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TABLE 219

ELECTROPHORETIC MOBILITIES OF SOME NUCLEOSIDES AND THEIR PHOSPHATES
(A. HOLÝ AND F. ŠORM, *Collection Czech. Chem. Commun.*, 34 (1969) 1934)

Paper: Whatman Nos. 1 or 3MM.
Electrolytes: E_1 = 0.05 *M* Na_2HPO_4 (pH 7.5).
E_2 = 0.1 *M* boric acid adjusted with triethylamine to pH 7.5.
Potential: 40 V/cm.
Time: 1.5 h.
Detection: Not stated.

Compound	E_1[a]	E_2[a]
Uridine	0.00	0.47
1-(β-D-Lyxofuranosyl)uracil	0.00	0.53
1-(α-D-Lyxofuranosyl)thymine	0.00	0.50
1-(α-L-Lyxofuranosyl)thymine	0.00	0.50
1-(β-D-Xylofuranosyl)uracil	0.00	0.37
1-(β-D-Arabinofuranosyl)uracil	0.00	0.00
2',3'-O-Ethoxymethyleneuridine	0.00	0.00
1-(2,3-O-Ethoxymethylene-β-D-lyxofuranosyl)uracil	0.00	0.00
1-(5-O-Benzoyl-2,3-O-ethoxymethylene-β-D-lyxofuranosyl) uracil	0.00	0.00
Uridine 2'(3')-phosphite	0.59	0.65
Uridine 5'-phosphite	0.67	0.65
1-(β-D-Lyxofuranosyl)uracil 2'-phosphite	0.58	0.85
1-(β-D-Lyxofuranosyl)uracil 3'-phosphite	0.59	0.65
1-(β-D-Lyxofuranosyl)uracil 5'-phosphite	0.67	1.05
1-(α-D-Lyxofuranosyl)thymine 2'-phosphite	0.54	0.80
1-(α-D-Lyxofuranosyl)thymine 3'-phosphite	0.54	0.65
1-(α-D-Lyxofuranosyl)thymine 5'-phosphite	0.57	0.97
1-(α-L-Lyxofuranosyl)thymine 2'-phosphite	0.54	0.80
1-(α-L-Lyxofuranosyl)thymine 3'-phosphite	0.54	0.65
1-(α-L-Lyxofuranosyl)thymine 5'-phosphite	0.58	0.97
1-(β-D-Xylofuranosyl)uracil 3'(5')-phosphite	0.63	0.62
1-(β-D-Arabinofuranosyl)uracil 2'(5')-phosphite	0.56	0.63
1-(β-D-Lyxofuranosyl)uracil 2',3'-cyclic phosphate	0.67	0.69
1-(β-D-Lyxofuranosyl)uracil 2',5'-cyclic phosphate	0.69	0.72
1-(β-D-Lyxofuranosyl)uracil 3',5'-cyclic phosphate	0.65	0.68
1-(α-D-Lyxofuranosyl)thymine 2',3'-cyclic phosphate	0.55	0.68
1-(α-L-Lyxofuranosyl)thymine 2',3'-cyclic phosphate	0.55	0.68
1-(β-D-Xylofuranosyl)uracil 3',5'-cyclic phosphate	0.61	0.45
Uridine 3'-phosphate	1.00	1.00
Uridine 5'-phosphate	1.00	1.17
1-(β-D-Lyxofuranosyl)uracil 2'-phosphate	1.00	1.06
1-(β-D-Lyxofuranosyl)uracil 3'-phosphate	1.00	1.04
1-(β-D-Lyxofuranosyl)uracil 5'-phosphate	1.02	1.15
1-(α-D-Lyxofuranosyl)thymine 2'-phosphate	1.00	0.93
1-(α-D-Lyxofuranosyl)thymine 3'-phosphate	1.00	0.93
1-(α-L-Lyxofuranosyl)thymine 2'-phosphate	1.00	0.94
1-(α-L-Lyxofuranosyl)thymine 3'-phosphate	1.00	0.94
1-(β-D-Xylofuranosyl)uracil 5'-phosphate	1.05	—

[a] Referred to uridine 3'-phosphate.

TABLE 220

PC R_F VALUES OF SOME NUCLEOSIDES AND THEIR PHOSPHITES AND PHOSPHATES
(A. HOLÝ AND F. ŠORM, *Collection Czech. Chem. Commun.*, 34 (1969) 1934)

Paper: Whatman No. 1.
Solvents: S_1 = 2-Propanol–conc. aqueous ammonia–water (7:1:2).
S_2 = Ethanol–1 *M* ammonium acetate (5:2).
S_3 = 2-Propanol–conc. aqueous ammonia–0.1 *M* boric acid adjusted with NaOH to pH 7.0 (7:1:2).

Detection: Not stated.

Compound	R_F		
	S_1	S_2	S_3
Uridine	0.43	0.70	0.39
1-(β-D-Lyxofuranosyl)uracil	0.43	0.70	0.39
1-(α-D-Lyxofuranosyl)thymine	0.50	—	0.44
1-(α-L-Lyxofuranosyl)thymine	0.50	—	0.44
1-(β-D-Xylofuranosyl)uracil	0.56	0.81	—
1-(β-D-Arabinofuranosyl)uracil	0.52	0.79	—
2',3'-O-Ethoxymethyleneuridine	0.70	—	0.60
1-(2,3-O-Ethoxymethylene-β-D-lyxofuranosyl)uracil	0.70	—	0.59
1-(5-O-Benzoyl-2,3-O-ethoxymethylene-β-D-lyxofuranosyl)-uracil	0.82	—	0.85
1-(5-O-Benzoyl-β-D-lyxofuranosyl)uracil	0.69	—	—
Uridine 2'(3')-phosphite	0.38	0.64	0.40
Uridine 5'-phosphite	0.36	0.56	0.29
1-(β-D-Lyxofuranosyl)uracil 2'-phosphite	0.38	0.62	0.40
1-(β-D-Lyxofuranosyl)uracil 3'-phosphite	0.38	0.62	0.40
1-(β-D-Lyxofuranosyl)uracil 5'-phosphite	0.32	0.45	0.29
1-(α-D-Lyxofuranosyl)thymine 2'-phosphite	0.39	—	0.50
1-(α-D-Lyxofuranosyl)thymine 3'-phosphite	0.39	—	0.50
1-(α-D-Lyxofuranosyl)thymine 5'-phosphite	0.35	—	0.25
1-(α-L-Lyxofuranosyl)thymine 2'-phosphite	0.39	—	0.59
1-(α-L-Lyxofuranosyl)thymine 3'-phosphite	0.39	—	0.50
1-(α-L-Lyxofuranosyl)thymine 5'-phosphite	0.35	—	0.25
1-(β-D-Xylofuranosyl)uracil 3'(5')-phosphite	0.47	0.62	—
1-(β-D-Arabinofuranosyl)uracil 2'(5')phosphite	0.41	0.70	—
1-(β-D-Lyxofuranosyl)uracil 2',3'-cyclic phosphate	0.34	0.61	0.38
1-(β-D-Lyxofuranosyl)uracil 2',5'-cyclic phosphate	0.37	0.62	0.44
1-(β-D-Lyxofuranosyl)uracil 3',5'-cyclic phosphate	0.30	0.55	0.37
1-(α-D-Lyxofuranosyl)thymine 2',3'-cyclic phosphate	0.39	—	0.43
1-(α-L-Lyxofuranosyl)thymine 2',3'-cyclic phosphate	0.39	—	0.43
1-(β-D-Xylofuranosyl)uracil 3',5'-cyclic phosphate	0.40	0.62	—
Uridine 3'-phosphate	0.11	0.27	0.11
Uridine 5'-phosphate	0.06	0.18	0.03
1-(β-D-Lyxofuranosyl)uracil 2'-phosphate	0.17	0.28	0.10
1-(β-D-Lyxofuranosyl)uracil 3'-phosphate	0.17	0.28	0.17
1-(β-D-Lyxofuranosyl)uracil 5'-phosphate	0.06	0.17	0.02
1-(α-D-Lyxofuranosyl)thymine 2'-phosphate	0.13	0.20	0.12
1-(α-D-Lyxofuranosyl)thymine 3'-phosphate	0.13	0.22	0.20
1-(α-L-Lyxofuranosyl)thymine 2'-phosphate	0.13	0.22	0.12
1-(α-L-Lyxofuranosyl)thymine 3'-phosphate	0.13	0.22	0.20
1-(β-D-Xylofuranosyl)uracil 5'-phosphate	0.23	—	—

TABLE 221

PC R_F VALUES OF ALKYL-2-CHLOROMETHYL-4-NITROPHENYL HYDROGEN PHOSPHATES
(T. HATA, Y. MUSHIKA AND T. MUKAIYAMA, *J. Am. Chem. Soc.*, 91 (1969) 4533)

Paper: Toyo Roshi No. 50.
Solvent: Isopropanol–concentrated ammonium hydroxide–water(7:1:2).
Detection: Not stated.

Compound (alkyl chain)	R_F
Ethyl	0.84
n-Amyl	0.86
n-Hexadecyl	0.85
Cyclohexyl	0.86
Bornyl	0.92
Benzyl	0.85
Phenyl	0.89

TABLE 222

PC R_F VALUES OF MONOANILINIUM SALTS OF ALKYL DIHYDROGEN PHOSPHATES
(T. HATA, Y. MUSHIKA AND T. MUKAIYAMA, *J. Am. Chem. Soc.* 91 (1969) 4534)

Paper: Toyo Roshi No. 50.
Solvent: Isopropanol–concentrated ammonium hydroxide–water(7:1:2).
Detection: Not stated.

Compound (alkyl chain)	R_F
Ethyl	0.24
n-Amyl	0.49
Cyclohexyl	0.40
Bornyl	0.54
Benzyl	0.35
Phenyl	0.32

TABLE 223

TLC R_F VALUES OF SOME AROMATIC AMINES
(K. SHIMOMURA AND H. F. WALTON, *Separation Sci.*, 3 (1968) 497)

Thin layer: Silica Gel G (Warner-Chilcott Co.). One part of silica gel was mixed with two parts by weight of 10% zinc or cadmium nitrate or pure water to prepare the slurry for coating the plates.

Solvents: S_1 = Chloroform–methanol (10:1).
S_2 = Benzene–methanol (5:1).
S_3 = Benzene–methyl ethyl ketone (3:1).

Compound	R_F						
	S_1		S_2		S_3		
	Water	*Zn*	*Water*	*Zn*	*Water*	*Zn*	*Cd*
Aniline	0.63	0.33	0.53	0.28	0.47	0.25	0.21
o-Toluidine	0.71	0.57	0.60	0.45	0.51	0.41	0.29
m-Toluidine	0.67	0.35	0.55	0.27	0.47	0.24	0.15
p-Toluidine	0.64	0.26	0.50	0.17	0.43	0.15	0.10
2,4-Xylidine	0.71	0.42	0.58	0.31	0.48	0.16	0.25
2-Methyl-5-isopropylaniline	0.76	0.64	0.65	0.54	0.56	0.45	0.32
N-Methylaniline	0.78	0.58	0.68	0.56	0.62	0.59	0.57
N,N-Dimethylaniline	0.82	0.73	0.74	0.67	0.69	0.65	0.61
N,N-Diethylaniline	0.84	0.45	0.78	0.28	0.73	0.35	0.35
N,N-Diethyl-*p*-toluidine	0.84	0.48	0.77	0.24	0.71	0.13	—
p-Phenetidine	0.59	0.23	0.49	0.11	0.31	0.06	0.06
Methyl *p*-aminobenzoate	0.65	0.69	0.49	0.50	0.46	0.52	0.45
N-Benzylaniline	0.87	0.87	0.79	0.85	0.71	0.79	0.79
Diphenylamine	0.83	0.86	0.76	0.85	0.71	0.78	0.80
1-Naphthylamine	0.70	0.67	0.60	0.59	0.52	0.53	0.44
2-Naphthylamine	0.66	0.52	0.55	0.44	0.47	0.32	0.21
4-Amino-1-naphthol	0.37	0.09	0.34	0.12	0.27	0.07	0.07

TABLE 224

TLC R_F VALUES OF SOME PURINE DERIVATIVES
(M. STUCHLÍK, I. CSIBA AND L. KRASNEC, *Česk. Farm.*, 18 (1969) 92)

Thin layer: Silica gel thin-layer sheets "Silufol" (Kavalier, Czechoslovakia).
Solvents: Britton–Robinson buffer solutions*:
S_1 = pH 3.0.
S_2 = pH 7.0.
S_3 = pH 10.0.
To this buffer solutions different amounts of sodium 2-naphthol-6,8-disulfonate have been added
A_1 = 0.025 *M*.
A_2 = 0.050 *M*.
A_3 = 0.075 *M*.
Detection: Purine derivatives extinguish the fluorescence of sodium 2-naphthol-6,8-disulfonate. Chromatograms developed only with the buffer solution must be sprayed with 1% solution of sodium 2-naphthol-6,8-disulfonate.

Compound	R_F											
	S_1	S_1A_1	S_1A_2	S_1A_3	S_2	S_2A_1	S_2A_2	S_2A_3	S_3	S_3A_1	S_3A_2	S_3A_3
Coffeine	0.44	0.50	0.59	0.60	0.45	0.57	0.61	0.62	0.45	0.47	0.63	0.67
7-(2-Hydroxyethyl)-theophylline	0.60	0.63	0.71	0.72	0.61	0.71	0.75	0.75	0.59	0.64	0.71	0.77
7-(2,3-Dihydroxypropyl)-theophylline	0.67	0.70	0.76	0.80	0.66	0.77	0.79	0.79	0.67	0.71	0.79	0.82
1-(2,3-Dihydroxypropyl)-theobromine	0.51	0.56	0.65	0.71	0.51	0.63	0.69	0.69	0.52	0.60	0.68	0.72
Theophylline	0.64	0.64	0.75	0.77	0.64	0.74	0.75	0.73	0.63	0.69	0.76	0.77
Theobromine	0.41	0.52	0.70	0.73	0.46	0.63	0.65	0.68	0.44	0.57	0.66	0.73
8-Methylcoffeine	0.27	0.33	0.48	0.56	0.25	0.46	0.46	0.48	0.26	0.34	0.54	0.60
8-Chlorocoffeine	0.36	0.46	0.62	0.75	0.32	0.59	0.71	0.68	0.35	0.54	0.62	0.67
8-Methoxycoffeine	0.33	0.41	0.50	0.64	0.26	0.53	0.49	0.51	0.29	0.48	0.52	0.58
8-Methoxytheobromine	0.46	0.48	0.64	0.70	0.44	0.56	0.68	0.63	0.42	0.56	0.59	0.65

* 0.04 *M* H_3PO_4, 0.04 *M* H_3BO_3, 0.04 *M* CH_3COOH and 0.2 *M* NaOH.

TABLE 225

TLC R_F VALUES OF 8-AZAPURINES
(A. ALBERT, W. PFLEIDERER AND D. THACKER, *J. Chem. Soc., C*, (1969) 1085)

Thin-layer: Merck alumina ($PF_{254+366}$).
Solvent: Ether.
Detection: UV light 254 nm.

Compound	R_F
9-Methyl-8-azapurine	0.84
8-Methyl-8-azapurine	0.67
7-Methyl-8-azapurine	0.05–0.1
(3?)-Methyl-8-azapurine	0.04
(Unsubstituted)	0.0 –0.04

TABLE 226

PC R_F VALUES OF 8-AZAPURINES
(A. ALBERT, W. PFLEIDERER AND D. THACKER, *J. Chem. Soc., C*, (1969) 1085)

Paper: Whatman No. 1.
Solvent: *n*-Butanol–5 *N* acetic acid (7:3).
Detection: UV light 254 nm.

Compound	R_F
9-Methyl-8-azapurine	0.74
8-Methyl-8-azapurine	0.69
7-Methyl-8-azapurine	0.64
1-Methyl-8-azapurine	0.60
(3?)-Methyl-8-azapurine	0.79
(Unsubstituted)	0.69

TABLE 227

PC R_F VALUES OF PYRIDOXINE AND ITS AUTORADIOLYSIS PRODUCTS
(C. COLOMBINI AND E. CELON, *Gazz. Chim Ital.*, 99 (1969) 530)

Paper: Whatman No. 1.
Solvent: S_1 = *tert.*-Pentanol–acetone–water–conc. ammonia (40:35:20:5).
S_2 = Ethanol–water–concentrated ammonia (80:16:4).
S_3 = *n*-Butanol saturated with 1 *N* HCl.
S_4 = Pyridine–*n*-pentanol–water (1:2:2).
Detection: UV light.

Compound	R_F			
	S_1	S_2	S_3	S_4
Pyridoxine	0.46	0.53	0.40	0.23
4-Desoxypyridoxine	0.54		0.55	
5-Desoxypyridoxine	0.67		0.69	

TABLE 228

TLC R_F VALUES OF SOME ALKALOIDS
(MANZUR-UL-HAQUE HASHMI, SHAHNAZ PARVEEN AND N. A. CHUGHTAI, *Mikrochim. Acta*, (1969) 452)

Thin layer: Kieselgel (D-O without binder, Camag).
Solvent: Chloroform–ethanol (9:1).
Detection: D_1 = Potassium iodoplatinate.
D_2 = Sulphuric acid (2 ml) in 24 ml of 96% ethanol.
D_3 = Ceric sulphate.
D_4 = Ferric ferricyanide.

Compound	R_F	*Spray reagent*	*Colour*
Nicotine	0.66	D_1	grey
Quinine	0.53	D_1	brown
		D_2	blue (under UV)
Strychnine	0.50	D_1	bluish violet
Brucine	0.46	D_1	blue
		D_3	light orange
Ephedrine	0.33	D_1	white
Pilocarpine	0.63	D_1	brown
Narcotine	0.76	D_1	purplish brown
		D_4	blue
Cinchonine	0.34	D_1	brown
		D_2	blue
Ajmaline	0.31	D_1	violet
Atropine	0.17	D_1	light blue
Cocaine	0.63	D_1	violet
Papaverine	0.72	D_1	violet

TABLE 229

PC R_F VALUES OF ELLAGIC ACID DERIVATIVES
(L. REICHEL AND P. GOLINSKE, *Ann. Chem.*, 721 (1969) 238)

Paper: Schleicher and Schüll 2043b.
Solvents: S_1 = Phenol–acetic acid–water (4:6:2).
S_2 = Acetone–1-butanol–water (1:5:2).
S_3 = Pyridine–1-butanol–water satd. with NaCl (1:1:2).
Detection: UV light.

Compound	R_F		
	S_1	S_2	S_3
Ellagic acid	0.52	0.46	—
3,3′-Dichloroacetylellagic acid	0.48	0.18	
4,4′-Dichloroacetylellagic acid	0.71	0.36	
3,4,3′,4′-Tetracinnamoylellagic acid	—	0.87	0.86
3,4,3′,4′-Tetraphenylacetylellagic acid	—	—	0.50
3,4,3′,4′-Tetra-O-benzyloxycarbonylellagic acid	—	—	0.41
3,4,3′,4′-Tetrapropionylellagic acid	—	0.86	—

TABLE 230

PC R_F VALUES OF SOME *tert.*-ALKYL BENZOQUINONES AND HYDROXYBENZOQUINONES
(I. BUBEN AND J. POSPÍŠIL, *Collection Czech. Chem. Commun.*, 34 (1969) 2000)

Paper: Whatman No. 1.
Impregnation: I_1 = 40% Solution of dimethylformamide in benzene.
I_2 = 20% Solution of formamide in methanol.
I_3 = 30% Solution of ethylene glycol in methanol.
Solvents: S_1 = Heptane.
S_2 = Butyl acetate–heptane (1:4).
S_3 = Benzene.
S_4 = Chloroform.
S_5 = Hexane–ether–pyridine (3:2:0.2).
Detection: Reduction with hydrogen sulphide and then ferric ferricyanide.

Compound	R_F				
	I_1S_1	I_1S_2	I_2S_3	I_2S_4	I_3S_5
4-*tert.*-Butyl-1,2-benzoquinone	0.15	0.45	0.85	—	—
4-*tert.*-Amyl-1,2-benzoquinone	0.28	0.58	0.90	—	—
4-*tert.*-Octyl-1,2-benzoquinone	0.58	0.80	0.95	—	—
4-*tert.*-Dodecyl-1,2-benzoquinone	0.86	0.92	0.95	—	—
2-*tert.*-Butyl-1,4-benzoquinone	0.77	—	—	—	—
2-*tert.*-Amyl-1,4-benzoquinone	0.85	—	—	—	—
2-*tert.*-Octyl-1,4-benzoquinone	0.92	—	—	—	—
2-Hydroxy-5-*tert.*-butyl-1,4-benzoquinone	0.11	0.39	0.65	0.80	0.80
2-Hydroxy-5-*tert.*-amyl-1,4-benzoquinone	0.12	0.47	0.72	0.86	0.83
2-Hydroxy-5-*tert.*-octyl-1,4-benzoquinone	0.36	0.71	0.88	0.93	0.95
2-Hydroxy-5-*tert.*-dodecyl-1,4-benzoquinone	0.59	0.85	0.94	—	—
2-Hydroxy-6-*tert.*-butyl-1,4-benzoquinone	0.04	0.19	0.43	0.73	0.36
2-Hydroxy-6-*tert.*-amyl-1,4-benzoquinone	0.04	0.24	0.54	0.79	0.39
2-Hydroxy-6-*tert.*-octyl-1,4-benzoquinone	0.17	0.53	0.76	0.85	0.91

TABLE 231

TLC R_F VALUES OF SOME PYRIDINE DERIVATIVES

(Z. GREGOROWICZ, I. BARANOWSKA, R. BARANOWSKI AND W. KARMIŃSKI, *Chem. Anal. (Warsaw)*, 14 (1969) 958)

Thin layer: Silica Gel G (E. Merck).
Solvents: S_1 = Carbon tetrachloride–2-propanol (50:3).
S_2 = Benzene–methanol (50:3).
S_3 = Carbon tetrachloride–2-propanol–formic acid (30:8:2).
Detection: D_1 = Dragendorff reagent (for pyrazine, bipyrazyl, quinoxaline, biquinoxalyl).
D_2 = 0.5% solution of ferric ammonium sulphate (for bipyridyl).
D_3 = 0.5% solution of cupric chloride and hydroxylamine hydrochloride (for biquinolyl).

Compound	R_F		
	S_1	S_2	S_3
Pyridine	0.12	0.13	—
2,2′-Bipyridyl	0.20	0.25	—
Quinoline	0.28	—	0.06
2,2′-Biquinolyl	0.61	—	0.59
4-Methylpyridine	0.13	0.11	—
4,4′-Dimethyl-2,2′-bipyridyl	0.22	0.21	—
4-Methylquinoline	0.27	—	0.02
4,4′-Dimethyl-2,2′-biquinolyl	0.67	—	0.15
Pyrazine	0.11	—	—
Bipyrazyl	0.18	—	—
Quinoxaline	0.25	—	—
Biquinoxalyl	0.52	—	—

TABLE 232

TLC R_F VALUES OF SOME PYRIDINE DERIVATIVES

(D. STEFANESCU, D. MORARU, I. PREDESCU, P. BARZA, T. STANCIU AND F. COMAN, *Farmacia (Bucharest)*, 17 (1969) 115–20; *C.A.*, 71 (1969) 30331s)

Thin layer: Silica Gel G.
Solvent: Ethyl acetate–methanol–formic acid (75:20:5).
Detection: Not stated.

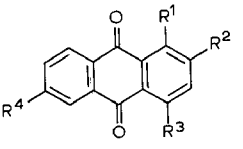
Compound	R_F
α-Picoline	0.18
β-Picoline	0.26
γ-Picoline	0.23
Isonicotinic hydrazide	0.4
Nicotinamide	0.55
Isonicotinic acid	0.73
Nicotinic acid	0.77

TABLE 233

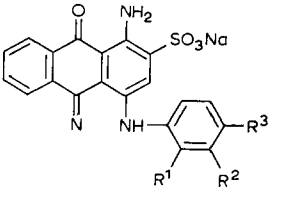
PC R_F VALUES OF ACID ANTHRAQUINONE DYES
(I. GEMZOVÁ AND J. GASPARIČ, *Collection Czech. Chem. Commun.*, 34 (1969) 3080)

Paper: Whatman No. 1.
Solvents: S_1 = 1-Propanol–ammonia (2:1).
S_2 = 1-Propanol–lauryl alcohol–ammonia (240 ml:137 g:120 ml).
S_3 = S_2 and paper impregnated with 5% solution of lauryl alcohol in ethanol.
S_4 = 1-Propanol–25% acetic acid (2:1).
S_5 = Methanol–1 *N* HCl (1:1).
S_6 = S_5 saturated with lauryl alcohol.
S_7 = S_6 and paper impregnated as in S_3.

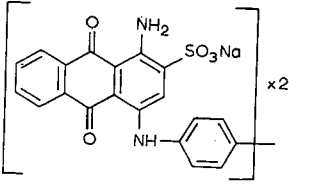
I	$R^1 = NH_2$, $R^2 = R^3 = R^4 = H$
II	$R^1 = NH_2$, $R^2 = COONa$, $R^3 = R^4 = H$
III	$R^1 = NH_2$, $R^2 = SO_3Na$, $R^3 = R^4 = H$
IV	$R^1 = NH_2$, $R^3 = SO_3Na$, $R^3 = Br$, $R^4 = H$
V	$R^1 = NH_2$, $R^2 = R^4 = H$, $R^3 = OH$
VI	$R^1 = NH_2$, $R^2 = SO_3Na$, $R^3 = OH$, $R^4 = H$
VII	$R^1 = R^3 = NH_2$, $R^2 = R^4 = H$
VIII	$R^1 = R^3 = NH_2$, $R^2 = SO_3Na$, $R^4 = H$
IX	$R^1 = R^3 = NH_2$, $R^2 = R^4 = SO_3Na$
X	$R^1 = NH_2$, $R^2 = SO_3Na$, $R^3 = \text{cyclo-}C_6H_{11}$, $R^4 = H$



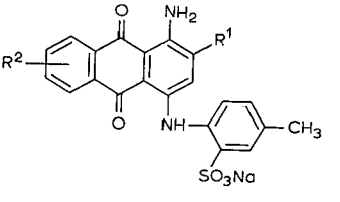
XI	$R^1 = R^2 = R^3 = H$
XII	$R^1 = CH_3$, $R^2 = R^3 = H$
XIII	$R^1 = R^3 = H$, $R^2 = CH_3$
XIV	$R^1 = R^2 = H$, $R^3 = CH_3$
XV	$R^1 = COONa$, $R^2 = R^3 = H$
XVI	$R^1 = R^3 = H$, $R^2 = COONa$
XVII	$R^1 = R^2 = H$, $R^3 = COONa$
XVIII	$R^1 = SO_3Na$, $R^2 = R^3 = H$
XIX	$R^1 = R^3 = H$, $R^2 = SO_3Na$
XX	$R^1 = R^2 = H$, $R^3 = SO_3Na$
XXI	$R^1 = R^3 = H$, $R^2 = NH_2$
XXII	$R^1 = H$, $R^2 = NH_2$, $R^3 = SO_3Na$
XXIII	$R^1 = SO_3Na$, $R^2 = H$, $R^3 = CH_3$



XXIV



XXV	$R^1 = CH_3$, $R^2 = H$
XXVI	$R^1 = CH_3$, $R^2 = SO_3Na$
XXVII	$R^1 = Br$, $R^2 = H$
XXVIII	$R^1 = Br$, $R^2 = SO_3Na$



XXIX	$R^1 = R^2 = CH_3$, $R^3 = R^4 = H$
XXX	$R^1 = R^2 = \text{cyclo-}C_6H_{11}$, $R^3 = R^4 = H$
XXXI	$R^1 = R^2 = CH_3$, $R^3 = R^4 = OH$

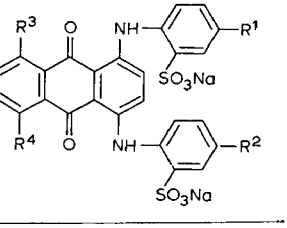
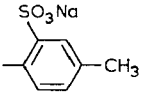
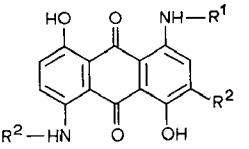


TABLE 233 *(continued)*

XXXII $R^1 =$  , $R^2 = H$

XXXIII $R^1 = H$, $R^2 = SO_3H$

XXXIV $R^1 = CH_3$, $R^2 = SO_3H$



Dye	R_F						
	S_1	S_2	S_3	S_4	S_5	S_6	S_7
I	0.89	0.89s	0.68s	0.89	0.52s	0.53s	0.11s
II	0.79	0.26	0.23	0.85	0.15	0.14	0.02
III	0.80	0.31	0.27	0.66	0.62	0.65	0.52
IV	0.83	0.21	0.21	0.74	0.57	0.61	0.38
V	0.87	—	—	0.90	—	—	0.07
VI	0.71	0.04	0.09	0.68	0.45	0.48	0.32
VII	0.85	0.85s	0.60s	0.85	0.41	0.43	0.32
VIII	0.71	—	—	0.58	—	—	s
IX	0.40	0.02	0.03	0.17	0.59	—	0.53
X	0.88	0.62	0.48	0.85	0.69	—	0.38
XI	0.86	0.54	0.45	0.80	0.53	0.48	0.13
XII	0.86	0.76	0.38	0.80	0.65	0.67	0.11
XIII	0.86	—	0.38	0.80	0.50	0.53	0.08
XIV	0.86	0.76	0.38	0.80	0.40	0.46	0.05
XV	0.57	0.11	0.14	0.78	0.52	0.52	0.34
XVI	0.63	0.16	0.19	0.79	0.53	0.48	0.22
XVII	0.53	0.12	0.15	0.72	0.37	0.37	0.18
XVIII	0.60	0.12	0.15	0.40	0.70	0.64	0.66
XIX	0.64	0.14	0.16	0.43	0.65	0.62	0.62
XX	0.57	0.12	0.14	0.33	0.56	0.53	0.60
XXI	0.81	—	—	0.67s	—	—	0.22
XXII	0.52	—	—	0.27	—	—	0.21
XXIII	0.66	—	—	0.50	0.71	—	0.68
XXIV	0.72s	0.18s	—	0.36	0.03	—	0
XXV	0.81	0.40	0.30	0.76	0.63	—	0.57
XXVI	0.55	0.08	0.06	0.33	0.72	—	0.87
XXVII	0.84	0.54	0.35	0.79	0.55	—	0.25
XXVIII	0.59	0.18	0.13	0.37	0.70	—	0.65
XXIX	0.81	—	—	0.61	—	—	0.59
XXX	0.85	—	—	0.85	—	—	0.02
XXXI	0.74	—	—	0.57	—	—	0.58
XXXII	0.74	—	—	0.55	—	—	0.71
XXXIII	0.57	—	—	0.32	—	—	0.44
XXXIV	0.61	—	—	0.37	—	—	0.52

TABLE 234

PC R_F VALUES OF ACID ANTHRAQUINONE DYES

I. GEMZOVÁ AND J. GASPARIČ, *Collection Czech. Chem. Commun.*, 34 (1969) 3076–3078)

Paper: Whatman No. 1.
Solvents: S_1 = 1-Propanol–ammonia (2:1).
S_2 = 1-Propanol–lauryl alcohol–ammonia (240 ml:137 g:120 ml).
S_3 = S_2 and paper impregnated with 5% solution of lauryl alcohol in ethanol.
S_4 = 1-Propanol–25% acetic acid (2:1).
S_5 = Methanol–1 *N* HCl (1:1).
S_6 = S_5 saturated with lauryl alcohol, paper impregnated as in S_3.
The values in brackets belong to weak spots.

Dye	*Producer*	*Colour Index No.*	R_F[a]					
			S_1	S_2	S_3	S_4	S_5	S_6
Cellitechtviolett ER	IG	62 000	0.71	0.33	0.17	0.58	0.42s	(0.37s)
			(0.83)	—	—	(0.85)	—	0.01
Alizarindirektviolett EBB	IG	62 005	(0.40)	0.02	0.03	0.17	0.59	0.53
			(0.59)	0.11	0.13	(0.35)	—	—
			(0.46)	—	—	—	(0.53)	—
Alizarinirisol RL	IG	62 010	0.59	0.14s	0.20s	0.52	0.35s	0.07s
								0.24s
Supracenviolett 4BF	FBy	62 020	0.82	0.51	0.38	0.77	0.65	0.44
Supracenviolett 3R	FBy	62 026	0.58	0.13	0.12	0.37	0.73	0.78
Alizarinbrillantreinblau R	FBy	62 045	0.88	0.62	0.48	0.85	0.69	0.38
Alizarinsaphirol A	FBy	62 055	0.86	0.54	0.45	0.80	0.53	0.13
Alizarinazurol ASR	Chem	62 070	0.66	—	—	0.50	0.71	0.68
Alizarinreinblau FFG	FBy	62 070	0.66	0.15	0.13	0.50	0.73	0.68
Kitonechtblau 3G	Ciba	61 530	0.83	0.52	0.38	0.81	0.72	0.64
								(0.96)
								(0.18)
Anthralanblau G	IG	62 125	0.81	0.41	0.32	0.74	0.45s	0.37
Kitonechtblau 4GL	Ciba	61 125	0.46	0.05	0.02	0.16	0.57	0.64
			(0.76)	(0.24)	(0.15)	0.23	—	—
				(0.16)	(0.10)	(0.57)		
Anthralanblau B	IG	62 130	0.82	0.45	0.34	0.76	0.55	0.44
Alizarinreinblau FFB	IG	62 145	0.88	0.60	0.43	0.85	0.55	0.10
			(0.74)	0.19	0.14	(0.77)	—	(0.96)
			(0.63)	—	—	(0.66)	—	(0.19)
Anthralanblau FR	IG	62 150	0.77	0.39	0.36	0.71	0.56	0.46
Carbolanviolett 2RS	ICI	62 165	0.88	0.79	0.53	0.89	0.92	0.00
			(0.78)	(0.35)	(0.28)	(0.74)	0.40	(0.02)
			(0.53)	(0.18)	(0.13)	(0.36)	0.08	—
Kitonechtblau CR	Ciba	62 085	0.81	0.40	0.30	0.76	0.63	0.57
Acilanechtblau RBX	FBy	62 095	0.56	0.40	0.30	0.33	0.72	0.87
			(0.81)	0.08	0.06	(0.76)	—	0.57
			(0.47)	0.00	0.00	(0.58)	—	—
				(0.16)	(0.12)			
				(0.03)	(0.02)			
Alizarinreinblau B	IG	62 105	0.84	0.54	0.35	0.79	0.55	0.25
Alizarinreinblau G	IG	62 110	0.59	0.54	0.39	0.37	0.70	0.65
			(0.84)	0.18	0.13	(0.79)	0.55	(0.25)
				0.15	0.11			
Alizarindirektblau B	MLB	62 060	0.82s	—	—	s	s	s
Anthrachinonblaugrün BXO			0.43	0.03	0.08	0.17	0.78	0.68
			(0.68)	(0.13)	0.01	(0.50s)	—	—
Alizarinuranol R	FBy	61 550	0.66	0.41	0.29	0.58	0.75	0.79
			(0.75)	0.31	0.20	(0.67)	0.65	0.00
			(0.50)	0.21	0.13	(0.34)	—	—
				0.14	0.08			
				0.05	0.02			

TABLE 234 *(continued)*

Dye	*Producer*	*Colour Index No.*	R_F[a]					
			S_1	S_2	S_3	S_4	S_5	S_6
Alizarinuranol BB	FBy	62 510	0.32	0.37	0.31	0.85s	0.38	0.95
			0.74	0.30	0.24	0.57	—	s
				0.20	0.15			
				0.15	0.11			
Alizarincyaningrau G	IG	62 520	0.87	0.65	0.44	0.87	0.77	0.24
			0.84	0.50	0.36	0.80	0.71	0.12
								0.09
Alizarincyaningrün G	IG	61 570	0.81	0.28	0.15	0.61	0.74	0.97
			(0.67)	—	—	(0.37)	—	0.68
								0.59
Alizarindirektviolett R	MLB	60 735	0.80	0.42	0.24	0.85	0.70	0.31
Alizarindirektgrün G	MLB	61 575	0.90	0.76	0.46	0.87	0.83	0.62
			0.81	0.28	0.15	0.61	0.58	0.02
Alizarincyaningrün 3G		62 550	0.48	0.04	0.02	0.24	0.74	0.69
			0.16	—	—	0.17	—	0.02
			(0.09)	—	—	(0.04)	—	—
			(0.06)	—	—	—	—	—
Alizarincyaningrün 5G	FBy	62 560	0.74	—	—	0.57	—	0.58
			(0.83)	—	—	(0.79)	—	(0.90)
								(0.25)
Alizarincyaningrün GWA	FBy	61 590	0.85	0.43	0.25	0.85	0.69s	0.02
			(0.55)	0.13	0.06	(0.35)	—	(0.68)
Alizarinechtblau R	Ciba	61 585	0.69	—	—	0.81	—	0.68
Kitonechtblau G	Ciba	63 000	0.57	0.00	0.00	0.32	0.46	0.44
			0.10s	0.14	0.11	0.03	0.00	(0.94)
Helioechtblau BL	IG	63 010	0.12s	0.00	0.00	0.03	0.52	0.44
			0.05s	—	—	—	—	0.35
Kitonechtblau CB	Ciba	63 005	0.12s	0.00	0.00	0.03	0.48	0.44
								0.35
Alizarinsaphirol SES	IG	63 315	(0.61)	0.19	0.14	0.37	0.55s	0.52
			0.57	0.00	0.00	0.32	0.25s	s
			(0.12)	—	—	0.06s	0.00	—
			0.02					
Toluidinblau	IG	63 340	0.74	0.22	0.19	0.55	0.83	0.71
				0.09	0.08	—	0.78	(0.14)
				0.00	0.00			
Alizarinlichtbraun GL	IG	65 000	0.43	0.08	0.06	0.20	0.71	0.76
Alizarinlichtgrau BBLW	FBy		0.72s	0.22	0.19	0.36	0.03	0.00
Polarblau 4GL	Gy	61 130	0.72s	0.22	0.19	0.36	0.03	0.00
Supranolblau GG	IG	61 135	0.83	0.31	0.37	0.77	0.11s	0.00
				0.28	0.24	(0.82)	0.00	(0.19)
Anthralanrot 3B	IG	68 215	0.76	0.29	0.26	0.68	0.44	0.00
Alizarinastrolviolett B	FBy	68 500	0.76	0.30	0.27	0.68	0.44	0.00
Alizarinreinblau NA	FBy	62 125	0.83	0.58	0.39	0.75	0.55	0.25
			(0.77)	(0.28)	—	(0.61)	0.25	(0.05)

[a] s = streak.

TABLE 235

TLC R_F VALUES OF SOME RHODAMINE DYES AND PYRONIN

(R. W. HOROBIN AND L. B. MURGATROYD, *Stain Technol.*, 44 (1969) 301)

Thin layer: Unactivated precoated silica thin layers Eastman "Chromagram 6061".
Solvent: Chloroform–methanol (8:2).

Dye	*Colour Index No.*	R_F
Rhodamine B	45170	0.51
Rhodamine 3B	45175	0.42
Rhodamine 3GO	45215	0.39
Rhodamine 6G	45160	0.44
Pyronin (G)Y	45000	0.22

TABLE 236

PC R_F VALUES OF SOME OPTICAL BRIGHTENING AGENTS
(J. GASPARIČ, *Chem. Listy*, 63 (1969) 1364)

Paper: Whatman No. 3.
Impregnation: 50% solution of dimethylformamide in ethanol.
Solvent: *n*-Heptane or *n*-hexane.
Detection: UV light.

Compound	*Producer*	R_F	*Fluorescence*
Uvitex EBF	Ciba	0.72	blue
SWN conc.		0.20	blue
ER conc.		0.75	violet
ERN		0.75	violet
SWR		0.06	light blue
K		0.77	violet-blue
OB		0.93	violet-blue
NA		0.02	violet
SK		0.77	violet-blue
SOF		0.72	violet-blue
Tinopal ET	Geigy	0.13	violet
SFG		0.27	blue
PCR		0.71	violet
Leucophor DC	Sandoz	0.20	blue
EFR		0.13	blue
EFG		0.43	violet
EFA		0.13	blue
Leukopur Base	Sandoz	0.20	blue
EGM		0.43	violet
Blankophor ACF	Bayer	0.09	violet-blue
KL		0.13	blue-green
Ultraphor NA	BASF	0.09	violet-blue
Delft Weiss SU	NCF	0.06	light blue
Photine EB	ACNA	0.80	violet-blue

TABLE 237

TLC R_F VALUES OF SOME ALIPHATIC AND TERPENE-TYPE 2,4-DINITROPHENYLHYDRAZONES
(J. H. DHONT AND G. J. C. MULDERS-DIJKMAN, *Analyst*, 94 (1969) 1093)

Thin layers: TL_1 = Silica Gel G (Merck) equilibrated with the atmosphere.
TL_2 = TL_1 impregnated with nitromethane by vapour phase adsorption.
TL_3 = TL_1 impregnated with acetonitrile by vapour phase adsorption.
Solvents: S_1 = Benzene–hexane (1:1); number of developments, 5.
S_2 = Hexane; number of developments, 3.
Detection: Not stated.

Compound	TL_1S_1	TL_2S_2	TL_3S_2
Methanal	0.23	0.02	0.06
Ethanal	0.22	0.05	0.11
Propanal	0.33	0.07	0.17
Butanal	0.39	0.10	0.24
Pentanal	0.44	0.15	0.31
Hexanal	0.48	0.21	0.38
Heptanal	0.51	0.27	0.47
Octanal	0.53	0.37	0.56
Nonanal	0.55	0.46	0.65
Decanal	0.57	0.57	0.73
Undecanal	0.59	0.66	0.78
Dodecanal	0.60	0.76	0.84
Propan-2-one	0.22	0.07	0.18
Butan-2-one	0.37	0.13	0.28
Pentan-2-one	0.41	0.19	0.35
Hexan-2-one	0.46	0.26	0.45
Heptan-2-one	0.50	0.34	0.53
Octan-2-one	0.53	0.44	0.63
Nonan-2-one	0.55	0.55	0.70
Undecan-2-one	0.60	0.73	0.82
Cyclopentanone	0.25	0.11	0.28
Cyclohexanone	0.35	0.17	0.37
Cycloheptanone	0.39	0.24	0.47
Cyclooctanone	0.30	0.32	0.53
α-Ionone	0.60	0.54	0.73
β-Ionone	0.63	0.60	0.76
α-Methylionone	0.67	0.68	0.79
β-Methylionone	0.66	0.73	0.82
Carvone	0.62	0.32	0.54
Carvotane acetone	0.67	0.49	0.67
Citronellal	0.49	0.32	0.52
Piperitone	0.39	0.43	0.64
Pseudoionone	0.51	0.40	0.60
Pulegone	0.47	0.57	0.64
Isopulegone	0.52	0.41	0.56
α-Thujone	0.53	0.46	0.66
β-Thujone	0.63	0.46	0.66
Dihydrocarvone	0.57	0.34	0.57
Citral	0.38	0.23	0.44
Perilla-aldehyde	0.44	0.20	0.39
α-Phellandral	0.64	0.50	0.68
Camphor	<0.05	0	0
Fenchone	<0.05	0	0
Methylheptenone	0.44	0.28	0.48
Menthone	0.51	0.55	0.73
Isomenthone	0.66	0.54	0.73

TABLE 238

TLC R_F VALUES OF SOME ORGANOPHOSPHORUS AND CARBAMATE INSECTICIDES
(M. RAMASAMY, *Analyst*, 94 (1969) 1078–1079)

Thin layers: TL_1 = Silica Gel G.
TL_2 = Aluminium Oxide G.
Solvents: S_1 = Hexane–acetone (3:1).
S_2 = Chloroform–acetone (9:1).
S_3 = Hexane–acetone (5:1).
Detection: D_1 = 2,6-Dibromo-*p*-benzoquinone-4-chlorimine.
D_2 = *p*-Nitrobenzenediazonium fluoroborate.
D_3 = 4-Methylumbelliferone.

Compound		R_F					
Common name	*Chemical name*	TL_1S_1	TL_2S_1	TL_1S_2	TL_2S_2	TL_1S_3	TL_2S_3
Dicapton	O-(2-Chloro-4-nitrophenyl) O,O-dimethyl phosphorothioate	0.50	0.62	0.85	0.90	0.27	0.55
Bromophos	O-(4-Bromo-2,5-dichlorophenyl) O,O-dimethyl phosphorothioate	0.55	—	0.83	—	0.47	0.85
Fenitrothion	O-(3-Methyl-4-nitrophenyl) O,O-dimethyl phosphorothioate	0.55	0.73	0.77	0.78	0.41	0.70
Malathion	S-[1,2-Di(ethoxycarbonyl)ethyl] O,O-dimethyl phosphorodithioate	0.42	0.69	0.84	0.88	0.25	0.58
Fenthion	O-(3-Methyl-4-methylthiophenyl) O,O-dimethyl phosphorothioate	0.31 0.55	0.50	0.74	0.89	0.18 0.42	0.79
Cidial	S-(α-Ethoxycarbonylbenzyl) O,O-dimethyl phosphorodithioate	0.52	0.73	0.85	0.96	0.37	0.70
—	O-(3-Chloro-4-diethylsulphamoylphenyl) O,O-dimethyl phosphorothioate	0.26	0.54	0.79	0.80	0.16	0.44
Iodofenphos	O-(2,5-Dichloro-4-iodophenyl) O,O-dimethyl phosphorothioate	0.46 0.68	—	0.63 0.85	0.85	0.56	—
—	O,O-Diethyl O-(α-cyanobenzylideneamino) phosphorothioate	0.25 0.48	0.19 0.65	0.86	0.79	0.34	0.68
—	O,O-Diethyl O-(2-chloro-α-cyanobenzylideneamino) phosphorothioate	0.32 0.55	0.74	0.88	0.81	0.44	0.75
Dichlorvos	2,2-Dichlorovinyl dimethyl phosphate	0.30	0.13 0.57	0.72	—	0.13	0.83
Mobam	4-Benzothienyl methylcarbamate	0.26	0.34	0.52	0.81	0.12	0.21
Propoxur	2-Isopropoxylphenyl methylcarbamate	0.26	0.38	0.52	0.76	0.14	0.32
Landrin	3,4,5-Trimethylphenyl methylcarbamate	0.26	0.53	0.58	0.82	0.17	0.35
—	2,3,5-Trimethylphenyl methylcarbamate	0.25	0.58	0.55	0.76	0.17	0.30
Carbamult	3-Methyl-5-isopropylphenyl methylcarbamate	0.27	0.83	0.59	0.76	0.19	0.36
—	3-Isopropylphenyl methylcarbamate	0.25	0.59	0.64	0.75	0.19	0.35
Carbaryl	1-Naphthyl methylcarbamate	0.18 0.34	0.44	0.67	0.76	0.10	0.24
—	2-Cyclopentylphenyl methylcarbamate	0.32	0.65	0.71	0.76	0.20	0.33

TABLE 239

PC R_F VALUES AND ELECTROPHORETIC MOBILITIES OF UDP GLUCOSE AND RELATED COMPOUNDS
(J. A. THOMAS, K. K. SCHLENDER AND J. LARNER, *Anal. Biochem.*, 25 (1968) 489)

Paper chromatography: Descending chromatography on Whatman No. 31 ET paper; solvent, 1 *M* ammonium acetate pH 7.5–absolute ethanol (3:7).
Electrophoresis: Whatman No. 31 ET paper; electrolyte, 150 m*M* triethylammonium acetate buffer, pH 4.4.

Compound	R_F	*Electrophoretic mobility,* R_{UDPG}
UDP glucose	0.44	1.0
UTP	0.17	1.33
UDP	0.22	1.17
UMP	0.33	0.75
Uridine	—	0.09
Glucose	0.78	0.07
Glucose 1-phosphate	0.29	0.86
Glucose 6-phosphate	0.22	0.85
Fructose 1,6-diphosphate	—	1.15

TABLE 240

ELECTROPHORETIC MOBILITIES OF NICOTINIC ACID MONONUCLEOTIDE AND SOME RELATED COMPOUNDS
(C. WAGNER, *Anal. Biochem.*, 25 (1968) 475)

Paper: Whatman No. 1.
Electrolyte: 0.075 *M* with respect to sodium acetate and 0.0018 *M* with respect to ethylene diaminetetraacetic acid, pH 5.3.
Voltage: 2000 V.
Amperage: 70–80 mA.
Running time: 50 min.
Detection: UV-light.

Compound	*Migration (cm)*
NAD	+ 3.5
Nicotinamide	− 2.3
Nicotinic acid	+11.1
Nicotinic acid mononucleotide	+ 9.3
Nicotinic acid monucleotide after basic hydrolysis	+10.8

TABLE 241

PC R_F VALUES OF OLIGONUCLEOTIDE DERIVATIVES
(A. F. COOK, M. J. HOLMAN AND A. L. NUSSBAUM, *J. Am. Chem. Soc.*, 91 (1969) 6484)

Paper: Whatman No. 1.
Solvents: S_1 = Ethanol–0.5 *M* ammonium acetate, pH 3.8 (7:3).
S_2 = Acetonitrile–0.1 *M* ammonium acetate, pH 7 (6:4).
Detection (for S-containing compounds): $HgCl_2$–sodium nitroprusside–potassium cyanide (T. WIELAND AND R. LAMBERT, *Chem. Ber.*, 89 (1956) 2476).

Compound	R_F	
	S_1	S_2
EtS-dpT	0.68	0.64
EtS-dpC	0.60	0.61
EtS-dpTpT	0.45	0.54
EtS-dpTpC	0.38	0.51
EtS-dpTpA	0.34	0.50
EtS-dpCpT	0.41	0.51
EtS-dpCpA	0.34	0.37
EtS-dpTpTpT	0.33	0.43
EtS-dpTpCpA	0.19	0.29
EtS-dpTpApG	0.19	0.15
EtS-dpCpTpA	0.15	0.31
MeO-dpTpCpA	0.20	0.29
MeO-dpTpApG	0.16	0.25
MeO-dpCpTpA	0.14	0.31
dpT	0.46	0.39
dpTpCpA	0.18[a]	0.11
dpCpTpA	0.18	0.12
dpTpApG	0.08	0.11
dpppTpT	0.17	0.26
dpppTpTpT	0.10	0.20
dpTpTpT | rpA	0.28	0.23

[a] This, and the remaining R_F values of this column, are calculated with respect to dpT.

TABLE 242

ELECTROPHORETIC MOBILITIES OF RIBOSE PHOSPHATES
(M. HALMANN, R. A. SANCHEZ AND L. E. ORGEL, *J. Org. Chem.*, 34 (1969) 3703)

Electrolyte: Sodium borate buffer (0.05 *M*, pH 9.0).
Potential: 1000 V.
Time: 2 h.

Compound	*Mobility*[a]
Ribose 5-phosphate	1.00
α-Ribofuranose 1-phosphate	0.92
β-Ribofuranose 1-phosphate	0.98
Ribopyranose 1-phosphate	0.93

[a] Relative to that of ribose 5-phosphate.

TABLE 243

PC R_F VALUES OF RIBOSE PHOSPHATES
(M. HALMANN, R. A. SANCHEZ AND L. E. ORGEL, *J. Org. Chem.*, 34 (1969) 3703)

Paper: Whatman No. 3 MM.
Solvents: S_1 = 2-Propanol–conc. ammonia–0.1 *M* sodium borate (7:1:2).
S_2 = Propanol–conc. ammonia–water (11:2:7).
S_3 = Propanol–conc. ammonia–0.1 *M* sodium borate (11:2:7).
S_4 = Methyl Cellosolve–methyl ethyl ketone–3 *N* ammonia (7:2:3).
S_5 = 1-Butanol–glacial acetic acid–water (4:1:1).
Detection: Aniline–phthalic acid and/or ammonium molybdate–perchloric acid, followed by UV irradiation.

Compound	R_F				
	S_1[a]	S_2[a]	S_3	S_4[a]	S_5
D-Ribose		1.65	0.70		0.36
Ribose 5-phosphate	0.43	1.02	0.43	4.0	
α-Ribofuranose 1-phosphate	0.8	1.21	0.47	2.3	
β-Ribofuranose 1-phosphate	0.6	1.23	0.48	2.5	
Ribopyranose 1-phosphate	0.8	1.07	0.47		
$H_2P_2O_7^{2-}$	0.4	0.79		0.2	
HPO_4^{2-}	1.0	1.0		1.0	

[a] R_F relative to orthophosphate.

TABLE 244

PC R_F VALUES OF ETHYLPYRIMIDINES
(R. T. MARKIW AND E. S. CANELLAKIS, *J. Org. Chem.*, 34 (1969) 3709)

Paper: Whatman No. 3 MM.
Solvents: S_1 = 2-Propanol–conc. ammonium hydroxide–water (7:1:2).
S_2 = 2-Propanol–water (7:3).
S_3 = 1-Butanol–water (86:14).
Detection: Not stated.

Compound	R_F		
	S_1	S_2	S_3
3-Ethylthymidine	0.84		
3-Ethylthymine	0.84		
3-Benzylthymidine	0.84	0.70	
3-Benzylthymine	0.84		
3-(*n*-Butyl)thymidine	0.84		
3-(*n*-Butyl)thymine	0.84		
3-(*n*-Octyl)thymidine	0.70		
1,3-Dimethylthymine	0.86		
1,3-Diethylthymine	0.86		
1-Ethylthymine	0.77		
3-Methyluridine	0.68		
3-(*n*-Butyl)uridine	0.42	0.76	
3-(*n*-Butyl)uracil	0.75	0.83	0.72

TABLE 245

ELECTROPHORETIC, CC AND PC DATA FOR THE IDENTIFICATION AND ESTIMATION OF URINARY PURINES, PYRIMIDINES AND PYRAZOLOPYRIMIDINES

(H. A. SIMMONDS, *Clin. Chim. Acta*, 23 (1969) 325)

Electrophoresis: Silica gel thin layer 20 × 20 cm, 250 μ thick; electrolyte, sodium borate–boric acid buffer 0.04 *M*, pH 8.65, potential, 75 V/cm; time, 30 min.

Column chromatography: Ion exchanger, Dowex 1 X8 acetate; column, 1.5 × 15 cm; flow rate, 0.6–1.0 ml/min; detection by UV (264 nm). 5–25 ml of urine at pH 10 were applied to the column. First wash: 10.0 ml 0.1 *N* NH_4OH; second wash: 10.0 ml of distilled water. Then the column was eluted with 0.01 *N* HCl. The first absorbing maximum was creatinine, the other three are referred to as A, B and C, respectively.

Paper chromatography: Whatman No. 1 paper; solvent system, *n*-propanol–methyl ethyl ketone–water–ammonia (40:30:20:10).

Compound	*Absorption maxima (nm)*		$E^{1\%}_{1cm}$ *max*	*Peak of elution from Dowex column*	*Electrophoretic mobility in borate buffer*	R_F × 100	*pK*
	pH 2	*pH 12*	*pH 2*				
N-methyl-2-pyridone-5-carboxamide	258/280–300	258/280–300	Eluted with creatinine prior to peak A				
Adenine	262.5	269	0.95	A	+4.7	65	9.8
5-Acetylamino-6-amino-3-methyluracil	263.5	265.5	0.68	A	+0.5	54	8.0
Guanine	248.5/275.5	246/273.5	0.69	A	+4.6	45	9.2
1-Methylguanine	251/274	256/276.5	0.62	A	+5.9	56	10.4
7-Methylguanine	249.5/273	244/280	0.62	A	+5.3	50	9.4
N^2-Methylguanine	251/278	245/276	0.74	A	+5.3	54	
7-Methylxanthine	268	238/289	0.61	A	Nil	57	8.5
Hypoxanthine	248.5	259.5	0.80	A	+4.0	56	8.94
1-Methylhypoxanthine	250	260	0.715	A	+6.4	64	9.1
Uracil	258	283	0.76	A	+7.1	61	9.5
Pseudouridine	263	286	0.31	A	−2.9	31	9.6
6-Succinaminopurine	276	275	0.50	Not available			
2-Dimethylamino-6-hydroxypurine	256/285	244/279		Not available			
7-Ribosyloxipurinol	252	268	0.24	A and B	−3.6	36	8.6
1-Ribosylallopurinol	251	271/286	0.31	A and B	−4.4	41	8.83
1,7-Dimethylxanthine	269	238/289	0.53	A and B	+3.0	66	8.5
Allopurinol	250	252/261	0.56	B	+6.2	66	9.34
Xanthine	267	240.5/277.5	0.66	B	−6.0	50	7.44
1-Methylxanthine	267	242/277	0.70	B	−4.2	59	7.7
Oxipurinol	252	242.5/267.5	0.40	C	−5.1	57	7.74
8-Hydroxy-7-methylguanine	248/294	248/287	0.85	C	+3.6	49	8.6

TABLE 246

CC ELUTION TIMES OF PURINES, PYRIMIDINES, NUCLEOSIDES AND AMINO ACIDS FROM AMBERLITE IRC 120 COLUMN

(Z. TEŇÍŠEK, J. LAŠŽOVKOVÁ AND J. VARHANÍK, *Sci. Tools*, 16 (1969) 40)

Single-column automatic amino acid analyzer equipped with UV absorptiometer with recorder for determining substances in the 254-nm region; column, Amberlite IRC 120.
Tau = taurine; Abu = aminobutyric acid; Nle = norleucine.

Composition of buffers	*pH*		
	2.875	*3.80*	*5.00*
Sodium citrate (g)	14.71	14.71	78.53
Sodium hydroxide 2-*N* (ml)	27.51	27.51	0
Thiodiglycol (ml)	5.0	5.0	5.0
Complexon III (g)	1.0	1.0	1.0
Brij 35 (ml)	3.0	3.0	3.0
Water to (ml)	1000.0	1000.0	1000.0

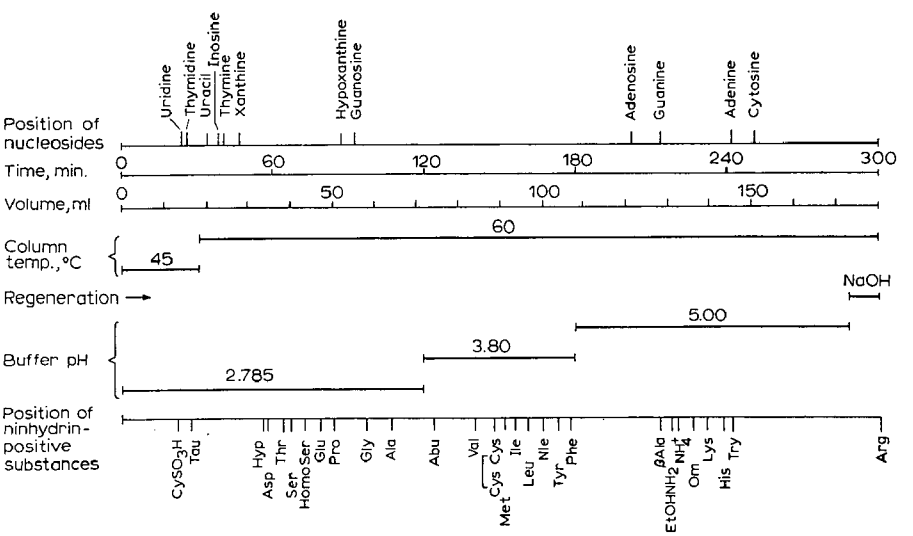


TABLE 247

CC SEPARATION OF NUCLEOSIDES ON VARIOUS CATION EXCHANGERS
(M. UZIEL, C. K. KOH AND W. E. COHN, *Anal. Biochem.*, 25 (1968) 96)

The column dimensions and the ion exchangers are specified below.
Buffer: Ammonium formate, pH 4.65.
Flow rate: 1.0 ml/cm²/min (the values for 2.0 are given in parentheses)..
Temperature: The columns were operated at 50°.
Abbreviations: U = uridine; G = guanosine; A = adenosine; C = cytidine.

Column					*Separation factor*[a]			
Exchanger		*Dimensions (cm × cm)*	*Pressure (p.s.i.)*	*Time (min)*	*(ψ–U)*	*(U–G)*	*(G–A)*	*(A–C)*
Material	*Particles*							
CG-120 III Amberlite	Coarser	56 × 0.9	15	120	1.0	4.6	2.6	2.6
CG-120 III Amberlite	Coarser	56 × 0.9	(30)	(60)	(0.8)	(3.5)	(2.0)	(2.0)
CG-120 III Amberlite	Finer	30 × 0.8	40	60		3.3	2.9	2.9
CG-120 III Amberlite	Finer	30 × 0.8	40	(30)		(2.4)	(1.7)	(1.7)
CG-120 III Amberlite	Finest	22 × 0.9	50	80		2.4	2.0	2.1
AG-50, X4 Bio-Rad, Dowex	−400	28 × 0.8		80		3.2	1.6	0.8
AG-50, X4 Bio-Rad, Dowex	−400	28 × 0.8		(40)		(2.7)	(1.4)	(0.5)
AG-50, X8	−400	28 × 0.8					1.25	1.1
AG-50, X8	−400	28 × 0.8				(1.5)	(0.8)	(0.7)
AA-27 Beckman		20 × 0.6	45	70		3.0	2.0	2.2
A-150 Beckman		25 × 1.0	20[b]	50[b]		2.2[b]	1.3[b]	1.3[b]
A-6 Bio-Rad		45 × 0.6	30–40	155	2.8	5.7	4.3	4.1
A-6 Bio-Rad		23 × 0.6	10–15	100		3.8	3.0	2.6
A-6 Bio-Rad		19 × 0.6	10–15[c]	90[c]		3.5[c]	2.6[c]	2.1[c]
A-6 Bio-Rad		24 × 0.5		100		3.3	2.3	2.2
A-6 Bio-Rad		24 × 0.5		(50)		(2.7)	(2.1)	(2.1)
A-6 Bio-Rad		13.5 × 0.5	5–10[d]	50[d]		2.0[d]	1.8[d]	1.6[d]

[a] Separation factor = ml between maxima of two adjacent peaks/sum of widths at half maximum of two adjacent peaks (in ml).
[b] Flow rate, 1.2 ml/cm²/min.
[c] Flow rate, 0.9 ml/cm²/min.
[d] Flow rate, 1.3 ml/cm²/min.

TABLE 248

CC SEPARATION OF VARIOUS NUCLEOSIDES AND BASES BY CATION EXCHANGE
(M. UZIEL, C. K. KOH AND W. E. COHN, *Anal. Biochem.*, 25 (1968) 96)

Column: Dimension, 0.6 × 23 cm.
Carrier: Bio-Rad A-6.
Operating conditions: Temperature, 48°; flow rate, 0.25 ml/min.
Buffer: 0.4 *M* ammonium formate, pH 4.65.
Time: 500 min.
Detection: Optical density 260 nm.

SF = $\Delta K/\Sigma W$. ΣW = the sum of the widths at the half maximum of two adjacent peaks (in ml). N = nucleoside; B = base. The columns are segregated to show the results expected from experiments limited to nucleosides (N–N′) or to bases (B–B′). The *K* value (ml to peak) for the following compounds is given in parentheses: O^2-methylguanosine (15.5 ml); 1-methylguanosine (12.4 ml); O^2-methyladenosine (28.5 ml); O^2-methylcytidine (31.5 ml); N^6-isopentenyladenosine (94 ml).

Order of elution	*K (ml to peak)*	*W (ml)*	*Separation factor (SF)*					
			N–N′		*N–B*		*B–B′*	
Pseudouridine	5.5	0.67	0.55					
Uridine	6.2	0.68	0.25					
Ribothymidine	6.6	0.73	0.21					
3-Methyluridine	6.8	0.68			1.00			
Uracil	8.2	0.59	1.8		0.95			
Inosine	9.2	0.55						
1-Methylinosine	9.2	0.75	0.04				1.8	
4-Thiouridine	10.5	0.83	0.80		0.2			
4-Thiouracil	10.8	0.63					0.2	
Thymine	10.5	0.63	1.1				1.3	
Hypoxanthine	12.2	0.68			0.13			
Guanosine	12.4	0.88	1.4					
N^2-Dimethylguanosine	15.2	1.11	1.4	3.2				
N^2-Methylguanosine	17.6	1.21	0.03				6.8	
Adenosine	18	1.07	0.40					
Bis(4-thiuridine) disulphide	20	2.12	0.67					
N^6-Methyladenosine	22.3	1.30		2.5				
Guanine	24.3	1.09	0.87		0.84			
Cytidine	24.4	1.13			0.4		4.2	
7-Methylguanine	35	1.43	5.2		4.1			
N^6-Dimethyladenosine	42.5	2.36			1.6		8.5	
Adenine	62	2.4	6.0		4.1			
Cytosine	67	2.4			0.96		1.12	
1-Methyladenosine	72	2.6						
7-Methylinosine	73	—	0.10					
3-Methylcytidine	72.5	2.5						
7-Methylguanosine	104	3.9	5.0					
1,7-Dimethylguanosine	125	4.5	2.5					

TABLE 249

PC R_F VALUES OF SOME NUCLEOTIDES, NUCLEOSIDES AND THEIR DERIVATIVES
(A. HOLÝ AND F. ŠORM, *Collection Czech. Chem. Commun.*, 34 (1969) 3527)

Paper: Whatman No. 1.
Solvents: S_1 = 2-Propanol–conc. ammonia–water (7:1:2).
S_2 = Ethanol–1 *M* ammonium acetate (5:2).
S_3 = Std. ammonium sulphate–1 *M* ammonium acetate–2-propanol (79:19:2).
Detection: Not stated.

Compound	R_F[a]		
	S_1	S_2	S_3
Uridine	0.50	—	—
Adenosine	0.56	—	—
9-(α-L-Lyxofuranosyl)adenine	0.47	—	—
Adenosine 2′-phosphite	0.48	—	0.20
Adenosine 3′-phosphite	0.48	—	0.12
9-(α-L-Lyxofuranosyl)adenine 2′-phosphite	0.43	—	—
9-(α-L-Lyxofuranosyl)adenine 3′-phosphite	0.43	—	—
9-(α-L-Lyxofuranosyl)adenine 5′-phosphite	0.45	—	—
Uridine 2′(3′)-phosphate	0.10	0.50	0.67
Adenosine 2′-phosphate	0.12	0.37	0.31
Adenosine 3′-phosphate	0.12	0.37	0.21
Adenosine 2′,3′-cyclic phosphate	0.48	—	0.16
9-(α-L-Lyxofuranosyl)adenine 2′,3′-cyclic phosphate	0.42	—	0.16
9-(α-L-Lyxofuranosyl)adenine 2′-phosphate	0.20	0.37	0.33
9-(α-L-Lyxofuranosyl)adenine 3′-phosphate	0.20	0.37	0.24
9-(α-L-Lyxofuranosyl)adenine 5′-phosphate	0.15	0.35	—
9-(α-L-Lyxofuranosyl)hypoxanthine 2′(3′)-phosphate	0.18	—	—
9-(α-L-Lyxofuranosyl)hypoxanthine 2′,3′-cyclic phosphate	0.34	—	—
Inosine 2′(3′)-phosphate	0.10	—	—
Inosine 2′,3′-cyclic phosphate	0.36	—	—

[a] All R_F values of the enantiomeric derivatives are identical.

TABLE 250

ELECTROPHORETIC MOBILITIES OF SOME NUCLEOTIDES, NUCLEOSIDES AND THEIR DERIVATIVES
(A. HOLÝ AND F. ŠORM, *Collection Czech. Chem. Commun.*, 34 (1969) 3527)

Paper: Whatman No. 1.
Electrolytes: E_1 = 0.1 *M* triethylammonium hydrogen carbonate, pH 7.5.
E_2 = 0.1 *M* triethylammonium borate, pH 7.5.
E_3 = 0.05 *M* sodium hydrogen citrate, pH 3.5.
Potential: 40 V/cm.
Time: 1 h.
Detection: Not stated.

Compound	E_1[a,b]	E_2[a,c]	E_3[a,b]
Uridine	—	1.00	—
Adenosine	—	0.74	—
9-(α-L-Lyxofuranosyl)adenine	—	0.82	—
Adenosine 2′-phosphite	0.47	0.91	0.55
Adenosine 3′-phosphite	0.47	0.91	0.55
9-(α-L-Lyxofuranosyl)adenine 2′-phosphite	0.43	1.10	0.48
9-(α-L-Lyxofuranosyl)adenine 3′-phosphite	0.43	0.85	0.48
9-(α-L-Lyxofuranosyl)adenine 5′-phosphite	0.43	1.58	0.50
Uridine 2′(3′)-phosphate	1.00	—	1.00
Adenosine 2′-phosphate	0.93	—	0.52
Adenosine 3′-phosphate	0.93	—	0.52
Adenosine 2′,3′-cyclic phosphate	0.46	—	0.55
9-(α-L-Lyxofuranosyl)adenine 2′,3′-cyclic phosphate	0.43	0.86	0.48
9-(α-L-Lyxofuranosyl)adenine 2′-phosphate	0.93	—	0.46
9-(α-L-Lyxofuranosyl)adenine 3′-phosphate	0.93	—	0.46
9-(α-L-Lyxofuranosyl)adenine 5′-phosphate	0.95	—	0.45
9-(α-L-Lyxofuranosyl)hypoxanthine 2′(3′)-phosphate	1.00	—	0.90
9-(α-L-Lyxofuranosyl)hypoxanthine 2′,3′-cyclic phosphate	0.60	—	0.92
Inosine 2′(3′)-phosphate	1.00	—	0.90
Inosine 2′,3′-cyclic phosphate	0.60	—	0.92

[a] All mobilities of the enantiomeric derivatives are identical.
[b] Referred to uridine 2′(3′)-phosphate.
[c] Referred to uridine.

TABLE 251

ELECTROPHORETIC MOBILITIES OF SOME NUCLEOSIDE PHOSPHITES AND PHOSPHATES
(A. HOLÝ, *Collection Czech. Chem. Commun.*, 34 (1969) 3519)

Paper: Whatman No. 1 or 3 MM.
Electrolytes: E_1 = 0.1 *M* triethylammonium hydrogen carbonate, pH 7.5.
E_2 = 0.2 *M* triethylammonium borate, pH 7.5.
Potential: 40 V/cm.
Time: 1 h.
Detection: UV light (Mineralight) and the reagent of Hanes and Isherwood.

Compound	E_1[a]	E_2[a]
Uridine	—	0.48
1-(2-Deoxyribopyranosyl)thymine 3′(4′)-phosphite	0.55	0.58
1-(D-Ribopyranosyl)thymine 2′(3′)(4′)-phosphite	0.54	0.56
1-(2-Deoxy-β-D-xylopyranosyl)thymine 3′(4′)-phosphite	0.52	0.58
1-(α-D-Mannopyranosyl)thymine 2′(3′)-phosphite	0.56	0.50
1-(α-D-Mannopyranosyl)thymine 2′,6′-diphosphite	0.97	0.88
Uridine 2′,3′-cyclic phosphate	0.67	0.58
1-(2-Deoxyribopyranosyl)thymine 3′,4′-cyclic phosphate	0.55	0.56
1-(D-Ribopyranosyl)thymine 2′,3′-cyclic phosphate	0.52	0.58
1-(D-Ribopyranosyl)thymine 3′,4′-cyclic phosphate	0.50	0.58
1-(2-Deoxy-β-D-xylopyranosyl)thymine 3′,4′-cyclic phosphate	0.52	0.56
1-(2-Deoxy-β-D-glucopyranosyl)thymine 3′,4′-cyclic phosphate	0.54	0.57
1-(2-Deoxy-β-D-glucopyranosyl)thymine 4′,6′-cyclic phosphate	0.50	0.54
1-(α-D-Mannopyranosyl)thymine 2′,3′-cyclic phosphate	0.46	0.50
1-(α-D-Mannopyranosyl)thymine 2′,3′; 4′,6′-cyclic diphosphate	0.93	0.87
1-(α-D-Mannopyranosyl)thymine 4′,6′-cyclic phosphate	0.54	0.55
Uridine 2′(3′)-phosphate	1.00	1.00
5-Methyluridine 2′(3′)-phosphate	1.00	1.00
1-(2-Deoxyribopyranosyl)thymine 3′(4′)-phosphate	0.94	1.00
1-(D-Ribopyranosyl)thymine 3′(2′) (4′)-phosphate	0.90	0.95
1-(2-Deoxy-β-D-xylopyranosyl)thymine 3′(4′)-phosphate	0.95	0.97
1-(2-Deoxy-β-D-glucopyranosyl)thymine 3′(4′)-phosphate	0.95	0.97
1-(α-D-Mannopyranosyl)thymine 2′(3′)-phosphate	0.96	—
1-(α-D-Mannopyranosyl)thymine 3′-phosphate-4′,6′-cyclic phosphate	1.24	—

[a] Referred to uridine 2′(3′)-phosphate.

TABLE 252

PC R_F VALUES OF SOME NUCLEOSIDES AND THEIR PHOSPHITES AND PHOSPHATES
(A. HOLÝ, *Collection Czech. Chem. Commun.*, 34 (1969) 3519)

Paper: Whatman No. 1.
Solvents: S_1 = 2-Propanol–conc. ammonia–water (7:1:2).
S_2 = Ethanol–1 *M* ammonium acetate (5:2).
S_3 = 2-Propanol–conc. ammonia–0.1 *M* triethylammonium borate, pH 7.5 (7:1:2).
Detection: UV light (Mineralight) and the reagent of Hanes and Isherwood for phosphorus-containing derivatives.

Compound	R_F		
	S_1	S_2	S_3
Uridine	0.50	0.60	0.37
1-(2-Deoxyribopyranosyl)thymine	0.61	—	—
1-(D-Ribopyranosyl)thymine	0.58	—	—
1-(2-Deoxy-β-D-xylopyranosyl)thymine	0.60	—	—
1-(2-Deoxy-β-D-glucopyranosyl)thymine	0.57	—	—
1-(α-D-Mannopyranosyl)thymine	0.56	—	—
1-(2-Deoxyribopyranosyl)thymine 3′(4′)-phosphite	0.48	—	—
1-(D-Ribopyranosyl)thymine 3′(4′)-phosphite	0.53	0.60	0.32
1-(2-Deoxy-β-D-xylopyranosyl)thymine 3′(4′)-phosphite	0.51	0.58	0.34
1-(α-D-Mannopyranosyl)thymine 2′(3′)-phosphite	0.52	0.72	—
1-(α-D-Mannopyranosyl)thymine 2′,6′-diphosphite	0.40	0.62	—
Uridine 2′,3′-cyclic phosphate	0.42	0.60	0.35
1-(2-Deoxyribopyranosyl)thymine 3′,4′-cyclic phosphate	0.40	0.67	0.37
1-(D-Ribopyranosyl)thymine 2′,3′-cyclic phosphate	0.43	0.62	0.36
1-(D-Ribopyranosyl)thymine 3′,4′-cyclic phosphate	0.40	0.60	0.36
1-(2-Deoxy-β-D-xylopyranosyl)thymine 3′,4′-cyclic phosphate	0.54	0.55	0.32
1-(2-Deoxy-β-D-glucopyranosyl)thymine 3′,4′-cyclic phosphate	0.50	0.56	0.34
1-(2-Deoxy-β-D-glucopyranosyl)thymine 4′,6′-cyclic phosphate	0.64	0.65	0.39
1-(α-D-Mannopyranosyl)thymine 2′,3′-cyclic phosphate	0.47	—	—
1-(α-D-Mannopyranosyl)thymine 2′,3′; 4′,6′-cyclic diphosphate	0.38	—	—
1-(α-D-Mannopyranosyl)thymine 4′,6′-cyclic phosphate	0.60	—	0.40
Uridine 2′(3′)-phosphate	0.12	0.35	0.16
5-Methyluridine 2′(3′)-phosphate	0.17	0.41	0.18
1-(2-Deoxyribopyranosyl)thymine 3′(4′)-phosphate	0.17	0.41	0.18
1-(D-Ribopyranosyl)thymine 3′(2′) (4′)-phosphate	0.22	0.21	0.16
		0.30	0.21
1-(2-Deoxy-β-D-xylopyranosyl)thymine 3′(4′)-phosphate	0.17	0.37	0.21
1-(2-Deoxy-β-D-glucopyranosyl)thymine 3′(4′)-phosphate	0.17	0.40	0.21
			0.26
1-(α-D-Mannopyranosyl)thymine 2′(3′)-phosphate	0.19	—	—
1-(α-D-Mannopyranosyl)thymine 3′-phosphate-4′,6′-cyclic phosphate	0.12	0.18	—

TABLE 253

TLC R_F VALUES OF CARBONYL COMPOUNDS AS 2-DIPHENYLACETYL-1,3-INDANEDIONE-1-HYDRAZONE DERIVATIVES

(D. J. PIETRZYK AND E. P. CHAN, *Anal. Chem.*, 42 (1970) 41)

Thin layer: Eastman Chromagram Sheet No. 6061 or SiliCAR TLC-7GF (Mallinckrodt). In both cases the layers were activated in an oven for 1 h prior to use.

Solvents: S_1 = Chloroform–hexane (1:1).
S_2 = Chloroform–hexane (2:1).

Detection: Visual, and fluorescence in UV light.

Compound	R_F	
	S_1	S_2
Formaldehyde	0.50	
Acetaldehyde	0.45	
Propionaldehyde	0.50	
Butyraldehyde	0.55	
Valeraldehyde	0.57	
Hexaldehyde	0.59	
Heptaldehyde	0.63	
2-Ethylhexaldehyde	0.70	
Benzaldehyde	0.30	
p-Hydroxybenzaldehyde	0	
p-Nitrobenzaldehyde	0.07	
p-Dimethylaminobenzaldehyde	0.12	
p-Methoxybenzaldehyde	0.14	
p-Chlorobenzaldehyde	0.29	
2,4-Dichlorobenzaldehyde	0.41	
Acetophenone	0.20	
p-Hydroxyacetophenone	0	
p-Aminoacetophenone	0	
p-Methoxyacetophenone	0.10	
p-Nitroacetophenone	0.05	
p-Chloroacetophenone	0.22	
p-Bromoacetophenone	0.21	
Testosterone		0.03
Androstan-17-one		0.48
Cholestan-3-one		0.53
Androstane-3,17-dione		0.06
Estrone		0.06
Dehydroisoandrosterone		0.03
Oxalacetic acid		0
3-Oxoglutaric acid		0.13
2-Ketoglutaric acid		0.09
Pyruvic acid		0
Phenylpyruvic acid		0.24
p-Hydroxyphenylpyruvic acid		0.03
Pyridoxal		0.03
Acetone	0.23	
9-Acridone	0.01	
d-Carvone		0.71
		0.64
l-Carvone		0.71
		0.64
Chalcone		0.36
d-Camphor		0.03
Benzophenone		0.35
Dibenzyl ketone		0.39
Acetylacetone		0.04
Ethyl acetoacetate		0.07
Chloral hydrate		0.70
Cinnamaldehyde		0.45

TABLE 254

TLC R_F VALUES OF WATER-SOLUBLE VITAMINS
(M. H. HASHMI, F. R. CHUGTAI AND M. I. D. CHUGHTAI, *Mikrochim. Acta*, (1969) 953)

Thin layer: Kieselgel (D-O, Camag, without binder).
Solvents: S_1 = Water–(96%)ethanol–2 *M* HCl (45:48:0.2).
S_2 = Benzene–glacial acetic acid–acetone (4:1:1).
Technique: Circular.
Detection: D_1 = Potassium iodoplatinate.
D_2 = 10% aqueous ferric chloride.
D_3 = 0.5% solution of *p*-dimethylaminobenzaldehyde in hot cyclohexane.
D_4 = UV light.

Vitamin	R_F		*Detection*	*Colour*
	S_1	S_2		
Thiamine hydrochloride	0.48	—	D_1	blue
Riboflavin	0.56	—	D_4	greenish yellow
Pyridoxine	0.61	—	D_2	reddish brown
Choline chloride	0.54	—	D_1	grey
p-Aminobenzoic acid	0.98	—	D_3	yellow
Cyanocobalamine	0.31	—	—	red
Nicotinic acid	—	0.55	D_1	white
Ascorbic acid	—	0.28	D_1	yellowish white

TABLE 255

ELECTROPHORETIC MOBILITIES OF VITAMIN B_6 COMPOUNDS
(H. AHRENS AND W. KORYTNYK, *Anal. Biochem.*, 30 (1969) 419)

Layer: Silica gel plates 10 × 20 cm.
Electrolytes: Acetate buffers pH 3.95 and 4.53; ionic strength 0.05.
Voltage: 500 V.
Amperage: 19–30 mA with pH 3.95 buffer, 28–43 mA with pH 4.53 buffer.
Running time: 55 min with pH 3.95 buffer, 40 min with 4.53 buffer.
Detection: UV light ,Gibb's reagent, diazotized *p*-nitroaniline, ninhydrin, phenylhydrazine.

Compound	*Distance moved (mm)*	
	Buffer pH 3.95	*Buffer pH 4.53*
Pyridoxol	−54	−19
Pyridoxal	−35	− 9
Pyridoxamine	−56	−34
Pyridoxol phosphate	0	+12
Pyridoxal phosphate	+24	+21
Pyridoxamine phosphate	−11	− 3

TABLE 256

TLC R_F VALUES OF SOME BACTERICIDES
(H. KÖNIG, *Z. Anal. Chem.*, 246 (1969) 251)

Thin layer: Kieselgel GF_{254} (Merck).
Solvent: Benzene–acetone (8:2).
Detection: D_1 = UV light.
D_2 = Gibb's reagent.

Compound	*Chemical name*	R_F
Raluben TL	Halogenated phenols	0.48
Raluben K	Halogenated phenols	0.65, 0.73
Preventol PN Witophen N	Sodium pentachlorophenolate	0.14
Pentachlorophenol	Pentachlorophenol	0.15
Ketolin H	2-Benzyl-4-chlorophenol	0.66
Dichlorophen	Di-(5-chloro-2-hydroxyphenyl)-methane	0.47
Bromchlorophen	2,2′-Dihydroxy-3,3′-dibromo-5,5′-dichlorodiphenylmethane	0.30
Hexachlorophen	2,2′-Methylene-bis(3,4,6-trichlorophenol)	0.085
Deodorant 8846	Main component: halogenated hydroxyphenyl ether	0.57
Actamer, Panbac	2,2′-Dihydroxy-3,3′,5,5′-tetrachlorodiphenyl sulfide	0–0.13
Dioxy-dichloro-dibromo-diphenylsulfide	2,2′-Dihydroxy-3,3′-dibromo-5,5′-dichlorodiphenyl sulfide	0–0.13
Temasept II	3,5-Dibromosalicyl-4′-bromo-anilide	0.58
Irgasan CF_3	3-Trifluoromethyl-4,4′-dichloro-N,N′-diphenylurea	0.49
TCC	3,4,4′-Trichlorodiphenylurea	0.51
Hibitane (Chlorhexidin)	1,1′-Hexamethylene-bis(4-chloro-phenyl)biguanide hydrochloride	0

TABLE 257

CC RECOVERIES AND RELATIVE RETENTION VOLUMES OF SACCHARIDES
(E. F. WALBORG, JR., D. B. RAY AND L. E. ÖHRBERG, *Anal. Biochem.*, 29 (1969) 437)

Column: Dimensions, 0.6 × 100 cm.
Ion exchanger: Dowex 1 X4, −400 mesh; total capacity, 3.5 mequiv./dry g; No. 5407-45.
Buffers: (A) 0.15 *M* boric acid, 0.5 *M* 2,3-butanediol, 0.1% BRIJ-35, 0.5 ml toluene per liter; pH 7 at 23°.
(B) 0.8 *M* boric acid, 1.0 *M* 2,3-butanediol, 0.1% BRIJ-35, 0.5 ml toluene per liter; pH 7 at 23°.
Operating conditions: Temperature between 40–60°; flow rate, 20 ml/h. Elution was begun with buffer A, column temperature 40°. At an effluent volume of 230 ml the temperature was increased to 60°. After 240 ml of the buffer had passed through the column, buffer A above the resin bed was removed and replaced by buffer B. Elution was continued up to the total effluent volume of 520 ml. The back pressure was 100–120 p.s.i. with buffer A and 50–60 p.s.i. with buffer B .Samples were applied in 1-ml aliquots of buffer A.
Detection: 1-ml aliquots were heated with aniline–acetic acid–orthophosphoric acid reagent.

Saccharide	*Recovery*		*Relative retention volumes*	
	Per cent	± *S.D.*	*Rhamnose = 100*	*Glucose = 100*
Sucrose	93.7	± 1.7	12	
Melezitose	98.1	± 3.0	14	
Raffinose	100.0	± 3.2	30	
Cellobiose	91.3	± 2.2	31	
Maltose	86.6	± 2.4	52	
Lactose	92.7	± 2.2	117	
Rhamnose	91.7	± 2.6	100	
Lyxose	90.6	± 1.5		22
Ribose	90.1	± 4.2		30
Mannose	84.8	± 2.5		34
Fucose	93.4	± 1.1		52
Arabinose	98.6	± 5.0		62
Fructose	90.5	+ 4.2		64
Xylose	95.2	± 1.2		75
Sorbose	92.4	± 2.8		76
Galactose	89.1	± 2.0		77
Glucose	102.7	± 1.5		100

TABLE 258

TLC R_F VALUES OF SOME INORGANIC CATIONS
(M. LESIGANG-BUCHTELA, *Mikrochim. Acta*, (1969) 1030)

Thin layer: Kieselgel HR with 5% ammonium phosphododecamolybdate.
Solvent: 0.01 *N* HCl.
Detection: Autoradiography.

Ion	R_F
Na	0.85
K	0.52
Rb	0.21
Cs	0.05
Ba	0.55
La	0.12
Sr	0.58
Y	0.03

TABLE 259

CC DISTRIBUTION COEFFICIENTS (K_d) OF ANIONS AND CATIONS IN AQUEOUS SOLUTIONS
(P. M. ZAREMBSKI AND A. HODGKINSON, *Clin. Chim. Acta*, 24 (1969) 142)

Column: Dimensions, 2.5 × 45 cm; temperature, 4 °; flow rate, 15 ml/h.
Sorbent: Sephadex G-10.
Buffer: This was prepared by mixing 4.0 ml of glacial acetic acid or 2.0 ml of formic acid (90% w/w) with 3 ml of concentrated ammonia solution (specific gravity 0.88) and diluting to 1 l with 0.05 *M* sodium chloride. pH 5.0; ionic strength 0.17. Sodium azide (0.02%) was added.
Detection: Ca and Mg by atomic absorption, inorganic phosphate by Technicon Auto Analyser procedure N-4b, reference for other detections supplied.

	V_e *(ml to peak)*	K_d*
Calcium salts		
Chloride	82	0.20
Sulphate	90	0.29
Citrate	94	0.34
Oxalate	96	0.37
Phosphate	103	0.45
Calcium (citrate)	126	0.74
Calcium (sulphate)	128	0.76
Calcium (chloride)	130	0.79
Calcium (oxalate)	138	0.88
Calcium (phosphate)	152	1.06
Magnesium salts		
Chloride	84	0.22
Sulphate	90	0.29
Magnesium	111	0.55
Oxalate	120	0.66

* $K_d = \dfrac{V_e - V_0}{V_i}$; for the particular column used: $K_d = \dfrac{V_e - 66}{81.5}$.

Editorial

Retention data are basic characteristics of the quality of a substance in chromatography. Gas chromatographic retention data can be measured with extraordinary accuracy and, therefore, these data are often used advantageously for the identification of gases and volatile materials.

Starting with this issue of the Journal of Chromatography, a selection of GC retention data for interesting groups of substances will be published monthly. The ideal situation would be if data obtained by different authors were unified to acquire an absolute applicability, *i.e.* to be universal and ready to compile. Some time ago, it seemed perhaps possible to attain the above situation by gradually standardizing the procedures and using appropriate methods for the formal processing of retention data. It is evident, nowadays, that even in cases where the data have been measured reliably and accurately, a number of factors (*e.g.* the influence of the support, non-ideality of the gaseous phase, etc.) exist, and, unfortunately will go on existing, which render it impossible to maintain perfectly identical conditions for measurements carried out at various places, on various instruments, and under various experimental conditions, and which inevitably impair the universality of the data.

However, if one is aware of these limitations, particularly the more comprehensive sets of data may be nearly always utilized for the qualitative estimation of the elution sequence of substances studied and, frequently, also for detailed identification of them. Moreover, data concerning some groups, particularly hydrocarbons, actually approach the desired ideal state.

This and certain popularity of the retention data obtained by paper chromatography, by thin-layer chromatography, and by other related methods make the opening of a new retention data section worthwhile, at least for a trial period. The data will be listed in tables to attain the closest correlation with the practice of the retention data sections already existing in the *Journal of Chromatography*. I would like to ask the authors to facilitate my task of selection of the most interesting and reliable data from the current scientific production of many authors by sending material (as complete as possible) to my address, or, if need be, by drawing my attention to especially interesting data. It is to be expected that in the course of time a useful collection of the most important sets of GC retention data will be established, from which desired information obtained by this important method can be effectively drawn.

As soon as I can determine an optimum presentation for the material, I shall apply to the authors of selected published data for their authorization and, if need be, request their completion of the data to avoid any uncertainty due to our taking over the material, and possible staleness, and also to ensure that the information is transformed into the most convenient form. It would be especially felicious if this rationalizing tendency of the GC Retention Data Section had a positive influence on the consequentiality in publishing GC retention data and encouraged the authors to publish all the parameters necessary for processing and checking their data. This is not always observed, despite the recommendations[1].

In my opinion, every transformation of data from one form into another without cooperation with the respective author may be a source of serious inaccuracies and, sometimes, cannot even be performed at all without complementary data. Therefore, I shall present the data as published for the time being, *i.e.* either as relative retention

data supplemented by absolute data on the reference substance (if possible), further, as Kováts' indices supplemented by the necessary parameters, such as the quantity *b*, or at least the retention time of some of the components (if possible), further, as data on retention times only (if there is no other possibility), or in the form of the constants of Antoine's equation, though it is a less frequent way (*e.g.* ref. 2, p. 8). As a supplement, the main working parameters will be quoted which are important for the appreciation of the data (*e.g.* column temperature, solid support, stationary phase and its percentage, carrier gas and its flow rate and mean pressure, sample size, type of detector, etc.).

Readers of this journal and those who use the section are kindly requested to address their comments and suggestions to: The Institute of Instrumental Analytical Chemistry, Czechoslovak Academy of Sciences, Brno, Czechoslovakia.

JAROSLAV JANÁK

1 E. R. ADLARD *et al.*, in A. GOLDUP (Editor), *Gas Chromatography 1964*, Institute of Petroleum, London, 1965, pp. 348, 355, and 359; *J. Gas Chromatog.*, 3 (1965) 298.
2 F. A. VANDENHEUVEL AND A. S. COURT, *J. Chromatog.*, 39 (1969) 1.

TABLE 260

GC RETENTION DATA OF C_5–C_{10} HYDROCARBONS AND CHLORINATED HYDROCARBONS
(A. E. DRABKIN, M. S. YAMINOV AND M. G. RUDIN, *Zh. Prikl. Khim.*, 42 (1969) 425)

Support material: Stainless steel.
Stationary phase: P_1 = Squalane capillary column; L = 45 m, I.D. = 0.2 mm.
Carrier gas: Not stated.
Temperatures: T_1 = 50°.
T_2 = 80°.
T_3 = 120°.
Detector: Flame ionization.
Sample size: Not stated.
Data given in: Retention sequence $R_{1,2}$ (relative to *n*-pentane).

Compound	$P_1(T_1)$	$P_1(T_2)$	$P_1(T_3)$
Saturated			
n-pentane	1.00	1.00	1.00
n-hexane	1.41	1.20	1.14
n-heptane	2.14	1.61	1.46
n-octane	—	2.56	1.54
n-nonane	—	4.62	2.02
n-decane	—	9.21	3.34
Unsaturated			
hexene-1	1.38	1.18	1.11
heptene-1	2.42	1.565	1.29
Aromatic			
benzene	—	1.64	1.34
toluene	—	2.65	1.75
o-xylene	—	4.42	2.42
m-xylene	—	4.87	2.80
p-xylene			
isopropylbenzene	—	5.75	2.74
mesitylene	—	6.49	3.00
pseudocumene	—	11.65	4.07
Chlorinated hydrocarbons			
chloroethane	0.78	0.9	0.98
1-chloropropane	1.25	1.15	1.10
2-chloropropane	1.04	1.05	1.11
1-chlorobutane	2.32	1.47	1.21
2-chloro-2-methylpropane	1.73	1.33	1.19
1-chloro-2-methylbutane	3.34	1.92	1.48
1-chlorohexane	—	4.24	2.17
1-chloropentane	—	6.80	3.33
1-chlorooctane	—	16.70	5.44
1-chlorononane	—	18.75	9.45
1-chlorodecane	—	35.5	17.00
n-Pentane (sec)	201	183	156

TABLE 261

GC RETENTION DATA OF C_6–C_{10} AROMATIC HYDROCARBONS
(CH. L. STUCKEY, *J. Chromatog. Sci.*, 7 (1969) 179)

Support material: Stainless steel.
Stationary phase: P_1 = TCEP (1,2,3-tris(2-cyanoethoxy)propane) in capillary column; L = 300 ft., I.D. = 0.01 in.
Carrier gas: Helium, 2.15 ml/min.
Temperature: T_1 = programmed 50–90°, 5°/min.
Detector: Flame ionization.
Sample size: 0.8 μl.
Data given in: Retention sequence $R_{1,2}$ (relative to *o*-xylene).

No.	*Compound*	$P_1(T_1)$
A	Benzene	0.560
B	Toluene	0.683
1	Ethylbenzene	0.829
2	*p*-Xylene	0.860
3	*m*-Xylene	0.869
4	Isopropylbenzene	0.904
5	*n*-Propylbenzene	0.999
6	*o*-Xylene	1.000
7	Isobutylbenzene	1.040
8	3-Ethyltoluene	1.067
	4-Ethyltoluene	
	sec.-Butylbenzene	
	tert.-Butylbenzene	
9	1,3,5-Trimethylbenzene	1.132
10	1-Methyl-3-isopropylbenzene	1.158
11	1-Methyl-4-isopropylbenzene	1.189
12	2-Ethyltoluene	1.233
13	1-Methyl-3-(*n*-propyl)benzene	1.293
14	1,4-Diethylbenzene	1.305
	Styrene	
15	*n*-Butylbenzene	1.320
16	1-Methyl-4-(*n*-propyl)benzene	
	1,2,4-Trimethylbenzene	1.346
17	1-Methyl-2-isopropylbenzene	1.360
	1,3-Diethylbenzene	
18	1,3-Dimethyl-5-ethylbenzene	1.404
19	1,2-Diethylbenzene	1.500
20	1-Methyl-2-(*n*-propyl)benzene	1.515
21	α-Methylstyrene	1.585
22	1,4-Dimethyl-2-ethylbenzene	1.634
23	1,2,3-Trimethylbenzene	1.683
	1,3-Dimethyl-4-ethylbenzene	
24	1,2-Dimethyl-4-ethylbenzene	1.729
25	Indane	1.872
26	1,3-Dimethyl-2-ethylbenzene	1.945
27	1,2-Dimethyl-3-ethylbenzene	2.085
28	1,2,4,5-Tetramethylbenzene	2.232
29	1,2,3,5-Tetramethylbenzene	2.299

TABLE 262

GC RETENTION DATA OF C_1–C_4 HYDROCARBONS
(F. W. WILLMOTT, *J. Chromatog. Sci.*, 7 (1969) 105)

Support material: Chromosorb P, 60/80 mesh.
Stationary phase: P_1 = Propylene carbonate, 20%.
Carrier gas: Nitrogen.
Temperature: $T_1 = 0 \pm 0.1°$.
Detector: Flame ionization.
Sample size: Not stated.
Data given in: Retention sequence $R_{1,2}$ (relative to *n*-propane).

Compound	$P_1(T_1)$
Methane	0.70
Ethane	0.80
Ethylene	0.85
n-Propane	1.00
Propylene	1.32
n-Butane	1.60
Butene-1	2.40
Isobutene	2.61
trans-Butene-2	3.02
n-Pentane	3.18
cis-Butene-2	3.64
Butadiene-1,3	5.22

TABLE 263

GC RETENTION DATA OF 17-KETOSTEROIDS
(P. PODHRADSKÝ AND M. Š. KANDRÁČ, *Chem. Zvesti*, 23 (1969) 227)

Support materials: Gas-Chrom Q, 100/120 mesh (P_1).
Chromosorb W, 100/120 mesh (P_2).
Stationary phases: P_1 = NGS, 1.5%; L = 2.10 m, I.D. = 4 mm.
P_2 = QF-1, 3%; L = 2.10 m, I.D. = 4 mm.
Carrier gas: Nitrogen, 55 ml/min (P_1); 45 ml/min (P_2).
Temperatures: T_1 = 220°.
T_2 = 205° and 215°.
Detector: Flame ionization.
Sample size: 4 μl.
Data given in: Retention sequence $R_{1,2}$ (relative to 5α-cholestane).

Trimethylsilyl ethers of	$P_1(T_1)$	$P_2(T_2)$
5α-Cholestane	1.00	1.00
Androsterone	1.00	1.13
Etiocholanolone	1.29	1.23
Isoandrosterone	1.55	1.40
Dehydroepiandrosterone	1.55	1.53
11β-Hydroxyandrosterone	2.48	1.74
11β-Hydroxyetiocholanolone	3.16	1.98
11-Ketoandrosterone	3.93	2.23
11-Ketoetiocholanolone	5.38	2.23
5α-Cholestane (min)	5.25	3.42

TABLE 264

GC RETENTION DATA OF C_5–C_{13} ALCOHOLS
(N. A. PROKOPENKO, R. V. MAIOROVA AND M. I. DEMENTIEVA, *Zh. Anal. Khim.*, 24 (1969) 768)

Support material: INZ-600, 0.25–0.5 mm.
Stationary phases: P_1 = EGS; P_2 = PGS; P_3 = TEGS; P_4 = 1,3-BuGS; P_5 = 1,4-BuGS; P_6 = 2,3-BuGS; P_7 = PEGA; P_8 = PGA; P_9 = TEGA; P_{10} = Apiezon L; P_{11} = 1,2,3-tris(2-cyanoethoxy)propane; P_{12} = Carbowax 20M
In all cases 5%; L = 2 m, I.D. = 4 mm.
Carrier gas: Helium, 140 ml/min.
Temperature: T_1 = 120°.
Detector: Thermal conductivity.
Sample size: Not stated.
Data given in: Retention sequence $R_{1,2}$ (relative to octyl alcohol).

Compound	P_1 (T_1)	P_2 (T_1)	P_3 (T_1)	P_4 (T_1)	P_5 (T_1)	P_6 (T_1)	P_7 (T_1)	P_8 (T_1)	P_9 (T_1)	P_{10} (T_1)	P_{11} (T_1)	P_{12} (T_1)
Alcohols												
amyl	0.18	—	0.18	0.20	—	0.19	—	0.18	—	0.16	—	0.22
hexyl	0.38	0.28	0.35	0.34	0.34	0.32	0.39	0.36	0.38	0.31	0.37	0.35
heptyl	0.64	0.52	0.56	0.57	0.59	0.57	0.60	0.625	0.50	0.55	0.43	0.41
octyl	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
nonyl	1.78	1.62	1.65	1.77	1.66	1.73	1.71	1.61	1.62	1.96	1.75	1.50
decyl	3.0	2.62	2.70	3.00	2.65	2.92	2.85	2.67	2.59	3.68	2.98	2.39
undecyl	4.85	4.2	4.41	4.98	4.22	4.97	4.70	4.23	4.15	6.65	5.00	3.79
dodecyl	7.75	6.7	7.10	8.06	6.72	8.54	7.55	6.75	6.53	1.92	7.86	5.88
tridecyl	12.25	10.8	11.65	—	—	13.62	12.16	10.9	10.06	21.15	12.4 19.9	9.05
Hydrocarbons												
dodecane	—	—	—	0.27	—	0.27	0.28	—	—	2.36	—	0.22
tridecane	0.65	0.38	0.56	0.49	0.28	0.46	0.49	0.62	0.29	4.42	0.73	0.35
tetradecane	1.2	0.63	—	0.86	0.47	0.81	0.86	1.61	0.50	3.18	1.00	0.41
pentadecane	2.0	0.86	1.90	1.52	0.87	1.40	1.50	2.67	0.82	14.78	1.75	1.00
hexadecane	3.3	1.38	3.41	2.53	1.45	2.36	2.50	4.23	1.35	25.52	2.98	1.50
heptadecane	5.3	2.28	5.88	4.13	2.13	4.03	4.82	6.75	2.12	—	5.71	2.39
octadecane	8.6	3.71	9.88	6.61	—	—	6.42	10.9	3.38	—	9.18	3.79
nonadecane	—	—	—	—	—	—	10.40	—	5.41	—	15.00	5.88

TABLE 265

GC RETENTION DATA OF ACETOPHENONES
(S. BÉKÁSSY AND M. NÓGRÁDI, *Acta Chim. Acad. Sci. Hung.*, 59 (1969) 427)

Support materials: Chromosorb W, 60/80 mesh (P_1).
Chromosorb G, 60/80 mesh (P_2, P_3, P_4).
Stationary phases: P_1 = Silicone Oil D-550, 20%; I.D. = 5 mm, L = 1 m.
P_2 = Apiezon L, 8%; I.D. = 6 mm, L = 1 m.
P_3 = SE-30, 8%; I.D. = 10 mm, L = 1 m.
P_4 = Epikote 728, 8%; I.D. = 5 mm, L = 1 m.
Carrier gas: Hydrogen, 540 ml/min, I.P. = 1.1 atm (P_1); 736 ml/min, I.P. = 1.1 atm (P_2); 824 ml/min, I.P. = 0.6 atm (P_3); 1250 ml/min, I.P. = 2 atm (P_4).
Temperature: T_1 = 170°.
Detector: Thermal conductivity.
Sample size: Not stated.
Data given in: Retention sequence $R_{1,2}$ (relative to 6'-hydroxy-2',3',4'-acetophenone).

Compound	$P_1(T_1)$	$P_2(T_1)$	$P_3(T_1)$	$P_4(T_1)$
2'-OH-4'-OCH_3	0.274	0.327	0.334	0.282
6'-OH-2',3',-OCH_3	0.356	0.404	0.432	0.328
6'-OH-2',3',4'-OCH_3	1.00	1.00	1.00	1.00
2'-OH-3',4',6'-OCH_3	1.64	1.56	1.58	2.50
2'-OH-2,4',6'-OCH_3	2.19	2.27	2.06	—
6'-OH-2,2',3',4'-OCH_3	2.54	2.34	2.32	—
2'-OH-2,3',4',6'-OCH_3	4.56	4.28	3.88	—
2'-OH-2,3',4',5',6',-OCH_3	3.00	2.58	2.90	—
2',4'-OCH_3	0.810	0.924	0.844	0.932
2',3',4',6'-OCH_3	0.987	0.654	0.943	1.28
2'2',3',4',6'-OCH_3	2.30	1.41	1.96	4.03
6'-Hydroxy-2',3',4'-acetophenone (min)	5.82	4.15	4.07	10.45

TABLE 266

GC RETENTION DATA OF ALKYL CARBAMATES AND ALKYL N-HYDROXYCARBAMATES
(R. NERY, *Analyst*, 94 (1969) 133)

Support material: Chromosorb W, HMDS, 80/100 mesh.
Stationary phase: P_1 = SE-30, 1.5%.
Carrier gas: Nitrogen, 30 ml/min.
Temperatures: T_1 = programmed 35–130°, 5°/min.
T_2 = programmed 50–140°, 5°/min.
Detector: Flame ionization.
Sample size: $1–5 \times 10^{-8}$ moles in about 1-μl samples.
Data given in: Retention sequence $R_{1,2}$ (relative to ethyl derivative).

Compound	*R*	$P_1(T_1)$	$P_1(T_2)$
$ROCONH_2$	Methyl	0.60	—
	Ethyl	1.00	—
	Propyl	1.73	—
	Isobutyl	2.20	—
	Butyl	2.53	—
	Pentyl	3.33	—
Ethyl (min)		3.0	
ROCONHOH	Methyl	0.79	0.77
	Ethyl	1.00	1.00
	Propyl	1.29	1.33
	Isobutyl	1.45	1.53
	Butyl	1.58	1.70
	Pentyl	1.84	2.07
	Hexyl	2.13	2.43
Ethyl (min)		7.6	6.0

TABLE 267

GC RETENTION DATA OF GLYCOL ETHERS
(M. ŠINGLIAR AND J. DYKYJ, *Collection Czech. Chem. Commun.*, 34 (1969) 773)

Support material: Chromosorb W, AW-DMCS, 80/100 mesh.
Stationary phases: P_1 = NPGS, 10%; L = 2.4 m, I.D. = 3 and 6 mm.
P_2 = Apiezon L, 10%; L = 2.4 m, I.D. = 3 and 6 mm.
Carrier gas: Helium, 22.5 ml/min.
Temperatures: T_1 = 140°.
T_2 = 170°.
Detector: Flame ionization.
Sample size: 2–10 µl.
Data given in: Kováts' indices.

Compound	P_1 T_1	T_2	P_2 T_1	T_2
Methyl ether of				
ethylene glycol	1098	1150	534	744
diethylene glycol	1474	1398	826	907
triethylene glycol	1833	1700	1114	1150
tetraethylene glycol	—	1980	1413	1416
Ethyl ether of				
ethylene glycol	1148	1219	622	718
diethylene glycol	1492	1500	900	951
triethylene glycol	1850	1771	1183	1198
tetraethylene glycol	—	2048	1458	1463
Propyl ether of				
ethylene glycol	1223	1272	723	819
diethylene glycol	1573	1558	1002	1046
triethylene glycol	1926	1823	1283	1299
tetraethylene glycol	—	2099	1557	1555
Butyl ether of				
ethylene glycol	1316	1326	826	887
diethylene glycol	1668	1626	1109	1139
triethylene glycol	2020	1892	1379	1396
tetraethylene glycol	—	2168	1651	1655
Monoisopropyl ether of				
ethylene glycol	1154	—	652	—
Monoisobutyl ether of				
ethylene glycol	1234	—	789	—
Monoisoamyl ether of				
ethylene glycol	1296	—	892	—
Ethylene glycol	1430	1432	634	652
Diethylene glycol	1782	1707	900	925
Triethylene glycol	2132	1983	1143	1177
Ethylene glycol (min)	3.80	1.60	—	—
Diethylene glycol (min)	20.8	6.80	—	—

TABLE 268

GC RETENTION DATA OF AMYLAMINES AND NITROGEN-CONTAINING HETEROCYCLIC COMPOUNDS
(R. E. POULSON, *J. Chromatog. Sci.*, 7 (1969) 154)

Support material: Chromosorb G, 70/80 mesh.
Stationary phases: P_1 = Triton X-305, 5%.
P_2 = Carbowax 20M.
P_3 = Carbowax 20M-TPA.
P_4 = Apiezon L (P-CT).
In all cases 5%; L = 10 ft., I.D. = 0.10 in. or 0.18 in.
Carrier gas: Helium, 73 ml/min; pressure drop for columns with I.D. of 0.10 in. and 0.18 in., 72 and 29 p.s.i.g., resp., at 220°.
Temperatures: T_1 = 180°.
T_2 = 220°.
Detector: Flame ionization.
Sample size: Less than 0.03 mg.
Data given in: Retention sequence $R_{1,2}$ (relative to quinoline).

Compound	P_1		P_2P_3		P_4
	T_1	T_2	T_1	T_2	T_2
Hydrocarbons					
Indene	0.221	0.255	0.212	0.256	—
Naphthalene	0.544	0.585	0.528	0.581	0.855
Decalin *trans*	0.084	0.107	0.072	0.108	—
cis	0.111	0.142	0.095	0.133	—
Eicosane	—	1.49	—	1.10	—
Phenanthrene	—	7.74	—	7.64	9.31
Anthracene	10.8	8.09	—	7.83	9.67
Amines					
Di-(*n*-amyl)amine	0.119	—	—	—	—
Benzylamine	0.290	—	—	—	—
Aniline	0.437	—	0.481	—	—
p-Toluidine	0.578	—	—	—	—
4-Ethylaniline	0.818	—	—	—	—
1,2,3,4-Tetrahydroisoquinoline	0.912	—	—	—	—
2,3-Dimethylaniline	0.950	—	—	—	—
1,2,3,4-Tetrahydroquinoline	1.50	—	—	—	—
1-Naphthylamine	—	6.34	—	6.99	—
2-Naphthylamine	—	7.32	—	8.06	—
Pyridines					
2-(*n*-Pentyl)pyridine	0.297	0.318	—	—	—
4-(*n*-Pentyl)pyridine	0.491	0.491	—	—	—
2-(5-Nonyl)pyridine	0.665	0.641	—	0.541[a]	1.53
4-(5-Nonyl)pyridine	1.23	1.10	0.970	0.890	2.51
2-Benzylpyridine	2.81	2.03	—	—	—
4-Benzylpyridine	3.64	2.92	—	2.75	2.88
Quinolines					
Quinoline	1.00	1.00	1.00	1.00	1.00
8-Methylquinoline	1.10	1.08	1.08	1.06	1.34
6-Methylquinoline	1.51	1.44	—	1.39	1.56
2,6-Dimethylquinoline	1.51	1.50	—	1.45	—
4-Methylquinoline	1.80	1.68	—	1.63	1.78
2,4-Dimethylquinoline	1.91	1.82	—	1.72	—
2,4,6,8-Tetramethylquinoline	2.78	2.32	—	—	—
Acridine	14.2	10.2	—	10.0	9.32
Phenanthridine	—	11.8	—	11.6[a]	10.5
3,4-Benzacridine	—	84.0	—	79.0[a]	77.6
1,2-Benzacridine	—	110.0	—	104.0	88.2

TABLE 268 *(continued)*

Compound	P_1		P_2P_3		P_4
	T_1	T_2	T_1	T_2	T_2
Isoquinolines					
Isoquinoline	1.16	1.15	—	1.15	1.06
3-Methylisoquinoline	1.25	1.22	—	1.18[a]	1.44
Indoles					
1-Methylindole	—	1.06	—	—	—
1,2-Dimethylindole	2.01	1.79	2.00	1.78	1.80
Indole	4.31	3.18	4.95	3.66	0.954
3-Methylindole	5.10	3.77	5.63	4.16	1.42
2-Methylindole	5.16	3.80	—	—	—
2,7-Dimethylindole	5.56	3.86	—	—	—
5-Methylindole	5.75	4.16	—	—	—
2,3-Dimethylindole	—	4.77	—	—	—
2,5-Dimethylindole	6.95	4.86	—	—	—
Carbazole	—	30.6	—	34.5	9.24

[a] Not measured for Carbowax 20M-TPA.

TABLE 269

CC EFFECT OF L/D AND $D\bar{V}$ ON ELUTION PATTERN[a]
(S. E. CHARM, C. C. MATTEO AND R. CARLSON, *Anal. Biochem.*, 30 (1969) 5)

Columns: Dimensions, as specified in the table; temperature, 4°C.
Carrier: Sephadex G-100.
Buffer: 1 *M* $NaPO_4$, pH 7.
Fractions: 10 ml, except the 14.2-cm-diameter column, where fractions of 100 ml were collected.
Detection: Optical density 520 nm.
Substances separated: Crude extract of horse muscle.
The separation of three fractions of the crude extract on columns of different proportions is compared. The degree of separation achieved in a column, Σ_{max}/min, measured by summing the maximum values of the second and third peaks of the elution pattern and dividing the total by the minimum value between them.

Column parameters			$D\bar{V}$ *(cm²/sec)*	$\frac{L/D}{D\bar{V}}$	$\frac{\Sigma_{max}}{min}$
L(cm)	*D (cm)*	*L/D*			
24.5	7.9	3.1	0.793	3.9	2.46
24.5	7.9	3.1	0.370	8.4	5.05
24.5	7.9	3.1	0.680	4.5	3.75
24.5	7.9	3.1	0.260	11.9	6.35
46.6	14.2	3.27	0.270	12.1	7.15
43.2	3.8	11.35	0.630	18.0	4.01
51.5	4.7	10.95	0.590	18.5	9.89
51.5	4.7	10.95	0.246	44.4	11.57
33.6	6.0	5.6	0.580	9.6	4.99
33.6	6.0	5.6	0.198	28.2	7.33
40.5	3.7	10.95	0.688	15.9	6.88

[a] L = Column length; D = column diameter; $\bar{V}$ = volumetric flow rate per cross-sectional area of the column.

TABLE 270

TLC R_F VALUES OF SOME CARDIAC GLYCOSIDES
(L. NOVER, *Arch. Pharm.*, 302 (1969) 328)

Thin layer: Kieselgel G.
Solvents: S_1 = *n*-Hexane–ethyl acetate–ethanol (15:75:10)/4.5% water.
S_2 = Toluene–ethyl acetate–pyridine (20:70:10)/2.8% water.
S_3 = *n*-Hexane–methyl ethyl ketone (40:60)/1.1% water.
S_4 = Toluene–ethyl acetate–propanol (20:66:14)/4.5% water.
Detection: Not stated.

Compound	R_F			
	S_1	S_2	S_3	S_4
Digitoxigenin	0.62	0.62	0.47	0.68
Digitoxin	0.44	0.39	0.14	0.50
Monoacetyl-digitoxin-α	0.58	0.58	0.27	0.64
Monoacetyl-digitoxin-β	0.61	0.59	0.34	0.68
Diacetyl-digitoxin-α, β	0.73	0.72	0.55	0.77
Triacetyl-digitoxin-α, β, γ and -α, β, δ	0.76	0.72	0.57	0.78
Tetraacetyl-digitoxin-α, β, γ, δ	0.79	0.79	0.61	0.83
Gitoxigenin	0.49	0.49	0.26	0.57
Monoacetyl-gitoxigenin-16 (= Oleandrigenin)	0.64	0.63	0.41	0.68
Gitoxin	0.38	0.28	0.08	0.43
Monoacetyl-gitoxin-α	0.49	0.47	0.15	0.55
Monoacetyl-gitoxin-β	0.54	0.51	0.20	0.64
Monoacetyl-gitoxin-γ and -δ	0.44	0.38	0.10	0.49
Monoacetyl-gitoxin-16	0.44	0.44	0.12	0.50
Diacetyl-gitoxin-α,16	0.58	—	0.26	0.65
Diacetyl-gitoxin-β,16	0.62	0.66	0.33	0.70
Diacetyl-gitoxin-γ, δ	0.48	0.43	0.11	0.54
Diacetyl-gitoxin-γ, 16 and -δ, 16	0.50	0.49	0.14	0.55
Triacetyl-gitoxin-α, β, 16	0.74	0.70	0.49	0.77
Triacetyl-gitoxin-γ, δ, 16	0.53	0.53	0.16	0.60
Tetraacetyl-gitoxin-α, β, γ, 16 and -α, β, δ, 16	0.76	0.75	0.53	0.80
Pentaacetyl-gitoxin-α, β, γ, δ, 16	0.80	0.80	0.55	0.81
Gitoxigenin-monodigitoxoside	0.46	0.41	0.15	0.50
Oleandrigenin-monodigitoxoside	0.53	0.51	0.24	0.55
Gitoxigenin-bisdigitoxoside	0.40	0.34	0.10	0.41
Oleandrigenin-bisdigitoxoside	0.49	0.44	0.15	0.47
Gitoxigenin-diacetyl-bisdigitoxoside	0.55	0.56	0.23	0.62
Oleandrigenin-diacetyl-bisdigitoxoside	0.64	0.65	0.30	0.70

TABLE 271

ELPHO MOBILITIES (ABSOLUTE DISTANCES) OF SOME GLUCOSAMINE DERIVATIVES

(R. R. WAGNER AND M. A. CYNKIN, *Anal. Biochem.*, 25 (1968) 573)

Paper: Whatman No. 3 MM.
Electrolyte: Pyridine–acetic acid–water (1:10:69), pH 3.5.
Voltage: 4000 V.
Running time: 30 min.
Detection: Rondle–Morgan procedure, Morgan–Elson procedure, silver nitrate reagent, UV light after quinine–sulphate treatment.

Compound	*Distance moved (cm)*
Glucosamine	−18.7
N-Acetylglucosamine	− 1.3
Glucosamine 6-phosphate	− 1.3
N-Acetylglucosamine 6-phosphate	+11.0
UDP N-acetylglucosamine	+15.6

TABLE 272

TLC R_F VALUES OF SOME NITROALKANES AFTER CONVERSION INTO THE 2,4-DINITROPHENYLHYDRAZONES OF THE CORRESPONDING OXO COMPOUNDS

(T. MEISEL, L. ERDEY AND P. GLASER, *Mikrochim. Acta*, (1969) 789)

Thin layer: Kieselgel G, (a) activated for 1 h at 110°; (b) activated for 3 h at 120°.
Solvents: S_1 = Light petroleum–diethyl ether (7:3).
S_2 = Cyclohexane–nitrobenzene–light petroleum (6:3:2).
S_3 = Carbon tetrachloride–acetone (9:1).
Detection: Not stated.

Nitroalkane	*2,4-Dinitrophenylhydrazone*	R_F				
		S_1		S_2		S_3
		a	*b*	*a*	*b*	*b*
Nitromethane	formaldehyde	0.25	0.22	0.27	0.34	0.52
1-Nitropropane	propionaldehyde	0.41	0.28	0.40	0.55	0.64
2-Nitropropane	acetone	0.36	0.34	0.33	0.44	0.60
1-Nitrobutane	butyraldehyde	0.47	0.48	0.45	0.64	0.66
2-Nitrobutane	methyl ethyl ketone	0.46	0.49	0.42	0.62	0.66
1-Nitropentane	valeraldehyde	0.51	0.54	0.51	0.77	0.69
1-Nitrohexane	hexanal	0.56	0.59	0.57	0.83	0.72
2,4-Dinitrophenylhydrazine		0.03	0.02	0.04	0.09	0.61

TABLE 273

CC ELUTION TIMES OF POLYAMINES AND RELATED COMPOUNDS
(D. R. MORRIS, K. L. KOFRON AND C. J. OKSTEIN, *Anal. Biochem.*, 30 (1969) 451)

Column: Dimensions, 0.9 × 7 cm.
Sorbent: Bio-Rex 70, minus 400 mesh.
Buffers and operating conditions: The initial elution buffer was 0.438 *M* pyridinium acetate, pH 5.7. After 100 ml of the initial buffer had passed through the column, the buffer was changed to 0.5 *M* pyridinium acetate, pH 4.4. Temperature, 80°; flow rate, 2 ml/min.
Detection: Technicon A.A. detection system with adjustable range expander.

Compound	*Time (min)*
Arginine	4
Putrescine	25
1,3-Diaminopropane	27
Cadaverine	32
Acetylspermidine B	34
Acetylspermidine A	42
Agmatine	59
Spermidine	64
Iminobispropylamine	64
Acetylspermine	68
Spermine	78

TABLE 274

TLC R_F VALUES OF SOME ALKALOIDS
(H. F. S. FONG, N. R. FARNSWORTH AND G. H. SVOBODA, *Lloydia*, 32 (1969) 111)

Thin layer: Silica Gel G heated at 90–100° for 30 min.
Solvents: S_1 = Benzene–pyridine (96:4).
S_2 = Benzene–ethyl formate–formic acid (65:30:5).
Detection: Observation of the visible colour or Dragendorff's reagent.

Alkaloid	*Visible colour*	R_F	
		S_1	S_2
Acronycidine	—	0.22	0.02
Acronycine	Yellow	0.32	0.16
Melicopidine	Yellow	0.35	0.08
Melicopine	Light orange	0.37	0.19
Normelicopine	Beige	0.48	0.70
Melicopicine	Yellow	0.49	0.36
Normelicopidine	Beige	0.53	0.73
Normelicopicine	Beige	0.56	0.74

TABLE 275

ELPHO MOBILITIES OF PYRROLIZIDINE ALKALOIDS AND RELATED COMPOUNDS
(J. L. FRAHN, *Australian J. Chem.*, 22 (1969) 1659)

Paper electrophoresis: Whatman No. 4 paper at 20 V/cm and 26°. Time to complete: 1–1.5 h. Mobilities are relative to heliotridine (M_H values).

Electrolytes: (A) Acetate buffer pH 4.6 containing 6.39 g $CH_3COONa \cdot 3\ H_2O$ and 3.2 g glacial acetic acid in 1 l of water. The solution was 0.1 *M* with respect to total acetate.
(B) Tris(hydroxymethyl)aminomethane–hydrochloric acid buffer, pH 7.
(C) Sodium bicarbonate solution 0.1 *M*, pH 8.4.
(D) Sodium bicarbonate–sodium carbonate solution, pH 9.2, containing 6.72 g of $NaHCO_3$ and 1.06 g of anhydrous Na_2CO_3 per litre.
(E) Sodium borate buffer pH 9.2, containing 0.2 g-atom of boron per litre.
(F) Sodium arsenite solution containing 0.2 *M* arsenious acid adjusted to pH 9.2 with sodium hydroxide.
(G) Sodium phosphate buffer (pH 7.0) containing 6.24 g $NaH_2PO_4 \cdot 2H_2O$ and 10.68 g $Na_2HPO_4 \cdot 2\ H_2O$ per litre. The solution was 0.1 *M* with respect to total phosphate.

Detection: (1) Chromium trioxide–permanganate–sulphuric acid (FRAHN AND MILLS, *Australian J. Chem.*, 12 (1959) 65).
(2) Hydrogen peroxide (30%).
(3) Acetic acid, 10% in hexane.
(4) Acetic anhydride–benzene–hexane (1:4:5).
(5) Ehrlich's reagent.
(6) Iodine vapour.

Compound	M_H *values* × 100						
	A	*B*	*C*	*D*	*E*	*F*	*G*
7α-Hydroxy-1-methylene-8α-pyrrolizidine	102	103	125	153	151	137	122
Heliotridine	100	100	100	100	100	100	100
(actual mobility, in cm)	(11.7)	(10.5)	(6.6)	(4.4)	(4.9)	(4.9)	(5.9)
Retronecine	99	99	98	99	45	94	87
Platynecine	96	100	154	197	44	159	107
7-Angelylheliotridine	77	72	38	27	28	28	84
Crispatine	69	58	16	9	8	13	32
Fulvine	69	58	17	9	8	11	32
Supinine	68	68	93	113	60	100	72
Supinidine viridiflorate	68	67	92	113	12	75	71
Heleurine	67	68	92	110	113	102	76
Echinatine	66	65	48	33	−48	15	61
Monocrotaline	65	56	19	6	−100	−38	32
Heliotrine	65	64	48	30	35	35	62
Intermedine	64	64	48	35	−6	34	56
Lycopsamine	64	64	48	35	48	15	56
Seneciphylline	64	54	11	5	10	4	26
Cynaustraline	64	68	101	131	23	93	73
Jacobine	63	46	6	4	7	3	14
Spectabiline	63	54	12	5	8	8	31
Senecionine	61	54	7	4	6	8	28
Jaconine	59	46	6	4	7	3	17
Latifoline	59	50	8	5	3	4	38
Lasiocarpine	56	46	9	4	−73	−10	54
Supinine N-oxide	30	8	5	4	−39	3	2
Heliotrine N-oxide	22	6	3	3	8	2	2
Lasiocarpine N-oxide	10	4	3	2	−76	−15	4
Heliotric acid	−69	−86	−131	−188	−164	−166	−130

TABLE 276

PC R_F VALUES OF SOME CONJUGATED BILE ACIDS
(H. E. GALLO-TORRES AND J. G. HAMILTON, *J. Chromatog. Sci.*, 7 (1969) 514)

Paper: Silica gel glass fiber paper ITLC-SG (Gelman Instruments Co., Ann Arbor, Mich.).
Solvents: S_1 = Isooctane–diisopropyl ether–glacial acetic acid–2-propanol (1:1:1:1).
S_2 = Chloroform–diisopropyl ether–glacial acetic acid–2-propanol (3:2:2:2).
S_3 = Chloroform–2-propanol–ammonium hydroxide (20:25:1).
Detection: Concentrated sulphuric acid and subsequent carbonisation on a hot plate.

Compound	R_F		
	S_1	S_2	S_3
Lithocholic acid	0.98	1.00	0.92
Chenodeoxycholic acid	0.96	1.00	0.80
Deoxycholic acid	0.98	1.00	0.78
Cholic acid	0.98	1.00	0.33
Glycolithocholic acid	0.94	1.00	0.82
Glycochenodeoxycholic acid	0.68	1.00	0.61
Glycodeoxycholic acid	0.73	1.00	0.56
Glycocholic acid	0.43	0.89	0.24
Taurolithocholic acid	0.24	0.86	0.88
Taurochenodeoxycholic acid	0.09	0.55	0.76
Taurodeoxycholic acid	0.09	0.56	0.75
Taurocholic acid	0.03	0.19	0.43
Lecithin	0.03	0.20	0.12

TABLE 277

PC R_F VALUES OF THYMIDINE AND URIDINE PHOSPHATES
(OYO MITSUNOBU, KOKI KATO AND JUNJI KIMURA, *J. Am. Chem. Soc.*, 91 (1969) 6511)

Paper: Toyo Roshi No. 51A.
Solvents: S_1 = 1-Propanol–2 *N* HCl (5:1).
S_2 = 1-Propanol–conc.ammonium hydroxide–water (6:3:1).
Technique: Ascending.
Detection: Not stated.

Compound	R_F	
	S_1	S_2
Thymidine 5′-phosphate	0.70	
Thymidine 3′-phosphate	0.83	
Uridine 5′-phosphate		0.22
Uridine 3′(2′)-phosphate		0.31

TABLE 278

GPC CALIBRATION DATA FOR GEL PERMEATION CHROMATOGRAPH (WATERS ASSOCIATES)
(E. J. QUINN, H. W. OSTERHOUDT, J. S. HECKLES AND D. C. ZIEGER, *Anal. Chem.*, 40 (1968) 548)

Columns: Five 4-ft. units. Permeability limits: 1–3000 Ä, 1–800 Ä, 1–400 Ä and 2–100 Ä, For full description of the system see H. W. OSTERHOUDT AND L. N. RAY, JR., (*J. Polymer Sci.*, A2, 5 (1967) 569).
Temperature: 25°.
Eluant: Tetrahydrofuran.
Flow rate: 1 ml/min.

Sample	*Mol. wt.*	*Elution vol.*
Phenolic[a]		
Phenol	94	39.30
o-Hydroxybenzyl alcohol	124	37.87
1-Phenoxy-2-propanol	152	38.02
Bis(2-hydroxyphenyl)methane	200	36.50
Bis(4-hydroxyphenyl)methane	200	35.71
2,2-Bis(4-hydroxyphenyl)propane	228	35.33
Phenolphthalol	306	34.10
Polyethylene glycol[b]		
Carbowax 200	200	36.34
Carbowax 300	300	34.60
Carbowax 400	400	33.48
Carbowax 600	600	32.04
Carbowax 1000	1000	30.42
Dow E-2000	2050	27.88
Polypropylene glycol[b]		
Dipropylene glycol	134	37.26
Dow P-400	400	33.65
Dow P-1200	1200	29.39
Dow P-2000	2000	27.84

[a] Elution volume in counts (one count = 5 ml) as determined by peak maximum.
[b] Elution volume in counts as determined by first moment of peak.

TABLE 279

GPC OF A STANDARD MIXTURE, AROMATIC COMPOUNDS, AMINES, PHENOLS, 2,2,4-DIOXOLANE DERIVATIVES, CARBOXYLIC ESTERS AND SOME OTHER COMPOUNDS

(J. G. HENDRICKSON, *Anal. Chem.*, 40 (1968) 51–52)

Columns: Filled with divinylbenzene–styrene copolymerized gel; dimensions and some other specifications as listed below.

Column	*Length (ft.)*	*Theoretical plates per ft.*
A	16	810
B	8	580
C	8	600
D	8	933
E	8	900
F	12	1000

Column diameter, 3/8 in., Theoretical plates per ft. (TPF), 16 (ml to elution)/ft. (ml at base of peak).

Flow rate: 1 ml/min.

Solvent: Tetrahydrofuran, calibration with a standard mixture of *n*-alkanes and di-*n*-alkyl ethers.

Detection: Differential refractometer.

Compound	*Column*	*Elution (ml)*			*Compared chain length (No. of C basis)*			*% H bonding*
		To peak	*At base*	*TPF*	*Theory*	*Observed*	*Error (obs. – theory)*	
Standard compounds								
Cumene peroxide	C	56.3	5.20	237	13.03	12.66	−0.37	
Cumene hydroperoxide	C	59.7	4.67	327	10.21	10.03	−0.18	
n-Butylbenzene	C	66.0	5.00	348	6.85	6.85	0.00	
Di-(β-chloroethyl)ether	E	64.8	4.30	454	6.85	7.15	+0.30	
p-Cymene	C	66.3	4.78	385	6.40	6.72	+0.32	
Phenethyl ether								
Mesitylene	C	70.8	5.14	379	5.40	5.05	−0.35	
2-Bromobutane	C	70.8	4.63	468	5.32	5.32	0.0	
Styrene	C	71.6	4.90	426	4.85	4.80	−0.05	
Anisole	C	73.7	5.13	413	4.52	4.20	−0.32	
Benzaldehyde	C	71.4	4.86	432	4.46	4.86	+0.40	
Isopropyl chloride	C	72.2	4.24	564	4.08	4.62	+0.54	
Aromatic compounds								
Benzene	F	113.0	4.12		(3.40)	3.31	−0.09	
Benzoic acid · THF	F	93.7	5.04		8.00	7.71	−0.29	3.6
Salicylic acid · THF	F	91.25	4.88		8.67	8.61	−0.06	0.7
Phenyl salicylate	F	91.50	4.69		8.67	8.50	−0.17	2.0
m-Diphenoxybenzene	F	88.0	4.84		9.88	9.91	−0.03	0.3
m-Phenoxyphenol.THF	F	85.4	4.24		10.55	11.10	+0.55	5.2
m-Hydroxybenzoic acid · $(THF)_2$	F	83.7	4.83		12.17	11.96	−0.21	1.7
p-Hydroxybenzoic acid · $(THF)_2$	F	82.8	4.54		12.2	12.6	+0.4	3
Polyphenyl oxide [φ—(O—φ)$_3$—O—φ]	F	74.4	4.42		16.82	17.99	+1.17	7.0
Polyphenyl oxide [φ—(O—φ)$_4$—O—φ]	F	70.8	5.47		20.14	21.07	+0.93	4.6

TABLE 279 *(continued)*

Compound	*Column*	*Elution (ml)*			*Compared chain length (No. of C basis)*			*% H bonding*
		To peak	*At base*	*TPF*	*Theory*	*Observed*	*Error (obs.—theory)*	
Amines and phenols								
Amines								
Methylamine	A	160.3[a]	5.04	1020	2.0	2	0	0
Aniline	A	126.6[a]	5.90	461	3.76	6.68	2.92	102
Diphenylamine	E	62.0	4.35	406	6.51	8.59	2.08	73
Phenyl-β-napthylamine	E	60.0	5.24	262	7.66	9.30	1.64	58
Dibenzylamine	B	60.7	5.04	290	8.71	8.79	0.09	3
Dibenzylphenylamine	E	59.8	5.94	202	10.36	9.95	−0.41	0
H (φ—N—φ)$_2$	E	51.0	4.96	211	12.32	18.09	5.67	200
Bonded phenols								
Phenol	A	123.0[a]	5.68	469	3.52	7.53	4.00	100[b]
p-Chlorophenol	A	116.8[a]	5.64	427	4.51	9.15	4.34	108
o-Cresol	C	63.4	4.96	327	4.52	8.07	3.55	89
m-Cresol	C	62.8	4.82	339	4.52	8.39	3.87	97
p-Methoxyphenol	C	62.8	4.80	343	5.19	10.44	4.23	
β-Naphthol	C	61.9	4.94	314	4.68	8.88	4.20	105
Hydroquinone	A	118.5[a]	5.48	467	3.73	8.61	4.88	122
Bisphenol A	C	50.7	4.88	216	9.13	18.05	8.92	223
Bisphenol S	C	51.3	4.43	268	8.13	17.36	8.23	206
Ionol	A	109.2	6.63	270	12.15	11.63	—	0
2,2-Propane-di-4α,4′α-(2,2,4-trimethyldioxolane) ketal	C	53.1	4.96	229	16.03	15.50	−0.53	
Di-4α,4′α-(2,2,4-trimethyldioxolane) ether	C	56.5	4.97	258	12.37	12.50	+0.13	
2,2-Propane-methyl-4-(2,2,4-trimethyldioxolane) ketal	C	59.5	4.92	292	11.18	10.34	−0.84	
2α-Chloro-4α-hydroxy-(2,2,4-trimethyldioxolane)	C	59.2	4.80	305	10.47	10.53	+0.07	
4α-Hydroxy-(2,2,4-trimethyldioxolane)	C	61.2	4.63	350	9.37	9.28	−0.08	
2α-Hydroxy-(2,2,4-trimethyldioxolane)	C	62.2	4.63	361	9.37	8.71	−0.66	
4α-Chloro-(2,2,4-trimethyldioxolane)	C	64.9	5.04	331	6.94	7.34	+0.40	
Parent compound	C	68.4	5.02	372	5.85	5.88	+0.03	
trans-4α-Hydroxy-(2,4-dimethyldioxolane)	C	63.3	4.55	387	8.37	8.12	−0.25	
cis-4α-Hydroxy-(2,4-dimethyldioxolane)	C	63.5	4.55	390	8.37	8.02	−0.35	
Diethylene glycol diacetate	C	60.2	5.0	292	10.01	9.89	−0.12	
Dimethyl adipate	E	61.8	4.45	386	9.33	8.72	−0.61	

(continued on p. D52)

TABLE 279 *(continued)*

Compound	*Column*	*Elution (ml)*			*Compared chain length (No. of C basis)*			*% H bonding*
		To peak	*At base*	*TPF*	*Theory*	*Observed*	*Error (obs. − theory)*	
β-Hydroxyethyl acrylate	C	61.4	4.19	430	9.19	9.16	−0.03	
β-Methoxy ethyl acetate	C	68.3	—	—	6.32	5.92	−0.40	
Ethyl carbonate	C	68.3	4.62	437	6.32	5.92	−0.40	
Methyl butyrate	C	69.9	4.54	473	5.67	5.35	−0.32	
Methyl benzoate	C	70.4	5.0	397	5.52	5.18	−0.34	
Ethyl acetate	B				4.67	4.17	−0.60	
Propargyl alcohol · THF	C	64.1	4.15	478	6.54	7.72	+1.18	
Dicyclopropyl ketone	C	72.1	5.04	409	5.61	4.65	−0.95	
Cyclopropanecarboxylic acid · THF	C	66.0	5.27	314	7.15	6.85	−0.29	
Bicyclohexyl	C	66.0	5.08	337	6.70	6.85	+0.15	
4-Bicyclohexanone	C	65.2	5.38	294	7.31	7.20	−0.09	

[a] Using 16-ft. columns.
[b] Using 4.0 number of C per OH bonded in phenols.

TABLE 280

GPC SEPARATION EFFICIENCY OF A 12-FT. 40 Å COLUMN
(J. G. HENDRICKSON, *Anal. Chem.*, 40 (1968) 53)

Column: 12 ft. × 3/8 in., filled with divinylbenzene–styrene copolymer.
Solvent and eluant: Tetrahydrofuran.
Flow rate: 1 ml/min.
Detection: Differential refractometry.

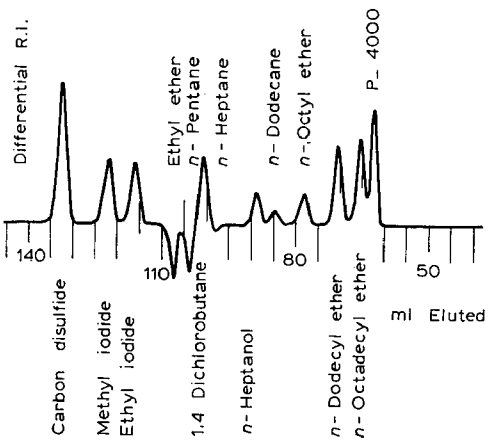


TABLE 281

CC GRADIENT ELUTION OF GLYCOSAMINOGLYCANS
(R. H. PEARCE, J. M. MATHIESON AND B. J. GRIMMER, *Anal. Biochem.*, 24 (1968) 147)

Column: Micro ion-exchange column. A 7-cm length of capillary tubing, 3 mm I.D. was sealed to a capillary stopcock, 1 mm I.D.; the latter was bent into a gooseneck. A 21-gauge disposable needle was cut at right angles 10 mm from the hub, and cemented to the glass.
Ion-exchanger: Dowex 1 X2, chloride, 100–200 mesh. Elution with a NaCl gradient as indicated. Detection either by carbazole–sulfuric acid reaction or by the carbazole–borosulfuric acid procedure.

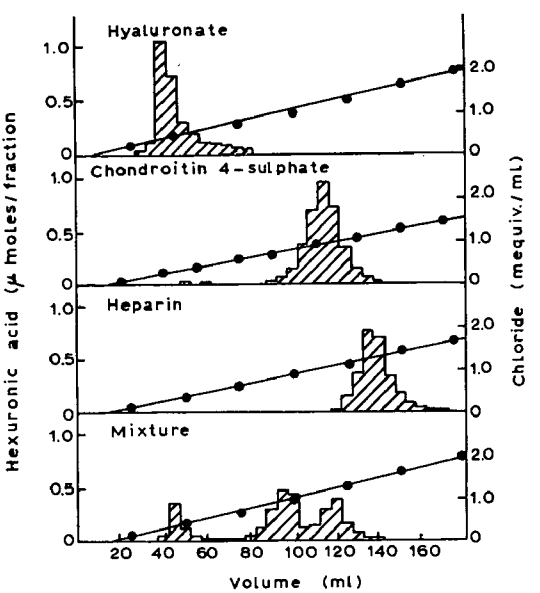


TABLE 282

CC SALT CONCENTRATIONS REQUIRED FOR THE ELUTION OF POLYSACCHARIDES FROM DOWEX 1
(R. H. PEARCE, J. M. MATHIESON AND B. J. GRIMMER, *Anal. Biochem.*, 24 (1968) 148)

3 to 5 μmoles of each polysaccharide were applied to a 400-mg Dowex 1 X2 column and eluted with a linear gradient of NaCl (0–2 *M* NaCl) in 8 *M* urea. The proportion of each polysaccharide eluted was plotted against the NaCl concentration for each fraction collected and the molarities of NaCl corresponding to the elution of 5% and 95% of the polysaccharide were recorded. Separation on a micro ion-exchange column, 7 cm long, 3 mm I.D. Detection by carbazole-sulphuric acid reaction or by carbazole–borosulphuric acid procedure.

Glycosaminoglycan	*Sodium chloride concentration (M) corresponding to the elution of*	
	5%	95%
Hyaluronate	0.27	0.78
	0.30	0.73
Chondroitin	0.39	0.94
Chondroitin 4-sulphate	0.75	1.14
	0.79	1.07
Chondroitin 6-sulphate	0.89	1.39
Dermatan sulphate A	0.89	1.25
Dermatan sulphate B	0.86	1.34
Keratan sulphate	0.76	1.35
Heparitin sulphate	0.38	1.44
Heparin	1.15	1.47
	1.10	1.45

TABLE 283

CC BEHAVIOR OF HYALURONIC ACID OLIGOSACCHARIDES
(L.-Ä. FRANSSON, L. RODÉN AND M. L. SPACH, *Anal. Biochem.*, 23 (1968) 326)

Column: 0.63 × 120 cm, AG 1 X8 (Bio-Rad Laboratories), chloride form.
Elution: non-linear LiCl gradient: 0.2 *M* LiCl solution was added to a 300 ml mixing vessel filled with water at the beginning of the separation. Flow rate 30 ml/h. Overpressure 200–300 p.s.i. Column operated at 37°. Detection by the orcinol–sulfuric acid procedure.
Samples: β-glucuronidase digest of tetra- and hexasaccharides, standards of di-, tetra- and hexasaccharides.
1 = trisaccharide; 2 = disaccharide; 3 = pentasaccharide; 4 = *d*-glucuronic acid; 5 = tetrasaccharide; 6 = hexasaccharide.
Digested material: Hyaluronic acid.

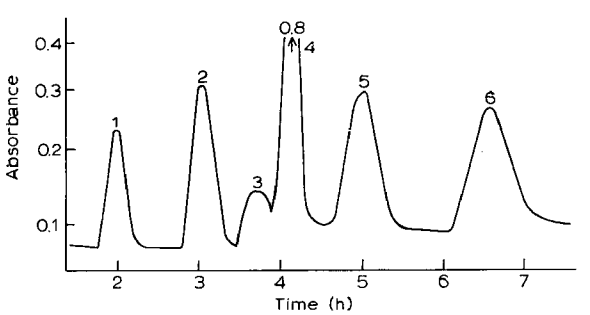


TABLE 284

CC BEHAVIOR OF CHONDROITIN 6-SULPHATE OLIGOSACCHARIDES

(L. Å. FRANSSON, L. RODÉN AND M. L. SPACH, *Anal. Biochem.*, 23 (1968) 327)

Column: 0.63 × 120 cm, AG 1 X8 (Bio-Rad Laboratories), chloride form.

Elution: nonlinear LiCl gradient: 2.0 *M* LiCl solution was added to a 300-ml mixing vessel filled with water at the beginning of the separation. Flow rate 30 ml/h. Overpressure 200–300 p.s.i. Column operated at 37°. Detection by the orcinol–sulphuric acid procedure.

Samples: β-glucuronidase digest of chondroitin 6-sulphate. 1 = N-acetylchondrosine or unsulphated tetrasaccharide; 2 = monosulphated trisaccharide; 3 = monosulphated tetrasaccharide; 4 = monosulphated disaccharide; 5 = disulphated tetrasaccharide; 6 = disulphated trisaccharide.

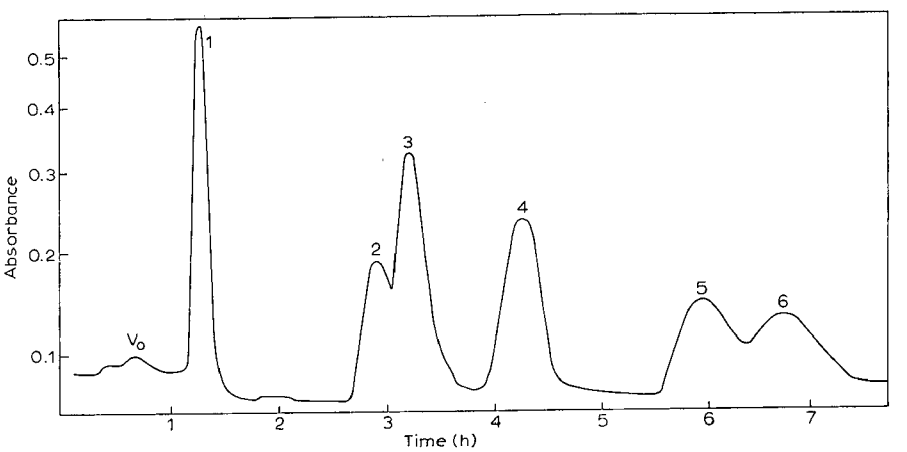


TABLE 285

CC STRATEGY OF AMINO ACID ANALYSIS UTILIZING THREE COLUMNS TO RESOLVE THE AMINO ACIDS IN ELASTIN HYDROLYZATES

(K. W. CORBIN, *Anal. Biochem.*, 132 (1969) 119)

Apparatus: Beckman Model 120 C amino acid analyzer.
Short column: 5 cm high, PA 35 resin.
Long column: 60 cm high, PA 28 resin.

Abbreviations: DES = desmosine, IDS = isodesmosine, B.C. = buffer change.

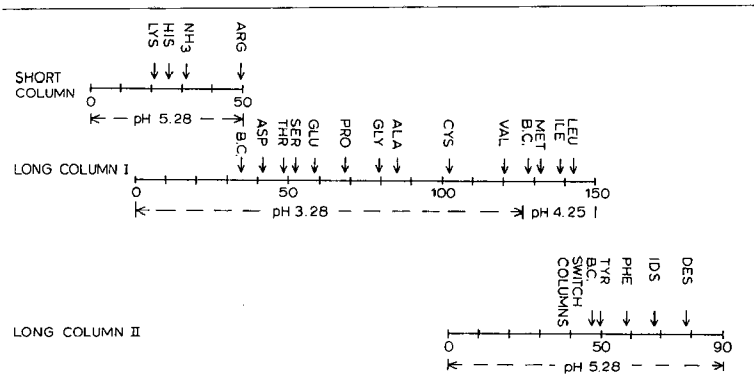


TABLE 286

CC AMINO ACID ANALYSIS RESOLVING LANTHIONINE
(A. S. INGLIS AND P. W. NICHOLLS, *Anal. Biochem.*, 24 (1968) 210 and 211)

Spinco model 120 B amino acid analyzer.

(A) Elution curves for amino acid mixtures (0.5 μmole loading) showing *d,l-* and *meso-*lanthionines resolved on either side of proline. Conditions: 150 cm column packed with Beckman type —150 A resin, buffer flow rate 30 ml/h, initial buffer pH 3.07 changing to pH 4.25, column temperature 61°.

(B) Elution curves for amino acid mixtures (0.5 μmole loading) showing *d,l-* and *meso-*lanthionines resolved between proline and glycine. Conditions: 50 cm column packed with Beckman resin type PA-28, buffer flow rate 68 ml/h, initial buffer pH 3.07 changed to 4.25, column temperature 52°.

In both elution patterns continuous line is optical density at 570 nm, broken line is optical density at 440 nm.

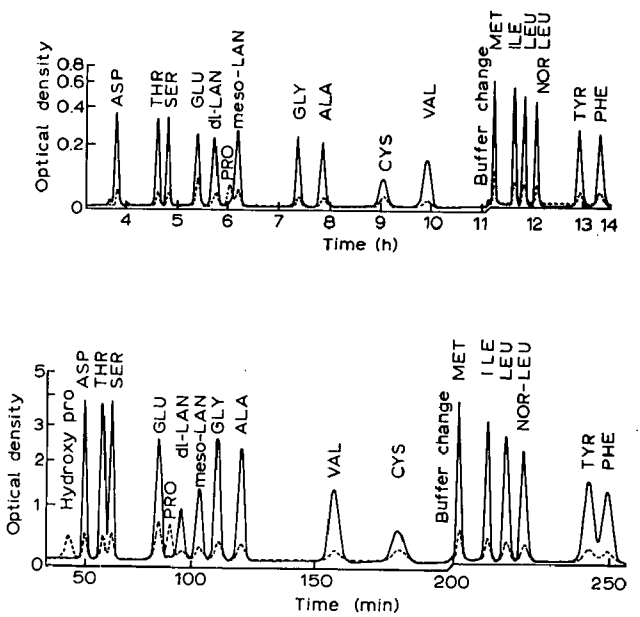


TABLE 287

CC ELUTION VOLUMES AND SPECTRAL DATA FOR THE SEPARATION OF OXYPURINES AND ALLOPURINOL METABOLITES

(L. SWEETMAN AND W. L. NYHAN, *Anal. Biochem.*, 31 (1969) 362)
Column: 0.9 × 30 cm, cation-exchange resin AG50W X4, H^+ form, 200–400 mesh.

Compound	*Elution vol. (ml)*	*Absorption*		*Ratios of absorption*	
		Max (nm)	*Min (nm)*	$\frac{250}{260}$ *(nm)*	$\frac{280}{260}$ *(nm)*
(a) Elution with 0.5 *N* HCl overnight; pressure 0.25 p.s.i., 30 min; fractions of 5–10 ml. Recodirng: absorbancy at wavelengths indicated.					
Sulfosalicylic acid	18				
Pseudouridine	22	262	232	0.73	0.41
Uridine	22	261	230	0.74	0.28
5′-ATP	25				
Allantoin	26				
Uric acid	30	283	255		
		231		1.06	2.98
Uracil	31	258	228	0.87	0.21
Allopurinol riboside	36	250	233	1.24	0.22
Thymine	38	264	231		
		208		0.68	0.55
Oxipurinol	40	252	223	1.11	0.24
5′-XMP	42	262	245		
		236	220	0.78	0.19
5′-ADP	43				
6-Acetylamino-5-amino-1,3-dimethyluracil	47	267	240	0.47	0.34
1,3-Dimethyluric acid	50	287	258		
		233	220	1.21	2.70
5′-IMP	67				
Hippuric acid	74	228	212	1.76	0.67
N-Methyl-2-pyridone-5-carboxamide	80	258	226	0.83	0.38
5′-GMP	85				
Xanthosine	94				
Benzoic acid	135	272	260		
		230	210	1.66	1.12
Xanthine	150	262	240		
		229	222	0.73	0.20
Inosine	150				
3-Methylxanthine	167	267	245		
		231	222	0.60	0.65
5′-AMP	170				
Allopurinol	185	250	235	1.15	0.22
Cytidine	205	279	239	0.44	1.92
Guanosine	217	250	225	1.18	0.51
Theobromine	226	269	242	0.51	0.77
7-Methylxanthine	226	264	242		
		229	223	0.66	0.34
Hypoxanthine	235	248	215	1.48	0.04
Creatinine	254	215			
1-Methylxanthine	277	260	240	0.80	0.22
Cytosine	311	274	239	0.53	1.35
N^2-Dimethylguanosine	320	262	227	0.83	0.37
Theophylline	356				

(continued on p. D58)

TABLE 287 *(continued)*

Compound	*Elution vol. (ml)*	*Absorption*		*Ratios of absorption*	
		Max (nm)	*Min (nm)*	*250/260 (nm)*	*280/260 (nm)*
(b) Conditions similar as under (a); after 300 ml of 0.5 *N* HCl the elution was continued by a gradient of 0.5 and 5 *N* HCl (320 ml of 0.5 *N* HCl and a reservoir of 5 *N* HCl under 0.25 p.s.i. air pressure)					
Adenosine	53				
Theophylline	60	264	244	0.66	0.42
1,7-Dimethylxanthine	82				
N^2-Dimethylguanine	90				
AIC	104	267	249		
		240	221	0.81	0.80
1-Methylhypoxanthine	130				
7-Methylguanine	150	250	227	1.31	0.66
Caffeine	152	266	246	0.66	0.58
Guanine	157	248	223	1.33	0.64
3-Methyladenine	200				
Adenine	244	262	227	0.83	0.37

TABLE 288

CC ELUTION PROFILES OF A MIXTURE OF Na, K, Rb, Cs, Be and Mg
(F. W. E. STRELOW, J. H. J. COETZEE AND C. R. VAN ZYL, *Anal. Chem.*, 40 (1968) 197–198)

Column: Volume 75 ml (25 g of resin) filled with AG50W X8, 200–400 mesh.
Eluant: 0.6 *M* HNO_3.
Flow rate: 2.0 ± 0.2 ml/min.
Detection: Atomic absorption spectrometer.

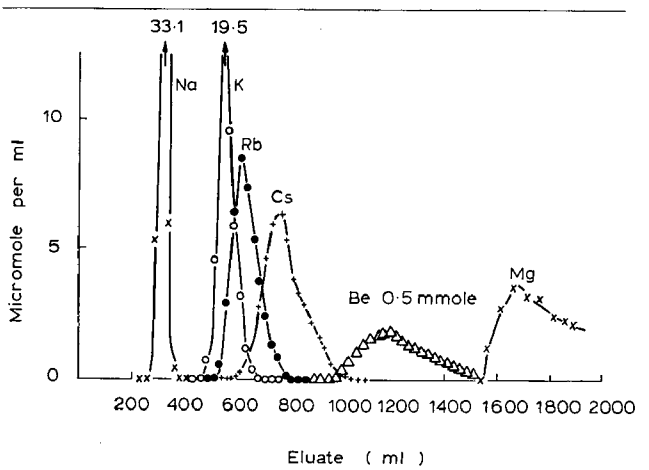


TABLE 289

CC DISTRIBUTION COEFFICIENTS OF SOME INORGANIC SALTS
(D. SAUNDERS AND R. L. PECSOK, *Anal. Chem.*, 40 (1968) 45)

Column: 0.9 × 25 cm, filled with Bio-Gel P-2, 100–200 mesh; overpressure less than 5 ft. of water.
Temperature: 23.0 ± 1.0°.
Flow rate: 1.00 ± 0.04 ml/min.
Concentration: 0.050 *M*.
Detection: Conductivity monitor.
Distribution coefficient: $K_D = (V_e - V_0)/V_i$ (V_0 = 7.32 ml; V_i = 5.72 ml).

Salt	K_D *Experimental*	*Calculated*	*Salt*	K_D *Experimental*	*Calculated*
LiF	0.93	0.99	$CaCl_2$	1.69	1.72
LiCl	1.38	1.33	$CaBr_2$	2.06	2.08
LiBr	1.62	1.60	CaI_2	2.61	2.53
LiI	1.91	1.94	$Ca(NO_3)_2$	2.16	2.18
$LiNO_3$	1.70	1.68			
Li_2SO_4	1.18	1.17	$SrCl_2$	1.59	1.66
$LiClO_4$	1.97	1.97	$SrBr_2$	1.98	2.02
			SrI_2	2.58	2.47
NaF	0.91	0.88	$Sr(NO_3)_2$	2.12	2.12
NaCl	1.27	1.22			
NaBr	1.44	1.49	$BaCl_2$	1.64	1.73
NaI	1.76	1.83	$BaBr_2$	2.12	2.09
$NaNO_3$	1.64	1.57	BaI_2	2.61	2.54
Na_2SO_4	1.07	1.02	$Ba(NO_3)_2$	2.19	2.20
$NaClO_4$	1.77	1.86			
			CuF_2	1.17	1.27
KF	0.88	0.83	$CuCl_2$	1.73	1.73
KCl	1.26	1.17	$CuBr_2$	2.08	2.09
KBr	1.44	1.44	$Cu(NO_3)_2$	2.19	2.20
KI	1.63	1.78	$CuSO_4$	1.60	1.68
KNO_3	1.52	1.52	$Cu(ClO_4)_2$	2.75	2.58
K_2SO_4	0.99	0.95			
$KClO_4$	1.77	1.81	$NiCl_2$	1.65	1.65
			$NiBr_2$	2.04	2.01
CsF	0.88	0.85	NiI_2	2.50	2.45
CsCl	1.23	1.19	$Ni(NO_3)_2$	2.10	2.11
CsBr	1.45	1.46	$NiSO_4$	1.45	1.55
CsI	1.70	1.80			
$CsNO_3$	1.52	1.54	$AlCl_3$	1.77	1.92
Cs_2SO_4	1.04	0.98	$AlBr_3$	2.37	2.33
			AlI_3	2.96	2.83
$MgCl_2$	1.53	1.50	$Al(NO_3)_3$	2.42	2.44
$MgBr_2$	1.91	1.86	$Al_2(SO_4)_3$	1.14	1.97
MgI_2	2.32	2.31			
$Mg(NO_3)_2$	1.93	1.97			
$MgSO_4$	1.28	1.34			

TABLE 290

CC SEPARATION OF METAL IONS BY ION EXCHANGE
(R. KURODA, K. ISHIDA, AND T. KIRIYAMA, *Anal. Chem.*, 40 (1968) 1506)

Columns: 1.0 × 8.5–14 cm, filled with Amberlite CG4B.
Flow rate: 0.4 ml/min.
Solvent: Subsequent elution with acid or base as indicated in table.
Detection: Any conventional method.

Metal separated	*Eluent (eluting volume, ml)*	*Loaded (mg)*	*Recovered (mg)*
Al–Ga			
Al	6 *M* HCl (40)	9.23	9.14
Ga	1 *M* HCl (20)	12.4	12.5
Al–Fe			
Al	9 *M* HCl (40)	9.23	9.14
Fe(III)	1 *M* HCl (10)	11.1	11.2
As–Mo			
As(III)	6 *M* HCl (40)	9.99	9.87
Mo(VI)	1 *M* HCl (150)	10.1	9.83
As–Sn			
As(III)	4.5 *M* HCl (40)	9.99	10.0
Sn(IV)	1 *M* NaOH (70)	15.8	15.5
Cr–Fe			
Cr(III)	9 *M* HCl (70)	4.44	4.36
Fe(III)	1 *M* HCl (10)	11.1	11.2
Cu–Hg			
Cu(II)	1 *M* HCl (60)	10.1	10.1
Hg(II)	2 *M* $HClO_4$ (40)	7.26	7.30
Fe–Re			
Fe(III)	1 *M* HCl (30)	11.1	11.1
Re(VII)	1 *M* NaOH (40)	4.53	4.52
Ga–In			
Ga	4.5 *M* HCl (50)	12.4	12.4
In	1 *M* HCl (20)	15.1	15.1
Ge–Sn			
Ge	3 *M* HCl (50)	5.84	5.72
Sn(IV)	1 *M* NaOH (50)	15.8	15.6
Ge–Te			
Ge	4.5 *M* HCl (50)	5.84	5.79
Te(IV)	1 *M* HCl (30)	9.00	9.03
In–Sn[a]			
In	2 *M* HCl (90)	15.1	15.2
Sn(IV)	1 *M* NaOH (100)	15.8	15.5
Mn–Fe			
Mn(II)	9 *M* HCl (100)	10.1	10.0
Fe(III)	1 *M* HCl (10)	11.1	11.3
Mo–Re			
Mo(VI)	1 *M* HCl (130)	10.1	9.85
Re(VII)	1 *M* NaOH (40)	4.53	4.49
Ni–Co			
Ni	9 *M* HCl (30)	9.53	9.48
Co	1 *M* HCl (20)	9.81	9.86
Ni–Cu			
Ni	6 *M* HCl (30)	9.53	9.53
Cu(II)	1 *M* HCl (80)	10.4	10.2
Se–Te			
Se(IV)	3 *M* HCl (40)	10.5	10.0
Te(IV)	1 *M* HCl (30)	9.00	9.11
Sn–Bi			
Sn(IV)	1 *M* HCl (100)	15.8	15.5
Bi(III)	3 *M* H_2SO_4 (120)	9.87	9.73
Sn–Hg			
Sn(IV)	1 *M* HCl (100)	15.8	15.6
Hg(II)	2 *M* $HClO_4$ (50)	7.26	7.19
V–Fe			
V(IV)	9 *M* HCl (50)	3.24	3.22
Fe(III)	1 *M* HCl (10)	11.1	11.1
Zn–Cd			
Zn	1 *M* HCl (100)	9.90	9.78
Cd	0.1 *M* HCl (40)	10.1	10.0
Sc–Th[a]			
Sc	11.4 *M* HCl (150)	0.911	0.889
Th	6 *M* HCl (100)	1.05	1.03
Y–Th[a]			
Y	11.4 *M* HCl (100)	108	108
Th	6 *M* HCl (100)	1.05	1.05
La–Th[a]			
La	11.4 *M* HCl (120)	27.1	26.9
Th	1 *M* HCl (150)	10.5	10.3
Sm–Th[a]			
Sm	11.4 *M* HCl (100)	8.94	9.07
Th	0.5 *M* $HClO_4$ (70)	3.86	3.86
Yb–Th[a]			
Yb	11.4 *M* HCl (100)	1.07	1.06
Th	6 *M* HCl (100)	10.5	10.5
Sc–U			
Sc	9 *M* HCl (80)	0.911	0.885
U(VI)	0.1 *M* HCl (40)	105	106
Y–U			
Y	9 *M* HCl (40)	108	107
U(VI)	0.1 *M* HCl (40)	1.05	1.08
La–U			
La	9 *M* HCl (80)	27.1	27.4
U(VI)	0.1 *M* HCl (40)	10.5	10.8
La	6 *M* HCl (40)	27.1	27.2
U(VI)	0.1 *M* HCl (20)	10.5	10.6
Sm–U			
Sm	9 *M* HCl (70)	8.94	9.17
U(VI)	0.1 *M* HCl (40)	10.5	10.3
Yb–U			
Yb	9 *M* HCl (60)	1.07	1.07
U(VI)	0.1 *M* HCl (40)	105	105
Th–U			
Th	6 *M* HCl (50)	3.86	3.91
U(VI)	0.1 *M* HCl (20)	10.5	10.7

[a] Separation conducted using 1 × 14 cm columns.

TABLE 291

GC RETENTION DATA OF DIFFERENT COMPOUNDS ON POROUS POLYMERS

(W. R. SUPINA AND L. P. ROSE, *J. Chromatog. Sci.*, 7 (1969) 192)

Stationary phases: P_1 = Porapak N.
P_2 = Porapak P.
P_3 = Porapak R.
P_4 = Porapak S.
P_5 = Porapak T.
P_6 = Chromosorb 102.
P_7 = Chromosorb 101.
P_8 = Chromosorb 103.
In all cases L = 6 ft., I.D. = 4 mm.
Carrier gas: Nitrogen, 60 ml/min.
Support material: Not stated.
Temperature: T_1 = 175°.
Detector: Flame ionization.
Sample size: Not stated.
Data given in: Kováts' indices and retention times for *n*-alkanes (from start of CH_4 peak).

Compound	P_1 (T_1)	P_2 (T_1)	P_3 (T_1)	P_4 (T_1)	P_5 (T_1)	P_6 (T_1)	P_7 (T_1)	P_8 (T_1)
Retention times								
n-Pentane	1.031	0.180	0.914	0.883	0.355	0.820	0.282	0.0936
n-Hexane	2.328	0.336	2.007	1.984	0.711	1.742	—	—
n-Heptane	5.25	—	4.375	4.383	1.383	3.710	0.914	0.320
n-Octane	—	0.589	—	—	—	—	1.742	0.844
n-Decane	—	—	—	—	—	—	—	1.992
Kováts' indices[a]								
Alcohols								
ethyl	483	504	468	436	564	402	466	514
n-propyl	591	603	566	549	678	500	572	620
n-butyl	688	712	668	665	780	622	680	726
isobutyl	676	680	648	629	756	599	648	688
tert.-butyl	604	574	568	586	667	534	561	595
Acids								
acetic	661	637	709	681	795	(515)	572	T
propionic	756	739	796	781	903	(612)	681	T
Ketones								
acetone	531	552	479	481	606	470	524	547
methyl ethyl ketone	624	658	579	582	702	576	628	654
Nitriles								
acetonitrile	528	582	480	462	639	452	563	T
acrylonitrile	562	600	517	505	659	496	576	T
Glycols								
ethylene glycol	768	807	758	702	940	629	704	T
propylene glycol	826	843	801	765	980	687	756	T
Nitroparaffins								
nitromethane	596	665	542	524	721	514	610	T
nitroethane	677	737	621	612	792	599	698	T
1-nitropropane	—	815	—	—	872	690	—	T
2-nitropropane	—	772	—	—	829	661	—	
Benzene	651	740	634	616	720	629	707	718
Chloroform	614	686	601	585	689	581	651	665
Dimethyl formamide	—	909	—	736	950	729	839	912
Dioxane	702	800	669	658	791	669	760	769
Ethyl acetate	623	645	583	561	688	578	630	650
Propylene oxide	490	538	454	453	552	456	516	541
Pyridine	748	871	702	701	849	715	801	839

[a] T = Tails severely; ( ) = Tails.

TABLE 292

GC RETENTION DATA OF GEOMETRIC ISOMERS OF PENTA- AND HEXAMETHYLHEXANES
(S. S. BERMAN, V. A. ZAKHARENKO AND A. A. PETROV, *Neftekhimiya*, 9 (1969) 505)

Support material: Stainless steel.
Stationary phase: Squalane (capillary column, L = 60 m).
Temperature: 120°.
Carrier gas: Not stated.
Detector: Flame ionisation (derived from circumstances).
Sample size: Not stated.
Data given in: Retention sequence R (relative to butyl- and pentylcyclohexane).

Substance	R
Butylcyclohexane	1.000
1,2,3,4,5-Pentamethylcyclohexane	
trans, trans, trans, trans	1.040
trans, trans, cis, trans	1.089
trans, cis, trans, cis	1.130
trans, trans, trans, cis	1.130
trans, trans, cis, cis	1.175
trans, cis, cis, trans	1.205
cis, trans, trans, cis	1.320
cis, trans, cis, cis	1.350
trans, cis, cis, cis	1.375
cis, cis, cis, cis	1.440
Pentylcyclohexane	1.760
Pentylcyclohexane	1.000
1,2,3,4,5,6-Hexamethylcyclohexane	
trans, trans, trans, cis, trans	1.143
trans, trans, trans, trans, trans	1.143
trans, trans, trans, trans, cis	1.267
trans, trans, cis, trans, trans	1.267–1.530
trans, trans, cis, cis, cis	
trans, cis, cis, trans, cis	
trans, cis, cis, cis, trans	
cis, cis, cis, cis, cis	1.690
Hexylcyclohexane	1.860

TABLE 293

GC RETENTION DATA OF SOME n-C_2–C_{11} ALDEHYDES AND METHYLKETONES
(R. V. GOLOVNYA AND V. P. URALETS, *Zh. Anal. Khim.*, 24 (1969) 450)

Support material: Celite (type not stated), 100/120 mesh.
Stationary phases: P_1 = Apiezon M, 10%.
P_2 = Dinonyl phthalate, 10%.
P_3 = PEGA, 10%.
P_4 = β,β'-oxydipropionitril, 10%.
Glass columns, L = 200 cm, I.D. = 4 mm each.
Carrier gas: Argon (?), 60 ml/min (T_2), 140 ml/min (T_1).
Temperatures: T_1 = 50°.
T_2 = 125°.
Detector: Flame ionisation.
Sample size: Not stated.
Data given in: Retention indices I.

Substances	I						
	P_1		P_2		P_3		P_4
	T_1	T_2	T_1	T_2	T_1	T_2	T_1
Aldehydes							
C_2	387	473	770	377	468	730	968
C_3	482	582	859	482	602	816	1057
C_4	579	681	947	577	683	898	1136
C_5	686	788	1054	679	785	998	1228
C_6	788	892	1156	780	886	1097	1313
C_7	888	995	1257	880	986	1194	1395
C_8	988	1097	1357				
C_9	1089	1197	1457				
C_{10}	1189	1295	1555				
Ketones							
C_3	484	583	898	480	606	856	1124
C_4	581	688	981	578	694	930	1193
C_5	670	776	1059	667	778	1005	1254
C_6	771	883	1159	767	878	1104	1340
C_7	871	983	1259	867	979	1198	1420
C_8	971	1083	1359				
C_9	1071	1183	1458				
C_{10}	1271	1383	1655				

TABLE 294

GC RETENTION DATA OF SOME HALOGENATED HYDROCARBONS (FREONES)
(A. FORIS AND J. G. LEHMAN, *Separation Sci.*, 4 (1969) 230)

Stationary phase: Porapak Q, 80/100 mesh.
Carrier gas: Helium.
Temperature: 130°.
Detector: Katharometer (Ni-filaments).
Sample size: 0.1 mole % in helium.
Data given in: Retention indices I and $\Delta I/10°$.

Compound	I	$\Delta I/10°$	*Temp. range (°C)*
CH_3F	174.9	−0.10	43–99
CH_3Cl	307.2	+1.2	117–157
CH_3Br	372.8	+2.0	117–157
CH_2Cl_2	446.4	+1.1	131–183
CH_2ClF	321.5	+0.10	129–183
CH_2F_2	173.1	−0.66	51–100
$CHCl_3$	550.1	−2.2	169–218
$CHCl_2F$	411.1	+0.31	162–210
$CHClF_2$	277.6	−1.1	83–127
CHF_3	160.2	−1.4	51–100
CCl_4	610.1	−3.4	169–218
CCl_3F	458.0	+1.0	162–210
CCl_2F_2	318.2	−0.34	123–183
$CClF_3$	188.9	−0.65	51–100
CCl_2FCClF_2	477.2	−0.21	131–183
$CClF_2CClF_2$	393.9	−1.1	131–179
$CClF_2CF_3$	268.0	−1.3	83–127
CF_3CF_3	161.4	−1.0	51–100
C_2H_4	181.2	+0.14	43–99
$CH_2=CHF$	212.6	−0.43	83–127
$CH_2=CHCl$	352.2	+0.79	131–179
$CH_2=CHBr$	417.1	+1.5	131–183
$CH_2=CF_2$	191.9	−0.55	43–99

TABLE 295

GC RETENTION DATA OF FATTY ACIDS IN RABBIT'S ADRENAL LIPID
(Y. MASADA, K. HASHIMOTO, T. INOUE, H. YOSHIDA, I. FUKUI, K. MASAKI AND J. TAKAHARA, *J. Pharm. Soc. Japan*, 89 (1969) 580)

Support material: Stainless steel.
Stationary phase: Butanediol succinate (capillary column, L = 45 m, I.D. = 0.5 mm).
Carrier gas: Helium, 5 ml/min.
Temperature: 200°.
Detector: Mass spectrograph *m/e* 2-450, 3 sec (Watson–Biemann separator).
Sample size: Not stated.
Data given in: Retention sequence *R* (relative to methyl *n*-octadecanoate).

Compound	*R*
Methyl *n*-tetradecanoate	0.41
Methyl *n*-pentadecanoate	0.49
Methyl isohexadecanoate	0.55
Methyl *n*-hexadecanoate	0.62
Methyl 9-hexadecenoate	0.67
Methyl *n*-heptadecanoate	0.77
Methyl *n*-heptadecenoate(?)	0.85
Methyl *n*-octadecanoate	1.00
Methyl 9-octadecenoate	1.14
Methyl 9,12-octadecadienoate	1.29
Methyl 6,9,12-octadecatrienoate	1.40
Methyl 9,12,15-octadecatrienoate	1.54
Methyl *n*-eicosanoate	1.65
Methyl 11-eicosenoate	1.81
Methyl 11,14-eicosadienoate	1.81
Methyl 11,14-eicosadienoate	2.14
Methyl 8,11,14-eicosatrienoate	2.43
Methyl 5,8,11,14-eicosatetraenoate	2.65
Methyl 8,11,14,17-eicosatetraenoate	2.98
Methyl 5,8,11,14,17-eicosapentaenoate	3.24
Methyl docosadienoate (?)	4.63
Methyl 7,10,13-docosatrienoate	5.73
Methyl *n*-octadecanoate (min)	13.00

TABLE 296

TLC R_F VALUES OF SOME PSYCHOTHERAPEUTICS OF THE THIOXANTHENE AND DIBENZO[*a*,*d*]-1,4-CYCLOHEPTADIENE SERIES

(H.-D. DELL, J. FIEDLER AND R. TEICHGRÄBER, *Z. Anal. Chem.*, 249 (1970) 43)

Thin layer: Kieselgel HF (E. Merck).

Solvents: S_1 = Ethanol–chloroform (8:92).
S_2 = Methanol–benzene (39.1:60.9).
S_3 = Dichloromethane–methanol (92.7:7.3).
S_4 = Methanol–chloroform–ethyl acetate (21.6:51.4:27.0).
S_5 = Methanol–chloroform–acetone (23:47:30).
S_6 = Methanol–acetone–cyclohexane (16.0:43.5:40.5).

Detection: UV light, iodine vapour, Dragendorff's reagent or sulphuric acid–methanol (1:1) with heating, respectively.

Compound	R_F					
	S_1	S_2	S_3	S_4	S_5	S_6
Chlorprothixen (Truxal)	0.49	0.76	0.48	0.56	0.58	0.62
Chlorprothixensulfoxid	0.29	0.55	0.38	0.35	0.38	0.28
			0.47			
Desmethylchlorprothixen	0.12	0.30	0.20	0.12	0.14	0.14
		0.51		0.28		
Prothixen	0.28	0.55	0.40	0.29	0.38	0.30
Dihydro-chlorprothixen	0.37	0.69	0.39	0.38	0.47	0.52
Clopenthixol (Ciatyl)	0.30	0.75	0.35	0.52	0.55	0.46
Clopenthixolsulfoxide	0.26	0.61	0.43	0.35	0.44	0.27
Flupentixol (Fluanxol)	0.26	0.75	0.38	0.52	0.58	0.44
Flupentixolsulfoxide	0.29	0.67	0.48	0.37	0.53	0.31
Des-(β-hydroxyethyl)-flupentixol	0.12	0.51	0.17	0.20	0.17	0.16
N 745	0.30	0.70	0.46	0.38	0.37	0.25
Meprotixol	0.15	0.35	0.20	0.20	0.22	0.25
Amitriptylin (Saroten)	0.30	0.63	0.42	0.41	0.46	0.38
Nortriptylin (Nortrilen)	0.14	0.21	0.11	0.12	0.20	0.13
		0.45	0.21			

TABLE 297

GC RETENTION DATA OF *n*-BUTYLBORONATES OF CATECHOLAMINES AND RELATED COMPOUNDS (G. M. ANTHONY, C. J. W. BROOKS, I. MACLEAN AND I. SANGSTER, *J. Chromatog. Sci.*, 7 (1969) 626)

Support material: Gas-Chrom Q, 100/120 mesh.
Stationary phase: OV-17, 1% (L = 6 ft).
Carrier gas: Nitrogen, 34 ml/min at 20 p.s.i.
Temperatures: T_1 = 140°.
T_2 = 170°.
T_3 = 190°.
Detector: Flame ionisation.
Sample size: Not given.
Data given in: Retention indices *I*.

Compound	*Type of derivative*	*I*		
		T_1	T_2	T_3
β-Hydroxy-β-phenylethylamine	Mono	1799		
Norephedrine	Mono	1776		
Nor-ψ-ephedrine	Mono	1774		
Ephedrine	Mono	1796		
ψ-Ephedrine	Mono	1782		
Synephrine	Mono		2185	
Neosynephrine	Mono		2171	
Normetanephrine	Mono			2315
Metanephrine	Mono			2270
Norepinephrine	Bis			2478
Epinephrine	Bis			2438
Isoprenaline	Bis			2512
3,4-Dihydroxynorephedrine	Bis			2450
Methyl 2,3-dihydroxybenzoate	Mono	1915		
Methyl 3,4-dihydroxybenzoate	Mono	1901		

TABLE 298

GC RETENTION DATA OF SOME ALKYLSUBSTITUTED MONOBASIC PHENOLS
(V. A. ZAKUPRA AND V. S. DOBROV, *Khim. Tekhnol. Topliva i Masel*, 14, No. 10 (1969) 55)

Support material: Chromosorb, 69/80 mesh.
Stationary phases: P_1 = PPO (polyphenylene oxide), 20%.
P_2 = Apiezon L, 20%.
(L = 2 m, I.D. = 3 mm each).
Carrier gas: Helium, 40–45 ml/min, inlet pressure 1.5 atm.
Temperature: 150°.
Detector: Katharometer.
Sample size: Not stated.
Data given in: Retention sequence R (relative to anisole).

Compound	R	
	P_1	P_2
Anisol	1.00	1.00
Phenol	1.66	1.06
o-Cresol	2.00	1.50
p-Cresol	2.40	1.74
m-Cresol	2.46	1.76
2,6-Xylenol	2.77	2.44
o-Ethylphenol	2.85	2.31
2,5-Xylenol	3.30	2.52
2,4-Xylenol	3.43	2.64
m-Ethylphenol	3.85	2.68
3,5-Xylenol	3.90	2.68
2,3-Xylenol	3.90	3.10
3,4-Xylenol	4.55	3.20
2-Fluorobutylphenol	5.00	4.00
3-Methyl-5-ethylphenol	5.50	3.80
2,3,5-Trimethylphenol	5.95	4.60
p-tert.-Butylphenol	6.10	4.60
3,4,5-Trimethylphenol	8.30	5.65
2,6-Diisopropylphenol	6.80	6.25
2,6-Di-*tert.*-butylphenol	8.20	9.40
2,4-Di-*tert.*-butylphenol	10.30	9.80
2,4-Difluorobutylphenol	13.40	12.20
2,4,6-Tri-*tert.*-butylphenol	16.90	—

TABLE 299

GC RETENTION DATA OF SOME CHLOROPHENOLS
(A. NOSAL, A. PASTERNAK AND S. WITEK, *Chem. Anal. (Warsaw)*, 14 (1969) 1117)

Support material: Chromosorb W, AW, 1.2% H_3PO_4, 0.2–0.3 mm.
Stationary phases: P_1 = Ucon 50B-55OX, 9.1%.
P_2 = Ucon 50B-55OX, 16.7%.
P_3 = Carbowax 20 M, 9.1%.
P_4 = Carbowax 20 M, 16.7%.
(Column length 85 m each).
Carrier gas: Nitrogen, 60 ml/min (P_1, P_2) and 75 ml/min (P_3, P_4).
Temperatures: T_1 = 160°.
T_2 = 169°.
Detector: Flame ionisation.
Sample size: Not stated.
Data given in: Retention sequence R (relative to phenol).

Chlorophenol	R			
	T_1		T_2	
	P_1	P_2	P_3	P_4
o-Chlorophenol	0.68	0.61	0.63	0.57
Phenol	1.00	1.00	1.00	1.00
2,6-Dichlorophenol	1.63	1.59	1.13	1.24
2,3-Dichlorophenol	1.96	2.02	1.87	1.92
2,4-Dichlorophenol	1.97	2.04	1.73	1.79
2,5-Dichlorophenol	2.03	2.20	1.81	1.87
3,4-Dichlorophenol	2.85	2.78	1.73	1.86
2,4,6-Trichlorophenol	3.81	3.84	2.30	2.54
p-Chlorophenol	4.30	4.45	4.41	4.45
m-Chlorophenol	4.56	4.65	4.50	4.55
2,4,5-Trichlorophenol	7.03	7.30	5.85	5.90

TABLE 300

GC RETENTION DATA OF ORGANOCHLORINE INSECTICIDES
(H. B. PIONKE, G. CHESTERS AND D. E. ARMSTRONG, *Analyst*, 94 (1969) 901)

Support material: Gas-Chrom Q, 60/80 mesh.
Stationary phases: P_1 = DC-200, 10% (L = 2 m, I.D. = 4 mm).
P_2 = DEGS, 10% (L = 1 m, I.D. = 4 mm).
Carrier gas: Nitrogen, 125 ml/min.
Temperature: 200°.
Detector: Electron capture (tritium).
Sample size: Not stated.
Data given in: Retention sequence *R* (relative to heptachlor epoxide).

Compound	*R*	
	P_1	P_2
Insecticides		
γBHC	0.38	0.70
Heptachlor	0.64	0.35
Aldrin	0.81	0.35
Heptachlor epoxide	1.00	1.00
p,p'-DDE	1.48	1.23
Dieldrin	1.48	1.52
Endrin	1.65	1.72
p,p'-TDE	1.96	3.92
o,p'-DDT	2.01	1.73
p,p'-DDT	2.45	3.25
p,p'-Methoxychlor	3.63	9.10
Potassium hydroxide derivatives of		
o,p'-DDT	1.20	0.97
p,p'-TDE	1.20	1.16
p,p'-DDT (*i.e.*, *p,p'*-DDE)	1.48	1.23
p,p'-Methoxychlor	2.29	3.84
Hydrochloric acid derivatives of		
Endrin	2.78	—
Dieldrin	2.90	—

TABLE 301

GC RETENTION DATA OF CHLOROSILANES, METHYLCHLOROSILANES AND RELATED SILOXANES
(K. R. BURSON AND CH. T. KENNER, *Anal. Chem.*, 41 (1969) 871)

Support materials: Chromosorb P, AW, 60/80 mesh (P_1–P_3, P_5–P_{11}), 30/50 mesh (P_4).
Stationary phases: P_1 = DMeP, 30%, L = 12 ft., I.D. = $^3/_{16}$ in.
P_2 = DEtP, 30%, L = 12 ft., I.D. = $^3/_{16}$ in.
P_3 = DBuP, 30%, L = 6 ft., I.D. = $^3/_{16}$ in.
P_4 = DNP, 30%, L = 6 ft., I.D. = $^1/_4$ in.
P_5 = Dipropyltetrachlorophthalate 20%, L = 6 ft., I.D. = $^3/_{16}$ in.
P_6 = SF-96, 10%, L = 12 ft., I.D. = $^3/_{16}$ in.
P_7 = DC-704, 20%, L = 6 ft., I.D. = $^1/_4$ in.
P_8 = QF-1, 20%, L = 6 ft., I.D. = $^3/_{16}$ in.
P_9 = XE-60, 10%, L = 18 ft., I.D. = $^3/_{16}$ in.
P_{10} = DC-710, 20%, L = 6 ft., I.D. = $^3/_{16}$ in.
P_{11} = DC-LSX-3-0295 (trifluoropropyl silicone gum), 10%, L = 12 ft., I.D. = $^3/_{16}$ in.
Carrier gas: Helium.
Temperatures: T_1 = programmed 25–50°, 5°/min (P_1, P_2, P_3).
T_2 = programmed 25–75°, 5°/min (P_5).
T_3 = programmed 25–100°, 5°/min (P_4).
T_4 = programmed 25–250°, 10°/min (P_6).
T_5 = programmed 25–200°, 10°/min (P_7).
T_6 = programmed 25–200°, 5°/min (P_8, P_9, P_{10}, P_{11}).
Detector: Thermal conductivity cell (W-Rh).
Sample size: 5 μl.
Data given in: Retention times t_R (min).

	t_R				
	Trichlorosilane	*Silicon tetrachloride*	*Trimethylchlorosilane*	*Methyltrichlorosilane*	*Dimethyldichlorosilane*
P_1 (T_1)	8.5	10.2	15.0	20.1	23.3
P_2 (T_1)	7.9	9.5	13.8	18.8	20.9
P_3 (T_1)	5.7	7.1	14.1	17.9	20.8
P_4 (T_3)	5.5	9.2	13.6	16.4	17.3
P_5 (T_2)	3.0	3.9	4.8	6.7	6.8
P_6 (T_4)	3.6	7.8	6.8	10.8	10.8
P_7 (T_5)	3.6	5.5	4.6	9.7	9.7
P_8 (T_6)	2.2	3.1	4.3	5.2	6.0
P_9 (T_6)	7.3	8.8	12.3	15.0	17.0
P_{10} (T_6)	2.8	4.3	4.5	6.7	6.7
P_{11} (T_6)	5.8	7.8	10.2	11.5	13.0

TABLE 302

GC RETENTION DATA OF TRIMETHYLSILYL ETHERS OF SOME OLIGOSACCHARIDES AND URINARY NEURAMINYL OLIGOSACCHARIDES

(J. K. HUTTUNEN AND T. A. MIETTINEN, *Anal. Biochem.*, 29 (1969) 448)

Stationary phases: P_1 = SE-30, 2.2% (T_1,T_4).
P_2 = QF-1, 3.0% (T_3).
P_3 = NGS, 1.0% (T_2).
Each L = 6 ft., I.D. = 4 mm.
Carrier gas: Nitrogen, inlet pressure 1.8 kg/cm².
Support material: Gas-Chrom P, AW-silanized, 100/120 mesh.
Temperatures: T_1 = 165°; T_2 = 185°; T_3 = 210°; T_4 = 245°.
Detector: Flame ionization.
Sample size: Not stated.
Data given in: Retention sequence $R_{1,2}$ (relative to TMSi ether of melibitol).

TMSi ether of	$R_{1,2}$					
	$P_1(T_1)$		$P_2(T_3)$		$P_3(T_2)$	
	Aldose[a]	*Alditol*[b]	*Aldose*[a]	*Alditol*[b]	*Aldose*[a]	*Alditol*[b]
Lactose	0.39	0.61	0.41	0.63	0.31	0.46
	0.56		0.66		0.50	
Melibiose	0.75	1.00	0.80	1.00	0.81	1.00
	0.80		0.97		0.92	
Maltose	0.45	0.74	0.45	0.75	0.36	0.55
	0.51		0.52		0.44	
Gentiobiose	0.63	0.80	0.66	0.87	0.73	0.91
	0.80		0.96		1.09	
Trehalose	0.54		0.54		0.37	
$LacNH_2$[c]	0.75	0.89	2.72	2.22	1.65	1.23
	0.82		3.28		3.51	
$GalgalNH_2$[d]	0.89	0.91	2.59	2.41	3.18	1.30
	1.16		5.82		4.39	
Fucosyllactose	2.68		2.89			
	3.20		3.48			
Melibitol (min)		9.9		9.4		15.7

[a] TMSi ether of intact compound.
[b] TMSi ether of $NaBH_4$-reduced compound.
[c] N-Acetyllactosamine.
[d] 3-β-Galactosyl-N-acetylgalactosamine.

TABLE 303

CC SEPARATION OF SIALYLOLIGOSACCHARIDES
(R. ÖHMAN AND O. HYGSTEDT, *Anal. Biochem.*, 23 (1968) 395)

Column: 2 × 20 cm, Dowex 1 X8, 200–400 mesh, acetate form.
Elution: 1 = 1500 ml of distilled water;
2 = linear gradient distilled water–0.1 *M* NaCl, total volume 2000 ml;
3 = 0.1 *M* NaCl, 1000 ml.
10-ml fractions collected and assayed for sialic acid (NANA).
Detection: Resorcinol method.
Peaks: I = 6′-monosialyllactose;
II = 3′-monosialyllactose;
III = disialyllactose.

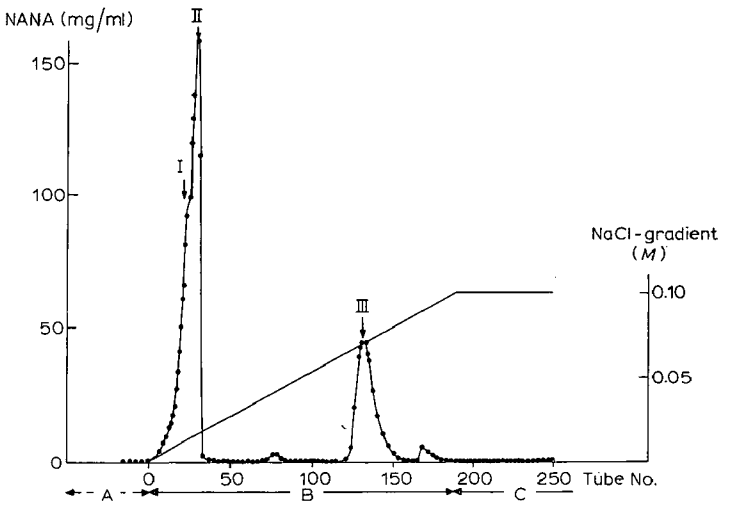
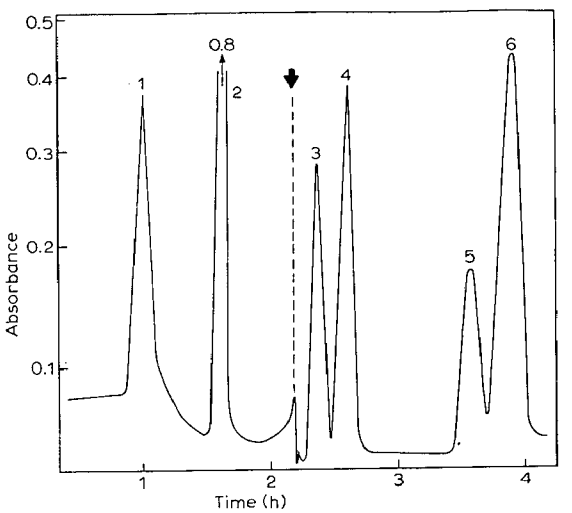


TABLE 304

CC BEHAVIOUR OF URONIC ACID AND URONIC ACID CONTAINING DISACCHARIDES
(L. Å. FRANSSON, L. RODÉN AND M. L. SPACH, *Anal. Biochem.*, 23 (1968) 322–323)

(a) Column AG 1-X 8, formate form (Bio-Rad Laboratories), 0.63 × 120 cm. Flow rate 30 ml/h. Overpressure 200–300 p.s.i. Eluant 0.5 *M* formic acid.
(b) Column AG 1 X4, formate form (Bio-Rad Laboratories), 0.63 × 120 cm. Flow rate 30 ml/h. Overpressure 200–300 p.s.i. Eluant 0.3 *M* formic acid. In both cases the standard Technicon automated equipment was used. Columns operated at 37°. Detection by the orcinol–H_2SO_4 method. The effluent was mixed with 1% aqueous orcinol and 70% v/v sulphuric acid. After passage through a mixing coil the effluent and reagents were heated up to 95° for 24 min, passed through a cooling coil and subsequently exposed to fluorescent light in order to increase the colour yield. O.D. measured at 420 nm.
Samples: 1 = chondrosine; 2 = glucuronolactone; 3 = N-acetyldermosine; 4 = N-acetylchondrosine; 5 = *l*-iduronic acid; 6 = *d*-glucuronic acid.
The arrow indicates the breakthrough of formic acid.



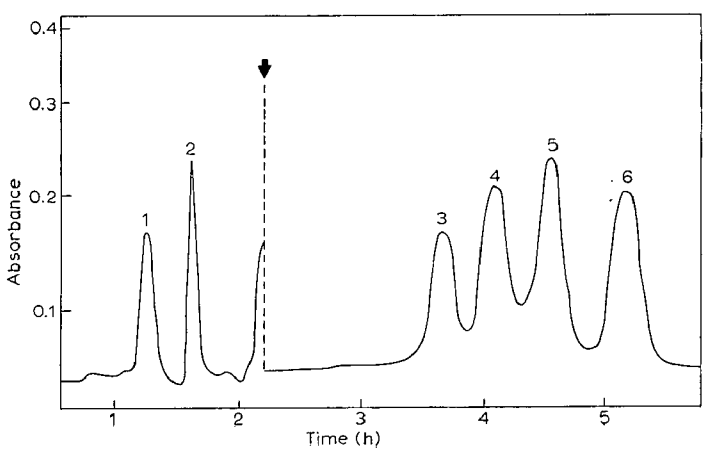


TABLE 305

GC RETENTION DATA OF SOME STEROID DERIVATIVES
(M. A. KIRSCHNER AND J. P. TAYLOR, *Anal. Biochem.*, 30 (1969) 349)

Support materials: S_1 = Gas-Chrom Q, 80/100 mesh (P_1).
S_2 = Diaport S, 60/80 mesh (P_2, P_3).
Stationary phases: P_1 = SE-30, 3% (S_1, T_3).
P_2 = XE-60, 2% (S_2, T_1).
P_3 = QF-1, 2% (S_2, T_2).
(Columns, L = 4 ft., I.D. = 3.4 mm).
Carrier gas: Argon–methane (95:5), 100 ml/min.
Temperatures: T_1 = 200° (P_2).
T_2 = 210° (P_3).
T_3 = 220° (P_1).
Detector: Flame ionisation.
Sample size: Not stated.
Data given in: Retention sequence *R* (relative to 17-mono-HFB testosterone).

Steroid derivative[a]	*R*		
	P_1	P_2	P_3
Testosterone	1.10	2.50	0.80
17-Mono-HFB	1.00	1.00	1.00
17-Mono-PFO	1.61	1.12	1.70
17-Mono-HFN	2.80	4.30	3.50
17-Mono-EFU	3.46	5.10	4.60
17-Monochloroacetate	2.86	2.50	3.00
Estradiol	1.04	3.50	0.32
17-Mono-HFB	0.88	1.10	0.27
17-Mono-PFO	1.68	1.20	0.68
17-Mono-HFN	2.29	4.50	3.40
17-Mono-EFU	2.86	5.10	4.40
17-Monochloroacetate	2.64	—	1.25
3,17-Di-HFB	0.95	0.20	0.33
3,17-Di-PFO	1.77	0.31	1.16
3,17-Di-HFN	2.64	2.80	5.40
3,17-Di-EFU	3.32	3.20	8.15

[a] Abbreviations: HFB = heptafluorobutyl-; PFO = perfluoroacetyl-; HFN = 9-H-hexadecafluorononyl; EFU = 11-H-eicosafluoroundecanyl.

TABLE 306

ELPHO MOBILITIES OF A SERIES OF VERTEBRATE CARBOXYLESTERASES

(N. KINGSBURY AND C. J. MASTERS, *Biochim. Biophys. Acta*, 200 (1970) 65)

Separation carried out on 7.5% polyacrylamide gel (Cyanogum) in 0.06 *M* Tris–glycine buffer pH 8.6 at 4°. Time to complete, 2 h. Amperage, 2 mA per gel. Mobilities estimated relative to the band of Bromphenol Blue. Staining with 0.1% solution of Amido Black, destaining with methanol–acetic acid–water (5:1:5).

Carboxyl-esterase	*Species*	*Relative mobility* × *100*	*Molecular weight*
Subgroup I	Pig	26	79 000
		28.5	79 000
		31	78 000
		34	77 000
		37	78 000
		18	162 000
	Sheep	39	75 000
		42	74 000
		17	145 000
		24	152 000
	Horse	5	86 000
		8	84 000
		23	80 000
		40	86 000
		16	166 000
		37	155 000
	Ox	27	83 000
		32	81 000
		36	80 000
		40	79 000
		46	81 000
		13	156 000
	Possum	21	82 000
		24	81 000
		48	144 000
	Guinea-pig	4	80 000
		9	86 000
		11	88 000
		15	85 000
		20	80 000
		23	80 000
	Rat	14	86 000
		16	85 000
		19	74 000
Subgroup II	Sheep	53	76 000
		56	72 000
	Ox	46	81 200
Subgroup IV	Possum	53	77 000
		58	84 000
		61	76 000
	Guinea-pig	44	84 000
Subgroup V	Sheep	63	69 000
	Possum	72	47 000
	Rat	24.5	47 000
		27.5	48 000
		31	49 000
		34	50 000
		37	49 000
		40	52 000
		42	55 000

TABLE 307

ELPHO MOBILITIES OF A SERIES OF VERTEBRATE CHOLINESTERASES
(N. KINGSBURY AND C. J. MASTERS, *Biochim. Biophys. Acta*, 200 (1970) 64)

Separation carried out on 7.5% polyacrylamide gel (Cyanogum) in 0.06 *M* Tris–glycine buffer pH 8.6 at 4°. Time to complete, 2 h. Amperage, 2 mA per gel. Mobilities estimated relatively to the band of Bromphenol Blue. Staining with 0.1% solution of Amido Black, destaining with methanol–acetic acid–water (5:1:5).

Cholinesterase	*Species*	*Relative mobility* × 100	*Molecular weight*
Subgroup I	Sheep	6	300 000
Subgroup II	Guinea-pig	27	49 500
		30	49 000
		33	48 000
		36	49 000
		39	50 000
Subgroup III	Sheep	79	39 000
	Ox	71	40 000

TABLE 308

ELPHO MOBILITIES OF A SERIES OF VERTEBRATE ACETYLESTERASES
(N. KINGSBURY AND C. J. MASTERS, *Biochim. Biophys. Acta*, 200 (1970) 63)

Separation carried out on 7.5% polyacrylamide gel (Cyanogum) in 0.06 *M* Tris–glycine buffer pH 8.6 at 4°. Time to complete, 2 h. Amperage, 2 mA per gel. Mobilities estimated relatively to the band of Bromphenol Blue. Staining with 0.1% solution of Amido Black, destaining with methanol–acetic acid–water (5:1:5).

Acetylesterase	*Species*	*Relative mobility* × 100	*Molecular weight*
Subgroup I	Pig	16	87 000
		24	87 000
		41	84 000
		46	85 000
	Ox	5	88 000
		10	88 000
	Rat	43	80 000
		46	79 000
		48	80 000
	Chicken	37	74 000
		41	75 000
		45	75 000
		48	67 000

TABLE 309

ELPHO MOBILITIES OF A SERIES OF VERTEBRATE ARYLESTERASES
(N. KINGSBURY AND C. J. MASTERS, *Biochim. Biophys. Acta*, 200 (1970) 61)

Separation carried out on 7.5% polyacrylamide gel (Cyanogum) in 0.06 *M* Tris–glycine buffer pH 8.6 at 4°. Time to complete, 2 h. Amperage 2 mA per gel. Mobilities estimated relatively to the band of Bromphenol Blue. Staining with 0.1% solution of Amido Black, destaining with methanol–acetic acid–water (5:1:5).

Aryl esterase	*Species*	*Relative mobility* × *100*	*Molecular weight*
Subgroup I	Pig	64	56 000
	Sheep	61	48 000
	Ox	70	63 000
	Possum	65	66 000
		67	66 500
	Guinea-pig	63	67 000
	Rat	60	62 000
	Chicken	73	54 000
		77	53 000
		82	52 000
		87	56 000
		92	56 000
Subgroup II	Pig	55	61 000
	Horse	60	59 000
	Ox	60	67 000
	Possum	57	67 000
	Guinea-pig	52	67 000
	Rat	50	56 000
		52	62 000
		57	62 000
Subgroup III	Pig	22	65 000
	Ox	22	72 000
	Rat	20	54 000

TABLE 310

ELPHO MOBILITIES OF POLYMERIC PROTEIN MARKERS (PANCREATIC RIBONUCLEASE AND β-LACTOGLOBULIN) USED FOR MOLECULAR WEIGHT DETERMINATION VIA POLYACRYLAMIDE GEL ELECTROPHORESIS

(B. WOLF, P. M. LAUSAROT, J. A. LENSAW AND M. E. REICHMANN, *Biochim. Biophys. Acta*, 200 (1970) 181)

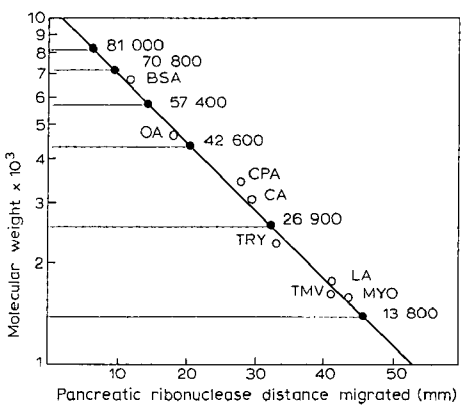
Preparation of polymeric pancreatic ribonuclease and β-lactoglobulin: 2 mg of protein in 1 ml of water and 0.02 ml of diethyl pyrocarbonate were agitated for 2–3 min at room temperature. Excess of diethyl pyrocarbonate was removed by flash evaporation or dialysis against 0.01 *M* phosphate buffer pH 7.8 containing 1% of sodium dodecyl sulphate and 1% of 2-mercaptoethanol.

Electrophoresis: Samples solubilised in buffer mentioned above were subjected to electrophoresis at room temperature on 5% polyacrylamide gels (0.5 × 5 cm) for 3 h.

Amperage: 6 mA per gel.

Detection: staining with Coomassie Brilliant Blue.

Abbreviations: BSA = bovine serum albumin; OA = ovalbumin; CPA = carboxypeptidase; CA = carbonic anhydrase; TRY = trypsin; TMV = tobacco mosaic virus coat protein; RN = bovine pancreatic ribonuclease; MYO = myoglobin; LA = β-lactoglobulin.



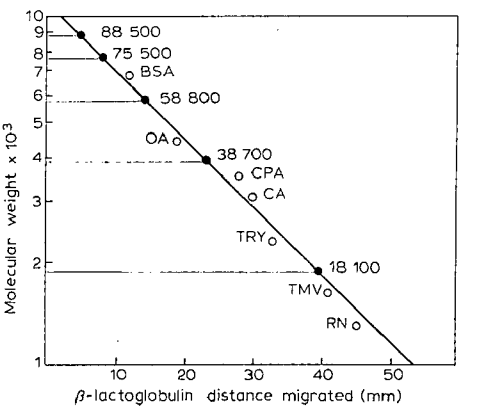


TABLE 311

CC AND TLC COMPARATIVE CHROMATOGRAPHY OF CHLOROPLAST PIGMENTS IN COLUMNS AND ON THIN LAYERS OF ALUMINA AND MAGNESIA

(H. H. STRAIN, J. SHERMA AND M. GANDOLFO, *Anal. Biochem.*, 24 (1968) 64)

Columns: 1 × 25 cm filled to the height of 20 cm with adsorbent packed dry. Flow with suction 0.5 atp.
Plates: 20 × 20 cm, thickness 0.25 mm.
Solvents: PE = petroleum ether;
Pr = *n*-propanol;
Bz = benzene;
Ac = acetone.
Abbreviations used for pigments separated: C = carotenes, V = violaxanthin, L = lutein, N = neoxanthin, a = chlorophyll a, b = chlorophyll b.
Visual detection: TLC colour reactions with HCl sometimes applied.
Order of spots or peaks given in the last column, compounds in parenthesis not separated.

Adsorbent	*Form*	*Pigments*	*Loading (µl)*	*Wash liquid*	*Time (min)*	*Pigments and sequence*
Alumina G	Col.	Sap. ext.	50–400	Bz + 36% Ac	90–105	N, V, L, C
	TL (spot)	Sap. ext.	0.25–20	Bz + 22% Ac	*ca.* 30	N, V, L, C
	TL (spot)	Sap. ext.	1–3	Bz + 10% Pr	*ca.* 30	N, V, L, C
Alumina	Neutral (spot)	Sap. ext.	0.25–20	PE + 30% Ac	*ca.* 75	N, V, L, C
Chromagram	Basic (spot)	Sap. ext.	0.25–20	PE + 30% Ac	*ca.* 80	N, V, L, C
sheets	Acidic (spot)	Sap. ext.	0.25–20	PE + 30% Ac	*ca.* 75	N, (V, L), C
Alumina	Unheated (spot)	Sap. ext.	*ca.* 10	Bz + 17% Ac	*ca.* 20	(N + V + L, C)
Type A paper	Heated (spot)	Sap. ext.	*ca.* 10	Bz + 17% Ac	*ca.* 20	(N + V + L, C)
Magnesia +	Col.	Plant ext.	150–800	PE + 60% Ac	*ca.* 60	(*b* + *a*), N, L, V, C
Celite 545	TL (spot)	Plant ext.	0.5–8	PE + 30% Ac	*ca.* 82	(*b* + *a*), N, L, V, C
(1/1)	Col.	Sap. ext.	150–400	PE + 60% Ac	*ca.* 60	N, L, V, C
	TL (spot)	Sap. ext.	0.5–8	PE + 30% Ac	*ca.* 80	N, L, V, C
Magnesia +						
Celite 545	Col.	Sap. ext.	*ca.* 400	PE + 20% Ac	*ca.* 35	N, (V + L), C
(1/1), slurried;	Col.	Sap. ext.	*ca.* 400	PE + 30% Ac	*ca.* 40	N, (V + L), C
dried, 20°,	Col.	Sap. ext.	*ca.* 400	PE + 2% Pr	*ca.* 34	N, (V, L), C
16–24 h	TL (spot)	Sap. ext.	0.25–0.75	PE + 30% Ac	*ca.* 28	N, (L, V), C
Magnesia +						
Celite 545						
(1/1), slurried;	Col.	Sap. ext.	*ca.* 400	PE + 40% Ac	*ca.* 40	N, L, V, C
dried, 20°,	Col.	Sap. ext.	*ca.* 400	PE + 5% Pr	*ca.* 30	N, L, V, C
16 h; 110°,	Col.	Sap. ext.	*ca.* 400	PE + 10% Pr	*ca.* 40	N, L, V, C
0.5 h	TL (spot)	Sap. ext.	0.75–5	PE + 30% Ac	*ca.* 83	N, L, V, C

TABLE 312

CC AND TLC COMPARATIVE CHROMATOGRAPHY OF CHLOROPLAST PIGMENTS IN COLUMNS AND ON THIN LAYERS OF VARIOUS ADSORPTIVE SACCHARIDES

(H. H. STRAIN, J. SHERMA AND M. GRANDOLFO, *Anal. Biochem.*, 24 (1968) 59)

Columns: 1 × 25 cm filled to the height of 20 cm with adsorbent packed dry. Flow with suction 0.5 atp.
Plates: 20 × 20 cm, thickness 0.25 mm.
Solvents: PE = petroleum ether
Pr = *n*-propanol
Bz = benzene
Abbreviations used for pigments separated: C = carotenes, V = violaxanthin, L = lutein, N = neoxanthin, a = chlorophyll a, b = chlorophyll b.
Visual detection: TLC colour reactions with HCl vapours sometimes applied.
Order of spots or peaks given in the last column. Compounds in parenthesis not separated.

Adsorbent	*Form*	*Pigments*	*Loading (µl)*	*Wash liquid*	*Time (min)*	*Pigments and sequence*
Sugar	Col.	Plant ext.	50–300	PE + 0.5% Pr	90–100	N, (V, *b*), L, *a*, C
	TL (spot)	Plant ext.	1–2	PE + 0.5% Pr	40–50	N, (V + *b*), L, *a*, C
	TL (streak)	Plant ext.	12–280	PE + 0.5% Pr	40–50	N, (V, *b*), L, *a*, C
	Col.	Sap. ext.	50–300	PE + 0.5% Pr	40–45	N, V, L, C
	TL (spot)	Sap. ext.	1–2	PE + 0.5% Pr	40–45	N, V, L, C
	Col.	Plant ext.	25–100	Bz	*ca.* 300	(*b*, N, *a*), V, L, C
	TL (spot)	Plant ext.	1–2	Bz	*ca.* 60	(*b* + N), *a*, V, L, C
	Col.	Sap. ext.	50–150	Bz	*ca.* 180	N, V, L, C
	TL (spot)	Sap. ext.	0.25–5	Bz	*ca.* 60	N, V, L, C
Starch	Col.	Plant ext.	25–350	PE + 0.5% Pr	30–35	N, (V + *b*), *a*, L, C
	TL (spot)	Plant ext.	0.25–8	PE + 0.5% Pr	25–30	N, (V + *b*), *a*, L, C
	Col.	Sap. ext.	25–300	PE + 0.5% Pr	30–35	N, V, L, C
	TL (spot)	Sap. ext.	0.25–0.75	PE + 0.5% Pr	25–30	N, V, L, C
Cellulose (powder)	Col.	Plant ext.	50–400	PE + 1% Pr	40–80	N, (V + *b*), (L, *a*), C
	TL (spot)	Plant ext.	0.25–5	PE + 1% Pr	20–25	N, (V + *b*), (L, *a*), C
	Col.	Sap. ext.	60–500	PE + 1% Pr	40–80	N, V, L, C
	TL (spot)	Sap. ext.	0.25–3	PE + 1% Pr	20–25	N, V, L, C
Cellulose (paper)	Sheet (streak)	Plant ext.	12–280	PE + 1% Pr	25–40	N, (V + *b*), (L, *a*), C
	Sheet (streak)	Sap. ext.	12–280	PE + 1% Pr	25–40	N, (V, L), C

TABLE 313

CC SEPARATION OF COPPER FROM IRON(II), COBALT, MANGANESE AND CHROMIUM ON COLUMNS OF CELLULOSE POWDER TREATED WITH LIX 64

(E. CERRAI AND B. GERSHINI, *Analyst*, 94 (1969) 602)

Column:	1.2 × 27 cm.
Sorbent:	Cellulose powder treated with LIX 64, a commercially available mixture of α-hydroxy oximes (General Mills, Kankakee, Ill., U.S.A.). Preparation: 20 g of cellulose dried previously at 40° for 1 h were mixed with 20 ml of LIX 64, diluted with 70 ml of cyclohexane and the slurry was mixed for 60 min, filtered and kept at 40° for 2 h.
Buffers:	Elution with (a) 0.5 *M* ammonium sulphate pH 3.0, then with (b) 2 *M* sulphuric acid.
Operating conditions:	Flow rate, 1 ml·min^{-1}. Effluent collected in 2-ml fractions.
Detection:	Any colorimetric procedure.

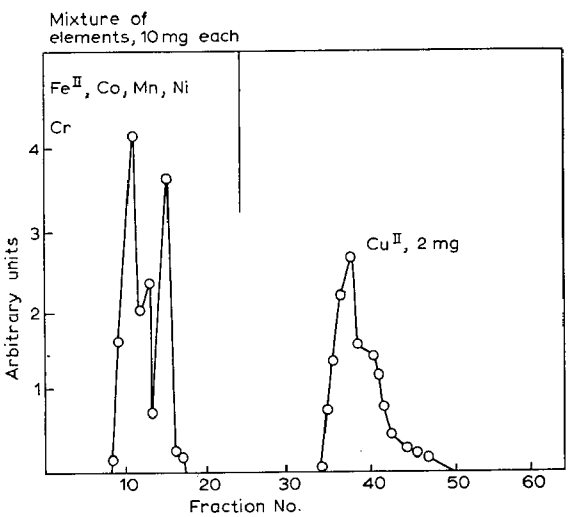


TABLE 314

CC SEPARATION OF GOLD FROM PLATINUM METALS ON CATION EXCHANGERS IN CONCENTRATED HYDROBROMIC ACID SOLUTIONS

(R. DYBCZYŃSKI AND H. MALESZEWSKA, *Analyst*, 94 (1969) 533)

Column:	2.5 cm × 0.0311 cm^2.
Sorbent:	Dowex 50W X8, H^+ form ($13\,\mu \leqslant \varnothing \leqslant 39\,\mu$).
Buffers:	(a) 6 *N* hydrobromic acid containing 0.0035 moles of bromine per litre, and (b) acetylacetone.
Operating conditions:	Flow rate, 0.29–0.37 $ml \cdot cm^{-2} \cdot min^{-1}$. Temperature, 15°. Separation of submicrogram amounts, less than 50 μg.
Detection:	By radioactive tracers prepared by irradiating the appropriate target in the Polish reactor EWA at a flux of 10^{13} $neutrons \cdot cm^{-2} \cdot sec^{-1}$ for about 20 h.

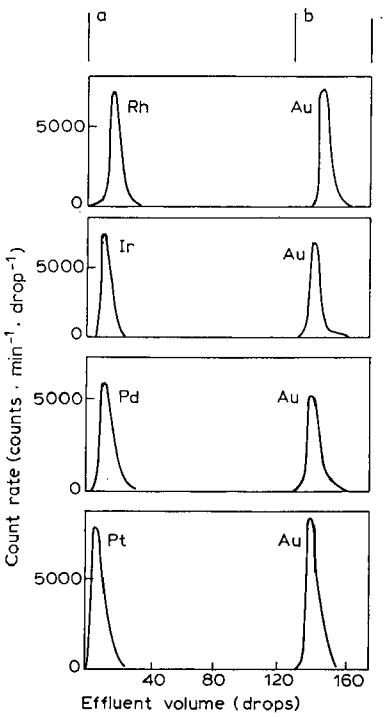


TABLE 315

CC DATA ON THE SEPARATION OF Zr AND Hf USING SILICA GEL COLUMNS
(R. CALETKA AND T. D. ZAITSEVA, *Zh. Anal. Khim.*, 25 (1970) 85)

Column: 1 × 45 cm.
Sorbent: Silica Gel KSK-2, 39 ml.
Buffers: As indicated below.
Operating conditions: Flow rate, 0.3–0.4 ml·cm^{-2}·min^{-1}. Fractions were collected after 39 ml had passed through the column.
Detection: By radioactivity counting.

Fraction No.	*Volume (ml)*	*Composition (%)*	
		Hf	*Zr*
(A) Elution with 6 *N* HCl; 100% Hf = 10 mg, 100% Zr = 0.2 mg.			
1	5	0.65	0.41
2	5	3.83	0.46
3	5	31.60	0.50
4	5	29.25	5.81
5	5	14.61	30.75
6	5	7.44	28.57
7	5	3.44	14.42
8	5	1.76	6.86
9	5	0.98	3.25
10	5	0.78	1.95
11	5	0.59	1.25
12	5	0.53	0.93
13–15	15	1.13	1.59
Not recovered residue remaining on the column	—	3.43	3.29
(B) Elution with 11 *M* HCl; 100% Zr = 10 mg, 100% Hf = 0.2 mg.			
1 and 2	10	not detectable	not detectable
3	5	0.94	not detectable
4	5	7.47	not detectable
5	5	29.86	not detectable
6	5	36.52	not detectable
7	5	16.33	0.1
8	5	4.52	0.2
9	5	1.04	3.84
10	5	0.53	17.60
11	5	0.49	26.30
12	5	0.32	21.91
13	5	0.27	13.14
14	5	0.25	7.36
15	5	0.22	3.44
16	5	0.18	1.75
17	5	0.15	1.05
18–20	15	0.29	1.03
Not recovered residue remaining on the column	—	0.51	2.11

TABLE 316

CC CALIBRATION OF SEPHADEX G-200 FOR MOLECULAR WEIGHT DETERMINATION

(J. M. SUMMERELL AND D. A. L. DAVIES, *Biochim. Biophys. Acta*, 207 (1970) 95)

Column: 1.5 × 70 cm.
Sorbent: Sephadex G-200.
Buffer system: 0.1 *M* Tris, pH 8.0.
Operating conditions: Samples, in a volume not exceeding 2 ml, were applied. Fraction size: 0.5 ml. Conventional flow rate range (10–20 ml/h).
Detection: UV absorbancy, void volume marked by Blue Dextran.
Note: Partition coefficient calculated from the relationship $K_D = (V_e - V_0)/V_i$.

Substance	*Molecular weight*	*Stokes radius* α *(nm)*	*Elution volume* V_e *(ml)*	*Partition coefficient* K_D
Cytochrome *c* (horse heart)	13 400 (15)	1.74 (17)	97.5	0.803
Myoglobin (horse)	16 900 (15)	2.07 (18)	93.5	0.747
Trypsin inhibitor (from Soya bean)	21 500 (17)	2.26 (17)	90.5	0.707
Chymotrypsinogen	25 000 (14)	2.24 (18)	91.0	0.714
Ovalbumin	45 000 (17)	2.80 (17)	78.5	0.569
Serum albumin (bovine)	67 000 (17)	3.61 (17)	72.0	0.452
Transferrin (human)	88 000 (17)	4.00 (16)	70.0	0.424
Serum albumin dimer (bovine)	134 000 (17)	4.35 (18)	62.0	0.314
γ-Globulin (human)	158 000 (15)	5.22 (16)	57.5	0.252

TABLE 317

ELPHO SEPARATION OF NUCLEIC ACIDS SYNTHESISED DURING THE EARLY DEVELOPMENT OF *Xenopus leavis* DAUDIN

(J. S. KNOWLAND, *Biochim. Biophys. Acta*, 204 (1970) 416–429)

Sorbent: Polyacrylamide gel (0.6 × 9 cm). Bis-acrylamide replaced by ethylene-diacrylate (D. H. L. BISHOP, J. R. CLAYBROOK AND S. SPIEGELMAN, *J. Mol. Biol.*, 26 (1967) 373.).
Acrylamide recrystallised before use, fraction crystallising between 0–4° was used for gel preparation (V. E. LOENING, *Biochem. J.*, 102 (1967) 251). Acrylamide solutions were shaken twice with hexane, thoroughly de-gassed and stored under a layer of hexane. Solutions of 0.55% w/v of ethylene-diacrylate were prepared by gently shaking the liquid in de-gassed electrophoresis buffer. 2.7% w/v acrylamide and 0.27% w/v diacrylate gels were used.
Buffer system: 40 m*M* Tris, 20 m*M* sodium acetate, 2 m*M* EDTA (disodium salt), acetic acid to pH 7.6.
Operating conditions: Room temperature, 1 h to complete the run, 5 mA per gel. Tubes loaded with 100 μg of nucleic acid per gel.
Detection: Gels were sliced and evaluated by radioactivity counting.

Compound	*Distance travelled (mm)*
DNA	11
28 S RNA	25
18 S RNA	35
4 S RNA	75

TABLE 318

CC SEPARATION OF BASES IN DNA OF ANIMAL ORIGIN

(L. A. CULP, E. DORE AND G. M. BROWN, *Arch. Biochem. Biophys.*, 136 (1970) 75)

Column:	1 × 12 cm.
Ion exchanger:	Dowex 50 (H^+) form.
Buffer system:	2 *N* HCl.
Operating conditions:	Column operated at room temperature, flow rate 1 ml/min, fractions of 8 ml collected.
Detection:	By reading optical density at 260 nm or by radioactivity counting.
Note:	HeLa DNA, 7.3 mg, 145000 c.p.m. hydrolysed with formic acid and the hydrolysate applied to the column.

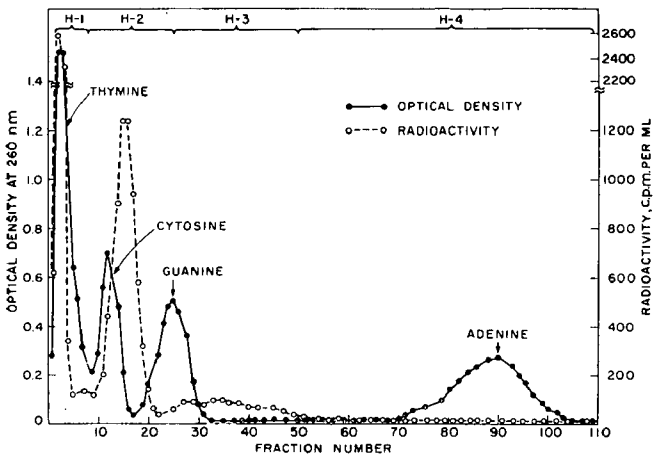


TABLE 319

CC SEPARATION OF URIDINE AND TUBERCIDYLURIDINE

(J. HASHIMITO, T. UCHIDA AND F. EGAMI, *Biochim. Biophys. Acta*, 199 (1970) 535)

Column:	1.5 × 50 cm.
Ion exchanger:	Dowex 1-X2, formate.
Buffers:	Linear gradient 0.1–0.5 *M* formic acid.
Operating conditions:	Conventional flow rates (10–20 ml/h); room temperature.
Detection:	O.D. at 260 nm.
Note:	Peaks are designed as follows: (I) uridine; (II) tubercidyl (2′–5′) uridine; (III) tubercidin monophosphate; (IV) tubercidylyl (3′–5′) uridine + tubercidin monophosphate.

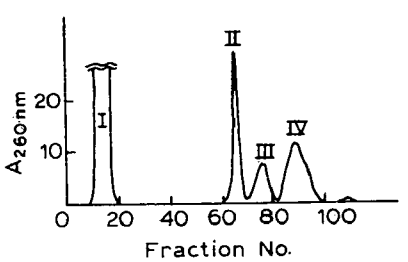


TABLE 320

CC SEPARATION OF TRANSALDOLASE ISOENZYMES IN *Candida utilis*

(O. TSOLAS AND B. L. HORECKER, *Arch. Biochem. Biophys.*, 136 (1970) 297)

Column: 3 × 33.2 cm, 234 ml bed volume.
Ion-exchanger: DEAE-Sephadex A-50.
Buffer system and operating conditions: The dialysed transaldolase, 390 ml, 33700 units, 4290 mg was placed on the column and washed with 35 ml of 0.03 *M* KCl in 0.05 *M* sodium phosphate buffer pH 6.5. A linear gradient, 0.03–0.08 *M* KCl in phosphate buffer, 900 ml for each of the two vessels was then applied. At 1180 ml of gradient volume the concentrations were changed to 0.08 and 0.12 *M* KCl in the same buffer, 900 ml per vessel and collection of fractions (290 drops, 24 ml per tube, 62 tubes in 24 h) was begun; after 1460 ml of the second gradient had passed onto the column, a third gradient, 0.12–0.22 *M* KCl, again in phosphate buffer, was applied with the difference that 650 ml was used for each of the two vessels.
Detection: Every fifth tube was assayed for activity and for protein by absorption at 280 nm (assuming 1.0 absorbance unit to equal 1 mg) and activities were pooled according to peaks representing the three isoenzymes:
Isoenzyme I = fractions 2239–2646 ml;
isoenzyme II = fractions 3487–3822 ml;
isoenzyme III = fractions 3823–4302 ml.

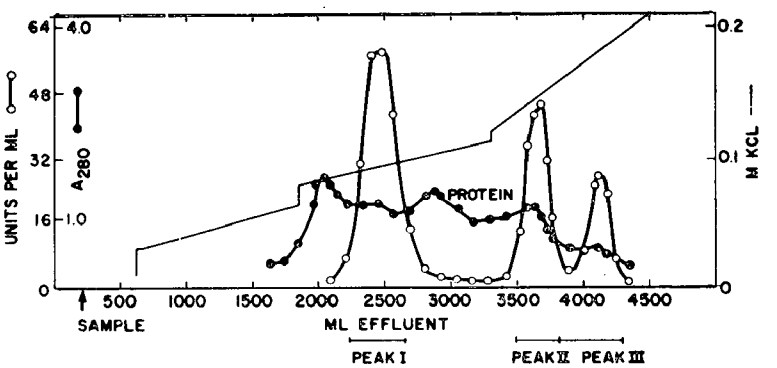
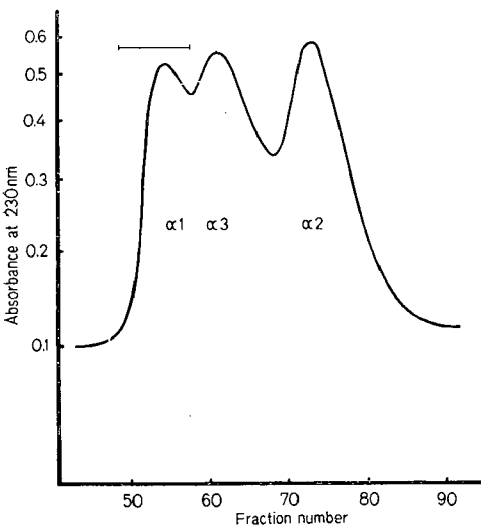


TABLE 321

CC SEPARATION OF α_1, α_2 AND α_3 CHAINS OF COD-SKIN COLLAGEN

(F. LASLO AND B. R. OLSEN, *European J. Biochem.*, 11 (1969) 142)

Column:	2.5 × 15 cm.
Sorbent:	CM cellulose (Sigma).
Buffer system:	Concave gradient from 0 to 0.18 *M* NaCl in acetate buffer, ionic strength 0.08, pH 4.8.
Operating conditions:	Flow rate 300 ml/min, 37°.
Detection:	By monitoring the effluent at 230 nm.



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CHROMATOGRAPHIC DATA

1970

CHROMATOGRAPHIC DATA

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TABLE 322

GPC DISTRIBUTION COEFFICIENTS AND EFFECTIVE CARBON CHAIN LENGTHS OF SOME ORGANIC ACIDS
(TEH-LIANG CHANG, *Anal. Chem.*, 40 (1968) 990)

Columns: A multicolumn unit consisting of four 4 ft. × 0.25 in. columns, two of which were filled with Bio-bead S-X2, the other two with Bio-bead S-X8.
Temperature: 30°.
Flow rate: 40 ml/h.
Pressure: 8 p.s.i./ft.
Solvent and eluant: Tetrahydrofuran.
Detection: Differential refractometer.

The distribution coefficient K is calculated as relative elution volume between the elution volumes of the higher and lower exclusion limits (see M. CANTOW, *Polymer Fractionation*, Academic Press, New York, 1967, p. 138).

Compound	*K*	*Effective chain length*	
		Calculated	*Observed*
Acetic acid	1.0	2.7	
Valeric acid	0.88	5.7	
Nonanoic acid	0.72	9.7	
Myristic acid	0.58	14.7	
Stearic acid	0.49	18.7	
Oleic acid	0.49		18.7
Linoleic acid	0.49		18.7
Abietic acid	0.66		11.4
Levopimaric acid	0.66		11.4
Dehydroabietic acid	0.66		11.4

TABLE 323

GPC REPRESENTATIVE ELUTION VOLUMES OF RESIN AND FATTY ACID METHYL ESTERS
(D. F. ZINKEL AND L. C. ZANK, *Anal. Chem.*, 40 (1968) 1145)

Column: 1 × 200 cm, filled with Styragel, 40 Å porosity, particle size 37–70 μ.
Temperature: 13°.
Solvent and eluant: Diethyl ether.
Flow rate: 16 ml/h.
Detection: Differential refractometer.

Methyl ester		*Elution vol. (ml)*	*Methyl ester*	*Elution vol. (ml)*
Lignocerate	(24:0)	86	Tetrahydroabietate	111
Behenate	(22:0)	87	(8β,9α,13α-H)	
Arachidate	(20:0)	89	Pimarate	112
Stearate	(18:0)	90	Tetrahydroabietate	112
Palmitate	(16:0)	92	(8α,9α,13α-H)	
Oleate	(18:1)	93	Palustrate	113
Myristate	(14:0)	94	Isopimarate	115
Linoleate	(18:2)	94	Abietate	116
Laurate	(12:0)	96	Levopimarate	117
Linolenate	(18:3)	96	Dehydroabietate	119
Caprate	(10:0)	97	Neoabietate	126
Nonanoate	(9:0)	98		

[a] Compilation of data from several experiments. A 3-mg sample of methyl linolenate or methyl pimarate is eluted in a total volume of *ca.* 12 ml.

TABLE 324

CC BEHAVIOUR OF BRAIN METABOLITES
(T. E. DUFFY AND J. J. O'NEILL, *Anal. Biochem.*, 24 (1968) 135)

Column: 1 × 14 cm.
Carrier: Dowex 1 X8 formate. Elution with linear gradient 0–1 *M* formic acid. 6 ml fractions collected at a flow rate of 1 ml/min. Detection by radioactivity. Evaluation in c.p.m./ml of eluting solution.
Notes: X_1, unidentified; ASP, aspartate; other peaks indicated directly in the figure.

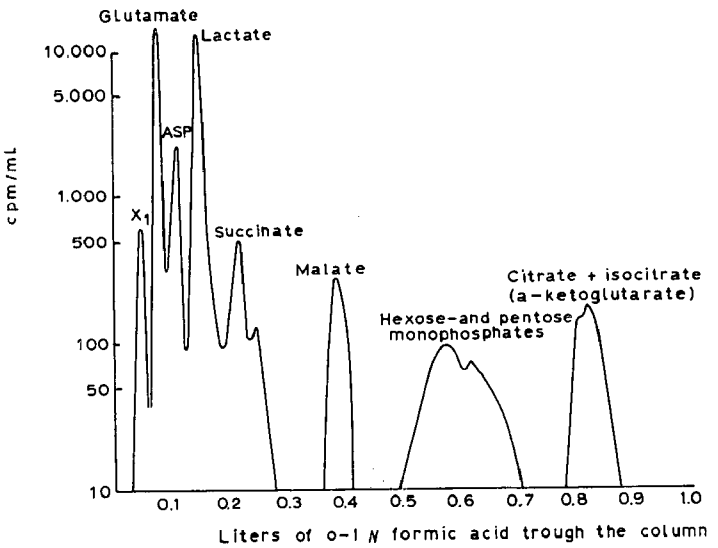


TABLE 325

CC DATA OF $\Delta^{4,5}$-UNSATURATED AND SATURATED DISACCHARIDES

(L. Å. FRANSSON, L. RODÉN AND M. L. SPACH, *Anal. Biochem.*, 23 (1968) 328)

Column: 0.63 × 120 cm, AG 1 X8 (Bio-Rad Laboratories), chloride form.
Elution: nonlinear LiCl gradient: 2.0 *M* LiCl solution was added to a 300-ml mixing vessel filled with water at the beginning of the separation. Flow rate 30 ml/h. Overpressure 200–300 p.s.i. Column operated at 37°. Detection by the orcinol–sulphuric acid procedure.
Samples: 1 = N-acetylchondrosine; 2 = unsaturated, nonsulphated disaccharide; 3 = saturated, sulphated disaccharide; 4 = unsaturated, sulphated disaccharide.

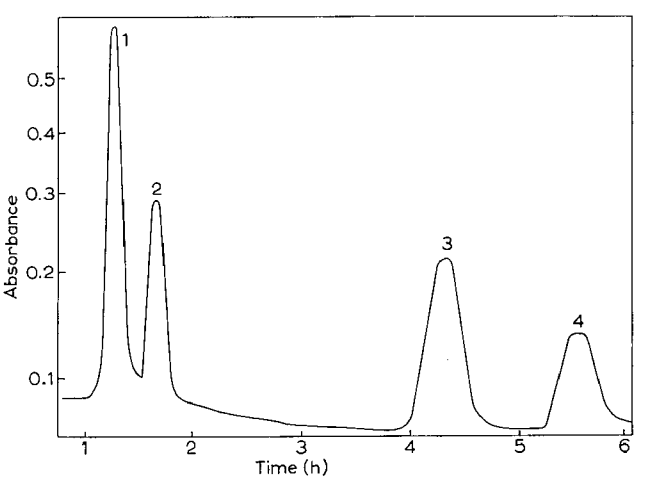


TABLE 326

CC ELUTION TIMES OF AMINO ACIDS AND RELATED COMPOUNDS IN AUTOMATIC AMINO ACID ANALYSIS USING LITHIUM BUFFERS

(J. H. PETERS, B. J. BERRIDGE, JR., J. C. CUMMINGS AND S. C. LIN, *Anal. Biochem.*, 23 (1968) 462)
Apparatus: modified Beckman/Spinco model 120. Column filled with Beckman custom research resin PA-28. The resin was pretreated with 0.3 *N* lithium hydroxide.
Flow rate 50 ml/h, ninhydrin flow 25 ml/h; chart speed 6 in./h, printing speed 1 dot/2 sec; column temperature 37°; buffers pH 2.8 and 3.82. Addition of the second buffer after valine.
For detailed description, see BENSON, GORDON AND PETERSON, *Anal. Biochem.*, 18 (1967) 228.
Mean values of elution times in minutes.

Amino acid or related compound	*Mean ± S.D.*	*Amino acid or related compound*	*Mean ± S.D.*
Taurine	38 ± <1	Glycine	206 ± 2
Urea	54 ± 0	Alanine	223 ± 2
Aspartic acid	86 ± 2	Citrulline	248 ± 1
Threonine	111 ± 1	α-Amino-*n*-butyric acid	258 ± 1
Serine	117 ± 1	Valine	291 ± 3
Asparagine	128 ± 2	½-Cystine	321 ± 4
Glutamic acid	139 ± 2	Methionine	338 ± 4
Glutamine	146 ± 2	Isoleucine	350 ± 4
α-Aminoadipic acid	189 ± 1	Leucine	363 ± 4
Proline	198 ± 2	Tyrosine	424 ± 4
		Phenylalanine	449 ± 4

TABLE 327

GC RETENTION DATA OF SOME POLYCYCLIC HYDROCARBONS
(H. J. DAVIS, *Talanta*, 16 (1969) 621)

Stationary phase: P_1 = SE-30, 3%; L = 2.75 m; I.D. = 3.2 mm.
Carrier gas: Not stated.
Support material: Chromosorb W, 60/80 mesh.
Temperatures: T_1 = 225°; T_2 = 250°; T_3 = 260°.
Detector: Electron capture (tritium).
Sample size: Not stated, hexane solution.
Data given in: Retention sequence $R_{1,2}$ (relative to benzo[*a*]pyrene).

Compound	T_1	T_2	T_3
Fluorene	0.10		
Anthracene	0.10		
Phenanthrene	0.12		
Fluoranthene	0.17		
Pyrene	0.19		
Benzo[*b*]fluorene	0.24		
Benzo[*g,h,i*]fluoranthene	0.35		
Benz[*a*]anthracene	0.40		
Chrysene	0.40		
Benzo[*b*]fluoranthene	0.83		
Benzo[*a*]pyrene		1	
Benzo[*e*]pyrene		1	
Perylene		1	
Dibenz[*a,c*]anthracene		1.9	
Dibenz[*a,h*]anthracene		1.9	
Benzo[*g,h,i*]perylene		2.1	
Dibenzo[*a, l*]pyrene			3.6
Coronene			4.0
Dibenzo[*a, e*]pyrene			4.2

TABLE 328

GC RETENTION DATA OF SOME GIBBERELLINE METHYL ESTERS
(A. A. SHCHEGOLEV AND V. K. KUTCHEROV, *Izv. Akad. Nauk SSSR, Ser. Khim.*, (1969) 1212 and 1213)

Stationary phases: P_1 = SE-30, 10%.
P_2 = SKTFT-50 (fluorosilicone rubber), 9%.
Each L = 150 cm, I.D. = 0.4 cm.
P_3 = SE-30 + NPGS, 10% + 0.5%; L = 200 cm; I.D. = 0.4 cm.
Carrier gas: Nitrogen, 60 ml/min (P_1, inlet pressure 2 kg/cm²).
33 ml/min (P_2, inlet pressure 2 kg/cm²).
30 ml/min (P_3, inlet pressure 2.7 kg/cm²).
Support material: Chromosorb W, silanized, 80/100 mesh.
Temperatures: T_1 = 223° (P_1); T_2 = 228° (P_3); T_3 = 230° (P_2).
Detector: Not stated.
Sample size: Not stated.
Data given in: Retention times t (min).

Methyl esters of gibbereline	P_1	P_2	P_3
A_4	15.0	15.0	29.7
A_7	15.0	16.2	35.7
A_{13}	22.5	14.2	32.3[a]
A_1	28.0	28.5	28.0
A_3	28.0	32.7	36.0

[a] Other isomer A_{13}, 27.0.

TABLE 329

GC RETENTION DATA OF POLYHYDRIC ALCOHOLS
(G. G. ESPITO AND M. H. SWANN, *Anal. Chem.*, 41 (1969) 1119)

Support material: Chromosorb W, 60/80 mesh.
Stationary phase: Silicone grease DC-11, 20%, L = 16 ft., I.D. = 0.25 in.
Carrier gas: Not stated.
Temperature: programmed 100–300°, 6°/min.
Detector: Flame ionisation.
Sample size: 40 μl.
Data given in: Retention sequence R (relative to 1,4-butanediol TMS-ether).

Trimethyl ether of polyol	R
Ethylene glycol	0.58
Propylene glycol	0.63
2,3-Butanediol	0.73
1,3-Butanediol	0.83
Neopentyl glycol	0.86
1,4-Butanediol	1.00
Diethylene glycol	1.19
Glycerine	1.29
Trimethylol ethane	1.46
Trimethylol propane	1.63
Triethylene glycol	1.83
Pentaerythritol	1.88

TABLE 330

GC RETENTION DATA OF SEVERAL MODEL HYDROCARBONS ON LIQUID CRYSTALS
(L. C. CHOW AND D. E. MARTIRE, *J. Phys. Chem.*, 73 (1969) 1130)

Stationary phases: P_1 = *p*-Azoxyanisole, 9.51%, wt. = 0.8866 g (S_1).
P_2 = *p*-Azoxyanisole, 16.74%, wt. = 1.6946 g (S_2).
P_3 = *p*-Azoxyanisole, 7.63%, wt. = 0.7467 g (S_2).
P_4 = 4,4-Dihexyloxyazoxybenzene, 10.00%, wt. = 0.6750 g (S_1).
P_5 = 4,4′-Dihexyloxyazoxybenzene, 7.63%, wt. = 0.7636 g (S_1).
Carrier gas: Helium, 35–50 ml/min.
Support materials: S_1 = Chromosorb W, AW-DMCS, 60/80 mesh.
S_2 = Chromosorb P, AW-DMCS, 60/80 mesh.
Temperatures: T_1 = 91.3°; T_2 = 102.3°; T_3 = 123.8°; T_4 = 140.8°.
Detector: Flame ionization.
Sample size: ~ 1 µl of solution.
Data given in: Specific retention volumes $V_g°$.

	P_4	P_5
Nematic phase (T_1)		
n-Heptane	20.86	20.80
n-Octane	43.67	43.69
n-Nonane	90.73	90.86
2-Methyloctane	65.17	65.18
2,2-Dimethylheptane	42.69	42.64
Nematic phase (T_2)		
n-Decane	133.4	133.5
Tetrachloroethylene	62.03	62.20
p-Xylene	112.2	112.1
Cumene	125.8	125.4

	P_1 (S_1)	P_2 (S_2)	P_3 (S_2)
Nematic phase (T_3)			
n-Undecane	49.41	50.14	51.28
n-1-Undecene	59.80	60.45	61.13
o-Xylene	57.83	57.88	57.71
n-Butylbenzene	119.4	119.3	119.3
Isotropic phase (T_4)			
n-Undecane	44.54	44.95	45.57
n-1-Undecene	53.57	53.84	54.33
o-Xylene	53.67	53.82	53.75
n-Butylbenzene	103.9	103.8	104.1

TABLE 331

GC RETENTION DATA OF SOME PRIMARY AMINES
(R. V. KUDRYAVTSEV AND V. M. SHIROCHENKOVA, *Zh. Anal. Khim.*, 24 (1969) 1432)

Stationary phase: P_1 = Polyethyleneimine 2500; L = 65 m; I.D. = 0.25 mm.
Carrier gas: Nitrogen, inlet pressure 0.4–0.5 kg/cm².
Support material: Glass capillaries.
Temperature: T_1 = 100°.
Detector: Flame ionization.
Sample size: ~ µl.
Data given in: Retention sequence $R_{1,2}$ (relative to *n*-butylamine) and Kováts' indices KI.

Compound	$R_{1,2}$	*KI*
Ethylamine	0.389	682
n-Propylamine	0.554	759
n-Butylamine	1.000	865
n-Amylamine	1.847	975
n-Hexylamine	3.219	1085
n-Heptylamine	7.000	—
n-Decylamine	22.803	—
n-Dodecylamine	75.300	—
Isooctylamine	7.929	—
Isobutylamine	0.790	796
Isopropylamine	—	654
Isopentylamine	—	929
$CF_3CFHCH_2NH_2$	0.205	
$CF_3CF_2CH_2NH_2$	0.274	
Diethylamine	0.294	
Di-*n*-propylamine	1.000	
Diisopropylamine	0.664	
Diisobutylamine	1.301	
Diisoamylamine	5.890	
Triethylamine	−0.308	
Cyclohexylamine	3.668	

TABLE 332

GC RETENTION DATA OF FERROCENE AND SOME DERIVATIVES
(C. POMMIER AND G. GUIOCHON, *Chromatographia*, 2 (1969) 347)

Support material: Not stated.
Stationary phase: SE-30.
Carrier gas: Not stated.
Temperature: 125°.
Detector: Not stated.
Sample size: Not stated.
Data given in: Retention times t_R (min).

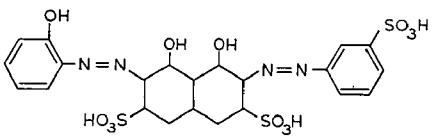
Substances	t_R
Ferrocene	3.7
n-Butylferrocene	16.0
Ethylferrocene	6.7
Vinylferrocene	6.8
1,1′-Di-*n*-butylferrocene	73.0
Acetylferrocene	18.5
1,1′-Diacetylferrocene	77.0
Hydroxymethylferrocene	15.0
1,1′-Dihydroxymethylferrocene	76.0

TABLE 333

ELPHO MOBILITIES OF SOME CATIONS IN CITRATE BUFFERS

(E. K. KORCHEMNAYA, V. I. NAUMOVA AND A. N. ERMAKOV, *Zh. Anal. Khim.*, 24 (1969) 343)

Sorbent: Whatman No. 3 paper.
Buffer: 0.05 *M* citric acid, pH adapted to the value desired by adding conc. ammonia.
Operating conditions: Voltage, 8.5 V/cm; time to complete, 30 min.
Detection: Identification of zones by spraying with "Phenol M" dye:



pH	*Distance migrated (cm)*					
	Mg	*Ca*	*Sr*	*Ba*	*Cd*	*Zn*
5.5	0.8	0.4	0.5	0.4	1.4	0.8
8.0	2.0	2.9	1.0	2.1	2.5	4.0

TABLE 334

ELPHO MOBILITIES OF TWELVE NUCLEOTIDES ON POLYETHYLENE-COATED AND UNCOATED WHATMAN DE-81 PAPER

G. SERLUPI-CRESCENZI, C. PAOLINI AND T. LEGGIO, *Anal. Biochem.*, 23 (1968) 267)

Separation carried out on uncoated and polyethylene-coated Whatman DE-81 paper. Voltage 25 V/cm, time to complete, 180 min. Buffer system: 0.1 *M* acetic acid–sodium citrate of the pH desired. Distances travelled in cm.

Nucleotide	*Whatman DE 81*				*Whatman DE 81, polyethylene-coated*			
	pH 3.0	*pH 3.5*	*pH 4.0*	*pH 4.5*	*pH 3.0*	*pH 3.5*	*pH 4.0*	*pH 4.5*
CMP	18.9	21.8	30.0	42.1	17.9	18.5	25.5	36.2
UMP	19.0	22.0	30.2	42.7	18.3	19.4	26.4	37.1
AMP	11.6	21.6	25.0	28.8	12.3	16.7	19.1	26.4
GMP	9.8	20.2	20.0	24.7	11.0	15.5	14.9	22.0
CDP	6.5	18.3	20.8	30.0	7.3	14.1	19.3	31.7
UDP	5.4	18.8	23.4	34.1	7.0	14.0	20.4	31.4
ADP	2.6	11.6	16.0	22.8	3.9	9.6	13.5	22.0
GDP	2.5	9.7	12.1	18.2	3.4	7.9	10.0	17.0
CTP	1.8	8.1	13.7	22.6	2.7	6.2	13.9	27.0
UTP	1.5	7.5	11.0	24.3	2.4	6.2	13.7	24.9
ATP	0.8	4.0	5.8	16.5	1.6	3.4	9.3	17.4
GTP	0.5	3.5	6.6	13.5	1.1	2.5	6.4	12.7

TABLE 335

ELPHO BEHAVIOUR OF CATIONS IN CITRATE BUFFERS
(E. K. KORCHEMNAYA, V. I. NAUMOVA AND A. N. ERMAKOV, *Zh. Anal. Khim.*, 24 (1969) 344)

Sorbent: Whatman No. 3 paper.
Buffer: 0.05 *M* citric acid, pH adapted to the desired value by adding conc. ammonia.
Operating conditions: (a) pH 8.0; voltage, 8 V/cm; time to complete, 30 min.
(b) pH 8.0; voltage, 24 V/cm; time to complete, 24 min.
(c) pH 5.5–6.0; voltage, 8.5 V/cm; time to complete, 60 min.
(d) pH 5.5–6.0; voltage, 24 V/cm; time to complete, 25 min.
(e) pH 5.5–6.0; voltage, 19 V/cm; time to complete, 60 min.
(f) pH 5.5–6.0; voltage, 24 V/cm; time to complete, 104 min.
(g) pH 5.5–6.0; voltage, 24 V/cm; time to complete, 180 min.
(In this last case Whatman No. 31 paper was used.)
Detection: By conventional methods (see I. M. HAIS AND K. MACEK (Editors), *Paper Chromatography. A Comprehensive Treatise.* Academic Press New York and Publ. House of the Czechoslovak. Acad. Cci., Praque 1963).

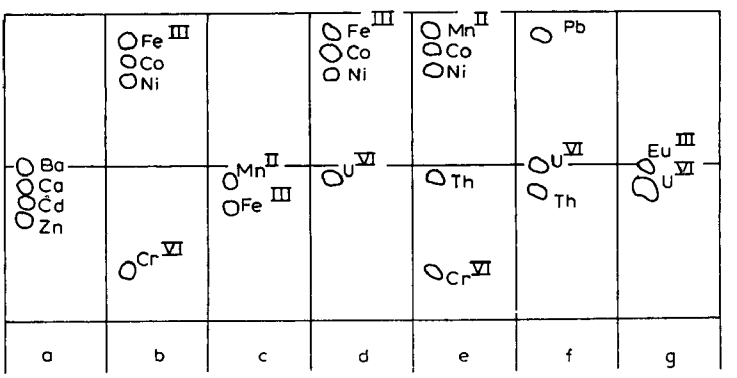


TABLE 336

ELPHO MOBILITIES OF CERTAIN PYRIDINECARBOXYLIC ACIDS ON PAPER
(A. P. MUSAKIN, V. G. PALMSKY AND E. N. IVANOVA, *Zh. Anal. Khim.*, 24 (1969) 1413)

Sorbent: Schleicher & Schuell 2043b paper.
Buffer: 30% acetic acid.
Operating conditions: Voltage, 15 V/cm; time to complete, 3–6 h.
Detection: By UV absorption.

Compound	*Distance travelled (cm)*	*Electrophoretic mobility ($cm^2/V \cdot sec \cdot 10^5$)*
Nicotinic acid	10.4–11.6	3.3
Isonicotinic acid	7.9– 9.5	2.6
Dipicolic acid	2.5– 3.5	0.9

TABLE 337

CC SEPARATION OF NUCLEOTIDES ON POLYACRYLAMIDE GEL

(M. JOHN, H. SKRABEI AND H. DELLWEG, *FEBS Letters*, 5 (1969) 186)

Columns:	Two-bed column, consisting of one column of 1.5 × 150 cm and one column of 1.5 × 127 cm.
Sorbent:	Bio-Gel P2, −400 mesh.
Buffer:	0.25 *M* citrate, pH 4.4.
Operating conditions:	Flow rate, 25 ml·h^{-1}. Columns were operated at 65°.
Detection:	Effluent monitored at 254 nm.
Note:	Abbreviations: Cyt = cytidine; Ura = uracil; Ade = adenine.

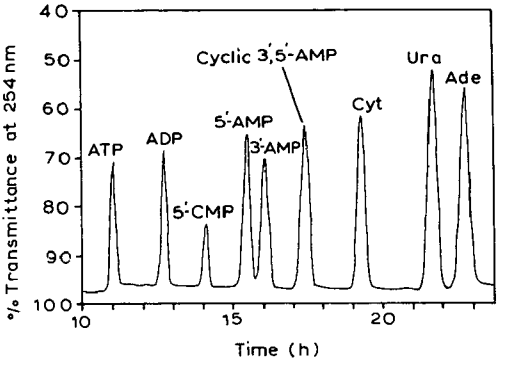


TABLE 338

CC PRECONCENTRATION OF CARBONYL COMPOUNDS FROM THEIR MEDIUM FOLLOWED BY POLAROGRAPHIC DETERMINATION OF THEIR AZOMETHINE DERIVATIVES

(M. D. BOOTH AND B. FLEET, *Analyst*, 94 (1969) 846)

Columns and sorbents: Two columns were used, *viz.* (1) a short Celite column (B.D.H.), 30–80 mesh, impregnated with the reagent for the formation of the derivative. (2) The main chromatographic column for the separation, for which silica gel (B.D.M.), 60–120 mesh, was used without pretreatment.

Buffers: As indicated in the table.

Operating conditions: Reaction column: 50 g of Celite were impregnated with a solution of 0.45 g of semicarbazide hydrochloride in 2 ml of 85% orthophosphoric acid (s.g. 1.75) diluted with 8 ml of water. This was transferred to a column (2 cm in diameter) and washed with 50 ml of absolute ethanol. This gave a reaction layer of about 10 cm in length. This column is capable of retaining carbonyl compounds from samples of up to 100 ml total volume in ethanol containing 10% of water.

Separation column: The second column (1 cm in diameter) contained sufficient silica gel to get a layer of 10 cm. The reaction column was fitted onto the top of the separation column.

Detection: Polarographic recording on Radelter's polarograph type OH 1021 (Metrimpex, Hungary). Capillary characteristics: off-flow velocity, $m = 2.04$ mg·sec^{-1}; drop time, $t = 4.1$ sec; mercury pressure, $h = 60$ cm.

Carbonyl compound	*Carbonyl added (μmoles)*	*Carbonyl recovered (μmoles)*	*Recovery (%)*	*Eluting solvent*[a]	*Separation*	*Retention volume*
Acetone	0.25	0.20	80 ± 2	ethanol	complete	5
4-Chlorobenzaldehyde	0.5	0.49	98 ± 2	ethanol–ethyl acetate	complete	5
Acetone	0.25	0.20	80 ± 2	ethanol or ethanol–ethyl acetate–dimethylformamide	none	both compounds approximately 18
Acetaldehyde	0.25	0.20	80 ± 2	ethanol or ethanol–ethyl acetate–dimethylformamide	none	both compounds approximately 18
Benzaldehyde	0.50	—	—	ethyl acetate	partial	10
4-Chlorobenzaldehyde	0.50	—	—	ethanol	partial	8
4-Methoxybenzaldehyde	0.50	—	—	ethanol	partial	6

[a] Mixed solvents were prepared by mixing equal volumes of constituents. In ethanol–ethyl acetate–dimethylformamide the polarograph waves were poorly defined.

TABLE 339

CC ELUTION SCHEME FOR THE ANALYSIS OF ASPHALT CONSTITUENTS

(L. W. CORBETT, *Anal. Chem.*, 41 (1969) 577)

Column: 3 × 100 cm.
Sorbent: F 20 alumina, dried at 750°F for 16 h and pre-wet with *n*-heptane.
Buffers: (a) *n*-Heptane; (b) benzene; (c) methanol–benzene; and (d) trichloroethylene. See also the table.
Operating conditions: Flow rate, not decisive.
Detection: Combined eluates were evaporated to dryness on a steam bath under nitrogen and the weight per cent was calculated.

Eluant feed	*Eluate volume (ml)*	*Nature of fraction recovered*
n-Heptane	200	Saturates
Benzene	100	Saturates
Benzene	300	Naphthalene aromatics
Methanol–benzene	300	Naphthalene aromatics
Trichloroethylene	300	Polar aromatics
Trichloroethylene	300	Polar aromatics
Trichloroethylene	Hold up	Polar aromatics

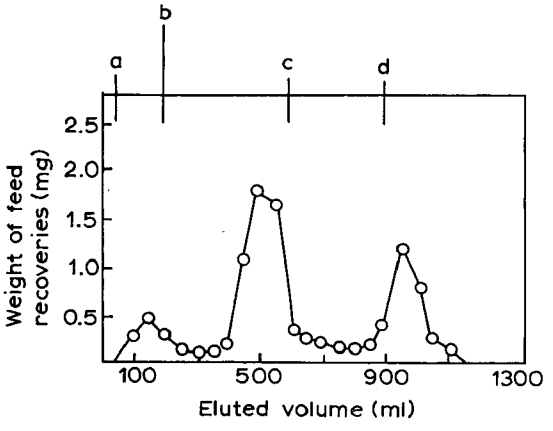


TABLE 340

GC RETENTION DATA OF C_6 ALIPHATIC OLEFINS
(R. W. DUNNING AND J. A. LEONARD, *Chromatographia*, 2 (1969) 295)

Support material: Stainless steel.
Stationary phase: Squalane in capillary column, L = 100 m, I.D. = 0.01 in.
Carrier gas: Hydrogen, 3.0 ml/min.
Temperature: 0°.
Detector: Flame ionisation.
Sample size: 1.0 μl (split ratio 1000:1).
Data given in: Retention sequence R (relative to pentane).

Olefin	*R*
4-Methyl-1-pentene	1.89
4-Methyl-*cis*-2-pentene	2.12
2,3-Dimethyl-1-butene	2.16
4-Methyl-*trans*-2-pentene	2.34
2-Methyl-1-pentene	2.94
1-Hexene	3.01
cis-3-Hexene	3.48
trans-3-Hexene	3.54
trans-2-Hexene	3.73
2-Methyl-2-pentene	3.81
cis-2-Hexene	4.05
2,3-Dimethyl-2-butene	5.28

TABLE 341

CC ANION-EXCHANGE DATA OF MONO-NITROPHENOLS ON De-ACIDITE FF RESIN IN METHANOLIC MEDIA
(D. E. THOMAS AND J. D. R. THOMAS, *Analyst*, 94 (1969) 1102)

Column: 1 × 24 cm.
Ion exchanger: De-acidite FF resin; for further specification see below.
Buffer: Eluent added to 4% triethylamine in methanol; for gradient elution methanol containing 4% of 1 *M* triethylamine acetate in methanol together with 80 ml of 1 *M* triethylamine in methanol and 10 ml of acetic acid (9 ml of glacial acetic acid for those resins marked with an asterisk) per litre was used.
Operating conditions: Load applied to the column, 6.0 ml of a solution containing 1 mg each of *o*-, *m*- and *p*-nitrophenol in 4% triethylamine in methanol. Mixing flask, 250-ml capacity; reservoir, 1000-ml capacity. Size of fractions collected, 10 ml.
Detection: Elution was monitored by UV absorption at 270 nm.

Resin cross-linkage (%)	*Mesh size*	*Fraction No.*		
		m-Nitro-phenol	*o-Nitro-phenol*	*p-Nitro-phenol*
2–3	>200	22–27	49–52	52–55
3–5	>200	22–25	48–49	52–54
7–9	>200	22–25	46–52	52–55
2–3	100–200	22–25	43–46	46–50
3–5*	100–200	23–26	46–49	49–53
7–9*	100–200	22–28	48–51	51–54
2–3*	52–100	20–23	46–50	50–53
3–5*	52–100	22–25	47–51	51–54
7–9*	52–100	23–26	47–51	51–55

TABLE 342

CC ANION-EXCHANGE DATA OF 2,5-, 3,4- AND 3,5-XYLENOLS ON De-ACIDITE FF RESIN IN METHANOLIC MEDIA

(D. E. THOMAS AND J. D. R. THOMAS, *Analyst*, 94 (1969) 1103)

Column: 1 × 24 cm.

Ion exchanger: De-acidite FF; for further specification see below.

Buffer: Eluent added to 20% diethylamine in methanol; for gradient elution methanol containing 4% of 1 *M* diethylamine acetate in methanol together with 51.4 ml of diethylamine per litre was used.

Operating conditions: Load applied to the column, 6.0 ml of a solution containing 1 mg each of 2,5-, 3,4-and 3,5-xylenols in 20% diethylamine in methanol. Mixing flask, 250-ml capacity; reservoir, 1000-ml capacity. Size of fractions collected, 10 ml

Detection: Elution was monitored by UV adsorption at 290 nm.

Resin cross-linkage (%)	*Mesh size*	*Fraction No.*		
		2,5-Xylenol	*3,4-Xylenol*	*3,5-Xylenol*
2–3	>200	24–28	28–31	33–35
3–5	>200	26–29	29–31	31–32
7–9	>200	25–28	28–31	31–33
2–3	100–200	26–28	28–32	34–35
3–5	100–200	27–29	29–31	31–33
7–9	100–200	24–29[a]	28–31[a]	31–33
2–3	52–100	23–26	26–29	29–32
3–5	52–100	23–26	26–29	29–31
7–9	52–100	23–26	26–29	29–32

[a] There is poor definition of resolution here and it has been assumed that the absorbance (at 290 nm) peak (from its position) is caused by 2,5-xylenol and that the shoulder is caused by 3,4-xylenol. This situation is best represented by an overlap in fraction numbers.

TABLE 343

CC ANION-EXCHANGE DATA OF CRESOLS ON De-ACIDITE FF RESIN IN METHANOLIC MEDIA
(D. E. THOMAS AND J. D. R. THOMAS, *Analyst*, 94 (1969) 1103)

Column: 1 × 24 cm.
Ion exchanger: De-acidite FF; for further specification see below.
Buffer: Eluent added to 20% diethylamine in methanol; for gradient elution methanol containing 4% 1 *M* diethylamine acetate in methanol together with 30% (20% for those resins marked with an asterisk) of 1 *M* diethylamine in methanol was used.
Operating conditions: Load applied to the column, 6.0 ml of a solution containing 1 mg each of *o*-, *m*- and *p*-cresol in 20% diethylamine in methanol. Mixing flask, 250-ml capacity; reservoir, 1000-ml capacity. Size of fractions collected, 10 ml.
Detection: Elution was monitored by UV absorption at 280 nm.

Resin cross-linkage (%)	*Mesh size*	*Fraction No.*		
		o-Cresol	*p-Cresol*	*m-Cresol*
2–3	>200	20–22	22–24	26–28
3–5*	>200	28–31	31–32	35–37
7–9*	>200	26–29	29–31	33–37
2–3	100–200	22–25	25–27	29–31
3–5*	100–200	24–26	26–28	30–33
7–9	100–200	24–26	26–28	30–32
2–3	52–100	25–29		32–34
3–5	52–100	25–29		31–33
7–9	52–100	22–27		29–32

TABLE 344

CC OF γ-METHYLENEGLUTAMINE AND γ-METHYLENEGLUTAMIC ACID
(E. J. CONCKERTON AND N. J. NEUCERE, *Anal. Biochem.*, 32 (1969) 513)

Column: Standard equipment for amino acid analysis, Technicon.
Ion exchanger: Amberlite IR-120.
Buffer: Sodium citrate, pH 3.28.
Note: Amino acid concentration: Mg (γ-methyleneglutamine), 0.175 μmole; MGA (γ-methyleneglutamic acid) and others, 0.25 μmole.

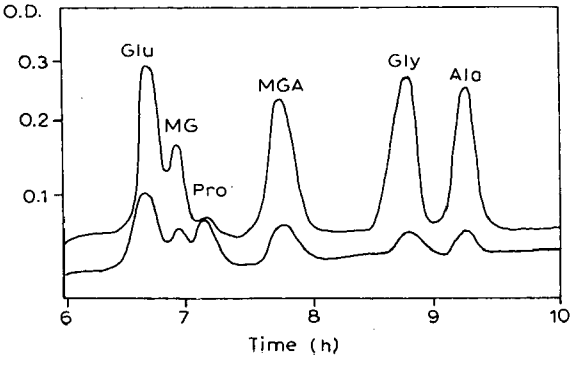


TABLE 345

CC SEPARATION OF BENZOIC, HIPPURIC AND URIC ACIDS
(S. N. SINHA AND E. R. GABRIELI, *Clin. Chim. Acta*, 19 (1968) 313)

Column:	45 × 1 cm.
Sorbent:	Sephadex G-10.
Buffer:	Before packing the Sephadex powder was washed several times with deionized water; the fine particles were decanted and then the slurry was equilibrated with 0.1 *M* phosphate buffer pH 7.0. The same buffer was used for elution.
Operating conditions:	Aliquots of 1 ml were collected. The flow rate is not further specified in the paper.
Detection:	By reading the optical density at 232 nm after diluting the 1-ml fraction five times. Optimum loading, 0.2 mg of substance separated.
Note:	Peaks are numbered as follows: I = amino acids (glycine, 1-cystine, 1-asparagine), II = creatinine, III = hippuric acid, IV = benzoic acid, and V = uric acid. Fig. A shows the separation of a standard mixture containing 0.2 mg of separated substances each, while Fig. B shows the results of a separation of 1 ml normal urine (diluted 1:5 before analysis).

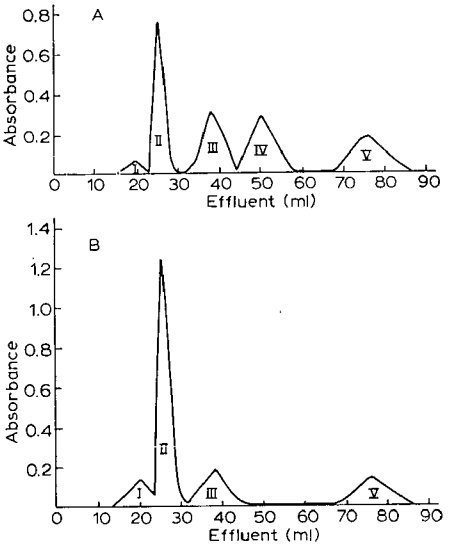


TABLE 346

GC RETENTION DATA OF AMINO ACIDS
(J. ALBEROLA AND E. PRIMO, *J. Chromatog. Sci.*, 7 (1969) 60)

Stationary phase: P_1 = NPS, 0.5%; L = 2 m, I.D. = 2.7 mm.
Carrier gas: Nitrogen, 25 ml/min.
Support material: Chromosorb G, AW-DMCS, 80/100 mesh.
Temperature: T_1 = programmed 60–210°, 2.5°/min.
Detector: Flame ionization.
Data given in: Retention sequence $R_{1,2}$ (relative to dibenzyl).

Methyl-N-trifluoroacetyl ester of	$P_1(T_1)$
Alanine	0.51
Valine	0.53
2-Amino-*n*-butyric acid	0.56
Glycine	0.69
Leucine	0.74
Proline	0.85
Aspartic acid	1.04
Threonine	1.14
Serine	1.22
Methionine	1.24
Glutamic acid	1.26
Phenylalanine	1.28
Hydroxyproline	1.58
Lysine	1.84
Tyrosine	2.20

TABLE 347

ELPHO BEHAVIOUR OF EYE LENS PROTEINS IN TUNA
(A. C. SMITH, *Comp. Biochem. Physiol.*, 33 (1970) 4)

Sorbent: Sepraphore III, cellulose acetate membrane 1 × 6 3/4 in. (Gelman Co).
Buffers: Beckman B-1 buffer pH 8.6; ionic strength 0.50.
Operating conditions: Time to complete 20 min; 350 V/4 ½ in.
Detection: Photovolt Densicord Densitometer. 5% trichloroacetic acid containing Ponceau 3 R dye (4 g %) for fixing and staining the protein bands; 5% glacial acetic acid for the first rinse, absolute methanol for the second and third rinses; final solution of 80 parts methanol and 20 parts glacial acetic acid for softening and clearing the membranes. Membranes were immersed in the last solution for 28 sec before being applied to glass microscope slides to fuse, become transparent and dry.

TABLE 348

ELPHO RELATIVE MOBILITIES OF DIFFERENT PROTEINOUS SUBSTANCES IN RELATION TO THEIR MOLECULAR WEIGHT

(A. K. DUNKER AND R. R. RUECKERT, *J. Biol. Chem.*, 244 (1969) 5076–5077)

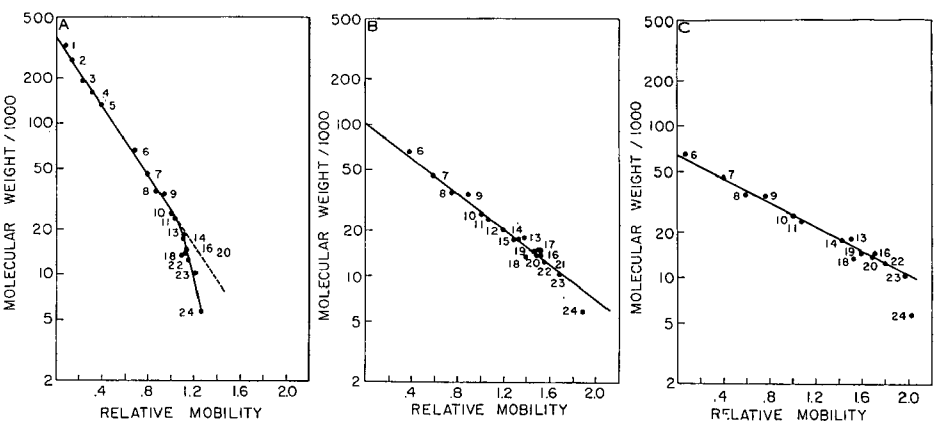
Sorbent: Polyacrylamide gel in the discontinuous arrangement. Gels of 5, 10 and 15% concentration were prepared by mixing the appropriate acrylamide solutions with 0.05 vol. of 1% ammonium persulphate. Columns (6–7 cm) were cast in soft glass tubing (I.D. 0.6 cm) and the monomer was carefully overlaid with about 0.3 ml of water. For all the three concentrations the acrylamide to methylene-bisacrylamide ratio was 29:1 (w/w). Besides acrylamide the solutions contained 0.1% sodium dodecyl sulphate (SDS), 0.1 *M* sodium phosphate pH 7.2, and 0.10% (v/v) N,N,N′, N′-tetramethylenediamine.

Buffer system: 0.1 *M* sodium phosphate pH 7.2.

Operating conditions: The samples, in dense solutions (4 *M* urea), were laid under the electrode buffer. Typically 5 to 30 μl containing 5 to 15 μg of each protein were applied to the gel. Gels were run at 7 to 9 mA per tube (roughly 3 V per cm) for 2–3 h (5% polyacrylamide gels), 4–5 h (10% gels), or 6–10 h (15% gels).

Detection: After electrophoresis, the SDS was leached out and the protein was precipitated by soaking the gels for 18–24 h in 20% sulphosalicylic acid. Next the gels were immersed for 4–6 h into 0.02% Coomassie Brilliant Blue, and freshly diluted in 12.5% trichloroacetic acid. After decanting the dye, 10% trichloroacetic acid was added, and the gels were allowed to stand in faintly blue solutions which further intensified the staining.

Notes: Fig. A relates to 5%, B to 10% and C to 15% gel. Identification of proteins in figures: numbers coincide with those in the attached table. ND = not determined.



No. Protein	*Molecular weight*	*Data from 5% gels*		*Data from 10% gels*		*Data from 15% gels*	
		Apparent molecular weight	*Deviation (%)*	*Apparent molecular weight*	*Deviation (%)*	*Apparent molecular weight*	*Deviation (%)*
1 Bovine serum albumin (pentamer)	330,000	305,000	7.6				
2 Bovine serum albumin (tetramer)	264,000	260,000	1.5				
3 Bovine serum albumin (trimer)	198,000	210,000	6.0				
4 γ-Globulin	160,000	164,000	2.5				

(continued on p. D18)

TABLE 348 *(continued)*

5 Bovine serum albumin (dimer)	132,000	134,000	1.5				
6 Bovine serum albumin	66,000	62,000	6.5	62,000	6.5	61,000	8.2
7 Ovalbumin	46,000	46,500	1.1	46,400	1.0	46,800	1.7
8 Pepsin	35,500	37,500	5.6	37,000	4.2	38,000	7.0
9 Carboxypeptidase A	34,400	31,000	9.9	31,300	9.0	32,000	7.4
0 Chymotrypsinogen A	25,741	26,300	2.0	26,300	2.1	26,200	1.9
1 Trypsin	23,800	24,500	2.9	24,100	1.3	24,200	1.7
12 Bromegrass mosaic virus	20,300	ND		20,800	2.4	ND	
13 β-Lactoglobulin	18,000	17,000	5.5	16,000	11.0	16,200	10.0
14 Myoglobin	17,600	17,500	0.5	17,500	0.5	17,500	0.5
15 Tobacco mosaic virus	17,400	ND		18,600	6.0	ND	
16 Lysozyme	14,400	13,800	4.2	13,900	3.5	13,600	5.5
17 β-Hydroxyethyl lysozyme	15,000	ND		13,700	8.7	ND	
18 Ribonuclease A	13,680	18,500	36.0	16,500	21.0	15,800	15.0
19 Acetylcystaminyl ribonuclease A	14,620	ND		15,500	6.0	15,000	2.6
20 Chymotrypsin B chain	13,927	14,100	1.4	14,000	0.7	14,100	1.44
21 R17 virus	13,729	ND		13,500	1.6	ND	
22 Cytochrome *c*	12,400	12,000	3.6	13,600	9.7	13,300	7.3
23 Chymotrypsin C chain	10,157	9,500	6.0	10,500	3.9	10,600	4.8
24 Insulin	5,700	6,000	5.3				

TABLE 349

ELPHO CHARACTERIZATION OF AMPHIBIAN TYROSINE OXIDASE FROM DIFFERENT ORGANS

(L. O. MILLER, R. NEWCOMBE AND E. L. TRIPLETT, *Comp. Biochem. Physiol.*, 32 (1970) 564)

Sorbent: 5% polyacrylamide gel; tube dimensions 0.5 × 7.6 cm.
Buffers: 0.012 *M* Tris–0.15 *M* glycine, pH 8.3.
Operating conditions: 4 mA per tube, time to complete, 90 min; 150 μg of protein applied.
Detection: By incubation at 37° in 4 m*M* DOPA or 3.6 m*M* tyrosine in 0.02 *M* Tris pH 7.2.

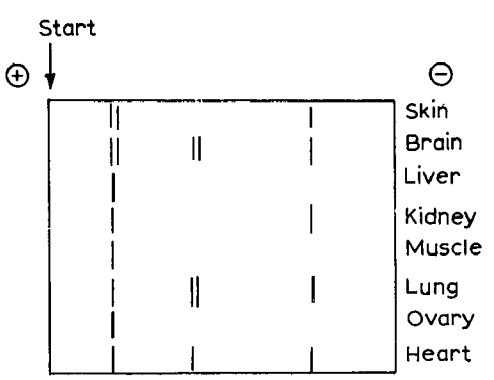


TABLE 350

ELPHO GLUCOSE-6-PHOSPHATE DEHYDROGENASE ZYMOGRAMS OF TWENTY-EIGHT VERTEBRATE SPECIES

(T. G. NÓBREGA, J. C. C. MAIA, W. COLLI AND P. H. SALDANHA, *Comp. Biochem. Physiol.*, 33 (1970) 195)

Sorbent:	Starch gel according to SMITHIES (*Advan. Protein Chem.*, 14 (1959) 65).
Buffer system:	The solution for the bridge buffer contained 0.21 *M* Tris, 0.15 *M* boric acid and $4.7 \cdot 10^{-3}$ *M* EDTA adjusted to pH 8.0 with HCl. The cathode tray contained $3.4 \cdot 10^{-5}$ *M* NADP.
Operating conditions:	4°, 14 h, 4 V/cm.
Detection:	After electrophoresis the gels were sliced by means of fine stainless-steel wire. The lower layer was incubated for about 2 h at room temperature in a staining solution containing $5 \cdot 10^{-3}$ *M* $MgCl_2$, 48 mg of G-6-P, 15 mg of NADP, 15 mg of Nitro Blue Tetrazolium and 12 mg of phenazinemethosulphate in Tris–HCl 0.2 *M*, pH 8.5.

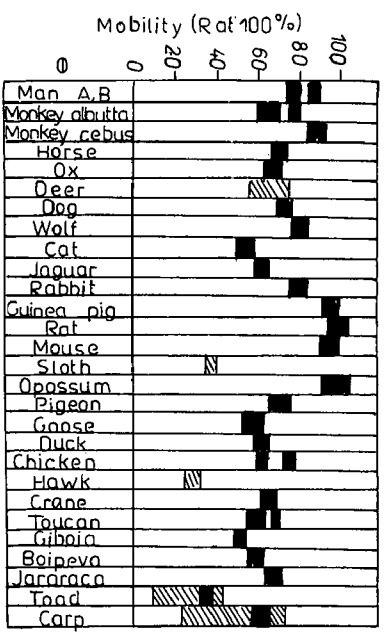


TABLE 351

ELPHO SEPARATION OF CHOLINESTERASE ISOENZYMES OF HUMAN PLASMA

(P. JUUL, *Clin. Chim. Acta*, 19 (1968) 210)

Sorbent: Polyacrylamide gel, discontinuous arrangement.
Sample gel: 3.5 g acrylamide, 0.25 g N,N'-methylenebisacrylamide, 0.063 ml N,N,N',N'-tetramethylenediamine, 20 g sucrose, 0.63 mg riboflavin, 6.3 ml 1 *N* HCl, 0.69 g tris(hydroxymethyl)aminomethane, pH 5.8 (22°).
Spacer gel: identical composition except for 30 g sucrose.
Separation gel: 9 g acrylamide, 0.16 g N,N'-methylenebisacrylamide, 0.03 ml N,N,N',N'-tetramethylenediamine, 10 g sucrose, 0.075 g ammonium persulphate, 6.3 ml 1 *N* HCl, 3.75 g tris(hydroxymethyl)aminomethane, pH 8.7 (22°).
Tube dimensions: 0.5 × 6.8 cm.

Buffer system: 0.5 g tris(hydroxymethyl)aminomethane, 4 g glycine, pH 8.4 (22°).
The buffer was used undiluted in the cathodic compartment, diluted 1:10 in the anodic compartment.

Operating conditions: Electrophoresis was performed at 3 mA per column for 3 h at 10°.

Detection: 1% Amidoblack in 7% acetic acid for 1 h. For destaining, gel rods were kept in 7% acetic acid for 24 h and subsequently destained by electrophoresis. Cholinesterase isoenzyme analysis was based on the method of KOELLE AND FRIEDENWALD (*Proc. Soc. Exptl. Biol. Med.*, 70 (1949) 617).

Note: MF_T = mobility relative to transferrin.

Percentages of total cholinesterase activity are distributed in between individual bands as follows:

Band No.	*Percentage of total cholinesterase activity*
1– 2	1.3
3	2.1
4	1.6
5	0.6
6– 8	92.6
9	1.1
10	0.4
11–12	0.4

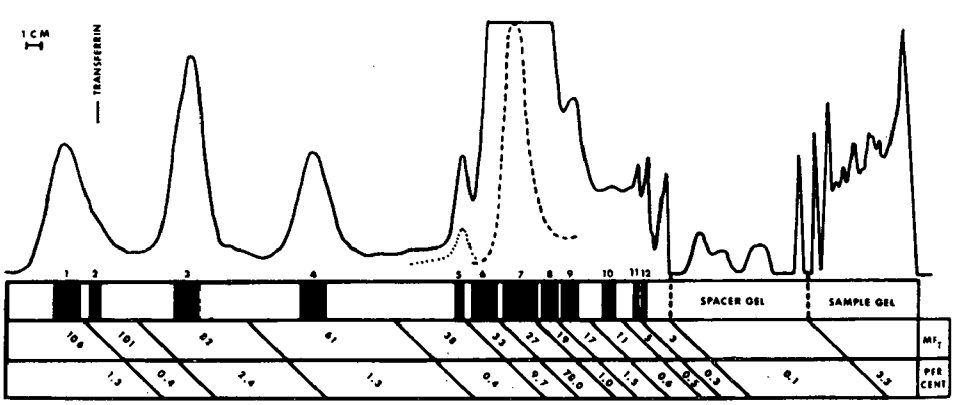


TABLE 352

CC OF CHLORINATED PESTICIDES IN THE PRESENCE OF DIMETHYL SULPHOXIDE ON FLORISIL
(N. F. WOOD, *Analyst*, 94 (1969) 402)

Column: 0.8–1.4 × 16 cm.
Sorbent: Florisil deactivated by 15% of water (5 g per column).
Buffer: Hexane.
Operating conditions: Solvents for the addition of the mixture were: (a) 1 ml of hexane, (B) 1 ml of dimethyl sulphoxide, and (C) 2 ml of dimethyl sulphoxide.
Detection: 5-ml fractions were evaluated by gas chromatography.
Note: Data indicate the percentage of the total amount applied.

Fraction	*Aldrin HHDN*			*Hepta-chlor*			*p,p'-DDE*			*p,p'-DDT*			*p,p'-TDE*			*γ-BHC*			*Hepta-chlor-epoxide*			*Dieldrin HEOD*		
	A	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*
1	1	14	42	—	8	29	—	9	28	—	—	16	—	—	7	—	—	—	—	—	—	—	—	—
2	69	77	55	72	77	66	68	79	63	67	73	56	23	18	40	20	18	44	—	1	12	—	—	—
3	30	7	2	27	10	4	32	10	7	33	14	20	54	34	20	61	38	18	2	17	53	—	—	21
4	—	2	1	1	3	1	—	2	2	—	9	8	23	13	10	17	13	8	29	47	19	—	3	37
5	—	—	—	—	2	—	—	—	—	—	4	—	—	11	7	1	10	8	50	20	9	2	24	25
6	—	—	—	—	—	—	—	—	—	—	—	—	—	8	7	1	7	7	16	8	4	15	35	11
7	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6	—	6	6	3	4	2	31	24	4
8	—	—	—	—	—	—	—	—	—	—	—	—	—	5	3	—	4	5	—	2	1	28	10	2
9	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—	—	4	4	—	1	—	19	3	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	1	—

TABLE 353

TLC R_F VALUES (× 100) OF SOME CHLORINATED INSECTICIDES

(G. S. TADJER, *Hebrew University Institute of Forensic Medicine, Jaffa, Israel* AND A. LUSTIG, *Kugel School, Holon, Israel*)

Thin layer: Silica Gel GF_{254} + water
Solvents: I = Carbon tetrachloride–petroleum ether (1:1).
II = Cyclohexane–chloroform (8:2).
III = Methanol.
IV = Petroleum ether–paraffin (8:2).
Detection: (a) UV light 254 nm.
(b) Spray: (1) 5% Rhodamin B in 95% alcohol; after that with (2) 10% Na_2CO_3.

No.	*Compound*	*I*	*II*	*III*	*IV*
1	Aldrin	89	78	76	83
2	Chlorodane	71	75	78	55
3	DDT	72	76	84	49
4	Dieldrin	21	33	80	14
5	Endrin	18	32	70	10
6	Lindane	35	45	84	10
7	Methoxychlor	0	0	82	0
8	Toxaphene	63	65	68	51

TABLE 354

CC SEPARATION OF HALIDE IONS
(T. L. ZALEVSKAYA AND G. L. STAROBINETS, *Zh. Anal. Khim.*, 24 (1969) 723)

Column: 1 × 50 cm.
Ion exchanger: Dowex 1 X4, 100–200 mesh.
Buffer: Elution with 0.045 *N* KOH.
Operating conditions: Fraction volume, 10 ml. Flow rate, 1 ml·min^{-1}. Effluent collected 30 min after the column had been started.
Detection: According to pH changes in the peak fractions. Loading: 1 μmole of halide ion each.

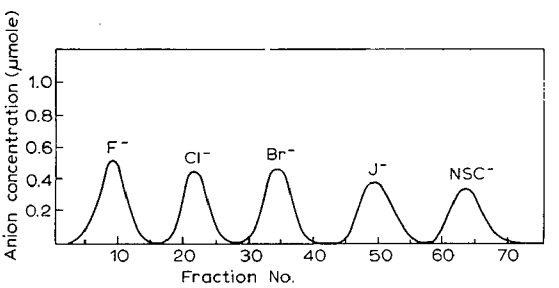


TABLE 355

CC ELUTION CURVE FOR Mn^{II}–Al–Ti^{IV} MIXTURE
(F. W. E. STRELOW, C. J. LIEBENBERG AND F. VON S. TOERIEN, *Anal. Chem.*, 41 (1969) 2059)

Column: 2.0 × 14 cm.
Ion exchanger: AG 1 X 8 (Bio-Rad Laboratories, Richmond, Calif.) > 46 ml.
Buffer: (a) 0.25 *M* oxalic acid–0.2 *M* HCl–0.02% H_2O_2; (b) 0.05 *M* oxalic acid–0.1 *M* HCl–0.02% H_2O_2; (c) 0.05 *M* oxalic acid–0.5 *M* HCl; and (d) 6 *N* HCl.
Operating conditions: Flow rate, 3.0 ± 0.3 ml·min^{-1}.
Detection: Complexometric titration with 1,2-diaminocyclohexanetetraacetic acid.

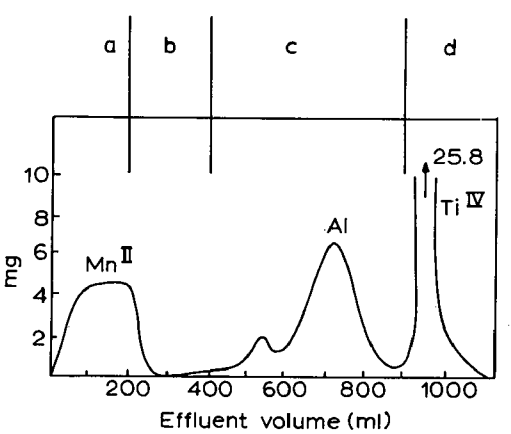


TABLE 356

CC SEPARATION OF Fe–Co–Ni MIXTURES
(A. K. LAVRUKHINA AND N. K. SAZHINA, *Zh. Anal. Khim.*, 24 (1969) 873)

Column: 1 × 21 cm.
Ion exchanger: Dowex 2 × 8, Cl^- form, 100–200 mesh.
Buffer: Samples are dissolved in acetone–6 *N* HCl (9:1).
Operating conditions: Titrimetric quantitation using EDTA.
Flow rate, 0.5 ml·min^{-1}.
Fe passes with the void volume of the column. In order to remove possible residues of this metal from the column, it is recommended to wash the column with approx. 40 ml of acetone–6 *N* HCl (9:1). Ni and Co are eluted with a mixture of 10 ml H_2SO_4, 5 ml 6 *N* HCl and 150 ml acetone.

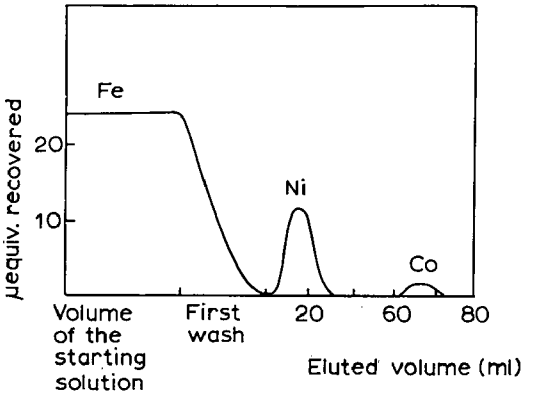


TABLE 357

ELPHO OPTIMUM CONDITIONS FOR THE SEPARATION OF Cu, Fe, Hg AND Zn
(V. P. SHVEDOV AND O. KLUG, *Zh. Anal. Khim.*, 24 (1969) 543)

Sorbent: Whatman No. 3 paper. No substantial differences were observed using Schleicher & Schuell 2043b paper.
Buffer: As specified in the table below.
Operating conditions: As specified in the table below.
Detection: By radioactivity counting or any other conventional procedure.

Ligand	*pH*	*HCl (molarity)*	*Voltage (V/cm)*	*Time to complete (min)*	*Separated zone*[a]
EDTA, 0.1 *M*	12	0.5	18	15	Cu, Fe, Hg, Zn
Citric acid, 0.1 *M*	11	0.5	18	12	Cu, Hg (Zn, Fe)
Tartaric acid, 0.1 *M*	11	0.5	18	12	Hg, Fe (Cu, Zn)
Succinic acid, 0.4 *M*	10.5	0.5	18	12	Hg, Zn (Fe, Cu)

[a] Those in parentheses are not separated.

TABLE 358

CC SEPARATION OF ^{155}Eu, ^{95}Zr AND $^{175+181}Hf$ ON A SILICA GEL COLUMN
(R. CALETKA AND T. D. ZAITSEVA, *Zh. Anal. Khim.*, 25 (1970) 86)

Column: 1 × 45 cm.
Sorbent: Silica Gel KSK-2, 39 ml.
Buffer: (a) 8.7 *M* HCl–30% methanol; (b) 7 *M* HCl.
Operating conditions: Flow rate, 0.3–0.4 ml·cm^{-2}·min^{-1}
Detection: By radioactivity counting.
Note: V/V_s = (retention volume + void volume)/void volume.

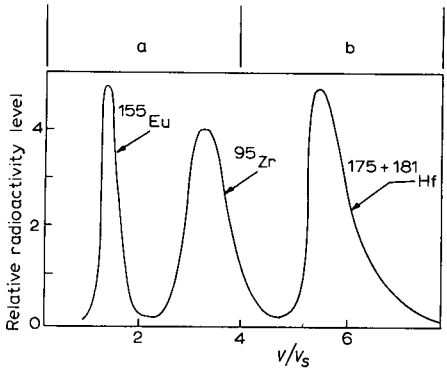


TABLE 359

ELPHO MOBILITIES OF RARE EARTH METALS IN 0.05 *M* CITRIC ACID
(E. K. KORCHEMNAYA, V. I. NAUMOVA AND A. N. ERMAKOV, *Zh. Anal. Khim.*, 24 (1969) 1671)

Paper: Whatman No. 31.
Buffer: 0.05 *M* citric acid.
Operating conditions: Voltage, 24.2 V/cm; time to complete, 3 h.
Detection: 0.1% solution of Arsenazo III.

Element	*Distance travelled (cm)*	*Relative mobility (La = 1)*
La	20.0	1.00
Ce	18.5	0.92
Pr	17.0	0.85
Nd	14.0	0.70
Sm	13.0	0.65
Eu	14.5	0.72
Gd	14.0	0.70
Tb	14.0	0.70
Dy	14.5	0.72
Ho	14.0	0.70
Er	14.2	0.71
Tu	15.0	0.75
Y	15.0	0.75
Yb	14.0	0.70
Lu	13.5	0.67

TABLE 360

GC RETENTION DATA OF ALKYLSUBSTITUTED CYCLOHEXANES
(V. A. ZAKHARENKO, I. O. DELONE, S. S. BERMAN AND A. A. PETROV, *Neftekhimiya*, 9 (1969) 658)

Support material: Copper capillaries.
Stationary phase: P = Squalane (capillary column, L = 85 m).
Carrier gas: Not stated.
Temperature: T = 120°.
Detector: Flame ionisation.
Sample size: Not stated.
Data given in. Retention sequence *R* (relative to 1,1,3,5-tetramethylcyclohexane, *cis*).

Compound	*R*
1,1,3,5-Tetramethylcyclohexane, *cis*	1.00
1,1,3,4-Tetramethylcyclohexane, *trans*	1.14
1,1,3,5-Tetramethylcyclohexane, *trans*	1.17
1,2,4,5-Tetramethylcyclohexane, *trans, cis, trans*	1.35
1,1,3,4-Tetramethylcyclohexane, *cis*	1.37
1,1,2,4-Tetramethylcyclohexane, *cis*	1.37
1,1,2,5-Tetramethylcyclohexane, *trans*	1.37
1,2,3,5-Tetramethylcyclohexane, *trans, trans, cis*	1.38
1,1-Dimethyl-3-ethylcyclohexane	1.40
1,2,4,5-Tetramethylcyclohexane, *trans, trans, trans*	1.43
1,3-Dimethyl-5-ethylcyclohexane, *cis, cis*	1.45
1,1,2,4-Tetramethylcyclohexane, *trans*	1.48
1,1,2,5-Tetramethylcyclohexane, *cis*	1.48
1,1-Dimethyl-4-ethylcyclohexane	1.49
1,2,3,5-Tetramethylcyclohexane, *trans, trans, trans*	1.51
1,3-Dimethyl-5-ethylcyclohexane, *cis, trans*	1.51
1,2,4,5-Tetramethylcyclohexane, *cis, cis, trans*	1.52
1,2,3,5-Tetramethylcyclohexane, *trans, cis, cis*	1.55
1,2,3,4-Tetramethylcyclohexane, *trans, trans, trans*	1.59
1,2,3,5-Tetramethylcyclohexane, *cis, trans, cis*	1.59
1,3-Dimethyl-5-ethylcyclohexane, *trans, trans*	1.59
1,2,3,5-Tetramethylcyclohexane, *cis, cis, cis*	1.60
1,4-Dimethyl-2-ethylcyclohexane, *trans, cis*	1.60
1,1,2,6-Tetramethylcyclohexane, *cis*	1.60
1,1,2,6-Tetramethylcyclohexane, *trans*	1.61
1,1,2,3-Tetramethylcyclohexane, *trans*	1.69
1,2-Dimethyl-4-ethylcyclohexane, *trans, cis*	1.69
1,3-Dimethyl-4-ethylcyclohexane, *trans, cis*	1.69
1,4-Dimethyl-2-ethylcyclohexane, *trans, trans*	1.72
1-Methyl-3-isopropylcyclohexane, *cis*	1.74
1,2-Dimethyl-4-ethylcyclohexane, *trans, trans*	1.76
1,1-Dimethyl-2-ethylcyclohexane	1.76
1,3-Dimethyl-4-ethylcyclohexane, *trans, trans*	1.76
1,1,2,3-Tetramethylcyclohexane, *cis*	1.79
1,3-Dimethyl-4-ethylcyclohexane, *cis, cis*	1.79
1,3-Dimethyl-4-ethylcyclohexane, *cis, trans*	1.80
1,2,3,5-Tetramethylcyclohexane, *cis, cis, trans*	1.80
1-Methyl-3-*n*-propylcyclohexane, *cis*	1.82
1,4-Dimethyl-2-ethylcyclohexane, *cis, cis*	1.82
1,4-Dimethyl-2-ethylcyclohexane, *cis, trans*	1.83
1,3-Dimethyl-2-ethylcyclohexane, *trans, trans*	1.85
1,2-Dimethyl-3-ethylcyclohexane, *trans, trans*	1.87
1-Methyl-4-isopropylcyclohexane, *trans*	1.88
1-Methyl-4-*n*-propylcyclohexane, *trans*	1.88
1,2-Dimethyl-4-ethylcyclohexane, *cis, cis*	1.93
1,2-Dimethyl-4-ethylcyclohexane, *cis, trans*	1.94
1,3-Diethylcyclohexane, *cis*	1.97
1,3-Dimethyl-2-ethylcyclohexane, *trans, cis*	2.02
1,2-Dimethyl-3-ethylcyclohexane, *trans, cis*	2.08
1,3-Dimethyl-2-ethylcyclohexane, *cis, cis*	2.08
1,4-Diethylcyclohexane, *trans*	2.12
1,2-Dimethyl-3-ethylcyclohexane, *cis, trans*	2.16
1,2-Dimethyl-3-ethylcyclohexane, *cis, cis*	2.17

TABLE 361

GC RETENTION DATA OF C_6–C_{10} ALKYL AROMATICS
(L. SOJÁK AND J. HRIVŇÁK, *Ropa Uhlie*, 11 (1969) 364)

Support material: Stainless steel.
Stationary phases: P_1 = Squalane.
P_2 = PEG 400.
(Capillary columns, L = 45 m, I.D. = 0.2 mm).
Carrier gas: Nitrogen, 0.9–1.3 kp/cm²
Temperatures: T_1 = 60°.
T_2 = 72°.
T_3 = 82°.
T_4 = 92°.
Detector: Flame ionisation.
Sample size: 0.1–0.3 µl, split ratio 1/100.
Data given in: Retention indices I and ΔI/°C.

Compound	I				ΔI/°C
	P_1	P_2			
	T_4	T_1	T_2	T_3	
n-Hexane	600	600	600	600	
Benzene	650	968	977	985	0.77
n-Heptane	700	700	700	700	
Toluene	758	1061	1073	1079	0.82
n-Octane	800	800	800	800	
Ethylbenzene	847	1140	1150	1160	0.91
1,4-Dimethylbenzene	861	1147	1158	1167	0.91
1,3-Dimethylbenzene	863	1153	1164	1172	0.86
1,2-Dimethylbenzene	883	1194	1208	1217	1.05
n-Nonane	900	900	900	900	
Isopropylbenzene	907	1184	1194	1202	0.81
n-Propylbenzene	935	1215	1226	1236	0.95
1-Methyl-3-ethylbenzene	948	1230	1240	1249	0.86
1-Methyl-4-ethylbenzene	950	1228	1239	1249	0.95
1-Methyl-2-ethylbenzene	964	1263	1276	1285	1.00
1,3,5-Trimethylbenzene	968	1245	1257	1265	0.91
tert.-Butylbenzene	973	1242	1253	1262	0.91
1,2,4-Trimethylbenzene	986	1280	1293	1302	1.00
sec.-Butylbenzene	989	1251	1262	1270	0.86
Isobutylbenzene	989	1242	1253	1262	0.91
n-Decane	1000	1000	1000	1000	
1-Methyl-3-isopropylbenzene	1002	1268	1278	1289	0.91
1-Methyl-4-Isopropylbenzene	1010	1270	1280	1290	0.91
1,2,3-Trimethylbenzene	1011	1329	1344	1357	1.27
Indane	1014	1357	1376	1389	1.45
1-Methyl-2-isopropylbenzene	1015	1299	1311	1320	0.91
1,3-Diethylbenzene	1028	1297	1308	1319	1.00
1-Methyl-3-*n*-propylbenzene	1033	1299	1311	1320	0.91
n-Butylbenzene	1035	1308	1319	1331	1.05
1-Methyl-4-*n*-propylbenzene	1039	1300	1312	1323	1.05
1,4-Diethylbenzene	1039	1305	1317	1328	1.05
1,2-Diethylbenzene	1039	1324	1337	1349	1.14
1-Methyl-2-*n*-propylbenzene	1045	1329	1342	1353	1.09
1,3-Dimethyl-5-ethylbenzene	1048	1317	1329	1339	1.00
2-Methylindane	1056	1368	1386	1398	1.36
1,4-Dimethyl-2-ethylbenzene	1060	1342	1357	1368	1.18
1-Methylindane	1063	1381	1397	1412	1.41
1,3-Dimethyl-4-ethylbenzene	1066	1348	1363	1374	1.18
1,2-Dimethyl-4-ethylbenzene	1070	1355	1371	1382	1.23
1,3-Dimethyl-2-ethylbenzene	1071	1372	1388	1399	1.23

TABLE 361 *(continued)*

1,2-Dimethyl-3-ethylbenzene	1087	1392	1408	1420	1.27
n-Undecane	1100	1100	1100	1100	
1,2,4,5-Tetramethylbenzene	1106	1402	1418	1430	1.27
1,2,3,5-Tetramethylbenzene	1111	1412	1427	1440	1.27
5-Methylindane	1119	1443	1460	1475	1.45
4-Methylindane	1126	1465	1483	1497	1.45
1,2,3,4-Tetramethylbenzene	1135	1457	1473	1487	1.36
Tetrahydronaphthalene	1137	1486	1504	1519	1.50
Naphthalene	1152	1593	1642	1683	4.10
n-Dodecane	1200	1200	1200	1200	
n-Tridecane	1300	1300	1300	1300	
n-Tetradecane	1400	1400	1400	1400	
n-Pentadecane	1500	1500	1500	1500	

TABLE 362

GC RETENTION DATA OF SOME DICARBOXYLIC ACIDS
(E. M. KAZINIK, N. V. NOVORUSSKAYA, L. M. LVOVICH AND G. A. GUDKOVA, *Zh. Anal. Khim.*, 24 (1969) 1593)

Support material: Celite 545, AW, 4% H_3PO_4, 0.17–0.25 mm.
Stationary phase: 1,4-Butanediol adipate, 20%, L = 1 m, I.D. = 4 mm.
Carrier gas: Argon, 100 ml/min, inlet pressure 1.2 atm.
Temperature: 220°.
Detector: Flame ionisation.
Sample size: 1–3 μl of 10% solution of acids in ethanol.
Data given in: Retention volumes V_R.

Acid	V_R
Succinic	110
Glutamic	270
Adipinic	1160
Sebacic	2660

TABLE 363

GC RETENTION DATA OF SOME PHENOLIC ACIDS
(F. C. DALLOS AND K. G. KOEPPL, *J. Chromatog. Sci.*, 7 (1969) 567)

Support material: S = Chromosorb G-HP, 60/80 mesh.
Stationary phase: P = OV-1, 3% (L = 5 ft., I.D. = $^1/_8$ in.).
Carrier gas: Nitrogen, 65 ml/min.
Temperatures: T_1 = 150°.
T_2 = 175°.
T_3 = 200°.
Detector: Flame ionisation.
Sample size: 2 μl.
Data given in: Retention indices *I*.

Compound	*I*		
	T_1	T_2	T_3
Cinnamic acid	1505	1420	—
p-Hydroxybenzoic acid	1620	1515	—
Vanillic acid	1780	1650	—
o-Hydroxycinnamic acid	1810	1700	1655
p-Hydroxycinnamic acid	1955	1830	1670
Gallic acid	2040	1880	1845
Syringic acid	1910	1780	1755
Protocatechuic acid	1850	1725	1720
Ferulic acid	—	1985	1935
Caffeic acid	—	—	2020
Sinapic acid	—	—	2200

TABLE 364

CC LITHIUM BUFFER SYSTEM FOR SINGLE-COLUMN AMINO ACID ANALYSIS
(A. VEGA AND P. B. NUNN, *Anal. Biochem.*, 32 (1969) 447)

Apparatus: Standard equipment Technicon, single-column apparatus, Chrombead resin Type A in the Li^+ form. Column, 130 × 0.62 cm, operating at 55°. Before use the column was pumped with 0.3 *M* lithium hydroxide followed by pH 3.010 buffer, each for 1 h. After each analysis the regeneration and equilibration were repeated.

Composition of buffers:

Component	*Buffer 1 pH 3.010*	*Buffer 2 pH 6.50*
Lithium	0.275 *M*	1.20 *M*
Citrate	0.070 *M*	0.10 *M*
Lithium citrate·$4H_2O$	19.74 g	28.20 g
Lithium chloride, dried	2.76 g	38.16 g
Thiodiglycol	1.0 ml	—
BRIJ 35	10.0	10.0
Final volume	1.0 l	1.0 l

The components were dissolved in deionized water and the solution was titrated with 6 *N* HCl to the desired pH before diluting to the final volume. 0.05 *M* potassium hydrogen phthalate was used as standard.

21-h gradient for nine-chamber autograd system:

Chamber No.	*Buffer 1 (ml)*	*Buffer 2 (ml)*	*Isopropanol (ml)*
1	74	—	1
2	74·5	—	0.5
3	75	—	—
4	55	20	—
5	45	30	—
6, 7, 8, 9	—	75	—

Note: Lithium systems are suggested for a better separation of threonine, serine, glutamine and asparagine.

TABLE 365

ELPHO PROFILES OF LIPOPROTEINS IN HUMAN SERUM UNDER DIFFERENT PHYSIOLOGICAL CIRCUMSTANCES

(W. RAPP AND W. KAHLKE, *Clin. Chim. Acta*, 19 (1968) 497)

Sorbent:	0.8% agarose gel in sodium veronal–HCl buffer, pH 8.2, 0.025 *M*. Gel plates, 12 × 9 × 0.1 cm.
Buffer system:	Sodium veronal–HCl buffer pH 8.2, 0.05 *M*.
Operating conditions:	10 V/cm.
Detection:	Staining with Sudan Black in 60% ethanol solution, destaining in 50% ethanol solution within 1–2 min.
Notes:	The following abbreviations were used in the description of the scheme: FIHL = hyperlipaemia induced by high fat diet; CIHL = hyperlipaemia induced by high carbohydrate diet; EHCH = essential hypercholesterolaemia; IMM = region of immunoelectrophoretically identified proteins; PEI = region of electrophoretically identified plasma proteins, and M_{rel} = relative mobility.

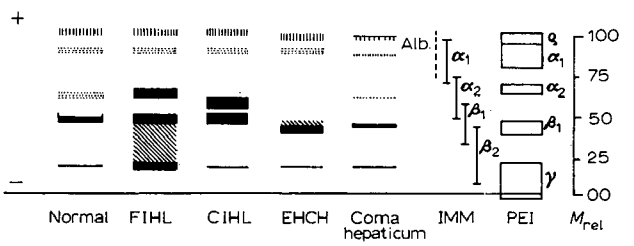


TABLE 366

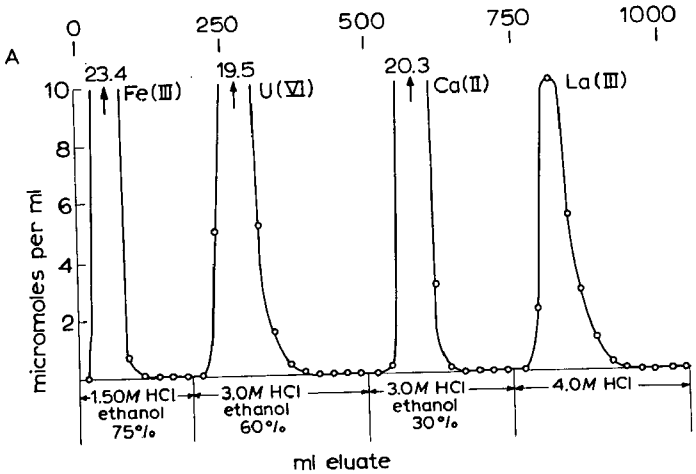
CC BEHAVIOUR OF ELEMENTS IN HYDROCHLORIC ACID–ETHANOL MIXTURES

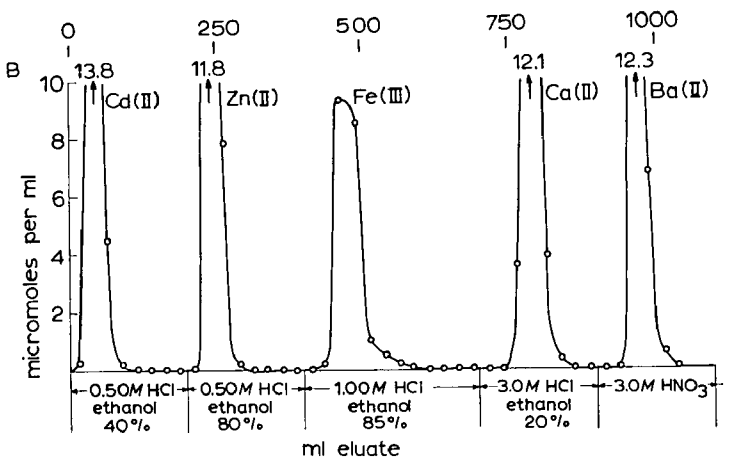
(F. W. E. STRELOW, C. R. VAN ZYL AND C. J. C. BOTHMA, *Anal. Chim. Acta*, 45 (1969) 87)

Column:	1 × 10 cm.
Sorbent:	AG 50W X8 resin (Bio-Rad Laboratories, Richmond, Calif.), 200–400 mesh, H^+ form.
Buffers:	A—(a) 1.5 *M* HCl–75% ethanol; (b) 3.0 *M* HCl–60% ethanol; (c) 3.0 *M* HCl–30% ethanol; and (d) 4.0 *M* HCl. B—(a) 0.5 *M* HCl–40% ethanol; (b) 0.5 *M* HCl–80% ethanol; (c) 1.0 *M* HCl–85% ethanol; (d) 3.0 *M* HCl–20% ethanol; and (e) 3.0 *M* HNO_3. C—(a) 0.2 *M* HCl–90% ethanol; (b) 0.75 *M* HCl–90% ethanol; (c) 1.0 *M* HCl; (d) 3.0 *M* HCl–50% ethanol; and (e) 3 *M* HCl.
Operating conditions:	Before changing the eluent, the solution was allowed to drain to the level of the resin bed. Flow rate, 1–1.2 ml·min^{-1}. Fractions of 2.5–3.0 ml were collected.
Detection:	By any conventional procedure.

(Continued on p. D 31)

Table 366 *(continued)*





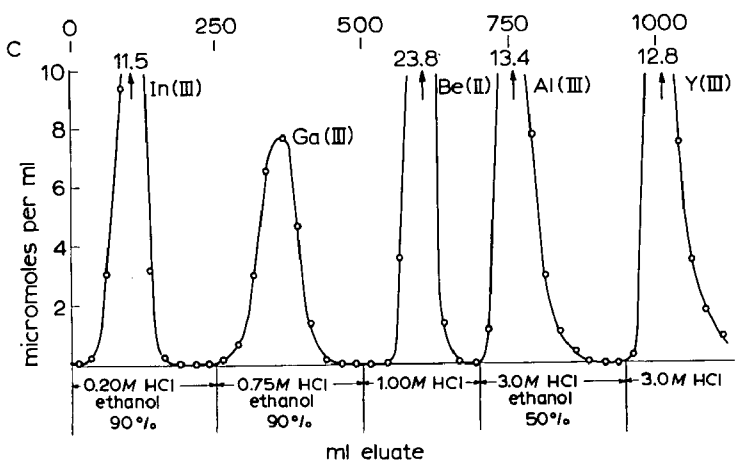


TABLE 367

ELPHO AND PC BEHAVIOUR OF PTERIDINES FROM *Bacillus subtilis* AND THEIR DEGRADATION PRODUCTS

(K. KOBAYASHI AND H. S. FORREST, *Comp. Biochem. Physiol.*, 33 (1970) 202)

Paper electrophoresis

Paper: Whatman No. 17.

Buffers: E_1 = Sodium acetate–acetic acid (1:1), 0.05 *M* solution each, pH 4.6.
E_2 = Ammonium acetate, 0.05 *M*, pH 6.7.
E_3 = Sodium phosphate, 0.05 *M*, pH 8.9.

Operating conditions: Voltage, 10 V/cm. Time to complete, 60 min.

Paper chromatography

Paper: Whatman No. 17.

Solvents: S_1 = *n*-Propanol–1% ammonium hydroxide (2:1).
S_2 = *n*-Butanol–acetic acid–water (4:1:1).
S_3 = *sec.*-Butanol–formic acid–water (8:2:5).
S_4 = Isopropanol–5% boric acid (4:1).
S_5 = 4% Sodium citrate.
S_6 = Ethyl acetate–pyridine–acetic acid–water (5:5:1:3).

Substance	*Electrophoretic mobilities*[a]		
	E_1	E_2	E_3
2-Amino-4-hydroxypteridine-6-carboxylic acid	40	20	43
Permanganate oxidation product	40	20	43
Neopterinyl-3′-β-D-glucuronic acid (B_1)	28	10	33
Acid-hydrolysed B_1	−5	−5	−8
Enzyme-hydrolysed B_1	−5	—	—
Neopterin	−5	−5	−8
2-Amino-4-hydroxypteridine	−5	—	—

[a] Distances in mm to anode.

Substance	R_F					
	S_1	S_2	S_3	S_4	S_5	S_6
2-Amino-4-hydroxypteridine-6-carboxylic acid	0.12	0.14	0.43	0.04	0.45	—
Permanganate oxidation product	0.12	0.14	0.43	0.04	0.45	—
Neopteridyl-3′-β-D-glucuronic acid (B_1)	0.06	0.01	0.25	0.03	0.69	—
Acid-hydrolysed B_1	0.37	0.12	0.41	0.23	0.62	—
Enzyme-hydrolysed B_1	0.37	0.12	—	0.23	—	—
Neopterin	0.37	0.12	0.41	0.23	0.62	—
Uronic acid from B_1 (and lactone)	0.15	—	—	—	—	0.29 (0.48)
D-Glucuronic acid (and lactone)	0.15	—	—	—	—	0.29 (0.48)
2-Amino-4-hydroxypteridine	0.43	0.35	0.53	0.40	0.47	—

TABLE 368

CC SEPARATION OF AN AQUEOUS EXTRACT OF MICROSOMAL ACETONE POWDER
(E. S. FIALA AND S. FIALA, *Biochim. Biophys. Acta*, 204 (1970) 361)

Column: 2.2 × 20 cm.
Ion exchanger: DEAE cellulose.
Buffer systems: Column equilibrated with 5 m*M* Tris–phosphate, pH = 7.6. The column was irrigated with the Tris–phosphate buffer until the protein content of the effluent decreased to zero, then a linear gradient of 5 m*M* Tris–phosphate–0.5 *M* NaCl 25 m*M* sodium phosphate was begun (B. W. MOORE AND R. H. LEE, *J. Biol. Chem.*, 235 (1960) 1359).
Operating conditions: Room temperature, flow rate within conventional range. Fraction volume 10.4 ml.
Detection: Thymidylate kinase (E.C. 2.7.4.9 and E.C. 2.7.4.6): The tubes were chilled, then 50 μmoles Tris–HCl (pH 7.6), 2.5 μmoles $MgCl_2$, 2.5 μmoles ATP and 30 μmoles of [2-^{14}C]TMP (thymidine monophosphate) or [2-^{14}C]TDP (thymidine diphosphate) were added. After incubation the tubes were heated in boiling water bath for 2 min, chilled and centrifuged. 20-μl aliquots of the supernatants were subjected to high-voltage electrophoresis at 2° in 0.1 *M* sodium citrate (pH 4.2). Radioactivity was determined in the separated mono-, di- and triphosphates by gas flow scanner.
d-CMP deaminase (deoxycytidylic acid deaminase, EC 3.5.4.12) according to S. FIALA and A. FIALA (*Biochim. Biophys. Acta*, 49 (1961) 228); detection is based on the empirically found relation between absorbancies at 260 and 280 nm and the percentage of d-CMP conversion.
Protein content: any conventional procedure.
Note: d-CMP deaminase and TMP kinase indicated by dark areas.

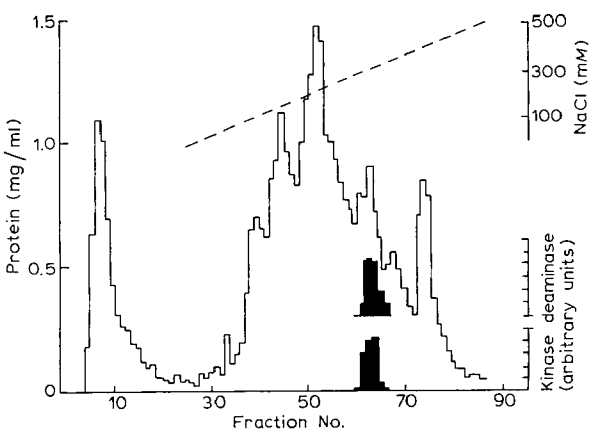
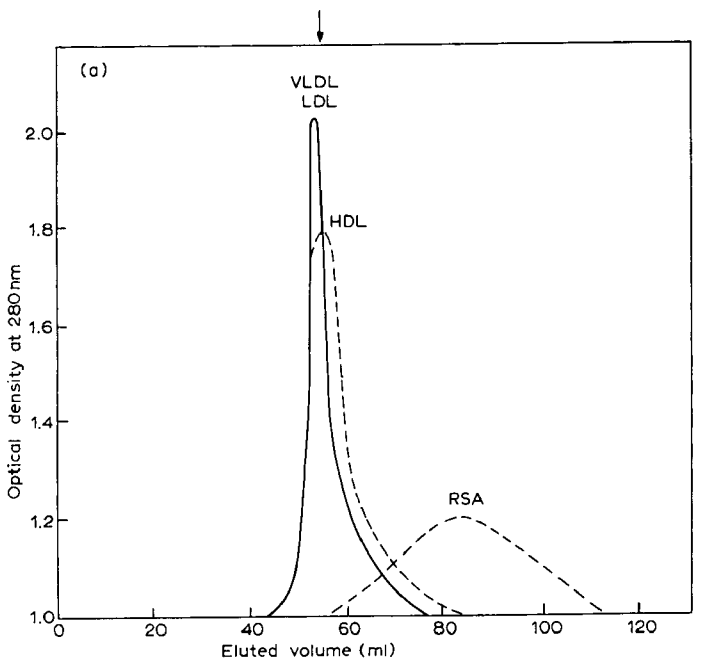


TABLE 369

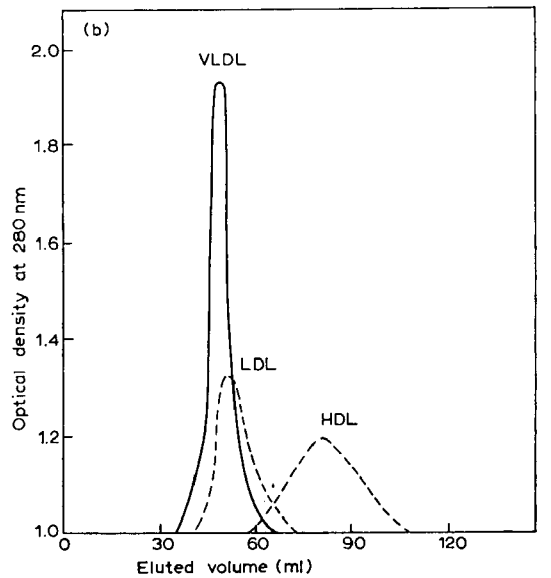
CC BEHAVIOUR OF RAT PLASMA LIPOPROTEINS
(J. A. BOWDEN AND M. FRIED, *Comp. Biochem. Physiol.*, 32 (1970) 394–395)

Columns:	(a) 2 × 35 cm, (b) 1 × 115 cm, and (c) 1 × 150 cm.
Sorbents:	Bio-gel (Bio-Rad, Richmond, Calif.) 50–100 mesh, (a) A-0.5 m, (b) A-5 m, and (c) A-15 m.
Buffer:	Elution with 0.4 *M* NaCl containing 0.1 *M* potassium phosphate buffer pH 7.0 and 0.1 g sodium EDTA per litre; toluene (1 drop per litre) was added to inhibit bacterial growth.
Operating conditions:	The Bio-gel bead was washed three times with 10 vol. of deionized water. Equilibration with the eluting buffer. Flow rate, 6–10 ml·h^{-1}.
Detection:	By optical density at 280 nm.
Note:	The following abbreviations were used: HDL = high density lipoprotein, IDL = intermedial density lipoprotein, LDL = low density lipoprotein, VLDL = very low density lipoprotein, and RSA = rat serum albumin.



(Continued on p. D 35)

Table 369 *(continued)*



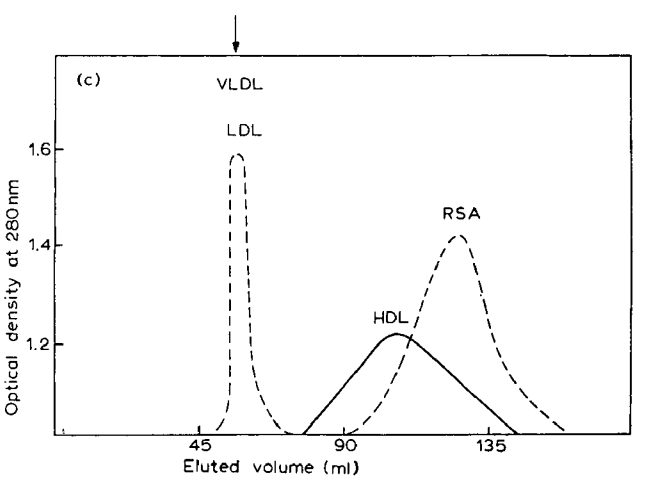


TABLE 370

CC BEHAVIOUR OF SERUM PROTEINS OF THE DOMESTIC GOOSE (*Anser anser*)
(A. C. SCHRAM, *Comp. Biochem. Physiol.*, 32 (1970) 83)

Column:	1.5 × 83 cm.
Sorbent:	Sephadex G-200.
Buffers:	Elution with 0.15 *M* NaCl in 0.01 *M* tris(hydroxymethyl)aminomethane–HCl, pH 8.0, containing 0.01% NaN_3. Before elution the column was equilibrated with the same buffer.
Operating conditions:	Flow rate, 2.8 ml·h^{-1}, temperature, + 25°; fraction volume, 2 ml.
Detection:	Anthrone method (—·—), optical density at 280 nm (———), Biuret method (·····), and Lowry method (— — —).
Note:	Peaks: (I) in the exclusion volume, macroglobulins; (II) molecular weight = 175 000, γ-globulins; (III) molecular weight = 65 000, albumin; (IV) detected only by the anthrone method, represents monosaccharides, molecular weight = 200.

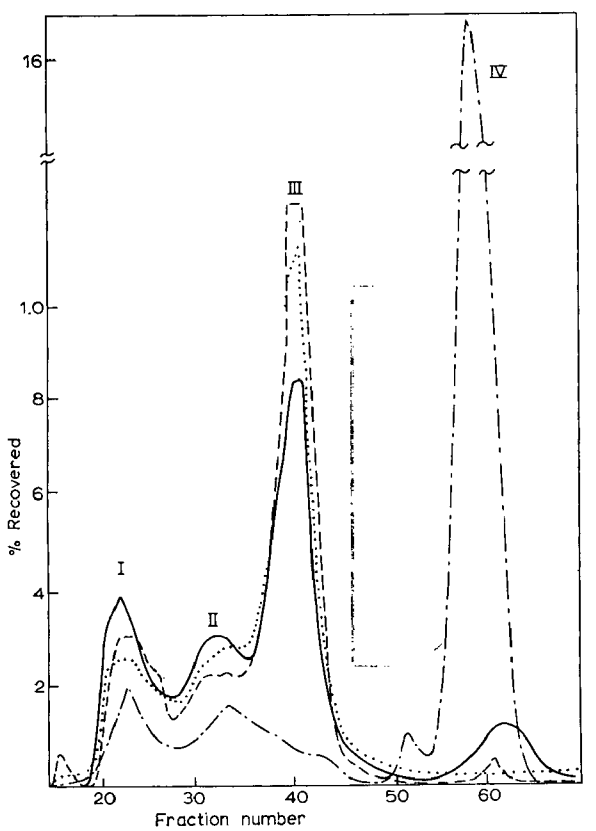


TABLE 371

ELPHO BEHAVIOUR OF DIFFERENT CLASSES OF PROTEINS AND ENZYMES IN HUMAN LIVER
(F. SCHEIFFARTH, H. GÖTZ AND M. GROTTKE, *Clin. Chim. Acta*, 20 (1968) 455)

Sorbent: Agar gel.
Buffer: 2.5% Agar gel in sodium Veronal buffer, pH 8.2 (according to P. GRABAR AND P. BURTIN, *Immunoelektrophoretische Analyse*, Elsevier, Amsterdam, 1964, p. 23).
Operating conditions: 100 V per 12 cm, time to complete, 2.5 h.
Detection: Proteins: staining with Amido Black 10 B.
Glycoproteins: staining with periodic acid and Schiff reagent.
Lipoproteins: staining with Sudan Black.
Esterase: staining with indoxyl acetate or β-naphthyl acetate.
Lacticodehydrogenase: staining with Tetrazolium Blue.
Oxidases: staining with *p*-phenylenediamine.
Peroxidases: benzidine.
Amylase: iodine–starch reaction.
Alkaline phosphatase: phenolphthalein diphosphate and glycocoll buffer.

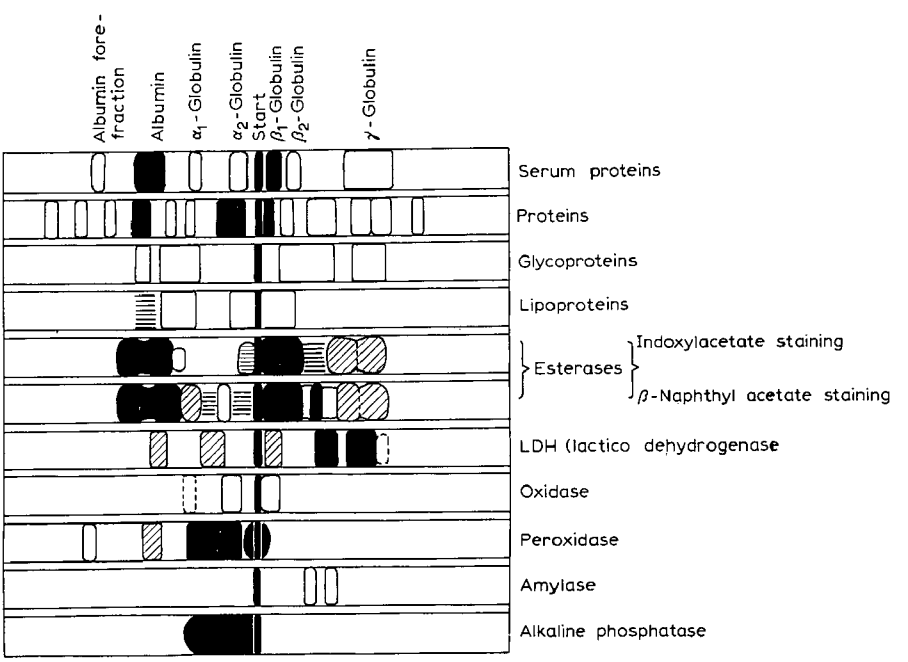


TABLE 372

ELPHO RELATIVE MOBILITIES OF TISSUE AND SERUM ALKALINE PHOSPHATASES

(I. SMITH, P. J. LIGHTSTONE AND J. D. PERRY, *Clin. Chim. Acta*, 19 (1968) 503)

Sorbent: Polyacrylamide gel (5%), discontinuous arrangement; 0.4 × 6 cm tubes. Running gel monomer: acrylamide (19 g) plus BIS (1 g) were dissolved in 100 ml of water.
Persulphate: ammonium persulphate (0.2 g) was dissolved in 100 ml of water.

Buffer systems: Tris–borate–Temed: Tris (45.5 g) was dissolved in 900 ml of water, Temed (1.2 ml) was added, the mixture was titrated to pH 9.5 with boric acid and the whole made up to a final volume of 1 l. This buffer was used to make the gel.
Tris–borate: A buffer was prepared as described above but with the omission of Temed. This buffer was diluted 1:4 with water for use in electrode vessels.

Operating conditions: 3 mA per tube (270 V), however in the beginning of the experiment amperage not exceeding 1 mA per gel was applied (90 V). Time to complete 30–40 min.

Detection: Location buffer: A stable buffer of the following composition was prepared: boric acid, 3.74 g; $MgCl_2 \cdot 6\ H_2O$, 2.04 g/l adjusted to pH 9.7 with KOH solution.
Substrate: α-Naphthylphosphate, 2 mg/ml in buffer.
Diazonium salt: Fast blue BB (Gurr), 1 mg/ml, was added to the location buffer solution immediately before use. A few milligrams of charcoal were added and the mixture was shaken and centrifuged. The gel was rimmed directly from its running tube into a slightly larger tube holding 5 ml of reagent and incubated in the dark at room temperature for 1 h.

Note: The mobilities of alkaline phosphatases are based on an arbitrary "50" for the front of the serum–liver band.

Tissue	*Relative mobilities*						
Serum	50–46	(45–43)[a,b]		37–34[b]			
Liver	51–47						
Bone		45–41					
Kidney	51–47	45–41			28–25		
Intestine		46–42		37–34			
Bile	51–49		41–38		35–33	7–4	2–0
Lung		(46–45)[a]	41–31				

[a] Bands shown in brackets are of weak intensity.
[b] These bands appear in only a small number of sera.

TABLE 373

ELPHO BEHAVIOUR OF LDH (LACTICODEHYDROGENASE) ISOENZYMES IN DIFFERENT TISSUES OF *Gadus virens* (genotype LDH_k-S)
(I. E. LUSH, *Comp. Biochem. Physiol.*, 32 (1970) 27)

Sorbent: Starch gel.

Buffer system: 12% starch gel prepared in 0.0126 *M* Tris and 0.0037 *M* citric acid. Two millilitres of 0.006 *M* nicotinamide adenine dinucleotide were added to starch solution after deaeration. The bridge solution consisted of 0.378 *M* Tris–0.141 *M* citric acid, pH 6.0 (according to F. N. SYNER AND M. GOODMAN, *Science*, 151 (1966) 206).

Operating conditions: Horizontal arrangement, gels cooled to 4° before starting the separation. Voltage, 6 V/cm. Time to complete, 17 h.

Detection: Sliced gel was incubated, cut surface uppermost, in darkness at 37° in 0.05 *M* Tris–HCl buffer, pH 8.0, containing reagents at the following concentrations: lithium l-lactate 45.0 m*M*, NAD 30 mg/100 ml, N-methylphenozonium methosulphate 2.0 mg/100 ml, nitro-blue tetrazolium 5.0 mg/100 ml.

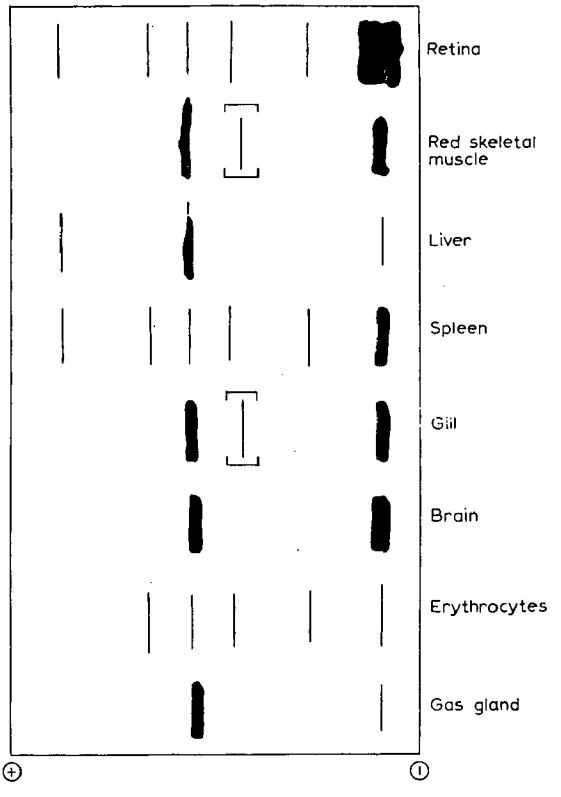


TABLE 374

ELPHO PROFILES OF SUBSTANCES WITH ESTERASE ACTIVITY IN PATHOLOGICAL SERA
(H. GÖTZ, F. SCHEIFFARTH AND F. VICTOR, *Clin. Chim. Acta*, 21 (1968) 122)

Sorbent: Agar gel.
Buffer system: 3% Agar gel in Veronal buffer, pH 8.0, ionic strength 0.05 (according to P. GRABER AND C. A. WILLIAMS, *Biochim. Biophys. Acta*, 10 (1953) 193).
Detection: Indoxylacetate.

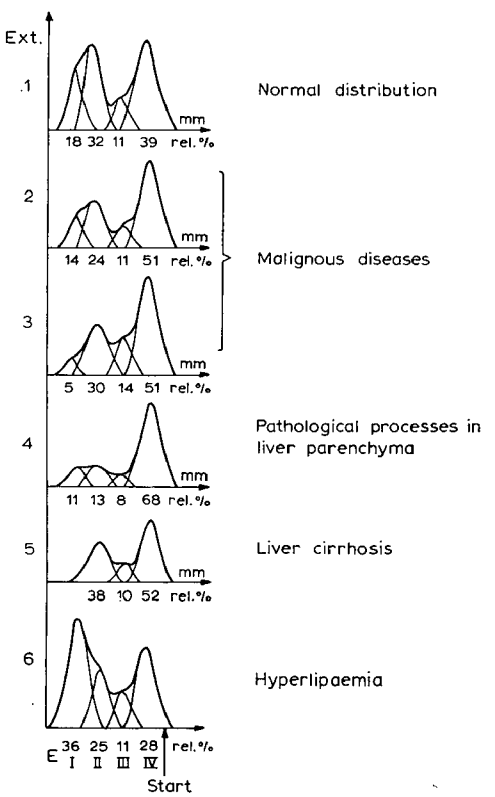


TABLE 375

ELPHO BEHAVIOUR OF SUBSTANCES WITH AMYLOLYTIC ACTIVITY FROM DIFFERENT SOURCES
(H. GÖTZ, H. WÜST AND F. RAIES, *Clin. Chim. Acta*, 19 (1968) 240)

Sorbent: Agar gel.

Buffer: 2.5% Agar gel in sodium Veronal buffer, pH 8.2. The same buffer is used in the electrode vessel. Agar gel electrophoresis according to P. GRABAR AND P. BURTIN, *Immunoelektrophoretische Analyse*, Elsevier, Amsterdam, 1964, p. 23.

Detection: Agar gel plates were incubated in a starch solution (3% in 1% NaCl) mixed prior to incubation with Michaelis buffer, pH 8.6, ionic strength 0.05, in a ratio 3:7. Incubation at 37° for ½ h. After this period the plates were removed from the incubation bath and overlaid with 20% sulphosalicylic acid for 10 min. Finally they were submersed into a 5% iodine solution.

Note: A = Serum (urine); B = pancreas extract; C = secretion of parotis; D = bacterial amylase.

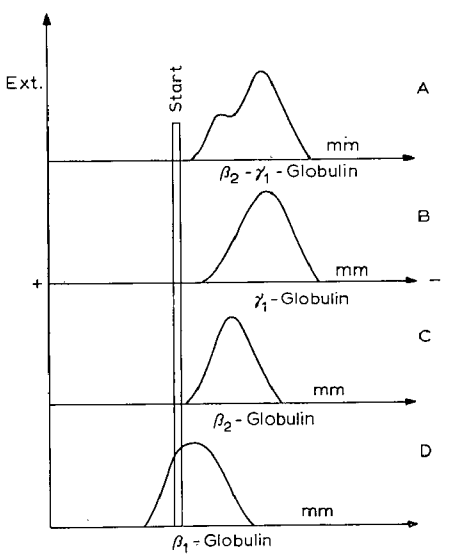


TABLE 376

PC R_F VALUES AND ELECTROPHORETIC MOBILITIES OF SOME NUCLEOTIDE DERIVATIVES OF 1'-HOMOURIDINE

(A. HOLÝ, *Collection Czech. Chem. Commun.*, 35 (1970) 85)

Paper chromatography

Paper: Whatman No 1.
Solvents: S_1 = 2-Propanol–conc. aqueous ammonia–water (7:1:2).
S_2 = Ethanol–1 *M* ammonium acetate (5:2).
Detection: Not stated.

Paper electrophoresis

Paper: Whatman No 1.
Electrolyte: 0.05 *M* Na_2HPO_4 (pH 7.5).
Potential: 40 V/cm.
Detection: Not stated.

Compound	R_F		*Mobility*[a]
	S_1	S_2	
Uridine	0.50	—	—
1'-Homouridine	0.54	—	—
2',3'-O-Isopropylidene-1'-homouridine	0.73	—	—
1'-Homouridine 2',3'-cyclic phosphate	0.48	0.71	0.67
Uridine 2',3'-cyclic phosphate	0.45	0.68	0.70
1'-Homouridine 2'(3')-phosphate	0.20	0.37	0.96
Uridine 2'(3')-phosphate	0.16	0.40	1.00
1'-Homouridine 5'-phosphate	0.20	0.37	0.96
Uridine 5'-phosphate	0.16	0.34	1.00
2',3'-O-Isopropylidene-1'-homouridine 5'-phosphate	0.35	—	0.90

[a] Referred to uridine 2'(3')-phosphate.

TABLE 377

PC R_F VALUES AND ELECTROPHORETIC MOBILITIES OF SOME AMINOACYL-DERIVATIVES OF NUCLEOSIDES AND NUCLEOTIDES

(S. CHLÁDEK AND J. ŽEMLIČKA, *Collection Czech. Chem. Commun.*, 35 (1970) 93)

Paper chromatography

Paper: Whatman No 1.

Solvents: S_1 = 2-Propanol–ammonia–water (7:1:2).
S_2 = 1-Butanol–acetic acid–water (5:2:3).
S_3 = 1-Butanol–water–pyridine–acetic acid (15:12:10:3).

Detection: Not stated.

Paper electrophoresis

Paper: Whatman No 1.

Electrolytes: E_1 = 0.05 *M* sodium hydrogen phosphate, pH 7.5.
E_2 = 0.05 *M* sodium hydrogen citrate, pH 3.4.
E_3 = 1 *M* acetic acid, pH 2.4.

Potential: Not stated.

Detection: Not stated.

Compound[a]	R_F			*Mobility*[b]		
	S_1	S_2	S_3	E_1	E_2	E_3
A	0.52	0.50	—	−1.0	−1.0	−1.0
Cp	0.10	0.18	—	15.7	0.51	−0.23
Ccp	0.32	—	—	—	—	—
CpA	0.21	0.13	—	—	−0.65	−0.61
CpA > (OEt) (CH_2NH–Z)	0.56	0.57	—	—	—	—
CpA > (OEt) (CH_2NH_2)	0.30	0.23	—	—	—	−1.2
A > (OEt) (CH_2NH_2)	0.61	0.55	—	—	—	—
CpA > (OEt) (CH_2NH–Z_2Lys)	0.76	0.75	—	2.0	−0.5	—
A > (OEt) (CH_2NH–Z_2Lys)	0.88	0.90	—	—	—	—
CpA(Z_2Lys–Gly)	dec.	0.66	—	—	—	—
CpA(Lys–Gly)	dec.	0.06	—	—	−1.9	−1.2
Lys	0.24	0.20	0.08	—	−3.5	—
Gly	0.35	0.33	0.15	—	−0.65	—
LysGly	0.24	0.20	0.06	—	−2.9	—
CpA > (OEt) (CH_2NHAc)	0.44	0.42	—	—	—	—
A > (OEt) (CH_2NHAc)	0.80	0.72	—	—	—	—
CpA(AcGly)	dec.	0.25	—	—	—	—
AcGly	0.49	—	—	—	—	—

[a] A = adenine residue; C = cytosine residue; Z = $C_6H_5CH_2OCO$.

[b] Relative to adenosine.

TABLE 378

TLC R_F VALUES (× 100) OF SOME ALKALOIDS, PHENOTHIAZINES, AND ORGANIC BASES
(G. S. TADJER, *Hebrew University Institute of Forensic Medicine, Jaffa, Israel* AND A. LUSTIG, *Kugel School, Holon, Israel*)

Equipment: Standard thin-layer chromatography equipment, glass plates 20 × 20 cm. S-Tank (S-chamber according to STAHL) and glass developing tank.

Thin layers:
A = Silica Gel G + water.
B = Silica Gel G + 0.1 *N* NaOH.
C = Silica Gel G + 0.5 *N* KOH.
D = Silica Gel G + 0.1 *N* $KHSO_4$.
E = Aluminium Oxide + water.

Solvents:
I = Methanol.
II = Chloroform–acetone–diethylamine (50:40:10).
III = Cyclohexane–chloroform–diethylamine (50:40:10).
IV = Methanol–acetone–triethylamine (50:50:1.5).
V = Chloroform–ethanol (90:10).
VI = Cyclohexane–diethylamine (90:10).
VII = Cyclohexane–chloroform (30:70) + 0.05% diethylamine.
VIII = 95% ethanol.
IX = Acetone.
X = Methyl acetate.
XI = Cyclohexane–benzene–diethylamine (75:15:10).

No.	*Compound*	*A/I*	*D/I*	*B/I*	*A/II*	*B/III*	*A/IV*	*A/V*	*A[a]/VI*	*E/VII*	*D/VIII*	*B/IX*	*B/X*	*B/XI*
1	Aconitine	50	90	85		20	44			40				17
2	Atropine	8	56	20	3	12[b]	30	5	34	72	31	3	1	7
						30								37
3	Berberine	7	80	68	2	21	35	6	4	37	35	1	80	40
4	Butaperazine	27	65	60	56	54	54	67	29	9	3	14	61	43
5	Chlordiazepoxide	79	76	79	70	36	74	40	16	8	89	95	61	14
						42								
6	Chlorpromazine	33	50	50	60	65	63	50	81	68	25	20	47	53
7	Cocaine	25	65	30	90	29	43	48	41	19	23	16	7	5
		47	34	77				66						
8	Codeine	21		41	90	49	40	40	17	7		19	14	26
9	Desipramine	45		31	85	37	82	24	71	10	87	13	2	37
				80										
10	Diazepam	93	81	72	98	42	88	48	39	9	82	99	92	30
11	Dixyrazine	52	35	60	75	15	75	53	6	48	21	40	60	15
						40				19			40	
12	Ephedrine	6		5	100	43	35	71	74	43	42	2	0	43
13	Ethylmorphine	23	35	49	96		31	49		37	34	12	6	2
				41										
14	Flufenazine		17	77	79	38	84	65	3	4	9	31		11
											82			
15	Heroin	35	36	46	100	62	64	43	15	31	29	22	11	16
							40			40				
16	Hydrocodone	16	19	62	96	46	21	45	17	39	20	66	0	11
				26										
17	Hydroxyzine	67	67	79	81	41	78	50	19	7	48		50	50
18	Hyosciamine	9	55	19	2	32	34	23	0		25	2	0	10
			7					4						
19	Imipramine	29	74	55	28	69	36	60	59	50	54	27	41	45
20	Levomepromazine	22	54	47	69	58	63	16	3	49	29	28	0	13
				68							47	80		
21	Methadone	27	62	50	100	62	39	42	99	40	60	66	35	36
												100		
22	Methaqualone	92	81				91	54		11		98	90	40
														60
23	Mogadan	83	84	81	75	15		54	2	0	89	99	98	29
														3
24	Morphine	20	35	38	34	7	28	23	0	0	34	6	3	30

(Continued on p. D 45)

TABLE 378 *(continued)*

No.	*Compound*	*A/I*	*D/I*	*B/I*	*A/II*	*B/III*	*A/IV*	*A/V*	*A*[a]*/VI*	*E/VII*	*D/VIII*	*B/IX*	*B/X*	*B/XI*
25	Nicotine	48	17	69	36	57	50	65	13	0	5	37	16	56
26	Opipramol	49	19	68	85	36	83	46	14	5	11	13	2	12
27	Papaverine	88	60	87	100	51	83	49	16	50	57	96	72	7
			25										82	
28	Periciazine	58	16	70	58	37	79	10	2	34	19	30	48	10
								37						
29	Perphenazine	54	29	15	50	17	70	50	3	44	15	0	0	14
						49								
30	Pethidine	48	40	55	100		43	45	92	49	27	30	19	35
31	Procaine	50	80	77	87	42	57	53	6	36	48	71	61	9
32	Promazine	18	36	33	63	31	60	41	4	49	30	29	51	12
						58			46			80		27
33	Promethazine	20	35	55	58	41	56	15	4	45	20	15	3	10
						53					49			
34	Promoton	16	33	39	55	12	37	7	3	44	15	0	0	14
						51								
35	Quinine	28	67	64	20	55	57	5	4	52	32	90		46
		45						65						
36	Scopolamine	57	61	65	100	42	64	60	55	27	24	48	48	33
37	Strychnine	12	41	25	5	55	52	50	13	57	4	31	1	10
								55			16			
38	Tetracaine	46	71	70	60	45	50	60	15	37	45		59	28
39	Thioproperazine	11	50	30	58	50	56	55	4	59	16	10	61	19
40	Thioridazine	20	50	64	77	55	50	24	57	49	30	15	42	10
							69					35		
41	Trifluoperazine	45	85	53	71	69	65	53	30	48	7	34	21	15
										55				47
42	Triflupromazine	44	23	30	66	65	76	20	69	47	54	0	63	41
				18						58	19			18
43	Rhodamine B	61	73	79	97		34	42		14	82	51	12	15

[a] The chromatogram was developed in a glass tank.
[b] In the case that two R_F values are mentioned, the lower one is the main one.

TABLE 379

CHROMOGENIC BEHAVIOUR OF SOME ALKALOIDS, PHENOTHIAZINES AND ORGANIC BASES

(G. S. TADJER, *Hebrew University Institute of Forensic Medicine, Jaffa, Israel* AND A. LUSTIG, *Kugel School, Holon, Israel*)

Thin layer: Silica Gel G + 0.1 *N* NaOH.
Solvent: Methanol.
Operating conditions: The amount of compounds applied to the chromatogram was 5–25 μg.
Detection:
A = Dragendorff's reagent.
B = Iodoplatinate.
C = FPN (ferric chloride–perchloric acid–nitric acid).
D = Folin and Ciocalteau's reagent.
E = Folin and Ciocalteau's reagent after heating at 100°
F = Marquis' reagent.
G = Sulfuric acid, conc.
H = UV light 365 nm, fluorescence on untreated plates.

Compound	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
Aconitine	orange	violet	orange-yellow	×[a]	blue-grey	light blue	×	light blue
Atropine	orange	violet	×	×	blue-grey	×	×	light blue
Berberine	orange	violet	yellow	×	blue-grey	×	yellow	greenish l. blue
Butaperazine	orange	violet	×	×	pink	pink	pink	yellow
Chlorodiazepoxide	orange	brown-yellow	×	yellow	yellow	yellow		light blue
Chlorpromazine	orange	violet	blue	pink	pink	pink	pink	violet
Cocaine	orange	violet	blue	×	×	light blue	×	light blue
Codeine	orange	violet	×			blue	×	blue
Desipramine	orange	brown-yellow	green l. blue	yellow-green	brown-reddish	yellow blue	blue-yellow	violet
Diazepam	orange	brown-yellow	×	yellow	yellow	yellow	yellow	light blue
Dixyrazine	orange	violet	brown-red	brown	pink	brick red	brick red	×
Ephedrine	orange	violet	×	×	×	×	×	×
Ethylmorphine	orange	violet	×	yellow	yellow	violet	×	blue
Flufenazine	orange	violet	×	×	×	pink	pink	light blue
Heroin	orange	blue	×	blue	dark blue	blue	×	blue
Hydrocodone	orange	deep violet	×	yellow	yellow	blue	×	blue
Hydroxyzine	orange	violet	×	yellow	yellow	×	×	violet
Hyosciamine	orange	violet	×	×	blue-grey	×	×	×
Imipramine	orange	violet	×	×	blue-grey	×	bluish	light blue
Levomepromazine	orange	violet	deep violet	violet	violet	violet	violet	blue-red
Methadone	orange	violet-red	×	light yellow	yellow	×	×	blue
Methaqualone	orange	×	×	yellow	yellow	×	×	violet
Mogadan	orange	×	×	yellow	yellow	×	×	×
Morphine	orange	violet	×	blue-yellow	deep violet	violet-blue	×	yellow-green
Nicotine	orange	violet	×	×	blue	×	×	×
Opipramol	orange	violet	×	yellow	blue-yellow	blue-yellow	blue-yellow	light blue
Papaverine	orange	×	×	yellow	yellow	light blue	×	light blue

(Continued on p. D 47)

TABLE 379 *(continued)*

Compound	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
Periciazine	orange	violet	red	brick red	brown--reddish	pink	pink	light blue
Perphenazine	orange	violet	×	×	pink	pink	pink	violet--red
Pethidine	orange	blue--violet	×	light yellow	yellow	×	×	blue
Procaine	orange	violet	×	×	×	×	×	light blue
Promazine	orange	violet	deep violet	bluish green	violet	violet--blue	violet--blue	violet
Promethazine	orange	violet	×	×	pink	dark pink	dark pink	red
Promoton	orange	violet	×	yellow	red	brown	brown	violet--red
Quinine	orange	violet	×	×	×	×	×	×
Scopolamine	orange	violet	×	×	×	×	pink	×
Strychnine	orange	violet	×	×	blue--grey	×	×	×
Tetracaine	orange	violet	×	×	blue--grey	×	×	light blue
Thioproperazine	orange	violet	light red	brick red	brown--reddish	pink	pink	light blue
Thioridazine	orange	violet	light violet	blue--red	green--red	green--violet	green--blue	blue
Trifluoperazine	orange	violet	red--blue	brown--red	brown--reddish	orange	yellow	violet
Triflupromazine	orange	violet	red--violet	brown--pink	brown	orange	orange	×

[a] The sign × shows that after the spray no spot appears.

TABLE 380

TLC R_F VALUES (× 100) OF SOME ORGANOPHOSPHORUS COMPOUNDS

(G. S. TADJER, *Hebrew University Institute of Forensic Medicine, Jaffa, Israel* AND A. LUSTIG, *Kugel School, Holon, Israel*)

Thin layer: Silica Gel GF_{254} + water.
Solvents: I = Acetone–benzene (15:35).
II = Acetone–benzene (2:48).
III = Acetone–benzene (1:1).
IV = Benzene–chloroform (1:1).
V = Aceton–petroleum ether (25:75).
Detection: (a) UV light 254 nm.
(b) Spray: (1) 2% 4-(*p*-nitrobenzyl)pyridine in acetone; (2) 5 min heated at 105°; (3) 10% tetraethylenepentamine in acetone.
Note: Detected by UV light or after spraying: parathion, methyl parathion, ruelene, cyolane, thimet, ronnel, paraoxon, phosphamidon, dimethoate, VC-13, and fenthion.
Detected only by UV light: malathion, guthion, and diazinon.
Detected only after spraying: metasystox and dipterex.

No.	*Compound*	*I*	*II*	*III*	*IV*	*V*
1	Cyolane	48, 81	—	81	63	9
2	Diazinon	81	55	98	84	73
3	Dimethoate	56	14	79	12	14
4	Dipterex	35	5	68	—	—
5	Fenthion	96	88	97	96	64
6	Guthion	74	56	86	35	49
7	Malathion	97	76	98	99	
8	Metasystox	9	0	28	8	4
9	Methyl parathion		70	94		
10	Paraoxon	73	35	84	17	40
11	Parathion	91	80	97	74	69
12	Phosphamidon	54	12	75	11	14
13	Ronnel	95	96	97	93	61
14	Ruelene	64	18	86	8	72
15	Thimet	93	90	95	80	66
16	VC-13	96	99	97	85	72

TABLE 381

ELPHO CHARACTERISATION OF OVOMUCIN, A SULPHATED GLYCOPROTEIN COMPLEX FROM CHICKEN EGGS

(J. W. DONOVAN, J. G. DAVIS AND C. M. WHITE, *Biochim. Biophys. Acta*, 207 (1970) 194)

Starch gel electrophoresis according to M.D. POULIK, *Nature*, 180 (1957) 1477. The gels are made from a buffer containing 0.076 *M* tris(hydroxymethyl)aminomethane and 0.005 *M* citric acid pH 8.65. These gels are used in a discontinuous buffer system with 0.3 *M* boric acid and 0.05 *M* sodium hydroxide in the electrode vessels. Gradient, 6 V/cm time; to complete, 3 h.

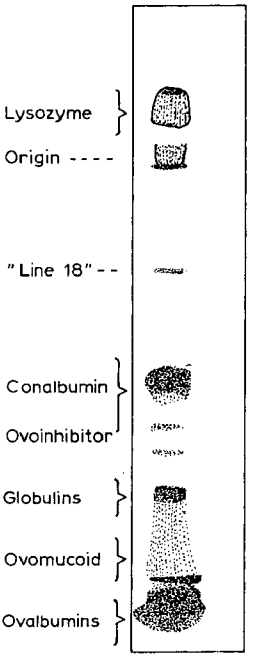


TABLE 382

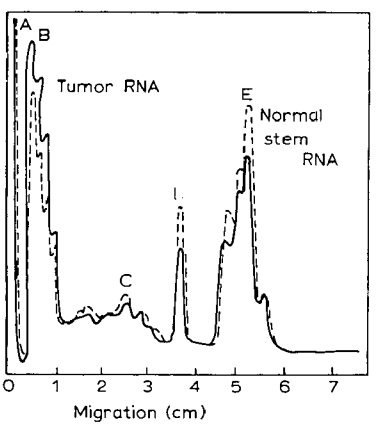
ELPHO PATTERNS OF TOMATO CROWN GALL TUMOR AND STEM RNA'S
(T. B. JOHNSON, C. ROSS AND R. BAKER, *Biochim. Biophys. Acta*, 199 (1970) 521)

Sorbents: Canalco polyacrylamide gel electrophoresis apparatus, 8% gel.
Preparation of composite agarose-acrylamide gels. Four solutions used in the preparation of the gels: (1) 20% acrylamide monomer (19 g of acrylamide and 1 g of Bis in 100 ml of water), (2) dimethylaminopropionitrile (6.4% in water) (3) ammonium persulphate (1.6% in water) and (4) buffer consisting of Tris (108 g), disodium EDTA (9.3 g) and boric acid (55 g) per 1 l (pH 8.3). Further procedure is that of A. C. PEACOCK AND C. W. DINGMAN, *Biochemistry*, 7 (1968) 668.

Buffers: Water is added to 0.8 g of agarose in an amount which varies according to the amount of acrylamide solution used (to give the final gel volume of 160 ml). The mixture of agarose and water is stirred vigorously by magnetic stirring, connected to a condenser and refluxed at 100° for 15 min. The agarose solution was cooled to 40°. Buffer (16 ml) dimethylaminopropionitrile (10 ml) and acrylamide (16 ml) were mixed and warmed up to 35°. The agarose and acrylamide solutions were mixed, the temperature adjusted to 35° and 5 ml of 1.6% ammonium persulphate was added.

Operating conditions: 25 μg of RNA loaded per gel; time to complete, 1.5–2 h. Voltage, 200 V per gel, gel approx. 9 cm long.

Detection: Staining with Methylene Blue, destaining with water.



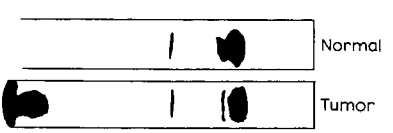


TABLE 383

ELPHO OF PROTHROMBIN AND THROMBIN
(A. C. COX AND D. J. HANAHAN, *Biochim. Biophys. Acta*, 207 (1970) 50)

Sorbent: Polyacrylamide gel.
Operating: Polyacrylamide gel electrophoresis performed in Canalco equipment (Canalco Industries Bethesda, Md.) in Tris-glycinate (pH 8.0) (according to B. J. DAVIS, *Ann. N.Y. Acad. Sci.*, 121 (1964) 404).

conditions: Vertical arrangement, 1.4 × 2½ in. tubes, electrophoresis carried out at about 5°, voltage 10 V/cm, amperage 5 mA per gel. Time to complete: 1 h.

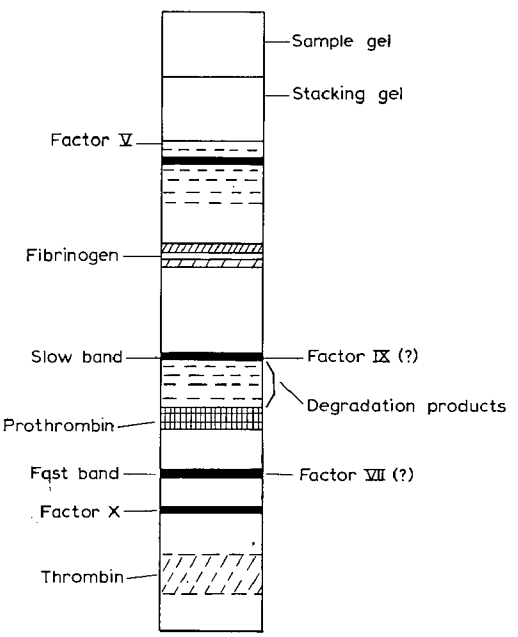


TABLE 384

CC CHARACTERISTICS OF PORASIL BEADS
(R. N. KELLEY AND F. W. BILLMEYER, JR., *Anal. Chem.*, 42 (1970) 400)

Type of Porasil	*Surface area (m^2/g)*	*Average pore diameter (Å)*	*Void fraction*	*Plates/ft.*[a]	*Molecular weight exclusion limit*
A	480	100	0.37	625	$3.0 \cdot 10^4$
B	200	100–200	0.37	865	$1.0 \cdot 10^5$
C	50	200–400	0.37	850	$4.0 \cdot 10^5$
D	25	400–800	0.37	650	$7.0 \cdot 10^5$
E	4	800–1500	0.37	475	$2.0 \cdot 10^6$
F	1.5	1500	0.37	625	$>2.0 \cdot 10^6$

[a] Plates/ft. measured at 1 cc/min flow rate with cyclohexane solute.

TABLE 385

CC PROFILES OF SULPHITOLYSED CROSSLINKED AND NON-CROSSLINKED FIBRINS
(R. CHEN AND R. F. DOOLITTLE, *Proc. Nat. Acad. Sci. U.S.*, 73 (1969) 422)

Column:	2 × 11 cm.
Ion exchanger:	Carboxymethylcellulose Whatman CM-52.
Buffer systems:	Starting buffer: 0.005 *M* sodium acetate, pH 5.2. After 50 ml of starting buffer have passed through the column, the elution was followed by a linear gradient prepared from 300 ml of the starting buffer and 300 ml of the limiting buffer (0.1 *M* sodium acetate, pH 5.2, in 8 *M* urea).
Operating conditions:	Columns loaded with 40 mg S-sulphoproteins in 2 ml of the starting buffer; fractions of 5.9 ml collected. Flow of the eluant under gravity, flow rate not specified.
Detection:	Optical density at 280 nm.
Note:	The designation of peaks in the figure attached corresponds to the common nomenclature of individual polypeptide chains of fibrin.

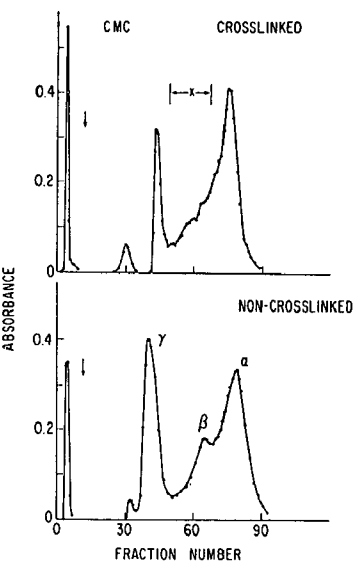


TABLE 386

CC BEHAVIOUR OF DIFFERENT MOLECULAR FORMS OF POTATO APYRASE
(A. TRAVERSO-CORI, S. TRAVERSO AND H. REYES, *Arch. Biochem. Biophys.*, 137 (1970) 138)

Column: 51 × 1.6 cm, 102 ml bed volume.
Ion exchanger: CM cellulose.
Buffer system: The ion exchanger was equilibrated with 50 m*M* potassium succinate buffer, pH 6.0. Proteins were eluted with a linear KCl gradient in 50 m*M* succinate buffer, pH 6.0. Potassium chloride concentrations are indicated in the figure.
Operating conditions: Amount loaded onto the column: 111.3 mg. Flow rate within conventional limits.
Detection: Apyrase activity determined as follows: 0.1 *M* potassium succinate buffer (pH 6.0), 5 m*M* $CaCl_2$ and 2 m*M* ATP or ADP were used as the incubation mixture. The enzyme was diluted in serum albumin (0.2 mg per ml) and the amount added was such that 0.4–0.8 μmole of P_i was liberated in 5 min at 30°. The reaction was stopped with acid molybdate and the colour was developed with Fiske–Subbarow reagent (according to A. TRAVERSO-CORI, H. CHAIMOVICH AND O. CORI, *Arch. Biochem. Biophys.*, 109 (1965) 173).
Note: ●—●, ATPase activity; ○—○, ADPase activity; ×—×, protein concentration.

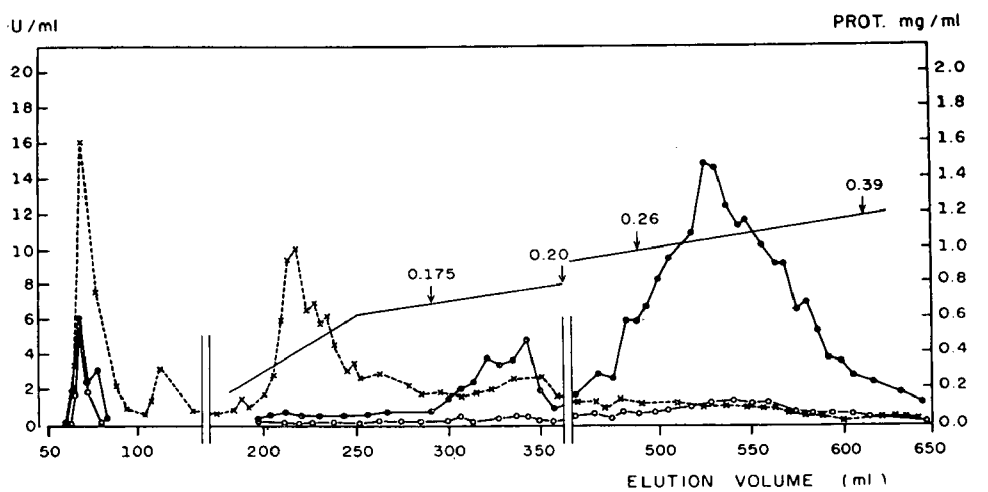


TABLE 387

CC CHROMATOGRAPHY AND ELECTROFOCUSING OF ALMOND EMULSIN ON CM-CELLULOSE (SEPARATION OF MANNOSIDASE, GLUCOSIDASE AND GALACTOSIDASE)

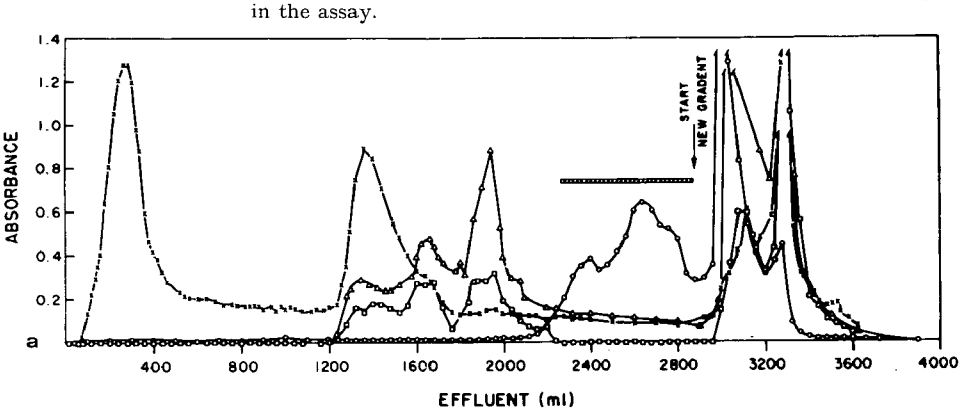
(J. SCHWARTZ, J. SLOAN AND Y. C. LEE, *Arch. Biochem. Biophys.*, 137 (1970) 123 and 125)

(A) Column chromatography

Column:	2.6 × 30 cm.
Ion exchanger:	Carboxymethylcellulose Whatman CM52.
Buffer systems:	Column was equilibrated first with 0.01 *M* sodium acetate, pH 4.8. Elution with a linear gradient (1 l each) of 0.01 *M* sodium acetate (pH 4.8) and 0.01 *M* sodium acetate (pH 4.8) containing 0.067 *M* NaCl; then another gradient consisting of (1 l each) 0.01 *M* sodium acetate buffer (pH 4.8) containing 0.1 *M* NaCl and 0.2 *M* sodium acetate (pH 4.8) containing 0.3 *M* NaCl was applied.
Operating conditions:	Room temperature, gravity flow.
Detection:	By absorbance level. Glycosidase activities were measured with phenyl or *p*-nitrophenyl glycosides. A sample of enzyme solution (5–25 μl) was added to 0.6 ml of 0.1 *N* sodium acetate (pH 4.8) containing 10 m*M* substrates and the reaction mixture was incubated for 10 min at 37°. Upon addition of 2 ml of 0.2 *M* Na_2CO_3 absorbance at 400 nm (for *p*-nitrophenol) was measured. Alternatively, absorbance at 295 nm was measured when phenylglycosides were used. (× — × — ×) Absorbance at 280 nm; (○ — ○ — ○) α-D-mannosidase; □ — □ — □ β-D-glucosidase; △ — △ — △ β-D-galactosidase.

(B) Electrofocusing:

Apparatus:	Electrofocusing apparatus LKB, 110 ml capacity.
Detection:	As described above, except for the low level of β-D-galactosidase and α-D-mannosidase, 10 times as much volume were used for these enzymes in the assay.



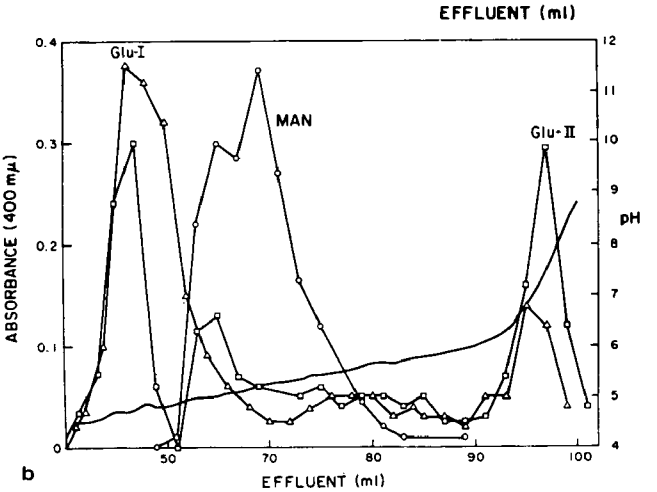
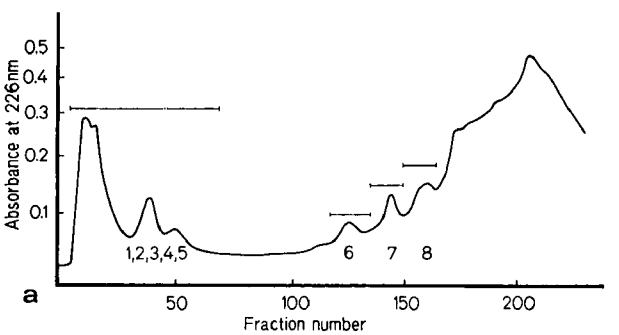


TABLE 388

CC SEPARATION OF CYANOGEN-BROMIDE PEPTIDES OF THE α_1 CHAIN OF COD-SKIN COLLAGEN (α_1CNBr)

(F. LASLO AND B. R. OLSEN, *Eur. J. Biochem.*, 11 (1969) 143)

Column:	(a) 2.5 × 15 cm (for CM-cellulose); (b) 2.5 × 10 cm (for phosphocellulose).
Ion exchangers:	CM-cellulose Sigma, fine mesh, 0.67 mequiv./g and phosphocellulose Sigma, fine mesh, 0.82 mequiv./g.
Buffers:	(a) For CM-cellulose chromatography: sodium acetate buffer ionic strength 0.01, pH 4.8. Concave sodium chloride gradient over 1800 ml; gradient device consisted of 6 chambers, filled 600 ml each. The fifth chamber contained 0.05 *M* NaCl dissolved in starting buffer, the sixth chamber contained 0.25 *M* NaCl in the same buffer. (b) For cellulosephosphate chromatography: acetate buffer, ionic strength 0.001, pH 4.8. Superimposed gradient of sodium chloride from 0.00 to 0.33 *M* over the total volume 1000 ml.
Operating conditions:	Flow rate for CM-cellulose chromatography 300 ml/h, for cellulosephosphate procedure, 265 ml/h. In the first case fractions 8 ml, in the second case fractions of 7 ml were collected.
Detection:	Optical density at 226 nm.
Note:	Numbers in figures design the number of the peptide according to the standardised nomenclature of K. PIEZ, *Biochemistry*, 4 (1965) 2590.



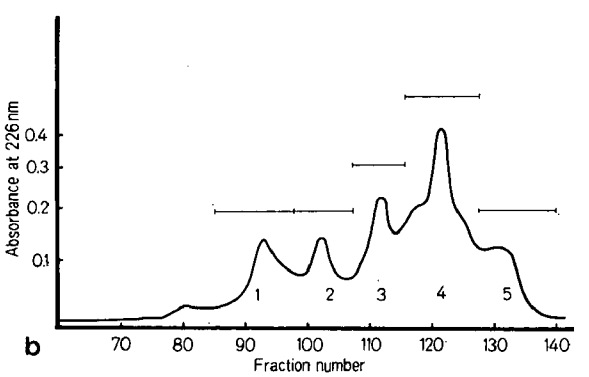
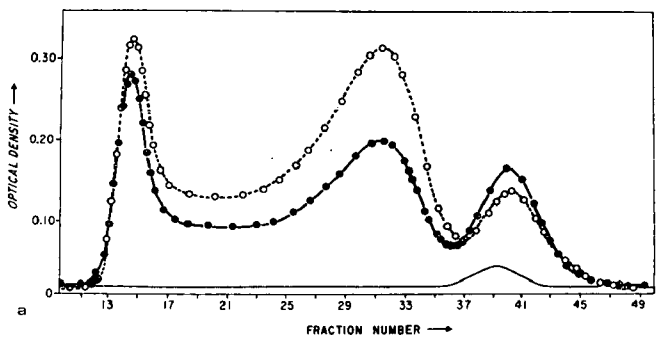


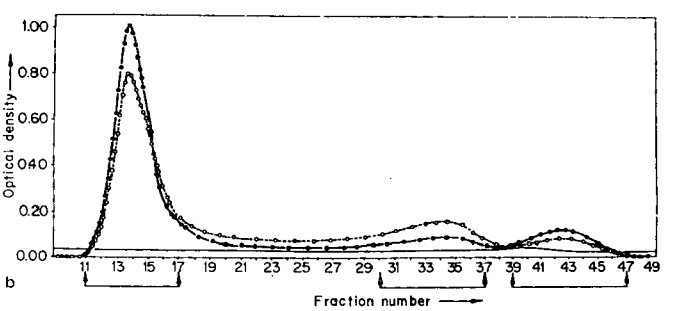
TABLE 389

CC ELUTION PROFILES OF RAT LIVER AND CALF THYMUS HISTONES
(S. E. BUSTOS-VALDES AND A. L. DOUNCE, *Arch. Biochem. Biophys.*, 136 (1970) 139–141)

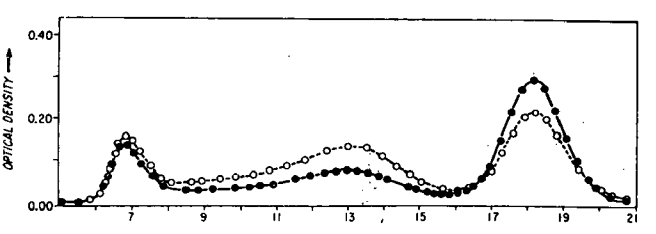
Column:	28.2 × 2.2 cm.
Sorbent:	Sephadex G-200.
Buffer system:	0.01 *N* HCl.
Operating conditions:	Room temperature, flow rate 4 ml·h^{-1}·cm^{-2}. Fractions of 3.2 ml collected. Void volume 35.2 ml.
Detection:	(●—●) Optical density at 260 nm; (○—○) optical density at 280 nm; broken line, conductance.



(a) Whole histone from rat liver cell nuclei isolated at pH 3.8 and subsequently subjected for a short time to pH 3.3.



(b) Whole histone solution from rat liver cell nuclei isolated at pH 5.8.



(c) Whole histone fraction from calf thymus cell nuclei isolated at pH 3.8.

TABLE 390

ELPHO SEPARATION OF FRUCTOSE 1,6-DIPHOSPHATE ALDOLASE ISOENZYMES OF *Rana pipiens*

(L.-J. CHEN, K. ADACHI AND H. J. SALLACH, *Biochim. Biophys. Acta*, 206 (1970) 165)

Sorbent:	Cellulose acetate strips (Gelman Sepraphore III) 2.5 × 17 cm.
Buffer:	0.06 *M* sodium barbital buffer pH 8.5 containing 1 m*M* EDTA and 2 m*M* β-mercaptoethanol.
Operating conditions:	25 V/cm, time to complete 2 h at 4°.
Detection:	According to K. ADACHI, L. J. CHEN AND H. J. SALLACH, *Biochem. Biophys. Res. Commun.*, 30 (1968) 343. The strips were stained for aldolase activity as follows. The staining solution contained 0.1 *M* Tris–HCl buffer, pH 7.5, 0.00015 *M* sodium arsenate, 0.001 *M* EDTA, 0.01 *M* FDP (fructose diphosphate) or 0.03 *M* FIP (fructose 1-phosphate), 0.001 *M* NAD, 0.12 mg/ml of rabbit muscle glyceraldehyde 3-phosphate dehydrogenase, 24 μg/ml of phenasine methosulphate and 0.5 mg/ml of nitroblue tetrazolium. A strip of cellulose acetate paper was soaked in this staining solution and then placed on a glass plate in a plastic box. After electrophoresis, the cellulose acetate strips containing the samples were placed on the staining strip and incubated in the dark at 37° for 10 to 20 min for colour development. After staining both sample and staining strips were soaked in 1% formalin for fixing.
Note:	Numbers designate individual zones of enzyme activity.

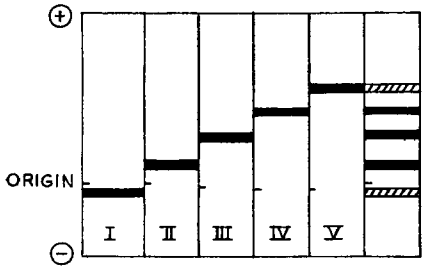


TABLE 391

CC ANION-EXCHANGE SEPARATION OF URANIUM

(O. A. VITA, C. R. WALKER, C. P. TRIVISONO AND R. W. SPARKS, *Anal. Chem.*, 42 (1970) 467)

Column: 28 × 1.7 cm.

Ion exchanger: Dowex 1 X8, 50–100 mesh.

Buffers:

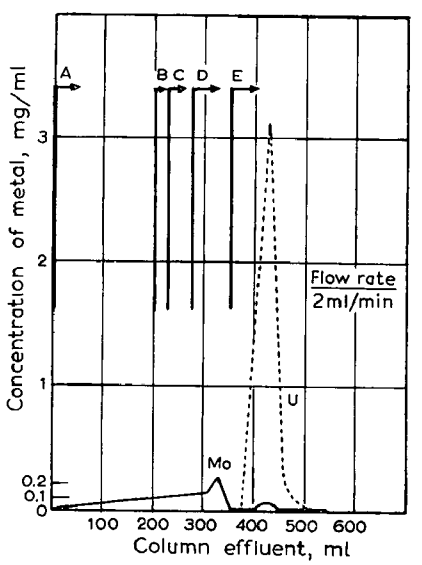
(I) A = 200 ml 1.9 *M* $Al(NO_3)_3$, 0.1 *M* HNO_3, 0.05 *M* HF; B = 25 ml 1.8 *M* $Al(NO_3)_3$; C = 50 ml 7.8 *M* $NaNO_3$; D = 75 ml 8 *M* HCl; E = 250 ml 0.1 *M* HCl; F = 512 mg of Mo was retained on the column.

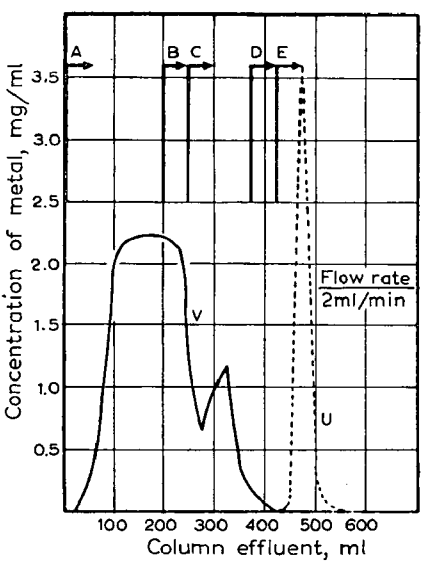
(II) A = 200 ml 1.9 *M* $Al(NO_3)_3$, 0.1 *M* HNO_3, 0.05 *M* F^-; B = 50 ml 1.9 *M* $Al(NO_3)_3$, 0.1 *M* HNO_3; C = 125 ml 8 *M* HCl; D = 50 ml 6 *M* HCl; E = 250 ml 0.1 *M* HCl.

(III) A = 200 ml 1.9 *M* $Al(NO_3)_3$, 0.5 *M* HNO_3, 1.2 *M* F^-; B = 50 ml, 1.9 *M* $Al(NO_3)_3$, 0.1 *M* HNO_3; C = 75 ml, 7.8 *M* $NaNO_3$; D = 75 ml, 8 *M* HCl; E = 75 ml, 6 *M* HCl; F = 250 ml, 0.1 *M* HCl.

Operating conditions: The resin was initially conditioned with the adsorption medium. For the salted nitrate exchange, 100 ml of 1.9 *M* $Al(NO_3)_3$–0.1 *N* HNO_3 solution was passed through the column at 2–4 ml/min; for the chloride exchange, 100 ml of 8 *M* hydrochloric acid was passed through the column at the same rate. Solutions containing up to 100 mg of uranium and other elements such as Mo and Zr were passed through the column at 2 ml/min during the adsorption phase.

Detection: Twenty five ml fractions were collected and analyzed for the respective elements by atomic adsorption or colorimetric techniques.





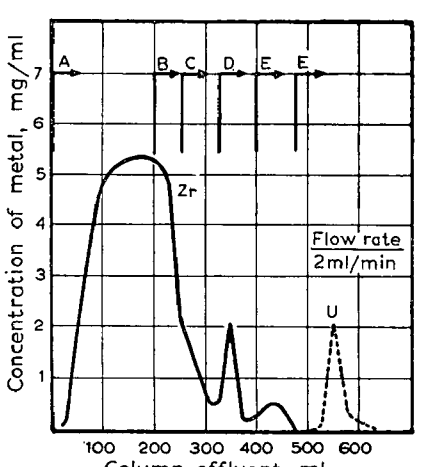


TABLE 392

CC PROPERTIES OF MOLECULAR WEIGHT MARKERS FOR SEPHADEX G-100 CHROMATOGRAPHY

(G. E. DEIBLER, R. E. MONTENSON AND M. W. KIES, *Biochim. Biophys. Acta*, 200 (1970) 346 and 347)

Column: 1.6 × 95 cm.
Sorbent: Sephadex G-100
Buffer: 0.01 *M* HCl.
Operating conditions: 5°, flow rate within 5–15 ml/h.
Detection: By optical density reading.

Protein	*Mol. wt.*	*Number of disulphide bonds*	*Mean charge per residue*
Ribonuclease	13 700	4	0.153
β-Lactoglobulin subunit	18 300	1	0.130
Soybean trypsin inhibitor	21 700	2	0.119
Trypsin	23 300	6	0.090
γ-Globulin L chain (reduced)	23 500	0	0.103
Chymotrypsinogen A	24 700	5	0.085
Carboxypeptidase A	34 600	1	0.114
Ovalbumin	44 000	1	0.119
γ-Globulin H chain (reduced)	51 600	0	0.111
Serum albumin	67 400	17	0.165

Protein	*Mol. wt.*	*Number of residues per chain*	*Mean charge per residue in 0.01 M HCl*
Cytochrome *c* (including ferroheme)	12 400	104	0.260
Reduced ribonuclease	13 700	124	0.153
Haemoglobin α chain	15 100	141	0.177
Haemoglobin β chain	15 900	146	0.164
Apomyoglobin	17 200	153	0.236
Lysine-rich histone	21 600	216	0.30

TABLE 393

CC DISTRIBUTION COEFFICIENTS, PERIODATE CONSUMPTION AND RELATIVE RESPONSE INDICES OF HYDROXY ACIDS IN AUTOMATIC COLUMN CHROMATOGRAPHY

(B. CARLSSON AND O. SAMUELSON, *Anal. Chim. Acta*, 49 (1970) 248)

Column: (A) Resin bed 4 × 700 mm (for the elution with 0.08 *M* sodium acetate).
(B) Resin bed 6 × 760 mm (for the elution with 0.5 *M* acetic acid).

Ion exchanger: (A) Dowex 1 × 8, 13–18 μm.
(B) Dowex 1 × 8, 24–27 μm.

Buffers: (A) 0.08 *M* sodium acetate, pH 5.9.
(B) 0.5 *M* acetic acid.

Operating conditions: (A) Flow rate 5.2 ml·cm^{-2}·min^{-1}, 30°.
(B) Flow rate 4.4 ml·cm^{-2}·min^{-1}, 30°.

Note: D_v refers to volume distribution coefficient. For the method of calculation see O. SAMUELSON, *Ion Exchange Separations in Analytical Chemistry*, Almquist and Wiksell, Stockholm, and Wiley, New York, 1963.
The periodate consumption of the eluted acids (mole per mole of acid) was calculated as $C_{max}w/af$, where C_{max} is the maximum decrease in the periodate concentration (m*M*) obtained from the peak height and the calibration curve, w the band width (ml) at half the band height, a the amount of acid (μmoles) applied to the column and f the fraction of the eluate passed through the periodate consumption channel. Four different ways of detection were used: (a) chromic acid oxidation, (b) colour reaction with carbazole, (c) periodate oxidation and subsequent determination of formaldehyde, and (d) periodate oxidation with subsequent determination of the periodate consumption.
The response indices are defined as the areas of the elution curves recorded in the more specific channels (b, c and d) divided by that recorded in the chromic acid channel.

Acid	D_v *value*		*Mole periodate per mole acid*	*Periodate index*[a]	*Formaldehyde index*	*Carbazole index*
	0.5 M HAc	*0.08 M NaAc*				
Erythronic	19.0		1.2	0.80	1.88	0.04
Threonic	19.2	10.9	1.7	0.90	1.72	0.03
Arabinonic	14.1	9.3	2.4	1.00	1.30	0
Lyxonic	19.4		2.2	0.97	1.53	0
Ribonic	9.1		1.7	1.05	1.30	0
Xylonic	15.6		2.5	1.01	1.38	0
Allonic	9.4		2.0	0.92	0.80	~0.01
Altronic	11.7		2.1	0.90	0.65	~0.01
Galactonic	11.3	8.0	2.2	0.95	0.87	~0.01
Gluconic	12.5	7.6	2.0	1	1	~0.01
Gulonic	13.5		2.4	1.01	1.11	~0.01
Idonic	12.6	7.1	2.3	0.96	0.92	~0.01
Mannonic	17.8	9.6	2.6	1.00	1.17	~0.01
Talonic	6.2		2.1	1.11	1.06	~0.01
6-Deoxy-mannonic	19.2	11.3	2.2	0.95	0	0
Melibionic	4.65	2.96	2.3	0.40	0	0.06
Lactobionic	5.10	3.46	1.5	0.30	0.50	0.07
α-D-Glucoisosaccharinic	6.01		0.7	0.50	1.80	0.07
β-D-Glucometasaccharinic	9.4		1.0	0.41	1.14	0.09
α-D-Glucosaccharinic	5.45		1.4	0.90	1.20	0
3,4-Dihydroxybutyric	3.37		0.9	0.70	1.42	0
2,3-*threo*-Dihydroxybutyric	16.7		1.0	0.77	0	0
2,3-*erythro*-Dihydroxybutyric	21.8		0.9	0.71	0	0
2,4-Dihydroxybutyric	14.5		0	0	0	0.04
Glycolic	18.7	15.0	0	0	0	0.10
Lactic	15.1	13.8	0	0	0	0.04
Glyoxylic		21.7	0.5	0.67	0.02	0.70

[a] The reported periodate consumption and the relative response indices refer to runs in acetic acid except for glyoxylic acid which was studied only in sodium acetate.

TABLE 394

CC PROFILES OF LYSOSOMAL ENZYMES

(M. MATSUNAGA, N. SAITO, J. KIRA, K. OGINO AND M. TAKAYASU, *Jap. Circ. J.*, 33 (1969) 547–548)

Buffer systems: For gel filtration, 0.9% saline; for DEAE-cellulose chromatography, linear gradient consisting of 0.05 *M* Tris–phosphate buffer, pH 8.0 and 1 *N* sodium chloride–0.01 Tris–phosphate, pH 8.0.

Operating conditions: Flow under gravity, flow rate within conventional limits, chromatography at 4°.

Detection: Angiotensinase activity: 0.25–0.50 μg of asparaginyl[1]-valyl[5]-angiotensin II (Hypertensin CIBA), 1.0 ml of 0.5 *M* Tris–acetic acid buffer and a sample in a total volume of 40 ml were incubated at 37° for 15–30 min.
Arylamidase activity, by the method of S. MAHADEVAN AND A. L. TAPPEL, *J. Biol. Chem.*, 242 (1967) 2369 in the presence of $2 \cdot 10^{-3}$ *M* dithiothreitol.
Catheptic activity, cathepsin A: 0.3 ml of a sample was incubated with 0.2 ml of 0.1 *M* carbobenzoxy-L-glutamyl–L–tyrosine (cbz–glu–tyr) as substrate and 1.5 ml of 0.2 *M* acetate buffer, pH 5.0, at 37° for 60 min. Reaction was stopped by adding 2 ml of 10% (w/v) trichloroacetic acid. After filtration tyrosine was assayed by the ninhydrin reaction in the filtrate.
Total protein: by optical density at 280 nm.

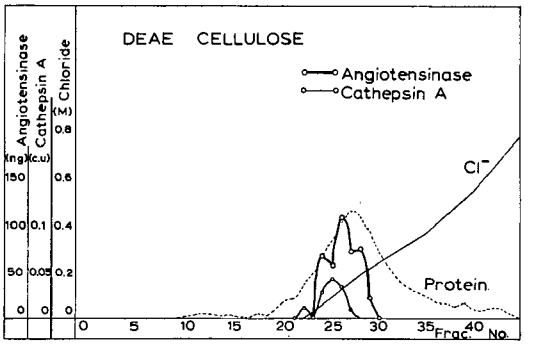


TABLE 395

CC SEPARATION OF PYRIMIDINE ISOPLITHS (OLIGONUCLEOTIDES OF A PARTICULAR CHAIN LENGTH INDEPENDENT OF COMPOSITION OR SEQUENCE)

(R. SALMON AND A. M. KAYE, *Biochim. Biophys. Acta*, 204 (1970) 342)

Column: 50 × 1 cm.

Ion exchanger: DEAE cellulose.

Buffer system: Linear NaCl gradient from 0–0.1 *M*, in 7 *M* urea, buffered with 0.1 *M* sodium acetate to pH 5.5 (system according to K. PETERSEN AND G. B. REEVES, *Biochim. Biophys. Acta*, 129 (1966) 438).

Operating conditions: Room temperature, fractions of 3 ml collected, flow rate generally low, not strictly specified.

Detection: Optical density at 271 nm.

Note: Column loaded with a hydrolysate of 50 mg of calf thymus DNA. Numbers designate the number of pyrimidine residues in the particular isoplith. The first three numbered peaks represent only a portion of the pyrimidine fraction since the pyrimidine mixture was dialysed for 40 h against 200 ml of water and only a portion of diffusate was returned. Pu = purine mononucleosides.

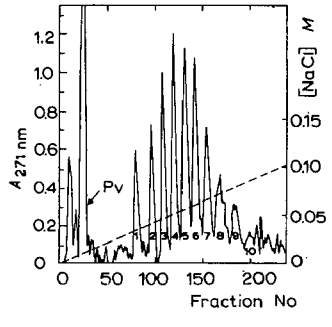


TABLE 396

CC SEPARATION OF NATIVE AND DENATURED MOUSE LS-CELL [^{32}P]DNA
(W. M. BECKER, A. HELL, J. PAUL AND R. WILLIAMSON, *Biochim. Biophys. Acta*, 199 (1970) 356)

Column:	1 cm column containing 1–1.5 g (wet weight) of hydroxylapatite.
Sorbent:	Hydroxylapatite, washed before use in boiling water bath, succesively with 1 *M* potassium phosphate buffer, 0.3 *M* potassium phosphate buffer and distilled water.
Buffer system:	100 m*M* KCl, 2 m*M* Tris–HCl, pH 7.3.
Operating conditions:	Column run at 70°. Firstly the column was washed with 0.03 *M* potassium phosphate and 0.1 *M* KCl to remove unretained material. The phosphate concentration of the eluent was increased in a linear gradient obtained by mixing 6 ml each of 0.03 *M* and 0.1 *M* potassium phosphate buffers containing 0.1 *M* KCl. Elution continued with 6 ml 0.1 *M* phosphate without KCl followed by a second linear gradient prepared by mixing 12 ml each of 0.10 *M* and 0.25 *M* potassium phosphate buffers. Fractions of 1.2 ml collected, conventional flow rate range.
Detection:	Optical density at 260 nm.
Note:	(A) Designates native and (B) denatured mouse LS-cell DNA.

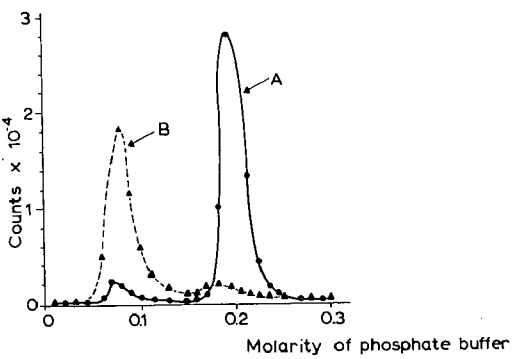


TABLE 397

CC BEHAVIOUR OF HEMAGGLUTINATING PROTEINS FROM LIMA BEANS
(N. R. GOULD AND S. L. SCHEINBERG, *Arch. Biochem. Biophys.*, 137 (1970) 4)

Column:	6 × 110 cm.
Sorbent:	Bio-Gel A 0.5.
Buffer system:	0.1 *M* phosphate buffer, pH 6.8.
Operating conditions:	Flow rate 50 ml/h, room temperature.
Detection:	Optical density at 280 nm.
Note:	Numbers designate fractions with hemagglutinating activity.

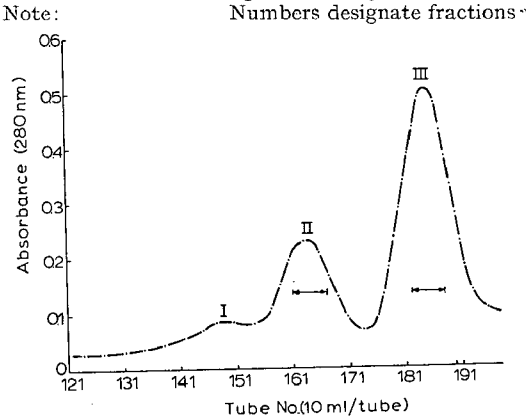


TABLE 398

CC CATION-EXCHANGE STUDIES OF CADMIUM

(S. B. AKKI AND S. M. KHOPKAR, *Z. Anal. Chem.*, 249 (1970) 229)

Column: 1.4 × 20 cm (contains 17.33 g of dry resin).
Ion exchanger: Dowex 50W X8.
Buffers: As indicated in the table.
Operating conditions and detection: An aliquot 19.92 mg of Cd was sorbed on the column. After rinsing the column with 10 ml of water, elution was carried out with various eluants (see table). The effluent was collected in 10 ml fractions and Cd determined volumetrically (for details of the detection procedure see A. I. VOGEL, *The Textbook of Quantitative Inorganic Analysis*, Longman Green 1961, p. 389). Flow rate within conventional limits.

Eluant		*Dead elution volume* $V_{max.}$ *(ml)*	*Total volume for full recovery* V_t *(ml)*	*Elution* (%)	*Elution constant* E	*Vol. distribution coefficient* D_v
HCl	0.5 *M*	150	200	101.0	0.23	0.043
	1.0 *M*	30	150	102.5	2.52	0.396
	2–4 *M*	20	100	101.9	13.98	0.072
HNO_3	2.0 *M*	150	200	102.6	0.23	0.043
	3.0 *M*	40	150	98.5	1.39	0.721
	4.0 *M*	20	150	100.9	13.98	0.072
H_2SO_4	1.0 *M*	150	200	100.9	0.23	0.043
	2.0 *M*	40	150	99.3	1.39	0.721
	4.0 *M*	20	150	100.9	13.98	0.072
CH_3COONH_4	0.5 *M*	150	200	100.9	0.23	0.043
	1–3 *M*	100	100	101.4	0.37	0.027
	4.0 *M*	50	100	98.9	0.95	0.011
KI	4 %	40	100	100.9	1.39	0.721
	5 %	30	100	102.3	2.52	0.396
	10 %	20	100	99.3	13.98	0.072
NaCl	2.5 %	150	200	102.6	0.23	0.043
	5 %	30	100	101.4	2.52	0.396
NH_4Cl	2.5 %	150	200	103.6	0.23	0.043
	5 %	20	50	101.2	13.98	0.072
$HClO_4$	4.0 *M*	150	200	100.4	0.23	0.043
NH_4Br	0.5	50	100	101.2	0.95	0.011
$NaNO_3$	1.5 *M*	150	200	98.8	0.23	0.043
	2.0 *M*	100	200	99.4	0.37	0.027
	1 *M* + 2 *M* HNO_3	150	200	101.7	0.23	0.043
EDTA	0.15 *M*	50	50	100.1	0.95	0.011

TABLE 399

CC OF METAL–EDTA COMPLEXES

(J. VANDERDEELEN, *Anal. Chim. Acta*, 49 (1970) 361)

Columns: (A) 24.5 cm × 0.95 cm^2.
(B) 27.2 cm × 0.95 cm^2.
(C) 17.3 cm × 0.95 cm^2.
(D) 21.7 cm × 0.95 cm^2.

Ion exchanger: Dowex 2-X8, 200–400 mesh (74–36 μ).

Buffers: (A) 0.1 *M* potassium chloride.
(B) 0.5 *M* sodium acetate.
(C) 0.5 *M* ammonium acetate.
(D) Hydrochloric acid.

Operating conditions: Flow rates: (A) 0.25 $ml \cdot min^{-1} \cdot cm^{-2}$; (B) 0.21 $ml \cdot min^{-1} \cdot cm^{-2}$; (C) 0.47 $ml \cdot min^{-1} \cdot cm^{-2}$; (D) 0.31 $ml \cdot min^{-1} \cdot cm^{-2}$. Fractions of 5 ml collected, all operations at room temperature.

Detection: The contents of Mn, Fe, Co and Zn were determined radiochemically and those of Cr, Cu and Ni colorimetrically, after destruction of the organic sequestering agent (for more details about the detection procedure see C. DUVAL, *Traité de Micro-analyse Minérale*, Press Scient. Int., Paris, 1956).

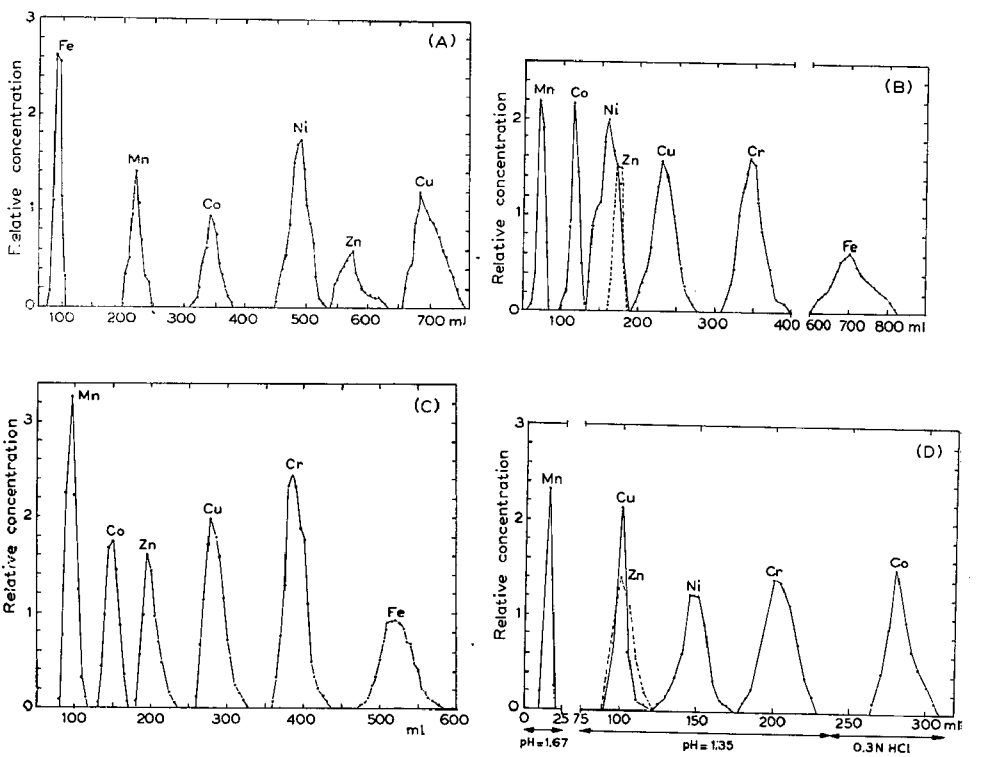
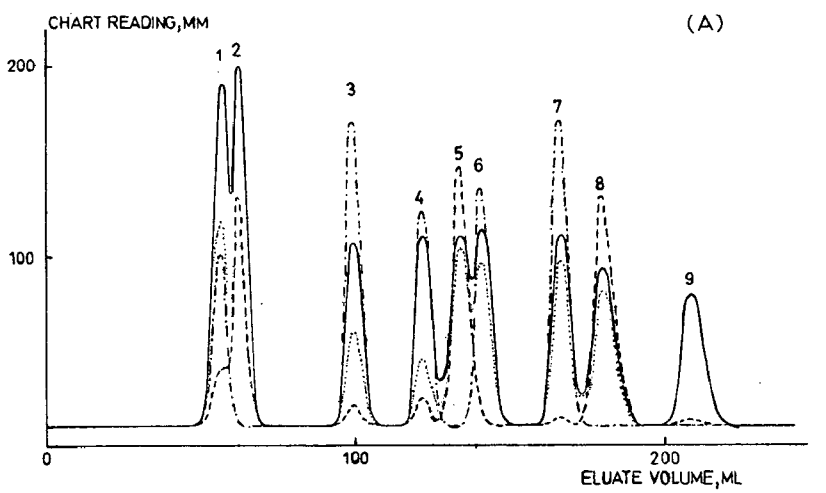


TABLE 400

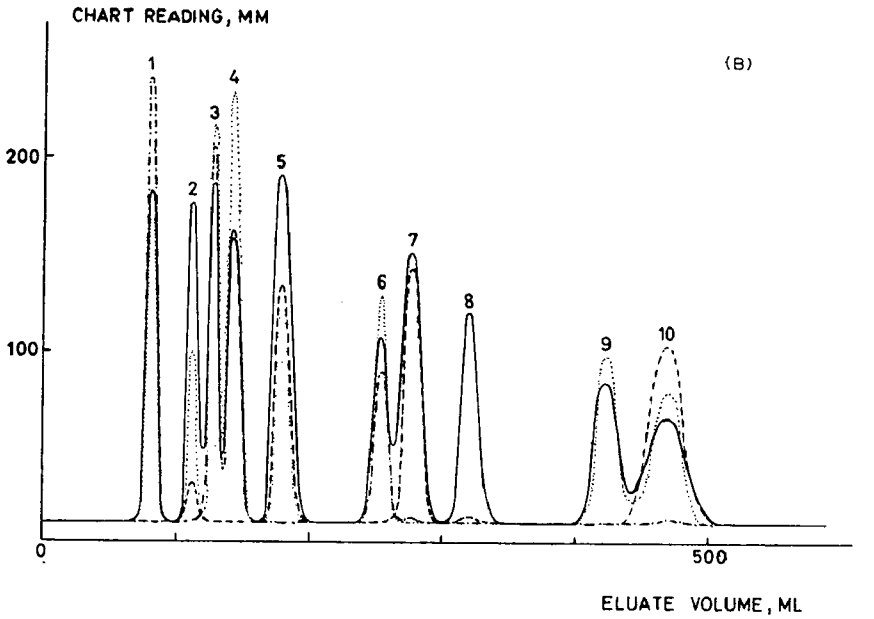
CC ANION-EXCHANGE SEPARATION OF HYDROXY ACIDS

(B. CARLSSON AND O. SAMUELSON, *Anal. Chim. Acta*, 49 (1970) 250)

Column:	(A) Resin bed 4 × 700 mm (for the elution with 0.08 *M* sodium acetate). (B) Resin bed 6 × 760 mm (for the elution with 0.5 *M* acetic acid)
Ion exchanger:	(A) Dowex 1 × 8, 13 × 18 μm. (B) Dowex 1 × 8, 24 × 27 μm.
Buffers:	(A) 0.08 *M* sodium acetate, pH 5.9. (B) 0.5 *M* acetic acid.
Operating conditions:	(A) Flow rate 5.2 ml·cm^{-2}·min^{-1}, 30°. (B) Flow rate 4.4 ml·cm^{-2}·min^{-1}, 30°.
Detection:	Four channel analyser: the eluate is divided into four streams which are subjected to the following reactions: (1) chromic acid oxidation, (2) colour reaction with carbazole, (3) periodate oxidation and subsequent determination of formaldehyde, (4) periodate oxidation with subsequent determination of periodate consumption.
Notes:	Numbers in chromatograms designate the following compounds: (A) Elution with 0.08 *M* sodium acetate: 1 = lactobionic acid; 2 = 2-O-(α-D-galactopyranosyluronic acid)-L-rhamnose; 3 = α-D-glucoisosaccharinic acid; 4 = β-D-glucometasaccharinic acid; 5 = D-galacturonic acid; 6 = D-arabinonic acid; 7 = D-threonic acid; 8 = D-glucuronic acid; 9 = lactic acid. (B) Elution with 0.5 *M* acetic acid: 1 = 3,4 dihydroxybutyric acid; 2 = mellibionic acid; 3 = α-D-glucosaccharinic acid; 4 = talonic acid; 5 = 2-O-(α-D-galactopyranosyluronic acid)-L-rhamnose; 6 = galactonic acid; 7 = 2-O-(4-O-methyl-α-D-glucopyranosyluronic acid)-D-xylose; 8 = 2,4-dihydroxybutyric acid; 9 = rhamnoic acid; 10 = D-galacturonic acid.



Designation of channels in chromatogram (applicable for both types of elution): (———) chromic acid channel; (– – – –) carbazole channel; (–·–·–) periodate–formaldehyde channel; (·····) periodate consumption channel.



Designation of channels in chromatogram (applicable for both types of elution): (———) chromic acid channel; (– – – –) carbazole channel; (–·–·–) periodate–formaldehyde channel; (·····) periodate consumption channel.

TABLE 401

ELPHO, PC, TLC LOCATION OF AMINO ACIDS AND ANALOGOUS COMPOUNDS ON CHROMATOGRAMS AND ELECTROPHEROGRAMS

(M. GUYER JR. AND E. SAWICKI, *Anal. Chim. Acta*, 49 (1970) 182)

Detection: Spray the chromatogram with dimethyl sulphoxide. Dry the chromatogram with gentle heat with a hair dryer. Next spray the chromatogram with the 7,7,8,8-tetracyanoquinodimethan solution. Let the chromatogram air dry for 15 min at room temperature. Record the visible colours and then put the chromatogram under the UV light for 5 min. Record the fluorescent colours at the end of the 5 min period. Applicable for Whatman papers and silica gel plates.

Compound[a]	*Determination limit* ($\mu g/cm^2$)			
	Visible colour[b]		*Fluorescence colour*	
	Si Gel	*Paper*	*Si Gel*	*Paper*
Alanine	G (5)	Br (2)	O (20)	—[c]
Cystathionine	Br (20)	G (3)	O (10)	O (10)
o-Aminoacetophenone	O (10)	—[d]	P (20)	—
γ-Aminobutyric acid	G (2)	Y (2)	O (2)	O (2)
DL-β-Aminoisobutyric acid	G (3)	G (5)	Y (3)	Y (10)
2-Aminoethanol	G (3)[e]	G (2.5)[e]	O (2)	O (2)
Arginine	O (20)	B (2)	O (10)	O (10)
L-Arterenol bitartrate	G (10)	G (1)	—	—
Asparagine	P (2)	Br (20)	O (20)	—
Aspartic acid	BrP (20)	BrP (10)	—	—
D-Azetidine-2-carboxylic acid	G (3)	G (3)	P (3)	P (10)
n-Butylamine	G (10)	—	O (10)	—
Canavanine	P (1)	BrP (2)	—	—
Carbazole	—	P (10)	—	—
Carnosine	G (3)	G (3)	YG (10)	Y (10)
Chymotrypsin	G (20)	G (10)	O (10)	O (10)

(*continued on*

TABLE 401 (*continued*)

Compound[a]	*Determination limit* ($\mu g/cm^2$)			
	Visible colour[b]		*Fluorescence colour*	
	Si Gel	*Paper*	*Si Gel*	*Paper*
Cysteic acid	G (20)	G (2)	O (20)	—
Cytochrome C	G (10)	G (10)	O (10)	—
L-Djenkolic acid	Br (3)	BrP (3)	O (20)	O (3)
Ethylenediamine	G (1)	Y (20)	O (1)	O (3)
γ-Globulin (human)	—	G (10)	—	Y (20)
D-Glucosamine	YG (10)	YG (10)	Y (10)	Y (1)
Glutamic acid	O (20)	Br (10)	—	O (10)
Glutamine	Br (10)	Br (2)	O (10)	O (2)
Glycine	P (2)	P (2)	—	—
Haemoglobin (human)	G (20)	G (10)	O (20)	—
Histidine	G (3)	G (3)	O (10)	O (20)
Hydroxylysine	G (3)	G (3)	O (20)	—
Hydroxyproline	G (10)	G (3)	YO (3)	Y (20)
2,2′-Iminodiethanol	Y (10)	G (10)	Y (10)	G (10)
Indole	G (20)[f]	G (3)[f]	—	—
Isoleucine	Br (3)	Br (5)	YO (10)	O (2)
Leucine	O (10)	Br (2)	O (10)	O (10)
Lysine	G (2)	Br (5)	O (2)	O (2)
Methionine	O (20)	Br (2)	O (10)	O (20)
L-1-Methylhistidine	Br (10)	BrP (10)	O (10)	O (10)
N-(-1Naphthyl)ethylene diamine	YG (10)	G (10)	P (10)	O (1)
DL-Norleucine	O (20)	Br (2)	O (10)	O (10)
Phenylalanine	Br (10)	Br (2)	O (10)	O (20)
Pipecolic acid	G (3)	Br (2)	Y (20)	O (2)
Piperazine	W (10)[g]	G (1)[g]	Y (10)	—
Proline	G (2)	G (2)	B (2)	O (2)
Ribonuclease A	G (20)	G (10)	—	O (20)
Serine	G (5)	Br (5)	O (20)	—
Taurine	G (5)	G (20)	O (2)	OY (2)
L-2-Thiohistidine	G (3)	G (2)	—	—
Thiourea	B (1)	B (1)	—	—
Threonine	P (2)	Br (2)	G (20)	—
Trypsin	G (10)	G (10)	O (10)	O (10)
Tryptamine	Y (10)	G (10)	Y (10)	Y (10)
Tryptophan	P (10)	P (10)	—	—
Tyrosine	G (2)	Br (20)	O (20)	—
Valine	Br (3)	Br (2)	YO (10)	O (10)

[a] Negative results with betaine, cytosine, diethylamine, glycocyamine, pepsin, pyrrol, *p*-tosylglycine and urea.

[b] B = blue; Br = brown; G = green; O = orange; P = purple; Y = yellow; W = white.

[c] — = negative at 20 μg.

[d] Turns brown-purple after 10 min under UV light.

[e] Gives a green visible colour without the dimethyl sulfoxide, and with the TCNQ reagent only; colour fades after 15 min.

[f] Turns blue after 5 min under UV light.

[g] Turns orange after 10 min under UV light.

TABLE 402

CC SEPARATION OF ASPARTATE KINASE (AK) AND HOMOSERINE DEHYDROGENASE (HDH)
(M. ROBERT-GERO, M. POIRET AND G. N. COHEN, *Biochim. Biophys. Acta*, 206 (1970) 21)

Column:	36 × 3.8 cm.
Ion exchanger:	DEAE Sephadex A-50.
Buffers:	The proteins were eluted by a linear KCl gradient. The total volume of the gradient was 2,500 ml. The concentration of KCl ranged from 0.15 *M* to 0.35 *M*. Under these conditions aspartate kinase was eluted within the range of 0.235–0.26 *M* KCl while homoserine dehydrogenase was eluted between 0.265–0.30 *M* KCl.
Operating conditions:	Flow rate within conventional limits, loading 50–100 mg of sample per 1 g of dry gel.
Detection:	By optical density reading, by AK and HDH activity.

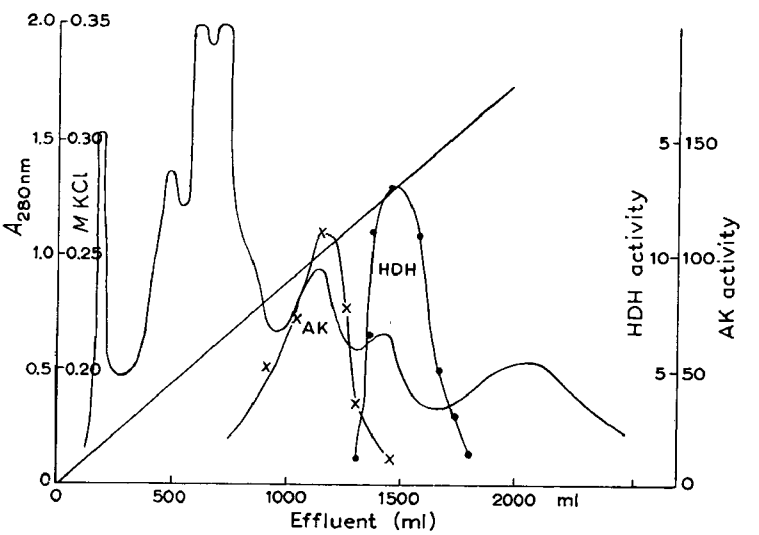


TABLE 403

CC OF Mg, Ca, Sr, Ba, Y AND Ra PRESENT IN MILK AND BONE ASH

(M. SENEGAČNIK, Š. PALJK AND J. KRISTIAN, *Z. Anal. Chem.*, 249 (1970) 41)

Column:	1.7 × 55 cm resin bed, 110 ml.
Ion exchanger:	Dowex 50W X8 (50–100 mesh), NH_4^+ form.
Buffers:	Step-wise elution with buffers indicated in the figure.
Operating conditions:	Sorption rate 10 ml/min, elution rate 5 ml/min, 20–25°. In the run presented the column was loaded with a synthetic leaching residue containing 50 mg of Mg, 2000 mg of Ca, $^{90}Sr + {}^{90}Y$ + 30 mg of Sr, 30 mg of Ba, ^{224}Ra in 150 ml of distilled water.
Detection:	Counting of radioactivity.
Notes:	Concentrations in elution peaks: C_m (^{90}Y) = 800 imp./min × ml; C_m(Mg) = 0.32 mg/ml; C_m(Ca) = 9.90 mg/ml; C_m(^{90}Sr) = 0.34 mg/ml; C_m(Ba) = 0.084 mg/ml; C_m(Ra) = 1900 imp./min × ml.

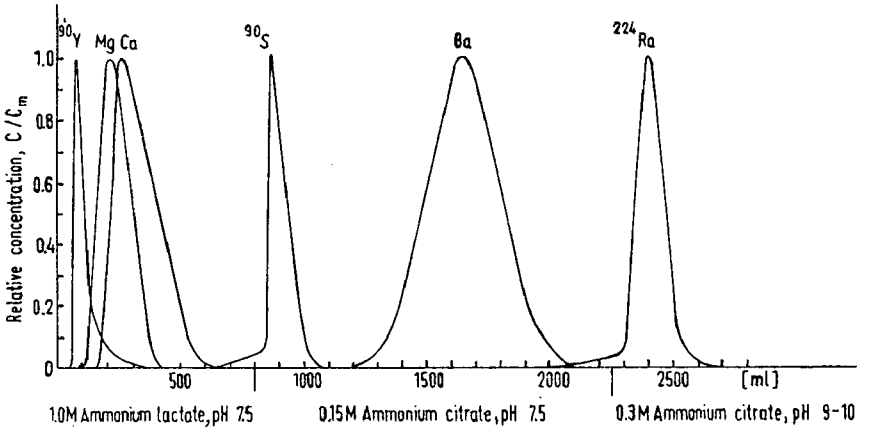


TABLE 404

ELPHO BEHAVIOUR OF HORSERADISH PEROXIDASE. ISOELECTRIC FOCUSING

(H. DELINCÉE AND B. J. RADOLA, *Biochim. Biophys. Acta*, 200 (1970) 406)

Operating conditions: The separations were carried out on 20 × 20 or 40 × 20 cm plates, coated with Sephadex Superfine G75 suspension containing 1 % of carrier ampholyte LKB in the pH range 3–10. The layer was 0.75 mm thick.

Detection: After completion of a run a print was taken with a Whatman No. 3MM paper. For detection of the peroxidase activity, the paper was impregnated with a methanolic solution of urea–peroxide and *o*-toluidine containing 0.5 % of each reagent. Although with other substrates higher sensitivity could be achieved, *o*-toluidine was chosen as hydrogen donor with the best quantitative response on densitometric evaluation in the peroxidase concentration used. Gels were loaded with 100-200 μg of protein.

Note: Grouping of peaks (I–IV) according to the activity and pH values. The dotted line indicates the pI of the particular fraction. Electrophoretic profile: densitomeric record.

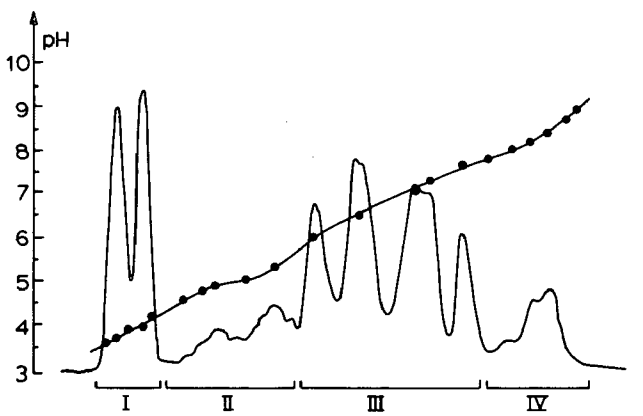


TABLE 405

ELPHO BEHAVIOUR OF MITOCHONDRIAL AND CYTOPLASMIC MALATE DEHYDROGENASES (MDH)

(P. S. PERLMAN AND H. R. MAHLER, *Arch. Biochem. Biophys.*, 136 (1970) 256)

Sorbent:	Starch gel according to O. SMITHIES, (*Biochem. J.*, 61 (1958) 629)
Buffer:	0.03 *M* Tris–HCl buffer, pH 7.4.
Operating conditions:	70 mA, 300 V per gel, gel size 6.5 × 20 × 250 mm.
Detection:	The malate dehydrogenase bands were detected by the following modification of the staining bath described by WIEME *et al.* (*Clin. Chim. Acta*, 7 (1960) 750). 40 ml of 0.1 *M* Tris–HCl buffer, pH 8.5, 1.5 ml of 1 *M* sodium L-malate, 20 mg nitro blue tetrazolium, 3.5 mg phenazine methosulphate and 0.5 ml of NAD^+ (40 mg/ml). After staining ethanol–acetic acid–water (70:5:25) was used for fixation.
Note:	Numbers designate individual fractions of MDH activity.

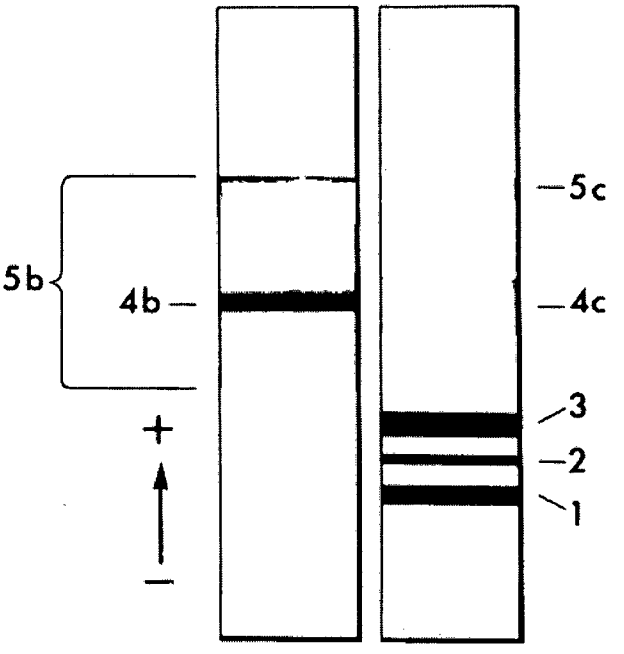


TABLE 406

PC R_F VALUES OF SOME ALIPHATIC SULPHUR AND NITROGEN-CONTAINING COMPOUNDS

(G. N. BONDAREV, S. A. GRACHEV, G. I. MUS AND E. V. LEONOVA, *Zh. Anal. Khim.*, 25 (1970) 1220)

Paper: P_1 = FN-1 (Niederschlag).
P_2 = Whatman Cellulose Phosphate Paper P81.
Solvents: S_1 = Ethanol–2-propanol–1 *N* HCl (2:2:1).
S_2 = Pyridine–butanol–water (1:1:1).
Detection: Ninhydrin or benzidine.

Compound	R_F		
	P_1S_1	P_2S_1	P_1S_2
Cysteamine	0.54	0.52	0.53
Cystamine	0.14	0.03	0.18
Mixed cysteine and cysteamine disulphide	0.13	0.02	—
Cystine	0.15	0.03	0.17
Thiotaurine	0.43	0.36	0.57
Hypotaurine	0.42	0.25	0.37
Cystamine disulphoxide	0.12	0.03	0.11
Cysteine	0.54	0.37	0.25
Taurine	0.34	0.21	0.48
S-Acetylcysteamine	0.59	0.59	0.88
Cysteic acid	0.31	0.18	0.38
Methionine	0.66	0.61	0.55
Sulphate ion	0.74	0.21	—

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