

TABLE 1

R_F VALUES OF SOME NITRO-DERIVATIVES OF SULPHAMIDOBENZOIC ACIDS
(J. FRANC, *Collection Czechoslov. Chem. Commun.*, 24 (1959) 3881)

Solvent: *n*-Butanol-pyridine-water (5:3:3).

Paper: Whatman No. 4 (descending).

Length of run: 23 cm.

Time: 4h.

Temperature: 24°.

Detection: Ehrlich reagent after Zn(II)-chloride reduction.

<i>Benzoic acid derivative</i>	R_F
3-Nitro-4-sulphamido-	0.64
2-Nitro-4-sulphamido-	0.95
4-Nitro-2-sulphamido-	0.75
6-Nitro-2-sulphamido-	0.65
5-Nitro-2-sulphamido-	0.96
3,5-Dinitro-4-sulphamido-	0.28
2,3-Dinitro-4-sulphamido-	0.17
2,5-Dinitro-4-sulphamido-	0.75
4,6-Dinitro-2-sulphamido-	0.75
3,6-Dinitro-2-sulphamido-	0.38
2,5,6-Trinitro-4-sulphamido-	0.71
2,3,5-Trinitro-4-sulphamido-	0.33
3,4,6-Trinitro-2-sulphamido-	0.38

TABLE 2

ELECTROPHORETIC MOBILITIES OF SOME NITRO-DERIVATIVES OF
SULPHAMIDOBENZOIC ACIDS AND RELATED SUBSTANCES
(J. FRANC, *Collection Czechoslov. Chem. Commun.*, 24 (1959) 3881)

Electrolyte: 3 *N* NH₄OH (pH > 10).

Paper: Whatman No. 1.

Potential: 6-7 V/cm.

Current: 2-6 mA.

Time of run: 2 h.

Migration units: cm²·V⁻¹·sec⁻¹ × 10⁵ (mobility). Anionic movement: +; cationic movement: —.

<i>Compound</i>	<i>Mobility</i>
3-Nitrophthalic acid *	+ 20.5
<i>o</i> -Toluenesulphamide	— 2.8
<i>p</i> -Toluenesulphamide	— 2.8
4-Sulphamido-3-nitrobenzoic acid	+ 8.4
2-Sulphamido-4-nitrobenzoic acid	+ 8.4

* Marker.

TABLE 3

ELECTROPHORETIC MOBILITIES OF AROMATIC COMPOUNDS

(J. FRANC AND M. WURST, *Collection Czechoslov. Chem. Commun.*, 24 (1959) 857)*Electrolytes: $E_1 = 3 N NH_4OH$ (pH > 10). $E_2 = 1 N CH_3COOH$ (pH 2.3).

Paper: Whatman No. 1 (13 × 45 cm).

Potential: 6-7 V/cm.

Current: 2-6 mA.

Time of run: 2 h.

Migration units: $cm^2 \cdot V^{-1} \cdot sec^{-1} \times 10^5$ (mobility).

Compound	Mobility**	
	E_1	E_2
<i>Acids</i>		
3-Nitrophthalic acid	20.5	6.4
4-Nitrophthalic acid	20.5	5.0
2-Nitroterephthalic acid	20.5	6.3
5-Nitroisophthalic acid	21.1	3.3
3-Nitrobenzoic acid	11.6	1.3
4-Nitrobenzoic acid	11.6	1.4
3,5-Dinitrobenzoic acid	11.1	1.9
2,4,6-Trinitrobenzoic acid	10.0	8.8
2,4,5-Trinitroterephthalic acid	20.3	—
3,5-Dinitro- <i>o</i> -toluic acid	11.4	—
3,5-Dinitro- <i>p</i> -toluic acid	11.4	—
2,3,5-Trinitro- <i>p</i> -toluic acid	11.1	—
3-Nitro- <i>p</i> -toluic acid	11.4	—
2,4-Dinitro- <i>m</i> -toluic acid	11.6	—
2-Aminobenzoic acid	12.3	1.8
3-Aminobenzoic acid	11.5	6.2
4-Aminobenzoic acid	11.6	3.0
2-Hydroxybenzoic acid	15.5	2.7
4-Hydroxybenzoic acid	20.3	0.9
Gallic acid	19.5	0.6
2-Hydroxy-3-methoxybenzoic acid	13.5	2.8
<i>Aldehydes</i>		
3-Methoxy-4-hydroxybenzaldehyde	10.7	0.7
3,4-Dimethoxybenzaldehyde	0.5	1.4
2-Hydroxy-3-ethoxybenzaldehyde	11.8	1.6
3-Hydroxy-4-methoxybenzaldehyde	11.7	1.3
2-Nitrobenzaldehyde	0.0	0.0
3-Nitrobenzaldehyde	0.0	0.0
4-Nitrobenzaldehyde	0.0	0.0
4-Chlorobenzaldehyde	0.0	0.0
4-Methoxyacetophenone	0.0	0.4
<i>Amines</i>		
2-Nitraniline	0.0	— 0.8
3-Nitraniline	0.0	— 3.9
4-Nitraniline	0.0	— 0.6
2,4-Dinitraniline	0.0	0.0
1-Naphthylamine	— 0.7	— 10.4
<i>p</i> -Phenylenediamine	— 3.7	— 20.6

(continued on p. D3)

TABLE 3 (continued)

Compound	Mobility**	
	E_1	E_2
<i>Phenols</i>		
2-Nitrophenol	12.5	0.0
3-Nitrophenol	11.4	0.0
4-Nitrophenol	11.3	0.0
2,4-Dinitrophenol	10.1	0.0
2,6-Dinitrophenol	12.0	0.0
4,6-Dinitro- <i>o</i> -cresol	8.7	0.7
5-Nitro-1,3,4-xylene	11.4	—
2,4,6-Trinitroresorcinol	17.2	7.4
4,6-Dinitro-2-aminophenol	9.1	—
1-Naphthol	9.6	0.0
Resorcinol	18.4	0.0
<i>Nitroderivatives</i>		
1,3-Dinitrobenzene	0.0	0.0
3,4,6-Trinitro- <i>o</i> -xylene	0.0	0.0
2,4,6-Trinitro- <i>m</i> -xylene	0.0	0.0
2,3,5-Trinitro- <i>p</i> -xylene	0.0	0.0
1,4-Dichloro-2-nitrobenzene	0.0	0.0
2,6-Dichloro-4-nitrobenzene	0.0	0.0
<i>Naphthylamine- and naphthol-sulphonic acids</i>		
1-Naphthylamine-4-sulphonic acid	9.3	4.5
1-Naphthylamine-5-sulphonic acid	9.5	0.0
1-Naphthylamine-6-sulphonic acid	8.9	0.0
1-Naphthylamine-7-sulphonic acid	8.9	0.0
1-Naphthylamine-8-sulphonic acid	9.5	0.0
2-Naphthylamine-1-sulphonic acid	9.6	6.2
2-Naphthylamine-6-sulphonic acid	9.3	0.0
2-Naphthylamine-5-sulphonic acid	9.3	0.0
2-Naphthylamine-7-sulphonic acid	9.3	0.0
1-Naphthylamine-3,6-disulphonic acid	20.4	13.4
1-Naphthylamine-3,6,8-trisulphonic acid	26.6	14.9
1-Naphthol-4-sulphonic acid	20.0	7.1
1-Naphthol-5-sulphonic acid	20.1	7.2
2-Naphthol-6-sulphonic acid	19.4	7.0
2-Naphthol-8-sulphonic acid	20.3	7.2
2-Naphthol-3,6-disulphonic acid	24.0	13.0
2-Naphthol-6,8-disulphonic acid	25.3	13.0
1-Naphthol-3,6,8-trisulphonic acid	—	17.2
H-acid	25.8	11.7
Chromotropic acid	27.3	10.5

* First published in *Chem. listy*, 52 (1958) 1474.

** Anionic movement: +; cationic movement: —. No correction for electrolyte movement through the paper as a result of electroendosmosis, evaporation etc.

TABLE 4

R_F VALUES OF SOME CHLORONITRONAPHTHALENES(J. FRANC, *Collection Czechoslov. Chem. Commun.*, 24 (1959) 3624)

Solvents: Stationary phases:

 S_1 = Liquid paraffin (boiling range: 190–275°) (impregnated as 20% solution in petroleum ether). S_2 = Diethylformamide. S_3 = Dimethylformamide. S_4 = Acetamide.(S_2 – S_4 impregnated as 30% solutions in ethanol.)

Mobile phases:

 M_1 = 80% ethanol. M_2 = Cyclohexane.Time of run: S_1 , 16 h; S_2 – S_4 , 3 h.

Length of run: 30 cm.

Paper: Whatman No. 1 (descending).

Detection: U.V.; *p*-dimethylaminobenzaldehyde after $ZnCl_2$ reduction.

Naphthalene or benzene derivative	<i>R_F</i>			
	<i>M₁</i>		<i>M₂</i>	
	S_1	S_2	S_3	S_4
1-Nitro-8-chloronaphthalene	0.76	0.18	0.49	0.83
1-Nitro-5-chloronaphthalene	0.46	0.44	0.79	0.92
1-Nitro-5,8-dichloronaphthalene	0.57	0.33	0.68	0.88
1-Nitro-4,5,8-trichloronaphthalene	0.39	0.49	0.80	0.91
2-Nitro-8-chloronaphthalene	0.49	0.42	0.76	0.89
2-Nitro-4-chloronaphthalene	0.91	0.08	0.22	—
2-Nitro-4,8-dichloronaphthalene	0.27	0.61	0.85	0.93
3,4-Dichloronitrobenzene	0.52	0.51	0.80	0.93
2,5-Dichloronitrobenzene	0.65	0.25	0.43	0.54
1-Nitronaphthalene	0.65	0.32	0.67	0.89
2-Nitronaphthalene	0.67	0.29	0.65	0.90

TABLE 5

R_F VALUES OF SOME CHLOROPHENOLS(D. V. PARKE AND R. T. WILLIAMS, *Biochem. J.*, 74 (1960) 5)Solvents: S_1 = Benzene–acetic acid–water (1:1:2, by vol.). S_2 = Ethanol–butan-1-ol–aq. 6 *N* NH_3 soln.–6 *N* $(NH_4)_2CO_3$ (22:80:19:19, by vol.). S_3 = *n*-Hexane–diisopropyl ether (9:1, v/v).Paper: Whatman No. 1 for S_1 and S_2 (descending).Whatman No. 4 impregnated with aq. 0.2 *N* Na_2CO_3 for S_3 (descending).Time of run: S_1 for 6 h; S_2 for 12 h; S_3 for 0.5 h.Detection: Gibbs reagent (2% ethanolic solution of 2,6-dichloroquinone chloroimide followed by 2 *N* Na_2CO_3 ; diazotized sulphanilic acid, followed by 2 *N* Na_2CO_3 ; aq. 1% $FeCl_3$, followed by saturated $NaHCO_3$; 5 *N* HNO_3 followed by aq. 2% urea after heating the dried paper (2 min, 120°) followed by solution of 0.5 g tetramethyl-*p,p'*-diaminodiphenylmethane (Tetrabase) and 2 g citric acid in 100 ml water.

Phenol	<i>R_F</i>		
	S_1	S_2	S_3
4-Chlorophenol	0.78	0.91	0.84
2,4,6-Trichlorophenol	0.92	—	0.10
Pentachlorophenol	0.92	0.85	0.04
4-Chlorocatechol	0.33	—	0.06

TABLE 6

R_F VALUES OF SOME HYDROXYNAPHTHALENE DERIVATIVES AND RELATED COMPOUNDS(P. SIMS, *Biochem. J.*, 73 (1959) 389)

Solvents: S₁ = *n*-Butanol saturated with aqueous 2 *N* NH₃ solution (descending).
 S₂ = *n*-Butanol-propan-1-ol-aqueous 2 *N* NH₃ solution (2:1:1, by vol.) (descending).
 S₃ = Aqueous 0.1 *N* NH₃ solution (ascending).
 Time of run: S₁ and S₂, 15 h; S₃, 5 h.
 Paper: Whatman No. 1.
 Detection: U.V. after NH₃ exposure; diazotized *p*-nitraniline (0.02% in 0.1 *N* HCl), then 10% aqueous Na₂CO₃ solution (or after aqueous 2 *N* HCl (70°)).

Compound	<i>R_F</i>		
	S ₁	S ₂	S ₃
1-Naphthol	0.96	0.97	0.62
2-Naphthol	0.96	0.97	0.55
<i>trans</i> -1,2-Dihydro-1,2-dihydroxynaphthalene	0.86	0.89	—
1-Naphthyl sulphate	0.51	0.62	—
2-Hydroxy-1-naphthyl sulphate	0.49	0.58	—
1-Hydroxy-2-naphthyl sulphate	0.46	0.55	—
2-Naphthyl sulphate	0.46	0.53	—
1-Naphthyl-glucosiduronic acid	0.11	0.28	—
1,2-Dihydro-2-hydroxy-1-naphthyl-glucosiduronic acid*	0.08	0.18	—
1,2-Dihydro-1-hydroxy-2-naphthyl-glucosiduronic acid	0.08	0.18	—

* The optically active forms could not be distinguished on paper chromatograms.

TABLE 7

R_F VALUES OF COMPOUNDS RELATED TO S-(1,2-DIHYDRO-2-HYDROXY-1-NAPHTHYL)-GLUTATHIONE
(J. BOOTH, E. BOYLAND AND P. SIMS, *Biochem. J.*, 74 (1960) 117)

Solvents: S₁ = Butanol-propan-1-ol-aq. 2 *N* NH₃ soln. (2:1:1, v/v).
 S₂ = Butanol-acetic acid-water (2:1:1, v/v).
 S₃ = Butanol-acetic acid-water (5:1:4, v/v organic phase).

Paper: Whatman No. 1 (descending).

Time of run: 18 h.

Detection: (1) Diazotized *p*-nitraniline (0.02% in 0.1 *N* HCl) followed by aqueous 10% Na₂CO₃ w/v; (2) 0.1 *M* K₂Cr₂O₇-acetic acid (1:1) followed by 0.1 *M* AgNO₃; (3) 0.4% ninhydrin in butanol saturated with water. Also before (1) some sprayed with 2 *N* HCl then heated at 70° (10 min).

Compound	<i>R_F</i>		
	S ₁	S ₂	S ₃
S-(1,2-Dihydro-2-hydroxy-1-naphthyl)-glutathione	0.04	0.47	0.36
S-(1,2-Dihydro-2-hydroxy-1-naphthyl)-L-cysteine	0.31	0.63	0.53
N-Acetyl-S-(1,2-dihydro-2-hydroxy-1-naphthyl)-L-cysteine	0.37	0.84	0.82
S-(1-Naphthyl)-glutathione	0.07	0.69	0.53
S-(1-Naphthyl)-L-cysteine	0.46	0.75	0.69
1-Naphthylmercapturic acid	0.51	0.86	0.87

TABLE 8

R_F VALUES OF SOME PHENOLIC COMPOUNDS(C. MADHOSINGH, *Ph. D. Thesis*, University of Western Ontario, London, Canada, 1959)

Paper: Whatman No. 1.

Temperature: about 24°.

Abbreviations used in the table:

Solvents:

A = Pentanol-ethanol-ammonia solution (sp. gr. 0.88)-benzene (1:2:1:1). Used in an ascending system under reduced pressure.

B = Benzene-glacial acetic acid-water in a 1:1:2 volume to volume mixture. The organic phase was used in descending systems.

C = 1-Butanol saturated with water and used in an ascending system.

Detecting agents:

1 = Ultraviolet.

2 = Solvent A without further treatment.

3 = Solvent B without further treatment.

4 = Solvent C without further treatment.

5 = Diazotized sulfanilic acid.

6 = Silver nitrate 0.1 N in 8% NH₃ solution.

7 = 1 N sodium hydroxide.

Colour code:

a = Yellow.

b = Orange-yellow.

c = Dark violet.

d = Violet.

e = Light blue.

f = Flawn-brown.

g = Scorched paper brown-black.

(—) Indicates no apparent colour reaction with this detecting agent.

h = Flame red-brown.

i = Silver-gray.

j = Green-gray.

k = Brown-gray.

l = Pink.

m = Orange.

Compound	<i>R_F</i> × 100 in solvent systems			Colours with detecting agents						
	C	B	A	1	2	3	4	5	6	7
2,4-Dinitrophenol	56	85	65	c	a	a	a		—	b
2-Amino-4-nitrophenol	86	100	52	c	b		a			b
4-Amino-2-nitrophenol	80	100	40	d	f	f	f			l
2,4-Diaminophenol	12		30	h	h	—	f		g	f
<i>p</i> -Nitrophenol	84	60	36	c	a	a	—		b	a
<i>m</i> -Nitrophenol	84	60	80	—	—		—	a	b	m
<i>o</i> -Nitrophenol	84	87	56	c	—		—	b	—	b
<i>p</i> -Aminophenol	72	5	71	e	f		f	j	g	f
<i>m</i> -Aminophenol	70	22	72	e	—		—	b	g	f
Picric acid	52		70	c	a		a		—	b
Picramic acid		6	30	c		—		—	g	—
Picramide	80	83	87		a	a		a		
Aniline	30		66	e		—		—	f	
Resorcinol	73	15	73	e				a	g	k
Dye of 2-amino-4-nitrophenol*	91	100	88	—	l		l	—		l
Dye of 4-amino-2-nitrophenol*	90	100	74	d	f		f			l
2,4-Diaminophenol-HCl**										
Spot 1	12		29		b		l			f
Spot 2	3		20	h	f		l			—
Spot 3	0	0	10		k		g			g

* Diazotized and coupled with β-naphthol.

** Solution chromatographed after standing for 72 hours.

TABLE 9

R_F VALUES OF SOME RELATED ALKYL PHENOLS(J. MACÁK AND J. KUBEŠ, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 301)

Solvent: Cyclohexane.

Paper: WF-1 Paper (G.D.R.).

Impregnation: 20% alcoholic formamide.

Time of run: 4-6 h.

Temperature of run: 15-17°.

Detection: Pauly reagent.

Compound	<i>R_F</i>
Phenol	0.03
<i>o</i> -Cresol	0.13
<i>m</i> -Cresol	0.08
<i>p</i> -Cresol	0.09
<i>o</i> -Ethylphenol	0.30
<i>m</i> -Ethylphenol	0.18
<i>p</i> -Ethylphenol	0.19
3-Propylphenol	0.45
2-Methyl-4-ethylphenol	0.57
4-Methyl-2-ethylphenol	0.61
2-Butylphenol	0.70
3-Butylphenol	0.47
4-Butylphenol	0.49
2,5-Diethylphenol	0.71
3,4-Diethylphenol	0.48
2-Ethyl-5-propylphenol	0.83
2-Ethyl-5-butylphenol	0.89
4-Methyl-2-benzylphenol	0.67

TABLE 10

R_F VALUES OF SOME ARYL SULPHATES(A. J. GRIMES, *Biochem. J.*, 73 (1959) 723)Solvents: S₁ = Butan-1-ol-acetic acid-water (4:1:5, v/v).S₂ = Butan-2-ol-aq. 3 N NH₃ soln.-3 N (NH₄)₂CO₃ (4:3:3).S₃ = Butan-1-ol-pyridine-aq. 3 N NH₃ soln. (4:3:3).

Paper: Whatman No. 1 (ascending; no equilibration).

Time of run: 16 h.

Detection: Ninhydrin; HCl vapour (10 min) followed by Pauly reagent spray, then NH₃ vapour exposure; radioactivity.

Compound	<i>R_F</i>		
	S ₁	S ₂	S ₃
Phenyl sulphate	0.49	0.35	0.76
<i>p</i> -Cresyl sulphate	0.61	0.34	0.77
<i>p</i> -Ethylphenyl sulphate	0.70	0.62	0.78
<i>p</i> -Acetylphenyl sulphate	0.54	0.25	0.77
Tyramine O-sulphate	0.34	0.10	0.66

TABLE 11

R_F VALUES (RELATIVE) OF POTASSIUM *p*-NITROPHENYL [^{35}S]SULPHATE,
p-AMINOPHENYL [^{35}S]SULPHATE AND SODIUM [^{35}S]SULPHATE
 (K. S. DODGSON AND N. TUDBALL, *Biochem. J.*, 74 (1960) 154)

Solvent: Butan-1-ol-acetic acid-water (50:12:25).

Paper: Whatman No. 1 (descending).

Detection: Radioactivity measured by "Panax" monitor after location by "C. 100 Actigraph";
 Ilford Industrial B X-ray film (21 day exposure).

$R_{NPS} = R_F$ of compound/ R_F of *p*-nitrophenyl sulphate.

Compound	R_{NPS}
Potassium <i>p</i> -nitrophenyl [^{35}S]sulphate	1.00
<i>p</i> -Aminophenyl [^{35}S]sulphate	0.55
Sodium [^{35}S]sulphate	0.12

TABLE 12

R_F VALUES OF SOME β -CHLOROVINYL ALDEHYDES AND RELATED COMPOUNDS
 (Z. ARNOLD AND J. ŽEMLIČKA, *Collection Czechoslov. Chem. Commun.*, 24 (1959) 2385)

Solvents: S_1 = Dibutyl formal-water.

S_2 = Cyclohexane-methanol.

S_3 = Diisopropyl ether-water.

Compound	R_F		
	S_1	S_2	S_3
β -Dimethylaminocinnamaldehyde	0.41		
β -Dimethylaminovinyl <i>tert.</i> -butyl ketone		0.55	
2-Dimethylaminocyclopent-1-enealdehyde	0.06		
2-Dimethylaminomethylenecyclopentanone	0.26		
β -Dimethylaminovinyl ethyl ketone			0.33
α -Methyl- β -dimethylvinyl methyl ketone			0.04

TABLE 13

R_F VALUES OF MEVALONIC ACID (3,5-DIHYDROXY-3-METHYLPENTANOIC ACID)
 AND SOME RELATED COMPOUNDS

(A. DE WAARD AND G. POPJÁK, *Biochem. J.*, 73 (1959) 410)

Solvent: Isobutyric acid-aqueous NH_3 solution-water (66:3:30, v/v).

Paper: Whatman No. 1.

Detection: U.V. photography, radioactivity scan.

Compound	R_F
Mevalonic acid	0.66
Mevalonic acid lactone	0.75
5-Phosphomevalonic acid*	0.37
Diphosphomevalonic acid*	0.20
Adenosine diphosphate	0.37
Adenosine triphosphate	0.20

* Tentative identification.

TABLE 14

R_F VALUES OF SOME PHOSPHOLIPIDS
(C. E. ROWE, *Biochem. J.*, 73 (1959) 438)

Solvent: 20% methanol in chloroform (v/v).

Paper: Silica impregnated.

Detection: Ninhydrin, iodine vapour, phosphomolybdic acid followed by SnCl_2 reduction; radioautography.

Compound	R_F
Cephalin	0.92
Lecithin	0.75
Sphingomyelin	0.55

TABLE 15

R_F VALUES (RELATIVE) OF SOME PHOSPHATE ESTERS

(S. A. BROOKS, J. C. LAWRENCE AND C. R. RICKETTS, *Biochem. J.*, 73 (1959) 566)

Solvents: S_1 = Propan-1-ol-aq. NH_3 soln. (sp. gr. 0.880)-water (60:30:10, by vol.).

S_2 = Picric acid-2-methylpropan-2-ol-water (4:80:20, w/v/v).

Paper: Whatman No. 1 (18 $\frac{1}{4}$ in. \times 22 $\frac{1}{2}$ in.) (descending; S_1 direction: run off; S_2 direction: front run to 2 in. from bottom). Paper soaked in 0.2% EDTA (pH 7.8), then water washed (two-dimensional runs).

Time of run: S_1 for 40 h; S_2 for 24 h.

Detection: Autoradiography (Kodirex X-ray film 14 in. \times 17 in., 9 days); spray of mixture: 5 ml of 60% (w/w) perchloric acid, 10 ml of N HCl, 25 ml of 4% (w/v) ammonium molybdate, water to 100 ml; then heated at 85° for 7 min; then sprayed with 5% (w/v) ascorbic acid; aniline hydrogen phthalate. The suitable method chosen in each case.

R_I value = $\frac{\text{distance moved by phosphate ester}}{\text{distance moved by orthophosphate}}$

Where more than one R_I value is given, the first in S_1 is paired with the first in S_2 , etc.: the pair is from the same two-dimensional chromatogram (information from 41 chromatograms).

Compound	R_I	
	S_1	S_2
Orthophosphate	1.00	1.00
Fructose-6-phosphate	1.19, 1.26	0.64, 0.68
3-Phospho-D-glyceric acid	1.05, 1.16	0.87, 0.88
Uridine diphosphate	0.77, 0.78	0.35, 0.40
Uridine diphosphoglucose	1.29, 1.27	0.16, 0.19
Adenosine monophosphate	0.95, 1.01, 0.89	0.33, 0.41, 0.33
Mannose-6-phosphate	1.08	0.54
Glucose-6-phosphate	1.05, 1.09	0.46, 0.41
Adenosine diphosphate	0.95, 0.94, 0.89	0.22, 0.25, 0.21
Guanosine diphosphate	0.38	0.24
Phosphoenolpyruvic acid	1.13, 1.16	1.16, 1.09
Adenosine triphosphate	0.71, 0.66, 0.67	0.15, 0.12, 0.06
Fructose-1,6-diphosphate	0.40, 0.46	0.68, 0.78
Glucose-1-phosphate	1.28, 1.35, 1.33	0.51, 0.51, 0.41
Pyrophosphate	0.49, 0.52, 0.56	0.42, 0.45, 0.47
2-Deoxyglucose-6-phosphate	1.25, 1.34	0.79, 0.77
Glucosone-6-phosphate	1.25, 1.36	0.57, 0.59
1,5-Anhydro-D-glucitol-6-phosphate	1.31, 1.34	0.77, 0.70
Glucosamine-6-phosphate	1.32, 1.38	0.54, 0.57

TABLE 16

 R_F VALUES OF SOME AZAURACIL DERIVATIVES AND RELATED COMPOUNDS(J. SMRT, J. BERÁNEK AND F. ŠORM, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 130)Solvents: S_1 = *n*-Butanol saturated with water. S_2 = *n*-Butanol-acetic acid-water (5:2:3). S_3 = Isopropanol-1 % aqueous ammonium sulphate (2:1).

Paper: Whatman No. 1 (descending).

Detection: U.V. light ("Chromatolite"); ammonium molybdate-perchloric acid.

Compound	R_F		
	S_1	S_2	S_3
2',3'-O-Isopropylidene-6-azauracil riboside	0.78		
2',3'-O-Isopropylidene-6-azauracil riboside-5'-dibenzyl phosphate	0.88		
β -D-Ribofuranosyl-6-azauracil-5'-phosphate (Ba salt)	0.00	0.04	0.30
<i>p</i> -Nitrophenol	0.91		
β -D-Ribofuranosyl-6-azauracil-5'-dibenzyl pyrophosphate	0.72		

TABLE 17

 R_F VALUES OF AZAURIDINE-5'-PHOSPHATE AND AZAURIDINE-5'-PYROPHOSPHATE(J. SMRT, J. BERÁNEK AND F. ŠORM, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 130)Solvents: S_1 = *n*-Butanol-acetic acid-water (5:2:3). S_2 = Isopropanol-1 % aqueous ammonium sulphate (2:1).

Paper: Whatman No. 1 (descending).

Detection: U.V. light ("Chromatolite"); ammonium molybdate-perchloric acid.

Compound	R_F	
	S_1	S_2
Azauridine-5'-phosphate	0.04	0.30
Azauridine-5'-pyrophosphate	0.00	0.16

TABLE 18

ELECTROPHORETIC MOBILITY OF AZAURIDINE-5'-PHOSPHATE AND AZAURIDINE-5'-PYROPHOSPHATE

(J. SMRT, J. BERÁNEK AND F. ŠORM, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 130)Electrolyte: Citrate buffer (0.05 *M*, pH 3.7).

Paper: Whatman No. 3.

Potential: 100 V/cm.

Units: cm/2 h.

Apparatus: Markham (1955).

Detection: U.V. light ("Chromatolite"); ammonium molybdate-perchloric acid.

Compound	Mobility
Azauridine-5'-phosphate	12.9
Azauridine-5'-pyrophosphate	20

TABLE 19

ELECTROPHORETIC MOBILITIES OF METHYLATED GUANOSINES

(J. D. SMITH AND D. B. DUNN, *Biochem. J.*, 72 (1959) 294)Electrolytes: $E_1 = 0.05 M$ sodium tetraborate (pH 9.2). $E_2 = 0.05 M$ glycine buffer, made by adding KOH to an aqueous glycine solution (pH 10). $E_3 = 0.05 M$ KH_2PO_4 and $0.05 M$ H_3PO_4 (pH 2.2).

Potential: 20 V/cm.

Detection: U.V. light.

Migration units: cm/h towards anode.

Compound	Mobility (cm/h)		
	E_1	E_2	E_3
Guanosine	+ 7.0		
1-Methyl-guanosine	+ 5.0	- 0.4	
6-Hydroxy-2-methylamino-purine riboside	+ 5.9	+ 0.6	- 4.5
2-Dimethylamino-6-hydroxypurine riboside	+ 5.9		- 5.1
Cytidine	+ 5.4		- 8.6

TABLE 20

ELECTROPHORETIC MOBILITIES OF METHYLATED GUANINE NUCLEOTIDES

(J. D. SMITH AND D. B. DUNN, *Biochem. J.*, 72 (1959) 294)Electrolyte: $0.05 M$ phosphate buffer (pH 2.1).

Detection: U.V. light.

Migration units: cm/h towards anode.

Compound	Mobility
Adenosine-3'-phosphate	1.0
Cytidine-3'-phosphate	1.0
2-Dimethylamino-6-hydroxypurine riboside-2'- and 3'-phosphates	2.6
6-Hydroxy-2-methylamino-purine riboside-2'- and 3'-phosphates	2.9
Guanosine-3'-phosphate	3.4
1-Methylguanosine-2'- and 3'-phosphates	2.9
Uridine-3'-phosphate	7.4

TABLE 21

 R_F VALUES OF GUANINE AND XANTHINE(R. BARCHIELLI, G. BORETTI, A. DI MARCO, P. JULITA, A. MIGLIACCI, A. MINGHETTI AND C. SPALLA, *Biochem. J.*, 74 (1960) 382)Solvents: $S_1 =$ Butanol-formic acid-water (77:10:13, v/v). $S_2 =$ Water adjusted to pH 10 with aq. NH_3 .

Paper: Not stated.

Detection: U.V. light.

Compound	R_F	
	S_1	S_2
Guanine	0.20	0.42
Xanthine		0.60

TABLE 22

R_G VALUES OF SOME OLIGOSACCHARIDES
(G. AVIGAD, *Biochem. J.*, 73 (1959) 587)

Solvents: S_1 = Butanol-ethanol-water (5:2:2, by vol.).

S_2 = Butanol-pyridine-water (5:3:2, by vol.).

Paper: Whatman No. 1.

Time of run: Descending = 72 h; circular = 8 h.

Detection: *p*-Anisidine·HCl; aniline-diphenylamine-phosphoric acid; and where suitable: urea-phosphoric acid; alkaline aq. triphenyltetrazolium chloride.

Compound	R_G	
	S_1	S_2
Sucrose	0.78	0.71
Maltose	0.64	0.45
Isomaltose	0.54	0.41
Turanose	0.84	0.74
Leucrose	0.68	0.50
Maltulose	0.71	0.58
Isomaltulose	0.68	0.53
1- β -Glucosylfructose	0.66	0.48
Isomaltotriose	0.26	0.18
Maltotriose	0.32	0.23
Isomaltotriulose	0.37	0.26
Maltotriulose	0.42	0.34
1- α -Glucosylfructose*	0.64	0.48

* Suggested identity.

TABLE 23

ELECTROPHORETIC MOBILITIES OF SOME OLIGOSACCHARIDES
(G. AVIGAD, *Biochem. J.*, 73 (1959) 587)

Electrolyte: 0.1 *M* sodium borate buffer, pH 10.

Paper: Whatman No. 3MM.

Potential: 20 V/cm; current: 25 mA.

Time of run: 4 h.

Migration units: *M* glucose* (relative).

Detection: *p*-Anisidine·HCl; aniline-diphenylamine-phosphoric acid; and where necessary: urea-phosphoric acid; alkaline aq. triphenyltetrazolium chloride.

Compound	<i>M</i> glucose*
Sucrose	0.20
Maltose	0.36
Isomaltose	0.60
Turanose	0.73
Leucrose	0.67
Maltulose	0.63
Isomaltulose	0.59
1- β -Glucosylfructose	0.68
Isomaltotriose	0.81
Maltotriose	0.32
Isomaltotriulose	0.31
Maltotriulose	0.35
1- α -Glucosylfructose**	0.70

* Index of migration in paper electrophoresis (A. B. FOSTER, *J. Chem. Soc.*, (1953) 982).

** Suggested identity.

TABLE 24

ELECTROPHORETIC MOBILITIES OF SOME AMINO-SUGARS

(H. R. PERKINS, *Biochem. J.*, 74 (1960) 182)Electrolyte: 2 *N* acetic acid.

Paper: Whatman No. 3.

Potential: 15 V/cm.

Apparatus: Kunkel (1954).

Time of run: 250 min.

Migration units: cm towards cathode.

Detection: *p*-Dimethylaminobenzaldehyde (without heating); aniline hydrogen phthalate.

Compound	cm
Glucosamine hydrochloride	24.2
Glucosaminic acid	10.0
Muramic acid	14.8

TABLE 25

ELECTROPHORETIC MOBILITIES OF SOME N-ACETYL-AMINO-SUGARS

(M. J. CRUMPTON, *Biochem. J.*, 72 (1959) 479)Electrolyte: pH 10 borate buffer (sodium tetraborate, 23.4 g and *N* NaOH, 30 ml/l).

Paper: Whatman No. 3.

Potential: 1300 V at 25 mA.

Duration: 2.5 h.

Detection: *p*-Anisidine·HCl.Units: R_M = rate of movement relative to glucose.

Compound	R_M
N-Acetyl-D-fucosamine	0.14
N-Acetyl-D-glucosamine	} 0.23
N-Acetyl-D-xylosamine	
N-Acetyl-D-galactosamine	0.33
N-Acetyl-D-allosamine	0.42
N-Acetyl-D-talosamine	0.60
N-Acetyl-D-gulosamine	0.63
N-Acetyl-D-mannosamine	0.65

TABLE 26

 R_F VALUES (RELATIVE) OF 6-O-(N-ACETYLGLUCOSAMINYL)-N-ACETYLMURAMIC ACID(H. R. PERKINS, *Biochem. J.*, 74 (1960) 182)Solvents: S_1 = Butan-1-ol-acetic acid-water (63:10:27, by vol., organic phase). S_2 = Butan-1-ol-pyridine-water (6:4:3, by vol.).

Paper: Whatman No. 3.

Time of run: 20 h for S_2 .Temperature of run: 22° for S_2 .

Detection: Aniline phthalate.

 R_A = R_F relative to N-acetylglucosamine.

Compound	R_A	
	S_1	S_2
6-O-(N-Acetylglucosaminyl)-N-acetylmuramic acid	0.85	0.85

TABLE 27

PAPER ELECTROPHORESIS OF PHENOLIC COMPOUNDS

(J. HALMEKOSKI, *Ann. Acad. Sci. Fennicae, Ser. A II*, No. 96 (1959))Electrophoresis at pH 7-8 in buffer solutions (Clark and Lub NaOH-KH₂PO₄ buffers) containing chelate-forming anions, paper Whatman No. 1, room temperature, current 8-10 mA (constant), time 13 h 45 min-20 h 50 min.

Chelating agent added per l of buffer	pH	Time		Const. current mA	True migration in cm							
		h	min		Vanillyl alcohol	Aceto-guaiacine	Vanillin	Vanillic acid	Catechol	3,4-Dihydroxybenzaldehyde	3,4-Dihydroxybenzoic acid	3,4,5-Trihydroxybenzoic acid
0.02 mole Na ₂ MoO ₄	7	17	40	10	0.0	1.2	3.2	10.4	14.3	14.0	22.4	20.8
0.02 mole Na ₂ WO ₄	7	20	50	8	0.1	2.9	6.8	11.0	18.4	18.1	24.2	22.7
0.001 mole Na phosphomolybdate	7	15	30	10	0.0	0.7	2.9	12.4	17.0	17.0	24.2	21.2
0.001 mole Na phosphotungstate	7	18	00	8	0.0	2.8	6.0	9.1	15.2	15.2	20.0	18.8
0.02 mole NH ₄ VO ₃	7	15	30	8	0.0	1.9	3.7	10.4	13.6	15.8	20.1	22.7
0.01 mole Na stannate	8	13	45	8	0.1	4.5	8.7	13.2	16.4	16.8	24.9	*
0.02 mole borax**	7.5	17	30	8	0.2	4.6	8.3	13.2	14.9	14.9	24.1	21.1

* Because of irregular and elongated spots difficult to determine center of spot.

** Migration of pyrogallol 12.3 cm.

TABLE 28

 R_F VALUES OF PHENOLIC COMPOUNDS(J. HALMEKOSKI, *Ann. Acad. Sci. Fennicae. Ser. A II*, No. 96 (1959))

Paper or eluents buffered with different anions; paper Whatman No. 1, temperature 18–20°, running time 5–22 hours.

Eluent used	Compound used	Saturation		R_F									
		Added to eluent	paper	Vanillyl alcohol	c- Vanillin	Aceto- guaia- ccone	Vanillin	Vanillic acid	Catechol	3,4-Dihy- droxybenz- aldehyde	3,4-Dihy- droxy- benzoic acid	Pyro- gallel	3,4,5-Tri- hydroxy- benzoic acid
K_2HPO_4 -NaOH buffer at pH 7	0.01 mole Na_2MoO_4/l	+		0.77	0.69	0.60	0.64	0.69	0.66	0.83	0.92	—	—
Pyridine- <i>n</i> -butanol- H_2O (1:1:2)	Na_2WO_4	+		0.88	0.89	—	0.86	0.66	0.92	0.92	0.66	0.88	0.29
Pyridine- <i>n</i> -butanol- H_2O (1:1:2)	Na phosphotungstate	+		0.89	0.92	—	0.92	0.70	0.94	0.96	0.69	0.91	0.64
Pyridine- <i>n</i> -butanol- H_2O (1:1:2)	Na_2MoO_4		+	0.96	0.96	—	0.93	0.70	0.77*	0.77*	—	0.96*	0.38*
Pyridine- <i>n</i> -butanol- H_2O (1:1:2)	NaCl	+		—	—	—	—	—	0.96	—	0.74	0.94	0.43
Pyridine- <i>n</i> -butanol (1:1)	Na_2MoO_4		+	0.91	0.90	—	0.87	0.58	0.73	0.71	0.02	0.90	0.00
Pyridine- <i>n</i> -butanol (1:1)	NH_4VO_3	+		0.89	0.87	—	0.92	0.79	0.77	0.78	0.56	0.92	0.36
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	Na_2MoO_4	+		0.88	0.97	—	0.96	0.91	0.57	0.18	0.15	0.14	0.05
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	Na_2WO_4	+		0.89	0.95	—	0.94	0.89	0.82	0.36	0.32	0.19	0.04
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	Na phosphomolybdate	+		0.93	0.97	—	0.96	0.92	0.60	0.23	0.16	0.12	0.03
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	Na phosphotungstate	+		0.85	0.92	—	0.91	0.90	0.88	0.82	0.81	0.74	0.61
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	Na_2HAsO_3	+		0.95	0.98	—	0.96	0.87	0.93	0.89	0.72	0.80	0.41
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	$NaVO_3$	+		0.90	—	0.95	0.94	0.92	*	0.40	0.40	0.16	0.13
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	borax	+		0.88	0.95	0.94	0.93	0.88	0.89	0.70	0.64	—	0.31
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	Na_2SO_4	+		0.86	0.92	—	0.93	0.91	0.91	0.90	0.87	0.75	0.64
<i>n</i> -Butanol-acetic acid- H_2O (4:1:5)	—			—	—	—	—	0.92	0.91	—	0.85	0.77	—
<i>n</i> -Butanol satd. with H_2O	Na_2MoO_4	+		0.89	—	0.94	0.94	0.29	0.36	0.07	0.00	0.00	0.00
<i>n</i> -Butanol satd. with H_2O	Na_2WO_4	+		0.92	—	0.87	0.72	0.11	0.09	0.05	0.00	0.00	0.00
<i>n</i> -Butanol satd. with H_2O	Na phosphomolybdate	+		0.92	—	0.96	0.94	0.18	0.33	0.09	0.03	0.03	0.03
<i>n</i> -Butanol satd. with H_2O	Na phosphotungstate	+		0.81	—	0.88	0.88	0.81	0.84	0.74**	0.54	0.66**	0.24**
<i>n</i> -Butanol satd. with H_2O	Na_2HAsO_3	+		0.88	—	0.68	0.52	0.05	0.71	0.35**	0.01	0.06	0.00
<i>n</i> -Butanol satd. with H_2O	$NaVO_3$	+		0.88	—	0.93	0.91	0.38	0.43	0.07	0.00	0.02	0.00
<i>n</i> -Butanol satd. with H_2O	borax	+		0.89	—	0.84	0.71	0.10	0.25	0.20	0.00	0.08**	0.00
<i>n</i> -Butanol satd. with H_2O	Na_2SO_4	+		0.84	—	0.88	0.88	0.68	0.88	0.83	0.44	0.72	0.17
<i>n</i> -Butanol satd. with H_2O	Na borate	+		—	—	—	—	—	0.40	0.28	0.02	0.16	—

* Diffuse spots.

** Tailing spots.

TABLE 29

R_F VALUES OF SOME PIPERIDINE-2-CARBOXYLIC ACIDS AND RELATED COMPOUNDS
(M. FERLES AND M. PRYSTAŠ, *Collection Czechoslov. Chem. Commun.*, 24 (1959) 3326)

Solvent: *n*-Butanol-acetic acid-water (4:1:1) (atmosphere: 20% acetic acid and *n*-butanol).
Paper: Whatman No. 1 (descending).
Temperature of run: 16.5°.
Length of run: 20 cm.
Detection: Ninhydrin (secondary amino acids); iodine vapour (tertiary amino acids).

Compound	R_F
Picolinic acid	0.87
Pipecolinic acid	0.82
Baikiain	0.89
N-Methylbaikiain	0.87
N-Methylpipecolinic acid	0.85

TABLE 30

R_F VALUES OF SOME SULPHOLANES AND RELATED COMPOUNDS
(M. PROCHÁZKA AND V. HORÁK, *Collection Czechoslov. Chem. Commun.*, 24 (1959) 2278)

Solvent: *n*-Butanol-acetic acid-water (4:1:5, organic phase).
Paper: Whatman No. 4.

Compound	R_F
3-Hydroxy-4-aminosulpholane	0.27-0.30
4-Hydroxy-2-sulpholene	0.63-0.67
3-Hydroxy-4-aminosulpholane hydrochloride	0.13
3a,7a-Dihydrobenzothiofophen 1,1-dioxide	0.86
4-Amino-2-sulpholene	0.34-0.37
4-Amino-2-sulpholene dimer	0.03
3,4-Diaminosulpholane	0.26-0.29
Bis-(4-amino-3-sulpholanil)-amine*	0.12
3,4-Diaminosulpholane hydrochloride	0.05

* Tentative identification.

TABLE 31

R_F VALUES OF SOME BRUCINES AND RELATED COMPOUNDS
(Z. DEYL AND M. EFFENBERGER, *Collection Czechoslov. Chem. Commun.*, 24 (1959) 3763)

Solvent: *n*-Butanol-butyl acetate-acetic acid-water (1:1:2:1).
Paper: Whatman No. 2 (descending).
Detection: 1% ethanolic *p*-dimethylaminobenzaldehyde after ZnCl₂ reduction; 15% ferric chloride and 1% potassium ferricyanide (1:1); Pauly; (depending on the compound).

Compound	R_F
Bisdemethylbrucine	0.47
Nitroisdemethylbrucine	0.61
Dinitrostrychnolcarboxylic acid	0.49
3,5-Dinitrobenzoic acid	0.89
2,4,6-Trinitrophenol	0.94

TABLE 32
R_F VALUES OF ALKALI METALS
 (E. C. MARTIN, *Anal. Chim. Acta*, 22 (1960) 142)

Metal ion	<i>R_F</i>	
	Methanol containing 1% 15 <i>N</i> ammonia	Methanol containing 5% 15 <i>N</i> ammonia
Li	0.82	0.74
Na	0.40	0.30
K	0.19	0.12
Rb	0.16	0.12
Cs	0.16	0.10
Mg	0	0

TABLE 33
R_F VALUES OF Mn, Co AND Cu IN TRIBUTYL PHOSPHATE-HCl-METHANOL MIXTURES
 (G. WEIDMANN, *Can. J. Chem.*, 38 (1960) 459)

Paper: Schleicher and Schüll 4023b.

Temperature: 22°.

Solvent: 200 ml portions of purified tributyl phosphate (TBP) are shaken repeatedly with the required concentration of aqueous HCl till the concentration of the aqueous phase remains constant. Two parts of this TBP-HCl mixture are then mixed with one part of methanol.

TBP adjusted with HCl of molarity	<i>R_F</i>		
	Mn	Co	Cu
5.5	0.15	0.16	0.42
6.5	0.20	0.23	0.48
7.5	0.24	0.28	0.52
8.5	0.30	0.35	0.54
9.0	0.31	0.38	0.56
9.5	0.34	0.43	0.57
10.0	0.35	0.46	0.57
10.5	0.36	0.48	0.57
11.0	0.38	0.51	0.58
11.5	0.42	0.61	0.59

TABLE 34
R_F VALUES OF INORGANIC ANIONS
 (H. LAUB, *Z. anal. Chem.*, 173 (1960) 208)

Solvent: Butanol-acetone-water (5:2:3).

Paper: Schleicher & Schüll 2040b.

Anion	<i>R_F</i>	Anion	<i>R_F</i>
ClO ₄ ⁻	0.67	Cl ⁻	0.36
ClO ₃ ⁻	0.50	NO ₃ ⁻	0.46
ClO ₂ ⁻	0.38	NO ₂ ⁻	0.41
I ⁻	0.55	BrO ₃ ⁻	0.34
Br ⁻	0.43	IO ₃ ⁻	0.19

TABLE 35

 R_F VALUES OF SOME URIDINE PHOSPHATES(J. SMRT AND F. ŠORM, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 553)Solvents: S_1 = *n*-Butanol-acetic acid-water (5:2:3). S_2 = Isopropanol-1 % aqueous ammonium sulphate solution (2:1).

Paper: Whatman No. 1.

Detection: U.V. light; ammonium molybdate-perchloric acid spray.

Uridine derivative	R_F	
	S_1	S_2
Deoxyuridine-5'-phosphate	0.23	0.64
5-Bromodeoxyuridine-5'-phosphate	0.28	0.67
5-Bromouridine-5'-phosphate	0.22	0.65

TABLE 36

ELECTROPHORETIC MOBILITIES OF SOME URIDINE DERIVATIVES

(J. SMRT AND F. ŠORM, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 553)

Electrolyte: citrate buffer (pH 3.7).

Paper: Whatman No. 3.

Potential: 100 V/cm.

Apparatus: Markham.

Units: cm/2 h.

Detection: U.V. light; ammonium molybdate-perchloric acid spray.

Uridine derivative	Mobility
Deoxyuridine-5'-phosphate	21.8
5-Bromodeoxyuridine-5'-phosphate	21.1
5-Bromouridine-5'-phosphate	21.1

TABLE 37

 R_F VALUES OF SOME AMINES AND CHOLINE(V. KWASNIEWSKI, *Planta Med.*, 7 (1959) 35)Solvents: S_1 = Butanol-acetic acid-water (4:1:5). S_2 = Methanol-water (9.5:0.5).

Paper: Schleicher & Schüll 2043b mgf (ascending).

Detection: 0.2 % ninhydrin in 95 % butanol with 5 % 2 *N* acetic acid (amines); 1 % potassium ferrocyanide then 0.5 % cobalt chloride (choline).

Compound	R_F	
	S_1	S_2
Histamine	0.11	0.43
Tyramine	0.44	0.64
Methylamine	0.24	0.10
Choline	0.29	0.62

TABLE 38

R_F VALUES OF N-ACETYL-S-(2-CHLORO-4-NITROPHENYL)-L-CYSTEINE
(H. G. BRAY AND S. P. JAMES, *Biochem. J.*, 74 (1960) 394)

Solvents: S_1 = Butan-1-ol-acetic acid-butyl acetate-water (24:10:5:2, v/v).

S_2 = Butan-1-ol saturated with aqueous 2 N NH_3 soln.

Paper: Whatman No. 4 (descending).

Detection: Potassium dichromate-silver nitrate solution; ninhydrin.

Compound	R_F	
	S_1^*	S_2^{**}
N-Acetyl-S-(2-chloro-4-nitrophenyl)-L-cysteine	0.89	0.46

* 7 h run.

** 16 h run.

TABLE 39

R_F VALUES OF ARABINOSE AND LYXOSE
(K. G. RIENITS, *Biochem. J.*, 74 (1960) 27)

Solvent: Pyridine-amyl alcohol-water (7:7:6, by vol.).

Paper: Whatman No. 54 (ascending).

Temperature of run: 18°.

Detection: Aniline hydrogen phthalate.

Sugar	R_F
Arabinose	0.47
Lyxose	0.67
(Hexosamine range)	(0.20-0.23)
(Hexuronic acids)	(0.08-0.1)

TABLE 40

R_F VALUES (RELATIVE) OF SOME O-METHYL ETHERS OF RHAMNOSE AND FUCOSE
(A. P. McLENNAN, D. W. SMITH AND H. M. RANDALL, *Biochem. J.*, 74 (1960) 3P)

Solvent: Butanol-pyridine-water (6:4:3, by vol.).

Detection: Reducing sugar tests; 6-deoxyhexose test (DISCHE AND SHETTLES, 1948).

Compound	R_{rhamnose}
Rhamnose	1.00
2-O-Methylfucose	1.18
2-O-Methylrhamnose	1.28
2,4-Di-O-methylrhamnose	1.45

TABLE 41

R_F VALUES OF SOME ANTHOCYANINS
(J. B. HARBORNE, *Biochem. J.*, 74 (1960) 262)

Solvent: Butan-1-ol-2 *N* HCl (1:1, v/v; upper phase).

Paper: Whatman No. 3.

Detection: Visible and U.V. light.

Compound	R_F	Colour	
		Visible	Ultraviolet
Pelargonidin*	0.44	Orange-red	Fluorescent orange
Cyanidin*	0.35	Magenta	Bright orange
Peonidin*	0.37	Magenta	Fluorescent pink
Delphinidin*	0.30	Mauve	Dull mauve
Petunidin*	0.30	Purple	Dull purple
Malvidin*	0.33	Purple	Fluorescent cerise
Pelargonidin**	0.31	Red	Dull red
Cyanidin**	0.25	Magenta	Dull magenta
Delphinidin**	0.19	Purple	Dull purple
Petunidin**	0.21	Purple	Dull purple

* *p*-Coumaryl 5-glucoside 3-rhamnosylglucoside derivative.

** 3-Rhamnosylglucoside derivative.

TABLE 42

R_F VALUES OF ANTHOCYANIN INTERMEDIATE GLYCOSIDES
(J. B. HARBORNE, *Biochem. J.*, 74 (1960) 262)

Solvents: S_1 = Butan-1-ol-acetic acid-water (4:1:5, by vol.; upper phase).

S_2 = Water-conc. HCl (97:3, v/v).

Paper: Whatman No. 1.

Detection: Visible and U.V. light.

Compound	R_F	
	S_1	S_2
Pelargonidin 5-glucoside	0.51	0.18
Cyanidin 5-glucoside	0.44	0.07
Peonidin 5-glucoside	0.45	0.08
Petunidin 5-glucoside	0.35	0.03
Malvidin 5-glucoside	0.43	0.04
Peonidin 3-rhamnosylglucoside	0.38	0.21
Malvidin 3-rhamnosylglucoside	0.35	0.15

TABLE 43

 R_F VALUES OF SOME COUMARINS AND RELATED COMPOUNDS(J. B. HARBORNE, *Biochem. J.*, 74 (1960) 270)Solvents: S_1 = Water. S_2 = Butan-1-ol-acetic acid-water (4:1:5, by vol.). S_3 = Butan-1-ol-aq. 2 *N* ammonia soln. (1:1, v/v). S_4 = Aq. 15% acetic acid. S_5 = Butan-1-ol-ethanol-water (4:1:5, by vol.).

Paper: Whatman No. 3.

Detection: U.V. light (before and after NH_3 treatment).

Compound	R_F					Colour in U.V.	
	S_1	S_2	S_3	S_4	S_5	Untreated	NH_3 -treated
Chlorogenic acid	0.67	0.56	0.00	0.66	0.34	Blue	Green
Scopolin	0.64	0.53	0.44	0.85	0.47	Violet-blue	Violet-blue
Cichoriin	0.61	0.53	0.10	0.78	0.49	Pale pink	Orange-yellow
Aesculin	0.56	0.53	0.13	0.76	0.51	Light blue	Bright blue
Rutin	0.24	0.43	0.23	0.56	0.45	Ochre	Yellow-brown
Isoquercitrin	0.07	0.61	0.23	0.41	0.58	Ochre	Yellow-brown
Fabiatrin	0.79	0.45	0.23	0.85	0.42	Violet-blue	Violet-blue
Caffeic acid	0.25	0.81	0.00	0.56	0.67	Blue	Light blue
Scopoletin	0.29	0.82	0.35	0.59	0.80	Violet-blue	Bright blue
Aesculetin	0.28	0.75	0.13	0.56	0.68	Blue	Light blue
Quercetin	0.00	0.71	0.00	0.05	0.70	Bright yellow	Yellow
6-Hydroxy-7-methoxycoumarin	0.21	0.83	0.54	0.51	0.81	Pale pink	Orange-yellow

TABLE 44

 R_F VALUES OF SOME CONDENSED TANNINS(D. G. ROUX AND E. A. MAIHS, *Biochem. J.*, 74 (1960) 44)Solvents: S_1 = 2% acetic acid (ascending). S_2 = Butan-1-ol-acetic acid-water (6:1:2). S_3 = Butan-1-ol-acetic acid-water (4:1:5). S_4 = Butan-2-ol saturated with water. S_5 = Water.

Paper: Whatman No. 3 (18¼ in. × 22½ in.).

Detection: U.V. light; vanillin-toluene-*p*-sulphonic acid; bis-diazotized benzidine; $FeCl_3$ solution.

Compound	R_F				
	S_1	S_2	S_3	S_4	S_5
(-)-7,3',4',5'-Tetrahydroxyflavan-3-ol [(-)-robinetinidol]	0.47	—	0.76	0.67	—
(+)-Catechin	—	—	0.75	0.67	0.35
(+)-Gallocatechin	—	—	0.57	0.54	0.32

TABLE 45

R_F VALUES OF SOME FLAVONOLS
(V. KWASNIEWSKI, *Planta Med.*, 7 (1959) 35)

Solvents: S_1 = Butanol-acetic acid-water (4:1:5).

S_2 = Pyridine-ethyl acetate-water (1:2:2).

S_3 = Butanol-acetone-water (4:1:5).

S_4 = Ethyl acetate-formic acid-water (10:2:3).

S_5 = Benzene-acetic acid-water (4:4:2).

Paper: Schleicher & Schüll 2043b mgl.

Detection: Zirconium-citric acid (HÖRHAMMER, 1954); Zn/HCl; Mg/HCl (flavonols); aniline phthalate (glucose).

Compound	R_F				
	S_1	S_2	S_3	S_4	S_5
Quercetin-3-glucoside	0.36		0.34		0.54
Kaempferol-3-glucoside	0.85		0.85		0.84
Quercetin	0.68		0.74		0.45
Kaempferol	0.88		0.89		0.83
Glucose	0.19	0.22	0.19	0.09	0.82

TABLE 46

R_F VALUES OF VERBASCOSIDE AND ITS AGLYCONES
(S. HEIN, *Planta Med.*, 7 (1959) 185)

Solvent: S_1 = Butanol-acetic acid-water (4:1:5).

S_2 = Ethyl acetate-formic acid-water (10:2:3).

Paper: P_1 = Schleicher & Schüll 2043b.

P_2 = Schleicher & Schüll 2045b.

Detection: U.V. light; $AlCl_3$ solution; magnesium acetate solution (flavonoids); aniline phthalate (sugars).

Compound	R_F			
	S_1		S_2	
	P_1	P_2	P_1	P_2
Verbascoside*	0.35	0.28	0.36	0.26
Verbascoside aglycone	0.78	0.76	0.86	0.98
Glucose	0.18			
Rhamnose	0.35			

* A flavonol-3-glycoside from *Verbascum phlomoides*.

TABLE 47

R_F VALUES OF SOME IODINE COMPOUNDS
(C. CAMERON, *Biochem. J.*, 74 (1960) 333)

Solvents: S_1 = Butanol-2 *N* acetic acid (1:1, v/v).
 S_2 = Butanol-aq. 2 *N* NH_3 soln. (1:1, v/v).
 S_3 = Butanol-aq. 6 *N* NH_3 soln. (1:1, v/v).
 S_4 = Butanol-dioxan-aq. 2 *N* NH_3 soln. (4:1:5, by vol.).
 S_5 = Butanol-pentanol-aq. 2 *N* NH_3 soln. (4:1:5, by vol.).
 S_6 = *tert.*-Pentanol-aq. 2 *N* NH_3 soln. (1:1, v/v).

Paper: Whatman No. 3 MM (descending).

Detection: Ilford Industrial X-ray film, Mica end-window Geiger tube (EW3H 20th Century Electronics Ltd.); ceric sulphate-sodium arsenite (1% and 5% (w/v) resp. in *N* H_2SO_4 mixed immediately before use), then 1% (w/v) *o*-phenylenediamine in acetone.

Compound	R_F					
	S_1	S_2	S_3	S_4	S_5	S_6
Iodide	0.15	0.29	0.35	0.41	0.16	0.20
Monoiodotyrosine	0.54	0.17	—	0.28	0.05	0.14
3,5-Diiiodotyrosine	0.84	0.05	—	0.16	—	—
3,5-Diiodo-4-hydroxyphenyl-lactic acid	0.95	0.08	—	0.20	0.03	0.06
3,5-Diiodo-4-hydroxyphenyl-pyruvic acid	0.90	—	—	0.82	—	—
3-Monoiodothyronine	—	—	0.55	0.79	0.69	—
3,5-Diiiodothyronine	—	0.79	0.85	0.85	0.68	0.90
3,3'-Diiiodothyronine	—	—	0.45	0.60	0.69	0.75
3,5,3'-Triiodothyronine	—	0.75	0.81	0.78	0.73	0.66
3,3',5'-Triiodothyronine	—	—	0.45	0.53	0.60	0.45
Thyroxine	—	0.62	0.72	0.61	0.64	0.45
Tetraiodothyroacetic acid	—	0.78	—	0.82	0.80	0.72
Triiodothyroacetic acid	—	0.69	—	0.69	0.65	0.84

TABLE 48

R_F VALUES OF BERBERINE AND OTHER *Chelidonium majus* ALKALOIDS

(F. KACZMAREK AND B. MALEK, *Planta Med.*, 7 (1959) 171)

Solvent: Carbon tetrachloride-chloroform-benzene (proportions not stated).

Paper: Schleicher & Schüll 2043b mgf (ascending).

Impregnation: Formamide-benzoic acid-acetone (6 ml:0.4 g:18 ml); acetone allowed to evaporate (24 h).

Length of run: 20 cm.

Time of run: 1 h.

Detection: Modified Dragendorff (AMELINK, 1934); U.V. light.

Compound	R_F
Chelidonine	0.83
Sanguinarine	0.62
Chelerythrine	0.44
Protopine	0.18
β -Allocriptopine	0.06
Berberine	0.00

TABLE 49

 R_F VALUES OF SOME *Senecio* ALKALOIDS(H.-B. SCHRÖTER AND F. ŠANTAVÝ, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 472)Solvents: S_1 = *n*-Butanol-acetic acid (5%)^{a,b}. S_2 = Isobutanol-toluene-water (1:1, satd. 5% for 48 h)^c. S_3 = *n*-Propanol-water (3:1) (paper impregnated with pH 5.5 phosphate buffer and dried at 80°). S_4 = *n*-Butanol-water (satd.) (paper impregnated with borate buffer pH 7.8).Paper: P_1 = Whatman No. 1 (used by authors). P_2 = Schleicher & Schüll 2043b (12 cm diam.) for circular paper chromatography.

Detection: Dragendorff (dip).

(a) = ascending; (d) = descending.

Alkaloid	Formula	R_F				
		S_1		S_2^c P_1 (d)	S_3 P_1 (a)	S_4 P_2
		(a)	(d)			
Integerrimine	$C_{18}H_{25}NO_5$		0.61a			
Senecionine	$C_{18}H_{25}NO_5$	0.56	0.64, 0.62a	0.56	0.58	0.80
Seneciphylline	$C_{18}H_{23}NO_5$	0.52	0.52 ^b , 0.58 ^a			
Retrorsine	$C_{18}H_{25}NO_5$		0.44 ^a			
Riddelliine	$C_{18}H_{23}NO_6$	0.35	0.40 ^a		0.37	0.69
Trichodesmine	$C_{18}H_{27}NO_6$		0.54 ^a			
Junceine	$C_{18}H_{27}NO_7$		0.38 ^a			
Jaconine	$C_{18}H_{23}NO_5$		0.43 ^b			
Jacoline	$C_{18}H_{27}NO_7$		0.26 ^{a,b}			
Jacozine	$C_{18}H_{23}NO_6$		0.32 ^b			
Jacobine	$C_{18}H_{25}NO_6$		0.39 ^b , 0.44 ^a			
Tomentosine	$C_{19}H_{27}NO_7$		0.40 ^d			
Otosenine	$C_{19}H_{27}NO_7$	0.39	0.41	0.39	0.47	0.54
Alkaloid S-C	$C_{18}H_{23}NO_6$	0.36	0.38	0.36	0.41 ^e	0.76
Alkaloid S-D	$C_{18}H_{25}NO_6$	0.56	0.64	0.59	0.58 ^e	0.90
Senecic acid	$C_{10}H_{16}O_5$	0.92	0.90 ^f			
Jaconecic acid	$C_{10}H_{16}O_6$	0.47	0.52 ^f			

^a R. ADAMS AND M. GIANTURCO, *J. Am. Chem. Soc.*, 78 (1956) 398, 1919, 1926.^b R. B. BRADBURY AND C. C. J. CULVENOR, *Australian J. Chem.*, 7 (1954) 378.^c J. BÜCHI AND H. SCHUMACHER, *Pharm. Acta Helv.*, 31 (1956) 417.^d R. ADAMS, M. GIANTURCO AND B. L. VAN DUREN, *J. Am. Chem. Soc.*, 78 (1956) 3513.^e Appear as brown spots first.^f R. B. BRADBURY AND J. B. WILLIS, *Australian J. Chem.*, 9 (1956) 258.

TABLE 50

 R_F VALUES OF SOME POLYHYDRIC ALCOHOLS(J. BORECKÝ AND J. GASPARIČ, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 1287)Solvents: S_1 = Water-saturated ethyl acetate. S_2 = Ethyl acetate-ethanol-water (12:2:1).

Paper: Whatman No. 3 (descending).

Detection: 5 % aq. AgNO_3 (9 ml) + ammonia (1 ml) spray, then heated to 100° (15-40 min), fixation by water wash (15 min), then fixation with 10 % thiourea in 0.1 N H_2SO_4 ; saturated aq. potassium periodate spray; 1 N NaOH -2 % triphenyl-tetrazolium chloride (1:1) spray, then heated to 100° for a short time.

Alcohol	R_F	
	S_1	S_2
Glucose	0	0
<i>d</i> -Arabitol	0	0.05
Glycerol	0.02	0.21
Ethylene glycol	0.15	0.43
1,2-Propylene glycol	0.35	0.58
1,4-Butylene glycol	0.32	0.62
1,3-Butylene glycol	0.42	0.67
2,3-Butylene glycol	0.55	0.70

TABLE 51

 R_F VALUES OF 3,5-DINITROBENZOATES OF SOME ALCOHOLS AND THEIR DERIVATIVES(J. BORECKÝ AND J. GASPARIČ, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 1287)

Solvent: Hexane.

Paper: Whatman No. 3 (descending).

Impregnation: I_1 = 50 % dimethyl formamide. I_2 = 25 % dimethyl formamide. I_3 = 20 % formamide

(Care must in be taken in removal of formamides.)

Detection: Unfiltered U.V. irradiation; Zn(II) chloride reduction, then *p*-dimethylaminobenzaldehyde spray.

3,5-Dinitrobenzoate of	R_F		
	I_1	I_2	I_3
Ethylene glycol monomethyl ether	0.04	0.24	0.20
Ethylene glycol monoethyl ether	0.10	0.46	0.43
Ethylene glycol mono- <i>n</i> -butyl ether	0.27	0.71	0.76
Diethylene glycol mono- <i>n</i> -butyl ether	0.20	0.63	0.59
Methanol	0.08	0.34	0.31
Ethanol	0.16	0.57	0.59
<i>n</i> -Propanol	0.29	0.70	0.76
<i>n</i> -Butanol	0.41	0.70	0.86
<i>n</i> -Amyl alcohol	0.53	0.84	—
α -Dichlorohydrin	0.06	0.31	0.42
Ethylene chlorohydrin	0.04	0.22	0.26
1,2-Propylene chlorohydrin	0.08	0.45	0.58

TABLE 52

R_F VALUES OF 3,5-DINITROBENZOATES OF HYDROXYETHYLATED *n*-BUTANOL,
OTHER ALIPHATIC ALCOHOLS AND RELATED COMPOUNDS

(J. BORECKÝ AND J. GASPARIČ, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 1287)

Solvent: S_1 = Hexane.

S_2 = Chloroform-ethyl acetate (2:8).

Impregnation: 20% formamide.

Detection: Unfiltered U.V. irradiation; Zn(II) chloride reduction, then *p*-dimethylaminobenzaldehyde spray.

3,5-Dinitrobenzoate of	R_F	
	S_1	S_2
Methanol	0.22	—
Ethanol	0.47	—
<i>n</i> -Propanol	0.65	—
<i>n</i> -Butanol	0.78	—
<i>n</i> -Amyl alcohol	0.86	—
Ethylene glycol mono- <i>n</i> -butyl ether	0.67	—
Diethylene glycol mono- <i>n</i> -butyl ether	0.51	—
Triethylene glycol mono- <i>n</i> -butyl ether	0.31	—
Tetraethylene glycol mono- <i>n</i> -butyl ether	0.16	—
Glycerol triester	—	0.93
Glycerol monoester	—	0.48
3,5-Dinitrobenzoic acid	—	0.04

TABLE 53

R_F VALUES OF 3,5-DINITROBENZOATES OF GLYCOLS

(J. BORECKÝ AND J. GASPARIČ, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 1287)

Solvent: S_1 = Hexane-benzene (3:1).

S_2 = Hexane-benzene (1:3).

Paper: Whatman No. 3 (descending).

Impregnation: 20% formamide.

Detection: Unfiltered U.V. irradiation; Zn(II) chloride reduction then *p*-dimethylaminobenzaldehyde spray.

3,5-Dinitrobenzoate of	R_F	
	S_1	S_2
1,3-Butylene glycol diester	0.48	0.92
1,2-Propylene glycol diester	0.42	—
Ethylene glycol diester	0.21	0.86
Ethylene glycol monoester	at start	0.12
1,2-Propylene glycol monoester	0.02	0.28
1,3-Butylene glycol monoester	0.06	0.50
Methanol	0.66	—
Ethanol	0.83	—
Glycerol triester	—	0.72
Glycerol monoester	—	at start

TABLE 54

 R_F VALUES OF AMINOACETONE AND δ -AMINOLAEVULINIC ACID(W. H. ELLIOTT, *Biochem. J.*, 74 (1960) 478)Solvents: S_1 = 2-Methylpropan-2-ol-methyl ethyl ketone-formic acid-water (120:50:40:40). S_2 = Ethanol-*M* acetic acid-pyridine-water (95:10:3:3).

Paper: Whatman No. 3 (washed by allowing distilled water to drip off bottom of sheets for three days).

Detection: Ninhydrin; copper-ninhydrin [satd. $\text{Cu}(\text{NO}_3)_2$ in acetone (0.4 ml/100 ml) dip; 0.2 % ninhydrin in acetone dip]; picrate spray (aq. satd. picric acid-10 *N* NaOH-water, 10:20:50), then sprayed with 5 *N* HCl after 1 min; modified Morgan-Elson [*M* acetate (pH 4.6) buffer-acetylacetone (10:1); autoclave paper 3 min at 15 lb./in.² pressure, then spray with modified Ehrlich of MAUZERALL AND GRANICK (1956)].

Compound	R_F	
	S_1	S_2
Aminoacetone	0.4	0.3
δ -Aminolaevulinic acid	0.4	0.15

TABLE 55

 R_F VALUES OF SOME DINITROPHENYL-AMINO ACIDS(J. C. CRAWHALL AND R. W. E. WATTS, *Biochem. J.*, 74 (1960) 514)

Solvent: 2-Methylbutan-2-ol system (BLACKBURN AND LOWTHER, 1951).

Paper: Whatman No. 1 (buffered).

Detection: Visible light.

Compound	R_F
DNP-glycine	0.38
DNP- δ -aminolaevulinic acid	0.63

TABLE 56

 R_F VALUES OF PHOSPHORYLCHOLINE AND PHOSPHORYLETHANOLAMINE(M. W. NEIL, *Biochem. J.*, 74 (1960) 32P)

Solvent: Phenol-ammonia.

Paper: Not stated (presumably Whatman).

Detection: Phosphate reagent.

Compound	R_F
Phosphorylcholine	0.85
Phosphorylethanolamine	0.35

TABLE 57

R_F VALUES OF SOME PHOSPHOLIPID HYDROLYSIS PRODUCTS(R. M. C. DAWSON, *Biochem. J.*, 75 (1960) 45)Solvents: *S*₁ = Phenol saturated with water-acetic acid-ethanol (100:10:12, by vol.), freshly prepared.*S*₂ = Methanol-98 % formic acid-water (80:13:7, by vol.), freshly prepared.Paper: Whatman No. 1, washed with 2 *N* acetic acid then water (ascending: *S*₁ and *S*₂; descending *S*₁).Time of run: 14-18 h (*S*₁).8 h (*S*₂).

Detection: 0.25 % ninhydrin in acetone (3 min at 100°); acid molybdate spray followed by U.V. irradiation; perchloric acid-hydrochloric acid acidified molybdate followed by U.V. irradiation.

<i>Hydrolysis product</i>	<i>R_F</i> *	
	<i>S</i> ₁	<i>S</i> ₂
Glycerylphosphorylcholine	0.77	0.67
Glycerylphosphorylethanolamine	0.63	0.47
Glycerylphosphorylserine	0.30	0.50
Glycerylphosphorylinositol	0.20	0.45
Phosphorylinositol	0.20	0.45
Glycerophosphoric acid	0.33	0.74
Polyglycerol phosphate	0.28	0.60
Cyclic glycerophosphoric acid	0.50	0.66
Inorganic P	0.25	0.85

* Approximate.

TABLE 58

ELECTROPHORETIC MOBILITIES OF SOME PHOSPHOLIPID HYDROLYSIS PRODUCTS

(R. M. C. DAWSON, *Biochem. J.*, 75 (1960) 45)Electrolyte: *E*₁ = Pyridine-acetic acid-water (1:10:89, by vol.), a volatile buffer at pH 3.6.Paper: Whatman No. 1 washed with 2 *N* acetic acid then water.

Potential: 2000V.

Time of run: 55 min.

Apparatus: RYLE, SANGER, SMITH AND KITAI (1955), paper under water-cooled toluene.

Mobility units: Relative to inorganic P (based on cm towards anode).

Detection: 0.25 % ninhydrin in acetone (3 min at 100°); acid molybdate spray followed by U.V. irradiation; perchloric acid-hydrochloric acid acidified molybdate followed by U.V. irradiation.

<i>Hydrolysis product</i>	<i>Mobility</i>
Glycerylphosphorylcholine	0
Glycerylphosphorylethanolamine	0
Glycerylphosphorylserine	0.61
Glycerylphosphorylinositol	0.57
Phosphorylinositol	0.64
Glycerophosphoric acid	0.82
Polyglycerol phosphate	0.96
Cyclic glycerophosphoric acid	1.0
Inorganic P	1.0

TABLE 59

 R_F VALUES OF TWO XANTHURENIC ACID CONJUGATES(C. BAGLIONI, P. FASELLA, C. TURANO AND N. SILIPRANDI, *Biochem. J.*, 74 (1960) 521)Solvents: S_1 = Butanol-acetic acid-water (4:1:5, by vol.). S_2 = 20% (w/v) KCl.

Paper: Not stated.

Detection: Ninhydrin, Pauly reagent, U.V. light.

Compound	R_F	
	S_1	S_2
Xanthurenic acid conjugate I*	0.14	0.47
Xanthurenic acid conjugate II**	0.09	0.53

* Tentatively identified as having 8-OH bound to sulphate and carboxyl group to glycine.

** Tentatively identified as having 8-OH bound to glucuronic acid and carboxyl group to glycine.

TABLE 60

ELECTROPHORETIC MOBILITIES OF TWO XANTHURENIC ACID CONJUGATES

(C. BAGLIONI, P. FASELLA, C. TURANO AND N. SILIPRANDI, *Biochem. J.*, 74 (1960) 521)Electrolyte: Potassium phosphate buffer (pH 5.9, I 0.05).

Paper: Not stated.

Potential gradient: 10 V/cm.

Method: Horizontal.

Units: cm (anodic displacement).

Time of run: 8 h.

Detection: Ninhydrin, Pauly reagent, U.V. light.

Compound	Mobility
Xanthurenic acid conjugate I*	25.00
Xanthurenic acid conjugate II**	14.50

* Tentatively identified as having 8-OH bound to sulphate and carboxyl group to glycine.

** Tentatively identified as having 8-OH bound to glucuronic acid and carboxyl group to glycine.

TABLE 61

 R_F VALUE OF 5-HYDROXYTRYPTACYAMINE CREATINE SULPHATE(D. B. HOPE AND A. D. SMITH, *Biochem. J.*, 74 (1960) 101)

Solvent: Butan-1-ol-acetic acid-water (4:1:5, upper phase).

Paper: Whatman No. 4.

Detection: Spray of: (A) diacetyl (1%, v/v, in water; 2.5 ml) with α -naphthol (25%, w/v, in propan-1-ol; 20 ml) made up to 100 ml with propan-1-ol. (B) 3 N NaOH. Immediately before use, 10 ml of (A) and 5 ml of (B) made up to 30 ml with water.

Compound	R_F
5-Hydroxytryptacyamine creatine sulphate	0.48

TABLE 62

 R_F VALUES OF SOME ANTHRAQUINONE DERIVATIVES(J. FRANC AND M. WURST, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 657)

Solvent: 80% ethanol.

Paper: Whatman No. 1, impregnated with 30% liquid paraffin (b.p. 190–275°) in benzene; descending.

Detection: U.V. light; visible light.

Standard: 1-Anilinoanthraquinone used as control on all chromatograms.

<i>Anthraquinone</i>	R_F	<i>Anthraquinone</i>	R_F
1-Anilino-	0.28	1-Amino-2-bromo-4-hydroxy-	0.15
1-Hydroxy-	0.42	1-Sulpho- (sodium salt)	0.49
2-Hydroxy-	0.70	2-Sulpho- (sodium salt)	0.58
1,2-Dihydroxy-	0.71	1,6-Disulpho- (sodium salt)	0.11
1,4-Dihydroxy-	0.34	1,7-Disulpho- (sodium salt)	0.18
1,5-Dihydroxy-	0.26	1,8-Disulpho- (sodium salt)	0.17
1,6-Dihydroxy-	0.85	2,6-Disulpho- (sodium salt)	0.22
1,8-Dihydroxy-	0.37	2,7-Disulpho- (sodium salt)	0.27
2,6-Dihydroxy-	0.85	1-Chloro-2-carboxy-	0.57
2,7-Dihydroxy-	0.90	2-Carboxy-	0.50
1,2,5,8-Tetrahydroxy-	—	1-Nitro-	0.59
1,4,5,8-Tetrahydroxy-	0.00	4-Nitro-1,8-dichloro-	0.63
1-Anilino-	0.28	1-Nitro-2-methyl-	0.62
1-Amino-	0.74	1-Nitro-5-sulpho-	0.50
2-Amino-	*	1-Nitro-6-sulpho-	0.58
1,5-Diamino-	0.70	1-Nitro-8-sulpho-	0.48
1,8-Diamino-	0.68	1-Nitro-7-sulpho-	0.58
2,3-Diamino-	0.72	1-Nitro-2-carboxy-	0.58
1,2-Diamino-	0.71	1-Nitro-5-chloro-	0.52
1-Amino-2-hydroxy-	0.71	1-Nitro-2-carbonylchloride	0.57
1-Amino-4-hydroxy-	0.70	2-Sulphochloride	0.66
2-Amino-3-hydroxy-	0.53	1,5-Disulphochloride	0.18
1-Amino-4-hydroxy-5-chloro-	0.65	1,8-Disulphochloride	0.25
2-Amino-1,3-dibromo-	0.65	2,6-Disulphochloride	0.41
1-Amino-2-hydroxyethoxy-4-hydroxy-	0.58	2,7-Disulphochloride	0.41
1,5-Diamino-2,4,6,8-tetrabromo-	0.34	1-Bromo-	0.46
1-Amino-2-sulpho-	0.63	2-Bromo-	0.33
1-Amino-2-carbonylchloride	0.52	1,3-Dibromo-	0.09
1-Amino-2-sulpho-4-bromo-	0.54	1,5-Dibromo-	—
1,5-Diamino-2-sulpho-	0.45	1,3,5,7-Tetrabromo-	0.03
1-Amino-2-chloro-	0.34	Anthraquinone	0.45
1-Amino-2-sulpho-4-bromo-	0.45 *	2-Methyl-	0.46
2-Amino-3-chloro-	0.52	Dianthrimide	0.00
1-Amino-2,4-dibromo-	0.15 *	4,4'-Diaminodianthrimide	0.00

* Elongated spots.

TABLE 63

ELECTROPHORETIC MOBILITIES OF SOME ANTHRAQUINONE DERIVATIVES
(J. FRANC AND M. WURST, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 657)

Electrolytes: $E_1 = 3 N NH_4OH$.

$E_2 = 1 N CH_3COOH$.

Paper: Whatman No. 1.

Mobility units: $u \times 10^6 \text{ cm}^2 \cdot \text{V}^{-1} \cdot \text{sec}^{-1}$.

Potential: 6-7 V/cm.

Detection: U.V. light; visible light.

Standard: 3-Nitrophthalic acid ($u = 20.5$).

Anthraquinone	Mobility		Anthraquinone	Mobility	
	E_1	E_2		E_1	E_2
1-Anilino-		0.0	1-Sulpho- (sodium salt)	11.3	7.4
1-Hydroxy-	0.0	0.0	2-Sulpho- (sodium salt)	11.0	7.3
2-Hydroxy-	4.6	0.0	1,6-Disulpho- (sodium salt)	—	12.6
1,2-Dihydroxy-	0.0	0.0	1,7-Disulpho- (sodium salt)	19.5	12.6
1,4-Dihydroxy-	0.0	0.0	1,8-Disulpho- (sodium salt)	14.5	12.7
1,5-Dihydroxy-	0.0	0.0	2,6-Disulpho- (sodium salt)	17.7	14.8
1,6-Dihydroxy-	1.75	0.0	2,7-Disulpho- (sodium salt)	19.0	15.1
1,8-Dihydroxy-	0.0	0.0	1-Chloro-2-carboxy-	6.6	3.55
2,6-Dihydroxy-	6.6	0.0	2-Carboxy-	4.8	0.0
2,7-Dihydroxy-	7.7	0.0	1-Nitro-	0.0	0.0
1,2,5,8-Tetrahydroxy-	0.0	0.0	4-Nitro-1,8-dichloro-	0.0	0.0
1,4,5,8-Tetrahydroxy-	0.0	0.0	1-Nitro-2-methyl-	0.0	0.0
1-Amino-	0.0	0.0	1-Nitro-5-sulpho-	7.3	6.8
2-Amino-	0.0	0.0	1-Nitro-6-sulpho-	6.7	6.6
1,5-Diamino-	0.0	0.0	1-Nitro-8-sulpho-	8.0	7.1
1,8-Diamino-	0.0	0.0	1-Nitro-7-sulpho-	9.1*	6.5
2,3-Diamino-	0.0	0.0	1-Nitro-2-carboxy-	6.6	5.1
1,2-Diamino-	0.0	0.0	1-Nitro-5-chloro-	0.0	0.0
1-Amino-2-hydroxy-	0.0	0.0	1-Nitro-2-carbonylchloride	7.8	4.4
1-Amino-4-hydroxy-	0.0	0.0	2-Sulphochloride	9.5	7.7
2-Amino-3-hydroxy-	2.3	0.0	1,5-Disulphochloride	17.4	13.7
1-Amino-4-hydroxy-5-chloro-	0.0	0.0	1,8-Disulphochloride	11.4	13.0
2-Amino-1,3-dibromo-	0.0	0.0	2,6-Disulphochloride	17.4	12.4
1-Amino-2-hydroxyethoxy-			2,7-Disulphochloride	17.4	12.4
4-hydroxy-	0.0	0.0	1-Bromo-	0.0	0.0
1,5-Diamino-			2-Bromo-	0.0	0.0
2,4,6,8-tetrabromo-	0.0	0.0	1,3-Dibromo-	0.0	0.0
1-Amino-2-sulpho-	3.6	6.2	1,5-Dibromo-	0.0	0.0
1-Amino-2-carbonylchloride	7.7	4.4	1,3,5,7-Tetrabromo-	0.0	0.0
1-Amino-2-sulpho-4-bromo-	7.5	7.0	Anthraquinone	0.0	0.0
1,5-Diamino-2-sulpho-	2.1	8.3	2-Methyl-	0.0	0.0
1-Amino-2-chloro-	0.0	0.0	Dianthrimide	0.0	0.0
1-Amino-2-sulpho-4-bromo-	7.0	7.0	4,4'-Diaminodianthrimide	0.0	0.0
2-Amino-3-chloro-	0.0	0.0			
1-Amino-2,4-dibromo-	0.0	0.0			
1-Amino-2-bromo-4-hydroxy-	0.0	0.0			

* Elongated spot.

TABLE 64

 R_F VALUES OF SOME CHLOROANTHRAQUINONES(J. FRANC AND M. WURST, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 657)

Solvent: 80% ethanol.

Paper: Whatman No. 1, impregnated with 30% liquid paraffin (b.p. 190–275°) in benzene; descending.

Detection: U.V. light; visible light.

<i>Anthraquinone</i>	R_F
1-Chloro-	0.49
2-Chloro-	0.33
1,4-Dichloro-	0.18
1,5-Dichloro-	0.41
1,6-Dichloro-	0.24
1,7-Dichloro-	0.28
1,8-Dichloro-	0.47
2,6-Dichloro-	0.02
2,7-Dichloro-	0.14

N.B. All have zero mobilities during electrophoresis in 3 N NH_4OH and in 1 N CH_3COOH .

TABLE 65

 R_F VALUES OF PHENOLS AND RELATED COMPOUNDS(W. E. HILLIS AND A. CARLE, *Biochem. J.*, 74 (1960) 607)Solvents: $S_1 = 6\%$ aqueous acetic acid. $S_2 =$ Butan-1-ol-acetic acid-water (6:1:2, by vol.).

Paper: Whatman No. 1 or No. 3 (ascending).

Length of run: 11.5 in.

Temperature of run: 20°.

Detection: Visible light; U.V. light; U.V. light after NH_3 exposure; ferric chloride-potassium ferricyanide; diazotized *p*-nitraniline-sodium acetate; vanillin-HCl; KCN solution; sodium periodate and aniline; aniline-phthalic acid; phloroglucinol-HCl; bromocresol green.

<i>Compound</i>	R_F	
	S_1	S_2
Lignan*	0.00	0.97
Gallic acid	0.40	0.59
(+)-Catechin	0.40	0.59
(-)- <i>epi</i> Catechin	0.38	0.41
Ellagic acid	0.00	0.35
Corilagin	0.39	0.20
Juglanin	0.50	0.14
1-Galloyl- β -glucose	0.68	0.27
1,3,6-Trigalloylglucose	0.12	0.32
Shikimic acid	0.42	0.77
Leucodelphinidin	0.45	0.20

* Tentatively identified as a member of this group of substances.

TABLE 66

 R_F VALUES OF SOME AMINO ACIDS(H. E. WRIGHT, JR., W. W. BURTON AND R. C. BERRY, JR., *Arch. Biochem. Biophys.*, 86 (1960) 94)Solvents: S_1 = *sec.*-Butanol-3% aqueous ammonia (5:2); run twice. S_2 = *sec.*-Butanol-90% formic acid-water (15:3:2). S_3 = *n*-Butanol-glacial acetic acid-water (12:3:5). S_4 = *n*-Butanol-methyl ethyl ketone-conc. ammonium hydroxide-water (5:3:1:1).

Paper: Whatman No. 1 (ascending).

Time of run: 20 h.

Detection: Ninhydrin spray (0.2 g ninhydrin in 90 ml acetone, followed by addition of 10 ml glacial acetic acid).

Amino acid	R_F			
	S_1	S_2	S_3	S_4
Cystine	0.10	0.05	0.11	0.02
Lysine	0.17	0.15	0.16	0.08
Histidine	0.25	0.11	0.17	0.13
Arginine	0.18	0.19	0.19	0.05
Serine	0.23	0.28	0.25	0.11
Glycine	0.23	0.32	0.27	0.07
Aspartic acid	0.10	0.29	0.27	0.02
Glutamic acid	0.10	0.39	0.34	0.02
Threonine	0.28	0.36	0.33	0.28
Alanine	0.28	0.49	0.38	0.11
Proline	0.34	0.49	0.41	0.13
Tyrosine	0.41	0.52	0.47	0.17
Methionine	0.51	0.64	0.53	0.23
Valine	0.47	0.69	0.55	0.21
Tryptophan	0.59	0.54	0.55	0.32
Phenylalanine	0.66	0.70	0.64	0.35
Leucine	0.66	0.78	0.70	0.34
Isoleucine	0.61	0.77	0.68	0.31

TABLE 67

 R_F VALUES OF SOME PHENYLALANINE DERIVATIVES(Z. A. SHABAROVA, L. G. ANDRONOVA, M. BEZDEK AND M. A. PROKOFIEV, *Compt. rend. acad. sci. U.R.S.S.*, 130 (1960) 346)Solvents: S_1 = *n*-Butanol saturated with water. S_2 = *n*-Butanol-water-acetic acid (4:1:1).

Paper: Not stated.

Detection: Not stated.

Compound	R_F	
	S_1	S_2
N-(2',3'-Isopropylidene-adenosine-5'-benzylphospho)-phenylalanine methyl ester	0.87	
N-(2',3'-Isopropylidene-adenosine-5'-phospho)-phenylalanine	0.50	
Glycylphenylalanine methyl ester	0.42	
Valylphenylalanine methyl ester	0.69	
Tyrosylphenylalanine methyl ester		0.65

TABLE 68

 R_F VALUES OF SOME SIMPLE PEPTIDES(S. K. MAJUMDAR AND S. K. BOSE, *Biochem. J.*, 74 (1960) 596)Solvents: S_1 = Water-saturated phenol. S_2 = Butanol-acetic acid-water (4:1:1).Paper: Whatman No. 1 (56 cm \times 46 cm), descending.

Detection: 0.2 % ninhydrin in acetone.

Peptide*	R_F	
	S_1	S_2
Asp·Glu	0.18	0.11
Ser·Asp	0.26	0.12
Glu·(Asp,Ala)	0.26	0.21
Glu·Asp	0.30	0.15
Asp·Ala	0.35	0.28
Asp·Tyr	0.36	0.34
Ala·Asp	0.40	0.40
Asp·(Glu,Tyr)	0.48	0.30
Glu·Tyr	0.50	0.41
Leu·(Asp,Glu)	0.52	0.36
Leu·(Asp,Glu,Ala)	0.60	0.42
Asp·(Ser, Tyr)	0.74	0.47
Ser·(Asp,Glu,Leu)	0.76	0.56
Ser·(Asp, Leu)	0.77	0.67
Ala·(Asp,Pro)	0.80	0.34

* Suggested structure. Tentative order given in brackets.

TABLE 69

ELECTROPHORETIC MOBILITIES OF ODONTOPHORE POLYSACCHARIDE AND SOME OTHER ACID POLYSACCHARIDES

(J. W. LASH AND M. W. WHITEHOUSE, *Biochem. J.*, 74 (1960) 351)

Electrolyte: 0.2 M sodium borate buffer pH 8.6.

Paper: Whatman No. 3 MM.

Potential: 12 V/cm.

Units: $\mu \times 10^{-5}$ cm²/sec⁻¹/V⁻¹ at 22°.

Detection: 0.15 % (w/v) thionin in 65 % (v/v) ethanol, acidified with approx. 0.1 % (v/v) acetic acid. Excess stain washed out either with 95 % (v/v) ethanol or running tap water.

Compound	Sulphate content (%)	Mobility
Odontophore polysaccharide	35	— 12.2
Chondroitin sulphate (sodium salt)	15	— 11.8
Heparin (sodium salt)	44	— 14.5

TABLE 70

R_F VALUES OF FATTY ACIDS AS THEIR 2,4-DINITROBENZYL ESTERS
(M. JUREČEK, J. CHURÁČEK AND V. ČERVINKA, *Mikrochim. Acta*, (1960) 102)

Paper: Whatman No. 1 impregnated with 25 % formamide in ethanol.

Solvent: Cyclohexane-benzene (2:1).

Temperature: 21°.

Preparation of derivatives: the sodium salts of the acids are heated in a sealed tube for 1 h at 100° with the required amount of 2,4-dinitrobenzyl bromide.

<i>Ester of</i>	R_F
Formic acid	0.00
Acetic acid	0.13
Propionic acid	0.34
Butyric acid	0.56
Isobutyric acid	0.58
Valeric acid	0.73
Isovaleric acid	0.73
Caproic acid	0.81
2,4-Dinitrobenzyl bromide	0.35

TABLE 71

R_F VALUES OF SOME N-ALKYL-3,5-DINITROBENZAMIDES
(M. VEČEŘA, B. VOLÁKOVÁ, M. KOZÁKOVÁ AND M. JUREČEK,
Collection Czechoslov. Chem. Commun., 25 (1960) 1281)

Solvent: Benzene-cyclohexane (2:1).

Paper: Whatman No. 1.

Impregnation: With formamide; $I_1 = 10\%$, $I_2 = 20\%$, $I_3 = 30\%$.

Temperature of run: 22°.

Detection: 1 % alcoholic α -naphthylamine, then U.V. observation; fresh acetone-2 N NaOH (1:1) spray.

<i>Alkyl group</i>	R_F		
	I_1	I_2	I_3
Methyl	0.16	0.10	0.05
Ethyl	0.27	0.23	0.13
<i>n</i> -Propyl	0.53	0.40	0.24
Isopropyl	0.51	0.36	0.22
<i>n</i> -Butyl	0.69	0.57	0.41
Isobutyl	0.66	0.52	0.38
<i>sec.</i> -Butyl	0.65	0.52	0.37
<i>tert.</i> -Butyl	0.78	0.68	0.54
<i>n</i> -Amyl	0.80	0.72	0.53
Isoamyl	0.78	0.68	0.50
<i>n</i> -Hexyl	0.85	0.82	0.70

TABLE 72

R_F VALUES OF ARTIFICIAL VANILLA FLAVOURS(E. SUNDT, in *New Research Laboratories in Geneva*, Brochure of Firmenich & Cie, Geneva, 1959, p. 27)Solvent: Cyclohexane-cyclohexene (5:3, v/v, previously saturated with dimethylformamide).
Paper: Whatman No. 7, impregnated with dimethylformamide.
Temperature: 25°.

<i>Compound</i>	<i>R_F</i>
Vanillin	0.06
<i>p</i> -Hydroxybenzaldehyde	0.09
Ethylvanillin	0.13
<i>o</i> -Vanillin	0.26
Veratraldehyde	0.27
Coumarin	0.29
Dihydrocoumarin	0.30
Piperonal (heliotropin)	0.35
6-Methylcoumarin	0.39
Propenylguaethol	0.44

TABLE 73

R_F VALUES OF SOME PHENOLS AND PHENOLIC ACIDS(H. E. WRIGHT, JR., W. W. BURTON AND R. C. BERRY, JR., *Arch. Biochem. Biophys.*, 86 (1960) 94)Solvents: S₁ = 2% Acetic acid.S₂ = Sodium formate-90% formic acid-water (10 g:1:200).S₃ = Isopropyl alcohol-conc. ammonium hydroxide-water (20:1:2).S₄ = 8% Sodium chloride-acetic acid (100:1).

Paper: Whatman No. 1 (ascending).

Time of run: 4 h (aqueous solvent).

20 h (isopropanol solvent).

Detection: Diazotized *p*-nitraniline; diazotized sulphanilic acid.

<i>Compound</i>	<i>R_F</i>				<i>Colour*</i>
	S ₁	S ₂	S ₃	S ₄	
Phloroglucinol	0.53	0.51	0.46	0.53	Orange
Salicylic acid	0.67	0.68	0.48	0.70	Yellow
<i>m</i> -Hydroxybenzoic acid	0.64	0.70	0.39	0.59	Rose red
<i>p</i> -Hydroxybenzoic acid	0.59	0.63	0.25	0.55	Rose red
<i>p</i> -Hydroxyphenylacetic acid	0.76	0.78	0.41	0.81	Violet
Protocatechuic acid	0.48	0.55	0.02	0.42	Violet
3,5-Dihydroxybenzoic acid	0.50	0.59	0.20	0.41	Yellow

* Colour of dye formed with diazotized *p*-nitraniline.

TABLE 74

R_F VALUES OF 2-NAPHTHYL SULPHAMATE AND 2-NAPHTHYLAMINE(A. B. ROY, *Biochem. J.*, 74 (1960) 49)Solvent: Butan-1-ol-propan-1-ol-aq. 0.1 N NH₃ (2:1:1, by vol.).

Paper: Whatman No. 1 (descending).

Detection: Ehrlich with heating to 37° for 30 min, successively sprayed with: N HCl; 0.1 % (w/v) NaNO₂ and 0.5 % (w/v) thymol in 2 N NaOH.

Compound	<i>R_F</i>
2-Naphthyl sulphamate	0.26
2-Naphthylamine	0.83

TABLE 75

R_F VALUES OF CYANIDIN CHLORIDE AND A METHYLATED PRODUCT(W. G. C. FORSYTH AND J. B. ROBERTS, *Biochem. J.*, 74 (1960) 374)Solvents: S₁ = Acetic acid-water-conc. hydrochloric acid (30:10:3).S₂ = Butanol-2 N hydrochloric acid (1:1, v/v).

Paper: (a) not stated; presumably Whatman.

(b) Whatman seed test paper.

Detection: Ferric chloride-potassium ferricyanide; vanillin-conc. HCl; visible light.

Compound	<i>R_F</i>	
	S ₁	S ₂
Cyanidin chloride	0.50 ^a	0.70 ^a
3',4',5,7-Tetra-O-methylcyanidin		0.5-0.6 ^{*b}

* Circular paper chromatography.

TABLE 76

R_F VALUES OF SOME PORPHYRINS(J. E. O'HAGAN, *Biochem. J.*, 74 (1960) 417)Solvents: S₁ = Lutidine-water-NH₃ (NICHOLAS AND RIMINGTON, *Scand. J. Clin. Lab. Invest.*, 1 (1949) 12).S₂ = Chloroform.S₃ = Solvent of CHU, GREEN AND CHU, *J. Biol. Chem.*, 190 (1951) 643.

Paper: Not stated.

Temperature of run: 21°.

Detection: U.V. detection on solvent damp chromatograms.

Compounds	<i>R_F</i>		
	S ₁	S ₂	S ₃
Aetiohaemin III	1.0	0.0	1.0
Dimethylprotohaemin IX	1.0		
Protohaemin *	0.7		
Tetramethylcoprohaemin III			0.63
Octamethyluroporphyrin I			0.21

* Tentative identification.