

**Bibliography Section****Please note**

The pagination of Vol. 650 continues  
from that of Vol. 649.

JOURNAL OF

**CHROMATOGRAPHY**

INCLUDING ELECTROPHORESIS AND OTHER SEPARATION METHODS

**EDITORS**

- U.A.Th. Brinkman (Amsterdam)
- R.W. Giese (Boston, MA)
- J.K. Haken (Kensington, N.S.W.)
- K. Macek (Prague)
- L.R. Snyder (Orinda, CA)

**EDITORS, SYMPOSIUM VOLUMES,  
E. Heftmann (Orinda, CA), Z. Deyl (Prague)****EDITORIAL BOARD**

- D.W. Armstrong (Rolla, MO)
- W.A. Aue (Halifax)
- P. Boček (Brno)
- A.A. Boulton (Saskatoon)
- P.W. Carr (Minneapolis, MN)
- N.H.C. Cooke (San Ramon, CA)
- V.A. Davankov (Moscow)
- Z. Deyl (Prague)
- S. Dill (Kensington, N.S.W.)
- H. Engelhardt (Saarbrücken)
- F. Erni (Basle)
- M.B. Evans (Hatfield)
- J.L. Glajch (N. Billerica, MA)
- G.A. Guiochon (Knoxville, TN)
- P.R. Haddad (Hobart, Tasmania)
- I.M. Hais (Hradec Králové)
- W.S. Hancock (San Francisco, CA)
- S. Hjerten (Uppsala)
- S. Honda (Higashi-Osaka)
- Cs. Horváth (New Haven, CT)
- J.F.K. Huber (Vienna)
- K.-P. Hupe (Waldbonn)
- T.W. Hutchens (Houston, TX)
- J. Janák (Brno)
- P. Jandera (Pardubice)
- B.L. Karger (Boston, MA)
- J.J. Kirkland (Newport, DE)
- E. sz. Kováts (Lausanne)
- A.J.P. Martin (Cambridge)
- L.W. McLaughlin (Chestnut Hill, MA)
- E.D. Morgan (Keele)
- J.D. Pearson (Kalamazoo, MI)
- H. Poppe (Amsterdam)
- F.E. Regnier (West Lafayette, IN)
- P.G. Righetti (Milan)
- P. Schoenmakers (Eindhoven)
- R. Schwarzenbach (Dübendorf)
- R.E. Shoup (West Lafayette, IN)
- R.P. Singhal (Wichita, KS)
- A.M. Sloutti (Marseille)
- D.J. Strydom (Boston, MA)
- N. Tanaka (Kyoto)
- S. Terabe (Hyogo)
- K.K. Unger (Mainz)
- R. Verpoorte (Leiden)
- Gy. Vigh (College Station, TX)
- J.T. Watson (East Lansing, MI)
- B.U. Westerlund (Uppsala)

**EDITORS, BIBLIOGRAPHY SECTION**

- Z. Deyl (Prague), J. Janák (Brno), V. Schwartz (Prague)

**ELSEVIER**

# JOURNAL OF CHROMATOGRAPHY

INCLUDING ELECTROPHORESIS AND OTHER SEPARATION METHODS

**Scope.** The *Journal of Chromatography* publishes papers on all aspects of **chromatography, electrophoresis** and related methods. Contributions consist mainly of research papers dealing with chromatographic theory, instrumental developments and their applications. The section *Biomedical Applications*, which is under separate editorship, deals with the following aspects: developments in and applications of chromatographic and electrophoretic techniques related to clinical diagnosis or alterations during medical treatment; screening and profiling of body fluids or tissues related to the analysis of active substances and to metabolic disorders; drug level monitoring and pharmacokinetic studies; clinical toxicology; forensic medicine; veterinary medicine; occupational medicine; results from basic medical research with direct consequences in clinical practice. In *Symposium volumes*, which are under separate editorship, proceedings of symposia on chromatography, electrophoresis and related methods are published.

**Submission of Papers.** The preferred medium of submission is on disk with accompanying manuscript (see *Electronic manuscripts* in the Instructions to Authors, which can be obtained from the publisher, Elsevier Science Publishers B.V., P.O. Box 330, 1000 AH Amsterdam, Netherlands). Manuscripts (in English; *four* copies are required) should be submitted to: Editorial Office of *Journal of Chromatography*, P.O. Box 681, 1000 AR Amsterdam, Netherlands, Telefax (+31-20) 5862 304, or to: The Editor of *Journal of Chromatography, Biomedical Applications*, P.O. Box 681, 1000 AR Amsterdam, Netherlands. Review articles are invited or proposed in writing to the Editors who welcome suggestions for subjects. An outline of the proposed review should first be forwarded to the Editors for preliminary discussion prior to preparation. Submission of an article is understood to imply that the article is original and unpublished and is not being considered for publication elsewhere. For copyright regulations, see below.

**Publication.** The *Journal of Chromatography* (incl. *Biomedical Applications*) has 40 volumes in 1993. The subscription prices for 1993 are:

*J. Chromatogr.* (incl. *Cum. Indexes*, Vols. 601-650) + *Biomed. Appl.* (Vols. 612-651):  
Dfl. 8520.00 plus Dfl. 1320.00 (p.p.h.) (total ca. US\$ 5466.75)

*J. Chromatogr.* (incl. *Cum. Indexes*, Vols. 601-650) only (Vols. 623-651):  
Dfl. 7047.00 plus Dfl. 957.00 (p.p.h.) (total ca. US\$ 4446.75)

*Biomed. Appl.* only (Vols. 612-622):

Dfl. 2783.00 plus Dfl. 363.00 (p.p.h.) (total ca. US\$ 1747.75).

**Subscription Orders.** The Dutch guilder price is definitive. The US\$ price is subject to exchange-rate fluctuations and is given as a guide. Subscriptions are accepted on a prepaid basis only, unless different terms have been previously agreed upon. Subscriptions orders can be entered only by calendar year (Jan.-Dec.) and should be sent to Elsevier Science Publishers, Journal Department, P.O. Box 211, 1000 AE Amsterdam, Netherlands, Tel. (+31-20) 5803 642, Telefax (+31-20) 5803 598, or to your usual subscription agent. Postage and handling charges include surface delivery except to the following countries where air delivery via SAL (Surface Air Lift) mail is ensured: Argentina, Australia, Brazil, Canada, China, Hong Kong, India, Israel, Japan\*, Malaysia, Mexico, New Zealand, Pakistan, Singapore, South Africa, South Korea, Taiwan, Thailand, USA. \*For Japan air delivery (SAL) requires 25% additional charge of the normal postage and handling charge. For all other countries airmail rates are available upon request. Claims for missing issues must be made within six months of our publication (mailing) date, otherwise such claims cannot be honoured free of charge. Back volumes of the *Journal of Chromatography* (Vols. 1-611) are available at Dfl. 230.00 (plus postage). Customers in the USA and Canada wishing information on this and other Elsevier journals, please contact Journal Information Center, Elsevier Science Publishing Co. Inc., 655 Avenue of the Americas, New York, NY 10010, USA, Tel. (+1-212) 633 3750, Telefax (+1-212) 633 3764.

**Abstracts/Contents Lists** published in Analytical Abstracts, Biochemical Abstracts, Biological Abstracts, Chemical Abstracts, Chemical Titles, Chromatography Abstracts, Current Awareness in Biological Sciences (CABS), Current Contents/Life Sciences, Current Contents/Physical, Chemical & Earth Sciences, Deep-Sea Research/Part B: Oceanographic Literature Review, Excerpta Medica, Index Medicus, Mass Spectrometry Bulletin, PASCAL-CNRS, Referativnyi Zhurnal, Research Alert and Science Citation Index.

**US Mailing Notice.** *Journal of Chromatography* (ISSN 0021-9673) is published weekly (total 52 issues) by Elsevier Science Publishers (Sara Burgerhartstraat 25, P.O. Box 211, 1000 AE Amsterdam, Netherlands). Annual subscription price in the USA US\$ 4446.75 (subject to change), including air speed delivery. Second class postage paid at Jamaica, NY 11431. **USA POSTMASTERS:** Send address changes to *Journal of Chromatography*, Publications Expediting, Inc., 200 Meacham Avenue, Elmont, NY 11003. Airfreight and mailing in the USA by Publications Expediting.

See inside back cover for Publication Schedule, Information for Authors and information on Advertisements.

© 1993 ELSEVIER SCIENCE PUBLISHERS B.V. All rights reserved.

0021-9673/93/\$06.00

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher, Elsevier Science Publishers B.V., Copyright and Permissions Department, P.O. Box 521, 1000 AM Amsterdam, Netherlands.

Upon acceptance of an article by the journal, the author(s) will be asked to transfer copyright of the article to the publisher. The transfer will ensure the widest possible dissemination of information.

**Special regulations for readers in the USA.** This journal has been registered with the Copyright Clearance Center, Inc. Consent is given for copying of articles for personal or internal use, or for the personal use of specific clients. This consent is given on the condition that the copier pays through the Center the per-copy fee stated in the code on the first page of each article for copying beyond that permitted by Sections 107 or 108 of the US Copyright Law. The appropriate fee should be forwarded with a copy of the first page of the article to the Copyright Clearance Center, Inc., 27 Congress Street, Salem, MA 01970, USA. If no code appears in an article, the author has not given broad consent to copy and permission to copy must be obtained directly from the author. All articles published prior to 1980 may be copied for a per-copy fee of US\$ 2.25, also payable through the Center. This consent does not extend to other kinds of copying, such as for general distribution, resale, advertising and promotion purposes, or for creating new collective works. Special written permission must be obtained from the publisher for such copying.

No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the materials herein. Because of rapid advances in the medical sciences, the Publisher recommends that independent verification of diagnoses and drug dosages should be made.

Although all advertising material is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer.

This issue is printed on acid-free paper.

VOL. 650, NO. 1

JOURNAL OF CHROMATOGRAPHY

SEPTEMBER 17, 1993

CONTENTS

*Bibliography Section*

Liquid Column Chromatography . . . . .	B257
Gas Chromatography . . . . .	B313
Planar Chromatography . . . . .	B330
Electrophoresis. . . . .	B343

ห้องสมุดฯ รวมวารสารศาสตร์บริการ

๑๘ ๗.๔. ๒๕๓๖



JOURNAL OF CHROMATOGRAPHY

VOL. 650 (1993)



# JOURNAL of CHROMATOGRAPHY

INCLUDING ELECTROPHORESIS AND OTHER SEPARATION METHODS

## EDITORS

U.A.Th. BRINKMAN (Amsterdam), R.W. GIESE (Boston, MA), J.K. HAKEN (Kensington, N.S.W.), K. MACEK (Prague),  
L.R. SNYDER (Orinda, CA)

## EDITORS, SYMPOSIUM VOLUMES

E. HEFTMANN (Orinda, CA), Z. DEYL (Prague)

## EDITORIAL BOARD

D.W. Armstrong (Rolla, MO), W.A. Aue (Halifax), P. Boček (Brno), A.A. Boulton (Saskatoon), P.W. Carr (Minneapolis, MN), N.H.C. Cooke (San Ramon, CA), V.A. Davankov (Moscow), Z. Deyl (Prague), S. Dilli (Kensington, N.S.W.), H. Engelhardt (Saarbrücken), F. Erni (Basle), M.B. Evans (Hatfield), J.L. Glajch (N. Billerica, MA), G.A. Guiochon (Knoxville, TN), P.R. Haddad (Hobart, Tasmania), I.M. Hais (Hradec Králové), W.S. Hancock (San Francisco, CA), S. Hjertén (Uppsala), S. Honda (Higashi-Osaka), Cs. Horváth (New Haven, CT), J.F.K. Huber (Vienna), K.-P. Hupe (Waldbonn), T.W. Hutchens (Houston, TX), J. Janák (Brno), P. Jandera (Pardubice), B.L. Karger (Boston, MA), J.J. Kirkland (Newport, DE), E. sz. Kováts (Lausanne), A.J.P. Martin (Cambridge), L.W. McLaughlin (Chestnut Hill, MA), E.D. Morgan (Keele), J.D. Pearson (Kalamazoo, MI), H. Poppe (Amsterdam), F.E. Regnier (West Lafayette, IN), P.G. Righetti (Milan), P. Schoenmakers (Eindhoven), R. Schwarzenbach (Dübendorf), R.E. Shoup (West Lafayette, IN), R.P. Singhal (Wichita, KS), A.M. Siouffi (Marseille), D.J. Strydom (Boston, MA), N. Tanaka (Kyoto), S. Terabe (Hyogo), K.K. Unger (Mainz), R. Verpoorte (Leiden), Gy. Vigh (College Station, TX), J.T. Watson (East Lansing, MI),  
B.D. Westerlund (Uppsala)

## EDITORS, BIBLIOGRAPHY SECTION

Z. Deyl (Prague), J. Janák (Brno), V. Schwarz (Prague)



ELSEVIER  
AMSTERDAM — LONDON — NEW YORK — TOKYO

---

*J. Chromatogr.*, Vol. 650 (1993)

The *Bibliography Section* 1993 will be published in two volumes (649 and 650) of two issues each. Combined indexes to both volumes will appear in the last issue of the year, Vol. 650, No. 2.

© 1993 ELSEVIER SCIENCE PUBLISHERS B.V. All rights reserved.

0021-9673/93/\$06.00

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher, Elsevier Science Publishers B.V., Copyright and Permissions Département, P.O. Box 521, 1000 AM Amsterdam, Netherlands.

Upon acceptance of an article by the journal, the author(s) will be asked to transfer copyright of the article to the publisher. The transfer will ensure the widest possible dissemination of information.

Submission of an article for publication entails the authors' irrevocable and exclusive authorization of the publisher to collect any sums or considerations for copying or reproduction payable by third parties (as mentioned in article 17 paragraph 2 of the Dutch Copyright Act of 1912 and the Royal Decree of June 20, 1974 (S. 351) pursuant to article 16 b of the Dutch Copyright Act of 1912) and/or to act in or out of Court in connection therewith.

**Special regulations for readers in the USA.** This journal has been registered with the Copyright Clearance Center, Inc. Consent is given for copying of articles for personal or internal use, or for the personal use of specific clients. This consent is given on the condition that the copier pays through the Center the per-copy fee stated in the code on the first page of each article for copying beyond that permitted by Sections 107 or 108 of the US Copyright Law. The appropriate fee should be forwarded with a copy of the first page of the article to the Copyright Clearance Center, Inc., 27 Congress Street, Salem, MA 01970, USA. If no code appears in an article, the author has not given broad consent to copy and permission to copy must be obtained directly from the author. All articles published prior to 1980 may be copied for a per-copy fee of US\$ 2.25, also payable through the Center. This consent does not extend to other kinds of copying, such as for general distribution, resale, advertising and promotion purposes, or for creating new collective works. Special written permission must be obtained from the publisher for such copying.

No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the materials herein. Because of rapid advances in the medical sciences, the Publisher recommends that independent verification of diagnoses and drug dosages should be made.

Although all advertising material is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer.  
This issue is printed on acid-free paper.

Printed in the Netherlands

# BIBLIOGRAPHY SECTION

SUPPLEMENT TO THE  
JOURNAL OF CHROMATOGRAPHY  
1993

## EDITORS:

Z. DEYL (Prague)  
J. JANAK (Brno)  
V. SCHWARZ (Prague)















## Bibliography Section

### Liquid Column Chromatography

#### 1. REVIEWS AND BOOKS

- 3029 Ahuja, S. (Editor): *Chromatography in Pharmaceuticals: Natural, Synthetic, and Recombinant Products*. ACS Symp. Ser., Vol. 512, ACS, Washington, 1992, 211 p.; C.A., 118 (1993) 66986n.  
3030 Hopper, M.L.: Solid-phase partition column technology. In: Cairns, T. and Sherma, J. (Editors), *Emerging Strategies Pestic. Anal.*, CRC, Boca Raton, 1992, pp. 39-50; C.A., 118 (1993) 96112s - a review with 32 refs.  
3031 Luque de Castro, M.D.: The role of flow injection analysis in speciation studies. *Microchim. Acta*, 109 (1992) 165-168; C.A., 118 (1993) 72591w - an overview.  
3032 Michielsen, M. and Schusud, F.: (Chromatography and electrophoresis: a strong combination). *Chem. Mag. (Ghent)*, 18 (1992) 87-88; C.A., 118 (1993) 55300h - a review with no refs.  
3033 Moskvin, L.N. and Katykhin, G.S.: (Chromatography: methodology and terminology aspects). *Zh. Anal. Khim.*, 47 (1992) 1508-1515. C.A., 118 (1993) 67356u - a review with 4 refs.  
3034 Szepesi, G.: *How to Use Reverse-Phase HPLC*. VCH, New York, 1992, 356 p.; C.A., 118 (1993) 72755c.  
3035 Van de Merbel, N.C., Hageman, J.J. and Brinkman, U.A.T.: Membrane-based sample preparation for chromatography. *J. Chromatogr.*, 634 (1993) 1-29 - a review with 86 refs.  
3036 Zou, H., Zhang, Y. and Lu, P.: Reversed-phase ion-pair liquid chromatography and its application. *Sepu*, 10 (1992) 329-333; C.A., 118 (1993) 72784m - a review with 55 refs.

See also 3044, 3049, 3075, 3086, 3088, 3101, 3112, 3138, 3147, 3156, 3167, 3176, 3179, 3189, 3208, 3210, 3362, 3500, 3538, 3585, 3634, 3814, 3906, 3914, 3987, 4004, 4005, 4006, 4008, 4011, 4018, 4023, 4024, 4065, 4093, 4117, 4123, 4125, 4145, 4212, 4367, 4386, 4387, 4394, 4424.

#### 2. FUNDAMENTALS, THEORY AND GENERAL

##### 2a. General

- 3037 Abe, S., Sone, T., Fujii, K. and Endo, M.: Liquid-liquid extraction of transition metal ions with macrocyclic Schiff bases containing phenol or thiophene subunits. *Anal. Chim. Acta*, 274 (1993) 141-146.  
3038 Baan, C., VanGoethem, I., Hordnes, S.M., Landsem, H.G. and Molid, S.: (Optimization of HPLC separations by the Synder method). *Kjemi*, 52 (1992) 4-6; C.A., 118 (1993) 138916q.

- 3039 Becker, R., Ihde, J., Cox, K. and Sarquis, J.L.: Making radial chromatography creative chromatography: for fun flowers on fabrics. *J. Chem. Educ.*, 69 (1992) 979-980; C.A., 118 (1993) 101196d.  
3040 Bradley, J.C. and Durst, T.: Visualization of column chromatography. *Tetrahedron Lett.*, 33 (1992) 7733-7734; C.A., 118 (1993) 123789b.  
3041 Buccigross, J.M.: T-Shirt chromatography: a chromatogram you can wear. *J. Chem. Educ.*, 69 (1992) 977-978; C.A., 118 (1993) 101195c.  
3042 Dolan, J.W.: Preventive maintenance-just three things. *LC-GC*, 10 (1992) 842-848; C.A., 118 (1993) 72788r.  
3043 Ettre, L.S. and Sakodyniskii, K.I.: Tswett and the discovery of chromatography II: completion of the development of chromatography. *Chromatographia*, 35 (1993) 329-338.  
3044 Fischer, S.: (Ion chromatography (IC)). *Oesterr. Chem. Z.*, 93 (1992) 349-351; C.A., 118 (1993) 138702s - a review with 2 refs.  
3045 Helfferich, F.G.: Golay's paradox: linear versus non-linear chromatography. *J. Chromatogr.*, 634 (1993) 334-337.  
3046 Kimbrough, D.R.: Supermarket column chromatography of leaf pigments. *J. Chem. Educ.*, 69 (1992) 987-988; C.A., 118 (1993) 101199g.  
3047 Laurent, T.C.: History of a theory. *J. Chromatogr.*, 633 (1993) 1-8.  
3048 Liu, G., Svenson, L., Djordjevic, N. and Erni, F.: Extra-column band broadening in high-temperature open-tubular liquid chromatography. *J. Chromatogr.*, 633 (1993) 25-30.  
3049 Majors, R.E.: Trends in sample preparation. *LC-GC*, 10 (1992) 912-918; C.A., 118 (1993) 115931b - a review with 11 refs.  
3050 McLoughlin, D.J.: Size-exclusion chromatography: separating large molecules from small. *J. Chem. Educ.*, 69 (1992) 993-995; C.A., 118 (1993) 101203d.  
3051 Ouchi, G.I.: Incorporating chromatograms into reports. *LC-GC*, 10 (1992) 759-760; C.A., 118 (1993) 58943f.  
3052 Stegeman, G., Kraak, J.C. and Poppe, H.: Dispersion in packed-column hydrodynamic chromatography. *J. Chromatogr.*, 634 (1993) 149-159.  
3053 Wigman, L.S. and Kelsch, C.T.: Separation science and chromatography: a colorful introduction. *J. Chem. Educ.*, 69 (1992) 991-992; C.A., 118 (1993) 101202c.

For additional information see C.A.:  
118 (1993) 138941u.

See also 3033, 3035, 3069, 3074, 3581, 3826, 4119, 4317.

## 2b. Thermodynamics and theoretical relationships

- 3054 Blumberg, L.M.: Variance of a zone migrating in a linear medium. II. Time-varying non-uniform medium. *J. Chromatogr.*, 637 (1993) 119-128.
- 3055 Chen, N., Zhang, Y. and Lu, P.: Effects of molecular structure on the log  $k'_w$  index and linear S-log  $k'_w$  correlation in reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 633 (1993) 31-41.
- 3056 Dimov, N.: (A new treatment of chromatographic retention data). *Izv. Khim.*, 24 (1991) 145-150; C.A., 118 (1993) 67421m.
- 3057 Fellinger, A. and Guiuchon, G.: Comparison of maximum production rates and optimum operating/desing parameters in overloaded elution and displacement chromatography. *Biotechnol. Bioeng.*, 41 (1993) 134-147; C.A., 118 (1993) 67603x.
- 3058 Hayashi, Y. and Matsuda, R.: Optimization theory of chromatography. *Chemom. Intell. Lab. Syst.*, 18 (1993) 1-16; C.A., 118 (1993) 138703t.
- 3059 Hejtmánek, V. and Schneider, P.: Axial dispersion under liquid-chromatography conditions. *Chem. Eng. Sci.*, 48 (1993) 1163-1168; C.A., 118 (1993) 127308s.
- 3060 Jacobson, S.C., Fellinger, A. and Guiuchon, G.: Optimizing the sample size and the retention parameters to achieve maximum production rates for enantiomers in chiral chromatography. *Biotechnol. Bioeng.*, 40 (1992) 1210-1217; C.A., 118 (1993) 66820d.
- 3061 Liang, Y.-Z. and Kvalheim, O.M.: Unique resolution of hidden minor peaks in multidetection chromatography by first-order differentiation and orthogonal projections. *Anal. Chim. Acta*, 276 (1993) 425-440.
- 3062 Marczewski, A.W. and Jaroniec, M.: Theory of ion-pair reversed-phase liquid chromatography on energetically heterogenous solid surfaces. *Langmuir*, 9 (1993) 749-755; C.A., 118 (1993) 132926w.
- 3063 Rodgers, A.H., Strasters, J.K. and Khaledi, M.G.: Simultaneous optimization of pH and micelle concentration in micellar liquid chromatography. *J. Chromatogr.*, 636 (1993) 203-212.
- 3064 Ulinskaya, N.N., Shadrina, N.E., Korsakov, V.G. and Ivanchev, S.S.: (Use of the linear free energy relationship principle for predicting retention on fluoropolymer sorbents). *Zh. Fiz. Khim.*, 66 (1992) 2235-2239; C.A., 118 (1993) 110323v.
- 3065 Zhu, J. and Guiuchon, G.: The shock layer thickness, a new approach to the study of column performance in non-linear chromatography. I. Optimum linear velocity in frontal analysis. *J. Chromatogr.*, 636 (1993) 189-202.
- 3066 Zou, H., Zhang, Y., Hong, M. and Lu, P.: Correlation of sulfonic acid retention values in RP-IPC with retention values in RP-HPLC and ion chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1069-1082.

For additional information see C.A.:  
118 (1993) 110418e.

See also 3107, 3136, 3143, 3168, 3191, 3331, 3469, 3984, 3986, 4433.

## 2c. Relationship between structure and chromatographic behaviour

- 3067 Forgacs, E. and Cserháti, T.: Dependence of the retention of some barbituric acid derivatives on a porous graphitized carbon column on their physicochemical parameters. *J. Pharm. Biomed. Anal.*, 10 (1992) 861-865.
- 3068 Husain, P.A., Debnath, J. and May, S.W.: HPLC-based method for determination of absolute configuration of  $\alpha$ -chiral amines. *Anal. Chem.*, 65 (1993) 1456-1461.
- See also 3055, 3195, 4229.
- 2d. Measurement of physico-chemical and related values
- 3069 Barbosa, J. and Sanz-Nebot, V.: pH Measurements in acetonitrile-water mixtures by use of a glass electrode. *J. Pharm. Biomed. Anal.*, 10 (1992) 1047-1051.
- 3070 Cheung, P., Lew, R., Balke, S.T. and Mourey, T.H.: Size-exclusion chromatography-viscometer detector systems. II. Resolution correction and determination of interdetector volume. *J. Appl. Polym. Sci.*, 47 (1993) 1701-1706; C.A., 118 (1993) 125388u.
- 3071 Guaita, M. and Chiantore, O.: Simulation of size exclusion chromatograms from viscometry and refractometry detectors: an analysis of the influence of concentration errors on reliability of estimated parameters. *J. Liq. Chromatogr.*, 16 (1993) 633-646.
- 3072 Ilchmann, A., Wienke, G., Meyer, T. and Gmehling, J.: (Determination of partition coefficients by liquid/liquid countercurrent chromatography). *Chem.-Ing.-Tech.*, 65 (1993) 72-75; C.A., 118 (1993) 133193s.
- 3073 Lew, R., Cheung, P., Balke, S.T. and Mourey, T.H.: Size-exclusion chromatography-viscometer detector system. I. Calibration and determination of Mark-Houwink constants. *J. Appl. Polym. Sci.*, 47 (1993) 1685-1700; C.A., 118 (1993) 125387t.

For additional information see C.A.:  
118 (1993) 103162p.

See also 3206, 3210, 3288, 3291, 3331, 3449, 4134, 4137, 4227, 4404.

## 3. GENERAL TECHNIQUES

## 3a. Apparatus and accessories

- 3074 Deal, S.T.: An inexpensive flash chromatography apparatus for the teaching/research lab. *J. Chem. Educ.*, 69 (1992) 939; C.A., 118 (1993) 58939j.
- 3075 Dolan, J.W.: Column care and feeding. *LC-GC*, 11 (1993) 22-24; C.A., 118 (1993) 138883b - a review without refs.
- 3076 Hauke, G. and Saettler, G.: Sealing device for chromatographs. *Ger. Offen. DE 4,118,785 (Cl. G01N30/02)*, 10 Dec. 1992, Appl. 07 Jun. 1991; 4 p.; C.A., 118 (1993) 93612u.
- 3077 Kaleja, M.: Separation column for liquid chromatographs. *Ger. Offen. DE 4,106,631 (Cl. G01N30/60)*, 10 Sep. 1992, Appl. 28 Feb. 1991; 6 p.; C.A., 118 (1993) 93603s.
- 3078 Kikumoto, M.: Device and method for collecting components of a sample analyzed by chromatography. *Ger. Offen. DE 4,213,410 (Cl. G01N30/80)*, 19 Nov. 1992, JP Appl. 91/124683, 25 Apr. 1991; 7 p.; C.A., 118 (1993) 93482b.

- 3079 Lee, E.D. and Henion, J.D.: Thermally assisted electrospray interface for liquid chromatography/mass spectrometry. *Rapid Commun. Mass Spectrom.*, 6 (1992) 727-733; C.A., 118 (1993) 72800p.
- 3080 Ohta, H.: Absorbance analyzer and data-processing method for chromatograph. *Eur. Pat. Appl.* EP 521,358 (Cl. G01N30/74), 07 Jan. 1993, JP Appl. 91/186,792, 30 Jun. 1991; 11 p.; C.A., 118 (1993) 72894x.
- 3081 Schoester, M.: Phase separator for two-phase liquid mixtures. *Ger. Offen.* DE 4,114,729 (Cl. G01N1/28), 12 Nov. 1992, Appl. 06 May 1991; 5 p.; C.A., 118 (1993) 105410s.
- 3082 Simon, P.K. and Dasgupta, P.K.: Wet effluent denuder coupled liquid/ion chromatography systems: annular and parallel plate denuders. *Anal. Chem.*, 65 (1993) 1134-1139.
- 3083 Vozka, S. and Podolak, M.: Pump for chromatography. *Czech. CS 266,677* (Cl. G01N30/24), 03 Dec. 1990, Appl. 87/5,062, 06 Jul. 1987; 5 p.; C.A., 118 (1993) 115995a.

For additional information see C.A.:  
118 (1993) 116001r.

See also 3127, 3155, 3157, 3457.

### 3b. Detectors and detection reagents

- 3084 Afeyan, N.B. and Regnier, F.E.: On-line product identification in a chromatography effluent by subtraction. *PCT Int. Appl.* WO 92 17,259 (Cl. B01D15/08), 15 Oct. 1992, US Appl. 676,872, 28 Mar. 1991; 34 pp.; C.A., 118 (1993) 55590c.
- 3085 Allen, L.B. and Koropchak, J.A.: Condensation nucleation light scattering: a new approach to development of high-sensitivity, universal detectors for separations. *Anal. Chem.*, 65 (1993) 841-844.
- 3086 Bararakis, M.S. and Bachas, L.G.: Binding proteins in development of on-line postcolumn reaction detection systems for liquid chromatography. *ACS Symp. Ser.*, 512(Chromatogr. Pharm.) (1992) 135-143; C.A., 118 (1993) 58127t - a review with 29 refs.
- 3087 Berglund, I., Dasgupta, P.K., Lopez, J.L. and Nara, O.: Two-dimensional conductometric detection in ion chromatography: sequential suppressed and single column detection. *Anal. Chem.*, 65 (1993) 1192-1198.
- 3088 Goodall, D.M.: Chiral analysis based on polarimetric detection. *TrAC*, 12 (1993) 177-184 - a review with 29 refs.
- 3089 Henshall, A., Rabin, S., Statler, J. and Stillian, J.: A recent development in ion chromatography detection: The selfregenerating suppressor. *Am. Lab. (Shelton)*, 24 (1992) 20R, 20T, 20V, 20X, 20Z; C.A., 118 (1993) 138767s.
- 3090 Henshall, A., Rabin, S., Statler, J. and Stillian, J.: A recent development in ion chromatography detection: the self-regenerating suppressor. *Int. Lab.*, 23, No. 1 (1993) P8-P14.
- 3091 Irth, H., Oosterkamp, A.J., van der Welle, W., Tjaden, U.R. and van der Greef, J.: On-line immunochemical detection in liquid chromatography using fluorescein-labelled antibodies. *J. Chromatogr.*, 633 (1993) 65-72.
- 3092 Iwata, T., Nakamura, M. and Yamaguchi, M.: 4-(5,6-Dimethoxy-2-benzimidazoyl)benzohydrazide as fluorescence derivatization reagent for carboxylic acids in high-performance liquid chromatography. *Anal. Sci.*, 8 (1992) 889-892; C.A., 118 (1993) 72807w.

- 3093 Kolbert, J.H.: Critical angle refractive index detector. *U.S. US 5,139,661* (Cl. 210-198.2; B01D15/08), 18 Aug. 1992, Appl. 639,870, 11 Jan. 1991; 6 p.; C.A., 118 (1993) 115880j.
- 3094 Li, J.B.: Signal-to-noise optimization in HPLC UV detection. *LC-GC*, 10 (1992) 856-864; C.A., 118 (1993) 72842d.
- 3095 Polesello, A.: (Universal HPLC detector with many advantages). *Lab. 2000*, 6 (1992) 14-17; C.A., 118 (1993) 138900e.
- 3096 Sagar, A.D., Sofia, S.J. and Merrill, E.W.: Estimation of inter-detector lag in multi-detection gel permeation chromatography. *J. Chromatogr.*, 635 (1993) 132-136.
- 3097 Sellergren, B.: Molecular imprinting by noncovalent interactions. in: Epton, R. (Editor), *Innovation Perspect. Solid Phase Synth. Collect., Int. Symp.*, 1st 1989, SPCC, Birmingham, 1990, pp. 293-306; C.A., 118 (1993) 72815x.
- 3098 Sorrels, J.W.: The development of a reticulated vitreous carbon-based thin-layer spectroelectrochemical detector for flow injection analysis and liquid chromatography. Avail. *Univ. Microfilms Int.*, Order No. 92008877, 1991, 122 p.; C.A., 118 (1993) 138907n.
- 3099 Svendsen, C.N.: Multi-electrode array detectors in high-performance liquid chromatography: A new dimensions in electrochemical analysis. *Analyst (London)*, 118 (1993) 123-129.
- 3100 Young, E.F.: Double beam detector system for liquid chromatographs. *U.S. US 5,173,742* (Cl. 356-319; G01J3/42), 22 Dec. 1992, Appl. 751,415, 28 Aug. 1991; 7 p.; C.A., 118 (1993) 115896u.
- 3101 Zhang, S.: (Recent developments of detection techniques in high performance liquid chromatography - two new detectors and their applications). *Sepu*, 11 (1993) 17-22; C.A., 118 (1993) 138887f - a review with 21 refs.

For additional information see C.A.:  
118 (1993) 72795s, 115872h.

- See also 3061, 3080, 3143, 3149, 3150, 3248, 3258, 3345, 3347, 3362, 3375, 3383, 3411, 3413, 3450, 3483, 3488, 3502, 3506, 3517, 3522, 3537, 3560, 3642, 3930, 3992, 4103, 4135, 4149, 4162, 4191, 4222, 4264, 4265, 4282, 4348, 4357, 4374, 4383, 4439.

### 3c. Sorbents and columns, packing procedures

- 3102 Akiyama, S., Nakashima, K., Yamada, K. and Kuroda, M.: High performance liquid chromatographic analyses of compounds related to nucleic acids by 3-(1-naphthylamino)- and 3-(1-anthroylarnino)-propyl-modified silica gel packing materials. *Biomed. Chromatogr.*, 7 (1993) 112-115.
- 3103 Arvidsson, L.E., Berg, H., Engstroem, B. and Hagstroem, G.: Anion exchanger for chromatographic separation. *PCT Int. Appl.* WO 92 11,088 (Cl. B01J39/06), 09 Jul. 1992, SE Appl. 90/4,129, 21 Dec. 1990; 21 p.; C.A., 118 (1993) 93599v.
- 3104 Bächmann, K., Haag, I. and Prokop, T.: Modified method for filling micro-HPLC-columns. *Fresenius J. Anal. Chem.*, 345 (1993) 545-546.
- 3105 Birkinshaw, F.L. and Taylor, D.R.: Cyclic peptides as chiral selectors in high-performance liquid chromatography. *Anal. Proc. (London)*, 29 (1992) 235-237; C.A., 118 (1993) 72803s.
- 3106 Bromberg, L. and Levin, G.: Extraction chromatography with modified poly(vinyl chloride) and di(2-ethylhexyl)dithiophosphoric acid. *J. Chromatogr.*, 634 (1993) 183-196.

- 3107 Buszewski, B. and Kulpa, M.: Influence of coverage density of chemically bonded C<sub>18</sub> phases on the retention data of substances eluted in dead volume during RP HPLC analysis. *J. Liq. Chromatogr.*, 16 (1993) 75-94.
- 3108 Chu, C.-H., Jonsson, E., Auvinen, M., Pesek, J.J. and Sandoval, J.E.: A new approach for the preparation of a hydride-modified substrate used as an intermediate in the synthesis of surface-bonded materials. *Anal. Chem.*, 65 (1993) 808-816.
- 3109 Chwastowska, J., Zmijewska, W. and Sterlinska, E.: Preparation and analytical properties of a chelating resin loaded with thion-alide. *Anal. Chim. Acta*, 276 (1993) 265-270.
- 3110 Cole, S.R. and Dorsey, J.G.: Effect of stationary phase solvation on shape selectivity in reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 635 (1993) 177-186.
- 3111 Cortes, H.J. and Pfeiffer, C.D.: Microcolumn size exclusion chromatography with polymeric stationary phases. *Anal. Chem.*, 65 (1993) 1476-1480.
- 3112 Dietrich, P.G., Falkenhagen, J. and Molnar, I.: (Base-resistant reversed-phase materials based on silica gel). *GIT Fachz. Lab.*, 37 (1993) 23-27; C.A., 118 (1993) 138890b - a review with 21 refs.
- 3113 Ge, H., Gilmore, K.J., Ashraf, S.A., Too, C.O. and Wallace, G.G.: Investigations into use of poly(methylpyrrole-4-carboxylic acid) coated silica as a chromatographic stationary phase. *J. Liq. Chromatogr.*, 16 (1993) 1023-1044.
- 3114 Gohlin, K. and Larsson, M.: Vinyl modification of fused-silica surfaces in polysiloxane-coated 10-50 μ-m I.D. capillaries for open-tubular liquid chromatography. *J. Chromatogr.*, 634 (1993) 31-39.
- 3115 Guentherberg, H., Kirstein, D., Mueller, H.G., Seidel, S. and Schuelke, U.: Method for production of chromatographic support material. *Ger. (East) DD 297,877* (Cl. G01N30/48), 23 Jan. 1992, Appl. 325,281, 27 Jan. 1989; 10 p.; C.A., 118 (1993) 93589s.
- 3116 Hanai, T., Hatano, H., Nimura, N. and Kinoshita, T.: Analysis of chemically bonded silica gel by computational chemistry. *J. Liq. Chromatogr.*, 16 (1993) 109-114.
- 3117 Herold, M.: SEC: influence of salt concentration in the mobile phase. *Int. Lab.*, 23, No. 3 (1993) 34-36.
- 3118 Hirayama, C., Ihara, H. and Nagaoka, S.: Characterization of spherical polymer packings from N,N-dialkyl acrylamide for reversed-phase liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 647-659.
- 3119 Hodek, P., Janku, J., Burkhard, J., Tuckova, D., Anzenbacher, P. and Vodicka, L.: Hydrophobization of agarose by immobilization of diamantane derivatives. *Czech. CS 272,387* (Cl. C07K3/20), 21 Oct. 1991, Appl. 88/2,103, 30 Mar. 1988; 4 p.; C.A., 118 (1993) 105209h.
- 3120 Hosoya, K. and Fréchet, J.M.J.: Reversed-phase chromatographic properties of monodispersed macroporous particles of poly(styrene-divinylbenzene) prepared by a multi-step swelling and polymerization method. *J. Liq. Chromatogr.*, 16 (1993) 353-365.
- 3121 Itoh, H., Kinoshita, T. and Nimura, N.: Reversed-phase high-performance liquid chromatographic separation of small molecules on nonporous C<sub>18</sub> silica gel column. *J. Liq. Chromatogr.*, 16 (1993) 809-823.
- 3122 Juvancz, Z., Grolimund, K. and Francotte, E.: Use of cellulose-based stationary phases for chiral separation in open tubular column chromatography. *Chirality*, 4 (1992) 459-461; C.A., 118 (1993) 138917r.
- 3123 Kirkland, J.J., Dilks, C.H., Jr. and DeStefano, J.J.: Normal-phase high-performance liquid chromatography with highly purified porous silica microspheres. *J. Chromatogr.*, 635 (1993) 19-30.
- 3124 Kutsuna, H., Ohtsu, Y. and Yamaguchi, M.: Synthesis and characterization of highly stable polymer-coated aminosilica packing material for high-performance liquid chromatography. *J. Chromatogr.*, 635 (1993) 187-193.
- 3125 Li, N. and Abdul Mazid, M.: Macroporous particles as biocompatible chromatographic supports. *U.S. US 5,168,104* (Cl. 521-64; C08J9/10), 01 Dec. 1992, Appl. 759,576, 13 Sep. 1991; 6 p.; C.A., 118 (1993) 93608x.
- 3126 Lloyd, L.L., Warner, F.P., Meehan, E., Jumel, K., Kennedy, J.F. and White, C.A.: A new packing material for the GPC analysis of water-soluble cellulose derivatives. In: Kennedy, J.F., Phillips, G.O. and Williams, P.A. (Editors), *Cellul. Sources Exploit*, Horwood, London, 1990, pp. 339-344; C.A., 118 (1993) 126701c.
- 3127 Muench, G., Rogler, E., Kreher, K., Reichert, K., Hauke, G. and Gunkel, W.: Method and device for filling chromatographic columns. *Eur. Pat. Appl. EP 515,955* (Cl. G01N30/56), 02 Dec. 1992, DE Appl. 4,117,604, 29 May 1991; 8 p.; C.A., 118 (1993) 127576c.
- 3128 Murata, H., Takao, T., Anaharo, S. and Shimonishi, Y.: On-line membrane blotting of peptides and proteins from a capillary column. *Anal. Biochem.*, 210 (1993) 206-208.
- 3129 Murthy, R.S.S. and Berry, J.P.: Studies on the hydrolytic stability of cyanobonded phase used in solid phase extraction columns. *Chem. Modif. Surf.*, 3 (1990) 151-159; C.A., 118 (1993) 132893h.
- 3130 Nesterenko, P.N., Shpigun, O.A. and Zolotov, Yu.A.: (Bipolar ion-exchangers and new prospects in ion chromatography). *Dokl. Akad. Nauk*, 324 (1992) 107-110; C.A., 118 (1993) 93352j.
- 3131 Ohta, T., Tairyo, Y. and Takitani, S.: An ion chromatographic method for the estimation of tresyl groups on activated supports. *Chromatographia*, 35 (1993) 321-324.
- 3132 Okamoto, Y.: Cyclic oligosaccharide derivatives for optical isomer separation. *PCT Int. Appl. WO 92 15,617* (Cl. C08B37/16), 17 Sep. 1992, JP Appl. 91/34,048, 28 Feb. 1991; 24 p.; C.A., 118 (1993) 83161g.
- 3133 Okamoto, Y., Aburatani, R., Kaida, Y. and Hatada, K.: Cellulose and amylose trisphenylcarbamates as chiral stationary phases for optical resolution by HPLC. In: Kennedy, J.F., Phillips, G.O. and Williams, P.A. (Editors), *Cellul. Sources Exploit*, Horwood, London, 1990, pp. 359-364; C.A., 118 (1993) 93524s.
- 3134 Perry, J.A., Invergo, B., Wagner, H., Szczerba, T.J. and Rateike, J.D.: An improved internal surface reversed phase. *J. Liq. Chromatogr.*, 15 (1992) 3343-3352.
- 3135 Pesek, J.J.: New perspectives on the chemical modification of silica. *Chem. Modif. Surf.*, 3 (1990) 93-107; C.A., 118 (1993) 110411x.
- 3136 Pesek, J.J., Miller, M. and Lu, Y.-F.: A comparison of temperature and mobile phase composition effects for bonded liquid crystal and polymeric stationary phases in HPLC. *Chromatographia*, 35 (1993) 85-89.

- 3137 Petro, M. and Berek, D.: (Silica gels modified with organic polymers as packing materials for columns for liquid chromatography). *Chem. Listy*, 86 (1992) 816-829; C.A., 118 (1993) 60871z.
- 3138 Rabel, F. and Palmer, K.: Regeneration of silica-based HPLC columns. *Am. Lab. (Shelton)*, 24 (1992) 65-66; C.A., 118 (1993) 115923a - a review without refs.
- 3139 Soane, D.S.: Mosaic microcolumns, slabs, and separation media for electrophoresis and chromatography. *PCT Int. Appl. WO 92 06,773* (Cl. B01D57/02), 30 Apr. 1992, US Appl. 597,528, 15 Oct. 1990; 28 p.; C.A., 118 (1993) 105400p.
- 3140 Stubbins, D., Bubb, M.O. and Conradi, J.D.: Two methods for the introduction of amino groups into agarose-based matrices: their use in immunoaffinity chromatography. *Anal. Biochem.*, 210 (1993) 159-162.
- 3141 Wilson, T.D. and Simmons, D.M.: A particle size distribution analysis of used HPLC column packing material. *Chromatographia*, 35 (1993) 295-301.
- 3142 Wirth, M.J. and Futunmbo, H.O.: Horizontal polymerization of mixed trifunctional silanes on silica. 2. Application to chromatographic silica gel. *Anal. Chem.*, 65 (1993) 822-826.

For additional information see C.A.:

118 (1993) 35445f, 93350g, 97556b, 103638y, 116020r.

See also 3064, 3067, 3075, 3145, 3146, 3170, 3172, 3173, 3174, 3178, 3179, 3180, 3184, 3187, 3188, 3223, 3271, 3317, 3471, 3507, 3571, 3584, 3594, 3881, 3887, 3890, 3893, 3907, 3972, 4051, 4141, 4197, 4214, 4255, 4414.

#### 3d. Quantitative analysis

- 3143 Herman, F.L.: Tandem detectors to quantitate overlapping chromatographic peaks. *Anal. Chem.*, 65 (1993) 1023-1027.

#### 3e. Preparative scale chromatography

- 3144 Nanguneri, S.R.: Design, development and analysis of a preparative scale ion exclusion chromatography system. Avail. *Univ. Microfilms Int.*, Order No. DA9206181, 1991, 182 p.; C.A., 118 (1993) 128159f.
- 3145 Noel, R., Sanderson, A. and Spark, L.: A monolithic ion-exchange material suitable for downstream processing of bioproducts. In: Slater, M.J. (Editor), *Ion Exch. Adv., Proc. IEX '92*, Elsevier, London, 1992, pp. 229-236; C.A., 118 (1993) 55345b.
- 3146 Perry, J.A. and Szczerba, T.J.: Liquid chromatographic preparative packing utility as a function of particle shape. *J. Liq. Chromatogr.*, 16 (1993) 1371-1383.
- 3147 Truel, Y.H., Gu, G., Tsai, G.J. and Tsao, G.T.: Large-scale gradient elution chromatography. *Adv. Biochem. Eng./Biotechnol.*, 47(Bioseparation) (1992) 1-44; C.A., 118 (1993) 100402f - a review with 84 refs.

See also 3205, 3401, 3507, 3580, 3662, 3997, 4034, 4077, 4281.

#### 3f. Programmed temperature, pressure, vapors, gradients

See 3443, 4094.

#### 4. SPECIAL TECHNIQUES

##### 4a. Automation

For additional information see C.A.:

118 (1993) 55611k.

See also 3345, 3463, 3509, 4138, 4147, 4148, 4185, 4191, 4220.

##### 4b. Computerization and modelling

- 3148 Barbay, G., McKinney, K. and Robinson, L.: Practical applications of a chromatography data system using Dynamic Data Exchange. *Am. Lab. (Shelton)*, 24 (1992) 21-24; C.A., 118 (1993) 138721x.
- 3149 Castledine, J.B. and Fell, A.F.: Strategies for peak-purity assessment in liquid chromatography. *J. Pharm. Biomed. Anal.*, 11 (1993) 1-13.
- 3150 Lincoln, D., Fell, A.F., Anderson, N.H. and England, D.: Assessment of chromatographic peak purity of drugs by multivariate analysis of diode-array and mass spectrometric data. *J. Pharm. Biomed. Anal.*, 10 (1992) 837-844.
- 3151 Nelson, D.C., Daucunas, V., Lysakowski, R. and Duff, M.: The Standard for Chromatography Data Communication from the Analytical Instruments Association. *Am. Lab. (Shelton)*, 24 (1992) 52-57; C.A., 118 (1993) 138714x.
- 3152 Repka, D., Sandra, P. and Krupcik, J.: Contribution to the use of threshold criteria for the optimization of a two-component mobile phase composition in isocratic RP-HPLC. *Analisis*, 20 (1992) 555-559; C.A., 118 (1993) 72839h.
- 3153 Schmitz, F., Wittek, R. and Loydl, F.: New DOS-calibration-software for routine application using ion chromatography. *GIT Fachz. Lab.*, 36 (1992) 1139-1147; C.A., 118 (1993) 93301s.
- 3154 Suwondo, E., Wilhelm, A.M., Pibouleau, L. and Domenech, S.: Optimization of a liquid chromatographic separation process. *Comput. Chem. Eng.*, 17 (1993) S135-S140; C.A., 118 (1993) 127164s.

For additional information see C.A.:

118 (1993) 72570p.

See also 3051, 3071, 3116, 3171, 3182, 3269, 4142, 4146, 4173, 4329.

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

- 3155 Bajic, S., Doerge, D.R., Lowes, S. and Preece, S.: APCI: a technique for routine LC-MS. *Int. Lab.*, 23, No. 5 (1993) P4-P12.
- 3156 Brinkman, U.A.T.: Hyphenation and column liquid chromatography. *Analisis*, 20 (1992) M22-M28; C.A., 118 (1993) 72774h - a review with 12 refs.
- 3157 Cappiello, A. and Brunner, F.: Micro flow rate particle beam interface for capillary liquid chromatography/mass spectrometry. *Anal. Chem.*, 65 (1993) 1281-1287.
- 3158 Griffiths, P.R., Norton, K.L. and Lange, A.J.: Recent advances in the hyphenation of chromatographs and FT-IR spectrometers. *Microchem. J.*, 46 (1992) 261-270; C.A., 118 (1993) 138963c.

3159 Ho, J.S., Behymer, T.D., Budde, W.L. and Bellar, T.A.: Mass transport and calibration in liquid chromatography particle beam mass spectrometry. *J. Am. Soc. Mass Spectrom.*, 3 (1992) 662-671; C.A., 118 (1993) 138967g.

3160 Kleintop, B.L., Eades, D.M. and Yost, R.A.: Operation of a quadrupole ion trap for particle beam LC/MS analysis. *Anal. Chem.*, 65 (1993) 1295-1300.

3161 Welch, K.J.: Chemistry of bonded electron-acceptor phases in liquid chromatography: application in on-line coupled HPLC-GC-MS. Avail. *Univ. Microfilms Int.*, Order No. DA9200161, 1991, 184 p.; C.A., 118 (1993) 115967t.

See also 3070, 3073, 3079, 3150, 3199, 3209, 3213, 3224, 3270, 3306, 3310, 3431, 3504, 3522, 3953, 3969, 4025, 4093, 4096, 4131, 4164, 4200, 4373, 4388, 4392, 4419, 4429.

#### 4d. Affinity chromatography (advances)

3162 Bergold, A.F.: High-performance lectin affinity chromatography an examination of the thermodynamic and kinetic limitations of the technique and the development of an alternative elution method. Avail. *Univ. Microfilms Int.*, Order No. DA9212042, 1991, 221 pp.; C.A., 118 (1993) 120152c.

3163 Kang, K.A.: Distributed nature of equilibrium in affinity chromatography: mathematical modeling, simulation, and scaleup. Avail. *Univ Microfilms Int.*, Order No. DA9137135, 1991, 230 pp.; C.A., 118 (1993) 120140x.

3164 Reinhard, B., Goetz, C. and Faillard, H.: Synthesis of N-acetyl-9-O-acetyleneuraminic acid  $\alpha$ -D-aminophenylthioketoside and its application as ligand in the affinity chromatography of a lectin with preferential affinity to O-acetylated sialic acids. *Biol. Chem. Hoppe-Seyler*, 373 (1992) 1243-1248; C.A., 118 (1993) 97308x.

3165 Serrat, J.M., Caminal, G., Godia, F., Sola, C. and Lopez-Santin, J.: A novel application of immobilized enzymes: affinity chromatography separations using enzymes depending on a cofactor. *Biotechnol. Tech.*, 6 (1992) 451-454; C.A., 118 (1993) 142709s.

3166 Tuncel, A., Denizli, A., Purvis, D., Lowe, C.R. and Piskin, E.: Cibacron Blue F3G-A-attached monosize poly(vinyl alcohol)-coated polystyrene microspheres for specific albumin adsorption. *J. Chromatogr.*, 634 (1993) 161-168.

3167 Yarmush, M.L., Weiss, A.M., Antonsen, K.P., Odde, D.J. and Yarmush, D.M.: Immunoaffinity purification: basic principles and operational considerations. *Biotechnol. Adv.*, 10 (1992) 413-446; C.A., 118 (1993) 35220d - a review with 104 refs.

For additional information see C.A.:

118 (1993) 97582g, 120310c, 142248r.

See also 3290, 3397, 3520, 3591, 3621, 3623, 3624, 3627, 3628, 3686, 3689, 3703, 3802, 3839.

#### 4f. Trace analysis and preseparation techniques

3168 Xu, M.: Development and applications of photothermal spectrometry for trace chemical analysis a chromatographic detection. Avail. *Univ. Microfilms Int.* Order No. DA9200162, 1991, 197 p.; C.A., 118 (1993) 115755x.

For additional information see C.A.:

118 (1993) 93351h.

See also 3218, 4185, 4421.

#### 4g. Enantiomers, separation

3169 Chang, S.C., Reid III, G.L., Chen, S., Chang, C.D. and Armstrong, D.W.: Evaluation of a new polar-organic high-performance liquid chromatographic mobile phase for cyclodextrin-bonded chiral stationary phases. *TrAC*, 12 (1993) 144-153.

3170 Dobashi, A., Dobashi, Y., Ono, T., Ishida, K., Oshida, N. and Hara, S.: Chiral recognition based on hydrophobic entanglement of enantiomers with chiral diamide phases in aqueous media. *J. Liq. Chromatogr.*, 16 (1993) 825-841.

3171 Hanai, T., Hatano, H., Nimura, N. and Konoshita, T.: Chiral recognition by chromatography and computational chemistry. *J. Liq. Chromatogr.*, 16 (1993) 801-808.

3172 Hargitai, T. and Okamoto, Y.: Evaluation of 3,5-dimethylphenyl carbamoylated  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins as chiral stationary phases for HPLC. *J. Liq. Chromatogr.*, 16 (1993) 843-858.

3173 Hilton, M.L., Chang, S.-C., Gasper, M.P., Pawlowska, M., Armstrong, D.W. and Stalcup, A.M.: Comparison of the enantioselectivity of phenethyl- and naphthylethylcarbamate substituted cyclodextrin bonded phases. *J. Liq. Chromatogr.*, 16 (1993) 127-147.

3174 Ishikawa, A. and Shibata, T.: Cellulosic chiral stationary phase under reversed-phase condition. *J. Liq. Chromatogr.*, 16 (1993) 859-878.

3175 Jacobson, S.C., Seidel-Morgenstern, A. and Guiochon, G.: Study of band broadening in enantioselective separations using microcrystalline cellulose triacetate. I. The linear case. *J. Chromatogr.*, 637 (1993) 13-18.

3176 Maoka, T.: (Separation of stereoisomers of carotenoids by high performance liquid chromatography). *Jasco Rep.*, 34 (1992) 6-8; C.A., 118 (1993) 138882a - a review with 13 refs.

3177 Mayer, S. and Schurig, V.: Enantiomer separation by electrochromatography in open tubular columns coated with Chirasil-Dex. *J. Liq. Chromatogr.*, 16 (1993) 915-931.

3178 Nakatsu, C.N. and Stalcup, A.M.: Separation of enantiomers using an (S)-naphthylethylcarbamoylated  $\gamma$ -cyclodextrin stationary phase. *J. Liq. Chromatogr.*, 16 (1993) 209-223.

3179 Noctor, T.A.G. and Wainer, I.W.: The use of displacement chromatography to alter retention and enantioselectivity on a human serum albumin-based HPLC chiral stationary phase: a mini-review. *J. Liq. Chromatogr.*, 16 (1993) 783-800 - a review with 27 refs.

3180 Oi, N., Kitahara, H. and Aoki, F.: Enantiomer separation by HPLC on reversed phase silica gel coated with copper(II) complexes of (R,R)-tartric acid mono-amide derivatives. *J. Liq. Chromatogr.*, 16 (1993) 893-901.

3181 Pirkle, W.H., Burke, J.A. and Deming, K.C.: The role of spatial complementarity in chiral recognition. *J. Liq. Chromatogr.*, 16 (1993) 161-170.

3182 Roussel, C. and Piras, P.: Chirbase: a molecular database for storage and retrieval of chromatographic chiral separations. *Pure Appl. Chem.*, 65 (1993) 235-244; C.A., 118 (1993) 123764q.

3183 Seidel-Morgenstern, A., Jacobson, S.C. and Guiochon, G.: Study of band broadening in enantioselective separations using microcrystalline cellulose triacetate. II. Frontal analysis. *J. Chromatogr.*, 637 (1993) 19-28.

- 3184 Sellergren, B. and Shea, K.J.: Influence of polymer morphology on the ability of imprinted network polymers to resolve enantiomers. *J. Chromatogr.*, 635 (1993) 31-49.
- 3185 Tomasella, F.P., Pan, Z. and Love, L.J.C.: Effects of selected alcohols on chiral recognition via cyclodextrin inclusion complexation. *Supramol. Chem.*, 1 (No. 1) (1992) 25-30; C.A., 118 (1993) 102335k.
- 3186 Vandenbosch, C., Massart, D.L. and Lindner, W.: Evaluation of six chiral stationary phases in LC for their selectivity toward drug enantiomers. *J. Pharm. Biomed. Anal.*, 10 (1992) 895-908.
- 3187 Williams, R.C., Edwards, J.F. and Potter, M.J.: Retention characteristics of protein-based chiral HPLC columns. *J. Liq. Chromatogr.*, 16 (1993) 171-196.

See also 3060, 3068, 3088, 3097, 3105, 3122, 3132, 3133, 3247, 3333, 3336, 3391, 3471, 3485, 3493, 3496, 3507, 3518, 3526, 3589, 3929, 3981, 4063, 4145, 4153, 4163, 4165, 4167, 4168, 4173, 4177, 4182, 4190, 4191, 4197, 4198, 4201, 4209, 4212, 4214, 4215, 4218, 4232, 4239, 4246, 4250, 4255, 4261, 4263, 4272, 4281, 4339, 4344, 4345, 4360.

#### 4h. Other special techniques

- 3188 Heft, B.K.: Radial flow chromatography in compressed pancake-shaped beds. Avail. *Univ. Microfilms Int.*, Order No. 9200067, 1991, 202 p.; C.A., 118 (1993) 105281a.
- 3189 Kilz, P.: (Two-dimensional chromatography. Application of HPLC-gel permeation chromatography coupling for analysis of complex polymer systems). *LaborPraxis*, 16 (1992) 628-632; C.A., 118 (1993) 133273t - a review with 12 refs.
- 3190 Okada, T.: Simultaneous separation of ionic and nonionic compounds using reversed-phase micellar chromatography. *Anal. Sci.*, 9 (1993) 59-64; C.A., 118 (1993) 138773r.
- 3191 Pazourek, J.: Three-dimensional velocity profile in channel with trapezoidal cross-section. *J. Liq. Chromatogr.*, 16 (1993) 69-74.
- 3192 Vilgis, T.A.: Connectivity selection by porous media: "spectral chromatography". *J. Phys. II*, 2 (1992) 2097-2101; C.A., 118 (1993) 60449t.
- 3193 Zabokritskii, M.P., Landau, V.V. and Chizhkov, V.P.: (Circulation high-performance liquid chromatography in the preparative separation of materials with similar physicochemical properties). *Zh. Fiz. Khim.*, 66 (1992) 2175-2182; C.A., 118 (1993) 59013q.

See also 3063, 3084, 3177, 3212.

### 5. HYDROCARBONS AND HALOGEN DERIVATIVES

#### 5a. Aliphatic hydrocarbons

See 4132.

#### 5b. Cyclic hydrocarbons

- 3194 Anacleto, J.F., Boyd, R.K., Pleasance, S., Quilliam, M.A., Howard, J.B., Lafleur, A.L. and Makarovskiy, Y.: Analysis of minor constituents in fullerene soots by LC-MC using a heated pneumatic nebulizer interface with atmospheric pressure chemical ionization. *Can. J. Chem.*, 70 (1992) 2558-2568; C.A., 118 (1993) 93362n.
- 3195 De Vries, G. and Rekker, R.F.: Retention studies of alkyl- and halogen-substituted aromatics on normal-phase silica and alumina columns. IV. Effect of the mobile phase structure on retention data. *J. Liq. Chromatogr.*, 16 (1993) 383-402.
- 3196 Fetzer, J.C.: Separation of perhydro polycyclic aromatic hydrocarbons by normal-phase HPLC. *J. Chromatogr. Sci.*, 31 (1993) 70-72.
- 3197 Giovannelli, L. and Bavazzano, P.: (The use of  $\beta$ -cyclodextrin in the determination of the isomers of the urinary metabolites of xylene). *Boll. Chim. Ig., Parte Sci.*, 43 (1992) 129-140; C.A., 118 (1993) 141323z.
- 3198 Hansen, K.H.: (Liquid chromatographic determination of polycyclic aromatic hydrocarbons (PAH) with programmed fluorescence detection). *GIT Fachz. Lab.*, 36 (1992) 1132-1137; C.A., 118 (1993) 87223b.
- 3199 Hsu, C.S. and Qian, K.: High-boiling aromatic hydrocarbons characterized by liquid chromatography-thermospray-mass spectrometry. *Energy Fuels*, 7 (1993) 268-272; C.A., 118 (1993) 127928u.
- 3200 Husain, N., Anigbogu, V.C., Cohen, M.R. and Warner, I.M.: Reversed-phase liquid chromatographic measurement of the influence of a co-modifier functional group on the retention behavior of the  $\beta$ -cyclodextrin-pyrene complex. *J. Chromatogr.*, 635 (1993) 211-219.
- 3201 Perrin, J.L., Poirot, N., Liska, P., Thienpont, A. and Felix, G.: Trace enrichment and HPLC analysis of PAHs in edible oils and fat products, using liquid chromatography on electron acceptor stationary phases in connection with reverse phase and fluorescence detection. *Fat Sci. Technol.*, 95 (1993) 46-51.
- 3202 Pryor, C.P., Mickelson, G.E. and Bixler, J.W.: Determination of some polynuclear aromatic hydrocarbons by liquid chromatography with electrochemical detection at carbon microdisk electrode. *Microchem. J.*, 47 (1993) 100-107; C.A., 118 (1993) 138982h.
- 3203 Rodriguez-Delgado, M.A., Sánchez, M.J., González, V. and García-Montelongo, F.: Correlation between retention data of polycyclic aromatic hydrocarbons in micellar liquid chromatography and several molecular descriptors. *Fresenius J. Anal. Chem.*, 345 (1993) 748-752.
- 3204 Soucaze-Guilhou, B., Kutner, W. and Kadish, K.M.: Amperometric and fast scan-rate voltammetry detection at a microelectrode for gel permeation high-performance liquid chromatography of fullerenes. *Anal. Chem.*, 65 (1993) 669-672.
- 3205 Stalling, D.L., Kuo, K.C., Guo, C.Y. and Saim, S.: Separation of fullerenes  $C_{60}$ ,  $C_{70}$ , and  $C_{76-84}$  on polystyrene divinylbenzene columns. *J. Liq. Chromatogr.*, 16 (1993) 699-722.
- 3206 Wise, W.R., Robinson, G.C. and Bedient, P.B.: Chromatographic evidence for nonlinear partitioning of aromatic compounds between petroleum and water. *Ground Water*, 30 (1992) 936-944; C.A., 118 (1993) 66315t.

3207 Yan, F., Liu, Y. and Ma, J.: High-performance liquid chromatographic separation of fullerenes. *Chin. Chem. Lett.*, 3 (1992) 903-906; C.A., 118 (1993) 138764p.

For additional information see C.A.:  
118 (1993) 127867y.

See also 3110, 3118, 3121, 3208, 4392.

#### 5c. Halogen derivatives

3208 Creaser, C.S., Krokos, F. and Startin, J.R.: Analytical methods for the determination of non-ortho substituted chlorobiphenyls: a review. *Chemosphere*, 25 (1992) 1981-2008; C.A., 118 (1993) 115930a - a review with 197 refs.

3209 Welch, K.J. and Hoffman, N.E.: Analysis of polychlorinated biphenyls, dibenzodioxins and dibenzofurans by on-line coupled microcolumn HPLC capillary GC-MS. *J. Liq. Chromatogr.*, 16 (1993) 307-313.

See also 3195.

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

3210 Joly, G., Farcas, F., Eladlani, A., Such, C. and Buisine, J.M.: (Thermodynamic behavior and physicochemical analyses of a series of road bitumens). *Calorim. Anal. Therm.*, 23 (1992) 343-349; C.A., 118 (1993) 84053k - a review with 6 refs.

3211 Koleva, R. and Stoyanova, G.: (A chromatographic study of neutral and polar bitumen extracts of recent and ancient sediments). *Izv. Khim.*, 24 (1991) 235-244; C.A., 118 (1993) 63495r.

3212 Tong, D., Bartle, K.D., Robinson, R.E. and Altham, P.: Unified chromatography in petrochemical analysis. *J. Chromatogr. Sci.*, 31 (1993) 77-81.

See also 3201.

#### 6. ALCOHOLS

3213 Niwa, T., Tohyama, K. and Kato, Y.: Analysis of polyols in uremic serum by liquid chromatography combined with atmospheric pressure chemical ionization mass spectrometry. *J. Chromatogr.*, 613 (1993) 9-14.

3214 Ogden, M.W. and Maiolo, K.C.: Comparison of GC and LC for determining solanesol in environmental tobacco smoke. *LC-GC*, 10 (1992) 459-462; C.A., 118 (1993) 95679v.

See also 4389.

#### 7. PHENOLS

3215 Achilli, G., Cellerino, G.P., Gamache, P.H. and Melzi d'Eril, G.V.: Identification and determination of phenolic constituents in natural beverages and plant extracts by means of a coulometric electrode array system. *J. Chromatogr.*, 632 (1993) 111-117.

3216 Ekabo, O.A., Farnsworth, N.R., Santisuk, T. and Reutrakul, V.: A phytochemical investigation of *Hornalium ceylanicum*. *J. Natural Prod.*, 56 (1993) 699-707.

3217 Hansen, A.M., Poulsen, O.M., Christensen, J.M. and Hansen, S.H.: Determination of 1-hydroxypyrene in human urine by high-performance liquid chromatography. *J. Anal. Toxicol.*, 17 (1993) 38-41; C.A., 118 (1993) 118374h.

3218 Lehota, J., Baloghová, M. and Hatrik, Š.: HPLC method for determination of phenol in river and waste water. *J. Liq. Chromatogr.*, 16 (1993) 999-1006.

3219 Lopez, V. and Lindsay, R.C.: Metabolic conjugates as precursors for characterizing flavor compounds in ruminant milks. *J. Agric. Food Chem.*, 41 (1993) 446-454.

3220 Mullin, W.J., Wolynetz, M.S. and Emery, J.P.: A comparison of methods for the extraction and quantitation of alk(en)ylresorcinols. *J. Food Compos. Anal.*, 5 (1992) 216-223; C.A., 118 (1993) 100590r.

3221 Piangerelli, V.: (Phenolic substances in water for human consumption. Determination by liquid chromatography with electrochemical detection). *Acqua Aria*, (1992) 541-548; C.A., 118 (1993) 87211w.

3222 Speranza, G., Manitto, P., Monti, D. and Pezzuto, D.: Studies on aloe, part 10. Feroxins A and B, two O-glucosylated 1-methyltetralins from Cape aloe. *J. Natural Prod.*, 55 (1992) 723-729.

3223 Yamauchi, S.: Retention indices of phenols for internal standards in reversed-phase high-performance liquid chromatography. Application to retention prediction and selectivities of mobile phases and packing materials. *J. Chromatogr.*, 635 (1993) 61-70.

For additional information see C.A.:  
118 (1993) 55340w.

See also 3225, 3372, 4118, 4279, 4399.

#### 8. SUBSTANCES CONTAINING HETEROCYCLIC OXYGEN

##### 8a. Flavonoids

3224 Carle, R., Dölle, B., Müller, W. and Baumeister, U.: Thermospray liquid chromatography/mass spectrometry (TSP LC/MS): analysis of acetylated apigenin-7-fluicosides from *Chamomilla recutita*. *Pharmazie*, 48 (1993) 304-306.

3225 Gamache, P., Ryan, E. and Acworth, I.N.: Analysis of phenolic and flavonoid compounds in juice beverages using high-performance liquid chromatography with coulometric array detection. *J. Chromatogr.*, 635 (1993) 143-150.

3226 Holcomb, M., Sutherland, J.B., Chiarelli, M.P., Korfsmacher, W.A., Thompson, H.C., Jr., Lay, J.O., Jr., Hankins, L.J. and Cerniglia, C.E.: HPLC and FAB mass spectrometry analysis of fumonisins B<sub>1</sub> and B<sub>2</sub> produced by *Fusarium moniliforme* on food substrates. *J. Agric. Food Chem.*, 41 (1993) 357-360.

3227 Mouly, P., Gaydou, E.M. and Estienne, J.: Column liquid chromatographic determination of flavanone glycosides in *Citrus*. *J. Chromatogr.*, 634 (1993) 129-134.

3228 Tanner, G.J. and Kristiansen, K.N.: Synthesis of 3,4-cis-[<sup>3</sup>H]leucocyanidin and enzymatic reduction to catechin. *Anal. Biochem.*, 209 (1993) 274-277.

- 3229 Tomás-Barberán, F.A., Ferreres, F., Amparo Blázquez, M.A., García-Viguera, C. and Tomás-Lorente, F.: High-performance liquid chromatography of honey flavonoids. *J. Chromatogr.*, 634 (1993) 41-46.

See also 4127, 4376.

*8b. Aflatoxins and other mycotoxins*

- 3230 Murphy, P.A., Rice, L.G. and Ross, P.F.: Fumonisins B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub> content of Iowa, Wisconsin and Illinois corn and corn screenings. *J. Agric. Food Chem.*, 41 (1993) 263-266.
- 3231 Olson, J.J. and Chu, F.S.: Immunochemical studies of urinary metabolites of sterigmatocystin in rats. *J. Agric. Food Chem.*, 41 (1993) 250-255.
- 3232 Rovira, R., Ribera, F., Sanchis, V. and Canela, R.: Improvements in the quantitation of patulin in apple juice by high-performance liquid chromatography. *J. Agric. Food Chem.*, 41 (1993) 214-216.
- 3233 Seidel, V., Poglits, E., Schiller, K. and Lindner, W.: Simultaneous determination of ochratoxin A and zearalenone in maize by reversed-phase high-performance liquid chromatography with fluorescence detection and  $\beta$ -cyclodextrin as mobile phase additive. *J. Chromatogr.*, 635 (1993) 227-235.
- 3234 Thiel, P.G., Sydenham, E.W., Shephard, G.S. and van Schalkwyk, D.J.: Study of the reproducibility characteristics of a liquid chromatographic method for the determination of fumonisins B<sub>1</sub> and B<sub>2</sub> in corn: IUPAC collaborative study. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 361-366.
- 3235 Valenta, H., Kühn, I. and Rohr, K.: Determination of ochratoxin A in urine and faeces of swine by high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 295-302.
- 3236 Yen, I.C. and Bidasee, K.R.: Liquid chromatographic determination of aflatoxins in animal feeds and feed components. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 366-370.

For additional information see C.A.:  
118 (1993) 79598u.

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

- 3237 Datzberger, K., Steiner, I., Washuetl, J. and Kroyer, G.: Methods for the fast analysis of anthocyanins and anthocyanidins in red wine. [Erratum to document cited in CA116(11):104612f]. *Z. Lebensm.-Unters. Forsch.*, 195 (1992) 572; C.A., 118 (1993) 146396k.
- 3238 Hartkopf, J. and Erbersdobler, H.F.: Stability of furosine during ion-exchange chromatography in comparison with reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 635 (1993) 151-154.
- 3239 Kodama, O., Ichikawa, H., Akatsuka, T., Santisopasri, V., Kato, A. and Hayashi, Y.: Isolation and identification of an antifungal naphthopyran derivative from *Rhinacanthus nasutus*. *J. Natural Prod.*, 56 (1993) 292-294.
- 3240 Lee, J.H., Lee, Y.M. and Moon, D.C.: (Rapid separation and identification method of tea catechins). *Anal. Sci. Technol.*, 5 (1992) 333-338; C.A., 118 (1993) 123202e.

- 3241 Pyell, U., Garrigues, P., Félix, G., Thienpont, A. and Den-traygues, P.: Separation of tetrachloro-p-dioxin isomers by high-performance liquid chromatography with electron-acceptor and electron-donor stationary phases. *J. Chromatogr.*, 634 (1993) 169-181.

See also 3209, 3228, 3327, 3587, 4171, 4333, 4376, 4382, 4389.

**9. OXO COMPOUNDS, ETHERS, EPOXIDES AND QUINONES**

- 3242 Brinkman, L.C., Ley, F.R. and Seaton, P.J.: Isolation and synthesis of benz[a]anthraquinones related to antitumor agent PD116740. *J. Natural Prod.*, 56 (1993) 374-380.
- 3243 Carboneau, M.A., Delmas-Beauvieux, M.C., Gallis, J.L., Peuchant, E., Perrotat, A., Canioni, P. and Clerc, M.: Lipid peroxidation studied by HPLC in isolated rat liver: comparative efficiency of UW and HTK preservation solutions. *J. Liq. Chromatogr.*, 16 (1993) 1385-1417.
- 3244 Cordis, G.A., Maulik, N., Bagchi, D., Engelman, R.M. and Das, D.K.: Estimation of the extent of lipid peroxidation in the ischemic and reperfused heart by monitoring lipid metabolic products with the aid of high-performance liquid chromatography. *J. Chromatogr.*, 632 (1993) 97-103.
- 3245 Cotsaris, E. and Nicholson, B.C.: Low level determination of formaldehyde in water by high-performance liquid chromatography. *Analyst (London)*, 118 (1993) 265-268.
- 3246 Courchesne, M. and Brassard, P.: Identification and characterization of naturally occurring rubiadins. *J. Natural Prod.*, 56 (1993) 722-730.
- 3247 Duchateau, A.L.L., Jacquemin, N.M.J., Straatman, H. and Noorduin, A.J.: Liquid chromatographic determination of chiral epoxides by derivatization with sodium sulphide, o-phthalaldehyde and an amino acid. *J. Chromatogr.*, 637 (1993) 29-34.
- 3248 Kaminski, J., Atwal, A.S. and Mahadevan, S.: High performance liquid chromatographic determination of formaldehyde in milk. *J. Liq. Chromatogr.*, 16 (1993) 521-526.
- 3249 Losada, P.P., Lozano, J.S., Abuin, S.P., Mahia, P.L. and Gándara, J.S.: Kinetics of the hydrolysis of bisphenol A diglycidyl ether (BADGE) in water-based food simulants. Implications for legislation on the migration of BAGDE-type epoxyresins into foodstuff. *Fresenius J. Anal. Chem.*, 345 (1993) 527-532.
- 3250 Madere, R. and Behrens, W.A.: Malonaldehyde determination in foods by ion-pairing high-performance liquid chromatography. *Food Res. Int.*, 25 (1992) 37-40; C.A., 118 (1993) 5831m.
- 3251 Rissler, K., Künzi, H.-P. and Grether, H.-J.: Chromatographic investigations of oligomeric  $\alpha,\omega$ -dihydroxy polyethers by reversed-phase high-performance liquid chromatography and evaporative light scattering and UV detection. *J. Chromatogr.*, 635 (1993) 89-101.
- 3252 Shigemura, T., Kang, D., Nagata-Kuno, K., Takeshige, K. and Hamasaki, N.: Characterization of NAD(P)H-dependent ubiquinone reductase activities in rat liver microsomes. *Biochim. Biophys. Acta*, 1141 (1993) 213-220.
- 3253 Takamiya, S., Kita, K., Wang, H., Weinstein, P.P., Hiraishi, A., Oya, H. and Aoki, T.: Developmental changes in the respiratory chain of *Ascaris* mitochondria. *Biochim. Biophys. Acta*, 1141 (1993) 65-74.

See also 3216, 4370, 4379.

## 10. CARBOHYDRATES

### 10a. Mono and oligosaccharides. Structural studies

- 3254 Alexoff, D.L., Casati, R., Fowler, J.S., Wolf, A.P., Shea, C., Schlyer, D.J. and Shive, C.Y.: Ion chromatographic analysis of high specific activity  $^{18}\text{FDG}$  preparations and detection of the chemical impurity 2-deoxy-2-chloro-D-glucose. *Appl. Radiat. Isot.*, 43 (1992) 1313-1322; C.A., 118 (1993) 81268y.
- 3255 Amatayakul-Chantler, S., Dwek, R.A., Tennent, G.A., Pepys, M.B. and Rademacher, T.W.: Molecular characterization of *Limulus polyphemus* C-reactive protein II. Asparagine-linked oligosaccharides. *Eur. J. Biochem.*, 214 (1993) 99-110.
- 3256 Bell, R.G. and Newman, K.L.: Carbohydrate analysis of fermentation broth by high-performance liquid chromatography utilizing solid-phase extraction. *J. Chromatogr.*, 632 (1993) 87-90.
- 3257 Bridges, S.: Continuous annular chromatography for the separation of carbohydrate mixtures. Avail. *Univ. Microfilms Int. Order No. BRDX94820*, 1990, 252 p.; C.A., 118 (1993) 105193y.
- 3258 Del Nozal, M.J., Bernal, J.L., Hernandez, V., Toribio, L. and Mendez, R.: Purpald (4-amino-3-hydrazino-5-mercaptop-1,2,4-triazole) as a reagent for post-column derivatization of neutral monosaccharides in high pressure liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1105-1116.
- 3259 Faulkner, P.L., Schoeneberger, M.M. and Ludovici, K.H.: Comparison of high performance liquid chromatography and enzymic analysis of soluble carbohydrates in loblolly pine. *Commun. Soil Sci. Plant Anal.*, 24 (1993) 149-160; C.A., 118 (1993) 97509p.
- 3260 Gorbics, L., Urge, L., Otvos-Papp, E. and Otvos, L., Jr.: Determination of amino sugars in synthetic glycopeptides during the conditions of amino acid analysis utilizing precolumn derivatization and high-performance liquid chromatographic analysis. *J. Chromatogr.*, 637 (1993) 43-53.
- 3261 Goso, Y. and Hotta, K.: Regional differences in sulfated oligosaccharides of rat gastrointestinal mucin as detected by two-dimensional chromatography. *Arch. Biochem. Biophys.*, 302 (1993) 212-217.
- 3262 Hagen, S.R.: High-performance liquid chromatographic quantitation of phenylthiocarbamyl muramic acid and glucosamine from bacterial cell walls. *J. Chromatogr.*, 632 (1993) 63-68.
- 3263 Hase, S., Hatanaka, K., Ochiai, K. and Shimizu, H.: Improved method for the component sugar analysis of glycoproteins by pyridylamino sugars purified with immobilized boronic acid. *Biosci., Biotechnol., Biochem.*, 56 (1992) 1676-1677; C.A., 118 (1993) 3188h.
- 3264 Hayase, T. and Lee, Y.C.: High-performance cation-exchange chromatography of hexosaminolts. *Anal. Biochem.*, 208 (1993) 208-209.
- 3265 Kinoshita, T., Miyayama, M., Kyodo, Y., Kamitani, Y., Miyamasu, M., Nimura, N. and Hanai, T.: Study of chemobiological reactions. 1. Selectivity of aromatic amino compounds and saccharides in glycosylation reactions. *Biomed. Chromatogr.*, 7 (1993) 64-67.
- 3266 Klein, A., Carnoy, C., Lo-Guidice, J.M., Lamblin, G. and Roussel, P.: Separation of mucin oligosaccharide-alditols by high-performance liquid chromatography on alkylamine-bonded silica columns. Effect of structural parameters. *Carbohydr. Res.*, 236 (1992) 9-16; C.A., 118 (1993) 120132w.
- 3267 Kramhöller, B., Pischetsrieder, M. and Severin, T.: Maillard reactions of lactose and maltose. *J. Agric. Food Chem.*, 41 (1993) 347-351.
- 3268 Kynaston, J.A., Fleming, S.C., Laker, M.F. and Pearson, A.D.J.: Simultaneous quantification of mannitol, 3-O-methyl glucose, and lactulose in urine by HPLC with pulsed electrochemical detection, for use in studies of intestinal permeability. *Clin. Chem. (Winston-Salem)*, 39 (1993) 453-456.
- 3269 Lameloise, M.L. and Viard, V.: Modelling and simulation of a glucose-fructose simulated moving-bed adsorber. *Inst. Chem. Eng. Symp. Ser.*, 126 (1992) 57-67; C.A., 118 (1993) 61842c.
- 3270 Liptak, M., Dinya, Z., Szaricskai, F.J., Litkei, G. and Jeko, J.: Liquid chromatography/thermospray mass spectrometry of monosaccharides and their derivatives. *Org. Mass Spectrom.*, 27 (1992) 1271-1275; C.A., 118 (1993) 72845g.
- 3271 Mada, A., Toyoda, H. and Imanari, T.: Utility of a carbon column for high-performance liquid chromatographic separation of unsaturated disaccharides produced from glycosaminoglycans. *Anal. Sci.*, 8 (1992) 793-797; C.A., 118 (1993) 55346c.
- 3272 Mulvaney, T.R.: Processed vegetable products. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 138-139.
- 3273 Nimtz, M., Martin, W., Wray, V., Klöppel, K.-D., Augustin, J. and Conradt, H.S.: Structures of sialylated oligosaccharides of human erythropoietin expressed in recombinant BHK-21 cells. *Eur. J. Biochem.*, 213 (1993) 39-56.
- 3274 Ogawa, H.K., Takeuchi, Y., Uchibori, H., Matsumoto, I. and Seno, N.: Determination of N-acetylneurameric acid and N-glycolyneurameric acid in glycoproteins by high-performance liquid chromatography without derivatization. *J. Chromatogr.*, 612 (1993) 145-149.
- 3275 Pastore, P., Lavagnini, I. and Versini, G.: Ion chromatographic determination of monosaccharides from trace amounts of glycosides isolated from grape musts. *J. Chromatogr.*, 634 (1993) 47-56.
- 3276 Powell, L.D., Sgroi, D., Sjoberg, E.R., Stamenkovic, I. and Varki, A.: Natural ligands of the B cell adhesion molecule CD22 $\beta$  carry N-linked oligosaccharides with  $\alpha$ -2,6-linked sialic acids that are required for recognition. *J. Biol. Chem.*, 268 (1993) 7019-7027.
- 3277 Puccia, R., Grondin, B. and Herscovics, A.: Disruption of the processing  $\alpha$ -mannosidase gene does not prevent outer chain synthesis in *Saccharomyces cerevisiae*. *Biochem. J.*, 290 (1993) 21-26.
- 3278 Rodén, L., Rodén, M., Yu, H., Jin, J. and Greenshields, J.: Separation of sugars by ion-exclusion chromatography on a cation-exchange resin. *J. Chromatogr.*, 638 (1993) 29-34.
- 3279 Rodén, L., Yu, H., Jin, J. and Greenshields, J.: Separation of N-acetylglucosamine and N-acetylmannosamine by chromatography on Sephadex in borate buffer. *Anal. Biochem.*, 209 (1993) 188-191.
- 3280 Takahashi, N., Wada, Y., Awata, J., Kurono, M. and Tomiya, N.: Two-dimensional elution map of GalNAc-containing N-linked oligosaccharides. *Anal. Biochem.*, 208 (1993) 96-109.

- 3281 Toyoda, H., Ikei, T., Demachi, Y., Toida, T. and Imanari, T.: Structural analysis of the N-linked oligosaccharides from human urinary trypsin inhibitor. *Chem. Pharm. Bull.*, 40 (1992) 2882-2884.
- 3282 Tyrrell, D.J., Ishihara, M., Rao, N., Horne, A., Kiefer, M.C., Stauber, G.B., Lam, L.H. and Stack, R.J.: Structure and biological activities of a heparin-derived hexasaccharide with high affinity for basic fibroblast growth factor. *J. Biol. Chem.*, 268 (1993) 4684-4689.
- 3283 Winchester, B., Al Daher, S., Carpenter, N.C., Cenci di Bello, I., Choi, S.S., Fairbanks, A.J. and Fleet, G.W.J.: The structural basis of the inhibition of human  $\alpha$ -mannosidases by azafuranose-analogues of mannose. *Biochem. J.*, 290 (1993) 743-749.
- 3284 Yamauchi, S., Nimura, N. and Kinoshita, T.: Protamine-coated silica gel as packing material for high-performance liquid chromatography of carbohydrates. *Analyst (London)*, 118 (1993) 161-164.
- For additional information see C.A.:  
118 (1993) 58293u.
- See also 3124, 3298, 3300, 3309, 3314, 3399, 3805, 3824, 3835, 4061, 4129, 4389.
- 10b. *Polysaccharides, mucopolysaccharides, lipopolysaccharides*
- 3285 Björnsson, S.: Size-dependent separation of proteoglycans by electrophoresis in gels of pure agarose. *Anal. Biochem.*, 210 (1993) 292-298.
- 3286 Bohn, M.A., Mueller, D. and Volk, F.: Degradation of cellulose esters during aging and processing measured by gel permeation chromatography. In: Kennedy, J.F., Phillips, G.O. and Williams, P.A. (Editors), *Cellul. Sources Exploit.*, Horwood, London, 1990, pp. 331-338; C.A., 118 (1993) 127760h.
- 3287 Hasegawa, M., Isogai, A. and Onabe, F.: Size-exclusion chromatography of cellulose and chitin using lithium chloride-N,N-dimethylacetamide as a mobile phase. *J. Chromatogr.*, 635 (1993) 334-337.
- 3288 Lawther, J.M., Rivera, Z.S., Jumel, K. and White, C.A.: Molecular weight determination of cellulose using high-performance size-exclusion chromatography (HPSEC), gel permeation chromatography (GPC) and viscometry. In: Kennedy, J.F., Phillips, G.O. and Williams, P.A. (Editors), *Cellul. Sources Exploit.*, Horwood, London, 1990, pp. 41-47; C.A., 118 (1993) 126699h.
- 3289 Leopold, K. and Fischer, W.: Molecular analysis of the lipoglycans of *Mycobacterium tuberculosis*. *Anal. Biochem.*, 208 (1993) 57-64.
- 3290 McCaffrey, T.A. and Falcone, D.J.: Purification of heparin by affinity chromatography. *Eur. Pat. Appl. EP 511,830 (Cl. C08B37/10)*, 04 Nov. 1992, US Appl. 692,921, 29 Apr. 1991; 14 p.; C.A., 118 (1993) 61851e.
- 3291 Melrose, J. and Ghosh, P.: Determination of the average molecular size of glycosaminoglycans by fast protein liquid chromatography. *J. Chromatogr.*, 637 (1993) 91-95.
- 3292 Orvášký, E., Šoltés, L., Chabreček, P., Novák, I., Kéry, V., Stančíková, M. and Vinš, I.: The determination of hyaluronan molecular weight distribution by means of high-performance size exclusion chromatography. *J. Liq. Chromatogr.*, 15 (1992) 3203-3218.
- 3293 Ploeger, A.: Conductivity detection of pectin: a rapid HPLC method to analyze degree of esterification. *J. Food Sci.*, 57 (1992) 1185-1197; C.A., 118 (1993) 37659c.
- 3294 Reeuwijk, H.J.E.M., Iirth, H., Tjaden, U.R., Merkus, F.W.H.M. and van der Greef, J.: Liquid chromatographic determination of  $\beta$ -cyclodextrin derivatives based on fluorescence enhancement after inclusion complexation. *J. Chromatogr.*, 614 (1993) 95-101.
- 3295 Schafer, S.J., Luyten, F.P., Yanagishita, M. and Reddi, A.H.: Proteoglycan metabolism is age related and modulated by isoforms of platelet-derived growth factor in bovine articular cartilage explant cultures. *Arch. Biochem. Biophys.*, 302 (1992) 431-438.
- 3296 Stumm, I. and Baltes, W.: (Determination of the synthetic carbohydrate polydextrose in foods by ion chromatography with pulsed amperometric detection). *Z. Lebensm.-Unters. Forsch.*, 195 (1992) 246-249; C.A., 118 (1993) 37674d.
- 3297 Suortti, T.: Size-exclusion chromatographic determination of  $\beta$ -glucan with postcolumn reaction detection. *J. Chromatogr.*, 632 (1993) 105-110.
- 3298 Sweeney, C., Mackintosh, D. and Mason, R.M.: UDP-sugar metabolism in Swarm rat chondrosarcoma chondrocytes. *Biochem. J.*, 290 (1993) 563-570.
- For additional information see C.A.:  
118 (1993) 37769p.
- See also 3126, 3280, 3365, 3833, 4279.
- 10c. *Glycoproteins and their constituents*
- 3299 Antonyuk, V.A.: (A lectin from *Polygonatum multiflorum* (L.) All. Purification, properties and preparation of peroxidase-labeled derivatives and lectin-gold complexes). *Biokhimiya (Moscow)*, 57 (1992) 1847-1854.
- 3300 Bergwerff, A.A., van Oostrum, J., Asselbergs, F.A.M., Bürgi, R., Hokke, C.H., Kamerling, J.P. and Vliegenthart, J.F.G.: Primary structure of N-linked carbohydrate chains of a human chimeric plasminogen activator K<sub>2</sub>tu-PA expressed in Chinese hamster ovary cells. *Eur. J. Biochem.*, 212 (1993) 639-656.
- 3301 Bihoreau, N., Layet, S., Fontaine-Aupart, M.P. and Paolantonaci, P.: Application of a new statistical approach to optimize the immunopurification of antihemophilia A factor. *J. Chromatogr.*, 612 (1993) 49-56.
- 3302 Cs-Szabó, G., Fülöp, C., Hadházy, C., Elődi, P. and Glant, T.T.: Substrate specificity of 'elastomucoproteinase': an enzyme which can degrade cartilage aggrecan. *Biochim. Biophys. Acta*, 1162 (1993) 266-274.
- 3303 Devaray, H., Griffith, J.W., Sheukhnazari, M., Naziruddin, B., Sachdev, G.P. and Bhavanandan, V.P.: Purification and characterization of moneky (*Macaca nemestrina*) tracheobronchial mucin. *Arch. Biochem. Biophys.*, 302 (1993) 285-293.
- 3304 Dickson, I.R. and Roghley, P.J.: The effects of vitamin D deficiency on proteoglycan and hyaluronate constituents of chick bone. *Biochim. Biophys. Acta*, 1181 (1993) 15-22.
- 3305 Halberstadt, J.B., Flowers, H. and Glick, M.C.: A method to detect polysialic acid in polymers of 10 or more sialyl residues synthesized *in vivo* and *in vitro*. *Anal. Biochem.*, 209 (1993) 136-142.

- 3306 Huddleston, M.J., Bean, M.F. and Carr, S.A.: Collisional fragmentation of glycopeptides by electrospray ionization LC/MS and LC/MS/MS: methods of selective detection of glycopeptides in protein digest. *Anal. Chem.*, 65 (1993) 877-884.
- 3307 Inoue, N., Takeuchi, M., Asano, K., Shimizu, R., Takasaki, S. and Kobata, A.: Structures of mucin-type sugar chains on human erythropoietins purified from urine and the culture medium of recombinant Chinese hamster ovary cells. *Arch. Biochem. Biophys.*, 301 (1993) 375-378.
- 3308 Kalraiyia, R.D., Sanjay, A. and Mehta, N.G.: Isolation of a glycoprotein responsible for the enhanced concanavalin A agglutinability of erythrocytes in Yoshida-ascites-sarcoma-bearing rats: the mechanism of paraneoplastic syndromes. *Biochem. J.*, 292 (1993) 163-170.
- 3309 Kunitani, M. and Kresin, L.: High-performance liquid chromatographic analysis of carbohydrate mass composition in glycoproteins. *J. Chromatogr.*, 632 (1993) 19-28.
- 3310 Liu, J., Volk, K.J., Kerns, E.H., Klohr, S.E., Lee, M.S. and Rosenberg, I.E.: Structural characterization of glycoprotein digests by microcolumn liquid chromatography-ion spray tandem mass spectrometry. *J. Chromatogr.*, 632 (1993) 45-56.
- 3311 Lu, Y., Ye, J. and Wold, F.: Isolation of oligomannose-type glycans from bean glycoproteins. *Anal. Biochem.*, 209 (1993) 79-84.
- 3312 Martin, H. and Dean, M.: An N-terminal peptide from link protein is rapidly degraded by chondrocytes, monocytes and B cells. *Eur. J. Biochem.*, 212 (1993) 87-94.
- 3313 Nagai, K. and Yamaguchi, H.: Direct demonstration of the essential role of the intramolecular high-mannose oligosaccharide chains in the folding and assembly of soybean (*Glycine max*) lectin polypeptides. *J. Biochem. (Tokyo)*, 113 (1993) 123-125.
- 3314 Nakata, N., Furukawa, K., Greenwalt, D.E., Sato, T. and Kobata, A.: Structural study of the sugar chains of CD36 purified from bovine mammary epithelial cells: occurrence of novel hybrid-type sugar chains containing the Neu5Ac $\alpha$ 2 $\rightarrow$ 6Gal1Nac $\beta$ 1 $\rightarrow$ 4GlcNAc and the Man $\alpha$ 1 $\rightarrow$ 2Man $\alpha$ 1 $\rightarrow$ 3Man $\alpha$ 1 $\rightarrow$ 6Man groups. *Biochemistry*, 32 (1993) 4369-4383.
- 3315 Ngoc, L.D., Brillard, M. and Hoebeke, J.: The  $\alpha$ - and  $\beta$ -subunits of the jacalin are cleavage products from a 17-kDa precursor. *Biochim. Biophys. Acta*, 1156 (1993) 219-222.
- 3316 O'Connell, B.C. and Tabak, L.A.: Separation of glycopeptides from *in vitro* O-glycosylation reactions using C18 cartridges. *Anal. Biochem.*, 210 (1993) 423-425.
- 3317 Parker, N., Finnie, I.A., Raouf, A.H., Ryder, S.D., Campbell, B.J., Tsai, H.H., Iddon, D., Milton, J.D. and Rhodes, J.M.: High performance gel filtration using monodisperse highly cross-linked agarose as a one-step system for mucin purification. *Biomed. Chromatogr.*, 7 (1993) 68-74.
- 3318 Pasquier, M.-C., Sabbagh, L., Vallot, T. and Vatier, J.: Molecular fractionation of gastric mucus component by high-performance liquid chromatography: application to pig gastric mucus *in vitro* and to human gastric mucus collected by aspiration during gastric endoscopy. *J. Chromatogr.*, 614 (1993) 27-35.
- 3319 Schmelzer, C.H., Harris, R.J., Butler, D., Yedinak, C.M., Wagner, K.L. and Burton, L.E.: Glycosylation pattern and disulfide assignments of recombinant human differentiation-stimulating factor. *Arch. Biochem. Biophys.*, 302 (1993) 484-489.
- 3320 Tiffache, C., Chesnel, A., Jego, P. and le Pennec, J.-P.: Isolation and characterization of a cDNA clone encoding a *Pleurodeles* lectin. *Eur. J. Biochem.*, 213 (1993) 901-907.
- 3321 Umetsu, K., Yamashita, K., Suzuki, J.-i., Yamashita, T. and Suzuki, T.: Purification and characterization of an N-acetyllactosamine-specific lectin from larvae of a moth, *Phalaena flavescentis*. *Arch. Biochem. Biophys.*, 301 (1993) 200-205.
- 3322 Valenzano, K.J., Kallay, L.M. and Lobel, P.: An assay to detect glycoproteins that contain mannose 6-phosphate. *Anal. Biochem.*, 209 (1993) 156-162.
- See also 3263, 3274, 3623, 3688.
- ## 11. ORGANIC ACIDS AND LIPIDS
- ### 11a. Organic acids and simple esters
- 3323 Adelhardt, R. and Spitteler, G.: Produkte der Dimerisierung ungesättigter Fettsäuren IX. Kinetische Untersuchungen zur Dimerisierung von Linolsäure. *Fat Sci. Technol.*, 95 (1993) 85-90.
- 3324 Baillet, A., Corbeau, L., Rafidison, P. and Ferrier, D.: Separation of isomeric compounds by reversed-phase high-performance liquid chromatography using Ag $^{+}$  complexation. *J. Chromatogr.*, 634 (1993) 251-256.
- 3325 Bernards, M.A. and Lewis, N.G.: Alkyl ferulates in wound healing potato tubers. *Phytochemistry*, 31 (1992) 3409-3412; C.A., 118 (1993) 35912f.
- 3326 Bernwieser, I. and Sontag, G.: Determination of phenolic acids in vegetable oil using HPLC coupled with multielectrode detection. *Z. Lebensm.-Unters. Forsch.*, 195 (1992) 559-561; C.A., 118 (1993) 146393g.
- 3327 Borges, M.F.M., Roleira, F.M.F. and Pinto, M.M.M.: Simultaneous isocratic HPLC separation of the diastereoisomers of cafecic, ferulic, and isoferulic acids and related coumarins. *J. Liq. Chromatogr.*, 16 (1993) 149-160.
- 3328 Cateni, F., Mamolo, M.G. and Lokar, L.C.: Rapid HPLC analysis for quantitative determination of aristolochic acids. *Farmaco*, 47 (1992) 1335-1342; C.A., 118 (1993) 55339c.
- 3329 Chen, Q. and Nilsson, Å.: Desaturation and chain elongation of n-3 and n-6 polyunsaturated fatty acids in the human CaCo-2 cell line. *Biochim. Biophys. Acta*, 1166 (1993) 193-201.
- 3330 Chin, S.F., Liu, W., Storkson, J.M., Ha, Y.L. and Pariza, M.W.: Dietary sources of conjugated dienoic isomers of linoleic acid, a newly recognized class of anticarcinogens. *J. Food Compos. Anal.*, 5 (1992) 185-197; C.A., 118 (1993) 100589x.
- 3331 Ching, C.B., Hidajat, K. and Rao, M.S.: Reversed phase high performance liquid chromatographic studies for homologous series of polyunsaturated fatty acids on a commercial  $\mu$ Bondapak free fatty acid column. *J. Liq. Chromatogr.*, 16 (1993) 527-540.
- 3332 Dette, C., Wätzig, H. and Uhl, H.: Characterization of the important pharmaceutical intermediate pyridine-2,4-dicarboxylic acid using capillary electrophoresis (CE). *Pharmazie*, 48 (1993) 276-280.
- 3333 Gasparini, F., Misiti, D., Villani, C., Pierini, M. and la Torre, F.: Direct high-performance liquid chromatographic resolution of 2-aryl- and 2-heteroarylpropionic acids on a chiral stationary phase containing the N,N'-dinitrobenzoyl derivative of (1R,2R)-diaminocyclohexane. *J. Chromatogr.*, 633 (1993) 81-87.

- 3334 Griesemann, E., Bouquet, S., Perault, M.C., Favreliere, S., Barrier, L. and Vandel, B.: Simple HPLC method for routine determination of urinary phenylacetic acid excretion. *J. Liq. Chromatogr.*, 16 (1993) 733-741.
- 3335 Kiran Kumar, Y.V., Raghunathan, A., Sailesh, S., Prasad, M., Venkuri, M.C. and Reddanna, P.: Differential effects of 15-HPETE and 15-HETE on BHK-21 cell proliferation and macromolecular composition. *Biochim. Biophys. Acta*, 1167 (1993) 102-108.
- 3336 Kunath, A., Henkel, B. and Wagner, J.: Direct optical resolution of 3,5-substituted  $\delta$ -valerolactones and related 3,5-dihydroxy-valeric methyl esters on modified amylose and cellulose chiral stationary phases. *J. Chromatogr.*, 634 (1993) 119-124.
- 3337 Lin, M.T., Wang, Y.-h., Chen, Y.-l. and Chang, W.-c.: The effect of copper ion on arachidonic acid metabolism in the porcine corneal epithelium. *Biochem. Biophys. Res. Commun.*, 190 (1993) 1122-1129.
- 3338 Loznikova, N.M., Balashova, E.Yu., Lavrushenkova, E.M., Morozova, T.N., Zamanskaya, I.S. and Molchanova, S.S.: (Determination of the products of interaction between dimethyltrichlorohexenoates and alkaline agents in the production of permethrin acid ethyl ester by HPLC). *Zh. Anal. Khim.*, 47 (1992) 922-926; C.A., 118 (1993) 34342h.
- 3339 Oliw, E.H.: bis-Allylic hydroxylation of linoleic acid and arachidonic acid by human hepatic monooxygenases. *Biochim. Biophys. Acta*, 1166 (1993) 258-263.
- 3340 Osterroht, C.: Extraction of dissolved fatty acids from sea water. *Fresenius J. Anal. Chem.*, 345 (1993) 773-779.
- 3341 Paavilainen, S. and Korpela, T.: Comparison of high-performance liquid and gas chromatography in the determination of organic acids in culture media of alkaliophilic bacteria. *J. Chromatogr.*, 634 (1993) 273-280.
- 3342 Petrarulo, M., Cerelli, E., Marangella, M., Maglienti, F. and Linari, F.: Ion-chromatographic determination of plasma oxalate re-examined. *Clin. Chem. (Winston-Salem)*, 39 (1993) 537-539.
- 3343 Řezanka, T. and Sokolov, M.Yu.: Rapid method for the enrichment of very long-chain fatty acids from microorganisms. *J. Chromatogr.*, 636 (1993) 249-254.
- 3344 Schmid, E.R., Kynclova, E. and Soevezgato, F.: (Determination of 1-naphthalacetic acid and 2-(1-naphthyl)-acetamide residues in peaches). *Ernaehrung (Vienna)*, 16 (1992) 274-277; C.A., 118 (1993) 5809k.
- 3345 Schneede, J. and Ueland, P.M.: Automated assay of methylmalonic acid in serum and urine by derivatization with 1-pyrenylidiazomethane, liquid chromatography, and fluorescence detection. *Clin. Chem. (Winston-Salem)*, 39 (1993) 392-399.
- 3346 Steijger, O.M., Lingeman, H., Brinkman, U.A.T., Holthuis, J.J.M., Smilde, A.K. and Doornbos, D.A.: Liquid chromatographic analysis of carboxylic acids using N-(4-aminobutyl)-N-ethylsulfonyl as chemiluminescent label: determination of ibuprofen in saliva. *J. Chromatogr.*, 615 (1993) 97-110.
- 3347 Takadate, A., Masuda, T., Murata, C., Haratake, C., Isobe, A., Irikura, M. and Goya, S.: 3-Bromoacetyl-6,7-methylenedioxycoumarin as a highly reactive and sensitive fluorescence labeling reagent for fatty acids. *Anal. Sci.*, 8 (1992) 695-697; C.A., 118 (1993) 120184q.
- 3348 Topalova, T., Borschukova, D., Angelova, N., Aleksandrova, M. and Petsev, N.: (Separation of phthalic esters by reversed phase high performance liquid chromatography). *Izv. Khim.*, 24 (1991) 306-312; C.A., 118 (1993) 72818a.
- 3349 Wahlman, M. and Davidson, B.S.: New destruxins from the entomopathogenic fungus *Metarrhizium anisopliae*. *J. Natural Prod.*, 56 (1993) 643-647.
- 3350 Wang, Y. and Zhou, M.: (Chromatographic study on heteropoly acids. III. Effect of stationary phase residual surface silanol groups on the retention behavior of heteropoly acids). *Sepu*, 10 (1992) 320-322; C.A., 118 (1993) 67583r.
- 3351 Wigren, J., Herbertsson, H., Tollbon, Ö. and Hammarström, S.: Metabolism of 12(S)-hydroxy-5,8,10,14-eicosatetraenoic acid by kidney and liver peroxisomes. *J. Lipid Res.*, 34 (1993) 625-631.
- 3352 Zosimo-Landolfo, G., Balkadjian, M. and Tronchet, J.M.J.: (Separation of organic acids by using silica impregnated with iron(II) and iron(III) ions). *Pharm. Acta Helv.*, 67 (1992) 322-324; C.A., 118 (1993) 109864r.
- For additional information see C.A.:  
118 (1993) 95704z, 100548h, 101937w, 120145c, 133266t.
- See also 3092, 3121, 3146, 3180, 3216, 3357, 3367, 3391, 3458, 3494, 4014, 4020.
- 11b. Prostaglandins
- 3353 Ben Gueddour, R., Matt, M., Nicolas, A., Donner, M. and Stoltz, J.F.: Determination of thromboxane B<sub>2</sub> by normal-phase high-performance liquid chromatography after pre-column derivatization with fluorescent reagents. *Anal. Lett.*, 26 (1993) 429-443.
- 3354 Nyysönen, K., Seppänen, K. and Salonen, J.T.: High-performance liquid chromatographic assay of platelet-produced thromboxane B<sub>2</sub>. *J. Chromatogr.*, 612 (1993) 27-32.
- 3355 Spurney, R.F., Onorato, J.J., Ruiz, P., Pisetsky, D.S. and Coffman, T.M.: Characterization of glomerular thromboxane receptors in murine lupus nephritis. *J. Pharmacol. Exp. Ther.*, 264 (1993) 584-590.
- 3356 Walker, T.A.: Separation of Beraprost sodium isomers using different cyclodextrin stationary phases. *J. Chromatogr.*, 633 (1993) 97-103.
- 11c. Lipids and their constituents
- 3357 Agren, J.J., Julkunen, A. and Penttila, I.: Rapid separation of serum lipids for fatty acid analysis by a single aminopropyl column. *J. Lipid Res.*, 33 (1992) 1871-1876.
- 3358 Aspinall, G.O., McDonald, A.G., Raju, T.S., Pang, H., Kurjanczyk, L.A., Penner, J.L. and Moran, A.P.: Chemical structure of the core region of *Campylobacter jejuni* serotype 0:2 lipopolysaccharide. *Eur. J. Biochem.*, 213 (1993) 1029-1037.
- 3359 Aspinall, G.O., McDonald, A.G., Raju, T.S., Pang, H., Moran, A.P. and Penner, J.L.: Chemical structures of the core regions of *Campylobacter jejuni* serotypes 0:1, 0:4, 0:23, and 0:36 lipopolysaccharides. *Eur. J. Biochem.*, 213 (1993) 1017-1027.
- 3360 Brearley, C.A. and Hanke, D.E.: Pathway of synthesis of 3,4- and 4,5-phosphorylated phosphatidylinositols in the duckweed *Spirodela polyrhiza* L. *Biochem. J.*, 290 (1993) 145-150.
- 3361 Burdge, G.C., Kelly, F.J. and Postle, A.D.: Mechanisms of hepatic phosphatidylcholine synthesis in the developing guinea pig: contributions of acyl remodelling and of N-methylation of phosphatidylethanolamine. *Biochem. J.*, 290 (1993) 67-73.

- 3362 Christie, W.W.: Detectors for high-performance liquid chromatography of lipids with special reference to evaporative light-scattering detection. In: Christie, W.W. (Editor), *Adv. Lipid Methodol.-One*, Oily Press, Ayr, 1992, pp. 239-271; C.A., 118 (1993) 142670x - a review with 147 refs.
- 3363 Cortesi, N., Rovellini, P. and Fedeli, E.: (Determination of trilinolein in unrefined olive husk oils). *Riv. Ital. Sostanze Grasse*, 69 (1992) 531-534; C.A., 118 (1993) 146369d.
- 3364 Dadi, H.K., Ke, S. and Roifman, C.M.: Interleukin 7 receptor mediates the activation of phosphatidylinositol-3 kinase in human B-cell precursors. *Biochem. Biophys. Res. Commun.*, 192 (1993) 459-464.
- 3365 Fischer, W.: Molecular analysis of lipid macroamphiphiles by hydrophobic interaction chromatography, exemplified with lipo-teichoic acids. *Anal. Biochem.*, 208 (1993) 49-56.
- 3366 Flor, R.V., Hecking, L.T. and Martin, B.D.: Development of high-performance liquid chromatography criteria for determination of grades of commercial olive oils. Part I. The normal ranges for the triacylglycerols. *J. Am. Oil Chem. Soc.*, 70 (1993) 199-203.
- 3367 Foglia, T.A., Petruso, K. and Fearheller, S.H.: Enzymatic interesterification of tallow-sunflower oil mixtures. *J. Am. Oil Chem. Soc.*, 70 (1993) 281-285.
- 3368 Haas, M.J., Cichowicz, D.J., Phillips, J. and Moreau, R.: The hydrolysis of phosphatidylcholine by an immobilized lipase: optimization of hydrolysis in organic solvents. *J. Am. Oil Chem. Soc.*, 70 (1993) 111-117.
- 3369 Hawkins, P.T., Stephens, L.R. and Piggott, J.R.: Analysis of inositol metabolites produced by *Saccharomyces cerevisiae* in response to glucose stimulation. *J. Biol. Chem.*, 268 (1993) 3374-3383.
- 3370 Hinrichs, J., Heinemann, U. and Kessler, H.G.: Differences in the composition of triglycerides in summer and winter milk fat. *Milchwissenschaft*, 47 (1992) 495-498; C.A., 118 (1993) 37660w.
- 3371 Jiang, L.W., Mitchell, B.A., Teodoro, J.G. and Rip, J.W.: Uptake and transport of fluorescent derivatives of dolichol in human fibroblasts. *Biochim. Biophys. Acta*, 1147 (1993) 205-213.
- 3372 Joerg, E. and Sontag, G.: Multichannel coulometric detection coupled with liquid chromatography for determination of phenolic esters in honey. *J. Chromatogr.*, 635 (1993) 137-142.
- 3373 Kadokawa, H., Patton, G.M. and Robins, S.J.: Effect of phosphatidylcholine molecular species on the uptake of HDL triglycerides and cholesteryl esters by the liver. *J. Lipid Res.*, 34 (1993) 180-189.
- 3374 Kunze, H. and Bohn, E.: Separation and analysis of amino alcohol-containing diacylglycerophospholipids and their hydrolytic metabolites. *J. Chromatogr.*, 636 (1993) 221-229.
- 3375 Letter, W.S.: A qualitative method for triglyceride analysis by HPLC using an evaporative light-scattering detector. *J. Liq. Chromatogr.*, 16 (1993) 225-239.
- 3376 Lin, D.S., Connor, W.E., Wolf, D.P., Neuringer, M. and Hatchey, D.L.: Unique lipids of primate spermatozoa: desmosterol and docosahexaenoic acid. *J. Lipid Res.*, 34 (1993) 491-499.
- 3377 Menniti, F.S., Miller, R.N., Putney, J.W., Jr. and Shears, S.B.: Turnover of inositol polyphosphate pyrophosphates in pancreaticoma cells. *J. Biol. Chem.*, 268 (1993) 3850-3856.
- 3378 Moffat, C.F., McGill, A.S., Hardy, R. and Anderson, R.S.: The production of fish oils enriched in polyunsaturated fatty acid-containing triglycerides. *J. Am. Oil Chem. Soc.*, 70 (1993) 133-138.
- 3379 Neff, W.E., Mounts, T.L., Rinsch, W.M. and Konishi, H.: Photo-oxidation of soybean oils as affected by triacylglycerol composition and structure. *J. Am. Oil Chem. Soc.*, 70 (1993) 163-168.
- 3380 Noda, N., Tsunefuka, S., Tanaka, R. and Miyahara, K.: Isolation and characterization of eight 1-O-alkyl-sn-glycero-3-phosphocholines from the crude drug "Jiryu", the earthworm, *Pheretima asiatica*. *Chem. Pharm. Bull.*, 40 (1992) 2756-2758.
- 3381 Oshima, T., Fujita, Y. and Koizumi, C.: Oxidative stability of sardine and mackerel lipids with reference to synergism between phospholipids and  $\alpha$ -tocopherol. *J. Am. Oil Chem. Soc.*, 70 (1993) 269-276.
- 3382 Poyner, D.R., Hanley, M.R., Jackson, T.R. and Hawkins, P.T.: Receptor regulation of phosphoinositide 3-hydroxykinase in the NG115-401L-C3 neuronal cell line: stimulation by insulin-like growth factor-I. *Biochem. J.*, 290 (1993) 901-905.
- 3383 Prieto, J.A., Ebri, A. and Collar, C.: Composition and distribution of individual molecular species of wheat flour phospholipids. *J. Chromatogr. Sci.*, 31 (1993) 55-60.
- 3384 Sanchez-Muniz, F.J., Cuesta, C. and Carrido-Polonio, C.: Sunflower oil used for frying: combination of column, gas and high-performance size-exclusion chromatography for its evaluation. *J. Am. Oil Chem. Soc.*, 70 (1993) 235-240.
- 3385 Schlamme, M., Brody, S. and Hostettler, K.Y.: Mitochondrial cardiolipin in diverse eukaryotes. Comparison of biosynthetic reactions and molecular acyl species. *Eur. J. Biochem.*, 212 (1993) 727-735.
- 3386 Sperling, P. and Heinz, E.: Isomeric sn-1-octadecenyl and sn-2-octadecenyl analogues of lysophosphatidylcholine as substrates for acylation and desaturation by plant microsomal membranes. *Eur. J. Biochem.*, 213 (1993) 965-971.
- 3387 Stephens, L., Radenbergs, T., Thiel, U., Vogel, G., Khoo, K., Dell, A., Jackson, T.R., Hawkins, P.T. and Mayr, G.W.: The detection, purification, structural characterization, and metabolism of di-phosphoinositol pentakisphosphate(s) and bisdiphosphoinositol tetrakisphosphate(s). *J. Biol. Chem.*, 268 (1993) 4009-4015.
- 3388 Swiezewska, E., Thelin, A., Dallner, G., Andersson, B. and Ernster, L.: Occurrence of prenylated proteins in plant cells. *Biochem. Biophys. Res. Commun.*, 192 (1993) 161-166.
- 3389 Tamai, Y., Nakamura, K., Takayama-Abe, K., Uchida, K., Kasama, T. and Kobatake, H.: Less polar glycolipids in Alaskan pollock brain: isolation and characterization of acyl galactosyl diacylglycerol, acyl galactosyl ceramide, and acyl glucosyl ceramide. *J. Lipid Res.*, 34 (1993) 601-608.
- 3390 Tinsley, P.W. and Maerker, G.: Effect of low-dose  $\gamma$ -radiation on individual phospholipids in aqueous suspension. *J. Am. Oil Chem. Soc.*, 70 (1993) 187-191.

For additional information see C.A.:

118 (1993) 10847n, 76370w.

See also 3289, 3324, 3391, 3706, 3970, 3974, 3975.

#### 11d. Lipoproteins and their constituents

- 3391 Belkner, J., Wiesner, R., Rathman, J., Barnett, J., Sigal, E. and Kühn, H.: Oxygenation of lipoproteins by mammalian lipoxygenases. *Eur. J. Biochem.*, 213 (1993) 251-261.

- 3392 Blanco-Vaca, F., Via, D.P., Yang, C.-y., Massey, J.B. and Powell, H.J.: Characterization of disulfide-linked heterodimers containing apolipoprotein-D in human plasma lipoproteins. *J. Lipid Res.*, 33 (1992) 1785-1796.
- 3393 Fazio, S., Horie, Y., Weisgraber, K.H., Havekes, L.M. and Rall, S.C., Jr.: Preferential association of apolipoprotein E Leiden with very low density lipoproteins of human plasma. *J. Lipid Res.*, 34 (1993) 447-453.
- 3394 Gómez-Coronado, D., Sáez, G.T., Lasunción, M.A. and Herrera, E.: Different hydrolytic efficiencies of adipose tissue lipoprotein lipase on very-low-density lipoprotein subfractions separated by heparin-Sepharose chromatography. *Biochim. Biophys. Acta*, 1167 (1993) 70-78.
- 3395 Kunitake, S.T., Mendel, C.M. and Hennessy, L.K.: Interconversion between apolipoprotein-A-I-containing lipoproteins of pre-beta and alpha electrophoretic mobilities. *J. Lipid Res.*, 33 (1992) 1807-1816.
- 3396 Levy, A., Amotz, A.B. and Aviram, M.: Preferential inhibition of LDL oxidation by the all-trans-isomer of  $\beta$ -carotene in comparison with 9-cis  $\beta$ -carotene. *Eur. J. Clin. Chem. Clin. Biochem.*, 31 (1993) 83-90.
- 3397 Lou, S.C., Patel, C., Ching, S. and Gordon, J.: One-step competitive immunochromatographic assay for semiquantitative determination of lipoprotein(a) in plasma. *Clin. Chem. (Winston-Salem)*, 39 (1993) 619-624.
- 3398 O'Brien, T., Buiithieu, J., Nguyen, T.T., Klein, L., Bren, N., Wentworth, M., Hallaway, B.J. and Kottke, B.A.: Separation of high-density lipoproteins into apolipoprotein E-poor and apolipoprotein E-rich subfractions by fast protein liquid chromatography using a heparin affinity column. *J. Chromatogr.*, 613 (1993) 239-246.
- 3399 Tertov, V.V., Orekhov, A.N., Sobenin, I.A., Morisset, J.D., Gotto, A.M., Jr. and Guevara, J.G., Jr.: Carbohydrate composition of protein and lipid components in sialic acid-rich and poor low density lipoproteins from subjects with and without coronary artery disease. *J. Lipid Res.*, 34 (1993) 365-375.
- See also 3702.
- ## 12. ORGANIC PEROXIDES
- 3400 Takayama, F., Egashiro, T., Kudo, Y. and Yamanaka, Y.: Chemiluminescence-HPLC assay of phosphatidylcholine hydroperoxide generated by ischemia-reperfusion in the liver of rats. *Biochem. Pharmacol.*, 44 (1992) 2412-2414; C.A., 118 (1993) 142714q.
- ## 13. STEROIDS
- ### 13a. General techniques
- 3401 Zhao, Q. and Li, Z.: Preparative separation and properties of (E)- and (Z)-steroidal  $\alpha,\beta$ -unsaturated ketoximes. *J. Chromatogr.*, 635 (1993) 342-345.
- ### 13b. Pregnane and androstane derivatives
- 3402 Chiba, H., Ito, Y., Matsuno, K., Kobayashi, K., Kurosawa, T., Ikegawa, S., Mahara, R. and Tohma, M.: Determination of urinary 18-hydroxycortisol by isocratic normal-phase high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 132-136.
- 3403 Dutta, T.K., Datta, J. and Samanta, T.B.: Onset of new catalytic activity in immobilized spores of *Aspergillus ochraceus* TS due to *in situ* germination: C<sub>17-20</sub> lysis accompanies 11 $\alpha$ -hydroxylation of steroid. *Biochim. Biophys. Res. Commun.*, 192 (1993) 119-123.
- 3404 Hariharan, M., Naga, S., VanNoord, T. and Kindt, E.K.: Assay of human plasma cortisone by liquid chromatography: normal plasma concentrations (between 8 and 10 a.m.) of cortisone and corticosterone. *J. Chromatogr.*, 613 (1993) 195-201.
- 3405 Harrell, A.W., Wheeler, S.M., Pennick, M., Clarke, S.E. and Chinery, R.J.: Evidence that famciclovir (BRL 42810) and its associated metabolites do not inhibit the 6 $\beta$ -hydroxylation of testosterone in human liver microsomes. *Drug Metab. Disp.*, 21 (1993) 18-23.
- 3406 Katayama, M., Masuda, Y. and Taniguchi, H.: Determination of corticosteroids in plasma by high-performance liquid chromatography after pre-column derivatization with 2-(4-carboxyphenyl)-5,6-dimethylbenzimidazole. *J. Chromatogr.*, 612 (1993) 33-39.
- 3407 Michniak, B.B., Chapman, J.M. and Seyda, K.L.: Facilitated transport of two model steroids by esters and amides of clofibrate acid. *J. Pharm. Sci.*, 82 (1993) 214-219.
- 3408 Migulla, H., Bauer, S., Gerbsch, S. and Kewitz, H.: Bestimmung von Hydroxyprogesteroncaproat im Serum mittels HPLC. *Pharmazie*, 48 (1993) 145-146.
- 3409 Murphy, E.J., Slivka, A.P., Rosenberger, T.A. and Horrocks, L.A.: High-performance liquid chromatography separation and quantitation of methylprednisolone from rat brain. *Anal. Biochem.*, 209 (1993) 339-342.
- 3410 Stubbings, G.W. and Shepherd, M.J.: A multi-dimensional liquid chromatography method for determination of androgen hormone residues in cattle liver. *J. Liq. Chromatogr.*, 16 (1993) 241-255.
- 3411 Uzu, S., Imai, K., Nakashima, K. and Akiyama, S.: Determination of medroxyprogesterone acetate in serum by HPLC with peroxyoxalate chemiluminescence detection using a fluorogenic reagent, 4-(N,N-dimethylaminosulphonyl)-7-hydrazino-2,1,3-benzoxadiazole. *J. Pharm. Biomed. Anal.*, 10 (1992) 979-984.
- 3412 Wald, J.A., Law, R.M., Ludwig, E.A., Sloan, R.R., Middleton, E., Jr. and Jusko, W.J.: Evaluation of dose-related pharmacokinetics and pharmacodynamics of prednisolone in man. *J. Pharmacokinet. Biopharm.*, 20 (1992) 567-589.
- See also 3738, 4159.
- ### 13c. Estrogens
- 3413 Fujino, H. and Goya, S.: 12-(Difluoro-1,3,5-triazinyl)-benz[f]isoindolo[1,2-b][1,3]benzothiazolidine as a fluorescent labeling reagent for estrogens in high-performance liquid chromatography. *Anal. Sci.*, 8 (1992) 715-717; C.A., 118 (1993) 52563k.

See also 3110.

**13d. Sterols**

- 3414 Aksoy, I.A., Otterness, D.M. and Weishilboum, R.M.: Cholesterol sulfation in human liver. Catalysis by dehydroepiandrosterone sulfotransferase. *Drug Metab. Disp.*, 21 (1993) 268-276.
- 3415 Biedermann, M., Grob, K. and Mariani, C.: Transesterification and on-line LC-GC for determining the sum of free and esterified sterols in edible oils and fats. *Fat Sci. Technol.*, 95 (1993) 127-133.
- 3416 Bocos, C., Castro, M., Orozco, E., Contreras, J.A. and Herrera, E.: A rapid and sensitive method for HPLC cholesterol determination in bile. *Rev. Esp. Fisiol.*, 48 (1992) 211-214; C.A., 118 (1993) 142715r.
- 3417 De Riccardis, F., Minale, L., Iorizzi, M., Debitus, C. and Levi, C.: Marine sterols. Side-chain-oxygenated sterols, possibly of abiotic origin, from the new caledonian sponge *Stelodoryx chlorophylla*. *J. Natural Prod.*, 56 (1993) 282-287.
- 3418 Heidepriem, R.W., Livant, P.D., Parish, E.J., Barbuch, R.J., Broaddus, M.G. and Bard, M.: A simple method for the isolation of zymosterol from a sterol mutant of *Saccharomyces cerevisiae*. *J. Steroid Biochem. Mol. Biol.*, 43 (1992) 741-743; C.A., 118 (1993) 55357g.
- 3419 Krause, B.R., Anderson, M., Bisgaier, C.L., Bocan, T., Bousley, R., DeHart, P., Essenburg, A., Hamelebe, K., Homan, R., Kieft, K., McNally, W. et al.: *In vivo* evidence that the lipid-regulating activity of the ACAT inhibitor CI-976 in rats is due to inhibition of both intestinal and liver ACAT. *J. Lipid Res.*, 34 (1993) 279-294.
- 3420 Lognay, G., Lacoste, F., Marlher, M., Mordret, F., Auge, C., Raoux, R., Wagstaffe, P.J., Boenke, A. and Severin, M.: The certification of the identity of individual sterols in three BCR oil and fat reference materials by GC-MS. *Fat Sci. Technol.*, 95 (1993) 98-104.
- 3421 Nes, W.D., Janssen, G.G., Crumley, F.G., Kalinowska, M. and Akihisa, T.: The structural requirements of sterols for membrane function in *Saccharomyces cerevisiae*. *Arch. Biochem. Biophys.*, 300 (1993) 724-733.
- 3422 Petrack, B. and Latario, B.J.: Synthesis of 27-hydroxycholesterol in rat liver mitochondria: HPLC assay and marked activation by exogenous cholesterol. *J. Lipid Res.*, 34 (1993) 643-649.
- 3423 Thewles, A., Parslow, R.A. and Coleman, R.: Effect of diosgenin on biliary cholesterol transport in the rat. *Biochem. J.*, 291 (1993) 793-798.

See also 3391, 4016.

**13e. Bile acids and alcohols**

- 3424 Mikami, T., Kihara, K., Ikawa, S., Yoshii, M., Miki, S., Mosbach, E.H. and Hoshita, T.: Metabolism of sulfonate analogs of ursodeoxycholic acid and their effects on biliary bile acid composition in hamsters. *J. Lipid Res.*, 34 (1993) 429-435.
- 3425 Nichols, J.H., Ellefson, R.D., Hermansen, J., Schifferdecker, K. and Burritt, M.F.: Simultaneous HPLC determination of free, conjugated, and sulfated bile acids. *J. Liq. Chromatogr.*, 16 (1993) 681-697.
- 3426 Niwa, T., Koshyama, T., Goto, J. and Nambara, T.: High-performance liquid chromatographic separation of bile acid N-acetylglucosaminides. *J. Liq. Chromatogr.*, 16 (1993) 331-341.

- 3427 Tao, S., Tazuma, S. and Kajiyama, G.: Apolipoprotein A-I stabilizes phospholipid lamellae and thus prolongs nucleation time in model bile systems: an ultrastructural study. *Biochim. Biophys. Acta*, 1166 (1993) 25-30.
- 3428 Thompson, M.B., Davis, D.G. and Morris, R.W.: Taurine conjugate of  $3\alpha,6\beta,7\beta$ -trihydroxy- $5\beta,22$ -cholen-24-oic acid (tauro $\Delta^{22}$ - $\beta$ -muricholate): the major bile acid in the serum of female rats treated with  $\alpha$ -naphthylisothiocyanate and its secretion by liver slices. *J. Lipid Res.*, 34 (1993) 553-561.
- 3429 Une, M., Izumi, N. and Hoshita, T.: Stereochemistry of intermediates in the conversion of  $3\alpha,7\alpha,12\alpha$ -trihydroxy- $5\beta$ -cholestanic acid to cholic acid by rat liver peroxisomes. *J. Biochem. (Tokyo)*, 113 (1993) 141-143.
- 3430 Van Borssum Waalkes, M., Kuipers, F., Havinga, R. and Scherphof, G.L.: Conversion of liposomal 5-fluoro-2'-deoxyuridine and its dipalmitoyl derivative to bile acid conjugates of  $\alpha$ -fluoro- $\beta$ -alanine and their excretion into rat bile. *Biochim. Biophys. Acta*, 1176 (1993) 43-50.
- 3431 Warrack, B.M. and DiDonato, G.C.: Ion spray liquid chromatographic/mass spectrometric characterization of bile acids. *Biol. Mass Spectrom.*, 22 (1993) 101-111; C.A., 118 (1993) 142944q.

**14. STEROID GLYCOSIDES AND SAPONINS**

- 3432 Ikeda, Y., Fujii, Y. and Yamazaki, M.: Determination of lanatoside C and digoxin in *Digitalis lanata* by HPLC and its application to analysis of the fermented leaf powder. *J. Natural Prod.*, 55 (1992) 748-752.
- 3433 Kennelly, E.J., Lewis, W.H., Winter, R.E.K., Johnson, S., Elvin-Lewis, M. and Gossling, J.: Triterpenoid saponins from *Gouania lupuloides*. *J. Natural Prod.*, 56 (1993) 402-410.
- 3434 Pistelli, L., Bilia, A.R., Marsili, A., de Tommasi, N. and Manunta, A.: Triterpenoid saponins from *Bupleurum fruticosum*. *J. Natural Prod.*, 56 (1993) 240-244.

For additional information see C.A.:  
118 (1993) 87478p.

See also 4378, 4380.

**15. TERPENES AND OTHER VOLATILE AROMATIC COMPOUNDS**

**15a. Terpenes**

- 3435 Brumley, W.C., Brownrigg, C.M. and Grange, A.H.: Determination of toxaphene in soil by electron-capture negative ion mass spectrometry after fractionation by high-performance gel permeation chromatography. *J. Chromatogr.*, 633 (1993) 177-183.
- 3436 Girin, M.A., Paphassarang, S., David-Etève, C., Chaboud, A. and Reynaud, J.: Determination of ingenol in homeopathic mother tinctures of *Euphorbia* species by high-performance liquid chromatography. *J. Chromatogr.*, 637 (1993) 206-208.
- 3437 Halawish, F.T. and Tallamy, D.W.: Quantitative determination of cucurbitacins by high performance liquid chromatography and high performance thin layer chromatography. *J. Liq. Chromatogr.*, 16 (1993) 497-511.

- 3438 Hull, C.J., Jr., Dutton, W.R. and Switzer, B.S.: Quantitation of azadirachtins in insecticidal formulations by high-performance liquid chromatography. *J. Chromatogr.*, 633 (1993) 300-304.
- 3439 Jäger, A.K., Gudiksen, L., Adsersen, A. and Smitt, U.W.: High-performance liquid chromatography of thapsigargin. *J. Chromatogr.*, 634 (1993) 135-137.
- 3440 Kawakami, J., Yamamura, Y., Santa, T., Kotaki, H., Uchino, K., Sawada, Y. and Iga, T.: Kinetic analysis of glycyrrhetic acid, an active metabolite of glycyrrhizin, in rats: role of enterohepatic circulation. *J. Pharm. Sci.*, 82 (1993) 301-305.
- 3441 Nowak, G.: Chromatography of twenty-six sesquiterpene lactones from *Centaurea bella*. *Chromatographia*, 35 (1993) 325-328.
- 3442 Pietta, P., Mauri, P. and Rava, A.: Rapid liquid chromatography of terpenes in *Ginkgo biloba* L. extracts and products. *J. Pharm. Biomed. Anal.*, 10 (1992) 1077-1079.
- 3443 Schmidt, P.C. and Ness, A.: Isolierung und Charakterisierung eines Matricin-Standards. *Pharmazie*, 48 (1993) 146-147.
- 3444 Tabata, M., Tanaka, S., Cho, H.J., Uno, C., Shimakura, J., Ito, M., Kamisako, W. and Honda, C.: Reduction of an anti-allergic triterpene, bryonolic acid, by plant cell cultures. *J. Natural Prod.*, 56 (1993) 165-174.
- 3445 Tischler, M. and Cardellina, II, J.H.: A simple method for the separation of triterpene carboxylic acids. *J. Liq. Chromatogr.*, 16 (1993) 15-19.

See also 3214, 3371, 3388, 3421, 3434, 4016.

#### 15b. Essential oils

- 3446 Günther, K., Carle, R., Fleischhauer, I. and Merget, S.: Semi-preparative liquid-chromatographic separation of all four stereoisomers of  $\alpha$ -bisabolol on tribenzoylcellulose. *Fresenius J. Anal. Chem.*, 345 (1993) 787-790.

#### 15c. Bitter substances

- 3447 Wolfender, J.-L., Hamburger, M., Hostettmann, K., Msomthi, J.D. and Mavi, S.: Search for bitter principles in *Chironia* species by LC-MS and isolation of a new secoiridoid diglycoside from *Chironia krebsii*. *J. Natural Prod.*, 56 (1993) 682-689.

### 16. NITRO AND NITROSO COMPOUNDS

- 3448 McCord, B.R. and Whitehurst, F.W.: The analysis and characterization of TNT using liquid chromatography with photodiode array detection. *J. Forensic Sci.*, 37 (1992) 1574-1584; C.A., 118 (1993) 74885u.

See also 4118, 4375.

### 17. AMINES, AMIDES AND RELATED NITROGEN COMPOUNDS

#### 17a. Amines and polyamines

- 3449 Adams, P.N., Apperley, D.C. and Monkman, A.P.: A comparison of the molecular weights of polyaniline samples obtained from gel permeation chromatography and solid state nitrogen-15 NMR spectroscopy. *Polymer*, 34 (1993) 328-332; C.A., 118 (1993) 103160m.
- 3450 Bernstein, S.C., Abrams, S.K., Leckrone, K.J. and Paul, L.A.: Chloroisothiocyanatoquinolines as fluorogenic derivatizing agents for primary and secondary amines. *J. Pharm. Biomed. Anal.*, 11 (1993) 61-69.
- 3451 Boersma, M.G., Cnubben, N.H.P., van Berkel, W.J.H., Blom, M., Vervoort, J. and Rietjens, I.M.C.M.: Role of cytochromes P-450 and flavin-containing monooxygenase in the biotransformations of 4-fluor-N-methylaniline. *Drug Metab. Disp.*, 21 (1993) 218-230.
- 3452 Cichy, M.A., Stegmeier, D.L., Veening, H. and Becker, H.-D.: High-performance liquid chromatographic separation of biogenic polyamines using 2-(1-pyrenyl)ethyl chloroformate as a new fluorogenic derivatizing reagent. *J. Chromatogr.*, 613 (1993) 15-21.
- 3453 Gamache, P., Ryan, E., Svendsen, C., Murayama, K. and Acworth, I.N.: Simultaneous measurement of monoamines, metabolites and amino acids in brain tissue and microdialysis perfusates. *J. Chromatogr.*, 614 (1993) 213-220.
- 3454 Taibi, G. and Schiavo, M.R.: Simple high-performance liquid chromatographic assay for polyamines and their monoacetyl derivatives. *J. Chromatogr.*, 614 (1993) 153-158.
- 3455 Toyo'oka, T., Chokshi, H.P., Carlson, R.G., Givens, R.S. and Lunte, S.M.: Oxazole-based tagging reagents for analysis of secondary amines and thiols by liquid chromatography with fluorescence detection. *Analyst (London)*, 118 (1993) 257-263.
- 3456 Washington, B., Nguyen, K. and Ochillo, R.F.: Application of a novel technique: the determination of histamine content of urine, brain, and cerebral spinal fluid. *J. Liq. Chromatogr.*, 16 (1993) 1195-1208.
- 3457 Watanabe, S., Sato, S., Nagase, S., Tomita, M., Saito, T. and Ishizu, H.: Automated quantitation of polyamines by improved cation-exchange high-performance liquid chromatography using a pump equipped with a plunger washing system. *J. Liq. Chromatogr.*, 16 (1993) 619-632.
- 3458 Wong, D.T., Threlkeld, P.G. and Bymaster, F.P.: Dopamine receptor affinities *in vitro* and neurochemical effects *in vivo* of pergolide and its metabolites. *Arzneim.-Forsch.*, 43 (1993) 409-412.

See also 3068, 3118, 3180, 3181.

#### 17b. Catecholamines and their metabolites

- 3459 Baran, H. and Schwedt, G.: Identifizierung von Epinephrin (Adrenalin) - Zersetzungprodukt in Infusionslösungen mittels HPLC und Multidetektion. *Pharmazie*, 48 (1993) 273-275.
- 3460 Cozzani, R., Cinquina, A.L. and Barchi, D.: (Direct determination of histamine in preserved fish products by HPLC with diode-array detection). *Ind. Aliment. (Pinerolo)*, 309 (1992) 1000-1002; C.A., 118 (1993) 79580a.

- 3461 Eriksson, B.-M.: Determination of catecholamines in rat heart tissue and plasma samples by liquid chromatography with electrochemical detection, by B.-M. Eriksson and B.-A. Persson, *J. Chromatogr.*, 228 (1982) 143; *J. Chromatogr.*, 612 (1993) 1-5.
- 3462 Gerlach, M., Russ, H., Winkler, J., Witzmann, K., Traber, J., Stasch, J.-P., Riederer, P. and Przuntek, H.: Effects of nimo-dipine on the 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine - induced depletions in the biogenic amine levels in mice. *Arzneim.-Forsch.*, 43 (1993) 413-415.
- 3463 Jussofie, A., Lojewski, J. and Hiemke, C.: Simultaneous automated determination of catecholamines, serotonin, and their metabolites in brain tissue by HPLC and electrochemical detection. *J. Liq. Chromatogr.*, 16 (1993) 447-463.
- 3464 Kumar, A.M., Kumar, M., Fernandez, J.B., Schneiderman, N. and Eisdorfer, C.: An improved assay of urinary catecholamine metabolites, 3-methoxy-4-hydroxyphenylglycol and vanillylmandelic acid, using high performance liquid chromatography with electrochemical detection. *J. Liq. Chromatogr.*, 16 (1993) 1329-1340.
- 3465 Li, J. and Christensen, B.M.: Identification of products and intermediates during L-dopa oxidation to dopachrome using high pressure liquid chromatography with electrochemical detection. *J. Liq. Chromatogr.*, 16 (1993) 1117-1133.
- 3466 Tsikas, D., Velásquez, R., Toledoano, C. and Brunner, G.: Ion-pair extraction of histamine from biological fluids and tissues for its determination by high-performance liquid chromatography with fluorescence detection. *J. Chromatogr.*, 614 (1993) 37-41.
- See also 3458, 3493, 3957, 4149, 4231.
- 17c. *Urea and guanidine derivatives*
- See 3478.
- 17d. *Other amine derivatives and amides (excl. peptides)*
- 3467 Fu, C., Xu, H. and Wang, Z.: Sensitive assay system for nitrosamines utilizing high-performance liquid chromatography with peroxyoxalate chemiluminescence detection. *J. Chromatogr.*, 634 (1993) 221-227.
- 3468 Murphy, S.E. and Coletta, K.A.: Two types of 4-(methylnitro-samino)-1-(3-pyridyl)-1-butanone hemoglobin adducts, from metabolites which migrate into or are formed in red blood cells. *Cancer Res.*, 53 (1993) 777-783.
- 3469 Vetrova, Z.P., Zabirov, N.G., Shuvalova, T.N., Smerkovich, L.S., Ivanova, L.A., Gol'berg, A.K. and Karabanov, N.T.: (Study of sorption properties of metal derivatives of N-phosphorylated amides and thioamides). *Zh. Obshch. Khim.*, 62 (1992) 1079-1083; *C.A.*, 118 (1993) 110329b.
- 3470 Zheng, M., Fu, C. and Xu, H.: High-performance liquid chromatographic determination of trace N-nitrosamines by pre-column derivatization with 4-(2-phthalimidyl)benzoyl chloride. *Analyst (London)*, 118 (1993) 269-271.
- See also 3344.
18. AMINO ACIDS AND PEPTIDES; CHEMICAL STRUCTURE OF PROTEINS
- 18a. *Amino acids and their derivatives*
- 3471 Alebic-Kolbah, T., Félix, G. and Wainer, I.W.: The on-line determination of the enantiomeric purity of enzymatically produced chiral compounds. *Chromatographia*, 35 (1993) 264-268.
- 3472 Anderegg, P. and Pfenninger, H.: (HPLC determination of iso- $\alpha$ -acids). *Brau-Getraenke-Rundsch.*, 103 (1992) 153-154; *C.A.*, 118 (1993) 123195e.
- 3473 Arakawa, N., Kim, M. and Otsuka, M.: An improved high-performance liquid chromatographic assay for the determination of pyridinoline in connective tissues. *J. Nutr. Sci. Vitaminol.*, 38 (1992) 375-380; *C.A.*, 118 (1993) 97317z.
- 3474 Astaphen, N. and Wheat, T.: An amino acid analysis method for assessing nutritional quality of infant formulas. *Int. Lab.*, 23, No. 5 (1993) 22-26.
- 3475 Bertini, J., Mannucci, C., Noferini, R., Perico, A. and Rovero, P.: Rapid simultaneous determination of tryptophan tyrosine in synthetic peptides by derivative spectroscopy. *J. Pharm. Sci.*, 82 (1993) 179-182.
- 3476 Casari, E., Ferrero, C.A., Grazioli, V. and Murone, M.: Performance of a modified HPLC method to determine total hydroxyprolinuria in 2-h urine samples. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2337-2338.
- 3477 Drnevich, D. and Vary, T.C.: Analysis of physiological amino acids using dabsyl derivatization and reversed-phase liquid chromatography. *J. Chromatogr.*, 613 (1993) 137-144.
- 3478 Evans, P.C., Liu, L. and Harding, J.E.: Solid-phase separation of  $^{14}\text{C}$ -labelled urea and aminoisobutyric acid for membrane transport studies. *J. Chromatogr.*, 614 (1993) 148-152.
- 3479 Geda, A., Briggs, C.J. and Venkataram, S.: Determination of the neurolathyrogen  $\beta$ -N-oxaly-L- $\alpha$ , $\beta$ -diaminopropionic acid using high-performance liquid chromatography with fluorometric detection. *J. Chromatogr.*, 635 (1993) 338-341.
- 3480 Georgi, G., Pietsch, C. and Sawatzki, G.: High-performance liquid chromatographic determination of amino acids in protein hydrolysates and in plasma using automated pre-column derivatization with o-phthaldialdehyde/2-mercaptoethanol. *J. Chromatogr.*, 613 (1993) 35-42.
- 3481 Grazioli, V., Casari, E., Murone, M. and Bonini, P.A.: High-performance liquid chromatographic method for measuring hydroxylysine glycosides and their ratio in urine as a possible marker of human bone collagen breakdown. *J. Chromatogr.*, 615 (1993) 59-66.
- 3482 Hirschberger, J., Goldberg, M. and Sauer, U.G.: Glutamine and glutamate in ascitic fluid of dogs. *Eur. J. Clin. Chem. Clin. Biochem.*, 31 (1993) 103-106.
- 3483 James, I., Crowley, C. and Perrett, D.: Assay of pyridinium crosslinks in serum using narrow-bore ion-paired reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 41-48.
- 3484 Jue, R.A. and Hale, J.E.: Identification of cysteine residues alkylated with 3-bromopropylamine by protein sequence analysis. *Anal. Biochem.*, 210 (1993) 39-44.
- 3485 Kang, I. and Buck, R.H.: Separation and enantiomer determination of OPA-derivatized amino acids by using capillary zone electrophoresis. *Amino Acids*, 2 (1992) 103-109; *C.A.*, 118 (1993) 60063n.

- 3486 Kim, H.S. and Angyal, G.: Comparison of liquid chromatographic method to AOAC microbiological method for determination of L-tryptophan in tablets and capsules. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 414-417.
- 3487 Knight, B.I. and Davidson, A.G.: Sensitive determination of 1,1'-ethylenedibis(L-tryptophan) in L-tryptophan by gradient HPLC with fluorimetric detection. *J. Pharm. Biomed. Anal.*, 11 (1993) 85-88.
- 3488 Kojima, E., Kai, M. and Ohkura, Y.: Determination of tryptophan in human serum by high-performance liquid chromatography with pre-column fluorescence derivatization using phenylglyoxal. *J. Chromatogr.*, 612 (1993) 187-190.
- 3489 Kollerup, G., Thamsborg, G., Bhatia, H. and Sorensen, O.H.: Quantitation of urinary hydroxypyridinium cross-links from collagen by high-performance liquid chromatography. *Scand. J. Clin. Lab. Invest.*, 52 (1992) 6577-652; C.A., 118 (1993) 76368b.
- 3490 Krutzsch, H.C. and Inman, J.K.: N-Isopropylidoacetamide in the reduction and alkylation of proteins: use in microsequence analysis. *Anal. Biochem.*, 209 (1993) 109-116.
- 3491 Lau-Cam, C.A. and Roos, R.W.: Assay of aminocaproic acid in dosage forms by reversed phase high performance liquid chromatography with dansylation. *J. Liq. Chromatogr.*, 16 (1993) 403-419.
- 3492 Lipton, A., Demers, L., Daniloff, Y., Curley, E., Hamilton, C., Harvey, H., Witters, L., Seaman, J., van der Giessen, R. and Seyedin, S.: Increased urinary excretion of pyridinium cross-links in cancer patients. *Clin. Chem. (Winston-Salem)*, 39 (1993) 614-618.
- 3493 Lobell, M. and Schneider, M.P.: 2,3,4,6-Tetra-O-benzoyl- $\beta$ -D-glucopyranosyl isothiocyanate: an efficient reagent for the determination of enantiomeric purities of amino acids,  $\beta$ -adrenergic blockers and alkylxiranes by high-performance liquid chromatography using standard reversed-phase columns. *J. Chromatogr.*, 633 (1993) 287-294.
- 3494 Milley, J.R. and Sweeley, J.C.: High-performance liquid chromatographic measurement of leucine and  $\alpha$ -ketoisocaproate in whole blood: application to fetal protein metabolism. *J. Chromatogr.*, 613 (1993) 23-33.
- 3495 Minkler, P.E. and Hoppel, C.L.: Quantification of carnitine and specific acylcarnitines by high-performance liquid chromatography: application to normal human urine and urine from patients with methylmalonic aciduria, isovaleric acidemia or medium-chain acyl-CoA dehydrogenase deficiency. *J. Chromatogr.*, 613 (1993) 203-221.
- 3496 Miyazawa, T., Shindo, Y., Yamada, T. and Kuwata, S.: Enantioselective separation of N-protected non-protein amino acid esters by chiral high-performance liquid chromatography. *Anal. Lett.*, 26 (1993) 457-473.
- 3497 Moller, S.E.: Quantification of physiological amino acids by gradient ion-exchange high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 223-230.
- 3498 Molnár-Perl, I., Pintér-Szakács, M. and Khalifa, M.: High-performance liquid chromatography of tryptophan and other amino acids in hydrochloric acid hydrolysates. *J. Chromatogr.*, 632 (1993) 57-61.
- 3499 Moro, L., Noris-Suarez, K., Michalsky, M., Romanello, M. and de Bernard, B.: The glycosides of hydroxylysine are final products of collagen degradation in humans. *Biochim. Biophys. Acta*, 1156 (1993) 288-290.
- 3500 Sarwar, G. and Botting, H.G.: Evaluation of liquid chromatographic analysis of nutritionally important amino acids in food and physiological samples. *J. Chromatogr.*, 615 (1993) 1-22 - a review with 56 refs.
- 3501 Schwandner, W.R.E., Jiménez, B., Schwartz, A., Weijer, C.J., Behrens, M., Mazón, M.J. and Fernández-Renart, M.: Chemo-tactic stimulation of aggregation-stage *Dictyostelium* cells induces rapid changes in energy metabolism, as measured by succinic thiokinase phosphorylation. *Biochim. Biophys. Acta*, 1176 (1993) 175-182.
- 3502 Simonson, P.G. and Pietrzyk, D.J.: Separation and detection of underivatized amino acids. *J. Liq. Chromatogr.*, 16 (1993) 597-618.
- 3503 Takahashi, M., Ohishi, T., Aoshima, H., Kushida, K., Inoue, T. and Horiuchi, K.: Pre-fractionation with cation exchanger for determination of intermolecular crosslinks, pyridoline, and pentosidine, in hydrolysate. *J. Liq. Chromatogr.*, 16 (1993) 1355-1370.
- 3504 Takatera, K. and Watanabe, T.: Speciation of iodo amino acids by high-performance liquid chromatography with inductively coupled plasma mass spectrometric detection. *Anal. Chem.*, 65 (1993) 759-762.
- 3505 Ueno, S., Sano, A., Kotani, K., Kondoh, K. and Kakimoto, Y.: Distribution of free methylarginines in rat tissues and in the bovine brain. *J. Neurochem.*, 59 (1992) 2012-2016; C.A., 118 (1993) 55334x.
- 3506 Worthen, H.G. and Liu, H.: Automatic pre-column derivatization and reversed-phase high performance liquid chromatography of primary and secondary amino acids in plasma with photo-diode array and fluorescence detection. *J. Liq. Chromatogr.*, 15 (1992) 3323-3341.
- 3507 Yan, H., Cheng, X., Ni, A. and He, B.: Resolution of amino acid enantiomers by ligand exchange chromatography on a new chiral packing. *J. Liq. Chromatogr.*, 16 (1993) 1045-1055.
- 3508 Yang, C.Y., Yang, T. and Yeh, B.K.: Liquid chromatographic analysis of amino acids: Using dimethylaminoazobenzenesulfonyl chloride and Hypersil ODS column to analyze the composition of apo B peptides. *J. Protein Chem.*, 12 (1993) 11-14; C.A., 118 (1993) 97319b.
- 3509 Yoshimura, Y., Ohnishi, K., Hamamura, M., Oda, T. and Sohda, T.: Automated high-performance liquid chromatographic determination of hydroxylsylpyridinoline and lysylpyridinoline in urine using a column-switching method. *J. Chromatogr.*, 613 (1993) 43-49.
- 3510 Ziegler, F., le Boucher, J., Coudray-Lucas, C. and Cynober, L.: Plasma amino acid determinations by reversed-phase HPLC: improvement of the *ortho*-phthalaldehyde method and comparison with ion-exchange chromatography. *J. Autom. Chem.*, 14 (1992) 145-149; C.A., 118 (1993) 35258x.

For additional information see C.A.:

118 (1993) 35257w, 72828d, 79583d, 97554z, 115962n, 120418u.

See also 3097, 3121, 3170, 3171, 3173, 3174, 3178, 3180, 3453, 3589, 3608, 3642, 3665, 3961, 4052, 4063.

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

- 3511 Barcia, M.G., Castro, J.M., Jullien, C.D. and Freire, M.: Prothymosin  $\alpha$  is phosphorylated in proliferating stimulated cells. *J. Biol. Chem.*, 268 (1993) 4704-4708.
- 3512 Basak, A., Boudreault, A., Jean, F., Chrétien, M. and Lazure, C.: Radiolabeled biotinyl peptides as useful reagents for the study of proteolytic enzymes. *Anal. Biochem.*, 209 (1993) 306-314.
- 3513 Bellini, T., Tomasi, M. and Dallocchio, F.: Selective modification of Sendai virus hemagglutinin neuraminidase by pyridoxal 5'-phosphate: evidence for an allosteric modulation of neuraminidase activity. *Biochim. Biophys. Acta*, 1161 (1993) 323-327.
- 3514 Bidard, J.-N., de Nadai, F., Rovere, C., Moinier, D., Laur, J., Martinez, J., Cuber, J.-C. and Kitabgi, P.: Immunological and biochemical characterization of processing products from the neurotensin/neuromedin N precursor in the rat medullary thyroid carcinoma 6-23 cell line. *Biochem. J.*, 291 (1993) 225-233.
- 3515 Bousquet, E., de Regis, M., Giannola, L.I., Santagati, N.A. and Tisendi, S.: Synthesis, characterization and *in vitro* hydrolysis of L-pyroglutamyl-L-tryptophan derivatives as potential drug carriers. *Pharmazie*, 48 (1993) 260-262.
- 3516 Casteels, P., Ampe, C., Jacobs, F. and Tempst, P.: Functional and chemical characterization of Hymenoptaecin, an antibacterial polypeptide that is infection-inducible in the honeybee (*Apis mellifera*). *J. Biol. Chem.*, 268 (1993) 7044-7054.
- 3517 Dave, K.J., Stobaugh, J.F., Rossi, T.M. and Riley, C.M.: Reversed-phase liquid chromatography of the opioid peptides. 3. Development of a microanalytical system for opioid peptides involving microbore liquid chromatography, post-column derivatization and laser-induced fluorescence detection. *J. Pharm. Biomed. Anal.*, 10 (1992) 965-977.
- 3518 Davies, J.S., Enjalbal, C. and Llewellyn, G.: Chiral analysis of synthetic peptides: high performance liquid chromatography of diastereoisomeric carbamoyl esters derived from N-terminal cleavage. *J. Chem. Soc., Perkin Trans. 2*, (1992) 1225-1231; *C.A.*, 118 (1992) 60079x.
- 3519 Finnis, C., Dodsworth, N., Pollitt, C.E., Carr, G. and Sleep, D.: Thymidine phosphorylase activity of platelet-derived endothelial cell growth factor is responsible for endothelial cell mitogenicity. *Eur. J. Biochem.*, 212 (1993) 201-210.
- 3520 Funakoshi, S., Fukuda, H. and Fujii, N.: Affinity purification method using a reversible biotinylation reagent for peptides synthesized by the solid-phase technique. *J. Chromatogr.*, 638 (1993) 21-27.
- 3521 Gruber, P., Bernard, A.R., Hassell, A.M., Milburn, M.V., Jordan, S.R., Proudfoot, A.E., Fattah, D. and Wells, T.N.C.: Purification, characterisation and crystallisation of selenomethionyl recombinant human interleukin-5 from *Escherichia coli*. *Eur. J. Biochem.*, 212 (1993) 751-755.
- 3522 Heath, T.G. and Giordani, A.B.: Reversed-phase capillary high-performance liquid chromatography with on-line UV, fluorescence and electrospray ionization mass spectrometric detection in the analysis of peptides and proteins. *J. Chromatogr.*, 638 (1993) 9-19.
- 3523 Hilgers, K.F. and Mann, J.F.E.: Tissue renin: focus on vascular angiotensin formation. *Arzneim.-Forsch.*, 43 (1993) 198-201.
- 3524 Hosoda, K., Eguchi, H., Nakamoto, T., Kubota, T., Honda, H., Jindai, S., Hasegawa, R., Kiyoki, M., Yamaji, T. and Shiraki, M.: Sandwich immunoassay for intact human osteocalcin. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2233-2238.
- 3525 Hulmes, J.D., Seddon, A.P., Decker, M.M. and Böhnen, P.: Comparison of the disulfide bond arrangements of human recombinant and bovine brain heparin binding neurite-promoting factors. *Biochem. Biophys. Res. Commun.*, 192 (1993) 738-746.
- 3526 Hyun, M.H., Ryoo, J.J., Min, C.S. and Pirkle, W.H.: Enantioseparation of HPLC chiral stationary phases. *Bull. Korean Chem. Soc.*, 13 (1992) 407-413; *C.A.*, 118 (1993) 39362z.
- 3527 Ichiki, Y., Kitamura, K., Kangawa, K. and Eto, T.: Dimeric form of calcitonin gene-related peptide in the porcine thyroid gland. *Biochem. Biophys. Res. Commun.*, 191 (1993) 961-967.
- 3528 Ikeda, T., Minakata, H., Nomoto, K., Kubota, I. and Muneoka, Y.: Two novel tachykinin-related neuropeptides in the echinoid worm, *Urechis unicinctus*. *Biochem. Biophys. Res. Commun.*, 192 (1993) 1-6.
- 3529 Iwamuro, S., Hayashi, H. and Kikuyama, S.: An additional arginine-vasotocin-related peptide, vasotocinyl-Gly-Lys, in *Xenopus* neurohypophysis. *Biochim. Biophys. Acta*, 1176 (1993) 143-147.
- 3530 Johnsen, A.H. and Rehfeld, J.F.: LymnaDFamides, a new family of neuropeptides from the pond snail, *Lymnaea stagnalis*. Clue to cholecystokinin immunoreactivity in invertebrates? *Eur. J. Biochem.*, 213 (1993) 875-879.
- 3531 Khan, Z. and Smyth, D.G.: Isolation and identification of N-terminally extended forms of 5-oxopropylglutamylprolinamide (Glp-Glu-Pro-NH<sub>2</sub>), a thyrotropin-releasing-hormone (TRH)-like peptide present in human semen. *Eur. J. Biochem.*, 212 (1993) 35-40.
- 3532 Kitamura, K., Kangawa, K., Kawamoto, M., Ichiki, Y., Nakamura, S., Matsuo, H. and Eto, T.: Adrenomedullin: a novel hypotensive peptide isolated from human pheochromocytoma. *Biochem. Biophys. Res. Commun.*, 192 (1993) 553-560.
- 3533 Koyama, J.-I., Inoue, S., Ikeda, K. and Hayashi, D.: Purification and amino-acid sequence of a nerve growth factor from the venom of *Vipera russelli russelli*. *Biochim. Biophys. Acta*, 1160 (1992) 287-292.
- 3534 Lampe, R.A., Lo, M.M.S., Keith, R.A., Horn, M.B., McLane, M.W., Herman, J.L. and Spreen, R.C.: Effects of site-specific acylation on  $\omega$ -conotoxin GVIA binding and function. *Biochemistry*, 32 (1993) 3255-3260.
- 3535 Leroy, P., Nicolas, A., Thioudellet, C., Oster, T., Wellman, M. and Siest, G.: Rapid liquid chromatographic assay of glutathione in cultured cells. *Biomed. Chromatogr.*, 7 (1993) 86-89.
- 3536 Lewis, J.R.E., Morley, J.S. and Venn, R.F.: Analysis of human  $\beta$ -endorphin 28-31 (melanotropin potentiating factor) and analogues by high-performance liquid chromatography of their 9-fluorenylemethoxycarbonyl derivatives. *J. Chromatogr.*, 615 (1993) 37-45.
- 3537 Lin Ling, B., Baeyens, W.R.G., Dewaele, C. and Del Castillo, B.: Packed capillary liquid chromatography coupled to fluorescence detection: application to human blood samples for the determination of glutathione. *J. Pharm. Biomed. Anal.*, 10 (1992) 985-988.
- 3538 Linde, S., Welinder, B.S. and Nielsen, J.H.: Analysis of proinsulin and its conversion products by reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 185-204 - a review with 117 refs.

- 3539 Magonet, E., Delaive, E., Delforge, D. and Remacle, J.: (Solid phase peptide synthesis with a fast protein liquid chromatography (FPLC) system). In: Epton, R. (Editor), *Innovation Perspect. Solid Phase Synth. Collect. Pap., Int. Symp., 1st 1989, SPCC, Birmingham, 1990*, pp. 526-532; C.A., 118 (1993) 81383g.
- 3540 Maruyama, S., Miyoshi, S., Nomura, G., Suzuki, M., Tanaka, H. and Maeda, H.: Specificity for various amino-acid-residues of a proline-specific dipeptidylcarboxypeptidase from a *Streptomyces* species. *Biochim. Biophys. Acta*, 1162 (1993) 72-76.
- 3541 Meng, Q.C., Durand, J., Chen, Y.-F. and Oparil, S.: Simplified method for quantitation of angiotensin peptides in tissue. *J. Chromatogr.*, 614 (1993) 19-25.
- 3542 Miller, A.D., Maghlaoui, K., Albanese, G., Kleinjan, D.A. and Smith, C.: *Escherichia coli* chaperonins Cpn60 (groEL) and Cpn10 (groES) do not catalyse the refolding of mitochondrial malate dehydrogenase. *Biochem. J.*, 291 (1993) 139-144.
- 3543 Miller, D.L., Papayannopoulos, I.A., Styles, J., Bobin, S.A., Lin, Y.Y., Biemann, K. and Iqbal, K.: Peptide composition of the cerebrovascular and senile plaque core amyloid deposits of Alzheimer's disease. *Arch. Biochem. Biophys.*, 301 (1993) 41-52.
- 3544 Morier-Teissier, E., Mestdagh, N., Bernier, J.-L. and Hjorth, J.-P.: Reduced and oxidized glutathione ratio in tumor cells: comparison of two measurement methods using HPLC and electrochemical detection. *J. Liq. Chromatogr.*, 16 (1993) 573-596.
- 3545 Naruo, K., Seko, C., Kuroshima, K., Matsutani, E., Sasada, R., Kondo, T. and Kurokawa, T.: Novel secretory heparin-binding factors from human glioma cells (glia-activating factors) involved in glial cell growth. Purification and biological properties. *J. Biol. Chem.*, 268 (1993) 2857-2864.
- 3546 Ohta, T., Ishimura, K. and Takitani, S.: Selective on-line enrichment and separation of peptides having aromatic amino acids at their C-termini by column-switching high-performance liquid chromatography using an anhydrochymotrypsin-immobilized precolumn. *J. Chromatogr.*, 637 (1993) 35-41.
- 3547 Pan, F.-M. and Chang, W.-C.: Purification of growth hormones by reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 326-329.
- 3548 Rhodes, C.J., Thorne, B.A., Lincoln, B., Nielsen, E., Hutton, J.C. and Thomas, G.: Processing of proinsulin by insulin secretory granule proinsulin processing endopeptidases. *J. Biol. Chem.*, 268 (1993) 4267-4275.
- 3549 Rissler, K., Katlein, R. and Cramer, H.: Recovery of substance P and related C-terminal fragments on solid-phase extraction cartridges for subsequent high-performance liquid chromatographic separation and radioimmunoassay. *J. Chromatogr.*, 612 (1993) 150-155.
- 3550 Salem, I.I., Bedmar, M.C., Medina, M.M. and Cerezo, A.: Insulin evaluation in pharmaceuticals: variables in RP-HPLC and method validation. *J. Liq. Chromatogr.*, 16 (1993) 1183-1194.
- 3551 Selsted, M.E., Tang, Y., Morris, W.L., McGuire, P.A., Novotny, M.J., Smith, W., Henschen, A.H. and Cullor, J.S.: Purification, primary structures, and antibacterial activities of  $\beta$ -defensins, a new family of antimicrobial peptides from bovine neutrophils. *J. Biol. Chem.*, 268 (1993) 6641-6648.
- 3552 Shahidi, S., Poronnik, P., Barden, J.A. and Cook, D.I.: Structure-function relations of biotin derivatives of apamin. *Biochim. Biophys. Acta*, 1157 (1993) 74-80.
- 3553 Shimomura, R., Sakai, K., Tanaka, Y., Yonezawa, K., Hashimoto, E., Kasuga, M. and Yamamura, H.: Phosphorylation sites of myelin basic proteins by a catalytic fragment of non-receptor type protein-tyrosine kinase p72<sup>syk</sup> and comparison with those by insulin receptor kinase. *Biochem. Biophys. Res. Commun.*, 192 (1993) 252-260.
- 3554 Takahashi, T., Tokumoto, T., Ishikawa, K. and Takahashi, K.: Cleavage specificity and inhibition profile of proteasome isolated from the cytosol of *Xenopus* oocyte. *J. Biochem. (Tokyo)*, 113 (1993) 225-228.
- 3555 Takeuchi, A., Hayashi, H., Naito, Y., Baba, T., Tamatani, T. and Onozaki, K.: Human myelomonocytic cell line THP-1 produces a novel growth-promoting factor with a wide target cell spectrum. *Cancer Res.*, 53 (1993) 1871-1876.
- 3556 Tanag, Y. and Selsted, M.E.: Characterization of the disulfide motif in BNBD-12, an antimicrobial  $\beta$ -defensin peptide from bovine neutrophils. *J. Biol. Chem.*, 268 (1993) 6649-6653.
- 3557 Toomik, R., Ekman, P., Eller, M., Järv, J., Zaitsev, D., Myasoedov, N., Regnarsson, U. and Engström, L.: Protein kinase assay using tritiated peptide substrates and ferric adsorbent paper for phosphopeptide binding. *Anal. Biochem.*, 209 (1993) 348-353.
- 3558 Tsomides, T.J. and Eisen, H.N.: Stoichiometric labeling of peptides by iodination on tyrosyl or histidyl residues. *Anal. Biochem.*, 210 (1993) 129-135.
- 3559 Watanabe, K., Iida, M., Takaishi, K., Suzuki, T., Hamada, Y., Iizuka, Y. and Tsurufuji, S.: Chemoattractants for neutrophils in lipopolysaccharide-induced inflammatory exudate from rats are not interleukin-8 counterparts but gro-gene-product/mallanoma-growth-stimulating-activity-related factors. *Eur. J. Biochem.*, 214 (1993) 267-270.
- 3560 Weber, S.G., Tsai, H. and Sandberg, M.: Electrochemical detection of dipeptides with selectivity against amino acids. *J. Chromatogr.*, 638 (1993) 1-8.
- 3561 Wilce, M.C.J., Aguilar, M.I. and Hearn, M.T.W.: High-performance liquid chromatography of amino acids, peptides and proteins. CXXII. Application of experimentally derived retention coefficients to the prediction of peptide retention times: studies with myohemerythrin. *J. Chromatogr.*, 632 (1993) 11-18.
- 3562 Zhang, Y.K., Chen, N. and Wang, L.: Free-solution capillary electrophoretic separation of small hydrophilic peptides. *Biomed. Chromatogr.*, 7 (1993) 75-77.

For additional information see C.A.:

118 (1993) 35253s, 95126n.

See also 3128, 3312, 3319, 3349, 3575, 3590, 3637, 3638, 3712, 3747, 3783, 3840, 3870.

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

- 3563 Adachi, H., Katayama, T., Nakazato, H. and Tsujimoto, M.: Importance of Glu-125 in the catalytic activity of human renal dipeptidase. *Biochim. Biophys. Acta*, 1163 (1993) 42-48.
- 3564 Atoda, H. and Morita, T.: Arrangement of the disulfide bridges in a blood coagulation factor IX/factor X-binding protein from the venom of *Trimeresurus flavoviridis*. *J. Biochem. (Tokyo)*, 113 (1993) 159-163.

- 3565 Chang, J.: Identification of productive folding intermediates which account for the flow of protein folding pathway. *J. Biol. Chem.*, 268 (1993) 4043-4049.
- 3566 Crimmins, D.L. and Thoma, R.S.: Semi-automated chromatographic procedure for the isolation of acetylated N-terminal fragments from protein digests. *J. Chromatogr.*, 634 (1993) 241-250.
- 3567 Ebwank, J.J. and Creighton, T.E.: Structural characterization of the disulfide folding intermediates of bovine  $\alpha$ -lactalbumin. *Biochemistry*, 32 (1993) 3694-3707.
- 3568 Ghenbot, G., Ernge, T. and Day, R.A.: Identification of the sites of modification on bovine carbonic anhydrase II (BCAlI) by the salt-bridge reagent cyanogen,  $C_2N_2$ . *Biochim. Biophys. Acta*, 1161 (1993) 59-65.
- 3569 Jones, G., Manczak, M., Wozniak, M. and Ko'rati, R.: Characterization of two major isoforms of juvenile hormone esterase from *Trichoplusia ni* (Lepidoptera). *Biochim. Biophys. Acta*, 1161 (1993) 235-243.
- 3570 Kouach, M., Jaquinod, M., Belaïche, D., Sautière, P., van Dorselaer, A., Chevaillier, P. and Briand, G.: A corrected primary structure for dog-fish *Scylliorhinus caniculus* protamine Z3. *Biochim. Biophys. Acta*, 1162 (1993) 99-104.
- 3571 Nice, E.C., Fabri, L., Hammacher, A., Andersson, K. and Hellman, U.: Micropreparative ion exchange high performance liquid chromatography: applications to microsequence analysis. *Biomed. Chromatogr.*, 7 (1993) 104-111.
- 3572 Nielsen, K.L. and Sottrup-Jensen, L.: Evidence from sequence analysis that hen egg-white ovomacroglobulin (ovostatin) is devoid of an internal  $\beta$ -Cys- $\gamma$ -Glu thiol ester. *Biochim. Biophys. Acta*, 1162 (1993) 230-232.
- 3573 Parente, A., Verde, C., Malorni, A., Montecucchi, P., Aniello, F. and Geraci, G.: Amino-acid sequence of the cooperative dimeric myoglobin from the radular muscles of the marine gastropod *Nassa mutabilis*. *Biochim. Biophys. Acta*, 1162 (1993) 1-9.
- 3574 Pennica, D., Lam, V.T., Weber, R.F., Kohr, W.J., Basa, L.J., Spellman, M.W., Ashkenazi, A., Shire, S.J. and Goeddel, D.V.: Biochemical characterization of the extracellular domain of the 75-kilodalton tumor necrosis factor receptor. *Biochemistry*, 32 (1993) 3131-3138.
- 3575 Qin, W., Smith, J.B. and Smith, D.L.: Reaction of aspirin with cysteinyl residues of lens  $\gamma$ -crystallins: a mechanism for the proposed anti-cataract effect of aspirin. *Biochim. Biophys. Acta*, 1181 (1993) 103-110.
- 3576 Stevens, W.K. and Nesheim, M.E.: Structural changes in the protease domain of prothrombin upon activation as assessed by N-bromosuccinimide modification of tryptophan residues in pre-thrombin-2 and thrombin. *Biochemistry*, 32 (1993) 2787-2794.
- 3577 Takahashi, M., Kimura, M., Kurosawa-Ohsawa, K., Iwaki, A., Tanaka, S. and Matsuishi, T.: Epitope mapping and characterization of monoclonal antibodies to human protein C. *Biochim. Biophys. Acta*, 1161 (1993) 113-123.
- 3578 Totty, N.F., Waterfield, M.D. and Hsuan, J.J.: Accelerated high-sensitivity microsequencing of proteins and peptides using a miniature reaction cartridge. *Protein Sci.*, 1 (1992) 1215-1224; C.A., 118 (1993) 3346h.
- 3579 Tsujita, M. and Ichikawa, Y.: Substrate-binding region of cytochrome P-450<sub>SCC</sub> (P-450 XIA1). Identification and primary structure of the cholesterol binding region in cytochrome P-450<sub>SCC</sub>. *Biochim. Biophys. Acta*, 1161 (1993) 124-130.
- See also 3315, 3392, 3484, 3513, 3524, 3556, 3598, 3604, 3610, 3639, 3641, 3642, 3645, 3646, 3652, 3653, 3670, 3673, 3701, 3711, 3740, 3741, 3769, 3795, 3805, 3852.
- ### 19. PROTEINS
- For additional information see C.A.: 118 (1993) 97555a.
- #### 19a. General techniques
- 3580 Bellot, J.C. and Condoret, J.S.: Theoretical study of the ion-exchange preparative chromatography of a two-protein mixture. *J. Chromatogr.*, 635 (1993) 1-17.
- 3581 Brooks, C.A. and Cramer, S.M.: Steric mass-action ion exchange: displacement profiles and induced salt gradient. *AIChE J.*, 38 (1992) 1969-1978; C.A., 118 (1993) 97305u.
- 3582 Cacia, J., Quan, C.P., Vasser, M., Sliwkowski, M.B. and Frenz, J.: Protein sorting by high-performance liquid chromatography. I. Biomimetic interaction chromatography of recombinant human deoxyribonuclease I on polyionic stationary phase. *J. Chromatogr.*, 634 (1993) 229-239.
- 3583 Champluvier, B. and Kula, M.R.: Sequential membrane-based purification of proteins, applying the concept of multidimensional liquid chromatography (MDLC). *Bioseparation*, 2 (1992) 343-351; C.A., 118 (1993) 75855w.
- 3584 Denizli, A., Olcay, M., Tuncel, A. and Piskin, E.: Production of PMMA by suspension polymerization and its use in hydrophobic chromatography. II: Protein adsorption/desorption studies. *Turk. J. Chem.*, 16 (1992) 135-143; C.A., 118 (1993) 97311t.
- 3585 Desplancq, D., Koleman, V., Chaussivert N., Rojo, E., Fischer, L., de Saizieu, A. and Egly, J.M.: Ion exchangers for protein purification. *Chim. Oggi*, 10 (1992) 41-53; C.A., 118 (1993) 142684e - a review with 20 refs.
- 3586 Dubin, P.L., Edwards, S.L., Mehta, M.S. and Tomalia, D.: Quantitation of non-ideal behavior in protein size-exclusion chromatography. *J. Chromatogr.*, 635 (1993) 51-60.
- 3587 Forster, Y. and Haas, E.: Preparation and characterization of three fluorescent labels for proteins, suitable for structural studies. *Anal. Biochem.*, 209 (1993) 9-14.
- 3588 Gerstner, J.A. and Cramer, S.M.: Heparin as a nontoxic displacer for anion-exchange protein displacement systems. *Bio-Pharm (Eugene)*, 5 (1992) 42-45; C.A., 118 (1993) 35269b.
- 3589 Hayashi, T. and Sasagawa, T.: A method for identifying the carboxy terminal amino acid of a protein. *Anal. Biochem.*, 209 (1993) 163-168.
- 3590 Kawakatsu, M. and Gooding, K.M.: Factors influencing fast liquid chromatography of proteins and peptides with microbore technology. *J. Liq. Chromatogr.*, 16 (1993) 21-32.
- 3591 Ohshita, T. and Katunuma, N.: Analysis of lysosomal degradation of fluorescein isothiocyanate-labelled proteins by Toyopearl HW-40 affinity chromatography. *J. Chromatogr.*, 633 (1993) 281-286.
- 3592 Riggan, A., Sportsman, J.R. and Regnier, F.E.: Immunochromatographic analysis of proteins. Identification, characterization and purity determination. *J. Chromatogr.*, 632 (1993) 37-44.

- 3593 Shinagawa, S., Kameyama, K. and Takagi, T.: Effect of salt concentration of buffer on the binding of sodium dodecyl sulfate and on the viscosity behavior of the protein polypeptide derived from bovine serum albumin in the presence of the surfactant. *Biochim. Biophys. Acta*, 1161 (1993) 79-84.
- 3594 Wirth, H.-J., Unger, K.K. and Hearn, M.T.W.: Influence of ligand density on the properties of metal-chelate affinity supports. *Anal. Biochem.*, 208 (1993) 16-25.

For additional information see C.A.:  
118 (1993) 120411m.

See also 3113, 3117, 3119, 3128, 3166, 3167, 3565, 3571, 3712, 3914.

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

- 3595 Beitle, R.R. and Ataai, M.M.: One-step purification of a model periplasmic protein from inclusion bodies by its fusion to an effective metal-binding peptide. *Biotechnol. Prog.*, 9 (1993) 64-69; C.A., 118 (1993) 76362v.
- 3596 Endoh, M., Kunishita, T. and Tabira, T.: Thioredoxin from activated macrophages as a trophic factor for central cholinergic neurons *in vitro*. *Biochem. Biophys. Res. Commun.*, 192 (1993) 760-765.
- 3597 Greenwalt, D.E.: A one-step procedure for purification of bovine mammary epithelial cell CD36. *Protein Expression Purif.*, 4 (1993) 72-75; C.A., 118 (1993) 120148f.
- 3598 Herwig, S., Kraut, V., Eckart, K. and Wittmann-Liebold, B.: Cross-linked amino acids in the protein pairs L3-L19 and L23-L29 of *Bacillus stearothermophilus* ribosomes after treatment with di-epoxybutane. *J. Biol. Chem.*, 268 (1993) 4643-4650.
- 3599 Jaiswal, R.K., Murphy, M.B. and Landreth, G.E.: Identification and characterization of a nerve growth factor-stimulated mitogen-activated protein kinase activator in PC12 cells. *J. Biol. Chem.*, 268 (1993) 7055-7063.
- 3600 Kristie, T.M. and Sharp, P.A.: Purification of the cellular C1 factor required for the stable recognition of the Oct-1 homeodomain by the herpes simplex virus  $\alpha$ -trans-induction factor (VP16). *J. Biol. Chem.*, 268 (1993) 6525-6534.
- 3601 Murakami, T., Matsushita, S., Maeda, Y., Takatsuki, K., Uchiyama, T. and Hattori, T.: Applications of biotinylated V3 loop peptides of human immunodeficiency virus type 1 to flow cytometric analyses and affinity chromatographic techniques. *Biochim. Biophys. Acta*, 1181 (1993) 155-162.
- 3602 Rasmussen, A.G., Fredlund, K.M. and Moller, I.M.: Purification of a rotenone-insensitive NAD(P)H dehydrogenase from the inner surface of the inner membrane of red beetroot mitochondria. *Biochim. Biophys. Acta*, 1141 (1993) 107-110.
- 3603 Salama, G., Nigam, M., Shome, K., Finkel, M.S., Lagenaar, C. and Zaidi, N.F.: Ryanodine-affinity chromatography purifies 106 kD calcium release channels from skeletal and cardiac sarcoplasmic reticulum. *Cell Calcium*, 13 (1992) 635-647; C.A., 118 (1993) 35264w.

For additional information see C.A.:  
118 (1993) 100512s.

- 3604 Bullock, J.: Capillary zone electrophoresis and packed capillary column liquid chromatographic analysis of recombinant human interleukin-4. *J. Chromatogr.*, 633 (1993) 235-244.

- 3605 Clogston, C.L., Hu, S., Boone, T.C. and Lu, H.S.: Glycosidase digestion, electrophoresis and chromatographic analysis of recombinant human granulocyte colony-stimulating factor glycoforms produced in Chinese hamster ovary cells. *J. Chromatogr.*, 637 (1993) 55-62.

- 3606 Evans, D.B., Vosters, A.F., Carter, J.B. and Sharma, S.K.: Immunodetection of recombinant proteins based on antibodies directed against a metal binding peptide engineered for purification by immobilized metal affinity chromatography. *J. Immunol. Methods*, 156 (1992) 231-238; C.A., 118 (1993) 142864p.

- 3607 Marcotte, P.A. and Henkin, J.: Characterization of the activation of pro-urokinase by thermolysin. *Biochim. Biophys. Acta*, 1161 (1993) 105-112.

- 3608 Peters, I.D., Rancourt, D.E., Davies, P.L. and Walker, V.K.: Isolation and characterization of an antifreeze protein precursor from transgenic *Drosophila*: evidence for partial processing. *Biochim. Biophys. Acta*, 1171 (1993) 247-254.

For additional information see C.A.:  
118 (1993) 95593n, 117531v, 119474c.

See also 3620, 3635, 3772, 3782.

**19d. Microbial and plant proteins**

- 3609 Aneiros, A., García, I., Martínez, J.R., Harvey, A., Anderson, A.J., Marshall, D.L., Engström, Å., Hellman, U. and Karlsson, E.: A potassium channel toxin from the secretion of the sea anemone *Bunodosoma granulifera*. Isolation, amino acid sequence and biological activity. *Biochim. Biophys. Acta*, 1157 (1993) 86-92.
- 3610 Brinegar, C. and Goundan, S.: Isolation and characterization of chenopodin, the 11S seed storage protein of quinoa (*Chenopodium quinoa*). *J. Agric. Food Chem.*, 41 (1993) 182-185.
- 3611 Daya-Makin, M., Szankasi, P., Tang, L., MacRae, D. and Pelech, S.L.: Regulation of p105<sup>wee1</sup> and p34<sup>cdc2</sup> during meiosis in *Schizosaccharomyces pombe*. *Biochem. Cell Biol.*, 70 (1992) 1088-1096.
- 3612 Khladnev, D.V., Pivnenko, N.V. and Mosolov, V.V.: (Chymotrypsin/subtilisin inhibitor from wheat grain endosperm). *Biokhimiya (Moscow)*, 57 (1992) 1874-1882.
- 3613 Marchylo, B.A., Hatcher, D.W., Kruger, J.E. and Kirkland, J.J.: Reversed-phase high-performance liquid chromatographic analysis of wheat proteins using a new, highly stable column. *Cereal Chem.*, 69 (1992) 371-378; C.A., 118 (1993) 37652v.
- 3614 Muschietti, J.P., Martinetto, H.E., Coso, O.A., Farber, M.D., Torres, H.N. and Flawia, M.M.: G-protein from *Medicago sativa*: functional association to photoreceptors. *Biochem. J.*, 291 (1993) 383-388.
- 3615 Parris, N., Anema, S.G., Singh, H. and Creamer, L.K.: Aggregation of whey proteins in heated sweet whey. *J. Agric. Food Chem.*, 41 (1993) 460-464.

- 3616 Prieta, J., Moreno, M.A., Bayo, J., Diaz, S., Suárez, G., Domínguez, L., Canela, R. and Sanchis, V.: Determination of patulin by reversed-phase high-performance liquid chromatography with extraction by diphasic dialysis. *Analyst (London)*, 118 (1993) 171-173.
- See also 3315, 3542, 3617, 3636, 3681, 3692, 3800.
- 19e. *Proteins of blood, serum and blood cells*
- 3617 Bellocq, C., Andrey-Tornare, I., Paunier Doret, A.-M., Maeder, B., Paturle, L., Job, D., Haiech, J. and Edelstein, S.J.: Purification of assembly-competent tubulin from *Saccharomyces cerevisiae*. *Eur. J. Biochem.*, 210 (1992) 343-349.
- 3618 Collier, N.C. and Wang, K.: Purification and properties of human platelet P235: talin. *Methods Enzymol.*, 215(Platelets: Recept., Adhes., Secretion, Pt. B) (1992) 99-109; C.A., 118 (1993) 120135z.
- 3619 De Weck, A.: Procedure for detecting and preparing anti-IgE autoantibodies for use in clinical diagnosis and therapy. *PCT Int. Appl.* WO 92 21,031 (Cl. GO1N33/564), 26 Nov. 1992, Appl. 91/EP881, 10 May 1991; 31 pp.; C.A., 118 (1993) 35457m.
- 3620 Fijalkowska, I., Babinska, A., Ligocka, A., Plucienniczak, G., Plucienniczak, A., Stec, W., Okruszek, A., Wilk, A. and Cierniewski, C.S.: Antibodies to recombinant fragment 212-276 of protein C specifically recognize the intact human molecule. *Biochim. Biophys. Acta*, 1161 (1993) 187-193.
- 3621 Flurer, C.L. and Novotny, M.: Dual microcolumn immunoaffinity liquid chromatography: an analytical application to human plasma proteins. *Anal. Chem.*, 65 (1993) 817-821.
- 3622 Gulian, J.-M., Dalmasso, C., Pesquié, M., Harlé, J.R. and Charrel, M.: Abnormal bilirubin binding to human serum albumin in a patient with unusual myeloma immunoglobulin G. *Eur. J. Clin. Chem. Clin. Biochem.*, 31 (1993) 115-119.
- 3623 Hervé, F., Gomas, E., Duché, J.-C. and Tillement, J.-P.: Fractionation of the genetic variants of human  $\alpha_1$ -acid glycoprotein in the native form by chromatography on an immobilized copper(II) affinity adsorbent. Heterogeneity of the separate variants by isoelectrofocusing and by concanavalin A affinity chromatography. *J. Chromatogr.*, 615 (1993) 47-57.
- 3624 Josic, D., Bal, F. and Schwinn, H.: Isolation of plasma proteins from the clotting cascade by heparin affinity chromatography. *J. Chromatogr.*, 632 (1993) 1-10.
- 3625 Kawamura, M., Ohashi, F., Murakami, F., Takai, N., Nishimura, R., Sasaki, N. and Takeuchi, A.: Detection of uremic peaks in dogs by anion exchange high performance liquid chromatography. *J. Vet. Med. Sci.*, 54 (1992) 951-955; C.A., 118 (1993) 35262u.
- 3626 Maurice, D.H., Waldo, G.L., Morris, A.J., Nicholas, R.A. and Harden, T.K.: Identification of  $G_{\alpha 11}$  as the phospholipase C-activating G-protein of turkey erythrocytes. *Biochem. J.*, 290 (1993) 765-770.
- 3627 McConnell, J.P. and Anderson, D.J.: Determination of fibrinogen in plasma by high performance immunoaffinity chromatography. *J. Chromatogr.*, 615 (1993) 67-75.
- 3628 Nakata, H.: Antibodies raised against the adenosine receptor agonist, 5'-N-ethylcarboxamidoadenosine (NECA). *J. Biochem. (Tokyo)*, 113 (1993) 241-244.
- 3629 Nishiguchi, E., Sindo, J. and Hamasaki, N.: Requirement of cytoplasmic components for lidocaine-induced shape change in human erythrocytes. *Biochim. Biophys. Acta*, 1176 (1993) 95-105.
- 3630 Piller, K. and Portmann, P.: Isolation and characterization of four basic proteins from horse eosinophilic granules. *Biochem. Biophys. Res. Commun.*, 192 (1993) 373-380.
- 3631 Rubenstein, D.S., Thøgersen, I.B., Pizzo, S.V. and Enghild, J.J.: Identification of monomeric  $\alpha$ -macroglobulin proteinase inhibitors in birds, reptiles, amphibians and mammals, and purification and characterization of a monomeric  $\alpha$ -macroglobulin proteinase inhibitor from the American bullfrog *Rana catesbeiana*. *Biochem. J.*, 290 (1993) 85-95.
- 3632 Semba, U., Shibuya, Y., Tanase, S., Nishino, N., Makinose, Y., Kambara, T., Okabe, H. and Yamamoto, T.: Difference between human and guinea pig Hageman factors in activation by bacterial proteinases: cleavage site shift due to local amino acid substitutions may determine the activation efficiency of serine proteinase zymogens. *Biochim. Biophys. Acta*, 1180 (1993) 267-276.
- 3633 Vazquez-Moreno, L., Porath, J., Schlüter, S.F. and Marchalonis, J.J.: Purification of a novel heterodimer from shark (*Carcharhinus plumbeus*) serum by gel-immobilized metal chromatography. *Comp. Biochem. Physiol., B: Comp. Biochem.*, 103B (1992) 563-568; C.A., 118 (1993) 35259y.
- 3634 Wawrzynczak, E.J. and Cumber, A.J.: Immunoaffinity purification and quantification of antibody-toxin conjugates. *Methods Mol. Biol. (Totowa)*, 10(Immunochem. Protoc.) (1992) 295-305; C.A., 118 (1993) 72904a - a review with 6 refs.
- 3635 Yan, J., Zou, Y. and Liu, Y.: (Research on screening the optimal eluent in monoclonal antibody affinity chromatography). *Hebei-sheng Kexueyuan Xuebao*, (1991) 47-51; C.A., 118 (1993) 94478s.
- For additional information see C.A.:  
118 (1993) 55327x, 119900p.
- See also 3166, 3576, 3593, 3604, 3608, 3848, 3859, 4410.
- 19f. *Structural and muscle proteins*
- 3636 Andersland, J.M., Jagendorf, A.T. and Pathasarathy, M.V.: The isolation of actin from pea roots by DNase I affinity chromatography. *Plant Physiol.*, 100 (1992) 1716-1723; C.A., 118 (1993) 76373z.
- 3637 Bonafe, N., Chaussepied, P., Capony, J.P., Derancourt, J. and Kassab, R.: Photochemical cross-linking of the skeletal myosin head heavy chain to actin subdomain-1 at Arg95 and Arg28. *Eur. J. Biochem.*, 213 (1993) 1243-1254.
- 3638 Eggert, M., Radomski, N., Londer, D., Tripier, D., Traub, P. and Jost, E.: Identification of novel phosphorylation sites in murine A-type lamins. *Eur. J. Biochem.*, 213 (1993) 659-671.
- 3639 Katoh, T. and Morita, F.: Actin-binding peptides obtained from the C-terminal 24-kDa fragment of porcine aorta smooth muscle myosin subfragment-1 heavy chain. *J. Biol. Chem.*, 268 (1993) 2380-2388.
- 3640 Niggli, V. and Gimona, M.: Evidence for a ternary interaction between  $\alpha$ -actinin, (meta)vinculin and acidic-phospholipid bilayers. *Eur. J. Biochem.*, 213 (1993) 1009-1011.

- 3641 Steinert, P.M. and Parry, D.A.D.: The conserved H1 domain of the type II keratin 1 chain plays an essential role in the alignment of nearest neighbor molecules in mouse and human keratin 1/keratin 10 intermediate filaments at the two- to four-molecule level of structure. *J. Biol. Chem.*, 268 (1993) 2878-2887.
- 3642 Welch, R.W., Acworth, I. and Levine, M.: Coulometric electrochemical detection of hydroxyproline using 7-chloro-4-nitrobenzo-2-oxa-1,3-diazole. *Anal. Biochem.*, 210 (1993) 199-205.

For additional information see C.A.:  
118 (1993) 53151m.

See also 3573.

19g. *Protamines, histones and other nuclear proteins*

- 3643 Boulikas, T. and Poirier, G.G.: Resistance of ADP-ribosylated histones and HMG proteins to proteases. *Biochem. Cell Biol.*, 70 (1992) 1258-1267.
- 3644 Giancotti, V., Bandiera, A., Ciani, L., Santoro, D., Crane-Robinson, C., Goodwin, G.H., Boiocchi, M., Dolcetti, R. and Casetta, B.: High-mobility-group (HMG) proteins and histone H1 subtypes expression in normal and tumor tissues of mouse. *Eur. J. Biochem.*, 213 (1993) 825-832.
- 3645 Sburlati, A.R., de la Rosa, A., Batey, D.W., Kurys, G.L., Marrow, R.E., Pannell, L.K., Martin, B.M., Sheeley, D.M. and Berger, S.L.: Phosphorylation of human and bovine prothymosin  $\alpha$  *in vivo*. *Biochemistry*, 32 (1993) 4587-4596.
- 3646 Waterborg, J.H.: Dynamic methylation of alfalfa histone H3. *J. Biol. Chem.*, 268 (1993) 4918-4921.

See also 3570.

19h. *Chromoproteins and metalloproteins*

- 3647 Comeau, R.D., McDonald, K.W., Tolman, G.L., Vasak, M. and Liberatore, F.A.: Gram scale purification and preparation of rabbit liver zinc metallothionein. [Erratum to document cited in C.A., 117(5): 43770c]. *Prep. Biochem.*, 22 (1992) 275; C.A., 118 (1993) 97300p.
- 3648 Farrell, R.A., McArdle, H.J. and Camakaris, J.: Effects of metallothionein on the observed copper distribution in cell extracts. *J. Inorg. Biochem.*, 49 (1993) 9-22; C.A., 118 (1993) 97318a.
- 3649 Fisher, K., Lowe, D.J. and Pau, R.N.: *Klebsiella pneumoniae* nitrogenase MoFe protein: chymotryptic proteolysis affects function by limited cleavage of the  $\beta$ -chain and provides high-specificity-activity MoFe protein. *Biochem. J.*, 291 (1993) 309-314.
- 3650 Golly, I. and Hlavica, P.: Inactivation of phenobarbital-inducible rabbit-liver microsomal cytochrome P-450 by allylisopropylacetamide: impact on electron transfer. *Biochim. Biophys. Acta*, 1142 (1993) 74-82.
- 3651 Makino, N. and Ohnaka, H.: Role of oligomeric interactions in the cooperativity of crayfish hemocyanin. *Biochim. Biophys. Acta*, 1162 (1993) 237-245.
- 3652 Ohnishi, T., Miura, S. and Ichikawa, Y.: Photoaffinity labeling of cytochrome P-450<sub>11</sub> $\beta$  with methyltrienolone as a probe for the substrate binding region. *Biochim. Biophys. Acta*, 1161 (1993) 257-264.

- 3653 Pan, A., Tie, F., Duan, Z., Ma, H., Li, L. and Ru, B.: Purification and characterization of hedgehog liver metallothioneins. *Biomed. Chromatogr.*, 7 (1993) 94-98.
- 3654 Pierik, A.J., Wolbert, R.B.G., Portier, G.L., Verhagen, M.F.J.M. and Hagen, W.R.: Nigerythrin and rubrerythrin from *Desulfovibrio vulgaris* each contain two mononuclear iron centers and two dinuclear iron clusters. *Eur. J. Biochem.*, 212 (1993) 237-245.
- 3655 Standing, S.J. and Taylor, R.P.: Glycated hemoglobin: an assessment of high capacity liquid chromatographic and immunoassay methods. *Ann. Clin. Biochem.*, 29 (1992) 494-505; C.A., 118 (1993) 3361j.
- 3656 Toda, A., Ogata, S., Nagamatsu, A. and Shimeno, H.: Cytochrome P-450 in liver microsomes of streptozotocin-induced diabetic rats: purification and characterization. *Biochim. Biophys. Acta*, 1141 (1993) 245-252.
- 3657 Wan, M., Kaegi, J.H.R. and Hunziker, P.E.: Resolution and quantification of four metallothionein isoforms from rabbit kidney cells. *Protein Expression Purif.*, 4 (1993) 38-44; C.A., 118 (1993) 142729v.
- 3658 Xin, Y., Rosman, A.S., Lasker, J.M. and Lieber, C.S.: Measurement of carbohydrate-deficient transferrin by isoelectric focusing/Western blotting and by micro anion-exchange chromatography/radioimmunoassay: comparison of diagnostic accuracy. *Alcohol Alcohol.*, 27 (1992) 425-433; C.A., 118 (1993) 118370d.

For additional information see C.A.:  
118 (1993) 76360t.

- 19i. *Proteins of glands, gland products, various zymogens (incl. milk proteins)*
- 3659 Chang, C.-C., Huang, T.-Y., Kuo, K.-W., Chen, S.-W., Huang, K.-F. and Chiou, S.-H.: Sequence characterization of a novel  $\alpha$ -neurotoxin from the king cobra (*Ophiophagus hannah*) venom. *Biochem. Biophys. Res. Commun.*, 191 (1993) 214-223.
- 3660 Cheng, C.Y., Morris, I. and Bardin, C.W.: Testins are structurally related to the mouse cysteine proteinase precursor but devoid of any protease/anti-protease activity. *Biochem. Biophys. Res. Commun.*, 191 (1993) 224-231.
- 3661 Kuo, C.-H., Taira, E., Takaha, N., Sohma, H., Akino, T., Fukada, Y., Sanada, K. and Miki, N.: Purification and characterization of three meka-like proteins in liver: association of a 94 kDa protein with  $\beta$ , subunits of G-proteins. *Biochem. Biophys. Res. Commun.*, 191 (1993) 1097-1104.
- 3662 Leaver, J. and Law, A.J.R.: Preparative-scale purification of bovine caseins on a cation-exchange resin. *J. Dairy Res.*, 59 (1992) 557-561; C.A., 118 (1993) 58380v.
- 3663 Levy-Favatier, F., Cuisset, L., Nedelec, B., Tichonicky, L., Kruh, J. and Delpech, M.: Characterization, purification and cDNA cloning of a rat perchloric-acid-soluble 23-kDa protein present only in liver and kidney. *Eur. J. Biochem.*, 212 (1993) 665-673.
- 3664 Pearson, J.A., Tyler, M.I., Retson, K.V. and Howden, M.E.H.: Studies on the subunit structure of textillotoxin, a potent presynaptic neurotoxin from the venom of the Australian common brown snake (*Pseudonaja textilis*). 3. The complete amino-acid sequences of all the subunits. *Biochim. Biophys. Acta*, 1161 (1993) 223-229.

- 3665 Rilling, H.C., Bruenger, E., Leining, L.M., Buss, J.E. and Epstein, W.W.: Differential prenylation of proteins as a function of mevalonate concentration in CHO cells. *Arch. Biochem. Biophys.*, 301 (1993) 210-215.
- 3666 Sabatier, J.-M., Zerrouk, H., Darbon, H., Mabrouk, K., Benslimane, A., Rochat, H., Martin-Eauclaire, M.-F. and van Riet-schoten, J.: P05, A new leurotoxin I-like scorpion toxin: synthesis and structure-activity relationships of the  $\alpha$ -amidated analog, a ligand of  $\text{Ca}^{2+}$ -activated  $\text{K}^+$  channels with increased affinity. *Biochemistry*, 32 (1993) 2763-2770.
- 3667 Shaw, D.C., Messer, M., Scrivener, A.M., Nicholas, K.R. and Griffiths, M.: Isolation, partial characterisation, and amino acid sequence of  $\alpha$ -lactalbumin from platypus (*Ornithorhynchus anatinus*) milk. *Biochim. Biophys. Acta*, 1161 (1993) 177-186.

See also 3567, 3804, 4390.

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

- 3668 Chiou, S.-H., Huang, C.-C. and Lin, C.-W.: Biochemical characterization of crystallins from pigeon lenses: structural and sequence analysis of pigeon  $\delta$ -crystallin. *Biochim. Biophys. Acta*, 1160 (1992) 317-324.
- 3669 Dean, K.R. and Akhtar, M.: Phosphorylation of solubilised dark-adapted rhodopsin. Insights into the activation of rhodopsin kinase. *Eur. J. Biochem.*, 213 (1993) 881-890.
- 3670 Roher, A.E., Lowenson, J.D., Clarke, S., Wolkow, C., Wang, R., Cotter, R.J., Reardon, I.M., Zürcher-Neely, H.A., Heinrikson, R.L. et al.: Structural alterations in the peptide backbone of  $\beta$ -amyloid core protein may account for its deposition and stability in Alzheimer's disease. *J. Biol. Chem.*, 268 (1993) 3072-3083.
- 3671 Rosenfeld, R. and Benedek, K.: Conformational changes of brain-derived neurotrophic factor during reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 632 (1993) 29-36.
- 3672 Samiei, M., Sanghera, J.S. and Pelech, S.L.: Activation of myelin basic protein and S6 peptide kinases in phorbol ester- and PAF-treated sheep platelets. *Biochim. Biophys. Acta*, 1176 (1993) 287-298.
- 3673 Sohma, H., Hashimoto, H., Hiraike, N., Ohguro, H. and Akino, T.: Identification of a novel  $\gamma$ -subunit from bovine brain GTP binding regulatory proteins (Gi/o). *Biochem. Biophys. Res. Commun.*, 190 (1993) 849-856.
- 3674 Vlaanderen, I., van Grondelle, R. and Bloemendaal, M.: The use of fast protein liquid (size exclusion) chromatography for the fractionation of crystallins and the study of  $\beta$ -crystallin aggregation. *J. Liq. Chromatogr.*, 16 (1993) 367-382.

See also 3533, 3571, 3691, 3694.

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

- 3675 Hanson, K., Aboul-Ela, N., Jacobson, M.K. and Wu, M.-C.: Evidence for unusual stability of ADP-ribosyl linkage to membrane proteins of a murine leukemic cell line. *Arch. Biochem. Biophys.*, 302 (1993) 193-199.

For additional information see C.A.:  
118 (1993) 117530u.

See also 3644, 3680, 3682.

**19l. Specific binding and receptor proteins**

- 3676 Aducci, P., Ballio, A., Fogliano, V., Fullone, M.R., Marra, M. and Proietti, N.: Purification and photoaffinity labeling of fusicoccin receptors from maize. *Eur. J. Biochem.*, 214 (1993) 339-345.
- 3677 Bishop, R.E. and Weiner, J.H.: Overproduction, solubilization, purification and DNA-binding properties of AmpR from *Citrobacter freundii*. *Eur. J. Biochem.*, 213 (1993) 405-412.
- 3678 Bornancin, F., Franco, M., Bigay, J. and Chabre, M.: Functional modifications of transducin induced by cholera or pertussis-toxin-catalyzed ADP-ribosylation. *Eur. J. Biochem.*, 210 (1992) 33-44.
- 3679 Burgess, J.W., Bevan, A.P., Bergeron, J.J.M. and Posner, B.I.: Pharmacological doses of insulin equalize insulin receptor phosphotyrosine content but not tyrosine kinase activity in plasma-membrane and endosomal membranes. *Biochem. Cell Biol.*, 70 (1992) 1151-1158.
- 3680 Clagett-Dame, M., Verhalen, T.J., Biedler, J.L. and Repa, J.J.: Identification and characterization of all-trans-retinoic acid receptor transcripts and receptor protein in human neuroblastoma cells. *Arch. Biochem. Biophys.*, 300 (1993) 684-693.
- 3681 Coren, J.S. and Vogt, V.M.: Purification of a telomere-binding protein from *Physarum polycephalum*. *Biochim. Biophys. Acta*, 1171 (1992) 162-166.
- 3682 Cren, H., Lechevrel, C., Roussel, G., Lemoisson, E. and Gousset, J.: Use of automated smoothing and deconvolution procedures for the determination of human breast cancer estrogen and progesterone receptor isoforms, after high-performance size-exclusion chromatography. *J. Chromatogr.*, 615 (1993) 23-36.
- 3683 Faye, L., Gomord, V., Fitchette-Lainé, A.-C. and Chrispeels, M.J.: Affinity purification of antibodies specific for Asn-linked glycans containing  $\alpha 1 \rightarrow 3$  fucose or  $\beta 1 \rightarrow 2$  xylose. *Anal. Biochem.*, 209 (1993) 104-108.
- 3684 Feldman, D.A. and Weinhold, P.A.: Identification of a protein complex between choline-phosphate cytidylyltransferase and a 112-kDa protein in rat liver. *J. Biol. Chem.*, 268 (1993) 3127-3135.
- 3685 Ginger, R.S. and Parker, P.J.: Expression, purification and characterisation of a functional phosphatidylinositol-specific phospholipase C- $\delta_1$  protein in *Escherichia coli*. *Eur. J. Biochem.*, 210 (1992) 155-160.
- 3686 Hosomi, O., Takeya, A. and Yazawa, S.: A novel lectin in rabbit serum binds H type 1, H type 2 and N-acetyl lactosamine structures. *Biochim. Biophys. Acta*, 1157 (1993) 45-49.
- 3687 Inoue, T., Yoshida, Y., Isaka, Y. and Tagawa, K.: Isolation of mitochondrial cyclophilin from bovine heart. *Biochim. Biophys. Res. Commun.*, 190 (1993) 857-863.
- 3688 Kabir, S., Aebersold, R. and Daar, A.S.: Identification of a novel 4 kDa immunoglobulin-A-binding peptide obtained by the limited proteolysis of jacalin. *Biochim. Biophys. Acta*, 1161 (1993) 194-200.
- 3689 Kroviarski, Y., Cochet, S., Martineau, P., Cartron, J.P. and Bertrand, O.: Evaluation of several affinity chromatographic supports for the purification of maltose-binding protein from *Escherichia coli*. *J. Chromatogr.*, 633 (1993) 273-280.

- 3690 Kuiper, G.G.J.M., de Ruiter, P.E., Trapman, J., Boersma, W.J.A., Grootegoed, J.A. and Brinkmann, A.O.: Localization and hormonal stimulation of phosphorylation sites in the LNCaP-cell androgen receptor. *Biochem. J.*, 291 (1993) 95-101.
- 3691 Lennon, A.M.: Purification and characterization of rat brain cytosolic 3,5,3'-triiodo-L-thyronine-binding protein. Evidence for binding activity dependent on NADPH, NADP and thioredoxin. *Eur. J. Biochem.*, 210 (1992) 79-85.
- 3692 Nagata, R., Kawachi, E., Hashimoto, Y. and Shudo, K.: Cytokinin-specific binding protein in etiolated mung bean seedlings. *Biochem. Biophys. Res. Commun.*, 191 (1993) 543-549.
- 3693 Nakajo, S. and Inagami, T.: Atrial natriuretic factor stimulates phosphorylation of a 52-kDa calmodulin-binding protein in vascular smooth muscle cells. *Arch. Biochem. Biophys.*, 301 (1993) 320-324.
- 3694 Nakata, H.: Development of an antiserum to rat-brain A<sub>1</sub> adenosine receptor: application for immunological and structural comparison of A<sub>1</sub> adenosine receptors from various tissues and species. *Biochim. Biophys. Acta*, 1177 (1993) 93-98.
- 3695 Negishi, M., Sugimoto, Y., Hayashi, Y., Namba, T., Honda, A., Watabe, A., Narumiya, S. and Ichikawa, A.: Functional interaction of prostaglandin E receptor EP<sub>3</sub> subtype with guanine nucleotide-binding proteins, showing low-affinity ligand binding. *Biochim. Biophys. Acta*, 1175 (1993) 343-350.
- 3696 Plakidou-Dymock, S., Tanner, M.J. and McGivan, J.D.: A role for aminopeptidase N in Na<sup>+</sup>-dependent amino acid transport in bovine renal brush-border membranes. *Biochem. J.*, 290 (1993) 59-65.
- 3697 Rinken, A. and Haga, T.: Solubilization and characterization of atrial muscarinic acetylcholine receptors in sucrose monolaurate. *Arch. Biochem. Biophys.*, 301 (1993) 158-164.
- 3698 Rosendal, J., Ertbjerg, P. and Knudsen, J.: Characterization of ligand binding to acyl-CoA-binding protein. *Biochem. J.*, 290 (1993) 321-326.
- 3699 Ross, C.R., Kubinak, S. and Hale, C.C.: Purification of a basic fibroblast growth factor-binding proteoglycan from bovine cardiac plasma membrane. *Biochim. Biophys. Acta*, 1145 (1993) 219-226.
- 3700 Snoek, G.T., Westerman, J., Wouters, F.S. and Wirtz, K.W.A.: Phosphorylation and redistribution of the phosphatidylinositol-transfer protein in phorbol 12-myristate 13-acetate- and bombesin-stimulated Swiss mouse 3T3 fibroblasts. *Biochem. J.*, 291 (1993) 649-656.
- 3701 Stüber, D., Friedlein, A., Fountoulakis, M., Lahm, H.-W. and Gorruta, G.: Alignment of disulfide bonds of the extracellular domain of the interferon  $\gamma$  receptor and investigation of their role in biological activity. *Biochemistry*, 32 (1993) 2423-2430.
- 3702 Takeuchi, N. and Chino, H.: Lipid transfer particle in the hemolymph of the American cockroach: evidence for its capacity to transfer hydrocarbons between lipophorin particles. *J. Lipid Res.*, 34 (1993) 543-551.
- 3703 Tokumaru, H., Anzai, K., Abe, T. and Kirino, Y.: Purification of the cardiac 1,4-dihydropyridine receptor using immunoaffinity chromatography with a monoclonal antibody against the  $\alpha 2\delta$  subunit of the skeletal muscle dihydropyridine receptor. *Eur. J. Pharmacol., Mol. Pharmacol. Sect.*, 227 (1992) 363-70; C.A., 118 (1993) 35265x.
- 3704 Tsuboi, I., Matsukawa, M., Sato, N. and Kimura, S.: Isolation and characterization of a sialic acid-specific binding lectin from the hemolymph of Asian horseshoe crab, *Tachypleus tridentatus*. *Biochim. Biophys. Acta*, 1156 (1993) 255-262.
- 3705 Van Dessel, G., Lagrou, A., Hilderson, H.J. and Dierick, W.: The shuttling of dolichol between VLDL and HDL: involvement of a protein factor from lipoprotein-deficient human serum. *Biochim. Biophys. Acta*, 1166 (1993) 64-72.
- 3706 Weber, G., Schwamberger, G. and Ferber, E.: A fast and sensitive method for detection of phospholipid-binding proteins on nitrocellulose membranes. *Anal. Biochem.*, 209 (1993) 251-257.
- See also 3525, 3545, 3574, 3622, 3634, 3867, 3868.
- 19m. Urinary proteins**
- 3707 Sudo, J., Hayashi, T., Terui, J., Suzue, T., Soyama, M. and Tateyama, M.: Urinary albumin determination by gel-filtration high-performance liquid chromatography. *J. Toxicol. Sci.*, 17 (1992) 107-118; C.A., 118 (1993) 55350z.
- 19n. Other proteins (incl. proteinous inhibitors of enzymic activity)**
- 3708 Jungblut, P., Dzionara, M., Klose, J. and Wittmann-Leibold, B.: Identification of tissue proteins by amino acid analysis after purification by two-dimensional electrophoresis. *J. Protein Chem.*, 11 (1992) 603-612; C.A., 118 (1993) 120353u.
- 3709 Warner, A.H. and Sonnenfeld-Karcz, M.J.: Purification and partial characterization of thiol protease inhibitors from embryos of the brine shrimp *Artemia*. *Biochem. Cell Biol.*, 70 (1992) 1020-1029.
- 3710 Waxman, L. and Connolly, T.M.: Isolation of an inhibitor selective for collagen-stimulated platelet aggregation from the soft tick *Ornithodoros moubata*. *J. Biol. Chem.*, 268 (1993) 5445-5449.
- 3711 Wu, H.-C. and Lin, J.-Y.: The complete amino acid sequence of a Kunitz family trypsin inhibitor from seeds of *Acacia confusa*. *J. Biochem. (Tokyo)*, 113 (1993) 258-263.
- See also 3565, 3587, 3612.
- 20. ENZYMES AND ENZYME ACTIVITY ESTIMATION**
- 3712 Buckler, D.R., Haas, E. and Scheraga, H.A.: C-Terminal labeling of ribonuclease A with an extrinsic fluorescent probe of carboxypeptidase Y-catalyzed transpeptidation in the presence of urea. *Anal. Biochem.*, 209 (1993) 20-31.
- 20a. Oxidoreductases**
- 3713 Bao, W., Usha, S.N. and Renganathan, V.: Purification and characterization of cellobiose dehydrogenase, a novel extracellular hemoflavoenzyme from the white-rot fungus *Phanerochaete chrysosporium*. *Arch. Biochem. Biophys.*, 300 (1993) 705-713.
- 3714 Barber, M.J., Trimboli, A.J., Clark, M., Young, C. and Neame, P.J.: Purification and properties of *Alligator mississippiensis* cytochrome c. *Arch. Biochem. Biophys.*, 301 (1993) 294-298.

- 3715 Belmouden, A., Le, K.H.D., Lederer, F. and Garchon, H.-J.: Molecular cloning and nucleotide sequence of cDNA encoding rat kidney long-chain L-2-hydroxy acid oxidase. Expression of the catalytically active recombinant protein as a chimaera. *Eur. J. Biochem.*, 214 (1993) 17-25.
- 3716 Berks, B.C., Baratta, D., Richardson, D.J. and Ferguson, S.J.: Purification and characterization of a nitrous oxide reductase from *Thiospaera pantotropha*. Implications for the mechanism of aerobic nitrous oxide reduction. *Eur. J. Biochem.*, 212 (1993) 467-476.
- 3717 Bhamre, S., Anandatheerathavarada, H.K., Shankar, S.K., Boyd, M.R. and Ravindranath, V.: Purification of multiple forms of cytochrome P450 from a human brain and reconstitution of catalytic activities. *Arch. Biochem. Biophys.*, 301 (1993) 251-255.
- 3718 Bhat, M.A., Ishida, T., Horiike, K., Vaidyanathan, C.S. and Nozaki, M.: Purification of 3,5-dichlorocatechol 1,2-dioxygenase, a nonheme iron dioxygenase and a key enzyme in the biodegradation of a herbicide, 2,4-dichlorophenoxyacetic acid (2,4-D), from *Pseudomonas cepacia* CSV90. *Arch. Biochem. Biophys.*, 300 (1993) 738-746.
- 3719 Blamey, J.M. and Adams, M.W.W.: Purification and characterization of pyruvate ferredoxin oxidoreductase from the hyperthermophilic archaeon *Pyrococcus furiosus*. *Biochim. Biophys. Acta*, 1161 (1993) 19-27.
- 3720 Brackmann, R. and Fuchs, G.: Enzymes of anaerobic metabolism of phenolic compounds. 4-Hydroxybenzoyl-CoA reductase (dehydroxylating) from a denitrifying *Pseudomonas* species. *Eur. J. Biochem.*, 213 (1993) 563-571.
- 3721 Cooper, K.O., Reik, L.M., Jayyosi, Bandiera, S., Kelley, M., Ryan, D.E., Daniel, R., McCluskey, S.A., Levin, W. and Thomas, P.E.: Regulation of two members of the steroid-inducible cytochrome P450 subfamily (3A) in rats. *Arch. Biochem. Biophys.*, 301 (1993) 345-354.
- 3722 Dubinina, E.E., Turkin, V.V., Babenko, G.A. and Isakov, V.A.: (Isolation and properties of human blood plasma superoxide dismutase). *Biokhimiya (Moscow)*, 57 (1992) 1892-1901.
- 3723 Fauss, J. and Pyerin, W.: Rapid assay of aromatase activity by fast liquid chromatography: spectroscopic evaluation of metabolic profiles indicate unexpected pitfalls. *Anal. Biochem.*, 210 (1993) 421-423.
- 3724 Ferrareto, A., Negri, A., Giuliani, A., de Grada, L., Fuhrman Conti, A.M. and Ronchi, S.: Aldose reductase is involved in long-term adaptation of EUE cells to hyperosmotic stress. *Biochim. Biophys. Acta*, 1175 (1993) 283-288.
- 3725 Fraser, P.D., Linden, H. and Sandmann, G.: Purification and reactivation of recombinant *Synechococcus* phytoene desaturase from an overexpressing strain of *Escherichia coli*. *Biochem. J.*, 291 (1993) 687-692.
- 3726 Freeman, K.B., Bulawa, M.C., Zeng, Q. and LeRoy Blank, C.: Rapid and simultaneous determination of monoamine oxidase A and monoamine oxidase B activities in mouse brain homogenates by liquid chromatography with electrochemical detection. *Anal. Biochem.*, 208 (1993) 182-196.
- 3727 Fujimoto, K., Masuda, K.-i., Asada, N. and Ohnishi, E.: Purification and characterization of prophenoloxidases from pupae of *Drosophila melanogaster*. *J. Biochem. (Tokyo)*, 113 (1993) 285-291.
- 3728 Ghenbot, G. and Weiner, H.: Purification of liver aldehyde dehydrogenase by *p*-hydroxyacetophenone-Sepharose affinity matrix and the coelution of chloramphenicol acetyl transferase from the same matrix with recombinantly expressed aldehyde dehydrogenase. *Protein Expression Purif.*, 3 (1992) 470-478; C.A., 118 (1993) 54830u.
- 3729 Imamura, Y., Higuchi, T., Nozaki, Y., Sugino, E., Hibino, S. and Otagiri, M.: Purification and properties of carbonyl reductase from rabbit kidney. *Arch. Biochem. Biophys.*, 300 (1993) 570-576.
- 3730 Jin, J.-Z., Azzi, A., Wang, J.-Y. and Lin, S.-X.: Preparation of the apoenzyme and holoenzyme forms of human 17 $\beta$ -hydroxysteroid dehydrogenase. *J. Chromatogr.*, 614 (1993) 159-163.
- 3731 Karlsson, K., Edlund, A., Sandström, J. and Marklund, S.L.: Proteolytic modification of the heparin-binding affinity of extracellular superoxide dismutase. *Biochem. J.*, 290 (1993) 623-626.
- 3732 Katsura, H., Kitamura, S. and Tatsumi, K.: Purification and characterization of salicylhydroxamic acid reductase from rat liver. *Arch. Biochem. Biophys.*, 302 (1993) 356-361.
- 3733 Lomnitski, L., Bar-Natan, R., Sklan, D. and Grossman, S.: The interaction between  $\beta$ -carotene and lipoxygenase in plant and animal systems. *Biochim. Biophys. Acta*, 1167 (1993) 331-338.
- 3734 Meijer, A.H., de Waal, A. and Verpoorte, R.: Purification of the cytochrome P-450 enzyme geraniol 10-hydroxylase from cell cultures of *Catharanthus roseus*. *J. Chromatogr.*, 635 (1993) 257-249.
- 3735 Nilsson, L. and Kagedal, B.: Co-purification of human serum lipoamidase and biotinidase: evidence that the two enzyme activities are due to the same enzyme protein. *Biochem. J.*, 291 (1993) 545-551.
- 3736 Nisimoto, Y., Otsuka-Murakami, H., Iwata, S., Isogai, Y. and Iizuka, T.: Characterization of superoxide dismutase-insensitive cytochrome c reductase activity in HL-60 cytosol as NADPH-cytochrome P450 reductase. *Arch. Biochem. Biophys.*, 302 (1993) 315-321.
- 3737 Ohshima, T. and Tanaka, S.: Dye-linked L-malate dehydrogenase from thermophilic *Bacillus* species DSM 465. Purification and characterization. *Eur. J. Biochem.*, 214 (1993) 37-42.
- 3738 Paek, S.-H., Bachas, L.G. and Schramm, W.: Defined analyte-enzyme conjugates as signal generators in immunoassays. *Anal. Biochem.*, 210 (1993) 145-154.
- 3739 Reynolds, K.A.: Comparison of two unusual enoyl-CoA reductases in *Streptomyces collinus*. *J. Natural Prod.*, 56 (1993) 175-185.
- 3740 Rüetschi, U., Dellén, A., Sahlin, P., Stenman, G., Rymo, L. and Lindstedt, S.: Human 4-hydroxyphenylpyruvate dioxygenase. Primary structure and chromosomal localization of the gene. *Eur. J. Biochem.*, 213 (1993) 1081-1089.
- 3741 Rüetschi, U., Nordin, I., Odellhög, B., Jörnvall, H. and Lindstedt, S.:  $\gamma$ -Butyrobetaine hydroxylase. Structural characterization of the *Pseudomonas* enzyme. *Eur. J. Biochem.*, 213 (1993) 1075-1080.
- 3742 Schröver, J.M.J., Frank, J., van Wielink, J.E. and Duine, J.A.: Quaternary structure of quinoprotein ethanol dehydrogenase from *Pseudomonas aeruginosa* and its reoxidation with a novel cytochrome c from this organism. *Biochem. J.*, 290 (1993) 123-127.

- 3743 Seifert, J.: Assay of tryptophan 2,3-dioxygenase using liver slices and high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 227-231.
- 3744 Söhling, B. and Gottschalk, G.: Purification and characterization of a coenzyme-A-dependent succinate-semialdehyde dehydrogenase from *Clostridium kluyveri*. *Eur. J. Biochem.*, 212 (1993) 121-127.
- 3745 Solyanikova, I.P., Mat'zeva, G.V. and Golovleva, L.A.: (Purification and properties of catechol 1,2-dioxygenase II from *Pseudomonas putida* 87). *Biokhimiya (Moscow)*, 57 (1992) 1883-1891.
- 3746 Sorgenfrei, O., Linder, D., Karas, M. and Klein, A.: A novel very small subunit of a selenium containing [NiFe] hydrogenase of *Methanococcus voltae* is posttranslationally processed by cleavage at a defined position. *Eur. J. Biochem.*, 213 (1993) 1355-1358.
- 3747 Suzuki, K., Ohta, M., Okamoto, M. and Nishikawa, Y.: Functional expression and characterization of *Xenopus laevis* peptidylglycine  $\alpha$ -amidating monooxygenase, AE-II, in insect-cell culture. *Eur. J. Biochem.*, 213 (1993) 93-98.
- 3748 Van Ophem, P.W., van Beeumen, J. and Duine, J.A.: Nicotinoprotein [NAD(P)-containing] alcohol/aldehyde oxidoreductases. Purification and characterization of a novel type from *Amycolatopsis methanolica*. *Eur. J. Biochem.*, 212 (1993) 819-826.
- 3749 Vanhove, G., van Veldhoven, P.P., Eyssen, H.J. and Mannaerts, G.P.: Mitochondrial short-chain acyl-CoA dehydrogenase of human liver and kidney can function as an oxidase. *Biochem. J.*, 292 (1993) 23-30.
- 3750 Westlund, P.: Purification and some properties of 11-hydroxy-thromboxane B<sub>2</sub> dehydrogenase from porcine kidney. *Eur. J. Biochem.*, 212 (1993) 403-409.
- 3751 Yun, H.-Y., Johnson, R.C., Mains, R.E. and Eipper, B.A.: Topological switching of the COOH-terminal domain of peptidylglycine  $\alpha$ -amidating monooxygenase by alternative RNA splicing. *Arch. Biochem. Biophys.*, 301 (1993) 77-84.
- 3752 Zhao, G., Xia, T., Ingram, L.O. and Jensen, R.A.: An allosterically insensitive class of cyclohexadienyl dehydrogenase from *Zymomonas mobilis*. *Eur. J. Biochem.*, 212 (1993) 157-165.
- For additional information see C.A.:  
118 (1993) 100543c.
- See also 3451.
- 20b. *Transferases (excl. E.C. 2.7.-.)*
- 3753 Aisen, S.O. and Walter, R.D.: Biogenic-amine acetylation: an additional function of the N-acetyltransferase from *Fasciola hepatica*. *Biochem. J.*, 291 (1993) 733-737.
- 3754 Awasthi, S., Singhal, S.S., Srivastava, S.K. and Awasthi, Y.C.: Purification and characterization of glutathione S-transferase of murine ovary and testis. *Arch. Biochem. Biophys.*, 301 (1993) 143-150.
- 3755 Banger, K.K., Lock, E.A. and Reed, C.J.: The characterization of glutathione S-transferases from rat olfactory epithelium. *Biochem. J.*, 290 (1993) 199-204.
- 3756 Beaudouin, C., Haurat, G., Fraisse, L., Souuppe, J. and Renaud, B.: Assay of phenylethanolamine N-methyltransferase activity using high-performance liquid chromatography with ultraviolet absorbance detection. *J. Chromatogr.*, 613 (1993) 51-58.
- 3757 Bhat, B.G., Bardes, E.S.-G. and Coleman, R.A.: Solubilization and partial purification of neonatally expressed rat hepatic microsomal monoacylglycerol acyltransferase. *Arch. Biochem. Biophys.*, 300 (1993) 663-669.
- 3758 Boivin, D., Gingras, D. and Bélineau, R.: Purification and characterization of a membrane-bound protein carboxyl methyltransferase from rat kidney cortex. *J. Biol. Chem.*, 268 (1993) 2610-2615.
- 3759 Doi, S., Tanigawa, Y., Tsuchiya, M. and Shimoyama, M.: Loss of poly(ADP-ribose) synthetase activity without change in arginine-specific ADP-ribosyltransferase activity by acid-treatment; application of the treatment to simple assay for transferase in the presence of poly(ADP-ribose) synthetase. *Biochim. Biophys. Acta*, 1162 (1993) 115-120.
- 3760 Fajardo, N., Abreu, P. and Alonso, R.: Determination of kinetic properties of serotonin-N-acetyltransferase in bovine pineal gland using HPLC with fluorimetric detection. *J. Pineal Res.*, 13 (1992) 80-84; C.A., 118 (1993) 96739b.
- 3761 Gärtner, P., Ecker, A., Fischer, R., Linder, D., Fuchs, G. and Thauer, R.K.: Purification and properties of N<sup>5</sup>-methyltetrahydro-methanopterin:coenzyme M methyltransferase from *Methanobacterium thermoautotrophicum*. *Eur. J. Biochem.*, 213 (1993) 537-545.
- 3762 Hyland, K. and Clayton, P.T.: Aromatic L-amino acid decarboxylase deficiency: diagnostic methodology. *Clin. Chem. (Winston-Salem)*, 39 (1992) 2405-2410.
- 3763 Kontani, Y., Kaneko, M., Kikugawa, M., Fujimoto, S. and Tamaki, N.: Identity of D-3-aminoisobutyrate-pyruvate aminotransferase with alanine-glyoxylate aminotransferase 2. *Biochim. Biophys. Acta*, 1156 (1993) 161-166.
- 3764 Mathur, M., Sharma, N. and Sachar, R.C.: Differential regulation of S-adenosylmethionine synthetase isozymes by gibberellic acid in dwarf pea epicotyls. *Biochim. Biophys. Acta*, 1162 (1993) 283-290.
- 3765 McIlhinney, R.A.J., McGlone, K. and Willis, A.C.: Purification and partial sequencing of myristoyl-CoA:protein N-myristoyltransferase from bovine brain. *Biochem. J.*, 290 (1993) 405-410.
- 3766 Primiano, T. and Novak, R.F.: Purification and characterization of class  $\beta$  glutathione S-transferase isozymes from rabbit hepatic tissue. *Arch. Biochem. Biophys.*, 301 (1993) 404-410.
- 3767 Raghavan, M., Lindberg, U. and Schutt, C.: The use of alternative substrates in the characterization of actin-methylating and carnosine-methylating enzymes. *Eur. J. Biochem.*, 210 (1992) 311-318.
- 3768 Roberts, G.A., Staunton, J. and Leadlay, P.F.: Heterologous expression in *Escherichia coli* of an intact multienzyme component of the erythromycin-producing polyketide synthase. *Eur. J. Biochem.*, 214 (1993) 305-311.
- 3769 Syed, S.K., Kim, S. and Paik, W.K.: Identification of the S-adenosyl-L-methionine binding site of protein-carboxyl O-methyltransferase using 8-azido-S-adenosyl-L-methionine. *Biochemistry*, 32 (1993) 2242-2247.
- 3770 Yarlett, N., Garofalo, J., Goldberg, B., Ciminelli, M.A., Ruggiero, V., Sufrin, J.R. and Bacchi, C.J.: S-Adenosylmethionine synthetase in bloodstream *Trypanosoma brucei*. *Biochim. Biophys. Acta*, 1181 (1993) 68-76.

- 3771 Yokoyama, K. and Gelb, M.H.: Purification of a mammalian protein geranylgeranyltransferase. Formation and catalytic properties of an enzyme-geranylgeranyl pyrophosphate complex. *J. Biol. Chem.*, 268 (1993) 4055-4060.
- For additional information see C.A.:  
118 (1993) 97147u, 119434q.
- 20c. Transferases transferring phosphorus containing groups (E.C. 2.7.-.)
- 3772 Boldyreff, B., Meggio, F., Dobrowolska, G., Pinna, L.A. and Issinger, O.-G.: Expression and characterization of a recombinant maize CK-2  $\alpha$  subunit. *Biochim. Biophys. Acta*, 1173 (1993) 32-38.
- 3773 Bond, M.D., Strydom, D.J. and Vallee, B.L.: Characterization and sequencing of rabbit, pig and mouse angiogenins: discernment of functionally important residues and regions. *Biochim. Biophys. Acta*, 1162 (1993) 177-186.
- 3774 Bontemps, F., Mimouni, M. and van den Berghe, G.: Phosphorylation of adenosine in anoxic hepatocytes by an exchange reaction catalysed by adenosine kinase. *Biochem. J.*, 290 (1993) 679-684.
- 3775 Falk, K.L. and Guerra, D.J.: Coenzyme A biosynthesis in plants: partial purification and characterization of pantothenate kinase from spinach. *Arch. Biochem. Biophys.*, 301 (1993) 424-430.
- 3776 Gettemans, J., de Ville, Y., Vandekerckhove, J. and Waelkens, E.: Purification and partial amino acid sequence of the actin-fragmin kinase from *Physarum polycephalum*. *Eur. J. Biochem.*, 214 (1993) 111-119.
- 3777 Khilko, S., Greenwood, J.A. and Johnson, G.V.W.: Brain casein kinase 2: affinity purification procedure using immobilized polyethylenimine. *Protein Expression Purif.*, 3 (1992) 355-361; C.A., 118 (1993) 75846u.
- 3778 Lambeth, D.O. and Muñonen, W.W.: The direct assay of kinases and acyl-CoA synthetases by HPLC: application to nucleoside diphosphate kinase and succinyl-CoA synthetase. *Anal. Biochem.*, 209 (1993) 192-198.
- 3779 Ohtsuki, K., Matsumoto, M., Saito, H. and Kato, T.: Characterization of casein kinase II, and of p98 as one of its effective phosphate acceptors in sea urchin eggs. *J. Biochem. (Tokyo)*, 113 (1993) 334-342.
- 3780 Park, J.H., Kim, J.S., Kwon, S.-T. and Lee, D.-S.: Purification and characterization of *Thermus caldophilus* GK24 DNA polymerase. *Eur. J. Biochem.*, 214 (1993) 135-140.
- 3781 Redpath, N.T. and Proud, C.G.: Purification and phosphorylation of elongation-factor-2 kinase from rabbit reticulocytes. *Eur. J. Biochem.*, 212 (1993) 511-520.
- 3782 Reynolds, C.H., Willson, M.G., Groffen, J., Heisterkamp, N., Peakman, T.C. and Page, M.J.: Comparison of baculovirus-expressed c-Abl and BCR/ABL protein tyrosine kinases. *Biochim. Biophys. Acta*, 1181 (1993) 122-130.
- 3783 Ruiz-Larrea, F., Vicendo, P., Yeish, P., End, P., Panayotou, G., Fry, M.J., Morgan, S.J., Thompson, A., Parker, P.J. and Waterfield, M.D.: Characterization of the bovine brain cytosolic phosphatidylinositol 3-kinase complex. *Biochem. J.*, 290 (1993) 609-616.
- 3784 Sestini, S., Ricci, C., Micheli, V. and Pompucci, G.: Nicotinamide mononucleotide adenyllyltransferase activity in human erythrocytes. *Arch. Biochem. Biophys.*, 302 (1993) 206-211.
- 3785 Stasek, J.L., Jr., Natarajan, V. and Garcia, J.G.N.: Phosphatidic acid directly activates endothelial cell protein kinase C. *Biochem. Biophys. Res. Commun.*, 191 (1993) 134-141.
- 3786 Su, J.Y. and Storey, K.B.: Phosphofructokinase from liver of the rainbow trout, *Oncorhynchus mykiss*. *Arch. Biochem. Biophys.*, 302 (1993) 49-55.
- 3787 Thompson, H.L., Shiroo, M. and Saklatvala, J.: The chemotactic factor N-formylmethionyl-leucyl-phenylalanine activates microtubule-associated protein 2 (MAP) kinase and a MAP kinase kinase in polymorphonuclear leucocytes. *Biochem. J.*, 290 (1993) 483-488.
- 3788 Zschocke, P.D., Schiltz, E. and Schulz, G.E.: Purification and sequence determination of guanylate kinase from pig brain. *Eur. J. Biochem.*, 213 (1993) 263-269.
- For additional information see C.A.:  
118 (1993) 100544d.
- See also 3684.
- 20d. Hydrolases, acting on ester bonds (E.C. 3.1.-.)
- 3789 Alessi, D.R., Street, A.J., Cohen, P. and Cohen, P.T.W.: Inhibitor-2 functions like a chaperone to fold three expressed isoforms of mammalian protein phosphatase-1 into a conformation with the specificity and regulatory properties of the native enzyme. *Eur. J. Biochem.*, 213 (1993) 1055-1066.
- 3790 Barnette, M.S., Manning, C.D., Price, W.J. and Barone, F.C.: Initial biochemical and functional characterization of cyclic nucleotide phosphodiesterase isozymes in canine colonic smooth muscle. *J. Pharmacol. Exp. Ther.*, 264 (1993) 801-812.
- 3791 Cordella-Miele, E., Miele, L., Beninati, S. and Mukherjee, A.B.: Transglutaminase-catalyzed incorporation of polyamines into phospholipase A<sub>2</sub>. *J. Biochem. (Tokyo)*, 113 (1993) 164-173.
- 3792 Coutts, M. and Brawerman, G.: A 5' exoribonuclease from cytoplasmic extracts of mouse sarcoma 180 ascites cells. *Biochim. Biophys. Acta*, 1173 (1993) 57-62.
- 3793 Coutts, M., Kowczynska, A. and Brawerman, G.: Protection of mRNA against nucleases in cytoplasmic extracts of mouse sarcoma ascites cells. *Biochim. Biophys. Acta*, 1173 (1993) 49-56.
- 3794 Deng, J.T., Hoylaerts, M.F., van Hoof, V.O. and de Broe, M.E.: Differential release of human intestinal alkaline phosphatase in duodenal fluid and serum. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2532-2538.
- 3795 Di Donato, A., Ciardiello, M.A., de Nigris, M., Piccoli, R., Mazzarella, L. and D'Alessio, G.: Selective deamidation of ribonuclease A. Isolation and characterization of the resulting isoasparhyl and aspartryl derivatives. *J. Biol. Chem.*, 268 (1993) 4745-4751.
- 3796 Duan, R.-D. and Borgström, B.: Is there a specific lysophospholipase in human pancreatic juice? *Biochim. Biophys. Acta*, 1167 (1993) 326-330.
- 3797 Ellis, M.V., Carne, A. and Katan, M.: Structural requirements of phosphatidylinositol-specific phospholipase C  $\delta_1$  for enzyme activity. *Eur. J. Biochem.*, 213 (1993) 339-347.
- 3798 Garcia-Diaz, M., Avalos, M. and Cameselle, J.C.: Alcohol esterification reactions and mechanisms of snake venom 5'-nucleotide phosphodiesterase. *Eur. J. Biochem.*, 213 (1993) 1139-1148.

- 3799 Han, Y., Li, K. and Zuo, W.: (Determination of phosphatase activity in plasma of patients with tumors by high performance liquid chromatography). *Sepu*, 10 (1992) 366-367; C.A., 118 (1993) 34827v.
- 3800 Hodgson, D., Gasparini, S., Drevet, P., Ducancel, F., Bouet, F., Boulain, J.-C., Harris, J.B. and Menez, A.: Production of recombinant notechis 11'2L, an enzymatically active mutant of a phospholipase A<sub>2</sub> from *Notechis scutatus scutatus* venom, as directly generated by cleavage of a fusion protein produced in *Escherichia coli*. *Eur. J. Biochem.*, 212 (1993) 441-446.
- 3801 Ichinose, N., Baba, S., Nakatsuji, T. and Nishino, N.: Fluorometric analysis of heat-stable alkaline phosphatase activity in human serum by means of high-performance liquid chromatography. *Fresenius J. Anal. Chem.*, 345 (1993) 610-612.
- 3802 Jackson, J.B., Thompson, H.M. and Walker, C.H.: The affinity purification of serum carboxylesterase from pigeons *Columba livia*. *Pestic. Sci.*, 36 (1992) 75-78; C.A., 118 (1993) 54827y.
- 3803 Jhon, D., Lee, H., Park, D., Lee, C., Lee, K., Yoo, O.J. and Rhee, S.G.: Cloning, sequencing, purification, and G<sub>q</sub>-dependent activation of phospholipase C-β3. *J. Biol. Chem.*, 268 (1993) 6654-6661.
- 3804 Krizaj, I., Siigur, J., Samel, M., Cotic, V. and Gubensek, F.: Isolation, partial characterization and complete amino acid sequence of the toxic phospholipase A<sub>2</sub> from the venom of the common viper, *Vipera berus berus*. *Biochim. Biophys. Acta*, 1157 (1993) 81-85.
- 3805 Kubelka, V., Altmann, F., Staudacher, E., Treter, V., März, L., Hard, K., Kamerling, J.P. and Vliegenthart, J.F.G.: Primary structures of the N-linked carbohydrate chains from honeybee venom phospholipase A<sub>2</sub>. *Eur. J. Biochem.*, 213 (1993) 1193-1204.
- 3806 Leech, A.P., Baker, G.R., Shute, J.K., Cohen, M.A. and Gani, D.: Chemical and kinetic mechanism of the inositol monophosphatase reaction and its inhibition by Li<sup>+</sup>. *Eur. J. Biochem.*, 212 (1993) 693-704.
- 3807 Marcoz, P., Némoz, G., Prigent, A.-F. and Lagarde, M.: Phosphatidic acid stimulates the rolipram-sensitive cyclic nucleotide phosphodiesterase from rat thymocytes. *Biochim. Biophys. Acta*, 1176 (1993) 129-136.
- 3808 Min, J., Heurtz, R.M. and Zassenhaus, H.P.: Isolation and characterization of an NTP-dependent 3'-exoribonuclease from mitochondria of *Saccharomyces cerevisiae*. *J. Biol. Chem.*, 268 (1993) 7350-7357.
- 3809 Nishihara, Y., Hayashi, Y., Adachi, T., Koyama, I., Stigbrand, T. and Hirano, K.: Chemical nature of intestinal-type alkaline phosphatase in human kidney. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2539-2542.
- 3810 Riaublanc, A., Ratomahenina, R. and Galzy, P.: Study of a lipase from *Candida rugosa* Diddens and Lodder. *Fat Sci. Technol.*, 95 (1993) 134-137.
- 3811 Robinson, A.K., de la Peña, C.E. and Barnes, L.D.: Isolation and characterization of diadenosine tetraphosphate (Ap<sub>4</sub>A) hydrolase from *Schizosaccharomyces pombe*. *Biochim. Biophys. Acta*, 1161 (1993) 139-148.
- 3812 Rua, M.L., Díaz-Mauriño, T., Fernández, V.M., Otero, C. and Ballisteros, A.: Purification and characterization of two distinct lipases from *Candida cylindracea*. *Biochim. Biophys. Acta*, 1156 (1993) 181-189.
- 3813 Steiner, M.R., Bomalaski, J.S. and Clark, M.A.: Responses of purified phospholipases A<sub>2</sub> to phospholipase A<sub>2</sub> activating protein (PLAP) and melittin. *Biochim. Biophys. Acta*, 1166 (1993) 124-130.
- 3814 Strobel, R. and Rosenberg, M.: Immunoaffinity chromatographic purification of chicken ectoATP diphosphohydrolase. *Acad. Sci.*, 671(Ion-Motive ATPase: Structure, Function, and Regulation) (1992) 487-489; C.A., 118 (1993) 142178t - a review with 1 ref.
- 3815 Tappia, P.S., Atkinson, P.G.P., Sharma, R.P. and Sale, G.J.: Regulation of an hepatic low-M<sub>r</sub> membrane-associated protein-tyrosine phosphatase. *Biochem. J.*, 292 (1993) 1-5.
- 3816 Ullah, A.H.J. and Dischinger, H.C., Jr.: Identification of active-site residues in *Aspergillus fuscum* extracellular pH 2.5 optimum acid phosphatase. *Biochem. Biophys. Res. Commun.*, 192 (1993) 754-759.
- 3817 Ullah, A.H.J. and Dischinger, H.C., Jr.: *Aspergillus fuscum* phytase: complete primary structure elucidation by chemical sequencing. *Biochem. Biophys. Res. Commun.*, 192 (1993) 747-753.
- 3818 Valaitis, A.P.: Use of concanavalin A in the purification of juvenile hormone esterase from the hemolymph and the fat body of *Lymantria dispar*. *Insect Biochem. Mol. Biol.*, 22 (1992) 639-648; C.A., 118 (1993) 75835q.
- 3819 Van Lith, H.A., Haller, M., van Hoof, I.J.M., van der Wouw, M.J.A., van Zutphen, B.F.M. and Beynen, A.C.: Characterization of rat plasma esterase ES-1A concerning its molecular and catalytic properties. *Arch. Biochem. Biophys.*, 301 (1993) 265-274.
- 3820 Wei, J.S., Chung, N.C., Wei, L.L.L., Tzeng, W.F., Liu, T.Z. and Wang, J.Y.: High-molecular-mass alkaline phosphatase as a tumor marker for colorectal cancer: comparison of two test methods. *Clin. Chem. (Winston-Salem)*, 39 (1993) 540-543.
- 3821 Wilkerson, L.S. and Touster, O.: Formation, turnover, and sensitivity to phosphatidylinositol-specific phospholipase C for Thy-1 of a rat neuronal tumor cell line. *Arch. Biochem. Biophys.*, 301 (1993) 6-14.
- 3822 Yokoyama, N., Ali, Z. and Wang, J.H.: Isozyme-specific monoclonal antibodies of CaM-stimulated phosphatase: identification of an enzyme domain involved in metal ion activation. *Arch. Biochem. Biophys.*, 200 (1993) 615-621.
- 3823 Zhao, Z., Bouchard, P., Diltz, C.D., Shen, S. and Fischer, E.H.: Purification and characterization of a protein tyrosine phosphatase containing SH2 domains. *J. Biol. Chem.*, 268 (1993) 2816-2820.
- See also 3569, 3582, 3916.
- 20e. *Hydrolases, acting on glycosyl compounds (E.C. 3.2.-.)*
- 3824 Endo, T., Tsukada, T., Hiraiwa, M., Uda, Y. and Kobata, A.: Purification and characterization of an α-L-fucosidase from *Pomacea canaliculata*. *Arch. Biochem. Biophys.*, 302 (1993) 152-160.
- 3825 Golubev, A.M., Nuradieva, A., Rodionova, N.A. and Neustroev, K.N.: (Polygalacturonase from *Geotrichum candidum* 3C: purification and properties). *Biokhimiya (Moscow)*, 57 (1992) 1855-1861.
- 3826 Hurst, M.O., Keenan, M.V. and Son, C.C.: Purification of lysozyme by linear salt gradient and SDS gel electrophoresis. *J. Chem. Educ.*, 69 (1992) 850-851; C.A., 118 (1993) 58916z.

- 3827 Ito, Y., Yamada, H., Nakamura, M., Yoshikawa, A., Ueda, T. and Imoto, T.: The primary structures and properties of non-stomach lysozymes of sheep and cow, and implication for functional divergence of lysozyme. *Eur. J. Biochem.*, 213 (1993) 649-658.
- 3828 Kengen, S.W.M., Luesink, E.J., Stams, A.J.M. and Zehnder, A.J.B.: Purification and characterization of an extremely thermostable  $\beta$ -glucosidase from the hyperthermophilic archaeon *Pyrococcus furiosus*. *Eur. J. Biochem.*, 213 (1993) 305-312.
- 3829 Kirsch, C., Kahlbrock, K. and Kombrink, E.: Purification and characterization of extracellular, acidic chitinase isoenzymes from elicitor-stimulated parsley cells. *Eur. J. Biochem.*, 213 (1993) 419-425.
- 3830 Kumagai, I., Maenaka, K., Sunada, F., Takeda, S. and Miura, K.-i.: Effects of subsite alterations on substrate-binding mode in the active site of hen egg-white lysozyme. *Eur. J. Biochem.*, 212 (1993) 151-156.
- 3831 Schmidhalter, D.R. and Canevascini, G.: Isolation and characterization of the cellobiose dehydrogenase from the brown-rot fungus *Coniophora puteana* (Schum ex Fr) Karst. *Arch. Biochem. Biophys.*, 300 (1993) 559-563.
- 3832 Schmidhalter, D.R. and Canevascini, G.: Purification and characterization of two exocellulobiohydrolases from the brown-rot fungus *Coniophora puteana* (Schum ex Fr) Karst. *Arch. Biochem. Biophys.*, 300 (1993) 551-558.
- 3833 Shea, E.M. and Hatfield, R.D.: Characterization of a pectic fraction from smooth bromegrass cell walls using an endopolygalacturonase. *J. Agric. Food Chem.*, 41 (1993) 380-387.
- 3834 Shibata, T., Tsuji, S., Kobayashi, K., Asai, Y., Honda, T., Noda, K., Iwaida, M., Mochizuki, E., Sugahara, O. and Ito, Y.: (Determination of lysozyme in various foodstuffs by high-performance liquid chromatography with fluorescence detector). *Jpn. J. Toxicol. Environ. Health*, 38 (1992) 437-442; *C.A.*, 118 (1993) 79556x.
- 3835 Tulsiani, D.R.P., Skudlarek, M.D., Nagdas, S.K. and Orgebin-Crist, M.-C.: Purification and characterization of rat epididymal-fluid  $\alpha$ -D-mannosidase: similarities to sperm plasma-membrane  $\alpha$ -D-mannosidase. *Biochem. J.*, 290 (1993) 427-436.
- 3836 Tuohy, M.G., Puls, J., ClaeysSENS, M., Vršanská, M. and Coughlan, M.P.: The xylan-degrading enzyme system of *Talaromyces emersonii*: novel enzymes with activity against aryl  $\beta$ -D-xilosides and unsubstituted xylyns. *Biochem. J.*, 290 (1993) 515-523.
- 3837 Yoshida, T., Inoue, T. and Ichishima, E.: 1,2- $\alpha$ -D-Mannosidase from *Penicillium citrinum*: molecular and enzymic properties of two isoenzymes. *Biochem. J.*, 290 (1993) 349-354.
- For additional information see *C.A.*:  
118 (1993) 34910s.
- See also 3805.
- 20f. Other hydrolases**
- 3838 Blair, H.C., Teitelbaum, S.L., Gross, L.E., Lacey, D.L., Tan, H.-L., McCourt, D.W. and Jeffrey, J.J.: Extracellular-matrix degradation at acid pH. Avian osteoclast acid collagenase isolation and characterization. *Biochem. J.*, 290 (1993) 873-884.
- 3839 Burton, N.P. and Lowe, C.R.: Design of novel affinity adsorbents for the purification of trypsin-like proteases. *J. Mol. Recognit.*, 5 (1992) 55-68; *C.A.*, 118 (1993) 96775k.
- 3840 Chikuma, T., Tanaka, W., Yamada, K., Ishii, Y., Tanaka, A. and Kato, T.: High-performance liquid chromatographic determination of PZ-peptidase activity. *J. Chromatogr.*, 635 (1993) 81-87.
- 3841 Czekay, G. and Bauer, K.: Identification of the thyrotropin-releasing-hormone-degrading ectoenzyme as a metallopeptidase. *Biochem. J.*, 290 (1993) 921-926.
- 3842 Doig, M.T. and Smiley, J.W.: Direct injection assay of angiotensin-converting enzyme by high-performance liquid chromatography using a shielded hydrophobic phase column. *J. Chromatogr.*, 613 (1993) 145-149.
- 3843 Felici, A., Amicosante, G., Oratore, A., Storm, R., Ledent, P., Joris, B., Fanuel, L. and Frere, J.-M.: An overview of the kinetic parameters of class of  $\beta$ -lactamases. *Biochem. J.*, 291 (1993) 151-155.
- 3844 Gan, Z.-R., Li, Y., Connolly, T.M., Sardana, M.K., Tsai, P.-K., Lewis, S.D. and Shafer, J.A.: Importance of the Arg-Gly-Asp triplet in human thrombin for maintenance of structure and function. *Arch. Biochem. Biophys.*, 301 (1993) 228-236.
- 3845 Hiraga, A., Hata, K., Suzuki, Y. and Tsuiki, S.: Identification of a rat liver protein-tyrosine phosphatase similar to human placental PTPase-1B using quantitatively phosphorylated protein substrates. *J. Biochem. (Tokyo)*, 113 (1993) 180-188.
- 3846 Huang, T.-F., Chang, M.-C., Peng, H.-C. and Teng, C.-M.: A novel  $\alpha$ -type fibrinogenase from *Agkistrodon rhodostoma* snake venom. *Biochim. Biophys. Acta*, 1160 (1992) 262-268.
- 3847 Knäuper, V., Osthus, A., DeClerck, Y.A., Langley, K.E., Bläser, J. and Tschesche, H.: Fragmentation of human polymorphonuclear-leucocyte collagenase. *Biochem. J.*, 291 (1993) 847-854.
- 3848 Lundblad, R.L., Tsai, J., Wu, H.-f., Jenzano, J.W., White, G.C., II and Connolly, T.M.: Hydrophobic affinity chromatography of human thrombin. *Arch. Biochem. Biophys.*, 302 (1993) 109-112.
- 3849 Mellor, G.W., Sreedharan, S.K., Kowlessur, D., Thomas, E.W. and Brocklehurst, K.: Catalytic-site characteristics of the porcine calpain II 80 kDa/18 kDa heterodimer revealed by selective reaction of its essential thiol group with two-hydronic-state time-dependent inhibitors: evidence for a catalytic site Cys/His interactive system and an ionizing modulatory group. *Biochem. J.*, 290 (1993) 75-83.
- 3850 Morel, F., Berthier, S., Guillot, M., Zaoui, P., Massoubre, C., Didier, F. and Vignais, P.V.: Human neutrophil gelatinase is a collagenase type IV. *Biochem. Biophys. Res. Commun.*, 191 (1993) 269-274.
- 3851 Ogawa, J., Shimizu, S. and Yamada, H.: N-Carbamoyl-D-amino acid amidohydrolase from *Corynebacterium* sp. E222c. Purification and characterization. *Eur. J. Biochem.*, 212 (1993) 685-691.
- 3852 Ohta, H., Sawabu, N., Kawakami, H., Watanabe, H., Ozaki, K., Toya, D. and Hattori, N.: Characterization of  $\gamma$ -glutamyltranspeptidase from human hepatocellular carcinoma, compared with enzymes from normal liver and cirrhotic liver. *Clin. Chim. Acta*, 214 (1993) 83-92.
- 3853 Oizumi, J. and Hayakawa, K.: Biocytin synthetase activity in human milk as assessed by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 156-160.
- 3854 Okamoto, Y., Otsuka-Fuchino, H., Horiuchi, S., Tamiya, T., Matsumoto, J.J. and Tsuchiya, T.: Purification and characterization of two metalloproteinases from squid mantle muscle, myosinase I and myosinase II. *Biochim. Biophys. Acta*, 1161 (1993) 97-104.

- 3855 Runser, S.M. and Meyer, P.C.: Purification and biochemical characterization of the hydantoin hydrolyzing enzyme from *Agrobacterium* species. A hydantoinase with no 5,6-dihydropyridine amidohydrolase activity. *Eur. J. Biochem.*, 213 (1993) 1315-1324.
- 3856 Rusu, I. and Yaron, A.: Aminopeptidase P from human leukocytes. *Eur. J. Biochem.*, 210 (1992) 93-100.
- 3857 Sawamura, T., Shimmi, O., Kishi, N., Sugita, Y., Yanagisawa, M., Goto, K., Masaki, T. and Kimura, S.: Characterization of phosphoramidon-sensitive metalloproteinases with endothelin-converting enzyme activity in porcine lung membrane. *Biochim. Biophys. Acta*, 1161 (1993) 295-302.
- 3858 Schnierer, S., Kleine, T., Gote, T., Hillemann, A., Knäuper, V. and Tschesche, H.: The recombinant catalytic domain of human neutrophil collagenase lacks type I collagen substrate specificity. *Biochem. Biophys. Res. Commun.*, 191 (1993) 319-326.
- 3859 Takahashi, A., Takayama, Y., Hatsuse, H. and Kawakami, M.: Presence of a serine protease in the complement-activating component of the complement-dependent bactericidal factor, RaRF, in mouse serum. *Biochem. Biophys. Res. Commun.*, 190 (1993) 681-687.
- 3860 Tamanoue, Y., Takahashi, T. and Takahashi, K.: Purification and characterization of two isoforms of serine proteinase from the microsomal membranes of rat liver. *J. Biochem. (Tokyo)*, 113 (1993) 229-235.
- 3861 Thakkar, J.K., Janero, D.R., Yarwood, C., Sharif, H. and Hreniuk, D.: Isolation and characterization of AMP deaminase from mammalian (rabbit) myocardium. *Biochem. J.*, 290 (1993) 335-341.
- 3862 Yokoyama, K., Ohmori, H. and Kumon, A.: Isolation of  $N^{\omega}$ -phosphoarginine hydrolase from rat liver and its physical properties. *J. Biochem. (Tokyo)*, 113 (1993) 236-240.
- 3863 Zhou, Y. and Lindberg, I.: Purification and characterization of the prohormone convertase PC1 (PC3). *J. Biol. Chem.*, 268 (1993) 5615-5623.

For additional information see C.A.:

118 (1993) 35135e.

See also 3302, 3512, 3735.

#### 20g. Lyases

- 3864 Allen, R.E., Lo, T.W.C. and Thornalley, P.J.: Purification and characterisation of glyoxalase II from human red blood cells. *Eur. J. Biochem.*, 213 (1993) 1261-1267.
- 3865 Harpel, M.R., Lee, E.H. and Hartman, F.C.: Anion-exchange analysis of ribulose-bisphosphate carboxylase/oxygenase reactions:  $\text{CO}_2/\text{O}_2$  specificity determination and identification of side products. *Anal. Biochem.*, 209 (1993) 367-374.
- 3866 Ishida, S., Muto, S. and Miyachi, S.: Structural analysis of periplasmic carbonic anhydrase 1 of *Chlamydomonas reinhardtii*. *Eur. J. Biochem.*, 214 (1993) 9-16.
- 3867 Klewes, L., Turley, E.A. and Prehm, P.: The hyaluronate synthase from a eukaryotic cell line. *Biochem. J.*, 290 (1993) 791-795.
- 3868 Pandey, K.N. and Kanungo, J.: Expression of extracellular ligand-binding domain of murine guanylate cyclase/atrial natriuretic factor receptor cDNA in *Escherichia coli*. *Biochim. Biophys. Res. Commun.*, 190 (1993) 724-731.

- 3869 Poulsen, C., Bongaerts, R.J.M. and Verpoorte, R.: Purification and characterization of anthranilate synthase from *Catharanthus roseus*. *Eur. J. Biochem.*, 212 (1993) 431-440.

- 3870 Spencer, P. and Jordan, P.M.: Purification and characterization of 5-aminolevulinic acid dehydratase from *Escherichia coli* and a study of the reactive thiols at the metal-binding domain. *Biochem. J.*, 290 (1993) 279-287.

- 3871 Vogt, T., Aebershold, R. and Ellis, B.: Purification and characterization of sinapine synthase from seeds of *Brassica napus*. *Arch. Biochem. Biophys.*, 300 (1993) 622-628.

For additional information see C.A.:

118 (1993) 119551a.

#### 20h. Isomerases

- 3872 Anderlucci, D. and Pedrini, A.M.: Structural similarities between *M. luteus* and *E. coli* DNA topoisomerase I. *Biochem. Biophys. Res. Commun.*, 192 (1993) 657-664.

- 3873 Hasumi, H. and Nishikawa, T.: Purification and properties of multiple molecular forms of yeast peptidyl prolyl *cis-trans* isomerase. *Biochim. Biophys. Acta*, 1161 (1993) 161-167.

- 3874 Onishi, Y., Azuma, Y. and Kizaki, H.: An assay method for DNA topoisomerase activity based on separation of relaxed DNA from supercoiled DNA using high-performance liquid chromatography. *Anal. Biochem.*, 210 (1993) 63-68.

#### 20i. Ligases

- 3875 Attwood, P.V., Johannsson, W., Chapman-Smith, A. and Wallace, J.C.: The existence of multiple tetrameric conformers of chicken liver pyruvate carboxylase and their roles in dilution inactivation. *Biochem. J.*, 290 (1993) 583-590.

- 3876 Biegert, T., Altenschmidt, U., Eckerskorn, C. and Fuchs, G.: Enzymes of anaerobic metabolism of phenolic compounds. 4-Hydroxybenzoate-CoA ligase from a denitrifying *Pseudomonas* species. *Eur. J. Biochem.*, 213 (1993) 555-561.

- 3877 Escalante, C. and Yang, D.C.H.: Expression of human aspartyl-tRNA synthetase in *Escherichia coli*. Functional analysis of the N-terminal putative amphiphilic helix. *J. Biol. Chem.*, 268 (1993) 6014-6023.

- 3878 Frolova, L.Y., Fleckner, J., Justesen, J., Timms, K.M., Tate, W.P., Kisseelev, L.L. and Haenni, A.-L.: Are the tryptophanyl-tRNA synthetase and the peptide-chain-release factor from higher eukaryotes one and the same protein? *Eur. J. Biochem.*, 212 (1993) 457-466.

See also 3778.

#### 20j. Complex mixtures and incompletely identified enzymes

- 3879 Aguilar, M., Cárdenas, J. and Fernández, E.: Quantitation of molybdopterin oxidation product in wild-type and molybdenum cofactor deficient mutants. *Biochim. Biophys. Acta*, 1160 (1992) 269-274.

- 3880 Stott, K., Saito, K., Thiele, D.J. and Massey, V.: Old Yellow Enzyme. The discovery of multiple isozymes and a family of related proteins. *J. Biol. Chem.*, 268 (1993) 6097-6106.

21. PURINES, PYRIMIDINES, NUCLEIC ACIDS AND THEIR CONSTITUENTS
- 21a. *Purines, pyrimidines, nucleosides, nucleotides*
- 3881 Basiuk, V.A. and Chuiko, A.A.: Selectivity of bonded stationary phases containing uracil derivatives for liquid chromatography of nucleic acid components. *J. Chromatogr. Sci.*, 31 (1993) 120-126.
- 3882 Bontemps, F., Vincent, M.F. and van den Berghe, G.: Mechanisms of elevation of adenosine levels in anoxic hepatocytes. *Biochem. J.*, 290 (1993) 671-677.
- 3883 Braz Vieira da Silva Pontes, Z., Vincent-Viry, M., Gueguen, R., Galteau, M.M. and Siest, G.: Acetylation phenotypes and biological variation in a French Caucasian population. *Eur. J. Clin. Chem. Clin. Biochem.*, 31 (1993) 59-68.
- 3884 Candito, M., Cavenel, C., Gugenheim, J., Mouiel, J., Parisot, F., Jacomet, Y., Sudaka, P. and Chambon, P.: Simple column liquid chromatographic assay for serum neopterin. *J. Chromatogr.*, 614 (1993) 164-168.
- 3885 Carmichael, P.L., Platt, K.L., Shé, M.N., Lecoq, S., Oesch, F., Phillips, D.H. and Grover, P.L.: Evidence for the involvement of a bis-diol-epoxide in the metabolic activation of dibenz[a,h]anthracene to DNA-binding species in mouse skin. *Cancer Res.*, 53 (1993) 944-948.
- 3886 Cumin, F., Asselbergs, F., Lartigot, M. and Felder, E.: Modulation of human prorenin gene expression by antisense oligonucleotides in transfected CHO cells. *Eur. J. Biochem.*, 212 (1993) 347-354.
- 3887 Ersoz, M., Yildiz, S. and Pehlivan, E.: Separation of nucleosides and nucleic-acid bases by ligand-exchange chromatography using Cu<sup>2+</sup>- and Ni<sup>2+</sup>-loaded glyoximated diaminosporopollenin derivatives. *J. Chromatogr. Sci.*, 31 (1993) 61-63.
- 3888 Feito, I., Fernandez, B., Centeno, M.L. and Rodriguez, A.: Use of high-performance liquid chromatography (HPLC) for analysis of natural and synthetic cytosinins. *Tec. Lab.*, 14 (1992) 674-677; *C.A.*, 118 (1993) 120139d.
- 3889 Hendale, J., Bückmann, A.F., Aehle, W., Schomburg, D. and Schmid, R.D.: Structure/activity relationship of adenine-modified NAD derivatives with respect to porcine heart lactate dehydrogenase isozyme H<sub>4</sub> simulated with molecular mechanics. *Eur. J. Biochem.*, 213 (1993) 947-956.
- 3890 Hicks, M., Wong, L.S. and Day, R.O.: Suitability of reverse-phase columns from different sources for separation of uric acid from its oxidation products. *Anal. Biochem.*, 210 (1993) 428-430.
- 3891 Hwang, I.Y. and Elfarra, A.A.: Detection and mechanisms of formation of S-(6-purinyl) glutathione and 6-mercaptopurine in rats given 6-chloropurine. *J. Pharmacol. Exp. Ther.*, 264 (1993) 41-46.
- 3892 Inaki, Y., Matsukawa, K., Wang, H., Mochizuki, E., Wada, T. and Takemoto, K.: (High-performance liquid chromatographic separation of oligonucleotides using deoxyadenosine immobilized on silica gel as stationary phase). *Bunseki Kagaku*, 42 (1993) 99-105; *C.A.*, 118 (1993) 142745a.
- 3893 Kiehlbauch, C.C., Aboul-Ela, N., Jacobson, E.L., Ringer, D.P. and Jacobson, M.K.: High resolution fractionation and characterization of ADP-ribose polymers. *Anal. Biochem.*, 208 (1993) 26-34.
- 3894 Lemaire, D.G.E. and Ruzsicska, B.P.: Kinetic analysis of the deamination reactions of cyclobutane dimers of thymidylyl-3',5'-2'-deoxycytidine and 2'-deoxycytidyl-3',5'-thymidine. *Biochemistry*, 32 (1993) 2525-2533.
- 3895 Löw, A., Sprinzl, M. and Limmer, S.: Nucleotide binding and GTP hydrolysis by the 21-kDa product of the C-H-ras gene as monitored by proton-NMR spectroscopy. *Eur. J. Biochem.*, 213 (1993) 781-788.
- 3896 Lux, O., Naidoo, D. and Saloniakas, C.: Improved HPLC method for the simultaneous measurement of allantoin and uric acid in plasma. *Ann. Clin. Biochem.*, 29 (1992) 674-675; *C.A.*, 118 (1993) 76369c.
- 3897 Mikšík, I., Hodný, Z. and Deyl, Z.: Chromatographic separation of glycated nucleotides. *J. Chromatogr.*, 612 (1993) 57-61.
- 3898 Mohri, K., Takeuchi, K., Shinozuka, K., Bjur, R.A. and Westfall, D.P.: Simultaneous determination of nerve-induced adenine nucleotides and nucleosides released from rabbit pulmonary artery. *Anal. Biochem.*, 210 (1993) 262-267.
- 3899 Ortiz, B., Sillero, A. and Sillero, M.A.G.: Specific synthesis of adenosine(5')tetraphospho(5')nucleoside and adenosine(5')oligophospho(5')adenosine (n4) catalyzed by firefly luciferase. *Eur. J. Biochem.*, 212 (1993) 263-270.
- 3900 Pane, F., Intrieri, M., Calzagno, G., Izzo, E., Liberti, A., Salvatore, F. and Sacchetti, L.: Diagnostic and discriminatory efficiency of eight serum modified nucleosides in HIV infection and in at-risk subjects. *J. Liq. Chromatogr.*, 16 (1993) 1229-1248.
- 3901 Prpic, V., Uhing, R.J. and Gettys, T.W.: Separation and assay of phosphodiesterase isoforms in murine peritoneal macrophages using membrane matrix DEAE chromatography and [<sup>32</sup>P]cAMP. *Anal. Biochem.*, 208 (1993) 155-160.
- 3902 Rotllan, P., Liras, A. and Llorente, P.: Salvage and interconversion of purines in developing *Artemia*. *Biochim. Biophys. Acta*, 1156 (1993) 128-134.
- 3903 Servilio, L., Balestrieri, C., Quagliuolo, L., Iorio, E.L. and Giovanelli, A.: tRNA Fluorescent labeling at 3' end inducing an aminoacyl-tRNA-like behavior. *Eur. J. Biochem.*, 213 (1993) 583-589.
- 3904 Slama, J.T., Simmons, A.M., Hernandez, T.M. and Keenan, R.W.: Synthesis of [<sup>35</sup>S]thiophosphoryl adenylic acid, utilizing a general procedure for [<sup>35</sup>S]thiophosphoryl chloride production. *Anal. Biochem.*, 209 (1993) 143-149.
- 3905 Taylor, C., Ford, K., Connolly, B.A. and Hornby, D.P.: Determination of the order of substrate addition to Mspl DNA methyltransferase using a novel mechanism-based inhibitor. *Biochem. J.*, 291 (1993) 493-504.
- 3906 Van Gennip, A.H., Busch, S., Elzinga, L., Stroomer, A.E.M., van Cruchten, A., Scholten, E.G. and Abeling, N.G.G.M.: Application of simple chromatographic methods for the diagnosis of defects in pyrimidine degradation. *Clin. Chem. (Winston-Salem)*, 39 (1993) 380-385 - a review with 20 refs.
- 3907 Yildiz, S., Pehlivan, E., Ersoz, M. and Pehlivan, M.: Ligand-exchange chromatography of nucleosides and nucleic-acid bases on a novel modified Co(II)-loaded *Lycopodium clavatum* and kinetics in the resin. *J. Chromatogr. Sci.*, 31 (1993) 150-152.

For additional information see C.A.:  
118 (1993) 35255u, 120161e.

See also 3102, 3124, 3298, 3489, 3774, 3910, 3917, 3927, 3971, 4314, 4318, 4320, 4332, 4335, 4368.

## 21b. Nucleic acids, RNA

- 3908 Cusick, M.E.: Purification of ribonucleoproteins by a novel approach: isolation of the SSB1 ribonucleoprotein from yeast and demonstration that it has no role in mRNA splicing. *Biochim. Biophys. Acta*, 1171 (1992) 176-186.
- 3909 Gaus, H., Lipford, G.B., Wagner, H. and Heeg, K.: Quantitative analysis of lymphokine mRNA expression by a nonradioactive method using PCR and anion exchange chromatography. *J. Immunol. Methods*, 158 (1993) 229-236; C.A., 118 (1993) 145371m.
- 3910 Itoh, H., Kinoshita, T. and Nimura, N.: High performance liquid chromatography of nucleic acids and related compounds on a fluorinated silica gel column. *Nucleic Acids Symp. Ser.*, 27(Nineteenth Symposium on Nucleic Acids Chemistry, 1992) (1992) 27-28; C.A., 118 (1993) 142739b.
- 3911 Xue, H., Shen, W. and Wong, J.T.-F.: Purification of hyperexpressed *Bacillus subtilis* tRNA<sup>Trp</sup> cloned in *Escherichia coli*. *J. Chromatogr.*, 613 (1993) 247-255.

See also 3914.

## 21c. Nucleic acids, DNA

- 3912 Brown, T. and Brown, D.J.S.: Purification of synthetic DNA. *Methods Enzymol.*, 211(DNA Struct., Pt. A) (1992) 20-35; C.A., 118 (1993) 35270v.
- 3913 Coto, E., Hugli, T.E., Ye, R.D. and DiScipio, R.G.: A preparation of  $\lambda$  phage DNA based on affinity chromatography. *Anal. Biochem.*, 209 (1993) 199-201.
- 3914 Jansen, C.: (Separation of biopolymers). *Chem. Mag. (Ghent)*, 18 (1992) 10-12; C.A., 118 (1993) 55299q - a review with no refs.
- 3915 Povinelli, C.M. and Gibbs, R.A.: Large-scale sequencing library production: an adaptor-based strategy. *Anal. Biochem.*, 210 (1993) 16-26.
- 3916 Yu, X., Chung, M., Morabito, M.A. and Barnstable, C.J.: Shared nuclear protein binding sites in the upstream region of the rat opsin gene. *Biochem. Biophys. Res. Commun.*, 191 (1993) 76-82.

See also 3874, 3918.

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

- 3917 Box, H.C., Budzinski, E.E., Evans, M.S., French, J.B. and Maccubbin, A.E.: The differential lysis of phosphoester bonds by nuclease P1. *Biochim. Biophys. Acta*, 1161 (1993) 291-294.
- 3918 Polverelli, M., Berger, M., Odin, F. and Cadet, J.: Simple chromatographic systems permitting both DNA purification and separation of 2'-deoxyribonucleoside 3'-monophosphates as substrates for  $^{32}$ P-postlabelling studies. *J. Chromatogr.*, 613 (1993) 257-265.
- 3919 Tsurui, H., Kishimoto, T., Sanokawa, R. and Shirai, T.: Precise discrimination among homologous sequences by DNA probe column chromatography. *Nucleic Acids Symp. Ser.*, 25(Symp. Nucleic Acids Chem., 18th, 1991) (1991) 39-40; C.A., 118 (1993) 53192a.

## 21f. Complex mixtures of nucleic acids and their fragments

- 3920 Baba, Y., Sumita, C., Hide, K., Ishimaru, N., Samata, K., Tanaka, A. and Tsuhako, M.: Separation of DNA fragments by high-performance liquid chromatography and capillary electrophoresis. *J. Liq. Chromatogr.*, 16 (1993) 955-965.

See also 3908.

## 22. ALKALOIDS

- 3921 Campíns-Falcó, P., Herráez-Hernández, R. and Sevillano-Cabeza, A.: Determination of caffeine in human urine samples free of the interference of its metabolites by reversed-phase liquid chromatography using solid-phase extraction from sample clean-up. *J. Liq. Chromatogr.*, 16 (1993) 1297-1314.
- 3922 Chaulet, J.-F., Robet, Y., Prevosto, J.-M., Soares, O. and Brazier, J.-L.: Simultaneous determination of chloroquine and quinine in human biological fluids by high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 303-310.
- 3923 De Groot, A.N.J.A., Vree, T.B., Hekster, Y.A., Baars, A.M., van den Biggelaar-Martea, M. and van Dongen, P.W.J.: High-performance liquid chromatography of ergometrine and preliminary pharmacokinetics in plasma of men. *J. Chromatogr.*, 613 (1993) 158-161.
- 3924 Dechelotte, P., Sabouraud, A., Sandouk, P., Hackbarth, I. and Schwenk, M.: Uptake, 3-, and 6-glucuronidation of morphine in isolated cells from stomach, intestine, colon, and liver of the guinea pig. *Drug Metab. Disp.*, 21 (1993) 13-17.
- 3925 Demetriou, D., Rustemeier, K., Voncken, P. and Schepers, G.: Two radiochromatographic high-pressure liquid chromatography methods for the determination of nicotine metabolites. *Med. Sci. Res.*, 20 (1992) 873-875; C.A., 118 (1993) 53691n.
- 3926 Domino, E.F., Hariharan, M., VanNoord, T. and Demana, T.: Current experience with HPLC and GC-MS analyses of nicotine and cotinine. *Med. Sci. Res.*, 20 (1992) 859-860; C.A., 118 (1993) 53690m.
- 3927 Eugster, H.-P., Probst, M., Würgler, F.E. and Sengstag, C.: Caffeine, estradiol, and progesterone interact with human CYP1A1 and CYP1A2. Evidence from cDNA-direct expression in *Saccharomyces cerevisiae*. *Drug Metab. Disp.*, 21 (1993) 43-49.
- 3928 Hallock, Y.F., Lu, H.S.M., Clardy, J., Strobel, G.A., Sugawara, F., Samsoedin, R. and Yoshida, S.: Triticones, spirocyclic lactams from the fungal plant pathogen *Drechslera tritici-repentis*. *J. Natural Prod.*, 56 (1993) 747-754.
- 3929 Hampe, T.R.E., Schlüter, J., Brandt, K.H., Nagel, J., Lamarter, E. and Blaschke, G.: Rapid and complete chiral chromatographic separation of racemic quaternary tropane alkaloids. Complementary use of a cellulose-based chiral stationary phase in reversed-phase and normal-phase modes - a mechanistic study. *J. Chromatogr.*, 634 (1993) 205-214.
- 3930 Lin, L.A.: Detection of alkaloids in foods with a multi-detector high-performance liquid chromatographic system. *J. Chromatogr.*, 632 (1993) 69-78.
- 3931 Ma, P. and Wu, C.Y.: (Determination of plasma level and pharmacokinetic parameters of anisodamine by micellar liquid chromatography). *Yaoxue Xuebao*, 27 (1992) 763-767; C.A., 118 (1993) 93691u.

- 3932 McCalley, D.V.: Evaluation of reversed-phase columns for the analysis of very basic compounds by high-performance liquid chromatography. *J. Chromatogr.*, 636 (1993) 213-220.
- 3933 Mellini, D.W., Caporaso, N.E. and Issaq, H.J.: Determination of the caffeine metabolite AFMU in human urine by column switching HPLC. *J. Liq. Chromatogr.*, 16 (1993) 1419-1426.
- 3934 Moore, C., Browne, S., Tebbett, I., Negrusz, A., Meyer, W. and Jain, L.: Determination of cocaine and benzoyllecgonine in human amniotic fluid using high flow solid-phase extraction columns and HPLC. *Forensic Sci. Int.*, 56 (1992) 177-181; C.A., 118 (1993) 74881q.
- 3935 Moubarak, A.S., Piper, E.L., West, C.P. and Johnson, Z.B.: Interaction of purified ergovaline from endophyte-infected tall fescue with synaptosomal ATPase enzyme system. *J. Agric. Food Chem.*, 41 (1993) 407-409.
- 3936 Nagy, E., Benko, S. and Klebovich, I.: Determination and validation of theophylline by high-performance liquid chromatography in human plasma. *Acta Pharm. Hung.*, 61 (1991) 169-175; C.A., 118 (1993) 93705b.
- 3937 Nowicky, W., Han, L.F., Nowicky, W., Gutmann, V. and Linert, W.: Reversed-phase liquid chromatography of alkaloids: masking effects of inorganic salts. *Talanta*, 39 (1992) 1437-1442; C.A., 118 (1993) 115961m.
- 3938 Papadogiannis, I.N., Samanidou, V.F., Theoridis, G.A., Vasiliotis, G.S., van Kempen, G.J.M. and Beelen, G.M.: A simple and quick solid phase extraction and reversed phase HPLC analysis of some tropane alkaloids in feedstuffs and biological samples. *J. Liq. Chromatogr.*, 16 (1993) 975-998.
- 3939 Pedras, M.S.C. and Taylor, J.L.: Metabolism of the phytoalexin brassinin by the "blackleg" fungus. *J. Natural Prod.*, 56 (1993) 731-738.
- 3940 Rop, P.P., Grimaldi, F., Oddoze, C. and Viala, A.: Determination of nicotine and its main metabolites in urine by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 302-309.
- 3941 Rustemeier, K., Demetriou, D., Schepers, G. and Voncken, P.: High-performance liquid chromatographic determination of nicotine and its urinary metabolites via their 1,3-diethyl-2-thiobarbituric acid derivatives. *J. Chromatogr.*, 613 (1993) 95-103.
- 3942 Speisky, H., Cassels, B.K., Nieto, S., Valenzuela, A. and Nuñez-Vergara, L.J.: Determination of boldine in plasma by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 315-319.
- 3943 Supko, J.G. and Malspeis, L.: Liquid chromatographic analysis of 9-aminocamptothecin in plasma monitored by fluorescence induced upon postcolumn acidification. *J. Liq. Chromatogr.*, 15 (1992) 3261-3263.
- 3944 Wielbo, D., Bhat, R., Chari, G., Vidyasagar, D., Tebbett, I.R. and Gulati, A.: High-performance liquid chromatographic determination of morphine and its metabolites in plasma using diode-array detection. *J. Chromatogr.*, 615 (1993) 164-168.
23. OTHER SUBSTANCES CONTAINING HETEROCYCLIC NITROGEN
- 23a. *Porphyrins and other pyrroles*
- 3945 Margaron, P., Gaspard, S. and van Lier, J.E.: Chromatographic analysis of asymmetric sulphophthalocyanines using a diode-array detector. *J. Chromatogr.*, 634 (1993) 57-64.
- 3946 Miyoshi-Akiyama, T., Hayashi, M. and Unemoto, T.: Purification and properties of cytochrome bo-type ubiquinol oxidase from a marine bacterium *Vibrio alginolyticus*. *Biochim. Biophys. Acta*, 1141 (1993) 283-287.
- 3947 Tsukahara, S., Saitoh, K. and Suzuki, N.: Modification of reversed-phase liquid chromatographic retention characteristics for metal-tetraphenylporphyrin complexes using octane as a mobile phase additive. *J. Chromatogr.*, 634 (1993) 138-142.
- 23b. *Bile pigments*
- 3948 Yin, H., Wu, J. and Liang, W.: (RP-HPLC determination of bilirubin isomers). *Yaowu Fenxi Zazhi*, 12 (1992) 338-340; C.A., 118 (1993) 142720p.
- 23c. *Indole derivatives and plant hormones (gibberellins)*
- 3949 Ademola, J.I., Wester, R.C. and Maibach, H.I.: Metabolism of 3-indolylacetic acid during percutaneous absorption in human skin. *J. Pharm. Sci.*, 82 (1993) 150-154.
- 3950 Herranz, T., Huang, Z. and Ough, C.S.: 1,2,3,4-Tetrahydro- $\beta$ -carboline-3-carboxylic acid and 1-methyl-1,2,3,4-tetrahydro- $\beta$ -carboline-3-carboxylic acid in wines. *J. Agric. Food Chem.*, 41 (1993) 455-459.
- 3951 Ishida, I., Iizuka, R. and Yamaguchi, M.: High-performance liquid chromatographic determination of 5-hydroxyindoles by post-column fluorescence derivatization. *Analyst (London)*, 118 (1993) 165-169.
- 3952 Kobzar', E.F. and Serdyuk, O.P.: (High-performance liquid chromatography in the analyses of auxins). *Biokhimiya (Moscow)*, 58 (1993) 50-61.
- 3953 Moritz, T., Schneider, G. and Jensen, E.: Capillary liquid chromatography/fast atom bombardment mass spectrometry of gibberellin glucosyl conjugates. *Biol. Mass Spectrom.*, 2 (1992) 554-559; C.A., 118 (1993) 3347.
- 3954 Murofushi, N., Yang, Y.Y., Yamaguchi, I., Schneider, G. and Kato, Y.: Liquid chromatography/atmospheric pressure chemical ionization mass spectrometry of gibberellin conjugates. *Curr. Plant Sci., Biotechnol. Agric.*, 13(Prog. Plant Growth Regul.) (1992) 900-904; C.A., 118 (1993) 120358z.
- 3955 Paolillo, M., Preda, S., Corona, G.L. and Schinelli, S.: Measurement of 5-hydroxytryptamine and 5-hydroxyindoleacetic acid in cultured rat mesencephalic neurons by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 613 (1993) 231-237.

For additional information see C.A.:

118 (1993) 35254t, 109469r, 109845k.

See also 4372, 4373, 4374.

See also 3462, 3463, 3486, 3939.

## 23d. Pyridine derivatives

- 3956 Mueller, H.: HPLC methods for the residue analysis of the nitrification inhibitor nitrapyrin (N-Serve) and its metabolite 6-chloropicolinic acid in crops. *Agribiol. Res.*, 45 (1992) 97-102; C.A., 118 (1993) 100577s.

See also 3118, 3332.

## 23e. Other N-heterocyclic compounds

- 3957 Cashaw, J.L.: Determination of tetrahydropapaveroline in the urine of Parkinsonian patients receiving L-dopa-carbidopa (Sinemet) therapy by high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 267-273.
- 3958 Schneiderka, P., Pacáková, V., Šulík, K., Kloudová, M. and Jelinková, K.: High-performance liquid chromatographic determination of creatinine in serum, and a correlation of the results with those of the Jaffé and enzymic methods. *J. Chromatogr.*, 614 (1993) 221-226.

See also 3890.

## 24. ORGANIC SULPHUR COMPOUNDS (INCL. GLUCOSINOLATES)

- 3959 Atwood, S.E.: Identification of sulphonation byproducts by ion chromatography. U.S. US 5,133,868 (Cl. 210-656; B01D15/08), 28 Jul. 1992, Appl. 773,383, 07 Oct. 1991; 6 p.; C.A., 118 (1993) 115911v.
- 3960 Dizdar, N., Kaagedal, B., Smeds, S. and Aastrand, K.: A high-sensitivity fluorometric high-performance liquid chromatographic method for determination of glutathione and other thiols in cultured melanoma cells, microdialysis samples from melanoma tissue, and blood plasma. *Melanoma Res.*, 1 (1991) 33-42; C.A., 118 (1993) 120131v.
- 3961 Patti, A., Morrone, R., Chillemi, R., Piattelli, M. and Sciuto, S.: Thetines and betaines of the red alga *Digenea simplex*. *J. Natural Prod.*, 56 (1993) 432-435.
- 3962 Saito, Y. and Chikuma, M.: Chromatographic analysis of the reaction between thiosalicyl acid and sealecious acid in methanol. *J. Chromatogr.*, 635 (1993) 71-74.
- 3963 Simonzadeh, N.: Ion chromatographic method for the simultaneous determination of trifluoromethanesulfonic acid and trifluoroacetic acid. *J. Chromatogr.*, 634 (1993) 125-128.
- 3964 Steenkamp, D.J.: Simple methods for the detection and quantification of thiols from *Crithidia fasciculata* and for the isolation of trypanothione. *Biochem. J.*, 292 (1993) 295-301.
- 3965 Swart, P.J. and de Zeeuw, R.A.: Pharmacokinetics of the dopamine D2 agonist S(-)-2-(N-propyl-N-2-thienylethylamino)-5-hydroxytetralin in freely moving rats. *J. Pharm. Sci.*, 82 (1993) 200-203.
- 3966 Van der Hage, E.R.E., van Loon, W.M.G.M., Boon, J.J., Lingeman, H. and Brinkman, U.A.T.: Combined high-performance aqueous size-exclusion chromatographic and pyrolysis-gas chromatographic-mass spectrometric study of lignosulphonates in pulp mill effluents. *J. Chromatogr.*, 634 (1993) 263-271.

- 3967 Wilder, D.R., Tindall, G.W., Cunningham, L.J. and Little, J.L.: High-performance liquid chromatographic analysis of sulfonated aromatics using a  $\beta$ -cyclodextrin-bonded phase. *J. Chromatogr.*, 635 (1993) 221-226.

For additional information see C.A.:  
118 (1993) 115983v.

See also 3066, 3455, 3469, 3945.

## 25. ORGANIC PHOSPHORUS COMPOUNDS (INCL. SUGAR PHOSPHATES)

- 3968 Ambrosio, S., de Oliveira, J.R. and Bartrons, R.: HPLC analysis of hexosamine phosphates in biological samples. *J. Biochem. Biophys. Methods*, 25 (1992) 237-244; C.A., 118 (1993) 76375b.
- 3969 Ben-Yoseph, O., Sparkes, M.J. and Dixon, H.B.F.: A rapid spectrophotometric estimation of individual phosphates and phosphonates: its application to chromatography of sugar phosphates and their phosphonate analogues. *Anal. Biochem.*, 210 (1993) 195-198.
- 3970 Burdge, G.C., Kelly, F.J. and Postle, A.D.: Synthesis of phosphatidylcholine in guinea-pig fetal lung involves acyl remodelling and differential turnover of individual molecular species. *Biochim. Biophys. Acta*, 1166 (1993) 251-257.
- 3971 Chen, P. and Du, H.: (Determination of the apparent stability constants of magnesium adenosine triphosphate and magnesium adenosine diphosphate by high performance liquid chromatography). *Sepu*, 11 (1993) 45-47; C.A., 118 (1993) 120160d.
- 3972 Deng, Z., Zhang, J.Z., Ellis, A.B. and Langer, S.H.: Catalytic oxidation of triphenyl phosphite with ferric ion-modified chromatographic silica. *J. Liq. Chromatogr.*, 16 (1993) 1083-1103.
- 3973 Gerwiss, P.: Modification of a competitive protein binding assay for determination of inositol 1,4,5-trisphosphate. *Anal. Biochem.*, 210 (1993) 45-49.
- 3974 Lin, B.Z., Yin, C.C. and Hauser, H.: The effect of positive and negative pH-gradients on the stability of small unilamellar vesicles of negatively charged phospholipids. *Biochim. Biophys. Acta*, 1147 (1993) 237-244.
- 3975 Offer, J., Metcalfe, J.C. and Smith, G.A.: The uptake of  $^3\text{H}$ -labelled monodeoxyfluoro-myoinositol into thymocytes and their incorporation into phospholipid in permeabilized cells. *Biochem. J.*, 291 (1993) 553-560.
- 3976 Xing, C., Zhou, J., Liao, J. and Liu, Y.: (Determination of phosphatidylcholine and phosphatidylserine in the membrane of rat lung by high performance liquid chromatography). *Sepu*, 10 (1992) 374-375; C.A., 118 (1993) 35268a.

See also 3377, 3387, 3469, 3501, 3553, 3557, 3783, 3865.

## 26. ORGANOMETALLIC AND RELATED COMPOUNDS

## 26a. Organometallic compounds

- 3977 Astruc, M., Astruc, A. and Pinel, R.: Speciation of butyltin compounds by on line HPLC-ETAAS. *Microchim. Acta*, 109 (1992) 83-86; C.A., 118 (1993) 72885v.
- 3978 Careri, M., Mori, G., Predieri, G., Souza de Rezende, N. and Sappa, E.: High-performance liquid chromatography of trinuclear ruthenium acetylido-carbonyl compounds. *J. Chromatogr.*, 634 (1993) 143-148.
- 3979 Hasunuma, R., Ogawa, T. and Kawanishi, Y.: Analysis of selenium metabolites in human urine using ion-exchange chromatography. *Bull. Environ. Contam. Toxicol.*, 50 (1993) 19-23; C.A., 118 (1993) 74874q.
- 3980 Matsuda, R., Suzuki, T. and Saito, Y.: Metabolism of tri-*n*-butyltin chloride in male rats. *J. Agric. Food Chem.*, 41 (1993) 489-495.

See also 3469, 4401, 4435.

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

- 3981 Plešek, J., Grüner, B., Vaněk, T. and Votavová, H.: Chiral resolution of enantiomers of asymmetric cobaltacarboranes with a monoatomic bridge between ligands by liquid chromatography on a  $\beta$ -cyclodextrin column. *J. Chromatogr.*, 633 (1993) 73-80.

## 26c. Coordination compounds

- 3982 Janos, P.: Separation of some metals as their anionic oxalate complexes by reversed-phase ion-interaction chromatography. *J. Chromatogr.*, 635 (1993) 257-263.
- 3983 Nakajima, K., Ohta, M., Yazaki, H. and Nakazawa, H.: High-performance liquid chromatographic determination of zinc pyrithione in antidandruff shampoos using on-line copper chelate formation. *J. Liq. Chromatogr.*, 16 (1993) 487-496.
- 3984 Timerbaev, A.R., Tsoi, I.G. and Petrukhin, O.M.: (Liquid chromatography of metal chelates. Evaluation of retention parameters by using molecular connectivity). *Zh. Anal. Khim.*, 47 (1992) 858-864; C.A., 118 (1993) 115763y.
- 3985 Yamagishi, A., Makino, H., Nakamura, Y. and Sato, H.: Separation of isomers of cobalt(III) complexes by liquid chromatography on a column packed with a clay-ruthenium(II) complex adduct. *Clays Clay Miner.*, 40 (1992) 359-361; C.A., 118 (1993) 115765a.
- 3986 Zhang, X.-X., Wang, M.-S. and Cheng, J.-K.: Effects of ion-pair ions on retention behaviors of metal complexes. *J. Liq. Chromatogr.*, 16 (1993) 1057-1068.
- 3987 Zhao, Y. and Fu, C.: (Metal chelation systems in high performance liquid chromatography). *Hebei Daxue Xuebao, Ziran Kexueban*, 10 (1990) 81-88; C.A., 118 (1993) 115685z - a review with 50 refs.

See also 4342, 4368, 4409, 4416, 4428, 4432.

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

- 3988 Bosset, J.O., Buetikofer, U., Fuchs, D., Imhof, M.I., Tagliaferri, E., Marchiando, C. and Bruttel, P.: (Overview and comparison of some titrimetric and HPLC methods for the determination of ascorbic and dehydroascorbic acids in milk). *Mitt. Geb. Lebensmittelunters. Hyg.*, 83 (1992) 173-196; C.A., 118 (1993) 37650t.
- 3989 Brawand, F. and Walter, P.: (Determination of vitamin D in foods). *Mitt. Geb. Lebensmittelunters. Hyg.*, 83 (1992) 270-278; C.A., 118 (1993) 146312e.
- 3990 Chase, G.W., Jr., Landen, W.O., Jr., Soliman, A.-G.M. and Eitzenmiller, R.R.: Liquid chromatographic analysis of niacin in fortified food products. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 390-393.
- 3991 De Antonis, K.M., Brown, P.R., Yi, Z. and Maugle, P.D.: High-performance liquid chromatography with ion pairing and electrochemical detection for the determination of the stability of two forms of vitamin C. *J. Chromatogr.*, 632 (1993) 91-96.
- 3992 De Leenheer, A.P. and Nelis, H.J.: Profiling and quantitation of carotenoids by high-performance liquid chromatography and photodiode array detection. *Methods Enzymol.*, 213(Carotenoids, Pt. A) (1992) 251-265; C.A., 118 (1993) 142723s.
- 3993 Dejager, S., Bruckert, E. and Chapman, M.J.: Dense low density lipoprotein subspecies with diminished oxidative resistance predominate in combined hyperlipidemia. *J. Lipid Res.*, 34 (1993) 295-308.
- 3994 Demoz, A., Netteland, B., Svardal, A., Mansoor, M.A. and Berge, R.K.: Separation and detection of tissue CoASH and long-chain acyl-CoA by reversed-phase high-performance liquid chromatography after precolumn derivatization with monobromobimane. *J. Chromatogr.*, 635 (1993) 251-256.
- 3995 Edmonds, B.K. and Nierenberg, D.W.: Serum concentrations of retinol,  $d$ - $\alpha$ -tocopherol and  $\beta$ -carotene: effects of storage at -70°C for five years. *J. Chromatogr.*, 614 (1993) 169-174.
- 3996 Finglas, P.M., Faure, U. and Southgate, D.A.T.: First BCR-intercomparison on the determination of folates in food. *Food Chem.*, 46 (1993) 199-213; C.A., 118 (1993) 37691g.
- 3997 Francis, G.W.: Preparative high-performance liquid chromatography of carotenoids. *Methods Enzymol.*, 213(Carotenoids, Pt. A) (1992) 246-250; C.A., 118 (1993) 142722r.
- 3998 Franke, A.A., Custer, L.J. and Cooney, R.V.: Synthetic carotenoids as internal standards for plasma micronutrient analyses by high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 43-57.
- 3999 Fukuda, A., Mazda, T., Gyure, W.L., Iino, T., Harada, H., Yakura, M., Kamitsukasa, H., Ohbayashi, A., Oka, T. and Tsusue, M.: A comparative study of urinary xanthopterin and neopterin in liver diseases. *Eur. J. Clin. Chem. Clin. Biochem.*, 31 (1993) 129-134.
- 4000 Gauch, R., Leuenberger, U. and Mueller, U.: (Determination of the water-soluble vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, and B<sub>12</sub> in milk by HPLC). *Z. Lebensm.-Unters. Forsch.*, 195 (1992) 312-315; C.A., 118 (1993) 37675e.
- 4001 Handelman, G.J., Shen, B. and Krinsky, N.I.: High resolution analysis of carotenoids in human plasma by high-performance liquid chromatography. *Methods Enzymol.*, 213(Carotenoids, Pt. A) (1992) 336-346; C.A., 118 (1993) 142724t.

- 4002 Harapanhalli, R.S., Howell, R.W. and Rao, D.V.: Testicular and plasma ascorbic acid levels in mice following dietary intake: a high-performance liquid chromatographic analysis. *J. Chromatogr.*, 614 (1993) 233-243.
- 4003 Ito, M., Katsuta, Y., Koyama, M., Murakami, M., Iwaki, N., Okano, A. and Tsukida, K.: Optical resolution of ( $\pm$ )-all-trans-3-hydroxyretinal by use of high-performance liquid chromatography. *J. Nutr. Sci. Vitaminol.*, 38 (1992) 111-115; C.A., 118 (1993) 81197z.
- 4004 Kawasaki, T.: Vitamin B<sub>1</sub>: thiamin. *Chromatogr. Sci.*, 60(Mod. Chromatogr. Anal. Vitam., 2nd ed.) (1992) 319-354; C.A., 118 (1993) 55295k - a review with 120 refs.
- 4005 Lambert, W.E. and de Leenheer, A.P.: Vitamin K. *Chromatogr. Sci.*, 60(Mod. Chromatogr. Anal. Vitam., 2nd ed.) (1992) 197-233; C.A., 118 (1993) 55292g - a review with 102 refs.
- 4006 Lang, J.K., Schillaci, M. and Irvin, B.: Vitamin E. *Chromatogr. Sci.*, 60(Mod. Chromatogr. Anal. Vitam., 2nd ed.) (1992) 153-195; C.A., 118 (1993) 55291f - a review with 27 refs.
- 4007 Laschi-Loquerie, A., Vallas, S., Viollet, J., Leclercq, M. and Fayol, V.: High performance liquid chromatographic determination of total thiamin in biological and food products. *Int. J. Vitam. Nutr. Res.*, 62 (1992) 248-251; C.A., 118 (1993) 5852u.
- 4008 Lesellier, E., Tchapla, A., Marty, C. and Lebert, A.: Analysis of carotenoids by high-performance liquid chromatography and supercritical fluid chromatography. *J. Chromatogr.*, 633 (1993) 9-23 - a review with 98 refs.
- 4009 Li, L., Chen, W. and Cui, J.: (Determination of vitamin B<sub>1</sub> and B<sub>2</sub> in fortified milk powder by high performance liquid chromatography). *Sepu*, 11 (1993) 49-50; C.A., 118 (1993) 146384e.
- 4010 Liau, L.S., Lee, B.L., New, A.L. and Ong, C.N.: Determination of plasma ascorbic acid by high-performance liquid chromatography with ultraviolet and electrochemical detection. *J. Chromatogr.*, 612 (1993) 63-70.
- 4011 Lindemanns, J.: Cobalamins. *Chromatogr. Sci.*, 60(Mod. Chromatogr. Anal. Vitam., 2nd ed.) (1992) 469-513; C.A., 118 (1993) 55296m - a review with 116 refs.
- 4012 McNulty, H., McPartlin, J., Weir, D. and Scott, J.: Reversed-phase high-performance liquid chromatographic method for the quantitation of endogenous folate catabolites in rat urine. *J. Chromatogr.*, 614 (1993) 59-66.
- 4013 Murcia, M.A., Vera, A. and Garcia-Carmona, F.: Determination by HPLC of changes in tocopherol levels in spinach after industrial processing. *J. Sci. Food Agric.*, 60 (1992) 81-84; C.A., 118 (1993) 79738h.
- 4014 Pourfarzam, M. and Bartlett, K.: Skeletal muscle mitochondrial  $\beta$ -oxidation of dicarboxylates. *Biochim. Biophys. Acta*, 1141 (1993) 81-89.
- 4015 Rettemaier, R. and Schuep, W.: Determination of vitamins A and E in liver tissue. *Int. J. Vitam. Nutr. Res.*, 62 (1992) 312-317; C.A., 118 (1993) 123209n.
- 4016 Rogers, E.J., Rice, S.M., Nicolosi, R.J., Carpenter, D.R., McClelland, C.A. and Romanczyk, L.J., Jr.: Identification and quantitation of  $\gamma$ -oryzanol components and simultaneous assessment of tocots in rice bran oil. *J. Am. Oil Chem. Soc.*, 70 (1993) 301-307.
- 4017 Schmitz, H.H., van Breemen, R.B. and Schwartz, S.J.: Fast-atom bombardment and continuous-flow fast-atom bombardment mass spectrometry in carotenoid analysis. *Methods Enzymol.*, 213(Carotenoids, Pt. A) (1992) 322-336; C.A., 118 (1993) 142927m.
- 4018 Shibata, K. and Shimono, T.: Nicotinic acid and nicotinamide. *Chromatogr. Sci.*, 60(Mod. Chromatogr. Anal. Vitam., 2nd ed.) (1992) 285-317; C.A., 118 (1993) 55294j - a review with 85 refs.
- 4019 Suarna, C., Hood, R.L., Dean, R.T. and Stocker, R.: Comparative antioxidant activity of tocotrienols and other natural lipid-soluble antioxidants in a homogeneous system, and in rat and human lipoproteins. *Biochim. Biophys. Acta*, 1166 (1993) 163-170.
- 4020 Sundquist, A.R., Stahl, W., Steigl, A. and Sies, H.: Separation of retinoic acid all-trans, mono-cis and poly-cis isomers by reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 637 (1993) 201-205.
- 4021 Tanishima, K. and Kita, M.: High-performance liquid chromatographic determination of plasma ascorbic acid in relationship to health care. *J. Chromatogr.*, 613 (1993) 275-280.
- 4022 Tanner, J.T., Barnett, S.A. and Mountford, M.K.: Analysis of milk-based infant formula. Phase V. Vitamins A and F, folic acid, and pantothenic acid: food and drug administration - infant formula commit: collaborative study. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 399-413.
- 4023 Ueda, T.: (Measurement of antioxidant *in vivo*. Determination of vitamin E). *Kagaku to Seibutsu*, 31 (1993) 44-48; C.A., 118 (1993) 142683d - a review with 20 refs.
- 4024 Velisek, J., Davidek J. and Davidek T.: Pantothenic acid. *Chromatogr. Sci.*, 60(Mod. Chromatogr. Anal. Vitam., 2nd ed.) (1992) 515-560; C.A., 118 (1993) 55297n - a review with 155 refs.
- 4025 Vicchio, D., Yergey, A., O'Brien, K., Allen, L., Ray, R. and Holick, M.: Quantification and kinetics of 25-hydroxyvitamin D<sub>3</sub> by isotope dilution liquid chromatography/thermospray mass spectrometry. *Biol. Mass Spectrom.*, 22 (1993) 53-58; C.A., 118 (1993) 76550e.
- 4026 Wang, X.-D., Russell, R.M., Marini, R.P., Tang, G., Dolnikowski, G.G., Fox, J.G. and Krinsky, N.I.: Intestinal perfusion of  $\beta$ -carotene in the ferret raises retinoic acid level in portal blood. *Biochim. Biophys. Acta*, 1167 (1993) 159-164.

For additional information see C.A.:  
118 (1993) 79589k, 120133x.

See also 3121, 3176, 3243, 3698, 3853, 4123, 4125, 4130, 4161.

## 28. ANTIBIOTICS

- 4027 Agematsu, H., Tsuchida, T., Kominato, K., Shibamoto, N., Yoshioka, T., Nishida, H. and Okamoto, R.: Enzymatic dimerization of penicillin X. *J. Antibiot.*, 46 (1993) 141-148.
- 4028 Aoyagi, T., Aoyama, T., Kojima, F., Hattori, S., Honma, Y., Hamada, M. and Takeuchi, T.: Cyclooctatin, a new inhibitor of lysophospholipase, produced by *Streptomyces melanoporofaciens* MI614-43F2. Taxonomy, production, isolation, physico-chemical properties and biological activities. *J. Antibiot.*, 45 (1992) 1587-1591.
- 4029 Aoyagi, T., Aoyama, T., Kojima, F., Matsuda, N., Maruyama, M., Hamada, M. and Takeuchi, T.: Benastatins A and B, new inhibitors of glutathione S-transferase, produced by *Streptomyces* sp. MI384-DF12. I. Taxonomy, production, isolation, physico-chemical properties and biological activities. *J. Antibiot.*, 45 (1992) 1385-1390.

- 4030 Aoyagi, T., Suda, H., Uotani, K., Kojima, F., Aoyama, T., Horiguchi, K., Hamada, M. and Takeuchi, T.: Nagstatin, a new inhibitor of N-acetyl- $\beta$ -D-glucosaminidase, produced by *Streptomyces amakusaensis* MG846-1F3. Taxonomy, production, isolation, physico-chemical properties and biological activities. *J. Antibiot.*, 45 (1992) 1404-1408.
- 4031 Borner, K., Borner, E. and Lode, H.: Determination of a new cephalosporin, SCE-2787, in serum and urine by high-performance liquid chromatography. *J. Chromatogr.*, 615 (1993) 174-179.
- 4032 Bortolo, R., Spera, S., Guglielmetti, G. and Cassani, G.: AB023, Novel polyene antibiotics. II. Isolation and structure determination. *J. Antibiot.*, 46 (1993) 255-264.
- 4033 Brill, G.M., Chen, R.H., Rasmussen, R.R., Whittern, D.N. and McAlpine, J.B.: Calbistrins, novel antifungal agents produced by *Penicillium restrictum*. II. Isolation and elucidation of structure. *J. Antibiot.*, 46 (1993) 39-47.
- 4034 Brooks, C.A., Cramer, S.M. and Rosano, T.G.: Preparative chromatographic purification of cyclosporine metabolites. *Clin. Chem. (Winston-Salem)*, 39 (1993) 457-466.
- 4035 Cachet, T., Delrue, M., Paesen, J., Busson, R., Roets, E. and Hoogmartens, J.: Analysis of erythromycin estolate by liquid chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 851-860.
- 4036 Carignan, G., Carrier, K. and Sved, S.: Assay of tetracycline residues in salmon muscle by liquid chromatography with ultraviolet detection. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 325-328.
- 4037 Carson, M.C.: Simultaneous determination of multiple tetracycline residues in milk using metal chelate affinity chromatography. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 329-334.
- 4038 Chen, J.: (Rapid determination by HPLC of chloramphenicol in poultry for export). *Zhongguo Kangshengsu Zazhi*, 17 (1992) 351-355; C.A., 118 (1993) 146367b.
- 4039 Chen, T.S., So, L., White, R. and Monaghan, R.L.: Microbial hydroxylation and glucuronidation of the angiotensin II (All) receptor antagonist MK 954. *J. Antibiot.*, 46 (1993) 131-134.
- 4040 Chulavatnatol, S. and Charles, B.G.: High-performance liquid chromatographic determination of amoxicillin in urine using solid-phase, ion-pair extraction and ultraviolet detection. *J. Chromatogr.*, 615 (1993) 91-96.
- 4041 Edwall, B., Arvidsson, A., Lake-Bakaar, D., Lanbeck-Vallén, K. and Yisak, W.: Disposition of oral [<sup>14</sup>C]cefcane daloxate hydrochloride in healthy male subjects. *Drug Metab. Disp.*, 21 (1993) 171-177.
- 4042 Ezaki, M., Shigematsu, N., Yamashita, M., Komori, T., Umehara, K. and Imanaka, H.: Biphenomycin C, a precursor of biphenomycin A in mixed culture. *J. Antibiot.*, 46 (1993) 135-140.
- 4043 Frankmölle, W.P., Larsen, L.K. Caplan, F.R., Patterson, G.M.L., Knübel, G., Levine, I.A. and Moore, R.E.: Antifungal cyclic peptides from the terrestrial blue-green alga *Anabaena laxa*. I. Isolation and biological properties. *J. Antibiot.*, 45 (1992) 1451-1457.
- 4044 Grabley, S., Hammann, P., Thiericke, R., Wink, J., Phillips, S. and Zeeck, A.: Secondary metabolites by chemical screening. 21. Clonostachydiol, a novel anthelmintic macrodiolide from the fungus *Clonostachys cylindrospora* (strain FH-A 6607). *J. Antibiot.*, 46 (1993) 343-345.
- 4045 Hasselberger, M.L.: Assay of tetracycline in animal feed by liquid chromatography and microbiological plate assay. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 39-43.
- 4046 Hatfield, G.M., Woodard, R.W. and Son, J.-K.: Isolation and structure determination of new macrolide antibiotics. *J. Natural Prod.*, 55 (1992) 753-759.
- 4047 Hedge, V.R., Miller, J.R., Patel, M.G., King, A.H., Puar, M.S., Horan, A., Hart, R., Yarborough, R. and Bullo, V.: SCH 45752 - An inhibitor of calmodulin-sensitive cyclic nucleotide phosphodiesterase activity. *J. Antibiot.*, 46 (1993) 207-213.
- 4048 Hendrix, C., Pijcke, M., Yun, L.M., Roets, E. and Hoogmartens, J.: Quantitative analysis of cefradine by liquid chromatography on poly(styrene-divinylbenzene). *J. Pharm. Biomed. Anal.*, 11 (1993) 145-155.
- 4049 Hendrix, C., Thomas, J., Yun, L.-M., Roets, E. and Hoogmartens, J.: Quantitative analysis of cefalexin by liquid chromatography on poly(styrene-divinylbenzene). *J. Liq. Chromatogr.*, 16 (1993) 421-445.
- 4050 Hendrix, C., Zhu, Y., Wijsen, C., Roets, E. and Hoogmartens, J.: Comparative study of liquid chromatographic methods for the determination of cefadroxil. *J. Chromatogr.*, 634 (1993) 257-261.
- 4051 Hoogmartens, J.: Liquid chromatography for the quantitative analysis of antibiotics-some applications using poly(styrene-divinylbenzene). *J. Pharm. Biomed. Anal.*, 10 (1992) 845-850.
- 4052 Ikeda, Y., Naganawa, H., Kondo, S. and Takeuchi, T.: Biosynthesis of bellenamine by *Streptomyces nashvillensis* using stable isotope labeled compounds. *J. Antibiot.*, 45 (1992) 1919-1924.
- 4053 Ito, M., Maruhashi, M., Sakai, N., Mizoue, K. and Hanada, K.: NG-O11 and NG-O12, novel potentiators of nerve growth factor. I. Taxonomy, isolation, and physico-chemical and biological properties. *J. Antibiot.*, 45 (1992) 1559-1565.
- 4054 Johdo, O., Tone, H., Okamoto, R., Yoshimoto, A. and Takeuchi, T.: Production of new anthracycline antibiotics by microbial 4-O-methylation using a specific daunorubicin-negative mutant. *J. Antibiot.*, 45 (1992) 1837-1847.
- 4055 Kato, Y., Yokoyama, T., Shimokawa, M., Kudo, K., Kabe, J. and Mohri, K.: Determination of erythromycin in human plasma and whole blood by high-performance liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 661-680.
- 4056 Kirchmann, E. and Welch, L.E.: High-performance liquid chromatographic separation and electrochemical detection of penicillins. *J. Chromatogr.*, 633 (1991) 111-118.
- 4057 Kotake, C., Yamasaki, T., Moriyama, T., Shinoda, M., Komiyama, N., Furumai, T., Konishi, M. and Oki, T.: Butyrolactols A and B, new antifungal antibiotics. Taxonomy, isolation, physico-chemical properties, structure and biological activity. *J. Antibiot.*, 45 (1992) 1442-1450.
- 4058 Kuehne, M., Kobe, A., Fries, R. and Elbrecht, A.: (Detection of oxytetracycline and furazolidone in poultry by HPLC). *Arch. Lebensmittelhyg.*, 43 (1992) 59-63; C.A., 118 (1993) 93685v.
- 4059 Lam, Y.K.T., Wichmann, C.F., Meinz, M.S., Guariglia, L., Giacobbe, R.A., Mochales, S., Kong, L., Honeycutt, S.S., Zink, D., Bills, G.F., Huang, L. et al.: A novel inositol mono-phosphatase inhibitor from *Memnoniella echinata*. Producing organism, fermentation, isolation, physico-chemical and *in vitro* biological properties. *J. Antibiot.*, 45 (1992) 1397-1403.

- 4060 Lam, Y.K.T., Williams, D.L., Jr., Sigmund, J.M., Sanchez, M., Genilloud, O., Kong, Y.L., Stenens-Miles, S., Huang, L. and Garrity, G.M.: Cochinimicins, novel and potent cyclodepsipeptide endothelin antagonists from a *Microbispora* sp. I. Production, isolation, and characterization. *J. Antibiot.*, 45 (1992) 1709-1716.
- 4061 Marko-Varga, G., Buttler, T., Gorton, L. and Grönsterwall, C.: A study of the use of microdialysis probes as a sampling unit in on-line bioprocess monitoring in conjunction with column liquid chromatography. *Chromatographia*, 35 (1993) 285-289.
- 4062 Masurekar, P.S., Fountoulakis, J.M., Hallada, T.C., Sosa, M.S. and Kaplan, L.: Pneumocandins from *Zalerion arboricola*. II. Modification of product spectrum by mutation and medium manipulation. *J. Antibiot.*, 45 (1992) 1867-1874.
- 4063 Matson, J.A., Colson, K.L., Belofsky, G.N. and Bleiberg, B.B.: Sandramycin, a novel antitumor antibiotic produced by a *Nocardiaoides* sp. II. Structure determination. *J. Antibiot.*, 46 (1993) 162-166.
- 4064 McBride, J.H., Kim, S.S., Rodgerson, D.O., Reyes, A.F. and Ota, M.K.: Measurement of cyclosporine by liquid chromatography and three immunoassays in blood from liver, cardiac, and renal transplant recipients. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2300-2306.
- 4065 Miyazaki, H., Kurobe, N., Mizuki, Y. and Sekine, Y.: (Concentration measurement of quinolones in blood). *Kagaku Ryoho no Ryoiki*, 8 (1992) 2192-2200; C.A., 118 (1993) 51616t - a review with 27 refs.
- 4066 Miyazawa, N. and Uematsu, T.: Analysis of ofloxacin in hair as a measure of hair growth and as a time marker for hair analysis. *Ther. Drug Monit.*, 14 (1992) 525-528; C.A., 118 (1993) 97315x.
- 4067 Morita, Y., Araki, T., Asami, S., Shimoda, M., Matsumoto, T., Kameda, M. and Kurihara, O.: (Determination of bacitracin in pork and chicken by high performance liquid chromatography with fluorescence detector). *Nippon Juishikai Zasshi*, 45 (1993) 961-964; C.A., 118 (1993) 146375c.
- 4068 Nakata, M., Saito, M., Inouye, Y., Nakamura, S., Hayakawa, Y. and Seto, H.: A new anthracycline antibiotic, cinerubin R. Taxonomy, structure elucidation and biological activity. *J. Antibiot.*, 45 (1992) 1599-1608.
- 4069 Ni, C., Yu, L., Lu, L. and Ao, B.: (Determination of cefoperazone in human plasma and its pharmacokinetic parameters by HPLC). *Zhongguo Yiyuan Yaoyue Zazhi*, 12 (1992) 295-297; C.A., 118 (1993) 93696z.
- 4070 Nihei, Y., Yamamoto, H., Hasegawa, M., Hanada, M., Fukagawa, Y. and Oki, T.: Epocharbazolins A and B, novel 5-lipoxygenase inhibitors. Taxonomy, fermentation, isolation, structures and biological activities. *J. Antibiot.*, 46 (1993) 25-33.
- 4071 Nishio, M., Hasegawa, M., Suzuki, K., Sawada, Y., Hook, D.J. and Oki, T.: Nitrosoxacins A, B and C, new 5-lipoxygenase inhibitors. *J. Antibiot.*, 46 (1993) 193-195.
- 4072 Ogita, T., Sato, A., Enokita, R., Suzuki, K., Ishii, M., Negishi, T., Okazaki, T., Tamaki, K. and Tanzawa, K.: Matlystatins, new inhibitors of type IV collagenases from *Actinomadura atramentaria*. I. Taxonomy, fermentation, isolation, and physicochemical properties of matlystatin-group compounds. *J. Antibiot.*, 45 (1992) 1723-1732.
- 4073 Ohtsuka, T., Kotaki, H., Nakayama, N., Itezono, Y., Shimma, N., Kudoh, T., Kuwahara, T., Arisawa, M. and Yokose, K.: Tetrothiodin, a novel cytokinin type-B receptor antagonist produced by *Streptomyces* sp. NR0489. II. Isolation, characterization and biological activities. *J. Antibiot.*, 46 (1993) 11-17.
- 4074 Omura, S., van der Pyl, D., Inokoshi, J., Takahashi, Y. and Takeshima, H.: Pepticinamins, new farnesyl-protein transferase inhibitors produced by an actinomycete. I. Producing strain, fermentation, isolation and biological activity. *J. Antibiot.*, 46 (1993) 222-228.
- 4075 Potterat, O., Zähner, H., Volkmann, C. and Zeeck, A.: Metabolic products of microorganisms. 264. Exfoliamycin and related metabolites, new naphthoquinone antibiotics from *Streptomyces exfoliatus*. *J. Antibiot.*, 46 (1993) 346-349.
- 4076 Schwartz, R.E., Sesin, D.F., Joshua, H., Wilson, K.E., Kempf, A.J., Goklen, K.A., Kuehner, D., Gailliot, P., Gleason, C., White, R., Inamine, E. et al.: Pneumocandins from *Zalerion arboricola*. I. Discovery and isolation. *J. Antibiot.*, 45 (1992) 1853-1866.
- 4077 Shanahan, P., Glennon, J.D., Crowley, J.J., Donnelly, D.F. nad O'Gara, F.: Liquid chromatographic assay of microbially derived phloroglucinol antibiotics for establishing the biosynthetic route to production, and the factors affecting their regulation. *Anal. Chim. Acta*, 272 (1993) 271-277.
- 4078 Showalter, H.D.H., Bunge, R.H., French, J.C., Hurley, T.R., Leeds, R.L., Leja, B., McDonell, P.D. and Edmunds, C.R.: Improved production of pentostatin and identification of fermentation metabolites. *J. Antibiot.*, 45 (1992) 1914-1918.
- 4079 Sokolic, M., Pokorni, V. and Johannsen, F.H.: Liquid chromatographic method for separation and determination of elaiophylin in biotechnology processes of salinomycin production. *J. Pharm. Biomed. Anal.*, 10 (1992) 989-994.
- 4080 Sugawara, K., Nishiyama, Y., Toda, S., Komiyama, N., Hatori, M., Moriyama, T., Sawada, Y., Kamei, H., Konishi, M. and Oki, T.: Lactimidomycin, a new glutarimide group antibiotic. Production, isolation, and structure and biological activity. *J. Antibiot.*, 45 (1992) 1433-1441.
- 4081 Tamura, M. and Imai, Y.: Method for purification of macrolide antibiotics. *Jpn. Kokai Tokkyo Koho* JP 04,235,996 [92,235,996] (Cl. C07H1/08), 25 Aug. 1992, Appl. 91/72,606, 16 Jan. 1991; 6 p.; C.A., 118 (1993) 81323n.
- 4082 Toda, S., Obi, Y., Numata, K.-I., Hamagishi, Y., Tomita, K., Komiyama, N., Kotake, C., Furumai, T. and Oki, T.: Eurystatins A and B, new prolyl endopeptidase inhibitors. I. Taxonomy, production, isolation and biological activities. *J. Antibiot.*, 45 (1992) 1573-1579.
- 4083 Tsunakawa, M., Komiyama, N., Tenmyo, O., Tomita, K., Kawano, K., Kotake, C., Konishi, M. and Oki, T.: New antiviral antibiotics, cycloviracins, B<sub>1</sub> and B<sub>2</sub>. I. Production, isolation, physico-chemical properties and biological activity. *J. Antibiot.*, 45 (1992) 1467-1471.
- 4084 Tyczkowska, K.L., Voyksner, R.D., Anderson, K.L. and Aronson, A.L.: Determination of ceftiofur and its metabolite desfuroylceftiofur in bovine serum and milk by ion-paired liquid chromatography. *J. Chromatogr.*, 614 (1993) 123-134.
- 4085 Tymak, A.A., Ax, H.A., Bolgar, M.S., Kahle, A.D., Porubcan, M.A. and Andersen, N.H.: Dactylocyclines, novel tetracycline derivatives produced by a *Dactylosporangium* sp. II. Structure elucidation. *J. Antibiot.*, 45 (1992) 1899-1906.

- 4086 Ueno, M., Iijima, M., Masuda, T., Kinoshita, N., Iinuma, H., Naganawa, H., Hamada, M., Ishizuka, M. and Takeuchi, T.: De-thymicin, a novel immunosuppressant isolated from an *Amycolatopsis*. Fermentation, isolation, physico-chemical properties and biological activities. *J. Antibiot.*, 45 (1992) 1819-1826.
- 4087 Wells, J.S., O'Sullivan, J., Aklonis, C., Ax, H.A., Tymiak, A.A., Kirsch, D.R., Trejo, W.H. and Principe, P.: Dactylocyclines, novel tetracycline derivatives produced by a *Dactylosporangium* sp. I. Taxonomy, production, isolation and biological activity. *J. Antibiot.*, 45 (1992) 1892-1898.
- 4088 Xaio, J.-Z., Kumazawa, S., Noshikawa, N., Mikawa, T. and Sato, Y.: Dactylfungis, a novel antifungal antibiotics produced by *Dactylaria parvispora*. *J. Antibiot.*, 46 (1993) 48-55.
- 4089 Yamazaki, T., Ishikawa, T., Nakai, H., Miyai, M., Tsubota, T. and Asano, K.: Determination of aspoxicillin in broncho-alveolar lavage fluid by high-performance liquid chromatography with photolysis and electrochemical detection. *J. Chromatogr.*, 615 (1993) 180-185.
- 4090 Yoshimoto, A., Fujii, S., Johdo, O., Kubo, K., Nishida, H., Okamoto, R. and Takeuchi, T.: Anthracycline metabolites from baumycin-producing *Streptomyces* sp. D788. II. New anthracycline metabolites produced by a blocked mutant strain RPM-5. *J. Antibiot.*, 46 (1993) 56-64.
- 4091 Yoshimoto, A., Johdo, O., Tone, H., Okamoto, R., Naganawa, H., Sawa, T. and Takeuchi, T.: Production of new anthracycline antibiotics 1-hydroxyoxaunomycin and 6-deoxyoxaunomycin by limited biosynthetic conversion using a daunorubicin-negative mutant. *J. Antibiot.*, 45 (1992) 1609-1617.
- 4092 Zou, J. and Mitscher, L.A.: (Separation of tetracyclines by silica gel RP-2 column chromatography). *Zhongguo Kangshengsu Zazhi*, 17 (1992) 341-347; C.A., 118 (1993) 109885y.
- For additional information see C.A.:  
 118 (1993) 37553p, 73011u, 73031a, 79570x, 109873t, 132279n.
- See also 3338, 3939, 4313, 4329, 4330, 4381.
- 29. INSECTICIDES, PESTICIDES AND OTHER AGROCHEMICALS**
- 29a. General techniques**
- 4093 Barcelo, D.: Hyphenated methods for pesticide residue analysis. In: Cairns, T. and Sherma, J. (Editors), *Emerging Strategies Pestic. Anal.*, CRC, Boca Raton, 1992, pp. 273-294; C.A., 118 (1993) 75212j - a review with 80 refs.
- 4094 Di Corcia, A., Samperi, R., Marcomini, A. and Stelluto, S.: Graphitized carbon black extraction cartridges for monitoring polar pesticides in water. *Anal. Chem.*, 65 (1993) 907-912.
- 4095 Scaroni, I., Bovolenta, A., Previati, M.P. and Baldi, M.: (HPLC determination of fungicides, acaricides and insecticides in fruit). *Ind. Aliment. (Pinerolo)*, 31 (1992) 1126-1129; C.A., 118 (1993) 146368c.
- 4096 Shalaby, L.M. and George, S.W.: Liquid chromatography/mass spectrometry multiresidue methods for thermally labile pesticides. In: Cairns, T. and Sherma, J. (Editors), *Emerging Strategies Pestic. Anal.*, CRC, Boca Raton, 1992, pp. 295-307; C.A., 118 (1993) 75222n.
- See also 3088, 3155.
- 29b. Chlorinated insecticides**
- 4097 Miyahara, M., Murayama, M., Suzuki, T. and Saito, Y.: Silica gel chromatographic cleanup procedure for organochlorine pesticide analysis with capillary gas chromatography. *J. Agric. Food Chem.*, 41 (1993) 221-226.
- 4098 Sun, Y. and Pignatello, J.J.: Activation of hydrogen peroxide by iron(III) chelates for abiotic degradation of herbicides and insecticides in water. *J. Agric. Food Chem.*, 41 (1993) 308-312.
- See also 3435.
- 29c. Phosphorus insecticides**
- 4099 Loerger, B.P. and Smith, J.S.: Multiresidue method for the extraction and detection of organophosphate pesticides and their primary and secondary metabolites from beef tissue using HPLC. *J. Agric. Food Chem.*, 41 (1993) 303-307.
- 29d. Carbamates**
- 4100 Li, H., Yan, X. and Zheng, H.: (Rapid qualitative analysis of carbamates pesticides in serum and gastric juice). *Yaowu Fenxi Zazhi*, 12 (1992) 323-326; C.A., 118 (1993) 95751n.
- See also 3155, 4150, 4371.
- 29e. Herbicides**
- 4101 Bushway, R.J. and Perkins, L.B.: Determination of oxyfluorfen in pesticide formulations by liquid chromatography. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 90-91.
- 4102 Davi, M.L., Scaroni, I., Malfatto, M.G. and Penazzi, L.: (Solid-phase extraction in determination of urea herbicides in water). *Lab. 2000*, 6 (1992) 68-71; C.A., 118 (1993) 66383p.
- 4103 Goodall, D.M., Robinson, N.A. and Wu, Z.: Enantiomeric purity determination of (+)-2-(4-chloro-2-methylphenoxy)-propanoic acid and (+)-2-(2,4-dichlorophenoxy)-propanoic acid using a high performance liquid chromatography diode-laser-based polarimetric detector. *J. Chromatogr. Sci.*, 31 (1993) 133-136.
- 4104 Katagi, T.: Photochemistry of organophosphorus herbicide butamifos. *J. Agric. Food Chem.*, 41 (1993) 496-501.
- 4105 Klaffenbach, P., Holland, P.T. and Lauren, D.R.: Analysis of sulfonylurea herbicides by gas-liquid chromatography. 1. Formation of thermostable derivatives of chlorsulfuron and metsulfuron-methyl. *J. Agric. Food Chem.*, 41 (1993) 388-395.
- 4106 Pothuluri, J.V., Freeman, J.P., Evans, F.E., Moorman, T.B. and Cerniglia, C.E.: Metabolism of alachlor by the fungus *Cunninghamella elegans*. *J. Agric. Food Chem.*, 41 (1993) 483-488.
- 4107 Pusino, A., Liu, W., Fang, Z. and Gessa, C.: Effect of metal-binding ability on the adsorption of acifluorfen on soil. *J. Agric. Food Chem.*, 41 (1993) 502-505.

- 4108 Scaroni, I., Davi, M.L., Previati, M.P., Bovolenta, A. and Baldi, M.: Determination of urea herbicides in vegetables by HPLC with a diode array detector. *Lab. 2000*, 6 (1992) 96-101; C.A., 118 (1993) 100606a.
- 4109 Schmitt, T.M.: Liquid chromatographic assay of bentazon formulations. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 387-389.

See also 4305.

#### 29f. Fungicides

- 4110 Cabras, P., Melis, M. and Spanedda, L.: Determination of cy-mazole residues in honey by liquid chromatography. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 92-94.
- 4111 Lehotay, J. and Kisová, D.: HPLC study of mancozeb degradation on leaves. *J. Liq. Chromatogr.*, 16 (1993) 1015-1022.
- 4112 Schenck, F.J. and Hennessy, M.K.: Determination of dinocap in apples, grapes, and pears using a solid phase extraction cleanup and HPLC-UV detection. *J. Liq. Chromatogr.*, 16 (1993) 755-766.

#### 29g. Other types of pesticides and various agrochemicals

- 4113 Wacher, V.J. and Casida, J.E.: Metabolism in mouse liver and photooxidation of the insecticidal *cis*- and *trans*-2-(4-bromophenyl)-5-*tert*-butyl-1,3-dithianes. *J. Agric. Food Chem.*, 41 (1993) 296-302.

See also 3072, 3349.

### 30. SYNTHETIC AND NATURAL DYES

#### 30a. Synthetic dyes

- 4114 Allen, J.L., Gofus, J.E. and Meinertz, J.R.: Analytical methods for malachite green: Completion report: Malachite green analysis in water. Report, DOE/BP/96356-2; Order No. DE92003492, 1992, 52 p.; C.A., 118 (1993) 131602a.
- 4115 Davis, V.M. and Bailey, J.E., Jr.: Chemical reduction of FD&C Yellow No. 5 to determine combined benzidine. *J. Chromatogr.*, 635 (1993) 160-164.
- 4116 Koch, H. and Gobet, H.: (Quantification of malachite green in fish by HPLC). *Mitt. Geb. Lebensmittelunters. Hyg.*, 83 (1992) 214-223; C.A., 118 (1993) 123188e.
- 4117 Krach, K., Kups, W. and Rogalski, J.: (Use of modern chromatographic methods in the study of dyes and intermediates). *Tech. Wiss.*, (1991) 185-188; C.A., 118 (1993) 104772z - a review with 9 refs.
- 4118 Scher, A.L. and Adamo, N.C.: Liquid chromatographic determination of 2-chlor-4-nitroaniline, 2-naphthol, and 2,4-dinitroaniline in D8C Red No. 36. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 287-291.
- 4119 Sturtevant, F.: Extraction of FD and C dyes from common food sources: their separation utilizing column chromatography. *J. Chem. Educ.*, 69 (1992) 996-998; C.A., 118 (1993) 101205f.
- 4120 White, P.C. and Tebbett, I.R.: Chromatographic analysis for fiber dyes. In: Robertson, J. (Editor), *Forensic Exam. Fibres*, Horwood, London, 1992, pp. 143-179; C.A., 118 (1993) 118417z.

See also 3072, 3945.

#### 30b. Chloroplast and other natural pigments

- 4121 Bassi, R., Pineau, B., Dainese, P. and Marquardt, J.: Carotenoid-binding proteins of photosystem II. *Eur. J. Biochem.*, 212 (1993) 297-303.
- 4122 Bone, R.A. and Landrum, J.T.: Distribution of macular pigment components, zeaxanthin and lutein, in human retina. *Methods Enzymol.*, 213(Carotenoids, Pt. A) (1992) 360-366; C.A., 118 (1993) 142725u.
- 4123 Craft, N.E.: Carotenoid reversed-phase high-performance liquid chromatography methods: reference compendium. *Methods Enzymol.*, 213(Carotenoids, Pt. A) (1992) 185-205; C.A., 118 (1993) 120099r - a review with 38 refs.
- 4124 Craft, N.E., Wise, S.A. and Soares, J.H., Jr.: Individual carotenoid content of SRM 1548 total diet and influence of storage temperature, lyophilization and irradiation on dietary carotenoids. *J. Agric. Food Chem.*, 41 (1993) 208-213.
- 4125 Furr, H.C., Barua, A.B. and Olson, J.A.: Retinoids and carotenoids. *Chromatogr. Sci.*, 60(Mod. Chromatogr. Anal. Vitam., 2nd ed.) (1992) 1-71; C.A., 118 (1993) 55289m - a review with 336 refs.
- 4126 Goncharova, N.V., Ptitsyn, G.A., Konyushenko, G.A. and Pakshina, E.V.: (ATP synthesis, oxygen evolution and carotenoid turnover in chloroplasts illuminated with short light flashes: a novel molecular oxygen evolutin hypothesis). *Biokhimiya (Moscow)*, 58 (1993) 70-80.
- 4127 Mahanta, P.K., Boruah, S.K., Boruah, H.K. and Kalita, J.N.: Changes of polyphenol oxidase and peroxidase activities and pigment composition of some manufactured black teas (*Camellia sinensis* L.). *J. Agric. Food Chem.*, 41 (1993) 272-276.
- 4128 Mínguez-Mosquera, M., Gallardo-Guerrero, L. and Gandul-Rojas, B.: Characterization and separation of oxidized derivatives of pheophorbide *a* and *b* by thin-layer and high-performance liquid chromatography. *J. Chromatogr.*, 633 (1993) 295-299.
- 4129 Olano, A., Santa-Maria, G., Corzo, N., Calvo, M.M., Martinez-Castro, I. and Jimeno, M.L.: Determination of free carbohydrates and Amadori compounds formed at the early stages of non-enzymic browning. [Erratum to document cited CA 116(19):192780n]. *Food Chem.*, 45 (1992) 310; C.A., 118 (1993) 123218q.
- 4130 Shen, M., Yuan, Y. and Wu, X.: (Determination of trans-retinoic acid in plasma using high-performance liquid chromatography and study of its pharmacokinetics). *Sepu*, 10 (1992) 368-369; C.A., 118 (1993) 51760k.
- 4131 Van Breemen, R.B., Schmitz, H.H. and Schwartz, S.J.: Continuous-flow fast atom bombardment liquid chromatography/mass spectrometry of carotenoids. *Anal. Chem.*, 65 (1993) 965-969.

See also 3046, 3176, 3237, 3396, 3725, 3992, 3995, 3997, 4001, 4017, 4026.

## 31. PLASTICS AND THEIR INTERMEDIATES

- 4132 Burzyk, J. and Zjawiony, I.: (Chromatographic determination of hydrocarbons liberated during aging of unprocessed and processed polyethylene and polypropylene). *Chem. Anal. (Warsaw)*, 36 (1991) 811-816; C.A., 118 (1993) 125548w.
- 4133 Kamei, S., Inoue, Y., Okada, H., Yamada, M., Ogawa, Y. and Toguchi, H.: New method for analysis of biodegradable polyesters by high-performance liquid chromatography after alkali hydrolysis. *Biomaterials*, 13 (1992) 953-958; C.A., 118 (1993) 66749n.
- 4134 Lesar, M., Zigon, M. and Malavasic, T.: Characterization of oligomers from 1,4-butanediol and toluene diisocyanate. *J. Appl. Polym. Sci.*, 47 (1993) 805-814; C.A., 118 (1993) 81736z.
- 4135 Mori, S.: Design of a differential pressure detector for use in the size-exclusion chromatography of polymers. *J. Chromatogr.*, 637 (1993) 129-135.
- 4136 Mori, S.: Identification method of synthetic polymers by high-performance liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1-13.
- 4137 Zhou, X.Q. and Hay, J.N.: Fractionation and structural properties of linear low-density polyethylene. *Eur. Polym. J.*, 29 (1993) 293-300; C.A., 118 (1993) 81738b.

See also 3189.

## 32. DRUG ANALYSIS

32a. *Drug analysis, general techniques*

- 4138 Bell, C. and Ip, D.P.: Utility of column switching to analyse low dose dissolution samples for pharmaceutical formulations. *J. Pharm. Biomed. Anal.*, 11 (1993) 177-181.
- 4139 Chen, X.-H., Franke, J.-P., Ensing, K., Wijsbeek, J. and de Zeeuw, R.A.: Semi-automated solid-phase extraction procedure for drug screening in biological fluids using the ASPEC system in combination with Clean Screen DAU columns. *J. Chromatogr.*, 613 (1993) 289-294.
- 4140 Gami-Yilinkou, R., Nasal, A. and Kaliszak, R.: Application of chemometrically processed chromatographic data for pharmacologically relevant classification of antihistamine drugs. *J. Chromatogr.*, 633 (1993) 57-63.
- 4141 Ge, H., Gilmore, K., Ashraf, A., Too, C.O. and Wallace, G.G.: Separation of small molecules in the presence of proteins using conducting polymer stationary phases. *J. Liq. Chromatogr.*, 16 (1993) 95-108.
- 4142 Hamoir, T., Bourguignon, B., Massart, D.L. and Hindriks, H.: Model building for the prediction of initial chromatographic conditions in pharmaceutical analysis using reversed-phase liquid chromatography. *J. Chromatogr.*, 633 (1993) 43-56.
- 4143 Jin, X., Zhou, Z.H., He, X.F., Zhang, Z.H. and Wang, M.Z.: (Solid-phase extraction and RP-HPLC screening procedure for diuretics, probenecid, caffeine, and pemoline in urine). *Yaoxue Xuebao*, 27 (1992) 875-880; C.A., 118 (1993) 73025b.

- 4144 Kruger, P.B., De V. Albrecht, C.F. and van Jaarsveld, P.P.: Use of guanidine hydrochloride and ammonium sulfate in comprehensive in-line sorption enrichment of xenobiotics in biological fluids by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 191-198.
- 4145 Krull, I.S., Zhou, F. and Yu, J.: Chiral drug analysis in biofluids by liquid chromatography. *TrAC*, 12 (1993) 159-168 - a review with 75 refs.
- 4146 Kucharczyk, N.: Estimation of the lower limit of quantitation, a method detection performance parameter for biomedical assays, from calibration curves. *J. Chromatogr.*, 612 (1993) 71-76.
- 4147 Lamparter, E. and Lunkenhimer, C.: The automation of dissolution testing of solid oral dosage forms. *J. Pharm. Biomed. Anal.*, 10 (1992) 727-733.
- 4148 Mathieu, R.J., van den Oever, M., Nicholson, D.G.M. and Kanfer, I.: Automated dissolution testing using on-line low-dispersion HPLC. *Am. Lab. (Shelton)*, 24 (1992) 27-30; C.A., 118 (1993) 87532b.
- 4149 Ortega, F., Cuevas, J.L., Centenera, J.I. and Dominguez, E.: Liquid chromatographic separation of phenolic drugs using catalytic detection: comparison of an enzyme reactor and enzyme electrode. *J. Pharm. Biomed. Anal.*, 10 (1992) 789-796.
- 4150 Poletti, G.: (Chromatography: separations of basic products with eluents at high pH). *Inf. Chim.*, 333 (1991) 188-190; C.A., 118 (1993) 132260z.
- 4151 Sarre, S., van Belle, K., Smolders, I., Krieken, G. and Michotte, Y.: The use of microdialysis for the determination of plasma protein binding of drugs. *J. Pharm. Biomed. Anal.*, 10 (1992) 735-739.
- 4152 Wongyai, S.: Effect of solvent strength on the chromatographic behavior of drugs in reversed-phase HPLC. *J. Sci. Soc. Thailand*, 18 (1992) 27-40; C.A., 118 (1993) 66962b.
- See also 3029, 3036, 3088, 3169, 3173, 3174, 3177, 3186, 3333, 4399, 4413.
- 32b. *Antirheumatics and antiinflammatory drugs*
- 4153 Beeson, M.D. and Vigh, G.: Examination of the retention behavior of underivatized profen enantiomers on cyclodextrin silica stationary phases. *J. Chromatogr.*, 634 (1993) 197-204.
- 4154 Castillo, M. and Smith, P.C.: Direct determination of ibuprofen and ibuprofen acyl glucuronide in plasma by high-performance liquid chromatography using solid-phase extraction. *J. Chromatogr.*, 614 (1993) 109-116.
- 4155 Cerretani, D., Micheli, L., Fiaschi, A.I. and Giorgi, G.: Rapid and sensitive determination of piroxicam in rat plasma, muscle and skin by high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 103-108.
- 4156 Colthup, P.V., Young, G.C. and Felgate, C.C.: Determination of salmeterol in rat and dog plasma by high-performance liquid chromatography with fluorescence detection. *J. Pharm. Sci.*, 82 (1993) 323-325.
- 4157 De Bernardi di Valserra, M., Feletti, F., Tripodi, A.S., Contos, S., Canabelli, A., Maggi, L. and Germogli, R.: Pharmacokinetic studies in healthy volunteers on a new gastroprotective pharmaceutical form of diclofenac. *Arzneim.-Forsch.*, 43 (1993) 373-377.

- 4158 Eckenberger, P., Bisler, H. and Panse, P.: Transkutane Resorption von nicht-steroidalen Antirheumatischen. Klinische Studie über ein neues Modell zur Untersuchung der Pharmakokinetik. *Arzneim.-Forsch.*, 43 (1993) 469-474.
- 4159 Friedrich, A., Schulz, R. and Meyer, H.H.D.: Use of enzyme immunoassay and reverse-phase high-performance liquid chromatography to detect and confirm identity of dexamethasone in equine blood. *Am. J. Vet. Res.*, 53 (1992) 2213-220; C.A., 118 (1992) 73757s.
- 4160 Haupt, D., Pettersson, C. and Westerlund, D.: Separation of (R)- and (S)-naproxen using micellar chromatography and an  $\alpha_1$ -acid-glycoprotein column: application for chiral monitoring in human liver microsomes by coupled-column chromatography. *J. Biochem. Biophys. Methods*, 25 (1992) 273-284; C.A., 118 (1993) 93707d.
- 4161 Kmetec, V.: Simultaneous determination of acetylsalicylic, salicylic, ascorbic and dehydroascorbic acid by HPLC. *J. Pharm. Biomed. Anal.*, 10 (1992) 1073-1076.
- 4162 Kubo, H., Umiguchi, Y. and Kinoshita, T.: Fluorometric determination of indomethacin in serum by high performance liquid chromatography using in-line oxidation with hydrogen peroxide. *J. Liq. Chromatogr.*, 16 (1993) 465-474.
- 4163 Shibukawa, A., Nagao, M., Terakita, A., He, J. and Nakagawa, T.: High-performance frontal analysis/high-performance liquid chromatographic system for the enantioselective determination of unbound fenoprofen concentration in protein binding equilibrium. *J. Liq. Chromatogr.*, 16 (1993) 903-914.
- 4164 Stanley, S.M.R., Wilhelm, B.S., Rodgers, J.P. and Bertschinger, H.: Immunoaffinity chromatography combined with gas chromatography-negative ion chemical ionisation mass spectrometry for the confirmation of flumethasone abuse in the equine. *J. Chromatogr.*, 614 (1993) 77-86.
- 4165 Takasaki, W., Asami, M., Muramatsu, S., Hayashi, R., Tanaka, Y., Kawabata, K. and Hoshiyama, K.: Stereoselective determination of the active metabolites of a new anti-inflammatory agent (CS-670) in human and rat plasma using antibody-mediated extraction and high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 67-77.
- 4166 Whelpton, R., Fernandes, K., Wilkinson, K.A. and Goldhill, D.R.: Determination of paracetamol (acetaminophen) in blood and plasma using high performance liquid chromatography with dual electrode coulometric quantification in the redox mode. *Biomed. Chromatogr.*, 7 (1993) 90-93.
- For additional information see C.A.:  
118 (1993) 116130b, 132281g.
- See also 3346, 4223, 4267, 4382.
- 32c. Autonomic and cardiovascular drugs
- 4167 Aboul-Enein, H.Y. and Serignese, V.: Role of solvents in the resolution of some beta-adrenergic blockers on cellulose 3,5-dimethylphenyl carbamate chiral stationary phase. *J. Liq. Chromatogr.*, 16 (1993) 197-207.
- 4168 Asakura, M., Nagakura, A., Tarui, S. and Matsumura, R.: Simultaneous determination of the enantiomers of pimobendan and its main metabolite in rat plasma by high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 135-141.
- 4169 Botterblom, M.H.A., Feenstra, M.G.P. and Erdtsieck-Ernste, E.B.H.W.: Determination of propranolol, labetalol and clenbuterol in rat brain by high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 121-126.
- 4170 Brent Miller, R., Dadgar, D. and Lalande, M.: High-performance liquid chromatographic method for the determination of indapamide in human whole blood. *J. Chromatogr.*, 614 (1993) 293-298.
- 4171 Chalermchaikit, T., Felice, L.J. and Murphy, M.J.: Simultaneous determination of eight anticoagulant rodenticides in blood serum and liver. *J. Anal. Toxicol.*, 17 (1993) 56-61; C.A., 118 (1993) 118375j.
- 4172 Chaudhary, R.S., Gangwal, S.S., Avachat, M.K., Shah, Y.N. and Jindal, K.C.: Determination of diltiazem hydrochloride in human serum by high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 261-266.
- 4173 De Lorenzi, E., Fell, A.F., Caccialanza, G., Massolini, G. and Kitsos, M.: Design of chiral LC separations for calcium antagonists on  $\alpha_1$ -acid glycoprotein and ovomucoid columns. *J. Pharm. Biomed. Anal.*, 10 (1992) 909-915.
- 4174 Echizen, H., Kawasaki, H., Chiba, K., Tani, M. and Ishizaki, T.: A potent inhibitory effect of erythromycin and other macrolide antibiotics on the mono-N-dealkylation metabolism of disopyramide with human liver microsomes. *J. Pharmacol. Exp. Ther.*, 264 (1993) 1425-1431.
- 4175 Eller, T.D., Walle, U.K. and Walle, T.: Immunoaffinity isolation of the sulfate conjugate of 4'-hydroxypropranolol from plasma. *J. Chromatogr.*, 612 (1993) 320-325.
- 4176 Fischer, C., Schönberger, F., Mück, W., Heuck, K. and Eichelbaum, M.: Simultaneous assessment of the intravenous and oral disposition of the enantiomers of racemic nimodipine by chiral stationary-phase high-performance liquid chromatography and gas chromatography/mass spectroscopy combined with a stable isotope technique. *J. Pharm. Sci.*, 82 (1993) 244-250.
- 4177 Fiset, C., Philippon, F., Gilbert, M. and Turgeon, J.: Stereoselective high-performance liquid chromatographic assay for the determination of sotalol enantiomers in biological fluids. *J. Chromatogr.*, 612 (1993) 231-237.
- 4178 Fox, S.D., Shaw, G.L., Caporaso, N.E., Welsh, S.E., Mellini, D.W., Falk, R. and Issaq, H.J.: The determination of debrisoquine and its 4-hydroxy metabolite in urine by capillary gas chromatography and high performance liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1315-1327.
- 4179 Fujimoto, H., Nishino, I., Ueno, K. and Umeda, T.: Determination of the enantiomers of a new 1,4-dihydropyridine calcium antagonist in dog plasma by achiral/chiral coupled high-performance liquid chromatography with electrochemical detection. *J. Pharm. Sci.*, 82 (1993) 319-322.
- 4180 Fujita, S., Umeda, S., Funae, Y., Imaoka, S., Abe, H., Ishida, R., Adachi, T., Masuda, M., Kazusaka, A. and Suzuki, T.: Regio- and stereoselective propranolol metabolism by 15 forms of purified cytochromes P-450 from rat liver. *J. Pharmacol. Exp. Ther.*, 264 (1993) 226-233.
- 4181 Gallo, B.V., Hinson, J.L. and Weidler, D.J.: Pharmacokinetic profile of flecainide in patients with compromised renal function. *J. Pharm. Sci.*, 82 (1993) 282-285.
- 4182 Herring, V.L. and Johnson, J.A.: Direct high-performance liquid chromatographic determination in urine of the enantiomers of propranolol and its major basic metabolite 4-hydroxypropranolol. *J. Chromatogr.*, 612 (1993) 215-221.

- 4183 Hezari, M. and Davis, P.J.: Microbial models of mammalian metabolism. Furosemide glucoside formation using the fungus *Cunninghamella elegans*. *Drug Metab. Disp.*, 21 (1993) 259-267.
- 4184 Hogan, L. and Weimann, M.D.: Rapid quantification of quinidine in porcine serum by microbore HPLC with fluorescence detection. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2323-2324.
- 4185 Hubert, P., Chiap, P., Ceccato, A., Bechet, I., Sibenaler-Dechamps, R., Maes, P. and Crommen, J.: Determination of verapamil and norverapamil in human plasma by liquid chromatography: comparison between a liquid-liquid extraction procedure and an automated liquid-solid extraction method for sample preparation. *J. Pharm. Biomed. Anal.*, 10 (1992) 937-942.
- 4186 Jandreski, M.A. and Vanderslice, W.E.: Clinical measurement of serum amiodarone and desethylamiodarone by using solid-phase extraction followed by HPLC with a high-carbon reversed-phase column. *Clin. Chem. (Winston-Salem)*, 39 (1993) 496-500.
- 4187 Jankowski, A., Marzec, A. and Lamparczyk, H.: Comparative bioavailability of verapamil from rapidly absorbed and slow release preparations. *J. Pharm. Biomed. Anal.*, 10 (1992) 1101-1103.
- 4188 Kim, N.-S., Umejima, H., Ito, T., Uchida, T. and Goto, S.: Preparation and evaluation of Eudragit gels. V. Rectal gel preparations for sustained release and avoidance of first-pass metabolism of lidocaine. *Chem. Pharm. Bull.*, 40 (1992) 2800-2804.
- 4189 Krause, W., Düsterberg, B., Jacobs, U. and Hoyer, G.-A.: Bio-transformation of proterguride in the perfused rat liver. *Drug Metab. Disp.*, 21 (1993) 203-208.
- 4190 Lacroix, P.M., Curran, N.M. and Lovering, E.G.: Nadolol: high-pressure liquid chromatographic methods for assay, racemate composition and related compounds. *J. Pharm. Biomed. Anal.*, 10 (1992) 917-924.
- 4191 Lai, F., Mayer, A. and Sheehan, T.: Chiral separation and detection enhancement of propranolol using automated pre-column derivatization. *J. Pharm. Biomed. Anal.*, 11 (1993) 117-120.
- 4192 Lamarter, E.: High-performance liquid chromatographic determination of mexiletine in film-coated tablets using a new polymeric stationary phase. *J. Chromatogr.*, 635 (1993) 155-159.
- 4193 Mamolo, M.G., Vio, L. and Furlan, G.: Simultaneous determination of amiodarone and desmethylamiodarone in human plasma by high performance liquid chromatography. *Farmaco*, 47 (1992) 1067-1080; C.A., 118 (1993) 93687x.
- 4194 Maurin, M.B., Vickery, R.D., Ma, P., Manalo, J. and Hussain, M.A.: Employing ionization behaviors to resolve a trace-level impurity: determination of 1,4-dihydro-2,6-dimethyl-4-(3-nitrophenyl)-3,5-pyridinedicarboxylic acid di-2-(methyl(phenylmethyl)amino)ethyl ester in nicardipine drug substance. *Pharm. Res.*, 9 (1992) 1518-1520; C.A., 118 (1993) 87735v.
- 4195 Miller, R.B.: A validated high-performance liquid chromatographic method for the determination of acebutolol and diacetolol in human plasma. *J. Liq. Chromatogr.*, 15 (1992) 3233-3245.
- 4196 Morris, R.G., Sallustio, B.C., Saccoia, N.C., Mangas, S., Ferguson, L.K. and Kassapidis, C.: Application of an improved HPLC perhexiline assay to human plasma specimens. *J. Liq. Chromatogr.*, 15 (1992) 3219-3232.
- 4197 Nishi, H., Fujimura, N., Yamaguchi, H. and Fukuyama, T.: Direct enantiomeric separation of racemic precursors to diltiazem hydrochloride and clentiazem maleate by HPLC on a chiral ovomucoid column. *Chromatographia*, 35 (1993) 305-310.
- 4198 Nishi, H., Fujimura, N., Yamaguchi, H. and Fukuyama, T.: Direct high-performance liquid chromatographic separation of the enantiomers of diltiazem hydrochloride and its 8-chloro derivative on a chiral ovomucoid column. *J. Chromatogr.*, 633 (1993) 89-96.
- 4199 Okuda, T., Aoki, I., Motohashi, M. and Yashiki, T.: Sensitive high-performance liquid chromatographic determination of 2,2'-[(2-aminoethyl)imino]diethanol bis(butylcarbamate) and its metabolites in human serum following pre-column derivatization with o-phthalaldehyde and stabilization of the derivatives. *J. Chromatogr.*, 612 (1993) 263-268.
- 4200 Olah, T.V., Gilbert, J.D. and Barrish, A.: Determination of the  $\beta$ -adrenergic blocker timolol in plasma by liquid chromatography-atmospheric pressure chemical ionization mass spectrometry. *J. Pharm. Biomed. Anal.*, 11 (1993) 157-163.
- 4201 Olsen, L., Bronnum-Hansen, K., Helboe, P., Jorgensen, G.H. and Kryger, S.: Chiral separations of  $\beta$ -blocking drug substances using derivatization with chiral reagents and normal-phase high-performance liquid chromatography. *J. Chromatogr.*, 636 (1993) 231-241.
- 4202 Plomp, T.A. and Buijs, M.J.H.: High-performance liquid chromatographic method for the simultaneous determination of pentisomide and its major metabolite N-desisopropylpentisomide in plasma, urine and tissues using solid-phase extraction. *J. Chromatogr.*, 612 (1993) 123-135.
- 4203 Quaglia, M.G., Farina, A. and Bossu, E.: Analysis of ICI 118551, a new  $\beta_2$  blocking drug, and related compounds by RP-HPLC-DAD. *J. Pharm. Biomed. Anal.*, 10 (1992) 1081-1084.
- 4204 Rau, H.L., Aroor, A.R. and Rao, P.G.: Simultaneous determination of terbutaline sulphate and etofylline in combined dosage forms. *Indian J. Pharm. Sci.*, 54 (1992) 77-79; C.A., 118 (1993) 109856q.
- 4205 Reid, R.W., Deakin, A. and Leehey, D.J.: Measurement of naloxone in plasma using high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 614 (1993) 117-122.
- 4206 Renberg, L. and Hoffmann, K.-J.: Determination of a renin inhibitor in plasma by solid-phase extraction using acetone as protein binding displacer followed by on-line high-performance liquid chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 959-963.
- 4207 Rondelli, I., Mariotti, F., Acerbi, D., Redenti, E., Amari, G. and Ventura, P.: Selective method for plasma quantitation of the stereoisomers of a new aminotetralin by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 612 (1993) 95-103.
- 4208 Rutledge, D.R., Abadi, A.H., Lopez, L.M. and Beaudereau, C.A.: High-performance liquid chromatographic determination of diltiazem and two of its metabolites in plasma using a short alkyl chain silanol deactivated column. *J. Chromatogr.*, 615 (1993) 111-116.

- 4209 Sakamoto, T., Otake, Y., Itoh, M., Tabata, S., Kuriki, T. and Uno, K.: Determination of felodipine enantiomers using chiral stationary phase liquid chromatography and gas chromatography/mass spectrometry, and the study of their pharmacokinetic profiles in human and dog. *Biomed. Chromatogr.*, 7 (1993) 99-103.
- 4210 Siren, H., Saarinen, M., Nainari, S., Lukkari, P. and Riekola, M.-L.: Screening of  $\beta$ -blockers in human serum by ion-pair chromatography and their identification as methyl or acetyl derivatives by gas chromatography-mass spectrometry. *J. Chromatogr.*, 632 (1993) 215-227.
- 4211 Thomassin, J., Battaglia, R., Allievi, C., Castelli, M.G. and Benedetti, M.S.: In vivo glucuronidation in rat and humans of 5,6-dihydro-7(1H-imidazol-1-yl)-naphthalene-2-carboxylic acid, a selective inhibitor of thromboxane synthase. *Drug Metab. Disp.*, 21 (1993) 151-155.
- 4212 Vandebosch, C., Massart, D.L., Egginger, G. and Lindner, W.: Liquid chromatographic methods for the chiral separation of  $\beta$ -adrenergic blocking agents. *TrAC*, 12 (1993) 168-177 - a review with 50 refs.
- 4213 Vuagnat, A., Goedel-Meinen, L., Gries, E., Hofmann, M., Presch, A. and Blömer, H.: Stability of amiodarone in serum samples under various storage conditions. *Arzneim.-Forsch.*, 43 (1993) 327-330.
- 4214 Wainer, I.W.: The impact of new liquid chromatography chiral stationary phase technology on the study of stereoselective pharmacokinetics. *TrAC*, 12 (1993) 153-158.
- 4215 Walle, T., Walle, U.K., Thornburg, K.R. and Schey, K.L.: Stereoselective sulfation of albuterol in humans. Biosynthesis of the sulfate conjugate by HEP G2 cells. *Drug Metab. Disp.*, 21 (1993) 76-80.
- 4216 Wallerstein, S., Csérháti, T. and Fischer, J.: Determination of the lipophilicity of some anti-hypoxia drugs: comparison of TLC and HPLC methods. *Chromatographia*, 35 (1993) 275-280.
- 4217 Wolf, B.: Beiträge zur Analytik von Prazosin-Hydrochlorid. *Pharmazie*, 48 (1993) 223-224.
- For additional information see C.A.:  
118 (1993) 73009z.
- See also 3186, 4039, 4156, 4286.
- 32d. Central nervous system drugs
- 4218 Aboul-Enein, H.Y. and Islam, M.R.: Enantiomeric separation of ketamine hydrochloride in pharmaceutical formulation and human serum by chiral liquid chromatography. *J. Liq. Chromatogr.*, 15 (1992) 3285-3293.
- 4219 Aden Abdi, Y.A., Villén, T., Gustafsson, L.L., Ericsson, Ö. and Sjöqvist, F.: Methodological commentary on the analysis of mefloquine and dichlorvos in biological samples. *J. Chromatogr.*, 612 (1993) 336-337.
- 4220 Altmayer, P., Büch, U., Büch, H.P. and Larsen, R.: Rapid and sensitive pre-column extraction high-performance liquid chromatographic assay for propofol in biological fluids. *J. Chromatogr.*, 612 (1993) 326-330.
- 4221 Bahal, N. and Nahata, M.C.: Determination of phenytoin and its major metabolite, 5-(*p*-hydroxyphenyl)-5-phenylhydantoin in urine by high-performance liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1135-1142.
- 4222 Bechet, I., Ceccato, A., Hubert, P., Herné, P. and Crommen, J.: Determination of meprobamate in pharmaceutical dosage forms also containing carbromal by liquid chromatography and indirect photometric detection. *J. Pharm. Biomed. Anal.*, 10 (1992) 995-999.
- 4223 Chaudhary, R.S., Gangwal, S.S., Jindal, K.C. and Khanna, S.: Reversed-phase high-performance liquid chromatography of ketorolac and its application to bioequivalence studies in human serum. *J. Chromatogr.*, 614 (1993) 180-184.
- 4224 Cheret, J.P., van Soest, R.E.J. and Salzmann, J.P.: Recent advances in capillary liquid chromatography. Enhanced detectability in bioanalysis. *LC-GC*, 10 (1992) 866-871; C.A., 118 (1993) 32435s.
- 4225 Chuang, S.F., Chen, F.S., Li, J.H., Liao, C.H. and Chen, G.L.: The HPLC stability indicating method for codeine phosphate. *Zhonghua Yaoxue Zazhi*, 44 (1992) 487-493; C.A., 118 (1993) 87539j.
- 4226 Chung, M.-C., Lin, S.-K., Chang, W.-H. and Jann, M.W.: Determination of clozapine and desmethylclozapine in human plasma by high-performance liquid chromatography with ultraviolet detection. *J. Chromatogr.*, 613 (1993) 168-173.
- 4227 Čížmárik, J., Lehotay, J., Pham Thi Viet Nga and Bednáříková, A.: Study of local anesthetics. Part 101: Correlation between *k'* and values of surface and infiltration anesthesia activity. *Pharmazie*, 48 (1993) 149-150.
- 4228 Clement, B., Lustig, K.L. and Ziegler, D.M.: Oxidation of desmethylpromethazine catalyzed by pig liver flavin-containing monooxygenase. Number and nature of metabolites. *Drug Metab. Disp.*, 21 (1993) 24-29.
- 4229 Demotes-Mainard, F., Thomas, J., Bosc, J.J., Devaux, G. and Jarry, C.: RP-HPLC of new antidepressant 2-amino-2-oxazolines: a comparative study of their lipophilicity. *J. Liq. Chromatogr.*, 16 (1993) 767-776.
- 4230 Diquet, B., Thomaré, P., Bocquentin, M. and Diviné, C.: Drug monitoring of clomipramine and desmethylclomipramine in depressed patients using a new liquid chromatographic assay. *Biomed. Chromatogr.*, 7 (1993) 59-63.
- 4231 Dutton, J., Copeland, L.G., Playfer, J.R. and Roberts, N.B.: Measuring L-dopa in plasma and urine to monitor therapy of elderly patients with Parkinson disease treated with L-dopa and a dopa decarboxylase inhibitor. *Clin. Chem. (Winston-Salem)*, 39 (1993) 629-634.
- 4232 Elsing, B. and Blaschke, G.: Achiral and chiral high-performance liquid chromatographic determination of tramadol and its major metabolites in urine after oral administration of racemic tramadol. *J. Chromatogr.*, 612 (1993) 223-230.
- 4233 Fang, J. and Gorrod, J.W.: High-performance liquid chromatographic method for the detection and quantitation of haloperidol and seven of its metabolites in microsomal preparations. *J. Chromatogr.*, 614 (1993) 267-273.
- 4234 Farina, A., Doldo, A. and Quaglia, M.G.: Analysis of new serotonergic anxiolytics by liquid chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 889-893.
- 4235 Fazio, A., Artesi, C., Russo, M., Trio, R., Oteri, G. and Pisani, F.: A liquid chromatographic assay using a high-speed column for the determination of lamotrigine, a new antiepileptic drug, in human plasma. *Ther. Drug Monit.*, 14 (1992) 509-512; C.A., 118 (1993) 93715e.

- 4236 Fisher, D.H. and Bourque, A.J.: Quantification of amphetamine in urine: solid-phase extraction, polymeric-reagent derivatization and reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 142-147.
- 4237 Franz, P.M., Mattiuz, E.L., Hatcher, B.L., Desante, K.A., Breau, A.P., Occolowitz, J.L., Dorman, D.E., Schmid, C.R., Goldberg, M.J. and Rubin, A.: Disposition of zatosetron, a serotonin (5-HT<sub>3</sub>) receptor antagonist, in humans. *Drug Metab. Disp.*, 21 (1993) 249-254.
- 4238 Franzelius, C. and Besserer, K.: Identification and quantitation of intact diastereoisomeric benzodiazepine glucuronides in biological samples by high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 162-167.
- 4239 Fujima, H., Wada, H., Miwa, T. and Haginiaka, J.: Chiral separation of lorazepam on ovomucoid-bonded columns: peak coalescence due to racemization. *J. Liq. Chromatogr.*, 16 (1993) 879-891.
- 4240 Goldnik, A., Gajewska, M. and Ostaszewska, B.: Measurement of some antidepressants in body fluids by high performance liquid chromatography. *Acta Pol. Pharm.*, 48 (1991) 5-7; C.A., 118 (1993) 93721d.
- 4241 Guichard, J., Panteix, G., Dubost, J., Baltassat, P. and Roche, C.: Simultaneous high-performance liquid chromatographic assay of droperidol and flunitrazepam in human plasma. Application to haemodilution blood samples collected during clinical anaesthesia. *J. Chromatogr.*, 612 (1993) 269-275.
- 4242 Guiso, G., Confalonieri, S., Caccia, S. and Kelly, R.G.: Post-column derivatization and fluorimetric detection for the liquid chromatographic analysis of the potential memory-enhancing agent CL 275,838 in human plasma. *Farmaco*, 47 (1992) 1215-1223; C.A., 118 (1993) 139096.
- 4243 Hamilton, C.L. and Cornpropst, J.D.: Determination of dapoxetine, an investigational agent with the potential for treating depression, and its mono- and di-desmethyl metabolites in human plasma using column-switching high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 253-261.
- 4244 Hamilton, C.L., Kirkwood, J.A., Carter, G. and Williams, R.S.: Sensitive liquid chromatographic method for the determination of a specific M1 agonist, LY246708, an investigational agent with potential for the treatment of Alzheimer's disease, in human plasma. *J. Chromatogr.*, 613 (1993) 365-370.
- 4245 Herbranson, D.E. and Kriss-Danziger, P.: Development and validation of a high performance liquid chromatographic (HPLC) method for the determination of phenytoin prodrug (fosphephenytoin) in solutions, parenteral formulations, and active drug substance. *J. Liq. Chromatogr.*, 16 (1993) 1143-1161.
- 4246 Hussein, Z., Chu, S.-y. and Granneman, G.R.: Enantioselective determination of DN-2317, a novel nonbenzodiazepine anxiolytic, and/or its active metabolite in human plasma and urine using high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 113-120.
- 4247 Hussein, Z., Chu, S.-y. and Granneman, G.R.: High-performance liquid chromatographic method for determination of DN-2327, a novel non-benzodiazepine anxiolytic, and/or its active metabolite in human plasma and urine. *J. Chromatogr.*, 613 (1993) 105-112.
- 4248 Hwang, P.T.R., Young, D.A., Straughn, A.B. and Meyer, M.C.: Quantitative determination of cyclobenzaprine in human plasma by high pressure liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1163-1171.
- 4249 Jacala, A., Adusumalli, V.E., Kucharczyk, N. and Sofia, R.D.: Determination of the anticonvulsant felbamate and its three metabolites in brain and heart tissue of rats. *J. Chromatogr.*, 614 (1993) 285-292.
- 4250 Jira, T., Vogt, C., Blaschke, G. and Beyrich, T.: HPLC-Trennung chiraler Benz-1,4-diazepine. *Pharmazie*, 48 (1993) 196-198.
- 4251 Kamath, B.V., Shivram, K., Newalker, B.L. and Shah, A.C.: Liquid chromatographic analysis and degradation kinetics of famotidine. *J. Liq. Chromatogr.*, 16 (1993) 1007-1014.
- 4252 Kramer Nielsen, K. and Brosen, K.: High-performance liquid chromatography of imipramine and six metabolites in human plasma and urine. *J. Chromatogr.*, 612 (1993) 87-94.
- 4253 Kudelin, B.K., Gavrilina, L.V. and Kaminski, Yu.L.: Isotope effects in liquid chromatography of imipramine and desmethylimipramine. *J. Chromatogr.*, 636 (1993) 243-247.
- 4254 Le Moing, J.P., Edouard, S. and Levron, J.C.: Determination of risperidone and 9-hydroxyrisperidone in human plasma by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 614 (1993) 333-339.
- 4255 Lippmann, T., Hartenstein, H. and Sicker, D.: Enantiomeric separation of close analogs to naturally occurring 1,4-benzoxazin-3-ones by liquid chromatography using  $\beta$ -cyclodextrin-modified stationary phase. *Chromatographia*, 35 (1993) 302-304.
- 4256 Liu, H., Montoya, J.L., Forman, L.J., Eggers, C.M., Barham, C.F. and Delgado, M.: Determination of free valproic acid: evaluation of the Centrifree system and comparison between high-performance liquid chromatography and enzyme immunoassay. *Ther. Drug Monit.*, 14 (1992) 513-521; C.A., 118 (1993) 93716f.
- 4257 Malkki, L. and Tammilehto, S.: Optimization of the separation of salbutamol and its decomposition products by liquid chromatography with diode-array detection. *J. Pharm. Biomed. Anal.*, 11 (1993) 79-84.
- 4258 Maya, M.T., Farinha, A.R., Lucas, A.M. and Morais, J.A.: Sensitive method for the determination of phenytoin in plasma, and phenytoin and 5-(4-hydroxyphenyl)-5-phenylhydantoin in urine by high-performance liquid chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 1001-1006.
- 4259 Miller, R.B. and Vranderick, M.: A validated HPLC method for the determination of carbamazepine and carbamazepine 10,11-epoxide in human plasma. *J. Liq. Chromatogr.*, 16 (1993) 1249-1261.
- 4260 Murata, H., Okabe, K., Harada, K.-I., Suzuki, M., Inagaki, K., Nagano, H., Akita, T., Yoshida, S., Matsuda, M. and Ishigure, H.: Quantification of pentazocine in human plasma by HPLC with electrochemical detection. *J. Liq. Chromatogr.*, 15 (1992) 3247-3260.
- 4261 Nishikata, M., Nakai, A., Fushida, H., Miyake, K., Arita, T., Iseki, K., Miyazaki, K. and Nomura, A.: Enantioselective pharmacokinetics of homochlorcyclizine. III. Simultaneous determination of (+)- and (-)-homochlorcyclizine in human urine by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 239-244.
- 4262 Ohkubo, T., Shimoyama, R. and Sugawara, K.: Determination of chlorpromazine in human breast milk and serum by high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 328-332.
- 4263 Oliveros, L., Minguillon, C. and Billaud, C.: Resolution of several racemic 3-hydroxy-1,4-benzodiazepin-2-ones by high-performance liquid chromatography on a chiral silica-bonded stationary phase. *J. Pharm. Biomed. Anal.*, 10 (1992) 925-930.

- 4264 Ryan, T.W.: Resolution of the non-specific spectra of barbiturates by UV-photodiode array detection. *J. Liq. Chromatogr.*, 16 (1993) 315-329.
- 4265 Ryan, T.W.: Resolution of the non-specific spectra of barbiturates by UV-photodiode array detection. II. Effects of sample concentration on spectral matching accuracy. *J. Liq. Chromatogr.*, 16 (1993) 33-49.
- 4266 Schleyer, E., Lohmann, R., Rolf, C., Gralow, A., Kaufmann, C.C., Unterhalt, M. and Hiddemann, W.: Column-switching solid-phase trace-enrichment high-performance liquid chromatographic method for measurement of buprenorphine and norbuprenorphine in human plasma and urine by electrochemical detection. *J. Chromatogr.*, 614 (1993) 275-283.
- 4267 Sharapov, V.I., Grek, O.R., Anan'ev, E.A. and Kolpakov, M.A.: (Antipyrrine, nifedipine, diazepam pharmacokinetic peculiarities under experimental myocardial infarction). *Byull. Eksp. Biol. Med.*, 113 (1992) 381-383; C.A., 118 (1993) 51775u.
- 4268 Stiff, D.D., Frye, R.F. and Branch, R.A.: Sensitive high-performance liquid chromatographic determination of chlorzoxazone and 6-hydroxychlorzoxazone in plasma. *J. Chromatogr.*, 613 (1993) 127-131.
- 4269 Thummel, K.E., Kharasch, E.D., Podoll, T. and Kunze, K.: Human liver microsomal enflurane defluorination catalyzed by cytochrome P-450 2E1. *Drug Metab. Disp.*, 21 (1993) 350-357.
- 4270 Unni, L.K.: Methodological commentary on the analysis of me-trifonate and dichlorvos in biological samples. Reply to Aden Abdi et al. *J. Chromatogr.*, 612 (1993) 338-339.
- 4271 Vasil'eva, N.L., Kartashov, V.A. and Maloletkina, T.S.: (Use of high-pressure liquid chromatography to identify barbiturates in cadaveric material). *Sud.-Med. Ekspert.*, 35 (1992) 28-29; C.A., 118 (1993) 53697u.
- 4272 Widman, M., Nilsson, L.B., Bryske, B. and Lundström, J.: Disposition of remoxipride in different species. Species differences in metabolism. *Arzneim.-Forsch.*, 43 (1993) 287-297.
- 4273 Wikberg, T. and Taskinen, J.: Identification of major metabolites of the catechol-O-methyltransferase inhibitor nitecapone in the rat and dog. *Drug Metab. Disp.*, 21 (1993) 325-333.
- 4274 Wikberg, T., Vuorela, A., Ottoila, P. and Taskinen, J.: Identification of major metabolites of the catechol-O-methyltransferase inhibitor entacapone in rats and humans. *Drug Metab. Disp.*, 21 (1993) 81-92.
- 4275 Williams, M.G. and Zhong, W.Z.: Determination of U-65575 in rat serum by solid-phase extraction and high-performance liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 743-753.
- 4276 Zecca, L., Radice, R., Mosca, A. and Pagella, P.G.: Determination of heptylphysostigmine in plasma by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 615 (1993) 169-173.
- 4277 Zhang, H. and Stewart, J.T.: Improved high performance liquid chromatographic determination of chlorzoxazone and its hydroxy metabolite in human serum and urine. *Anal. Lett.*, 26 (1993) 675-687.
- 4278 Alvinerie, M., Sutra, J.F., Eeckhoutte, C., Galtier, P., van't Klooster, G.A.E. and van Miert, A.S.J.P.A.M.: Determination of aditoprim and its oxidative metabolites in plasma and microsomal incubation mixtures by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 115-121.
- 4279 Béres, A., Wassermann, O., Bruhn, T., Béress, L., Kraiselburd, E.N., Gonzalez, L.V., de Motta, G.E. and Chavaz, P.I.: A new procedure for the isolation of anti-HIV compounds (polysaccharides and polyphenols) from the marine alga *Fucus vesiculosus*. *J. Natural Prod.*, 56 (1993) 478-488.
- 4280 Campanella, L., Sammartino, M.P., Sbrilli, R. and Tomassetti, M.: Analytical comparison of an enzyme-amperometric method for chlor cresol determination in ointments with colorimetry and liquid chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 751-755.
- 4281 Ching, C.B., Lim, B.G., Lee, E.J.D. and Ng, S.C.: Preparative resolution of praziquantel enantiomers by simulated counter-current chromatography. *J. Chromatogr.*, 634 (1993) 215-219.
- 4282 Di Pietra, A.M., Cavrini, V., Andrisano, V. and Gatti, R.: HPLC Analysis of imidazole antimycotic drugs in pharmaceutical formulations. *J. Pharm. Biomed. Anal.*, 10 (1992) 873-879.
- 4283 Dua, V.K., Sarin, R. and Prakash, A.: Determination of quinine in serum, plasma, red blood cells and whole blood in healthy and *Plasmodium falciparum* malaria cases by high-performance liquid chromatography. *J. Chromatogr.*, 614 (1993) 87-93.
- 4284 Duke, P.D., Weiss, G. and MacDonald, A.: Liquid chromatographic method for the simultaneous analysis of sulfadimethoxine and ormetoprim in animal feeds. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 320-324.
- 4285 El-Dareer, S.M., Tillary, K.F., Rose, L.M., Posey, C.F., Struck, R.F., Stiller, S.W. and Hill, D.L.: Metabolism and disposition of a thiazolobenzimidazole active against human immunodeficiency virus-1. *Drug Metab. Disp.*, 21 (1993) 231-235.
- 4286 Gallo, J.M., Swagler, A.R., Mehta, M. and Qian, M.: Pharmacokinetic evaluation of drug interactions with antihuman immunodeficiency virus drugs. VI. Effect of the calcium channel blocker nimodipine on zidovudine kinetics in monkeys. *J. Pharmacol. Exp. Ther.*, 264 (1993) 315-320.
- 4287 Gentleman, M.S., Burt, H.M., Kitts, D.D. and McErlane, K.M.: High-performance liquid chromatographic determination of sulphydiazine and trimethoprim in Chinook salmon muscle tissue. *J. Chromatogr.*, 633 (1993) 105-110.
- 4288 González-Esquível, D.F., Okuno, C.M., Rodriguez, M.S., Morales, J.S. and Cook, H.J.: Sensitive high-performance liquid chromatographic assay for praziquantel in plasma, urine and liver homogenates. *J. Chromatogr.*, 613 (1993) 174-178.
- 4289 Lam, Y.W.F., Chan, D.C.N., Rodriguez, S.Y., Lintakoon, J.H. and Lam, T.-H.: Sensitive high-performance liquid chromatographic assay for the determination of chlorhexidine in saliva. *J. Chromatogr.*, 612 (1993) 166-171.
- 4290 Landuyt, J., Debackere, M., Delbeke, F. and McKellar, Q.: A high performance liquid chromatographic method for the determination of febantel and its major metabolites in lamb plasma. *Biomed. Chromatogr.*, 7 (1993) 78-81.

For additional information see C.A.:

118 (1993) 87527d, 109882v, 118409y, 118410s, 132278m, 132280f.

See also 3056, 3067, 3186, 4138, 4140, 4143, 4149, 4150, 4160, 4369.

- 4291 Leadbetter, M.G. and Matusik, J.E.: Liquid chromatographic determination and liquid chromatographic-thermospray mass spectrometric confirmation of nicarbazin in chicken tissues: interlaboratory study. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 420-423.
- 4292 Lemnge, M.M., Rønn, A., Flachs, H. and Bygbjerg, I.C.: Simultaneous determination of dapsone, monoacetyl dapsone and pyrimethamine in whole blood and plasma by high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 340-346.
- 4293 Markus, J.R. and Sherma, J.: Method I. Liquid chromatographic determination of tiamulin hydrogen fumarate in feed premixes. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 444-446.
- 4294 Markus, J.R. and Sherma, J.: Method II. Liquid chromatographic determination of tiamulin hydrogen fumarate in tiamulin-poly(vinyl chloride) formulations. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 447-448.
- 4295 Markus, J.R. and Sherma, J.: Method III. Liquid chromatographic determination of tiamulin hydrogen fumarate in complete swine meal feeds. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 449-450.
- 4296 Mengelers, M.J.B., Polman, A.M.M., Aerts, M.M.L., Kuiper, H.A. and van Miert, A.S.J.P.A.M.: Determination of sulfadimethoxine, sulfamethoxazole, trimethoprim and their main metabolites in lung and edible tissues from pigs by multi-dimensional liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 257-278.
- 4297 Mineo, H. and Kaneko, S.: An analytical study of antibacterial residues in meat: the simultaneous determination of 23 antibiotics and 13 drugs using gas chromatography. *Vet. Hum. Toxicol.*, 34 (1992) 393-397; *C.A.*, 118 (1993) 58283r.
- 4298 Parkin, J.E.: Salting-out solvent extraction for pre-concentration of benzalkonium chloride prior to high-performance liquid chromatography. *J. Chromatogr.*, 635 (1993) 75-80.
- 4299 Pfaff, G., Zimmermann, T., Lach, P., Yates, R., Simon, G. and Wildfeuer, A.: Pharmacokinetics and tolerance of fluconazole suppositories in healthy volunteers. *Arzneim.-Forsch.*, 43 (1993) 391-395.
- 4300 Schenck, F.J., Wagner, R. and Bargo, W.: Determination of clorsulon residues in milk using a solid-phase extraction cleanup and liquid chromatographic determination. *J. Liq. Chromatogr.*, 16 (1993) 513-520.
- 4301 Steenbaar, J.G., Hajee, C.A.J. and Haagsma, N.: High-performance liquid chromatographic determination of the anthelmintic mebendazole in eel muscle tissue. *J. Chromatogr.*, 615 (1993) 186-190.
- 4302 Tarbin, J.A. and Shearer, G.: High-performance liquid chromatographic method for the determination of the anthelmintic nitroxynil in cattle muscle tissue with on-line anion-exchange clean-up. *J. Chromatogr.*, 613 (1993) 347-353.
- 4303 Tarbin, J.A. and Shearer, G.: High-performance liquid chromatographic method for the determination of the dinitrocarbanilide component of nicarbazin in eggs with on-line clean-up. *J. Chromatogr.*, 613 (1993) 354-358.
- 4304 Taylor, R.B., Reid, R.G., Behrens, R.H. and Kanfer, I.: Multidrug assay method for antimalarials. *J. Pharm. Biomed. Anal.*, 10 (1992) 867-871.
- 4305 Wang, Y.: (High-)performance liquid chromatographic (HPLC) method for determination of thiabendazole residues in fruit. *Sepu*, 10 (1992) 354-356; *C.A.*, 118 (1993) 79573a.
- 4306 Wong, S.L., van Belle, K. and Sawchuk, R.J.: Distributional transport kinetics of zidovudine between plasma and brain extracellular fluid-cerebrospinal fluid in the rabbit: investigation of the inhibitory effect of probenecid utilizing microdialysis. *J. Pharmacol. Exp. Ther.*, 264 (1993) 899-909.
- 4307 Woolf, E., Fu, I. and Matuszewski, B.: The determination of 3-amino-5-ethyl-6-methyl-pyridin-2-one in human plasma by high performance liquid chromatography with fluorescence detection. *J. Liq. Chromatogr.*, 16 (1993) 1209-1222.
- 4308 Woolf, E.J. and Matuszewski, B.K.: Column-switching high-performance liquid chromatographic determination of a 2-pyridone-based human immunodeficiency virus type 1 (HIV-1)-specific reverse transcriptase inhibitor in human plasma. *Pharm. Res.*, 10 (1993) 56-60; *C.A.*, 118 (1993) 93708e.

See also 3922, 4044, 4058, 4110, 4352, 4384.

### 32f. Cytostatics

- 4309 Bakes, D.M., Turner, N.D., Gordon, B.H., Hiley, M.P., Walther, B. and Lucas, C.: Method for the analysis of S9788, a drug to reverse resistance to anticancer agents, in animal plasma and human plasma and serum by high-performance liquid chromatography with ultraviolet detection. *J. Chromatogr.*, 615 (1993) 117-126.
- 4310 Blaney, S.M., Cole, D.E., Balis, F.M., Godwin, K. and Poplack, D.G.: Plasma and cerebrospinal fluid pharmacokinetic study of topotecan in nonhuman primates. *Cancer Res.*, 53 (1993) 725-727.
- 4311 Brandsteterová, E., Kelner, M.J., McMorris, T.C., Wang, W. and Bangell, R.: HPLC analysis of novel anti-cancer agents-illudins and their analogs. *J. Liq. Chromatogr.*, 16 (1993) 115-125.
- 4312 Bullen, W.W., Andress, L.D., Chang, T., Whitfield, L.R., Welch, M.L. and Newman, R.A.: A high-performance liquid chromatographic assay for Cl-973, a new anticancer platinum diamine complex, in human plasma and urine ultrafiltrates. *Cancer Chemother. Pharmacol.*, 30 (1992) 193-198; *C.A.*, 118 (1993) 32429t.
- 4313 Cummings, J., Chirrey, L., Willmott, N., Halbert, G.W. and Smyth, J.F.: Determination of mitomycin C, 2,7-diaminomitosen, 1,2-cis- and 1,2-trans-1-hydroxy-2,7-diaminomitosen in tumour tissue by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 105-113.
- 4314 Czejka, M.J., Jäger, W., Schüller, J., Fogl, U., Weiss, C. and Schernthaner, G.: Clinical pharmacokinetics of 5-fluorouracil. Influence of the biomodulating agents interferon, dipyridamole and folic acid alone and in combination. *Arzneim.-Forsch.*, 43 (1993) 387-390.
- 4315 Digua, K., Kauffmann, J.-M., Ghanem, G. and Patriarche, G.J.: Determination of cis-platin in human plasma by HPLC with a glassy carbon-based wall-jet amperometric detector. *J. Liq. Chromatogr.*, 15 (1992) 3295-3313.
- 4316 Extra, J.-M., Rousseau, F., Bruno, R., Clavel, M., le Bail, N. and Marty, M.: Phase I and pharmacokinetic study of taxotere (RP 56976; NSC 628503) given as a short intravenous infusion. *Cancer Res.*, 53 (1993) 1037-1042.
- 4317 Fornstedt, T.: Peak distortion effects of suramin due to large system peaks in bioanalysis using ion-pair adsorption chromatography. *J. Chromatogr.*, 612 (1993) 137-144.

- 4318 Galushko, S.V. and Shishkina, I.P.: Simultaneous determination of 6-azacytidine, 6-azauridine, arabinoside cytosine and arabinoside uracil in blood by liquid chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 1093-1095.
- 4319 Garcia, L.L. and Shihabi, Z.K.: Suramin determination by direct serum injection. *J. Liq. Chromatogr.*, 16 (1993) 1279-1288.
- 4320 Giannola, L.I., di Stefano, V. and de Caro, V.: White beewachs microspheres: a comparative *in vitro* evaluation of cumulative release of the anticancer agents fluorouracil and flotafur. *Pharmazie*, 48 (1993) 123-126.
- 4321 Godeneche, D., Labarre, P., Moreau, M.F., Madelmont, J.C., Rapp, M., Papon, J. and Veyre, A.: Main urinary metabolites of two cysteamine-containing 2-(chloroethyl)nitrosoureas in rats. *Drug Metab. Disp.*, 21 (1993) 93-99.
- 4322 Holmes, K.A., Chaffins, S., Osborn, B.L., Liotta, L.A. and Kohn, E.C.: Quantitation of human plasma levels of the anticancer agent carboxyamidotriazole by high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 317-325.
- 4323 Kanekal, S. and Kehrer, J.P.: Evidence for peroxidase-mediated metabolism of cyclophosphamide. *Drug Metab. Disp.*, 21 (1993) 37-42.
- 4324 Kubo, H., Umiguchi, Y., Fukumoto, M. and Kinoshita, T.: Fluorimetric determination of methotrexate in serum by high-performance liquid chromatography using in-line oxidation with hydrogen peroxide. *Anal. Sci.*, 8 (1992) 789-792; C.A., 118 (1993) 51764q.
- 4325 Machida, M., Tanaka, S. and Nakamori, K.: Simultaneous determination of NK611, a novel water-soluble derivative of etoposide, and its metabolite (DeNK611) in dog plasma by column-switching high performance liquid chromatography. *Biomed. Chromatogr.*, 7 (1993) 82-85.
- 4326 Mader, R.M., Rizovski, B., Steger, G.G., Rainer, H., Proprentner, R. and Kotz, R.: Determination of methotrexate in human urine at nanomolar levels by high-performance liquid chromatography with column switching. *J. Chromatogr.*, 632 (1993) 311-316.
- 4327 Morrison, J.G., Bissett, D., Stephens, I.F.D., McKay, K., Brown, R. and Graham, M.A.: The isolation and identification of *cis*-diaminedichloroplatinum(II)-DNA adducts by anion exchange HPLC and inductively coupled plasma mass spectrometry. *Int. J. Oncol.*, 2 (1993) 33-37; C.A., 118 (1993) 116109b.
- 4328 Munck, J.-N., Rigg, M., Rougier, P., Chabot, G.G., Ramirez, L.H., Zhao, Z., Bognel, C., Ardouin, P., Herait, P. and Gouyette, A.: Pharmacokinetic and pharmacodynamic advantages of pirarubicin over adriamycin after intraarterial hepatic administration in the rabbit VX2 tumor model. *Cancer Res.*, 53 (1993) 1550-1554.
- 4329 Nicholls, G., Clark, B.J. and Brown, J.E.: Solid-phase extraction and optimized separation of doxorubicin, epirubicin, and their metabolites using reversed-phase high-performance liquid chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 949-957.
- 4330 Papadopoulou, L.C. and Tsiftsoglou, A.S.: Mitochondrial cytochrome c oxidase as a target site for daunomycin in K-562 cells and heart tissue. *Cancer Res.*, 53 (1993) 1072-1078.
- 4331 Patel, D.K., Lewis, R.P., Hinton, M.L., Schroeder, D.H., Shockcor, J.P., Johnson, R.L. and Sigel, C.W.: Pharmacokinetics and disposition in the rat of a DNA intercalator 502U83. *Drug Metab. Disp.*, 21 (1993) 62-70.
- 4332 Schilsky, R.L., Janisch, L., Berezin, F., Mick, R., Vogelzang, N.J. and Ratain, M.J.: Phase I clinical and pharmacological study of iododeoxyuridine and bleomycin in patients with advanced cancer. *Cancer Res.*, 53 (1993) 1293-1296.
- 4333 Sharifi, S., Michaelis, H.C., Lotterer, E. and Bircher, J.: Determination of coumarin, 7-hydroxycoumarin, 7-hydroxycoumarin-glucuronide, and 3-hydroxycoumarin by high-performance liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1263-1278.
- 4334 Van Gijn, R., Rosing, H., ten Bokkel Huinink, W.W., van Tellingen, O., Vermorken, J.B., Liefting, A.J.M., Bruno, R., Pinedo, H.M. and Beijnen, J.H.: Determination of intoplicine, a new antitumour drug, in human whole blood and plasma by normal-phase high-performance liquid chromatography with fluorescence detection. *J. Chromatogr.*, 614 (1993) 299-306.
- 4335 Vandenbosch, C., van Belle, S., de Smet, M., Taton, G., Bruynseels, V., Vandenhouven, G. and Massart, D.L.: Determination of leucovorin and 5-fluorouracil in plasma by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 77-85.
- 4336 Vermeulen, N.P.E., Baldew, G.S., Los, G., McVie, J.G. and de Goeij, J.J.M.: Reduction of cisplatin nephrotoxicity by sodium selenite. Lack of interaction at the pharmacokinetic level of both compounds. *Drug Metab. Disp.*, 21 (1993) 30-36.
- 4337 Ye, Y., Jiang, F. and Lu, S.: (Determination of cisplatin in tumor patient plasma by high performance liquid chromatography using copper(2<sup>+</sup>) in human blood as internal standard). *Sepu*, 11 (1993) 47-48; C.A., 118 (1993) 139118t.
- 4338 Zhao, Z., Tepperman, K., Dorsey, J.G. and Elder, R.C.: Determination of cisplatin and some possible metabolites by ion-pairing chromatography with inductively coupled plasma mass spectrometric detection. *J. Chromatogr.*, 615 (1993) 83-89.
- For additional information see C.A.:  
118 (1993) 139107p.
- See also 3242, 3891, 3945, 4370, 4377.
- 32g. Other drug categories
- 4339 Andersen, C., Balmér, K. and Lagerström, P.-O.: Enantioselective assay of warfarin in blood plasma by liquid chromatography on Chiralcel OC. *J. Chromatogr.*, 615 (1993) 159-163.
- 4340 Campins-Falcó, P., Herráez-Hernández, R. and Sevillano-Cabeza, A.: Sensitive determination of probenecid in urine samples by reversed-phase liquid chromatography and UV-visible detection using solid-phase extraction techniques for sample clean-up. *Chromatographia*, 35 (1993) 317-320.
- 4341 Campins-Falcó, P., Herráez-Hernández, R. and Sevillano-Cabeza, A.: Improved detection limits for screening of diuretics by coupled liquid chromatography and ultraviolet-visible spectrophotometry. *J. Chromatogr.*, 612 (1993) 245-251.
- 4342 Chellquist, E.M. and Dicken, C.M.: The effect of mobile phase modifiers on the simultaneous LC elution of a gadolinium complex and free ligand. *J. Pharm. Biomed. Anal.*, 11 (1993) 139-143.
- 4343 Chou, J.Z., Albeck, H. and Kreek, M.J.: Determination of nalmefene in plasma by high-performance liquid chromatography with electrochemical detection and its application in pharmacokinetic studies. *J. Chromatogr.*, 613 (1993) 359-364.

- 4344 Görög, S., Herényi, B. and Rényei, M.: Estimation of impurity profiles of drugs and related materials. Part 9: HPLC investigation of flumenicol. *J. Pharm. Biomed. Anal.*, 10 (1992) 831-835.
- 4345 Green, J.M., Jones, R., Harrison, R.D., Edwards, D.S. and Glajch, J.L.: Liquid chromatographic separation of radiopharmaceutical ligand enantiomers. *J. Chromatogr.*, 635 (1993) 203-209.
- 4346 Hauss, D.J., Martin, P.J., Mehta, S.C. and Radebaugh, G.W.: Determination of 2,2-dimethyl-N-(2,4,6-trimethoxyphenyl)-dodecanamide, a lipid regulator, in rat plasma and mesenteric lymph by reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 336-339.
- 4347 Kalafsky, G., Smith, H.T. and Choc, M.G.: High-performance liquid chromatographic method for the determination of fluvastatin in human plasma. *J. Chromatogr.*, 614 (1993) 307-313.
- 4348 Kosonen, J.P.: Determination of disodium clodronate in bulk material and pharmaceuticals by ion chromatography with post-column derivatization. *J. Pharm. Biomed. Anal.*, 10 (1992) 881-887.
- 4349 Kučová, D., Maryšková, D., Davídková, P. and Gasparič, J.: High-performance liquid chromatographic determination of methoxsalen in plasma after liquid-solid extraction. *J. Chromatogr.*, 614 (1993) 340-344.
- 4350 Lam, Y.W.F., Rodriguez, S.Y. and Casto, D.T.: No time-dependent change in cytochrome P-450 2D6 phenotyping results during HPLC analysis. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2350-2352.
- 4351 Moore, D.J., Perrino, P.J., Klerer, C.P. and Robertson, P.: High-performance liquid chromatographic assay for two rifamycin-derived hypocholesterolemic agents in liver and biological fluids. *J. Chromatogr.*, 612 (1993) 310-314.
- 4352 Procopio, J.R., Da Silva, M.P., Asensio, M.d.C., Sevilla, T. and Hernandez, L.: HPLC analysis for thiomerosal and its degradation products in ophthalmic solutions with electrochemical detection. *Talanta*, 39 (1992) 1619-1623; *C.A.*, 118 (1993) 109879z.
- 4353 Prodolliet, J. and Bruelhart, M.: Determination of acesulfam-K in foods. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 268-274.
- 4354 Prodolliet, J. and Bruelhart, M.: Determination of aspartame and its major decomposition products in foods. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 275-282.
- 4355 Riley, C.M., Shetty, B.V., Chetwyn, N.C., Kasper, V.T., Kindberg, C.G. and Dicken, C.M.: A stability-indicating assay and the pre-formulation characteristics of the radiosensitizer, 1,2,4-benzotriazin-3-amine 1,4-dioxide. *J. Pharm. Biomed. Anal.*, 11 (1993) 131-138.
- 4356 Sadana, G.S. and Potdar, A.: HPLC method for estimation of domperidone in pharmaceutical preparations. *Indian J. Pharm. Sci.*, 54 (1992) 162-164; *C.A.*, 118 (1993) 132298t.
- 4357 Šalamoun, J. and Remien, J.: Indirect detection of anti-acetylcholinesterase compounds in microcolumn liquid chromatography using packed bed reactor with immobilized human red blood cell acetylcholinesterase and choline oxidase. *J. Pharm. Biomed. Anal.*, 10 (1992) 931-936.
- 4358 Shihabi, Z.K., Thompson, E.N. and Constantinescu, M.S.: Iohexol determination by direct injection of serum on the HPLC column. *J. Liq. Chromatogr.*, 16 (1993) 1289-1296.
- 4359 Sidhu, J.S. and Charles, B.G.: Simple microscale high-performance liquid chromatographic method for determination of furosemide in neonatal plasma. *J. Chromatogr.*, 612 (1993) 161-165.
- 4360 Siret, L., Tambute, A., Rocca, P. and Caude, M.: (Resolution of the eight stereoisomers of 2-norbornyl-2-(3-thienyl)glycolic acid on a  $\beta$ -cyclodextrin-bonded phase). *Analisis*, 20 (1992) 375-378; *C.A.*, 118 (1993) 66971d.
- 4361 Uchida, T., Usui, T., Watanabe, T. and Higuchi, S.: Simultaneous determination of a new inhibitor of acyl CoA cholesterol acyltransferase, YM17E, and five metabolites using high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 613 (1993) 179-183.
- 4362 Vens-Cappell, B., Berndt, P., Hilgenstock, C., Kühle, K., Reifferscheid, I., Schütt, S. and Bührens, K.G.: Vergleich der Pharmakokinetik einer schelffreisetzenden Bezaflibat-Formulierung mit einer Retard-Formulierung. 2. Mitteilung: Multiple-dose-Applikation und Chronopharmakokinetik. *Arzneim.-Forsch.*, 43 (1993) 351-356.
- 4363 Vens-Cappell, B., Hilgenstock, C., Gellert, M., Kühle, K., Reifferscheid, I., Winckler, P. and Bührens, K.G.: Vergleich der Pharmakokinetik einer schelffreisetzenden Bezaflibat-Formulierung mit einer Retard-Formulierung. 1. Mitteilung: Single-dose-Applikation. *Arzneim.-Forsch.*, 43 (1993) 346-350.
- 4364 Wudrich, G.G., McSheffrey, S. and Low, N.H.: Liquid chromatographic detection of a variety of inexpensive sweeteners added to pure orange juice. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 342-354.

For additional information see *C.A.*:

118 (1993) 73011u, 73106d, 132266f.

See also 3187, 3486, 3491, 4034, 4086, 4114, 4143, 4225, 4323.

### 32h. Toxicological and forensic applications

- 4365 Bogusz, M. and Wu, M.: Standardized HPLC/DAD system, based on retention indexes and spectral library, applicable for systematic toxicological screening. [Erratum to document cited in CA115(11):107963m]. *J. Anal. Toxicol.*, 16 (1992) 16A; *C.A.*, 118 (1993) 34030e.
- 4366 Bogusz, M., Erkens, M., Franke, J.P., Wijsbeek, J. and de Zeeuw, R.A.: Interlaboratory applicability of a retention index library of drugs for screening by reversed phase HPLC in systematic toxicological analysis. *J. Liq. Chromatogr.*, 16 (1993) 1341-1354.
- 4367 Cone, E.J. and Deyl, Z. (Editors): *Toxicological and Forensic Applications of Chromatography*. Elsevier, Amsterdam, 1992, 375 pp.; *C.A.*, 118 (1993) 54152z.
- 4368 Da Col, R., Silvestro, L., Baiocchi, C., Giacosa, D. and Viano, I.: High-performance liquid chromatographic-mass spectrometric analysis of *cis*-dichlorodiamineplatinum-DNA complexes using an ionspray interface. *J. Chromatogr.*, 633 (1993) 119-128.
- 4369 Hanisch, W. and Meyer, L.V.: Determination of the heroin metabolite 6-monoacetylmorphine in urine by high-performance liquid chromatography with electrochemical detection. *J. Anal. Toxicol.*, 17 (1993) 48-50; *C.A.*, 118 (1993) 95759w.

- 4370 Kajser, G.P., Beijnen, J.H., Jeunink, E.L., Bult, A., Keizer, H.J., de Kraker, J. and Underberg, W.J.M.: Determination of chloroacetaldehyde, a metabolite of oxazaphosphorine cytostatic drugs, in plasma. *J. Chromatogr.*, 614 (1993) 253-259.
- 4371 Leenheers, L.H., Engel, R., Spruit, W.E.T., Meuling, W.J.A. and Jongen, M.J.M.: Determination of methyl 5-hydroxy-2-benzimidazole carbamate in urine by high-performance liquid chromatography with electrochemical detection. *J. Chromatogr.*, 613 (1993) 89-94.
- 4372 Murphy, L.J., Olsen, G.D. and Konkol, R.J.: Quantitation of benzoylnorecgonine and other cocaine metabolites in meconium by high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 330-335.
- 4373 Pacifici, R., Pichini, S., Altieri, I., Rosa, M., Bacosi, A. and Caronna, A.: Determination of nicotine and two major metabolites in serum by solid-phase extraction and high-performance liquid chromatography, and high-performance liquid chromatography-particle beam mass spectrometry. *J. Chromatogr.*, 612 (1993) 209-213.
- 4374 Roy, I.M., Jefferies, T.M., Threadgill, M.D. and Dewar, G.H.: Analysis of cocaine, benzoylecgonine, ecgonine methyl ester, ethylcocaine and norcocaine in human urine using HPLC with post-column ion-pair extraction and fluorescence detection. *J. Pharm. Biomed. Anal.*, 10 (1992) 943-948.
- 4375 Yoshida, T.: Determination of *p*-chloronitrobenzene and its metabolites in urine by reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 79-88.
- See also 3448, 3925, 3926, 3934, 3979, 4066, 4120, 4159, 4271, 4297, 4400, 4403, 4430, 4434, 4435.
- 32i. Plant extracts**
- 4376 Buszewski, B., Kawka, S. and Wolski, T.: Simultaneous isolation and determination of esculetin and rutin in natural materials using SPE and HPLC. *Chromatographia*, 35 (1993) 311-316.
- 4377 Castor, T.P. and Tyler, T.A.: Determination of taxol in *Taxus media* needles in the presence of interfering components. *J. Liq. Chromatogr.*, 16 (1993) 723-731.
- 4378 Cui, J.-f., Garle, M., Lund, E., Björkhem, I. and Enerothen, P.: Analysis of ginsenosides by chromatography and mass spectrometry: release of 20 S-protopanaxadiol and 20 S-protopanaxatriol for quantitation. *Anal. Biochem.*, 210 (1993) 411-417.
- 4379 Gupta, M.M., Verma, R.K., Uniyal, G.C. and Jain, S.P.: Determination of plumbagin by normal-phase high-performance liquid chromatography. *J. Chromatogr.*, 637 (1993) 209-212.
- 4380 Kanazawa, H., Nagato, Y., Kurosoaki, E., Matsushima, Y. and Takai, N.: Comparison of columns of chemically modified porous glass and silica in reversed-phase high-performance liquid chromatography of ginsenosides. *J. Chromatogr.*, 632 (1993) 79-85.
- 4381 Patterson, G.M.L. and Bolis, C.M.: Determination of scytophytins in cyanophyte cultures by high performance liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 475-486.
- 4382 Poukens-Renwart, P., Tits, M., Wauters, J.-N. and Angenot, L.: Reversed-phase HPTLC densitometric evaluation of fraxin in *Fraxinus excelsior* leaves. *J. Pharm. Biomed. Anal.*, 10 (1992) 1089-1091.
- 4383 Sonoki, S., Sono, Y., Hisamatsu, S. and Sugiyama, T.: High-performance liquid chromatographic analysis of cytokinins using isatoic anhydride as a fluorescent derivatizing reagent. *J. Liq. Chromatogr.*, 16 (1993) 343-352.
- 4384 Titulaer, H.A.C. and Vink-Blijlevens, N.: Assay of artelinic acid in serum by high-performance liquid chromatography. *J. Chromatogr.*, 612 (1993) 331-335.
- 4385 Tsai, T.-H., Chou, C.-J., Lin, L.-C., Tsai, W.-J. and Chen, C.-F.: Determination of aristolochic acid in rabbit plasma by high-performance liquid chromatography with photodiode-array ultraviolet detection and its pharmacokinetic application. *J. Liq. Chromatogr.*, 16 (1993) 1173-1182.
- For additional information see C.A.:  
118 (1993) 109844j, 132270c, 132275h.
- See also 3224, 3442, 3443, 3445, 3446, 3447.
- 33. CLINICO-CHEMICAL APPLICATIONS**
- 33a. General papers and reviews**
- 4386 Grimble, G.K.: Ion chromatography in clinical research: a neglected technique? *Anal. Proc.*, 29 (1992) 468-470; C.A., 118 (1993) 55336z.
- For additional information see C.A.:  
118 (1993) 35256v.
- See also 3906.
- 33b. Complex mixtures and profiling (single compounds by cross-reference only)**
- See 3213, 3268, 3334, 3342, 3345, 3392, 3395, 3397, 3399, 3402, 3404, 3425, 3456, 3464, 3476, 3477, 3489, 3492, 3494, 3495, 3503, 3506, 3510, 3524, 3537, 3543, 3619, 3622, 3655, 3762, 3794, 3809, 3820, 3852, 3896, 3900, 3993, 3998, 3999, 4010, 4130.
- 34. FOOD ANALYSIS**
- 34a. General papers and reviews**
- 4387 Mizukami, Y.: (Separation of food components by liquid chromatography). *Gekkan Fudo Kemikaru*, 8 (1992) 48-52; C.A., 118 (1993) 58256j - a review with 5 refs.
- See also 3500.
- 34b. Complex mixtures (single compounds by cross-reference only)**
- 4388 Biedermann, M., Grob, K., Froehlich, D. and Meier, W.: Online coupled liquid chromatography-gas chromatography (LC-GC) and LC-LC-GC for detecting the irradiation of fat-containing foods. *Z. Lebensm.-Unters. Forsch.*, 195 (1992) 409-416; C.A., 118 (1993) 58297y.

4389 Fuleki, T. and Pelayo, E.: Sugars, alcohols, and hydroxymethylfurfural in authentic varietal and commercial grape juices. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 59-66.

4390 Pellegrino, L., Tirelli, A. and Masotti, F.: (Detection of cow milk in nonbovine cheese by HPLC of whey proteins). *Sci. Tec. Latt.-Casearia*, 43 (1992) 297-310; C.A., 118 (1993) 146372z.

4391 Schulz, H., Albroscheit, G. and Nowak, D.: (Characterization of grapefruit oil and juice by HPLC). *Z. Lebensm.-Unters. Forsch.*, 195 (1992) 254-258; C.A., 118 (1993) 58289x.

See also 3215, 3219, 3220, 3225, 3227, 3230, 3232, 3233, 3236, 3237, 3248, 3249, 3250, 3275, 3293, 3296, 3326, 3330, 3344, 3370, 3375, 3410, 3460, 3662, 3834, 3930, 3938, 3950, 3988, 3989, 3990, 3996, 4000, 4007, 4009, 4013, 4015, 4038, 4045, 4058, 4067, 4095, 4112, 4116, 4129, 4284, 4295, 4296, 4300, 4305, 4353, 4399.

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

See 3219.

### 35. ENVIRONMENTAL ANALYSIS

35a. *General papers and reviews*

See 4413.

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

4392 Kelly, G.W., Bartle, K.D., Clifford, A.A. and Scammells, D.: Identification and quantitation of polycyclic aromatic compounds in air particulate and diesel exhaust particulate extracts by LC-GC. *J. Chromatogr. Sci.*, 31 (1993) 73-76.

See also 3214, 4411.

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

See 3218, 3221, 3338, 3340, 3966, 4094, 4102, 4114, 4397, 4415, 4436, 4440.

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

For additional information see C.A.:

118 (1993) 101041z.

See also 3435.

### 36. SOME TECHNICAL PRODUCTS AND COMPLEX MIXTURES

36a. *Surfactants*

4393 Hirose, T., Akieda, T. and Kasimura, H.: Analysis of surface-active agents by ion-exchange chromatography. *Kanzei Chuo Bunsekishoho*, 31 (1992) 115-125; C.A., 118 (1993) 105321p.

4394 Nitsche, L. and Huber, L.: (Tenside analysis by HPLC. Analysis of nonionic and amphotolytic tensides). *LaborPraxis*, 16 (1992) 1114-1116; C.A., 118 (1993) 83297f - a review with 16 refs.

4395 Nitschke, L. and Huber, L.: Analysis of ethoxylated alcohol surfactants in water by HPLC. *Fresenius J. Anal. Chem.*, 345 (1993) 585-588.

4396 Schoester, M. and Kloster, G.: HPLC separation and quantification of anionic surfactants using an automated on-line ion pair extraction system. *Fresenius J. Anal. Chem.*, 345 (1993) 767-772.

4397 Schuster, R.: (Determination of anionic surfactants in wastewater by HPLC with a diode-array detector). *Lab. 2000*, 6 (1992) 66-67; C.A., 118 (1993) 66382n.

4398 Wang, Z. and Fingas, M.: Rapid separation of non-ionic surfactants of polyethoxylated octylphenol and determination of ethylene oxide oligomer distribution by C1 column reversed-phase liquid chromatography. *J. Chromatogr.*, 637 (1993) 145-156.

### 36b. *Antioxidants and preservatives*

4399 Boussenadjid, R., Porthault, M. and Berthod, A.: Microbore liquid chromatography with electrochemical detection for the control of phenolic antioxidants in drugs and foods. *J. Pharm. Biomed. Anal.*, 11 (1993) 71-78.

4400 Hashizume, K., Toda, C., Yasui, T. and Nagano, H.: Determination of butylated hydroxyanisole and its conjugated metabolites in the organs, blood, and excreta of mice by high-performance liquid chromatography. *Jpn. J. Toxicol. Environ. Health*, 38 (1992) 397-402; C.A., 118 (1993) 34006b.

4401 Larroque, M. and Vian, L.: Determination of phenylmercuric nitrate in pharmaceuticals by HPLC. *J. Pharm. Biomed. Anal.*, 11 (1993) 173-175.

4402 Pavlova, A., Ivanova, R. and Milina, R.: (Methods for determination of an antioxidant in jet fuels). *Izv. Khim.*, 24 (1991) 257-262; C.A., 118 (1993) 62822h.

4403 Yamamoto, M., Yamada, T., Yoshihira, K., Kawashima, K., Tanaka, S. and Takanaka, A.: Analytical method for BHA in biological samples by high performance liquid chromatography with electrochemical detection. *Jpn. J. Toxicol. Environ. Health*, 38 (1992) 410-417; C.A., 118 (1993) 34007c.

For additional information see C.A.:

118 (1993) 72861j.

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

4404 Faix, O. and Beinhoff, O.: Improved calibration of high-performance size-exclusion chromatography of lignins using lignin-like model compounds. *Holzforschung*, 46 (1992) 355-356; C.A., 118 (1993) 83087n.

4405 Langhorst, M.A. and Henry, J.B.: Size separation of particles contained within a material by the use of nonaqueous hydrodynamic chromatography. *U.S. US 5,183,604 (Cl. 264-40.1; B29C45/00)*, 02 Feb. 1993, Appl. 825,353, 24 Jan. 1992; 8 p.; C.A., 118 (1993) 138995q.

- 4406 Masselin, P., Lassus, P. and Bardouil, M.: High performance liquid chromatography analysis of diarrhetic toxins in *Dinophysis* spp. from the French coast. *J. Appl. Phycol.*, 4 (1992) 385-389; C.A., 118 (1993) 141324a.
- 4407 Nomeir, A.A., Markham, P.M., Ghanayem, B.I. and Chadwick, M.: Disposition of the flame retardant 1,2-bis(2,4,6-tribromo-phenoxy)ethane in rats following administration in the diet. *Drug Metab. Disp.*, 21 (1993) 209-214.
- 4408 Tamura, M., Naruse, M., Sakakibara, M. and Inagami, T.: Isolation of an endogenous Na-pump specific inhibitor from normal pig urine: characterization and comparison with the inhibitor purified from bovine adrenal glands. *Biochim. Biophys. Acta*, 1157 (1993) 15-22.
- For additional information see C.A.:  
118 (1993) 61937n.
- See also 4402, 4428.
37. CELLS, CELLULAR PARTICLES AND SUPRAMOLECULAR STRUCTURES
- See 4405.
38. INORGANIC COMPOUNDS
- 38a. Cations
- 4409 Akama, Y. and Tong, A.: High-performance liquid chromatographic determination of aluminium and iron(III) in solar salt in the form of their 1-phenyl-3-methyl-4-benzoyl-5-pyrazolone chelates. *J. Chromatogr.*, 633 (1993) 129-133.
- 4410 Cornelis, R., Borguet, F., Dyg, S. and Griepink, B.: Chromium speciation studies in human plasma and stability studies of chromium(III) and chromium(VI) species in a candidate water reference material. *Microchim. Acta*, 109 (1992) 145-148; C.A., 118 (1993) 93430h.
- 4411 Dabek-Zlotorzynska, E. and Dlouhy, J.F.: Simultaneous determination of alkali, alkaline-earth metal cations and ammonium in environmental samples by gradient ion chromatography. *J. Chromatogr.*, 638 (1993) 35-41.
- 4412 Dolezel, P., Kahle, V. and Krejci, M.: Comparison of post-column and on-column fluorescence detection of  $\text{UO}_2^{2+}$  in water. *Fresenius J. Anal. Chem.*, 345 (1993) 762-766.
- 4413 Goossens, J. and Dams, R.: Anion exchange for elimination of spectral interferences by chlorine and sulphur in inductively coupled plasma mass spectrometry. *J. Anal. At. Spectrom.*, 7 (1992) 1167-1171; C.A., 118 (1993) 115849f.
- 4414 Harino, H., Kimura, K., Tanaka, M. and Shono, T.: Liquid chromatographic retention of alkali and alkaline-earth metal cations on dynamically coated cryptand stationary phases. *Anal. Sci.*, 8 (1992) 883-884; C.A., 118 (1993) 72612d.
- 4415 Kaneko, E., Hoshino, H., Yotsuyanagi, T., Watabe, R. and Seki, T.: Determination of aluminium in natural waters by ion-pair reversed-phase partition HPLC. *Bull. Chem. Soc. Jpn.*, 65 (1992) 3192-3194; C.A., 118 (1993) 66420y.
- 4416 Khuhavar, M.Y., Bozdar, R.B. and Babar, M.A.: High-performance liquid chromatographic determination of selenium in coal after derivatization to 2,1,3-benzoselenadiazoles. *Analyst (Cambridge)*, 117 (1992) 1725-1727; C.A., 118 (1993) 72683c.
- 4417 Klancke, J.W.: Determination of monovalent and divalent cations and chloride in the carbacephalosporin loracarbef by ion chromatography. *J. Chromatogr.*, 637 (1993) 63-70.
- 4418 Larsen, E.H. and Honore Hansen, S.: Separation of arsenic species by ion-pair and ion exchange high-performance liquid chromatography. *Microchim. Acta*, 109 (1992) 47-51; C.A., 118 (1993) 72619m.
- 4419 Lee, K.A., Sung, H.J. and Hwang, Y.: (A study on the determination of lanthanide elements by IC/ICP (ion chromatography/inductively coupled plasma spectrometry)). *Anal. Sci. Technol.*, 4 (1991) 75-81; C.A., 118 (1993) 72653t.
- 4420 Li, J.B. and Rahn, P.C.: Automated dissolution testing with IC analysis of potassium chloride extended-release tablets. *Int. Lab.*, 23, No. 3 (1993) 17-20.
- 4421 Li, K., Liu, F., Dong, W. and Tong, S.: Preconcentration and separation of trace metal ions using 1-(2-pyridylazo)-2-naphthol loaded on silica gel. *Beijing Daxue Xuebao, Ziran Kexueban*, 28 (1992) 202-208; C.A., 118 (1993) 93354m.
- 4422 Maruo, M., Hirayama, N., Shiota, A. and Kuwamoto, T.: Elution behavior of tungsten and molybdenum in ion chromatography using organic eluents having  $\alpha$ -hydroxyl group. *Anal. Sci.*, 8 (1992) 511-516; C.A., 118 (1993) 93347m.
- 4423 Nagaosa, Y. and Segawa, S.: Phase separation and extraction with acetonitrile for sample preparation in HPLC analysis. *Fresenius J. Anal. Chem.*, 345 (1993) 753-754.
- 4424 Nesterenko, P.N., Kopiylov, R.V., Tarasenko, D.A., Sphigun, O.A. and Zolotov, Yu.A.: (Simultaneous separation of anions and cations by single-column ion chromatography). *Dokl. Akad. Nauk*, 32 (1992) 838-841; C.A., 118 (1993) 115688c - a review with 11 refs.
- 4425 Novotny, M.A.: Chromatographic separation of calcium isotopes. *Report*, MLM-3716, Order No. DE92004623, 1991, 16 p.; C.A., 118 (1993) 134391s.
- 4426 Pathak, R.B. and Argekar, A.P.: Extraction chromatographic separation of thorium(IV) with tri-*n*-octylphosphine oxide (TOPO). *J. Radioanal. Nucl. Chem.*, 166 (1992) 503-510; C.A., 118 (1993) 72614f.
- 4427 Quaglio, M., Bottazzini, N., Querci, C., Ricci, M. and Cavalli, S.: Ion chromatographic determination of phosphorus and tungsten in epoxidized soybean oil. *J. Am. Oil Chem. Soc.*, 69 (1992) 1248-1250; C.A., 118 (1993) 60531p.
- 4428 Saraswati, R., Desikan, N.R. and Rao, T.H.: Determination of transition and rare earth elements in low-alloy steels as chelates with 4-(2-thiazolylazo)resorcinol by reversed-phase high-performance liquid chromatography. *Microchim. Acta*, 109 (1992) 253-260; C.A., 118 (1993) 72740u.
- 4429 Seubert, A.: On-line coupling of atomic spectrometry and ion chromatography with time resolved registration as new tool for ultra trace analysis in refractory metals. *Fresenius J. Anal. Chem.*, 345 (1993) 547-563.
- 4430 Sturano, A., Parvoli, G., Doretti, L., Zanchetta, S., Allegri, G. and Battiston, G.: Simultaneous determination of trace metals in human hair by dynamic ion-exchange chromatography. *Anal. Chim. Acta*, 274 (1993) 163-170.

- 4431 Vajda, N., Ghods-Espahani, A., Cooper, E. and Danesi, P.R.: Determination of radiostrontium in soil samples using a crown ether. *J. Radioanal. Nucl. Chem.*, 162 (1992) 307-323; C.A., 118 (1993) 2988g.  
 4432 Yu, J.J.: Preparation, characterization and chromatographic separation of arsenicals and metal ions by complexation with sodium bis(trifluoroethyl) dithiocarbamate. Avail. *Univ. Microfilms Int.*, Order No. DA9208467, 1991, 257 p.; C.A., 118 (1993) 138627w.

For additional information see C.A.:

118 (1993) 72603b, 72647u, 93418k, 115789m, 115798p.

See also 3106, 4442, 4448.

### 38b. Anions

- 4433 Halmos, P. and Borszki, J.: The use of ICP-AES in ion-exchange chromatography. *Microchem. J.*, 46 (1992) 313-319; C.A., 118 (1993) 110434g.  
 4434 Michigami, Y., Kuroda, Y., Ueda, K. and Yamamoto, Y.: Determination of urinary fluoride by ion chromatography. *Anal. Chim. Acta*, 274 (1993) 299-302.  
 4435 Nixon, D.E. and Moyer, T.P.: Arsenic analysis II: rapid separation and quantification of inorganic arsenic plus metabolites and arsenobetaine from urine. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2479-2483.  
 4436 Poboz, E., Sweryda-Krawiec, B. and Trojanowicz, M.: Ion interaction chromatography with nonylamine reagent for the determination of nitrite and nitrate in natural waters. *J. Chromatogr.*, 633 (1993) 305-310.  
 4437 Togawa, T., Ogawa, M., Nawata, M., Ogasawara, Y., Kawanabe, K. and Tanabe, S.: High-performance liquid chromatographic determination of bound sulfide and sulfite and thiosulfate at their low levels in human serum by pre-column fluorescence derivatization with monobromobimane. *Chem. Pharm. Bull.*, 40 (1992) 3000-3004; C.A., 118 (1993) 142736y.  
 4438 Utermahlen, W.E., Jr., Mellini, D.W. and Issaq, H.J.: Solid-phase extraction procedure for the clean-up of urine and gastric juice specimens for nitrite and nitrate analysis by ion chromatography. *J. Liq. Chromatogr.*, 15 (1992) 3315-3322.  
 4439 Xu, J., Xin, M., Takeuchi, T. and Miwa, T.: Determination of oxidizable inorganic anions by reversed-phase ion-pair chromatography with amperometric detection. *Anal. Chim. Acta*, 276 (1993) 261-264.  
 4440 Zenki, M., Nabekura, T., Kobayashi, A., Iwachido, T. and Shimotsu, Y.: Ion-exclusion chromatographic determination of hydrogen carbonate in natural waters using unmodified silica gel and conductometric detection. *Analyst (London)*, 118 (1993) 273-276.

See also 3963, 4417, 4424, 4441.

### 38d. Volatile inorganic compounds

- 4441 Petrie, L.M., Jakel, E.M., Brandvig, R.L. and Kroening, J.G.: Ion chromatography of sulfur dioxide, sulfate ion and dithionite ion in aqueous mineral leachates. *Anal. Chem.*, 65 (1993) 952-955.

See also 3082.

## 39. RADIOACTIVE AND OTHER ISOTOPE COMPOUNDS

- 4442 Chen, J., Nomura, M., Fujii, Y., Kawakami, F. and Okamoto, M.: Gadolinium isotope separation by cation exchange chromatography. *J. Nucl. Sci. Technol.*, 29 (1992) 1086-1092; C.A., 118 (1993) 68544r.  
 4443 Firsova, L.A., Chuveleva, E.A., Kharitonov, O.V., Peshkov, A.S. and Nazarov, P.P.: (Gadolinium-153 isolation from irradiated targets by a chromatographic method). *Radiokhimiya*, 34 (1992) 61-69; C.A., 118 (1993) 111565n.  
 4444 Jepson, B.E., Novotny, M.A. and Evans, W.F.: Dimethyl sulphoxide augmented calcium isotope effect with polymer-bound 18-crown-6 a chromatographic chemical exchange system. *Sep. Sci. Technol.*, 28 (1993) 507-517; C.A., 118 (1993) 68551r.  
 4445 Mel'nik, M.I., Kuznetsov, R.A. and Filimonov, V.G.: (Preparation of high-purity gadolinium-153. 1. Extraction chromatographic purification of the sample from impurity elements). *Radiokhimiya*, 34 (1992) 72-77; C.A., 118 (1993) 133194t.  
 4446 Ordonez-Regil, E. and Iturbe, G., J.L.: Isolation and electroplating of polonium-210. *J. Radioanal. Nucl. Chem.*, 175 (1993) 47-53; C.A., 118 (1993) 115771z.  
 4447 Park, W.K. and Michaels, E.D.: Displacement band chromatography of hydrogen sulphites for enrichment of sulphur isotopes. *Sep. Sci. Technol.*, 28 (1993) 477-486; C.A., 118 (1993) 111559p.  
 4448 Subramanian, S. and Woittiez, J.R.W.: Utility of reversed phase high performance liquid chromatography for on-line yield determination of radiochemical separations: studies with cobalt. *J. Liq. Chromatogr.*, 16 (1993) 553-572.

See also 4014, 4426, 4431.

## Gas Chromatography

### 1. REVIEWS AND BOOKS

- 1437 Davankov, V.A.: (Advances in chromatographic method of analysis.) *Zavod. Lab.*, 58, No. 12 (1992) 1-7.  
 1438 Middelitch, B.S.: *Analytical Artifacts: GC, MS, HPLC, TLC and PC*. *J. Chromatogr. Library*, Vol. 74, Elsevier, Amsterdam, 1992. XXIV + 1034 p.

See also 1537, 1548, 1549, 1587, 1601, 1657, 1762, 1798.

### 2. FUNDAMENTALS, THEORY AND GENERAL

#### 2a. General

- 1439 Ette, L.S.: Unified nomenclature for chromatography. *J. High Resolut. Chromatogr.*, 16 (1993) 258-261.

#### 2b. Thermodynamics and theoretical relationships

- 1440 Helfferich, F.G.: Golay's paradox: linear versus non-linear chromatography. *J. Chromatogr.*, 634 (1993) 334-337.  
 1441 McCoy, B.J.: Partitioning and adsorption in gas-liquid-solid chromatography: Models of temporal moments for retention and variance. *Chromatographia*, 36 (1993) 234-240.

See also 1521, 1557, 1558.

#### 2c. Relationship between structure and chromatographic behaviour

- 1442 Petrova, E.I., Milyukova, E.I., Kharina, V.I. and Vigdergauz, M.S.: (Some aspects of the application of the dependence of sorbate retention on boiling point in qualitative gas-chromatographic analysis.) *Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol.*, 35, No. 7 (1992) 44-48; C.A., 118 (1993) 51567c.  
 1443 Woloszyn, T.F. and Jurs, P.C.: Prediction of gas chromatographic retention data for hydrocarbons from naphthas. *Anal. Chem.*, 65 (1993) 582-587.  
 1444 Zhang, H. and Hu, Z.: Utilization of total solubility parameter for calculating retention indexes of alkylbenzenes. *Chromatographia*, 33 (1992) 575-580.  
 1445 Zhang, M., Chen, B. and Yu, Z.: (Significance of the slope factors in relationship between retention indices and boiling points for homologous series.) *Sepu*, 11 (1993) 1-3.

See also 1505, 1551, 1570, 1722.

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

- 1446 Bobok, D. and Ondrejková, M.: Diffusion coefficients of *n*-hexane in particles of molecular sieve NaY determined by means of chromatographic measurement. *Chem. Papers (Bratislava)*, 46 (1993) 363-367.

- 1447 Dallinga, L., Schiller, M. and Gmehling, J.: Measurement of activity coefficients at infinite dilution using differential ebulliometry and non-steady-state gas-liquid chromatography. *J. Chem. Eng. Data*, 38 (1993) 147-155; C.A., 118 (1993) 46739f.  
 1448 Hanai, T., Hatano, H., Nimura, N. and Kinoshita, T.: Enthalpy and boiling points in capillary column gas chromatography. *Anal. Sci.*, 9 (1993) 43-46.  
 1449 Li, F., Zhao, C. and Han, S.: (Study on gas-liquid chromatographic method for determination of activity coefficients of volatile components in ternary systems.) *Gaoxiao Huaxue Gongcheng Xuebao*, 6, No. 1 (1992) 34-40; C.A., 118 (1993) 46737d.  
 1450 Meacham, R.L., Buffham, B.A. and Mason, G.: Causes and elimination of noise in sorption-effect chromatography. I. Pressure noise. *J. Chromatogr. Sci.*, 30 (1992) 459-464.  
 1451 Medina, I.: Determination of molecular diffusion coefficients in liquid crystal 4,4'-bis(heptyloxy)azoxybenzene by gas chromatography. *Chromatographia*, 35 (1993) 539-542.  
 1452 Medina, I.: Determination of molecular diffusion coefficients in liquid-crystalline cholesteryl myristate using gas chromatography. *Liq. Cryst.*, 12 (1992) 989-995; C.A., 118 (1993) 67293w.  
 1453 Rosenblatt, J., Chinkes, D., Wolfe, M. and Wolfe, R.R.: Stable isotope tracer analysis by GC-MS, including quantification of isotopomer effects. *Am. J. Physiol.*, 263, No. 3 (1992) E584-E596; C.A., 118 (1993) 35393n.  
 1454 Steinberg, S.M. and Kreamer, D.K.: Evaluation of the sorption of volatile organic compounds by unsaturated calcareous soil from southern Nevada using inverse gas chromatography. *Environ. Sci. Technol.*, 27 (1993) 883-888.  
 1455 Sybilska, D., Asztemborska, M., Bielejewska, A., Kowalczyk, J., Dodziuk, H., Duszczyk, K., Lamparczyk, H. and Zarzycki, P.: Chromatographic studies on the inclusion of isomeric dimethyl-naphthalenes by  $\beta$ - and  $\gamma$ -cyclodextrin. *Chromatographia*, 35 (1993) 637-642.  
 1456 Zenkevich, I.G. and Vasil'ev, A.V.: (Comparative estimation of informative value of additional data in gas chromatographic identification. Some new possibilities of using distribution coefficients in a hexano-aceto-nitrile system.) *Zh. Anal. Khim.*, 48 (1993) 473-486.  
 1457 Zhang, Y., Dallas, A.J. and Carr, P.W.: Critical comparison of gas-hexadecane partition coefficients as measured with packed and open tubular capillary columns. *J. Chromatogr.*, 638 (1993) 43-56.

See also 1584, 1770.

### 3. GENERAL TECHNIQUES

#### 3a. Apparatus and accessories

- 1458 Arthur, C.L., Chai, M. and Pawliszyn, J.: Solventless injection technique for microcolumn separations. *J. Microcolumn Separ.*, 5 (1993) 51-56.
- 1459 Bjoroe, M., Hall, K., Hall, P.B. and Leplat, P.: Detailed hydrocarbon analyzer for well site and laboratory use. *Mar. Pet. Geol.*, 9 (1992) 648-665; C.A., 118 (1993) 41909b.
- 1460 Clauss, F., Mahler, H. and Maurer, T.: 15 Jahre Kapillarsäulen in der Prozess-gaschromatographie. Teil 3: Apparative Aspekte. *LaborPraxis*, 17, No. 4 (1993) 50-53.
- 1461 Feng, J. and Hou, J.: (Study on a new chromatographic sampling tool - adsorption wire.) *Zhejiang Daxue Xuebao, Ziran Kexueban*, 26 (1992) 76-79; C.A., 118 (1993) 72791m.
- 1462 Grob, K. and Bronz, M.: Sample liquid pulled out of the syringe needle during injection in GC. *J. High Resolut. Chromatogr.*, 16 (1993) 121-122.
- 1463 Irving, R.: Improvements in analytical performance with the variable geometry split/splitless injector. *Am. Lab. (Shelton)*, 25, No. 2 (1993) 40PP-40TT.
- 1464 Klemp, M.A.: Vacuum backflush recycle strategies for high-speed gas chromatography. *Avail. Univ. Microfilms Int.*, Order No. DA9135625, 1991, 177 pp.; C.A., 118 (1993) 51554w.
- 1465 Miller, D.J., Hawthorne, S.B. and McNally, M.E.P.: Solventless collection of analytes by rapid depressurization after static supercritical fluid extraction. *Anal. Chem.*, 65 (1993) 1038-1042.
- 1466 Myagkov, E.A., Timofeev, I.A. and Shepelev, V.E.: (Chromatograph for analysis of impurities in gases.) *U.S.S.R. SU 1,716,433 (Cl. G01N30/08)*, 28 Feb. 1992, Appl. 4,718,892, 13 Jul. 1989; C.A., 118 (1993) 51593h.
- 1467 Ogino, H. and Hirako, K.: An accessory for trace gas analysis by gas chromatography. *Am. Lab. (Shelton)*, 25, No. 2 (1993) 40UU-40YY.
- 1468 Poy, F.: Improvements in GC instrumentation. *Int. Lab.*, 23, No. 3 (1993) 25-29.
- 1469 Ragunathan, N., Krock, K.A. and Wilkins, C.L.: Multidimensional gas chromatography with parallel cryogenic traps. *Anal. Chem.*, 65 (1993) 1012-1016.
- 1470 Sacks, R.D. and Rankin, C.L.: Thermal-modulation inlet for gas-chromatograph system. *U.S. US 5,141,532 (Cl. 55-67; B01D15/08)*, 25 Aug. 1992, US Appl. 590,174, 28 Sep. 1990; 5 pp.; C.A., 118 (1993) 72896z.
- 1471 Sacks, R.D., Klemp, M.A. and Rankin, C.L.: Sample collection and inlet systems with a thermal-focusing chamber for a gas chromatograph. *U.S. US 5,141,534 (Cl. 55-197; B01D15/08)*, 25 Aug. 1992, US Appl. 590,174, 28 Sep. 1990; 10 pp.; C.A., 118 (1993) 72895y.
- 1472 Wiezorek, B., Schiller, A., Baykut, G. and Wanczek, K.P.: An infrared pyrolyzer for analysis of solid samples by gas chromatography/mass spectrometry. *Rev. Sci. Instrum.*, 63 (1992) 5607-5612; C.A., 118 (1993) 51545u.
- 1473 Yashin, Ya.I.: (Scientometric study of the state of art and trends in chromatographic methods and instrumentation.) *Zh. Anal. Khim.*, 48 (1993) 415-426.

See also 1509, 1513, 1514, 1518, 1542, 1554, 1555, 1791.

#### 3b. Detectors and detection reagents

- 1474 Aue, W.A. and Sun, X.-Y.: Spectrum, multi-element selectivity and elemental response of a linear sulfur emitter in flame photometry. *J. Chromatogr.*, 633 (1993) 151-162.
- 1475 Barbour, C.J.: Electrochemical studies of diffusion-plasticization phenomena: an electrochemical gas-liquid chromatography detector. *Avail. Univ. Microfilms Int.*, Order No. DA9135225, 1991, 201 pp.; C.A., 118 (1993) 51536s.
- 1476 Barry, E.: The effect of detector gas purity on FID baseline stability. *Am. Lab. (Shelton)*, 25, No. 7 (1993) 36B-36E.
- 1477 Dyson, M.: The Sievers SCD 350 detector. *Anal. Proc.*, 30 (1993) 79-86.
- 1478 Hayhurst, J.S. and Driscoll, J.N.: Photoionization detection is 30 years old. The story so far plus 'Son of photoionization detection': Far-ultraviolet adsorption. *Anal. Proc.*, 30 (1993) 90-92.
- 1479 Patterson, P.L.: Organic fuelled flames in selective ionization detectors for chromatography. *Chromatographia*, 36 (1993) 225-233.
- 1480 Yu, A., Xu, W., Xu, X. and Jin, Q.: (Study of novel microwave plasma ionization detector (MPID) for gas chromatography.) *Sepu*, 11 (1993) 23-24.
- See also 1498, 1545, 1547, 1553, 1686, 1688, 1693, 1806, 1815.
- 3c. Sorbents and columns, packing procedures
- 1481 Abe, I., Kobara, H. and Wasa, T.: A new method for immobilization of Chirasil-Val for gas chromatography. *Chromatographia*, 35 (1993) 503-505.
- 1482 Buzinkajova, T., Benicka, E. and Krupcik, J.: (Adsorption properties of glass capillary columns with thin liquid phase film.) *Zh. Anal. Khim.*, 47 (1992) 2004-2010.
- 1483 Clauss, F., Mahler, H. and Maurer, T.: 15 Jahre Kapillarsäulen in der Prozess-gaschromatographie. Teil 1: Aspekte der Säulentecnologie. *LaborPraxis*, 17 (1993) 30-35.
- 1484 Grob, K. and Fröhlich, D.: Splitless injection of large volumes of aqueous samples - a basic feasibility study. *J. High Resolut. Chromatogr.*, 16 (1993) 224-228.
- 1485 Hinshaw, J.V.: Selecting the right column length. *LC-GC Int.*, 6 (1993) 82-84.
- 1486 Hinshaw, J.V.: The effects of inlet liner configuration and septum purge flow rate on discrimination in splitless injection. *J. High Resolut. Chromatogr.*, 16 (1993) 247-253.
- 1487 Horká, M., Kahle, V. and Krejci, M.: Immobilized polyethylene-glycol-based stationary phase for the analysis of amines and organic acids by capillary gas chromatography. *J. Chromatogr.*, 637 (1993) 96-99.
- 1488 Liu, Z., Ostrovsky, I., Farnsworth, P.B. and Lee, M.L.: Instrumentation for comprehensive two-dimensional capillary supercritical fluid-gas chromatography. *Chromatographia*, 35 (1993) 567-573.
- 1489 Reid, G.L., III, Monge, C.A., Wall, W.T. and Armstrong, D.W.: Cyclodextrin stationary phases for the gas-solid chromatographic separation of light hydrocarbons. Evidence for multiple retention mechanisms. *J. Chromatogr.*, 633 (1993) 135-142.
- 1490 Reid, G.L., III, Wall, W.T. and Armstrong, D.W.: Cyclodextrin stationary phases for the gas-solid chromatographic separation of inorganic gases. *J. Chromatogr.*, 633 (1993) 143-149.

- 1491 Sidisky, L.M. and Robillard, M.V.: Carbon layer open tubular capillary columns. *J. High Resolut. Chromatogr.*, 16 (1993) 116-119.
- 1492 Staniewski, J. and Rijks, J.A.: Potential and limitations of differently designed programmed-temperature injector liners for large volume sample introduction in capillary GC. *J. High Resolut. Chromatogr.*, 16 (1993) 182-187.
- 1493 Takeuchi, T., Miwa, T. and Nagae, N.: Estimation of silanol groups in silica-based packings for liquid chromatography from gas chromatographic retention of cyclohexane and benzene. *Chromatographia*, 35 (1993) 375-380.
- 1494 Wenzel, T.J., Townsend, K.J., Frederique, D.E. and Baker, A.G.: Supercritical fluid extraction of metal-containing selective sorbents. *J. Chromatogr.*, 637 (1993) 187-194.
- 1495 Xiu, Z., Li, H. and Zhang, Y.: (Study on preparation and characteristics of wide-bore capillary column.) *Sepu*, 11 (1993) 42-43.
- 1496 Zou, N., Yusheng, T., Jiahe, S. and Wanzen, L.: Stainless steel capillary columns for high temperature gas chromatography. *J. High Resolut. Chromatogr.*, 16 (1993) 188-191.

See also 1529, 1530, 1533, 1534, 1535, 1536, 1539, 1540, 1548, 1556, 1559, 1656, 1659, 1780.

#### 3d. Quantitative analysis

- 1497 Boenke, A.: Certification of the mass concentration of three stilbenes in bovine urine reference materials by gas chromatographic-mass spectrometric method. Sources of error and their control. *Anal. Chim. Acta*, 275 (1993) 3-8.
- 1498 Farzane, N.G., Ilyasov, L.V. and Zakharova, L.V.: (Diffusion method for determination of relative sensitivity coefficients during thermoconductometric detection of substances in chromatography.) *Zavod. Lab.*, 58, No. 4 (1992) 9-11.
- 1499 Herman, F.L.: Tandem detectors to quantitate overlapping chromatographic peaks. *Anal. Chem.*, 65 (1993) 1023-1027.
- 1500 Jie, G., Wang, S. and Wu, Y.: (Computer processing of the area for freon chromatographic peaks and determination of their standard curves.) *Zhileng Xuebao*, No. 1 (1992) 7-14; C.A., 118 (1993) 51524m.
- 1501 Meyer, V.R.: Error sources in the determination of chromatographic peak-size ratios in the case of enantiomers and epimers. *Am. Lab. (Shelton)*, 25, No. 4 (1993) 34B, 34D, 34F, 34G.
- 1502 Van den Bogaert, B., Boelens, H.F.M. and Smit, H.C.: Evaluation and correction of signal model errors in a matched filter for the quantification of chromatographic data. *Anal. Chim. Acta*, 274 (1993) 71-85.
- 1503 Van den Bogaert, B., Boelens, H.F.M. and Smit, H.C.: Quantification of chromatographic data using a matched filter: robustness towards noise model error. *Anal. Chim. Acta*, 274 (1993) 87-97.
- 1504 Xie, M., Quian, Y., Pan, W. and Zhou, C.: (Experimental studies on the rule of peak widths at half height of solute under random conditions in capillary gas chromatography.) *Sepu*, 11 (1993) 3-7.

See also 1508, 1568, 1607, 1664, 1701.

#### 3f. Programmed temperature, pressure, vapors, gradients

- 1505 Castello, G., Moretti, P. and Vezzani, S.: Comparison of different methods for the prediction of retention times in programmed-temperature gas chromatography. *J. Chromatogr.*, 635 (1993) 103-111.

See also 1543, 1546, 1558, 1570, 1631, 1811.

#### 4. SPECIAL TECHNIQUES

##### 4a. Automation

- 1506 Barbay, G., McKinley, K. and Robison, L.: Practical applications of a chromatography data system using Dynamic Data Exchange. *Int. Lab.*, 23, No. 4 (1993) 20-23.
- 1507 Clauss, F., Mahler, H. and Maurer, T.: 15 Jahre Kapillarsäulen in der Prozess-Gaschromatographie. Teil 2: Kapillarsäulenschaltungen. *LaborPraxis*, 17 (1993) 38-45.
- 1508 Guillemin, C.L.: Le point sur la validation des résultats chromatographiques en ligne ou au laboratoire. *Analisis*, 21, No. 4 (1993) M38-M43.
- 1509 Majors, R.E., Fogelman, K.D.: The integration of automated sample preparation with analysis in gas chromatography. *Am. Lab. (Shelton)*, 25, No. 2 (1993) 40W, 40X, 40Z, 40AA-40CC, 40FF, 40GG.

See also 1460, 1483, 1729, 1743.

##### 4b. Computerization and modelling

- 1510 Milne, R.: Intelligent applications and gas chromatography. *Anal. Proc.*, 30 (1993) 168.

See also 1505, 1631, 1820.

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

- 1511 Arpino, P.J., Sadoun, F. and Virelizier, H.: Reviews on recent trends in chromatography/mass spectrometry coupling. Part IV. Reasons why supercritical fluid chromatography is not so easily coupled with mass spectrometry as originally assessed. *Chromatographia*, 36 (1993) 283-288 - a review with 49 refs.
- 1512 De Brabander, H.F., Batjоens, P., van den Braembussche, C., Dirinck, P., Smet F. and Pottie, G.: Pitfalls in selected ion monitoring in gas chromatography-mass spectrometry: a theoretical example. *Anal. Chim. Acta*, 275 (1993) 9-15.
- 1513 Eisele, F.L. and Berresheim, H.: High-pressure selected ion chemical ionization interface for connecting a sample source to a mass spectrometer. *PCT Int. Appl.* WO 92 16,961 (Cl. H01J49/26), 01 Oct. 1992, US Appl. 674,548, 22 Mar. 1991; 58 pp.; C.A., 118 (1993) 51594j.
- 1514 Kim, A.W., Foulkes, M.E., Ebdon, L., Hill, S.J., Patience, R.L., Barwise, A.G. and Rowland, S.J.: Construction of a capillary gas chromatography inductively coupled plasma mass spectrometry transfer line and application of the technique to the analysis for alkyllead species in fuel. *J. Anal. At. Spectrom.*, 7 (1992) 1147-1149; C.A., 118 (1993) 72866q.

- 1515 Kosman, J.J. and Lukco, R.G.: The use of GC-AES multielement simulated distillation for petroleum product fingerprinting. *J. Chromatogr. Sci.*, 31 (1993) 88-94.
- 1516 Lobinski, R. and Adams, F.C.: Recent advances in speciation analysis by capillary gas chromatography-microwave induced plasma atomic emission spectrometry. *TrAC*, 12 (1993) 41-49.
- 1517 Schumacher, H.-J. and Eulig, C.: Identifizierung unbekannter Peaks in Gaschromatogrammen. *LaborPraxis*, 17, No. 4 (1993) 54-63.
- 1518 Snyder, A.P., Harden, C.S., Brittain, A.H., Kim, M.-G., Arnold, N.S. and Meuzelaar, H.L.C.: Portable, hand-held gas chromatography-ion mobility spectrometer. *Int. Lab.*, 23, No. 3 (1993) 30-33.
- 1519 Van Berkel, G.J. and Goeringger, D.E.: Gas chromatography-tandem mass spectrometry on a bench-top quadrupole ion trap-based instrument using random noise to effect collision-induced dissociation. *Anal. Chim. Acta*, 277 (1993) 41-54.
- 1520 Villalanti, D.C. and Wadsworth, P.A.: Application of NOISE (nitric oxide ionization spectrometry evaluation) GC/MS analysis to reformulated gasolines and their blending components. *J. Chromatogr. Sci.*, 31 (1993) 100-104.

See also 1469, 1528, 1607, 1646, 1674, 1692, 1733, 1734, 1761, 1807, 1808, 1827, 1833.

#### 4e. Functional analysis

See 1517, 1565, 1598, 1624.

#### 4f. Trace analysis and preseparation techniques

- 1521 Comes, P., Gonzales-Flesca, N., Ménard, T. and Grimalt, J.O.: Langmuir-derived equations for the prediction of solid adsorbent breakthrough volumes of volatile organic compounds in atmospheric emission effluents. *Anal. Chem.*, 65 (1993) 1048-1053.
- 1522 Goretti, G., Russo, M.V. and Veschetti, E.: Trapping efficiency of aqueous micropollutants sampled and analysed using the same capillary column. Theoretical aspects and experimental results. *Chromatographia*, 35 (1993) 653-660.
- 1523 Keinhofer, F. and Tittel, G.: Supercritical carbon dioxide in sample preparation. *Int. Lab.*, 23, No. 5 (1993) P16-P21.
- 1524 Levy, J.M. and Houck, R.K.: Developments in off-line collection for supercritical fluid extraction. *Am. Lab. (Shelton)*, 25, No. 7 (1993) 36R-36Y.
- 1525 Onuska, F.I. and Terry, K.A.: Extraction of pesticides from sediments using a microwave technique. *Chromatographia*, 36 (1993) 191-194.
- 1526 Tehrani, J.: Successful supercritical fluid extraction strategies. *Am. Lab. (Shelton)*, 25, No. 2 (1993) 40HH-40MM.
- 1527 Vitenberg, A.G., Novikaitė, N.V. and Kostkina, M.I.: High-temperature gas-chromatographic headspace-analysis of volatile polar impurities in aqueous solutions. *Chromatographia*, 35 (1993) 661-666.
- 1528 Vreuls, J.J., Bulterman, A.J., Ghijssen, R.T. and Brinkman, U.A.T.: On-line-preconcentration of aqueous samples for gas chromatographic-mass spectrometric analysis. *Analyst (Cambridge)*, 117 (1992) 1701-1705.

See also 1467, 1541, 1542, 1600, 1689, 1695, 1698, 1829.

#### 4g. Enantiomers, separation

- 1529 Armstrong, D.W., Tang, Y., Ward, T. and Nichols, M.: Derivatized cyclodextrins immobilized on fused silica capillaries for enantiomeric separations via capillary electrophoresis, gas chromatography, or supercritical fluid chromatography. *Anal. Chem.*, 65 (1993) 1114-1117.
- 1530 Bicchi, C., Artuffo, G., D'Amato, A., Manzin, V., Galli, A. and Galli, M.: Cyclodextrin derivatives for the GC separation of racemic mixtures of volatile compounds. Part VI: The influence of the diluting phase on the enantioselectivity of 2,6-di-O-methyl-3-O-pentyl- $\beta$ -cyclodextrin. *J. High Resolut. Chromatogr.*, 16 (1993) 209-214.
- 1531 Buser, H.R. and Mueller, M.D.: Enantiomer separation of chlor dane components and metabolites using chiral high-resolution gas chromatography and detection by mass spectrometric techniques. *Anal. Chem.*, 64 (1992) 3168-3175.
- 1532 Feibush, B., Woolley, C.L. and Mani, V.: Separation of chiral silicon compounds using permethylated  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrin capillary GC columns. *Anal. Chem.*, 65 (1993) 1130-1133.
- 1533 Hardt, I. and König, W.A.: Diluted versus undiluted cyclodextrin derivates in capillary gas chromatography and the effect of linear carrier gas velocity, column temperature, and length on enantiomer separation. *J. Microcolumn Separ.*, 5 (1993) 35-40.
- 1534 Jung, M. and Schurig, V.: Enantiomeric separation by GC on Chirasil-Dex: systematic study of cyclodextrin concentration, polarity, immobilization, and column stability. *J. Microcolumn Separ.*, 5 (1993) 11-22.
- 1535 Jung, M. and Schurig, V.: Extending the scope of enantiomer separation by capillary supercritical fluid chromatography on immobilized polysiloxane-anchored permethyl- $\beta$ -cyclodextrin (Chirasil-Dex). *J. High Resolut. Chromatogr.*, 16 (1993) 215-223.
- 1536 Juvancz, Z., Grolimund, K. and Schurig, V.: Unusual overloading phenomenon in GC using Chirasil-Dex, an enantioselective stationary phase. *J. High Resolut. Chromatogr.*, 16 (1993) 202-204.
- 1537 König, W.A.: Enantioselective gas chromatography. *TrAC*, 12 (1993) 130-136 - a review with 37 refs.
- 1538 König, W.A. and Gehrcke, B.: Gas chromatographic enantiomer separation with modified cyclodextrins: carboxylic acid esters and epoxides. *J. High Resolut. Chromatogr.*, 16 (1993) 175-181.
- 1539 Lohmiller, K., Bayer, E. and Koppenhoefer, B.: Recognition of enantiomers by Chirasil-Val and oligopeptide analogues as studied by gas-phase calorimetry and  $^1\text{H}$  NMR spectrometry in solution. *J. Chromatogr.*, 634 (1993) 65-77.
- 1540 Schleimer, M. and Schurig, V.: Enantiomer separation by complexation gas and supercritical fluid chromatography on immobilized polysiloxane-bonded nickel(II) bis[(3-heptafluorobutanoyl)-10-methylene-(1R)-camphorate] (Chirasil-nickel). *J. Chromatogr.*, 638 (1993) 85-96.

See also 1481, 1501, 1671, 1676, 1721, 1740, 1779, 1780.

#### 4h. Other special techniques

- 1541 Markelov, M. and Guzowski, J.P., Jr.: Matrix independent headspace gas chromatographic analysis. The full evaporation technique. *Anal. Chim. Acta*, 276 (1993) 235-245.

- 1542 Rijks, J.: MAS für die Kapillar-GC. *LaborPraxis*, 17, No. 5 (1993) 28-39.
- 1543 Sato, K., Motokawa, O., Watabe, K., Ihara, T. and Hobo, T.: Temperature gradient method for continuous countercurrent gas-liquid chromatography. *Separ. Sci. Technol.*, 28 (1993) 1409-1420.
- 1544 Workman, D.S., Noel, F. and Watt, M.R.: Simulated distillation of petroleum fractions by capillary gas chromatography. *J. Chromatogr. Sci.*, 31 (1993) 95-99.

See also 1595, 1804.

4i. *Supercritical fluid chromatography*

- 1545 Brown, F.R. and Roehl, R.: Chlorine-selective detection in supercritical fluid chromatography using a Coulson electrolytic conductivity detector. *Anal. Lett.*, 26 (1993) 773-792.
- 1546 Chester, T.L. and Innis, D.P.: Solute retention and selectivity behavior in linear-temperature-programmed, constant-density supercritical fluid chromatography. *J. Microcolumn Separ.*, 5 (1993) 127-133.
- 1547 Demirbuker, M., Anderson, P.E. and Blomberg, L.G.: Miniaturized light scattering detector for packed capillary supercritical fluid chromatography. *J. Microcolumn Separ.*, 5 (1993) 141-147.
- 1548 Gasparini, F., Misiti, D. and Villani, C.: Direct resolution in sub- and supercritical fluid chromatography on packed columns containing *trans*-1,2-diaminocyclohexane derivatives as selectors. *TrAC*, 12 (1993) 137-144 - a review with 61 refs.
- 1549 Hirata, Y.: (Recent advances in supercritical fluid technology in analytical chemistry.) *Kagaku Kogaku*, 56 (1992) 896-901; C.A., 118 (1993) 72509a - a review with 72 refs.
- 1550 Huston, C.K.: Manipulation of ion trap parameters to maximize compound-specific information in gas chromatographic-mass spectrometric analyses. *J. Chromatogr.*, 606 (1992) 203-9.
- 1551 Janák, K., Bergmård, A., Colmsjö, A., Häglund, I. and Blomberg, L.G.: Mass transfer in open-tubular supercritical fluid chromatography. *J. Chromatogr.*, 637 (1993) 213-218.
- 1552 Janssen, H.-G. and Cramers, C.A.: Supercritical fluid chromatography; recent developments and new directions. *Anal. Proc.*, 30 (1993) 89-90.
- 1553 Jew, R.K. and Richter, B.E.: Thermionic ionization detection of halogenated compounds using supercritical fluid chromatography. *J. Microcolumn Separ.*, 5 (1993) 41-45.
- 1554 Kirschner, C.H. and Taylor, L.T.: Recent advances in sample introduction for supercritical fluid chromatography. *J. High Resolut. Chromatogr.*, 16 (1993) 73-84.
- 1555 Koski, I.J., Lee, E.D., Ostrovsky, I. and Lee, M.L.: Solid-phase injector for open tubular column supercritical fluid chromatography. *Anal. Chem.*, 65 (1993) 1125-1129.
- 1556 Oudsema, J.W. and Poole, C.F.: A comparison of formic acid and formamide as modifiers of supercritical carbon dioxide compatible with flame ionization detection. *J. High Resolut. Chromatogr.*, 16 (1993) 130-134.
- 1557 Petersson, P., Lundell, N. and Markides, K.E.: Retention time and peak width models for capillary column supercritical fluid chromatography: Part I. Isothermal and isopycnic separations. *Chromatographia*, 35 (1993) 479-485.

- 1558 Petersson, P., Lundell, N. and Markides, K.E.: Retention time and peak width models for capillary column supercritical fluid chromatography: Part II. Density programmed separations at different temperatures. *Chromatographia*, 35 (1993) 486-492.

- 1559 Raynie, D.E., Payne, K.M., Markides, K.E. and Lee, M.L.: Evaluation of microbore and packed capillary column chromatography with an ethylvinylbenzene-divinylbenzene polymeric packing material and supercritical ammonia as the mobile phase. *J. Chromatogr.*, 638 (1993) 75-83.

- 1560 Riekolla, M.-L. and Manninen, P.: Supercritical fluid chromatography as an alternative sample preparation method. *TrAC*, 12 (1993) 108-114.

- 1561 Sauvage, E., Rocca, J.-L. and Toussaint, G.: The use of nitrous oxide for supercritical fluid extraction of pharmaceutical compounds from animal feed. *J. High Resolut. Chromatogr.*, 16 (1993) 234-238.

- 1562 Stevenson, R.: Supercritical fluid chromatography: A modern buffer state. *Am. Lab. (Shelton)*, 25, No. 4 (1993) 34N, 34P.

- 1563 Xie, L.Q., Markides, K.E., Lee, M.L., Hollenberg, N.K., Williams, G.H. and Graves, S.W.: Bioanalytical application of multidimensional open tubular column supercritical fluid chromatography. *Chromatographia*, 35 (1993) 363-371.

- See also 1465, 1488, 1494, 1511, 1523, 1524, 1526, 1529, 1535, 1540, 1569, 1582, 1590, 1592, 1602, 1651, 1655, 1656, 1657, 1662, 1665, 1688, 1694, 1713, 1721, 1722, 1728, 1730, 1775, 1798, 1801, 1802, 1819.

5. HYDROCARBONS AND HALOGEN DERIVATIVES

5a. *Aliphatic hydrocarbons*

- 1564 Alpers, M., Fehrenbach, P. and Schneider, S.: (Mixtures of lower hydrocarbons. Part 1. Gas chromatographic investigations.) *Prax. Naturwiss., Chem.*, 41, No. 2 (1992) 2-5; C.A., 118 (1993) 38143s.

- 1565 Bhatt, B.D., Ali, S. and Prasad, J.V.: GC/GC-MS studies on the determination of the position and geometry of the double bond in straight-chain olefins by derivatization techniques. *J. Chromatogr. Sci.*, 31 (1993) 113-119.

- 1566 Ramnas, O., Östermark, U. and Petersson, G.: Assessment by gas chromatography-mass spectrometry of hexenes emitted to air from petrol. *J. Chromatogr.*, 638 (1993) 65-69.

- 1567 Tan, Y.A. and Kuntom, A.: Gas chromatographic determination of hydrocarbons in crude palm kernel oil. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 371-376.

- See also 1489, 1827, 1828.

5b. *Cyclic hydrocarbons*

- 1568 Bulyacheva, Z.Yu., Kiseleva, T.G., Rudenko, B.A., Khesina, A.Ya., Krivosheeva, L.V. and Topunov, V.: (Estimation of repeatability and reproducibility of gas chromatographic and luminiscence determination of polycyclic arenes.) *Zh. Anal. Khim.*, 48 (1993) 487-493.

- 1569 Fraile, R. and Sanchez, V.: Experimental design optimization of the separation of the aromatic compounds in petroleum cuts by supercritical fluid chromatography. *J. High Resolut. Chromatogr.*, 16 (1993) 169-174.
- 1570 Gerbino, T.C., Castello, G. and Pettinati, U.: Prediction of the retention of polynuclear aromatic hydrocarbons in programmed-temperature gas chromatography. *J. Chromatogr.*, 634 (1993) 338-344.
- 1571 Kelly, G.W., Bartle, K.D., Clifford, A.A. and Scammells, D.: Identification and quantitation of polycyclic aromatic compounds in air particulate and diesel exhaust particulate extracts by LC-GC. *J. Chromatogr. Sci.*, 31 (1993) 73-76.
- 1572 Knobloch, T., and Engewald, W.: Identification of some polar polycyclic compounds in emmissions from brown-coal-fired residential stoves. *J. High Resolut. Chromatogr.*, 16 (1993) 239-242.
- 1573 Morabito, P.L., McCabe, T., Hiller, J.F. and Zakett, D.: Determination of polynuclear aromatic hydrocarbons in water samples using large volume on-column injection capillary gas chromatography. *J. High Resolut. Chromatogr.*, 16 (1993) 90-94.
- See also 1443, 1455, 1497, 1522, 1813.
- 5c. Halogen derivatives
- 1574 Baifanz, E., Fuchs, J. and Kieper, H.: Sampling and analysis of polychlorinated biphenyls (PCB) in indoor air due to permanently elastic sealants. *Chemosphere*, 26 (1993) 871-880.
- 1575 Barber, L.B., II, Thurman, E.M., Takahashi, Y. and Noriega, M.C.: Comparison of purge and trap GC/MS and purgeable organic chloride analysis for monitoring volatile chlorinated hydrocarbons. *Ground Water*, 30 (1992) 836-842; C.A., 118 (1993) 66398x.
- 1576 Chen, X.M., Dallas, C.E., Muralidhara, S., Srivatsan, V. and Bruckner, J.V.: Analyses of volatile C<sub>2</sub> haloethanes and haloethenes in tissues: sample preparation and extraction. *J. Chromatogr.*, 612 (1993) 199-208.
- 1577 Fuoco, R., Colombini, M.P. and Samcova, E.: Individual determination of *ortho* and non-*ortho* substituted polychlorobiphenyls (PCBs) in sediments by high performance liquid chromatographic and gas chromatography/ECD detection. *Chromatographia*, 36 (1993) 65-70.
- 1578 Gerhards, P. and Horst, J.: (Quantitative analysis of low-volatile halogenated hydrocarbons in blood.) *LaborPraxis*, 16 (1992) 340-344.
- 1579 Haglund, P., Jakobsson, E., Asplund, L., Athanasiadou, M. and Bergman, Å.: Determination of polychlorinated naphthalenes in polychlorinated biphenyl products via capillary gas chromatography-mass spectrometry after separation by gel permeation chromatography. *J. Chromatogr.*, 634 (1993) 79-86.
- 1580 Hembree, D.M., Jr., Smyrl, N.R., Davis, W.E. and Williams, D.M.: Isomeric characterization of polychlorinated biphenyls using gas chromatography-Fourier transform infrared spectroscopy-mass spectrometry. *Analyst (Cambridge)*, 118 (1993) 249-252.
- 1581 Hughes, J.M., Goodley, P. and Imatani, K.: GC-MS analysis for trace gases in air. *Am. Lab. (Shelton)*, 24 (1992) 40.
- 1582 Johansen, H.R., Thorstensen, C., Greibrokk, T. and Becher, G.: On-line SFE-GC for determination of PCBs in human milk and blood serum. *J. High Resolut. Chromatogr.*, 16 (1993) 148-152.
- 1583 Krupcik, J., Kocan, A., Petrik, J., Leclercq, P.A. and Ballischmpter, K.: Reference standards for quantitative trace analysis of PCB's by GC. Technical PCB formulations for the calibration of ECD and MSD responses. *Chromatographia*, 35 (1993) 410-418.
- 1584 Lin, D.P., Falkenberg, C., Payne, D.A., Thakkar, J., Tang, C. and Elly, C.: Kinetics of purging for the priority volatile organic compounds in water. *Anal. Chem.*, 65 (1993) 999-1002.
- 1585 McLachlan, M.S.: Mass balance of polychlorinated biphenyls and other organochlorine compounds in a lactating cow. *J. Agric. Food Chem.*, 41 (1993) 474-480.
- 1586 Nylund, K., Asplund, L., Jansson, B., Jonsson, P., Litzen, K. and Sellstroem, U.: Analysis for some polyhalogenated organic pollutants in sediment and sewage sludge. *Chemosphere*, 24 (1992) 1721-1730.
- 1587 O'Mahony, T.K.P., Cox, A.P. and Roberts, D.J.: Gas chromatographic separation of perfluorocarbons. *J. Chromatogr.*, 637 (1993) 1-11 - a review with 85 refs.
- 1588 Siren, H., Hyvonen, H., Saarinen, M., Rovio, S. and Riekola, M.L.: Comparison of HPLC and solid phase clean-up methods for identification of PCBs in cod-liver oil by HRGC/MS-SIM technique. *Chromatographia*, 34 (1992) 421-430.
- 1589 Szelaag, H., Zwierzgkowski, W. and Makuch, B.: Determination of tetrachloroethylene in cocoa butter. *Fat Sci. Technol.*, 94 (1992) 436-438; C.A., 118 (1993) 58300u.
- 1590 Yarita, T., Horimoto, Y., Yamada, J. and Nomura, A.: Supercritical fluid chromatographic determination of polychlorinated biphenyls on an octadecylsilyl-silica gel column using an electron-capture detector. *Anal. Sci.*, 8 (1992) 811-815.
- 1591 Yasuhara, A.: A monitoring system for chlorinated benzenes in exhaust gas from waste incinerators. *Chemosphere*, 26 (1993) 1071-1078.
- See also 1458, 1465, 1500, 1599, 1695, 1760, 1807, 1808.
- 5d. Complex hydrocarbon mixtures (incl. analysis of tars, bitumens and mineral oils)
- 1592 Chen, E.N., Cusatis, P.D. and Popiel, E.J.: Validation of the aromatic ring distribution in diesel fuel refinery streams by supercritical fluid chromatography and mass spectrometry. *J. Chromatogr.*, 637 (1993) 181-186.
- 1593 Koussiafas, P. and Bertsch, W.: Profile matching for the analysis of accelerants in suspected arson cases. *J. Chromatogr. Sci.*, 31 (1993) 137-144.
- See also 1459, 1788, 1793, 1811.
6. ALCOHOLS
- 1594 Artsruni, G.K. and Muradyan, A.G.: (Gas chromatographic determination of methanol impurities in solution of 1-arginine produced by chemical transformation of ornitine.) *Zavod. Lab.*, 59, No. 1 (1993) 17-18.
- 1595 Cacho, J., Ferreira, V. and Fernandez, P.: Microextraction by demixing for the determination of volatile compounds in aqueous solutions. *Anal. Chim. Acta*, 264 (1992) 311-317.
- 1596 Di Stefano, R., Moruno, E.G. and Borsa, D.: (Sample preparation for the determination of glycols in wine.) *Vini Ital.*, 34 (1992) 61-64; C.A., 118 (1993) 58296x.

- 1597 Spyres, G.: Determination of 3-chloropropane-1,2-diol in hydrolyzed vegetable proteins by capillary gas chromatography with electrolytic conductivity detector. *J. Chromatogr.*, 638 (1993) 71-74.

See also 1799, 1811.

## 7. PHENOLS

- 1598 Demyanov, P.: (Chemical derivatization in chromatographic analysis of phenols.) *Zh. Anal. Khim.*, 47 (1992) 1942-1966 - a review with 187 refs.
- 1599 Först, C., Simon, H. and Stieglitz, L.: Determination of chlorophenols and chlorobenzenes in leachate by headspace analysis. *Chemosphere*, 26 (1993) 1355-1364.
- 1600 Kontzas, H., Rosenberg, C., Jäppinen, P. and Riekolla, M.-L.: Glass fibre prefilter-XAD-2 sampling and gas chromatographic determination of airborne chlorophenols. *J. Chromatogr.*, 636 (1993) 255-261.
- 1601 Korba, T. and Popl, M.: (Chlorophenols in water and methods of their determination.) *Chem. Listy*, 87 (1993) 332-347 - a review with 250 refs.
- 1602 Lee, H.-B., Peart, T.E. and Hong-You, R.L.: Determination of phenolics from sediments of pulp mill origin by *in situ* supercritical carbon dioxide extraction and derivatization. *J. Chromatogr.*, 636 (1993) 263-270.

See also 1527, 1795, 1813, 1820.

## 8. SUBSTANCES CONTAINING HETEROCYCLIC OXYGEN

### 8a. Flavonoids

- 1603 Christov, R. and Bankova, V.: Gas chromatographic analysis of underivatized phenolic constituents from propolis using electron-capture detector. *J. Chromatogr.*, 623 (1992) 182-185.
- 1604 Schmidt, T.J., Merfort, I. and Matthiesen, U.: Resolution of complex mixtures of flavonoid aglycones by analysis of gas chromatographic-mass spectrometric data. *J. Chromatogr.*, 634 (1993) 350-355.

### 8b. Aflatoxins and other mycotoxins

- 1605 Luo, Y., Liu, F., Zheng, J. and Yang, J.: (Systematic extraction, separation, and detection of *Fusarium* mycotoxins in cereals.) *Junshi Yixue Kexueyuan Yuankan*, 16, No. 1 (1992) 20-25; C.A., 118 (1993) 58276r.

See also 1609.

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

- 1606 De Jong, A.P.J.M. and Liem, A.K.D.: Gas chromatography-mass spectrometry in ultra trace analysis of polychlorinated dioxins and related compounds. *TrAC*, 12 (1993) 115-124.

- 1607 Schimmel, H., Schmid, B., Bacher, R. and Ballschmiter, K.: Molar response of polychlorinated dibenz-p-dioxins and dibenzofurans by the mass spectrometric detector. *Anal. Chem.*, 65 (1993) 640-644.

See also 1779.

## 9. OXO COMPOUNDS, ETHERS, EPOXIDES AND QUINONES

- 1608 Niyati-Shirkhodaei, F. and Shibamoto, T.: Gas chromatographic analysis of glyoxal and methylglyoxal formed from lipids and related compounds upon ultraviolet irradiation. *J. Agric. Food Chem.*, 41 (1993) 227-230.
- 1609 Ramstad, T., Miller, L.S. and Thomas, V.N.: Determination of residual ethylene oxide in spectinomycin hydrochloride bulk drug by dynamic headspace gas chromatography. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 313-319.
- 1610 Sasaki, K., Kijima, K., Takeda, M. and Kojima, S.: Specific determination of ethylene oxide and ethylene chlorohydrin in cosmetics and polyoxyethylated surfactants by gas chromatography with electron capture detector. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 292-296.
- 1611 Vidal, J.P., Estreguil, S. and Cantagrel, R.: Quantitative analysis of cognac carbonyl compounds at the PPB level by GC-MS of their O-(perfluorobenzyl amine) derivatives. *Chromatographia*, 36 (1993) 183-186.

See also 1538, 1595, 1765, 1787.

## 10. CARBOHYDRATES

### 10a. Mono and oligosaccharides. Structural studies

- 1612 Karoutis, A.I., Tyler, R.T. and Slater, G.P.: Analysis of legume oligosaccharides by high-resolution gas chromatography. *J. Chromatogr.*, 623 (1992) 186-190.
- 1613 Kitajima, K., Inoue, S., Kitazume, S. and Inoue, Y.: Analytical methods for identifying and quantitating deamidated sialic acid (2-keto-3-deoxy-D-glycero-D-galactonic acid) and  $\alpha$ 2 → 8-linked poly(oligo)nonulosonate residues in glycoconjugates. *Anal. Biochem.*, 205 (1992) 244-250.
- 1614 Lau, E. and Bacic, A.: Capillary gas chromatography of partially methylated alditol acetates on a high-polarity, cross-linked, fused-silica BPX70 column. *J. Chromatogr.*, 637 (1993) 100-103.

See also 1624.

## 11. ORGANIC ACIDS AND LIPIDS

### 11a. Organic acids and simple esters

- 1615 Bai, X.: (Gas chromatographic analysis for trimellitic acid and acidic compounds.) *Huaxue Yu Nianhe*, No. 1 (1992) 36-38; C.A., 118 (1993) 72809y.

- 1616 Dotson, K.D., Jerrell, J.P., Picciano, M.F. and Perkins, E.G.: High-performance liquid chromatography of human milk triacylglycerols and gas chromatography of component fatty acids. *Lipids*, 27 (1992) 933-939.
- 1617 Guido, D.M., McKenna, R. and Mathew, W.R.: Quantitation of hydroperoxy-eicosatetraenoic acids and hydroxy-eicosatetraenoic acids as indicators of lipid peroxidation using gas chromatography-mass spectrometry. *Anal. Biochem.*, 209 (1993) 123-129.
- 1618 Hušek, P.: Long-chain fatty acids esterified by action of alkyl chloroformates and analysed by capillary gas chromatography. *J. Chromatogr.*, 615 (1993) 334-338.
- 1619 Kataoka, H., Hirabayashi, N. and Makita, M.: Analysis of lipoic acid in biological samples by gas chromatography with flame photometric detection. *J. Chromatogr.*, 615 (1993) 197-202.
- 1620 Kimball, B.A. and Mishalanie E.A.: Gas chromatographic determination of sodium monofluoroacetate as the free acid in an aqueous solvent. *J. Chromatogr.*, 634 (1993) 289-296.
- 1621 Kozma-Kovacs, E., Halasz, A., Hajos, G., Sass, A. and Boross, F.: Estimation of lipoic acid in brewers' yeast by thin-layer and capillary gas chromatographic methods. *Acta Aliment.*, 20 (1991) 151-162; C.A., 118 (1993) 35250p.
- 1622 Marchese, N. and Caruso, U.: Quantitative measurements of 4-hydroxy-3-methoxymandelic and homovanillic acids in plasma using capillary gas chromatography-mass spectrometry and stable isotope dilution: preliminary data. *Chromatographia*, 36 (1993) 179-182.
- 1623 Meier-Augenstein, W., Hoffman, G.F., Holmes, B., Jones, J.L., Nyhan, W.L. and Sweetman, L.: Use of thick-film capillary column for the analysis of organic acids in body fluids. *J. Chromatogr.*, 615 (1993) 127-135.
- 1624 Morvai-Vitányi, M., Molnár-Perl, I., Knausz, D. and Sass, P.: Simultaneous GC derivatization and quantification of acids and sugars. *Chromatographia*, 36 (1993) 204-206.
- 1625 Müller, K.-D., Nalik, H.P., Schmid, E.N., Husmann, H. and Schomburg, G.: Fast identification of mycobacterium species by GC analysis with trimethylsulfonium hydroxide (TMSH) for transesterification. *J. High Resolut. Chromatogr.*, 16 (1993) 161-165.
- 1626 Ng, L.-K. and Hupé, M.: Simple gas chromatographic method for the assay of salts of carboxylic acids as their trimethylsilyl derivatives. *J. Chromatogr.*, 637 (1993) 104-108.
- 1627 Nimz, E.L. and Morgan, S.L.: On-line derivatization for complex fatty acid mixtures by capillary gas chromatography/mass spectrometry. *J. Chromatogr. Sci.*, 31 (1993) 145-149.
- 1628 Paavilainen, S. and Korpeila, T.: Comparison of high-performance liquid and gas chromatography in the determination of organic acids in culture media of alkaliphilic bacteria. *J. Chromatogr.*, 634 (1993) 273-280.
- 1629 Pawlosky, R.J., Sprecher, H.W. and Salem, N., Jr.: High sensitivity negative ion GC-MS method for detection of desaturated and chain-elongated products of deuterated linoleic and linolenic acids. *J. Lipid Res.*, 33 (1992) 1711-1717; C.A., 118 (1993) 35410r.
- 1630 Rocchiccioli, F. and Saniere, M.: Determination on the micro-scale of plasmatic lactic acid as its *tert*-butyldimethylsilyl derivative by stable-isotope dilution using capillary gas chromatography/mass spectrometry. *Rapid Commun. Mass Spectrom.*, 6 (1992) 781-783; C.A., 118 (1993) 55580z.
- 1631 Sippola, E., David, F. and Sandra, P.: Temperature program optimization by computer simulation for the capillary GC analysis of fatty acid methyl esters on biscyanopropyl siloxane phases. *J. High Resolut. Chromatogr.*, 16 (1993) 95-100.
- 1632 Tande, T., Breivik, H. and Aasoldsen, T.: Validation of a method for gas chromatographic analysis of eicosapentaenoic acid and docosahexaenoic acid as active ingredients in medicinal products. *J. Am. Oil Chem. Soc.*, 69 (1992) 1124-1130.
- 1633 Tardi, P.G., Mukherjee, J.J. and Choy, P.C.: The quantitation of long-chain acyl-CoA in mammalian tissue. *Lipids*, 27 (1992) 65-67; C.A., 116 (1992) 124330r.
- 1634 Toida, T., Qiu, G., Matsunaga, T., Sagehashi, Y. and Imanari, T.: Gas chromatography-mass spectrometric determination of iduronic and glucuronic acids in glycosaminoglycans after reduction of carboxylic group using sodium borodeuteride. *Anal. Sci.*, 8 (1992) 799-804.
- 1635 Yu, Z., Rijks, J.A. and Cramers, C.A.: (Capillary gas chromatographic analysis of cellular fatty acids from yeast species.) *Fenxi Huaxue*, 20 (1992) 1178-1180; C.A., 118 (1993) 35252r.
- 1636 Zhang, N., Liang, L. and Liu, Y.: (Gas chromatographic determination of sodium cyclamate in beverages.) *Shipin Kexue (Beijing)*, 150 (1992) 47-49; C.A., 118 (1993) 37666c.
- See also 1487, 1538, 1563, 1595, 1603, 1760, 1764, 1792.
- 11b. *Prostaglandins*
- 1637 Morrow, J.D. and Minton, T.A.: Improved assay for the quantitation of 11-dehydrothromboxane B<sub>2</sub> by gas chromatography-mass spectrometry. *J. Chromatogr.*, 612 (1993) 179-185.
- 11c. *Lipids and their constituents*
- 1638 Alonso, L.: Capillary gas chromatography of some triglycerides in cheese using programmed-temperature injection. *Chromatographia*, 35 (1993) 649-652.
- See also 1616, 1640.
12. ORGANIC PEROXIDES
- 1639 Foglia, T.A., Silbert, L.S. and Vail, P.D.: Peroxides. XII. Gas-liquid and high performance liquid chromatographic analysis of aliphatic hydroperoxides and dialkyl peroxides. *J. Chromatogr.*, 637 (1993) 157-165.
- 1640 Ulberth, F. and Roubicek, D.: Evaluation of a static headspace gas chromatographic method for the determination of liquid peroxides. *Food Chem.*, 46 (1993) 137-141; C.A., 118 (1993) 37689n.
- See also 1617.

## 13. STEROIDS

13b. *Pregnane and androstane derivatives*

- 1641 Cairns, T., Siegmund, E.G. and Rader, B.: Analysis of testosterone esters by tandem mass spectrometry. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 306-312.
- 1642 Cravedi, J.P., Belous, G., Debrauwer, L., Rao, D. and Prome, D.: Liquid chromatographic separation and gas chromatographic-mass spectrometric determination of 17 $\alpha$ -methyltestosterone residue extracted from rainbow trout tissues. *Anal. Chim. Acta*, 275 (1993) 89-94.
- 1643 Le Bizec, B., Montrade, M.-P., Monteau, F. and Andre, F.: Detection and identification of anabolic steroids in bovine urine by gas chromatography-mass spectrometry. *Anal. Chim. Acta*, 275 (1993) 123-133.
- 1644 Rizzo, A.F., Alitupa, E., Hirvi, T., Berg, S., Hirn, J. and Leinonen, A.: Determination of 19-nartestosterone in finnish boar plasma and urine samples. *Anal. Chim. Acta*, 275 (1993) 135-138.
- 1645 Schanzer, W. and Donike, M.: Metabolism of anabolic steroids in man: synthesis and use of reference substances for identification of anabolic steroid metabolites. *Anal. Chim. Acta*, 275 (1993) 23-48.
- 1646 Stanley, S.M.R., Wilhelm, B.S., Rodgers, J.P. and Bertschinger, H.: Immunoaffinity chromatography combined with gas chromatography-negative ionisation mass spectrometry for the confirmation of flumethazine abuse in the equine. *J. Chromatogr.*, 614 (1993) 77-86.
- 1647 Williams, K.R., Anderson, R.A. and Grey, P.J.: Metabolism of anabolic agent in the racing greyhound. *Anal. Chim. Acta*, 275 (1993) 163-172.
- 1648 Yang, Y.W. and Wu, R.J.: (Trimethylsilylation of testosterone, epitestosterone, and determination of their ratio in urine by GC-MS.) *Yaoxue Xuebao*, 27 (1992) 758-762; C.A., 118 (1993) 33044a.

See also 1512, 1649.

13c. *Estrogens*

- 1649 Becker, D., Galili, N. and Degani, G.: GCMS-identified steroids and steroid glucuronides in gonads and holding water of *Trichogaster trichopterus* (Acanthidae, Pallas 1770). *Comp. Biochem. Physiol., B: Comp. Biochem.*, 103B (1992) 15-19; C.A., 117 (1992) 248801k.
- 1650 Daeseleire, E.A.I., de Guesquiere, A. and van Peteghem, C.H.: Multiresidue analysis of anabolic agents in muscle tissues and urines of cattle by GC-MS. *J. Chromatogr. Sci.*, 30 (1992) 409-414.
- 1651 Jagota, N.K. and Stewart, J.T.: Supercritical fluid chromatography of selected estrogens. *J. Pharm. Biomed. Anal.*, 10 (1992) 667-673; C.A., 118 (1993) 66970c.

13d. *Sterols*

- 1652 Pizzoferrato, L., Nicoli, S. and Lintas, C.: GC-MS characterization and quantification of sterols and cholesterol oxidation products. *Chromatographia*, 35 (1993) 269-274.

- 1653 Yoshida, T., Honda, A., Tanaka, N., Matsuzaki, Y., He, B., Osuga, T., Kobayashi, N., Ozawa, K. and Miyazaki, H.: Simultaneous determination of mevalonate and 7 $\alpha$ -hydroxycholesterol in human plasma by gas chromatography-mass spectrometry as indices of cholesterol and bile acid biosynthesis. *J. Chromatogr.*, 613 (1993) 185-193.

- 1654 Young, J.C. and Games, D.E.: Supercritical fluid extraction and supercritical fluid chromatography of the fungal metabolite ergosterol. *J. Agric. Food Chem.*, 41 (1993) 577-581.

See also 1563, 1774.

13e. *Bile acids and alcohols*

- 1655 Scalia, S. and Games, D.E.: Analysis of conjugated bile acids by on-line supercritical fluid chromatography/thermospray mass spectrometry. *Org. Mass Spectrom.*, 27 (1992) 1266-1270; C.A., 118 (1993) 35427b.

## 15. TERPENES AND OTHER VOLATILE AROMATIC COMPOUNDS

15a. *Terpenes*

- 1656 Lesellier, E., Krstulovic, A.M. and Tchapla, A.: Influence of the modifiers on the nature of the stationary phase and the separation of carotenes in sub-critical fluid chromatography. *Chromatographia*, 36 (1993) 275-282.
- 1657 Lesellier, E., Tchapla, A., Marty, C. and Lebert, A.: Analysis of carotenoids by high-performance liquid chromatography and supercritical fluid chromatography. *J. Chromatogr.*, 633 (1993) 9-23.
- 1658 Semenchenko, V.F. and Kudrin, S.V.: (The content of betulenol in the external bark of birch (*Betula*).) *Farmatsiya (Moscow)*, 41, No. 4 (1992) 24-27; C.A., 118 (1993) 45874j.

See also 1530, 1534.

15b. *Essential oils*

- 1659 Chanegriha, N. and Baaliouamer, A.: Evaluation of series-coupled gas chromatographic capillaries of different polarities. Application to the resolution of problem pairs of constituents in Algerian cypress essential oil. *J. Chromatogr.*, 633 (1993) 163-168.
- 1660 Coleman, W.M., III and Lawrence, B.M.: Comparative automated static and dynamic quantitative headspace analyses of coriander oil. *J. Chromatogr. Sci.*, 30 (1992) 396-398.
- 1661 Dai, B. and Qiu, C.: (Comparison of constituents of essential oils from two species of *Ferula* in Chinese traditional drugs by GC-MS.) *Yaowu Fenxi Zazhi*, 12 (1992) 285-288; C.A., 118 (1993) 45561e.
- 1662 Hawthorne, S.B., Riekkola, M.-L., Serenius, K., Holm, Y., Hiltunen, R. and Hartonen, K.: Comparison of hydrodistillation and supercritical fluid extraction for the determination of essential oils in aromatic plants. *J. Chromatogr.*, 634 (1993) 297-308.
- 1663 Mahmout, Y., Bessiere, J.-M. and Dolmazon, R.: Composition of the essential oil from *Kyllinga erecta* S. *J. Agric. Food Chem.*, 41 (1993) 277-279.

- 1664 Moshonas, M.G. and Shaw, P.E.: Comparison of static and dynamic headspace gas chromatography for quantitative determination of volatile orange juice constituents. *Food Sci. Technol. (London)*, 25 (1992) 236-239; C.A., 118 (1993) 37655y.

## 16. NITRO AND NITROSO COMPOUNDS

See 1807.

## 17. AMINES, AMIDES AND RELATED NITROGEN COMPOUNDS

### 17a. Amines and polyamines

- 1665 Berger, T.A. and Wilson W.H.: Separation of anilines, benzamides, benzylamines, and phenylethylamines by packed column supercritical fluid chromatography. *J. Chromatogr. Sci.*, 31 (1993) 127-132.  
 1666 Gu, Y. and Yin, B.: (Separation of amines with ligand-exchange gas chromatography.) *Fenxi Huaxue*, 20 (1992) 753-760; C.A., 118 (1993) 72813v.  
 1667 Hušek, P.: Capillary GC analysis of biogenic amines, their precursors and catabolites after fast derivatization with ethyl chloroformate. *J. Microcolumn Separ.*, 5 (1993) 101-103.  
 1668 Tekel, J., Schultzova, K., Kovacicova, J. and Brandsterova, E.: Capillary GC with nitrogen-selective detection for on-line analysis of substituted anilines formed from phenylurea herbicides. *J. High Resolut. Chromatogr.*, 16 (1993) 126-130.  
 1669 Vainiotalo, S., Matveinen, K. and Reunanan, A.: GC/MS determination of the mutagenic heterocyclic amines MelQx and Di-MelQx in cooking fume. *Fresenius J. Anal. Chem.*, 345 (1993) 462-466.

See also 1487, 1742, 1792.

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

- 1670 Conyers, B., Walker, E., Scully, F.E., Jr. and Marbury, G.D.: *N*-Chloroaldimines. 4. Identification in a chlorinated municipal wastewater by gas chromatography/mass spectrometry. *Environ. Sci. Technol.*, 27 (1993) 720-724.  
 1671 Lou, X., Liu, X. and Zhou, L.: Chiral recognition of enantiomeric amides on a diamide chiral stationary phase by gas chromatography. *J. Chromatogr.*, 634 (1993) 345-349.  
 1672 Rosseel, M.T., Belpaire, F.M., Samijn, N. and Wijnant, P.: Simultaneous determination of *N,N*-dimethylformamide, *N*-monomethylformamide and *N*-hydroxymethyl-*N*-methylformamide in rat plasma by capillary gas chromatography. *J. Chromatogr.*, 615 (1993) 154-158.

See also 1665, 1741.

## 18. AMINO ACIDS AND PEPTIDES; CHEMICAL STRUCTURE OF PROTEINS

### 18a. Amino acids and their derivatives

- 1673 Bruckner, H. and Hausch, M.: Gas chromatographic characterization of free D-amino acids in the blood serum of patients with renal disorders and of healthy volunteers. *J. Chromatogr.*, 614 (1993) 7-17.  
 1674 Huang, Z.-H., Wang, J., Gage, D.A., Watson, J.T., Sweeley, C.C. and Huek, P.: Characterization of *N*-ethoxycarbonyl ethylesters of amino acids by mass spectrometry. *J. Chromatogr.*, 635 (1993) 271-281.  
 1675 Kataoka, H., Nakai, K. and Makita, M.: Identification of O-phosphoamino acids in urine hydrolysate by gas chromatography-mass spectrometry. *J. Chromatogr.*, 615 (1993) 136-141.  
 1676 Lou, X., Liu, X. and Zhou, L.: Series-coupled capillary columns for the separation of *N*(O)-trifluoroacetyl isopropyl derivatives of *D,L*-aspartic acid and *L*-hydroxyproline by gas chromatography. *J. Chromatogr.*, 634 (1993) 281-288.  
 1677 Schoun, J., Dulery, B. and Haegele, K.D.: Validation of a gas chromatographic/mass spectrometric method for the determination of (E)- $\beta$ -fluoromethylene-*m*-tyrosine and its active metabolite in human plasma and urine. *Biol. Mass Spectrom.*, 21 (1992) 625-632; C.A., 118 (1993) 51756p.  
 1678 Woo, K.-L. and Chang, D.-K.: Determination of 22 protein amino acids as *N*(O)-*tert*.-butyldimethylsilyl derivatives by gas chromatography. *J. Chromatogr.*, 638 (1993) 97-107.

## 22. ALKALOIDS

- 1679 Domino, E.F., Hariharan, M., VanNoord, T. and Demana, T.: Current experience with HPLC and GC-MS analyses of nicotine and cotinine. *Med. Sci. Res.*, 20 (1992) 859-860; C.A., 118 (1993) 53690m.  
 1680 McAdams, S.A. and Cordeiro, M.L.: Simple selected ion monitoring capillary gas chromatographic-mass spectrometric method for the determination of cotinine in serum, urine and oral samples. *J. Chromatogr.*, 615 (1993) 148-153.  
 1681 Nakahara, Y., Takahashi, K., Shimamine, M. and Saitoh, A.: Hair analysis for drugs of abuse. IV. Determination of total morphine and confirmation of 6-acetylmorphine in monkey and human hair by GC/MS. *Arch. Toxicol.*, 66 (1992) 669-74; C.A., 118 (1993) 17536g.  
 1682 Ohshita, T., Miyata, Y. and Ando, H.: (Application of capillary GC/MS for identification of drugs on forensic chemistry. I. Direct detection of 6-acetylmorphine in urine samples of heroin abusers.) *Shitsuryo Bunseki*, 40 (1992) 231-234; C.A., 118 (1993) 17528f.

See also 1759.

23. OTHER SUBSTANCES CONTAINING HETEROCYCLIC NITROGEN

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

1683 Guo, Y., Ren, Q. and He, Y.: (Studies on the constituents of cytokinin in leaves of *Portulaca grandiflora* Hook by gas chromatography (GC), gas chromatography-mass spectrometry (GC-MS) and high performance thin-layer chromatography.) *Separ.*, 11 (1993) 27-29.

1684 Schaefer, S. and Pilet, P.E.: Quantification of indole-3-acetic acid in untransformed and *Agrobacterium rhizogenes*-transformed pea roots using gas chromatography mass spectrometry. *Planta*, 189 (1993) 55-59; C.A., 118 (1993) 56427s.

See also 1767.

23d. *Pyridine derivatives*

See 1740.

23e. *Other N-heterocyclic compounds*

See 1737.

24. ORGANIC SULPHUR COMPOUNDS (INCL. GLUCOSINOLATES)

1685 Haase-Aschoff, K. and Haase-Aschoff, I.: (Detection and determination of methyl isothiocyanate in wine and juice.) *Dtsch. Lebensm.-Rundsch.*, 88, No. 5 (1992) 144-146; C.A., 118 (1993) 37645v.

1686 Shearer, R.L., Poole, E.B. and Nowalk, J.B.: Application of gas chromatography and flameless sulfur chemiluminescence detection to the analysis of petroleum products. *J. Chromatogr. Sci.*, 31 (1993) 82-87.

See also 1621, 1778, 1815.

25. ORGANIC PHOSPHORUS COMPOUNDS (INCL. SUGAR PHOSPHATES)

See 1675, 1716.

26. ORGANOMETALLIC AND RELATED COMPOUNDS

26a. *Organometallic compounds*

1687 Cai, Y., Rapsomanikis, S. and Andreae, M.O.: Determination of butyltin compounds in sediment using gas chromatography-atomic absorption spectrometry: comparison of sodium tetrahydorate and sodium tetraethylborate derivatization method. *Anal. Chim. Acta*, 274 (1993) 243-251.

1688 Dachs, J. and Bayona, J.M.: Optimization of a flame photometric detector for supercritical fluid chromatography of organotin compounds. *J. Chromatogr.*, 636 (1993) 277-283.

1689 Liu, Y., Lopez-Avila, V., Alcaraz, M. and Beckert, W.F.: Determination of organotin compounds in environmental samples by supercritical fluid extraction and gas chromatography with atomic emission detection. *J. High Resolut. Chromatogr.*, 16 (1993) 106-112.

1690 Matsuda, R., Suzuki, T. and Saito, Y.: Metabolism of tri-n-butyltin chloride in male rats. *J. Agric. Food Chem.*, 41 (1993) 489-495.

1691 Yamada, S., Fujii, Y., Mikami, E., Kawamura, N., Hayakawa, J., Aoki, K., Fukaya, M. and Terao, C.: Small-scale survey of organotin compounds in household commodities. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 436-441.

See also 1474, 1479, 1514, 1516, 1728.

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

See 1532, 1830.

26c. *Coordination compounds*

1692 Aggarwal, S.K., Gemma, N.W., Kinter, M., Nicholom, J., Shipe, J.R., Jr., and Herold, D.A.: Determination of platinum in urine, ultrafiltrate and whole plasma by isotope dilution gas chromatography-mass spectrometry compared to electrothermal atomic absorption spectrometry. *Anal. Biochem.*, 210 (1993) 113-118.

1693 Khuhawar, M.Y., Sarafraz-Yazdi, A. and Uden, P.C.: Capillary gas chromatographic determination of copper and nickel using microwave-induced plasma atomic emission detection. *J. Chromatogr.*, 636 (1993) 271-276.

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

1694 Masuda, M., Koike, S., Handa, M., Sagara, K. and Mituzani, T.: Application of supercritical fluid extraction and chromatography to assay fat-soluble vitamins in hydrophobic ointment. *Anal. Sci.*, 9 (1993) 29-32.

28. ANTIBIOTICS

See 1776.

29. INSECTICIDES, PESTICIDES AND OTHER AGROCHEMICALS

29a. *General techniques*

1695 Kelly, A.G., Cruz, I. and Wells, D.E.: Polychlorobiphenyls and persistent organochlorine pesticides in sea water at the pg l<sup>-1</sup> level. Sampling apparatus and analytical methodology. *Anal. Chim. Acta*, 276 (1993) 3-13.

1696 Redondo, M.J., Ruiz, M.J., Boluda, R. and Font, G.: Determination of pesticides in soil samples by solid phase extraction disks. *Chromatographia*, 36 (1993) 187-190.

See also 1805.

## 29b. Chlorinated insecticides

- 1697 Ismail, S.M.M., Ali, H.M. and Habiba, R.A.: GC-ECD and GC-MS analyses of profenofos residues and its biochemical effects in tomatoes and tomato products. *J. Agric. Food Chem.*, 41 (1993) 610-615.
- 1698 Miyahara, M., Murayama, M., Suzuki, T. and Saito, Y.: Silica gel chromatographic cleanup procedure for organochlorine pesticide analysis with capillary gas chromatography. *J. Agric. Food Chem.*, 41 (1993) 221-226.
- 1699 Mukherjee, I. and Gopal, M.: Organochlorine pesticide residues in dairy milk in and around Delhi. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 283-286.
- 1700 Russo, M.V., Goretti, G. and Liberti, A.: Rapid determination of chlorinated pesticides using CN-bonded cartridges followed by GC-ECD. *Chromatographia*, 35 (1993) 290-294.

See also 1525, 1531, 1553.

## 29c. Phosphorus insecticides

- 1701 Erney, D.R., Gillespie, A.M., Gilvidis, D.M. and Poole, C.F.: Explanation of the matrix-induced chromatographic response enhancement of organophosphorus pesticides during open tubular column gas chromatography with splitless or hot on-column injection and flame photometric detection. *J. Chromatogr.*, 638 (1993) 57-63.
- 1702 Hagmann, M. and Mohl, B.: Spurenbestimmung von Stickstoff- und Phosphorpestiziden. *LaborPraxis*, 17, No. 5 (1993) 56-62.
- 1703 Lartiges, S. and Garrigues, P.: Determination of organophosphorus and organonitrogen pesticides in water and sediments by GC-NPD and GC-MS. *Analisis*, 21 (1993) 157-165.
- 1704 Miliadis, G.E.: Gas chromatographic determination of pesticides in natural waters of Greece. *Bull. Environ. Contam. Toxicol.*, 50 (1993) 247-252; C.A., 118 (1993) 66373k.
- 1705 Richardson, E.R. and Seiber, J.N.: Gas chromatographic determination of organophosphorus insecticides and their dialkyl phosphate metabolites in liver and kidney samples. *J. Agric. Food Chem.*, 41 (1993) 416-422.

See also 1479.

## 29d. Carbamates

- 1706 Ballesteros, E., Gallego, M. and Valcárcel, M.: Automatic determination of N-methylcarbamate pesticides by using a liquid-liquid extractor derivatization module coupled on-line to a gas chromatograph equipped with a flame ionization detector. *J. Chromatogr.*, 633 (1993) 169-176.
- 1707 Faerber, H. and Schoeler, H.F.: Gas chromatographic determination of carbamate pesticides after flash-heater methylation with trimethylsulfonium hydroxide. *J. Agric. Food Chem.*, 41 (1993) 217-220.
- 1708 Matsudo, T., Aoki, T., Abe, K., Fukuta, N., Higuchi, T., Sasaki, M. and Uchida, K.: Determination of ethyl carbamate in soy sauce and its possible precursor. *J. Agric. Food Chem.*, 41 (1993) 352-356.

## 29e. Herbicides

- 1709 Karg, F.P.M.: Determination of phenylurea pesticides in water by derivatization with heptafluorobutyric anhydride and gas chromatography-mass spectrometry. *J. Chromatogr.*, 634 (1993) 87-100.
- 1710 Klaffenbach, P. and Holland, P.T.: Analysis of sulfonylurea herbicides by gas-liquid chromatography. 2. Determination of chlor-sulfuron and metsulfuron-methyl in soil and water samples. *J. Agric. Food Chem.*, 41 (1993) 396-401.
- 1711 Klaffenbach, P., Holland, P.T., and Lauren D.R.: Analysis of sulfonylurea herbicides by gas-liquid chromatography. 1. Formation of thermostable derivatives of chlorsulfuron and metsulfuron-methyl. *J. Agric. Food Chem.*, 41 (1993) 388-395.
- 1712 Mortimer, R.D. and Weber, D.F.: Determination of residual imazethapyr in soybeans by gas chromatography/nitrogen-phosphorus detection. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 377-381.
- 1713 Nishikawa, Y.: Supercritical fluid chromatographic separation of synthetic pyrethroids on packed columns and capillary columns. *Anal. Sci.*, 8 (1992) 817-822.
- 1714 Pérez, S., Matienzo, M.T. and Tadeo, J.L.: GC-ITD analysis of chlortoluron and its metabolites in cereals. *Chromatographia*, 36 (1993) 195-200.
- 1715 Singh, S.B. and Kulshrestha, G.: Gas chromatographic method for the determination of anilophos in soil. *J. Chromatogr.*, 637 (1993) 109-112.
- 1716 Tsunoda, N.: Simultaneous determination of the herbicides glyphosate, glufosinate and bialaphos and their metabolites by capillary gas chromatography-ion-trap mass spectrometry. *J. Chromatogr.*, 637 (1993) 167-173.

See also 1511, 1550, 1668, 1702, 1703.

## 29f. Fungicides

- 1717 Diekmann, H., Stockmaier, M., Kreuzig, R. and Bahadir, M.: Simultaneous determination of fenpropimorph and the corresponding metabolite fenpropimorphic acid in soil. *Fresenius J. Anal. Chem.*, 345 (1993) 784-786.
- 1718 Gándara, J.S., Losada, P.P., Rodríguez, V.G. and Rodríguez, A.R.: Comparison of GC-MS and HPLC-UV for determination of procymidone in wine. *J. Agric. Food Chem.*, 41 (1993) 674-677.
- 1719 Neri, B., Ubaldi, A., Barchi, D., di Lullo, A. and Cozzani, R.: (Determination of fluvanilate residues in honey.) *Ind. Aliment. (Pinerolo)*, 31 (1992) 748-750; C.A., 118 (1993) 37657a.
- 1720 Valverde-García, A., Gonzales-Pradas, E., Aguilera-Del Real, A., Ureña-Amate, M.D. and Samacho-Ferre, F.: Determination and degradation study of chlorothalonil residues in cucumbers, pepper and cherry tomatoes. *Anal. Chim. Acta*, 276 (1993) 15-23.

## 29g. Other types of pesticides and various agrochemicals

- 1721 Nishikawa, Y.: Enantiomer separation of synthetic pyrethroids by subcritical and supercritical fluid chromatography with chiral stationary phases. *Anal. Sci.*, 9 (1993) 33-37.
- 1722 Nishikawa, Y.: Retention behavior of synthetic pyrethroids in capillary supercritical fluid chromatography. *Anal. Sci.*, 9 (1993) 39-42.

See also 1620.

### 31. PLASTICS AND THEIR INTERMEDIATES

- 1723 Abrantes, S.: GC-MS identification of styrene and oligomers in polystyrene plastic for milk packaging. Headspace and solution injection technique. *J. High Resolut. Chromatogr.*, 16 (1993) 113-115.
- 1724 Cascaval, C.N. and Rosu, D.: Phenolic and epoxy resins. I. Thermal characterization by pyrolysis-gas chromatography. *Rev. Roum. Chim.*, 36 (1991) 1331-1336; *C.A.*, 118 (1993) 39881t.
- 1725 Evans, M.B.: Inverse gas chromatography in the study of polymer degradation. Part 4: A study of model systems for reinforced vulcanizates. *Chromatographia*, 36 (1993) 241-245.
- 1726 Farooque, A.M. and Deshpande, D.D.: Studies of polystyrene-polybutadiene blend system by inverse gas chromatography. *Polymer*, 33 (1992) 5005-5018; *C.A.*, 118 (1993) 39780j.
- 1727 Jakab, E., Till, F., Szekely, T., Kozhabekov, S.S. and Zhubanov, B.A.: Thermal decomposition of aryl-alicyclic polyimides studied by thermogravimetry/mass spectrometry and pyrolysis-gas chromatography/mass spectrometry. *J. Anal. Appl. Pyrolysis*, 23 (1992) 229-243.
- 1728 Oudsema, J.W. and Poole, C.F.: Determination of an organotin stabilizer in a rigid poly(vinyl chloride) plastic by on-line supercritical fluid extraction and chromatography with formic acid modified carbon dioxide and flame ionization detection. *J. High Resolut. Chromatogr.*, 16 (1993) 198-202.
- 1729 Satoh, E., Hoshi, M., Kondoh, Y., Tokuda, H. and Matsumoto, K.: (A new automated analysis system of polymers by pyrolysis GC.) *Bunseki Kagaku*, 42 (1993) 119-125.
- 1730 Venema, A. and Jelink, T.J.: Selectivity and efficiency enhancement of supercritical fluid extraction by application of reactive additives. *J. High Resolut. Chromatogr.*, 16 (1993) 166-168.
- 1731 Yasuhara, A.: Thermal decomposition of tetrachloroethylene. *Chemosphere*, 26 (1993) 1507-1512.

See also 1798.

### 32. DRUG ANALYSIS

#### 32a. Drug analysis, general techniques

- 1732 Grob, R.L.: Environmental analyses utilizing gas and liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1783-1802.
- 1733 Kalasinsky, K.S., Levine, B. and Smith, M.L.: Feasibility of using GC/FT-IR for drug analysis in the forensic toxicology laboratory. *J. Anal. Toxicol.*, 16 (1992) 332-336; *C.A.*, 117 (1992) 206537y.
- 1734 Kalasinsky, K.S., Levine, B., Smith, M.L. and Platoff, G.E., Jr.: Comparison of infrared and mass spectroscopies for drug analysis. *Crit. Rev. Anal. Chem.*, 23 (1993) 441-457.

See also 1632.

#### 32b. Antirheumatics and antiinflammatory drugs

See 1535.

#### 32c. Autonomic and cardiovascular drugs

- 1735 Carlin, A.S., Simmons, J.E., Kocova El-Arini, S. and Shiu, G.K.: Determination of khellin in serum by gas chromatography. *J. Chromatogr.*, 614 (1993) 324-327.
- 1736 Debrauwer, L., Delous, G. and Bories, G.: Comparison of various hyphenated chromatography-mass spectrometry methods for the analysis of  $\beta$ -agonists. *Chromatographia*, 36 (1993) 218-224.
- 1737 Fox, S.D., Shaw, G.L., Caporaso, N.E., Welsh, S.E., Mellini, D.W., Falk, R. and Issaq, H.J.: The determination of debrisoquine and its 4-hydroxy metabolite in urine by capillary gas chromatography and high performance liquid chromatography. *J. Liq. Chromatogr.*, 16 (1993) 1315-1327.
- 1738 Kajita, M., Niwa, T., Takeda, N., Yoshizumi, H., Tatematsu, A., Watanabe, K. and Nagatsu, T.: Presence of N-methyldopamine in parkinsonian and normal human brains. *J. Chromatogr.*, 613 (1993) 1-8.
- 1739 Montrude, M.-P., LeBizec, B., Monteau, F., Siliart, B. and Audre, F.: Multi-residue analysis for  $\beta$ -agonistic drugs in urine of meat-producing animals by gas chromatography-mass spectrometry. *Anal. Chim. Acta*, 275 (1993) 253-268.
- 1740 Sakamoto, T., Ohtake, Y., Itoh, M., Tabata, S., Kuriki, T. and Uno K.: Determination of felodipine enantiomers using chiral stationary phase liquid chromatography and gas chromatography/mass spectrometry, and the study of their pharmacokinetic profiles in human and dog. *Biomed. Chromatogr.*, 7 (1993) 99-103.
- 1741 Visser, T., Uredenbregt, M.J., de Jong, A.P.J.M., van Ginkel, L.A., van Rossum, H.J. and Stephany, R.W.: Cryotrapping gas chromatography-Fourier transform infrared spectrometry: a new technique to confirm the presence of  $\beta$ -agonists in animal material. *Anal. Chim. Acta*, 275 (1993) 205-214.
- 1742 Yeleswaram, K., Rurak, D.W., Kwan, E., Hall, C., Abbott, F.S. and Axelson, J.E.: Identification and quantitation of an oxidative metabolite of labetalol in sheep: pharmacokinetic and metabolic implications. *Biol. Mass Spectrom.*, 21 (1992) 534-540; *C.A.*, 118 (1993) 51745j.

See also 1749.

#### 32d. Central nervous system drugs

- 1743 Chen, X.-H., Franke, J.-P., Ensing, K., Wijsbeek, J. and de Zeeuw, R.A.: Semi-automated solid-phase extraction procedure for drug screening in biological fluids using the ASPEC system in combination with Clean Screen DAU columns. *J. Chromatogr.*, 613 (1993) 289-294.
- 1744 Degen, P.H., Risser, F. and Lauber, J.W.: Improved determination of brofaromine by capillary gas chromatography and by utilization of a multi-purpose injector. *J. Chromatogr.*, 623 (1992) 191-195.
- 1745 Dill, D.N. and Eilbacher, B.: Gas chromatographic-mass spectrometric method for the determination of bifemelane in human plasma at therapeutic doses. *J. Chromatogr.*, 613 (1993) 150-157.

- 1746 Jourdin, N., Pinteau B., Vincent, F., Marka, C. and Bessard, G.: Simultaneous determination of trimipramine and desmethyl- and hydroxytrimipramine in plasma and red blood cells by capillary gas chromatography with nitrogen-selective detection. *J. Chromatogr.*, 613 (1993) 59-65.
- 1747 Lantz, R.J., Farid, K.Z., Koons, J., Tenbarge, J.B. and Bopp, R.J.: Determination of fluoxetine and norfluoxetine in human plasma by capillary gas chromatography with electron-capture detection. *J. Chromatogr.*, 614 (1993) 175-179.
- 1748 Miyano, K., Tanifuji, Y. and Obata, T.: The determination of a new inhalational anaesthetic, sevoflurane, using an internal standard, xenon, by gas chromatography/mass spectrometry/selected ion monitoring. *Biomed. Chromatogr.*, 7 (1993) 116-117.
- 1749 Mutlib, A.E., Chui, Y.C., Young, L.M. and Abbott, F.S.: Characterization of metabolites of xylazine produced *in vivo* and *in vitro* by LC/MS/MS and by GC/MS. *Drug Metab. Disp.*, 20 (1992) 840-848; *C.A.*, 118 (1993) 32484g.
- 1750 Trenque, T., Lamiable, D., Millart, H., Vistelle, R. and Choisy, H.: Gas chromatographic determination of meprobamate in human plasma. *J. Chromatogr.*, 615 (1993) 343-346.
- 1751 Yu, H.-Y. and Liu, J.-K.: Quantitation of propofol in plasma by capillary gas chromatography. *J. Chromatogr.*, 615 (1993) 77-81.

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

- 1752 Markus, J. and Sherma, J.: Method II. Gas chromatographic/mass spectrometric confirmatory method for identification of clorsulon residues in kidney tissues of cattle. *J. Assoc. Off. Anal. Chem.*, 75 (1992) 942-946.
- 1753 Markus, J.R., O'Rangers, J. and Sherma, J.: Animal drugs. Method IV. Gas chromatographic determination of tiamulin residues in swine liver. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 451-458.
- 1754 Markus, J.R., O'Rangers, J. and Sherma, J.: Animal drugs. Method V. Gas chromatographic/mass spectrometric confirmation of 8-hydroxymutilin, a tiamulin metabolite, in swine liver extracts. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 459-460.
- 1755 Plata, J., Orte, J.C., Martinez, F. and Alvarez, J.M.: (Identification of salicylamide by gas chromatography in Porapak QS column.) *An. Quim.*, 88 (1992) 374-375; *C.A.*, 118 (1993) 45892p.

See also 1561, 1609, 1776.

### 32g. Other drug categories

- 1756 Saleh, H. and Schnekenburger, J.: Determination of praziquantel in tablets by gas-liquid chromatography. *Analyst (London)*, 117 (1992) 1457-1460.
- 1757 Yoo, Y.C., Chung, H.S. and Kim, E.M.: (Gas-chromatographic analysis of zipeprol in blood.) *Yakhak Haechi*, 36 (1992) 191-198; *C.A.*, 118 (1993) 34003y.

### 32h. Toxicological and forensic applications

- 1758 Clark, C.R., DeRuiter, J. and Noggle, F.T.: GC-MS identification of amine-solvent condensation products formed during analysis of drugs of abuse. *J. Chromatogr. Sci.*, 30 (1992) 399-404.

- 1759 Debrabandere, L., van Boven, M., Laruelle, L. and Daenens, P.: Routine detection of buprenorphine in horse urine: possibilities and limitations of the combined use of radioimmunoassay, liquid chromatography and gas chromatography-mass spectrometry. *Anal. Chim. Acta*, 275 (1993) 295-303.
- 1760 Horike, T., Michitsuji, H., Taguchi, T. and Ogata, M.: (Biomonitoring of solvents in the urine of workers exposed to chlorinated organic solvents.) *Igaku to Seibutsugaku*, 125 (1992) 103-108; *C.A.*, 118 (1993) 53667j.
- 1761 Joern, W.A.: Marijuana testing in urine: use of a hexadeuterated internal standard for extended linearity, and ion trap vs mass selective detector gas chromatograph/mass spectrometer systems. *Clin. Chem. (Winston-Salem)*, 38 (1992) 717-719.
- 1762 Levine, B.: Forensic toxicology. *Anal. Chem.*, 65 (1993) 272A-276A.

See also 1647, 1680, 1681, 1682, 1733, 1824.

### 32i. Plant extracts

- 1763 Biemer, T.A., Asral, N. and Albanese, J.A.: Simultaneous, stability-indicating capillary gas chromatographic assay for benzocaine and the two principal benzyl esters of Balsam Peru formulated in a topical ointment. *J. Chromatogr.*, 623 (1992) 395-398.

See also 1658, 1661.

### 33. CLINICO-CHEMICAL APPLICATIONS

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

- 1764 Caruso, U., Lupino, S., Schiaffino, M.C. and Romano, C.: Capillary GC-MS-stable isotope dilution analysis of methylmalonic acid in plasma: A candidate reference method for the diagnosis and the follow-up of methylmalonic acidaemias. *Chromatographia*, 36 (1993) 212-214.
- 1765 Frankel, E.N., German, J.B. and David, P.A.: Headspace gas chromatography to determine human low density lipoprotein oxidation. *Lipids*, 27 (1992) 1047-1051.
- 1766 Mattamal, M.B., Chung, H.D., Strong, R. and Hsu, F.-F.: Confirmation of a dopamine metabolite in parkinsonian brain tissue by gas chromatography-mass spectrometry. *J. Chromatogr.*, 614 (1993) 205-212.
- 1767 Musshoff, F., Daldrup, T. and Bonte, W.: Gas chromatographic-mass spectrometric screening procedure for the identification of formaldehyde-derived tetrahydro- $\beta$ -carbolines in human urine. *J. Chromatogr.*, 614 (1993) 1-6.
- 1768 Tang, F., Cheng, Z., Chen, N., Shen, Y., She, J. and Shi, K.: (Pattern recognition of pyrolysis-gas chromatography for the study of early diagnosis of gastric carcinoma.) *Sepu*, 11 (1993) 25-26.
- 1769 Zhong, F., Tan, L., An, X., Shen, P., Chen, B., Zheng, T. and Long, H.: (Analysis of mononuclear cells in bone marrow of the patients with leukemia by pyrolytic gas chromatography.) *Sepu*, 11 (1993) 7-10.

See also 1453, 1622, 1673, 1692, 1738.

## 34. FOOD ANALYSIS

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

- 1770 Abraham, M.H. and Whiting, G.S.: Hydrogen-bonding. Part 22. Characterization of soybean oil and prediction of activity coefficients in soyabean oil from inverse gas chromatographic data. *J. Am. Oil Chem. Soc.*, 69 (1992) 1236-1238.
- 1771 Biedermann, M., Grob, K., Froehlich, D. and Meier, W.: Online coupled liquid chromatography-gas chromatography (LC-GC) and LC-LC-GC for detecting the irradiation of fat-containing foods. *Z. Lebensm.-Unters. Forsch.*, 195 (1992) 409-416; C.A., 118 (1993) 58297y.
- 1772 Dasgupta, A., Banerjee, P. and Malik, S.: Use of microwave irradiation for rapid transesterification of lipids and accelerated synthesis of fatty acyl pyrrolidides for analysis by gas chromatography-mass spectrometry: study of fatty acid profiles of olive oil, evening primrose oil, fish oils and phospholipids from mango pulp. *Chem. Phys. Lipids*, 62 (1992) 281-291; C.A., 118 (1993) 58292t.
- 1773 Forcen, M., Mulet, A. and Berna, A.: Contribution of gas chromatographic and conventional data to the characterization of Majorcan musts and wines by means of pattern recognition techniques. *J. Sci. Food Agric.*, 60 (1992) 229-238; C.A., 118 (1993) 58457a.
- 1774 Frega, N., Bocci, F., Giovannoni, G. and Lercker, G.: High resolution GC of unsaponifiable matter and sterol fraction in vegetable oils. *Chromatographia*, 36 (1993) 215-217.
- 1775 Lembeck, P. and Engelhardt, H.: Development of a new SFE method for rapid determination of total fat content of food. *Chromatographia*, 35 (1993) 509-516.
- 1776 Mineo, H. and Kaneko, S.: An analytical study of antibacterial residues in meat: the simultaneous determination of 23 antibiotics and 13 drugs using gas chromatography. *Vet. Hum. Toxicol.*, 34 (1992) 393-397; C.A., 118 (1993) 58283r.

See also 1567, 1585, 1589, 1596, 1636, 1638, 1685, 1697, 1699, 1708, 1714, 1718, 1719, 1720, 1794.

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

- 1777 Bakoyianis, V., Kana, K., Kallifas, A. and Koutinas, A.A.: Low-temperature continuous wine making by kissiris-supported biocatalyst: volatile byproducts. *J. Agric. Food Chem.*, 41 (1993) 465-468.
- 1778 Block, E.: Flavor artifacts. *J. Agric. Food Chem.*, 41 (1993) 692.
- 1779 Bruche, G., Dietrich, A. and Mosandl, A.: Stereoisomeric flavor compounds, part LXI: enantioselective analysis of aroma-relevant dihydrofuranones. *J. High Resolut. Chromatogr.*, 16 (1993) 101-105.
- 1780 Bruche, G., Mosandl, A. and Kinkel, J.N.: Stereoisomeric flavor compounds. Part LXV: Preparative resolution of the enantiomers of chiral dihydrofuranones by recycling chromatography. *J. High Resolut. Chromatogr.*, 16 (1993) 254-257.
- 1781 Kawabe, T. and Morita, H.: Volatile components in culture fluid of *Polyporus tuberaster*. *J. Agric. Food Chem.*, 41 (1993) 637-640.

- 1782 Kawakami, M., Kobayashi, A. and Kator, K.: Volatile constituents of Rooibos Tea (*Aspalathus linearis*) as affected by extraction process. *J. Agric. Food Chem.*, 41 (1993) 633-636.
- 1783 Lopez, V. and Lindsay, R.C.: Metabolic conjugates as precursors for characterizing flavor compounds in ruminant milks. *J. Agric. Food Chem.*, 41 (1993) 446-454.
- 1784 Paik, J.S.: Comparison of sorption in orange flavor components by packaging films using the headspace technique. *J. Agric. Food Chem.*, 40 (1992) 1822-1825.
- 1785 Shiratsuchi, H., Shimoda, M., Minegishi, Y. and Osajima, Y.: Isolation and identification of volatile flavor compounds in nonfermented coarse-cut sausage. Flavor as quality factor of nonfermented sausage. 1. *J. Agric. Food Chem.*, 41 (1993) 647-652.
- 1786 Wilkins, C.K.: Paprika: relationships between aroma profile data and both GC and HPLC data. *Food Sci. Technol. (London)*, 25 (1992) 212-218; C.A., 118 (1993) 37761e.

See also 1611.

## 35. ENVIRONMENTAL ANALYSIS

## 35a. General papers and reviews

- 1787 Beresnev, A.N., Stan'kov, I.N., Lelikov, Yu.A., Yarova, V.A. and Omekhin, A.A.: (Gas chromatographic determination of formic aldehyde in environmental samples.) *Zh. Anal. Khim.*, 48 (1993) 390-399 - a review with 62 refs.

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

- 1788 Almasi, E., Kirshen, N.: Analytical tools for ozone precursors. *Am. Lab. (Shelton)*, 24, No. 2 (1993) 28, 30-31.
- 1789 Scheff, P.A. and Wadden, R.A.: Receptor modeling of volatile organic compounds. 1. Emission inventory and validation. *Environ. Sci. Technol.*, 27 (1993) 617-625.

See also 1566, 1571, 1574, 1581, 1591, 1600, 1795, 1827.

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

- 1790 Elsaesser, W., Gilbert, E. and Eberle, S.H.: (Characterization and identification of low-molecular weight organic substances in biologically treated effluents.) *Z. Wasser-Abwasser-Forsch.*, 25, No. 2 (1992) 82-91; C.A., 117 (1992) 198050s.
- 1791 Schlegelmilch, F.: CLSA-Apparatur. Erfassung flüchtiger Inhaltsstoffe in wässrigen Lösungen. *LaborPraxis*, 17 (1993) 20-27.
- 1792 Yang, X.H., Lee, C. and Scranton, M.I.: Determination of nanomolar concentrations of individual dissolved low molecular weight amines and organic acids in seawater. *Anal. Chem.*, 65 (1993) 572-576.

See also 1573, 1575, 1584, 1599, 1601, 1670, 1695, 1702, 1703, 1704, 1710, 1813, 1831, 1832.

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

- 1793 Krahn, M.M., Ylitalo, G.M., Buzitis, J., Chan, S.-L., Varanasi, U., Wade, T.L., Jackson, T.J., Brooks, J.M., Wolfe, D.A. and Manen, C.-A.: Comparison of high-performance liquid chromatography/fluorescence screening and gas chromatography/mass spectrometry analysis for aromatic compounds in sediments sampled after the Exxon Valdez oil spill. *Environ. Sci. Technol.*, 27 (1993) 699-708.
- 1794 Lu, Y., Xue, Y., Xu, J. and Yan, W.: Gas chromatographic determination of acaricide danjiami in citrus and soil. *J. Assoc. Off. Anal. Chem.*, 75 (1992) 1100-1102.
- 1795 Saito, T.: Determination by pyrolysis-gas chromatography of the phenolic resin concentration in particle matter accumulated from traffic on road. *Anal. Chim. Acta*, 276 (1993) 295-302.
- 1796 Voje, T.C. and Kolb, B.: Static and dynamic headspace analysis of volatile organic compounds in soils. *Environ. Sci. Technol.*, 27 (1993) 709-713.

See also 1465, 1525, 1541, 1577, 1586, 1602, 1687, 1689, 1696, 1703, 1710, 1717.

### 36. SOME TECHNICAL PRODUCTS AND COMPLEX MIXTURES

#### 36a. Surfactants

- 1797 Hida, M., Okuyama, S., Mitsui, T., Minami, Y. and Fujimura, Y.: Determination of sodium dodecylbenzene sulfonate using several internal standards by multivariate analysis of Curie-point, pyrolysis gas chromatography. *Chromatographia*, 35 (1993) 643-648.
- 1798 Raynor, M.W. and Bartle, K.D.: Supercritical fluid chromatography and extraction in surface coatings analysis - review of representative applications. *J. Supercrit. Fluids*, 6 (1993) 39-49 - a review with 37 refs.

See also 1610.

#### 36b. Antioxidants and preservatives

See 1798.

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

- 1799 Bondioli, P., Mariani, C., Fedeli, E., Gomez, A.M. and Veronesi, S.: (Vegetable oil derivatives as diesel fuel substitutes. Analytical aspects. Note 3: Determination of methanol). *Riv. Ital. Sostanze Grasse*, 69 (1992) 467-469; *C.A.*, 118 (1993) 42209k.
- 1800 Bornhop, D.J. and Verga, G.R.: Gasoline analysis by rapid scanning absorbance detection for capillary gas chromatography. *TrAC*, 11 (1992) 194-199.
- 1801 Brooks, M.W. and Uden, P.C.: Extraction and analysis of diesel fuel by supercritical fluid extraction and microbore supercritical fluid chromatography. *J. Chromatogr.*, 637 (1993) 175-179.
- 1802 Brossard, S., Lafosse, M., Dreux, M. and Becart, J.: Abnormal composition of commercial waxes revealed by supercritical fluid chromatography. *Chromatographia*, 36 (1993) 268-274.

- 1803 Chen, P.H., VanAusdale, W.A., Keeran, W.S. and Roberts, D.F.: GC/MS identification of artifacts formed during sample preparation using USEPA methods 625 and 8270. *Chemosphere*, 26 (1993) 1743-1749.
- 1804 John, R., Mirmohseni, A., Teasdale, P.R. and Wallace, G.G.: Interfacial analysis - techniques for the study and characterisation of advanced materials. *TrAC*, 12 (1993) 94-100.
- 1805 Kobayashi, A., Takashima, Y. and Umeda, I.: (Simultaneous determination of active ingredients in commercial insecticide formulations by capillary GC.) *Bunseki Kagaku*, 42 (1993) T77-T81.
- 1806 Kuhn, L.A.: Flame ionization detector response factors for paint solvents: measuring emissions of volatile organic compounds. *Plat. Surf. Finish.*, 79, No. 10 (1992) 16-17; *C.A.*, 118 (1993) 51582d.
- 1807 Kuruc, J., Sahoo, M.K. and Kubinec, R.: GC-FTIR-MS analysis of volatile radiolytic products in the radiolysis of dinitrobenzene-carbon tetrachloride solutions. *Chromatographia*, 35 (1993) 579-583.
- 1808 Kuruc, J., Sahoo, M.K. and Kurán, P.: GC-FTIR-MS analysis of volatile products in the radiolysis of nitrobenzene-carbon tetrachloride solution. *Chromatographia*, 35 (1993) 574-578.
- 1809 Lapidus, A.L. and Krylova, A.Y.: (Gas-liquid chromatographic study of the interactions of petroleum sulfoxides and petroleum sulfones with fenvalerate.) *Neftekhimiya*, 32 (1992) 271-277.
- 1810 Malosse, C., Descoins, C. and Frerot, B.: Identification of a minor component of the sex pheromone of the leopard moth (*Zeuzera pyrina* L.; Lepidoptera, Cossidae) by capillary gas chromatography. *J. High Resolut. Chromatogr.*, 16 (1993) 123-125.
- 1811 Marsman, J.H., Breman, B.B. and Beenackers, A.A.C.M.: Online single column capillary gas chromatographic analysis of all reactants and products in the synthesis of fuel methanol from hydrogen and oxides of carbon. *J. High Resolut. Chromatogr.*, 16 (1993) 141-147.
- 1812 Pearson, D.E.: A simple confirmation of kerosine from debris in arson cases. *Am. Lab. (Shelton)*, 24, No. 12 (1992) 63-64.
- 1813 Pörschmann, J. and Stottmeister, U.: Methodical investigation of interactions between organic pollutants and humic organic material in coal wastewaters. *Chromatographia*, 36 (1993) 207-211.
- 1814 Rastogi, S.C.: Sample preparation for gas chromatographic analysis of organic solvents in aerosol cans. *Chromatographia*, 36 (1993) 201-203.
- 1815 Rowland, S., Evans, R., Ebdon, L. and Rees, A.: Geochemical applications of pyrolysis gas chromatography with an atomic emission detector. *Anal. Proc.*, 30 (1993) 87-88.
- 1816 Sinnighe Damste, J.S., de las Heras, F.X.C. and de Leeuw, J.W.: Molecular analysis of sulfur-rich brown coals by flash pyrolysis-gas chromatography-mass spectrometry: the Type III-S kerogen. *J. Chromatogr.*, 607 (1992) 361-376.
- 1817 Sithole, B.B., Sullivan, J.L. and Allen, L.H.: Identification and quantification of acetone extractives of wood and bark by ion exchange and capillary GC with a spreadsheet program. *Holzforschung*, 46 (1992) 409-416; *C.A.*, 118 (1993) 41003b.
- 1818 Szocik, A.: (Use of gas chromatography for determination of components of reaction mixture in synthesis of acrylic acid.) *Chem. Anal. (Warsaw)*, 36 (1991) 945-947.

- 1819 Tong, D., Bartle, K.D., Robinson, R.E. and Altham, P.: Unified chromatography in petrochemical analysis. *J. Chromatogr. Sci.*, 31 (1993) 77-81.
- 1820 Van der Hage, E.R.E., van Loon W.M.G.M., Boon, J.J., Lingenman, H. and Brinkman, U.A.T.: Combined high performance aqueous size-exclusion chromatographic and pyrolysis-gas chromatographic-mass spectrometric study of lignosulphonates in pulp mill effluents. *J. Chromatogr.*, 634 (1993) 263-271.
- 1821 Wu, Z., Yang, G., Qian, J. and Wu, L.: (Pyrolysis kinetics and pyrolysis-GC of artifical maturation for source rock with type I kerogen.) *Shiyou Xuebao*, 13, No. 1 (1992) 30-36; C.A., 118 (1993) 41906y.
- 1822 Xue, L., Wang, G. and Wang, G.: (Gas chromatographic analysis of formaldehyde-water-benzene-metaformaldehyde liquid-liquid equilibrium system.) *Sepu*, 11 (1993) 55-56.

See also 1443, 1454, 1515, 1520, 1544, 1567, 1569, 1572, 1583, 1592, 1593, 1594, 1597, 1609, 1610, 1628, 1686, 1691, 1723, 1730, 1775, 1825, 1833.

### 37. CELLS, CELLULAR PARTICLES AND SUPRAMOLECULAR STRUCTURES

- 1823 Smith, P.B. and Snyder, A.P.: Characterization of bacteria by quartz tube pyrolysis-gas chromatography/ion trap mass spectrometry. *J. Anal. Appl. Pyrolysis*, 24 (1992) 23-38.

See also 1625, 1769.

### 38. INORGANIC COMPOUNDS

#### 38b. Anions

- 1824 Seto, Y., Tsunoda, N., Ohta, H. and Shinohara, T.: Determination of blood cyanide by headspace gas chromatography with nitrogen-phosphorus detection and using a megabore capillary column. *Anal. Chim. Acta*, 276 (1993) 247-259.
- 1825 Skocir, E., Pecavar, A., Kranja, A. and Proek, M.: Quantitative determination of fluorine in toothpastes. *J. High Resolut. Chromatogr.*, 16 (1993) 243-246.

#### 38c. Permanent and rare gases

- 1826 Kucharczyk, B. and Zabreski, J.: Modification of the chromatographic method for analysis of argon, oxygen, and nitrogen mixtures with catalytic reduction of oxygen. *Chem. Anal. (Warsaw)*, 37 (1992) 167-170.

- 1827 Talasek, R.T. and Daugherty, K.E.: Simultaneous analysis of carbon oxides and hydrocarbons by gas chromatography-mass spectrometry. *J. Chromatogr.*, 635 (1993) 265-270.
- 1828 Tsuji, K., Shimizu, M., Nishimura, Y., Nakagawa, Y. and Ichikawa, T.: Simultaneous determination of hydrogen, methane and carbon dioxide of breath using gas-solid chromatography. *J. Nutr. Sci. Vitaminol.*, 38 (1992) 103-109; C.A., 118 (1993) 35260s.
- 1829 Wu, L.X. and He, H.N.: Improvements in preconcentration method for determining trace impurities in ultra-pure gases by gas chromatography. *Chromatographia*, 35 (1993) 339-343.

See also 1811.

#### 38d. Volatile inorganic compounds

- 1830 Johansson, K., Örnemark, U. and Olin, Å.: Solid-phase extraction procedure for the determination of selenium by capillary gas chromatography. *Anal. Chim. Acta*, 274 (1993) 129-140.
- 1831 Kataoka, H., Ohrai, S., Kanemoto, A. and Makita, M.: Determination of ammonia as its benzenesulphonyldimethylaminomethylene derivate in environmental water samples by gas chromatography with flame photometric detection. *J. Chromatogr.*, 633 (1993) 311-314.
- 1832 Radford-Knery, J. and Cutter, G.A.: Determination of carbonyl sulfide and hydrogen sulfide species in natural waters using specialized collection procedures and gas chromatography with flame photometric detection. *Anal. Chem.*, 65 (1993) 976-982.
- 1833 Schoene, K., Bruckert, H.-J. and Steinhanses, J.: Derivatization of acylating gases and vapours on the sorbent tube and gas chromatographic analysis of the products by atomic emission and mass spectrometric detection. *Fresenius J. Anal. Chem.*, 345 (1993) 688-694.

See also 1490, 1811, 1828, 1834.

### 39. RADIOACTIVE AND OTHER ISOTOPE COMPOUNDS

- 1834 Gaeaggeler, H.W., Jost, D.T., Kovacs, J., Scherer, U.W., Weber, A., Vermeulen, D., Tuerler, A., Gregorich, K.E. and Henderson, R.A.: Gas phase chromatography experiments with bromides of tantalum and element 105. *Radiochim. Acta*, 57 (1992) 93-100; C.A., 118 (1993) 67409p.

See also 1629.

## Planar Chromatography

### 1. REVIEWS AND BOOKS

- 542 Menon, S.K. and Agrawal, Y.K.: Chromatographic separations using liquid ion exchangers. *Rev. Anal. Chem.*, 11 (1992) 149-170; C.A., 118 (1993) 159944n - a review with 86 refs.
- 543 Rabel, F. and Palmer, K.: Advantages of using thin-layer plates with concentration zones. *Am. Lab. (Shelton)*, 24, No. 17 (1992) 20BB; C.A., 118 (1993) 138689t - a review with no refs.
- 544 Simpson, N.: Solid-phase extraction: disposable chromatography. *Am. Lab. (Shelton)*, 24, No. 12 (1992) 37-43; C.A., 118 (1993) 93513n - a review with 11 refs.
- 545 Xu, L. and Zhou, T.: (Pharmaceutical analysis in China). *Fenxi Shiyanshi*, 11 (1992) 79-110; C.A., 118 (1993) 154668r - a review with 546 refs.

See also 702, 759, 761, 775.

### 2. FUNDAMENTALS, THEORY AND GENERAL

#### 2a. General

- 546 Markowski, W.: Computer-aided optimization of gradient multiple development thin-layer chromatography. Part II. Multi-stage development. *J. Chromatogr.*, 635 (1993) 283-289.

See also 754.

#### 2b. Thermodynamics and theoretical relationships

- 547 Chibowski, E. and Gonzalez-Caballero, F.: Theory and practice of thin-layer wicking. *Langmuir*, 9 (1993) 330-340; C.A., 118 (1993) 46451f.

#### 2c. Relationship between structure and chromatographic behaviour

See 687, 769.

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

- 548 Gasparian, S.E., Andronikashvili, T.G. and Kankanian, A.G.: (Study of ion migration velocities in a thin sorbent layer). *Izv. Akad. Nauk Gruz., Ser. Khim.*, 17 (1991) 185-191; C.A., 118 (1993) 199060c.

### 3. GENERAL TECHNIQUES

#### 3b. Detectors and detection reagents

- 549 Evgen'ev, M.I., Levinson, F.S. and Evgen'eva, I.I.: (5-Chloro-4,6-dinitrobenzofuran as a reagent in thin-layer chromatography of aromatic amines). *Zavod. Lab.*, 58, No. 4 (1992) 11-13; C.A., 118 (1993) 72804t.
- 550 Hodek, P., Burkhard, J., Janku, J., Smrcek, S., Anzenbacher, P. and Vodicka, L.: (Detection of diamantane derivatives by thin-layer chromatography). *Czech. CS 267,290* (Cl. G01N90/94), 01 Oct. 1990, Appl. 88/2,959, 02 May 1988; 4 pp.; C.A., 118 (1993) 138991k.
- 551 Kohli, J.C. and Grewal, S.K.: A novel spray reagent for the detection of amino acids by thin-layer chromatography. *Natl. Acad. Sci. Lett. (India)*, 15 (1992) 113-115; C.A., 118 (1993) 138947a.
- 552 Shive, D.W., Allison, K.J. and Hamilton, M.M.: Voltammetric detectors for scanning planar chromatography sheets. *Microchem. J.*, 47 (1993) 230-239; C.A., 118 (1993) 138861t.
- 553 Smalera, I. and Cheng, I.F.: A quantitative detector for thin-layer chromatography based on voltammetry at a platinum microwire electrode. *Microchem. J.*, 47 (1993) 182-186; C.A., 118 (1993) 138906m.

See also 568, 577, 634, 763, 794.

#### 3c. Sorbents and columns, packing procedures

- 554 Arai, K., Sano, S. and Satoh, H.: Preparation of cellulose stilbene-4-carboxylate and its application to thin-layer chromatography. *J. Mater. Chem.*, 2 (1992) 1257-1260; C.A., 118 (1993) 82355m.
- 555 Liu, H., Wang, L., Chen, L. and Liu, W.: (Study and application of  $\beta$ -cyclodextrin thin layer chromatography). *Fenxi Ceshi Tong-bao*, 11 (1992) 78-81; C.A., 118 (1993) 160233m.
- 556 Varshney, K.G., Khan, A.A., Maheshwari, S.M. and Gupta, U.: Chromatographic separation of  $\alpha$ -amino acids on antimony(V) phosphate-silica gel "G" plates from some synthetic mixtures and drug samples. *Bul. Chem. Soc. Jpn.*, 65 (1992) 2773-2778; C.A., 118 (1993) 51553v.

See also 547, 567, 744, 771.

#### 3d. Quantitative analysis

See 553, 761.

#### 3e. Preparative scale chromatography

See 565.

#### 3g. High performance procedures

See 626, 798, 814.

## 4. SPECIAL TECHNIQUES

- 4c. Combination with other physico-chemical techniques (MS, IR etc.)
- 557 Johnson, C.R., Gill, S.J. and Peters, K.S.: Thin-layer microcalorimetric studies of oxygen and carbon monoxide binding to hemoglobin and myoglobin. *Biophys. Chem.*, 45 (1992) 7-15; C.A., 118 (1993) 96491g.
- 558 Monaghan, J.J., Morden, W.E., Johnson, T., Wilson, I.D. and Martin, P.: Thin-layer chromatography/mass spectrometry: the advantages of tandem mass spectrometry. *Rapid Commun. Mass Spectrom.*, 6 (1992) 608-615; C.A., 118 (1993) 51569e.

See also 703, 743, 753, 775.

## 4e. Functional analysis

See 686.

## 4g. Enantiomers, separation

See 686.

## 4h. Other special techniques

See 721, 759.

## 5. HYDROCARBONS AND HALOGEN DERIVATIVES

## 5b. Cyclic hydrocarbons

- 559 Spencer, G.G., Beach, A.C. and Gupta, R.C.: Improved thin-layer chromatographic separation of  $^{32}\text{P}$ -postlabeled DNA adducts. *J. Chromatogr.*, 612 (1993) 295-301.

See also 550.

## 6. ALCOHOLS

- 560 Dreassi, E., Celesti, L., Ceramelli, G., Savini, L. and Corti, P.: Thin-layer chromatography in pharmaceutical quality control. Assay of Inosiplex in different pharmaceutical forms. *Pharm. Acta Helv.*, 67 (1992) 341-345; C.A., 118 (1993) 109865s.
- 561 Koyama, T., Obata, S., Osabe, M., Takeshita, A., Yokoyama, K., Uchida, M., Nishino, T. and Ogura, K.: Thermostable farnesyl diphosphate synthase of *Bacillus stearothermophilus*: molecular cloning, sequence determination, overproduction, and purification. *J. Biochem. (Tokyo)*, 113 (1993) 355-363.

See also 575.

## 7. PHENOLS

- 562 Ekabo, O.A., Farnsworth, N.R., Santisuk, T. and Reutrakul, V.: A phytochemical investigation of *Homalium ceylanicum*. *J. Natural Prod.*, 56 (1993) 699-707.
- 563 Speranza, G., Manitto, P., Monti, D. and Pezzuto, D.: Studies on aloe, part 10. Feroxins A and B, two O-glucosylated 1-methyltritamins from *Cape aloe*. *J. Natural Prod.*, 55 (1992) 723-729.

See also 555, 573.

## 8. SUBSTANCES CONTAINING HETEROCYCLIC OXYGEN

## 8a. Flavonoids

- 564 Anyanwutaku, I.O., Zirbes, E. and Rosazza, J.P.N.: Isoflavonoids from *Streptomyces*: origins of genistein, 8-chlorogenistein, and 6,8-dichlorogenistein. *J. Natural Prod.*, 55 (1992) 1498-1504.
- 565 Gunasegaran, R., Recio, M.C., Alcaraz, M.J. and Nair, A.G.R.: Additional constituents from *Clerodendrum indicum* L. (Verbenaceae). *Pharmazie*, 48 (1993) 151-152.
- 566 Ogbeide, O.N. and Parvez, M.: Identification of the flavonoids in Papilionaceae flowers using paper chromatography. *J. Liq. Chromatogr.*, 15 (1992) 2989-2996.
- 567 Okamoto, M., Ohta, M., Kakamu, H. and Omori, T.: Evaluation of phenyldimethylethoxysilane treated high-performance thin-layer chromatographic plates. Application to analysis of flavonoids in *Scutellariae radix*. *Chromatographia*, 35 (1993) 281-284.
- 568 Poukens-Renwart, P., Tits, M., Wauters, J.-N. and Angenot, L.: Densitometric evaluation of spiraeoside after derivatization in flowers of *Filipendula almaria* (L.) maxim. *J. Pharm. Biomed. Anal.*, 10 (1992) 1085-1088.

See also 803.

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

- 569 Kodama, O., Ichikawa, H., Akatsuka, T., Santisopasri, V., Kato, A. and Hayashi, Y.: Isolation and identification of an antifungal naphthopyran derivative from *Rhinacanthus nasutus*. *J. Natural Prod.*, 56 (1993) 292-294.
- 570 Pereda-Miranda, R., Hernández, L., Villavicencio, M.J., Novelo, M., Ibarra, P., Chai, H. and Pezzuto, J.M.: Structure and stereochemistry of pectinolides A-C, novel antimicrobial and cytotoxic 5,6-dihydro- $\alpha$ -pyrones from *Hyptis pectinata*. *J. Natural Prod.*, 56 (1993) 583-593.
- 571 Randerath, K., Putman, K.L. and Randerath, E.: Flavor constituents in cola drinks induce hepatic DNA adduct in adult and fetal mice. *Biochem. Biophys. Res. Commun.*, 192 (1993) 61-68.
- 572 Rashid, M.A., Gray, A.I., Waterman, P.G. and Armstrong, J.A.: Coumarins from *Phebalium tuberculosum* ssp. *megaphyllum* and *Phebalium filifolium*. *J. Natural Prod.*, 55 (1992) 851-858.

- 573 Stonik, V.A., Marakieva, T.N. and Dmitrenok, A.S.: Sarcochromenol sulfates A-C and sarcohydroquinone sulfates A-C, new natural products from the sponge *Sarcotragus spinulosus*. *J. Natural Prod.*, 55 (1992) 1256-1260.

See also 657, 801, 803.

## 9. OXO COMPOUNDS, ETHERS, EPOXIDES AND QUINONES

- 574 Brinkman, L.C., Ley, F.R. and Seaton, P.J.: Isolation and synthesis of benz[a]anthraquinones related to antitumor agent PD116740. *J. Natural Prod.*, 56 (1993) 374-380.
- 575 Hu, T., Marr, J., DeFreitas, A.S.W., Quilliam, M.A., Walter, J.A., Wright, J.L.C. and Pleasance, S.: New diol esters isolated from cultures of the dinoflagellates *Protorocentrum lima* and *Protorocentrum concavum*. *J. Natural Prod.*, 55 (1992) 1631-1637.
- 576 Metwally, M.M.F., El-Bolkiny, M.N., El-Sayed, W. and El-Kheir, A.A.: Identification of the carbonyl compounds formed in stored cough mixture. *Egypt. J. Pharm. Sci.*, 32 (1991) 787-796; C.A., 118 (1993) 45890m.
- 577 Xu, C., Zhao, S. and Zou, Q.: (Isolation and identification of malonaldehyde in plant tissue). *Zhiwu Shenglixue Tongxun*, 28 (1992) 288-290; C.A., 118 (1993) 164464k.
- 578 Zhang, Y.-L., Shen, Y.-C., Wang, Z.-Q., Chen, H.-X., Guo, X., Cheng, Y.-C. and Lee, K.H.: Antitumor agents, 130. Novel 4 $\beta$ -arylamino derivatives of 3',4'-didemethoxy-3,4-dioxo-4-deoxypodophyllotoxin as potent inhibitors of human DNA topoisomerase II. *J. Natural Prod.*, 55 (1992) 1100-1111.

See also 562, 573, 800, 810, 814.

## 10. CARBOHYDRATES

### 10a. Mono and oligosaccharides. Structural studies

- 579 Biely, P., Kluepfel, D., Morosoli, R. and Shareck, F.: Mode of action of three endo- $\beta$ -1,4-xylanases of *Streptomyces lividans*. *Biochim. Biophys. Acta*, 1162 (1993) 246-254.
- 580 Bosch-Reig, F., Marcote, M.J. and Minana, M.D.: Separation and identification of sugars and maltodextrins by thin layer chromatography: application to biological fluids and human milk. *Talanta*, 39 (1992) 1493-1498; C.A., 118 (1993) 76374a.
- 581 Goso, Y. and Hotta, K.: Regional differences in sulfated oligosaccharides of rat gastrointestinal mucin as detected by two-dimensional chromatography. *Arch. Biochem. Biophys.*, 302 (1993) 212-217.
- 582 Ishii-Karakasa, I., Iwase, H., Hotta, K., Tanaka, Y. an Omura, S.: Partial purification and characterization of an endo- $\alpha$ -N-acetyl galactosaminidase from the culture medium of *Streptomyces* sp. OH-11242. *Biochem. J.*, 288 (1992) 475-482.
- 583 Vinogradov, E.V., Holst, O., Thomas-Oates, J.E., Broady, K.W. and Brade, H.: The structure of the O-antigenic polysaccharide from lipopolysaccharide of *Vibrio cholerae* strain H11 (non-O1). *Eur. J. Biochem.*, 210 (1992) 491-498.

- 584 Winchester, B., Al Daher, S., Carpenter, N.C., Cenci di Bello, I., Choi, S.S., Fairbanks, A.J. and Fleet, G.W.J.: The structural basis of the inhibition of human  $\alpha$ -mannosidases by azafuranose-analogues of mannose. *Biochem. J.*, 290 (1993) 743-749.

See also 612, 667.

### 10b. Polysaccharides, mucopolysaccharides, lipopolysaccharides

- 585 Schlenzka, W., Shaw, L. and Schauer, R.: Catalytic properties of the CMP-N-acetyleneuraminc acid hydroxylase from the starfish *Asterias rubens*: comparison with the mammalian enzyme. *Biochim. Biophys. Acta*, 1161 (1993) 131-138.
- 586 Schneider, P., Ralton, J.E., McConville, M.J. and Ferguson, M.A.J.: Analysis of the neutral glycan fractions of glycosyl-phosphatidylinositols by thin-layer chromatography. *Anal. Biochem.*, 210 (1993) 106-112.

### 10c. Glycoproteins and their constituents

See 612.

## 11. ORGANIC ACIDS AND LIPIDS

### 11a. Organic acids and simple esters

- 587 Adelhardt, T. and Spitteler, G.: Produkte der Dimerisierung ungesättigter Fettsäuren IX: Kinetische Untersuchungen zur Dimerisierung von Linolsäure. *Fat Sci. Technol.*, 95 (1993) 85-90.
- 588 Ahmad, A., Misra, L.N. and Gupta, M.M.: Hydroxyalk-(4Z)-enoic acids and volatile components from the seeds of *Xanthoxylum armatum*. *J. Natural Prod.*, 56 (1993) 456-460.
- 589 Lee, B.Y. and Thurmon, T.F.: Practical clinical screening for organic acid disorders. *LC-GC*, 10 (1992) 884-887; C.A., 118 (1993) 187131p.
- 590 Mutua, L.N. and Akoh, C.C.: Synthesis of alkyl glycoside fatty acid esters in non-aqueous media by *Candida* sp. lipase. *J. Am. Oil Chem. Soc.*, 70 (1993) 43-46.
- 591 Naval, J., Martínez-Lorenzo, M.J., Marzo, I., Desportes, P. and Pineiro, A.: Alternative route for the biosynthesis of polyunsaturated fatty acids in K562 cells. *Biochem. J.*, 291 (1993) 841-845.
- 592 Özgül, S. and Türkay, S.: *In situ* esterification of rice bran oil with methanol and ethanol. *J. Am. Oil Chem. Soc.*, 70 (1993) 145-147.
- 593 Spencer, J.B. and Jordan, P.M.: Purification and properties of 6-methylsalicylic acid synthase from *Penicillium patulum*. *Biochem. J.*, 288 (1992) 839-846.
- 594 Wheeler, P.R., Besra, G.S., Minnikin, D.E. and Ratledge, C.: Stimulation of mycolic acid biosynthesis by incorporation of *cis*-tetracos-5-enoic acid in a cell-wall preparation from *Mycobacterium smegmatis*. *Biochim. Biophys. Acta*, 1167 (1993) 182-188.
- 595 Wu, N., Wang, Y., Chen, H., Xia, G. and Ma, L.: (Determination of the oleanolic acid from Chinese drugs). *Zhongcaoyao*, 23 (1992) 467-468; C.A., 118 (1993) 154680p.

See also 562, 597, 635, 679.

## 11b. Prostaglandins

- 596 Kiran Kumar, Y.V., Raghunathan, A., Sailesh, S., Prasad, M., Venkateswaran, M.C. and Reddanna, P.: Differential effects of 15-HPETE and 15-HETE on BHK-21 cell proliferation and macromolecular composition. *Biochim. Biophys. Acta*, 1167 (1993) 102-108.
- 597 Mahmud, I., Suzuki, T., Yamamoto, Y., Suzuki, H., Takahashi, Y., Yoshimoto, T. and Yamamoto, S.: Induction of cyclooxygenase and suppression of 12-lipoxygenase in human erythroleukemia cells upon phorbol ester-induced differentiation. *Biochim. Biophys. Acta*, 1166 (1993) 211-216.
- 598 Westlund, P.: Purification and some properties of 11-hydroxy-thromboxane B<sub>2</sub> dehydrogenase from porcine kidney. *Eur. J. Biochem.*, 212 (1993) 403-409.

## 11c. Lipids and their constituents

- 599 Aleksandrova, O.A.: (TLC with densitometry for determination natural lipid class compositions). *Okeanologia (Moscow)*, 32 (1992) 583-587; C.A., 118 (1993) 51585g.
- 600 Allan, C.J. and Exton, J.H.: Quantification of inositol phospholipid breakdown in isolated rat hepatocytes. *Biochem. J.*, 290 (1993) 865-872.
- 601 Alvarez, J.G. and Ludmir, J.: Semiautomated multisample analysis of amniotic fluid lipids by high-performance thin-layer chromatography-reflectance spectrodensitometry. *J. Chromatogr.*, 615 (1993) 142-147.
- 602 Butikofer, P., Yee, M.C., Schott, M.A., Lubin, B.H. and Kuypers, F.A.: Generation of phosphatidic acid during calcium-loading of human erythrocytes. Evidence for a phosphatidylcholine-hydrolyzing phospholipase D. *Eur. J. Biochem.*, 213 (1993) 367-375.
- 603 Chapman, K.D. and Moore, T.S., Jr.: N-Acylphosphatidylethanolamine synthesis in plants: occurrence, molecular composition, and phospholipid origin. *Arch. Biochem. Biophys.*, 301 (1993) 21-33.
- 604 Chatterjee, D. and Anderson, G.M.: The human platelet dense granule: serotonin uptake, tetrabenazine binding, phospholipid and ganglioside profiles. *Arch. Biochem. Biophys.*, 302 (1993) 439-446.
- 605 Chiu, T.-h., Morimoto, H. and Baker, J.J.: Biosynthesis and characterization of phosphatidylglycerophosphoglycerol, a possible intermediate in lipoteichoic acid biosynthesis in *Streptococcus sanguis*. *Biochim. Biophys. Acta*, 1166 (1993) 222-228.
- 606 Compagnon, D., Lagos, N. and Vergara, J.: Phosphoinositides in giant barnacle muscle fibers: a quantitative analysis at rest and following electrical stimulation. *Biochim. Biophys. Acta*, 1167 (1993) 94-101.
- 607 Crans, D.C., Mikuš, M. and Marshman, R.W.: <sup>31</sup>P NMR Examination of phosphorus metabolites in the aqueous, acidic, and organic extracts of *Phaseolus vulgaris* seeds. *Anal. Biochem.*, 209 (1992) 85-94.
- 608 Dadi, H.K., Ke, S. and Roifman, C.M.: Interleukin 7 receptor mediates the activation of phosphatidylinositol-3 kinase in human B-cell precursors. *Biochem. Biophys. Res. Commun.*, 192 (1993) 459-464.
- 609 De Valk, D., Beyaert, R., van Roy, F. and Fiers, W.: Tumor necrosis factor cytotoxicity is associated with phospholipase D activation. *Eur. J. Biochem.*, 212 (1993) 491-497.
- 610 Downing, D.T., Dose, R.W. and Abraham, W.: Interaction between sphingosine and cholesteryl sulfate in epidermal lipids. *J. Lipid Res.*, 34 (1993) 563-569.
- 611 Eichholz, T., Jalink, K., Fahrenfort, I. and Moolenaar, W.H.: The bioactive phospholipid lysophosphatidic acid is released from activated platelets. *Biochem. J.*, 291 (1993) 677-680.
- 612 Ferrero-Garcia, M.A., Trombetta, S.E., Sanchez, D.O., Reglero, A., Frasch, A.C.C. and Parodi, A.J.: The action of *Trypanosoma cruzi* trans-sialidase on glycolipids and glycoproteins. *Eur. J. Biochem.*, 213 (1993) 765-771.
- 613 Fisher, A.B., Dodia, C., Chander, A. and Jain, M.: A competitive inhibitor of phospholipase A<sub>2</sub> decreases surfactant phosphatidylcholine degradation by the rat lung. *Biochem. J.*, 288 (1992) 407-411.
- 614 Frot-Coutaz, J., Degiuli, A., Martel, M.-B. and Létoublon, R.: *In vitro* transfer of N,N'-diacetylchitobiose to glycoproteins in rat liver nuclei. *Biochem. Cell Biol.*, 70 (1992) 677-683.
- 615 Hamanaka, S., Takemoto, T., Hamanaka, Y., Asagami, C., Suzuki, M., Suzuki, A. and Otsuka, F.: Structure determination of glycosphingolipids of cultured human keratinocytes. *Biochim. Biophys. Acta*, 1167 (1993) 1-8.
- 616 Hidaka, M., Nagakura, S., Horikawa, K., Kawaguchi, T., Iwamoto, N., Kagimoto, T., Takatsuki, K. and Nakakuma, H.: Impaired glycosylation of glycosylphosphatidylinositol-anchor synthesis in paroxysmal nocturnal hemoglobinuria leukocytes. *Biochem. Biophys. Res. Commun.*, 191 (1993) 571-579.
- 617 Hines, M.E. and Frazier, K.S.: Differentiation of mycobacteria on the basis of chemotype profiles by using matrix solid-phase dispersion and thin-layer chromatography. *J. Clin. Microbiol.*, 31 (1993) 610-614. C.A., 118 (1993) 209101h.
- 618 Hirschberg, K., Rodger, J. and Futterman, A.H.: The long-chain sphingoid base of sphingolipids is acylated at the cytosolic surface of the endoplasmic reticulum in rat liver. *Biochem. J.*, 290 (1993) 751-757.
- 619 Holmes, E.H. and Macher, B.A.: Specificity of fucose transfer to GlcNAc residues of extended chain neolacto-series glycolipids catalyzed by human  $\alpha 1\rightarrow 3$  fucosyltransferases: effect of the lipidic environment on the myeloid enzyme form. *Arch. Biochem. Biophys.*, 301 (1993) 180-199.
- 620 Jiang, L.W., Mitchell, B.A., Teodoro, J.G. and Rip, J.W.: Uptake and transport of fluorescent derivatives of dolichol in human fibroblasts. *Biochim. Biophys. Acta*, 1147 (1993) 205-213.
- 621 Jones, A.L., Hann, A.C., Harwood, J.L. and Lloyd, D.: Temperature-induced membrane-lipid adaptation in *Acanthamoeba castellanii*. *Biochem. J.*, 290 (1993) 273-278.
- 622 Kamata, Y., Kimura, Y., Hiroi, T., Sakaguchi, G. and Kozaki, S.: Purification and characterization of the ganglioside-binding fragment of *Clostridium botulinum* type E neurotoxin. *Biochim. Biophys. Acta*, 1156 (1993) 213-218.
- 623 Karunaratne, D.N., Richards, J.C. and Hancock, R.E.W.: Characterization of lipid A from *Pseudomonas aeruginosa* O-antigenic B band lipopolysaccharide by 1D and 2D NMR and mass spectral analysis. *Arch. Biochem. Biophys.*, 299 (1992) 368-376.
- 624 Kasai, N., Kamimura, A., Miyoshi, I. and Ariga, T.: Ganglioside distribution in the liver of inbred strains of rats and the cancerous liver of LEC rats. *J. Biochem. (Tokyo)*, 113 (1993) 251-257.

- 625 Kiguchi, K., Henning-Chubb, C. and Huberman, E.: Glycosphingolipid patterns in human promyelocytic HL-60 leukemia cells susceptible or resistant to differentiation induction by phorbol 12-myristate 13-acetate. *Biochim. Biophys. Acta*, 1176 (1993) 27-36.
- 626 Koetting, J., Marchner, N.W., Unger, C. and Eibl, H.: Determination of alkylphosphocholines and of alkyl-glycerophosphocholines in biological fluids and tissues. *Prog. Exp. Tumor Res.*, 34 (1992) 6-11; C.A., 118 (1993) 73003h.
- 627 Kuroki, Y., Gasa, S., Ogasawara, Y., Makita, A. and Akino, T.: Binding of pulmonary surfactant protein A to galactosylceramide and asialo-G<sub>M2</sub>. *Arch. Biochem. Biophys.*, 299 (1992) 261-267.
- 628 Levy, A., Amotz, A.B. and Aviram, M.: Preferential inhibition of LDL oxidation by the all-trans-isomer of  $\beta$ -carotene in comparison with 9-cis  $\beta$ -carotene. *Eur. J. Clin. Chem. Clin. Biochem.*, 31 (1993) 83-90.
- 629 Lekka, M., Tokumura, A., Tsuji, H. and Hanahan, D.J.: Isolation of a phospholipid inhibitor of platelet activating factor-induced activity from perfused rat liver: identification as phosphatidylglycerol. *Arch. Biochem. Biophys.*, 302 (1993) 380-384.
- 630 Mallinger, A.G., Yao, J.K., Brown, A.S. and Dippold, C.S.: Analysis of complex mixtures of phospholipid classes from cell membranes using two-dimensional thin-layer chromatography and scanning laser densitometry. *J. Chromatogr.*, 614 (1993) 67-75.
- 631 Masterson, C., Fried, B. and Sherma, J.: Comparison of mobile phases and detection reagents for the separation of triacylglycerols by silica gel, argentation, and reversed-phase thin layer chromatography. *J. Liq. Chromatogr.*, 15 (1992) 2967-2980.
- 632 Matsubara, T. and Hayashi, A.: Occurrence of phosphonotriglycosyl ceramide in the sea hare *Dolabella auricularia*. *Biochim. Biophys. Acta*, 1166 (1993) 55-63.
- 633 Melander, I.M., Lindner, B., Seydel, U. and Vaara, M.: Defective biosynthesis of the lipid A component of temperature-sensitive *firA* (*omsA*) mutant of *Escherichia coli*. *Eur. J. Biochem.*, 212 (1993) 363-369.
- 634 Müthing, J. and Heitmann, D.: Nondestructive detection of gangliosides with lipophilic fluorochromes and their employment for preparative high-performance thin-layer chromatography. *Anal. Biochem.*, 208 (1993) 121-124.
- 635 Mutua, L.N. and Akoh, C.C.: Lipase-catalyzed modification of phospholipids: incorporation of n-3 fatty acids into biosurfactants. *J. Am. Oil Chem. Soc.*, 70 (1993) 125-129.
- 636 O, K.-M. and Choy, P.C.: Effects of fasting on phosphatidylcholine biosynthesis in hamster liver: regulation of choline-phosphotransferase activity by endogenous argininosuccinate. *Biochem. J.*, 289 (1993) 727-733.
- 637 Park, Y.S. and Huang, L.: Effect of chemically modified G<sub>M1</sub> and neoglycolipid analogs of G<sub>M1</sub> on liposome circulation time: evidence supporting the dysopsonin hypothesis. *Biochim. Biophys. Acta*, 1166 (1993) 105-114.
- 638 Puoti, A. and Conzelmann, A.: Characterization of abnormal free glycoprophatidylinositol accumulating in mutant lymphoma cells of classes B, E, F, and H. *J. Biol. Chem.*, 268 (1993) 7215-7224.
- 639 Rother, J., van Echten, G., Schwarzmüller, G. and Sandhoff, K.: Biosynthesis of sphingolipids: dihydroceramide and not sphinganine is desaturated by cultured cells. *Biochim. Biophys. Res. Commun.*, 189 (1992) 14-20.
- 640 Sanchez-Muniz, F.J., Cuesta, C. and Carrido-Polonio, C.: Sunflower oil used for frying: combination of column, gas and high-performance size-exclusion chromatography for its evaluation. *J. Am. Oil Chem. Soc.*, 70 (1993) 235-240.
- 641 Schlame, M., Brody, S. and Hostettler, K.Y.: Mitochondrial cardiolipin in diverse eukaryotes. Comparison of biosynthetic reactions and molecular acyl species. *Eur. J. Biochem.*, 212 (1993) 727-735.
- 642 Schubert, J., Schmidt, R.E. and Medoff, M.E.: Regulation of glycoinositol phospholipid anchor assembly in human lymphocytes. Absent mannosidase synthesis in affected T and natural killer cell lines from paroxysmal nocturnal hemoglobinuria patients. *J. Biol. Chem.*, 268 (1993) 6281-6287.
- 643 Siddiqui, R.A. and Exton, J.H.: Oleate stimulation of diacylglycerol formation from phosphatidyl-choline through effects on phospholipase D and phosphatide phosphohydrolase. *Eur. J. Biochem.*, 210 (1992) 601-607.
- 644 Sperling, P. and Heinz, E.: Isomeric sn-1-octadecenyl and sn-2-octadecenyl analogues of lysophosphatidylcholine as substrates for acylation and desaturation by plant microsomal membranes. *Eur. J. Biochem.*, 213 (1993) 965-971.
- 645 Stasek, J.L., Jr., Natarajan, V. and Garcia, J.G.N.: Phosphatidic acid directly activates endothelial cell protein kinase C. *Biochem. Biophys. Res. Commun.*, 191 (1993) 134-141.
- 646 Stern, N. and Tietz, A.: Octadecatetraenoate synthesis in the unicellular alga *Isochrysis galbana*: studies with intact and broken chloroplasts. *Biochim. Biophys. Acta*, 1167 (1993) 248-256.
- 647 Tamai, Y., Nakamura, K., Takayama-Abe, K., Uchida, K., Kasama, T. and Kobatake, H.: Less polar glycolipids in Alaskan pollock brain: isolation and characterization of acyl galactosyl diacylglycerol, acyl galactosyl ceramide, and acyl glucosyl ceramide. *J. Lipid Res.*, 34 (1993) 601-608.
- 648 Vajdi, M.: Comparative analysis of brain and omentum tissue gangliosides. *J. Liq. Chromatogr.*, 15 (1992) 2959-2966.
- 649 Van Weeley, S., Brandsma, M., Strijland, A., Tager, J.M. and Aerts, M.F.G.: Demonstration of the existence of a second, non-lysosomal glucocerebrosidase that is not deficient in Gaucher disease. *Biochim. Biophys. Acta*, 1181 (1993) 55-62.
- 650 Van der Veer, E., van der Weide, D., Heijmans, H.S.A. and Hoekstra, D.: Translocation of fluorescent ether phospholipid, but not its diacyl counterpart, after insertion in plasma membranes of control and plasmalogen-deficient fibroblasts. *Biochim. Biophys. Acta*, 1146 (1993) 294-300.
- 651 Vossen, R.C.R.M., Feijge, M.A.H., Heemskerk, J.W.M., van Dam-Mieras, M.C.E., Hornstra, G. and Zwaal, R.F.A.: Long-term fatty acid modification of endothelial cells: implications for arachidonic acid distribution in phospholipid classes. *J. Lipid Res.*, 34 (1993) 409-420.
- 652 Wieder, T., Geilen, C.C. and Reutter, W.: Antagonism of phorbol-ester-stimulated phosphatidylcholine biosynthesis by the phospholipid analogue hexadecylphosphocholine. *Biochem. J.*, 291 (1993) 561-567.
- 653 Zdebska, E., Antoniewicz, J., Nilsson, B., Sandhoff, K., Fürst, W., Janik, P. and Koscielak, J.: Ganglioside binding proteins of calf brain with ubiquitin-like N-terminals. *Eur. J. Biochem.*, 210 (1992) 483-489.

See also 544, 586, 658, 760.

## 11d. Lipoproteins and their constituents

- 654 Nes, W.D., Janssen, G.G., Crumley, F.G., Kalinowska, M. and Akihisa, T.: The structural requirements of sterols for membrane function in *Saccharomyces cerevisiae*. *Arch. Biochem. Biophys.*, 300 (1993) 724-733.

## 13. STEROIDS

## 13b. Pregnan and androstane derivatives

- 655 Akwa, Y., Morfin, R.F., Robel, P. and Baulieu, E.-E.: Neurosteroid metabolism. 7 $\alpha$ -Hydroxylation of dehydroepiandrosterone and pregnenolone by rat brain microsomes. *Biochem. J.*, 288 (1992) 959-964.
- 656 Chang, T.K.H., Teixeira, J., Gil, G. and Waxman, D.J.: The lithocholic acid 6 $\beta$ -hydroxylase cytochrome P-450, CYP 3A10, is an active catalyst of steroid-hormone 6 $\beta$ -hydroxylation. *Biochem. J.*, 291 (1993) 429-434.

## 13c. Estrogens

- 657 Medina, M.B. and Nagdy, N.: Improved thin-layer chromatographic detection of diethylstilbestrol and zearanol in plasma and tissues isolated with alumina and ion-exchange membrane columns in tandem. *J. Chromatogr.*, 614 (1993) 315-323.

## 13d. Sterols

- 658 Lin, D.S., Connor, W.E., Wolf, D.P., Neunringer, M. and Hachey, D.L.: Unique lipids of primate spermatozoa: desmosterol and docosahexaenoic acid. *J. Lipid Res.*, 34 (1993) 491-499.
- 659 Lognay, G., Lacoste, F., Marlier, M., Mordret, F., Auge, C., Raoux, R., Wagstaffe, P.J., Boenke, A. and Severin, M.: The certification of the identity of individual sterols in three BCR oil and fat reference materials by GC-MS. *Fat Sci. Technol.*, 95 (1993) 98-104.
- 660 Maerker, G. and Jones, K.C.: A-ring oxidation products from  $\gamma$ -irradiation of cholesterol in liposomes. *J. Am. Oil Chem. Soc.*, 70 (1993) 255-259.
- 661 Notaro, G., Piccialli, V., Sica, D. and Pronzato, R.: New  $\Delta^8(14)$ -3 $\beta$ ,7 $\alpha$ -dihydroxysterols from the marine sponge *Pellina semitubulosa*. *J. Natural Prod.*, 55 (1992) 773-779.

See also 808.

## 13e. Bile acids and alcohols

- 662 Mikami, T., Kihira, K., Ikawa, S., Yoshii, M., Miki, S., Mosbach, E.H. and Hoshita, T.: Metabolism of sulfonate analogs of ursodeoxycholic acid and their effects on biliary bile acid composition in hamsters. *J. Lipid Res.*, 34 (1993) 429-435.

## 14. STEROID GLYCOSIDES AND SAPONINS

- 663 Calis, I., Yürük, A., Rüegger, H., Wright, A.D. and Sticher, O.: Triterpene saponins from *Primula veris* subsp. *macrocalyx* and *Primula elatior* subsp. *meyeri*. *J. Natural Prod.*, 55 (1992) 1299-1306.
- 664 Finamore, E., Zollo, F., Minale, L. and Yasumoto, T.: Starfish saponins, part 47. Steroidal glycoside sulfates and polyhydroxysteroids from *Aphelasterias japonica*. *J. Natural Prod.*, 55 (1992) 767-772.
- 665 Ikeda, Y., Fujii, Y. and Yamazaki, M.: Determination of lanatoside C and digoxin in *Digitalis lanata* by HPLC and its application to analysis of the fermented leaf powder. *J. Natural Prod.*, 55 (1992) 748-752.
- 666 Nguyen, T.N., Vo, X.M. and Nguyen, V.B.: (Studies of saponins of Dinh Lang (*Polyscias fruticosa* Harms-Araliaceae)). *Tap Chi Duoc Hoc.*, No. 3 (1992) 15-16; *C.A.*, 118 (1993) 87476m.
- 667 Woo, M.H., Do, J.C. and Son, K.H.: Five new spirostanol glycosides from the subterranean parts of *Smilax sieboldii*. *J. Natural Prod.*, 55 (1992) 1129-1135.

See also 760.

## 15. TERPENES AND OTHER VOLATILE AROMATIC COMPOUNDS

## 15a. Terpenes

- 668 Ayer, W.A. and Trifonov, L.S.: Drimane sesquiterpene lactones from *Peniophora polygonia*. *J. Natural Prod.*, 55 (1992) 1454-1461.
- 669 Chan, W.R., Sheppard, V., Medford, K.A., Tinto, W.F., Reynolds, W.F. and McLean, S.: Triterpenes from *Miconia stenostachya*. *J. Natural Prod.*, 55 (1992) 963-966.
- 670 Halawehi, F.T. and Tallamy, D.W.: Quantitative determination of cucurbitacins by high performance liquid chromatography and high performance thin layer chromatography. *J. Liq. Chromatogr.*, 16 (1993) 497-511.
- 671 Nowak, G.: Chromatography of twenty-six sesquiterpene lactones from *Centaurea bella*. *Chromatographia*, 35 (1993) 325-328.
- 672 Sagami, H., Kurisaki, A., Ogura, K. and Chojnacki, T.: Separation of dolichol from dehydrololichol by a simple two-plate thin-layer chromatography. *J. Lipid Res.*, 33 (1992) 1857-1862.

See also 620, 654, 663, 718, 749.

## 16. NITRO AND NITROSO COMPOUNDS

- 673 Boichanova, E.S., Leont'eva, L.B., Tselinskii, I.V. and Krauklish, I.V.: (Determination of microgram amounts of 2,4,6-trinitrophenol by paper chromatography). *Zh. Prikl. Khim. (S.-Peterburg)*, 65 (1992) 437-439; *C.A.*, 118 (1993) 204459w.
- 674 Miszczak, M. and Bladek, J.: Quantitative measurement of propellant stabilizers with TLC and liquid-crystalline method of visualization. *Propellants, Explos., Pyrotech.*, 18 (1993) 29-32; *C.A.*, 118 (1993) 194688d.

## 17. AMINES, AMIDES AND RELATED NITROGEN COMPOUNDS

## 17a. Amines and polyamines

- 675 Porter, R.K., Scott, J.M. and Brand, M.D.: Characterization of betaine efflux from rat liver mitochondria. *Biochim. Biophys. Acta*, 1141 (1993) 269-274.
- 676 Pyra, E. and Iskierko, J.: Chromatographic separation of some monoamines in the form of 4-N,N-dibutylaminoazobenzene-4'-thiocarbamoyl (DBABTC) derivatives. *Acta Pol. Pharm.*, 48, No. 3-4 (1991) 13-16; C.A., 118 (1993) 2204428k.
- 677 Ryan, J.W., Chung, A.Y.K., Nearing, J.A., Valido, F.A., Shun-Cun, C. and Berryer, P.: A radiochemical assay for aminopeptidase N. *Anal. Biochem.*, 210 (1993) 27-33.

See also 549, 791.

## 17b. Catecholamines and their metabolites

- 678 Price, N.P.J. and Gray, D.O.: Mapping of derivatised biogenic amines by two-dimensional/thin-layer chromatography. A comparative study. *J. Chromatogr.*, 635 (1993) 165-170.

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

- 679 Postma, G.J.: (Ethanolamine oleate injection: therapeutic and pharmaceutical aspects). *Ziekenhuisfarmacie*, 8 (1992) 84-91; C.A., 118 (1993) 27356n.
- 680 Wang, S., Sun, H., Li, Z., Zheng, B. and Zhang, H.: (Compatibility of aminophylline in lincomycin formulation). *Zhongguo Yiyuan Yaoxue Zazhi*, 12, No. 1 (1992) 27-28; C.A., 118 (1993) 11621j.
- 681 Yang, Z. and Luthy, J.: (Separation and determination of agaritidine in mushroom). *Shipin Yu Fajiao Gongye*, (1992) 75-78; C.A., 118 (1993) 190197v.

See also 675, 676, 757.

## 18. AMINO ACIDS AND PEPTIDES; CHEMICAL STRUCTURE OF PROTEINS

## 18a. Amino acids and their derivatives

- 682 Iskierko, J. and Pyra, E.: Chromatographic separation of some  $\alpha$ -amino acids in the form of 4-N,N-dibutylaminoazobenzene-4'-thiohydantoin (DBABTH) derivatives. *Acta Pol. Pharm.*, 48, No. 3-4 (1991) 9-12; C.A., 118 (1993) 204429m.
- 683 Krutzsch, H.C. and Inman, J.K.: N-Isopropylodoacetamide in the reduction and alkylation of proteins: use in microsequence analysis. *Anal. Biochem.*, 209 (1993) 109-116.
- 684 Schwandner, W.R.E., Jiménez, B., Schwartz, A., Weijer, C.J., Behrens, M., Mazón, M.J. and Fernández-Renart, M.: Chemo-tactic stimulation of aggregation-stage *Dictyostelium* cells induces rapid changes in energy metabolism, as measured by succinic thiokinase phosphorylation. *Biochim. Biophys. Acta*, 1176 (1993) 175-182.

- 685 Wang, A.Y., Lin, J.L., Lo, J.G. and Tsai, Z.T.: (Study on the complexation of pertechnetate with cysteine by thin layer chromatography). *Huaxue*, 50 (1992) 113-124; C.A., 118 (1993) 208638b.

- 686 Xuan, H.T.K. and Lederer, M.: Adsorption chromatography on cellulose. IX. Chiral separations with aqueous solvents and liquid-liquid systems. *J. Chromatogr.*, 635 (1993) 346-348.

See also 551, 556, 636, 681, 690, 716.

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

- 687 Davydov, V.Ya. and Zhao, Z.: (Correlation between the molecular structure of dermorphin-related oligopeptides and their  $R_M$  values in TLC). *Beijing Daxue Xuebao, Ziran Kexueban*, 28 (1992) 178-184; C.A., 118 (1993) 169563b.
- 688 Fry, M.J., Panayotou, G., Dhand, R., Ruiz-Larrea, F., Gout, I., Nguyen, O., Courneidge, S.A. and Waterfield, M.D.: Purification and characterization of a phosphatidylinositol 3-kinase complex from bovine brain by using phosphopeptide affinity columns. *Biochem. J.*, 288 (1992) 383-393.
- 689 Okamoto, M., Hayashi, T., Kono, S., Inoue, G., Kubota, M., Okamoto, M., Kuzuya, H. and Imura, H.: Specific activity of phosphatidylinositol 3-kinase is increased by insulin stimulation. *Biochem. J.*, 290 (1993) 327-333.
- 690 Oudinet, J.-P., Russo-Marie, F., Cavadore, J.-C. and Rothhut, B.: Protein kinase C-dependent phosphorylation of annexins I and II in mesangial cells. *Biochem. J.*, 292 (1993) 63-68.
- 691 Redpath, N.T., Price, N.T., Severinov, K.V. and Proud, C.G.: Regulation of elongation factor-2 by multisite phosphorylation. *Eur. J. Biochem.*, 213 (1992) 689-699.
- 692 Rusu, I. and Yaron, A.: Aminopeptidase P from human leukocytes. *Eur. J. Biochem.*, 210 (1992) 93-100.

## 19. PROTEINS

## 19h. Chromoproteins and metalloproteins

See 557.

## 20. ENZYMES AND ENZYME ACTIVITY ESTIMATION

## 20a. Oxidoreductases

See 598.

## 21. PURINES, PYRIMIDINES, NUCLEIC ACIDS AND THEIR CONSTITUENTS

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

- 693 Anschutz, A.L., Um, H.-D., Siegel, N.R., Veron, M. and Klein, C.: P36, a *Dictyostelium discoideum* protein whose phosphorylation is stimulated by GDP, is monologous to the  $\alpha$ -subunit of succinyl-CoA synthetase. *Biochim. Biophys. Acta*, 1162 (1993) 40-46.

- 694 Arner, E.S.J. and Eriksson, S.: Catabolism of deoxycytidine in human peripheral blood mononuclear cells and its interference with the determination of *in situ* thymidylate synthase activity. *Anal. Biochem.*, 210 (1993) 102-105.
- 695 Cannistraro, V.J. and Kennell, D.: The 5' ends of RNA oligonucleotides in *Escherichia coli* and mRNA degradation. *Eur. J. Biochem.*, 213 (1993) 285-293.
- 696 Coutts, M. and Brewerman, G.: A 5' exoribonuclease from cytoplasmic extracts of mouse sarcoma 180 ascites cells. *Biochim. Biophys. Acta*, 1173 (1993) 57-62.
- 697 Hendale, J., Bückmann, A.F., Aehle, W., Schomburg, D. and Schmid, R.D.: Structure/activity relationship of adenine-modified NAD derivatives with respect to porcine heart lactate dehydrogenase isozyme H<sub>4</sub> simulated with molecular mechanics. *Eur. J. Biochem.*, 213 (1993) 947-956.
- 698 Jones, N.J., McGregor, A.D. and Waters, R.: Detection of DNA adducts in human oral tissue: correlation of adduct levels with tobacco smoking and differential enhancement of adducts using the butanol extraction and nuclease P1 versions of <sup>32</sup>P post-labeling. *Cancer Res.*, 53 (1993) 1522-1528.
- 699 Mikšík, I., Hodný, Z. and Deyl, Z.: Chromatographic separation of glycated nucleotides. *J. Chromatogr.*, 612 (1993) 57-61.
- 700 Moens, U., Subramaniam, N., Johansen, B. and Aarbakke, J.: The c-fos cAMP-response element: regulation of gene expression by a  $\beta_2$ -adrenergic agonist, serum and DNA methylation. *Biochim. Biophys. Acta*, 1173 (1993) 63-70.
- 701 Nath, R.G., Vulimiri, S.V. and Randerath, K.: Circadian rhythm of covalent modifications in liver DNA. *Biochem. Biophys. Res. Commun.*, 189 (1992) 545-550.
- 702 Van Gennip, A.H., Busch, S., Elzinga, L., Stroomer, A.E.M., van Cruchten, A., Scholten, E.G. and Abeling, N.G.G.M.: Application of simple chromatographic methods for the diagnosis of defects in pyrimidine degradation. *Clin. Chem. (Winston-Salem)*, 39 (1993) 380-385 - a review with 20 refs.
22. ALKALOIDS
- 705 Abdel Rahman, A.A. and Abdel Bakty, A.M.: Effect of certain macromolecules on the extraction of *Sophora* alkaloids. *Bull. Pharm. Sci., Assiut Univ.*, 15, No. 1 (1992) 37-48; C.A., 118 (1993) 175576z.
- 706 Mit'kina, L.I. and Zaitseva, I.I.: (Development of methods for qualitative analysis of injectable Dixaphen solution). *Khim.-Farm. Zh.*, 26 (1992) 74-76; C.A., 118 (1993) 45885r.
- 707 Moriyasu, M., Ichimaru, M., Sawada, Y., Izutsu, K., Nishiyama, Y. and Kato, A.: Analysis of alkaloids in *Nandina domestica* by HPLC and TLC-densitometry. *Shoyakugaku Zasshi*, 46 (1992) 143-149; C.A., 118 (1993) 27555b.
- 708 Pelletier, S.W., Bhandaru, S., Desai, H.K., Ross, S.A. and Sayed, H.M.: Two new diterpenoid alkaloids from the roots of *Delphinium ajacis*. *J. Natural Prod.*, 55 (1992) 736-743.
- 709 Perellino, N.C., Malyszko, J., Ballabio, M., Gioia, B. and Minighetti, A.: Identification of ergobine, a new natural peptide ergot alkaloid. *J. Natural Prod.*, 56 (1993) 489-493.
- 710 Ping, Q., Fang, X. and Lu, G.: (The prediction of the chemical stability of transdermal therapeutic system of scopolamine using TLC-scanning method). *Zhongguo Yiyuan Yaoxue Zazhi*, 12 (1992) 246-248; C.A., 118 (1993) 66692p.
- 711 Pothier, J., Galand, N. and Viel, C.: Determination of some narcotic and toxic alkaloidal compounds by overpressured thin-layer chromatography with ethyl acetate as eluent. *J. Chromatogr.*, 634 (1993) 356-359.
- 712 Sayed, H.M., Desai, H.K., Ross, S.A., Pelletier, S.W. and Aasen, A.J.: New diterpenoid alkaloids from the roots of *Aconitum septentrionale*: isolation by an ion exchange method. *J. Natural Prod.*, 55 (1992) 1595-1606.
- 713 Viladomat, F., Bastida, J., Codina, C., Rubiralta, M. and Quirion, J.-C.: Narcissus alkaloids, XVII. Obesine, a novel alkaloid from *Narcissus obesus*. *J. Natural Prod.*, 55 (1992) 804-806.

See also 719, 780, 784.

21c. Nucleic acids, DNA

- 703 Moller, L. and Zeisig, M.: DNA adduct formation after oral administration of 2-nitrofluorene and N-acetyl-2-aminofluorene, analyzed by phosphorus-32 TLC and phosphorus-32 HPLC. *Carcinogenesis (London)*, 14 (1993) 53-59; C.A., 118 (1993) 141307x.

21d. Structural studies on RNA and RNA mapping

- 704 Reddy M.V.: C<sub>18</sub> thin-layer chromatographic enhancement of the <sup>32</sup>P-postlabeling assay for aromatic or bulky carcinogen-DNA adducts: evaluation of adduct recoveries in comparison with nuclease P1 and butanol methods. *J. Chromatogr.*, 614 (1993) 245-251.

21e. Structural studies on DNA and DNA mapping

See 704.

See also 552, 744, 774.

23. OTHER SUBSTANCES CONTAINING HETEROCYCLIC NITROGEN

23c. Indole derivatives and plant hormones (gibberellins)

See 749.

23d. Pyridine derivatives

- 714 Ishijima, C., Nishiwaki, T., Hirayama, K., Irie, Y., Inazuka, S., Watanabe, D., Fukutani, T., Ozaki, M., Ikawa, H. and Mizutani, H.: Chemical structure and physicochemical properties of 2-methoxyethyl (E)-3-phenyl-2-propen-1-yl ( $\pm$ -1,4-dihydro-2,6-dimethyl-4-(3-nitrophenyl)pyridine-3,5-dicarboxylate (FRC-8653). *Iyakuhin Kenkyu*, 23 (1992) 547-557; C.A., 118 (1993) 197889t.

See also 766.

## 23e. Other N-heterocyclic compounds

- 715 Kanekal, S. and Kehrer, J.P.: Evidence for peroxidase-mediated metabolism of cyclophosphamide. *Drug Metab. Disp.*, 21 (1993) 37-42.

See also 552, 788.

## 24. ORGANIC SULPHUR COMPOUNDS (INCL. GLUCOSINOLATES)

- 716 Patti, A., Morrone, R., Chillemi, R., Piattelli, M. and Sciuto, S.: Thetones and betaines of the red alga *Digenea simplex*. *J. Natural Prod.*, 56 (1993) 432-435.  
 717 Steenkamp, D.J.: Simple methods for the detection and quantification of thiols from *Crithidium fasciculata* and for the isolation of trypanothione. *Biochem. J.*, 292 (1993) 295-301.

See also 773, 788.

## 25. ORGANIC PHOSPHORUS COMPOUNDS (INCL. SUGAR PHOSPHATES)

- 718 Ohnuma, S.-i., Koyama, T. and Ogura, K.: Alteration of the product specificities of prenyltransferases by metal ions. *Biochem. Biophys. Res. Commun.*, 192 (1993) 407-412.  
 719 Slama, J.T., Simmons, A.M., Hernandez, T.M. and Keenan, R.W.: Synthesis of [<sup>35</sup>S]thiophosphoryl adenylic acid, utilizing a general procedure for [<sup>35</sup>S]thiophosphoryl chloride production. *Anal. Biochem.*, 209 (1993) 143-149.

See also 630, 684, 689, 691.

## 26. ORGANOMETALLIC AND RELATED COMPOUNDS

## 26a. Organometallic compounds

- 720 Li, W., Wang, S., Sun, T. and Dong, C.: (Purity determination of organotin compounds and triphenylphosphine by using thin-layer chromatography). *Huaxue Shijie*, 33 (1992) 225-226; *C.A.*, 118 (1993) 171454k.

See also 552, 553.

## 26c. Coordination compounds

- 721 Ge, Z. and Lin, H.: (Micellar thin-layer chromatographic behavior of cobalt(II)-1-(2-pyridylazo)-2-naphthol complex). *Fenxi Huaxue*, 20 (1992) 1369-1372; *C.A.*, 118 (1993) 93445s.  
 722 Wei, T., Feng, G., Zhang, J. and Cheng, Z.: (Separation and identification of molybdenum(IV)-amino acid coordination compounds by thin-layer chromatography). *Sepu*, 11 (1993) 52-53; *C.A.*, 118 (1993) 160033w.

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

- 723 Dean, K.R. and Akhtar, M.: Phosphorylation of solubilised dark-adapted rhodopsin. Insights into the activation of rhodopsin kinase. *Eur. J. Biochem.*, 213 (1993) 881-890.

## 28. ANTIBIOTICS

- 724 Aoyagi, T., Aoyama, T., Kojima, F., Hattori, S., Honma, Y., Hamada, M. and Takeuchi, T.: Cyclooctatin, a new inhibitor of lysophospholipase, produced by *Streptomyces melanosporofaciens* MI614-43F2. Taxonomy, production, isolation, physico-chemical properties and biological activities. *J. Antibiot.*, 45 (1992) 1587-1591.  
 725 Aoyagi, T., Aoyama, T., Kojima, F., Matsuda, N., Maruyama, M., Hamada, M. and Takeuchi, T.: Benastatins A and B, new inhibitors of glutathione S-transferase, produced by *Streptomyces* sp. MI384-DF12. I. Taxonomy, production, isolation, physico-chemical properties and biological activities. *J. Antibiot.*, 45 (1992) 1385-1390.  
 726 Aoyagi, T., Suda, H., Uotani, K., Kojima, F., Aoyama, T., Horiguchi, K., Hamada, M. and Takeuchi, T.: Nagstatin, a new inhibitor of N-acetyl- $\beta$ -D-glycosaminidase, produced by *Streptomyces amakusaensis* MG846-fF3. Taxonomy, production, isolation, physico-chemical properties and biological activities. *J. Antibiot.*, 45 (1992) 1404-1408.  
 727 Betzel, C., Rachev, R., Dolashka, P. and Genov, N.: Actinomycins as proteinase inhibitors. *Biochim. Biophys. Acta*, 1161 (1993) 47-51.  
 728 Ezaki, M., Shigematsu, N., Yamashita, M., Komori, T., Umehara, K. and Imanaka, H.: Biphenomycin C, a precursor of biphenomycin A in mixed culture. *J. Antibiot.*, 46 (1993) 135-140.  
 729 Grabley, S., Hammann, P., Thiericke, R., Wink, J., Phillips, S. and Zeeck, A.: Secondary metabolites by chemical screening. 21. Clonostachydiol, a novel antihelmintic macrodiolide from the fungus *Clonostachys cylindrospora* (strain FH-A 6607). *J. Antibiot.*, 46 (1993) 343-345.  
 730 Harper, D.E. and Welch, D.R.: Isolation, purification, synthesis and antiinvasive/antimetastatic activity of U-77863 and U-77864 from *Streptomyces griseoluteus*, strain WS6724. *J. Antibiot.*, 45 (1992) 1826-1836.  
 731 Hatfield, G.M., Woodard, R.W. and Son, J.-K.: Isolation and structure determination of new macrolide antibiotics. *J. Natural Prod.*, 55 (1992) 753-759.  
 732 Ikeda, Y., Naganawa, H., Kondo, S. and Takeuchi, T.: Preparation of <sup>13</sup>C and <sup>15</sup>N labelled bellenamine and its degradation products. *J. Antibiot.*, 45 (1992) 1925-1929.  
 733 Ito, M., Maruhashi, M., Sakai, N., Mizoue, K. and Hanada, K.: NG-011 and NG-012, novel potentiators of nerve growth factor. I. Taxonomy, isolation, and physico-chemical and biological properties. *J. Antibiot.*, 45 (1992) 1559-1565.  
 734 Johdo, O., Tone, H., Okamoto, R., Yoshimoto, A. and Takeuchi, T.: Production of new anthracycline antibiotics by microbial 4-O-methylation using a specific daunorubicin-negative mutant. *J. Antibiot.*, 45 (1992) 1837-1847.

- 735 Johdo, O., Tone, H., Okamoto, R., Yoshimoto, A., Naganawa, H., Sawa, T. and Takeuchi, T.: Photochemically obtained N-de-methyl derivatives of anthracyclines. *J. Antibiot.*, 45 (1992) 1653-1661.
- 736 Kotake, C., Yamasaki, T., Moriyama, T., Shinoda, M., Komiya, N., Furumai, T., Konishi, M. and Oki, T.: Butyrolactols A and B, new antifungal antibiotics. Taxonomy, isolation, physico-chemical properties, structure and biological activity. *J. Antibiot.*, 45 (1992) 1442-1450.
- 737 Kunze, B., Jansen, R., Pridzun, L., Jurkiewicz, E., Hunsmann, G., Höfle, G. and Reichenbach, H.: Phenoxan, a new oxazole-pyrone from myxobacteria: production, antimicrobial activity and its inhibition of the electron transport in complex I of the respiratory chain. *J. Antibiot.*, 45 (1992) 1549-1552.
- 738 Kuzuyama, T., Hidaka, T., Kamigiri, K., Imai, S. and Seto, H.: Studies on the biosynthesis of fosfomycin. 4. The biosynthetic origin of the methyl group of fosfomycin. *J. Antibiot.*, 45 (1992) 1812-1814.
- 739 Lam, Y.K.T., Wichmann, C.F., Meinz, M.S., Guariglia, L., Giacobbe, R.A., Mochales, S., Kong, L., Honeycutt, S.S., Zink, D., Bills, G.F., Huang, L. et al.: A novel inositol mono-phosphatase inhibitor from *Memnoniella echinata*. Producing organism, fermentation, isolation, physico-chemical and *in vitro* biological properties. *J. Antibiot.*, 45 (1992) 1397-1403.
- 740 Nair, M.G., Mishra, S.K., Putnam, A.R. and Pandey, R.C.: Antifungal anthracycline antibiotics, spartanamicins A and B from *Micromonospora* spp. *J. Antibiot.*, 45 (1992) 1738-1745.
- 741 Nakata, M., Saito, M., Inouye, T., Nakamura, S., Hayakawa, Y. and Seto, H.: A new anthracycline antibiotic, cinerubin R. Taxonomy, structure elucidation and biological activity. *J. Antibiot.*, 45 (1992) 1599-1608.
- 742 Nikei, Y., Yamamoto, H., Hasegawa, M., Hanada, M., Fukagawa, Y. and Oki, T.: Epocarbazolins A and B, novel 5-lipoxygenase inhibitors. Taxonomy, fermentation, isolation, structures and biological activities. *J. Antibiot.*, 46 (1993) 25-33.
- 743 Oka, H., Ikai, Y., Hayakawa, J., Masuda, K., Harada, K.-I., Suzuki, M., Martz, V. and MacNeil, J.D.: Improvement of chemical analysis of antibiotics. 18. Identification of residual tetracyclines in bovine tissues by TLC/FABMS with a sample condensation technique. *J. Agric. Food Chem.*, 41 (1993) 410-415.
- 744 Parimoo, P., Umapathi, P. and Ilango, K.: Determination of oxytetracycline hydrochloride and diiodohydroxyquinoline in tablet preparations by preparative thin-layer chromatography. *Indian Drugs*, 30 (1993) 92-94; *C.A.*, 118 (1993) 175930k.
- 745 Roy, K., Vijayakumar, E.K.S., Mukhopadhyay, T., Chatterjee, S., Bhat, R.G., Blumbach, J. and Ganguli, B.N.: Aranorosinol A and aranorosinol B, the new metabolites from *Pseudoarachniotus roseus*: production, isolation, structure elucidation and biological properties. *J. Antibiot.*, 45 (1992) 1592-1598.
- 746 Tsuda, Y., Wakamatsu, H., Yoshizawa, E., Kitagawa, E. and Fujimoto, T.: (Microbiological determination of netilmicin using a thin-layer chromatography scanner). *Jpn. J. Antibiot.*, 46 (1993) 1-7; *C.A.*, 118 (1993) 154688x.
- 747 Tsunakawa, M., Komiya, N., Tenmyo, O., Tomita, K., Kawano, K., Kotake, C., Konishi, M. and Oki, T.: New antiviral antibiotics, cycloviracins B<sub>1</sub> and B<sub>2</sub>. I. Production, isolation, physico-chemical properties and biological activity. *J. Antibiot.*, 45 (1992) 1467-1471.
- 748 Ueno, M., Iijima, M., Masuda, T., Kinoshita, N., Iinuma, H., Naganawa, H., Hamada, M., Ishizuka, M. and Takeuchi, T.: De-thymicin, a novel immunosuppressant isolated from an *Amycolatopsis*. Fermentation, isolation, physico-chemical properties and biological activities. *J. Antibiot.*, 45 (1992) 1819-1826.
- 749 Van der Pyl, D., Inokoshi, J., Shiomi, K., Yang, H., Takeshima, H. and Omura, S.: Inhibition of farnesyl-protein transferase by gliotoxin and acetylglotoxin. *J. Antibiot.*, 45 (1992) 1802-1805.
- 750 Yoshimoto, A., Fujii, S., Johdo, O., Kubo, K., Nishida, H., Okamoto, R. and Takeuchi, T.: Anthracycline metabolites from baumycin-producing *Streptomyces* sp. D788. II. New anthracycline metabolites produced by a blocked mutant strain RPM-5. *J. Antibiot.*, 46 (1993) 56-64.
- 751 Yoshimoto, A., Johdo, O., Tone, H., Okamoto, R., Nasanawa, H., Sawa, T. and Takeuchi, T.: Production of new anthracycline antibiotics 1-hydroxyoxaunomycin and 6-deoxyoxaunomycin by limited biosynthetic conversion using a daunorubicin-negative mutant. *J. Antibiot.*, 45 (1992) 1609-1617.
- See also 680, 760, 786.
29. INSECTICIDES, PESTICIDES AND OTHER AGROCHEMICALS
- 29e. Herbicides
- 752 Johnson, R.M., Halaweish, F. and Fuhrmann, J.J.: Analysis of atrazine and associated metabolites by reverse-phase high performance thin layer chromatography. *J. Liq. Chromatogr.*, 15 (1992) 2941-2957.
30. SYNTHETIC AND NATURAL DYES
- 30a. Synthetic dyes
- 753 Misra, G., Rana, L.S., Cheema, D.P.S., Misra, G.J., Mittal, V.K. and Sahota, H.S.: Comparative study of some samples of Indian lipsticks by thin-layer chromatography and colorimetry. *Indian J. Forensic Sci.*, 6 (1992) 75-77; *C.A.*, 118 (1993) 118420v.
- 754 Reynolds, R.C. and O'Dell, C.A.: A thin layer and column chromatography experiment adapted for use in secondary schools: a quick safe, colorful, convenient introduction in two basic techniques. *J. Chem. Educ.*, 69 (1992) 989-991. *C.A.*, 118 (1993) 101201b.
- 30b. Chloroplast and other natural pigments
- 755 Dai, R., Shoemaker, R., Farrens, D., Han, M.J., Kim, C.S. and Song, P.-S.: Characterization of silkworm chlorophyll metabolites as an active photosensitizer for photodynamic therapy. *J. Natural Prod.*, 55 (1992) 1241-1251.
- 756 Mínguez-Mosquera, M., Gallardo-Guerrero, L. and Gandul-Rojas, B.: Characterization and separation of oxidized derivatives of pheophorbide a and b by thin-layer and high-performance liquid chromatography. *J. Chromatogr.*, 633 (1993) 295-299.

See also 628.

### 31. PLASTICS AND THEIR INTERMEDIATES

- 757 Kasemsuksakul, L., Sekikawa, Y., Kasimura, H., Yagasaki, K. and Shimada, M.: Rapid method for isocyanate prepolymer examination. *Kanzei Chuo Bunseki Shoho*, 31 (1992) 127-134; C.A., 118 (1993) 125377q.

### 32. DRUG ANALYSIS

#### 32a. Drug analysis, general techniques

- 758 Heinisch, G. and Kopelent-Frank, H.: Identity control of formulated drugs. Part 7. *Sci. Pharm.*, 60 (1992) 41-51; C.A., 118 (1993) 154692u.  
 759 Nyiredy, S. and Szepesi, G.: Planar chromatography: current status and future perspectives in pharmaceutical analysis (short review) - II. Special techniques and future perspectives in planar chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 1017-1024 - a review with 25 refs.  
 760 Renger, B.: Quantitative planar chromatography as a tool in pharmaceutical analysis. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 7-13.  
 761 Szepesi, G. and Nyiredy, S.: Planar chromatography: current status and future perspectives in pharmaceutical analysis - I. Applicability, quantitation and validation. *J. Pharm. Biomed. Anal.*, 10 (1992) 1007-1015 - a review with 38 refs.

See also 545.

#### 32b. Antirheumatics and antiinflammatory drugs

- 762 Singhai, A.K., Talwar, N., Khapra, P. and Jain, N.K.: (Analysis of ibuprofen-paracetamol tablets). *J. Inst. Chem. (India)*, 63 (1991) 227; C.A., 118 (1993) 132297s.

See also 801, 803.

#### 32c. Autonomic and cardiovascular drugs

- 763 Camara, J.M., Blanco, J.L., Cutuli, M.T., Suarez, G. and Dominguez, L.: (Biphasic dialysis in the determination of clenbuterol in the urine of animals for slaughter). *Alimentaria (Madrid)*, 118 (1992) 25-31; C.A., 118 (1993) 79558z.  
 764 Martens, J., Meyér, F.P. and Tröglar, U.: Eine schnelle Methode zur quantitative Bestimmung von Etoxazin in Serum bei Intoxikationen. *Pharmazie*, 48 (1993) 309-310.  
 765 Tufenkji, A.E., Campistron, G., Malbosc, R., Declume, C., Dommard, Y., Atabakhsh, F., Benard, P. and Houin, G.: Pharmacokinetics of <sup>14</sup>C-N,N'-dicyclopropyl-methyl-piperazine-dichlorhydrate. 1st Communication: balance of elimination, plasma and blood kinetics, metabolism in rats. *Arzneim.-Forsch.*, 43 (1993) 323-326.  
 766 Wagner, G. and Prantl, J.: Synthese von Euro[2,3-b]pyridin-amidinen mit antianafylaktischer Wirkung. *Pharmazie*, 48 (1993) 250-253.

- 767 Wallerstein, S., Cserháti, T. and Fischer, J.: Determination of the lipophilicity of some anti-hypoxia drugs: comparison of TLC and HPLC methods. *Chromatographia*, 35 (1993) 275-280.

See also 714, 794.

#### 32d. Central nervous system drugs

- 768 Ahmed, S.M.: Drug-excipient physicochemical incompatibility studies involving temazepam, medazepam and lorazepam. *Alexandria J. Pharm. Sci.*, 6 (1992) 117-120; C.A., 118 (1993) 45585r.  
 769 Cserháti, T. and Magyar, K.: Use of TLC and multivariate mathematical statistical methods to study the interaction of monoamine oxidase inhibitory drugs with amino acids. *J. Pharm. Biomed. Anal.*, 10 (1992) 1033-1039.  
 770 El Kousy, N.M.: Stability-indicating method for the quantitation of trazodone hydrochloride in tablet form. *Egypt. J. Pharm. Sci.*, 32 (1991) 633-640; C.A., 118 (1993) 11855p.  
 771 Kovacs-Hadady, K.: Overpressured layer chromatographic study of retention behaviour of various benzodiazepine derivatives on layers impregnated with tricaprylmethylammonium chloride. *J. Pharm. Biomed. Anal.*, 10 (1992) 1025-1032.  
 772 Mutilib, A.E., Chui, Y.C., Young, L.M. and Abbott, F.S.: Characterization of metabolites of xylazine produced *in vivo* and *in vitro* by LC/MS/MS and GC/MS. *Drug Metab. Disp.*, 20 (1992) 840-848.

See also 706, 760.

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

- 773 Ban, Y.D., Sun, Y.Q. and Mao, X.L.: (Optimization of the solvent system used for thin layer chromatography. VI. Furthering of the uniform design method). *Yaoxue Xuebao*, 27 (1992) 768-772; C.A., 118 (1993) 154673p.  
 774 Beedham, C., Al-Tayib, Y. and Smith, J.A.: Role of guinea pig and rabbit hepatic aldehyde oxidase in oxidative *in vitro* metabolism of cinchona antimalarials. *Drug Metab. Disp.*, 20 (1992) 889-895.  
 775 Gardner, J.J., Wilkinson, D. and Entwistle, N.: Experiences with the analysis of anti-asthmatic drugs over 25 years. *Methodol. Surv. Biochem. Anal.*, 22 (1992) 183-190; C.A., 118 (1993) 160360a - a review with 4 refs.  
 776 Li, Z., Shi, T. and Wu, J.: (Determination of compounds injection of sulfamethoxazole by thin-layer chromatographic densitometry). *Zhongguo Yiyao Gengye Zazhi*, 23 (1992) 321-322; C.A., 118 (1993) 109875v.  
 777 Maffei Facino, R., Carini, M., Aldini, G., Ceserani, R., Casciarri, I., Cavaletti, E. and Verderio, L.: Efficacy of glutathione for treatment of fascioliasis. An investigation in the experimentally infested rat. *Arzneim.-Forsch.*, 43 (1993) 455-460.  
 778 Unruh, J., Schwartz, D.P. and Barford, R.A.: Quantitation of sulfamethazine in pork tissue by thin-layer chromatography. *J. Assoc. Off. Anal. Chem.*, 76 (1993) 335-341.

See also 729.

## 32f. Cytostatics

- 779 Fu, Q., Que, Z. and Yang, Y.: (Substitution kinetics of carboplatin in sodium chloride or glucose aqueous solution). *Guojishu*, 13, No. 1 (1992) 1-9; C.A., 118 (1993) 87552h.
- 780 Giannola, L.I., di Stefano, V. and de Caro, V.: White beewachs microspheres: a comparative *in vitro* evaluation of cumulative release of the anticancer agents fluorouracil and fluorouracil. *Pharmazie*, 48 (1993) 1123-126.
- 781 Kaleagasioglu, F.: Identification of antineoplastic agents by thin-layer chromatography. Part I. *Acta Pharm. Turc.*, 34 (1992) 115-119; C.A., 118 (1993) 175941q.
- 782 Patel, D.K., Lewis, R.P., Hinton, M.L., Schroeder, D.H., Shockcor, J.P., Johnson, R.L. and Sigel, C.W.: Pharmacokinetics and disposition in the rat of a DNA intercalator 502U83. *Drug Metab. Disp.*, 21 (1993) 62-70.
- 783 Shipley, L.A., Brown, T.J., Cornpropst, J.D., Hamilton, M., Daniels, W.D. and Culp, H.W.: Metabolism and disposition of gemcitabine, and oncolytic deoxycytidine analog, in mice, rats, and dogs. *Drug Metab. Disp.*, 20 (1992) 849-855.
- 784 Steinberg, J.J., Oliver, G.W., Jr. and Cajigas, A.: Assay of deoxy-deazapurines in DNA by 3'-phosphorylation and two-dimensional thin-layer chromatography. *J. Chromatogr.*, 612 (1993) 277-285.

See also 574, 578.

## 32g. Other drug categories

- 785 Dwivedi, A.K., Chauhan, S.K., Seth, R.K. and Sarin, J.P.S.: Simultaneous determination of  $\alpha$ - and  $\beta$ -arteether in arteether samples and formulations by TLC densitometry. *Indian J. Pharm. Sci.*, 54 (1992) 157-159; C.A., 118 (1993) 154717t.
- 786 Iijima, M., Masuda, T., Nakamura, H., Naganawa, H., Kurasawa, S., Okami, Y., Ishizuka, M. and Takeuchi, T.: Metacytofilin, a novel immunomodulator produced by *Metarhizium* sp. TA2759. *J. Antibiot.*, 45 (1992) 1553-1555.
- 787 Iskenderov, V.G.: (Thin-layer chromatographic determination of pyridoxal impurity in pyridoxal phosphate). *Farmatsiya (Moscow)*, 41, No. 4 (1992) 44-45; C.A., 118 (1993) 27583j.
- 788 Kirilmaz, L., Ercakir, K., Ekiz-Gucer, N. and Guneri, T.: The stability of famotidine hydrochloride solutions at different pH values. *Pharm. Acta Helv.*, 67 (1992) 346-348; C.A., 118 (1993) 109498z.
- 789 Kiss, A.D., Haggard, K., Veltman, J.C. and Ziegler, D.M.: Oxidation of aldose reductase inhibitors ALO-4114 and ALO-3152 catalyzed by liver microsomes. *Drug Metab. Disp.*, 20 (1992) 948-953.
- 790 Kocic-Pesic, V., Radulovic, D., Pecanac, D. and Zivanovic, L.: Determination of sodium cromoglycate in pharmaceutical dosage forms using TLC-densitometry. *Farmaco*, 47 (1992) 1563-1567; C.A., 118 (1993) 87743w.
- 791 Koshikawa, S., Yamashita, I., Sonoda, R., Watanabe, N., Ohtani, Y., Tanji, S., Maeda, T., Ishiyama, N. and Takase, M.: (Chemical structure, physicochemical properties and stability of butenafine hydrochloride). *Iyakuhin Kenkyu*, 23 (1992) 533-546; C.A., 118 (1993) 154264f.

- 792 Liu, S., Huang, H., Li, X., Chen, Y. and Yang, X.: (Quantitative determination of atractylodin in  $\beta$ -cyclodextrin inclusion of Atractylodes oil by thin-layer optical densitometric method). *Zhongguo Yiyuan Yaoxue Zazhi*, 12, No. 2 (1992) 78-79; C.A., 118 (1993) 109842g.
- 793 Tantillo, G., Augelli, R. and Todaro, M.P.: (Determination of derivatized salbutamol by HPTLC). *Ind. Aliment. (Pinerolo)*, 32 (1993) 42-44; C.A., 118 (1993) 190216a - determination in meat and urine.
- 794 Tantillo, G., Augelli, R. and Todaro, M.P.: Detection of clenbuterol residues in treated pigs. *Ind. Aliment. (Pinerolo)*, 309 (1992) 1039-1041; C.A., 118 (1993) 79582c.
- 795 Wu, X.J. and Song, Y.W.: (Separation and identification of impurities in mifepristone). *Yaoxue Xuebao*, 27 (1992) 796-799; C.A., 118 (1993) 154700v.
- 796 Zhao, H., Lin, N., Chen, Z., Xie, X., Lin, X. and Ye, M.: (Experimental studies of azone on the promotion of transdermal absorption of Ruyijiuhuangsan black plaster). *Zhongcaoyao*, 23 (1992) 525-527; C.A., 118 (1993) 87500q.

See also 679, 748, 763, 781.

## 32h. Toxicological and forensic applications

- 797 Mathur, S.C., Murugesan, N., Kumar, Y., Rathore, Y.K.S. and Sethi, P.D.: A simple TLC method for identification of nonoxynol-9 in contraceptive preparations. *Indian J. Forensic Sci.*, 6 (1992) 85-86; C.A., 118 (1993) 118422x.
- See also 559, 703, 764.
- 32i. Plant extracts
- 798 Cheng, J., Chen, Y., Sheng, G. and Hou, L.: (Quantitative determination of aucubia in Asiatic plantain (*Plantago asiatica*) by HPTLC). *Zhongcaoyao*, 23 (1992) 459-473; C.A., 118 (1993) 154679v.
- 799 Luo, M., Cheng, J. and Ma, Y.: (Determination of paeoniflorin in Jianerchongji by TLC scanning). *Zhongguo Yiyuan Yaoxue Zazhi*, 12 (1992) 366-367; C.A., 118 (1993) 154687w.
- 800 Luo, S. and Li, T.: (Determination of naphthoquinone in Zicao). *Zhongguo Zhongyao Zazhi*, 17 (1992) 552-554; C.A., 118 (1993) 154683s.
- 801 Poukens-Renwart, P., Tits, M., Wauters, J.-N. and Angenot, L.: Reversed-phase HPTLC densitometric evaluation of fraxin in *Fraxinus excelsior* leaves. *J. Pharm. Biomed. Anal.*, 10 (1992) 1089-1091.
- 802 Shen, L. and Wang, R.: (Quality and stability of  $\beta$ -cyclodextrin inclusion complex of the essential oil of garlic). *Zhongcaoyao*, 23 (1992) 518-520; C.A., 118 (1993) 131885v.
- 803 Tits, M., Poukens, P., Angenot, L. and Dierckxsens, Y.: Thin-layer chromatographic analysis of proanthocyanidins from *Ribes nigrum* leaves. *J. Pharm. Biomed. Anal.*, 10 (1992) 1097-1100.
- 804 Wu, F. and Chen, J.: (Quality control of corni in Liuwei Dihuang Wan). *Zhongguo Yiyuan Yaoxue Zazhi*, 12, No. 1 (1992) 30-32; C.A., 118 (1993) 131847j.
- 805 Yoshizaki, F., Suzuki, K., Ando, T. and Hisamichi, S.: (Identification of crude drugs in Keishito). *Annu. Rep. Tohoku Coll. Pharm.*, 38 (1991) 107-110; C.A., 118 (1993) 11834f.

- 806 Zhang, H., Yuan, C. and Chen, G.: (Chemical constituents of Chinese crude drug 'Zheduho'). *Zhongcaoyao*, 23 (1992) 515-554; C.A., 118 (1993) 131851f.
- 807 Zhou, Y., Pan, L. and Zhan, S.: (Preparations of Danshen granules). *Zhongguo Zhongyao Zazhi*, 17 (1992) 540-543; C.A., 118 (1993) 131848k.
- See also 565, 568, 705.
- 33. CLINICO-CHEMICAL APPLICATIONS**
- 33a. *General papers and reviews*
- See 702.
- 33b. *Complex mixtures and profiling (single compounds by cross-reference only)*
- See 580, 589, 616.
- 34. FOOD ANALYSIS**
- 34b. *Complex mixtures (single compounds by cross-reference only)*
- 808 Seibel, W.: Detection of soft wheat in durum meal and pasta. Part 4. Thin-layer chromatography of pasta dried at high temperature. *Veroeff. Arbeitsgem. Getreideforsch.*, 241 (1992) 76-89; C.A., 118 (1993) 123194d.
- 809 Sherma, J. and Norfolk, E.: Quantitative TLC determination of stevioside and rebaudioside A in beverages. *J. Liq. Chromatogr.*, 15 (1992) 2981-2988.
- See also 571, 681, 793, 794.
- 35. ENVIRONMENTAL ANALYSIS**
- 35d. *Soil pollution (complex mixtures; single compounds by cross-reference only)*
- See 752.
- 36. SOME TECHNICAL PRODUCTS AND COMPLEX MIXTURES**
- 36a. *Surfactants*
- 810 Guo, S. and Zhang, L.: (Determination of ethoxylate oligomer distribution in polyoxyethylene surfactants by thin-layer chromatography). *Sepu*, 10 (1992) 295-297; C.A., 118 (1993) 83304f.
- 811 Pinazo, A., Diz, M., Solans, C., Pés, M.A., Erra, P. and Infante, M.R.: Synthesis and properties of cationic surfactants containing a disulfide bond. *J. Am. Oil Chem. Soc.*, 70 (1993) 37-42.
- 812 Zhang, P. and You, L.: (Isolation of some main surfactant in detergent by TLC). *Riyong Huaxue Gongye*, No. 1 (1992) 42-46; C.A., 118 (1993) 24122x.
- See also 590, 635, 760.
- 36b. *Antioxidants and preservatives*
- 813 Buck, E. and Sudbury, J.B.: Process for the detection and quantitation of corrosion and scale inhibitors in produced well fluids. U.S. US 5,152,177 (Cl. 73-61.54; G01N30/90), 06 Oct. 1992, Appl. 579,425, 07 Sep. 1990; 9 pp.; C.A., 118 (1993) 106134s.
- 814 Horvath, R.: (Use of high-performance thin-layer chromatography for identification of antioxidants and peroxide cross-linking initiators in polyolefins). *Plasty Kauc.*, 28 (1991) 73-78; C.A., 118 (1993) 23083y.
- See also 674.
- 36c. *Complex mixtures, technical products and unidentified compounds*
- See 578, 636, 674.
- 37. CELLS, CELLULAR PARTICLES AND SUPRAMOLECULAR STRUCTURES**
- See 617.
- 38. INORGANIC COMPOUNDS**
- 38a. *Cations*
- 815 Das, N.R. and Lahiri, S.: Reversed-phase chromatographic separation of zirconium, niobium and hafnium tracers with HDEHP. *J. Radioanal. Nucl. Chem.*, 163 (1992) 213-223; C.A., 118 (1993) 72617j.
- 816 Menezes, M.L., Campos, J.T.S. and Moreira, J.C.: (Qualitative determination of aluminum, cobalt, copper, iron, manganese, nickel and zinc in ores using paper chromatography with fusel oil as the mobile phase). *Quim. Nova*, 15 (1992) 372-373; C.A., 118 (1993) 51492z.
- See also 548.
- 38c. *Permanent and rare gases*
- See 557.
- 39. RADIOACTIVE AND OTHER ISOTOPE COMPOUNDS**
- See 685.

## Electrophoresis

### 1. REVIEWS AND BOOKS

- 1240 Grossman, P.D. and Soane, D.S.: Principles of electrophoretic separations in polymer matrixes. In: Soane, D.S. (Editor), *Polym. Appl. Biotechnol.*, Prentice Hall, Englewood Cliffs, 1992, pp. 155-168; C.A., 118 (1993) 142677e - a review with 19 refs.
- 1241 Linton, M.F., Farese, R.V., Jr. and Young, S.G.: Familial hypobetalipoproteinemia. *J. Lipid Res.*, 34 (1993) 521-541.
- 1242 Michielsen, M. and Schusud, F.: (Chromatography and electrophoresis: a strong combination). *Chem. Mag. (Ghent)*, 18 (1992) 87-88; C.A., 118 (1993) 55300h - a review with no refs.
- 1243 Radola, B.J. (Editor): *Electrophoresis Forum '92. Proceedings of the International Meeting, Munich, October 26-28, 1992. Electrophoresis (Weinheim)*, 13 (1992) 223 p.; C.A., 118 (1993) 76561j.
- 1244 Rose, D.: Polymers in electrophoresis. In: Soane, D.S. (Editor), *Polym. Appl. Biotechnol.*, Prentice Hall, Englewood Cliffs, 1992, pp. 169-203; C.A., 118 (1993) 146122t - a review with 98 refs.

See also 1258, 1287, 1294, 1303, 1310, 1317, 1322, 1504, 1693, 1890.

### 2. FUNDAMENTALS, THEORY AND GENERAL

#### 2a. General

- 1245 Baratuci, W.B.: Counteracting flow electrophoresis. Avail. *Univ. Microfilms Int.*, Order No. DA9137031, 1991, 121 p.; C.A., 118 (1993) 97408e.
- 1246 Chrambach, A. and Aldroubi, A.: Relative efficiency of molecular sieving in solutions of four polymers. *Electrophoresis (Weinheim)*, 14 (1993) 18-22.
- 1247 Clifton, M.J., Roux-De-Balman, H. and Sanchez, V.: Electrohydrodynamic deformation of the sample stream in continuous-flow electrophoresis with an AC electric field. *Can. J. Chem. Eng.*, 70 (1992) 1055-1062; C.A., 118 (1993) 120269w.

See also 1305, 1308, 1323, 1515.

#### 2b. Thermodynamics and theoretical relationships

- 1248 Rilbe, H.: On the use of dimensionless parameters in acid-base theory. II. The molar buffer capacities of bivalent weak acids and bases. *Electrophoresis (Weinheim)*, 14 (1993) 202-204.

See also 1274, 1308, 1319, 1320, 1325, 1793, 1841.

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

See 1283, 1286.

### 3. GENERAL TECHNIQUES

#### 3a. Apparatus and accessories

- 1249 Bettencourt, G., Fernwood, G., Hernandez, E.G. and Grawforth, L.: Non-breakable electrically insulating sample well inserts for slab electrophoresis. U.S. US 5,164,065 (Cl. 204-299R; G01N27/26), 17 Nov. 1992, Appl. 808,412, 13 Dec. 1991; 4 p.; C.A., 118 (1993) 116011p.
- 1250 Brumley, R.L., Jr. and Smith, L.M.: Horizontal gel electrophoresis apparatus with higher voltages. *Eur. Pat. Appl. EP 492,769* (Cl. G01N27/447), 01 Jul. 1992, US Appl. 630,675, 20 Dec. 1990; 14 p.; C.A., 118 (1993) 93597t.
- 1251 Flesher, R.W.: Vertical gel electrophoresis apparatus having universal gel assembly support structure. U.S. US 5,149,418 (Cl. 204-299R; B01D61/42), 22 Sep. 1992, Appl. 754,530, 04 Sep. 1991; 8 p.; C.A., 118 (1993) 116010n.
- 1252 Holloway, R.R.: Capillary gel electrophoresis column and method of preparing them. U.S. US 5,167,783 (Cl. 204-182.8; G01N27/26), 01 Dec. 1992, Appl. 632,278, 20 Dec. 1990; 7 p.; C.A., 118 (1993) 93609y.
- 1253 Lauer, H.H. and Bischoff, K.: Capillary electrophoresis. Variable injection device for this high-resolution separation method. *LaborPraxis*, 16 (1992) 1126-1130; C.A., 118 (1993) 93521p.
- 1254 Lunte, S.M., Lunte, G.E. and O'Shea, T.J.: Ion-permeable polymer joint for use capillary electrophoresis. U.S. US 5,169,510 (Cl. 204-299R; G01N27/26), 08 Dec. 1992, Appl. 844,762, 02 Mar. 1992; 8 p.; C.A., 118 (1993) 116012q.
- 1255 Mackay, C.D. and Barker, R.F.: A method and an apparatus for electrophoretic separation. *PCT Int. Appl. WO 93 00,986* (Cl. B01D57/02), 21 Jan. 1993, GB Appl. 91/15,073, 12 Jul. 1991; 13 pp.; C.A., 118 (1993) 142968a.
- 1256 Piletskii, S.A., Butovich, I.A. and Kukhar, V.P.: (Design of molecular sensors based on substrate-selective polymer membranes). *Zh. Anal. Khim.*, 47 (1992) 1681-1684; C.A., 118 (1993) 93525t.
- 1257 Sarrine, R.J.: Automatic electrophoresis apparatus and method. *Can. Pat. Appl. CA 2,058,346* (Cl. B01D57/02), 17 Jul. 1992, US Appl. 642,119, 16 Jan. 1991; 75 p.; C.A., 118 (1993) 93613v.
- 1258 Sasaki, T.: (Jasco CE-800 capillary electrophoresis system). *Jasco Rep.*, 3 (1991) 12-14; C.A., 118 (1993) 115680u - a review with 3 refs.
- 1259 Seiler, K., Harrison, D.J. and Manz, A.: Planar glass chips for capillary electrophoresis: repetitive sample injection, quantitation and separation efficiency. *Anal. Chem.*, 65 (1993) 1481-1488.
- 1260 Tarnopolsky, Y., Roman, M. and Brown, P.R.: A new approach to scaling up electrophoresis. *Sep. Sci., Technol.*, 28 (1993) 719-731; C.A., 118 (1993) 82807k.
- 1261 Toyama, J., Akatsuka, T., Tadakuma, A., Oshiro, T. and Mori, T.: Electrophoretic display device. *Jpn. Kokai Tokkyo Koho JP 04,166,917 [92,166,917]* (Cl. G02F1/167), 12 Jun. 1992, Appl. 90/294,190, 30 Oct. 1990; 7 p.; C.A., 118 (1993) 70258u.

- 1262 Zare, R.N. and Tsuda, T.: Capillary electrophoresis injection device and method. U.S. US 5,141,621 (Cl. 204-299R; G01N27/26), 25 Aug. 1992, Appl. 470,883, 26 Jan. 1990; 6 p.; C.A., 118 (1993) 105402r.

See also 1269, 1288, 1910.

### 3b. Detectors and detection procedures

- 1263 Afeyan, N.B. and Regnier, F.E.: On-line product identification in a chromatography effluent by subtraction. *PCT Int. Appl. WO 92 17,259* (Cl. B01D15/08), 15 Oct. 1992, US Appl. 676,872, 28 Mar. 1991; 34 pp.; C.A., 118 (1993) 55590c.
- 1264 Barnes, C.S., Upadrashta, B., Pacheco, F. and Portnoy, J.: Enhanced sensitivity of immunoblotting with peroxidase-conjugated antibodies using an adsorbed substrate method. *J. Chromatogr.*, 613 (1993) 281-288.
- 1265 Kirkeby, S., Moe, D. and Bøg-Hansen, T.C.: The silver staining procedure of sodium dodecyl sulfate-gels may be accelerated by shortening fixation time. *Electrophoresis (Weinheim)*, 14 (1993) 51-55.
- 1266 Kono, N. and Suuoki, J.: Method and reagents for silver staining in gel electrophoresis. *Jpn. Kokai Tokkyo Koho JP 04,366,765 [92,366,765]* (Cl. G01N33/68), 18 Dec. 1992, Appl. 91/167,770, 12 Jun. 1991; 4 pp.; C.A., 118 (1993) 142994f.
- 1267 Kostichka, A.J. and Smith, L.M.: Detection apparatus for electrophoretic gels for determining attachment of fluorophores to band of molecules. U.S. US 5,162,654 (Cl. 250-458.1; G01N21/64), 10 Nov. 1992, Appl. 650,393, 01 Feb. 1991; 8 p.; C.A., 118 (1993) 116000j.
- 1268 Nann, A. and Simon, W.: On-column detection in capillary zone electrophoresis with ion-selective microelectrodes in conical capillary apertures. *J. Chromatogr.*, 633 (1993) 207-211.
- 1269 Williams, S.J., Bergström, E.T., Goodall, D.M., Kawazumi, H. and Evans, K.P.: Diode laser-based indirect absorbance detector for capillary electrophoresis. *J. Chromatogr.*, 636 (1993) 39-45.
- 1270 Wu, N. and Huie, C.W.: Peroxyxalate chemiluminescence detection in capillary electrophoresis. *J. Chromatogr.*, 634 (1993) 309-315.

See also 1289, 1290, 1291, 1292, 1304, 1334, 1336, 1339, 1359, 1418, 1429, 1452, 1683, 1833.

### 3c. Stabilization media for electrophoresis

- 1271 Chen, N., Zhang, Y. and Lu, P.: Standardization of different octadecyl bonded phases based on the retention equation in reversed-phase high-performance liquid chromatography. *J. Liq. Chromatogr.*, 15 (1992) 3141-3155.
- 1272 Kanbara, H.: Gel plate for electrophoresis to improve throughput effect. *Jpn. Kokai Tokkyo Koho JP 04,364,459 [92,364,459]* (Cl. G01N27/447), 16 Dec. 1992, Appl. 91/139,984, 12 Jun. 1991; 5 pp.; C.A., 118 (1993) 120464f.
- 1273 Kozulic, B.: Gels for submerged gel electrophoresis. *PCT Int. Appl. WO 92 15,868* (Cl. G01N27/26), 17 Sep. 1992, GB Appl. 91/4,411, 01 Mar. 1991; 39 p.; C.A., 118 (1993) 76607d.
- 1274 Lyubimova, T. and Righetti, P.G.: On the kinetics of photopolymerization: a theoretical study. *Electrophoresis (Weinheim)*, 14 (1993) 191-201.

- 1275 Lyubimova, T., Caglio, S., Gelfi, C., Righetti, P.G. and Rabilloud, T.: Photopolymerization of polyacrylamide gels with methylene blue. *Electrophoresis (Weinheim)*, 14 (1993) 40-50.
- 1276 Mori, Y. and Yoshioka, H.: Electrophoretic gel for separation and recovery of substances and its use. *Eur. Pat. Appl. EP 501,301* (Cl. C08L33/26), 02 Sep. 1992, JP Appl. 91/32,643, 27 Feb. 1991; 7 pp.; C.A., 118 (1993) 120461c.
- 1277 Mori, Y., Mikami, M. and Yoshioka, H.: Polymer-membrane electrophoretic matrixes and electrophoretic method using them. U.S. US 5,164,057 (Cl. 204-299R; G01N27/26), 17 Nov. 1992, Appl. 762,272, 19 Sep. 1991; 5 p.; C.A., 118 (1993) 93606v.
- 1278 Soane, D.S.: Mosaic microcolumns, slabs, and separation media for electrophoresis and chromatography. *PCT Int. Appl. WO 92 06,773* (Cl. B01D57/02), 30 Apr. 1992, US Appl. 597,528, 15 Oct. 1990; 28 p.; C.A., 118 (1993) 105400p.
- 1279 Sugawara, S., Ogino, H. and Yamada, R.: Cellulose acetate medium for electrophoresis of serum proteins. *Jpn. Kokai Tokkyo Koho JP 04,269,652 [92,269,652]* (Cl. G01N27/447), 25 Sep. 1992, Appl. 91/31/011, 26 Feb. 1991; 4 pp.; C.A., 118 (1993) 35450d.
- 1280 Takeda, H., Koshiji, Y., Kubota, H. and Iizuka, T.: Polyacrylamide gel medium with amphoteric electrolytes for electrophoresis of proteins, nucleic acids and other biomolecules. *Jpn. Kokai Tokkyo Koho JP 04,184,163 [92,184,163]* (Cl. G01N27/447), 01 Jul. 1992, Appl. 90/311,406, 19 Nov. 1990; 8 pp.; C.A., 118 (1993) 3414d.

See also 1293, 1311, 1433.

### 3d. Quantitative analysis

- 1281 Wätzig, H. and Dette, C.: Precise quantitative capillary electrophoresis. Methodological and instrumental aspects. *J. Chromatogr.*, 636 (1993) 31-38.

See also 1300, 1309.

### 3e. Preparative scale electrophoresis

See 1552, 1555, 1621, 1908.

### 3f. Programmed voltage and buffer gradients

- 1282 Chang, H.-T. and Yeung, E.S.: Voltage programming in capillary zone electrophoresis. *J. Chromatogr.*, 632 (1993) 149-155.

## 4. SPECIAL TECHNIQUES

### 4a. Automation

See 1253, 1298.

### 4b. Computerization and modelling

- 1283 Hirokawa, T. and Kiso, Y.: Computer simulation of isotachophoresis. Application to the determination of physicochemical constants and separation optimization. *Anal. Sci.*, 8 (1992) 737-748; C.A., 118 (1993) 72785n.

- 1284 Slater, G.W. and Villeneuve, C.: A computer simulation of trapping electrophoresis. *J. Polym. Sci., Part B: Polym. Phys.*, 30 (1992) 1451-1457; *C.A.*, 118 (1993) 35328v.

See also 1786, 1847.

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

- 1285 Niessen, W.M.A., Tjaden, U.R. and van der Greef, J.: Capillary electrophoresis-mass spectrometry. *J. Chromatogr.*, 636 (1993) 3-19 - a review with 79 refs.

See also 1306, 1898.

*4d. Affinity electrophoresis*

- 1286 Chu, Y.-H., Chen, J.K. and Whitesides, G.M.: Affinity electrophoresis in multisectional polyacrylamide slab gels is a useful and convenient technique for measuring binding constants of aryl sulfonamides to bovine carbonic anhydrase B. *Anal. Chem.*, 65 (1993) 1314-1322.

See also 1523, 1733.

*4e. Capillary zone electrophoresis and electrokinetic chromatography*

- 1287 Albin, M., Grossman, P.D. and Moring, S.E.: Sensitivity enhancement for capillary electrophoresis. *Anal. Chem.*, 65 (1993) 489A-497A. - a review with 42 refs.

- 1288 Armstrong, D.W., Tang, Y., Ward, T. and Nichols, M.: Derivatized cyclodextrins immobilized on fused-silica capillaries for enantiomeric separations via capillary electrophoresis, gas chromatography, or supercritical fluid chromatography. *Anal. Chem.*, 65 (1993) 1114-1117.

- 1289 Avdalovic, N., Pohl, C.A., Rocklin, R.D. and Stillian, J.R.: Determination of cations and anions by capillary electrophoresis combined with suppressed conductivity detection. *Anal. Chem.*, 65 (1993) 1470-1475.

- 1290 Chen, F.T.A.: Identification of sample constituents utilizing capillary electrophoresis. *U.S. US 5,139,630* (Cl. 204-280.1; BO1D57/02), 18 Aug. 1992, Appl. 708,424, 31 May 1991; 15 pp.; *C.A.*, 118 (1993) 142990b.

- 1291 Chen, F.T.A.: Ionic species and method for quantitation of samples using capillary electrophoresis. *Eur. Pat. Appl. EP 517,370* (Cl. G01N27/26), 09 Dec. 1992, US Appl. 708,144, 31 May 1991; 15 pp.; *C.A.*, 118 (1993) 142992d.

- 1292 Dasgupta, P.K. and Bao, L.: Suppressed conductometric capillary electrophoresis separation systems. *Anal. Chem.*, 65 (1993) 1003-1011.

- 1293 Dill, R. and Burd, S.: Capillary cartridge with exposed retractable capillary ends for high-performance electrophoresis. *U.S. US 5,164,064* (Cl. 204-299R; G01N27/26), 17 Nov. 1992, Appl. 686,644, 17 Apr. 1991; 8 p.; *C.A.*, 118 (1993) 138987p.

- 1294 Dubrow, R.S.: Capillary gel electrophoresis. In: Grossman, P.D. and Colburn, J.C. (Editors), *Capillary Electrophor.*, Academic, San Diego, 1992, pp. 133-157; *C.A.*, 118 (1993) 3161u - a review with many refs.

- 1295 Evans, K.P. and Beaumont, G.L.: Role of capillary electrophoresis in specialty chemical research. *J. Chromatogr.*, 636 (1993) 153-169.
- 1296 Grossman, P.D.: Free-solution capillary electrophoresis. In: Grossman, P.D. and Colburn, J.C. (Editors), *Capillary Electrophor.*, Academic, San Diego, 1992, pp. 111-132; *C.A.*, 118 (1993) 3264e.
- 1297 Hirokawa, T., Ohmori, A. and Kiso, Y.: Analysis of a dilute sample by capillary zone electrophoresis with isotachophoretic preconcentration. *J. Chromatogr.*, 634 (1993) 101-106.
- 1298 Houben, R.J.H., Gielen, H. and van der Wal, S.: Automated preseparation derivatization on a capillary electrophoresis instrument. *J. Chromatogr.*, 634 (1993) 317-322.
- 1299 Liu, J.: Fundamental aspects and biochemical applications of capillary electromigration methods. Avail. *Univ. Microfilm Int.*, Order No. DA9212323, 1991, 362 pp.; *C.A.*, 118 (1993) 120313f.
- 1300 Moring, S.E.: Quantitative aspects of capillary electrophoresis analysis. In: Grossman, P.D. and Colburn, J.C. (Editors), *Capillary Electrophor.*, Academic, San Diego, 1992, pp. 87-108; *C.A.*, 118 (1993) 35334u.
- 1301 Nielsen, M.W.F.: Chiral separation of basic drugs using cyclo-dextrin-modified capillary zone electrophoresis. *Anal. Chem.*, 65 (1993) 885-893.
- 1302 Sadeghkhanikord, A.: Solvent strength and selectivity in micellar liquid chromatography. Avail. *Univ. Microfilms Int.*, Order No. DA9203174, 1991, 189 p.; *C.A.*, 118 (1993) 132943z.
- 1303 Shihabi, Z.K.: Clinical applications of capillary electrophoresis: *Ann. Clin. Lab. Sci.*, 22 (1992) 398-405; *C.A.*, 118 (1993) 398-405 - a review with 30 refs.
- 1304 Taylor, J.A. and Yeung, E.A.: Multiplexed fluorescence detector for capillary electrophoresis using axial optical fiber illumination. *Anal. Chem.*, 65 (1993) 956-960.
- 1305 Terabe, S.: Selectivity manipulation in micellar electrokinetic chromatography. *J. Pharm. Biomed. Anal.*, 10 (1992) 705-715.
- 1306 Thompson, T.J., Foret, F., Vouros, P. and Karger, B.L.: Capillary electrophoresis/electrospray ionization mass spectrometry: improvement of protein detection limits using on-column transient isotachophoretic sample preconcentration. *Anal. Chem.*, 65 (1993) 900-906.
- 1307 Tsai, P., Patel, B. and Lee, C.S.: Direct control of electroosmosis and retention window in micellar electrokinetic capillary chromatography. *Anal. Chem.*, 65 (1993) 1439-1442.
- 1308 Tsuda, T., Ikeda, M., Jones, G., Dadoo, R. and Zare, R.N.: Observation of flow profiles in electroosmosis in a rectangular capillary. *J. Chromatogr.*, 632 (1993) 201-207.
- 1309 Wätzig, H. and Dette, C.: Precise quantitative results by capillary electrophoresis (CE): Instrumental aspects. *Fresenius J. Anal. Chem.*, 345 (1993) 403-410.
- 1310 Wehr, T.: Recent advances in capillary electrophoresis columns. *LC-GC*, 11 (1993) 14-20; *C.A.*, 118 (1993) 120093j - a review with 28 refs.
- 1311 Yao, X.-W. and Regnier, F.E.: Polymer- and surfactant-coated capillaries for isoelectric focusing. *J. Chromatogr.*, 632 (1993) 185-193.
- 1312 Yao, X.-W., Wu, D. and Regnier, F.E.: Manipulation of electroosmotic flow in capillary electrophoresis. *J. Chromatogr.*, 632 (1993) 21-29.

See also 1252, 1253, 1254, 1258, 1259, 1262, 1268, 1269, 1270, 1281, 1282, 1285, 1315, 1316, 1317, 1318, 1319, 1320, 1326, 1328, 1329, 1330, 1331, 1334, 1339, 1340, 1356, 1360, 1362, 1363, 1390, 1391, 1393, 1394, 1396, 1397, 1398, 1400, 1401, 1404, 1405, 1407, 1408, 1409, 1413, 1417, 1422, 1424, 1427, 1430, 1431, 1432, 1433, 1437, 1470, 1508, 1514, 1549, 1561, 1716, 1726, 1734, 1736, 1738, 1744, 1805, 1880, 1884, 1888, 1892, 1893, 1895, 1897, 1898, 1900, 1901, 1902, 1903, 1906, 1907, 1908, 1911, 1912, 1913, 1914, 1915, 1916, 1919, 1920, 1922, 1924, 1925, 1926, 1927, 1929, 1930, 1931, 1936, 1941, 1943, 1944.

#### 4f. Isotachophoresis

- 1313 Deshmukh, R.R. and Bier, M.: Counterflow in isotachophoresis: computer simulation and experimental studies. *Electrophoresis (Weinheim)*, 14 (1993) 205-213.  
 1314 Hirokawa, T., Watanabe, K., Yokota, Y. and Kiso, Y.: Bidirectional isotachophoresis. I. Verification of bidirectional isotachophoresis and simultaneous determination of anionic and cationic components. *J. Chromatogr.*, 633 (1993) 251-259.

See also 1283, 1306, 1524, 1942.

#### 4g. Enantiomers, separation

- 1315 Busch, S., Kraak, J.C. and Poppe, H.: Chiral separations by complexation with proteins in capillary zone electrophoresis. *J. Chromatogr.*, 635 (1993) 119-126.  
 1316 Ishihama, Y. and Terabe, S.: Enantiomeric separation by micellar electrokinetic chromatography using saponins. *J. Liq. Chromatogr.*, 16 (1993) 933-944.  
 1317 Otsuka, K. and Terabe, S.: Enantiomeric separation by micellar electrokinetic chromatography. *TrAC*, 12 (1993) 125-130 - a review with 34 refs.  
 1318 Terabe, S., Miyashita, Y., Ishihama, Y. and Shibata, O.: Cyclodextrin-modified micellar electrokinetic chromatography: separation of hydrophobic and enantiomeric compounds. *J. Chromatogr.*, 636 (1993) 47-55.  
 1319 Wren, S.A.C.: Theory of chiral separation in capillary electrophoresis. *J. Chromatogr.*, 636 (1993) 57-62.  
 1320 Wren, S.A.C. and Rowe, R.C.: Theoretical aspects of chiral separation in capillary electrophoresis. III. Application to  $\beta$ -blockers. *J. Chromatogr.*, 635 (1993) 113-118.

See also 1288, 1301, 1394, 1915, 1917, 1921, 1922, 1930.

#### 4h. Two dimensional electrophoresis

- 1321 Barent, R.L. and Elthon, T.E.: Two-dimensional gels: an easy method for large quantities of proteins. *Plant Mol. Biol. Rep.*, 10 (1992) 338-344; C.A., 118 (1993) 120261n.  
 1322 Goerg, A.: Two-dimensional electrophoresis with immobilized pH gradients: Current state. *Biochem. Soc. Trans.*, 21 (1993) 130-132; C.A., 118 (1993) 142688j - a review with 21 refs.

See also 1341, 1353, 1423, 1424, 1435, 1447, 1449, 1452, 1453, 1467, 1487, 1518, 1528, 1529, 1547, 1567, 1618, 1623, 1719, 1787, 1788, 1790, 1803, 1829, 1838.

#### 4i. Other special techniques

- 1323 Chmelik, J. and Thormann, W.: Isoelectric focusing field-flow fractionation and capillary isoelectric focusing with electroosmotic zone displacement. Two approaches to protein analysis in flowing streams. *J. Chromatogr.*, 632 (1993) 229-234.  
 1324 Harrison, D.J., Glavina, P.G. and Manz, A.: Towards miniaturized electrophoresis and chemical analysis systems on silicon: an alternative to chemical sensors. *Sens. Actuators, B*, B10 (1993) 107-116; C.A., 118 (1993) 115735r.  
 1325 Heinrich, J. and Wagner, H.: Influence of the electrode compartment separating membranes on continuous flow electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 99-107.  
 1326 Jorgenson, J.W. and Bushey, M.M.: Two-dimensional high-performance liquid chromatography/capillary electrophoresis. *U.S. US 5,31,998* (Cl. 204-299R: BO1D61/42), 21 Jul. 1992, Appl. 612,662, 13 Nov. 1990; 16 pp.; C.A., 118 (1993) 3381r.

See also 1632.

### 5. HYDROCARBONS AND HALOGEN DERIVATIVES

#### 5a. Aliphatic hydrocarbons

- 1327 Agaev, S.G. and Deryugina, O.P.: (Electrophoresis of petroleum paraffin wax in oils). *Izv. Vyssh. Uchebn. Zaved., Neft. Gaz.*, (1991) 37-42; C.A., 118 (1993) 106063t.

### 7. PHENOLS

- 1328 Masselter, S.M., Zemann, A.J. and Bobleter, O.: Separation of cresols using coelectroosmotic capillary electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 36-39.

### 8. SUBSTANCES CONTAINING HETEROCYCLIC OXYGEN

#### 8a. Flavonoids

- 1329 McGhie, T.K.: Analysis of sugarcane flavonoids by capillary zone electrophoresis. *J. Chromatogr.*, 634 (1993) 107-112.  
 1330 Pietta, P., Mauri, P., Maffei Facino, R. and Carini, M.: Analysis of flavonoids by MECC with ultraviolet diode array detection. *J. Pharm. Biomed. Anal.*, 10 (1992) 1041-1045.

#### 8b. Allatoxins and other mycotoxins

- 1331 Holland, R.D. and Sepaniak, M.J.: Qualitative analysis of mycotoxins using micellar electrokinetic capillary chromatography. *Anal. Chem.*, 65 (1993) 1140-1146.

## 10. CARBOHYDRATES

## 10a. Mono and oligosaccharides. Structural studies

- 1332 Jackson, P.: Analysis of carbohydrates and kits therefore. *PCT Int. Appl.* WO 93,02,356 (Cl. GO1N33/00), 04 Feb. 1993, Appl. 91/Us4555, 22 Jul. 1991; 16 pp.; C.A., 118 (1993) 142985d.
- 1333 Klock, J.C., Jr.: Fluorophore-assisted carbohydrate electrophoresis diagnosis. *PCT Int. Appl.* WO 92 19,975 (Cl. GO1N33/66), 12 Nov. 1992, US Appl. 696,584, 07 May 1991; 30 pp.; C.A., 118 (1993) 55620n.
- 1334 O'Shea, T.J., Lunte, S.M. and LaCourse, W.R.: Detection of carbohydrates by capillary electrophoresis with pulsed amperometric detection. *Anal. Chem.*, 65 (1993) 948-951.

See also 1344, 1345, 1361.

## 10b. Polysaccharides, mucopolysaccharides, lipopolysaccharides

- 1335 Bjornsson, S.: Size-dependent separation of proteoglycans by electrophoresis in gels of pure agarose. *Anal. Biochem.*, 210 (1993) 292-298.
- 1336 Moller, H.J., Heinegard, D. and Poulsen, J.H.: Combined Alcian Blue and silver staining of subnanogram quantities of proteoglycans and glycosaminoglycans in sodium dodecyl sulfate-polyacrylamide gels. *Anal. Biochem.*, 209 (1993) 169-175.
- 1337 Oreste, P., Peruzzi, M. and Stella, P.: Micromethod for the determination of heparin in plasma after intravenous and subcutaneous administration. *Anal. Biochem.*, 210 (1993) 136-139.
- 1338 Pogany, G. and Vogel, K.G.: The interaction of decorin core protein fragments with type I collagen. *Biochem. Biophys. Res. Commun.*, 189 (1992) 165-172.
- 1339 Richmond, M.D. and Yeung, E.S.: Development of laser-excited indirect fluorescence detection for high-molecular-weight polysaccharides in capillary electrophoresis. *Anal. Biochem.*, 210 (1993) 245-248.
- 1340 Tindall, G.W. and Perry, R.L.: Determination of ester substituents in cellulose esters. *J. Chromatogr.*, 633 (1993) 227-233.
- 1341 Wang, Y., Fu, A., Mi, Z., Ma, H. and Dong, G.: (Two-dimensional electrophoresis for measurement of acidic glycosaminoglycans and its clinical application). *Zhongguo Yike Daxue Xuebao, 20*(Zengkan) (1991) 46-48; C.A., 118 (1993) 3261b.

See also 1355, 1933.

## 10c. Glycoproteins and their constituents

- 1342 Antonyuk, V.A.: (A lectin from *Polygonatum multiflorum* (L.) All. Purification, properties and preparation of peroxidase-labeled derivatives and lectin-gold complexes). *Biokhimiya (Moscow)*, 57 (1992) 1847-1854.
- 1343 Dickson, I.R. and Roughley, P.J.: The effects of vitamin D deficiency on proteoglycan and hyaluronate constituents of chick bone. *Biochim. Biophys. Acta*, 1181 (1993) 15-22.
- 1344 Frot-Coutaz, J., Degiuli, A., Martel, M.-B. and Létoublon, R.: *In vitro* transfer of N,N'-diacetylchitobiose to glycoproteins in rat liver nuclei. *Biochem. Cell Biol.*, 70 (1992) 677-683.

- 1345 Inoue, N., Takeuchi, M., Asano, K., Shimizu, R., Takasaki, S. and Kobata, A.: Structures of mucin-type sugar chains on human erythropoietins purified from urine and the culture medium of recombinant Chinese hamster ovary cells. *Arch. Biochem. Biophys.*, 301 (1993) 375-378.
- 1346 Kita, K., Omata, S. and Horigome, T.: Purification and characterization of a nuclear pore glycoprotein complex containing p62. *J. Biochem. (Tokyo)*, 113 (1993) 377-382.
- 1347 Martin, H. and Dean, M.: An N-terminal peptide from link protein is rapidly degraded by chondrocytes, monocytes and B cells. *Eur. J. Biochem.*, 212 (1993) 87-94.
- 1348 Matthews, I., Mata, A.M., Lee, A.G. and East, J.M.: Evidence for the luminal location of the 53 kDa glycoprotein of sarcoplasmic reticulum. *Biochim. Biophys. Acta*, 1146 (1993) 265-274.
- 1349 Miller, C.C., Fayer-Hosken, R.A., Timmons, T.M., Lee, V.H., Caudle, A.B. and Dunbar, B.S.: Characterization of equine zona pellucida glycoproteins by polyacrylamide gel electrophoresis and immunological techniques. *J. Reprod. Fertil.*, 96 (1992) 815-825; C.A., 118 (1993) 97498.
- 1350 Ngoc, L.D., Brillard, M. and Hoebeke, J.: The  $\alpha$ - and  $\beta$ -subunits of the jacelins are cleavage products from a 17-kDa precursor. *Biochim. Biophys. Acta*, 1156 (1993) 219-222.
- 1351 Parker, N., Finnie, I.A., Raouf, A.H., Ryder, S.D., Campbell, B.J., Tsai, H.H., Iddon, D., Milton, J.D. and Rhodes, J.M.: High performance gel filtration using monodisperse highly cross-linked agarose as a one-step system for mucin purification. *Biomed. Chromatogr.*, 7 (1993) 68-74.
- 1352 Preobrazhensky, A.A.: Electrophoresis of neurochordins, a family of high molecular weight neural tissue glycoproteins, on horizontal submerged agarose gels in the presence of dodecyl sulphate. *Anal. Biochem.*, 209 (1993) 315-317.
- 1353 Rago, R.P., Ramirez-Soto, D. and Poretz, R.D.: Two-dimensional polyacrylamide electrophoresis of fluoresceinated glycopeptides. Resolution and structural characterization of ovalbumin glycans. *Carbohydr. Res.*, 236 (1992) 1-8; C.A., 118 (1993) 97401x.
- 1354 Rocha, J., Amorim, A., Luckenbach, C., Kömpf, J. and Ritter, H.: Subtyping of alkylated human orosomucoid: evidence for a duplicated gene, ORM1\*F2S. *Electrophoresis (Weinheim)*, 14 (1993) 235-237.
- 1355 Savolainen, H.: A sensitive method for the analysis of urinary proteoglycans. *Biochem. Int.*, 28 (1992) 475-479; C.A., 118 (1993) 55440d.
- 1356 Stefansson, M. and Westerlund, D.: Capillary electrophoresis of glycoconjugates in alkaline media. *J. Chromatogr.*, 632 (1993) 195-200.
- 1357 Stroemqvist, M. and Gruffman, H.: Periodic acid/Schiff staining of glycoproteins immobilized on a blotting matrix. *BioTechniques*, 13 (1992) 744-749; C.A., 118 (1993) 35275a.
- 1358 Tiffache, C., Chesnel, A., Jegou, P. and le Pennec, J.-P.: Isolation and characterization of a cDNA clone encoding a *Pleurodeles* lectin. *Eur. J. Biochem.*, 213 (1993) 901-907.
- 1359 Valenzano, K.J., Kallay, L.M. and Lobel, P.: An assay to detect glycoproteins that contain mannose 6-phosphate. *Anal. Biochem.*, 209 (1993) 156-162.
- 1360 Watson, E. and Yao, F.: Capillary electrophoretic separation of human recombinant erythropoietin (r-HuEPO) glycoforms. *Anal. Biochem.*, 210 (1993) 389-393.

- 1361 Weitzhandler, M., Kadlecik, D., Avdalovic, N., Forte, J.G., Chow, D. and Townsend, R.R.: Monosaccharide and oligosaccharide analysis of proteins transferred to polyvinylidene fluoride membranes after sodium dodecyl sulfate-polyacrylamide gel electrophoresis. *J. Biol. Chem.*, 268 (1993) 5121-5130.

See also 1511, 1601, 1932.

## 11. ORGANIC ACIDS AND LIPIDS

### 11a. Organic acids and simple esters

- 1362 Dette, C., Wätzig, H. and Uhl, H.: Characterization of the important pharmaceutical intermediate pyridine-2,4-dicarboxylic acid using capillary electrophoresis (CE). *Pharmazie*, 48 (1993) 276-280.
- 1363 Smith, S.C. and Khaledi, M.G.: Prediction of the migration behavior of organic acids in micellar electrokinetic chromatography. *J. Chromatogr.*, 632 (1993) 177-184.

See also 1289, 1393.

### 11c. Lipids and their constituents

- 1364 Park, Y.S. and Huang, L.: Effect of chemically modified GM<sub>1</sub> and neoglycolipid analogs of GM<sub>1</sub> on liposome circulation time: evidence supporting the dysopsonin hypothesis. *Biochim. Biophys. Acta*, 1166 (1993) 105-114.

### 11d. Lipoproteins and their constituents

- 1365 Blanco-Vaca, F., Via, D.P., Yang, C.-y., Massey, J.B. and Powell, H.J.: Characterization of disulfide-linked heterodimers containing apolipoprotein-D in human plasma lipoproteins. *J. Lipid Res.*, 33 (1992) 1785-1796.
- 1366 Brasaemle, D.L., Cornely-Moss, K. and Bensadoun, A.: Hepatic lipase treatment of chylomicron remnants increases exposure of apolipoprotein E. *J. Lipid Res.*, 34 (1993) 455-465.
- 1367 DeJager, S., Bruckert, E. and Chapman, M.J.: Dense low density lipoprotein subspecies with diminished oxidative resistance predominate in combined hyperlipidemia. *J. Lipid Res.*, 34 (1993) 295-308.
- 1368 Fazio, S., Horie, Y., Weisgraber, K.H., Havekes, L.M. and Rall, S.C., Jr.: Preferential association of apolipoprotein E Leiden with very low density lipoproteins of human plasma. *J. Lipid Res.*, 34 (1993) 447-453.
- 1369 Forte, T.M., Goth-Goldstein, R., Nordhausen, R.W. and McCall, M.R.: Apolipoprotein A-I-cell membrane interaction: extracellular assembly of heterogenous nascent HDL particles. *J. Lipid Res.*, 34 (1993) 317-324.
- 1370 Gómez-Coronado, D., Sáez, G.T., Lasunción, M.A. and Herrera, E.: Different hydrolytic efficiencies of adipose tissue lipoprotein lipase on very-low-density lipoprotein subfractions separated by heparin-Sepharose chromatography. *Biochim. Biophys. Acta*, 1167 (1993) 70-78.
- 1371 Greenspan, P. and Gutman, R.L.: Detection by Nile Red of agarose gel electrophoresed native and modified low density lipoprotein. *Electrophoresis (Weinheim)*, 14 (1993) 65-68.

- 1372 Hajri, T., Férézou, J., Steinmetz, P. and Lutton, C.: Total parenteral nutrition and plasma lipoproteins in the rat: evidence for accelerated clearance of apo-A-I-rich HDL. *Biochim. Biophys. Acta*, 1166 (1993) 84-91.
- 1373 Higuchi, K., Kitagawa, K., Kogishi, K. and Takeda, T.: Developmental and age-related changes in apolipoprotein B mRNA editing in mice. *J. Lipid Res.*, 33 (1992) 1753-1764.
- 1374 Inui, Y., Heusman, A.M.L., Nanthakumar, N., Henning, S.J. and Davidson, N.O.: Apolipoprotein-B messenger RNA editing in rat liver: developmental and hormonal modulation is divergent from apolipoprotein-A-IV gene expression despite increased hepatic lipogenesis. *J. Lipid Res.*, 33 (1992) 1843-1856.
- 1375 Kadokawa, H., Patton, G.M. and Robins, S.J.: Effect of phosphatidylcholine molecular species on the uptake of HDL triglycerides and cholestryl esters by the liver. *J. Lipid Res.*, 34 (1993) 180-189.
- 1376 Kinoshita, M., Arai, H., Fukasawa, M., Watanabe, T., Tsukamoto, K., Hashimoto, Y., Inoue, K., Kurokawa, K. and Teramoto, T.: Apolipoprotein E enhances lipid exchange between lipoproteins mediated by cholestryl ester transfer protein. *J. Lipid Res.*, 34 (1993) 261-268.
- 1377 Kunitake, S.T., Mendel, C.M. and Hennessy, L.K.: Interconversion between apolipoprotein-A-I-containing lipoproteins of pre-beta and alpha electrophoretic mobilities. *J. Lipid Res.*, 33 (1992) 1807-1816.
- 1378 Lilly-Stauderman, M., Brown, T.L., Balasubramanian, A. and Harmony, J.A.K.: Heparin releases newly synthesized cell surface-associated apolipoprotein E from HepG2 cells. *J. Lipid Res.*, 34 (1993) 190-200.
- 1379 Lin-Lee, Y.C., Strobl, W., Soyal, S., Radosavljevic, M., Song, M., Goto, A.M. and Patsch, W.: Role of thyroid hormone in the expression of apolipoprotein AIV and CIII genes in rat liver. *J. Lipid Res.*, 34 (1993) 249-259.
- 1380 O'Kane, M.J., Wisdom, G.B., McEneny, J., McFerran, N.V. and Trimble, E.R.: Pre-beta high-density lipoprotein determined by immunoblotting with chemiluminescent detection. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2273-2277.
- 1381 Oida, K., Takai, H., Maeda, H., Takahashi, S., Shimada, A., Suzuki, J., Tamai, T., Nakai, T. and Miyabo, S.: Apolipoprotein(a) is present in urine and its excretion is decreased in patients with renal failure. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2244-2248.
- 1382 Oku, H., Ishikawa, M., Nagata, J., Toda, T. and Chinen, I.: Lipoprotein and apoprotein profile of Japanese quail. *Biochim. Biophys. Acta*, 1167 (1993) 22-28.
- 1383 Rainwater, D.L., Andres, D.W., Ford, A.L., Lowe, W.F., Blanche, P.J. and Krauss, R.M.: Production of polyacrylamide gradient gels for the electrophoretic resolution of lipoproteins. *J. Lipid Res.*, 33 (1992) 1876-1881.
- 1384 Saku, K., Liu, R., Ohkubo, K., Bai, H., Hirata, K., Yamamoto, K., Morimoto, Y., Yamada, K. and Arakawa, K.: *In vivo* conversion of recombinant human proapolipoprotein AI (rh-Met-proapo AI) to apolipoprotein AI in rabbits. *Biochim. Biophys. Acta*, 1167 (1993) 257-263.
- 1385 Semprini, A., Maddalena-Peruzzi, A. and Giunta, S.: Immuno-fixation electrophoresis (IFE) of serum apolipoproteins: a new tool for probing lipoprotein disorders and the atherosclerosis risk. *Arch. Gerontol. Geriatr. Suppl.*, 3(Congr. IABG: Free Pap., 4th, 1991) (1992) 325-332; C.A., 118 (1993) 55489b.

- 1386 Thorn, J.A., Stocks, J., Reichl, D., Alcolado, J.C., Chamberlain, J.C. and Galton, D.: Variability of plasma apolipoprotein (apo) A-II levels associated with an apo A-II gene polymorphism in monozygotic twin pairs. *Biochim. Biophys. Acta*, 1180 (1993) 299-303.
- 1387 White, A.L., Rainwater, D.L. and Lanford, R.E.: Intracellular maturation of apolipoprotein[a] and assembly of lipoprotein[a] in primary baboon hepatocytes. *J. Lipid Res.*, 34 (1993) 509-517.
- 1388 Young, S.G., Pullinger, C.R., Zysow, B.R., Hofmann-Radvani, H., Linton, M.F., Farese, R.V., Jr., Terdiman, J.F., Snyder, S.M., Grundy, S.M., Vega, G.L. et al.: Four new mutations in the apolipoprotein B gene causing hypobetalipoproteinemia, including two different frameshift mutations that yield truncated apolipoprotein B proteins of identical length. *J. Lipid Res.*, 34 (1993) 501-507.
- See also 1241.
13. STEROIDS
- 13e. *Bile acids and alcohols*
- 1389 Chen, N., Zhang, Y. and Lu, P.: The selectivity between glycine and taurine conjugated bile acids in reversed-phase high-performance liquid chromatography. *J. Liq. Chromatogr.*, 15 (1992) 3157-3168.
14. STEROID GLYCOSIDES AND SAPONINS
- 1390 Gaus, H.-J., Treumann, A., Kreis, W. and Bayer, E.: Separation of cardiac glycosides by micellar electrokinetic capillary electrophoresis. *J. Chromatogr.*, 635 (1993) 319-327.
17. AMINES, AMIDES AND RELATED NITROGEN COMPOUNDS
- 17a. *Amines and polyamines*
- 1391 Zhang, R., Cooper, C.L. and Ma, Y.: Determination of total polyamines in tumor cells by high-performance capillary zone electrophoresis with indirect photometric detection. *Anal. Chem.*, 65 (1993) 704-706.
- See also 1289.
- 17b. *Catecholamines and their metabolites*
- 1392 Bedanr, I., Södersten, P. and Qureshi, G.A.: A simple HPLC method in monitoring catecholamines, tryptophan, and their metabolites in CSF of rats: a role of dopamine and noradrenaline in food intake. *J. Liq. Chromatogr.*, 15 (1992) 3087-3096.
- 1393 Issaq, H.J., Delviks, K., Janini, G.M. and Muschik, G.M.: Capillary zone electrophoretic separation of homovanillic and vanillyl-mandelic acids. *J. Liq. Chromatogr.*, 15 (1992) 3193-3201.
- See also 1301.
18. AMINO ACIDS AND PEPTIDES; CHEMICAL STRUCTURE OF PROTEINS
- 18a. *Amino acids and their derivatives*
- 1394 Kang, L. and Buck, R.H.: Separation and enantiomer determination of OPA-derivatized amino acids by using capillary zone electrophoresis. *Amino Acids*, 2 (1992) 103-109; C.A., 118 (1993) 60063n.
- 1395 Zheng, S.N., Hanai, T., Yonemoto, T. and Tadaki, T.: Separation of amino acids by recycling free-flow electrophoresis. *J. Chem. Eng. Jpn.*, 25 (1992) 686-691; C.A., 118 (1993) 115957q.
- See also 1270, 1307, 1316, 1392.
- 18b. *Peptides, peptidic and proteinous hormones, growth factors*
- 1396 Chu, Y.H., Avila, L.Z., Biébuyck, H.A. and Whitesides, G.M.: Using affinity capillary electrophoresis to identify the peptide in a peptide library that binds most tightly to vancomycin. *J. Org. Chem.*, 58 (1993) 648-652; C.A., 118 (1993) 51762n.
- 1397 Colburn, J.C.: Capillary electrophoresis separations of peptides: practical aspects and applications. In: Grossman, P.D. and Colburn, J.C. (Editors), *Capillary Electrophor.*, Academic, San Diego, 1992, pp. 237-271; C.A., 118 (1993) 3163w.
- 1398 Corran, P.H. and Sutcliffe, N.: Identification of gonadorelin (LHRH) derivatives: comparison of reversed-phase high-performance liquid chromatography and micellar electrokinetic chromatography. *J. Chromatogr.*, 636 (1993) 87-94.
- 1399 Deb, S., Hamlin, G.P., Roby, K.F., Kwik, S.C.M. and Soares, M.J.: Heterologous expression and characterization of prolactin-like protein-A. Identification of serum binding proteins. *J. Biol. Chem.*, 268 (1993) 3298-3305.
- 1400 Gaus, H.-J., Beck-Sickinger, A.G. and Bayer, E.: Optimization of capillary electrophoresis of mixtures of basic peptides and comparison with HPLC. *Anal. Chem.*, 65 (1993) 1399-1405.
- 1401 Idei, M., Mező, I., Vadász, Z., Horváth, A., Teplán, I. and Kéri, G.: Capillary electrophoretic analysis of somatostatin analog peptides. Effect of organic solvents as buffer modifiers. *J. Liq. Chromatogr.*, 15 (1992) 3181-3192.
- 1402 Pan, F.-M. and Chang, W.-C.: Purification of growth hormones by reversed-phase high-performance liquid chromatography. *J. Chromatogr.*, 613 (1993) 326-329.
- 1403 Redpath, N.T., Price, N.T., Severinov, K.V. and Proud, C.G.: Regulation of elongation factor-2 by multisite phosphorylation. *Eur. J. Biochem.*, 213 (1993) 689-699.
- 1404 Survey, M.A., Goodall, D.M., Wren, S.A.C. and Rowe, R.C.: Oligoglycines and oligoalanines as tests for modelling mobility of peptides in capillary electrophoresis. *J. Chromatogr.*, 636 (1993) 81-86.
- 1405 Sutcliffe, N. and Corran, P.H.: Comparison of selectivities of reversed-phase high-performance liquid chromatography, capillary zone electrophoresis and micellar capillary electrophoresis in the separation of neurohypophyseal peptides and analogues. *J. Chromatogr.*, 636 (1993) 95-103.
- 1406 Takahashi, K., Kishimoto, S., Ohori, K., Yoshizawa H., Okamoto, H., Miyakawa, Y. and Mayumi, S.-K.: SDS-PAGE after micro-affinity adsorption for analysis of heterogeneous antigen polypeptides in individual sera. *J. Immunol. Methods*, 157 (1993) 217-223; C.A., 118 (1993) 142866r.

- 1407 Toulas, C. and Hernandez, L.: A highly sensitive capillary electrophoresis laser induced fluorescence detection method to measure zeptomole amounts of bradykinin. *Analisis*, 20 (1992) 583-585; C.A., 118 (1993) 73762q.
- 1408 Weldon, M.A. and Packman, L.C.: Disulfide bridge formation in synthetic peptides. Rapid monitoring of the process by capillary electrophoresis. In: Epton, R. (Editor), *Innovation Perspect. Solid Phase Synth. Collect. Pap., Int. Symp., 2nd 1991*, Intercept, Andover, 1992, pp. 489-493; C.A., 118 (1993) 148055x.
- 1409 Zhang, Y.K., Chen, N. and Wang, L.: Free-solution capillary electrophoretic separation of small hydrophilic peptides. *Biomed. Chromatogr.*, 7 (1993) 75-77.

See also 1347, 1413, 1417, 1534, 1607, 1664, 1667, 1932.

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

- 1410 Bergmann, U. and Wittmann-Liebold, B.: Identification of cross-linked amino acids in the protein pair Hma23-Hma29 from the 50S ribosomal subunit of the archaeabacterium *Haloarcula marismortui*. *Biochemistry*, 32 (1993) 2880-2887.
- 1411 Edel, C.M., Hartog, A.F. and Berden, J.A.: Identification of an exchangeable non-catalytic site on mitochondrial F<sub>1</sub>-ATPase which is involved in the negative cooperativity of ATP hydrolysis. *Biochim. Biophys. Acta*, 1142 (1993) 327-335.
- 1412 Omkumar, R.V. and Ramasarma, T.: Irreversible inactivation of 3-hydroxy-3-methylglutaryl-CoA reductase by H<sub>2</sub>O<sub>2</sub>. *Biochim. Biophys. Acta*, 1156 (1993) 267-274.
- 1413 Ross, G.A., Lorkin, P. and Perrett, D.: Separation and tryptic digest mapping of normal and variant haemoglobins by capillary electrophoresis. *J. Chromatogr.*, 636 (1993) 69-79.
- 1414 Soundar, S. and Colman, R.F.: Identification of metal-isocitrate binding site of pig heart NADP-specific isocitrate dehydrogenase by affinity cleavage of the enzyme by Fe<sup>2+</sup>-isocitrate. *J. Biol. Chem.*, 268 (1993) 5264-5271.

See also 1350, 1470, 1490, 1657, 1679, 1717.

#### 19. PROTEINS

##### 19a. General techniques

- 1415 Abdi, K., Li, X. and Mentzer, S.J.: Semi-dry PhastTransfer detection of biotinylated cell surface molecules. *Electrophoresis (Weinheim)*, 14 (1993) 73-77.
- 1416 Atmeh, R.F. and Abuhafeil, N.M.: Electroblotting of proteins on agarose gel containing specific antibodies. *Electrophoresis (Weinheim)*, 14 (1993) 69-72.
- 1417 Cobb, K.A.: Methods for high-sensitivity separations of proteins and peptides using capillary electrophoresis and microcolumn liquid chromatography. Avail. *Univ. Microfilms Int.*, Order No. DA9212314, 1991, 218 pp.; C.A., 118 (1993) 120419v.
- 1418 Dordward, D.W.: Detection and quantitation of heme-containing proteins by chemiluminescence. *Anal. Biochem.*, 209 (1993) 219-223.
- 1419 Granzier, H.L.M. and Wang, K.: Gel electrophoresis of giant proteins: solubilization and silver-staining of titin and nebulin from single muscle fiber segments. *Electrophoresis (Weinheim)*, 14 (1993) 56-64.

- 1420 Guttman, A., Nolan, J.A. and Cooke, N.: Capillary sodium dodecyl sulfate gel electrophoresis of proteins. *J. Chromatogr.*, 632 (1993) 171-175.
- 1421 Hamase, K., Nakamura, H. and Nakajima, T.: Sodium dodecyl sulfate curdlan gel electrophoresis system for proteins. *Anal. Sci.*, 8 (1992) 699-700; C.A., 118 (1993) 3257e.
- 1422 Hilser, V.J., Worosila, G.D. and Freire, E.: Analysis of thermally induced protein folding/unfolding transitions using free solution capillary electrophoresis. *Anal. Biochem.*, 208 (1993) 125-131.
- 1423 Jungblut, P., Dzionara, M., Klose, J. and Wittmann-Liebold, B.: Identification of tissue proteins by amino acid analysis after purification by two-dimensional electrophoresis. *J. Protein Chem.*, 11 (1992) 603-612; C.A., 118 (1993) 120353u.
- 1424 Lemmo, A.V. and Jorgenson, J.W.: Two-dimensional protein separation by microcolumn size-exclusion chromatography-capillary zone electrophoresis. *J. Chromatogr.*, 633 (1993) 213-220.
- 1425 Michael, A. and Clark, W.M.: Two-phase electrohoresis of proteins. *Sep. Sci. Technol.*, 28 (1993) 1561-1577; C.A., 118 (1993) 120270q.
- 1426 Mozdzanowski, J. and Speicher, D.W.: Microsequence analysis of electroblotted proteins. I. Comparison of electroblotting recoveries using different types of PVDF membranes. *Anal. Biochem.*, 207 (1992) 11-18.
- 1427 Nashabeh, W. and El Rassi, Z.: Fundamental and practical aspects of coupled capillaries for the control of electroosmotic flow in capillary zone electrophoresis of proteins. *J. Chromatogr.*, 632 (1993) 157-164.
- 1428 Reim, D.F. and Speicher, D.W.: Microsequence analysis of electroblotted proteins. II. Comparison of sequence performance on different types of PVDF membranes. *Anal. Biochem.*, 207 (1992) 19-23.
- 1429 Shultz, J.W. and Leland, D.L.: Hydrophobic dyes and their use as stains in detection of proteins. *PCT Int. Appl. WO 92 08,689* (Cl. C07C229/00), 29 May 1992, US Appl. 615,078, 19 Nov. 1990; 101 p.; C.A., 118 (1993) 82837v.
- 1430 Strege, M.A. and Lagu, A.L.: Micellar electrokinetic capillary chromatography of proteins. *Anal. Biochem.*, 210 (1993) 402-410.
- 1431 Strege, M.A. and Lagu, A.L.: Studies of migration time reproducibility of capillary electrophoretic protein separations. *J. Liq. Chromatogr.*, 16 (1993) 51-68.
- 1432 Swedberg, S. and McManigill, D.: Apparatus and method for electrophoretic separation of proteins. *Eur. Pat. Appl. EP 519,203* (Cl. G01N27/447), 23 Dec. 1992, US Appl. 718,600, 21 Jun. 1991; 10 p.; C.A., 118 (1993) 97539y.
- 1433 Town, J.K.: Surface deactivation of fused silica capillaries for capillary electrophoresis of proteins. Avail. *Univ. Microfilms Int.*, Order No. DA9132512, 1991, 183 pp.; C.A., 118 (1993) 120147e.
- 1434 Tsuzuki, W., Kasumimoto, H. and Kobayashi, S.: Use of synthetic detergents to partition protein mixtures. *Analyst (London)*, 118 (1993) 131-135.
- 1435 Unwin, V.E. and Jackson, P.: Two-dimensional polyacrylamide gel electrophoresis of proteins labeled with the fluorophore monobromobimane prior to first-dimension isoelectric focusing: imaging of the fluorescent protein spot patterns using a cooled charge-coupled device. *Anal. Biochem.*, 209 (1993) 57-62.

- 1436 Vefring, H.K. and Ostrand, A.: Simple device for electroelution of proteins from a large number of pieces of polyacrylamide gel. *J. Chromatogr.*, 635 (1993) 329-333.
- 1437 Wiktorowicz, J.E.: Protein analyses by capillary electrophoresis. In: Grossman, P.D. and Colburn, J.C. (Editors), *Capillary Electrophoresis*, Academic, San Diego, 1992, pp. 273-300; C.A., 118 (1993) 3164x.
- See also 1264, 1265, 1280, 1306, 1312, 1321, 1323, 1447, 1623.
- 19b. *Proteins of cells, viruses and subcellular particles*
- 1438 Aledo, J.C., Gómez-Biedma, S., Segura, J.A., Molina, M., de Castro, I.N. and Márquez, J.: Native polyacrylamide gel electrophoresis of membrane proteins: glutaminase detection after *in situ* specific activity staining. *Electrophoresis (Weinheim)*, 14 (1993) 88-93.
- 1439 Bayan, N., Schrempp, S., Joliff, G., Leblon, G. and Shechter, E.: Role of the proton motive force and of the state of the lipids in the *in vivo* protein secretion in *Corynebacterium glutamicum*, a Gram-positive bacterium. *Biochim. Biophys. Acta*, 1146 (1993) 97-105.
- 1440 Boal, T.R., Chiorini, J.A., Cohen, R.B., Miyamoto, S., Frederickson, R.M., Sonenberg, N. and Safer, B.: Regulation of eukaryotic translation initiation factor expression during T-cell activation. *Biochim. Biophys. Acta*, 1176 (1993) 257-264.
- 1441 Caruana, M.L., Nicoli, M. and Chabrier, C.: (Utilization and adaptation of the sPAGE technique for the detection of citrus viroids in Corsica). *Fruits*, 47(Spec. Agrumes) (1992) 174-180; C.A., 118 (1993) 97400w.
- 1442 Cordero, O.J., Sarandeses, C.S., Lopez, J.L. and Nogueira, M.: On the anomalous behavior on gel-filtration and SDS-electrophoresis of prothymosin-alpha. *Biochim. Int.*, 28 (1992) 1117-1124; C.A., 118 (1993) 116917p.
- 1443 Del C. Alonso, A., Arce, C.A. and Barra, H.S.: Tyrosinatable and non-tyrosinatable tubulin subpopulations in rat muscle in comparison with those in brain. *Biochim. Biophys. Acta*, 1163 (1993) 26-30.
- 1444 Eleftheriou, C.S., Trakas, N., Kokla, A. and Tzartos, S.J.: A group of three fibroblast secreted polypeptides suppressed by cellular ageing and interferon-gamma. *Biochim. Biophys. Acta*, 1180 (1993) 304-312.
- 1445 Emmermann, M., Braun, H.-P. and Schmitz, U.K.: The two high molecular weight subunits of cytochrome c reductase from potato are immunologically related to the mitochondrial processing enhancing protein. *Biochim. Biophys. Acta*, 1142 (1993) 306-310.
- 1446 Hale, C.C., Kleiboeker, S.B. and Ochoa, V.B.: Characterization of cardiac Na<sup>+</sup>/Ca<sup>2+</sup>-exchange by site-directed polyclonal antibodies. *Biochim. Biophys. Acta*, 1160 (1992) 293-300.
- 1447 Hansen, K. and Mller, J.V.: Application of two-dimensional gel analysis to identification and characterization of tyrosine phosphorylated substrates for growth factor receptors. *Electrophoresis (Weinheim)*, 14 (1993) 112-126.
- 1448 Hensley, K., Postlewaite, J., Dobbs, P. and Butterfield, D.A.: Alteration of the erythrocyte membrane via enzymatic degradation of ankyrin (band 2.1): subcellular surgery characterized by EPR spectroscopy. *Biochim. Biophys. Acta*, 1145 (1993) 205-211.
- 1449 Higgins, P.J. and Smith, T.J.: Pleiotrophic action of interferon gamma in human orbital fibroblasts. *Biochim. Biophys. Acta*, 1181 (1993) 23-30.
- 1450 Kasahara, K., Ikuta, T., Chida, K., Asakura, R. and Kuroki, T.: Rapid phosphorylation of 28-kDa heat-shock protein by treatment with okadaic acid and phorbol ester of BALB/MK-2 mouse keratinocytes. *Eur. J. Biochem.*, 213 (1993) 1101-1107.
- 1451 Koga, R., Ishiura, S., Takemitsu, M., Kamakura, K., Matsuzaki, T., Arahata, K., Nonaka, I. and Sugita, H.: Immunoblot analysis of dystrophin-related protein (DRP). *Biochim. Biophys. Acta*, 1180 (1993) 257-261.
- 1452 Luo, L.-d. and Wirth, P.J.: Consecutive silver staining and autoradiography of <sup>35</sup>S and <sup>32</sup>P-labeled cellular proteins: application for the analysis of signal transducing pathways. *Electrophoresis (Weinheim)*, 14 (1993) 127-136.
- 1453 McLaren, J., Argo, E. and Cash, P.: Evolution of coxsackie B virus during *in vitro* persistent infection: detection of protein mutations using two-dimensional polyacrylamide gel electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 137-147.
- 1454 Mimura, H., Hashimoto, T., Yoshida, Y., Ichikawa, N. and Tagawa, K.: Binding of an intrinsic ATPase inhibitor to the interface between  $\alpha$ - and  $\beta$ -subunits of F<sub>1</sub>F<sub>0</sub>ATPase upon de-energization of mitochondria. *J. Biochem. (Tokyo)*, 113 (1993) 350-354.
- 1455 Moens, U., Subramani, N., Johansen, B. and Aarbakke, J.: The c-fos cAMP-response element: regulation of gene expression by a  $\beta$ -adrenergic agonist, serum and DNA methylation. *Biochim. Biophys. Acta*, 1173 (1993) 63-70.
- 1456 Muñoz-Centeno, M.C., Cejudo, F.J., Ruiz, M.T. and Panque, A.: The Azotobacter chroococcum nitrate permease is a multicomponent system. *Biochim. Biophys. Acta*, 1141 (1993) 75-80.
- 1457 Murakami, T., Matsushita, S., Maeda, Y., Takatsuki, K., Uchiyama, T. and Hattori, T.: Applications of biotinylated V3 loop peptides of human immunodeficiency virus type 1 to flow cytometric analyses and affinity chromatographic techniques. *Biochim. Biophys. Acta*, 1181 (1993) 155-162.
- 1458 Rasmussen, A.G., Fredlund, K.M. and Moller, I.M.: Purification of a rotenone-insensitive NAD(P)H dehydrogenase from the inner surface of the inner membrane of red beetroot mitochondria. *Biochim. Biophys. Acta*, 1141 (1993) 107-110.
- 1459 Raymond, F.D., Moss, D.W. and Fisher, D.: Phase partitioning detects differences between phospholipase-released forms of alkaline phosphatase - a GPI-linked protein. *Biochim. Biophys. Acta*, 1156 (1993) 117-122.
- 1460 Santos, C., Ortiz-Reyes, B., Naranda, T., Remacha, M. and Baldesta, J.P.G.: The acidic phosphoproteins from *Saccharomyces cerevisiae* ribosomes. NH<sub>2</sub>-terminal acetylation is a conserved difference between P1 and P2 proteins. *Biochemistry*, 32 (1993) 4231-4236.
- 1461 Schmidt, M., Pichl, L., Lepper, M. and Feierabend, J.: Identification of the nuclear-encoded chloroplast ribosomal protein L12 of the monocotyledonous plant *Secale cereale* and sequencing of two different cDNAs with strong codon bias. *Biochim. Biophys. Acta*, 1172 (1993) 349-352.
- 1462 Schwandner, W.R.E., Jiménez, B., Schwartz, A., Weijer, C.J., Behrens, M., Mazón, M.J. and Fernández-Renart, M.: Chemo-tactic stimulation of aggregation-stage *Dictyostelium* cells induces rapid changes in energy metabolism, as measured by succinic thiokinase phosphorylation. *Biochim. Biophys. Acta*, 1176 (1993) 175-182.

- 1463 Soltau, J.B., Zhou, L.X. and McLaughlin, B.J.: Isolation of plasma membrane domains from bovine corneal endothelial cells. *Exp. Eye Res.*, 56 (1993) 115-120; C.A., 118 (1993) 120406p.
- 1464 Takamiya, S., Kita, K., Wang, H., Weinstein, P.P., Hiraishi, A., Oya, H. and Aoki, T.: Developmental changes in the respiratory chain of *Ascaris* mitochondria. *Biochim. Biophys. Acta*, 1141 (1993) 65-74.
- 1465 Tilley, L., McPherson, R.A., Jones, G.L. and Sawyer, W.H.: Structural organisation of band 3 in Melanesian ovalocytes. *Biochim. Biophys. Acta*, 1181 (1993) 83-89.
- 1466 Weis, M., Cotgreave, I.C., Moore, G.A., Norbeck, K. and Moldeus, P.: Accessibility of hepatocyte protein thiols to monobromobimane. *Biochim. Biophys. Acta*, 1176 (1993) 13-19.
- 1467 Yamaguchi, T., Saeki, T. and Kimoto, E.: Release of protein 4.1-rich vesicles from diamide-treated erythrocytes under hydrostatic pressure. *Biochim. Biophys. Acta*, 1147 (1993) 1-5.
- 1468 Yamashita, T. and Kawakita, M.: Characterization of the Na<sup>+</sup>/H<sup>+</sup>-antiporter of bovine renal cortex and its immunoaffinity purification in a reconstitutively active form. *J. Biochem. (Tokyo)*, 113 (1993) 136-140.
- See also 1410, 1415, 1474, 1485, 1489, 1493, 1540, 1566, 1604, 1612, 1654, 1710.
- 19c. *Proteins synthesized by genetic manipulation, monoclonal antibodies*
- 1469 Annweiler, A., Zwilling, S., Hipskind, R.A. and Wirth, T.: Analysis of transcriptional stimulation by recombinant Oct proteins in a cell-free system. *J. Biol. Chem.*, 268 (1993) 2525-2534.
- 1470 Bullock, J.: Capillary zone electrophoresis and packed capillary column liquid chromatographic analysis of recombinant human interleukin-4. *J. Chromatogr.*, 633 (1993) 235-244.
- 1471 Clogston, C.L., Hu, S., Boone, T.C. and Lu, H.S.: Glycosidase digestion, electrophoresis and chromatographic analysis of recombinant human granulocyte colony-stimulating factor glycoforms produced in Chinese hamster ovary cells. *J. Chromatogr.*, 637 (1993) 55-62.
- 1472 Fujiwara, S., Kawahara, H., Makabe, K. and Satoh, N.: A complementary DNA for an ascidian embryonic nuclear antigen Hgv2 encodes a protein closely related to the amphibian histone-binding protein N1. *J. Biochem. (Tokyo)*, 113 (1993) 189-195.
- 1473 Li, N., Seetharam, S., Lindemans, J., Alpers, D.H., Arwert, F. and Seetharam, B.: Isolation and sequence analysis of variant forms of human transcobalamin II. *Biochim. Biophys. Acta*, 1172 (1993) 21-30.
- 1474 Majumdar, S., Kane, L.H., Rossi, M.W., Volpp, B.D., Nauseef, W.M. and Korchak, H.M.: Protein kinase C isotypes and signal-transduction in human neutrophils: selective substrate specificity of calcium-dependent  $\beta$ -PKC and novel calcium-independent nPKC. *Biochim. Biophys. Acta*, 1176 (1993) 276-286.
- 1475 Marcotte, P.A. and Henkin, J.: Characterization of the activation of pro-urokinase by thermolysin. *Biochim. Biophys. Acta*, 1161 (1993) 105-112.
- 1476 Marigo, V., Volpin, D. and Bressan, G.M.: Regulation of the human elastin promoter in chick embryo cells. Tissue-specific effect of TGF- $\beta$ . *Biochim. Biophys. Acta*, 1172 (1993) 31-36.
- 1477 Saegusa, Y., Sato, M., Galli, I., Nakagawa, T., Ono, N., Iguchi-Ariga, S.M.M. and Ariga, H.: Stimulation of SV40 DNA replication and transcription by Alu family sequence. *Biochim. Biophys. Acta*, 1172 (1993) 274-282.
- 1478 Tsao, L.-S., Lin, L.-L., Chen, J.-C., Chen, J.-H. and Hsu, W.-H.: Cloning and characterization of an  $\alpha$ -amylase gene from *Streptomyces lividans*. *Biochim. Biophys. Acta*, 1171 (1993) 255-262.
- See also 1487, 1500, 1509, 1539, 1591, 1656, 1666, 1742, 1859.
- 19d. *Microbial and plant proteins*
- 1479 Adamska, I., Kloppstech, K. and Ohad, I.: Early light-inducible protein in pea is stable during light stress but is degraded during recovery at low light intensity. *J. Biol. Chem.*, 268 (1993) 5438-5444.
- 1480 Andreasson, E. and Albertsson, P.-Å.: Heterogeneity in Photosystem I - the larger antenna of Photosystem I $\zeta$  is due to functional connection to a special pool of LHCII. *Biochim. Biophys. Acta*, 1141 (1993) 175-182.
- 1481 Cole, K.D.: Separation of lipoxygenase and the major soybean proteins using aqueous two-phase extraction and poly(ethylene glycol) precipitation systems. *J. Agric. Food Chem.*, 41 (1993) 334-340.
- 1482 Dasso, M.C. and de Tito, E.H.: Electrophoretic analysis of *Trypanosoma cruzi* proteins. *An. Asoc. Quim. Argent.*, 80 (1992) 293-304; C.A., 118 (1993) 120555m.
- 1483 Gardiner, S.E. and Forde, M.B.: Identification of cultivars of grasses and forage legumes by SDS-PAGE of seed proteins. *Mod. Methods Plant Anal., New Ser.*, 14(Seed Anal.) (1992) 43-61; C.A., 118 (1993) 97286p.
- 1484 Gong, H., Nilsen, S. and Allen, J.F.: Photoinhibition of photosynthesis *in vivo*: Involvement of multiple sites in a photodamage process under CO<sub>2</sub>- and O<sub>2</sub>-free conditions. *Biochim. Biophys. Acta*, 1142 (1993) 115-122.
- 1485 Harrison, M.A. and Allen, J.F.: Differential phosphorylation of individual LHC-II polypeptides during short-term and long-term acclimation to light regime in the green alga *Dunaliella salina*. *Biochim. Biophys. Acta*, 1141 (1993) 37-44.
- 1486 Hatanaka, H., Sonoike, K., Hirano, M. and Katoh, S.: Small subunits of Photosystem I reaction center complexes from *Synechococcus elongatus*. I. Is the psaF gene product required for oxidation of cytochrome c-553? *Biochim. Biophys. Acta*, 1141 (1993) 45-51.
- 1487 Hatch, L., Fimmel, A.L. and Gibson, F.: The role of arginine in the conserved polar loop of the c-subunit of the *Escherichia coli* H<sup>+</sup>-ATPase. *Biochim. Biophys. Acta*, 1141 (1993) 183-189.
- 1488 Hedges, B.R., Palmer, R.G. and Amberger, L.A.: Electrophoretic analyses of soybean seed proteins. *Mod. Methods Plant Anal., New Ser.*, 14(Seed Anal.) (1992) 143-158; C.A., 118 (1993) 55452j.
- 1489 Howitt, C.A., Smith, G.D. and Day, D.A.: Cyanide-insensitive oxygen uptake and pyridine nucleotide dehydrogenases in the cyanobacterium *Anabaena* PCC 7120. *Biochim. Biophys. Acta*, 1141 (1993) 313-320.
- 1490 Kamata, Y., Kimura, Y., Hiroi, T., Sakaguchi, G. and Kozaki, S.: Purification and characterization of the ganglioside-binding fragment of *Clostridium botulinum* type E neurotoxin. *Biochim. Biophys. Acta*, 1156 (1993) 213-218.

- 1491 Khladnev, D.V., Pivnenko, N.V. and Mosolov, V.V.: (Chymotrypsin/subtilisin inhibitor from wheat grain endosperm). *Biokhimiya (Moscow)*, 57 (1992) 1874-1882.
- 1492 Kozyakov, S.Ya.: (Electrophoresis of acidic phenol-soluble proteins of *Pleurotus ostreatus* (Jacq.:Fr.) Kumm). *Mikol. Fitopatol.*, 26 (1992) 125-132; C.A., 118 (1993) 35587d.
- 1493 Millership, S.E. and Want, S.V.: Whole-cell protein electrophoresis for typing *Mycobacterium tuberculosis*. *J. Clin. Microbiol.*, 30 (1992) 2784-2787; C.A., 118 (1993) 3530p.
- 1494 Mor, T.S., Post, A.F. and Ohad, I.: The manganese stabilising protein (MSP) of *Prochlorothrix hollandica* is a hydrophobic membrane-bound protein. *Biochim. Biophys. Acta*, 1141 (1993) 206-212.
- 1495 Orden, J.A., Goyache, J., Hernandez, J., Domenech, A., Suarez, G. and Gomez-Lucia, E.: Applicability of an immunoblot technique combined with a semiautomated electrophoresis system for detection of staphylococcal enterotoxins in food extracts. *Appl. Environ. Microbiol.*, 58 (1992) 4083-4085; C.A., 118 (1993) 37688m.
- 1496 Price, N.C., Kelly, S.M., Thomson, G.J., Coggins, J.R., Wood, S. and auf der Mauer, A.: The unfolding and attempted refolding of the bacterial chaperone protein groEL (cpn60). *Biochim. Biophys. Acta*, 1161 (1993) 52-58.
- 1497 Roininen, J., Nissila, E., Puolimatka, M. and Pulli, S.: Identification of barley cultivars using SDS-PAGE electrophoresis. *Agric. Sci. Finl.*, 1 (No. 1) (1992) 73-82; C.A., 118 (1993) 77058n.
- 1498 Sonoike, K., Hatanaka, H. and Katoh, S.: Small subunits of Photosystem I reaction center complexes from *Synechococcus elongatus*. II. The psaE gene product has a role to promote interaction between the terminal electron acceptor and ferredoxin. *Biochim. Biophys. Acta*, 1141 (1993) 52-57.
- 1499 Speelmans, G., Hillenga, D., Poolman, B. and Konings, W.N.: Application of thermostable reaction centers from *Chloroflexus aurantiacus* as a protonmotive force generating system. *Biochim. Biophys. Acta*, 1142 (1993) 269-276.
- 1500 Ueda, Y., Taguchi, S., Nishiyama, K.-i., Kumagai, I. and Miura, K.-i.: Effect of a rare leucine codon, TTA, on expression of a foreign gene in *Streptomyces lividans*. *Biochim. Biophys. Acta*, 1172 (1993) 262-266.
- 1501 Van der Stay, G.W.M., Boekema, E.J., Dekker, J.P. and Mattheij, H.C.P.: Characterization of trimeric Photosystem I particles from the prochlorophyte *Prochlorothrix hollandica* by electron microscopy and image analysis. *Biochim. Biophys. Acta*, 1142 (1993) 189-193.
- 1502 Walker, B., Krishnasastri, M. and Bayley, H.: Functional complementation of staphylococcal  $\alpha$ -hemolysin fragments. Overlaps, nicks, and gaps in the glycine-rich loop. *J. Biol. Chem.*, 268 (1993) 5285-5292.
- 1503 Weder, J.K.P., Haussner, K. and Bokor, M.V.: Use of fluorogenic substrates to visualize trypsin and chymotrypsin inhibitors after electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 220-226.
- 1504 Wrigley, C.W.: Identification of cereal varieties by gel electrophoresis of the grain proteins. *Mod. Methods Plant Anal., New Ser., 14(Seed Anal.)* (1992) 17-41; C.A., 118 (1993) 76308g - a review with 54 refs.
- 1505 Agnani, G. and Marcel, Y.L.: Cholesterol efflux from fibroblasts to discoidal lipoproteins with apolipoprotein A-I (LpA-I) increases with particle size but cholesterol transfer from LpA-I to lipoproteins decreases with size. *Biochemistry*, 268 (1993) 2643-2649.
- 1506 Alexander, R.L., Jr., Roodman, S.T., Petruska, P.J., Tsai, C.C. and Janney, C.G.: A new case of IgE myeloma. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2328-2332.
- 1507 Bundschuh, I., Jäckle-Meyer, I., Lüneberg, E., Bentzel, C., Petzoldt, R. and Stolte, H.: Glycation of serum albumin and its role in renal protein excretion and the development of diabetic nephropathy. *Eur. J. Clin. Chem. Clin. Biochem.*, 30 (1992) 651-656.
- 1508 Cengiz, S. and Cengiz, M.: (Capillary electrophoresis). *Biyokim. Derg.*, 17 (1992) 41-52; C.A., 118 (1993) 142837g.
- 1509 Fijalkowska, I., Babinska, A., Ligocka, A., Plucienniczak, G., Plucienniczak, A., Stec, W., Okruszek, A., Wilk, A. and Cierniewski, C.S.: Antibodies to recombinant fragment 212-276 of protein C specifically recognize the intact human molecule. *Biochim. Biophys. Acta*, 1161 (1993) 187-193.
- 1510 Gulian, J.-M., Dalmasso, C., Pesquie, M., Harle, J.-R. and Charrel, M.: Abnormal bilirubin binding to human serum albumin in a patient with unusual myeloma immunoglobulin G. *Eur. J. Clin. Chem. Clin. Biochem.*, 31 (1993) 115-119.
- 1511 Hervé, F., Gomas, E., Duché, J.-C. and Tillement, J.-P.: Fractionation of the genetic variants of human  $\alpha_1$ -acid glycoprotein in the native form by chromatography on an immobilized copper(II) affinity adsorbent. Heterogeneity of the separate variants by isoelectrofocusing and by concanavalin A affinity chromatography. *J. Chromatogr.*, 615 (1993) 47-57.
- 1512 Huang, T.-F., Chang, M.-C., Peng, H.-C. and Teng, C.-M.: A novel  $\alpha$ -type fibrinogenase from *Agkistrodon rhodostoma* snake venom. *Biochim. Biophys. Acta*, 1160 (1992) 262-268.
- 1513 Jiang, S. and Cheng, T.: (The analysis of globin chain composition of cord blood by polyacrylamide gel electrophoresis). *Hunan Yike Daxue Xuebao*, 17 (1992) 293-294; C.A., 118 (1993) 55428f.
- 1514 Kim, J.W., Park, J.H., Park, J.W., Doh, H.J., Heo, G.S. and Lee, K.-J.: Quantitative analysis of serum proteins separated by capillary electrophoresis. *Clin. Chem. (Winston-Salem)*, 39 (1993) 689-692.
- 1515 Kontturi, A.K., Kontturi, K., Savonen, A., Vuoristo, M. and Schiffrin, D.J.: Electrical migration in convective electrophoresis: modeling and membrane separation of bovine serum albumin (BSA) and cytochrome c. *J. Chem. Soc., Faraday Trans.*, 89 (1993) 99-106; C.A., 118 (1993) 142838h.
- 1516 Lampreave, F., Alava, M.A. and Piñeiro, A.: Concanavalin A crossed affinityimmunoelectrophoretic analysis of the major pig serum proteins during fetal development. *Electrophoresis (Weinheim)*, 14 (1993) 214-219.
- 1517 Mitchell, T.I., Jeffrey, J.J., Palmiter, R.D. and Brinckerhoff, C.E.: The acute phase reactant serum amyloid A (SAA3) is a novel substrate for degradation by the metalloproteinases collagenase and stromelysin. *Biochim. Biophys. Acta*, 1156 (1993) 245-254.
- 1518 Nakamura, K., Mimura, Y. and Takeo, K.: Immune response to a hapten of fluorescein isothiocyanate in a single mouse analyzed by two-dimensional affinity electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 81-87.

See also 1350, 1445, 1544, 1584, 1590, 1592, 1600, 1604, 1619.

- 1519 Nishiguchi, E., Sindo, J. and Hamasaki, N.: Requirement of cytoplasmic components for lidocaine-induced shape change in human erythrocytes. *Biochim. Biophys. Acta*, 1176 (1993) 95-105.
- 1520 Pemberton, A.D. and John, H.A.: Retardation of serum albumin migration in native polyacrylamide gel electrophoresis by the incorporation of blue dextran in the gel matrix. *Electrophoresis (Weinheim)*, 14 (1993) 240-241.
- 1521 Rubenstein, D.S., Thogersen, I.B., Pizzo, S.V. and Enghild, J.J.: Identification of monomeric  $\alpha$ -macroglobulin proteinase inhibitors in birds, reptiles, amphibians and mammals, and purification and characterization of a monomeric  $\alpha$ -macroglobulin proteinase inhibitor from the American bullfrog *Rana catesbeiana*. *Biochem. J.*, 290 (1993) 85-95.
- 1522 Shiao, Y.-J., Chen, J.-C., Wang, C.-N. and Wang, C.-T.: The mode of action of primary bile salts on human platelets. *Biochim. Biophys. Acta*, 1146 (1993) 282-293.
- 1523 Shimizu, K., Taniichi, T., Satomura, S., Matsuura, S., Taga, H. and Taketa, K.: Establishment of assay kits for the determination of microheterogeneities of alpha-fetoprotein using lectin-affinity electrophoresis. *Clin. Chim. Acta*, 214 (1993) 3-12.
- 1524 Šipoš, J. and Ninčáková, A.: Determination of stabilizers in human serum albumin preparations. *J. Chromatogr.*, 638 (1993) 108-111.
- 1525 Speicher, D.W., DeSilva, T.M., Speicher, K.D., Ursitti, J.A., Hemrbach, P. and Weglarz, L.: Location of the human red cell spectrin tetramer binding site and detection of a related "closed" hairpin loop dimer using proteolytic footprinting. *J. Biol. Chem.*, 268 (1993) 4227-4235.
- 1526 Swanson, S.J., Christner, R.B. and Mortensen, R.F.: Human serum amyloid P-component (SAP) selectively binds to immobilized or bound forms of C-reactive protein (CRP). *Biochim. Biophys. Acta*, 1160 (1992) 309-316.
- 1527 Takahashi, M., Kimura, M., Kurosawa-Ohsawa, K., Iwaki, A., Tanaka, S. and Matsuishi, T.: Epitope mapping and characterization of monoclonal antibodies to human protein C. *Biochim. Biophys. Acta*, 1161 (1993) 113-123.
- 1528 Tissot, J.-D., Hochstrasser, D.F., Spertini, F., Schifferli, J.A. and Schneider, P.: Pattern variations of polyclonal and monoclonal immunoglobulins of different isotypes analyzed by high-resolution two-dimensional electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 227-234.
- 1529 Tissot, J.-D., Hohlfeld, P., Hochstrasser, D.F., Tolsa, J.-F., Calme, A. and Schneider, P.: Clonal imbalances of plasma/serum immunoglobulin production in infants. *Electrophoresis (Weinheim)*, 14 (1993) 245-247.
- 1530 Yuo, A., Kitagawa, S., Azuma, E., Natori, Y., Togawa, A., Saito, M. and Takaku, F.: Tyrosine phosphorylation and intracellular alkalinization are early events in human neutrophils stimulated by tumor necrosis factor, granulocyte-macrophage colony-stimulating factor and granulocyte colony-stimulating factor. *Biochim. Biophys. Acta*, 1156 (1993) 197-203.
- See also 1279, 1354, 1470, 1565, 1596, 1772.
- 19f. Structural and muscle proteins
- 1531 Bartels, E.M., Cooke, P.H., Elliott, G.F. and Hughes, R.A.: The myosin molecule - charge response to nucleotide binding. *Biochim. Biophys. Acta*, 1157 (1993) 63-73.
- 1532 Biram, D., Garratt, C.J. and Hester, R.E.: Ligand affinities in mutant metmyoglobins. *Biochim. Biophys. Acta*, 1163 (1993) 67-74.
- 1533 Bodor, G.S., Porter, S., Landt, Y. and Ladensosn, J.H.: Development of monoclonal antibodies for an assay of cardiac troponin-I and preliminary results in suspected cases of myocardial infarction. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2203-2214.
- 1534 Bonafe, N., Chaussepied, P., Capony, J.P., Derancourt, J. and Kassab, R.: Photochemical cross-linking of the skeletal myosin head heavy chain to actin subdomain-1 at Arg95 and Arg28. *Eur. J. Biochem.*, 213 (1993) 1243-1254.
- 1535 Chou, C. and Omary, M.B.: Mitotic arrest-associated enhancement of O-linked glycosylation and phosphorylation of human keratins 8 and 18. *J. Biol. Chem.*, 268 (1993) 4465-4472.
- 1536 Eggert, M., Radomski, N., Linder, D., Tripier, D., Traub, P. and Jost, E.: Identification of novel phosphorylation sites of murine A-type lamins. *Eur. J. Biochem.*, 213 (1993) 659-671.
- 1537 Granot, I., Halevy, O., Hurwitz, S. and Pines, M.: Halofuginone: an inhibitor of collagen type I synthesis. *Biochim. Biophys. Acta*, 1156 (1993) 107-112.
- 1538 Nakamura, F., Mino, T., Yamamoto, J., Naka, M. and Tanaka, T.: Identification of the regulatory site in smooth muscle calponin that is phosphorylated by protein kinase C. *J. Biol. Chem.*, 268 (1993) 6194-6201.
- 1539 Novy, R.E., Liu, L.-F., Lin, C.-S., Helfman, D.M. and Lin, J.J.-C.: Expression of smooth muscle and nonmuscle tropomyosins in *Escherichia coli* and characterization of bacterially produced tropomyosins. *Biochim. Biophys. Acta*, 1162 (1993) 255-265.
- 1540 Riabowol, K.T.: Transcription factor activity during cellular aging of human diploid fibroblasts. *Biochem. Cell Biol.*, 70 (1992) 1064-1072.
- 1541 Rupp, H. and Jacob, R.: Structural and functional diversity of human ventricular myosin. *Basic Res. Cardiol.*, 87(Suppl. 1) (1992) 95-106; C.A., 118 (1993) 75557a.
- 1542 Strand, M.A., Louis, C.F. and Mickelson, J.R.: Phosphorylation of the porcine skeletal and cardiac muscle sarcoplasmic reticulum ryanodine receptor. *Biochim. Biophys. Acta*, 1175 (1993) 319-326.
- 1543 Venema, R.C. and Kuo, J.F.: Protein kinase C-mediated phosphorylation of troponin I and C-protein in isolated myocardial cells is associated with inhibition of myofibrillar actomyosin MgATPase. *J. Biol. Chem.*, 268 (1993) 2705-2711.
- See also 1419, 1451, 1476, 1580, 1710.
- 19g. Protamines, histones and other nuclear proteins
- 1544 Albert, P., Lacorre-Arescaldino, I. and Toublan, B.: High resolution polyacrylamide gel electrophoresis of *Physarum polycephalum* histones: improved resolution of variants and modified forms. *Anal. Biochem.*, 209 (1993) 224-227.
- 1545 Boulikas, T. and Poirier, G.G.: Resistance of ADP-ribosylated histones and HMG proteins to proteases. *Biochem. Cell Biol.*, 70 (1992) 1258-1267.
- 1546 Le Hégarat, F., Salti-Montesanto, V., Hauck, Y. and Hirschbein, L.: Purification and characterization of the HU-like protein HPB9 from the *Bacillus subtilis* nucleoid. *Biochim. Biophys. Acta*, 1172 (1993) 101-107.

- 1547 Prasad, S.C. and Dritschilo, A.: High-resolution two-dimensional electrophoresis of nuclear proteins: a comparison of HeLa nuclei prepared by three different methods. *Anal. Biochem.*, 207 (1992) 121-128.
- 1548 Tarkka, T., Yli-Märyy, N., Mannermaa, R.-M., Majamaa, K. and Oikarinen, J.: Specific non-enzymatic glycation of the rat histone H1 nucleotide binding site *in vitro* in the presence of AlF<sub>4</sub>. A putative mechanism for impaired chromatin function. *Biochim. Biophys. Acta*, 1180 (1993) 294-298.

See also 1600, 1613, 1743, 1890.

19h. Chromoproteins and metalloproteins

- 1549 Beattie, J.H., Richards, M.P. and Self, R.: Separation of metallothionein isoforms by capillary zone electrophoresis. *J. Chromatogr.*, 632 (1993) 127-135.
- 1550 Chowne, C.W. and Stamp, R.J.: Performance of the Beckman Diatrac gel electrophoresis method for the measurement of HbA<sub>1c</sub>. *Ann. Clin. Biochem.*, 29 (1992) 565-566; C.A., 118 (1993) 3260a.
- 1551 Edwards, R.J., Murray, B.P., Murray, S., Singleton, A.M., Davies, D.S. and Boobis, A.R.: An inhibitory monoclonal anti-protein antibody and an anti-peptide antibody share an epitope on rat cytochrome P-450 enzymes CYP1A1 and CYP1A2. *Biochim. Biophys. Acta*, 1161 (1993) 38-46.
- 1552 Ferranti, P., Parlapiano, A., Malorni, A., Pucci, P., Marino, G., Cossu, G., Manca, L. and Masala, B.: Hemoglobin Ozieri: a new  $\alpha$ -chain variant ( $\alpha$ 71(E20)Ala  $\rightarrow$  Val). Characterization using FAB- and electrospray-mass spectrometric techniques. *Biochim. Biophys. Acta*, 1162 (1993) 203-208.
- 1553 Girodon, E., Ghanem, N., Vidaud, M., Riou, J., Martin, J., Galacteros, F. and Goossens, M.: Rapid molecular characterization of mutations leading to unstable hemoglobin  $\beta$ -chain variants. *Ann. Hematol.*, 65 (1992) 188-192; C.A., 118 (1993) 53226q.
- 1554 Krauss, J.S., Jonah, M.H., Devoe, L.D. and Pantazis, C.G.: Failure of microchromatographic measurement of fetal hemoglobin in  $\beta^0$  thalassemia-hereditary persistence of fetal hemoglobin. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2325-2327.
- 1555 Kyriakopoulos, A., Kalcklösch, M., Weiss-Nowak, C. and Behne, D.: Studies on 16 kDa selenium-containing proteins enriched by means of preparative electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 108-111.
- 1556 Makino, N. and Ohnaka, H.: Role of oligomeric interactions in the cooperativity of crayfish hemocyanin. *Biochim. Biophys. Acta*, 1162 (1993) 237-245.
- 1557 Sinha, P., Galacteros, F., Righetti, P.G., Kohlmeier, M. and Köttgen, E.: Analysis of haemoglobin variants using immobilized pH gradients. *Eur. J. Clin. Chem. Clin. Biochem.*, 31 (1993) 91-96.
- 1558 Toda, A., Ogata, S., Nagamatsu, A. and Shimeno, H.: Cytochrome P-450 in liver microsomes of streptozotocin-induced diabetic rats: purification and characterization. *Biochim. Biophys. Acta*, 1141 (1993) 245-252.
- See also 1312, 1418.
- 19i. Proteins of glands, gland products, various zymogens (incl. milk proteins)
- 1559 Beeley, J.A.: Fascinating families of proteins: electrophoresis of human saliva. *Biochem. Soc. Trans.*, 21 (1993) 133-138; C.A., 118 (1993) 142846j.
- 1560 Bläker, M., Kock, K., Ahlers, C., Buck, F. and Schmale, H.: Molecular cloning of human von Ebner's gland protein, a member of the lipocalin superfamily highly expressed in lingual salivary glands. *Biochim. Biophys. Acta*, 1172 (1993) 131-137.
- 1561 Cheng, C.Y., Morris, I. and Bardin, C.W.: Testins are structurally related to the mouse cysteine proteinase precursor but avoid of any protease/anti-protease activity. *Biochem. Biophys. Res. Commun.*, 191 (1993) 224-231.
- 1562 Donovan, G.R., Baldo, B.A. and Sutherland, S.: Molecular cloning and characterization of a major allergen (Myr p I) from the venom of the Australian jumper ant, *Myrmecia pilosula*. *Biochim. Biophys. Acta*, 1171 (1993) 272-280.
- 1563 Ewbank, J.J. and Creighton, T.E.: Pathway of disulfide-coupled unfolding and refolding of bovine  $\alpha$ -lactalbumin. *Biochemistry*, 32 (1993) 366-3693.
- 1564 Hurley, W.L., Zou, S., Magura, C.E. and Jimenez-Flores, R.: Heating skim milk alters the migration of immunoreactive milk proteins in acrylamide gels. *J. Agric. Food Chem.*, 41 (1993) 280-282.
- 1565 Luckenbach, C., Wahl, R. and Kallee, E.: Isoelectric focusing of human thyroxine globulin (thyropepin) and human prealbumin (transthyretin). *Eur. J. Clin. Chem. Clin. Biochem.*, 30 (1992) 387-390.
- 1566 Moos, J., Peknicova, J. and Tesarik, J.: Relationship between molecular conversions of acrosin and the progression of exocytosis in the calcium ionophore-induced acrosome reaction. *Biochim. Biophys. Acta*, 1176 (1993) 199-207.
- 1567 Richardson, F.C., Strom, S.C., Copple, D.M., Bendele, R.A., Probst, G.S. and Anderson, N.L.: Comparisons of protein changes in human and rodent hepatocytes induced by the rat-specific carcinogen, methapyrilene. *Electrophoresis (Weinheim)*, 14 (1993) 157-161.
- 1568 Shaw, D.C., Messer, M., Scrivener, A.M., Nicholas, K.R. and Griffiths, M.: Isolation, partial characterisation, and amino acid sequence of  $\alpha$ -lactalbumin from platypus (*Ornithorhynchus anatinus*) milk. *Biochim. Biophys. Acta*, 1161 (1993) 177-186.
- 1569 Sshitani, M.: (Genetic polymorphism of salivary cystatin and tissue expressions of salivary-type cystatins). *Shika Gakuho*, 92 (1992) 941-958; C.A., 118 (1993) 121591g.
- 19j. Proteins of brain, cerebrospinal fluid and eye
- 1570 Araujo, H., Danziger, N., Cordier, J., Glowinski, J. and Chneiweiss, H.: Characterization of PEA-15, a major substrate for protein kinase C in astrocytes. *J. Biol. Chem.*, 268 (1993) 5911-5920.
- 1571 Chiou, S.-H., Hung, C.-C. and Lin, C.-W.: Biochemical characterization of crystallins from pigeon lenses: structural and sequence analysis of pigeon  $\delta$ -crystallin. *Biochim. Biophys. Acta*, 1160 (1992) 317-324.
- 1572 Cirovic, M.S. and Djurica, S.: Electrophoretic characterization of light protein fractions in pathologic cerebrospinal fluid: prealbumin and beta - trace protein concentrations. *Iugosl. Physiol. Pharmacol. Acta*, 28 (1992) 77-86; C.A., 118 (1993) 142834d.

- 1573 Dai, Z., Lackland, H., Stein, S., Li, Q., Radziewicz, R., Williams, S. and Sigal, L.H.: Molecular mimicry in Lyme disease: monoclonal antibody H9724 to *b. burgdorferi* flagellin specifically detects chaperonin-HSP60. *Biochim. Biophys. Acta*, 1181 (1993) 97-100.
- 1574 Kato, K., Goto, S., Hasegawa, K., Shinohara, H. and Inaguma, Y.: Responses to heat shock of  $\alpha$ B crystallin and HSP28 in U373 MG human glioma cells. *Biochim. Biophys. Acta*, 1175 (1993) 257-262.
- 1575 Koyama, J.-i., Inoue, S., Ikeda, K. and Hayashi, K.: Purification and amino-acid sequence of a nerve growth factor from the venom of *Vipera russelli russelli*. *Biochim. Biophys. Acta*, 1160 (1992) 287-292.
- 1576 Manenti, S., Sorokine, O., van Dorsselaer, A. and Taniguchi, H.: Isolation of the non-myristoylated form of a major substrate of protein kinase C (MARCKS) from bovine brain. *J. Biol. Chem.*, 268 (1993) 6878-6881.
- 1577 Samiei, M., Sanghera, J.S. and Pelech, S.L.: Activation of myelin basic protein and S6 peptide kinases in phorbol ester- and PAF-treated sheep platelets. *Biochim. Biophys. Acta*, 1176 (1993) 287-298.
- 1578 Vlaanderen, I., van Grondelle, R. and Bloemendal, M.: The use of fast protein liquid (size exclusion) chromatography for the fractionation of crystallins and the study of  $\beta$ -crystallin aggregation. *J. Liq. Chromatogr.*, 16 (1993) 367-382.
- See also 1606.
- 19k. *Proteins of neoplastic tissue and transformed cells*
- 1579 Chang, H.R., Koda, K., Chang, S. and Baird, S.: AgSK1, A novel carcinoma associated antigen. *Cancer Res.*, 53 (1993) 1122-1127.
- 1580 Myrmrk, J.S., Oakes, J.D., Muthuswamy, K., D'Amico, P., Bayley, S.T. and Lee, R.W.H.: Disruption of the coordinate expression of muscle genes in a transfected BC<sub>3</sub>H1 myoblast cell line producing a low level of the adenovirus E1A transforming protein. *Biochem. Cell Biol.*, 70 (1992) 1268-1276.
- 1581 Partin, A.W., Getzenberg, R.H., CarMichael, M.J., Vindivich, D., Yoo, J., Epstein, J.I. and Coffey, D.S.: Nuclear matrix protein patterns in human benign prostatic hyperplasia and prostate cancer. *Cancer Res.*, 53 (1993) 744-746.
- 1582 Rudy, W., Hofmann, M., Schwartz-Albiez, R., Zöller, M., Heider, K.-H., Ponta, H. and Herrlich, P.: The two major CD44 proteins expressed on a metastatic rat tumor cell line are derived from different splice variants: each one individually suffices to confer metastatic behavior. *Cancer Res.*, 53 (1993) 1262-1268.
- 1583 Vlock, D.R., Toporowicz, A., Arnold, B., Aul, D., McCoy, J.P., Jr., Carey, T.E. and Brown, W.E.: Isolation and purification of a squamous cell carcinoma of the head and neck-associated antigen identified by autologous antibody. *Biochim. Biophys. Acta*, 1181 (1993) 174-182.
- 19l. *Specific binding and receptor proteins*
- 1584 Araga, C., Akabori, K., Sasaki, J., Maeda, A., Shiina, T. and Toyoshima, Y.: Functional reconstitution of the primary quinone acceptor, Q<sub>A</sub>, in the Photosystem II core complexes. *Biochim. Biophys. Acta*, 1142 (1993) 36-42.
- 1585 Barker, S., Marchant, W., Clark, A.J.L., Jimenez, E., Marsigliante, S., Montiel, M. and Vinson, G.P.: Comparison of COS cell transfected AT<sub>1A</sub> and AT<sub>1B</sub> angiotensin II receptors and angiotensin II receptor isoforms in rat tissues using isoelectric focusing. *Biochem. Biophys. Res. Commun.*, 192 (1993) 392-398.
- 1586 Bornancin, F., Franco, M., Bigay, J. and Chabre, M.: Functional modifications of transducin induced by cholera or pertussis-toxin-catalyzed ADP-ribosylation. *Eur. J. Biochem.*, 210 (1992) 33-44.
- 1587 Chao, W., Liu, H., Hanahan, D.J. and Olson, M.S.: Protein tyrosine phosphorylation and regulation of the receptor for platelet-activating factor in rat Kupffer cells. Effect of sodium vanadate. *Biochem. J.*, 288 (1992) 777-784.
- 1588 Chin, J.E., Dickens, M., Tavare, J.M. and Roth, R.A.: Overexpression of protein kinase C isoenzymes  $\alpha$ ,  $\beta$ <sub>I</sub>,  $\gamma$ , and  $\epsilon$  in cells overexpressing the insulin receptor. Effects on receptor phosphorylation and signaling. *J. Biol. Chem.*, 268 (1993) 6338-6347.
- 1589 Clagett-Dame, M., Verhalen, T.J., Biedler, J.L. and Repa, J.J.: Identification and characterization of all-trans-retinoic acid receptor transcripts and receptor protein in human neuroblastoma cells. *Arch. Biochem. Biophys.*, 300 (1993) 684-693.
- 1590 Coren, J.S. and Vogt, V.M.: Purification of a telomere-binding protein from *Physarum polycephalum*. *Biochim. Biophys. Acta*, 1171 (1992) 162-166.
- 1591 Darwish, H.M., Burmester, J.K., Moss, V.E. and DeLuca, H.F.: Phosphorylation is involved in transcriptional activation by the 1,25-dihydroxyvitamin D<sub>3</sub> receptor. *Biochim. Biophys. Acta*, 1167 (1993) 29-36.
- 1592 Ehrlich, K.C.: Characterization of DBPm, a plant protein that binds to DNA containing 5-methylcytosine. *Biochim. Biophys. Acta*, 1172 (1993) 108-116.
- 1593 Faye, L., Gomord, V., Fitchette-Laine, A.-C. and Chrispeels, M.J.: Affinity purification of antibodies specific for Asn-linked glycans containing  $\alpha$ 1-3 fucose or  $\beta$ 1-2 xylose. *Anal. Biochem.*, 209 (1993) 104-108.
- 1594 Gibb, A.L., Freeman, A.M., Smith, R.A.G., Edmonds, S. and Sim, E.: The interaction of soluble human complement receptor type 1 (sCR1, BRL55730) with human complement component C4. *Biochim. Biophys. Acta*, 1180 (1993) 313-330.
- 1595 Gibson, A.W., Ye, R., Johnston, R.N. and Browder, L.W.: Multiple antigens recognized by anti-c-myc antibodies in human cells and *Xenopus* oocytes. *Biochem. Cell Biol.*, 70 (1992) 998-1005.
- 1596 Gonzalez-Gronow, M., Enghild, J.J. and Pizzo, S.V.: Streptokinase and human fibronectin share a common epitope: implications for regulation of fibrinolysis and rheumatoid arthritis. *Biochim. Biophys. Acta*, 1180 (1993) 283-288.
- 1597 Grady, M., Stevens, P.A., Pyne, S. and Pyne, N.: Adenylyl cyclase in lung from hypersensitive guinea pig displays increased responsiveness to guanine nucleotides and isoproterenol: the role of the G proteins G<sub>s</sub> and G<sub>i</sub>. *Biochim. Biophys. Acta*, 1176 (1993) 313-320.
- 1598 Haino, M., Kawahire, S., Omata, S. and Horigome, T.: Purification of a 60 kDa nuclear localization signal binding protein in rat liver nuclear envelopes and characterization of its properties. *J. Biochem. (Tokyo)*, 113 (1993) 308-313.

- 1599 Hayashi, K., Kurokawa, J.-i., Nomura, S., Kuga, Y., Ohkura, Y. and Kajiyama, G.: Effect of fluvastatin sodium (XU62-320), a new inhibitor of 3-hydroxy-3-methylglutaryl coenzyme A reductase, on the induction of low-density lipoprotein receptor in HepG2 cells. *Biochim. Biophys. Acta*, 1167 (1993) 223-225.
- 1600 Hiraga, K., Suzuki, K., Tsuchiya, E. and Miyakawa, T.: Identification and characterization of nuclear calmodulin-binding proteins of *Saccharomyces cerevisiae*. *Biochim. Biophys. Acta*, 1177 (1993) 25-30.
- 1601 Kabir, S., Aebersold, R. and Daar, A.S.: Identification of a novel 3 kDa immunoglobulin-A-binding peptide obtained by the limited proteolysis of jacalin. *Biochim. Biophys. Acta*, 1161 (1993) 194-200.
- 1602 Kroviasinski, Y., Cochet, S., Martineau, P., Cartron, J.P. and Bertrand, O.: Evaluation of several affinity chromatographic supports for the purification of maltose-binding protein from *Escherichia coli*. *J. Chromatogr.*, 633 (1993) 273-280.
- 1603 Masumi, A., Akamatsu, Y. and Kitagawa, T.: Modulation of the synthesis and glycosylation of the glucose transporter protein by transforming growth factor- $\beta$ 1 in Swiss 3T3 fibroblasts. *Biochim. Biophys. Acta*, 1145 (1993) 227-234.
- 1604 Menzlauff, E. and Flügge, U.-I.: Purification and functional reconstitution of the 2-oxoglutarate/malate translocator from spinach chloroplasts. *Biochim. Biophys. Acta*, 1147 (1993) 13-18.
- 1605 Myake, S.: Detection of DNA-binding proteins by sequential gel electrophoresis. *Jpn. Kokai Tokkyo Koho*, JP 04,281,800 [92,281,800] (Cl. C12Q1/68), 07 Oct. 1992, Appl. 91/44,858, 11 Mar. 1991; 4 pp.; C.A., 118 (1993) 1993t.
- 1606 Nakata, H.: Development of an antiserum to rat-brain A<sub>1</sub> adenosine receptor: application for immunological and structural comparison of A<sub>1</sub> adenosine receptors from various tissues and species. *Biochim. Biophys. Acta*, 1177 (1993) 93-98.
- 1607 Oudinet, J.-P., Russo-Marie, F., Cavadore, J.-C. and Rothhut, B.: Protein kinase C-dependent phosphorylation of annexins I and II in mesangial cells. *Biochem. J.*, 292 (1993) 63-68.
- 1608 Parker, C.M., Pujades, C., Brenner, M.B. and Hemler, M.E.:  $\alpha^4/\beta\gamma$ , A novel form of the integrin  $\alpha^4$  subunit. *J. Biol. Chem.*, 268 (1993) 7028-7035.
- 1609 Ritsch, A., Auer, B., Föger, B., Schwarz, S. and Patsch, J.R.: Polyclonal antibody-based immunoradiometric assay for quantification of cholesteryl ester transfer protein. *J. Lipid Res.*, 34 (1993) 673-679.
- 1610 Ross, C.R., Kubinak, S. and Hale, C.C.: Purification of a basic fibroblast growth factor-binding proteoglycan from bovine cardiac plasma membrane. *Biochim. Biophys. Acta*, 1145 (1993) 219-226.
- 1611 Stüber, D., Friedlein, A., Fountoulakis, M., Lahm, H.W. and Gartner, G.: Alignment of disulfide bonds of the extracellular domain of the interferon  $\gamma$  receptor and investigation of their role in biological activity. *Biochemistry*, 32 (1993) 2423-2430.
- 1612 Takase, S., Goda, T. and Shinohara, H.: Adaptive changes of intestinal cellular retinol-binding protein, type II following jejunum-bypass operation in the rat. *Biochim. Biophys. Acta*, 1156 (1993) 223-231.
- 1613 Thibodeau, J., Potvin, F., Kirkland, J.B. and Poirier, G.: Expression in *Escherichia coli* of the 36 kDa domain of poly(ADP-ribose) polymerase and investigation of its DNA binding properties. *Biochim. Biophys. Acta*, 1163 (1993) 49-53.
- 1614 Tsuboi, I., Matsukawa, M., Sato, N. and Kimura, S.: Isolation and characterization of a sialic acid-specific binding lectin from the hemolymph of Asian horseshoe crab, *Tachypleus tridentatus*. *Biochim. Biophys. Acta*, 1156 (1993) 255-262.
- 1615 Tsuchiya, T., Ueda, M., Ochiai, H., Imajoh-Ohmi, S. and Kanegasaki, S.: Erythropoietin 5'-flanking sequence-binding protein induced during hypoxia and cobalt exposure. *J. Biochem. (Tokyo)*, 113 (1993) 395-400.
- 1616 White, A.M., Varney, M.A., Maeda, N., Mikoshiba, K. and Watson, S.P.: Comparison of Ins(1,4,5)P<sub>3</sub> receptors from rat cerebellum and bovine adrenal cortex. *Biochim. Biophys. Acta*, 1175 (1993) 307-311.
- 1617 Zhang, W.-W., Zhang, L.-X., Busch, R.K., Farres, J. and Busch, H.: Purification and characterization of a DNA-binding heterodimer of 52 and 100 kDa from HeLa cells. *Biochem. J.*, 290 (1993) 267-272.
- See also 1376, 1510, 1542, 1726.
- 19m. Urinary proteins
- See 1418.
- 19n. Other proteins (incl. proteinous inhibitors of enzymic activity)
- 1618 Lenz, A.-G., Meyer, B., Costabel, U. and Maier, K.: Bronchoalveolar lavage fluid proteins in human lung disease: analysis by two-dimensional electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 242-244.
- 1619 Mangel, A., Leitao, J.M., Batel, R., Zimmermann, H., Müller, W.E.G. and Schröder, H.C.: Purification and characterization of a pore-forming protein from the marine sponge *Tethya lyncurium*. *Eur. J. Biochem.*, 210 (1992) 499-507.
- 1620 Nielsen, K.L. and Sottrup-Jensen, L.: Evidence from sequence analysis that hen egg-white ovomacroglobulin (ovostatin) is devoid of an internal  $\beta$ -Cys- $\gamma$ -Glu thiol ester. *Biochim. Biophys. Acta*, 1162 (1993) 230-232.
- 1621 Pressi, G., Curioni, A., Peruffo, A.D.B. and Zamorani, A.: Effectiveness of the electroendosmotic preparative electrophoresis for the purification of all proteins and polypeptides from beer. *J. Int. Brew.*, 99 (1993) 63-65; C.A., 118 (1993) 146382c.
- 1622 Ramanujam, K.S.; Seetharam, S. and Seetharam, B.: Regulated expression of intrinsic factor-cobalamin receptor by rat visceral yolk sac and placental membranes. *Biochim. Biophys. Acta*, 1146 (1993) 243-246.
- 1623 Tsoris, P.A.: A comparative two-dimensional gel protein database of the intact and regenerating newt limbs. *Electrophoresis (Weinheim)*, 14 (1993) 148-156.
- 1624 Turk, B., Krizaj, I., Kralj, B., Bolenc, I., Popovic, T., Bieth, J.G. and Turk, V.: Bovine stefin C, a new member of the stefin family. *J. Biol. Chem.*, 268 (1993) 7323-7329.
- See also 1491.
20. ENZYMES AND ENZYME ACTIVITY ESTIMATION
- 1625 Destro-Bisol, G.: Reusing Cellogel strips after visualization of electrophoretically separated isozymes. *Electrophoresis (Weinheim)*, 14 (1993) 238-239.

- 1626 Tucker, M.M., Worsham, L.M.S. and Ernst-Fonberg, M.L.: Nucleotide cofactor-binding-domain-specific antibodies show immunologic relatedness among unrelated proteins that bind phosphoryl compounds. *Biochim. Biophys. Acta*, 1162 (1993) 315-322.
- 20a. *Oxidoreductases*
- 1627 Blamey, J.M. and Adams, M.W.W.: Purification and characterization of pyruvate ferredoxin oxidoreductase from the hyperthermophilic archaeon *Pyrococcus furiosus*. *Biochim. Biophys. Acta*, 1161 (1993) 19-27.
- 1628 De Carolis, E. and de Luca, V.: Purification, characterization, and kinetic analysis of a 2-oxoglutarate-dependent dioxygenase involved in vindoline biosynthesis from *Catharanthus roseus*. *J. Biol. Chem.*, 268 (1993) 5504-5511.
- 1629 Dubinin, E.E., Turkin, V.V., Babenko, G.A. and Isakov, V.A.: (Isolation and properties of human blood plasma superoxide dismutase). *Biokhimiya (Moscow)*, 57 (1992) 1892-1901.
- 1630 Ferraretto, A., Negri, A., Giuliani, A., de Grada, L., Fuhrman Conti, A.M. and Ronchi, S.: Aldose reductase is involved in long-term adaptation of EUE cells to hyperosmotic stress. *Biochim. Biophys. Acta*, 1175 (1993) 283-288.
- 1631 Fujimoto, K., Masuda, K.-i., Asada, N. and Ohnishi, E.: Purification and characterization of prophenoloxidases from pupae of *Drosophila melanogaster*. *J. Biochem. (Tokyo)*, 113 (1993) 285-291.
- 1632 Hampton, R.S. and Rutan, S.C.: Kinetic detection method for the quantitation of isoenzymes on electrophoretic media. *Anal. Chem.*, 65 (1993) 894-899.
- 1633 Hull, H.H. and Wharton, D.C.: Isoelectrophoretic characterization of *Pseudomonas* cytochrome oxidase/nitrite reductase and its heme di-containing domain. *Arch. Biochem. Biophys.*, 301 (1993) 85-90.
- 1634 Jin, J.-Z., Azzi, A., Wang, J.-Y. and Lin, S.-X.: Preparation of the apoenzyme and holoenzyme forms of human 17 $\beta$ -hydroxysteroid dehydrogenase. *J. Chromatogr.*, 614 (1993) 159-163.
- 1635 Ladrière, J.-M., Delcour, J. and Vandenhoute, J.: Sequence of a gene coding for a cytoplasmic alcohol dehydrogenase from *Kluyveromyces marxianus* ATCC 12424. *Biochim. Biophys. Acta*, 1173 (1993) 99-101.
- 1636 Miller, R.W., Yu, Z. and Zarkadas, C.G.: The nitrogenase proteins of *Rhizobium meliloti*: purification and properties of the MoFe and Fe components. *Biochim. Biophys. Acta*, 1163 (1993) 31-41.
- 1637 Ocheretina O., Harnecker, J., Rother, T., Schmid, R. and Scheibe, R.: Effects of N-terminal truncations upon chloroplast NADP-malate dehydrogenases from pea and spinach. *Biochim. Biophys. Acta*, 1163 (1993) 10-16.
- 1638 Ohshima, T. and Soda, K.: Valine dehydrogenase from a non-spore-forming bacterium, *Alcaligenes faecalis*: purification and characterization. *Biochim. Biophys. Acta*, 1162 (1993) 221-226.
- 1639 Sadeque, A.J.M., Thummel, K.E. and Rettie, A.E.: Purification of macaque liver flavin-containing monooxygenase: a form of the enzyme related immunochemically to an isozyme expressed selectively in adult human liver. *Biochim. Biophys. Acta*, 1162 (1993) 127-134.
- 1640 Schlenk, D. and Buhler, D.R.: Immunological characterization of flavin-containing monooxygenases from the liver of rainbow trout (*Oncorhynchus mykiss*): sexual- and age-dependent differences and the effect of trimethylamine on enzyme regulation. *Biochim. Biophys. Acta*, 1156 (1993) 103-106.
- 1641 Seronie-Vivien, S., Favre, G., Chevreau, C. and Soula, G.: Abnormal lactate dehydrogenase isoenzyme pattern in serum of a patient with a testicular tumor. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2354-2355.
- 1642 Shirahase, Y., Watazu, Y., Kaneda, N., Uji, Y., Okabe, H. and Karmen, A.: Specific assay of serum lactate dehydrogenase isoenzyme 1 by proteolysis with  $\alpha$ -chymotrypsin and protein denaturation. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2193-2196.
- 1643 Sorensen, H.N., Hvattum, E., Paulssen, E.J., Gautvik, K.M., Bremer, J. and Spydevold, O.: Induction of peroxisomal acyl-CoA oxidase by 3-thia fatty acid, in hepatoma cells and hepatocytes in culture is modified by dexamethasone and insulin. *Biochim. Biophys. Acta*, 1171 (1993) 263-271.
- 1644 Van Schijndel, J.W.P.M., Vollenbroek, E.G.M. and Wever, R.: The chloroperoxidase from the fungus *Curvularia inaequalis*: a novel vanadium enzyme. *Biochim. Biophys. Acta*, 1161 (1993) 249-256.
- 1645 Yamaguchi, M. and Hatefi, Y.: Mitochondrial NADH:ubiquinone oxidoreductase (complex I): proximity of the subunits of the flavoprotein and the iron-sulfur protein subcomplexes. *Biochemistry*, 32 (1993) 1935-1939.
- See also 1414, 1759.
- 20b. *Transferases (excl. E.C. 2.7.-.)*
- 1646 Ahmad, H., Singhal, S.S., Saxena, M. and Awasthi, Y.C.: Characterization of two novel subunits of the  $\alpha$ -class glutathione S-transferases of human liver. *Biochim. Biophys. Acta*, 1161 (1993) 333-336.
- 1647 Cordella-Miele, E., Miele, L., Beninati, S. and Mukherjee, A.B.: Transglutaminase-catalyzed incorporation of polyamines into phospholipase A<sub>2</sub>. *J. Biochem. (Tokyo)*, 113 (1993) 164-173.
- 1648 Hall, T.R., Wallin, R., Reinhart, G.D. and Hutson, S.M.: Branched chain aminotransferase isoenzymes. Purification and characterization of the rat brain isoenzyme. *J. Biol. Chem.*, 268 (1993) 3092-3098.
- 1649 Koyama, T., Obata, S., Osabe, M., Takeshita, A., Yokoyama, K., Uchida, M., Nishino, T. and Ogura, K.: Thermostable farnesyldiphosphate synthase of *Bacillus stearothermophilus*: molecular cloning, sequence determination, overproduction, and purification. *J. Biochem. (Tokyo)*, 113 (1993) 355-363.
- 1650 Mathur, M., Sharma, N. and Sachar, R.C.: Differential regulation of S-adenosylmethionine synthetase isozymes by gibberellic acid in dwarf pea epicotyls. *Biochim. Biophys. Acta*, 1162 (1993) 283-290.
- 1651 Taniguchi, M., Tsuchiya, M. and Shimoyama, M.: Comparison of acceptor protein specificities on the formation of ADP-ribose acceptor adducts by arginine-specific ADP-ribosyltransferase from rabbit skeletal muscle sarcoplasmic reticulum with those of the enzyme from chicken peripheral polymorphonuclear cells. *Biochim. Biophys. Acta*, 1161 (1993) 265-271.

- 1652 Yomogida, K., Yamamoto, M., Yamagami, T., Fujita, H. and Hayashi, N.: Structure and expression of the gene encoding rat nonspecific form  $\delta$ -aminolevulinate synthase. *J. Biochem. (Tokyo)*, 113 (1993) 364-371.
- 1653 Yuan, L., Wu, C.-S.C., Craig, S.P., III, Liu, A.F. and Wang, C.C.: Comparing the human and schistosomal hypoxanthine-guanine phosphoribosyltransferases by circular dichroism. *Biochim. Biophys. Acta*, 1162 (1993) 10-16.
- 20c. Transferases transferring phosphorus containing groups (E.C. 2.7.-.)
- 1654 Anschutz, A.L., Um, H.-D., Siegel, N.R., Veron, M. and Klein, C.: P36, a *Dictyostelium discoideum* protein whose phosphorylation is stimulated by GDP, is monologous to the  $\alpha$ -subunit of succinyl-CoA synthetase. *Biochim. Biophys. Acta*, 1162 (1993) 40-46.
- 1655 Biswas, E.E., Chen, P., Gray, W., Li, Y.H., Ray, S. and Biswas, S.B.: Purification and characterization of a yeast DNA polymerase  $\alpha$  complex with associated primase, 5'- $\rightarrow$ 3' exonuclease, and DNA-dependent ATPase activities. *Biochemistry*, 32 (1993) 3013-3019.
- 1656 Boldyreff, B., Meggio, F., Dobrowolska, G., Pinna, L.A. and Islinger, O.-G.: Expression and characterization of a recombinant maize CK-2  $\alpha$  subunit. *Biochim. Biophys. Acta*, 1173 (1993) 32-38.
- 1657 Gout, I., Dhand, R., Panayotou, G., Fry, M.J., Hiles, I., Otsu, M. and Waterfield, M.D.: Expression and characterization of the p85 subunit of the phosphatidylinositol 3-kinase complex and a related p85 $\beta$  protein by using the baculovirus expression system. *Biochem. J.*, 288 (1992) 395-405.
- 1658 Graves, P.R., Haas, D.W., Hagedorn, C.H., DePaoli-Roach, A.A. and Roach, P.J.: Molecular cloning, expression, and characterization of a 49-kilodalton casein kinase I isoform from rat testis. *J. Biol. Chem.*, 268 (1993) 6394-6401.
- 1659 Kikuchi, H., Imajoh-Ohmi, S. and Kanegasaki, S.: Novel antibodies specific for proteolyzed forms of protein kinase C: production of anti-peptide antibodies available for *in situ* analysis of intracellular limited proteolysis. *Biochim. Biophys. Acta*, 1162 (1993) 171-176.
- 1660 Mishin, A.A., Khropov, Yu.V., Tunitskaya, V.L. and Kochetkov, S.N.: (A study of the bacteriophage T7 DNA-dependent RNA polymerase using GTP analogs). *Biokhimiya (Moscow)*, 58 (1993) 43-49.
- 1661 Mukai, H., Kuno, T., Chang, C.-D., Lane, B., Luly, J.R. and Tanaka, C.: FKBP12-FK506 complex inhibits phosphatase activity of two mammalian isoforms of calcineurin irrespective of their substrates or activation mechanisms. *J. Biochem. (Tokyo)*, 113 (1993) 292-298.
- 1662 Ohgi, K., Horiuchi, H., Watanabe, H., Iwama, M., Takagi, M. and Irie, M.: Role of Asp51 and Glu105 in the enzymatic activity of a ribonuclease from *Rhizopus niveus*. *J. Biochem. (Tokyo)*, 113 (1993) 219-224.
- 1663 Ohtsuki, K., Matsumoto, M., Saito, H. and Kato, T.: Characterization of casein kinase II, and of p98 as one of its effective phosphate acceptors in sea urchin eggs. *J. Biochem. (Tokyo)*, 113 (1993) 334-342.
- 1664 Okamoto, M., Hayashi, T., Kono, S., Inoue, G., Kubota, M., Okamoto, M., Kuzuya, H. and Imura, H.: Specific activity of phosphatidylinositol 3-kinase is increased by insulin stimulation. *Biochem. J.*, 290 (1993) 327-333.
- 1665 Redpath, N.T. and Proud, C.G.: Purification and phosphorylation of elongation-factor-2 kinase from rabbit reticulocytes. *Eur. J. Biochem.*, 212 (1993) 511-520.
- 1666 Reynolds, C.H., Willson, M.G., Groffen, J., Heisterkamp, N., Peakman, T.C. and Page, M.J.: Comparison of baculovirus-expressed c-Abl and BCR/ABL protein tyrosine kinases. *Biochim. Biophys. Acta*, 1181 (1993) 122-130.
- 1667 Ruiz-Larrea, F., Vicendo, P., Yaish, P., End, P., Panayotou, G., Fry, M.J., Morgan, S.J., Thompson, A., Parker, P.J. and Waterfield, M.D.: Characterization of the bovine brain cytosolic phosphatidylinositol 3-kinase complex. *Biochem. J.*, 290 (1993) 609-616.
- 1668 Shiesh, S.C., Ting, W.K. and Jap, T.S.: Measurement of creatine kinase isoforms by agarose gel electrophoresis in the diagnosis of myocardial infarction. *Clin. Biochem.*, 25 (1992) 293-301; C.A., 118 (1993) 57335x.
- 1669 Shiota, T., Yasuda, S., Yamada, K., Yamada, M., Nakazawa, A. and Kawasaki, T.: Thiamin-triphosphate-synthesizing activity of mutant cytosolic adenylate kinases: significance of Arg-128 for substrate specificity. *Biochim. Biophys. Acta*, 1161 (1993) 230-234.
- 1670 Su, Y. and Storey, K.B.: Phosphofructokinase from white muscle of the rainbow trout, *Oncorhynchus mykiss*: purification and properties. *Biochim. Biophys. Acta*, 1160 (1992) 301-308.
- 1671 Tomoda, T., Murata, T., Arai, K.-i. and Muramatsu, M.-a.: Mutations on 170Glu, a substrate recognition residue in mouse cAMP-dependent protein kinase, generate enzymes with altered substrate affinity and biological functions. *Biochim. Biophys. Acta*, 1175 (1993) 333-342.
- 1672 Uemori, T., Ishino, Y., Fujita, K., Asada, K. and Kato, I.: Cloning of the DNA polymerase gene of *Bacillus caldotenax* and characterization of the gene product. *J. Biochem. (Tokyo)*, 113 (1993) 401-410.
- See also 1710.
- 20d. Hydrolases, acting on ester bonds (E.C. 3.1.-.)
- 1673 Bessesen, D.H., Richards, C.L., Etienne, J., Goers, J.W. and Eckel, R.M.: Spinal cord of the rat contains more lipoprotein lipase than other brain regions. *J. Lipid Res.*, 34 (1993) 229-238.
- 1674 Brown, E.D., Yada, R.Y. and Marangoni, A.G.: The dependence of the lipolytic activity of *Rhizopus arrhizus* lipase on surfactant concentration in Aerosol-OT/isooctane reverse micelles and its relationship to enzyme structure. *Biochim. Biophys. Acta*, 1161 (1993) 66-72.
- 1675 Cacia, J., Quan, C.P., Vassar, M., Sliwkowski, M.B. and Frenz, J.: Protein sorting by high-performance liquid chromatography. I. Biomimetic interaction chromatography of recombinant human deoxyribonuclease I on polyionic stationary phases. *J. Chromatogr.*, 634 (1993) 229-239.
- 1676 Carozzi, A.J., Kriz, R.W., Webster, C. and Parker, P.J.: Identification, purification and characterization of a novel phosphatidylinositol-specific phospholipase C, a third member of the  $\beta$  subfamily. *Eur. J. Biochem.*, 210 (1992) 521-529.

- 1677 Deng, J.T., Hoylaerts, M.F., van Hoof, V.O. and de Broe, M.E.: Differential release of human intestinal alkaline phosphatase in duodenal fluid and serum. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2532-2538.
- 1678 Grones, J. and Turna, J.: Some properties of restriction endonuclease ApaBI from *Acetobacter pasteurianus*. *Biochim. Biophys. Acta*, 1162 (1993) 323-325.
- 1679 Jones, G., Manczak, M., Wozniak, M. and Ko'reti, R.: Characterization of two major isoforms of juvenile hormone esterase from *Trichoplusia ni* (Lepidoptera). *Biochim. Biophys. Acta*, 1161 (1993) 235-243.
- 1680 Kraemer, F.B., Patel, S., Saedi, M.S. and Szalay, C.: Detection of hormone-sensitive lipase in various tissues. I. Expression of an HSL/bacterial fusion protein and generation of anti-HSL antibodies. *J. Lipid Res.*, 34 (1993) 663-671.
- 1681 Kraemer, F.B., Patel, S., Singh-Bist, A., Gholami, S.S., Saedi, M.S. and Szalay, C.: Detection of hormone-sensitive lipase in various tissues. II. Regulation in the rat testis by human chorionic gonadotropin. *J. Lipid Res.*, 34 (1993) 609-616.
- 1682 Makiya, R. and Stigbrand, T.: Placental alkaline phosphatase as the placental IgG receptor. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2543-2545.
- 1683 Queiroz-Claret, C. and Meunier, J.-C.: Staining technique for phosphatases in polyacrylamide gels. *Anal. Biochem.*, 209 (1993) 228-231.
- 1684 Reina, M., Brunzell, J.D. and Deeb, S.S.: Molecular basis of familial chylomicronemia: mutations in the lipoprotein lipase and apolipoprotein C-II genes. *J. Lipid Res.*, 33 (1992) 1823-1832.
- 1685 Reitz, M. and Gutjahr, P.: Acid DNase activities in peripheral mononuclear blood cells: a possible parameter to detect proliferating cell populations. *Z. Naturforsch., C: Biosci.*, 47 (1992) 910-914; C.A., 118 (1993) 97404a.
- 1686 Reynolds, L.J., Hughes, L.L., Louis, A.I., Kramer, R.M. and Dennis, E.A.: Metal ion and salt effects on the phospholipase A<sub>2</sub>, lysophospholipase, and transacylase activities of human cytosolic phospholipase A<sub>2</sub>. *Biochim. Biophys. Acta*, 1167 (1993) 272-280.
- 1687 Riaublanc, A., Ratomahenina, R. and Galzy, P.: Study of a lipase from *Candida rugosa* Diddens and Lodder. *Fat Sci. Technol.*, 95 (1993) 134-137.
- 1688 Robinson, A.K., de la Peña, C.E. and Barnes, L.D.: Isolation and characterization of diadenosine tetraphosphate (Ap<sub>4</sub>A) hydrolase from *Schizosaccharomyces pombe*. *Biochim. Biophys. Acta*, 1161 (1993) 139-148.
- 1689 Rua, M.L., Díaz-Mauriño, T., Fernández, V.M., Otero, C. and Ballessteros, A.: Purification and characterization of two distinct lipases from *Candida cylindracea*. *Biochim. Biophys. Acta*, 1156 (1993) 181-189.
- 1690 Schuchard, M.D. and Killilea, S.D.: Purification of porcine heart latent protein phosphatase Fc.M. *Prepar. Biochem.*, 22 (1992) 199-213.
- 1691 Simsolo, R.B., Ong, J.M. and Kern, P.A.: Characterization of lipoprotein lipase activity, secretion, and degradation at different sites of post-translational processing in primary cultures of rat adipocytes. *J. Lipid Res.*, 33 (1992) 1777-1784.
- 1692 Steiner, M.R., Bomalaski, J.S. and Clark, M.A.: Responses of purified phospholipases A<sub>2</sub> to phospholipase A<sub>2</sub> activating protein (PLAP) and melittin. *Biochim. Biophys. Acta*, 1166 (1993) 124-130.
- 1693 Tsukada, T.: (Electrophoresis of alkaline phosphatase isozymes). *Med. Technol. (Tokyo)*, 20 (1992) 911-917; C.A., 118 (1993) 75738k - a review with 8 refs.
- 1694 Wei, J.S., Chung, N.C., Wei, L.L.L., Tzeng, W.F., Liu, T.Z. and Wang, J.Y.: High-molecular-mass alkaline phosphatase as a tumor marker for colorectal cancer: comparison of two test methods. *Clin. Chem. (Winston-Salem)*, 39 (1993) 540-543.
- 1695 Wong, Y.W. and Low, M.G.: Phospholipase resistance of the glycosyl-phosphatidylinositol membrane anchor on human alkaline phosphatase. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2517-2525.
- See also 1459, 1632.
- 20e. Hydrolases, acting on glycosyl compounds (E.C. 3.2.-.)*
- 1696 Asaga, H. and Inoue, T.: (Detection of amylase activity resolved by a simple polyacrylamide gel electrophoresis). *Kagaku to Kyoiku*, 40 (1992) 700-701; C.A., 118 (1993) 38155x.
- 1697 Bisenbaev, A.K., Tairov, M.M. and Bersimbaev, R.I.: (The role of protein synthesis and Ca<sup>2+</sup> ions in the mechanism of action of gibberellic acid on  $\alpha$ -amylase secretion from isolated aleurone layers of wheat grains). *Biokhimiya (Moscow)*, 57 (1992) 1834-1840.
- 1698 De la Mata, I., Dominguez, J.M., Macarron, R., Acebal, C., Estrada, P. and Castillon, M.P.: A method to detect  $\beta$ -glucosidase and  $\beta$ -xylosidase activities in polyacrylamide gels. *An. Quim.*, 88 (1992) 365-368; C.A., 118 (1993) 119415j.
- 1699 Golubev, A.M., Nuradieva, A., Rodionova, N.A. and Neustroev, K.N.: (Polygalacturonase from *Geotrichum candidum* 3C: purification and properties). *Biokhimiya (Moscow)*, 57 (1992) 1855-1861.
- 1700 McBride, J.D., Stubberfield, C.R. and Hayes, D.J.: Electrophoretic detection of chitinase isoenzymes using the PhastSystem. *Electrophoresis (Weinheim)*, 14 (1993) 165-167.
- 1701 Sova, V.V., Svetasheva, T.G. and Kostyuk, I.O.: (Molecular mass of endo- $\beta$ -1,3-glucanase from the marine mollusc *Spisula sacha-linensis*). *Biokhimiya (Moscow)*, 57 (1992) 1930-1934.
- See also 1478.
- 20f. Other hydrolases*
- 1702 Abbott, A. and Ball, W.J., Jr.: The epitope for the inhibitory antibody M7-PB-E9 contains Ser-646 and Asp-652 of the sheep Na<sup>+</sup>,K<sup>+</sup>-ATPase  $\alpha$ -subunit. *Biochemistry*, 32 (1993) 3511-3518.
- 1703 Arai, K., Shimaya, A., Hiratani, N. and Ohkuma, S.: Purification and characterization of lysosomal H<sup>+</sup>-ATPase. An anion-sensitive v-type H<sup>+</sup>-ATPase from rat liver lysosomes. *J. Biol. Chem.*, 268 (1993) 5649-5660.
- 1704 Broomfield, S.J. and Hooper, N.M.: Characterization of an antibody to the cross-reacting determinant of the glycosyl-phosphatidylinositol anchor of human membrane dipeptidase. *Biochim. Biophys. Acta*, 1145 (1993) 212-218.
- 1705 Cs-Szabó, G., Fülöp, C., Hadházy, C., Elődi, P. and Glant, T.T.: Substrate specificity of 'elastomucoproteinase': an enzyme which can degrade cartilage aggrecan. *Biochim. Biophys. Acta*, 1162 (1993) 266-274.

- 1706 Hiraga, A., Hata, K., Suzuki, Y. and Tsuiki, S.: Identification of a rat liver protein-tyrosine phosphatase similar to human placental PTPase-1B using quantitatively phosphorylated protein substrates. *J. Biochem. (Tokyo)*, 113 (1993) 180-188.
- 1707 Jang, J.S., Park, D.K., Chun, M. and Byun, S.M.: Identification of autoproteolytic cleavage site in the Asp-49 mutant subtilisin J by site-directed mutagenesis. *Biochim. Biophys. Acta*, 1162 (1993) 233-235.
- 1708 Kawabata, T., Nishimura, Y., Higaki, M. and Kato, K.: Purification and processing of rat liver procathepsin B. *J. Biochem. (Tokyo)*, 113 (1993) 389-394.
- 1709 Kung, S.K.P. and Lau, H.K.F.: Modulation of the plasminogen activation system in murine macrophages. *Biochim. Biophys. Acta*, 1176 (1993) 113-122.
- 1710 Kwak, K.B., Chung, S.S., Kim, O.-M., Kang, M.-S., Ha, D.B. and Chung, C.H.: Increase in the level of m-calpain correlates with the elevated cleavage of filamin during myogenic differentiation of embryonic muscle cells. *Biochim. Biophys. Acta*, 1175 (1993) 243-249.
- 1711 Loch, N., Tauber, R., Becker, A., Hartel-Schenk, S. and Reutter, W.: Biosynthesis and metabolism of dipeptidylpeptidase IV in primary cultured rat hepatocytes and Morris hepatoma 7777 cells. *Eur. J. Biochem.*, 210 (1992) 161-168.
- 1712 Locher, C.P., Vandekerckhove, F. and Tam, L.Q.: Three matrix metalloproteinases form a non-covalent association with the rhopty-associated protein-1 of *Plasmodium falciparum*. *Biochim. Biophys. Acta*, 1160 (1992) 275-280.
- 1713 Maley, G.F., Lobo, A.P. and Maley, F.: Properties of an affinity-column-purified human deoxycytidylate deaminase. *Biochim. Biophys. Acta*, 1162 (1993) 161-170.
- 1714 Michaud, D., Faye, L. and Yelle, S.: Electrophoretic analysis of plant cysteine and serine proteinases using gelatin-containing polyacrylamide gels and class-specific proteinase inhibitors. *Electrophoresis (Weinheim)*, 14 (1993) 94-98.
- 1715 Morin, P.J., Johnson, R.J. and Fine, R.E.: Kinesin is rapidly transported in the optic nerve as a membrane associated protein. *Biochim. Biophys. Acta*, 1146 (1993) 275-281.
- 1716 Mulholland, F., Movahedi, S., Hague, G.R. and Kasumi, T.: Monitoring tripeptidase activity using capillary electrophoresis. Comparison with the ninhydrin assay. *J. Chromatogr.*, 636 (1993) 63-68.
- 1717 Ohta, H., Sawabu, N., Kawakami, H., Watanabe, H., Ozaki, K., Toya, D. and Hattori, N.: Characterization of  $\gamma$ -glutamyltranspeptidase from human hepatocellular carcinoma, compared with enzymes from normal liver and cirrhotic liver. *Clin. Chim. Acta*, 214 (1993) 83-92.
- 1718 Okamoto, Y., Otsuka-Fuchino, H., Horiuchi, S., Tamiya, T., Matsumoto, J.J. and Tsuchiya, T.: Purification and characterization of two metalloproteinases from squid mantle muscle, myosinase I and myosinase II. *Biochim. Biophys. Acta*, 1161 (1993) 97-104.
- 1719 Santarén, J.F., Alconada, A. and Cuevva, J.M.: Examination of processing of the rat liver mitochondrial F1-ATPase  $\beta$  subunit precursor protein by high-resolution 2D-gel electrophoresis. *J. Biochem. (Tokyo)*, 113 (1993) 129-131.
- 1720 Shi, Y.E., Torri, J., Yieh, L., Wellstein, A., Lippman, M.E. and Dickson, R.B.: Identification and characterization of a novel matrix-degrading protease from hormone-dependent human breast cancer cells. *Cancer Res.*, 53 (1993) 1409-1415.
- 1721 Siddiqui, A.A., Zhou, Y., Podesta, R.B., Karcz, S.R., Tognon, C.E., Strejan, G.H., Dekaban, G.A. and Clarke, M.W.: Characterization of  $\text{Ca}^{2+}$ -dependent neutral protease (calpain) from human blood flukes, *Schistosoma mansoni*. *Biochim. Biophys. Acta*, 1181 (1993) 37-44.
- 1722 Tamanoue, Y., Takahashi, T. and Takahashi, K.: Purification and characterization of two isoforms of serine proteinase from the microsomal membranes of rat liver. *J. Biochem. (Tokyo)*, 113 (1993) 229-235.
- 1723 Yamaguchi, T., Kido, H., Kitazawa, R., Kitazawa, S., Fukase, M. and Katunuma, N.: A membrane-bound metallo-endopeptidase from rat kidney: its immunological characterization. *J. Biochem. (Tokyo)*, 113 (1993) 299-303.
- 1724 Yokoyama, K., Ohmori, H. and Kumon, A.: Isolation of  $\text{N}^{\omega}$ -phosphoarginine hydrolase from rat liver and its physical properties. *J. Biochem. (Tokyo)*, 113 (1993) 236-240.
- 1725 Zhang, H.-Z., Scanlon, M., Murray, J.L., III and Chan, J.C.: Substrate preference of metalloproteinases secreted by ts-110 moloney murine sarcoma virus-transformed normal rat kidney cells. *Biochim. Biophys. Res. Commun.*, 189 (1992) 21-26.
- See also 1438, 1454, 1512.
- 20g. Lyases**
- 1726 Pandey, K.N. and Kanungo, J.: Expression of extracellular ligand-binding domain of murine guanylate cyclase/atrial natriuretic factor receptor cDNA in *Escherichia coli*. *Biochim. Biophys. Res. Commun.*, 190 (1993) 724-731.
- 1727 Yu, S., Kenne, L. and Pedersen, M.:  $\alpha$ -1,4-Glucan lyase, a new class of starch/glycogen degrading enzyme. I. Efficient purification and characterization from red seaweeds. *Biochim. Biophys. Acta*, 1156 (1993) 313-320.
- See also 1286.
- 20h. Isomerases**
- 1728 Hasumi, H. and Nishikawa, T.: Purification and properties of multiple molecular forms of yeast peptidyl prolyl *cis-trans* isomerase. *Biochim. Biophys. Acta*, 1161 (1993) 161-167.
- 20j. Complex mixtures and incompletely identified enzymes**
- 1729 Charnock, C. and Bergan, T.: Multilocus enzyme electrophoresis of major O-antigen reference strains of *Pseudomonas aeruginosa*. *Eur. J. Clin. Microbiol. Infect. Dis.*, 11 (1992) 810-816; C.A., 118 (1993) 120262p.
- 1730 Kuroda, K., Kagiyama-Takahashi, R., Okuda, A. and Omori, A.: Identification of the specific labile sites in the 180 kDa catalytic polypeptide of the *Drosophila melanogaster* DNA polymerase  $\alpha$ -primase complex. *J. Biochem. (Tokyo)*, 113 (1993) 126-128.
- 1731 Moss, D.M., Visvesvara, G.S., Mathews, H.M. and Ware, D.A.: Isoenzyme comparison of axenic *Giardia lamblia* strains. *J. Protozool.*, 39 (1992) 559-564; C.A., 118 (1993) 3533s.
- 1732 Toenjem, T., Caugant, D. and Boevre, K.: Differentiation of *Moraxella nonliquefaciens*, *M. lacunata*, and *M. bovis* by using multilocus enzyme electrophoresis and hybridization with pilin-specific DNA probes. *J. Clin. Microbiol.*, 30 (1992) 3099-3107; C.A., 118 (1993) 120764d.

21. PURINES, PYRIMIDINES, NUCLEIC ACIDS AND THEIR CONSTITUENTS
- 21a. *Purines, pyrimidines, nucleosides, nucleotides*
- 1733 Baba, Y., Tsuhako, M., Sawa, T. and Akashi, M.: Temperature-programmed capillary affinity gel electrophoresis for the sensitive base-specific separation of oligodeoxynucleotides. *J. Chromatogr.*, 632 (1993) 137-143.
- 1734 Bevan, C.D., Mutton, I.M. and Pipe, A.J.: Resolution of diastereomeric phosphoramidate bridged unnatural oligonucleotides by micellar electrokinetic chromatography. *J. Chromatogr.*, 636 (1993) 113-123.
- 1735 Cannistraro, V.J. and Kennell, D.: The 5' ends of RNA oligonucleotides in *Escherichia coli* and mRNA degradation. *Eur. J. Biochem.*, 213 (1993) 285-293.
- 1736 Grune, T., Ross, G.A., Schmidt, H., Siems, W. and Perrett, D.: Optimized separation of purine bases and nucleosides in human cord plasma by capillary zone electrophoresis. *J. Chromatogr.*, 636 (1993) 105-111.
- 1737 Kiehlbauch, C.C., Aboul-Ela, N., Jacobson, E.L., Ringer, D.P. and Jacobson, M.K.: High resolution fractionation and characterization of ADP-ribose polymers. *Anal. Biochem.*, 208 (1993) 26-34.
- 1738 Li, W., Moussa, A. and Giese, R.W.: Capillary electrophoresis with laser fluorescence detection for profiling damage to fluorescein-labeled deoxyadenylic acid by background, ionizing radiation and hydrogen peroxide. *J. Chromatogr.*, 633 (1993) 315-319.
- 1739 Peter, M.E., She, J., Huber, L.A. and Terhorst, C.: Labelling of adenine and guanine nucleotide-binding proteins in permeabilized cells with *in situ* periodate-oxidized nucleotides. *Anal. Biochem.*, 210 (1993) 77-85.
- 1740 Taylor, C., Ford, K., Connolly, B.A. and Hornby, D.P.: Determination of the order of substrate addition to Mspl DNA methyltransferase using a novel mechanism-based inhibitor. *Biochem. J.*, 291 (1993) 493-504.
- 1741 Xodo, L.E., Alunni-Fabbroni, M., Manzini, G. and Quadrifoglio, F.: Sequence-specific DNA-triplex formation at imperfect homopurine-homopyridine sequences within a DNA plasmid. *Eur. J. Biochem.*, 212 (1993) 395-401.
- See also 1684, 1835.
- 21b. *Nucleic acids, RNA*
- 1742 Amrani, D.L., Rosenberg, J., Samad, F., Bergstrom, G. and Banfield, D.K.: Developmental expression of chicken antithrombin III is regulated by increased RNA abundance and intracellular processing. *Biochim. Biophys. Acta*, 1171 (1993) 239-246.
- 1743 An, G. and Wu, R.: cDNA Cloning of a hnRNP A1 isoform and its regulation by retinol in monkey tracheobronchial epithelial cells. *Biochim. Biophys. Acta*, 1172 (1993) 292-300.
- 1744 Baba, Y. and Tsuhako, M.: High-performance separation of polynucleotides by capillary gel electrophoresis. *Nucleic Acids Symp. Ser.*, 27(Nineteenth Symposium on Nucleic Acids Chemistry, 1992) (1992) 49-50; *C.A.*, 118 (1993) 142844g.
- 1745 Canossa, M., Ventura, C., Vaona, I., Carboni, L., Guarneri, C. and Spampinato, S.: Prodynorphin mRNA expression in adult cultured rat ventricular cardiac myocytes. *Biochim. Biophys. Acta*, 1172 (1993) 247-250.
- 1746 Colwell, N.S., Aleman-Gomez, J.A. and Kumar, B.V.: Molecular cloning and expression of rabbit pancreatic cholesterol esterase. *Biochim. Biophys. Acta*, 1172 (1993) 175-180.
- 1747 Coutts, M., Krowczynska, A. and Brawerman, G.: Protection of mRNA against nucleases in cytoplasmic extracts of mouse sarcoma ascites cells. *Biochim. Biophys. Acta*, 1173 (1993) 49-56.
- 1748 Engle, M.J. and Alpers, D.H.: The two mRNAs encoding rat intestinal alkaline phosphatase represent two distinct nucleotide sequences. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2506-2509.
- 1749 Franco del Amo, F., Gendron-Maguire, M., Swiatek, P.J. and Gridley, T.: Cloning, sequencing and expression of the mouse mammalian achaete-scute homolog 1 (MASH1). *Biochim. Biophys. Acta*, 1171 (1993) 323-327.
- 1750 Freeman, T.C., Wood, I.S., Sirinathsinghji, D.J.S., Beechey, R.B., Dyer, J. and Shirazi-Beechey, S.P.: The expression of the Na<sup>+</sup>/glucose cotransporter (SGLT1) gene in lamb small intestine during postnatal development. *Biochim. Biophys. Acta*, 1146 (1993) 203-212.
- 1751 Gadson, P., Jr. and McCoy, J.: Differential expression of tyrosine aminotransferase by glucocorticoids and insulin. *Biochim. Biophys. Acta*, 1173 (1993) 22-31.
- 1752 Hromas, R., May, W., Denny, C., Raskind, W., Moore, J., Maki, R.A., Beck, E. and Klemsz, M.J.: Human FLI-1 localizes to chromosome 11Q24 and has an aberrant transcript in neuroepithelioma. *Biochim. Biophys. Acta*, 1172 (1993) 155-158.
- 1753 Itoh, T. and Teraoka, H.: Cloning and tissue-specific expression of cDNAs for the human and mouse homologues of rat pancreatitis-associated protein (PAP). *Biochim. Biophys. Acta*, 1172 (1993) 184-186.
- 1754 Kambe, F., Tsukahara, S., Kato, T. and Seo, H.: The POU-domain protein Oct-1 is widely expressed in adult rat organs. *Biochim. Biophys. Acta*, 1171 (1993) 307-310.
- 1755 Komori, M., Kikuchi, O., Sakuma, T., Funaki, J., Kitada, M. and Kamataki, T.: Molecular cloning of monkey liver cytochrome P-450 cDNAs: similarity of the primary sequences to human cytochromes P-450. *Biochim. Biophys. Acta*, 1171 (1992) 141-146.
- 1756 Kurabayashi-Ohta, K., Tamatsukuri, S., Hikata, M., Miyamoto, C. and Furuiichi, Y.: Application of oligo(dT)<sub>30</sub>-latex for rapid purification of poly(A)<sup>+</sup> mRNA and for hybrid subtraction with the *in situ* reverse transcribed cDNA. *Biochim. Biophys. Acta*, 1156 (1993) 204-212.
- 1757 Labelle, Y., Puymirat, J. and Tanguay, R.M.: Localization of cells in the rat brain expressing fumarylacetoacetate hydrolase, the deficient enzyme in hereditary tyrosinemia type 1. *Biochim. Biophys. Acta*, 1180 (1993) 250-256.
- 1758 Leetun, D.T., Bruns, E. and Bruns, D.E.: Decreased abundance of alkaline phosphatase and calbindin-D<sub>9k</sub> mRNAs in the intestine of the spontaneously hypertensive rat. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2526-2531.
- 1759 Mahmud, I., Suzuki, T., Yamamoto, Y., Suzuki, H., Takahashi, Y., Yoshimoto, T. and Yamamoto, S.: Induction of cyclooxygenase and suppression of 12-lipoxygenase in human erythroleukemia cells upon phorbol ester-induced differentiation. *Biochim. Biophys. Acta*, 1166 (1993) 211-216.

- 1760 Mangasarian, K. and Mellon, W.S.: 1,25-Dihydroxyvitamin D<sub>3</sub> destabilizes c-myc mRNA in HL-60 leukemic cells. *Biochim. Biophys. Acta*, 1172 (1993) 55-63.
- 1761 Marie, S., Roussel, F. and Cresteil, T.: Age- and tissue-dependent expression of CYP2C23 in the rat. *Biochim. Biophys. Acta*, 1172 (1993) 124-130.
- 1762 Matsuda, S., Murakami, J., Yamamoto, Y., Konishi, Y., Yokoyama, C., Yoshimoto, T., Yamamoto, S., Mirmura, Y. and Okuma, M.: Decreased messenger RNA of arachidonate 12-lipoxygenase in platelets of patients with myeloproliferative disorders. *Biochim. Biophys. Acta*, 1180 (1993) 243-249.
- 1763 Mitchell, A., Fidge, N. and Griffiths, P.: The effect of the HMG-CoA reductase inhibitor simvastatin and of cholestyramine on hepatic apolipoprotein mRNA levels in the rat. *Biochim. Biophys. Acta*, 1167 (1993) 9-14.
- 1764 Nakagawa, T., Hosaka, M., Torii, S., Watanabe, T., Murakami, K. and Nakayama, K.: Identification and functional expression of a new member of the mammalian Kex2-like processing endopeptidase family: its striking structural similarity to PACE4. *J. Biochem. (Tokyo)*, 113 (1993) 132-135.
- 1765 Nzouzi, N.L., Guerin, M.F. and Hayes, D.H.: Comparison of electrophoretic distribution patterns of ribosomal RNA gene restriction fragments and of ribosomal subunit proteins of *Lactococci*, *Streptococci*, and *Pediococi*. *Biochimie*, 74 (1992) 1007-1017; C.A., 118 (1993) 120260m.
- 1766 Otero, A., Bustelo, X.R., Pichel, J.G., Freire, M. and Gómez-Márquez, J.: Transcript levels of thymosin  $\beta_4$ , an'actin-sequestering peptide, in cell proliferation. *Biochim. Biophys. Acta*, 1176 (1993) 59-63.
- 1767 Palmer, C.N.A., Richardson, T.H., Griffin, K.J., Hsu, M.-H., Muerhoff, A.S., Clark, J.E. and Johnson, E.F.: Characterization of a cDNA encoding a human kidney, cytochrome P-450 4A fatty acid  $\omega$ -hydroxylase and the cognate enzyme expressed in *Escherichia coli*. *Biochim. Biophys. Acta*, 1172 (1993) 161-166.
- 1768 Peri, K.G. and McKenzie, R.E.: NAD<sup>+</sup>-Dependent methylene-tetrahydrofolate dehydrogenase-cyclohydrolase: detection of the mRNA in normal murine tissues and transcriptional regulation of the gene in cell lines. *Biochim. Biophys. Acta*, 1171 (1993) 281-287.
- 1769 Perry, A.C.F., Jones, R. and Hall, L.: Sequence analysis of monkey acrosin-trypsin inhibitor transcripts and their abundant expression in the epididymis. *Biochim. Biophys. Acta*, 1172 (1992) 159-160.
- 1770 Price, B.D. and Laughon, A.: The isolation and characterization of a *Drosophila* gene encoding a putative NAD-dependent methylenetetrahydrofolate dehydrogenase-methenyltetrahydrofolate cyclohydrolase. *Biochim. Biophys. Acta*, 1173 (1993) 94-98.
- 1771 Rabbani, S.A., Yasuda, T., Bennett, H.P.J., Hendy, G.N. and Banville, D.: Nucleotide and (derived) amino acid sequence of a novel peptide from a rat (hypercalcemic) Leydig cell tumor. *Biochim. Biophys. Acta*, 1171 (1992) 229-230.
- 1772 Shibahara, S., Yoshizawa, M., Suzuki, H., Takeda, K., Meguro, K. and Endo, K.: Functional analysis of cDNAs for two types of human heme oxygenase and evidence for their separate regulation. *J. Biochem. (Tokyo)*, 113 (1993) 214-218.
- 1773 Slobin, L.I. and Rao, M.N.: Translational repression of EF-1 $\alpha$  mRNA *in vitro*. *Eur. J. Biochem.*, 213 (1993) 919-926.
- 1774 Spencer, T.A. and Mackie, G.A.: The nucleotide sequence of a cloned DNA encoding ribosomal protein S6 from *Drosophila melanogaster*. *Biochim. Biophys. Acta*, 1172 (1993) 332-334.
- 1775 St-Pierre, B., Couture, C., Laroche, A. and Pallotta, D.: Two developmentally regulated mRNAs encoding actin-binding proteins in *Physarum polycephalum*. *Biochim. Biophys. Acta*, 1173 (1993) 107-110.
- 1776 Tanabe, T., Yamada, M., Norma, T., Kajii, T. and Nakazawa, A.: Tissue-specific and developmentally regulated expression of the genes encoding adenylate kinase isozymes. *J. Biochem. (Tokyo)*, 113 (1993) 200-207.
- 1777 Thompson, M.P., Cooper, S.T., Parry, B.R. and Tuckey, J.A.: Increased expression of the mRNA for hormone-sensitive lipase in adipose tissue of cancer patients. *Biochim. Biophys. Acta*, 1180 (1993) 236-242.
- 1778 Traber, P.G., McDonnell, W.M., Wang, W. and Florence, R.: Expression and regulation of cytochrome P-450I genes (CYP1A1 and CYP1A2) in the rat alimentary tract. *Biochim. Biophys. Acta*, 1171 (1992) 167-175.
- 1779 Tsukamoto, A., Kaneko, Y. and Kurokawa, K.: Thapsigargin, an inhibitor of endoplasmic reticulum Ca<sup>2+</sup>-ATPase, enhances c-fos expression but antagonizes vacuole formation of human hepatoma cells induced by teleocidin. *Biochim. Biophys. Acta*, 1177 (1993) 31-36.
- 1780 Van Groenigen, M., Valentijn, L.J. and Baas, F.: Identification of a functional initiator sequence in the human MDR1 promoter. *Biochim. Biophys. Acta*, 1172 (1993) 138-146.
- 1781 Van Leuven, F., Stas, L., Raymakers, L., Overbergh, L., de Strooper, B., Hilliker, C., Lorent, K., Fias, E., Umans, L., Torrekens, S., Serneels, L. et al.: Molecular cloning and sequencing of the murine alpha-2-macroglobulin receptor cDNA. *Biochim. Biophys. Acta*, 1173 (1993) 71-74.
- 1782 Wein, K.-H., Netzker, R. and Brand, K.: Cell cycle-related expression of poly(ADP-ribosyl)transferase in proliferating rat thymocytes. *Biochim. Biophys. Acta*, 1176 (1993) 69-76.
- 1783 Yang, F.L., David, E.A. and DiSilverstro, R.A.: Neonatal rat liver contains low concentrations of Cu-Zn superoxide dismutase protein and mRNA. *Biochim. Biophys. Acta*, 1156 (1993) 232-234.
- 1784 Zahedi, K. and Whitehead, A.S.: Regulation of mouse serum amyloid P gene expression by cytokines *in vitro*. *Biochim. Biophys. Acta*, 1176 (1993) 162-168.
- See also 1280, 1374, 1379, 1472, 1580, 1603, 1652, 1673, 1681, 1785, 1799, 1807, 1834, 1845, 1850, 1856, 1860, 1871, 1889.
- 21c. *Nucleic acids, DNA*
- 1785 Abrama, E.S. and Stanton, V.P., Jr.: Use of denaturing gradient gel electrophoresis to study conformational transitions in nucleic acids. *Methods Enzymol.*, 212(DNA Struct., Pt. B) (1992) 71-104; C.A., 118 (1993) 55437h.
- 1786 Arshad, M.F., Dunn, F.J., Vega, R., Valvano, J.W. and Serwer, P.: Progress in developing improved programs for pulsed field agarose gel electrophoresis of DNA. *Electrophoresis (Weinheim)*, 14 (1993) 344-348.
- 1787 Belotserkovskii, B.P. and Frank-Kamenetskii, M.D.: Study of pH-dependent structural transition in telomeric sequences by two-dimensional gel electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 266-270.

- 1788 Boffini, A. and Prentki, P.: Two-dimensional gel selection of protein binding sites on DNA. *Electrophoresis (Weinheim)*, 14 (1993) 259-265.
- 1789 Bonincontro, A., Matzeu, M., Mazzei, F., Minoprio, A. and Pedone, F.: Influence of defects on the electrophoretic, thermodynamic and dielectric properties of a 21 base pair DNA in solution. *Biochim. Biophys. Acta*, 1171 (1993) 288-294.
- 1790 Bowater, R., Aboul-Ela, F. and Lilley, D.M.J.: Two-dimensional gel electrophoresis of circular DNA topoisomers. *Methods Enzymol.*, 212(DNA Struct., Pt. B) (1992) 105-120; C.A., 118 (1993) 5543g.
- 1791 Buchko, G.W. and Weinfeld, M.: Influence of nitrogen, oxygen, and nitroimidazole radiosensitizers on DNA damage induced by ionizing radiation. *Biochemistry*, 32 (1993) 2186-2193.
- 1792 De Bellis, A., Quigley, C.A., Cariello, N.F., El-Awady, M.K., Sar, M., Lane, M.V., Wilson, E.M. and French, F.S.: Single base mutations in the human androgen receptor gene causing complete androgen insensitivity: rapid detection by a modified denaturing gradient gel electrophoresis technique. *Mol. Endocrinol.*, 6 (1992) 1909-1920; C.A., 118 (1993) 14032s.
- 1793 Défontaines, A.-D. and Viovy, J.-L.: Gel electrophoresis of an end-labeled DNA. I. Dynamics and trapping in constant fields. *Electrophoresis (Weinheim)*, 14 (1993) 8-17.
- 1794 Demmer, J., Hill, D.F. and Petersen, G.B.: Characterization of two sheep insulin-like growth factor II cDNAs with different 5'-untranslated regions. *Biochim. Biophys. Acta*, 1173 (1993) 79-80.
- 1795 Diekmann, S.: Analyzing DNA curvature in polyacrylamide gels. *Methods Enzymol.*, 212(DNA Struct., Pt. B) (1992) 30-46; C.A., 118 (1993) 76448c.
- 1796 Droege, P. and Nordheim, A.: Topoisomer gel retardation: protein recognition of torsional stress-induced DNA conformations. *Methods Enzymol.*, 212(DNA Struct., Pt. B) (1992) 371-387; C.A., 118 (1993) 55439k.
- 1797 Erickson, C.E. and Castora, F.J.: PCR amplification using a single cell allows the detection of the mtDNA lesion associated with leber's hereditary optic neuropathy. *Biochim. Biophys. Acta*, 1181 (1993) 77-82.
- 1798 Fattorini, P., Cacciò, S., Gustincih, S., Florian, F., Altamura, B.M. and Graziosi, G.: Sex identification by polymerase chain reaction of  $\alpha$ -satellite in aged tissue samples. *Electrophoresis (Weinheim)*, 14 (1993) 23-26.
- 1799 Feng, X.-H., Zhao, Y., Bottino, P.J. and Kung, S.-d.: Cloning and characterization of a novel member of protein kinase family from soybean. *Biochim. Biophys. Acta*, 1172 (1993) 200-204.
- 1800 Gerdes, A.-M., Horder, M., Petersen, P.H. and Bonnevie-Nielsen, V.: Effect of increased gene dosage expression on the  $\alpha$ -interferon receptors in Down's syndrome. *Biochim. Biophys. Acta*, 1181 (1993) 135-140.
- 1801 Gosnell, D.L. and Zimm, B.H.: Measurement of diffusion coefficients of DNA in agarose gel. *Macromolecules*, 26 (1993) 1304-1308; C.A., 118 (1993) 120264r.
- 1802 Guo, X.H., Huff, E.J. and Schwartz, D.C.: Sizing single DNA molecules. *Nature (London)*, 359(6398) (1992) 783-784; C.A., 118 (1993) 35404s.
- 1803 Hayashizaki, Y., Hirotsume, S., Okazaki, Y., Hatada, I., Shibata, H., Kawai, J., Hirose, K., Watanabe, S., Fushiki, S., Wada, S., Sugimoto, T. et al.: Restriction landmark genomic scanning method and its various applications. *Electrophoresis (Weinheim)*, 14 (1993) 251-258.
- 1804 Hayes, C.K., Harman, G.E., Woo, S.L., Gullino, M.L. and Lorito, M.: Methods for electrophoretic karyotyping of filamentous fungi in the genus *Trichoderma*. *Anal. Biochem.*, 209 (1993) 176-182.
- 1805 Heiger, D.N.: High performance capillary electrophoresis of DNA using continuous and pulsed electric fields. *Avail. Univ. Microfilms Int.*, Order DA9205758, 1991, 330 pp.; C.A., 118 (1993) 120275v.
- 1806 Heller, C. and Beck, S.: Membrane electrophoresis of DNA. *Electrophoresis (Weinheim)*, 14 (1993) 162-164.
- 1807 Heller, M.J.: Method for the electrophoretic separation of nucleic acids and other linear macromolecules in gel media with restrictive pore diameters. *PCT Int. Appl.* WO 92 19,960 (Cl. GO1N27/26), 12 Nov. 1992, US Appl. 698,482, 09 May 1991; 89 pp.; C.A., 118 (1993) 55621p.
- 1808 Howard, T.D. and Holzwarth, G.: Fluctuations in the velocity of individual DNA molecules during agarose gel electrophoresis. *Biophys. J.*, 63 (1992) 1487-1492; C.A., 118 (1993) 76454b.
- 1809 Hoylaerts, M.F., Manes, T. and Millán, J.L.: Allelic amino acid substitutions affect the conformation and immunoreactivity of germ-cell alkaline phosphatase phenotypes. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2493-2500.
- 1810 Imano, E., Kawamori, R., Iwama, N., Umayahara, Y., Yamasaki, Y. and Kamada, T.: Rapid screening method of abnormal insulin-receptor gene expression: allele-specific oligonucleotide hybridization by using silent polymorphisms. *Biochim. Biophys. Acta*, 1181 (1993) 131-134.
- 1811 Ito, T., Hohjoh, H. and Sakaki, Y.: Pulsed-field polyacrylamide gel electrophoresis: basic phenomena and applications. *Electrophoresis (Weinheim)*, 14 (1993) 278-282.
- 1812 Ito, T., Smith, C.L. and Cantor, C.R.: Affinity capture electrophoresis for sequence-specific DNA purification. *Genet. Anal.: Tech. Appl.*, 9 (1992) 96-99; C.A., 118 (1993) 53214j.
- 1813 Jagannatha Rao, K.S., Sridhara Rao, B., Vishnuvardhan, D. and Prasad, K.V.S.: Alteration of superhelical state of DNA by aluminum (Al). *Biochim. Biophys. Acta*, 1172 (1993) 17-20.
- 1814 Kirkpatrick, F.H., Dumais, M.M., White, H.W. and Guiseley, K.B.: Influence of the agarose matrix in pulsed-field electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 349-354.
- 1815 Konrad, M.: Identification and characterization of a yeast gene encoding an adenylate kinase homolog. *Biochim. Biophys. Acta*, 1172 (1993) 12-16.
- 1816 Kotaka, T., Adachi, S. and Shikata, T.: Biased sinusoidal field gel electrophoresis for the separation of large DNA. *Electrophoresis (Weinheim)*, 14 (1993) 313-321.
- 1817 Kowalska-Loth, B., Staron, K., Buraczewska, I., Szumiel, I., Kapiszewska, M. and Lange, C.S.: Reduced sensitivity to camptothecin of topoisomerase I from a L5178Y mouse lymphoma subline sensitive to X-radiation. *Biochim. Biophys. Acta*, 1172 (1993) 117-123.
- 1818 Lahiri, A., Chaudhuri, S. and Bhattacharyya, N.P.: Theoretical analysis of gel electrophoretic data for interaction of lysine rich histone with supercoiled DNA. *Biophys. Chem.*, 45 (1992) 193; C.A., 118 (1993) 55459s.
- 1819 Lai, E.: Improvement of electrophoretic resolution by asymmetric field inversion for single strand DNA separation. *U.S. US 5,178,737 (Cl. 204-182.8; GO1N27/26)*, 12 Jan. 1993, Appl. 803,316, 04 Dec. 1991; 7 pp.; C.A., 118 (1993) 120463e.

- 1820 Lilley, D.M.J. and Dahlberg, J.E. (Editors): *DNA Structures. Part B. Chemical and Electrophoretic Analysis of DNA. Methods Enzymol.*, Vol. 212, Academic, San Diego, 1992, 501 pp.; C.A., 118 (1993) 55587g.
- 1821 Lobos, C. and Vásquez, C.: Purification and characterisation of BstV1 restriction endonuclease, a thermostable isoschizomer of Clal from *Bacillus stearothermophilus* LV. *Biochim. Biophys. Acta*, 1171 (1993) 295-298.
- 1822 Löbrich, M., Ilpeme, S. and Kiefer, J.: Analysis of the inversion effect in pulsed field gel electrophoresis by a two-dimensional contour-clamped homogeneous electric field system. *Anal. Biochem.*, 208 (1993) 65-73.
- 1823 Magdolen, U., Müller, G., Magdolen, V. and Bandlow, W.: A yeast gene (BLH1) encodes a polypeptide with high homology to vertebrate bleomycin hydrolase, a family member of thiol proteinases. *Biochim. Biophys. Acta*, 1171 (1993) 299-303.
- 1824 März, W., Ruzicka, V., Fisher, E., Russ, A.P., Schneider, W. and Gross, W.: Typing of the 3' hypervariable region of the apolipoprotein B gene: approaches, pitfalls, and applications. *Electrophoresis (Weinheim)*, 14 (1993) 169-173.
- 1825 Mayer, P., Sturm, J., Heitz, C. and Weill, G.: Dynamics of DNA under pulsed-field gel electrophoresis as analyzed from birefringence rise and decay. *Electrophoresis (Weinheim)*, 14 (1993) 330-336.
- 1826 Mburu, P.W. and Beebe, T.J.C.: Preliminary characterisation and partial purification of ribosomal gene promoter-binding proteins from *Trypanosoma brucei*. *Biochim. Biophys. Acta*, 1172 (1993) 5-11.
- 1827 Monti, E., Mimnaugh, E.G. and Sinha, B.K.: Synergistic interactions of etoposide and interleukin-1 $\alpha$  are not due to DNA damage in human melanoma cells. *Biochim. Biophys. Acta*, 1180 (1993) 231-235.
- 1828 Mrazek, J. and Spanova, A.: ANAGEL: a personal computer program for evaluating DNA fragment lengths from distances migrated in an agarose gel. *Comput. Appl. Biosci.*, 8 (1992) 524; C.A., 118 (1993) 76519b.
- 1829 Neitzey, L.M., Hutson, M.S. and Holzwarth, G.: Two-dimensional motion of DNA bands during 120° pulsed-field gel electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 298-303.
- 1830 Niederweis, M., Lederer, T. and Hillen, W.: An accurate method for determining the helical repeat of DNA in solution reveals differences to the crystal structures of two B-DNA decamers. *J. Mol. Biol.*, 228 (1992) 322-326; C.A., 118 (1993) 120192r.
- 1831 Nomura, M., Morohashi, K.-i., Kirita, S., Nonaka, Y., Okamoto, M., Nawata, H. and Omura, T.: Three forms of rat CYP11B genes: 11 $\beta$ -hydroxylase gene, aldosterone synthase gene, and a novel gene. *J. Biochem. (Tokyo)*, 113 (1993) 144-152.
- 1832 Nostrand, J.: Polymer dynamics in electrophoresis of DNA. *Annu. Rev. Phys. Chem.*, 43 (1992) 237-256; C.A., 118 (1993) 35332s.
- 1833 Oto, M. and Yuasa, Y.: (Nonisotopic PCR-SSCP technique with silver staining and gradient gel electrophoresis). *Seikagaku*, 65 (1993) 35-38; C.A., 118 (1993) 140734x.
- 1834 Peters, I.D., Rancourt, D.E., Davies, P.L. and Walker, V.K.: Isolation and characterization of an antifreeze protein precursor from transgenic *Drosophila*: evidence for partial processing. *Biochim. Biophys. Acta*, 1171 (1993) 247-254.
- 1835 Reuter, M., Kupper, D., Pein, C.-D., Petrusyte, M., Siksnys, V., Frey, B. and Krüger, D.H.: Use of specific oligonucleotide duplexes to stimulate cleavage of refractory DNA sites by restriction endonucleases. *Anal. Biochem.*, 209 (1993) 232-237.
- 1836 Ribeiro, E.A. and Sutherland, J.C.: Resolving power: a quantitative measure of electrophoretic resolution. *Anal. Biochem.*, 210 (1993) 378-388.
- 1837 Rincon-Limas, D.E., Reséndez-Pérez, D., Ortiz-López, R., Alvarez-Quihui, L.E., Castro-Muñozledo, F., Kuri-Harcuch, W., Martínez-Rodríguez, H.G. et al.: HGH isoforms: cDNA expression, adipogenic activity and production in cell culture. *Biochim. Biophys. Acta*, 1172 (1993) 49-54.
- 1838 Römling, U. and Tümmler, B.: Comparative mapping of the *Pseudomonas aeruginosa* PAO genome with rare-cutter linking clones or two-dimensional pulsed-field gel electrophoresis protocols. *Electrophoresis (Weinheim)*, 14 (1993) 283-289.
- 1839 Sadlock, J.E., Lightowers, R.N., Capaldi, R.A. and Schon, E.A.: Isolation of a cDNA specifying subunit VIb of human cytochrome c oxidase. *Biochim. Biophys. Acta*, 1172 (1993) 223-225.
- 1840 Serwer, P., Hayes, S.J., Moreno, E.T., Louie, D., Watson, R.H. and Son, M.: Pulsed field agarose gel electrophoresis in the study of morphogenesis: packaging of double-stranded DNA in the capsids of bacteriophages. *Electrophoresis (Weinheim)*, 14 (1993) 271-277.
- 1841 Slater, G.W.: Theory of band broadening for DNA gel electrophoresis and sequencing. *Electrophoresis (Weinheim)*, 14 (1993) 1-7.
- 1842 Smith, M.A. and Bar-Yam, Y.: Cellular automaton simulation of pulsed field gel electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 337-343.
- 1843 Sowden, J., Edwards, M., Morrison, K., Butterworth, P.H.W. and Edwards, Y.H.: Erythroid expression and DNase I - hypersensitive sites of the carbonic anhydrase 1 gene. *Biochem. J.*, 288 (1992) 545-551.
- 1844 Stellwagen, N.C. and Stellwagen, J.: "Flip-flop" orientation of agarose gel fibers in pulsed alternating electric fields. *Electrophoresis (Weinheim)*, 14 (1993) 355-368.
- 1845 Štros, M. and Dixon, G.H.: A retropseudogene for non-histone chromosomal protein HMG-1. *Biochim. Biophys. Acta*, 1172 (1993) 231-235.
- 1846 Tee, M.K., Moran, C. and Nicholas, F.W.: Temperature gradient gel electrophoresis: detection of a single base substitution in the cattle  $\beta$ -lactoglobulin gene. *Anim. Genet.*, 23 (1992) 431-435; C.A., 118 (1993) 117601t.
- 1847 Tietz, D. and Chrumbach, A.: DNA shape and separation efficiency in polymer media: a computerized method based on electrophoretic mobility data. *Electrophoresis (Weinheim)*, 14 (1993) 185-190.
- 1848 Tominaga, S.-i., Yokota, T., Yanagisawa, K., Tsukamoto, T., Takagi, T. and Tetsuka, T.: Nucleotide sequence of a complementary DNA for human ST2. *Biochim. Biophys. Acta*, 1171 (1992) 215-218.
- 1849 Torok, T., Royer, C., Rockhold, D. and King, A.D., Jr.: Electrophoretic karyotyping of yeasts and Southern blotting using whole chromosomes as templates for the probe preparation. *J. Gen. Appl. Microbiol.*, 38 (1992) 313-325; C.A., 118 (1993) 117669w.
- 1850 Trnovsky, J.: Semi-dry electroblotting of DNA and RNA from agarose and polyacrylamide gels. *BioTechniques*, 13 (1992) 800-804; C.A., 118 (1993) 35336w.

- 1851 Turmel, C. and Noolandi, J.: Effect of one-dimensional pulsed-field gel electrophoresis on linear and circular DNA. *Electrophoresis (Weinheim)*, 14 (1993) 304-312.
- 1852 VanDevanter, D.R., Yirdaw, G., Do, C., Tysseling, K.A., Drescher, C.A., Forseth, B.J., von Hoff, D.D. and McNutt, M.A.: Preparation of uniform, intact DNA samples from resected tumor tissues for pulsed-field gel electrophoretic analyses. *BioTechniques*, 13 (1992) 884-887; C.A., 118 (1993) 142914e.
- 1853 Varnerot, A., Clement, F., Gheorghiu, M. and Vincent-Levy-Frebault, V.: Pulsed field gel electrophoresis of representatives of *Mycobacterium tuberculosis* and *Mycobacterium bovis* BCG strains. *FEMS Microbiol. Lett.*, 98 (1992) 155-160; C.A., 118 (1993) 56007e.
- 1854 Viovy, J.-L. and Duke, T.: DNA electrophoresis in polymer solutions: Ogston sieving, reptation and constraint release. *Electrophoresis (Weinheim)*, 14 (1993) 322-329.
- 1855 Whatling, C.A. and Thomas, C.M.: Preelectrophoresis of agarose plugs containing bacterial chromosomal DNA prepared for analysis by pulsed field gel electrophoresis can improve the clarity of restriction patterns. *Anal. Biochem.*, 210 (1993) 98-101.
- 1856 Yazaki, N., Fujita, H., Ohta, M., Kawasaki, T. and Itoh, N.: The structure and expression of FGF receptor-1 mRNA isoforms in rat tissues. *Biochim. Biophys. Acta*, 1172 (1993) 37-42.
- 1857 Zhang, T.Y., Fan, J.-B., Ringquist, S., Smith, C.L. and Cantor, C.R.: The 0.7 to 3.3 megabase chromosomes from *Candida*, *Kluyveromyces*, and *Pichia* provide accurate size standards for pulsed field gel electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 290-295.
- 1858 Zsolnai, A., Orbán, L. and Chrambach, A.: Agarose electrophoresis of DNA in discontinuous buffers, using a horizontal slab apparatus and a buffer system with improved properties. *Electrophoresis (Weinheim)*, 14 (1993) 179-184.
- See also 1280, 1562, 1652, 1656, 1744, 1752, 1756, 1779, 1873, 1874, 1876, 1883, 1887, 1939.
- 21d. Structural studies on RNA and RNA mapping**
- 1859 Balakin, A.G., Bogdanova, S.L. and Skripkin, E.A.: (S1-Independent translation of mRNA containing an extended Shine-Dalgarno sequence). *Biokhimiya (Moscow)*, 58 (1993) 98-107.
- 1860 Boussadia, O., Jacquemin-Sablon, H. and Dautry, F.: Exon skipping in the expression of the gene immediately upstream of N-ras (un/NRU). *Biochim. Biophys. Acta*, 1172 (1993) 64-72.
- See also 1652, 1761, 1767, 1780.
- 21e. Structural studies on DNA and DNA mapping**
- 1861 Adom, J.N., Gouilleux, F. and Richard-Foy, H.: Interaction with the nuclear matrix of a chimeric construct containing a replication origin and a transcription unit. *Biochim. Biophys. Acta*, 1171 (1992) 187-197.
- 1862 Aldroubi, A. and Garner, M.M.: Minimal electrophoresis time for DNA sequencing. *BioTechniques*, 13 (1992) 620-624; C.A., 118 (1993) 33650v.
- 1863 Berardini, M.D., Souhami, R.L., Lee, C., Gibson, N.W., Butler, J. and Hartley, J.A.: Two structurally related diazidinylbenzoquinones preferentially cross-link DNA at different sites upon reduction with DT-diaphorase. *Biochemistry*, 32 (1993) 3306-3312.
- 1864 Carlson, D.P., Watkins, P.C. and Klevan, L.: Size markers for electrophoretic and blot hybridization analysis of DNA. *Eur. Pat. Appl. EP 466,404 (Cl. C12Q1/68)*, 15 Jan. 1992, US Appl. 552,406, 13 Jul. 1990; 15 p.; C.A., 118 (1993) 74742v.
- 1865 Carsana, A., Merola, M., Costanzo, C., Maffei, L., Lievens, P.M.J., Furia, A. and Palmieri, M.: Protein-DNA interactions in the 5'-flanking region of the bovine pancreatic ribonuclease gene. *Biochim. Biophys. Acta*, 1171 (1992) 147-152.
- 1866 Crothers, D.M. and Drak, J.: Global features of DNA structure by comparative gel electrophoresis. *Methods Enzymol.*, 212(DNA Struct., Pt. B) (1992) 46-71; C.A., 118 (1993) 76449d.
- 1867 Drabent, B., Kunz, C. and Doenecke, D.: A rat histone H2B pseudogene is closely associated with the histone H1d gene. *Biochim. Biophys. Acta*, 1172 (1993) 193-196.
- 1868 Droege, P. and Cozzarelli, N.R.: Topological structure of DNA knots and catenanes. *Methods Enzymol.*, 212(DNA Struct., Pt. B) (1992) 120-130; C.A., 118 (1993) 55547u.
- 1869 Elia, M.C. and Nichols, W.W.: Application of programmable, autonomously controlled electrode (PACE) technology to the development of an improved pulsed field gel electrophoresis assay for DNA double-strand breaks in mammalian cells. *Int. J. Radiat. Biol.*, 63 (1993) 7-11; C.A., 118 (1993) 142836f.
- 1870 Gruskin, E.A. and Rich, A.: B-DNA to Z-DNA structural transitions in the SC40 enhancer: stabilization of Z-DNA in negatively supercoiled DNA minicircles. *Biochemistry*, 32 (1993) 2167-2176.
- 1871 Gütlich, M., Schott, K., Werner, T., Bacher, A. and Ziegler, I.: Species and tissue specificity of mammalian GTP cyclohydrolase I messenger RNA. *Biochim. Biophys. Acta*, 1171 (1992) 133-140.
- 1872 Iguchi-Ariga, S.M.M., Ogawa, N. and Ariga, H.: Identification of the initiation region of DNA replication in the murine immunoglobulin heavy chain gene and possible function of the octamer motif as a putative DNA replication origin in mammalian cells. *Biochim. Biophys. Acta*, 1172 (1993) 73-81.
- 1873 James, H.L., Girolami, A., Hubbard, J.G., Kumar, A. and Fair, D.S.: The dysfunction of coagulation factor VII<sub>Padua</sub> results from substitution of arginine-304 by glutamine. *Biochim. Biophys. Acta*, 1172 (1993) 301-305.
- 1874 Kigawa, K., Kihara, K., Miyake, Y., Tajima, S., Funahashi, T., Yamamura, T. and Yamamoto, A.: Low-density lipoprotein receptor mutation that deletes exons 2 and 3 by Alu-Alu recombination. *J. Biochem. (Tokyo)*, 113 (1993) 372-376.
- 1875 Lambert, J., Provost, P.R., Marcel, Y.L. and Rassart, E.: Structure of the human apolipoprotein D gene promoter region. *Biochim. Biophys. Acta*, 1172 (1993) 190-192.
- 1876 Le Roux, M.-G., Thézé, N., Wolff, J. and le Pennec, J.-P.: Organization of a rainbow trout estrogen receptor gene. *Biochim. Biophys. Acta*, 1172 (1993) 226-230.
- 1877 Matsunaga, A., Araki, K., Moriyama, K., Handa, K., Arakawa, F., Nishi, K., Sasaki, J. and Arakawa, K.: Detection of a point mutation in cholesteryl ester transfer protein gene by polymerase chain reaction-mediated site-directed mutagenesis. *Biochim. Biophys. Acta*, 1166 (1993) 131-134.

- 1878 Ng, S.W., Wiedemann, M., Kontermann, R. and Petersen, G.: Molecular characterization of a putative peroxidase gene of *Drosophila melanogaster*. *Biochim. Biophys. Acta*, 1171 (1992) 224-228.
- 1879 Niwa, H., Araki, K., Kimura, S., Taniguchi, S.-i., Wakasugi, S. and Yamamura, K.-i.: An efficient gene-trap method using poly A trap vectors and characterization of gene-trap events. *J. Biochem. (Tokyo)*, 113 (1993) 343-349.
- 1880 Paulus, A. and Hüskens, D.: DNA digest analysis with capillary electrophoresis. *Electrophoresis (Weinheim)*, 14 (1993) 27-35.
- 1881 Schmidt, E.D.L., van Beeren, M., Glass, C.K., Wiersinga, W.M. and Lamers, W.H.: Interaction between the thyroid hormone receptor and co-factors on the promoter of the gene encoding phosphoenolpyruvate carboxykinase. *Biochim. Biophys. Acta*, 1172 (1993) 82-88.
- 1882 Strasberg, P.M. and Clarke, J.T.R.: Rapid nonradioactive tracer method for detecting carriers of the major Ashkenazi Jewish Tay-Sachs disease mutations. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2249-2255.
- 1883 Suttorp, M., Sprenger, C., Dreger, P., Sievers, E., Claviez, A., Löffler, H., Schaub, J. and Schmitz, N.: Amplification of a Y-chromosomal DNA sequence by the polymerase chain reaction for documentation of residual recipient cells in small samples from bone marrow, peripheral blood and cerebrospinal fluid after bone marrow transplantation. *Electrophoresis (Weinheim)*, 14 (1993) 174-178.
- 1884 Swerdlow, H.: Capillary gel electrophoresis for DNA sequencing. Avail. *Univ. Microfilms Int.*, Order No. DA9211541, 1991, 178 p.; C.A., 118 (1993) 95236y.
- 1885 Tamura, K., Tanimoto, K., Murakami, K. and Fukamizu, A.: Activation of mouse renin promoter by cAMP and c-Jun in a kidney-derived cell line. *Biochim. Biophys. Acta*, 1172 (1993) 306-310.
- 1886 Top, B.: A simple method to attach a universal 50-bp GC-clamp to PCR fragments used for mutation analysis by DGGE. *PCR Methods Appl.*, 2 (1992) 83-85; C.A., 118 (1993) 1618z.
- 1887 Xu, W.-F., Tao, W.-K., Gong, Z.-Z. and Chi, C.-W.: cDNA and genomic structures of arrowhead proteinase inhibitors. *J. Biochem. (Tokyo)*, 113 (1993) 153-158.
- See also 1478, 1672, 1684, 1741, 1778, 1821, 1824, 1845, 1846.
- 21f. Complex mixtures of nucleic acids and their fragments**
- 1888 Baba, Y., Sumita, C., Hide, K., Ishimaru, N., Samata, K., Tanaka, A. and Tsuhako, M.: Separation of DNA fragments by high-performance liquid chromatography and capillary electrophoresis. *J. Liq. Chromatogr.*, 16 (1993) 955-965.
- 1889 Cusick, M.E.: Purification of ribonucleoproteins by a novel approach: isolation of the SSB1 ribonucleoprotein from yeast and demonstration that it has no role in mRNA splicing. *Biochim. Biophys. Acta*, 1171 (1992) 176-186.
- 1890 Lane, D., Prentki, P. and Chandler, M.: Use of gel retardation to analyze protein-nucleic acid interactions. *Microbiol. Rev.*, 56 (1992) 509-528; C.A., 118 (1993) 120092h - a review with 162 refs.
- 1891 Pennington, S., Meersseman, G. and Bradbury, E.M.: Effect of glycerol on the separation of nucleosomes and bent DNA in low ionic strength polyacrylamide gel electrophoresis. *Nucleic Acids Res.*, 20 (1992) 6667-6672; C.A., 118 (1993) 74458g.

See also 1613.

## 22. ALKALOIDS

- 1892 Liu, Y.-M. and Sheu, S.-J.: Determination of ephedrine and pseudoephedrine in Chinese herbal preparations by capillary electrophoresis. *J. Chromatogr.*, 637 (1993) 219-223.
- 1893 Liu, Y.-M. and Sheu, S.-J.: Determination of quaternary alkaloids from Phellodendri Cortex by capillary electrophoresis. *J. Chromatogr.*, 634 (1993) 329-333.
- 1894 Stoev, G. and Uzunov, D.: Influence of the structure of the amine modifiers on the mechanism of the separation of basic compounds by reversed-phase high-performance liquid chromatography. *J. Liq. Chromatogr.*, 15 (1992) 3097-3114.

See also 1904.

## 23. OTHER SUBSTANCES CONTAINING HETEROCYCLIC NITROGEN

### 23a. *Porphyrins and other pyrroles*

- 1895 Chan, E.N.L. and Goodall, D.M.: Capillary electrophoresis analysis of polyhaematoxyrin, a photosensitizer used in photodynamic therapy. *J. Chromatogr.*, 636 (1993) 171-178.
- 1896 Yao, Y.J., Lee, H.K. and Li, S.F.Y.: Optimization of separation of porphyrins by micellar electrokinetic chromatography using the overlapping resolution mapping scheme. *J. Chromatogr.*, 637 (1993) 195-200.

### 23d. *Pyridine derivatives*

See 1362.

### 23e. *Other N-heterocyclic compounds*

- 1897 Lee, K.-J., Heo, G.S. and Doh, H.J.: Determination of creatinine in serum by capillary zone electrophoresis. *Clin. Chem. (Winston-Salem)*, 38 (1992) 2322-2323.

## 25. ORGANIC PHOSPHORUS COMPOUNDS (INCL. SUGAR PHOSPHATES)

- 1898 Kostilainen, R., Bruins, A.P. and Häkkinen, V.M.A.: Identification of degradation products of some chemical warfare agents by capillary electrophoresis-ionspray mass spectrometry. *J. Chromatogr.*, 634 (1993) 113-118.

See also 1403, 1667.

## 26. ORGANOMETALLIC AND RELATED COMPOUNDS

## 26c. Coordination compounds

- 1899 Srivastava, S.K., Gupta, V.K., Tiwari, B.B. and Ali, I.: Electrophoretic determination of stability constants of Zn(II)- and Cd(II)-nitrilotriacetate-penicillamine mixed complexes. *J. Chromatogr.*, 635 (1993) 171-175.

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

- 1900 Ang, Q., Sun, Z. and Ling, D.: (Analysis of nicotinamide and vitamin B<sub>6</sub> by micellar electrokinetic capillary chromatography). *Yaowu Fenxi Zazhi*, 12 (1992) 273-276; C.A., 118 (1993) 132265e.
- 1901 Huopalahti, R. and Sunell, J.: Use of capillary zone electrophoresis in the determination of B vitamins in pharmaceutical products. *J. Chromatogr.*, 636 (1993) 133-135.
- 1902 Koh, E.V., Bissell, M.G. and Ito, R.K.: Measurement of vitamin C by capillary electrophoresis in biological fluids and fruit beverages using a stereoisomer as an internal standard. *J. Chromatogr.*, 633 (1993) 245-250.
- 1903 Lin Ling, B., Baeyens, W.R.G., van Acker, P. and Dewaele, C.: Determination of ascorbic acid and isoascorbic acid by capillary zone electrophoresis: application to fruit juices and to a pharmaceutical formulation. *J. Pharm. Biomed. Anal.*, 10 (1992) 717-721.

## 28. ANTIBIOTICS

- 1904 Fabre, H. and Fell, A.F.: Comparison of techniques for peak purity testing of cephalosporins. *J. Liq. Chromatogr.*, 15 (1992) 3031-3043.
- 1905 Salvatore, M.J., Feygin, I. and Katz, S.E.: Agarose gel electrophoresis system for the separation of antibiotics in animal agriculture. *Analyst (London)*, 118 (1993) 281-287.

## 29. INSECTICIDES, PESTICIDES AND OTHER AGROCHEMICALS

## 29e. Herbicides

- 1906 Nielsen, M.W.F.: (Enantio-)separation of phenoxy acid herbicides using capillary zone electrophoresis. *J. Chromatogr.*, 637 (1993) 81-90.

## 30. SYNTHETIC AND NATURAL DYES

## 30a. Synthetic dyes

See 1295.

## 32. DRUG ANALYSIS

## 32a. Drug analysis, general techniques

- 1907 Altria, K.D.: High-speed determination of drug related impurities by capillary electrophoresis employing commercial instrumentation. *J. Chromatogr.*, 636 (1993) 125-132.
- 1908 Altria, K.D. and Dave, Y.K.: Peak homogeneity determination and micro-preparative fraction collection by capillary electrophoresis for pharmaceutical analysis. *J. Chromatogr.*, 633 (1993) 221-225.
- 1909 Chee, G.L. and Wan, T.S.M.: Reproducible and high-speed separation of basic drugs by capillary zone electrophoresis. *J. Chromatogr.*, 612 (1993) 172-177.
- 1910 D'Emanuele, A. and Staniforth, J.: Feedback controlled drug delivery using an electro-diffusion pump. *J. Controlled Release*, 23 (1993) 97-104; C.A., 118 (1993) 109553p.
- 1911 Fu, X., Lu, J. and Yan, L.: (Separation of some drugs by capillary electrophoresis). *Fenxi Huaxue*, 20 (1992) 524-526; C.A., 118 (1993) 109853m.
- 1912 Iwagami, S., Sawabe, Y. and Nakagawa, T.: (Micellar electrokinetic chromatography for the analysis of crude drugs. (II)). Simultaneous determination of glycyrrhizin and paeoniflorin in oriental pharmaceutical preparations. *Shoyakugaku Zasshi*, 46 (1992) 49-54; C.A., 118 (1993) 132262b.
- 1913 Swartz, M.E. and Merion, M.: On-line sample preconcentration on a packed-inlet capillary for improving the sensitivity of capillary electrophoretic analysis of pharmaceuticals. *J. Chromatogr.*, 632 (1993) 209-213.
- 1914 Thormann, W., Lienhard, S. and Wernly, P.: Strategies for the monitoring of drugs in body fluids by micellar electrokinetic capillary chromatography. *J. Chromatogr.*, 636 (1993) 137-148.

See also 1301.

## 32b. Antirheumatics and antiinflammatory drugs

- 1915 Rawjee, Y.Y., Staerk, D.U. and Vigh, G.: Capillary electrophoretic chiral separations with cyclodextrin additives. I: Acids: chiral selectivity as a function of pH and the concentration of  $\beta$ -cyclodextrin for fenoprofen and ibuprofen. *J. Chromatogr.*, 635 (1993) 291-306.

See also 1923.

## 32c. Autonomic and cardiovascular drugs

- 1916 Lukkari, P., Sirén, H., Pantsar, M. and Riekola, M.-L.: Determination of ten  $\beta$ -blockers in urine by micellar electrokinetic capillary chromatography. *J. Chromatogr.*, 632 (1993) 143-148.
- 1917 Rasimas, A.K., Boudoulas, H. and Kichan, J.M.: Determination of verapamil enantiomers in serum following racemate administration using HPLC. *J. Liq. Chromatogr.*, 15 (1992) 3013-3029.
- 1918 Stampfli, H.F., Person, C.R., Huang, S.-M. and Quon, C.Y.: HPLC-EC assay for the inodilator EXP513 and its application in a dog pharmacokinetic study. *J. Liq. Chromatogr.*, 15 (1992) 3129-3139.

## 32d. Central nervous system drugs

- 1919 Altria, K.D.: Determination of salbutamol-related impurities by capillary electrophoresis. *J. Chromatogr.*, 634 (1993) 323-328.
- 1920 Clark, B.J., Barker, P. and Large, T.: The determination of the geometric isomers and related impurities of dothiepin in a pharmaceutical preparation by capillary electrophoresis. *J. Pharm. Biomed. Anal.*, 10 (1992) 723-726.
- 1921 Oda, Y., Ohe, H., Asakawa, N., Yoshida, Y., Sato, T. and Nakagawa, T.: Resolution of 1-benzyl-4-[(5,6-dimethoxy-1-indanon)-2-yl] methyl(piperidine hydrochloride enantiomers in plasma by high-performance liquid chromatography with direct injection into avidin-conjugated column. *J. Liq. Chromatogr.*, 15 (1992) 2997-3012.
- 1922 Otsuka, K. and Terabe, S.: Optical resolution of chlorpheniramine by cyclodextrin added capillary zone electrophoresis and cyclodextrin modified micellar electrokinetic chromatography. *J. Liq. Chromatogr.*, 16 (1993) 945-953.
- 1923 Papadoyannis, I.N., Samanidou, V.F. and Panopoulou, G.D.: The use of bamifylline as internal standard in the reversed phase HPLC analysis of mefenamic acid in pharmaceuticals and small volumes of biological fluids. *J. Liq. Chromatogr.*, 15 (1992) 3065-3086.
- 1924 Tomita, M., Okuyama, T., Sato, S. and Ishizu, H.: (Determination of barbiturates in serum by capillary electrophoresis). *Hochudoku*, 10 (1992) 120-121; C.A., 118 (1993) 95734j.
- 1925 Tomita, M., Okuyama, T., Sato, S. and Ishizu, H.: (Determination of nitazepam and its metabolites in urine by capillary electrophoresis). *Hochudoku*, 10 (1992) 122-123; C.A., 118 (1993) 95735k.
- 1926 Zhang, C.-X., Sun, Z.-P., Ling, D.-K., Zheng, J.-S., Guo, J. and Li, X.-Y.: Determination of 3-methylflavone-8-carboxylic acid, the main metabolite of flavoxate, in human urine by capillary electrophoresis with direct injection. *J. Chromatogr.*, 612 (1993) 287-294.

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

- 1927 Avila, L.Z., Chu, Y.H., Blossey, E.C. and Whitesides, G.M.: Use of affinity capillary electrophoresis to determine kinetic and equilibrium constants for binding of arylsulfonamides to bovine carbonic anhydrase. *J. Med. Chem.*, 36 (1993) 126-133; C.A., 118 (1993) 35333t.
- 1928 Iannelli, R.M.: Determination of Sutocide®A in cosmetic formulations by single column ion chromatography with pulsed amperometric detection (SCIC-PAD). *J. Liq. Chromatogr.*, 15 (1992) 3045-3063.
- 1929 Ng, C.L., Lee, H.K. and Li, S.F.Y.: Determination of sulphonamides in pharmaceuticals by capillary electrophoresis. *J. Chromatogr.*, 632 (1993) 165-170.
- 1930 Penn, S.G., Goodall, D.M. and Loran, J.S.: Differential binding of tiiconazole enantiomers to hydroxypropyl- $\beta$ -cyclodextrin studied by capillary electrophoresis. *J. Chromatogr.*, 636 (1993) 149-152.

## 32f. Cytostatics

- 1931 Hughes, D.E. and Richberg, P.: Capillary micellar electrokinetic, sequential multiwavelength chromatographic characterization of a chimeric monoclonal antibody-cytotoxin conjugate. *J. Chromatogr.*, 635 (1993) 313-318.
- 32g. Other drug categories
- 1932 Dalal, P.S., Reid, R., Audibert, F. and Bhagat, H.R.: Development and validation of murabutide assay by high performance capillary electrophoresis. *Anal. Lett.*, 26 (1993) 657-664.
- 1933 Gervasi, G.P., Farina, C., Bartoli, C., Catalani, R., Carpita, G. and Pistelli, N.: Disposition of a new heparan sulfate with fibrinolytic activity in the rat. *Arzneim.-Forsch.*, 43 (1993) 445-449.
- 1934 Sidhu, B.K., Washington, C., Davis, S.S. and Purewal, T.S.: Electrophoretic properties of lactose and salbutamol sulphate suspension in halogenated solvents. *Langmuir*, 9 (1993) 839-843; C.A., 118 (1993) 131912b.

See also 1524, 1928.

## 32h. Toxicological and forensic applications

- 1935 Berthod, A., Laserna, J.J. and Carrettero, I.: Oil-in-water microemulsions as mobile phases for rapid screening of illegal drugs in sports. *J. Liq. Chromatogr.*, 15 (1992) 3115-3127.

## 33. CLINICO-CHEMICAL APPLICATIONS

## 33a. General papers and reviews

See 1303.

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

- See 1241, 1365, 1367, 1377, 1380, 1381, 1385, 1388, 1418, 1506, 1507, 1510, 1514, 1523, 1533, 1550, 1554, 1642, 1677, 1682, 1684, 1694, 1717, 1736, 1777, 1882, 1897.

## 34. FOOD ANALYSIS

## 34a. General papers and reviews

- 1936 Jimidar, M., Hamoir, T.P., Foriers, A. and Massart, D.L.: Comparison of capillary zone electrophoresis with high-performance liquid chromatography for the determination of additives in food-stuffs. *J. Chromatogr.*, 636 (1993) 179-186.

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

- 1937 Carlier, C., Etchepare, M., Ceccon, J.F. and Amedee-Manesme, O.: Assessment of the vitamin A status of preschool and school age Senegalese children during a cross-sectional study. *Int. J. Vitam. Nutr. Res.*, 62 (1992) 209-215; C.A., 118 (1993) 6062y.

See also 1488, 1495, 1621, 1903.

37. CELLS, CELLULAR PARTICLES AND SUPRAMOLECULAR STRUCTURES

- 1938 Crawford, N., Authi, K.S. and Haack, N.: Isolation and characterization of platelet membranes prepared by free flow electrophoresis. *Methods Enzymol.*, 215(Platelets: Recept., Adhes., Secretion, Pt. B) (1992) 5-20; C.A., 118 (1993) 120265s.
- 1939 Olive, P.L., Durand, R.E., Le Riche, J., Olivotto, I.A. and Jackson, S.M.: Gel electrophoresis of individual cells to quantify hypoxic fraction in human breast cancers. *Cancer Res.*, 53 (1993) 733-736.
- 1940 Zbinden, R., Gottschalk, J., Mez, K., Neuenschwander, H. and Heinzer, I.: A simplified agarose gel electrophoresis for rotavirus detection. *Zentralbl. Bakteriol.*, 277 (1992) 84-89; C.A., 118 (1993) 55429g.

38. INORGANIC COMPOUNDS

38a. Cations

- 1941 Aguilar, M., Farran, A. and Martínez, M.: Determination of gold(II) and silver(II) cyanide in ores by capillary zone electrophoresis. *J. Chromatogr.*, 635 (1993) 127-131.

- 1942 Hirokawa, T., Ueda, M., Ijuin, A., Yoshida, S., Nishiyama, F. and Kiso, Y.: Study of isotachophoretic separation behaviour of metal cations by means of particle-induced X-ray emission. IV. Separation of metal ions in a non-radioactive model solution of a high-level liquid waste. *J. Chromatogr.*, 633 (1993) 261-272.
- 1943 Wu, N., Horvath, W.J., Sun, P. and Huie, C.W.: Speciation of aluminum using capillary zone electrophoresis with indirect UV detection. *J. Chromatogr.*, 635 (1993) 307-312.

See also 1899.

38b. Anions

- 1944 Amran, M.B., Lakkis, M.D., Lagarde, F., Leroy, M.J.F., Lopez-Sanches, J.F. and Rauret, G.: Separation of bromide, bromate, iodide, iodate, nitrate, nitrite and selenite anions by capillary zone electrophoresis. *Fresenius J. Anal. Chem.*, 345 (1993) 420-423.

See also 1289, 1295.

# Intelligent Software for Chemical Analysis

Edited by L.M.C. Buydens and P.J. Schoenmakers

Data Handling in Science and Technology Volume 13

Various emerging techniques for automating intelligent functions in the laboratory are described in this book. Explanations on how systems work are given and possible application areas are suggested. The main part of the book is devoted to providing data which will enable the reader to develop and test his own systems. The emphasis is on expert systems; however, promising developments such as self-adaptive systems, neural networks and genetic algorithms are also described.

## Contents:

**1. Introduction.** Automation and intelligent software. Expert systems. Neural networks and genetic algorithms. Reader's guide. Concepts. Conclusions.

### **2. Knowledge-based Systems in Chemical Analysis**

(P. Schoenmakers). Computers in analytical chemistry. Sample preparation. Method selection. Method development. Instrument control and error diagnosis. Data handling and calibration. Data interpretation. Validation. Laboratory management. Concluding remarks. Concepts. Conclusions. Bibliography.

**3. Developing Expert Systems** (H. van Leeuwen). Introduction. Prerequisites. Knowledge acquisition. Knowledge engineering. Inferencing. Explanation facilities. The integration of separate systems. Expert-system testing validation

and evaluation. Concepts. Conclusions. Bibliography.

**4. Expert-System-Development Tools** (L. Buydens, H. van Leeuwen, R. Wehrens). Tools for implementing expert systems. Tool selection. Knowledge-acquisition tools. Concepts. Conclusions. Bibliography.

**5. Validation and Evaluation of Expert Systems for HPLC Method Development - Case Studies** (F. Maris, R. Hindriks). Introduction. Case study I: Expert systems for method selection and selectivity optimization. Case study II: System-optimization expert system. Case study III: Expert system for repeatability testing, applied for trouble-shooting in HPLC. Case study IV: Ruggedness-testing expert system. General comments on the evaluations. Concepts.

Conclusions. Bibliography.

**6. Self-adaptive Expert Systems** (R. Wehrens). Introduction - maintaining expert systems. Self-adaptive expert systems: Methods and approaches. The refinement approach of SEEK. Examples

from analytical chemistry. Concluding remarks. Concepts. Conclusions. Bibliography.

**7. Inductive Expert Systems** (R. Wehrens, L. Buydens).

Introduction. Inductive classification by ID3. Applications of ID3 in analytical chemistry. Concluding remarks. Concepts. Conclusions.

Bibliography.

**8. Genetic Algorithms and Neural Networks** (G. Kateman). Introduction. Genetic algorithms. Artificial neural networks. Concepts. Conclusions. Bibliography.

**9. Perspectives.** Limitations of Intelligent Software. Dealing with intelligent software. Potential of intelligent software. Index.

© 1993 366 pages Hardbound

Price: Dfl. 350.00 (US \$ 200.00)

ISBN 0-444-89207-9

## ORDER INFORMATION

For USA and Canada  
**ELSEVIER SCIENCE PUBLISHERS**

Judy Weislogel, P.O. Box 945  
Madison Square Station  
New York, NY 10160-0757  
Fax: (212) 633 3880

In all other countries  
**ELSEVIER SCIENCE PUBLISHERS**

P.O. Box 330  
1000 AH Amsterdam  
The Netherlands  
Fax: (+31-20) 5862 845

US\$ prices are valid only for the USA & Canada and are subject to exchange rate fluctuations; in all other countries the Dutch guilder price (Dfl.) is definitive. Customers in the European Community should add the appropriate VAT rate applicable in their country to the price(s). Books are sent postfree if prepaid.



**ELSEVIER**  
SCIENCE PUBLISHERS

### Audience

Organic and physical organic chemists, biochemists, pharmacologists and scientists studying heterocyclic compounds.

# HETEROCYCLES

An international journal for reviews and communications in heterocyclic chemistry

### EDITOR

Kelichiro Fukumoto, Japan

### HONORARY EDITORIAL ASSOCIATES

D.H.R. Barton, USA

H.C. Brown, USA

M. Hamana, Japan

T. Nozoe, Japan

V. Prelog, Switzerland

G. Stork, USA

Lord Todd, UK

K. Tsuda, Japan

### AIMS AND SCOPE

Since its inception in 1973, *Heterocycles* has provided a platform for the rapid exchange of research in the areas of organic, pharmaceutical, analytical, and medicinal chemistry of heterocyclic compounds. The journal publishes reviews, communications, reports and original papers. There are two special sections. One lists new natural products with a heterocyclic ring system collected from current literature. The other lists such compounds whose total synthesis has been reported.

Due to the fact that the journal is able to publish articles within two months of receipt of the manuscripts, researchers in this field can obtain up-to-date information on heterocyclic research by reading *Heterocycles* regularly.

**ABSTRACTED/INDEXED IN:** Chemical Abstracts, Current Contents: Physical, Chemical & Earth Sciences, PASCAL/CNRS.

### 1993 SUBSCRIPTION INFORMATION

Volumes 35-36 in 14 issues

Dfl. 2280.00 / US \$ 1373.50 (including postage)

ISSN 0385-5414

- 
- I would like  a free sample copy of HETEROCYCLES.  
 Instructions to Authors.  
 to enter a subscription for 1993.  
Please send me a Proforma Invoice.

Name \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*The Dutch Guilder price (Dfl.) is definitive. US\$ prices are for your convenience only and are subject to exchange fluctuations. Customers in the European Community should add the appropriate VAT rate applicable in their country to the price(s).*



**Elsevier Science Publishers**  
Attn. Eugene P.M. Wijnhoven  
P.O. Box 330, 1000 AH Amsterdam  
The Netherlands  
Fax: (+31-20) 5862 845  
**In the USA & Canada**  
Attn. Judy Weislogel  
P.O. Box 945, Madison Square Station  
New York, NY 10160-0757, USA  
Fax: (+1-212) 633 3880

## PUBLICATION SCHEDULE FOR THE 1993 SUBSCRIPTION

*Journal of Chromatography* and *Journal of Chromatography, Biomedical Applications*

MONTH	1992	J-A	M	J	J	A	S	O	N	D	1994
Journal of Chromatography	Vols. 623-627	Vols. 628-636	637/1 637/2 638/1 638/2	639/1 639/2 640/1 + 2	641/1 641/2 642/1 + 2 643/1 + 2 644/1	644/2 645/1 645/2 646/1	646/2 647/1 647/2	648/1 648/2			
Cumulative Indexes, Vols. 601-650											651/1 + 2
Bibliography Section		649/1		649/2			650/1			650/2	
Biomedical Applications		Vols. 612, 613 and 614/1	614/2 615/1	615/2 616/1	616/2 617/1	617/2 618/1 + 2	619/1 619/2	620/1 620/2	621/1 621/2	622/1 622/2	

### INFORMATION FOR AUTHORS

(Detailed *Instructions to Authors* were published in Vol. 609, pp. 437-443. A free reprint can be obtained by application to the publisher, Elsevier Science Publishers B.V., P.O. Box 330, 1000 AH Amsterdam, Netherlands.)

**Types of Contributions.** The following types of papers are published in the *Journal of Chromatography* and the section on *Biomedical Applications*: Regular research papers (Full-length papers), Review articles, Short Communications and Discussions. Short Communications are usually descriptions of short investigations, or they can report minor technical improvements of previously published procedures; they reflect the same quality of research as Full-length papers, but should preferably not exceed five printed pages. Discussions (one or two pages) should explain, amplify, correct or otherwise comment substantively upon an article recently published in the journal. For Review articles, see inside front cover under Submission of Papers.

**Submission.** Every paper must be accompanied by a letter from the senior author, stating that he/she is submitting the paper for publication in the *Journal of Chromatography*.

**Manuscripts.** Manuscripts should be typed in **double spacing** on consecutively numbered pages of uniform size. The manuscript should be preceded by a sheet of manuscript paper carrying the title of the paper and the name and full postal address of the person to whom the proofs are to be sent. As a rule, papers should be divided into sections, headed by a caption (e.g., Abstract, Introduction, Experimental, Results, Discussion, etc.) All illustrations, photographs, tables, etc., should be on separate sheets.

**Abstract.** All articles should have an abstract of 50-100 words which clearly and briefly indicates what is new, different and significant. No references should be given.

**Introduction.** Every paper must have a concise introduction mentioning what has been done before on the topic described, and stating clearly what is new in the paper now submitted.

**Illustrations.** The figures should be submitted in a form suitable for reproduction, drawn in Indian ink on drawing or tracing paper. Each illustration should have a legend, all the legends being typed (with double spacing) together on a *separate sheet*. If structures are given in the text, the original drawings should be supplied. Coloured illustrations are reproduced at the author's expense, the cost being determined by the number of pages and by the number of colours needed. The written permission of the author and publisher must be obtained for the use of any figure already published. Its source must be indicated in the legend.

**References.** References should be numbered in the order in which they are cited in the text, and listed in numerical sequence on a separate sheet at the end of the article. Please check a recent issue for the layout of the reference list. Abbreviations for the titles of journals should follow the system used by *Chemical Abstracts*. Articles not yet published should be given as "in press" (journal should be specified), "submitted for publication" (journal should be specified), "in preparation" or "personal communication".

**Dispatch.** Before sending the manuscript to the Editor please check that the envelope contains four copies of the paper complete with references, legends and figures. One of the sets of figures must be the originals suitable for direct reproduction. Please also ensure that permission to publish has been obtained from your institute.

**Proofs.** One set of proofs will be sent to the author to be carefully checked for printer's errors. Corrections must be restricted to instances in which the proof is at variance with the manuscript. "Extra corrections" will be inserted at the author's expense.

**Reprints.** Fifty reprints will be supplied free of charge. Additional reprints can be ordered by the authors. An order form containing price quotations will be sent to the authors together with the proofs of their article.

**Advertisements.** The Editors of the journal accept no responsibility for the contents of the advertisements. Advertisement rates are available on request. Advertising orders and enquiries can be sent to the Advertising Manager, Elsevier Science Publishers B.V., Advertising Department, P.O. Box 211, 1000 AE Amsterdam, Netherlands; courier shipments to: Van de Sande Bakhuyzenstraat 4, 1061 AG Amsterdam, Netherlands; Tel. (+31-20) 515 3220/515 3222, Telefax (+31-20) 6833 041, Telex 16479 els vi nl. UK: T.G. Scott & Son Ltd., Tim Blake, Portland House, 21 Narborough Road, Cosby, Leics. LE9 5TA, UK; Tel. (+44-533) 753 333, Telefax (+44-533) 750 522. USA and Canada: Weston Media Associates, Daniel S. Lipner, P.O. Box 1110, Greens Farms, CT 06436-1110, USA; Tel. (+1-203) 261 2500, Telefax (+1-203) 261 0101.

# Progress in Medicinal Chemistry 30

Edited by  
**G.P. Ellis and D.K. Luscombe**

©1993 404 pages Hardbound  
Price: Dfl. 325.00 (US \$ 185.75)  
ISBN 0-444-89989-8

In this volume, the medicinal chemistry is reviewed of the rapidly expanding family of retinoids, of promising new semi-synthetic erythromycins and of the multifaceted amidines. Another chapter continues the coverage of inorganic elements which have a medical role; this time, recent studies on the various biological roles of manganese are examined. Inhibition of enkephalin-degrading enzymes is reviewed as also are studies of the digitalis recognition site which are expected to lead to the development of more highly selective inotropic drugs. This book will be of great value to medicinal chemists, pharmacists and pharmacologists. It will also be appreciated by all newcomers as well as those who wish to be kept

up to date with recent work on these topics.

## Contents:

Preface. Recent Advances in the Chemistry and Biology of Retinoids (J.B. Gale). Semi-synthetic Derivatives of Erythromycin (H.A. Kirst). Biological Significance of Manganese in Mammalian Systems (F.C. Wedler). Approach to the Chemotopography of the Digitalis Recognition Matrix in  $\text{Na}^+/\text{K}^+$ -transporting ATPase as a Step in the Rational Design of New

Inotropic Steroids (K.R.H. Repke, J. Weiland, R. Megges). Amidines and Guanidines in Medicinal Chemistry (J.V. Greenhill, P. Lue). Inhibitors of Enkephalin-degrading Enzymes as Potential Therapeutic Agents (A. Patel, H.J. Smith, R.D.E. Sewell). Index. Author Index (Vols. 1-30). Subject Index (Vols 1-30).



**ELSEVIER**  
SCIENCE PUBLISHERS

*In the USA and Canada:*  
Elsevier Science Publishing Co., Inc.  
P.O. Box 945, Madison Square Station,  
New York, NY 10160-0757, USA  
Fax: (212) 633-3880 Tel: (212) 989-5800

*In the rest of the world:*  
Elsevier Science Publishers,  
P.O. Box 181, 1000 AD,  
Amsterdam, The Netherlands  
Fax: 31-20-5803-249 Tel: 31-20-5803-911

The Dutch guilder price is definitive.  
US \$ prices are subject to exchange rate fluctuations. Customers in the European Community should add the appropriate VAT rate applicable in their country to the price.



0021-9673(19930917)650:1;1-U