Bruchet, A., Legrand, M.F., Arpino, P. and Dilettato, D.: Recent methods for the determination of volatile and non-volatile organic compounds in natural and purified drinking water. *J. Chromatogr.*, 562 (1991) 469-480.
- 1191 Cremonesi, A., Rindone, B., Galassi, S. and Guzzella, L.: (Extraction and analysis of organic trace pollutants in river water by GC/MS.) *Lab. 2000*, 4, No. 1 (1990) 55-58; *C.A.*, 113 (1990) 177827p.
- 1192 Gao, Y., Zhang, G., Ma, Y. and Xin, B.: (A purge-and-trap concentration apparatus for the analysis of trace volatile organics in water.) *Fenxi Huaxue*, 17 (1989) 944-948; *C.A.*, 113 (1990) 120500m.
- 1193 Guardiola, A., Ventura, F., Matia, L., Caixach, J. and Rivera, J.: Gas chromatographic-mass spectrometric characterization of volatile organic compounds in Barcelona tap water. *J. Chromatogr.*, 562 (1991) 481-492.
- 1194 Koe, L.C.C. and Tan, N.C.: GC-MS identification of gaseous volatiles in wastewater. *Environ. Monit. Assess.*, 15 (1990) 13-24; *C.A.*, 113 (1990) 197130y.
- 1195 Korber, H.G. and Grotehans, J.: (Gas chromatography/mass spectrometry techniques and appropriate sample preparation for the study of wastewaters from coke plants and the coal beneficiation industry.) *Gewaesserschutz, Wasser, Abwasser*, 114 (1990) 39-59; *C.A.*, 113 (1990) 217645a.
- 1196 Kraut-Vass, A. and Thoma, J.: Performance of an extraction disk in synthetic organic chemical analysis using gas chromatography-mass spectrometry. *J. Chromatogr.*, 538 (1991) 233-240.
- 1197 Manez, J., Piso, Y., Molto, J.C. and Font, G.: Solid-phase extraction of pesticides from water samples. *J. High Resolut. Chromatogr.*, 13 (1990) 843-845.
- 1198 Morimoto, M., Uchimura, Y., Haraguchi, K. and Shinohara, R.: (A screening method for 34 kinds of organic pollutants in water by GC/MS-SIM.) *Suishitsu Odaku Kenkyu*, 13 (1990) 311-319; *C.A.*, 13 (1990) 158312q.
- 1199 Ovelheiro Narvion, J.L., Felipe Portero, S. and Mutuberria Cortabitarte, M.: (Characterization of wastewater from epoxy resin manufacture.) *Ing. Quim. (Madrid)*, 22 (1990) 131-135; *C.A.*, 113 (1990) 177880q.
- 1200 Rodger, C.E., Huck, P.M., Daignault, S.A. and Williams, D.T.: Use of a chi-squared procedure for comparison of complex gas chromatograms. *Water Pollut. Res. J. Can.*, 24 (1989) 233-253; *C.A.*, 114 (1991) 29808c.
- 1201 Rosell, A., Gomez-Belinchon, J.I. and Grimalt, J.O.: Gas chromatographic-mass spectrometric analysis of urban-related aquatic and airborne volatile organic compounds. Study of the extracts obtained by water closed-loop stripping and air adsorption with charcoal and polyurethane foam. *J. Chromatogr.*, 562 (1991) 493-506.
- 1202 Rosen, M. and Pankow, J.F.: Adsorption/thermal desorption for the determination of volatile organic compounds in water. *J. Chromatogr.*, 537 (1991) 321-328.

- 1203 Semrau, A.: (Organic substances in water analysis. An on-line measuring system for automated gas-chromatographic analysis of gas-extractable substances contained in water.) *Gewaesserschutz, Wasser, Abwasser*, 114 (1990) 74-88; *C.A.*, 114 (1991) 49187c.
- 1204 Shi, M., Zhu, X. and Hu, Z.: (Gas chromatographic analysis of wastewater from manufacture of pyrethroid.) *Fenxi Ceshi Tongbao*, 9, No. 2 (1990) 7-9; *C.A.*, 114 (1991) 48947p.
- 1205 Tarasov, V.V. and Usmanov, I.A.: (Gas-chromatographic determination of monofurfurylidene acetone and difurfurylidene acetone in water reservoirs.) *Gig. Sanit.*, No. 8 (1990) 91-92; *C.A.*, 114 (1991) 29818f.
- 1206 Zhang, W.: (Identification of oil spill on seawater using gas chromatography with a flame photometric detector (FPD).) *Huanjing Kexue*, 11 (1990) 58-61; *C.A.*, 114 (1991) 11861e.

See also 655, 747, 762, 820, 838, 845, 846, 851, 854, 863, 868, 887, 925, 943, 1037, 1044, 1048, 1067, 1080, 1081, 1082, 1083, 1178, 1179, 1181.

35d. Soil pollution (complex mixtures; single compounds by cross-reference only)

- 1207 Greenlaw, P.D., Bath, R.J., Spear, R.D. and Collins, G.: Using TC/MS to analyze soils in preremedial site investigations. *Hazard. Mater. Control*, 3 (1990) 34-41; *C.A.*, 114 (1991) 29560r.
- 1208 Lewis, T.E., Deason, B.A., Gerlach, C.L. and Bottrell, D.W.: Performance evaluation materials for the analysis of volatile organic contaminants in soil: a preliminary assessment. *J. Environ. Sci. Health*, A25 (1990) 505-531; *C.A.*, 113 (1990) 170925z.

See also 611, 831, 851, 881, 1037, 1064, 1080, 1083, 1230.

36. SOME TECHNICAL PRODUCTS AND COMPLEX MIXTURES

36a. Surfactants

- 1209 Liu, E. and Tang, X.: (Determination of surfactant hydrophobic groups by pyrolysis gas chromatography.) *Riyong Huaxue Gongye*, No. 6 (1989) 293-296; *C.A.*, 113 (1990) 193939w.
- 1210 Szymanowski, J.: Polarity of nonionic surfactants as determined by gas chromatography. *Crit. Rev. Anal. Chem.*, 21 (1990) 407-451 - a review with 165 refs.

36b. Antioxidants and preservatives

- 1211 Vega, M., Saelzer, R., Mendoza, N. and Katalinic, J.: Analysis of ethoxyquin 6-ethoxy-1,2,4-trimethylquinoline in fishmeal. Comparison between HPLC, GC, and HPTLC. *J. High Resolut. Chromatogr.*, 13 (1990) 854-855.

See also 1086.

36c. Complex mixtures, technical products and unidentified compounds

- 1212 Amati, D. and Li, Y.: Gas chromatographic determination of flumetralin in tobacco. *J. Chromatogr.*, 539 (1991) 237-240.

- 1213 Cobb, G.P., III: Preconcentration of atmospheric organic compounds in carbon hollow tubes with subsequent gas chromatographic analysis. Avail. *Univ. Microfilms Int.*, Order No. DA9003711, 1989, 201 pp.; *C.A.*, 113 (1990) 177339v.
- 1214 Doviborov, N.A. and Venters, K.K.: (Gas chromatographic analysis of di-*tert.*-butyl pyrocarbonate.) *Zh. Anal. Khim.*, 45 (1990) 2034-2038.
- 1215 Estel, D., Ohl, J. and Döring, C.E.: Packed column gas chromatography-capillary column gas chromatography-mass spectrometry coupling for the qualitative characterization of technical products. *J. Chromatogr.*, 520 (1990) 175-183.
- 1216 Fini, A.: Method and apparatus for determining the heating value of a gaseous fuel. *U.S. Pat.* 4,951,503 (Cl. 73-23.1; G01N30/78), 28 Aug. 1990, Appl. 469,012, 23 Jan. 1990; 10 pp.; *C.A.*, 113 (1990) 175357a.
- 1217 Greenaway, W. and Whatley, F.R.: Analysis of phenolics of bud exudate of *Populus angustifolia* by GC-MS. *Phytochemistry*, 29 (1990) 2551-2554; *C.A.*, 114 (1991) 3414w.
- 1218 Greenaway, W., English, S. and Whatley, F.R.: Phytochemical affinity of *Populus angustifolia* with sect. *Aigeiros* poplars established by GC-MS of bud exudate. *Biochem. Syst. Ecol.*, 18 (1990) 329-445; *C.A.*, 114 (1991) 21002q.
- 1219 Guha, O.K. and Roy, J.: Effect of coal rank on molecular probe chromatography of coke and char. *Fuel Process. Technol.*, 25 (1990) 57-66; *C.A.*, 113 (1990) 26617h.
- 1220 Haanappel, V.A.C., Stevens, T.W., Hovestad, A., Skolnik, V. and Visser, R.: Gas chromatographic-mass spectrometric analysis of tar compounds formed during pyrolysis of rice husks. *J. Chromatogr.*, 562 (1991) 531-545.
- 1221 Hancock, J.R. and Peters, G.R.: Retention index monitoring of compounds of chemical defence interest using thermal desorption gas chromatography. *J. Chromatogr.*, 538 (1991) 249-257.
- 1222 Kaplunova, T.S., Abduazimov, Kh.A., Ismailova, P.L. and Shermatov, B.E.: (Gas chromatographic study of the products of thermolysis of hydrolytic lignin.) *Khim. Prir. Soedin.*, No. 3 (1990) 420-421; *C.A.*, 113 (1990) 233547a.
- 1223 Kenndler, E. and Mairinger, F.: Examination of the diterpenoic resin components of anatomical wax models from the eighteenth century by gas chromatography. *Fresenius' Z. Anal. Chem.*, 338 (1990) 635-640.
- 1224 Kumari, D.: Chemical analysis of filtrate and condensate from wet-carbonized peat by gas chromatography-mass spectrometry. *Int. J. Coal Geol.*, 15 (1990) 63-69; *C.A.*, 113 (1990) 217409b.
- 1225 Kuroda, K., Inoue, Y. and Sakai, K.: Analysis of lignin by pyrolysis-gas chromatography. I. Effect of inorganic substances on guaiacol-derivative yield from softwoods and their lignins. *J. Anal. Appl. Pyrolysis*, 18 (1990) 59-69.
- 1226 Kutinchev, V., Balabanov, V. and Kolev, V.: (Gas-chromatographic monitoring of the condition of 110-kV transformers in a power system.) *Energetika (Sofia)*, 40, No. 4 (1989) 19-23; *C.A.*, 113 (1990) 175186u.
- 1227 Li, T., Zhou, J., Xu, Z., Pan, J. and Mao, S.: (Effects of processing methods on the amounts of volatile oil of nutmeg and on isolation and characterization of the volatile oil constituents.) *Zhongguo Zhongyao Zazhi*, 15 (1990) 405-407; *C.A.*, 113 (1990) 197627r.
- 1228 Lyapkin, A.A. and Domrachev, K.Yu.: (Gas-chromatographic method for determining carbon in ores and slags.) *U.S.S.R. Pat.* SU 1,575,113 (Cl. G01N31/22), 30 Jun. 1990, Appl. 4,403,638, 04 Apr. 1988; *C.A.*, 113 (1990) 184041v.

- 1229 Nagy, L., Biro, E. and Balla, J.: Analysis of internal filling gas of small-sized halogen lamps by gas chromatography. *J. Chromatogr.*, 520 (1990) 213-216.
- 1230 Peresyppkin, V.I.: (Method for determination of lignin in bottom sediments.) *Okeanologiya (Moscow)*, 30 (1990) 678-681; *C.A.*, 114 (1991) 29816d.
- 1231 Perry, K.L.: A gas chromatographic technique for the analysis of fuel vapor containing oxygenates. *J. Chromatogr. Sci.*, 28 (1990) 624-627.
- 1232 Radovskii, G.S.: (Revealing of components not eluted in gas chromatographic analysis using mass spectrometry.) *Zh. Anal. Khim.*, 45 (1990) 2052-2055.
- 1233 Sharma, D.K. and Mishra, S.: Gas-chromatographic and IR spectral studies of the products obtained from extractive disintegration of coal. *Fuel Sci. Technol. Int.*, 8 (1990) 837-851; *C.A.*, 114 (1991) 9440y.
- 1234 Sugimoto, Y., Miki, Y., Oba, M. and Yamadaya, S.: Aromatic skeletal structures in distillable coal-derived liquids. *Bull. Chem. Soc. Jpn.*, 63 (1990) 1478-1483; *C.A.*, 113 (1990) 43670n.
- 1235 Takatsu, M. and Yamamoto, T.: (Studies on identification of soot. II. Effect of analysis temperature on identification of soot by pyrolysis gas chromatography.) *Nippon Kagaku Kaishi*, No. 8 (1990) 880-886; *C.A.*, 113 (1990) 206278g.
- 1236 Tanaka, T.: (Analysis by gas chromatography-mass spectrometry of volatile compounds emitted by bacterial colony.) *Kyoritsu Joshi Tanki Daigaku Kasika Kiyo*, 33 (1990) 49-52; *C.A.*, 113 (1990) 187684t.
- 1237 Tian, X., Zhang, P. and Yang, H.: (Study on the constitution and structure of Fushun bituminous coal by supercritical gas extraction. I. Separation of extract, GC and GC/MS analyses.) *Ranliao Huaxue Xuebao*, 18 (1990) 177-184; *C.A.*, 114 (1991) 9446e.
- 1238 Torres, M.C., Dean, M.A. and Wagner, F.W.: Chromatographic separations of sucrose monostearate structural isomers. *J. Chromatogr.*, 522 (1990) 245-253.
- See also 617, 620, 621, 726, 734, 757, 790, 794, 814, 819, 824, 830, 832, 833, 836, 850, 852, 855, 856, 858, 889, 897, 940, 948, 1005, 1024, 1031, 1042, 1043, 1054, 1241, 1242, 1246.

37. CELLS, CELLULAR PARTICLES AND SUPRAMOLECULAR STRUCTURES

See 780, 892, 913, 920, 945, 1236.

38. INORGANIC COMPOUNDS

38b. Anions

See 1161.

38c. Permanent and rare gases

- 1239 Probst, R. and Splitt, K.: (Application of gas chromatography in welding technique.) *Schweisstechnik (Berlin)*, 40 (1990) 345-347; *C.A.*, 113 (1990) 235294q.
- 1240 Song, H. and Parcher, J.F.: Separation of permanent gases by single-column gas-liquid chromatography with liquid nitrogen as the stationary phase. *Anal. Chem.*, 62 (1990) 2616-2619.

- 1241 Zhao, X.: (Improvement of method for analysis of process gases in oxidative dehydrogenation of butene.) *Hecheng Xiangjiao Gongye*, 13 (1990) 240-243; *C.A.*, 114 (1991) 16731x.

See also 826, 1245, 1256.

38d. Volatile inorganic compounds

- 1242 Badoni, R.P. and Jayaraman, A.: Determination of the water content in organic compounds by gas chromatography using back flush technique. *Fresenius' Z. Anal. Chem.*, 338 (1990) 745-748.
- 1243 Battin, F., Dzierzynski, M., Côme, G.M. and Baronnet, F.: Determination of chlorine by gas chromatography. *Analisis*, 19 (1991) 36-38.
- 1244 Czerwinski, W. and Gromotowicz, W.: Determination of impurities in thionyl chloride by gas chromatography. *J. Chromatogr.*, 520 (1990) 163-168.
- 1245 Drugov, Yu.S.: (Chromatographic analysis of inorganic gases.) *Zav. Lab.*, 56, No. 10 (1990) 10-19 - a review with 120 refs.
- 1246 Feng, Q., King, Y. and Liu, P.: (Determination of moisture in metallurgical powders by pulse heating-gas chromatography.) *Yejin Fenxi*, 9, No. 5 (1989) 54-55; *C.A.*, 114 (1991) 34998u.
- 1247 Kogawa, H., Koyama, K., Omichi, N., Sanaga, M., Bouchi, A., Fujii, A. and Goto, E.: A rapid method for determination of water content of minute amount of the liver tissue by gas-liquid chromatography. *Kyoiku Daigaku Kiyo, Dai-3-bumon*, 38 (1989) 63-65; *C.A.*, 113 (1990) 227348v.
- 1248 Massil, S.E. and Ovadia, D.: Determination of phosgene as its N,N,N',N'-tetraethylurea derivative by gas chromatography. *J. Chromatogr.*, 538 (1991) 435-440.
- 1249 Min, D.B. and Lee, S.H.: Gas chromatographic determination of carbon dioxide in non-fat dry milk during nonenzymic browning reaction. *J. Sci. Food Agric.*, 53 (1990) 93-99; *C.A.*, 113 (1990) 210261p.
- 1250 Nishitsuji, T., Iwanaga, T. and Harada, I.: (Gas-chromatographic method for determination of oxygen difluoride in nitrogen trifluoride gas.) *Jpn. Kokai Tokkyo Koho* JP 02,114,176 [90,114,176] (Cl. G01N30/54), 26 Apr. 1990, Appl. 88/267,057, 25 Oct. 1988; 6 pp.; *C.A.*, 113 (1990) 183952f.
- 1251 Shih, M.L., Smith, J.R. and McMonagle, J.D.: Gas chromatographic analysis of toxic edemagenic inhalation compounds. *Anal. Lett.*, 23 (1990) 1711-1727.
- 1252 Sotnikov, E.E., Radzinskii, S.A., Bogunenko, N.I. and Lanskova, T.G.: (Gas-chromatographic analysis of impurities in phosgene.) *Plast. Massy*, No. 9 (1990) 69-71; *C.A.*, 114 (1991) 24629k.
- 1253 Sparling, G.P. and West, A.W.: A comparison of gas chromatography and differential respirometer methods to measure soil respiration and to estimate the soil microbial biomass. *Pedobiologia*, 34 (1990) 103-112; *C.A.*, 114 (1991) 22858k.
- 1254 Zou, L. and Song, J.: (Determination of cyanogen chloride in the environment by using gas chromatography.) *Shanghai Huanjing Kexue*, 9, No. 2 (1990) 30-31; *C.A.*, 113 (1990) 236794q.

See also 681, 1032, 1046, 1228, 1229, 1257.

39. RADIOACTIVE AND OTHER ISOTOPE COMPOUNDS

- 1255 Fedoseev, E.V., Aizenberg, M.I., Davydov, A.C. and Myasoedov, B.F.: Separation of actinide and fission product elements by means of thermo chromatography and fractional sublimation of their β -diketonates. *J. Radioanal. Nucl. Chem.*, 136 (1989) 395-403; *C.A.*, 113 (1990) 33899e.

- 1256 Goode, S.R., Gemmill, J.J. and Watt, B.E.: Determination of deuterium by gas chromatography with a microwave-induced plasma emission detector. *J. Anal. At. Spectrom.*, 5 (1990) 483-486; *C.A.*, 113 (1990) 184022q.
- 1257 Guilluy, R., Billion-Rey, F. and Brazier, J.L.: On-line measurements of ^{13}C enrichments in rat breath. Non-invasive method for *in vivo* study of drug enzymatic induction. *J. Chromatogr.*, 562 (1991) 341-350.
- 1258 Zvara, I.: Thermo chromatographic method of separation of chemical elements in nuclear and radiochemistry. *Isotopenpraxis*, 26 (1990) 251-258; *C.A.*, 113 (1990) 140369d.

See also 674, 722, 734, 907, 924, 1007, 1011.

Planar Chromatography

1. REVIEWS AND BOOKS

- 232 Gonnord, M.F.: Image analysis in planar chromatography. *Analisis*, 18 (1990) 122; *C.A.*, 113 (1990) 125378n - a review with 3 refs.
- 233 Grinberg, N. (Editor): *Modern Thin-Layer Chromatography, Chromatographic Science Series*, Vol. 52, Dekker, New York, 1990, 490 p.; *C.A.*, 113 (1990) 125676h.
- 234 Grinberg, N., Kalasz, H., Han, S.M. and Armstrong, D.W.: Special techniques (in thin-layer chromatography). *Chromatogr. Sci.*, 52 (Mod. Thin-Layer Chromatogr.) (1990) 313-434; *C.A.*, 113 (1990) 223820v - a review with 13 refs.
- 235 Postaire, E., Delvordre, P., Sarbach, C., Regnault, C., Bernard, C. and Pradeau, D.: Post-chromatographic derivatization in planar chromatography.. *Analisis*, 18, No. 5 (1990) i18-i19; *C.A.*, 113 (1990) 144529d - a review with 7 refs.
- 236 Sano, A., Suzuki, M. and Takitani, S.: (Thin-layer chromatography of organic compounds). *Bunseki*, (1990) 277-282; *C.A.*, 113 (1990) 223821w - a review with 72 refs.
- 237 Schmid, E.R.: Chromatography and mass spectrometry - an overview. *Chromatographia*, 30 (1990) 573-576 - a review with 43 refs.
- 238 Schuetz, H., Erdmann, F. and Funk, W.: (TLC-scanners in toxicological analysis). *GIT-Suppl.*, (1990) 17-29; *C.A.*, 113 (1990) 146767d - a review with 18 refs.
- 239 Touchstone, J.C.: Currents in planar chromatography. *Chem. Anal. (N.Y.)*, 108 (Planar Chromatogr. Life Sci) (1990) 1-5; *C.A.*, 113 (1990) 114520u - a review with 2 refs.

See also 280, 284, 356.

2. FUNDAMENTALS, THEORY AND GENERAL

2a. General

- 240 Bolotov, S.L.: General approach to the R_F adjustment in TLC. *Kontakte (Darmstadt)*, No. 2 (1990) 36-39.
- 241 Grinberg, N.: Relationship between thin-layer and column chromatography. *Chromatogr. Sci.*, 52 (Mod. Thin-Layer Chromatogr.) (1990) 453-463; *C.A.*, 113 (1990) 204186b.
- 242 Kowalska, T., Sliwiok, J. and Kus, P.: Novel prediction of R_F coefficient in reversed phase partition TLC with methanol - water mobile phases. *J. Planar Chromatogr.*, 3 (1990) 430-431.
- 243 Newsely, H.: Friedrich Goppelstroeder - a protagonist of modern chromatography? *Chromatographia*, 30 (1990) 595-596.
- 244 Rozylo, J.K. and Janicka, M.: Some theoretical aspects of the use of TLC as a pilot technique for column liquid chromatography. *J. Planar Chromatogr.*, 3 (1990) 413-416.
- 245 Shelly, D.C. and Antonucci, V.L.: Effects of solute focusing on zone shape in column - planar separations. *J. Liq. Chromatogr.*, 13 (1990) 2711-2725.
- 246 Wardas, W. and Pyka, A.: Prediction of R_M values for disubstituted benzene derivatives. *J. Planar Chromatogr.*, 3 (1990) 425-428.

2b. Thermodynamics and theoretical relationships

- 247 Sarbu, C. and Nascu, H.: (Use of energy and information correlation in thin layer chromatography). *Rev. Chim. (Bucharest)*, 41 (1990) 276-280; *C.A.*, 113 (1990) 159646p.

2c. Relationship between structure and chromatographic behaviour

- 248 Bieganowska, M.L., Petrudzynik, A. and Gadzikowska, M.: Retention of some organic electrolytes in ion-pair reversed-phase high-performance liquid and reversed-phase high-performance thin-layer chromatographic systems. *J. Chromatogr.*, 520 (1990) 403-410.
- 249 Janos, E. and Gros, G.: Reversed-phase thin-layer and gas chromatographic retention behaviour of triphenylmethane derivatives. *J. Chromatogr.*, 520 (1990) 217-222.

See also 395, 428, 508, 565.

2d. Measurement of physico-chemical and related values

- 250 Illes, Z. and Cserhati, T.: Effect of the impregnating agent on the lipophilicity determination of some triazine and cyanophenyl derivatives. *J. Planar Chromatogr.*, 3 (1990) 381-385.
- 251 Levine, S.G.: Identification of unknowns by melting point and thin-layer chromatography in combination. *J. Chem. Educ.*, 67 (1990) 972; *C.A.*, 114 (1991) 41645e.

See also 257.

3. GENERAL TECHNIQUES

3a. Apparatus and accessories

- 252 Aranovich, G.L., Budovich, V.L., Nikulicheva, S.I., Tkachuk, B.V. and Trubnikov, V.I.: (Method of producing plates for thin-layer chromatographs). *U.S.S.R. SU 1,571,496* (Cl. G01N30/93), 15 Jun. 1990, Appl. 4,314,470, 08 Oct. 1987; *C.A.*, 113 (1990) 144648s.
- 253 Ebel, S. and Völkl, S.: DC-Analytik von Naturstoffen. Verbesserung mit automatisierter Mehrfachentwicklung (AMD). *Dtsch. Apoth.-Ztg.*, 130 (1990) 2162-2169.

See also 269.

3b. Detectors and detection reagents

- 254 Aldridge, P.K., Callis, J.B. and Burns, D.H.: Laptop chemistry: a compact, portable thin layer scanner. *J. Liq. Chromatogr.*, 13 (1990) 2829-2839.

See also 292, 294, 465, 574, 638.

3c. Sorbents and columns, packing procedures

- 255 Bondarenko, I.V., Budovich, V.L., Kan, T.P., Nikulicheva, S.I. and Trubnikov, V.I.: (Method of chromatographic analysis in a thin sorbent layer involving a corona discharge). *U.S.S.R. SU 1,562,851* (Cl. G01N30/94), 07 May 1990, Appl. 4,388,158, 25 Dec. 1987; *C.A.*, 113 (1990) 125843k.

- 256 Botz, L., Nyiredy, S., Wehrli, E. and Sticher, O.: Applicability of Empore TLC sheets for forced-flow planar chromatography. I. Characterization of the silica sheets. *J. Liq. Chromatogr.*, 13 (1990) 2809-2828.
- 257 Fernando, W.P.N. and Poole, C.F.: The influence of layer porosity on the flow resistance and apparent particle size of thin layer chromatography plates. *J. Planar Chromatogr.*, 3 (1990) 389-395.
- 258 Gould, M. and Enzweiler, T.: Use of bonded phases in planar chromatography. *Chem. Anal. (N.Y.)*, 108 (Planar Chromatogr. Life Sci.) (1990) 15-47; *C.A.*, 113 (1990) 144521v.
- 259 Rozylo, J.K., Gwis-Chomicz, D. and Malinowska, I.: (Use of chitin as a stationary phase in chromatography). *Zesz, Nauk.-Politech. Lodz., Technol. Chem. Spozyw.*, 513, No. 42 (1988) 55-64; *C.A.*, 113 (1990) 164713n.
- 260 Shrivastava, P.K. and Prakash, R.: Thin-layer chromatographic separation of a few vitamins over scolecite (zeolite) as a new adsorbent. *Orient. J. Chem.*, 5 (1989) 136-138; *C.A.*, 114 (1991) 24317g.
- 261 Wang, G., Yang, R. and Li, S.: (Thin-layer chromatography of acetaminin: selection of adsorbent and solvent system by statistics). *Sepeu*, 8 (1990) 129-130; *C.A.*, 113 (1990) 178372n.

See also 250, 252, 278, 395, 455, 490.

3d. Quantitative analysis

- 262 Basak, B. and Laskar, S.: Spray reagents for the detection of amino acids on thin-layer plates. *Talanta*, 37 (1990) 1105-1106; *C.A.*, 114 (1991) 16888d.
- 263 Bonate, P.L.: Chromatographic calibration revisited. *J. Chromatogr. Sci.*, 28 (1990) 559-562.
- 264 Lam, K.K. and Sequera, D.E.: Two dimensional quantitative analysis in planar chromatography. *J. Liq. Chromatogr.*, 13 (1990) 2901-2920.
- 265 Le Vaugueresse-Daurade, M.H. and Bounias, M.: Analytical advances in thin-layer chromatography: solid-phase spectrophotodensitometry. *Analisis*, 18, No. 5 (1990) i12-i13; *C.A.*, 113 (1990) 144542c.
- 266 Le Vaugueresse-Daurade, M.H. and Bounias, M.: Quantification of thin-layer chromatograms: a general procedure for algebraic linearization of calibration curves. *Analisis*, 18, No. 5 (1990) i11-i12; *C.A.*, 113 (1990) 144239j.
- 267 Maslowska, J. and Leszczynska, J.: (Developing of ketones and aldehydes with enzymic reaction on chromatograms). *Chem. Anal. (Warsaw)*, 33 (1988) 941-947; *C.A.*, 114 (1991) 16884z.
- 268 Ohsawa, K., Uchiyama, K., Yoshimura, Y., Takasuka, A., Mibe, K., Tamura, K., Ohtani, Y. and Imaeda, K.: Photoacoustic spectroscopy by the rear-surface detection for an aluminum foil thin-layer chromatography plate. *Anal. Sci.*, 6 (1990) 589-592; *C.A.*, 114 (1991) 16694n.

See also 273, 392, 440, 498, 550, 555, 582, 620.

3e. Preparative scale chromatography

- 269 Botz, L., Nyiredy, S. and Sticher, O.: A new device for circular preparative planar chromatography. *J. Planar Chromatogr.*, 3 (1990) 401-406.

See also 543.

3f. Programmed temperature, pressure, vapors, gradients

- 270 Matysik, G. and Jusiak, L.: Stepwise gradient in thin-layer chromatography of *chelidonium* alkaloids. *J. Chromatogr.*, 518 (1990) 273-276.

See also 253.

3g. *High performance procedures*

- 271 Futter, J.E.: Industrial environmental monitoring via high-performance thin-layer chromatography: prospects and future trends. *Anal. Proc. (London)*, 27 (1990) 123-124; *C.A.*, 114 (1991) 11347s.
- 272 Paradis, A. and de Spiegeleer, B.M.J.: Planar chromatography: a flexible analytical technique in the pharmaceutical industry. *Analysis*, 18 (1990) i20-i21; *C.A.*, 113 (1990) 138585c.

See also 248, 407, 440, 457, 558, 582, 620.

4. SPECIAL TECHNIQUES

4a. *Automation*

- 273 Jaenchen, D.: Automated sample application in quantitative TLC analysis. *GIT-Suppl.*, (1990) 94-95; *C.A.*, 113 (1990) 223837f.

4b. *Computerization and modelling*

See 593.

4c. *Combination with other physico-chemical techniques (MS, IR etc.)*

- 274 Busch, K.L., Brown, S.M., Doherty, S.J., Dunphy, J.C. and Buchanan, M.V.: Analysis of planar chromatograms by fast atom bombardment and laser desorption mass spectrometry. *J. Liq. Chromatogr.*, 13 (1990) 2841-2869.
- 275 Dewey, C.R. and Finney, R.W.: Direct spectroscopic analysis of components on thin-layer chromatography plates. *Anal. Proc. (London)*, 27 (1990) 125-127; *C.A.*, 113 (1990) 155477m.
- 276 Doherty, S.J.: Desorption ionization mass spectrometric analysis of thin layer chromatograms. Avail. *Univ. Microfilms Int.*, Order No. DA9012128. Diss. Abstr. Int. B, 50 (1990) 5577; *C.A.*, 114 (1991) 2959r.
- 277 Glauning, G., Kovar, K.-A. and Hoffmann, V.: Possibilities and limits of an on-line coupling of thin-layer chromatography and FTIR-spectroscopy. *Fresenius' Z. Anal. Chem.*, 338 (1990) 710-716.
- 278 Nakagawa, Y. and Iwatani, K.: Scanning thin-layer chromatography-liquid secondary ion mass spectrometry and its application for investigation of drug metabolites. *J. Chromatogr.*, 562 (1991) 99-110.
- 279 Stanley, M.S.: The direct analysis of thin-layer chromatograms and planar electropherograms with chromatography/SIMS. Avail. *Univ. Microfilms Int.*, Order No. DA9012142, 1989, 246 pp.; *C.A.*, 113 (1990) 178344e.
- 280 White, R.: *Chromatography/Fourier Transform Infrared Spectroscopy and its Applications*. Marcel Dekker, New York, Basle, 1990, VI + 328 p.
- 281 Zhu, J.: New development of laser-based techniques in applications of thin-layer chromatography, microprobe elemental analysis, and gas phase pyrolysis. Avail. *Univ. Microfilms Int.*, Order No. DA9014972, 1989, 186 pp.; *C.A.*, 113 (1990) 223567t.

See also 237, 250, 251, 487, 494, 495.

4d. *Affinity chromatography (advances)*

- 282 Schwabacher, A.W. and Lei, H.: A new assay for molecular recognition. *J. Org. Chem.*, 55 (1990) 6080-6081; *C.A.*, 114 (1991) 2862d.

4f. *Trace analysis and preseparation techniques*

See 383.

4g. *Enantiomers, separation*

- 283 Duncan, J.D.: Chiral separations: a comparison of HPLC and TLC. *J. Lig. Chromatogr.*, 13 (1990) 2737-2755.
284 Han, S.M. and Armstrong, D.W.: Enantiomeric separation by thin-layer chromatography. *Chem. Anal. (N.Y.)*, 108 (Planar Chromatogr. Life Sci.) (1990) 81-100; *C.A.*, 113 (1990) 144522w - a review with 30 refs.

See also 462.

4h. *Other special techniques*

- 285 Chatain, J.C.: (A rapid and viable technique for biochemical investigations: TLC-FID). *Analisis*, 18 (1990) i23-i24; *C.A.*, 113 (1990) 187452r.
286 Kalasz, H., Bathori, M. and Matkovics, B.: Spacer-displacement and carrier spacer-displacement thin-layer chromatography. *J. Chromatogr.*, 520 (1990) 287-293.
287 Maxwell, R.J., Yeisley, S.W. and Unruh, J.: The importance of effective predevelopment plate washing techniques in thin-layer chromatography. *J. Lig. Chromatogr.*, 13 (1990) 2000-2011.

See also 235, 238, 268, 281, 297, 376.

5. HYDROCARBONS AND HALOGEN DERIVATIVES

5b. *Cyclic hydrocarbons*

- 288 Sliwiok, J. and Kocjan, B.: TLC and HPLC investigation of the hydrophobicity of isomeric benzopyrenes. *J. Planar Chromatogr.*, 3 (1990) 433-434.
289 Stoyke, M. and Mueller, L.: (Screening test for the analysis of benzo[a]pyrene in animal fats.) *Arch. Lebensmittelhyg.*, 41 (1990) 85-88; *C.A.*, 113 (1990) 189883f.

5d. *Complex hydrocarbon mixtures (incl. analysis of tars, bitumens and mineral oils)*

- 290 Wang, Y.Y. and Yen, T.F.: Rapid separation and characterization of fossil fuels by thin layer chromatography. *J. Planar Chromatogr.*, 3 (1990) 376-380.

See also 371, 627.

6. ALCOHOLS

See 617, 627.

7. PHENOLS

- 291 Korenman, Ya.I. and Kryukov, A.I.: (Analysis of phenol-containing extracts by thin-layer chromatography). *Zh. Anal. Khim.*, 45 (1990) 1140-1144; *C.A.*, 113 (1990) 144621c.
- 292 Marutoiu, C., Coman, V., Patrut, A., Roman, L. and Gansca, A.: A new detection method for the separation of phenols by TLC. *J. Planar Chromatogr.*, 3 (1990) 435-436.
- 293 Petrovic, M., Kastelan-Macan, M. and Durrigl, A.: (Separation of structural isomers of some phenol compounds by thin-layer chromatography). *Prehrambeno-Technol. Biotechnol. Rev.*, 27 (1989) 141-145; *C.A.*, 114 (1991) 42157j.

See also 246, 275, 340, 447, 627.

8. SUBSTANCES CONTAINING HETEROCYCLIC OXYGEN

8a. Flavonoids

- 294 Billeter, M., Meier, B. and Sticher, O.: Densitometric determination of flavonoids after derivatization. *J. Planar Chromatogr.*, 3 (1990) 370-375.
- 295 Britsch, L.: Purification and characterization of flavone synthase I, a 2-oxoglutarate-dependent desaturase. *Arch. Biochem. Biophys.*, 282 (1990) 152-160.
- 296 Crawford, L., McDonald, G.M. and Friedman, M.: Composition of sicklepod (*Cassia obtusifolia*) toxic weed seeds. *J. Agric. Food Chem.*, 38 (1990) 2169-2175.
- 297 Heisig, W. and Wichtl, M.: Bestimmung pflanzlicher Glykoside. Methodenkombination von zweidimensionaler DC und HPLC. I. Inhaltsstoffe aus *Calendulae officinalis* flos. *Dtsch. Apoth.-Ztg.*, 130 (1990) 2058-2062.
- 298 McInotsh, C.A., Latchinian, L. and Mansell, R.L.: Flavanone-specific 7-O-glucosyltransferase activity in *Citrus paradisi* seedlings: purification and characterization. *Arch. Biochem. Biophys.*, 282 (1990) 50-57.
- 299 Vogt, T. and Gülz, P.-G.: Isocratic column liquid chromatographic separation of a complex mixture of epicuticular flavonoid aglycones and intracellular flavonol glycosides from *Cistus laurifolius* L. *J. Chromatogr.*, 537 (1991) 454-459.

8b. Aflatoxins and other mycotoxins

- 300 Adensam, L., Lebedova, M. and Turek, B.: (Estimation of low sterigmatocystine concentrations). *Cesk. Hyg.*, 35 (1990) 8-12; *C.A.*, 113 (1990) 229798r.
- 301 Beckwith, A.C. and Stoloff, L.: Fluorodensitometric measurement of aflatoxin thin layer chromatograms. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 340.
- 302 Bennett, G.A. and Shotwell, O.L.: Criteria for determining purity of *Fusarium* mycotoxins. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 270-275.
- 303 Chu, F.S., Fan, T.S.L., Zhang, G.-S. and Xu, Y.-C.: Improved enzyme-linked immunosorbent assay for aflatoxin B₁ in agricultural commodities. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 342.
- 304 Czerwiecki, L. and Giryń, H.: (Determination of trichothecenes in cereals). *Rocz. Panstw. Zakł. Hig.*, 40 (1989) 284-290; *C.A.*, 114 (1991) 4963m.

- 305 Dell, M.P.K., Haswell, S.J., Roch, O.G., Coker, R.D., Medlock, V.F.P. and Tomlins, K.: Analytical methodology for the determination of aflatoxins in peanut butter: comparison of high-performance thin-layer chromatographic, enzyme-linked immunosorbent assay and high-performance liquid chromatographic methods. *Analyst (London)*, 115 (1990) 1435-1439.
- 306 Gordon, W.C. and Gordon, L.J.: Rapid screening method for deoxynivalenol in agricultural commodities by fluorescent minicolumn. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 266-270.
- 307 Neely, F.L. and Emerson, C.S.: Determination of sterigmatocystin in fermentation broths by reversed-phase high-performance liquid chromatography using post-column fluorescence enhancement. *J. Chromatogr.*, 523 (1990) 305-311.
- 308 Ngilorititi, E.M. and Kroll, J.: Determination of aflatoxins and ochratoxin A in animal tissues. *Nahrung*, 34 (1990) 97-98; *C.A.*, 114 (1991) 37240b.
- 309 Pons, W.A., Jr.: High pressure liquid chromatographic determination of aflatoxins in corn. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 342.
- 310 Pons, W.A., Jr.: Evaluation of reflectance fluorodensitometry for measuring aflatoxins on thin layer plates. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 340.
- 311 Trucksess, M.W., Young, K., Donahue, K.F., Morris, D.K. and Lewis, E.: Comparison of two immunochemical methods with thin-layer chromatographic methods for determination of aflatoxins. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 425-428.
- 312 Wu, X., Yin, W. and Zhang, Y.: (Determination of deoxynivalenol in feed by TLC). *Weishengwuxue Tongbao*, 17 (1990) 116-119; *C.A.*, 113 (1990) 229797q.

8c. *Other compounds with heterocyclic oxygen (incl. tannins)*

- 313 Jaziri, M., Diallo, B. and Vanhaelen, M.: Separation of quassinoids from *Ailanthus altissima* by high-speed counter-current chromatography. *J. Chromatogr.*, 538 (1991) 227-229.
- 314 Veress, T., Szanto, J.I. and Leisztner, L.: Determination of cannabinoid acids by high-performance liquid chromatography of their neutral derivatives formed by thermal decarboxylation. I. Study of the decarboxylation process in open reactors. *J. Chromatogr.*, 520 (1990) 339-347.

See also 296, 298, 597, 598, 601.

9. OXO COMPOUNDS, ETHERS, EPOXIDES AND QUINONES

- 315 Cai, D., Zhang, T., Gu, M., Zhang, J. and Zhu, G.: (Separation of hydroxy-anthraquinones of rhubarb by high-speed countercurrent chromatography). *Zhongguo Yiyao Gongye Zazhi*, 31 (1990) 130-133; *C.A.*, 113 (1990) 178350d.

See also 253, 267, 296, 456.

10. CARBOHYDRATES

10a. *Mono and oligosaccharides. Structural studies*

- 316 Bi, Q., Lu, L. and Lin, H.: (Determination of glucomannan and starch in konjak flour by TLC). *Sepu*, 8 (1990) 198, 158; *C.A.*, 113 (1990) 150939d.

- 317 Do, K.-Y., Smith, D.F. and Cummings, R.D.: LAMP-1 in CHO cells is a primary carrier of poly-N-acetyllactosamine chains and is bound preferentially by a mammalian S-type lectin. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1123-1128.
- 318 Fan, J.-Q., Kanatani, K., Andoh, N., Yamamoto, K., Kumagai, H. and Tochikura, T.: Release of T-antigen, a carcinoma marker from native human cells, by endo- α -N-acetylgalactosaminidase of *Alcaligenes* sp. *Biochem. Biophys. Res. Commun.*, 172 (1990) 341-347.
- 319 Fu, D. and Robyt, J.F.: Acceptor reactions of maltodextrins with *Leuconostoc mesenteroides* B-512FM dextransucrase. *Arch. Biochem. Biophys.*, 283 (1990) 379-387.
- 320 Miano, T.M.: Fractionation of water-soluble sugars in two humus profiles by thin-layer chromatography. *Z. Pflanzenernaehr. Bodenkd.*, 153 (1990) 241-244; *C.A.*, 113 (1990) 190291t.
- 321 Mizuochi, T., Hamako, J., Titani, K., Matsushita, M. and Okada, H.: Structures of the asparagine-linked oligosaccharides of guinea-pig Factor B of the alternative complement pathway. *Biochem. J.*, 272 (1990) 533-535.
- 322 Nakano, H., Takenishi, S., Kitahata, S., Kinugasa, H. and Watanabe, Y.: Purification and characterization of an exo-1,4- β -galactanase from a strain of *Bacillus subtilis*. *Eur. J. Biochem.*, 193 (1990) 61-67.
- 323 Seguchi, T., Merkle, R.K., Ono, M., Kuwano, M. and Cummings, R.D.: The dysfunctional LDL receptor in a monensin-resistant mutant of chinese hamster ovary cells lacks selected O-linked oligosaccharides. *Arch. Biochem. Biophys.*, 284 (1991) 245-256.
- 324 Tanaka, M. and Kojima, M.: Purification and characterization of *p*-coumaroyl-D-glucose hydroxylase of sweet potato (*Ipomoea batatas*) roots. *Arch. Biochem. Biophys.*, 284 (1991) 151-157.
- 325 Torres, M.C., Dean, M.A. and Wagner, F.W.: Chromatographic separations of sucrose monostearate structural isomers. *J. Chromatogr.*, 522 (1990) 245-253.
- 326 Vrbaski, L. and Lepojevic, Z.: (Thin-layer chromatographic separation of carbohydrates as possible products of microbial fermentation of starch). *Zb. Matice Srp. Prir. Nauke*, (1989) 129-134; *C.A.*, 114 (1991) 40947t.

See also 299, 329, 450, 606.

10b. Polysaccharides, mucopolysaccharides, lipopolysaccharides

- 327 Lepers, A., Shaw, L., Schneckeburger, P., Calan, R., Verbert, A. and Schauer, A.: A study on the regulation of N-glycoloylneuraminic acid biosynthesis and utilization in rat and mouse liver. *Eur. J. Biochem.*, 193 (1990) 715-723.
- 328 Silbert, C.K., Humphries, D.E., Palmer, M.E. and Silbert, J.E.: Effects of sulfate deprivation on the production of chondroitin/dermatan sulfate by cultures of skin fibroblasts from normal and diabetic individuals. *Arch. Biochem. Biophys.*, 285 (1991) 137-141.

See also 326.

10c. Glycoproteins and their constituents

- 329 Edge, A.S.B. and Spiro, R.G.: Characterization of novel sequences containing 3-O-sulfated glucosamine in glomerular basement membrane heparan sulfate and localization of sulfated disaccharides to a peripheral domain. *J. Biol. Chem.*, 265 (1990) 15874-15881.

See also 317.

11. ORGANIC ACIDS AND LIPIDS

11a. Organic acids and simple esters

- 330 Alvarez, J.G., Fang, X.G., Grob, R.L. and Touchstone, J.C.: Determination of free fatty acids by diphasic-two dimensional TLC-fluorescence spectrodensitometry. *J. Liq. Chromatogr.*, 13 (1990) 2727-2735.
- 331 Cecchi, L. and Malaspina, P.: Lactic acid enantiomers: separation by thin-layer chromatography on silica gel plates impregnated with Cu^{2+} . *Anal. Biochem.*, 192 (1991) 219-221.
- 332 Chaudhry, A., Kleiman, R. and Carlson, K.D.: Minor components of *Lesquerella fendleri* seed oil. *J. Am. Oil Chem. Soc.*, 67 (1990) 863-866.
- 333 Gardner, D.R. and Sanders, R.A.: Isolation and characterization of polymers in heated olestra and an olestra/triglyceride blend. *J. Am. Oil Chem. Soc.*, 67 (1990) 788-796.
- 334 Hamberg, M. and Hamberg, G.: Hydroperoxide-dependent epoxidation of unsaturated fatty acids in the broad bean (*Vicia faba* L.). *Arch. Biochem. Biophys.*, 283 (1990) 409-416.
- 335 Hills, M.J., Kiewitt, I. and Mukherjee, K.D.: Enzymatic fractionation of fatty acids - enrichment of gamma-linolenic acid and docosahexaenoic acid by selective esterification catalyzed by lipases. *J. Am. Oil Chem. Soc.*, 67 (1990) 561-564.
- 336 Kearns, E.V., Hugly, S. and Somerville, C.R.: The role of cytochrome b_5 in Δ^{12} desaturation of oleic acid by microsomes of safflower (*Carthamus tinctorius* L.). *Arch. Biochem. Biophys.*, 284 (1991) 431-436.
- 337 Melamed, D.B., Lyapkov, B.G. and Medvedev, F.A.: (Determination of benzoic acid, sorbic, and their salts in food). *Zh. Anal. Khim.*, 45 (1990) 1640-1646; *C.A.*, 113 (1990) 210254p.
- 338 Servat, F., Montet, D., Pina, M., Galzy, P., Arnaud, A., Ledon, H., Marcou, L. and Graille, J.: Synthesis of fatty hydroxamic acids catalyzed by the lipase of *Mucor miehei*. *J. Am. Oil Chem. Soc.*, 67 (1990) 646-649.
- 339 Wang, S., Tan, K. and Jia, J.: (Determination of the content of benzoic acid in *Sanguis draconia* of Qilisan by TLC). *Zhongguo Zhongyao Zazhi*, 15 (1990) 483-484; *C.A.*, 113 (1990) 237919w.
- 340 Özden, S., Ertepinar, H., Sentürk, H.B., Dürüst, N. and Beyazoglu, O.: *Trans*-aconitic and phenolic acids from *Consolida armenica* flowers. *Pharmazie*, 45 (1990) 803-804.

See also 248, 350, 363, 371, 378, 555, 563, 598, 607, 621, 625, 627.

11b. Prostaglandins

- 341 Di Marzo, V., Cimino, G., Crispino, A., Minardi, C., Sodano, G. and Spinella, A.: A novel multifunctional metabolic pathway in a marine mollusc leads to unprecedented prostaglandin derivatives (prostaglandin 1,15-lactones). *Biochem. J.*, 273 (1991) 593-600.

11c. Lipids and their constituents

- 342 Arthur, G. and Page, L.: Synthesis of phosphatidylethanolamine and ethanolamine plasmalogen by the CDP-ethanolamine and decarboxylase pathways in rat heart, kidney and liver. *Biochem. J.*, 273 (1991) 121-125.
- 343 Asotra, K., Lagos, N. and Vergara, J.: Synthesis of polyphosphoinositides in transverse tubule and sarcoplasmic reticulum membranes of frog skeletal muscle. *Biochim. Biophys. Acta*, 1081 (1991) 229-237.

- 344 Bordoni, A., Biagi, P.L., Rossi, C.A. and Hrelia, S.: Alpha-1-stimulated phosphoinositide breakdown in cultured cardiomyocytes: diacylglycerol production and composition in docosahexaenoic acid supplemented cells. *Biochem. Biophys. Res. Commun.*, 174 (1991) 869-877.
- 345 Bouhours, D., Bouhours, J.-F., Larson, G. and Hansson, G.C.: Regional differences in the appearance of adult-type glycosphingolipids in the small intestine of inbred rats at weaning time. *Arch. Biochem. Biophys.*, 282 (1990) 147-151.
- 346 Bouhours, D., Bouhours, J.-F., Larson, G., Karlsson, H., Pimlott, W. and Hansson, G.C.: Transient expression of type 2 chain in A-active hexaglycosylceramide of rat small intestine at weaning time. Demonstration by affinity chromatography and ceramide glycanase hydrolysis of A-active glycosphingolipids followed by gas chromatography and mass spectrometry of permethylated hexasaccharides. *Arch. Biochem. Biophys.*, 282 (1990) 141-146.
- 347 Bradova, V., Smid, F., Ledvinova, J. and Michalec, C.: Improved one-dimensional thin-layer chromatography for the separation of phospholipids in biological material. *J. Chromatogr.*, 533 (1990) 297-299.
- 348 Brami, B.A., Leli, U. and Hauser, G.: Influence of lithium on second messenger accumulation in NG108-15 cells. *Biochem. Biophys. Res. Commun.*, 174 (1991) 606-612.
- 349 Catalioto, R.-M., Ailhaud, G. and Negrel, R.: Diacylglycerol production induced by growth hormone in OB1771 preadipocytes arises from phosphatidylcholine breakdown. *Biochem. Biophys. Res. Commun.*, 173 (1990) 840-848.
- 350 Chao, W., Liu, H., Hanahan, D.J. and Olson, M.S.: Regulation of platelet-activating factor receptor and PAF receptor-mediated arachidonic acid release by protein kinase C activation in rat Kupffer cells. *Arch. Biochem. Biophys.*, 282 (1990) 188-197.
- 351 Cubitt, A.B. and Gershengorn, M.C.: CMP activates reversal of phosphatidylinositol synthase and base exchange by distinct mechanisms in rat pituitary GH₃ cells. *Biochem. J.*, 272 (1990) 813-816.
- 352 Dasgupta, S., Chien, J.-L. and Hogan, E.L.: Biosynthesis of GM1b and similar neolactoseries gangliosides by a partially purified chicken skeletal muscle sialyltransferase. Effect of sphingomyelin and acetylcholine. *Biochim. Biophys. Acta*, 1036 (1990) 11-17.
- 353 Deal, C.D. and Krivan, H.C.: Lacto- and ganglio-series glycolipids are adhesion receptors for *Neisseria gonorrhoeae*. *J. Biol. Chem.*, 265 (1990) 12774-12777.
- 354 Dudeja, P.K., Harig, J.M., Wali, R.K., Knaup, S.M., Ramaswamy, K. and Brasitus, T.A.: Differential modulation of human small intestinal brush-border membrane hemileaflet fluidity affects leucine aminopeptidase activity and transport of D-glucose and L-glutamate. *Arch. Biochem. Biophys.*, 284 (1991) 338-345.
- 355 Fishman, J.B., Cahill, M., Morin, P., McCrory, M., Bucher, N.L.R. and Ullman, M.D.: Specific gangliosides increase rapidly in rat liver following partial hepatectomy. *Biochem. Biophys. Res. Commun.*, 174 (1991) 638-646.
- 356 Fried, B. and Sherma, J.: Thin layer chromatography of lipids found in snails (*Gastropoda: Mollusca*). *J. Planar.Chromatogr.*, 3 (1990) 290-299 - a review with 49 refs.
- 357 Gasser, H., Strohmaier, W., Schlag, G., Schmid, E.R. and Allmaier, G.: Characterization of phosphatidylcholines in rabbit lung lavage fluid by positive and negative ion fast-atom bombardment mass spectrometry. *J. Chromatogr.*, 562 (1991) 257-266.
- 358 Gevorkian, E.S. and Tadevosian, Yu.V.: (Estradiol action on phosphoinositide catabolism initiation in rat brain synaptosomal membranes). *Biokhimiya (Moscow)*, 55 (1990) 1381-1386.
- 359 Gu, T.-J., Gu, X.-B. and Yu, R.K.: Assay of rat brain sialyltransferase activities on thin-layer plate. *J. Liq. Chromatogr.*, 13 (1990) 2771-2781.

- 360 Hanahan, D.J., Nouchi, T., Weintraub, S.T. and Olson, M.S.: Novel route to preparation of high purity lysoplasmylethanolamine. *J. Lipid Res.*, 31 (1990) 2113-2117.
- 361 Hayashi, H. and Takahata, S.-i.: Role of peroxisomal fatty acyl-CoA β -oxidation in phospholipid biosynthesis. *Arch. Biochem. Biophys.*, 284 (1991) 326-331.
- 362 Holgersson, J., Clausen, H., Hakomori, S., Samulesson, B.E. and Breimer, M.E.: Blood group A glycolipid antigen expression in kidney, ureter, kidney artery, and kidney vein from a blood group A₁Le(a-b⁺) human individual. Evidence for a novel blood group A heptaglycosylceramide based on a type 3 carbohydrate chain. *J. Biol. Chem.*, 265 (1990) 20790-20798.
- 363 Hullin, F., Bossant, M.-J. and Salem, N., Jr.: Aminophospholipid molecular species asymmetry in the human erythrocyte plasma membrane. *Biochim. Biophys. Acta*, 1061 (1991) 15-25.
- 364 Hurst, K.M., Hughes, B.P. and Barritt, G.J.: The roles of phospholipase D and a GTP-binding protein in guanosine 5'-[γ -thio]triphosphate - stimulated hydrolysis of phosphatidylcholine in rat liver plasma membranes. *Biochem. J.*, 272 (1990) 749-753.
- 365 Igarashi, Y., Kitamura, K., Zhou, Q. and Hakomori, S.-i.: A role of lyso-phosphatidylcholine in GM3-dependent inhibition of epidermal growth factor receptor autophosphorylation in A431 plasma membranes. *Biochem. Biophys. Res. Commun.*, 172 (1990) 77-84.
- 366 Ilinov, P., Katarova, E., Dimov, S. and Zaprianova, E.: Direct thin-layer chromatographic method for isolation of gangliosides. *J. Liq. Chromatogr.*, 13 (1990) 1921-1931.
- 367 Itabashi, Y., Kuksis, A., Marai, L. and Takagi, T.: HPLC resolution of diacylglycerol moieties of natural triacylglycerols on a chiral phase consisting of bonded (R)-(+)-1-(1-naphthyl)ethylamine. *J. Lipid Res.*, 31 (1990) 1711-1717.
- 368 Jennemann, R., Rodden, A., Bauer, B.L., Mennel, H.-D. and Wiegandt, H.: Glycosphingolipids of human gliomas. *Cancer Res.*, 50 (1990) 7444-7449.
- 369 Kam, N.T.P., Albright, E., Mathur, S. and Field, F.J.: Effect of lovastatin on acyl-CoA:cholesterol O-acyltransferase (ACAT) activity and the basolateral-membrane secretion of newly synthesized lipids by CaCo-2 cells. *Biochem. J.*, 272 (1990) 427-433.
- 370 Kariel, N., Davidson, E. and Keough, K.M.W.: Cholesterol does not remove the gel-liquid crystalline phase transition of phosphatidylcholines containing two polyenoic acyl chains. *Biochim. Biophys. Acta*, 1062 (1991) 70-76.
- 371 Kawabuchi, K., Takechi, Y. and Morimoto, M.: (An application of thin-layer chromatography of fat and oil, fatty acid and mineral oil for science education). *Kogaku to Kyoiku*, 38 (1990) 440-443; *C.A.*, 114 (1991) 23074p.
- 372 Kawashima, I., Tada, N., Fujimori, T. and Tai, T.: Monoclonal antibodies to disialogangliosides: characterization of antibody-mediated cytotoxicity against human melanoma and neuroblastoma cells *in vitro*. *J. Biochem. (Tokyo)*, 108 (1990) 109-115.
- 373 Kiss, Z., Chattapodhyay, J. and Pettit, G.R.: Stimulation of phosphatidylcholine synthesis by activators of protein kinase C is dissociable from increased phospholipid hydrolysis. *Biochem. J.*, 273 (1991) 189-194.
- 374 Kobayashi, T. and Goto, I.: A sensitive assay of lysogangliosides using high-performance liquid chromatography. *Biochim. Biophys. Acta*, 1081 (1991) 159-166.
- 375 Kuriyama, M., Yoshida, H., Suzuki, M., Fujiyama, J. and Igata, A.: Lysosomal acid lipase deficiency in rats: lipid analyses and lipase activities in liver and spleen. *J. Lipid Res.*, 31 (1990) 1605-1612.
- 376 Lam, K.K. and Sequera, D.E.: Two dimensional quantitative analysis in planar chromatography. *J. Liq. Chromatogr.*, 13 (1990) 1967-1982.

- 377 Ledvinova, J., Iwamori, M. and Nagai, Y.: Characteristics binding of human plasma apolipoprotein B to gangliotetraosylceramide and gangliotriaosylceramide. *Eur. J. Biochem.*, 194 (1990) 507-511.
- 378 Lee, I. and Hammond, E.G.: Oat (*Avena sativa*) caryopses as a natural lipase bioreactor. *J. Am. Oil Chem. Soc.*, 67 (1990) 761-765.
- 379 Li, G., Regazzi, R., Ullrich, S., Pralong, W.-F. and Wollheim, C.B.: Potentiation of stimulus-induced insulin secretion in protein kinase C-deficient RINm5F cells. *Biochem. J.*, 272 (1990) 637-645.
- 380 Lum, P.Y. and Chino, H.: Primary role of adipokinetic hormone in the formation of low density lipophorin in locusts. *J. Lipid Res.*, 31 (1990) 2039-2044.
- 381 Macaulay, S.L. and Larkins, R.G.: Isolation of insulin-sensitive phosphatidylinositol-glycan from rat adipocytes. Its impaired breakdown in the streptozotocin-diabetic rat. *Biochem. J.*, 271 (1990) 427-435.
- 382 Martinez, R. and Moyna, P.: TLC-scanning for direct quantitation of natural waxes. *J. Liq. Chromatogr.*, 13 (1990) 1959-1965.
- 383 Matsubara, C., Yoshihara, K. and Takamura, K.: (Trace analysis of phospholipids by enzymic reactions on a silicagel plate). *Nippon Kagaku Kaishi*, (1990) 896-897; *C.A.*, 113 (1990) 148345p.
- 384 McNeill, G.P., Shimizu, S. and Yamane, T.: Solid phase enzymatic glycerolysis of beef tallow resulting in a high yield of monoglyceride. *J. Am. Oil Chem. Soc.*, 67 (1990) 779-783.
- 385 Metz, S.A. and Dunlop, M.: Production of phosphatidylethanol by phospholipase D phosphatidyl transferase in intact or dispersed pancreatic islets: evidence for the *in situ* metabolism of phosphatidylethanol. *Arch. Biochem. Biophys.*, 283 (1990) 417-428.
- 386 Mitsui, H., Iwamori, M., Hashimoto, N., Yamada, H., Ikeda, Y., Toda, G., Kurokawa, K. and Nagai, Y.: The β subunit of cholera toxin enhances DNA synthesis in rat hepatocytes induced by insulin and epidermal growth factor. *Biochem. Biophys. Res. Commun.*, 174 (1991) 373-378.
- 387 Mok, A.Y.P. and McMurray, W.C.: Biosynthesis of phosphatidic acid by glycerophosphate acyltransferases in rat liver mitochondria and microsomes. *Biochem. Cell Biol.*, 68 (1990) 1380-1392.
- 388 Na, A., Eriksson, C., Eriksson, S.-V., Österberg, E. and Holmberg, K.: Synthesis of phosphatidylcholine with (*n*-3) fatty acids by phospholipase A2 in microemulsion. *J. Am. Oil Chem. Soc.*, 67 (1990) 766-770.
- 389 Nissen, H.P. and Kreysel, H.W.: The use of HPLC for the determination of lipids in biological materials. *Chromatographia*, 30 (1990) 686-690.
- 390 Ohkubo, I., Gasa, S., Namikawa, C., Makita, A. and Sasaki, M.: Human erythrocyte multicatalytic proteinase: activation and binding to sulfated galacto- and lactosylceramides. *Biochem. Biophys. Res. Commun.*, 174 (1991) 1133-1140.
- 391 Ohta, A., Mayo, M.C., Kramer, N. and Lands, W.E.M.: Rapid analysis of fatty acids in plasma lipids. *Lipids*, 25 (1990) 742-747; *C.A.*, 114 (1991) 20370w.
- 392 Olsson, U., Kaufmann, P. and Herslöf, G.: Densitometry of lipids with iodine staining on HPTLC. *J. Liq. Chromatogr.*, 13 (1990) 2021-2033.
- 393 Omatsu-Kanbe, M. and Kitasato, H.: Insulin stimulates the translocation of Na^+/K^+ -dependent ATPase molecules from intracellular stores to the plasma membrane in frog skeletal muscle. *Biochem. J.*, 272 (1990) 727-733.
- 394 Ostrander, G.K., Bozlee, M., Fukuda, M., Dell, A., Thomas-Oates, J.E., Levery, S.B., Eaton, H.L., Hakomori, S.-i. and Holmes, E.H.: Isolation and characterization of the major glycosphingolipids from the liver of the rainbow trout (*Oncorhynchus mykiss*): identification of an abnormal source of 9-*O*-acetyl GD₃. *Arch. Biochem. Biophys.*, 284 (1991) 413-421.

- 395 Pchelkin, V.P. and Véreshchagin, A.G.: Identification of individual diacylglycerols by adsorption thin-layer chromatography of their coordination complexes. *J. Chromatogr.*, 538 (1991) 373-383.
- 396 Pelle, E., Maes, D., Padulo, G.A., Kim, E.-K. and Smith, W.P.: An *in situ* model to test relative antioxidant potential: ultraviolet-induced lipid peroxidation in liposomes. *Arch. Biochem. Biophys.*, 283 (1990) 234-240.
- 397 Riboni, L., Ghidoni, R., Benevento, A. and Tettamanti, G.: Content, pattern and metabolic processing of rat-liver gangliosides during liver regeneration. *Eur. J. Biochem.*, 194 (1990) 377-382.
- 398 Roldan, E.R.S. and Harrison, R.A.P.: Diacylglycerol and phosphatidate production and the exocytosis of the sperm acrosome. *Biochem. Biophys. Res. Commun.*, 172 (1990) 8-15.
- 399 Rush, J.S., Sweitzer, T., Kent, C., Decker, G.L. and Waechter, C.J.: Biogenesis of the endoplasmic reticulum in activated B lymphocytes: temporal relationships between the induction of protein N-glycosylation activity and the biosynthesis of membrane protein and phospholipid. *Arch. Biochem. Biophys.*, 284 (1991) 63-70.
- 400 Sakaki, K., Yokochi, T., Suzuki, O. and Hakuta, T.: Supercritical fluid extraction of fungal oil using CO₂, N₂O, CHF₃ and SF₆. *J. Am. Oil Chem. Soc.*, 67 (1990) 553-557.
- 401 Sauro, V.S. and Strickland, K.P.: Triacylglycerol synthesis and diacylglycerol acyltransferase activity during skeletal myogenesis. *Biochem. Cell Biol.*, 68 (1990) 1393-1401.
- 402 Schick, P.K. and He, X.: Composition and synthesis of glycolipids in megakaryocytes and platelets: differences in synthesis in megakaryocytes at different stages of maturation. *J. Lipid Res.*, 31 (1990) 1645-1654.
- 403 Schlame, M. and Rüstow, B.: Lysocardiolipin formation and reacylation in isolated rat liver mitochondria. *Biochem. J.*, 272 (1990) 589-595.
- 404 Schmitz, G., Beuck, M., Fischer, H., Nowicka, G. and Robenek, H.: Regulation of phospholipid biosynthesis during cholesterol influx and high density lipoprotein - mediated cholesterol efflux in macrophages. *J. Lipid Res.*, 31 (1990) 1741-1752.
- 405 Schneider, E., Völcker, C.-E. and Haude, W.: Phospholipid pattern and distribution of phosphatidylethanolamine in erythrocyte membrane of patients with malignancies. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 786.
- 406 Sekine, M., Hashimoto, Y., Inagaki, F., Yamakawa, T. and Suzuki, A.: The expression of IV^β[Galβ1-4(Fucα1-3)GlcNAc]-Gb₅Cer in mouse kidney is controlled by the Gsl-5 gene through regulation of UDP-GlcNAc:Gb₅Cer β1-6N-acetylglucosaminyltransferase activity. *J. Biochem. (Tokyo)*, 108 (1990) 103-108.
- 407 Shantha, N.C. and Ackman, R.G.: Advantages of total lipid hydrogenation prior to lipid class determination of Chromarods-SIII. *Lipids*, 25 (1990) 570-574; *C.A.*, 113 (1990) 207724m.
- 408 Spasokukotskaya, T., Taljanidisz, J., Sasvari-Szekely, M. and Staub, M.: Deoxycytidine is salvaged not only into DNA but also into phospholipid precursors. III. dCDP-Diacylglycerol formation in tonsillar lymphocytes. *Biochem. Biophys. Res. Commun.*, 174 (1991) 680-687.
- 409 Stathopoulos, V.M., Coco-Maroney, A., Wei, C.-W., Goth, M., Zaricznyj, C. and Macara, I.G.: Identification of two cytosolic diacylglycerol kinase isoforms in rat brain, and in NIH-3T3 and ras-transformed fibroblasts. *Biochem. J.*, 272 (1990) 569-575.
- 410 Sugita, M., Inagaki, F., Naito, H. and Hori, T.: Studies on glycosphingolipids in larvae of the green-bottle fly, *Lucilia caesar*: two neutral glycosphingolipids having large straight oligosaccharide chains with eight and nine sugars. *J. Biochem. (Tokyo)*, 107 (1990) 899-903.

- 411 Terabayashi, T., Ogawa, T. and Kawanishi, Y.: Characterization of ganglioside G_{M4} lactones isolated from the whale brain. *J. Biochem. (Tokyo)*, 107 (1990) 868-871.
- 412 Thurmond, R.L., Lindblom, G. and Brown, M.F.: Influences of membrane curvature in lipid hexagonal phases studied by deuterium NMR spectroscopy. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1231-1238.
- 413 Trbojevic-Cepe, M. and Kracun, I.: Determination of gangliosides in human cerebrospinal fluid by high-performance thin-layer chromatography and direct densitometry. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 863-872; *C.A.*, 114 (1991) 58302p.
- 414 Tysnes, O.-B., Johanessen, E. and Steen, V.M.: Neomycin does not interfere with the inositol phospholipid metabolism, but blocks binding of α -thrombin to intact human platelets. *Biochem. J.*, 273 (1991) 241-243.
- 415 Wali, R.K., Dudeja, P.K., Bolt, M.J.G., Sitrin, M.D. and Brasitus, T.A.: Correction of abnormal small intestinal cytosolic protein kinase C activity in streptozotocin-induced diabetes by insulin therapy. *Biochem. J.*, 272 (1990) 653-658.
- 416 Weiss, A.: Enzymatische Herstellung von festen Fettsäuremonoglyceriden. *Fat Sci. Technol.*, 92 (1990) 392-396.
- 417 Wertz, P.W. and Downing, D.T.: Metabolism of linoleic acid in porcine epidermis. *J. Lipid Res.*, 31 (1990) 1839-1844.
- 418 Wilder, P.J., Overman, D.K., Tenenholz, T.C. and Gutierrez, P.L.: Differences in myristic acid synthesis and in metabolic rate for P388 cells resistant to doxorubicin. *J. Lipid Res.*, 31 (1990) 1973-1982.
- 419 Yang, C.Y.S. and Peng, A.C.: Analysis of soybean oil from Ohio. *J. Am. Oil Chem. Soc.*, 67 (1990) 594-596.
- 420 Ye, J.N., Gu, T., Xia, L., Murphy, M.J., Jr., Lee, W., Gao, N., Gu, J. and Fuhrer, J.P.: Enhanced expression of ganglioside G_{D3} in human and rat hepatocellular carcinoma cells and NIH 3T3 cells transfected with human tumor DNAs. *Cancer Res.*, 50 (1990) 7697-7702.
- 421 Yokochi, T., Usita, M.T., Kamisaka, Y., Nakahara, T. and Suzuki, O.: Increase in the γ -linolenic acid content by solvent winterization of fungal oil extracted from *Mortierella* genus. *J. Am. Oil Chem. Soc.*, 67 (1990) 846-851.
- See also 264, 285, 619, 638.

13. STEROIDS

13a. General techniques

- 422 Fenske, M. and Schönheiter, H.: Thin-layer chromatography on silica-coated aluminium sheet as an adjunct to radioimmunoassay of steroids. *J. Chromatogr.*, 563 (1991) 178-183.
- 423 Meulenberg, E.P.M.M. and Hofman, J.A.: The effect of pretreatment of saliva on steroid hormone concentrations. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 923-928.

13b. Pregnane and androstane derivatives

- 424 Heyde, R., Schwalbe, R. and Illig, G.: Bestimmung von Prednisolon in Salben. *Pharmazie*, 45 (1990) 860-861.

- 425 Hoobenboom, L.A.P., Berghmans, M.C.J., van Veldhuizen, A. and Kuiper, H.A.: The use of pig hepatocytes to study the biotransformation of β -nortestosterone by pigs. Identification of glucuronidated 15α -hydroxy-norandrostenedione as an important *in vitro* and *in vivo* metabolite. *Drug Metab. Disp.*, 18 (1990) 999-1004.
- 426 Novakovic, J., Nemcova, I. and Vasatova, M.: Quantitative HPTLC determination of cyproterone acetate and ethynyl estradiol in pharmaceuticals. *J. Planar Chromatogr.*, 3 (1990) 407-409.
- 427 Prokhorov, B.S., Rylin, A.F. and Titova, A.V.: (Study of testosterone enanthate purity). *Khim.-Farm. Zh.*, 24, No. 7 (1990) 84-85; *C.A.*, 113 (1990) 158769u.
- 428 Sliwiok, J., Podgorny, A., Siwek, A. and Witkowska, B.: Chromatographic investigation of the hydrophobicity of selected cortisone derivatives. *J. Planar Chromatogr.*, 3 (1990) 410-412.

See also 423.

13c. Estrogens

see 426.

13d. Sterols

- 429 Cuthbert, J.A. and Lipsky, P.E.: Mitogenic stimulation alters the regulation of LDL receptor gene expression in human lymphocytes. *J. Lipid Res.*, 31 (1990) 2067-2078.
- 430 Homberg, E. and Bielefeld, B.: Hauptkomponenten der 4-Methylsterin- und Triterpenfraktion von 12 Pflanzenfetten und ihr Einfluss auf die Sterinanalyse. *Fat Sci. Technol.*, 92 (1990) 478-480.
- 431 Li, K.: Simple and rapid thin-layer chromatographic method for quantitative measurement of free cholesterol in serum. *J. Chromatogr.*, 532 (1990) 449-452.
- 432 Obasi, N.B.B., Igboechi, A.C. and Benjamin, T.V.: Seasonal variations in the seed oil of *Theretia peruviana* (Pers.) K. Schum. *J. Am. Oil Chem. Soc.*, 67 (1990) 624-625.
- 433 Pal, S. and Davis, P.J.: N-3 polyunsaturated fatty acids enhance cholesterol efflux from human fibroblasts in culture. *Biochem. Biophys. Res. Commun.*, 173 (1990) 566-570.
- 434 Pascal, S., Taton, M. and Rahier, A.: Oxidative C4-demethylation of 24-methylene cycloartanol by a cyanide-sensitive enzymatic system from higher plant microsomes. *Biochem. Biophys. Res. Commun.*, 172 (1990) 98-106.

See also 361, 404.

13e. Bile acids and alcohols

- 435 Ferreira, H.E.C.S. and Elliot, W.H.: Pre-column derivatization of free bile acids for high-performance liquid chromatographic and gas chromatographic-mass spectrometric analysis. *J. Chromatogr.*, 562 (1991) 697-712.
- 436 Radomska, A., Comer, K.A., Zimniak, P., Falany, J., Iscan, M. and Falany, C.N.: Human liver steroid sulphotransferase sulphates bile acids. *Biochem. J.*, 272 (1990) 597-604.
- 437 Takikawa, H., Ohki, H., Sano, N., Kasama, T. and Yamanaka, M.: Cholestasis induced by lithocholate and its glucuronide: their biliary excretion and metabolism. *Biochim. Biophys. Acta*, 1081 (1991) 39-44.

- 438 Takikawa, H., Tomita, J., Takemura, T. and Yamanaka, M.: Cytotoxic effect and uptake mechanisms by isolated rat hepatocytes of lithocholate and its glucuronide and sulfate. *Biochim. Biophys. Acta*, 1091 (1991) 173-178.
- 439 Wang, Y., Wang, Q., Guo, Y. and Cheng, H.: (TLC-densitometric determination of deoxycholic acid and cholic acid in Angongniu Huangwan). *Zhongguo Yaoxue Zazhi*, 24 (1989) 732-734; *C.A.*, 113 (1990) 158761k.
- 440 Zhang, Q., Li, S., Cheng, J., Yan, K. and Tian, S.: (HPTLC-densitometric determination of free bile acids in bezoar). *Zhongguo Zhongyao Zazhi*, 15 (1990) 360-362; *C.A.*, 113 (1990) 237916t.

See also 361.

14. STEROID GLYCOSIDES AND SAPONINS

- 441 Fujii, Y., Ikeda, Y. and Yamazaki, M.: Quantitative determination of digitalis glycosides in *Digitalis purpurea* leaves by reversed-phase thin-layer chromatography. *J. Liq. Chromatogr.*, 13 (1990) 1909-1919.
- 442 Goto, A., Ishiguro, T., Yamada, K., Ishii, M., Yoshioka, M., Eguchi, C., Shimora, M. and Sugimoto, T.: Isolation of a urinary digitalis-like factor indistinguishable from digoxin. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1093-1101.
- 443 Karikura, M., Miyase, T., Tanizawa, H., Takino, Y., Taniyama, T. and Hayashi, T.: Studies on absorption, distribution, excretion and metabolism of ginseng saponins. V. The decomposition products of ginsenoside Rb₂ in the large intestine of rats. *Chem. Pharm. Bull.*, 38 (1990) 2859-2861.
- 444 Kreutzer, S., Schimmer, O. and Waibel, S.: Triterpenoid saponins in the genus *Grindelia*. *Planta Med.*, 56 (1990) 392-394; *C.A.*, 113 (1990) 237639e.
- 445 Oleszek, W., Price, K.R., Colquhoun, I.J., Jurzysta, M., Ploszynski, M. and Fenwick, G.R.: Isolation and identification of alfalfa (*Medicago sativa* L.) root saponins: their activity in relation to a fungal bioassay. *J. Agric. Food Chem.*, 38 (1990) 1810-1817.

See also 297, 610.

15. TERPENES AND OTHER VOLATILE AROMATIC COMPOUNDS

15a. Terpenes

- 446 Hidaka, Y., Satoh, T. and Kamei, T.: Regulation of squalene epoxidase in HepG2 cells. *J. Lipid Res.*, 31 (1990) 2087-2094.
- 447 Lee, Y.W.: Dual counter-current chromatography - its applications in natural products research. *J. Chromatogr.*, 538 (1991) 37-44.
- 448 Munck, S.L. and Croteau, R.: Purification and characterization of the sesquiterpene cyclase patchoulol synthase from *Pogostemon cablin*. *Arch. Biochem. Biophys.*, 282 (1990) 58-64.
- 449 Pachaly, P.: Süßholzwurzel. *Dtsch. Apoth.-Ztg.*, 130 (1990) 2264-2265.
- 450 Salles, C., Jallageas, J.-C. and Cruzet, J.: Chromatographic separation and partial identification of glycosidically bound volatile components of fruit. *J. Chromatogr.*, 522 (1990) 255-265.

15b. *Essential oils*

- 451 Kreis, P., Mosandl, A. and Schmarr, H.-G.: Mentha-Öle. Enantioselektive Analyse des Menthylacetats zur Qualitätsbeurteilung von Mentha-Ölen. *Dtsch. Apoth.-Ztg.*, 130 (1990) 2579-2581.
- 452 Tamasi, G.M., Botz, L. and Szabo, L.G.: (The use of *Allium ursinum* L. in folk therapy and some characteristics of its essential oil). *Gyogyszereszet*, 34 (1990) 201-203; *C.A.*, 113 (1990) 158520f.
- 453 Yang, S., Wang, Q. and Huang, M.: (Effect of disintegrating method on the quantity and constituents of essential oil in *Fructus aurantii*). *Zhongguo Zhongyao Zazhi*, 15 (1990) 346-348; *C.A.*, 113 (1990) 178110a.

See also 599.

16. NITRO AND NITROSO COMPOUNDS

See 250, 454.

17. AMINES, AMIDES AND RELATED NITROGEN COMPOUNDS

See 275.

17a. *Amines and polyamines*

- 454 Ajmal, M., Mohammad, A. and Anwar, S.: Some observations on thin-layer chromatography for identification and separation of amino compounds on mixed adsorbents with benzene-containing eluents. *Microchem. J.*, 42 (1990) 206-217; *C.A.*, 113 (1990) 164721p.
- 455 Jain, R. and Bhatia, A.: Rapid TLC separation of aromatic amines on surfactant impregnated silica gel-G plates. *J. Indian Chem. Soc.*, 67 (1990) 355-356; *C.A.*, 113 (1990) 144583s.
- 456 Maslennikova, T.A.: (Thin-layer chromatographic analysis of products of reaction of anthraquinone, aniline hydrochloride, and aniline). *Anal. Kontrol v Pr-ve Monomerov, M.*, (1989) 110-116; *C.A.*, 113 (1990) 164728w.
- 457 Maslowska, J. and Bazylak, G.: Effect of some association effect in adsorption HPTLC of aliphatic amino alcohols. *Chem. Anal. (Warsaw)*, 33 (1988) 949-955; *C.A.*, 114 (1991) 16867w.

See also 246, 385, 545.

17b. *Catecholamines and their metabolites*

- 458 Hachula, U. and Buhl, F.: Determination of selected pharmacologically active reductants in drugs. *J. Planar Chromatogr.*, 3 (1990) 432-433.

17d. *Other amine derivatives and amides (excl. peptides)*

- 459 Bandyopadhyay, C., Narayan, V.S. and Variyar, P.S.: Phenolics of green pepper berries (*Piper nigrum* L.). *J. Agric. Food Chem.*, 38 (1990) 1696-1699.
- 460 Mutlib, A.E., Talaat, R.E., Slatter, J.G. and Abbott, F.S.: Formation and reversibility of S-linked conjugates of N-(1-methyl-3,3-diphenylpropyl)isocyanate, an *in vivo* metabolite of N-(1-methyl-3,3-diphenylpropyl)formamide, in rats. *Drug Metab. Disp.*, 18 (1990) 1038-1045.

See also 248, 456.

18. AMINO ACIDS AND PEPTIDES; CHEMICAL STRUCTURE OF PROTEINS

18a. Amino acids and their derivatives

- 461 Boudah, F. and Guermouche, M.H.: Determination of phenylalanine phenylthiohydantoin during phenylketonuria using HPTLC. *Analisis*, 18 (1990) 483-486; *C.A.*, 114 (1991) 38610j.
- 462 Brückner, H. and Keller-Hoehl, C.: HPLC separation of DL-amino acids derivatized with N²-(5-fluoro-2,4-dinitrophenyl)-L-amino acid amides. *Chromatographia*, 30 (1990) 621-629.
- 463 Cahnmann, H.J., Goncalves, E., Ito, Y., Fales, H.M. and Sokoloski, E.A.: Synthesis and characterization of N-bromoacetyl-3,3'-5-triiodo-L-thyronine. *J. Chromatogr.*, 538 (1991) 165-175.
- 464 Devani, M.B., Shishoo, C.J., Shah, S.A., Soni, K.P. and Shah, R.S.: Localization of amino acids on thin-layer chromatograms with acetylacetone-formaldehyde reagent. *J. Chromatogr.*, 537 (1991) 494-496.
- 465 Hurst, M.O. and Cobb, D.K.: Color reactions and thin-layer chromatography of amino acids: an undergraduate organic chemistry experiment for students in the allied health sciences. *J. Chem. Educ.*, 67 (1990) 978; *C.A.*, 114 (1991) 41648h.
- 466 McLaurin, J. and Moscarello, M.A.: The preparation of antibodies reactive against citrulline-containing charge isomers of myelin basic protein but not against the arginine-containing charge isomers. *Anal. Biochem.*, 191 (1990) 272-277.
- 467 Munoz, G. and Marshall, S.H.: An alternative method for a fast separation of phosphotyrosine. *Anal. Biochem.*, 190 (1990) 233-237.
- 468 Shimada, A., Fukuhara, T., Isoyama, M., Itoh, M. and Yuasa, S.: (Construction of chiral evolution model). *Viva Origino*, 17, No. 1 (1989) 53-62; *C.A.*, 113 (1990) 243953u.

See also 262, 475, 500, 624.

18b. Peptides, peptidic and proteinous hormones, growth factors

- 469 Beck-Sickinger, A.G., Jung, G., Gaida, W., Köppen, H., Schnorrenberg, G. and Lang, R.: Structure/activity relationships of C-terminal neuropeptide Y peptide segments and analogues composed of sequence 1-4 linked to 25-36. *Eur. J. Biochem.*, 194 (1990) 449-456.
- 470 Bertrams, A.A. and Ziegler, K.: New substrates of the multispecific bile acid transporter in liver cells: interference of some linear renin inhibiting peptides with transport protein(s) for bile acids. *Biochim. Biophys. Acta*, 1073 (1991) 213-220.
- 471 Dudek, S., Friebe, S. and Hermann, P.: High-performance liquid chromatographic method for the study of solvent effects on the peptidase and esterase activity of thermitase. *J. Chromatogr.*, 520 (1990) 333-338.
- 472 Haas, D.W. and Hagedorn, C.H.: Casein kinase I phosphorylates the 25-kDa mRNA cap-binding protein. *Arch. Biochem. Biophys.*, 284 (1991) 84-89.
- 473 Saez, J.C., Nairn, A.C., Czernik, A.J., Spray, D.C., Hertzberg, E.L., Greengard, P. and Bennett, M.V.L.: Phosphorylation of connexin 32, a hepatocyte gap-junction protein, by cAMP-dependent protein kinase, protein kinase C and Ca²⁺/calmodulin-dependent protein kinase II. *Eur. J. Biochem.*, 192 (1990) 263-273.

- 474 Shelly, D.C. and Du, Y.: Mechanistic study of microwave-assisted acid hydrolysis of peptides on TLC plates. *J. Liq. Chromatogr.*, 13 (1990) 2757-2769.
- 475 Skubitz, K.M. and Goueli, S.A.: Basic fibroblast growth factor is a substrate for phosphorylation by human neutrophil ecto-protein kinase activity. *Biochem. Biophys. Res. Commun.*, 174 (1991) 49-55.

18c. *Elucidation of structure of proteins and enzymes*

- 476 Makevnina, L.G., Golubenko, Z., Akhunov, A. and Paskhina, T.S.: (Kininase from spider (*Latrodectus tredecimguttatus*) venom: the relationship of the enzyme to thiol endopeptidases hydrolyzing the -Pro⁷-Phe⁸- bond of bradykinin). *Biokhimiya (Moscow)*, 55 (1990) 1481-1490.

20. ENZYMES AND ENZYME ACTIVITY ESTIMATION

20c. *Transferases transferring phosphorus containing groups (E.C. 2.7.--)*

See 409.

20f. *Other hydrolases*

See 476.

21. PURINES, PYRIMIDINES, NUCLEIC ACIDS AND THEIR CONSTITUENTS

21a. *Purines, pyrimidines, nucleosides, nucleotides*

- 477 Bernikov, L.R., Dzhandzhugazyan, K.N., Lutsenko, S.V. and Modyanov, N.N.: Dialdehyde ATP derivative as an affinity modifier of the Na⁺,K⁺-ATPase active site. *Eur. J. Biochem.*, 194 (1990) 413-421.
- 478 Buczynski, G. and Potter, R.L.: Nucleoside diphosphate kinase from *Xenopus* oocytes; partial purification and characterization. *Biochim. Biophys. Acta*, 1041 (1990) 296-304.
- 479 Hoheisel, J.D., Craig, A.C. and Lehrach, H.: Effect of 5-bromo- and 5-methyldeoxycytosine on duplex stability and discrimination of the NotI octadeoxynucleotide. Quantitative measurements using thin-layer chromatography. *J. Biol. Chem.*, 265 (1990) 16656-16660.
- 480 Keith, G., Desgres, J. and de Murcia, G.: Use of two-dimensional thin-layer chromatography for the components study of poly(adenosine diphosphate ribose). *Anal. Biochem.*, 191 (1990) 309-313.
- 481 Kumar, A.M. and Nayak, R.: Glycosidic bond cleavage of 5-fluoro-2'-deoxyuridine and 5-fluorouridine by amino acyl-tRNA synthetases. *Biochem. Biophys. Res. Commun.*, 173 (1990) 731-735.
- 482 Nupenko, E.V., Panchenko, M.P., Starikova, M.G., Grishin, A.V. and Tkachuk, V.A.: Apparent activation of rabbit lung membrane adenylate cyclase by cytosolic proteins possessing adenylate kinase activity. *Biochim. Biophys. Acta*, 1091 (1991) 213-221.
- 483 Sapotsky, M.V. and Drygin, Yu.F.: (Characterization of radish mosaic virus RNA: terminal structures and translation products). *Biokhimiya (Moscow)*, 55 (1990) 1437-1444.

- 484 Tanuma, S.-i. and Otsuka, F.: Change in activity of nuclear poly(ADP-ribose) glycohydrolase during the HeLa S3 cell cycle. *Arch. Biochem. Biophys.*, 284 (1991) 227-231.

See also 499, 504, 507, 536, 578.

21c. *Nucleic acids, DNA*

- 485 Li, D., Xu, D., Chandar, N., Lombardi, B. and Randerath, K.: Persistent reduction of indigenous DNA modification (I-compound) levels in liver DNA from male Fischer rats fed choline-devoid diet and in DNA of resulting neoplasms. *Cancer Res.*, 50 (1990) 7577-7580.

22. ALKALOIDS

- 486 Blum, L.M., Carenzo, E.F. and Rieders, F.: Determination of lysergic acid diethylamide (LSD) in urine by instrumental high-performance thin-layer chromatography. *J. Anal. Toxicol.*, 14 (1990) 285-287; *C.A.*, 113 (1990) 206306q.
- 487 Budnikov, G.K., Kargina, O.Yu. and Kargina, N.M.: (Use of polarography in combination with thin-layer chromatography in the analysis of papaverine-containing pharmaceutical mixtures). *Farmatsiya (Moscow)*, 39, No. 4 (1990) 60-62; *C.A.*, 113 (1990) 158776u.
- 488 Hokama, N., Ohshiro, S. and Fujimoto, K.: (Compatibility of five [pharmaceutical] liquids in combination with brocin solution or brocin-codeine syrup concentrate). *Byoin Yakugaku*, 16 (1990) 37-44; *C.A.*, 114 (1991) 12051c.
- 489 Nobler, L.: The discovery of the vinca alkaloids - chemotherapeutic agents against cancer. *Biochem. Cell Biol.*, 68 (1990) 1344-1351.
- 490 Shrivastava, P.K. and Prakash, R.: Thin layer chromatographic separation of a few alkaloids over scolecite as a new adsorbent. *Natl. Acad. Sci. Lett. (India)*, 12 (1989) 197-199; *C.A.*, 114 (1991) 43269j.
- 491 Wang, K. and Tong, Y.Y.: (Determination of the main alkaloids in Wutou (*Aconitum*) by TLC-densitometry). *Yaoxue Xuebao*, 25 (1990) 387-390; *C.A.*, 113 (1990) 178349k.
- 492 Xiao, X.: (Determination of arecoline by thin-layer chromatography). *Lihua Jianyan, Huaxue Fence.*, 24 (1988) 371; *C.A.*, 114 (1991) 4936e.
- 493 Zweifel, U. and Luethy, J.: Collaborative experiments of the determination of pyrrolizidine alkaloids (PAs) in *Symphytum* extracts. *Pharm. Acta Helv.*, 65 (1990) 165-169; *C.A.*, 113 (1990) 158765q.

See also 270, 272, 278, 286, 550, 592.

23. OTHER SUBSTANCES CONTAINING HETEROCYCLIC NITROGEN

23a. *Porphyrins and other pyrroles*

- 494 Bonnett, R., Czechowski, F. and Latos-Grazynski, L.: Metalloporphyrins in coal. 4. TLC-NMR of iron porphyrins from coal: the direct characterization of coal hemes using paramagnetically shifted proton NMR spectroscopy. *Energy Fuels*, 4 (1990) 710-716; *C.A.*, 113 (1990) 194618c.

- 495 Schurz, H.H. and Busch, K.L.: Fast atom bombardment ionization of porphyrins: studies of reduction processes and use in coupling of thin-layer chromatography with mass spectrometry. *Energy Fuels*, 4 (1990) 730-736; *C.A.*, 113 (1990) 194492g.

23d. *Pyridine derivatives*

See 249.

23e. *Other N-heterocyclic compounds*

- 496 Monje, M.C., Lattes, A. and Riviere, M.: Separation and determination of Z and E isomers of dodecyl urocanate. *J. Chromatogr.*, 521 (1990) 148-152.

See also 249, 250, 567, 569, 587.

24. ORGANIC SULPHUR COMPOUNDS (INCL. GLUCOSINOLATES)

- 497 Feng, Y., Zhang, Z., Chen, Z. and Xia, Z.: (Application of thin-layer chromatography scanning method in the determination of N-phenylphenothiazine and N-(α -pyridyl)phenothiazine). *Fenxi Huaxue*, 18 (1990) 567-570; *C.A.*, 114 (1991) 16891z.

- 498 Zhou, X., Yu, G., He, H. and Liu, Z.: (TLC densitometric determination of 3-methyl-4-(methylthio)phenol). *Huazhong Shifan Daxue Xuebao, Ziran Kexueban*, 23 (1989) 376-380; *C.A.*, 113 (1990) 144576s.

See also 242, 590.

25. ORGANIC PHOSPHORUS COMPOUNDS (INCL. SUGAR PHOSPHATES)

- 499 Thalmann, E. and Blaas, D.: Synthesis of γ -[4-(benzoylphenyl)methylamido]-7-methylguanosine 5'-triphosphate, a photoaffinity-label for cap-binding proteins. *Biochim. Biophys. Acta*, 1088 (1991) 301-304.

See also 480, 482, 619.

26. ORGANOMETALLIC AND RELATED COMPOUNDS

26a. *Organometallic compounds*

- 500 Hasunuma, R., Ogawa, T., Ishii, J. and Kawanishi, J.: Determination of selenium in organic compounds on a silica gel sintered thin-layer chromatographic plate with 2,3-diaminonaphthalene after direct digestion. *J. Chromatogr.*, 537 (1991) 397-405.

26c. *Coordination compounds*

- 501 Schuster, M., Kugler, B. and König, K.H.: The chromatography of metal chelates. XIX. Influence of the acyl substituents on the chromatographic properties of acylthiourea chelates. *Fresenius' Z. Anal. Chem.*, 338 (1990) 717-720.

- 502 Stetsenko, A.I., Yakovlev, K.I., Rozhkova, N.D., Pogareva, V.G. and Kazakov, S.A.: (Binuclear platinum(II) complexes with bridging polymethylenediamines). *Koord. Khim.*, 16 (1990) 560-565; *C.A.*, 113 (1990) 144006f.

27. VITAMINS AND VARIOUS ANIMAL GROWTH FACTORS (NON-PEPTIDIC)

- 503 Antonova, N.P., Prokhvatilova, S.S., Rybkina, E.M., Makarova, N.V., Shchavlin-skii, A.N. and Petrova, E.A.: (Application of ATLC plates to the pharmacopeial analysis of vitamins). *Farmatsiya (Moscow)*, 39 (1990) 71; *C.A.*, 113 (1990) 237930t.
- 504 Baldwin, J.E., Dreisbach, J.H. and Veca, A.: Biosynthetic preparation of [riboflavin-2-¹⁴C]flavin adenine dinucleotide using *Clostridium kluyveri*. *Prepar. Biochem.*, 20 (1990) 179-185.
- 505 Ford, S.H., Gallery, J., Nichols, A. and Shambee, M.: High-performance liquid chromatographic analysis of the (cyanoaquo) stereoisomers of several putative vitamin B₁₂ precursors. *J. Chromatogr.*, 537 (1991) 235-247.
- 506 Ford, S.H., Nichols, A. and Gallery, J.M.: Separation and study of corrinoid cobalt-ligand isomers by high-performance liquid chromatography. *J. Chromatogr.*, 536 (1991) 185-191.
- 507 Kim, Y.S. and Chae, H.Z.: Purification and properties of malonyl-CoA synthetase from *Rhizobium japonicum*. *Biochem. J.*, 273 (1991) 511-516.
- 508 Sliwiok, J., Podgorny, A. and Siwek, A.: Chromatographic comparison of the hydrophobicity of vitamin A derivatives. *J. Planar Chromatogr.*, 3 (1990) 429-430.

See also 260, 432, 458.

28. ANTIBIOTICS

- 509 Ajito, K., Ikeda, D., Nosaka, C., Komuro, K., Kondo, S. and Takeuchi, T.: Improved antitumor effects of 3'-deamino-3'-morpholine derivatives of pirarubicin. *J. Antibiot.*, 43 (1990) 1464-1470.
- 510 Asano, N., Kameda, Y., Matsui, K., Horii, S. and Fukase, H.: Validamycin H, a new pseudotetrasaccharide antibiotic. *J. Antibiot.*, 43 (1990) 1039-1041.
- 511 De Maio, A. and Buchman, T.G.: Mammalian liver contains an activity which mimics bacterial chloramphenicol acetyltransferase. *Biochim. Biophys. Acta*, 1087 (1990) 303-308.
- 512 Funaishi, K., Kawamura, K., Saroh, F., Hiramatsu, M., Hagiwara, M. and Okanishi, M.: New analogues of rosaramycin isolated from a *Micromonospora* strain. I. Taxonomy, fermentation, isolation and physico-chemical and biological properties. *J. Antibiot.*, 43 (1990) 938-947.
- 513 Gireva, N.N., Naavtzenya, L.G. and Demchenko, B.I.: (Impurities in levomycetin stearate and purification of its technical product). *Khim.-Farm. Zh.*, 24, No. 8 (1990) 56-58; *C.A.*, 113 (1990) 218359x.
- 514 Ichimura, M., Ogawa, T., Takahashi, K.-i., Kobayashi, E., Kawamoto, I., Yasuzawa, T., Takahashi, I. and Nakano, H.: Duocarmycin S1, a new antitumor antibiotic from *Streptomyces* sp. *J. Antibiot.*, 43 (1990) 1037-1038.
- 515 Inoue, K., Akita, N., Yamashita, S., Shiba, T. and Fujita, T.: Constitutive and inducible expression of a transgene directed by heterologous promoters in a trout liver cell line. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1311-1316.

- 516 Itoh, A., Ido, J., Iwamoto, Y., Goshima, E., Miki, T. and Hasuda, K.: YS-822A, a new polyene macrolide antibiotic. I. Production, isolation, characterization and biological properties. *J. Antibiot.*, 43 (1990) 948-955.
- 517 Kuhnt, D., Anke, T., Besl, H., Bross, M., Herrmann, R., Mocek, U., Steffan, B. and Steglich, W.: Antibiotics from basidiomycetes. XXXVII. New inhibitors of cholesterol biosynthesis from cultures of *Xerula melanotricha* Dörfelt. *J. Antibiot.*, 43 (1990) 1413-1420.
- 518 Mikawa, T., Chiba, N., Ogishi, H., Sato, Y., Miyaji, S. and Sezaki, M.: (Antimicrobial formulations containing vermispurin). *Jpn. Kokai Tokkyo Koho JP 02 40,328 [90 40,328] (Cl. A61K35/74)*, 09 Feb. 1990, Appl. 88/189,833, 29 Jul. 1988; 14 pp.; *C.A.*, 113 (1990) 178272e.
- 519 Mori, H., Funayama, S., Sudo, Y., Komiyama, K. and Omura, S.: A new antibiotic, 13-hydroxyglycopiericidin A. Isolation, structure elucidation and biological characteristics. *J. Antibiot.*, 43 (1990) 1329-1331.
- 520 Nakagawa, K., Torikata, A., Sato, K. and Tsukamoto, Y.: Microbial conversion of milbemycins: 30-oxidation of milbemycin A₄ and related compounds by *Amycolata autotrophica* and *Amycolatopsis mediterranei*. *J. Antibiot.*, 43 (1990) 1321-1328.
- 521 Oka, M., Kamei, H., Hamagishi, Y., Tomita, K., Miyakai, T., Konishi, M. and Oki, T.: Chemical and biological properties of rubiginone, a complex of a new antibiotics with vincristine-cytotoxicity potentiating activity. *J. Antibiot.*, 43 (1990) 967-976.
- 522 Sakamoto, M., Yamamoto, K.-i., Isshiki, K., Ishikura, T., Fukagawa, Y. and Yohioka, T.: Antibacterial activity and chemical modifications of PS-5 at the C-3 side chain. *J. Antibiot.*, 43 (1990) 1254-1270.
- 523 Sawada, Y., Hatori, M., Yamamoto, H., Nishio, M., Miyaki, T. and Oki, T.: New antifungal antibiotics pradimicins FA-1 and FA-2: D-serine analogs of pradimicins A and C. *J. Antibiot.*, 43 (1990) 1223-1229.
- 524 Sawada, Y., Tsuno, T., Yamamoto, H., Nishio, M., Konishi, M. and Oki, T.: Pradimicins M, N, O and P, new dihydrobenzo[*a*]naphthacenequinones produced by blocked mutants of *Actinomadura hibisca* P157-2. *J. Antibiot.*, 43 (1990) 1367-1374.
- 525 Suzukake-Tsuchiya, K., Moriya, Y., Yamazaki, K., Hori, M., Hosokawa, N., Sawa, T., Iinuma, H., Naganawa, H., Imada, C. and Hamada, M.: Screening of antibiotics preferentially active against ras oncogene-expressed cells. *J. Antibiot.*, 43 (1990) 1489-1496.
- 526 Ushio, K. and Hayashi, E.: (Stability of pimarin eye ointment). *Kagaku Ryoho no Ryoiki*, 6 (1990) 1495-1499; *C.A.*, 113 (1990) 237661f.
- 527 Vega, M., Geshe, E., Garcia, G. and Saelzer, R.: Screening of antibiotic residues in poultry meat. *J. Planar Chromatogr.*, 3 (1990) 437-438.
- 528 Wong, F.A. and Flor, S.C.: The metabolism of ofloxacin in humans. *Drug Metab. Disp.*, 18 (1990) 1103-1104.
- 529 Yamashita, Y., Saitoh, Y., Ando, K., Takahashi, K., Ohno, H. and Nakano, H.: Saintopin, a new antitumor antibiotic with topoisomerase II dependent DNA cleavage activity, from *Paecilomyces*. *J. Antibiot.*, 43 (1990) 1344-1346.

See also 278.

29. INSECTICIDES, PESTICIDES AND OTHER AGROCHEMICALS

29b. Chlorinated insecticides

- 530 Chandurkar, P.S., Cheng, E.Y. and Menzer, R.E.: Metabolism of N-[3-chloro-4-(β -D-glucosylmethyl)phenyl]urea, a metabolite of chlorotoluron, in rat and Japanese quail. *J. Agric. Food Chem.*, 38 (1990) 1739-1742.
- 531 Pavkov, S., Vojinovic, M., Buzarov, D. and Urac, G.: (Application of thin layer chromatography for determination of organochlorine insecticides and polychlorinated biphenyls). *Zb. Matice Srp. Prir. Nauke*, 76 (1989) 31-38; *C.A.*, 113 (1990) 147138m.

29c. Phosphorus insecticides

- 532 Sherma, J. and Bretschneider, W.: Determination of organophosphorus insecticides in water by C-18 solid phase extraction and quantitative TLC. *J. Liq. Chromatogr.*, 13 (1990) 1983-1989.

29e. Herbicides

- 533 Cserhati, T. and Gyorfi, L.: Effect of overdevelopment on the TLC separation of three 2,6-dinitro-4-(trifluoromethyl)-aniline derivatives. *J. Liq. Chromatogr.*, 13 (1990) 2013-2020.
- 534 Zulalian, J.: Study of the absorption, excretion, metabolism and residues in tissues in rats treated with carbon-14-labeled pendimethalin, PROWL herbicide. *J. Agric. Food Chem.*, 38 (1990) 1743-1754.

29f. Fungicides

- 535 Ando, T., Tecle, B., Toia, R.F. and Casida, J.E.: Tritonikkomycin Z, (uracil-5- 3 H, pyridyl-2,4- 3 H₂): radiolabeling of a potent inhibitor of fungal and insect chitin synthetase. *J. Agric. Food Chem.*, 38 (1990) 1712-1715.

29g. Other types of pesticides and various agrochemicals

- 536 Efimtsev, E.I., Burov, G.P. and Solomin, A.A.: (Determination of *Bacillus thuringiensis* β -exdotoxin in insecticidal preparations). *Biol. Nauki (Moscow)*, (1990) 119-126; *C.A.*, 113 (1990) 147137k.
- 537 Serpe, L., Oliviero, G. and Begliomini, A.: (Determination of amitraz residues in honey by detection of the fluorescent derivative 2,4-xylydine following HPTLC). *Ind. Aliment. (Pinerolo)*, 28 (1989) 1173-1174; *C.A.*, 113 (1990) 210220z.
- 538 Sheinina, R.I., Panchenko, O.I. and Koneva, Ya.A.: (Determination of cotoran in products of cottonseed processing by TLC). *Otkrytiya, Izobret.*, (1990) 218; *C.A.*, 113 (1990) 206700p.

See also 531, 535.

30. SYNTHETIC AND NATURAL DYES

30a. Synthetic dyes

- 539 Liu, H., Shen, J. and Wang, C.: (Determination of alizarin anthraquinone derivatives by thin layer chromatography spectrophotometric method). *Zhejiang Gongxueyuan Xuebao*, 43 (1989) 84-89; *C.A.*, 113 (1990) 134146n.

- 540 Nayak, A. and Devi, S.: Thin-layer chromatographic separation of isomeric azodyes of 3-methyl-2-pyrazolin-5-ones. *Acta Cienc. Indica, Chem.*, 15 (1989) 137-142; *C.A.*, 114 (1991) 42446c.
- 541 Oka, H., Ikal, Y., Kawamura, N., Hayakawa, J., Yamada, M., Harada, K.-I., Murata, H., Suzuki, M., Nakazawa, H., Suzuki, S., Sakita, T., Fujita, M. et al.: Purification of Food Color Red No. 106 (Acid Red) using high-speed counter-current chromatography. *J. Chromatogr.*, 538 (1991) 149-156.
- 542 Sclar, R.N. and Freeman, K.A.: Chromatographic procedures for the separation of water-soluble acid dye mixtures. *J. Assoc. Off. Anal. Chem.*, 73 (1990) 829-837.
- 543 Weisz, A., Langowski, A.J., Meyers, M.B., Thieken, M.A. and Ito, Y.: Preparative purification of tetrabromotetrachlorofluorescein and Phloxine B by centrifugal counter-current chromatography. *J. Chromatogr.*, 538 (1991) 157-164.

See also 628.

30b. Chloroplast and other natural pigments

- 544 Khairy, A.H.: Contribution to the quantification of humic acids by thin layer chromatography. *Z. Pflanzenernaehr. Bodenkd.*, 153 (1990) 133-140; *C.A.*, 113 (1990) 151277y.

See also 603.

31. PLASTICS AND THEIR INTERMEDIATES

- 545 Dukhovnaya, I.S. and Kazarinova, N.F.: (Method of determining polyethylene-polyamines in aqueous solutions by thin-layer chromatography). *U.S.S.R. SU* 1,569,702 (Cl. G01N30/90), 07 Jun. 1990, Appl. 4,326,902, 12 Nov. 1987; *C.A.*, 113 (1990) 144656t.
- 546 Iyengar, D.R. and McCarthy, T.J.: Trends in adsorption of end-functionalized polystyrenes by thin-layer chromatography. *Macromolecules*, 23 (1990) 4344-4346; *C.A.*, 113 (1990) 153456e.
- 547 Jiang, Y. and Liang, E.: (Applications of thin-layer chromatography in polymeric material studies). *Gaofenzi Cailiao Kexue Yu Gongcheng*, 6, No. 2 (1990) 1-7; *C.A.*, 114 (1991) 7486u.
- 548 Negoescu, E., Nita, M., Chiriac, G. and Botea, M.: (Characterization of indigenous polyethylene glycol with 200, 400, 600 molecular weights by thin layer and gas chromatography). *Rev. Chim. (Bucharest)*, 41 (1990) 173-177; *C.A.*, 113 (1990) 232404g.

32. DRUG ANALYSIS

32a. Drug analysis, general techniques

- 549 Chowdary, K.P.R. and Krishna, S.R.: Evaluation of water soluble cellulose polymers as carriers for ketoprofen solid dispersions. *East. Pharm.*, 33, No. 389 (1990) 149-151; *C.A.*, 113 (1990) 217998t.

- 550 Corti, P., Corbini, G., Dreassi, E., Murratzu, C. and Celesti, I.: Thin layer densitometry in the quantitative assay of drugs. Note V. Assay of reserpine and chlorthalidone in the presence of the potential impurities of their solid pharmaceutical forms. *Pharm. Acta Helv.*, 65 (1990) 222-227; *C.A.*, 113 (1990) 218361s.
- 551 De Zeeuw, R.A. and Franke, J.P.: Computerized identification of drugs by TLC and color reactions. Is Cinderella becoming a princess? *GIT-Suppl.*, (1990) 13-16; *C.A.*, 113 (1990) 198087b.
- 552 Evtushenko, N.S., Popkov, V.A., Fatova, E.Yu., Nechaeva, Yu.A., Reshetnyak, V.Yu. and Azizov, I.K.: (Identification of components of dosage forms by reflectance spectrometry and thin-layer chromatography). *Farmatsiya (Moscow)*, 39, No. 4 (1990) 36-39; *C.A.*, 113 (1990) 158759r.
- 553 Sashida, Y., Suzuki, K., Moriya, S., Ogawa, K., Shimomura, H. and Hara, S.: (Microextraction of volatile constituents using gasified-solvent flow). *Yaku-gaku Zasshi*, 110 (1990) 321-324; *C.A.*, 113 (1990) 120879s.

See also 424.

32b. Antirheumatics and antiinflammatory drugs

- 554 Hladon, T., Pawlaczyk, J., Szafran, B. and Sobczak, H.: (Inclusion complexes of β -cyclodextrins with drugs derived from pyrazole. III. Stability of phenylbutazone in a β -cyclodextrin clathrate). *Acta Pol. Pharm.*, 46 (1989) 482-485; *C.A.*, 113 (1990) 197786s.
- 555 Zhang, Q., Wu, L. and Liu, A.: (Determination of the main components in acetylsalicylic acid tablets by thin-layer chromatography). *Sepeu*, 8 (1990) 193-194; *C.A.*, 113 (1990) 178367q.

See also 549.

32c. Autonomic and cardiovascular drugs

- 556 Bittererova, J., Soltes, L., Kallay, Z. and Trnovec, T.: Thin-layer chromatographic determination of tritium-labelled stobadin in rat plasma for pharmacokinetic purposes. *Pharmazie*, 45 (1990) 437-438; *C.A.*, 113 (1990) 144759d.
- 557 Budvári-Bárány, Z., Szász, G., Radeczky, G., Simonyi, I. and Shalaby, A.: Some new data concerning the chromatographic purity test for nifedipine. *J. Liq. Chromatogr.*, 13 (1990) 3541-3551.
- 558 Funk, W. and Azarderakhsh, M.: Derivatization of β -blockers in quantitative HPTLC. *GIT-Suppl.*, (1990) 31-39; *C.A.*, 113 (1990) 198119p.
- 559 Kwok, D.W.K., Pillai, G., Vaughan, R., Axelson, J.E. and McErlane, K.M.: Preparative high-performance liquid chromatography and preparative thin-layer chromatography isolation of tocinide carbamoyl-O- β -D-glucuronide: structural characterization by gas chromatography-mass spectrometry and fast atom bombardment-mass spectrometry. *J. Pharm. Sci.*, 79 (1990) 857-861.
- 560 Pfeifer, S., Flonka, G.-R., Dobbrodt, I., Franke, P. and Steenbeck, L.: Biotransformation und Ausscheidung von N,N'-Bis[3-(2-ethoxy-phenoxy)-2-hydroxy-propyl]ethylendiamin-dihydrochlorid (Falirytmin[®]) bei der Ratte. *Pharmazie*, 45 (1990) 751-755.
- 561 Singhvi, S.M., Foley, J.E., Willard, D.A. and Morrison, R.A.: Disposition of zofenopril calcium in healthy subjects. *J. Pharm. Sci.*, 79 (1990) 970-973.

See also 286.

32d. Central nervous system drugs

- 562 Berlyand, A.S., Zhidkova, A.M., Kutsyi, M.V., Spektor, S.S., Upadysheva, A.V. and Grigor'eva, N.D.: (Stage-by-stage quality control of a new preparation - amiridin). *Vysokochist. Veshchestva*, (1989) 176-180; *C.A.*, 113 (1990) 125793u.
- 563 Corti, P., Cenni, A., Corbini, G., Dreassi, E., Murratzu, C. and Caricchia, A.M.: Thin-layer chromatography and densitometry in drug assay: comparison of methods for monitoring valproic acid in plasma. *J. Pharm. Biomed. Anal.*, 8 (1990) 431-436; *C.A.*, 113 (1990) 224031a.
- 564 Franz, P.M., Anliker, S.L., Callaghan, J.T., DeSante, K.A., Dhahir, P.H., Nelson, R.L. and Rubin, A.: Disposition in humans of racemic piconadol, an opioid analgesic. *Drug Metab. Disp.*, 18 (1990) 968-973.
- 565 Pietrogrande, M.C., Bighi, C., Borea, P.A. and Dondi, F.: Linear solvation energy relationships in the study of the solvatochromic properties and liquid chromatographic retention behaviour of benzodiazepines. *J. Chromatogr.*, 522 (1990) 37-48.
- 566 Radulovic, D., Zivarovic, L. and Zivanov-Stakic, D.: Determination of mixture of spasmolytics in pharmaceutical preparations using TLC densitometry. *Acta Pol. Pharm.*, 46 (1989) 506-509; *C.A.*, 113 (1990) 158810a.
- 567 Seth, R.K. and Sarin, J.P.S.: Analytical and shelf-life studies on centbutindole, a new neuroleptic compound. *Indian J. Pharm. Sci.*, 51 (1989) 244-247; *C.A.*, 113 (1990) 197746d.
- 568 Shu, Y.-Z., Hubbard, J.W., McKay, G. and Midha, K.K.: Identification of phenolic doxepin glucuronides from patient urine and rat bile. *Drug Metab. Disp.*, 18 (1990) 1096-1099.
- 569 Stevenson, P.J., Hauksdottir, R., Kabada, P.K. and Damani, L.A.: Triazolines. XXII. Chromatography of 1-phenyl-5-(4-pyridyl)- Δ^2 -1,2,3-triazolines and related 1,2,3-triazoles, a new class of anticonvulsant agents. *J. Chromatogr.*, 533 (1990) 248-254.
- 570 Stiff, D.D. and Zemaitis, M.A.: Metabolism of the anticonvulsant agent zonisamide in the rat. *Drug Metab. Disp.*, 18 (1990) 888-894.
- 571 Zimak, J.: (Analytical utilization of acid hydrolysis in selected 1,4-benzodiazepine derivatives: a study of reaction conditions). *Folia Pharm. Univ. Carol.*, 11 (1988) 25-39; *C.A.*, 114 (1991) 12054f.

See also 277, 278, 314, 594.

32e. Chemotherapeutics (exc. cytostatics and antibiotics)

- 572 Detolle, S., Postaire, E., Prognon, P., Montagnier, C. and Pradeau, D.: Quantitative over-pressure layer chromatography of quinine, quinidine, and hydroquinidine in biomedical analysis. *J. Liq. Chromatogr.*, 13 (1990) 1991-2000.
- 573 El Dareer, S.M., Tillery, K.F., Rose, L.M., Struck, R.F. and Hill, D.L.: Disposition and metabolism of carbovir in mice dosed intravenously or orally. *Drug Metab. Disp.*, 18 (1990) 842-845.
- 574 Golan, R., Wasserzug, O., Freidlin, P., Pholpramool, C. and Lewin, L.M.: Bioautographic detection of sulpha drugs and their derivatives in drug preparations and in urine. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 637.
- 575 Högemann, A., Kiec-Kononowicz, K., Westhoff, F. and Blaschke, G.: Microsomal oxidation of priziquantel. *Arzneim.-Forsch.*, 40 (1990) 1159-1162.
- 576 Whitehouse, L.W., Menzies, A., Dawson, B., Zamecnik, J. and Sy, W.-W.: Deacetylated ketoconazole: a major ketoconazole metabolite isolated from mouse liver. *J. Pharm. Biomed. Anal.*, 8 (1990) 603-606.

See also 580, 595.

32f. Cytostatics

- 577 Datta, K., Roy, S.K. and Das, S.K.: A simple reversed phase partition thin layer chromatographic method for rapid identification and quantitation of methotrexate in presence of its disintegration products. *J. Liq. Chromatogr.*, 13 (1990) 1933-1941.
- 578 Foth, H., Hellkamp, J., Kunellis, E.-M. and Kahl, G.F.: Pulmonary elimination and metabolism of 5-fluoro-2'-deoxyuridine in isolated perfused rat lung and lung slices. *Drug Metab. Disp.*, 18 (1990) 1011-1017.
- 579 Foth, H., Kunellis, E.-M., Müsseler, T. and Kahl, G.F.: Nonlinear elimination kinetics of 5-fluoro-2'-deoxyuridine in isolated perfused rat liver and isolated hepatocytes. *J. Pharmacol. Exp. Ther.*, 254 (1990) 427-432.
- 580 Tomankova, H. and Sabartova, J.: Determination of impurities in azidothymidine by HPTLC densitometry and HPLC. *Chromatographia*, 29 (1990) 562-570.
- 581 Xu, B., Sun, Q., Zhang, N., Xie, B. and Zhang, J.: (Encapsulation of antitumor drug methotrexate in liposome vesicles). *Hejishu*, 13 (1990) 317-320; *C.A.*, 113 (1990) 237732e.

32g. Other drug categories

- 582 Chen, D., Lou, Y., Li, Z., Xia, Z., Chen, D. and Jiang, H.: (Determination of semisynthetic triptolide by HPTLC densitometry). *Zhongguo Yiyao Gongye Zazhi*, 21 (1990) 211-212; *C.A.*, 113 (1990) 237942y.
- 583 Gao, H., Li, J., Xie, X., Xu, Q. and Wang, G.: (Determination of hydroscopicity and stability of glycyrrhizic acid in Weisukang powder). *Zhongcaoyao*, 21 (1990) 353-354; *C.A.*, 113 (1990) 218042p.
- 584 Ianniello, R.M.: Thin layer chromatographic method for the determination of Surfadone™ QSP in formulated products. *J. Liq. Chromatogr.*, 13 (1990) 1943-1957.
- 585 Price, K., Perpall, H., Bicker, G., Tway, P. and Grinberg, N.: Quantitative analysis of a chloroquinolin-ethenyl phenyl derivative using thin layers impregnated with di-*p*-toluyl tartaric acid. *J. Liq. Chromatogr.*, 13 (1990) 2783-2807.
- 586 Radulovic, D., Zivanovic, L. and Glisovic, L.: Determination of tilidine in pharmaceutical preparations using thin-layer chromatographic densitometry. *Farmaco*, 45 (1990) 927-931; *C.A.*, 113 (1990) 237955e.
- 587 Sadikova, Sh.A., Genkina, G.L., Sattarova, A.Kh., Dobronravova, E.K. and Shakirov, T.T.: (Stability of 1% desoxypeganine hydrochloride injection solution). *Farmatsiya (Moscow)*, 39 (1990) 53-55; *C.A.*, 113 (1990) 237656h.
- 588 Tanaka, H., Miyata, T. and Nakagawa, H.: (Physicochemical properties and stability of emedastine difumarate). *Iyakuhin Kenkyu*, 21 (1990) 229-241; *C.A.*, 113 (1990) 197770g.
- 589 Toennesen, H.H. and Grislingaas, A.L.: Photochemical stability of biologically active compounds. II. Photochemical decomposition of mefloquine in water. *Int. J. Pharm.*, 60 (1990) 157-162; *C.A.*, 113 (1990) 158530j.
- 590 Trius, N.V., Gernikova, E.P., Bokovikova, T.N., Petrykina, E.A., Khromov, G.L. and Dolgopyatova, A.A.: (Quality control and standardization of ophthalmic films containing taufon). *Farmatsiya (Moscow)*, 39 (1990) 69-70; *C.A.*, 113 (1990) 237961d.
- 591 Xie, X., Pan, X. and Wang, Z.: (Assay and stability study of sodium cromoglycate eyedrops by TLC). *Zhongguo Yiyao Gongye Zazhi*, 21 (1990) 171-174; *C.A.*, 113 (1990) 158804b.

See also 261, 426, 488, 550.

32h. Toxicological and forensic applications

- 592 Foltz, R.L. and Sunshine, I.: Comparison of a TLC method with EMIT and GC/MS for detection of cannabinoids in urine. *J. Anal. Toxicol.*, 14 (1990) 375-378; *C.A.*, 114 (1991) 37286w.
- 593 Matyska, M. and Soczewinski, E.: Computer-aided optimization of liquid-solid systems in TLC 4. Retention versus eluent composition relationships of some drugs and poisons. *J. Planar Chromatogr.*, 3 (1990) 417-421.
- 594 Narimatsu, S., Watanabe, K., Matsunaga, T., Yamamoto, I., Imaoka, S., Funae, Y. and Yoshimura, H.: Cytochrome P-450 isozymes in metabolic activation of Δ^9 -tetrahydrocannabinol by rat liver microsomes. *Drug Metab. Disp.*, 18 (1990) 943-948.
- 595 Sriwoelan, S., Sri, T., Siam, S., Hermeni, T., Armayati, T., Toeti, A. and Sri, K.: (Screening test and identification in blood of several similar drugs of abuse). *Acta Pharm. Indones.*, 14 (1989) 27-33; *C.A.*, 113 (1990) 225880p.
- 596 Szoltysek, H.: (The use of phenylbutazone oxidation to azobenzene for identification and quantification of the drug in biological materials in poisoning). *Arch. Med. Sadowej Kryminol.*, 40 (1990) 8-15; *C.A.*, 114 (1991) 37257n.

See also 238, 486.

32i. Plant extracts

- 597 Amaral, M.T. and Proenca da Cunha, A.: (Linear furanocoumarins of *Ruta chalepensis* L. I. Determination of 5-methoxyypsoralen). *Rev. Port. Farm.*, 39, No. 3 (1989) 21-23; *C.A.*, 113 (1990) 138595f.
- 598 Bladt, S., Wagner, H. and Woo, W.S.: Taiga-Wurzel. DC- und HPLC-Analyse von *Eleutherococcus*- bzw. *Acanthopanax*-Extrakten und diese enthaltenden Phytopräparaten. *Dtsch. Apoth.-Ztg.*, 130 (1990) 1499-1508.
- 599 Buchbauer, G., Jirovetz, L., Nikiforov, A., Remberg, G. and Raverdino, V.: Headspace-analysis and aroma compounds of Austrian hay-blossoms (flores graminis, graminis flos) used in aromatherapy. *J. Essent. Oil Res.*, 2 (1990) 185-191; *C.A.*, 113 (1990) 197739d.
- 600 Chen, X., Chen, L., Yao, C., Yao, Y., Zhou, X. and Zhang, Z.: (Studies on inclusion compound oil of aromatic tumeric (*Curcuma aromatica*) in β -cyclodextrin). *Zhongcaoyao*, 21 (1990) 347-354; *C.A.*, 113 (1990) 218040m.
- 601 Cheng, D., Lei, Y. and Zhao, J.: (TLC-spectrophotometric determination of osthol and total linear furanocoumarins in Shechuangzi). *Zhongguo Yaoxue Zazhi*, 25 (1990) 164-166; *C.A.*, 113 (1990) 218336n.
- 602 Choi, K.J., Ko, S.R. and Yang, J.W.: (Identification of index components of scutellariae radix and quantitative determination of baicalin from crude drug preparation containing bupleuri radix). *Saengyak Hakhoechi*, 21 (1990) 158-162; *C.A.*, 114 (1991) 12277f.
- 603 Liang, W., Bi, Y., Chen, T., Lu, H., Chen, Y. and Zhen, H.: (Quantitative determination of isatin and indigotin in Banlangen (*Isatis indigotica*) and Daigingye by TLC scanning method). *Zhongcaoyao*, 21 (1990) 155-156; *C.A.*, 113 (1990) 138589g.
- 604 Liang, X. and Xiao, P.: (HPTLC separation and densitometry of procyanidin B-2 in rhizome *Fagopyrum dibotrys* (D. Don) Hara). *Yaowu Fenxi Zazhi*, 10 (1990) 227-230; *C.A.*, 113 (1990) 178357m.
- 605 Liang, Z., Zhang, Y. and Miao, C.: (Isolation, purification and structural investigation of pigmentary glucan CF₁ from *Ganoderma applanatum* (Pers.) Pat. from Changbaishan [China]). *Shengwu Huaxue Zazhi*, 6 (1990) 273-278; *C.A.*, 113 (1990) 237651c.

- 606 Lichius, J.J., Daniel, M., Fingerhut, T. and Wärtgen, K.: Der Nektar von *Digitalis*. Ist seine Zusammensetzung ein taxonomisches Merkmal? *Dtsch. Apoth.-Ztg.*, 130 (1990) 2191-2193.
- 607 Liu, M., Wang, J. and Wu, S.: (The determination of oleanolic acid in glossy privet (*Ligustrum lucidum*) from different place of production). *Zhongcaoyao*, 21 (1990) 260-261; *C.A.*, 113 (1990) 218334k.
- 608 Ming, D., Chzengyie, S., Guozhu, H., Shufang, D. and Leming, L.: Separation and quantitative determination of gentiopicroside in various biological matrices by thin layer chromatography. *J. Planar Chromatogr.*, 3 (1990) 386-388.
- 609 Nishibe, S., Sasahara, M., Miyageta, M., Noro, Y., Kawamura, T. and Tanaka, T.: (Studies on the methods for chemical identification of forsythiae fructus and plantaginis herba). *Yakugaku Zasshi*, 110 (1990) 453-456; *C.A.*, 113 (1990) 158518m.
- 610 Pekic, B., Lepojevic, Z. and Slavica, B.: (Determination of apigenin and apigenin 7-O- β -glucoside in the *Matricaria chamomilla ligulate* flowers). *Arh. Farm.*, 39 (1989) 163-168; *C.A.*, 113 (1990) 158767s.
- 611 Schaufelberger, D.E.: Applications of analytical high-speed counter-current chromatography in natural products chemistry. *J. Chromatogr.*, 538 (1991) 45-57.
- 612 Schilcher, H. and Hagels, H.: Carlinae radix. Verfälschung, Verwechslung oder Ersatzdroge? *Dtsch. Apoth.-Ztg.*, 130 (1990) 2186-2190.
- 613 Shao, L., Zhou, G. and Yu, H.: (Determination of baicalin in Kangduling injections). *Zhongcaoyao*, 21 (1990) 302-306 *C.A.*, 113 (1990) 198105f.
- 614 Sun, W.J., Sha, Z.F. and Gao, H.: (Determination of osthol and imperatorin in *Cnidium monnieri* (L.) Cuss by fluorometry TLC scanning). *Yaoxue Xuebao*, 25 (1990) 530-533; *C.A.*, 113 (1990) 237917u.
- 615 Waksudzka-Hajnos, M. and Wawrzynowicz, T.: Some methodological aspects of the separation of closely related compounds. *J. Planar Chromatogr.*, 3 (1990) 439-441.
- 616 Wang, Y. and Tong, Y.: (TLC separation and densitometric determination of irioids in cape jasmine (*Gardenia jasminoides*)). *Zhongcaoyao*, 21 (1990) 252-254; *C.A.*, 113 (1990) 218332h.
- 617 Werman, M.J., Mokady, S. and Neeman, I.: Partial isolation and characterization of a new natural inhibitor of lysyl oxidase from avocado seed oil. *J. Agric. Food Chem.*, 38 (1990) 2164-2168.
- 618 Woldemariam, T.Z., Linley, P.A. and Fell, A.F.: Phytochemical studies on male and female flowers of *Hagenia abyssinica* by column chromatography, thin-layer chromatography and high-performance liquid chromatography. *Anal. Proc. (London)*, 27 (1990) 178-179; *C.A.*, 113 (1990) 198093a.
- 619 Xu, Y., Wang, Y., Wu, L. and Chen, J.: (Phospholipids in Chinese medicine Nanshashen and Beishashen). *Zhongguo Yaoxue Zazhi*, 25 (1990) 330-332; *C.A.*, 113 (1990) 217930q.
- 620 Zhang, G., Cui, J. and Liu, H.: (HPTLC fluorometric determination of dencichin, a hemostatic component of *Panax notoginseng* (Burk) F.H. Chen). *Yaowu Fenxi Zazhi*, 10 (1990) 209-212; *C.A.*, 113 (1990) 218339r.
- 621 Zhang, G., Liang, S. and Jiang, Y.: (Determination of the contents of chlorogenic acid in Qingrejiedu injection by three wavelength spectrophotometry). *Zhongguo Zhongyao Zazhi*, 15 (1990) 481-483; *C.A.*, 113 (1990) 237918v.
- 622 Zhang, X., Wang, H. and Qi, Y.: (Studies on the chemical constituents of Shezucao (*Huperzia serrata*)). *Zhongcaoyao*, 21 (1990) 146-147; *C.A.*, 113 (1990) 138370d.

See also 253, 285, 297, 339, 449, 452, 453, 491, 493.

33. CLINICO-CHEMICAL APPLICATIONS

33b. *Complex mixtures and profiling (single compounds by cross-reference only)*

See 383, 405, 413, 423, 431.

34. FOOD ANALYSIS

34b. *Complex mixtures (single compounds by cross-reference only)*

623 Yang, Z. and Cui, H.: (Determination of cyclamate in foods). *Shipin Yu Fajiao Gongye*, (1990) 29-35; *C.A.*, 113 (1990) 150946d.

See also 289, 300, 304, 305, 312, 316, 332, 337, 419, 430, 459, 492, 527, 537, 626.

35. ENVIRONMENTAL ANALYSIS

35b. *Air pollution (complex mixtures; single compounds by cross-reference only)*

See 271.

36. SOME TECHNICAL PRODUCTS AND COMPLEX MIXTURES

36a. *Surfactants*

624 Montet, D., Servat, F., Pina, M., Graille, J., Galzy, P., Arnaud, A., Ledon, H. and Marcou, L.: Enzymatic synthesis of N- ϵ -acylllysines. *J. Am. Oil Chem. Soc.*, 67 (1990) 771-774.

See also 325.

36b. *Antioxidants and preservatives*

625 Tomankova, H. and Pinkasova, M.: Determination of parabens and their degradation product *p*-hydroxybenzoic acid in pharmaceutical dosage forms by HPTLC densitometry. *Anal. Lett.*, 23 (1990) 1319-1333.

626 Vega, M., Saelzer, R., Mendoza, N. and Katalinic, J.: Analysis of ethoxyquin (6-ethoxy-1,2,4-trimethylquinoline) in fishmeal. Comparison between HPLC, GC, and HPTLC. *J. High Resolut. Chromatogr.*, 13 (1990) 854-855.

See also 275.

36c. *Complex mixtures, technical products and unidentified compounds*

627 Kuranova, I.L., Balykina, L.V. and Kovaleva, N.G.: (Analysis of group composition of tall oil by thin-layer chromatography). *Gidroliz. Lesokhim. Prom-st.*, No. 8 (1989) 11-13; *C.A.*, 113 (1990) 174339j.

- 628 Niepsuj, B., Krach, K., Kups, W. and Kacprzak, G.: (Chromatographic method for monitoring the course of the condensation of 1-amino-4-bromoanthraquinone-2-sulfonic acid with 2,5-diaminobenzenesulfonic acid). *Biul. Inf.: Barwniki Srodki Pomocnicze*, 33 (1989) 44-47; *C.A.*, 114 (1991) 5937k.

See also 275, 285.

38. INORGANIC COMPOUNDS

38a. Cations

- 629 Ishida, K. and Ninomiya, S., Uchida, Y. and Osawa, M.: Thin-layer chromatographic behaviour and separation of zirconium(IV) and hafnium(IV) on silica gel in mineral acid-hydrogen peroxide media. *J. Chromatogr.*, 539 (1991) 169-175.
- 630 Karczynski, F., Zajwroniuk, H. and Pliszka, B.: (Separation of isomers of cobalt(III)-amino acid complexes by thin-layer chromatography). *Zesz. Nauk.-Politech. Lodz., Technol. Chem. Spozyw.*, 513, No. 42 (1988) 35-39; *C.A.*, 113 (1990) 243751b.
- 631 Lei, Q. and Li, Y.: (Thin-layer chromatographic determination of trace nickel(II), copper(II), cadmium(II), cobalt(II), and zinc(II)). *Fenxi Ceshi Tongbao*, 9, No. 3 (1990) 22-25; *C.A.*, 114 (1991) 16769r.
- 632 Malinowska, I., Rozylo, J.K. and Gaybakyan, D.S.: Some aspects of the separation and identification of gold(III), selenium(IV), and tellurium(IV) ions by TLC. *J. Planar Chromatogr.*, 3 (1990) 422-424.
- 633 Mokhov, A.A., Leont'eva, L.B., Bardin, V.V., Gritsai, G.I., Kovarskaya, O.M. and Tselinskii, I.V.: (Method of determining cadmium, copper and lead by paper chromatography). *U.S.S.R. SU 1,582,120 (Cl. G01N30/00)*, 30 Jul. 1990, Appl. 4,351,986, 29 Dec. 1987; *C.A.*, 113 (1990) 243927p.
- 634 Shapovalova, E.N., Timerbaeva, A.R., Bol'shova, T.A., Mel'nik, S.V. and Cordeiro, E.: (Separation of metals as ion associates by thin-layer chromatography). *Vestn. Mosk. Univ., Ser. 2, Khim.*, 31 (1990) 274-278; *C.A.*, 113 (1990) 223619m.

See also 500, 501.

38b. Anions

- 635 Ajmal, M., Mohammad, A., Fatima, N. and Ahmad, J.: TLC separation of common anions on silica gel layers with organic solvent systems. Quantitative separation of iodate from iodide, bromide or chloride. *J. Planar Chromatogr.*, 3 (1990) 396-400.
- 636 Farroqi, M.I., Anwar, J., Nasir, B.A., Vaseem, O. and Rafique, A.: Separation and identification of some anions by paper chromatography. *J. Chem. Soc. Pak.*, 11 (1989) 318-321; *C.A.*, 113 (1990) 125511a.

39. RADIOACTIVE AND OTHER ISOTOPE COMPOUNDS

- 637 Hirsch, J.I., Fratkin, M.J. and Balseiro, J.: Evaluation of technetium-99m Disofenin by column and instant thin-layer chromatography: demonstration of radiocolloid as a cause for splenic uptake. *Am. J. Physiol. Imaging*, 5 (1990) 22-25; *C.A.*, 113 (1990) 158568g.

- 638 Hook, L.A., Macdonell, M.T. and Traynor-Kaplan, A.E.: Imaging and quantitation of one and two dimensional TLC with a new radioanalytic imaging system. *J. Liq. Chromatogr.*, 13 (1990) 2871-2899.
- 639 Huang, T., Jiang, H., Yan, W. and Xu, C.: (Selection of methods for determining radiochemical purity of ^{201}Tl thallos chloride). *Hejishu*, 13 (1990) 172-175; *C.A.*, 113 (1990) 223660t.

See also 422, 556.

Electrophoresis

1. REVIEWS AND BOOKS

- 471 Berry, V.: HPCE '90: *The Second International Symposium on High Performance Capillary Electrophoresis*. Part II. *LC-GC*, 8 (1990) 546-552; *C.A.*, 113 (1990) 168227e - a review with no refs.
- 472 Bocek, P. (Editor): *Capillary Electrophoresis*. *Electrophoresis (Weinheim)*, Vol. 11, No. 9, Weinheim, 1990, 123 p.; *C.A.*, 114 (1991) 2992w.
- 473 Horvath, C. and Nikelly, J.G. (Editors): *Analytical Biotechnology: Capillary Electrophoresis and Chromatography*. *Developed from a Symposium at the 196th National Meeting of the American Chemical Society, Los Angeles, September 25-30, 1990*. *ACS Symp. Ser. 434*, ACS, Washington, 1990, 213 p.; *C.A.*, 114 (1991) 2994y.
- 474 Otsuka, K. and Terabe, S.: (Electrokinetic chromatography). *Hyomen*, 28 (1990) 405-415; *C.A.*, 113 (1990) 198592n - a review with 47 refs.
- 475 Righetti, P.G.: Recent developments in electrophoretic methods. *J. Chromatogr.*, 516 (1990) 3-22 - a review with 79 refs.
- 476 Schmid, E.R.: Chromatography and mass spectrometry - an overview. *Chromatographia*, 30 (1990) 573-576.
- 477 Schwer, C. and Kenndler, E.: Capillary electrophoresis. *Chromatographia*, 30 (1990) 546-554 - a review with 32 refs.

See also 512, 521, 523, 528, 529, 604, 627, 628, 1012, 1133, 1134, 1153, 1161.

2. FUNDAMENTALS, THEORY AND GENERAL

2a. General

- 478 Aksenov, A.A., Golovinkin, A.V., Gudzovskii, A.V., Meshkov, M.A. and Serebrov, A.A.: (Feasibilities and restrictions of electrophoretic free-continuous-flow technology for separation of biopreparations in weightlessness). *Kosm. Nauka i Tekhn., Kiev*, (1989) 39-43; *C.A.*, 114 (1991) 2916z.
- 479 Hofmann, K.: Method for long-term preservation of thin-layer polyacrylamide gels by producing a gelatine coating. *J. Chromatogr.*, 538 (1991) 504-505.
- 480 Keh, H.J. and Yang, F.R.: Particle interaction in electrophoresis. III. Axisymmetric motion of multiple spheres. *J. Colloid Interface Sci.*, 139 (1990) 105-116; *C.A.*, 113 (1990) 178964k.
- 481 Suttner, J., Dyr, J.E., Pristach, J. and Hólada, K.: Versatile modular microelectrophoresis system and the simultaneous preparation of large numbers of polyacrylamide gels. *J. Chromatogr.*, 563 (1991) 184-187.
- 482 Van Alstine, J.M.: Controlled method for reducing electrophoretic mobility of various substances. *U.S. Pat. Appl. US 376,487 01 Feb. 1990, Appl. 07 Jul. 1989*; 20 p.; *C.A.*, 113 (1990) 164756d.

See also 1088.

2b. *Thermodynamics and theoretical relationships*

- 483 Bello, M.S. and Vilenchik, L.Z.: (Diffusion effects in free-flowing electrophoresis). *Kosm. Nauka i Tekhn. (Kiev)*, (1989) 35-39; *C.A.*, 113 (1990) 238679e.
- 484 Gobie, W.A. and Ivory, C.F.: Thermal model of capillary electrophoresis and a method for counteracting thermal band broadening. *J. Chromatogr.*, 516 (1990) 191-210.
- 485 Kenndler, E.: Capillary zone electrophoresis and isotachopheresis: a comparison by information theory. *Chromatographia*, 30 (1990) 713-718.
- 486 Kozak, M.W. and Davis, E.J.: Moving boundary electrophoresis of concentrated suspensions and electroosmosis in porous media. *Langmuir*, 6 (1990) 1585-1590; *C.A.*, 113 (1990) 178938b.
- 487 Sanchez, V., de Balmann, H. and Clifton, M.J.: (Electrophoresis. From analytical scale to preparative scale). *Inf. Chim.*, 319 (1990) 150-153; *C.A.*, 113 (1990) 207776e.

See also 520, 531, 538.

2d. *Measurement of physico-chemical and related values*

See 518, 1146, 1147.

3. GENERAL TECHNIQUES

3a. *Apparatus and accessories*

- 488 Beritashvili, D.R., Karklit, L.V. and Tverdokhlebov, E.N.: Apparatus for electrophoretic gel separation of high-molecular-weight DNA. *PCT Int. Appl. WO 89 07,261* (Cl. G01N27/26) 10 Aug. 1989, *SU Appl.* 4,365,904, 02 Feb. 1988; 17 pp.; *C.A.*, 113 (1990) 207873j.
- 489 Bustelo de la Quintana, J.: Apparatus for the identification and evaluation of a substance undergoing electrophoresis without background coloring. *Span. ES 2,012,842* (Cl. G01J3/42) 16 Apr. 1990, *Appl.* 8,802,516, 11 Aug. 1988; 10 p.; *C.A.*, 113 (1990) 204247x.
- 490 Gabuev, I.S.: (Cell for microelectrophoresis). *U.S.S.R. SU 1,583,818* (Cl. G01N27/26), 07 Aug. 1990, *Appl.* 4,404,843, 05 Apr. 1988; *C.A.*, 113 (1990) 223903z.
- 491 Gavryushkin, A.V. and Matvienko, N.I.: (Apparatus for preparative electrophoresis in gel). *U.S.S.R. SU 1,583,819* (Cl. G01N27/26), 07 Aug. 1990, *Appl.* 4,405,455, 04 Feb. 1988; *C.A.*, 113 (1990) 194044n.
- 492 Groschup, M.H., Boschwitz, J. and Timoney, J.F.: A convenient gel holder for preparative electrophoretic separation of aggregated bacterial proteins. *Electrophoresis (Weinheim)*, 12 (1991) 90-93.
- 493 Hartman, D.R. and Courtney, W.H.: Economical electrophoresis with a controlled-current power supply. *J. Chem. Educ.*, 67 (1990) 703; *C.A.*, 113 (1990) 190410f.
- 494 Irie, T. and Sekiguchi, S.: (Dryers for gels). *Jpn. Kokai Tokkyo Koho JP 02,161,348* (90,161,348) (Cl. G01N27/447), 21 Jun. 1990, *Appl.* 88/315,771, 14 Dec. 1988; 3 p.; *C.A.*, 114 (1991) 8664n.
- 495 Kozubek, A.: Apparatus for gel electrophoresis. *Pol. PL 136,324* (Cl. B01D57/02), 20 Feb. 1987, *Appl.* 236,208, 27 Apr. 1982; 5 p.; *C.A.*, 113 (1990) 233818q.
- 496 Kölblle, K. and Sim, R.B.: An angle-variable three-dimensional pulsed field gel electrophoresis system. *Anal. Biochem.*, 192 (1991) 32-38.

- 497 Ledley, R.S.: Methods and apparatus for determining distributions of radioactive materials. *U.S.* US 4,929,832 (Cl. 250-328; G01T1/00), 29 May 1990, US Appl. 797,725, 13 Nov. 1985; 18 p.; *C.A.*, 113 (1990) 199927n.
- 498 Miyamoto, H., Kihara, K., Okazaki, H. and Matsumoto, H.: (Electrophoresis apparatus). *Jpn. Kokai Tokkyo Koho* JP 02,198,354 (90,198,354) (Cl. G01N27/447), 06 Aug. 1990, Appl. 89/16,180, 27 Jan. 1989; 4 p.; *C.A.*, 114 (1991) 8646h.
- 499 Nardo, P.: Unit for the treatment of electrophoretic strips. *Eur. Pat.* Appl. EP 378,878 (Cl. G01N35/00), 25 Jul. 1990, IT Appl. 89/19,099, 16 Jan. 1989; 6 p.; *C.A.*, 113 (1990) 204246w.

See also 519, 522, 533, 540, 1045, 1065, 1072.

3b. Detectors and detection procedures

- 500 Chen, C.-Y. and Morris, M.D.: On-line multichannel Raman spectroscopic detection system for capillary zone electrophoresis. *J. Chromatogr.*, 540 (1991) 355-363.
- 501 Ehata, Y., Tanaka, H. and Negishi, A.: Silver staining of biosubstance on gel after electrophoresis. *Jpn. Kokai Tokkyo Koho* JP 02 80,958 [90 80,958] (Cl. G01N33/66), 22 Mar. 1990, Appl. 88/232,058, 16 Sep. 1988; 10 pp.; *C.A.*, 113 (1990) 187612t.
- 502 Harper, D.R. and Murphy, G.: Nonuniform variation in band pattern with luminol/horseradish peroxidase Western blotting. *Anal. Biochem.*, 192 (1991) 59-63.
- 503 Pollak, V.A. and Schulze-Clewing, J.: Electronic scanning for the densitometric evaluation of flat bed separations. *J. Planar Chromatogr.*, 3 (1990) 104-110; *C.A.*, 113 (1990) 243671a.
- 504 Tanaka, H. and Negishi, A.: Silver staining of biosubstances after gel electrophoresis. *Jpn. Kokai Tokkyo Koho* JP 02 80,959 [90 80,959] (Cl. G01N33/66), 22 Mar. 1990, Appl. 88/232,059, 16 Sep. 1988; 7 pp.; *C.A.*, 113 (1990) 187613u.
- 505 Van Saarloos, P.P.: New analysis technique to enhance electrophoretic light scattering spectra. *J. Colloid. Interface Sci.*, 139 (1990) 392-396; *C.A.*, 113 (1990) 218839d.
- 506 Yamamoto, H., Nakatani, M., Shinya, K., Kim, B.-H. and Kakuno, T.: Ultraviolet imaging densitometry of unstained gels for two-dimensional electrophoresis. *Anal. Biochem.*, 191 (1990) 58-64.

See also 497, 525, 629, 632, 779, 1131, 1147.

3c. Stabilization media for electrophoresis

- 507 Knabe, G., Peisker, K., Hendler, J., Brodtka, M. and Klemm, L.: (Method for production of foundation-supported electrophoretic gels). *Ger. (East)* DD 277,126 (Cl. G01N27/40), 21 Mar. 1990, Appl. 321,886, 17 Nov. 1988; 5 p.; *C.A.*, 113 (1990) 223894x.
- 508 Smith, R.D., Loo, J.A., Edmonds, C.G., Barinaga, C.J. and Udseth, H.R.: Sensitivity considerations for large molecule detection by capillary electrophoresis-electrospray ionization mass spectrometry. *J. Chromatogr.*, 516 (1990) 157-165.
- 509 Yashima, E., Suehiro, N., Akashi, M. and Miyauchi, N.: Agarose-poly(9-vinyladenine) conjugated gel. Application for electrophoretic separation of nucleic acids. *Chem. Lett.*, (1990) 1113-1116; *C.A.*, 113 (1990) 191838p.

3e. Preparative scale electrophoresis

See 491, 886.

3f. Programmed voltage and buffer gradients

510 Berry, V. and Rohwer, E.: Low-cost liquid chromatography (LC-LC). IV. "Pulsed open tube gradient generation", a new approach for generating nanoliter volume linear and tailored gradients for capillary electrophoresis and micro-LC. *J. Liq. Chromatogr.*, 13 (1990) 1529-1558.

511 Gavryushkin, A.V.: (Method for electrophoresis in a buffer flow). *U.S.S.R. SU 1,580,235* (Cl. G01N27/42), 23 Jul. 1990, Appl. 4,309,746, 25 Sep. 1987; *C.A.*, 113 (1990) 223904a.

See also 524, 526, 534.

4. SPECIAL TECHNIQUES

4b. Computerization and modelling

512 Miller, M.J.: Computer-assisted analysis of two-dimensional gel electrophoretograms. *Adv. Electrophor.*, 3 (1989) 181-217; *C.A.*, 113 (1990) 164691d - a review with 91 refs.

513 Ryu, H.W. and Bier, M.: Fluid flow characteristics of forced flow electrophoresis. *Sep. Sci. Technol.*, 25 (1990) 1007-1020; *C.A.*, 113 (1990) 233873d.

See also 542.

4c. Combination with other physicochemical techniques, (MS, IR etc.)

514 Moseley, M.A., Deterding, L.J., Tomer, K.B. and Jorgenson, J.W.: Capillary zone electrophoresis-mass spectrometry using a coaxial continuous-flow fast atom bombardment interface. *J. Chromatogr.*, 516 (1990) 167-173.

515 Reinhoud, N.J., Schröder, E., Tjaden, U.R., Niessen, W.M.A., ten Noever de Brauw, M.C. and van der Greef, J.: Static and scanning array detection in capillary electrophoresis-mass spectrometry. *J. Chromatogr.*, 516 (1990) 147-155.

See also 476, 535.

4d. Affinity electrophoresis

See 599.

4e. Capillary zone electrophoresis and electrokinetic chromatography

516 Atamna, I.Z., Metral, C.J., Muschik, G.M. and Issaq, H.J.: Factors that influence mobility, resolution, and selectivity in capillary zone electrophoresis. III. The role of the buffers' anion. *J. Liq. Chromatogr.*, 13 (1990) 3201-3210.

517 Atamna, I.Z., Metral, C.J., Muschik, G.M. and Issaq, H.J.: Factors that influence mobility, resolution and selectivity in capillary zone electrophoresis. II. The role of the buffers' cation. *J. Liq. Chromatogr.*, 13 (1990) 2517-2527.

- 518 Beckers, J.L., Everaerts, F.M. and Ackermans, M.T.: Determination of absolute mobilities, pK values and separation numbers by capillary zone electrophoresis. Effective mobility as a parameter for screening. *J. Chromatogr.*, 537 (1991) 407-428.
- 519 Cobb, K.A., Dolnik, V. and Novotny, M.: Electrophoretic separations of proteins in capillaries with hydrolytically stable surface structures. *Anal. Chem.*, 62 (1990) 2478-2483.
- 520 Datta, R.: Theoretical evaluation of capillary electrophoresis performance. *Biotechnol. Prog.*, 6 (1990) 485-493; *C.A.*, 113 (1990) 218832w.
- 521 Di Biase, S.: (Theory and practice of capillary electrophoresis). *Lab. 2000*, 4 (1990) 50-54; *C.A.*, 113 (1990) 168223a - a review with 13 refs.
- 522 Dülffer, T., Herb, R., Herrmann, H. and Kobold, U.: Capillary electrophoresis. Basic considerations for industrial applications. *Chromatographia*, 30 (1990) 675-685.
- 523 Foret, F. and Bocek, P.: Capillary electrophoresis. *Adv. Electrophor.*, 3 (1989) 271-347; *C.A.*, 113 (1990) 164483n - a review with 211 refs.
- 524 Foret, F., Fanali, S. and Bocek, P.: Applicability of dynamic change of pH in the capillary zone electrophoresis of proteins. *J. Chromatogr.*, 516 (1990) 219-222.
- 525 Garner, T.W. and Yeung, E.S.: Absorption detection in capillary electrophoresis by fluorescence energy transfer. *Anal. Chem.*, 62 (1990) 2193-2198.
- 526 Huang, X. and Ohms, J.I.: Non-uniform electrical field effect caused by different concentrations of electrolyte in capillary zone electrophoresis. *J. Chromatogr.*, 516 (1990) 233-240.
- 527 Huang, X. and Zare, R.N.: Continuous sample collection in capillary zone electrophoresis by coupling the outlet of a capillary to a moving surface. *J. Chromatogr.*, 516 (1990) 185-189.
- 528 Lee, K.J.: (Capillary electrophoresis). *Saenghwahak Nyusu*, 9 (1990) 289-297; *C.A.*, 113 (1990) 94092h - a review with 62 refs.
- 529 Lukkari, P. and Riekkola, M.L.: (Capillary (zone) electrophoresis and its applications). *Kem.-Kemi*, 16 (1989) 1127-1132; *C.A.*, 114 (1991) 16844m - a review with 60 refs.
- 530 Pfeffer, W.D. and Yeung, E.S.: Open-tubular liquid chromatography with surfactant-enhanced electroosmotic flow. *Anal. Chem.*, 62 (1990) 2178-2182.
- 531 Rasmussen, H.T. and McNair, H.M.: Influence of buffer concentration, capillary internal diameter and forced convection on resolution in capillary zone electrophoresis. *J. Chromatogr.*, 516 (1990) 223-231.
- 532 Righetti, P.G., Ettori, C. and Chiari, M.: Analysis of acrylamido-buffers for isoelectric focusing by capillary zone electrophoresis. *Electrophoresis (Weinheim)*, 12 (1991) 55-58.
- 533 Schomburg, G.: Problems and achievements in the instrumentation and column technology for chromatography and capillary electrophoresis. *Chromatographia*, 30 (1990) 500-508.
- 534 Sepaniak, M.J., Swaile, D.F., Powell, A.C. and Cole, R.O.: Capillary electrokinetic separations: influence of mobile phase composition on performance. *J. High Resolut. Chromatogr.*, 13 (1990) 679-682.
- 535 Smith, R.D., Loo, J.A., Barinaga, C.J., Edmonds, C.G. and Udseth, H.R.: Combined capillary electrophoresis and electrospray ionization mass spectrometry. *Nippon Iyo Masu Supekutoru Gakkai Koenshu*, 14 (1989) 9-16; *C.A.*, 113 (1990) 148312a.
- 536 Stegehuis, D.S., Irth, H., Tjaden, U.R. and van der Greef, J.: Isotachopheresis as an on-line concentration pretreatment technique in capillary electrophoresis. *J. Chromatogr.*, 538 (1991) 393-402.

537 Terabe, S., Miyashita, Y., Shibata, O., Barnhart, E.R., Alexander, L.R., Patterson, D.G., Karger, B.L., Hosoya, K. and Tanaka, N.: Separation of highly hydrophobic compounds by cyclodextrin-modified micellar electrokinetic chromatography. *J. Chromatogr.*, 516 (1990) 23-31.

538 Thormann, W.: Isotachopheresis in open-tubular fused-silica capillaries. Impact of electroosmosis on zone formation and displacement. *J. Chromatogr.*, 516 (1990) 211-217.

See also 475, 476, 477, 483, 484, 485, 500, 508, 514, 515, 546, 547, 548, 602, 603, 605, 606, 608, 609, 621, 636, 638, 651, 680, 681, 718, 725, 868, 1015, 1114, 1118, 1127, 1135, 1140, 1144, 1145, 1148, 1149, 1153, 1157.

4f. Isotachopheresis

539 Beckers, J.L., Everaerts, F.M. and Ackermans, M.T.: Isotachopheresis with electroosmotic flow: open *versus* closed systems. *J. Chromatogr.*, 537 (1991) 429-442.

540 Hirokawa, T., Yokota, Y. and Kiso, Y.: Isotachopheretic analyser equipped with a scanning ultraviolet photometric detection system. *J. Chromatogr.*, 538 (1991) 403-411.

541 Oshurkova, O.V. and Gorshkov, A.I.: (Thermovisual method of recording the boundaries in capillary isotachopheresis and modifications). *Elektrokhimiya*, 26 (1990) 532-536; *C.A.*, 113 (1990) 139281n.

See also 485, 536, 538, 569, 601, 718, 1019, 1136, 1138, 1140, 1150, 1151, 1163, 1164.

4g. Enantiomers, separation

See 606.

4h. Two dimensional electrophoresis

542 Aldroubi, A., Unser, M., Tietz, D. and Trus, B.: Computerized methods for analyzing two-dimensional agarose gel electropherograms. *Electrophoresis (Weinheim)*, 12 (1991) 39-46.

543 Tietz, D., Aldroubi, A., Schneerson, R., Unser, M. and Chrambach, A.: The distribution of particles characterized by size and free mobility within polydisperse populations of protein-polysaccharide conjugates, determined from two-dimensional agarose electropherograms. *Electrophoresis (Weinheim)*, 12 (1991) 46-54.

544 Tietz, D.: Analysis of one-dimensional gels and two-dimensional Serwer-type gels on the basis of the extended Ogston model using personal computers. *Electrophoresis (Weinheim)*, 12 (1991) 28-39.

See also 627, 628, 630, 637, 640, 721, 747, 756, 764, 778, 779, 796, 803, 807, 818, 864, 867.

4i. Other special techniques

545 Chmelik, J.: Isoelectric focusing field-flow fractionation. Experimental study of the generation of pH gradient. *J. Chromatogr.*, 539 (1991) 111-121.

See also 533, 1048, 1078, 1083, 1092, 1160.

7. PHENOLS

- 546 Ong, C.P., Ng, C.L., Chong, N.C., Lee, H.K. and Li, S.F.: Retention of eleven priority phenols using micellar electrokinetic chromatography. *J. Chromatogr.*, 516 (1990) 263-270.

9. OXO COMPOUNDS, ETHERS, EPOXIDES AND QUINONES

- 547 Deyl, Z., Miksik, I. and Struzinsky, R.: Separation and partial characterization of Maillard reaction products by capillary zone electrophoresis. *J. Chromatogr.*, 516 (1990) 287-298.

10. CARBOHYDRATES

10a. Mono and oligosaccharides. Structural studies

- 548 Honda, S., Makino, A., Suzuki, S. and Kakehi, K.: Analysis of the oligosaccharides in ovalbumin by high-performance capillary electrophoresis. *Anal. Biochem.*, 191 (1990) 228-234.
- 549 Jackson, P. and Williams, G.R.: Polyacrylamide gel electrophoresis of reducing saccharides labeled with the fluorophore 8-aminonaphthalene-1,3,6-trisulphonic acid: Application to the enzymological structural analysis of oligosaccharides. *Electrophoresis (Weinheim)*, 12 (1991) 94-96.
- 550 Mizuochi, T., Hamako, J., Titani, K., Matsushita, M. and Okada, H.: Structures of the asparagine-linked oligosaccharides of guinea-pig Factor B of the alternative complement pathway. *Biochem. J.*, 272 (1990) 533-535.
- 551 Nishikawa, Y.: An FM3A mutant, G258, with a mutation that affects both cell growth and oligosaccharide-lipid synthesis. *Biochim. Biophys. Acta*, 1091 (1991) 135-140.

See also 547, 564, 725.

10b. Polysaccharides, mucopolysaccharides, lipopolysaccharides

- 552 Crook, M.: Plasma and platelet interactions: changes in platelet electrophoretic mobility. *Biochem. Soc. Trans.*, 18 (1990) 1268-1269; *C.A.*, 113 (1990) 149500x.
- 553 Vilim, V. and Krajickova, J.: Proteoglycans of human articular cartilage. Identification of several populations of large and small proteoglycans and of hyaluronic acid-binding proteins in successive cartilage extracts. *Biochem. J.*, 273 (1991) 579-585.

See also 848.

10c. Glycoproteins and their constituents

- 554 Akasaki, K., Yamaguchi, Y., Ohta, M., Matsuura, F., Furuno, K. and Tsuji, H.: Purification and characterization of a major glycoprotein in rat liver lysosomal membrane. *Chem. Pharm. Bull.*, 38 (1990) 2766-2770.
- 555 Anagnostides, S.T., Aletras, A.J., Lymberi, P. and Tsiganos, C.P.: Isolation and characterization of two glycoproteins from hyaline cartilage. *Eur. J. Biochem.*, 193 (1990) 905-912.

- 556 Bourin, M.-C., Lundgren-Akerlund, E. and Lindahl, U.: Isolation and characterization of the glycosaminoglycan component of rabbit thrombomodulin proteoglycan. *J. Biol. Chem.*, 265 (1990) 15424-15431.
- 557 Dhar, A. and Shukla, S.D.: Release of a membrane surface glycoprotein from human platelets by phosphatidylinositol specific phospholipase(s) C. *Biochim. Biophys. Acta*, 1091 (1991) 15-21.
- 558 Haselbeck, A., Schickaneder, E., von der Eltz, H. and Hösel, W.: Structural characterization of glycoprotein carbohydrate chains by using digoxigenin-labeled lectins on blots. *Anal. Biochem.*, 191 (1990) 25-30.
- 559 Konarev, A.V.: (Lectins detection by analytical isoelectrofocusing of wheat proteins). *Biokhimiya (Moscow)*, 55 (1990) 1975-1983.
- 560 Koshte, V.L., van Dijk, W., van der Stelt, M.E. and Aalberse, R.C.: Isolation and characterization of BanLec-I, a mannoside-binding lectin from *Musa paradisiaca* (banana). *Biochem. J.*, 272 (1990) 721-726.
- 561 Kouns, W.C., Wall, C.D., White, M.M., Fox, C.F. and Jennings, L.K.: A conformation-dependent epitope of human platelet glycoprotein IIIa. *J. Biol. Chem.*, 265 (1990) 20594-20601.
- 562 Lustbader, J.W. and Pollak, S.: A method for assessing the reassembly of a multisubunit glycoprotein by Western blotting. *Anal. Biochem.*, 192 (1991) 39-43.
- 563 Manihar, S.R. and Das, H.R.: Isolation and characterization of a new lectin from plasma of fish *Channa punctatus*. *Biochim. Biophys. Acta*, 1036 (1990) 162-165.
- 564 Matsui, T., Sugino, H., Miura, M., Bousfield, G.R., Ward, D.N., Titani, K. and Mizuochi, T.: β -Subunits of equine chorionic gonadotropin and luteinizing hormone with an identical amino acid sequence have different asparagine-linked oligosaccharide chains. *Biochem. Biophys. Res. Commun.*, 174 (1991) 940-945.
- 565 Naziruddin, B., Shankar, V., Reyes de la Rocha, S. and Sachdev, G.P.: Polymeric structure of human respiratory mucin: studies on two protein components released upon reduction of disulfide bonds. *Biochim. Biophys. Acta*, 1041 (1990) 164-171.
- 566 Ogawa, H., Ueno, M., Uchibori, H., Matsumoto, I. and Seno, N.: Direct carbohydrate analysis of glycoproteins electroblotted onto polyvinylidene difluoride membrane from sodium dodecyl sulfate-polyacrylamide gel. *Anal. Biochem.*, 190 (1990) 165-169.
- 567 Rindler, M.J., Naik, S.S., Li, N., Hoops, T.C. and Peraldi, M.-N.: Uromodulin (Tamm-Horsfall glycoprotein/uromucoid) is a phosphatidylinositol-linked membrane protein. *J. Biol. Chem.*, 265 (1990) 20784-20789.
- 568 Seguchi, T., Merkle, R.K., Ono, M., Kuwano, M. and Cummings, R.D.: The dysfunctional LDL receptor in a monensin-resistant mutant of Chinese hamster ovary cells lacks selected O-linked oligosaccharides. *Arch. Biochem. Biophys.*, 284 (1991) 245-256.

See also 543, 645, 725, 859.

11. ORGANIC ACIDS AND LIPIDS

11a. Organic acids and simple esters

- 569 Oefner, P., Häfele, R., Bartsch, G. and Bonn, G.: Isotachophoretic separation of organic acids in biological fluids. *J. Chromatogr.*, 516 (1990) 251-262.

11c. Lipids and their constituents

- 570 Manzi, A.E., Sjoberg, E.R., Diaz, S. and Varki, A.: Biosynthesis and turnover of O-acetyl and N-acetyl groups in the gangliosides of human melanoma cells. *J. Biol. Chem.*, 265 (1990) 13091-13103.

11d. Lipoproteins and their constituents

- 571 Atmeh, R.F.: Isolation and identification of HDL particles of low molecular weight. *J. Lipid Res.*, 31 (1990) 1771-1780.
- 572 Aufenanger, J.: Determination of relative contents of cholesterol-containing lipoproteins in body fluids by thin-layer electrophoresis. *Ger. Offen. DE 3,817,747* (Cl. GO1N27/30), 30 Nov. 1989, Appl. 25 May 1988; 6 pp.; *C.A.*, 113 (1990) 94385f.
- 573 Cuthbert, J.A. and Lipsky, P.E.: Mitogenic stimulation alters the regulation of LDL receptor gene expression in human lymphocytes. *J. Lipid Res.*, 31 (1990) 2067-2078.
- 574 Hamilton, R.L., Wong, J.S., Guo, L.S.S., Krisans, S. and Havel, R.J.: Apolipoprotein E localization in rat hepatocytes by immunogold labeling of cryothin sections. *J. Lipid Res.*, 31 (1990) 1589-1603.
- 575 Hayashi, H., Nutting, D.F., Fujimoto, K., Cardelli, J.A., Black, D. and Tso, P.: Transport of lipid and apolipoproteins A-I and A-IV in intestinal lymph of the rat. *J. Lipid Res.*, 31 (1990) 1613-1625.
- 576 Hill, J.S. and Pritchard, P.H.: Improved phenotyping of apolipoprotein E: application to population frequency distribution. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1871-1874.
- 577 Hoeg, J.M., Sviridov, D.D., Tennyson, G.E., Demosky, S.J., Jr., Meng, M.S., Bojanovski, D., Safonova, I.G., Repin, V.S., Kuberger, M.B. et al.: Both apolipoproteins B-48 and B-100 are synthesized and secreted by the human intestine. *J. Lipid Res.*, 31 (1990) 1761-1769.
- 578 Knipping, G., Rotheneder, M., Striegl, G. and Esterbauer, H.: Antioxidants and resistance against oxidation of porcine LDL subfractions. *J. Lipid Res.*, 31 (1990) 1965-1972.
- 579 Kume, N., Arai, H., Kawai, C. and Kita, T.: Receptors for modified low-density lipoproteins on human endothelial cells: different recognition for acetylated low-density lipoprotein and oxidized low-density lipoprotein. *Biochim. Biophys. Acta*, 1091 (1991) 63-67.
- 580 La Belle, M. and Krauss, R.M.: Differences in carbohydrate content of low density lipoproteins associated with low density lipoprotein subclass patterns. *J. Lipid Res.*, 31 (1990) 1577-1588.
- 581 Lagrost, L., Gambert, P., Dangremont, V., Athias, A. and Lallemand, C.: Role of cholesteryl ester transfer protein (CETP) in the HDL conversion process as evidenced by using anti-CETP monoclonal antibodies. *J. Lipid Res.*, 31 (1990) 1569-1575.
- 582 Laplaud, P.M., Bauchart, D., Durand, D. and Chapman, M.J.: Lipoproteins and apolipoproteins in intestinal lymph of the preruminant calf, *Bos spp.*, at peak lipid absorption. *J. Lipid Res.*, 31 (1990) 1781-1792.
- 583 Leighton, J.K., Joyner, J., Zamarripa, J., Deines, M. and Davis, R.A.: Fasting decreases apolipoprotein B mRNA editing and the secretion of small molecular weight apoB by rat hepatocytes: evidence that the total amount of apoB secreted is regulated post-transcriptionally. *J. Lipid Res.*, 31 (1990) 1663-1668.
- 584 Levy, E., Rochette, C., Londono, I., Roy, C.C., Milne, R.W., Marcel, Y.L. and Bendayan, M.: Apolipoprotein B-100: immunolocalization and synthesis in human mucosa. *J. Lipid Res.*, 31 (1990) 1937-1946.

- 585 Levy, E., Thibault, L., Garofalo, C., Messier, M., Lepage, G., Ronco, N. and Roy, C.C.: Combined (*n*-3 and *n*-6) essential fatty deficiency is a potent modulator of plasma lipids, lipoprotein composition, and lipolytic enzymes. *J. Lipid Res.*, 31 (1990) 2009-2017.
- 586 Lichtenstein, A.H., Cohn, J.S., Hachey, D.L., Millar, J.S., Ordovas, J.M. and Schaefer, E.J.: Comparison of deuterated leucine, valine, and lysine in the measurement of human apolipoprotein A-I and B-100 kinetics. *J. Lipid Res.*, 31 (1990) 1693-1701.
- 587 Lum, P.Y. and Chino, H.: Primary role of adipokinetic hormone in the formation of low density lipoprotein in locusts. *J. Lipid Res.*, 31 (1990) 2039-2044.
- 588 May, K., Kraemer, F.B., Chen, J. and Cooper, A.D.: ELISA measurement of LDL receptors. *J. Lipid Res.*, 31 (1990) 1683-1691.
- 589 Mora, R., Simionescu, M. and Simionescu, N.: Purification and partial characterization of extracellular liposomes isolated from the hyperlipidemic rabbit aorta. *J. Lipid Res.*, 31 (1990) 1793-1807.
- 590 März, W., Cezanne, S. and Gross, W.: Phenotyping of apolipoprotein E by immunoblotting in immobilized pH gradients. *Electrophoresis (Weinheim)*, 12 (1991) 59-63.
- 591 Novikov, D.K., Kosykh, V.A., Trakht, I.N., Podrez, E.A. and Repin, V.S.: (Effects of chylomicron remnants on cholesterol metabolism in primary cultures of rabbit hepatocytes: VLDL and bile acid production). *Biokhimiya (Moscow)*, 55 (1990) 1902-1910.
- 592 Nowicka, G., Bruning, T., Böttcher, A., Kahl, G. and Schmitz, G.: Macrophage interaction of HDL subclasses separated by free flow electrophoresis. *J. Lipid Res.*, 31 (1990) 1947-1963.
- 593 Ogata, F.: Heterogeneity of serum amyloid A with respect to molecular mass. *Biochem. J.*, 273 (1991) 245.
- 594 Papadopoulos, N.M.: Advances of initial population screen with determinations of total cholesterol in serum and of lipoproteins by electrophoresis. *Clin. Chem. (Winston-Salem)*, 36 (1990) 2009-2010.
- 595 Parhofer, K.G., Daugherty, A., Kinoshita, M. and Schonfeld, G.: Enhanced clearance from plasma of low density lipoproteins containing a truncated apolipoprotein, apoB-89. *J. Lipid Res.*, 31 (1990) 2001-2007.
- 596 Provost, P.P., Weech, P.K., Tremblay, N.M., Marcel, Y.L. and Rassart, E.: Molecular characterization and differential mRNA tissue distribution of rabbit apolipoprotein D. *J. Lipid Res.*, 31 (1990) 2057-2065.
- 597 Roma, P., Gregg, R.E., Bishop, C., Ronan, R., Zech, L.A., Meng, M.V., Glueck, C., Vergani, C., Giudici, G. and Brewer, H.B., Jr.: Apolipoprotein A-I metabolism in subjects with a PstI restriction fragment length polymorphism of the apo-I gene and familial hypoalphalipoproteinemia. *J. Lipid Res.*, 31 (1990) 1753-1760.
- 598 Sattler, W., Kostner, G.M., Waeg, G. and Esterbauer, H.: Oxidation of lipoprotein Lp(a). A comparison with low-density lipoproteins. *Biochim. Biophys. Acta*, 1081 (1991) 65-74.
- 599 Sun, D.H. and Kerkay, J.: Lipid peroxidation on the Down syndrome protein. *Anal. Lett.*, 23 (1990) 1451-1464.
- 600 Ying, H., Saku, K., Harada, R., Takami, N., Sasaki, N., Saito, Y. and Arakawa, K.: Putative mechanisms of action of probucol on high-density lipoprotein apolipoprotein A-I and its isoproteins kinetics in rabbits. *Biochim. Biophys. Acta*, 1047 (1990) 247-254.

See also 718.

16. NITRO AND NITROSO COMPOUNDS

- 601 Langmaier, J.: (Electrochemical determination of nitrate and nitrite ions). *Chem. Listy*, 84 (1990) 697-715; *C.A.*, 113 (1990) 223503u.

17. AMINES, AMIDES AND RELATED NITROGEN COMPOUNDS

17a. *Amines and polyamines*

See 1144.

17b. *Catecholamines and their metabolites*

- 602 Kaneta, T., Tanaka, S. and Yoshida, H.: Improvement of resolution in the capillary electrophoretic separation of catecholamines by complex formation with boric acid and control of electroosmosis with a cationic surfactant. *J. Chromatogr.*, 538 (1991) 385-391.

18. AMINO ACIDS AND PEPTIDES; CHEMICAL STRUCTURE OF PROTEINS

18a. *Amino acids and their derivatives*

- 603 Meyer, H.E., Hoffmann-Posorske, H., Korte, H., Donella-Deana, A., Brunati, A.-M., Pinna, L.A., Coull, J., Perich, J., Valerio, R.M. and Johns, R.B.: Sequence analysis of phosphotyrosine-containing peptides. Determination of PTH-phosphotyrosine by capillary electrophoresis. *Chromatographia*, 30 (1990) 691-695.
- 604 Mitsui, K. and Iwashita, S.: (Phosphoamino acid analysis by 2-dimensional electrophoresis). *Seikagaku*, 62 (1990) 457-461; *C.A.*, 113 (1990) 94107s - a review with 4 refs.
- 605 Nguyen, A.-L., Luong, J.H.T. and Masson, C.: Capillary electrophoresis for detection and quantification of domoic acid in mussels. *Anal. Lett.*, 23 (1990) 1621-1634.
- 606 Tran, A.D., Blanc, T. and Leopold, E.J.: Free solution capillary electrophoresis and micellar electrokinetic resolution of amino acid enantiomers and peptide isomers with L- and D-Marfey's reagents. *J. Chromatogr.*, 516 (1990) 241-249.
- 607 Ueno, S.-i., Kotani, K., Sano, A. and Kakimoto, Y.: Isolation and identification of α -(β -alanyl)hypusine from bovine brain. *Biochim. Biophys. Acta*, 1073 (1991) 233-235.

See also 516, 517, 536, 921, 930.

18b. *Peptides, peptidic and proteinous hormones, growth factors*

- 608 Aebersold, R. and Morrison, H.D.: Analysis of dilute peptide samples by capillary zone electrophoresis. *J. Chromatogr.*, 516 (1990) 79-88.
- 609 Chen, T.-M., George, R.C. and Payne, M.H.: Separation of anticoagulant peptide MDL 28,050 from its deletion by-products by capillary zone electrophoresis. *J. High Resolut. Chromatogr.*, 13 (1990) 782-784.
- 610 Chu, C.T., Rubenstein, D.S., Enghild, J.J. and Pizzo, S.V.: Mechanism of insulin incorporation into α_2 -macroglobulin: implications for the study of peptide and growth factor binding. *Biochemistry*, 30 (1991) 1551-1560.

- 611 Hammond, J.W., Potter, M., Truscott, R. and Wilcken, B.: γ -Glutamylglutamine identified in plasma and cerebrospinal fluid from hyperammonaemic patients. *Clin. Chim. Acta*, 194 (1990) 173-184.
- 612 Horn, J.C.: Electrophoresis of reduced polypeptides dissolved from Lincoln wool other animal fibers. Avail *Univ. Microfilms Int.*, Order No. BRD-88135, 1986, 411 p.; *C.A.*, 113 (1990) 173951r.
- 613 Le Greves, P., Sundqvist, C. and Nyberg, F.: Enzymatic and radioimmunoassay procedures combined with electrophoresis and HPLC for the recovery and characterization of substance P in human brain. *Prepar. Biochem.*, 20 (1990) 145-161.
- 614 Linnekin, D. and Farrar, W.L.: Signal transduction of human interleukin 3 and granulocyte-macrophage colony-stimulating factor through serine and tyrosine phosphorylation. *Biochem. J.*, 271 (1990) 317-324.
- 615 Murata, Y., Yamaguchi, N., Hitoshi, Y., Tominaga, A. and Takatsu, K.: Interleukin 5 and interleukin 3 induce serine and tyrosine phosphorylations of several cellular proteins in an interleukin 5-dependent cell line. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1102-1108.
- 616 Sakakibara, R., Miyazaki, S. and Ishiguro, M.: A nicked β -subunit of human chorionic gonadotropin purified from pregnancy urine. *J. Biochem. (Tokyo)*, 107 (1990) 858-862.
- 617 Sherry, B., Jue, D.-M., Zentella, A. and Cerami, A.: Characterization of high molecular weight glycosylated forms of murine tumor necrosis factor. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1072-1078.
- 618 Thotakura, N.R., LiCalzi, L. and Weintraub, B.D.: The role of carbohydrate in thyrotropin action assessed by a novel approach using enzymatic deglycosylation. *J. Biol. Chem.*, 265 (1990) 11527-11534.

See also 522, 603, 725, 771, 787, 793, 797, 824, 844, 930, 992, 1038.

18c. *Elucidation of structure of proteins and enzymes*

- 619 Coluccio, L.M. and Bretscher, A.: Mapping of the microvillar 110K-calmodulin complex (brush border myosin I). Identification of fragments containing the catalytic and F-actin-binding sites and demonstration of a calcium ion dependent conformational change. *Biochemistry*, 29 (1990) 11089-11094.
- 620 Joshi, R. and Bennett, V.: Mapping the domain structure of human erythrocyte adductin. *J. Biol. Chem.*, 265 (1990) 13130-13136.
- 621 Nielsen, R.G. and Rickard, E.C.: Method optimization in capillary zone electrophoretic analysis of hGH tryptic digest fragments. *J. Chromatogr.*, 516 (1990) 99-114.
- 622 Puchkova, L.V., Verbina, I.A., Denezhkina, V.V., Shavlovsky, M.M., Gaitskhoki, V.S. and Neifakh, S.A.: (Some properties of the ceruloplasmin receptor from human erythrocyte membranes). *Biokhimiya (Moscow)*, 55 (1990) 2182-2190.
- 623 Sobel, J.H., Thibodeau, C.A., Gawinowicz Kolks, M.A. and Canfield, R.E.: Isolation and partial structural characterization of an equine fibrinogen CNBr fragment that exhibits immunologic cross-reactivity with an α -chain cross-linking region of human fibrinogen. *Biochemistry*, 29 (1990) 8907-8916.
- 624 Tsao, F.H.C., Hull, W.M., Strickland, M.S., Whitsett, J.A., Foo, T.K.F., Zografis, G. and DeLuca, P.M., Jr.: Lung calcium-dependent phospholipid-binding proteins: structure and function. *Biochim. Biophys. Acta*, 1081 (1991) 141-150.
- 625 Vanag, V.K., Shelyapin, A.A. and Livshits, V.A.: (Mechanism of interaction of peroxidase and *p*-phenylenediamine). *Biokhimiya (Moscow)*, 55 (1990) 1222-1228.

See also 719, 729, 732, 753, 758, 836, 839, 845, 855, 983, 1004.

19. PROTEINS

19a. General techniques

- 626 Barbarakis, M.S. and Bachas, L.G.: Isoelectric focusing electrophoresis of protein-ligand conjugates: effect of the degree of substitution. *Clin. Chem. (Winston-Salem)*, 37 (1991) 87-90.
- 627 Celis, J.E., Dejgaard, K., Madsen, P., Leffers, H., Gesser, B., Honore, B., Rasmussen, H.H., Olsen, E., Lauridsen, J.B., Ratz, G., Mouritzen, S. et al.: The MRC-5 human embryonal lung fibroblast two-dimensional gel cellular protein database: quantitative identification of polypeptides whose relative abundance differs between quiescent, proliferating and SV40 transformed cells. *Electrophoresis (Weinheim)*, 11 (1990) 1072-1113.
- 628 Celis, J.E., Gesser, B., Rasmussen, H.H., Madsen, P., Leffers, H., Dejgaard, K., Honore, B., Olsen, E., Ratz, G., Lauridsen, J.B., Basse, B. et al.: Comprehensive two-dimensional gel protein databases offer a global approach to the analysis of human cells: the transformed amnion cells (AMA) master database and its link to genome DNA sequence data. *Electrophoresis (Weinheim)*, 11 (1990) 989-1071.
- 629 Doucet, J.-P., Murphy, B.J. and Tuana, B.S.: Modification of a discontinuous and highly porous sodium dodecyl sulfate-polyacrylamide gel system for minigel electrophoresis. *Anal. Biochem.*, 190 (1990) 209-211.
- 630 Garrels, J.I., Franza, B.R., Chang, C. and Latter, G.: Quantitative exploration of the REF52 protein database: cluster analysis reveals the major protein expression profiles in responses to growth regulation, serum stimulation, and viral transformation. *Electrophoresis (Weinheim)*, 11 (1990) 1114-1130.
- 631 Kawasaki, H., Emori, Y. and Suzuki, K.: Production and separation of peptides from proteins stained with Coomassie Brilliant Blue R-250 after separation by sodium dodecyl sulfate-polyacrylamide gel electrophoresis. *Anal. Biochem.*, 191 (1990) 332-336.
- 632 Ogawa, M. and Makino, Y.: Staining of proteins after gel electrophoresis. *Jpn. Kokai Tokkyo Koho JP 02,150,760 [90,150,760] (Cl. GO1N27/447)*, 11 Jun. 1990, Appl. 88/303,715, 30 Nov. 1988; 5 pp.; *C.A.*, 113 (1990) 207877p.
- 633 Okino, H.: Gel washing with alcohol for recovery of proteins after gel electrophoresis. *Jpn. Kokai Tokkyo Koho JP 02 83,397 [90 83,397] (Cl. CO7K3/14)*, 23 Mar. 1990, Appl. 88/232,068, 16 Sep. 1988; 4 pp.; *C.A.*, 113 (1990) 148389f.
- 634 Reimert, C.M. and Bog-Hansen, T.C.: Cationic detergent in agarose for improved electrophoresis of cationic proteins. *Electrophoresis (Weinheim)*, 12 (1991) 96-99.
- 635 Szewczyk, A., Claeys, D., Mertens, W. and Azzi, A.: Azido derivative of tricarboxylic acid for photoaffinity labeling. *Biochim. Biophys. Acta*, 1073 (1991) 209-212.
- 636 Towns, J.K. and Regnier, F.E.: Polyethyleneimine-bonded phases in the separation of proteins by capillary electrophoresis. *J. Chromatogr.*, 516 (1990) 69-78.
- 637 VanBogelen, R.A., Hutton, M.E. and Neidhardt, F.C.: Gene-protein database of *Escherichia coli* K-12: edition 3. *Electrophoresis (Weinheim)*, 11 (1990) 1131-1166.
- 638 Zhu, M., Rodriguez, R., Hansen, D. and Wehr, T.: Capillary electrophoresis of proteins under alkaline conditions. *J. Chromatogr.*, 516 (1990) 123-131.

See also 502, 519, 524, 543, 612, 688, 694, 789, 1153.

19b. *Proteins of cells, viruses and subcellular particles*

- 639 De Pinto, V., Zara, V., Benz, R., Gnoni, G.V. and Palmieri, F.: Characterization of pore-forming activity in liver mitochondria from *Anguilla anguilla*. Two porins in mitochondria? *Biochim. Biophys. Acta*, 1061 (1991) 279-286.
- 640 Dekio, S., Hashimoto, K. and Makino, M.: Two-dimensional gel electrophoresis of ribosomal proteins from (*Propionibacterium acnes* and *granulosum*. *Zentralbl. Bakteriolog.*, 271 (1989) 442-451; *C.A.*, 113 (1990) 94235g.
- 641 Deziel, M.R. and Mau, M.M.: Biotin-conjugated reagents as site-specific probes of membrane protein structure: application to the study of the human erythrocyte hexose transporter. *Anal. Biochem.*, 190 (1990) 297-303.
- 642 Di Giambattista, M., Nyssen, E., Pecher, A. and Cocito, C.: Affinity labeling of the virginiamycin S binding site on bacterial ribosome. *Biochemistry*, 29 (1990) 9203-9211.
- 643 Farkas, G., Buday, L., Antoni, F. and Farago, A.: The 38 kDa Ca²⁺/membrane-binding protein of pig granulocytes needs a high Ca²⁺ concentration to be phosphorylated by protein kinase C. *Biochim. Biophys. Acta*, 1091 (1991) 81-86.
- 644 Franceschi, F.J. and Nierhaus, K.H.: Ribosomal proteins L15 and L16 are mere late assembly proteins of the large ribosomal subunit. Analysis of an *Escherichia coli* mutant lacking L15. *J. Biol. Chem.*, 265 (1990) 16676-16682.
- 645 Gross, V., Ludolph, D., vom Berg, D., Kreisel, W., Andus, T., Katz, N., Giffhorn-Katz, S., Heinrich, P.C. and Gerok, W.: Hepatocyte specific long lasting inhibition of protein N-glycosylation by D-galactosamine. *Biochim. Biophys. Acta*, 1036 (1990) 143-150.
- 646 Gustafson, S. and Forsberg, N.: Hyaluronan-binding proteins on cultured J 774 macrophages. *Biochim. Biophys. Acta*, 1091 (1991) 36-40.
- 647 Hirai, H., Natori, S. and Sekimizu, K.: Inhibitory action of phospholipid-interacting drugs on transcription initiation in a nuclear extract of Ehrlich ascites tumor cells. *Biochim. Biophys. Acta*, 1088 (1991) 191-196.
- 648 Inokuchi, Y. and Hirashima, A.: Interference with viral infection by RNA replicase deleted at the carboxy-terminal region. *J. Biochem. (Tokyo)*, 108 (1990) 53-58.
- 649 Jin, Y., Koyasu, S., Moingeon, P., Steinbrich, R., Tarr, G.E. and Reinherz, E.L.: A fraction of CD3ε subunits exists as disulfide-linked dimers in both human and murine T lymphocytes. *J. Biol. Chem.*, 265 (1990) 15850-15853.
- 650 Jones, G.L., Edmundson, H.M.L., Wesche, D. and Saul, A.: Human erythrocyte band-3 has an altered N terminus in malaria-resistant Melanesian ovalocytosis. *Biochim. Biophys. Acta*, 1096 (1990) 33-40.
- 651 Josic, D., Zeilinger, K., Reutter, W., Böttcher, A. and Schmitz, G.: High-performance capillary electrophoresis of hydrophobic membrane proteins. *J. Chromatogr.*, 516 (1990) 89-98.
- 652 Kramer, W., Gutjahr, U., Girbig, F. and Leipe, I.: Intestinal absorption of dipeptides and β-lactam antibiotics. II. Purification of the binding protein for dipeptides and β-lactam antibiotics from rabbit small intestinal brush border membranes. *Biochim. Biophys. Acta*, 1030 (1990) 50-59.
- 653 Lai, C., Gong, S. and Esteban, M.: Structural and functional properties of the 14-kDa envelope protein of vaccinia virus synthesized in *Escherichia coli*. *J. Biol. Chem.*, 265 (1990) 22174-22180.
- 654 Moghimi, M.S. and Patel, H.M.: Calcium as a possible modulator of Kupffer cell phagocytic function by regulating liver-specific opsonic activity. *Biochim. Biophys. Acta*, 1028 (1990) 304-308.
- 655 Pinelli, E. and Shapira, M.: Temperature-induced expression of proteins in *Leishmania mexicana amazonensis*. A 22-kDa protein is possibly localized in the mitochondrion. *Eur. J. Biochem.*, 194 (1990) 685-691.

- 656 Ramagopal, S.: Induction of cell-specific ribosomal proteins in aggregation-competent nonmorphogenetic *Dictyostelium discoideum*. *Biochem. Cell Biol.*, 68 (1990) 1281-1287.
- 657 Romero, D.P., Arredondo, J.A. and Traut, R.R.: Identification of a region of *Escherichia coli* ribosomal protein L2 required for the assembly of L16 into the 50 S ribosomal subunit. *J. Biol. Chem.*, 265 (1990) 18185-18191.
- 658 Sako, Y., Sato, S.B. and Ohnishi, S.-i.: Subpopulations of endosomes generated at sequential stages in the endocytic pathway of asialoganglioside-containing ferrite ligands in rat liver. *J. Biochem. (Tokyo)*, 107 (1990) 846-853.
- 659 Sester, U., Sawada, M. and Wang, E.: Purification and biochemical characterization of statin, a nonproliferation specific protein from rat liver. *J. Biol. Chem.*, 265 (1990) 19966-19972.
- 660 Sheppard, A., Wu, J., Rutishauser, U. and Lynch, G.: Proteolytic modification of neural cell adhesion molecule (NCAM) by the intracellular proteinase calpain. *Biochim. Biophys. Acta*, 1076 (1991) 156-160.
- 661 Siddique, H.R. and Sarkar, N.H.: The interaction of a c-Jun/Fos related protein factor with the U3 sequences of the mouse mammary tumor virus LTR. *Biochem. Biophys. Res. Commun.*, 172 (1990) 348-356.
- 662 Singh, K., DeVouge, M.W. and Mukherjee, B.B.: Physiological properties and differential glycosylation of phosphorylated and nonphosphorylated forms of osteopontin secreted by normal rat kidney cells. *J. Biol. Chem.*, 265 (1990) 18696-18701.
- 663 Taketani, S., Sato, H., Yoshinaga, T., Tokunaga, R., Ishii, T. and Bannai, S.: Induction in mouse peritoneal macrophages of 34 kDa stress protein and heme oxygenase by sulfhydryl-reactive agents. *J. Biochem. (Tokyo)*, 108 (1990) 28-32.
- 664 Takuma, T.: Evidence for the involvement of cAMP-dependent protein kinase in the exocytosis of amylase from parotid acinar cells. *J. Biochem. (Tokyo)*, 108 (1990) 99-102.
- 665 Tokida, Y., Aratani, Y., Morita, A. and Kitagawa, Y.: Production of two variant laminin forms by endothelial cells and shift of their relative levels by angiostatic steroids. *J. Biol. Chem.*, 265 (1990) 18123-18129.
- 666 Verkhovskaya, L.V., Ulasov, V.I. Kiseleva, E.K., Khilko, S.N. and Tikhonenko, T.I.: (Purification and properties of the hexon antigen from canine adenovirus serotype CAV-1). *Biokhimiya (Moscow)*, 55 (1990) 1996-2001.
- 667 Wu, X., Manabe, M., Yu, J. and Sun, T.: Large scale purification and immunolocalization of bovine uroplakins I, II, and III. Molecular markers or urothelial differentiation. *J. Biol. Chem.*, 265 (1990) 19170-19179.
- 668 Yamashita, A., Sato, E., Yasuda, H., Kurokawa, T. and Ishibashi, S.: Reduction of mono(ADP-ribosylation) of 20 kDa protein with maturation in rat testis: involvement of guanine nucleotides. *Biochim. Biophys. Acta*, 1091 (1991) 46-50.
- 669 Yoo, Y. and Rechsteiner, M.: The use of ubiquitin-peptide extensions as protein kinase substrates. *Anal. Biochem.*, 191 (1990) 35-40.

See also 627, 682, 693, 697, 776, 814, 818, 821, 824, 846, 935, 1106.

19c. Proteins synthesized by genetic manipulation, monoclonal antibodies

- 670 Fausset, P.R. and Lu, H.S.: Structural analysis of recombinant proteins prepared by semi-dry electroblotting after sodium dodecyl sulfate-polyacrylamide gel electrophoresis. *Electrophoresis (Weinheim)*, 12 (1991) 22-27.
- 671 Free, M.L., Gordon, R.B., Keough, D.T., Beacham, I.R., Emmerson, B.T. and de Jersey, J.: Expression of active human hypoxanthine-guanine phosphoribosyl-transferase in *Escherichia coli* and characterisation of the recombinant enzyme. *Biochim. Biophys. Acta*, 1087 (1990) 205-211.

- 672 Grisshammer, R., Oeckl, C. and Michel, H.: Expression in *Escherichia coli* of c-type cytochrome genes from *Rhodospseudomonas viridis*. *Biochim. Biophys. Acta*, 1088 (1991) 183-190.
- 673 Götz, F., Schulze-Forster, K., Wagner, H., Kröger, H. and Simon, D.: Transcription inhibition of sv40 by *in vitro* DNA methylation. *Biochim. Biophys. Acta*, 1087 (1990) 323-329.
- 674 Halenbeck, R., Crosier, W.J., Clark, R., McCormick, F. and Kothe, K.: Purification, characterization, and western blot analysis of human GTPase-activating protein from native and recombinant sources. *J. Biol. Chem.*, 265 (1990) 21922-21928.
- 675 McCormack, F.X., Fisher, J.H., Suwabe, A., Smith, D.L., Shannon, J.M. and Voelker, D.R.: Expression and characterization of rat surfactant protein A synthesized in Chinese hamster ovary cells. *Biochim. Biophys. Acta*, 1087 (1990) 190-198.
- 676 Motojima, K. and Goto, S.: Characterization of liver-specific expression of rat uricase using monoclonal antibodies and cloned cDNAs. *Biochim. Biophys. Acta*, 1087 (1990) 316-322.
- 677 Pieper, U., Ehbrecht, H.-J., Fliess, A., Schick, B., Journak, F. and Pingoud, A.: Genetic engineering, isolation and characterization of a truncated *Escherichia coli* elongation factor Tu comprising domains 2 and 3. *Biochim. Biophys. Acta*, 1087 (1990) 147-156.
- 678 Ribeiro, A., Cardot, P., Benarous, R., Pernas, P., Pepin, D., Rybkine, T., Chambaz, J. and Bereziat, G.: Partial apolipoprotein E- β -galactosidase fusion protein expressed in *Escherichia coli* retains binding activity to the LDL(B/E) receptor. *Biochim. Biophys. Acta*, 1087 (1990) 219-225.
- 679 Seeger, W., Thede, C., Günther, A. and Grube, C.: Surface properties and sensitivity to protein-inhibition of a recombinant apoprotein C-based phospholipid mixture *in vitro* - comparison to natural surfactant. *Biochim. Biophys. Acta*, 1081 (1991) 45-52.
- 680 Wenisch, E., Tauer, C., Jungbauer, A., Katinger, H., Faupel, M. and Righetti, P.G.: Capillary zone electrophoresis for monitoring r-DNA protein purification in multi-compartment electrolyzers with immobilized membranes. *J. Chromatogr.*, 516 (1990) 133-146.
- 681 Wu, S.-L., Teshima, G., Cacia, J. and Hancock, W.S.: Use of high-performance capillary electrophoresis to monitor charge heterogeneity in recombinant-DNA derived proteins. *J. Chromatogr.*, 516 (1990) 115-122.

See also 630, 637.

19d. Microbial and plant proteins

- 682 Bergmann, U. and Wittmann-Liebold, B.: Purification of ribosomal proteins from the extreme halophilic archaeobacterium *Halobacterium marismortui* by high-performance liquid chromatography. *Chromatographia*, 30 (1990) 707-712.
- 683 Bier, M., Long, T. and Ryu, H.W.: Separation of (*Lens culinaris*) hemagglutinin by forced flow electrophoresis. *Sep. Sci. Technol.*, 25 (1990) 997-1005; *C.A.*, 114 (1991) 2926c.
- 684 Blinnikova, E.I., Dyng, L.O. and Briko, N.I.: (Heterogeneity of protein components of group A streptococcus cell wall). *Biokhimiya (Moscow)*, 55 (1990) 2031-2037.
- 685 Brussock, S.M. and Currier, T.C.: Use of sodium dodecyl sulfate-polyacrylamide gel electrophoresis to quantify *Bacillus thuringiensis* δ -endotoxins. *ACS Symp. Ser.*, 432 (Anal. Chem. *Bacillus thuringiensis*) (1990) 78-87; *C.A.*, 113 (1990) 209957p.

- 686 Caer, D., Baniel, A., Subirade, M., Gueguen, J. and Colas, B.: Preparation and physicochemical properties of glycosylated derivatives of pea legumin. *J. Agric. Food Chem.*, 38 (1990) 1700-1706.
- 687 Clements, R.L.: Polyacrylamide gel electrophoresis of salt-soluble proteins of soft wheats from the eastern United States. *Cereal Chem.*, 67 (1990) 264-267; *C.A.*, 113 (1990) 190060s.
- 688 Costas, M., Holmes, B. and Wood, A.C.: Numerical analysis of electrophoretic proteins patterns of *Providencia stuartii* strains from urine, wound and other clinical sources. *J. Appl. Bacteriol.*, 68 (1990) 505-518; *C.A.*, 113 (1990) 148471b.
- 689 Froehlich, J.E., Poorman, R., Reardon, E., Barnum, S.R. and Jaworski, J.G.: Purification and characterization of acyl carrier protein from two cyanobacteria species. *Eur. J. Biochem.*, 193 (1990) 817-825.
- 690 Garnier, J., Wu, B., Maroc, J., Guyon, D. and Tremolieres, A.: Restoration of both an oligomeric form of the light-harvesting antenna CP II and a fluorescence state II-state I transition by Δ^3 -trans-hexadecenoic acid-containing phosphatidylglycerol, in cells of a mutant of *Chlamydomonas reinhardtii*. *Biochim. Biophys. Acta*, 1020 (1990) 153-162.
- 691 Grosso, L.E., Parks, W.C., Wu, L. and Mecham, R.P.: Fibroblast adhesion to recombinant tropoelastin expressed as a Protein A-fusion protein. *Biochem. J.*, 273 (1991) 517-522.
- 692 Hantula, J., Korhonen, T.K. and Bamford, D.H.: Determination of taxonomic resolution capacity of conventional one-dimensional SDS-polyacrylamide gel electrophoresis of whole-cell proteins using Enterobacteriaceae. *FEMS Microbiol. Lett.*, 70 (1990) 325-330; *C.A.*, 113 (1990) 168392e.
- 693 Herwig, S.: Preparation and comparison of RP-HPLC of crosslinked ribosomal protein pairs by chromatography on PLRP- and Vydac-columns. *Chromatographia*, 30 (1990) 696-702.
- 694 Holmes, B., Costas, M., Wood, A.C. and Kersters, K.: Numerical analysis of electrophoretic protein patterns of 'Achromobacter' group B, E and F strains from human blood. *J. Appl. Bacteriol.*, 68 (1990) 495-504; *C.A.*, 113 (1990) 148470a.
- 695 Hunter, S.W., Rivoire, B., Mehra, V., Bloom, B.R. and Brennan, P.J.: The major native proteins of the leprosy bacillus. *J. Biol. Chem.*, 265 (1990) 14065-14068.
- 696 Kessler, G.A., Moore, S., Usher, D.C. and Parks, L.W.: Yeast proteins with reactivity to antibodies elicited against mammalian apolipoproteins. *Biochem. Biophys. Res. Commun.*, 174 (1991) 631-637.
- 697 Lebedev, N.N., Tang, C.-Q. and Ladygin, V.G.: (The polypeptide content and pigment-protein complex formation in *Chlamydomonas reinhardtii* mutants). *Biokhimiya (Moscow)*, 55 (1990) 2072-2077.
- 698 Nesterenko, M.V., Shatalov, A.G., Khor'kov, E.I., Belyanin, E.K. and Shemyakin, M.F.: (Isolation of monospecific antibodies to wheat (*Triticum aestivum*) seed prolamine subfactions). *Biokhimiya (Moscow)*, 55 (1990) 2274-2280.
- 699 Skerritt, J.H. and Hill, A.S.: Monoclonal antibody sandwich enzyme immunoassays for determination of gluten in foods. *J. Agric. Food Chem.*, 38 (1990) 1771-1778.
- 700 Van der Berg, B.M.: A rapid and economical method for hybrid purity testing of tomato (*Lycopersicon esculentum* L.) F1 hybrids using ultrathin-layer isoelectric focusing of alcohol dehydrogenase variants from seeds. *Electrophoresis (Weinheim)*, 12 (1991) 64-69.
- 701 Vanoni, M., Vavassori, M., Frascotti, G., Martegani, E. and Alberghina, L.: Overexpression of the CDC25 gene, an upstream element of the RAS/adenylyl cyclase pathway in *Saccharomyces cerevisiae*, allows immunological identification and characterization of its gene product. *Biochem. Biophys. Res. Commun.*, 172 (1990) 61-69.

- 702 Xiong, Y.L. and Kinsella, J.E.: Mechanism of urea-induced whey protein gelation. *J. Agric. Food Chem.*, 38 (1990) 1887-1891.

See also 492, 559, 656, 808, 815, 835.

19e. *Proteins of blood, serum and blood cells*

- 703 Beisembaeva, R.U., Mursagalieva, A.T., Dzhumaliev, L.M., Shaikenov, T.E. and Mevkh, A.T.: (Identification of haptoglobin as an endogenous inhibitor of prostaglandin H synthetase in the cytosol fraction of the primary cells of sheep vesicular glands). *Biokhimiya (Moscow)*, 55 (1990) 2261-2267.
- 704 Carpenter, A.B., Huczko, E., Eisenbeis, C.H., Jr. and Kelly, R.H.: Evidence for locally synthesized and clonally restricted immunoglobulin in the synovial fluid from rheumatoid arthritis patients. *Clin. Chim. Acta*, 193 (1990) 1-12.
- 705 Curling, E.M.A., Hayter, P.M., Baines, A.J., Bull, A.T., Gull, K., Strange, P.G. and Jenkins, N.: Recombinant human interferon- γ . Differences in glycosylation and proteolytic processing lead to heterogeneity in batch culture. *Biochem. J.*, 272 (1990) 333-337.
- 706 Dalgleish, D.G.: Denaturation and aggregation of serum proteins and caseins in heated milk. *J. Agric. Food Chem.*, 38 (1990) 1995-1999.
- 707 Donnelly, P.K., Trotter, P., White, M. and Shenton, B.K.: Immunoelectrophoretic pattern of α_2 -macroglobulin and α_2 -macroglobulin-protease complexes. *Clin. Chim. Acta*, 195 (1990) 85-90.
- 708 Dyr, J.E. and Suttner, J.: Affinity high-performance liquid chromatography on heparin-Glc-Spheron. *J. Chromatogr.*, 563 (1991) 124-128.
- 709 Eguchi, Y., Sakata, Y., Matsuda, M., Osada, H., Numao, N., Ohmori, M. and Kondo, K.: Characterization of thrombin- and plasmin-resistant mutants of recombinant human single chain urokinase-type plasminogen activator. *J. Biochem. (Tokyo)*, 108 (1990) 72-79.
- 710 Enghild, J.J., Thøgersen, I.B., Salvesen, G., Fey, G.H., Figler, N.L., Gonias, S.L. and Pizzo, S.V.: α -Macroglobulin from *Limulus polyphemus* exhibits proteinase inhibitory activity and participates in a hemolytic system. *Biochemistry*, 29 (1990) 10070-10080.
- 711 Falkenberg, C., Grubb, A. and Akerstrom, B.: Isolation of rat serum α_1 -microglobulin. Identification of a complex with α_1 -inhibitor-3, a rat α_2 -macroglobulin homologue. *J. Biol. Chem.*, 265 (1990) 16150-16157.
- 712 Fang, X., Chen, X., Gan, W. and He, Y.: (Determination of copper in human serum proteins by electrophoresis and graphite furnace atomic absorption spectrometry). *Fenxi Huaxue*, 18 (1990) 578-580; *C.A.*, 113 (1990) 168447b.
- 713 Fonong, T., Evans, S.M. and Homburger, H.A.: Development and comparative evaluation of immunoblot assays for detecting autoantibodies to Scl 70 and Jo 1 antigens in serum. *Clin. Chem. (Winston-Salem)*, 36 (1990) 2053-2056.
- 714 Gahnberg, C.G., Nortamo, P., Zimmermann, D. and Ruoslahti, E.: The human leukocyte-adhesion ligand, intercellular-adhesion molecule 2. Expression and characterization of the protein. *Eur. J. Biochem.*, 195 (1991) 177-182.
- 715 Harff, G.A. and Backer, E.T.: Radial immunodiffusion and immunoelectrophoresis compared for identifying autoantibodies to lactate dehydrogenase in human serum. *Clin. Chim. Acta*, 193 (1990) 157-164.
- 716 Hänisch, J. and Gutsche, C.: Nachweis oligoklonaler Banden in Liquor. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 726.
- 717 Inaba, M., Amano, Y. and Maede, Y.: Two novel molecular isoforms of band 4.2 in Japanese Sika deer (*Cervus nippon yesoensis*, Heude) erythrocytes. *Biochim. Biophys. Acta*, 1021 (1990) 101-104.
- 718 Josic, Dj., Bottcher, A. and Schmitz, G.: High-performance capillary isotachopheresis of serum lipoproteins and membrane proteins. *Chromatographia*, 30 (1990) 703-706.

- 719 Karinch, A.M., Zimmer, W.E. and Goodman, S.R.: The identification and sequence of the actin-binding domain of human red blood cell β -spectrin. *J. Biol. Chem.*, 265 (1990) 11833-11840.
- 720 Kots, A.Ya., Skurat, A.V. and Bulargina, T.V.: (Study of substrates of human erythrocyte ADP-ribosyl transferase). *Biokhimiya (Moscow)*, 55 (1990) 1169-1176.
- 721 Kumar, A., Gudi, S.R.P., Gokhale, S.M., Bhakuni, V. and Gupta, C.M.: Heat-induced alterations in monkey erythrocyte membrane phospholipid organization and skeletal protein structure and interactions. *Biochim. Biophys. Acta*, 1030 (1990) 269-278.
- 722 LaMarre, J., Wollenberg, G.K., Gonias, S.L. and Hayes, M.A.: Reaction of α_2 -macroglobulin with plasmin increases binding of transforming growth factors- β_1 and β_2 . *Biochim. Biophys. Acta*, 1091 (1991) 197-204.
- 723 Lirschbaum, N.E. and Budzynski, A.Z.: A unique proteolytic fragment of human fibrinogen containing the A α COOH-terminal domain of the native molecule. *J. Biol. Chem.*, 265 (1990) 13669-13676.
- 724 Monkovic, D.D. and Tracy, P.B.: Functional characterization of human platelet-released factor V and its activation by factor Xa and thrombin. *J. Biol. Chem.*, 265 (1990) 17132-17140.
- 725 Nashabeh, W. and el Rassi, Z.: Capillary zone electrophoresis of α_1 -acid glycoprotein fragments from trypsin and endoglycosidase digestions. *J. Chromatogr.*, 536 (1991) 31-42.
- 726 Nielsen, R.G., Rickard, E.C., Santa, P.F., Sharknas, D.A. and Sittampalam, G.S.: Separation of antibody-antigen complexes by capillary zone electrophoresis, isoelectric focusing and high-performance size-exclusion chromatography. *J. Chromatogr.*, 539 (1991) 177-185.
- 727 Nunomura, W.: C-Reactive protein in eel: purification and agglutinating activity. *Biochim. Biophys. Acta*, 1076 (1991) 191-196.
- 728 Porstmann, T., Schmechta, H., Hentschel, C., Doepel, H., Pas, P., Becker, J., Pergande, M., Jung, K. and Nugel, E.: Development of an immunoenzymometric assay for α_1 -microglobulin and measurement of its serum concentration in normal and HIV-infected persons. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 669-675.
- 729 Read, R., Bellew, T., Yang, J., Hill, K.E., Palmer, I.S. and Burk, R.F.: Selenium and amino acid composition of selenoprotein P, the major selenoprotein in rat serum. *J. Biol. Chem.*, 265 (1990) 17899-17905.
- 730 Rehemtulla, A., Arndt, A. and Hart, D.A.: Induction of plasminogen activator inhibitor type 2 expression during differentiation of human K562 cells towards a macrophage phenotype. *Biochem. Cell Biol.*, 68 (1990) 1337-1343.
- 731 Roberts, D.B., Jowett, T., Hughes, J., Smith, D.F. and Glover, D.M.: The major serum protein of *Drosophila* larvae, larval serum protein 1, is dispensable. *Eur. J. Biochem.*, 195 (1991) 195-201.
- 732 Saito, A. and Sinohara, H.: Amino acid sequence at the reactive site of rabbit α -1-antiproteinases. *J. Biochem. (Tokyo)*, 108 (1990) 80-85.
- 733 Van Liedekerke, B.M., Nelis, H.J., Kint, J.A., Vanneste, F.W. and de Leenheer, A.P.: Quality control of albumin solutions by size-exclusion high-performance liquid chromatography, isoelectric focusing and two-dimensional immunoelectrophoresis. *J. Pharm. Sci.*, 80 (1991) 11-16.
- 734 Vranckx, R., Savu, L., Maya, M. and Nunez, E.A.: Characterization of a major development-regulated serum thyroxine-binding globulin in the euthyroid mouse. *Biochem. J.*, 271 (1990) 373-379.
- 735 Yang, X.-J., Blajchman, M.A., Craven, S., Smith, L.M., Anvari, N. and Oforu, F.A.: Activation of Factor V during intrinsic and extrinsic coagulation. Inhibition of heparin, hirudin and D-Phe-Pro-Arg-CH₂Cl. *Biochem. J.*, 272 (1990) 399-406.

- 736 Yannoukakos, D., Vasseur, C., Piau, J.-P., Wajcman, H. and Bursaux, E.: Phosphorylation sites in human erythrocyte band 3 protein. *Biochim. Biophys. Acta*, 1061 (1991) 253-266.

See also 620, 623, 625, 787, 827, 838, 845, 856, 867.

19f. *Structural and muscle proteins*

- 737 Adams, S., DasGupta, G., Chalovich, J.M. and Reisler, E.: Immunochemical evidence for the binding of caldesmon to the NH₂-terminal segment of actin. *J. Biol. Chem.*, 265 (1990) 19652-19657.
- 738 An, H., Klein, P.A., Kao, K.J., Marshall, M.R., Otwell, W.S. and Wei, C.: Development of monoclonal antibody for rock shrimp identification using enzyme-linked immunosorbent assay. *J. Agric. Food Chem.*, 38 (1990) 2094-2100.
- 739 Cheung, D.T., Benya, P.D., Perelman, N., DiCesare, P.E. and Nimni, M.E.: A highly specific and quantitative method for determining type III/I collagen ratios in tissues. *Matrix (Stuttgart)*, 10 (1990) 164-171; *C.A.*, 113 (1990) 148268r.
- 740 De Jongh, K.S., Warner, C. and Catterall, W.A.: Subunits of purified calcium channels. $\alpha 2$ and δ are encoded by the same gene. *J. Biol. Chem.*, 265 (1990) 14738-14741.
- 741 Eddinger, T.J. and Murphy, R.A.: Developmental changes in actin and myosin heavy chain isoform expression in smooth muscle. *Arch. Biochem. Biophys.*, 284 (1991) 232-237.
- 742 Ferraz, C., Widada, J.S. and Liautard, J.-P.: Purification and characterization of recombinant tropomyosins. *J. Chromatogr.*, 539 (1991) 465-473.
- 743 Hock, R.S., Davis, G. and Speicher, D.W.: Purification of human smooth muscle filamin and characterization of structural domains and functional sites. *Biochemistry*, 29 (1990) 9441-9451.
- 744 Jakubiec-Puka, A., Kordowska, J., Catani, C. and Carraro, U.: Myosin heavy chain isoform composition in striated muscle after denervation and self-reinnervation. *Eur. J. Biochem.*, 193 (1990) 623-628.
- 745 Kandror, K.V. and Stepanov, A.S.: (Inhibition of casein kinase 2 by the formation of complexes with mRNA *in vivo*). *Biokhimiya (Moscow)*, 55 (1990) 1584-1589.
- 746 Kielty, C.M., Boot-Handford, R.P., Ayad, S., Shuttleworth, C.A. and Grant, M.E.: Molecular composition of type VI collagen. Evidence for chain heterogeneity in mammalian tissues and cultured cells. *Biochem. J.*, 272 (1990) 787-795.
- 747 Kovalev, L.I., Volgin, A.Yu., Konorova, A.L., Tsvetkova, M.N., Pulyaeva, E.V., Pevnitsky, L.A. and Shishkin, S.S.: (Identification of myosin light chain I from human heart ventricles on two-dimensional electrophoregrams by using monoclonal antibodies). *Biokhimiya (Moscow)*, 55 (1990) 1911-1913.
- 748 Labbe, J.-P., Mejean, C., Benyamin, Y. and Roustan, C.: Characterization of an actin-myosin head interface in the 40-113 region of actin using specific antibodies as probes. *Biochem. J.*, 271 (1990) 407-413.
- 749 Lai, Y., Seagar, M.J., Takahashi, M. and Catterall, W.A.: Cyclic AMP-dependent phosphorylation of two size forms of $\alpha 1$ subunits of L-type calcium channels in rat skeletal muscle cells. *J. Biol. Chem.*, 265 (1990) 20839-20848.
- 750 Laird, D.W., Puranam, K.L. and Revel, J.-P.: Turnover and phosphorylation dynamics of connexin 43 gap junction protein in cultured cardiac myocytes. *Biochem. J.*, 273 (1991) 67-72.
- 751 Liu, A.Y.-C., Choi, H.-S. and Bae-Lee, M.S.: Decreased heat shock response upon adipose differentiation of 3T3-L1 cells. *Biochem. Biophys. Res. Commun.*, 172 (1990) 1-7.

- 752 Marston, S.: Stoichiometry and stability of caldesmon in native thin filaments from sheep aorta smooth muscle. *Biochem. J.*, 272 (1990) 305-310.
- 753 Maurel, E., Azema, C., Deloly, J. and Bouissou, H.: Collagen of the normal and the varicose human saphenous vein: a biochemical study. *Clin. Chim. Acta*, 193 (1990) 27-38.
- 754 McConchie, S.M., Coakley, J., Edwards, R.H.T. and Beynon, R.J.: Molecular heterogeneity in McArdle's disease. *Biochim. Biophys. Acta*, 1096 (1990) 26-32.
- 755 Melching, L.I. and Roughley, P.J.: A matrix protein of M_r 55 000 that accumulates in human articular cartilage with age. *Biochim. Biophys. Acta*, 1036 (1990) 213-220.
- 756 Miyazaki, J.-I., Hosoya, M., Ishimoda-Takagi, T. and Hirabayashi, T.: Tissue specificity of tropomyosin from the crayfish, *Cambarus clarki*. *J. Biochem. (Tokyo)*, 108 (1990) 59-65.
- 757 Simonides, W.S. and van Harveldt, C.: An assay for sarcoplasmic reticulum Ca^{2+} -ATPase activity in muscle homogenates. *Anal. Biochem.*, 191 (1990) 321-331.
- 758 Wallis, G.A., Starman, B.J., Schwartz, M.F. and Byers, P.H.: Substitution of arginine for glycine at position 847 in the triplehelical domain of the $\alpha 1(I)$ chain of type I collagen produces lethal osteogenesis imperfecta. Molecules that contain one or two abnormal chains differ in stability and secretion. *J. Biol. Chem.*, 265 (1990) 18628-18633.
- 759 Wrana, J.L., Kubota, T., Zhang, Q., Overall, C.M., Aubin, J.E., Butler, W.T. and Sodek, J.: Regulation of transformation-sensitive secreted phosphoprotein (SPPI/osteopontin) expression by transforming growth factor- β . Comparisons with expression of SPARC (secreted acidic cysteine-rich protein). *Biochem. J.*, 273 (1991) 523-531.
- 760 Yonemasu, K., Sasaki, T., Dohi, Y., Lapiere, C.M. and Nusgens, B.: Clq, a collagen-like complement subcomponent, in dermatosparactic cattle: its extracellular modification is not affected by lack of procollagen N-terminal proteinase (pN-proteinase). *Biochim. Biophys. Acta*, 1096 (1990) 47-51.
- 761 Zabielski, J., Uchman, W. and Fiszer, W.: The identification of irradiated meat. *Arch. Lebensmittelhyg.*, 41 (1990) 94-96; *C.A.*, 113 (1990) 190006d.

See also 619.

19g. Protamines, histones and other nuclear proteins

- 762 Akama, K., Maruyama, R., Mochizuki, H. and Tobita, T.: Boar transition protein 2 and 4 isolated from late spermatid nuclei by high-performance liquid chromatography. *Biochim. Biophys. Acta*, 1041 (1990) 264-268.
- 763 Banchev, T., Srebrevna, L. and Zlatanova, J.: Purification of histone H1⁰ and its subfractions under non-denaturing conditions. *Biochim. Biophys. Acta*, 1073 (1991) 230-232.
- 764 Feuerstein, N., Mond, J.J., Kinchington, P.R., Hickey, R., Lindsberg, M.-L.K., Hay, I. and Ruyechan, W.T.: Evidence for DNA binding activity of numatrin (B23), a cell cycle-regulated nuclear matrix protein. *Biochim. Biophys. Acta*, 1087 (1990) 127-136.
- 765 Fukuda, K., Dong, J.-M. and Chiu, J.-F.: Association of fibronectin-like antigens in chromatin preparations from rat hepatoma cells. *Arch. Biochem. Biophys.*, 283 (1990) 401-408.
- 766 Gatewood, J.M., Cook, G.R., Balhorn, R., Schmid, C.W. and Bradbury, E.M.: Isolation of four core histones from human sperm chromatin representing a minor subset of somatic histones. *J. Biol. Chem.*, 265 (1990) 20662-20666.

- 767 Imamoto-Sonobe, N., Matsuoka, Y., Semba, T., Okada, Y., Uchida, T. and Yoneda, Y.: A protein recognized by antibodies to Asp-Asp-Asp-Glu-Asp shows specific bonding activity to heterogeneous nuclear transport signals. *J. Biol. Chem.*, 265 (1990) 16504-16508.
- 768 Malek, S.N., Katumuluwa, A.I. and Pasternack, G.R.: Identification and preliminary characterization of two related proliferation-associated nuclear phosphoproteins. *J. Biol. Chem.*, 265 (1990) 13400-13409.
- 769 Pfaffle, P. and Jackson, V.: Studies on rates of nucleosome formation with DNA under stress. *J. Biol. Chem.*, 265 (1990) 16821-16829.
- 770 Sudhakar, L. and Rao, M.R.S.: Stage-dependent changes in localization of a germ cell-specific lamin during mammalian spermatogenesis. *J. Biol. Chem.*, 265 (1990) 22526-22532.
- 771 Thorne, A.W., Kmiciek, D., Mitchelson, K., Sautiere, P. and Crane-Robinson, C.: Patterns of histone acetylation. *Eur. J. Biochem.*, 193 (1990) 701-713.
- 772 Woppmann, A., Patschinsky, T., Bringmann, P., Godt, F. and Luehrmann, R.: Characterization of human and murine snRNP proteins by two-dimensional gel electrophoresis and phosphopeptide analysis of U1-specific 70K protein variants. *Nucleic Acids Res.*, 18 (1990) 4427-4438; *C.A.*, 113 (1990) 186813x.

See also 647.

19h. *Chromoproteins and metalloproteins*

- 773 Friden, H., Cheesman, M.R., Hederstedt, L., Andersson, K.K. and Thomson, A.J.: Low temperature EPR and MCD studies on cytochrome b-558 of the *Bacillus subtilis* succinate:quinone oxidoreductase indicate bis-histidine coordination of the heme iron. *Biochim. Biophys. Acta*, 1041 (1990) 207-215.
- 774 Imaoka, S., Yamaguchi, Y. and Funae, Y.: Induction and regulation of cytochrome P450 K-5 (lauric acid hydroxylase) in rat renal microsomes by starvation. *Biochim. Biophys. Acta*, 1036 (1990) 18-23.
- 775 Lobanov, N.A., Vlasova, T.M. and Adamovich, T.B.: (A comparative study of adrenodoxin and renoredoxin from bovine). *Biokhimiya (Moscow)*, 55 (1990) 1059-1064.

See also 672, 712.

19i. *Proteins of glands, gland products, various zymogens (incl. milk proteins)*

- 776 Ambudkar, I.S., Horn, V.J., Dai, Y. and Baum, B.J.: Evidence against a role for a pertussis toxin-sensitive G protein in Ca^{2+} mobilization in rat parotid acinar cells. *Biochim. Biophys. Acta*, 1055 (1990) 259-264.
- 777 Bushfield, M., Griffiths, S.L., Murphy, G.J., Pyne, N.J., Knowler, J.T., Milligan, G., Parker, P.J., Mollner, S. and Houslay, M.D.: Diabetes-induced alterations in the expression, functioning and phosphorylation state of the inhibitory guanine nucleotide regulatory protein G_i-2 in hepatocytes. *Biochem. J.*, 271 (1990) 365-372.
- 778 Giometti, C.S., Tollaksen, S.L., Gemmell, M.A., Taylor, J., Hawes, N. and Roderick, T.: The analysis of recessive lethal mutations in mice by using two-dimensional gel electrophoresis of liver proteins. *Mutat. Res.*, 242 (1990) 47-55; *C.A.*, 113 (1990) 206288k.
- 779 Hänslér, M., Appelt, G. and Rogos, R.: Improved detection of human pancreatic proteins separated by two-dimensional isoelectric focusing/sodium dodecyl sulphate gel electrophoresis using a combined staining procedure. *J. Chromatogr.*, 563 (1991) 63-71.

- 780 Leaver, J. and Dalgleish, D.G.: The topography of bovine β -casein at an oil/water interface as determined from the kinetics of trypsin-catalysed hydrolysis. *Biochim. Biophys. Acta*, 1041 (1990) 217-322.
- 781 Nikolaev, A.A. and Karasev, V.S.: (Isolation and properties of organospecific trypsin inhibitor from human seminal plasma). *Biokhimiya (Moscow)*, 55 (1990) 1065-1072.
- 782 Ostoa-Saloma, P., Ramirez, J. and Perez-Montfort, R.: Causes of the decrease in fluorescence due to proteolysis of α -casein. *Biochim. Biophys. Acta*, 1041 (1990) 146-152.
- 783 Scanff, P., Savalle, B., Miranda, G., Pelissier, J.-P., Guilloteau, P. and Toullec, R.: *In vivo* gastric digestion of milk proteins. Effect of technological treatments. *J. Agric. Food Chem.*, 38 (1990) 1623-1629.
- 784 Teno, A.M., Vieira, C.A., Santoro, M., de Almeida Neves, A.G. and Giglio, J.R.: Interchain disulfide bonds in crotonamine self-association. *J. Biochem. (Tokyo)*, 107 (1990) 821-825.
- 785 Zargarova, T.A., Aleksandrova, N.M., Palej, E.L. and Favorova, O.O.: (Phosphorylation of tryptophanyl-tRNA-synthetase in bovine pancreas extracts). *Biokhimiya (Moscow)*, 55 (1990) 1328-1337.
- see also 645, 661, 664, 668, 706, 718, 762, 852, 857.
- 19j. *Proteins of brain, cerebrospinal fluid and eye*
- 786 Banerjee, A., Richiert, D.M., Emanuel, K., Singh, A.K. and Bagchi, M.: Studies on the possible role of vitreous humor on protein synthesis and morphology of organ cultured adult rabbit lens. II. Epithelial cells. *Biochim. Biophys. Acta*, 1076 (1991) 330-336.
- 787 Becker, P.S., Schwartz, M.A., Morrow, J.S. and Lux, S.E.: Radiolabel-transfer cross-linking demonstrates that protein 4.1 binds to the N-terminal region of β -spectrin and to actin in binary interactions. *Eur. J. Biochem.*, 193 (1990) 827-836.
- 788 Bereznikova, A.V., Gareeva, A.B., Kochanova, N.A., Popov, K.M., Bulargina, T.V. and Severin, E.S.: (Study of binding of the α -subunit of bovine brain GTP-binding protein, G_0 , to the cytoskeleton). *Biokhimiya (Moscow)*, 55 (1990) 1229-1235.
- 789 Bours, J. and Ahrend, M.H.J.: Staining of free sulfhydryl groups of proteins after separation by isoelectric focusing of Bio-Rad standards and lens crystallins. *Anal. Biochem.*, 190 (1990) 244-248.
- 790 Boyles, J.K., Notterpek, L.M. and Anderson, L.J.: Accumulation of apolipoproteins in the regenerating and remyelinating mammalian peripheral nerve. Identification of apolipoprotein D, apolipoprotein A-IV, apolipoprotein E, and apolipoprotein A-I. *J. Biol. Chem.*, 265 (1990) 17805-17815.
- 791 Desrosiers, R.R., Romanik, E.A. and O'Connor, C.M.: Selective carboxyl methylation of structurally altered calmodulins in *Xenopus* oocytes. *J. Biol. Chem.*, 265 (1990) 21368-21374.
- 792 Enomoto, K. and Asakawa, T.: ADP-ribosylation of myelin basic protein by cholera toxin. *Biochim. Biophys. Acta*, 1036 (1990) 188-192.
- 793 Farrell, K.P. and Keates, R.A.B.: Synapsin-1 is found in a microtubule-associated complex of proteins isolated from bovine brain. *Biochem. Cell Biol.*, 68 (1990) 1256-1261.
- 794 Gabrielides, C., McCormack, A.L., Hunt, D.F. and Christakos, S.: Brain calbindin-D_{28k} and a M_r 29000 calcium binding protein in cerebellum are different but related proteins: evidence obtained from sequence analysis by tandem mass spectrometry. *Biochemistry*, 30 (1991) 656-662.
- 795 Garland, D., Rao, P.V., del Corso, A., Mura, U. and Zigler, J.S.: ζ -Crystallin is a major protein in the lens of *Camelus dromedarius*. *Arch. Biochem. Biophys.*, 285 (1991) 134-136.

- 796 Gillette, R., Gillette, M., Lipeski, L. and Connor, J.: pH-Sensitive, Ca^{2+} /calmodulin-dependent phosphorylation of unique protein in molluscan nervous system. *Biochim. Biophys. Acta*, 1036 (1990) 207-212.
- 797 Lampe, P.D. and Johnson, R.G.: Amino acid sequence of *in vivo* phosphorylation sites in the main intrinsic protein (MIP) of lens membranes. *Eur. J. Biochem.*, 194 (1990) 541-547.
- 798 Lishko, V.K., Nikolishina, E.V. and Himmelreich, N.G.: (Internalization and degradation of latrotoxin bound to rat brain synaptosomes). *Biokhimiya (Moscow)*, 55 (1990) 1375-1380.
- 799 Matsui, W. and Kirchhausen, T.: Stabilization of clathrin coats by the core of the clathrin-associated protein complex AP-2. *Biochemistry*, 29 (1990) 10791-10798.
- 800 McLaurin, J. and Moscarello, M.A.: The preparation of antibodies reactive against citrulline-containing charge isomers of myelin basic protein but not against the arginine-containing charge isomers. *Anal. Biochem.*, 191 (1990) 272-277.
- 801 Souverijn, J.H.M., Peet, R., Smit, W.G., Serree, H.M.P. and Bruijn, G.W.: The HAF enigma: origin and clinical consequences of the appearance of high alkaline fractions on isoelectric focusing patterns of cerebrospinal fluid. *J. Neurol. Sci.*, 97 (1990) 117-128; *C.A.*, 113 (1990) 94330j.

See also 847.

19k. *Proteins of neoplastic tissue and transformed cells*

- 802 Doyle, L.A., Goldstein, L.H., Clingroth, C.J. and Cuttitta, F.: Identification of conditioned medium proteins from human cancer cells adapted to serum-free conditions. *Anal. Biochem.*, 190 (1990) 238-243.
- 803 Isoda, N., Kajii, E., Ikemoto, S. and Kimura, K.: Two-dimensional polyacrylamide gel electrophoretic pattern of duodenal tumour proteins. *J. Chromatogr.*, 534 (1990) 47-55.
- 804 Kwast-Welfeld, J., de Belle, I., Walker, P.R., Isaacs, R.J., Whitfield, J.F. and Sikorska, M.: Changes in cyclic adenosine monophosphate-responsive element binding proteins in rat hepatomas. *Cancer Res.*, 51 (1991) 528-535.
- 805 Nabeshima, K., Lane, W.S. and Biswas, C.: Partial sequencing and characterization of the tumor cell-derived collagenase stimulatory factor. *Arch. Biochem. Biophys.*, 285 (1991) 90-96.
- 806 Takahashi, N. and Breitman, T.R.: Retinoylation of proteins in leukemia, embryonal carcinoma, and normal kidney cell lines: differences associated with differential responses to retinoic acid. *Arch. Biochem. Biophys.*, 285 (1991) 105-110.
- 807 Yoshida, M., Itoh, M., Imai, T., Tanimoto, Y., Sakurabayashi, I. and Furuya, S.: Analysis of two-dimensional electrophoretic patterns of proteins obtained from the sera of normal and tumor-bearing nude rats. *Electrophoresis (Weinheim)*, 12 (1991) 80-83.

See also 823, 867.

19l. *Specific binding and receptor proteins*

- 808 Akita, M., Shinkai, A., Matsumura, S.-i. and Mizushima, S.: SecA, an essential component of the secretory machinery of *Escherichia coli*, exists as homodimer. *Biochem. Biophys. Res. Commun.*, 174 (1991) 211-216.
- 809 Bartegi, A., Fattoum, A., Derancourt, J. and Kassab, R.: Characterization of the carboxyl-terminal 10-kDa cyanogen bromide fragment of caldesmon as an actin-calmodulin-binding region. *J. Biol. Chem.*, 265 (1990) 15231-15238.

- 810 Baum, L.G. and Cresswell, P.: Isolation and characterization of a galactose-specific carbohydrate binding protein from human lymphoblastic cells. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1079-1085.
- 811 Bicsak, T.A., Nakatani, A., Shimonaka, M., Malkowski, M. and Ling, N.: Insulin-like growth factor binding protein measurement: sodium dodecyl sulfate-stable complexes with insulin-like growth factor in serum prevent accurate assessment of total binding protein content by ligand blotting. *Anal. Biochem.*, 191 (1990) 75-79.
- 812 Blumberg, R.S., Alarcon, B., Sancho, J., McDermott, F.V., Lopez, P., Breitmeyer, J. and Terhorst, C.: Assembly and function of the T cell antigen receptor. Requirement of either the lysine or arginine residues in the transmembrane region of the α chain. *J. Biol. Chem.*, 265 (1990) 14036-14043.
- 813 Brown, P.J., Lee, A.B., Norman, M.G., Presky, D.H. and Schonbrunn, A.: Identification of somatostatin receptors by covalent labeling with a novel photoreactive somatostatin analog. *J. Biol. Chem.*, 265 (1990) 17995-18004.
- 814 Campos, F., Corona-Reyes, M. and Zinker, S.: The yeast 5S rRNA binding ribosomal protein YL3 is phosphorylated *in vivo*. *Biochim. Biophys. Acta*, 1987 (1990) 142-146.
- 815 Carmo Avides, M. do, Sunkel, C.E., Moradas-Ferreira, P. and Rodrigues-Pousada, C.: Properties and partial characterization of the heat-shock factor from *Tetrahymena pyriformis*. *Eur. J. Biochem.*, 194 (1990) 331-336.
- 816 Chao, J., Chai, K.X., Chen, L., Xiong, W., Chao, S., Woodley-Miller, C., Wang, L., Lu, H.S. and Chao, L.: Tissue kallikrein-binding protein is a serpin. I. Purification, characterization, and distribution in normotensive and spontaneously hypertensive rats. *J. Biol. Chem.*, 265 (1990) 16394-16401.
- 817 Chiba, S., Shibuya, K., Miyazono, K., Tojo, A., Oka, Y., Miyagawa, K. and Takaku, F.: Affinity purification of human granulocyte macrophage colony-stimulating factor receptor α -chain. Demonstration of binding by photoaffinity labeling. *J. Biol. Chem.*, 265 (1990) 19777-19781.
- 818 De Block, J., Petit, K., van Laer, L., Dillen, L., Roggen, E. and de Potter, W.: Calmodulin-binding proteins in granule and plasma membranes from bovine chromaffin cells. *Biochim. Biophys. Acta*, 1030 (1990) 134-142.
- 819 Denison, M.S. and Yao, E.F.: Characterization of the interaction of transformed rat hepatic cytosolic Ah receptor with a dioxin responsive transcriptional enhancer. *Arch. Biochem. Biophys.*, 284 (1991) 158-166.
- 820 Denovan-Wright, E.M. and Wright, J.M.: Immunologically-related nucleic acid-binding proteins associated with the nuclear matrix of *Physarum polycephalum*. *Biochim. Biophys. Acta*, 1088 (1991) 25-30.
- 821 Dierks, T., Salentin, A., Heberger, C. and Krämer, R.: The mitochondrial aspartate/glutamate and ADP/ATP carrier switch from obligate counterexchange to unidirectional transport after modification by SH-reagents. *Biochim. Biophys. Acta*, 1028 (1990) 268-280.
- 822 Fountoulakis, M., Juranville, J.-F., Maris, A., Ozmen, L. and Garotta, G.: One interferon γ receptor binds one interferon γ dimer. *J. Biol. Chem.*, 265 (1990) 19758-19767.
- 823 Goldman, R., Levy, R.B., Peles, E. and Yarden, Y.: Heterodimerization of the erbB-1 and erbB-2 receptors in human breast carcinoma cells: a mechanism for receptor transregulation. *Biochemistry*, 29 (1990) 11024-11028.
- 824 Goncalves, E., Lakshmanan, M., Cahnmann, H.J. and Robbins, J.: High-affinity binding of thyroid hormones to neuroblastoma plasma membranes. *Biochim. Biophys. Acta*, 1055 (1990) 151-156.
- 825 Haas, D.W. and Hagedorn, C.H.: Casein kinase I phosphorylates the 25-kDa mRNA cap-binding protein. *Arch. Biochem. Biophys.*, 284 (1991) 84-89.
- 826 Haunerland, N.H. and Chisholm, J.M.: Fatty acid binding protein in flight muscle of the locust, *Schistocerca gregaria*. *Biochim. Biophys. Acta*, 1047 (1990) 233-238.

- 827 Heise, H., Bayerl, T., Isenberg, G. and Sackmann, E.: Human platelet P-235, a talin-like actin binding protein, binds selectively to mixed lipid bilayers. *Biochim. Biophys. Acta*, 1061 (1991) 121-131.
- 828 Hohmann, H.-P., Brockhaus, M., Baeuerle, P.A., Remy, R., Kolbeck, R. and van Loon, A.P.G.M.: Expression of the types A and B tumor necrosis factor (TNF) receptors is independently regulated, and both receptors mediate activation of the transcription factor NF- κ B. TNF α is not needed for induction of a biological effect *via* TNF receptors. *J. Biol. Chem.*, 265 (1990) 22409-22417.
- 829 Housley, P.R., Sanchez, E.R., Danielsen, M., Ringold, G.M. and Pratt, W.B.: Evidence that the conserved region in the steroid binding domain of the glucocorticoid receptor is required for both optimal binding of hsp90 and protection from proteolytic cleavage. A two-site model for hsp90 binding to the steroid binding domain. *J. Biol. Chem.*, 265 (1990) 12778-12781.
- 830 Howard, K.J., Holley, S.J., Yamamoto, K.R. and Distelhorst, C.W.: Mapping the HSP90 binding region of the glucocorticoid receptor. *J. Biol. Chem.*, 265 (1990) 11928-11935.
- 831 Iwanij, V. and Vincent, A.C.: Characterization of the glucagon receptor and its functional domains using monoclonal antibodies. *J. Biol. Chem.*, 265 (1990) 21302-21308.
- 832 Kadowaki, H., Kadowaki, T., Cama, A., Marcus-Samuels, B., Rovira, A., Bevins, C.L. and Taylor, S.I.: Mutagenesis of lysine 460 in the human insulin receptor. Effects upon receptor recycling and cooperative interactions among binding sites. *J. Biol. Chem.*, 265 (1990) 21285-21296.
- 833 Kanakaraj, P., Raj, S., Khan, S.A. and Bishayee, S.: Ligand-induced interaction between α - and β -type platelet-derived growth factor (PDGF) receptors: role of receptor heterodimers in kinase activation. *Biochemistry*, 30 (1991) 1761-1767.
- 834 Kurtenbach, E., Curtis, C.A.M., Pedder, E.K., Aitken, A., Harris, A.C.M. and Hulme, E.C.: Muscarinic acetylcholine receptors. Peptide sequencing identifies residues involved in antagonist binding and disulfide bond formation. *J. Biol. Chem.*, 265 (1990) 13702-13708.
- 835 Le Rudulier, D., Bloux, K. and Riou, N.: Identification of an osmotically induced periplasmic glycine betaine-binding protein from *Rhizobium meliloti*. *Biochim. Biophys. Acta*, 1061 (1991) 197-205.
- 836 Lee, R.H., Brown, B.M. and Lolley, R.N.: Protein kinase A phosphorylates retinal phosphducin on serine 73 *in situ*. *J. Biol. Chem.*, 265 (1990) 15860-15866.
- 837 Lin, M.C., Kramer, W. and Wilson, F.A.: Identification of cytosolic and microsomal bile acid-binding proteins in rat ileal enterocytes. *J. Biol. Chem.*, 265 (1990) 14986-14995.
- 838 Lobo, E., Elfman, F., Kelly, E. and Perez, H.D.: Effect of phorbol myristate acetate on processing of formyl peptide receptors by human neutrophils. *Biochim. Biophys. Acta*, 1055 (1990) 193-196.
- 839 Loetscher, H., Schlaeger, E.J., Lahm, H.-W., Pan, Y.E., Lesslauer, W. and Brockhaus, M.: Purification and partial amino acid sequence analysis of two distinct tumor necrosis factor receptors from HL60 cells. *J. Biol. Chem.*, 265 (1990) 20131-20138.
- 840 Maltese, W.A. and Sheridan, K.M.: Isoprenoid modification of G25K (G_p), a low molecular mass GTP-binding protein distinct from p21^{ras}. *J. Biol. Chem.*, 265 (1990) 17883-17890.
- 841 Meresse, S., Ludwig, T., Frank, R. and Hoflack, B.: Phosphorylation of the cytoplasmic domain of the bovine cation-independent mannose 6-phosphate receptor. Serines 2421 and 2492 are the targets of a casein kinase II associated to the Golgi-derived HAI adaptor complex. *J. Biol. Chem.*, 265 (1990) 18833-18842.

- 842 Mollner, S., Simmoteit, R., Palm, D. and Pfeuffer, T.: Monoclonal antibodies against various forms of the adenylyl cyclase catalytic subunit and associated proteins. *Eur. J. Biochem.*, 195 (1991) 281-286.
- 843 Morishita, R., Kobayashi, T., Kato, K. and Asano, T.: Isolation of three types of G_i from bovine spleen. *Biochem. Biophys. Res. Commun.*, 172 (1990) 249-255.
- 844 Mortensen, E.R., Drachman, J.G. and Guidotti, G.: The $\alpha\beta$ monomer of the insulin receptor has hormone-responsive tyrosine kinase activity. *Biochem. J.*, 273 (1991) 49-56.
- 845 Namkung, P.C., Kumar, S., Walsh, K.A. and Petra, P.H.: Identification of lysine 134 in the steroid-binding site of the sex steroid-binding protein of human plasma. *J. Biol. Chem.*, 265 (1990) 18345-18350.
- 846 Ono, H. and Tuboi, S.: Purification of the putative import-receptor for the precursor of the mitochondrial protein. *J. Biochem. (Tokyo)*, 107 (1990) 840-845.
- 847 Pang, I. and Sternweis, P.C.: Purification of unique α subunits of GTP-binding regulatory proteins (G proteins) by affinity chromatography with immobilized $\beta\gamma$ subunits. *J. Biol. Chem.*, 265 (1990) 18707-18712.
- 848 Parish, C.R., Jakobsen, K.B., Coombe, D.R. and Bacic, A.: Isolation and characterization of cell adhesion molecules from the marine sponge, *Ophlitaspongia tenuis*. *Biochim. Biophys. Acta*, 1073 (1991) 56-64.
- 849 Shih, Y.J., Baynes, R.D., Hudson, B.G., Flowers, C.H., Skikne, B.S. and Cook, J.D.: Serum transferrin receptor is a truncated form of tissue receptor. *J. Biol. Chem.*, 265 (1990) 19077-19081.
- 850 Suhara, A., Kato, M. and Kanai, M.: Ultrastructural localization of plasma retinol-binding protein in rat liver. *J. Lipid Res.*, 31 (1990) 1669-1681.
- 851 Thalmann, E. and Blaas, D.: Synthesis of γ -[4-(benzoylphenyl)methylamido]-7-methylguanosine 5'-triphosphate, a photoaffinity-label for cap-binding proteins. *Biochim. Biophys. Acta*, 1088 (1991) 301-304.
- 852 Traub, L.M., Evans, W.H. and Sagi-Eisenberg, R.: A novel 100 kDa protein, localized to receptor-enriched endosomes, is immunologically related to the signal-transducing guanine-nucleotide-binding proteins G_t and G_i. *Biochem. J.*, 272 (1990) 453-458.
- 853 Tuana, B.S., Sunahara, R.K., Murphy, B.J. and Pierce, G.N.: Two major antigens of heart sarcolemma are Ca²⁺-binding glycoproteins that copurify with the dihydropyridine receptor. *Biochim. Biophys. Acta*, 1091 (1991) 236-241.
- 854 Waheed, A. and von Figura, K.: Rapid equilibrium between monomeric, dimeric and tetrameric forms of the 46-kDa mannose 6-phosphate receptor at 37°C. Possible relation to the function of the receptor. *Eur. J. Biochem.*, 193 (1990) 47-54.
- 855 Xu, Q., Paxton, R.J. and Fujita-Yamaguchi, Y.: Substructural analysis of the insulin receptor by microsequence analyses of limited tryptic fragments isolated by sodium dodecyl sulfate-polyacrylamide gel electrophoresis in the absence or presence of dithiothreitol. *J. Biol. Chem.*, 265 (1990) 18673-18681.
- 856 Zapf, J., Kiefer, M., Merryweather, J., Masiarz, F., Bauer, D., Born, W., Fischer, J.A. and Froesch, E.R.: Isolation from adult human serum of four insulin-like growth factor (IGF) binding proteins and molecular cloning of one of them that is increased by IGF I administration and in extrapancreatic tumor hypoglycemia. *J. Biol. Chem.*, 265 (1990) 14892-14898.
- 857 Zhang, W.-W., Farres, J. and Busch, H.: Purification of a novel 55 kDa HeLa cell nuclear DNA-binding protein. *Biochem. Biophys. Res. Commun.*, 174 (1991) 542-548.

See also 566, 568, 573, 588, 622, 734, 776.

19m. *Urinary proteins*

- 858 Langer, T., Peisker, K. and Klette, H.: (Comparison of urine protein analysis by SDS-electrophoresis and isoelectric focusing). *Z. Urol. Nephrol.*, 83 (1990) 197-203; *C.A.*, 113 (1990) 168386f.
- 859 Norden, A.G.W., Fulcher, L.M., Lapsley, M. and Flynn, F.V.: Excretion of β_2 -glycoprotein I (apolipoprotein H) in renal tubular disease. *Clin. Chem. (Winston-Salem)*, 37 (1991) 74-77.
- 860 Töpfer, G., Pfisterer, J., Seifert, A. and Schäfer, P.: Immunoblotting von Urin-Proteinen nach SDS-PAGE. *J. Clin. Chem. Clin. Biochem.*, 28 (1990) 798.

See also 728.

19n. *Other proteins (incl. proteinous inhibitors of enzymic activity)*

- 861 Balgir, P.P., Kornienko, Y.A. and Shiahkin, S.S.: (Fractionation of chorionic villi and choriomembrane proteins by two-dimensional electrophoresis). *Vopr. Med. Khim.*, 36 (1990) 44-45; *C.A.*, 113 (1990) 227443x.
- 862 Kapel, N., Meillet, D., Iscaki, S., Bouvet, J.P., Gobert, J.G. and Raichvarg, D.: Characterisation of the main molecular forms of human fecal immunoglobulin A. *Clin. Chim. Acta*, 195 (1990) 67-76.
- 863 Ramanujam, K.S., Seetharam, S., Ramasamy, M. and Seetharam, B.: Renal brush border membrane bound intrinsic factor. *Biochim. Biophys. Acta*, 1030 (1990) 157-164.
- 864 Santaren, J.F. and Garcia-Bellido, A.: High-resolution two-dimensional gel analysis of proteins in wing imaginal disks: a data base of *Drosophila*. *Exp. Cell Res.*, 189 (1990) 169-176; *C.A.*, 113 (1990) 94243h.
- 865 Scobbie, A.E. and Mackie, I.M.: The use of sodium dodecyl sulfate-polyacrylamide gel electrophoresis in species identification of fish eggs. *Comp. Biochem. Physiol., B: Comp. Biochem.*, 96B (1990) 743-746; *C.A.*, 113 (1990) 168393f.
- 866 Shimizu, H., Miyamura, K. and Kuroki, Y.: Appearance of surfactant proteins, SP-A and SP-B, in developing rat lung and the effects of *in vivo* dexamethasone treatment. *Biochim. Biophys. Acta*, 1081 (1991) 53-60.
- 867 Thompson, S., Wong, E., Cantwell, B.M.J. and Turner, G.A.: Serum alpha-1-proteinase inhibitor with abnormal properties in ovarian cancer. *Clin. Chim. Acta*, 193 (1990) 13-26.
- 868 Vinther, A., Bjorn, S.E., Sorensen, H.H. and Soeberg, H.: Identification of aprotinin degradation products by the use of high-performance capillary electrophoresis, high-pressure liquid chromatography and mass spectrometry. *J. Chromatogr.*, 516 (1990) 175-184.

See also 627, 628, 988.

20. ENZYMES AND ENZYME ACTIVITY ESTIMATION

- 869 Lerbs-Mache, S., Braeutigam, E. and Mache, R.: Immunoelectrophoretic method for detection and characterization of enzymes and enzyme subunits. *Ger. (East) DD 273,125 (Cl. GO1N33/573)*, 01 Nov. 1989, Appl. 316,974, 21 Jun. 1988; 9 pp.; *C.A.*, 113 (1990) 94000b.

20a. Oxidoreductases

- 870 Alamillo, J.M., Cardenas, J. and Pineda, M.: Purification and molecular properties of urate oxidase from *Chlamydomonas reinhardtii*. *Biochim. Biophys. Acta*, 1076 (1991) 203-208.
- 871 Arthur, J.R., Nicol, F. and Beckett, G.J.: Hepatic iodothyronine 5'-deiodinase. The role of selenium. *Biochem. J.*, 272 (1990) 537-540.
- 872 Dizhe, E.B., Vasilyeva, L.E., Klimova, T.A. and Mal'tseva, O.A.: (Isoelectrofocusing of 3-hydroxy-3-methylglutaryl-CoA reductase of the postmitochondrial fraction of rat liver). *Biokhimiya (Moscow)*, 55 (1990) 2159-2162.
- 873 Flourie, F., Beaudeau, J.L., Peynet, J., Cywiner Golenzer, C. and Rousselet, F.: Abnormal lactate dehydrogenase isoenzyme pattern in serum of a patient with a neuroendocrine tumor. *Clin. Chem. (Winston-Salem)*, 36 (1990) 2008-2009.
- 874 Frydman, J., Tomaro, M.L. and Frydman, R.B.: An analysis of the topography of molecular forms 1 and 3 of rat liver biliverdin reductase using polyclonal antibodies. *Biochim. Biophys. Acta*, 1076 (1991) 321-329.
- 875 Gupta, R.P., Lapadula, D.M. and Abou-Donia, M.B.: Purification and characterization of cytochrome P450 isozymes from β -naphthoflavone-induced adult hen liver. *Arch. Biochem. Biophys.*, 282 (1990) 170-182.
- 876 Haycock, J.W.: Phosphorylation of tyrosine hydroxylase *in situ* at serine 8, 19, 31, and 40. *J. Biol. Chem.*, 265 (1990) 11682-11691.
- 877 Hsu, S. and Molday, R.S.: Glyceraldehyde-3-phosphate dehydrogenase is a major protein associated with the plasma membrane of retinal photoreceptor outer segments. *J. Biol. Chem.*, 265 (1990) 13308-13313.
- 878 Jordan, P. and Vilter, H.: Extraction of proteins from material rich in anionic mucilages: partition and fractionation of vanadate-dependent bromoperoxidases from the brown algae *Laminaria digitata* and *L. saccharina* in aqueous polymer two-phase systems. *Biochim. Biophys. Acta*, 1073 (1991) 98-106.
- 879 Kiryukhin, M.Yu., Chistoserdov, A.Yu. and Tsygankov, Yu.D.: (Purification and properties of methylamine dehydrogenase of the obligate methylotroph *Methylobacillus flagellatum* KT). *Biokhimiya (Moscow)*, 55 (1990) 1669-1674.
- 880 Lai, T.S. and Chiang, J.Y.L.: Cloning and characterization of two major 3-methylcholanthrene inducible hamster liver cytochrome P450s. *Arch. Biochem. Biophys.*, 283 (1990) 429-439.
- 881 Leontyevsky, A.A., Myasoedova, N.M., Maltseva, O.V., Termkhitarova, N.G., Krupyanko, V.I. and Golovleva, L.A.: (Mn-Dependent peroxidase and *Panus tigrinus* 8/18 oxidase: purification and properties). *Biokhimiya (Moscow)*, 55 (1990) 1841-1846.
- 882 Li, N.G., Ponomarev, A.G., Bubyakina, V.V. and Osakovsky, V.L.: (Aldehyde dehydrogenase of mitochondria of the mung bean roots). *Biokhimiya (Moscow)*, 55 (1990) 1590-1598.
- 883 Nieto, A.R., Sancho, A.C., Barros, M.V. and Gorge, J.L.: Peroxidase zymograms at constant and gradient pH electrophoresis as an analytical test in the identification of potato varieties. *J. Agric. Food Chem.*, 38 (1990) 2148-2153.
- 884 Ninfali, P., Orsenigo, I., Baronciani, L. and Rapa, S.: Rapid purification of glucose-6-phosphate dehydrogenase from mammal's erythrocytes. *Prepar. Biochem.*, 20 (1990) 297-309.
- 885 Peiffer, W.E., Ingle, R.T. and Ferguson-Miller, S.: Structurally unique plant cytochrome c oxidase isolated from wheat germ, a rich source of plant mitochondrial enzymes. *Biochemistry*, 29 (1990) 8696-8701.
- 886 Petrash, J.M., DeLucas, L.J., Bowling, E. and Egen, N.: Resolving isoforms of aldose reductase by preparative isoelectric focusing in the Rotofor. *Electrophoresis (Weinheim)*, 12 (1991) 84-90.

- 887 Petruschka, L., Rebrin, I., Grimm, U. and Herrmann, F.H.: The immunological evidence for a phenylalanine hydroxylase like immunoreactive protein in different human cells and tissues. *Clin. Chim. Acta*, 193 (1990) 65-78.
- 888 Schinkinger, M.F., Redl, B. and Stöffler, G.: Purification and properties of an extreme thermostable glutamate dehydrogenase from the archaeobacterium *Sulfolobus solfataricus*. *Biochim. Biophys. Acta*, 1073 (1991) 142-148.
- 889 Selifonov, S.A. and Starovoytov, I.I.: (A comparative study of aromatic ring meta-cleavage enzymes in *Pseudomonas* strains with a plasmid and chromosomal genetic control of biphenyl and *m*-toluate catabolism). *Biokhimiya (Moscow)*, 55 (1990) 2171-2181.
- 890 Shimomura, Y., Nanaumi, N., Suzuki, M., Popov, K.M. and Harris, R.A.: Purification and partial characterization of branched-chain α -ketoacid dehydrogenase kinase from rat liver and rat heart. *Arch. Biochem. Biophys.*, 283 (1990) 293-299.
- 891 Sun, Y., Wu, Q., van Etten, H.D. and Hrazdina, G.: Stereoisomerism in plant disease resistance: induction and isolation of the 7,2-dihydroxy-4',5'-methylenedioxyisoflavone oxidoreductase, an enzyme introducing chirality during synthesis of isoflavonoid phytoalexins in pea (*Pisum sativum* L.). *Arch. Biochem. Biophys.*, 284 (1991) 167-173.
- 892 Wright, J.A., Chan, A.K. Choy, B.K., Hurta, R.A.R., McClarty, G.A. and Tagger, A.Y.: Regulation and drug resistance mechanisms of mammalian ribonucleotide reductase, and the significance to DNA synthesis. *Biochem. Cell Biol.*, 68 (1990) 1364-1371.

See also 676, 1010.

20b. *Transferases (excl. E.C. 2.7.--)*

- 893 Adams, J.B.: Enzymic synthesis of steroid sulphates XVII. On the structure of bovine estrogen sulphotransferase. *Biochim. Biophys. Acta*, 1076 (1991) 282-288.
- 894 Cesarone, C.F., Scarabelli, L., Scovassi, A.I., Izzo, R., Menegazzi, M., de Prati, A.C., Orunesu, M. and Bertazzoni, U.: Changes in activity and mRNA levels of poly(ADP-ribose) polymerase during rat liver regeneration. *Biochim. Biophys. Acta*, 1087 (1990) 241-246.
- 895 Dannenberg, A., Wong, T., Zakim, D. and Eibl, H.: Synthesis and use of a lysolecithin analog for the purification of UDP-glucuronosyltransferase. *Anal. Biochem.*, 191 (1990) 183-186.
- 896 Fazi, A., Piacentini, M.P., Piatti, E. and Accorsi, A.: Purification and partial characterization of the phosphoglucomutase isozymes from human placenta. *Prepar. Biochem.*, 20 (1990) 219-240.
- 897 Fischer, P., Scherberich, J.E. and Schoeppe, W.: Comparative biochemical and immunological studies on gamma-glutamyltransferases from human kidney and renal cell carcinoma applying monoclonal antibodies. *Clin. Chim. Acta*, 191 (1990) 185-200.
- 898 Fu, D. and Robyt, J.F.: A facile purification of *Leuconostoc mesenteroides* B-512FM dextranucrase. *Prepar. Biochem.*, 20 (1990) 93-106.
- 899 Libby, P.R., Ganis, B., Bergeron, R.J. and Porter, C.W.: Characterization of human spermidine/spermine N¹-acetyltransferase purified from cultured melanoma cells. *Arch. Biochem. Biophys.*, 284 (1991) 238-244.
- 900 Melkerson-Watson, L.J. and Sweeley, C.C.: Special considerations in the purification of the GN₃ ganglioside forming enzyme, CMP-sialic acid:lactosylceramide α 2-3 sialyltransferase (SAT-1): solubilization of SAT-1 with lauryldimethylamine oxide. *Biochem. Biophys. Res. Commun.*, 172 (1990) 165-171.

- 901 Rudnick, D.A., McWherter, C.A., Adams, S.P., Ropson, I.J., Duronio, R.J. and Gordon, J.I.: Structural and functional studies of *Saccharomyces cerevisiae* myristoyl-CoA:protein N-myristoyltransferase produced in *Escherichia coli*. Evidence for an acyl-enzyme intermediate. *J. Biol. Chem.*, 265 (1990) 13370-13378.
- 902 Singhal, S.S., Ahmad, H., Sharma, R., Gupta, S., Haque, A.K. and Awasthi, Y.C.: Purification and characterization of human muscle glutathione S-transferases: evidence that glutathione S-transferase ζ corresponds to a locus distinct from GST1, GST2, and GST3. *Arch. Biochem. Biophys.*, 285 (1991) 64-73.
- 903 Tilgmann, C. and Kalkkinen, N.: Purification and partial sequence analysis of the soluble catechol-O-methyltransferase from human placenta: comparison to the rat liver enzyme. *Biochem. Biophys. Res. Commun.*, 174 (1991) 995-1002.

See also 671.

20c. *Transferases transferring phosphorus containing groups (E.C. 2.7.--)*

- 904 Akita, Y., Ohno, S., Yajima, Y. and Suzuki, K.: Possible role of Ca^{2+} -independent protein kinase C isozyme, nPKC ϵ , in thyrotropin-releasing hormone-stimulated signal transduction: differential down-regulation of nPKC ϵ in GH₄C₁ cells. *Biochem. Biophys. Res. Commun.*, 172 (1990) 184-189.
- 905 Bar, S., Barnea, E., Levy, Z., Neuman, S., Yaffe, D. and Nudel, U.: A novel product of the Duchenne muscular dystrophy gene which greatly differs from the known isoforms in its structure and tissue distribution. *Biochem. J.*, 272 (1990) 557-560.
- 906 Baron, G., Madec-Baron, A., Samperez, S. and Jouan, P.: A rapid two-step purification of rat liver fetal thymidine kinase. *Prepar. Biochem.*, 20 (1990) 241-256.
- 907 Bazenet, C.E., Ruano, A.R., Brockman, J.L. and Anderson, R.A.: The human erythrocyte contains two forms of phosphatidylinositol-4-phosphate 5-kinase which are differentially active toward membranes. *J. Biol. Chem.*, 265 (1990) 18012-18022.
- 908 Bernard, D., Moyret, C. and Maurizis, J.C.: Purification on poly(U)-sepharose 4B of human breast cancer cell line T-47D DNA polymerases. *J. Chromatogr.*, 539 (1991) 511-516.
- 909 Brunati, A.M., Donella-Deana, A., Ralph, S., Marchiori, F., Borin, G., Fischer, S. and Pinna, L.A.: Stimulation by NaCl, polylysine and heparin of two forms of spleen tyrosine protein kinase immunologically related with the protein expressed by lyn oncogene. *Biochim. Biophys. Acta*, 1091 (1991) 123-126.
- 910 Carpenter, C.L., Duckworth, B.C., Auger, K.R., Cohen, B., Schaffhausen, B.S. and Cantley, L.C.: Purification and characterization of phosphoinositide 3-kinase from rat liver. *J. Biol. Chem.*, 265 (1990) 19704-19711.
- 911 Deguchi, H., Sugiyama, N., Kawamura, H., Uemura, T., Shimizu, A. and Yamamoto, M.: Macro creatine kinase in a case of carnitine palmitoyltransferase deficiency. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1997-1999.
- 912 Engelke, D.R., Krikos, A., Bruck, M.E. and Ginsburg, D.: Purification of *Thermus aquaticus* DNA polymerase expressed in *Escherichia coli*. *Anal. Biochem.*, 191 (1990) 396-400.
- 913 Garkusha, N.F. and Goncharova, N.Yu.: (study of the isozyme composition of hexokinase in rat sarcoma M-1). *Biokhimiya (Moscow)*, 55 (1990) 1519-1526.
- 914 Goulian, M., Herrmann, S.M., Sackett, J.W. and Grimm, S.L.: Two forms of DNA polymerase δ from mouse cells. Purification and properties. *J. Biol. Chem.*, 265 (1990) 16402-16411.
- 915 Grozdova, I.D., Nyupenko, E.V., Sveshnikova, E.V. and Severin, E.S.: (Immunochemical properties of the cAMP-dependent protein kinase regulatory subunit type II). *Biokhimiya (Moscow)*, 55 (1990) 1244-1250.

- 916 Ikebe, M., Reardon, S., Scott-Woo, G.C., Zhou, Z. and Koda, Y.: Purification and characterization of calmodulin-dependent multifunctional protein kinase from smooth muscle: isolation of caldesmon kinase. *Biochemistry*, 29 (1990) 11242-11248.
- 917 Kandror, K.V., Vasilyev, A.O., Kapkov, D.V., Fuentes, A.M. and Stepanov, A.S.: (A comparative study of chromatographic, kinetic and antigenic properties of casein kinases 2 from bovine liver and phytopathogenic fungus *Verticillium dahliae*). *Biokhimiya (Moscow)*, 55 (1990) 2115-2121.
- 918 Khatra, B.S., Nguyen, O., Tuazon, P.T., DeVack, C. and Traugh, J.A.: A ribosomal protein S6 kinase copurifies with phosphatase-1 activating factor. *Arch. Biochem. Biophys.*, 284 (1991) 186-192.
- 919 Kinyanjui, P.W. and Pearlman, R.E.: Thymidine kinase from *Tetrahymena thermophila*. Purification and immunological analysis. *Eur. J. Biochem.*, 195 (1991) 55-63.
- 920 Kottke, M., Adams, V., Wallimann, T., Nalam, V.K. and Brdiczka, D.: Location and regulation of octameric mitochondrial creatine kinase in the contact sites. *Biochim. Biophys. Acta*, 1061 (1991) 215-225.
- 921 Legagneux, V., Morange, M. and Bensaude, O.: Heat-shock and related stress enhance RNA polymerase II C-terminal-domain kinase activity in HeLa cell extracts. *Eur. J. Biochem.*, 193 (1990) 121-126.
- 922 Li, J. and Petryshyn, R.A.: Activation of the double-stranded RNA-dependent eIF-2 α kinase by cellular RNA from 3T3-F442A cells. *Eur. J. Biochem.*, 195 (1991) 41-48.
- 923 Man, N., Cartwright, A.J., Osborne, M. and Morris, G.E.: Structural changes in the C-terminal region of human brain creatine kinase studied with monoclonal antibodies. *Biochim. Biophys. Acta*, 1076 (1991) 245-251.
- 924 Miwa, I., Mitsuyama, S., Toyoda, Y., Murata, T. and Okuda, J.: High-yield purification of glucokinase from rat liver. *Prepar. Biochem.*, 20 (1990) 163-178.
- 925 Orr, N., Yavin, E., Shinitzky, M. and Lester, D.S.: Application of high-pressure to subfractionate membrane protein-lipid complexes: a case study of protein kinase C. *Anal. Biochem.*, 191 (1990) 80-85.
- 926 Rajasekhar, V.K., Sun, E., Meeker, R., Wu, B.-W. and Tewari, K.K.: Highly purified pea chloroplast RNA polymerase transcribes both rRNA and mRNA genes. *Eur. J. Biochem.*, 195 (1991) 215-228.
- 927 Sarcevic, B., Robinson, P.J., Pearson, R.B. and Kemp, B.E.: The smooth muscle 132 kDa cyclic GMP-dependent protein kinase substrate is not myosin light chain kinase or caldesmon. *Biochem. J.*, 271 (1990) 493-499.
- 928 Sato, H., Yamauchi, T. and Fujisawa, H.: Purification and characterization of calmodulin-dependent protein kinase II from rat spleen: a new type of calmodulin-dependent protein kinase II. *J. Biochem. (Tokyo)*, 107 (1990) 802-809.
- 929 Sheehan, H., O'Kennedy, R. and Kilty, C.: Investigation of the properties of bovine heart creatine kinase cross-linked with dimethyl suberimidate. *Biochim. Biophys. Acta*, 1041 (1990) 141-145.
- 930 Skubitz, K.M. and Goueli, S.A.: Basic fibroblast growth factor is a substrate for phosphorylation by human neutrophil ecto-protein kinase activity. *Biochem. Biophys. Res. Commun.*, 174 (1991) 49-55.
- 931 Teissere, M., Sergi, I., Job, C. and Job, D.: Analysis of wheat-germ RNA polymerase II by trypsin cleavage. The integrity of the two largest subunits of the enzyme is not mandatory for basal transcriptional activity. *Eur. J. Biochem.*, 193 (1990) 913-919.
- 932 Wei, Y.-F. and Matthews, H.R.: A filter-based protein kinase assay selective for alkali-stable protein phosphorylation and suitable for acid-labile protein phosphorylation. *Anal. Biochem.*, 190 (1990) 188-192.

- 933 Zevgolis, V.G., Sotiroudis, T.G. and Evangelopoulos, A.E.: Phosphorylase kinase from bovine stomach smooth muscle: a Ca^{2+} -dependent protein kinase associated with an actin-like molecule. *Biochim. Biophys. Acta*, 1091 (1991) 222-230.

See also 785, 1010.

20d. *Hydrolases, acting on ester bonds (E.C. 3.1.--)*

- 934 Andreeva, N.A., Okorokov, L.A. and Kulaev, I.S.: (Purification and some properties of cell envelope polyphosphatase from *Saccharomyces carlsbergensis*). *Biokhimiya (Moscow)*, 55 (1990) 1094-1103.
- 935 Barash, V., Riskin, A., Shafir, E., Waddell, I.D. and Burchell, A.: Kinetic and immunologic evidence for the absence of glucose-6-phosphatase in early human chorionic villi and term placenta. *Biochim. Biophys. Acta*, 1073 (1991) 161-167.
- 936 Berrebi, P., Landaud, P., Borsa, P. and Renno, J.F.: Esterases of the flounder (*Platichthys flesus*, Pleuronectidae, Teleostei): development of an identification protocol using starch gel electrophoresis and characterization of loci. *Experientia*, 46 (1990) 863-867; *C.A.*, 113 (1990) 186969c.
- 937 Flocke, K. and Mannherz, H.G.: Isolation and characterization of 5'-nucleotidase of a human pancreatic tumor cell line. *Biochim. Biophys. Acta*, 1076 (1991) 273-281.
- 938 Fujimori-Arai, Y., Koyama, I., Hirano, K., Sakagishi, Y. and Komoda, T.: Purification and partial characterization of intestinal-like alkaline phosphatase in rabbit kidney. *Arch. Biochem. Biophys.*, 284 (1991) 320-325.
- 939 Huang, Y. and Hui, D.Y.: Metabolic fate of pancreas - derived cholesterol esterase in intestine: an *in vitro* study using Caco-2 cells. *J. Lipid Res.*, 31 (1990) 2029-2037.
- 940 Ikeda, S., Seki, S., Watanabe, S., Hatsushika, M. and Tsutsui, K.: Detection of possible DNA repair enzymes on sodium dodecyl sulfate-polyacrylamide gels by protein blotting to damaged DNA-fixed membranes. *Anal. Biochem.*, 192 (1991) 96-103.
- 941 Ikeda, Y., Takagi, A., Ohkaru, Y., Nogi, K., Iwanaga, T., Kurooka, S. and Yamamoto, A.: A sandwich-enzyme immunoassay for the quantification of lipoprotein lipase and hepatic triglyceride lipase in human postheparin plasma using monoclonal antibodies to the corresponding enzymes. *J. Lipid Res.*, 31 (1990) 1911-1924.
- 942 Inoue, K., Sohma, H. and Morita, F.: Ca^{2+} -Dependent protein phosphatase which dephosphorylates regulatory light chain-a in scallop smooth muscle myosin. *J. Biochem. (Tokyo)*, 107 (1990) 872-878.
- 943 Kosak, H.G. and Kemper, B.W.: Large-scale preparation of T4 endonuclease VII from over-expressing bacteria. *Eur. J. Biochem.*, 194 (1990) 779-784.
- 944 Kuwana, T. and Rosalki, S.B.: Intestinal variant alkaline phosphatase in plasma in disease. *Clin. Chem. (Winston-Salem)*, 36 (1990) 1918-1921.
- 945 Onica, D., Rosendahl, K. and Waldenlind, L.: Further characterization of a heat-stable alkaline phosphatase with low sensitivity to L-phenylalanine. *Clin. Chim. Acta*, 194 (1990) 193-202.
- 946 Perrella, F.W., Jankewicz, R. and Dandrow, E.A.: Phospholipase C from human melanoma: purification and characterization of a phosphatidylinositol-selective enzyme. *Biochim. Biophys. Acta*, 1076 (1991) 209-214.
- 947 Picard, B. and Goulet, P.: Epidemiological typing of *Acinetobacter* strains by esterase electrophoresis. *FEMS Microbiol. Lett.*, 72 (1990) 229-234; *C.A.*, 113 (1990) 227835b.
- 948 Seacchiero, S., Zaninotto, M. and Burlina, A.: Three agarose electrophoretic systems for quantifying alkaline phosphatase isoenzymes in serum. *Med. Sci. Res.*, 18 (1990) 457-459; *C.A.*, 113 (1990) 147628w.

- 949 Severini, G., Aliberti, L.M. and di Giovannan-Drea, R.: Diagnostic aspects of alkaline phosphatase: separation of isoenzymes in normal and pathological human serum by high-performance liquid chromatography. *J. Chromatogr.*, 563 (1991) 147-152.
- 950 Townsend, M.W. and DeLuca, P.P.: Nature of aggregates formed during storage of freeze-dried ribonuclease A. *J. Pharm. Sci.*, 80 (1991) 63-66.
- 951 Toyoshima, S., Matsumoto, N., Wang, P., Inoue, H., Yoshioka, T., Hotta, Y. and Osawa, T.: Purification and partial amino acid sequences of phosphoinositide-specific phospholipase C of *Drosophila* eye. *J. Biol. Chem.*, 265 (1990) 14842-14848.
- 952 Verhoeven, A.J.M. and Jansen, H.: Secretion of rat hepatic lipase is blocked by inhibition of oligosaccharide processing at the stage of glycosidase I. *J. Lipid Res.*, 31 (1990) 1883-1893.
- 953 Wang, J., Jin, B. and Rong, Y.: (Purification of wheat-germ-agglutinin and its application in affinity electrophoresis for separating and quantifying bone and liver alkaline phosphatase isoenzymes). *Zhonghua Yixue Jianyan Zazhi*, 12 (1989) 335-337; *C.A.*, 113 (1990) 147627v.
- 954 Whiting, P., Gee, N.S., Potter, J., Howell, S. and Ragan, C.I.: Limited proteolysis and "in vivo" mutagenesis of bovine brain inositol monophosphatase identifies an N-terminal region important for activity. *Biochem. J.*, 272 (1990) 456-468.

20e. *Hydrolases, acting on glycosyl compounds (E.C. 3.2.-.-)*

- 955 Bank, R.A., Hetteema, E.H., Arwert, F., Nieuw Amerongen, A.V. and Pronk, J.C.: Electrophoretic characterization of posttranslational modifications of human parotid salivary α -amylase. *Electrophoresis (Weinheim)*, 12 (1991) 74-79.
- 956 Cote, F., El Ouakfaoui, S. and Asselin, A.: Detection of β -glucanase activity on various β -1,3 and β -1,4-glucans after native and denaturing polyacrylamide gel electrophoresis. *Electrophoresis (Weinheim)*, 12 (1991) 69-74.
- 957 Hoefsloot, L.H., Willemsen, R., Kroos, M.A., Hoogeveen-Westerveld, M., Hermans, M.M.P., van der Ploeg, A.T., Oostra, B.A. and Reuser, A.J.J.: Expression and routing of human lysosomal α -glucosidase in transiently transfected mammalian cells. *Biochem. J.*, 272 (1990) 485-492.
- 958 Johnson, K.F., Hancock, L.W. and Dawson, G.: Synthesis and processing of lysosomal α -fucosidase in cultured human fibroblasts. *Biochim. Biophys. Acta*, 1073 (1991) 120-128.
- 959 Lenman, M., Rödin, J., Josefsson, L.-G. and Rask, L.: Immunological characterization of rapeseed myrosinase. *Eur. J. Biochem.*, 194 (1990) 747-753.
- 960 Luderer, M.E.H., Hofer, F., Hagspiel, K., Allmaier, G., Blaas, D. and Kubicek, C.P.: A re-appraisal of multiplicity of endoglucanase I from *Trichoderma reesei* using monoclonal antibodies and plasma desorption mass spectrometry. *Biochim. Biophys. Acta*, 1076 (1991) 427-434.
- 961 Munch, O. and Tritsch, D.: Irreversible thermoinactivation of glucoamylase from *Aspergillus niger* and thermostabilization by chemical modification of carboxyl groups. *Biochim. Biophys. Acta*, 1041 (1990) 111-116.
- 962 Oguma, T., Kikuchi, M. and Mizusawa, K.: Purification and some properties of cyclodextrin-hydrolyzing enzyme from *Bacillus sphaericus*. *Biochim. Biophys. Acta*, 1036 (1990) 1-5.
- 963 Sklenarova, S. and Ticha, M.: Electrophoretic study of α -D-mannosidase and α -D-galactosidase from dry seeds of *Pisum sativum*. *J. Chromatogr.*, 540 (1991) 365-372.
- 964 Waksman, G., Keon, J.P.R. and Turner, G.: Purification and characterization of two endopolygalacturonases from *Sclerotinia sclerotiorum*. *Biochim. Biophys. Acta*, 1073 (1991) 43-48.

- 965 Waksman, G.: Purification and characterization of two endo- β -1,4-D-glucanases from *Sclerotinia sclerotiorum*. *Biochim. Biophys. Acta*, 1073 (1991) 49-55.
- 966 Zapater, I.G., Ullah, A.H.J. and Wodzinsky, R.J.: Extracellular α galactosidase (E.C. 3.2.1.22) from *Aspergillus ficuum* NRRL 3135 purification and characterization. *Prepar. Biochem.*, 20 (1990) 263-296.

20f. Other hydrolases

- 967 Abraham, C.R., Driscoll, J., Potter, H., van Nostrand, W.E. and Tempst, P.: A calcium-activated protease from Alzheimer's disease brain cleaves at the N-terminus of the amyloid β -protein. *Biochem. Biophys. Res. Commun.*, 174 (1991) 790-796.
- 968 Addison, R.: Studies on the sedimentation behavior of the *Neurospora crassa* plasma membrane H^+ -ATPase synthesized *in vitro* and integrated into homologous microsomal membranes. *Biochim. Biophys. Acta*, 1030 (1990) 127-133.
- 969 Altieri, P., Candiano, G., Ginevri, F. and Ghiggeri, G.M.: Purification of proteinase-free collagenase from commercial batches of the enzyme. *Prepar. Biochem.*, 20 (1990) 137-144.
- 970 Chung, S.S., Kwak, K.B., Lee, J.S., Ha, D.B. and Chung, C.H.: Preferential degradation of the $KMnO_4$ -oxidized or N-ethylmaleimide-modified form of sarcoplasmic reticulum ATPase by calpain from chick skeletal muscle. *Biochim. Biophys. Acta*, 1041 (1990) 160-163.
- 971 Hagag, N.G., Kirchner, M. and DiStefano, J.F.: Molecular cloning of proteinase-encoding genes from cancer cells by zymogen assay and direct sequencing. *Anal. Biochem.*, 191 (1990) 235-241.
- 972 Huang, W.-h., Ganjeizadeh, M., Wang, Y., Chiu, I.-N. and Askari, A.: Auto-regulation of the phosphointermediate of Na^+/K^+ -ATPase by the amino-terminal domain of the α -subunit. *Biochim. Biophys. Acta*, 1030 (1990) 65-72.
- 973 Jascur, T., Matter, K. and Hauri, H.-P.: Oligomerization and intracellular protein transport: dimerization of intestinal dipeptidylpeptidase IV occurs in the Golgi apparatus. *Biochemistry*, 30 (1991) 1908-1915.
- 974 Katayama, Y., Kasahara, A., Kuraishi, H. and Amano, F.: Regulation of activity of an ATP-dependent protease, Clp, by the amount of a subunit, ClpA, in the growth of *Escherichia coli* cells. *J. Biochem. (Tokyo)*, 108 (1990) 37-41.
- 975 Krestyanova, I.N., Uvarov, N.N., Rudenskaya, G.N., Tsibanov, V.V., Vasilyeva, L.I. and Stepanov, V.M.: (Intracellular aminopeptidase from *Xanthomonas rubriilineans* capable to hydrolyze α -amino acid esters and cephalixin). *Biokhimiya (Moscow)*, 55 (1990) 2226-2238.
- 976 Lyons, J.G., Birkedal-Hansen, B., Moore, W.G.I., O'Grady, R.L. and Birkedal-Hansen, H.: Characteristics of a 95-kDa matrix metalloproteinase produced by mammary carcinoma cells. *Biochemistry*, 30 (1991) 1449-1456.
- 977 Mallya, S.K., Mookhtiar, K.A., Gao, Y., Brew, K., Dioszegi, M., Birkedal-Hansen, H. and van Wart, H.E.: Characterization of 58-kilodalton human neutrophil collagenase: comparison with human fibroblast collagenase. *Biochemistry*, 29 (1990) 10628-10634.
- 978 Miyazaki, K., Hattori, Y., Umenishi, F., Yasumitsu, H. and Umeda, M.: Purification and characterization of extracellular matrix-degrading metalloproteinase, matrin (pump-1), secreted from human rectal carcinoma cell line. *Cancer Res.*, 50 (1990) 7758-7764.
- 979 Nishimura, Y., Kawabata, T., Yano, S. and Kato, K.: Inhibition of intracellular sorting and processing of lysosomal cathepsins H and L at reduced temperature in primary cultures of rat hepatocytes. *Arch. Biochem. Biophys.*, 283 (1990) 458-463.
- 980 Okada, Y., Morodomi, T., Enghild, J.J., Suzuki, K., Yasui, A., Nakanishi, I., Salvesen, G. and Nagase, H.: Matrix metalloproteinase 2 from human rheumatoid synovial fibroblasts. Purification and activation of the precursor and enzymic properties. *Eur. J. Biochem.*, 194 (1990) 721-730.

- 981 Roitsch, T. and Lehle, L.: The vacuolar protein-targeting signal of yeast carboxypeptidase is functional in oocytes from *Xenopus laevis*. *Eur. J. Biochem.*, 195 (1991) 145-150.
- 982 Sato, S. and Shiratsuchi, A.: Chymotrypsin-like activity of chicken liver multicatalytic proteinase resides in the smallest subunit. *Biochim. Biophys. Acta*, 1041 (1990) 269-272.
- 983 Sottrup-Jensen, L., Hansen, H.F., Pedersen, H.S. and Kristensen, L.: Localization of ϵ -lysyl- γ -glutamyl cross-links in five human α_2 -macroglobulin-proteinase complexes. Nature of the high molecular weight cross-linked products. *J. Biol. Chem.*, 265 (1990) 17727-17737.
- 984 Stearns, N.A., Dong, J., Pan, J.-X., Brenner, D.A. and Sahagian, G.G.: Comparison of cathepsin L synthesized by normal and transformed cells at the gene, message, protein, and oligosaccharide levels. *Arch. Biochem. Biophys.*, 283 (1990) 447-457.
- 985 Suzuki, K., Enghild, J.J., Morodomi, T., Salvesen, G. and Nagase, H.: Mechanisms of activation of tissue procollagenase by matrix metalloproteinase 3 (stromelysin). *Biochemistry*, 29 (1990) 10261-10270.
- 986 Thompson, N.L., Hixson, D.C., Callanan, H., Panzica, M., Flanagan, D., Faris, R.A., Hong, W., Hartel-Schenk, S. and Doyle, D.: A Fischer rat substrain deficient in dipeptidyl peptidase IV activity makes normal steady-state RNA levels and an altered protein. Use as a liver-cell transplantation model. *Biochem. J.*, 273 (1991) 497-502.
- 987 Wang, Z. and Gluck, S.: Isolation and properties of bovine kidney brush border vacuolar H^+ -ATPase. A proton pump with enzymatic and structural differences from kidney microsomal H^+ -ATPase. *J. Biol. Chem.*, 265 (1990) 21957-21965.
- 988 Whitelock, J.M., O'Grady, R.L. and Gibbins, J.R.: The identification, purification and characterisation of an inhibitor of collagenase (20K) produced by neoplastic epithelial cells. *Biochim. Biophys. Acta*, 1073 (1991) 107-113.
- 989 Yonezawa, S. and Nakamura, K.: Species-specific distribution of cathepsin E in mammalian blood cells. *Biochim. Biophys. Acta*, 1073 (1991) 155-160.
- 990 Zimacheva, A.V., Ievleva, E.V. and Mosolov, V.V.: (High molecular weight proteinase from barley malt). *Biokhimiya (Moscow)*, 55 (1990) 1874-1881.

20g. Lyases

- 991 Carter, N.D., Dodgson, S.J. and Quant, P.A.: Expression of hepatic mitochondrial carbonic anhydrase V. *Biochim. Biophys. Acta*, 1036 (1990) 237-241.
- 992 Chai, Y.-C., Jung, C.-H., Lii, C.-K., Ashraf, S.S., Hendrich, S., Wolf, B., Sies, H. and Thomas, J.A.: Identification of an abundant S-thiolated rat liver protein as carbonic anhydrase III; characterization of S-thiolation and de-thiolation reactions. *Arch. Biochem. Biophys.*, 284 (1991) 270-278.
- 993 Hekman, C. and Hatefi, Y.: The F_0 subunits of bovine mitochondrial ATP synthase complex: purification, antibody production, and interspecies cross-immunoreactivity. *Arch. Biochem. Biophys.*, 284 (1991) 90-97.
- 994 Inoue, Y., Choi, B.-Y., Murata, K. and Kimura, A.: Sexual response of *Saccharomyces cerevisiae*: phosphorylation of yeast glyoxalase I by a cell extract of mating factor-treated cells. *J. Biochem. (Tokyo)*, 108 (1990) 4-6.
- 995 Ito, K., Tanaka, T., Tsutsumi, R., Ishikawa, K. and Tsutsumi, K.-i.: The different HNF1-like transcriptional activators in the liver bind to the same region of the rat aldolase B promoter. *Biochem. Biophys. Res. Commun.*, 173 (1990) 1337-1343.
- 996 Romana, L.K., Santiago, F.S. and Reeves, P.R.: High level expression and purification of athymidine diphospho-D-glucose 4,6-dehydratase (rfbB) from *Salmonella* serovar *typhimurium* LT2. *Biochem. Biophys. Res. Commun.*, 174 (1991) 846-852.

- 997 Viallard, J.-L., Caillaud, D. and Kantelip, B.: Atypical enolase isoenzyme in serum: a macroenolase formed from the α -hybrid form. *Clin. Chem. (Winston-Salem)*, 36 (1990) 2000-2003.

See also 842.

20h. Isomerases

- 998 Caserta, M., Amadei, A., Camilloni, G. and Di Mauro, E.: Regulation of the function of eukaryotic DNA topoisomerase I: analysis of the binding step and of the catalytic constants of topoisomerization as a function of DNA topology. *Biochemistry*, 29 (1990) 8152-8157.
- 999 Staron, K., Kowalska-Loth, B., Czerwinski, R.M., Bandorowska, J. and Guberska, J.: Topoisomerase I in actively growing plasmodia and during differentiation of the slime mold *Physarum polycephalum*. *Biochim. Biophys. Acta*, 1088 (1991) 36-40.
- 1000 Sugimoto, Y., Tsukahara, S., Oh-hara, T., Isoe, T. and Tsuruo, T.: Decreased expression of DNA topoisomerase I in camptothecin-resistant tumor cell lines as determined by a monoclonal antibody. *Cancer Res.*, 50 (1990) 6925-6930.

See also 1027, 1141.

20i. Ligases

- 1001 Majumdar, R., Guest, J.R. and Bridger, W.A.: Functional consequences of substitution of the active site (phospho)histidine residue of *Escherichia coli* succinyl-CoA synthetase. *Biochim. Biophys. Acta*, 1076 (1991) 86-90.
- 1002 Nakano, Y. and Kimura, K.: Temperature-sensitive mutant of *Bacillus subtilis* glutamine synthetase obtained by random mutation. *J. Biochem. (Tokyo)*, 108 (1990) 116-121.
- 1003 Rubelj, I., Weygand-Durasevic, I. and Kucan, Z.: Evidence for two types of complexes formed by yeast tyrosyl-tRNA synthetase with cognate and non-cognate tRNA. Effect of ribonucleoside triphosphates. *Eur. J. Biochem.*, 193 (1990) 783-788.
- 1004 Rubio, V., Cervera, J., Lusty, C.J., Bendala, E. and Britton, H.G.: Domain structure of the large subunit of *Escherichia coli* carbamoyl phosphate synthetase. Location of the binding site for the allosteric inhibitor UMP in the COOH-terminal domain. *Biochemistry*, 30 (1991) 1068-1075.
- 1005 Schray, B., Thömmes, P. and Knippers, R.: Glutaminyl-tRNA synthetase as a component of the high-molecular weight complex of human aminoacyl-tRNA synthetases. An immunological study. *Biochim. Biophys. Acta*, 1087 (1990) 226-234.
- 1006 Senichak, V.I., Kaush, M.V., Toma, S.I., Evstigneeva, Z.G. and Kretovich, W.L.: (Glutamine synthetase from plant tissue cytosol of soya, alfalfa and pea tubercular cells). *Biokhimiya (Moscow)*, 55 (1990) 1299-1303.
- 1007 Suarez de Mata, Z., Lizardo, R., Diaz, F. and Saz, H.J.: Propionyl-CoA condensing enzyme from *Ascaris* muscle mitochondria. I. Isolation and characterization of multiple forms. *Arch. Biochem. Biophys.*, 285 (1991) 158-165.
- 1008 Woehle, D.L., Lueddecke, B.A. and Ludden, P.W.: ATP-dependent and NAD-dependent modification of glutamine synthase from *Rhodospirillum rubrum* in vitro. *J. Biol. Chem.*, 265 (1990) 13741-13749.
- 1009 Zakharova, O.D., Kotenko, Yu.G. and Lavrik, O.I.: (Phenylalanyl-tRNA synthetase from human placenta: isolation and properties). *Biokhimiya (Moscow)*, 55 (1990) 1025-1031.

20j. *Complex mixtures and incompletely identified enzymes*

- 1010 Amelyushkina, V.A., Bochkova, N.A., Chernyadeva, I.F. and Titov, V.N.: (Simultaneous electrophoretic separation of creatine kinase and lactate dehydrogenase isoenzymes). *Lab. Delo*, (1990) 46-50; *C.A.*, 113 (1990) 147649d.
- 1011 Baier, M., Behr, E., Kurth, R. and König, H.: Cloning and expression of the complete SIV_{egm} pol region in *E. coli*. Purification and partial characterization of the reverse transcriptase. *Arzneim.-Forsch.*, 40 (1990) 1284-1287.
- 1012 Beeckman, S., van Driessche, E. and Kanarek, L.: Affinity electrophoresis as a tool to investigate clustering of sequential enzymes. *UCLA Symp. Mol. Cell. Biol., New Ser.*, 133 (Struct. Organ. Aspects Metab. Regul.) (1990) 245-257; *C.A.*, 113 (1990) 186926m - a review with 45 refs.
- 1013 Bibb, W.F., Gellin, B.G., Weaver, R., Schwartz, B., Plikaytis, B.D., Reeves, M.W., Pinner, R.W. and Broome, C.V.: Analysis of clinical and food-borne isolates of *Listeria monocytogenes* in the United States by multilocus enzyme electrophoresis and application of the method to epidemiologic investigations. *Appl. Environ. Microbiol.*, 56 (1990) 2133-2141; *C.A.*, 113 (1990) 94636p.
- 1014 Reubsaet, F.A.G., Veerkamp, J.H., Dirven, H.A.A.M., Brückwilder, M.L.P., Hashimoto, T., Trijbels, J.M.F. and Monnens, L.A.H.: The effect of di(ethylhexyl)phthalate on fatty acid oxidation and carnitine palmitoyltransferase in various rat tissues. *Biochim. Biophys. Acta*, 1047 (1990) 264-270.

See also 1007.

21. PURINES, PYRIMIDINES, NUCLEIC ACIDS AND THEIR CONSTITUENTS

21a. *Purines, pyrimidines, nucleosides, nucleotides*

- 1015 Nguyen, A.-L., Luong, J.H.T. and Masson, C.: Determination of nucleotides in fish tissues using capillary electrophoresis. *Anal. Chem.*, 62 (1990) 2490-2493.
- 1016 Olashaw, N.E., Rhee, S.G. and Pledger, W.J.: Cyclic AMP agonists induce the phosphorylation of phospholipase C- α and of a 76 kDa protein co-precipitated by anti-(phospholipase C- α) monoclonal antibodies in BALB/c-3T3 cells. Relationship to inositol phosphate formation. *Biochem. J.*, 272 (1990) 297-303.
- 1017 Oser, A., Collasius, M. and Valet, G.: Multiple end labeling of oligonucleotides with terbium chelate-substituted psoralen for time-resolved fluorescence detection. *Anal. Biochem.*, 191 (1990) 295-301.
- 1018 Schmitz, G.G., Walter, T., Seibl, R. and Kessler, C.: Nonradioactive labeling of oligonucleotides *in vitro* with the hapten digoxigenin by tailing with terminal transferase. *Anal. Biochem.*, 192 (1991) 222-231.
- 1019 Takechi, T., Wakiguchi, H., Kurashige, T., Kikkawa, K. and Kodama, H.: Determination of orotic acid in urine and serum by isotachopheretic analysis. *J. Chromatogr.*, 532 (1990) 144-149.
- 1020 Xu, H.: (Separation and determination of nucleoside substances by high pressure paper electrophoresis). *Fenxi Huaxue*, 18 (1990) 692; *C.A.*, 113 (1990) 227428w.

See also 533, 661.

21b. *Nucleic acids, RNA*

- 1021 Chan, S.-O., Wong, S.S.-C. and Yeung, D.C.-Y.: Regulation of Ki-ras expression in Reuber H35 cells. *Eur. J. Biochem.*, 193 (1990) 681-685.

- 1022 Gruber, A., Soldati, D., Burri, M. and Schümperli, D.: Isolation of an active gene and of two pseudogenes for mouse U7 small nuclear RNA. *Biochim. Biophys. Acta*, 1088 (1991) 151-154.
- 1023 Hanic-Joyce, P.J. and Gray, M.W.: Processing of transfer RNA precursors in a wheat mitochondrial extract. *J. Biol. Chem.*, 265 (1990) 13782-13791.
- 1024 Hegg, L.A. and Thurlow, D.L.: Residual tRNA secondary structure in 'denaturing' 8M urea/TBE polyacrylamide gels: effects on electrophoretic mobility and dependency on prior chemical modification of the tRNA. *Nucleic Acids Res.*, 18 (1990) 2993-3000; *C.A.*, 113 (1990) 94232d.
- 1025 Jamison, C.S. and Friezner Degen, S.J.: Prenatal and postnatal expression of mRNA coding for rat prothrombin. *Biochim. Biophys. Acta*, 1088 (1991) 208-216.
- 1026 Kaisho, Y., Shintani, A., Ono, Y., Kato, K. and Igarashi, K.: Regional expression of the nerve growth factor gene family in rat brain during development. *Biochem. Biophys. Res. Commun.*, 174 (1991) 379-385.
- 1027 Kunze, N., Klein, M., Richter, A. and Knippers, R.: Structural characterization of the human DNA topoisomerase I gene promoter. *Eur. J. Biochem.*, 194 (1990) 323-330.
- 1028 Li, Y.C., Wang, D.P. and Chiang, J.Y.L.: Regulation of cholesterol 7 α -hydroxylase in the liver. Cloning, sequencing, and regulation of cholesterol 7 α -hydroxylase mRNA. *J. Biol. Chem.*, 265 (1990) 12012-12019.
- 1029 Lichtenstein, A.V., Moiseev, V.L. and Zaaboikin, M.M.: A procedure for DNA and RNA transfer to membrane filters avoiding weight-induced gel flattening. *Anal. Biochem.*, 191 (1990) 187-191.
- 1030 Mahonen, A., Pirskanen, A. and Mäenpää, P.H.: Homologous and heterologous regulation of 1.25-dihydroxyvitamin D-3 receptor mRNA levels in human osteosarcoma cells. *Biochim. Biophys. Acta*, 1088 (1991) 111-118.
- 1031 Mann, E.A. and Lingrel, J.B.: Developmental and tissue-specific expression of rat T-kininogen. *Biochem. Biophys. Res. Commun.*, 174 (1991) 417-423.
- 1032 Mellits, K.H., Pe'ery, T., Manche, L., Robertson, H.D. and Mathews, M.B.: Removal of double-stranded contaminants from RNA transcripts: synthesis of adenovirus VA RNA₁ from a T7 vector. *Nucleic Acids Res.*, 18 (1990) 5401-5406; *C.A.*, 114 (1991) 2966r.
- 1033 Nanbu, R., Kubo, T., Ueno, K. and Natori, S.: Preferential deadenylation of *Sarcophaga* lectin mRNA during its acute phase expression. *Biochim. Biophys. Acta*, 1088 (1991) 71-76.
- 1034 Parfett, C.L.J., Brudzynski, K. and Stiller, C.: Enhanced accumulation of mRNA for 78-kilodalton glucose-regulated protein (GRP78) in tissues of nonobese diabetic mice. *Biochem. Cell Biol.*, 68 (1990) 1428-1432.
- 1035 Sameshima, Y., Akiyama, T., Mori, N., Mizoguchi, H., Toyoshima, K., Sugimura, T., Terada, M. and Yokota, J.: Point mutation of the p53 gene resulting in splicing inhibition in small cell lung carcinoma. *Biochem. Biophys. Res. Commun.*, 173 (1990) 697-703.
- 1036 Scheffner, M., Knippers, R. and Stahl, H.: Simian-virus-40 large-T-antigen-catalyzed DNA and RNA unwinding reactions. *Eur. J. Biochem.*, 195 (1991) 49-54.
- 1037 Smith, T.J., Haque, S. and Drummond, G.S.: Induction of heme oxygenase mRNA by cobalt protoporphyrin in rat liver. *Biochim. Biophys. Acta*, 1073 (1991) 221-224.
- 1038 Sorimachi, H., Tsukahara, T., Kawasaki, H., Ishiura, S., Emori, Y., Sugita, H. and Suzuki, K.: Molecular cloning of cDNAs for two subunits of rat multicatalytic proteinase. Existence of N-terminal conserved and C-terminal diverged sequences among subunits. *Eur. J. Biochem.*, 193 (1990) 775-781.
- 1039 Tavakkol, A.: Molecular cloning of porcine α_1 -microglobulin/HI-30 reveals developmental and tissue-specific expression of two variant messenger ribonucleic acids. *Biochim. Biophys. Acta*, 1088 (1991) 47-56.

- 1040 Tsuchida, K., Shigemoto, R., Yokota, Y. and Nakanishi, S.: Tissue distribution and quantitation of the mRNAs for three rat tachykinin receptors. *Eur. J. Biochem.*, 193 (1990) 751-757.
- 1041 Uehara, T., Chihara, T., Tokumitsu, Y. and Nomura, Y.: Possible involvement of pertussis toxin-sensitive GTP-binding protein(s) in c-fos expression during differentiation of 3T3-L1 fibroblasts to adipocytes. *Biochim. Biophys. Acta*, 1088 (1991) 41-46.
- 1042 Wollenzien, P., Expert-Bezancon, A. and Favre, A.: Sites of contact of mRNA with 16S rRNA and 23S rRNA in the *Escherichia coli* ribosome. *Biochemistry*, 30 (1991) 1788-1795.
- 1043 Yano, H., Seino, Y., Inagaki, N., Hinokio, Y., Yamamoto, T., Yasuda, K., Masuda, K., Someya, Y. and Imura, H.: Tissue distribution and species difference of the brain type glucose transporter (GLUT3). *Biochem. Biophys. Res. Commun.*, 174 (1991) 470-477.
- See also 509, 573, 577, 583, 596, 730, 905, 922, 986, 1057, 1061, 1065, 1075, 1078, 1084, 1086, 1088, 1089, 1099.

21c. Nucleic acids, DNA

- 1044 Amano, H., Ives, C.L., Bott, K.F. and Shishido, K.: A limited number of *Bacillus subtilis* strains carry a tetracycline-resistance determinant at a site close to the origin of replication. *Biochim. Biophys. Acta*, 1088 (1991) 251-258.
- 1045 Ansoerge, W.: Electrophoresis apparatus, especially for DNA electrophoresis, with rotating electrode holder. *Ger. Offen.* DE 3,816,626 (Cl. BOLD57/02), 30 Nov. 1989, Appl. 16 May 1988; 7 pp.; *C.A.*, 113 (1990) 94348w.
- 1046 Bhanot, O.S., Grevatt, P.C., Donahue, J.M., Gabrielides, C.N. and Solomon, J.J.: Incorporation of dA opposite N3-ethylthymidine terminates *in vitro* DNA synthesis. *Biochemistry*, 29 (1990) 10357-10364.
- 1047 Cao, T.M. and Ing, Y.H.: Gel electrophoresis system for the micropreparation of plasmid DNA. *Anal. Biochem.*, 192 (1991) 251-253.
- 1048 Chang, N. and Taylor, D.E.: Use of pulsed-field agarose gel electrophoresis to size genomes of *Campylobacter* species and to construct a Sall map of *Campylobacter jejuni* UA580. *J. Bacteriol.*, 172 (1990) 5211-5217; *C.A.*, 113 (1990) 185543x.
- 1049 Chen, H., Keseler, I.M. and Shinketa, L.J.: Genome size of *Myxococcus xanthus* determined by pulsed-field gel electrophoresis. *J. Bacteriol.*, 172 (1990) 4206-4213; *C.A.*, 113 (1990) 92229j.
- 1050 Ciaccio, P.J., Graves, P.E., Bourque, D.P., Glinsmann-Gibson, B. and Halpert, J.R.: cDNA and deduced amino acid sequences of a dog liver cytochrome P-450 of the IIIA gene subfamily. *Biochim. Biophys. Acta*, 1088 (1991) 319-322.
- 1051 Colman, S.D., Hu, P.C., Litaker, W. and Bott, K.F.: A physical map of the *Mycoplasma genitalium* genome. *Mol. Microbiol.*, 4 (1990) 683-687; *C.A.*, 113 (1990) 146198u.
- 1052 Deglon, N., Krapp, A., Bron, C. and Fasel, N.: Translocation of the yeast dolichol-phosphate-mannose synthase into microsomal membranes. *Biochem. Biophys. Res. Commun.*, 174 (1991) 1337-1342.
- 1053 Devilee, P., van Vliet, M., Bardoel, A., Kievits, T., Kuipers-Dijkshoorn, N., Pearson, P.L. and Cornelisse, C.J.: Frequent somatic imbalance of marker alleles for chromosome 1 in human primary breast carcinoma. *Cancer Res.*, 51 (1991) 1020-1025.
- 1054 Einhorn, S., Grander, D., Björk, O., Brøndum-Nielsen, K. and Söderhäll, S.: Deletion of α -, β -, and ω -interferon genes in malignant cells from children with acute lymphocytic leukemia. *Cancer Res.*, 50 (1990) 7781-7785.

- 1055 Engelhardt, M.: Cation-dependent solubilization of rat thymocyte chromatin is closely related to decondensation of the nuclei. *Biochim. Biophys. Acta*, 1987 (1990) 173-179.
- 1056 Fronza, G., Tornaletti, S., Menichini, P., Galiegue-Zouitina, S., Bailleul, B., Loucheux-Lefebvre, M.-H., Abbondandolo, A. and Pedrini, A.M.: Extent of helix perturbation associated with DNA modification by the *o*-acetyl derivative of the carcinogen 4-hydroxyaminoquinoline-1-oxide. *Biochim. Biophys. Acta*, 1087 (1990) 330-335.
- 1057 Garber, A.T., Winkfein, R.J. and Dixon, G.H.: A novel creatine kinase cDNA whose transcript shows enhanced testicular expression. *Biochim. Biophys. Acta*, 1087 (1990) 256-258.
- 1058 Geigl, E.M. and Eckardt-Schupp, F.: Chromosome-specific identification and quantification of S1 nuclease-sensitive sites in yeast chromatin by pulsed-field gel electrophoresis. *Mol. Microbiol.*, 4 (1990) 801-810; *C.A.*, 113 (1990) 146687c.
- 1059 Hall, R.L.: Physical mapping and field inversion gel electrophoresis of *Amsacta moorei* entomopoxvirus DNA. Avail. *Univ. Microfilms Int.*, Order No. DA9014430, 1989, 315 pp.; *C.A.*, 113 (1990) 205720h.
- 1060 Hatch, C.L. and Bonner, W.M.: The human histone H2A.Z gene. Sequence and regulation. *J. Biol. Chem.*, 265 (1990) 15211-15218.
- 1061 Hurta, R.A.R. and Wright, J.A.: Mammalian drug resistant mutants with multiple gene amplifications: genes encoding the M1 component of ribonucleotide reductase, the M2 component of ribonucleotide reductase, ornithine decarboxylase, p5-8, the H-subunit of ferritin and the L-subunit of ferritin. *Biochim. Biophys. Acta*, 1087 (1990) 165-172.
- 1062 Johnson, K.R.: A small-scale plasmid preparation yielding DNA suitable for double-stranded sequencing and *in vitro* transcription. *Anal. Biochem.*, 190 (1990) 170-174.
- 1063 Kambara, H.: Method and apparatus for gene detection by fluorescent probe hybridization and gel electrophoresis. *Ger. Offen.* DE 3,917,436 (Cl. C12Q1/68), 07 Dec. 1989, JP Appl. 88/128,392, 27 May 1988; 8 pp.; *C.A.*, 113 (1990) 94384e.
- 1064 Kobayashi, T., Doi, M., Makino, Y. and Ogawa, M.: Mobility minima in field-inversion gel electrophoresis. *Macromolecules*, 23 (1990) 4480-4481; *C.A.*, 113 (1990) 148264m.
- 1065 Kolble, K.: Pulsed-field gel electrophoresis method and apparatus. *PCT Int.* Appl. WOP 90 05,017 (Cl. B01D57/02), 17 May 1990, GB Appl. 88/25,625, 02 Nov. 1988; 25 pp.; *C.A.*, 113 (1990) 148390z.
- 1066 Kontula, K., Aalto-Setälä, K., Kuusi, T., Hämäläinen, L. and Syvänen, A.-C.: Apolipoprotein E polymorphism determined by restriction enzyme analysis of DNA amplified by polymerase chain reaction: convenient alternative to phenotyping by isoelectric focusing. *Clin. Chem. (Winston-Salem)*, 36 (1990) 2087-2092.
- 1067 Landry, S. and Zannis-Hadjopoulos, M.: classes of autonomously replicating sequences are found among early-replicating monkey DNA. *Biochim. Biophys. Acta*, 1088 (1991) 234-244.
- 1068 Lebionka, A.J.: (Methylation of Eco RI (GAM⁶ATTC) sequences of bacterial DNA). *Biokhimiya (Moscow)*, 55 (1990) 1132-1139.
- 1069 Leblond, P., Francou, F.X., Simonet, J.M. and Decaris, B.: Pulsed-field gel electrophoresis analysis of the genome of *Streptomyces ambofaciens* strains. *FEMS Microbiol. Lett.*, 72 (1990) 79-88; *C.A.*, 113 (1990) 225401h.
- 1070 Lo, K.-M. and Gillies, S.D.: High level expression of human proteins in murine hybridoma cells: induction by methotrexate in the absence of gene amplification. *Biochim. Biophys. Acta*, 1088 (1991) 217-224.
- 1071 Lund, K., Andersen, A.H., Christiansen, K., Svejstrup, J.Q. and Westergaard, O.: Minimal DNA requirement for topoisomerase II-mediated cleavage *in vitro*. *J. Biol. Chem.*, 265 (1990) 13856-13863.

- 1072 Maule, J. and Green, D.K.: Semiconductor-controlled contour-clamped homogeneous electric field apparatus. *Anal. Biochem.*, 191 (1990) 390-395.
- 1073 Mayrand, P.E., Hoff, L.B., McBride, L.J., Bridgham, J.A., Cathcart, R., Corcoran, K.P., Golda, G.S., Keith, D.H., Laachenmeier, E.W., Madden, D.E. et al.: Automation of specific human gene detection. *Clin. Chem. (Winston-Salem)*, 36 (1990) 2063-2071.
- 1074 Mignotte, F., Gueride, M., Champagne, A.-M. and Mounolou, J.-C.: Direct repeats in the non-coding region of rabbit mitochondrial DNA. Involvement in the generation of intra- and inter-individual heterogeneity. *Eur. J. Biochem.*, 194 (1990) 561-571.
- 1075 Muller, S.J. and Caradonna, S.: Isolation and characterization of a human cDNA encoding uracil-DNA glycosylase. *Biochim. Biophys. Acta*, 1088 (1991) 197-207.
- 1076 Naito, A., Kitamura, Y. and Yoshikura, H.: Homologous recombination in bovine papillomavirus shuttlevector: effect of relative orientation of substrate sequences. *Biochem. Biophys. Res. Commun.*, 174 (1991) 305-312.
- 1077 Nakagami, S., Matsunaga, H., Miyoshi, K.-i. and Yamane, A.: Nonradioactive detection of nucleic acid by the universal probe system. *Anal. Biochem.*, 192 (1991) 11-16.
- 1078 O'Reilly, M.A.J. and Kinnon, C.: The technique of pulsed field gel electrophoresis and its impact on molecular immunology. *J. Immunol. Methods*, 131 (1990) 1-13; *C.A.*, 113 (1990) 169854u.
- 1079 Paquet, L., Lazure, C., Seidah, N.G., Chretien, M. and Mbikay, M.: The production of alternate splicing of two mRNAs differing by one codon could be an intrinsic property of neuroendocrine protein 7B2 gene expression in man. *Biochem. Biophys. Res. Commun.*, 174 (1991) 156-162.
- 1080 Parzer, S. and Mannhalter, C.: A rapid method for the isolation of genomic DNA from citrated whole blood. *Biochem. J.*, 273 (1991) 229-231.
- 1081 Pfaffle, P., Gerlach, V., Bunzel, L. and Jackson, V.: *In vitro* evidence that transcription-induced stress causes nucleosome dissolution and regeneration. *J. Biol. Chem.*, 265 (1990) 16830-16840.
- 1082 Prior, T.W., Papp, A.C., Snyder, P.J., Highsmith, W.E., Jr., Friedman, K.J., Perry, T.R., Silverman, L.M. and Mendell, J.R.: Determination of carrier status in Duchenne and Becker muscular dystrophies by quantitative polymerase chain reaction and allele-specific oligonucleotides. *Clin. Chem. (Winston-Salem)*, 36 (1990) 2113-2117.
- 1083 Pun, K.K. and Kam, W.: Extraction of nucleic acids from agarose gel - a quantitative and qualitative comparison of four different methods. *Prepar. Biochem.*, 20 (1990) 123-135.
- 1084 Rahman, M.A. and Schaup, H.W.: Nuclease S1 mapping of 16S ribosomal RNA in ribosomes. *Biochim. Biophys. Acta*, 1087 (1990) 212-218.
- 1085 Sakakibara, T., Koyata, H., Ishiguro, Y., Kure, S., Kume, A., Tada, K. and Hiraga, K.: One of the two genomic copies of the glycine decarboxylase cDNA has been deleted at a 5' region in a patient with nonketotic hyperglycinemia. *Biochem. Biophys. Res. Commun.*, 173 (1990) 801-806.
- 1086 Seibel, P., Degoul, F., Romero, N., Marsac, C. and Kadenbach, B.: Identification of point mutations by mispairing PCR as exemplified in Merrf disease. *Biochem. Biophys. Res. Commun.*, 173 (1990) 561-565.
- 1087 Semenov, A.N. and Subbotin, A.V.: (Anomalous mobility of deoxyribonucleic acid macromolecules during gel electrophoresis). *Vysokomol. Soedin. Ser. A*, 32 (1990) 1691-1696; *C.A.*, 113 (1990) 207777f.
- 1088 Schmidt, J.L. and Cheh, H.Y.: Continuous free flow electrophoresis in an alternating electric field with a variable buffer flow. *Sep. Sci. Technol.*, 25 (1990) 889-902; *C.A.*, 113 (1990) 94233e.

- 1089 Sobral, B.W.S.: Pulsed-field gel electrophoresis studies of Rhizobiaceae. Avail. *Univ. Microfilms Int.*, Order No. DA9014956, 1989, 197 pp.; *C.A.*, 113 (1990) 185623y.
- 1090 Sullivan, K.M., Hopgood, R., Lang, B. and Gill, P.: Automated amplification and sequencing of human mitochondrial DNA. *Electrophoresis (Weinheim)*, 12 (1991) 17-21.
- 1091 Suzuki, Y., Sekiya, T. and Hayashi, K.: Allele-specific polymerase chain reaction: a method for amplification and sequence determination of a single component among a mixture of sequence variants. *Anal. Biochem.*, 192 (1991) 82-84.
- 1092 Tanskanen, E.I., Tulloch, D.L., Hillier, A.J. and Davidson, B.E.: Pulsed-field gel electrophoresis of SmaI digests of lactococcal genomic DNA, a novel method of strain identification. *Appl. Environ. Microbiol.*, 56 (1990) 3105-3111; *C.A.*, 114 (1991) 2918b.
- 1093 Titomirov, A.V., Sukharev, S. and Kistanova, E.: *In vivo* electroporation and stable transformation of skin cells of newborn mice by plasmid DNA. *Biochim. Biophys. Acta*, 1088 (1991) 131-134.
- 1094 Uitterlinden, A.G. and Vijg, J.: Denaturing gradient gel electrophoretic analysis of minisatellite alleles. *Electrophoresis (Weinheim)*, 12 (1991) 12-16.
- 1095 Urabe, H., Toyama, K. and Ogawara, H.: Cloning from *Streptomyces cellulosa* of the gene encoding β -lactamase, a blue-dextran binding protein. *J. Antibiot.*, 43 (1990) 1483-1488.
- 1096 Wang, Y. and Griffith, J.: Effects of bulge composition and flanking sequence on the kinking of DNA by bulged bases. *Biochemistry*, 30 (1991) 1358-1363.
- 1097 Whitley, J.C. and Finch, L.R.: Ligated mycoplasma genomes as DNA size markers for PFGE. *Nucleic Acids Res.*, 18 (1990) 6167-6168; *C.A.*, 114 (1991) 2925b.
- 1098 Wilson, W.W. and Hoffman, R.M.: Methylation of intact chromosomes by bacterial methylases in agarose plugs suitable for pulsed-field electrophoresis. *Anal. Biochem.*, 191 (1990) 370-375.
- 1099 Yajima, Y. and Maekawa, Y.: Gel composition for nucleic acid separation by electrophoresis. *Jpn. Kokai Tokkyo Koho JP 02 54,162 [190 54,162] (Cl. G01N27/447)*, 23 Feb. 1990, Appl. 88/205,256, 18 Aug. 1988; 4 pp.; *C.A.*, 113 (1990) 148377a.
- 1100 Yamamoto, T.: Electrophoretic isolation of DNA fragment using low-melting-point agarose gel. *Jpn. Kokai Tokkyo Koho JP 02 92,284 [90 92,284] (Cl. C12N15/10)*, 03 Apr. 1990, Appl. 88/240,893, 28 Sep. 1988; 3 pp.; *C.A.*, 113 (1990) 207856f.
- 1101 Yokota, H. and Oishi, M.: Differential cloning of genomic DNA: cloning of DNA with an altered primary structure by in-gel competitive reassociation. *Proc. Natl. Acad. Sci. U.S.A.*, 87 (1990) 6398-6402; *C.A.*, 113 (1990) 146711f.

See also 488, 496, 509, 1026, 1029, 1035, 1036, 1038, 1043, 1160.

21d. *Structural studies on RNA and RNA mapping*

- 1102 Bach, M. and Lührmann, R.: Protein-RNA interactions in 20S U5 snRNPs. *Biochim. Biophys. Acta*, 1088 (1991) 139-143.
- 1103 Claes, V., Taquet, A.N., Kettmann, R. and Burny, A.: Sequence analysis of the pig phosphoglucose isomerase gene promoter region. *Biochim. Biophys. Acta*, 1087 (1990) 339-340.
- 1104 Gross, G., Mielke, C., Hollatz, I., Blocker, H. and Frank, R.: RNA primary sequence or secondary structure in the translational initiation region controls expression of two variant interferon-genes in *Escherichia coli*. *J. Biol. Chem.*, 265 (1990) 17627-17636.

- 1105 Rose, S.D.: Classes of polyadenylation sites revealed by native gel electrophoresis of *in vitro* assembled complexes and sensitivity to U RNA cleavage. Avail. *Univ. Microfilms Int.*, Order No. DA9012861, 1988, 140 pp.; C.A., 113 (1990) 185607w.
- 1106 Sapotsky, M.V. and Drygin, Yu.F.: (Characterization of radish mosaic virus RNA: terminal structures and translation products). *Biokhimiya (Moscow)*, 55 (1990) 1437-1444.
- 1107 Sarge, K.D. and Maxwell, E.S.: Intermolecular hybridization of 5S rRNA with 18S rRNA: identification of a 5'-terminally-located nucleotide sequence in mouse 5S rRNA which base-pairs with two specific complementary sequences in 18S rRNA. *Biochim. Biophys. Acta*, 1088 (1991) 57-70.
- 1108 Topper, J.N. and Clayton, D.A.: Secondary structure of the RNA component of a nuclear/mitochondrial ribonucleoprotein. *J. Biol. Chem.*, 265 (1990) 13254-13262.

See also 1120.

21e. *Structural studies on DNA and DNA mapping*

- 1109 Autexier, C., Wragg-Legare, S. and DuBow, M.S.: Characterization of the *Pseudomonas aeruginosa* transposable phage D3132 left-end regulatory region. *Biochim. Biophys. Acta*, 1088 (1991) 147-150.
- 1110 Baril, C. and Saint Girons, I.: Sizing of the *Leptospira* genome by pulsed-field agarose gel electrophoresis. *Microbiol. Lett.*, 71 (1990) 95-99; C.A., 113 (1990) 185582j.
- 1111 Caprino, D., Acquila, M., Pecorara, M. and Mori, P.G.: DGGE detection of HhaI polymorphism in the F9 gene. *Nucleic Acids Res.*, 18 (1990) 4960; C.A., 113 (1990) 206176x.
- 1112 Chen, H.-T., Chiou, C.-S. and Chang, W.-C.: Cloning and characterization of the carp prolactin gene. *Biochim. Biophys. Acta*, 1088 (1991) 315-318.
- 1113 Choi, Y.-L., Kawase, S., Kawamukai, M., Sakai, H. and Komano, T.: Regulation of glpD and glpE gene expression by a cyclic AMP-cAMP receptor protein (cAMP-CRP) complex in *Escherichia coli*. *Biochim. Biophys. Acta*, 1088 (1991) 31-35.
- 1114 Cohen, A.S., Najarian, D.R. and Karger, B.L.: Separation and analysis of DNA sequence reaction products by capillary gel electrophoresis. *J. Chromatogr.*, 516 (1990) 49-60.
- 1115 Farkasovsky, M., Kormanec, J. and Kollarova, M.: Localization and characterization of a temporally regulated promoter from the *Streptomyces aureofaciens* 2201 plasmid pSA 2201. *Biochim. Biophys. Acta*, 1088 (1991) 119-126.
- 1116 Gonzalez-Cadavid, N., Gatti, R.A. and Neuwirth, H.: Automated direct sequencing of polymerase chain reaction-amplified fragments of the human Ha-ras gene. *Anal. Biochem.*, 191 (1990) 359-364.
- 1117 Goode, B.L. and Feinstein, S.C.: Restriction mapping of recombinant λ DNA molecules using pulsed field gel electrophoresis. *Anal. Biochem.*, 191 (1990) 70-74.
- 1118 Heiger, D.N., Cohen, A.S. and Karger, B.L.: Separation of DNA restriction fragments by high performance capillary electrophoresis with low and zero crosslinked polyacrylamide using continuous and pulsed electric fields. *J. Chromatogr.*, 516 (1990) 33-48.
- 1119 Hirao, I., Ishida, M., Watanabe, K. and Miura, K.-i.: Unique hairpin structures occurring at the replication origin of phage G3 DNA. *Biochim. Biophys. Acta*, 1087 (1990) 199-204.

- 1120 Hjerten, S.: High-performance electrophoresis including separation of nucleic acids and their degradation products. Interplay between theory and practical experiments. *Nucleosides Nucleotides*, 9 (1990) 319-330; *C.A.*, 113 (1990) 187566f.
- 1121 Koller, M., Schnyder, B. and Strehler, E.E.: Structural organization of the human CaMIII calmodulin gene. *Biochim. Biophys. Acta*, 1087 (1990) 180-189.
- 1122 Lampel, K.A., Jagow, J.A., Trucksess, M. and Hill, W.E.: Polymerase chain reaction for detection of invasive *Shigella flexneri* in food. *Appl. Environ. Microbiol.*, 56 (1990) 1536-1540; *C.A.*, 113 (1990) 96223a.
- 1123 Luckey, J.A., Drossman, H., Kostichka, A.J., Mead, D.A., D'Cunha, J., Norris, T.B. and Smith, L.M.: High speed DNA sequencing by capillary electrophoresis. *Nucleic Acids Res.*, 18 (1990) 4417-4421; *C.A.*, 113 (1990) 166846g.
- 1124 Prakash, A.S., Denny, W.A., Gourdie, T.A., Valu, K.K., Woodgate, P.D. and Wakelin, L.P.G.: DNA-directed alkylating ligands as potential antitumor agents: sequence specificity of alkylation by intercalating aniline mustards. *Biochemistry*, 29 (1990) 9799-9807.
- 1125 Sanders, J.Z., Petterson, A.A., Hughes, C.R., Connell, C.R., Raff, M., Menchen, S., Hood, L.E. and Teplow, D.B.: Imaging as a tool for improving length and accuracy of sequence analysis in automated fluorescence-based DNA sequencing. *Electrophoresis (Weinheim)*, 12 (1991) 3-11.
- 1126 Sinha, B.K., Antholine, W.M., Kalyanaraman, B. and Eliot, H.M.: Copper ion-dependent oxy-radical mediated DNA damage from dihydroxy derivative of etoposide. *Biochim. Biophys. Acta*, 1096 (1990) 81-83.
- 1127 Szwedlow, H., Heather, Wu, S., Harke, H. and Dovichi, N.J.: Capillary gel electrophoresis for DNA sequencing. Laser-induced fluorescence detection with the sheath flow cuvette. *J. Chromatogr.*, 516 (1990) 61-67.
- 1128 Taira, M. and Takano, Y.: Colorants in DNA sequencing by fluorescence electrophoresis. *Jpn. Kokai Tokkyo Koho JP 02 96,653 [90 96,653] (Cl. G01N27/447)*, 09 Apr. 1990, Appl. 88/247,480, 03 Oct. 1988; 3 pp.; *C.A.*, 113 (1990) 187616x.
- 1129 Thweatt, R., Goldstein, S. and Reis, R.J.S.: A universal primer mixture for sequence determination at the 3' ends of cDNAs. *Anal. Biochem.*, 190 (1990) 314-316.
- 1130 Wani, A.A. and Yamasaki, E.F.: Quantitative analysis of carbodiimide modified DNA and immunoprobng by adduct specific antibodies. *Biochim. Biophys. Acta*, 1088 (1991) 259-269.
- 1131 West, S., Schröder, J. and Kunz, W.: A multiple-staining procedure for the detection of different DNA fragments on a single blot. *Anal. Biochem.*, 190 (1990) 254-258.
- 1132 Yakhnin, A.V., Vorozheykina, D.P. and Matvienko, N.I.: (Molecular cloning and sequence determination of the fus gene coding for the elongation factor G of *Thermus thermophilus* HB8). *Biokhimiya (Moscow)*, 55 (1990) 1539-1552.
- See also 1044, 1051, 1058, 1062, 1091.

21f. Complex mixtures of nucleic acids and their fragments

- 1133 Lührmann, R., Kastner, B. and Bach, M.: Structure of spliceosomal snRNPs and their role in pre-mRNA splicing. *Biochim. Biophys. Acta*, 1087 (1990) 265-292 - a review dealing partly with electrophoresis.
- 1134 Revzin, A.: Analyzing DNA-protein interactions by gel electrophoresis. *J. Chem. Educ.*, 67 (1990) 749-753; *C.A.*, 113 (1990) 210873q.

22. ALKALOIDS

See 533.

23. OTHER SUBSTANCES CONTAINING HETEROCYCLIC NITROGEN

23a. *Porphyrins and other pyrroles*

1135 Weinberger, R., Sapp, E. and Moring, S.: Capillary electrophoresis of urinary porphyrins with absorbance and fluorescence detection. *J. Chromatogr.*, 516 (1990) 271-285.

25. ORGANIC PHOSPHORUS COMPOUNDS (INCL. SUGAR PHOSPHATES)

See 628.

26. ORGANOMETALLIC AND RELATED COMPOUNDS

26c. *Coordination compounds*

1136 Tanaka, S., Kaneta, T., Nishimura, K. and Yoshida, H.: Capillary tube isotachophoretic separation of lanthanide complexes using polyaminocarboxylic acid as terminating ion. *J. Chromatogr.*, 540 (1991) 475-478.

27. VITAMINS AND VARIOUS ANIMAL GROWTH FACTORS (NON-PEPTIDIC)

See 863.

28. ANTIBIOTICS

1137 Fox, K.R.: Footprinting studies of the interaction of quinomycin antibiotic UK63052 with DNA: comparison with echinomycin. *J. Antibiot.*, 43 (1990) 1307-1315.

1138 Fujishita, O., Nakashima, K., Hirakawa, M., Otsubo, K., Higuchi, S. and Aoyama, T.: Estimation of the molecular volumes of the reaction products between β -lactam antibiotics and aminoglycoside antibiotics, and those of the degradation products of β -lactam antibiotics by isotachophoresis. *Chem. Pharm. Bull.*, 38 (1990) 2518-2522.

1139 Goldberg, S.L., Romero, J.G. and Deo, Y.M.: Cloning and characterization of the sisomicin-resistance gene from *Micromonospora ingoensis*. *J. Antibiot.*, 43 (1990) 992-999.

1140 Tsikas, D., Hofrichter, A. and Brunner, G.: Capillary isotachophoretic analysis of β -lactam antibiotics and their precursors. *Chromatographia*, 30 (1990) 657-662.

1141 Yamashita, Y., Saitoh, Y., Ando, K., Takahashi, K., Ohno, H. and Nakano, H.: Saintopin, a new antitumor antibiotic with topoisomerase II dependent DNA cleavage activity, from *Paecilomyces*. *J. Antibiot.*, 43 (1990) 1344-1346.

30. SYNTHETIC AND NATURAL DYES

30a. Synthetic dyes

- 1142 Schroeder, J.: (Acid-base properties of pigments). *Farbe Lacke*, 96 (1990) 91-98; *C.A.*, 113 (1990) 213889k.

30b. Chloroplast and other natural pigments

- 1143 Ubillas Sanchez, R. and Lock de Ugaz, O.: (Separation of pigments of *Amaranthus caudatus* L. var. *atropurpureus*). *Bol. Soc. Quim. Peru*, 55 (1989) 1-12; *C.A.*, 113 (1990) 213846u.

See also 690.

31. PLASTICS AND THEIR INTERMEDIATES

- 1144 Amankwa, L.N., Scholl, J. and Kuhr, W.G.: Characterization of the oligomeric dispersion of poly(oxyalkylene)diamine polymers by precolumn derivatization and capillary zone electrophoresis with fluorescence detection. *Anal. Chem.*, 62 (1990) 2189-2193.
- 1145 Jones, H.K. and Ballou, N.E.: Separation of chemically different latex particles by capillary electrophoresis. *Anal. Chem.*, 62 (1990) 2484-2490.
- 1146 Shimizu, K., Sakai, N. and Takahashi, A.: Agarose gel electrophoresis of polyelectrolytes. *Polym. J. (Tokyo)*, 22 (1990) 901-907; *C.A.*, 113 (1990) 213089z.
- 1147 Versmold, H. and Palberg, T.: Electrophoretic light scattering revisited: the role of electroosmosis. *NATO ASI Ser., Ser. C.*, 291 (1989) 439-453; *C.A.*, 113 (1990) 213063m.

32. DRUG ANALYSIS

32a. Drug analysis, general techniques

- 1148 Altria, K.D. and Smith, N.W.: Pharmaceutical analysis by capillary zone electrophoresis and micellar electrokinetic capillary chromatography. *J. Chromatogr.*, 538 (1991) 506-509.
- 1149 Nielsen, R.G. and Rickard, E.C.: Applications of capillary zone electrophoresis to quality control. *ACS Symp. Ser.*, 434 (1990) 36-49; *C.A.*, 113 (1990) 198095c.

32d. Central nervous system drugs

- 1150 Chmela, Z. and Stransky, Z.: (Analytical capillary isotachopheresis of some psychopharmacological agents). *Cesk. Farm.*, 39 (1990) 172-176; *C.A.*, 113 (1990) 158809g.
- 1151 Jokl, V., Koubalikova, I. and Vitkovic, B.: (Capillary isotachopheresis of moxastin and embramine). *Cesk. Farm.*, 39 (1990) 168-171; *C.A.*, 113 (1990) 158808f.

32g. Other drug categories

- 1152 Mays, D.C., Hilliard, J.B., Wong, D.D., Chambers, M.A., Park, S.S., Gelboin, H.V. and Gerber, N.: Bioactivation of 8-methoxypsoralen and irreversible inactivation of cytochrome P-450 in mouse liver microsomes: modification by monoclonal antibodies, inhibition of drug metabolism and distribution of covalent adducts. *J. Pharmacol. Exp. Ther.*, 254 (1990) 720-731.

See also 609.

33. CLINICO-CHEMICAL APPLICATIONS

33a. General papers and reviews

- 1153 Chen, F.-T.A., Liu, C.-M., Hsieh, Y.-Z. and Sternberg, J.C.: Capillary electrophoresis - a new clinical tool. *Clin. Chem. (Winston-Salem)*, 37 (1991) 14-19 - a review with 16 refs.

33b. Complex mixtures and profiling (single compounds by cross-reference only)

- See 522, 571, 576, 577, 580, 584, 592, 594, 595, 597, 611, 626, 704, 713, 715, 716, 728, 859, 862, 867, 873, 911, 941, 944, 945, 949, 967, 997, 1066, 1073, 1082, 1085, 1135.

34. FOOD ANALYSIS

34b. Complex mixtures (single compounds by cross-reference only)

- 1154 An, H.: Electrophoretic and immunochemical identification of seafood species using shrimp as a model. Avail. *Univ. Microfilms Int.*, Order No. DA9021170, 1989, 192 pp.; *C.A.*, 114 (1991) 4973q.
- 1155 Jtten, E.L., Pistola, S.E., Mulet, M.C., Pasquare, N.J. and Sotorres, A.M.: (Fish species identification by polyacrylamide gel electrophoresis: *Micropogon opercularis*, *Micropogon barretoii* and *Pogonias courbina*). *An. Bromatol.* 1989, 41 (1990) 367-374; *C.A.*, 113 (1990) 210374c.

See also 605, 699, 761, 883.

35. ENVIRONMENTAL ANALYSIS

35c. Water pollution (complex mixtures; single compounds by cross-reference only)

- 1156 Fair, M.C. and Anderson, J.L.: Electrophoresis of dumbbell-like colloidal particles. *Int. J. Multiphase Flow*, 16 (1990) 663-679; *C.A.*, 113 (1990) 178959j.

36. SOME TECHNICAL PRODUCTS AND COMPLEX MIXTURES

36a. Surfactants

1157 Zweigenbaum, J.: Separation of anionic surfactant components by capillary electrophoresis and micellar electrokinetic capillary chromatography using P/ACE System 2000. *Chromatogram*, 11 (1990) 9-10; *C.A.*, 113 (1990) 204210e.

36c. Complex mixtures, technical products and unidentified compounds

1158 Avena, M.J., Cabrol, R. and de Pauli, C.P.: Study of some physicochemical properties of pillared montmorillonites: Acid-base potentiometric titrations and electrophoretic measurements. *Clays Clay Miner.*, 38 (1990) 356-362; *C.A.*, 113 (1990) 194953h.

1159 Shikov, A.K., Kalinin, N.B., Gorshkov, T.P. and Zyablov, V.M.: (Use of electrophoresis for producing composite high-temperature superconductors). *Vysokotemperaturn. Sverkhprovodimost, Moskva*, (1989) 21-23; *C.A.*, 113 (1990) 242758x.

37. CELLS, CELLULAR PARTICLES AND SUPRAMOLECULAR STRUCTURES

1160 Cox, E.C., Vocke, C.D., Walter, S., Gregg, K.Y. and Bain, E.S.: Electrophoretic karyotype for *Dictyostelium discoideum*. *Proc. Natl. Acad. Sci. U.S.A.*, 87 (1990) 8247-8251; *C.A.*, 114 (1991) 3275b.

1161 Smith, C.L., Abad, J.P. and Condemine, G.: Pulsed field gel electrophoretic snapshots of chromosomes. In: Okuda, K. (Editor), *Autom. New Technol. Clin. Laab., Proc. IUPAC Int. Congr., 3rd 1988*, Blackwell, Oxford, 1990, pp. 43-46; *C.A.*, 113 (1990) 205545e - a review with 24 refs.

See also 658, 692.

38. INORGANIC COMPOUNDS

38a. Cations

1162 Hine, T.: (Determination of iron(III) in water by electrophoresis). *Jpn. Kokai Tokkyo Koho* JP 02,156,149 (90,156,149) (Cl. G01N27/447), 15 Jun. 1990, Appl. 88/309,621,07 Dec. 1988; 5 p.; *C.A.*, 114 (1991) 11927f.

1163 Hirokawa, T., Hu, J.-Y., Eguchi, S., Nishiyama, F. and Kiso, Y.: Study of isotachophoretic separation behaviour of metal cations by means of particle-induced X-ray emission. I. Separation of twenty metal cations using an acetic acid buffer system and α -hydroxyisobutyric acid complex-forming system. *J. Chromatogr.*, 538 (1991) 413-423.

1164 Ishiyama, T., Matsuda, Y. and Kiyoda, S.: Analysis of rare earth elements in seawater submarine deposit. Attempt to separate rare earth elements by isotachophoresis. *Rep. Osaka Prefect. Radiat. Res. Inst.*, 30 (1990) 13-19; *C.A.*, 113 (1990) 237406b.

See also 1136.

39. RADIOACTIVE AND OTHER ISOTOPE COMPOUNDS

1165 Huang, T., Jiang, H., Yan, W. and Xu, C.: (selection of methods for determining radiochemical purity of ^{201}Tl thallos chloride). *Hejishu*, 13 (1990) 172-175; *C.A.*, 113 (1990) 223660t.

See also 497.

PUBLICATION SCHEDULE FOR 1991

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