

EDITORIAL

COOPERATION IN DATA COLLECTION

R_F values and electrophoretic mobilities in paper have established themselves as new physical constants used in the characterisation of compounds. Their value, whether precise or approximate, is appreciated; their function in the comparison and contrast of similar compounds is widely recognised. They have the benefit of versatility by virtue of the changes that can be rung in solvent and electrolyte and are backed by the microanalytical spot test which, almost without fail, follows the separation. The first major clues to chemical identity are now very often obtained with the aid of the new physical constants. Their value in comparison, contrast and clue-seeking led to the inception of the present data section as an aid to research workers.

We now wish to enlist the cooperation of others, so that we may expand the present facilities, since the rapid increase in volume of work and publication precludes extensive coverage. To this end we ask authors to help (a) by sending regularly reprints of their papers containing R_F and electrophoretic mobility values (paper or thin solid layer) to:

Dr. C. B. COULSON,
c/o Arthur D. Little Research Institute,
Inveresk,
Midlothian,
Scotland

and (b) by giving in their paper all the essential details of method (solvent system and electrolyte composition, paper type, temperature of run, and mode of detection) as well as by placing all their values together.

TABLE 1

 R_F VALUES OF SOME POLYAMINES(U. BACHRACH, S. PERSKY AND S. RAZIN, *Biochem. J.*, 76 (1960) 306)

Solvent: Butanol-acetic acid-water (50:25:25).

Paper: Whatman No. 1 (K. V. GIRI, A. N. RADHAKRISHNAN AND C. S. VAIDYANATHAN, *Nature*, 170 (1952) 1025).

Detection: 0.2% ninhydrin in butanol (spray).

| Compound | R_F |
|-----------------------------|-------|
| Spermidine | 0.13 |
| Propane-1,3-diamine | 0.24 |
| β -Alanine | 0.50 |
| γ -Aminobutyric acid | 0.58 |

TABLE 2

 R_F VALUES OF SOME GLYCEROPHOSPHORIC ESTERS(M. G. MACFARLANE, *Biochem. J.*, 78 (1961) 44)Solvents: S_1 = Phenol saturated with aqueous 1% NH_4OH . S_2 = *tert.*-Butanol-water (62:38, v/v), trichloroacetic acid (10%, w/v).Paper and detection: See R. M. C. DAWSON, *Biochim. Biophys. Acta*, 14 (1954) 374.

| Compound | R_F | |
|---------------------------------------|-------|-------|
| | S_1 | S_2 |
| Glycerophosphorylinositol | 0.09 | 0.26 |
| Polyglycerophosphate from cardiolipin | 0.13 | 0.45 |
| Glycerophosphorylserine | 0.20 | 0.41 |
| Glycerophosphate | 0.25 | 0.61 |
| Glycerophosphorylethanolamine | 0.67 | 0.41 |

TABLE 3

 R_F VALUES OF SOME GLYCEROPHOSPHORIC ESTERS(C. BRADBEER AND P. K. STUMPF, *J. Lipid Research*, 1 (1960) 214)Solvents: S_1 = Butanol-propionic acid-water (40:30:7). S_2 = Phenol saturated with water.

Paper: Whatman No. 1, acid washed.

Detection: Method of C. S. HANES AND F. A. ISHERWOOD, *Nature*, 164 (1949) 1107, as modified by R. S. BANDURSKI AND B. AXELROD, *J. Biol. Chem.*, 193 (1951) 405.

| Compound | R_F^* | |
|--------------------------------|---------|-------|
| | S_1 | S_2 |
| Glycerophosphate | 0.17 | 0.26 |
| Glycerolphosphorylethanolamine | 0.19 | 0.57 |
| Glycerolphosphorylcholine | 0.23 | 0.83 |
| Glycerolphosphorylinositol** | 0.08 | 0.10 |
| Glycerolphosphorylglycerol** | 0.13 | 0.38 |

* Obtained from two-dimensional chromatogram.

** Tentative identification.

TABLE 4

 R_F VALUES OF RIBITOL, ITS DERIVATIVES AND CERTAIN OTHER COMPOUNDS(J. J. ARMSTRONG, J. BADDILEY AND J. G. BUCHANAN, *Biochem. J.*, 76 (1960) 610)Solvents: S_1 = Propanol-NH₄OH, sp. gr. 0.88-water (6:3:1). S_2 = Butanol-ethanol-water-NH₄OH, sp. gr. 0.88 (40:10:49:1), organic phase.Paper: Whatman No. 1 or No. 4 (not specified) (previously washed with 2 *N* acetic acid then water).Detection: Improved periodate-Schiff reagent* (for α -glycols); molybdate reagent (for phosphoric esters); aniline phthalate (for reducing sugars); ninhydrin reagent (for amino acids).

| Compounds | R_F | |
|-------------------------------------|-------|-------|
| | S_1 | S_2 |
| Anhydroribitol | 0.75 | 1.38 |
| Glycerol | 0.75 | 1.47 |
| Ribitol | 0.65 | 1.00 |
| Glucose | 0.61 | 0.65 |
| Alanine | 0.63 | 0.57 |
| Glucosylribitol | 0.55 | 0.55 |
| Ribitol 1-phosphate | 0.30 | — |
| Ribitol 2 (and 3)-phosphate | 0.33 | — |
| Anhydroribitol 5-phosphate | 0.29 | — |
| Glucosylribitol 1 (and 2)-phosphate | 0.28 | — |
| Ribitol diphosphate | 0.12 | — |
| Glucosylribitol diphosphate | 0.12 | — |
| Glycerol diphosphate | 0.12 | — |

* *Cf.* J. BADDILEY, J. G. BUCHANAN, R. E. HANDSCHUMACHER AND J. F. PRESCOTT, *J. Chem. Soc.*, (1956) 2818.** $R_{ribitol} = R_F$ compound/ R_F ribitol.

TABLE 5

 R_F VALUES (RELATIVE) OF TETROSES AND TETRITOLS(R. D. BATT, F. DICKENS AND D. H. WILLIAMSON, *Biochem. J.*, 77 (1960) 272)Solvents: S_1 = Butan-2-one-acetic acid-aq. 4% boric acid (9:1:1). S_2 = Ethyl acetate-pyridine-water (12:5:4).

Paper: Whatman No. 1 (descending).

Time of run: 16 h.

Detection: Aniline-phosphoric acid-acetic acid solution (*cf.* F. DICKENS AND D. H. WILLIAMSON, *Biochem. J.*, 64 (1956) 567); periodic acid-benzidine reagent (H. T. GORDON, W. THORNBURG AND L. N. WERUM, *Anal. Chem.*, 28 (1956) 849) for polyols and sugars having adjacent hydroxyls; thin end-window Panex monitor (model 50A) for ¹⁴C.

| Compound | R_G^* | |
|---------------|---------|-------|
| | S_1 | S_2 |
| L-Erythrulose | 8.9 | 2.25 |
| D-Erythrose | 10.1 | 2.00 |
| Erythritol | 5.9 | 1.56 |
| D-Threitol | 6.0 | 1.44 |

* $R_G = R_F$ of compound/ R_F glucose.

TABLE 6

R_F VALUES OF STRUCTURAL ISOMERS OF GLUTAMYL-CYSTINYL-VALINE
(D. MORRIS, *Biochem. J.*, 76 (1960) 349)

Solvents: S_1 = Butanol-acetic acid-water (63:10:27).

S_2 = Amyl alcohol-pyridine-water (7:7:6).

S_3 = Phenol-water (5:2)/ NH_3 in tank.

Paper: Whatman No. 1 (descending).

Detection: Not given.

| Compound | R_F | | |
|--|-------|-------|-------|
| | S_1 | S_2 | S_3 |
| α -Peptide (disulphide form) | 0.16 | — | 0.21 |
| γ -Peptide (disulphide form) | 0.12 | — | 0.42 |
| α -Peptide ($-\text{SO}_3\text{H}$ form) | — | 0.43 | 0.17 |
| γ -Peptide ($-\text{SO}_3\text{H}$ form) | — | 0.48 | 0.16 |

TABLE 7

ELECTROPHORETIC MOBILITIES OF STRUCTURAL ISOMERS OF GLUTAMYL-CYSTINYL-VALINE
(D. MORRIS, *Biochem. J.*, 76 (1960) 349)

Electrolyte: E_1 = 2 *N* acetic acid (pH 2.1).

E_2 = 0.35 *M* pyridine-acetic acid (pH 3.5).

Paper: Whatman No. 3 MM.

Apparatus: A_1 = uncooled low voltage.

A_2 = cooled high voltage.

Potential: P_1 = 25 V/cm (26 mA).

P_2 = 19 V/cm (14 mA).

P_3 = 66 V/cm (24 mA).

Units: cm.

Time of run: T_1 = 4 h.

T_2 = 1 h.

T_3 = 20 min.

Detection: Not given.

| Compound | Mobility | | |
|--|-------------|-------------|-------------|
| | $E_1P_1T_1$ | $E_2P_2T_2$ | $E_3P_3T_3$ |
| α -Peptide ($-\text{SO}_3\text{H}$ form) | 3.0 | 9.0 | 2.3 |
| γ -Peptide ($-\text{SO}_3\text{H}$ form) | 3.0 | 13.0 | 5.6 |

TABLE 8

 R_F VALUES OF BENZOIC ACID AND SOME DERIVATIVES(B. C. BALDWIN, D. ROBINSON AND R. T. WILLIAMS, *Biochem. J.*, 76 (1960) 595)

Solvents: S_1 = Butanol-acetic acid-water (4:1:5).
 S_2 = Butanol-benzene-water (5:2:2).
 S_3 = Butanol-NH₄OH soln. sp. gr. 0.88-water (4:1:5).
 S_4 = Methyl ethyl ketone-2 N NH₄OH (1:1).
 S_5 = Propanol-NH₄OH soln. sp. gr. 0.88 (7:3).
 S_6 = Benzene-acetic acid-water (1:1:2).
 (All ratios by vol.)

Paper: Whatman No. 4 (descending).

Time of run: 5-6 h (S_1, S_2, S_3, S_5); 2-2.5 h (S_4, S_6).

Length of run: 30 cm (approx.).

Detection: D_1 = Ninhydrin (1% in ethanol); heat to 100-120° for 10 min. D_2 = *p*-Dimethylaminobenzaldehyde (1% in acetic anhydride); heat at 120° for 5 min. D_3 = *p*-Dimethylaminocinnamaldehyde (0.05% in acetic anhydride); heat at 120-140° for 2 min. D_4 = U.V. light (quenching at 270 m μ).

| Compound | R_F | | | | | | Colour* | | | |
|----------------------------------|---------|-------|---------|----------|----------|-------|---------|-------|--------|-------|
| | S_1 | S_2 | S_3 | S_4 | S_5 | S_6 | D_1 | D_2 | D_3 | D_4 |
| Benzoic acid | 1.0 | 0.95 | 0.5 | 0.1 | 0.65 | 0.9 | — | — | — | + |
| Benzoyl glucuronide** | 0.7 | 0.15 | 0.25 | 0.05-0.1 | 0.35 | 0.0 | — | — | — | + |
| Ornithuric acid | 0.9-1.0 | 0.7 | 0.65 | 0.4 | 0.8-0.95 | 0.3 | — | — | w(ybd) | + |
| Hippuric acid | 0.85 | 0.2 | 0.3-0.4 | 0.1-0.2 | 0.05 | 0.1 | — | o | r | + |
| N ⁵ -Benzoylornithine | 0.5 | 0.1 | 0.35 | 0.01*** | 0.6 | 0.0 | p | — | w(ybd) | + |
| N ² -Benzoylornithine | 0.46 | 0.1 | 0.27 | 0.01*** | 0.6 | 0.0 | p | — | w(ybd) | + |

* p = purple; o = orange; r = red; w(ybd) = white spot on yellow background. + indicates positive result, — negative result.

** Detected by naphtharesorcinol spray (see B. C. BALDWIN, D. ROBINSON AND R. T. WILLIAMS, *Biochem. J.*, 71 (1959) 638).

*** Can be separated by 10 h run.

TABLE 9

 R_F VALUES OF DIHYDROXYPHTHALIC ACIDS AND PROTOCATECHUIC ACID(D. W. RIBBONS AND W. C. EVANS, *Biochem. J.*, 76 (1960) 310)

Solvent: Butan-1-ol-acetic acid-water (40:10:50, upper phase).

Paper: Whatman No. 4.

Detection: Diazotised *p*-nitroaniline or diazotised sulphanilic acid followed by Na₂CO₃ (H. G. BRAY AND W. V. THORPE, *Methods of Biochem. Anal.*, 1 (1954) 27); Folin-Ciocalteu reagent then exposure to NH₃ fumes (F. L. MITCHELL AND R. E. DAVIES, *Biochem. J.*, 56 (1954) 690); molybdate-nitrite reagent (C. B. COULSON AND W. C. EVANS, *J. Chromatog.*, 1 (1958) 374); U.V. light.

| Compound | R_F |
|----------------------------|-------|
| 3,4-Dihydroxyphthalic acid | 0.52 |
| 4,5-Dihydroxyphthalic acid | 0.49 |
| Protocatechuic acid | 0.73 |

TABLE 10

R_F VALUES OF SOME CONDENSED TANNINS
(D. G. ROUX AND E. PAULUS, *Biochem. J.*, 77 (1960) 315)

Solvents: S_1 = 2% aq. acetic acid (ascending).
 S_2 = Butan-2-ol saturated with water.
 S_3 = Butan-1-ol-acetic acid-water (4:1:5).

Paper: Whatman No. 3.

Detection: Toluene-*p*-sulphonic acid (D. G. ROUX, *Nature*, 180 (1957) 973).

| Compound | R_F | | |
|--|--------------|-------|-------|
| | S_1 | S_2 | S_3 |
| (+)-Fustin | 0.37* ; 0.43 | 0.81 | 0.80 |
| (+)-Mollisacacidin | 0.55; 0.57 | | |
| (-)-Robinetinidol | 0.42* | | |
| (+)-Catechin | 0.36* | | |
| (-)-Fustin | 0.35* | 0.81 | 0.80 |
| (±)-Fustin | 0.36* | 0.81 | 0.80 |
| (-)-7, 3', 4'-Trihydroxy-flavan-3,4-diol | 0.49 | 0.76 | |

* Determined on the same chromatogram.

TABLE 11

R_F VALUES OF SOME FLAVONOID COMPOUNDS
(D. G. ROUX AND E. PAULUS, *Biochem. J.*, 78 (1961) 120)

Solvents: S_1 = 2% aqueous acetic acid.
 S_2 = Butan-2-ol saturated with water.
 S_3 = Butan-1-ol-acetic acid-water (4:1:5).

Paper: P_1 = Whatman No. 1 (not specified).

P_2 = Whatman No. 3 (ascending).

Detection: Ammoniacal silver nitrate; bis-diazotised benzidine; ferric alum; toluene-*p*-sulphonic acid.

| Compound | R_F | | | |
|--------------------|----------|----------|----------|----------|
| | S_1P_1 | S_1P_2 | S_2P_1 | S_3P_1 |
| (+)-Fustin | 0.37 | 0.43 | — | — |
| (-)-Mollisacacidin | — | 0.57 | — | — |
| (-)-Fisetinidol | 0.48 | — | 0.82 | 0.81 |
| (+)-Fisetinidol | 0.43 | — | 0.82 | 0.81 |

TABLE 12

 R_F VALUES OF SOME DEOXYRIBOSIDES AND RELATED COMPOUNDS

(D. W. A. ROBERTS, Research Station, Lethbridge, Alberta, Canada, unpublished results)

Solvents: $S_1 = n$ -Propanol-tetrahydrofurfuryl alcohol-water-0.75 M citrate pH 5.7 (20:10:9:1 by vol.). $S_2 = n$ -Propanol-ammonium hydroxide (sp. gr. 0.90)-water (3:1:1 by vol.). $S_3 =$ Isobutyric acid-acetic acid-water (100:1:50 by vol.). $S_4 = n$ -Butanol-acetic acid-water (5:4:1 by vol.). $S_5 =$ Isobutyric acid-ammonium hydroxide (sp. gr. 0.90)-water (60:1:33 by vol.). $S_6 =$ *tert.*-Butyl alcohol-water-formic acid (sp. gr. 1.2) (16:4:1 by vol.).

Paper: Whatman No. 1 (descending).

Time: 20 h.

Detection: (1) Ultraviolet from Mineralight Model SL 2537.

(2) Dische reagent (0.5% cysteine hydrochloride in 3 N H_2SO_4) followed by heating at 85° (approx. 5 min). This reagent does not give satisfactory results after irrigation with S_1 .

| Compound | R_F | | | | | |
|----------------------------|-------|-------|-------|-------|-------|-------|
| | S_1 | S_2 | S_3 | S_4 | S_5 | S_6 |
| Adenine | 0.57 | 0.64 | 0.83 | 0.64 | 0.90 | 0.43 |
| Cytosine | 0.50 | 0.52 | 0.57 | 0.52 | 0.65 | 0.43 |
| Guanine | 0.40 | 0.35 | 0.46 | 0.19 | 0.55 | 0.23 |
| Hypoxanthine | 0.53 | 0.52 | 0.54 | 0.47 | 0.55 | 0.37 |
| Thymine | 0.71 | 0.71 | 0.70 | 0.63 | 0.71 | 0.66 |
| Uracil | 0.72 | 0.55 | 0.54 | 0.51 | 0.62 | 0.72 |
| Xanthine | 0.54 | 0.41 | 0.34 | 0.21 | 0.42 | 0.28 |
| Adenosine | 0.54 | 0.62 | 0.75 | 0.48 | 0.74 | 0.37 |
| Inosine | 0.46 | 0.49 | 0.42 | 0.33 | 0.43 | 0.29 |
| Uridine | 0.69 | 0.50 | 0.38 | 0.40 | 0.43 | 0.52 |
| Deoxyadenosine | 0.64 | 0.68 | 0.83 | 0.60 | 0.86 | 0.46 |
| Deoxycytidine | 0.59 | 0.57 | 0.53 | 0.55 | 0.61 | 0.42 |
| 5-Methyl- deoxycytidine | 0.65 | 0.68 | 0.57 | — | 0.64 | 0.42 |
| Deoxyguanosine | 0.61 | 0.53 | 0.53 | 0.26 | 0.54 | 0.35 |
| Deoxyinosine | 0.54 | 0.56 | 0.49 | 0.45 | 0.53 | 0.37 |
| Deoxyuridine | 0.62 | 0.61 | 0.51 | 0.54 | 0.59 | 0.56 |
| Thymidine | 0.78 | 0.75 | 0.64 | 0.60 | 0.65 | 0.65 |
| Deoxyribose | 0.73 | 0.64 | 0.46 | 0.56 | 0.48 | 0.57 |

TABLE 13

 R_F VALUES OF SOME URIDINE DERIVATIVES(J. SMRT, J. BERÁNEK AND F. ŠORM, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 2459)

Solvent: Isopropanol-ammonia-water (7:1:2).

Paper: Whatman No. 1.

Detection: Not given.

| Compound | R_F |
|---|-------|
| Uridine-5'-O-acetate-3'-phosphate | 0.22 |
| 2'-O-Tetrahydropyran-yl-uridine- 5'-O-acetate-3'-phosphate | 0.38 |
| 6-Azauridylyl-(5' → 3')-uridine | 0.24 |

TABLE 14

 R_F VALUES OF SOME FLAVINS(I. G. WHITE AND G. J. LINCOLN, *Biochem. J.*, 76 (1960) 301)Solvents: S_1 = Butan-1-ol-acetic acid-water (4:1:5, upper phase). S_2 = 5% (w/v) Na_2HPO_4 . S_3 = Methanol. S_4 = Phenol-butan-1-ol-water (160:30:100, w/v/v).Paper: Whatman No. 1 (descending, S_1, S_2, S_4 ; ascending, S_3).

Detection: U.V. light.

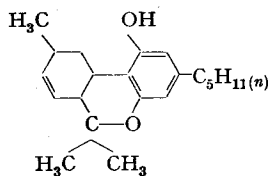
| Compound | R_F | | | |
|----------------------------|-------|-------|-------|-------|
| | S_1 | S_2 | S_3 | S_4 |
| Riboflavin | 0.25 | 0.30 | 0.16 | 0.80 |
| Riboflavin phosphate | 0.04 | 0.56 | — | 0.15 |
| Lumichrome | 0.65 | 0.05 | 0.28 | — |
| Flavinadenine dinucleotide | 0.03 | 0.41 | 0.00 | 0.17 |
| Lumiflavin | 0.41 | 0.15 | — | — |

TABLE 15

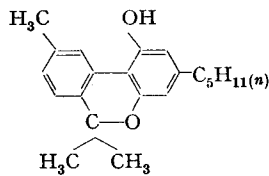
 R_F VALUES OF SOME HASHISH CONSTITUENTS(F. KORTE AND H. SIEPER, *Angew. Chem.*, 72 (1960) 210)

Solvent: Ligroin-benzene-chloroform-methanol-water (2:2:1:4:1, aqueous phase).

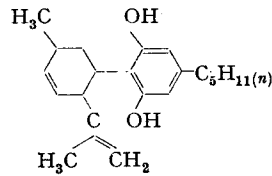
Paper: Schleicher & Schüll 2043a hy (hydrophobic).

Detection: D_1 = Beam reagent (W. BEAM, *cf. Chem. Zentr.*, (1924 II) 1255) followed by Pauly reagent (F. G. FISCHER AND H. DÖRFEL, *Z. physiol. Chem.*, 297 (1954) 278). D_2 = Beam reagent followed by 2,6-dichloroquinone chloroimide (E. HOFFMAN AND G. HOFFMAN, *Naturwiss.*, 45 (1958) 337). D_3 = Beam reagent followed by diazotised *p*-nitroaniline (A. GRÜNE, *Chimia (Switz.)*, 11 (1957) 173, 213). D_4 = 2,6-Dichloroquinone chloroimide followed by diazotised *p*-nitroaniline. D_5 = 2,6-Dichloroquinone chloroimide followed by Pauly reagent. D_6 = U.V. absorption on chromatogram (λ max; $m\mu$) (F. KORTE AND H. SIEPER, *Angew. Chem.*, 70 (1958) 434; 71 (1959) 455).

(I) Tetrahydrocannabinol



(II) Cannabinol



(III) Cannabidiol

| Compound | R_F | Detection* | | | | | |
|----------|-------|------------|-------|-------|-------|-------|---------|
| | | D_1 | D_2 | D_3 | D_4 | D_5 | D_6 |
| I | 0.53 | ly | cb | ly | ly | cb | 274-280 |
| II | 0.67 | oc-bn | b-gn | o | oc-bn | b-gn | 284 |
| III | 0.74 | di-dy | li | r-bn | o | li | 274-280 |

* b = blue; bn = brown; cb = cobalt blue; d = dark; di = dirty; gn = green; l = lemon; li = lilac; o = orange; oc = ochre; r = red; y = yellow.

TABLE 16

 R_F VALUES OF ORGANO-TIN COMPOUNDS(D. J. WILLIAMS AND J. W. PRICE, *Analyst*, 85 (1960) 579)

Paper: Whatman No. 1.

Temperature: $24 \pm 1^\circ$.

Solvents: (a) Pyridine-water (60:40).

(b) Butanol-pyridine-water (7.5 : 3.5, saturated with water).

(c) Butanol-ammonia-water (N in ammonia and saturated with water).

(d) Butanol-ethanol-water (3 : 1, saturated with water).

| Compound | R_F | | | |
|---|-----------------|-------------------------|-------------------------|------------------|
| | a | b | c | d |
| Me_2SnCl_2 | 0.36 T | 0.55 T | 0.03 | 0.67 T |
| Me_3SnCl | 0.35 | 0.25 | — | 0.32 |
| EtSnCl_3 | | streaks in all solvents | | |
| Et_2SnCl_2 | 0.36 T | 0.80 T | 0.16 | 0.98 T |
| Et_2SnOAc | 0.40 | 0.85 T | — | 0.95 T |
| Et_2SnOH | 0.88 | 0.94 | 0.94 | 0.95 |
| Pr_2SnCl_2 | 0.00 T | 0.9 T | streaks to 0.52 | |
| $(\text{Pr}_3\text{Sn})_2\text{O}$ | 0.85 | 0.94 | — | — |
| $(\text{isoPr}_3\text{Sn})_2\text{O}$ | 0.87 | 0.94 | — | — |
| $\text{Pr}_2\text{SnCH}_2\text{CH}_2\text{COONa}$ | 0.82 | 0.90 | 0.83 | — |
| BuSnCl_3 | streaks to 0.8 | | streaks length of paper | |
| Bu_2SnCl_2 | 0.00 T | 0.93 | 0.00 T | 0.98 slight tail |
| $\text{Bu}_2\text{Sn dilaurate}$ | 0.00 T | 0.95 | — | 0.96 |
| Bu_3SnCl | 0.85 | 0.92 | 0.95 | 0.94 |
| $\text{Bu}_3\text{Sn laurate}$ | 0.82 | 0.92 | — | 0.94 |
| $(\text{Bu}_3\text{Sn})_2\text{O}$ | 0.82 | 0.97 | — | 0.96 |
| $\text{Bu}_3\text{Sn abietate}$ | 0.84 | 0.97 | 0.94 | — |
| Hexabutyl distannane | — | 0.94 | 0.95 | — |
| | | (0.8, 0.3) | (0.8, 0.3) | |
| Bu_4Sn | 0.00 | 0.93 | 0.94 | 0.92 |
| $n\text{-Hexyl}_2\text{Sn dilaurate}$ | 0.00 | 0.95 | — | 0.95 |
| $n\text{-Octyl}_2\text{Sn dilaurate}$ | 0.00 | — | — | 0.94 |
| $n\text{-Octyl}_3\text{SnCl}$ | 0.00 | 0.94 | 0.93 | 0.95 |
| $n\text{-Octyl}_4\text{Sn}$ | 0.00 | 0.90 | 0.94 | 0.83 |
| PhSnCl_3 | streaks to 0.85 | | streaks length of paper | |
| Ph_2SnCl_2 | 0.00 | 0.00 | 0.00 | 0.95 T |
| Ph_3SnCl | 0.85 | 0.95 | 0.97 | 0.97 |
| Ph_3SnOAc | 0.85 | 0.95 | 0.97 | 0.97 |
| Ph_4Sn | 0.00 | 0.00 | 0.00 | 0.00 |
| SnCl_4 | 0.00 | 0.00 | 0.00 | 0.00 |

T = tailing.

TABLE 17

 R_F VALUES OF ADDITION COMPOUNDS OF OLEFINS WITH MERCURIC ACETATE(W. HUBER, *Mikrochim. Acta*, (1960) 44)Solvent: Butanol mixed with 1.5 N NH_3 + 1.5 N $(\text{NH}_4)_2\text{CO}_3$ (1:1) (two phase).

Paper: Schleicher & Schüll 2043b (paper first dipped in aqueous phase, then blotted; final chromatographic development with organic phase) (descending).

Preparation of addition compound: Olefin mixture (gas or liquid) dissolved in pure methanol (0.5 g/100 ml), is shaken 2 h at room temperature with an excess of solid mercuric acetate (10–20 μl of supernatant taken). Hg acetate remains on start.Detection: $(\text{NH}_4)_2\text{S}$ or dithizone spray after 5 min exposure to HCl fumes.

| Olefin | R_F | Olefin | R_F |
|-----------------------|-----------|------------------------|-----------|
| Ethylene | 0.10 | 4-Methylpent-2-ene* | 0.50/0.60 |
| Propylene | 0.15 | 2-Methylpent-1-ene | 0.62 |
| Isobutylene | 0.22 | <i>n</i> -Hex-2-ene* | 0.59/0.63 |
| But-1-ene | 0.28 | <i>n</i> -Hex-1-ene | 0.70 |
| 2-Methylbut-2-ene | 0.32 | 2,3-Dimethylpent-2-ene | 0.70 |
| 2-Methylbut-1-ene | 0.36 | Isooctene | 0.80 |
| <i>n</i> -Pent-2-ene* | 0.38/0.43 | Cyclooctene | 0.76 |
| <i>n</i> -Pent-1-ene | 0.50 | Cyclopentadiene | 0.17 |
| Cyclohexene | 0.46 | Dicyclopentadiene | 0.83 |
| 2-Methylpent-2-ene | 0.48 | Styrol | 0.56 |

* These olefins yield two spots of equal intensity.

TABLE 18

 R_F VALUES OF ADDITION COMPOUNDS OF OLEFINS WITH MERCURIC ACETATE(W. HUBER, *Mikrochim. Acta*, (1960) 44)Solvent: Propanol just saturated with 1.5 N NH_3 –1.5 N $(\text{NH}_4)_2\text{CO}_3$ (1:1).

Paper: Schleicher & Schüll 2043b (descending).

Preparation of addition compound: Olefin mixture (gas or liquid) dissolved in pure methanol (0.5 g/100 ml) is shaken 30 min at room temperature with excess solid mercuric acetate (10–20 μl of the supernatant taken). Hg acetate remains at start.Detection: $(\text{NH}_4)_2\text{S}$ or dithizone spray after 5 min exposure to HCl fumes.

| Olefin | R_F^* |
|---------------------|-------------------------|
| Ethylene | 0.47 |
| Propylene | 0.54 |
| Isobutylene | 0.62 |
| 2-Methylbut-1-ene | 0.68 |
| 2-Methylbut-2-ene | 0.68 |
| Cyclohexene | 0.72 |
| <i>n</i> -Hex-1-ene | 0.79 |
| Isooctene | 0.84 |
| Isoprene | 0.09/0.12/(0.53)/(0.68) |
| 1,5-Hexadiene | 0.14/(0.73) |
| Dipentene | 0.15/0.31** |

* R_F values in brackets are for weaker spots—perhaps impurities.

** Impure?

TABLE 19

R_F VALUES OF ADDITION COMPOUNDS OF OLEFINS WITH MERCURIC ACETATE
(W. HUBER, *Mikrochim. Acta*, (1960) 44)

Solvent: 1.5 N NH_3 + 1.5 N $(\text{NH}_4)_2\text{SO}_3$ (1:1) mixed with isoamyl alcohol (two phases).
Aqueous phase used.

Paper: Schleicher & Schüll 2043b (impregnated with organic phase of solvent) (descending).

Preparation of addition compound: Olefin mixture (gas or liquid) dissolved in pure methanol (~ 0.5 g/100 ml) is shaken 2 h at room temperature with an excess of solid mercuric acetate (10–20 μl of supernatant taken). Hg acetate runs near front.

Detection: $(\text{NH}_4)_2\text{S}$ or dithizone spray after 5 min exposure to HCl fumes.

| Olefin | R_F | Olefin | R_F |
|----------------|-------|---------------------|-----------|
| Hg acetate | 0.82 | Propylene tetramer | 0.05 |
| Ethylene | 0.74 | Cetene | 0.05 |
| Isobutylene | 0.56 | Propylene trimer* | 0.7–0.4** |
| Diisobutylene | 0.38 | Propylene tetramer* | 0.17 |
| Triisobutylene | 0.05 | Triisobutylene* | 0.13 |
| Dodecene | 0.05 | | |

* Determined on a chromatogram with front run off. R_F of isooctene found to be 1.00.

** Tailing.

TABLE 20

R_F VALUES OF SOME COUPLING PRODUCTS OF *p*-NITROBENZENEDIAZONIUM SULPHATE
WITH ACETONE

(Z. J. ALLAN AND J. PODSTATÁ, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 1324)

Solvent: Methanol–butanol–water (80:5:15).

Paper: Whatman No. 1.

Impregnation: Liquid paraffin–ethanol (1:19) (30 min drying to remove ethanol followed by spotting of substances in pyridine solution and another 20 min drying).

Detection: 2.5 N NaOH spray followed by exposure to dioxane fumes; visible light.

| Compound | Colour | | R_F |
|--|-------------|----------------|-------|
| | Actual | 50% NaOH | |
| $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{N}=\text{N}-\text{CH}_2-\text{CO}-\text{CH}_3$ | weak yellow | intense red | 0.85 |
| 1,3-Bis-(<i>p</i> -nitrobenzeneazo)-triazene | yellow | reddish violet | 0.65 |
| $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{N}=\text{N}-\text{CH}$ $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{N}=\text{N}-\text{CO}-\text{CH}_3$ | orange | blue* | 0.55 |
| Unknown | orange | weak blue | 0.30 |
| $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{N}=\text{N}-\text{CH}_2$ $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{N}=\text{N}-\text{CH}-\text{CH}_3$ | orange | greenish blue | 0.15 |
| Decomposition product of diazonium salt | orange | orange** | 0.00 |

* Colour intensified by dioxane.

** Dioxane yields conversion to yellow-brown.

TABLE 21

R_F VALUES OF SOME DYESTUFF FISSION PRODUCTS(J. PANCHARTEK, Z. J. ALLAN AND F. MUŽIK, *Collection Czechoslov. Chem. Commun.*, 25 (1960)2783)Solvents: S₁ = *n*-Butanol saturated with 2.5 *N* HCl.S₂ = 2.5 *N* HCl.Paper: Whatman No. 1 (a piece of fused sodium sulphide was added in certain cases* to produce H₂S (a) to complex copper in paper and (b) to provide a reducing atmosphere). Descending.

Detection: Paper exposed to nitrous gases for diazotization then sprayed with sodium 2-naphthol-3,6-disulphonate or resorcinol solution and finally made alkaline in an ammonia atmosphere; U.V. fluorescence.

| Compound | <i>R_F</i> | | U.V. | Colour** | | | |
|---|----------------------|----------------|------|----------------|----------------|----------------|----------------|
| | S ₁ | S ₂ | | C ₁ | C ₂ | C ₃ | C ₄ |
| <i>p</i> -Phenylenediamine | 0.07 | 0.82 | | gv | rg | blgn | g |
| <i>m</i> -Phenylenediamine | 0.09 | 0.89 | blgn | rb | yb | | yb |
| 7-Amino-8-hydroxyquinoline-5-sulphonic acid | 0.09 | 0.74 | | | y | wr | |
| 5-Amino-8-hydroxyquinoline | 0.10 | 0.80 | ygn | g | rg | r | wy |
| 3,3'-Dihydroxybenzidine | 0.12 | 0.34 | | | gb | gbl | |
| 2-Naphthylamine-4,8-disulphonic acid | 0.13 | 0.54 | bl | blsr | wy | | |
| 2,5-Diamino-4-methoxytoluene | 0.20 | 0.90 | | rv | b | blgn | |
| Benzidine | 0.31 | 0.62 | ygn | b | rg | wggn | |
| Aniline- <i>p</i> -sulphonic acid | 0.34 | 0.93 | wgn | o | wy | | |
| Aniline- <i>m</i> -sulphonic acid | 0.34 | 0.92 | | o | wy | | |
| 2-Naphthylamine-7-sulphonic acid | 0.44 | 0.67 | | blsr | | | wblsr |
| 2,6-Diamino-1-naphthol-3-sulphonic acid | 0.46 | 0.60 | blv | v | b | | |
| Aniline- <i>o</i> -sulphonic acid | 0.54 | 0.88 | | o | wy | | re |
| 5-Aminosalicylic acid | 0.64 | 0.69 | blgn | | | gbl | |
| Pyrazolone derivative II | 0.64 | 0.71 | | ygn | | | |
| <i>m</i> -Aminophenol | 0.70 | 0.78 | blgn | y | yb | | yb |
| Aniline | 0.84 | 0.85 | | r | gy | | r |
| <i>m</i> -Chloroaniline | 0.89 | 0.74 | | r*** | gy | | b |
| <i>p</i> -Chloroaniline | 0.91 | 0.82 | | mr | rg | | |
| 2,5-Dichloroaniline-4-sulphonic acid | 0.93 | 0.87† | | yr | wy | | |
| 2,5-Dichloroaniline | 0.97 | 0.84 | | yr | | | |

* For 4-amino-1-phenyl-3-methylpyrazol-5-one and some of its derivatives.

** C₁ = diazotization and coupling with 2-naphthol-3,6-disulphonic acid; C₂ = 24 h oxidation in air; C₃ = indophenol test; C₄ = with *p*-nitrobenzenediazonium chloride; bl = blue; b = brown; g = grey; gn = green; r = red; bls = bluish; m = muddy; v = violet; o = orange; w = weak; y = yellow; re = rose.

*** Immediately red after diazotization.

† Elongated spot.

TABLE 22

 R_F VALUES OF SOME ARYLAZO- β -NAPHTHOLS(J. GASPARIČ, M. NOVOTNÁ AND M. JUREČEK, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 2757)Solvents: S_1 = Hexane. S_2 = Ethanol-ammonia (4:1). S_3 = Ethanol-water (4:1). S_4 = 85 % acetic acid. S_5 = 90 % acetic acid.Papers: Whatman No. 3 or WF₁ Papier (Papierfabrik Niederschlag) (both ascending).Impregnation: I_1 = Ethanolic dimethylformamide. I_2 = 10 % liquid paraffin in hexane. I_3 = 10 % 1-bromonaphthalene in methanol.

Temperature of run: 18–22°.

Detection: Visible light.

| Parent amine | R_F | | | | | Colour* |
|--|----------|----------|----------|----------|----------|---------|
| | S_1I_1 | S_2I_2 | S_3I_3 | S_4I_4 | S_5I_5 | |
| Aniline | 0.51 | 0.42 | 0.54 | 0.60 | 0.26 | o |
| <i>o</i> -Chloroaniline | 0.49 | 0.41 | 0.51 | 0.56 | 0.21 | o |
| <i>m</i> -Chloroaniline | 0.55 | 0.32 | 0.45 | 0.53 | 0.20 | o |
| <i>p</i> -Chloroaniline | 0.56 | 0.35 | 0.48 | 0.53 | 0.20 | or |
| 2,5-Dichloroaniline | 0.65 | 0.25 | 0.39 | 0.41 | 0.12 | o |
| <i>o</i> -Bromoaniline | 0.46 | 0.36 | 0.51 | 0.53 | 0.18 | o |
| <i>m</i> -Bromoaniline | 0.55 | 0.29 | 0.43 | 0.47 | 0.18 | o |
| <i>p</i> -Bromoaniline | 0.52 | 0.29 | 0.44 | 0.50 | 0.16 | o |
| <i>o</i> -Iodoaniline | 0.39 | 0.39 | 0.48 | 0.45 | 0.15 | o |
| <i>p</i> -Iodoaniline | 0.45 | 0.26 | 0.40 | 0.43 | 0.11 | or |
| <i>o</i> -Toluidine | 0.65 | 0.39 | 0.50 | 0.53 | 0.24 | r |
| <i>m</i> -Toluidine | 0.66 | 0.35 | 0.50 | 0.54 | 0.24 | r |
| <i>p</i> -Toluidine | 0.67 | 0.34 | 0.48 | 0.53 | 0.24 | or |
| 4-Chloro-2-aminotoluene | 0.69 | 0.25 | 0.36 | 0.38 | 0.15 | r |
| 5-Chloro-2-aminotoluene | 0.68 | 0.23 | 0.33 | 0.40 | 0.15 | r |
| <i>m</i> -Nitroaniline | 0.12 | — | — | 0.75 | 0.21 | o |
| <i>p</i> -Nitroaniline | 0.09 | — | — | 0.76 | 0.24 | r |
| 2,4-Dinitroaniline | 0.02 | — | — | 0.79 | 0.17 | or |
| <i>p</i> -Chloro- <i>o</i> -nitroaniline | 0.14 | — | — | 0.71 | 0.16 | r |
| <i>o</i> -Chloro- <i>p</i> -nitroaniline | streak | — | — | 0.68 | 0.10 | r |
| <i>p</i> -Nitro- <i>o</i> -toluidine | 0.20 | — | — | 0.72 | 0.18 | or |
| <i>o</i> -Nitro- <i>p</i> -toluidine | 0.20 | — | — | 0.72 | 0.18 | or |
| <i>m</i> -Nitro- <i>p</i> -toluidine | 0.12 | — | — | 0.79 | 0.22 | c |
| <i>o</i> -Xylidine | 0.68 | 0.26 | 0.42 | 0.44 | 0.20 | r |
| <i>m</i> -Xylidine | 0.69 | 0.31 | 0.43 | 0.50 | 0.23 | or |
| <i>p</i> -Xylidine | 0.72 | 0.31 | 0.46 | 0.46 | 0.20 | r |
| <i>o</i> -Anisidine | 0.19 | 0.59 | 0.70 | 0.75 | 0.30 | c |
| <i>p</i> -Anisidine | 0.36 | 0.45 | 0.58 | 0.67 | 0.27 | r |
| <i>p</i> -Chloro- <i>o</i> -anisidine | 0.29 | 0.50 | 0.68 | 0.69 | 0.20 | c |
| <i>p</i> -Nitro- <i>o</i> -anisidine | 0.10 | — | — | 0.79 | 0.20 | v |
| <i>o</i> -Phenetidine | 0.41 | 0.54 | 0.68 | 0.69 | 0.23 | c |
| <i>p</i> -Phenetidine | 0.51 | 0.38 | 0.51 | 0.52 | 0.19 | r |
| α -Naphthylamine | 0.48 | 0.30 | 0.41 | 0.46 | 0.14 | v |
| β -Naphthylamine | 0.42 | 0.30 | 0.42 | 0.47 | 0.15 | c |
| 4-Aminodiphenyl | 0.40 | 0.26 | 0.38 | 0.40 | 0.10 | c |

* o = orange; c = carmine; r = red; v = violet.

TABLE 23

 R_F VALUES OF SOME NAPHTHALENESULPHONIC ACIDS(J. LATINÁK, *Collection Czechoslov. Chem. Commun.*, 25 (1960) 1649)Solvents: $S_1 = 37\%$ HCl-water (1:3). $S_2 = n$ -Propanol-ammonia (2:1).Paper: $P_1 =$ Schleicher & Schüll No. 2043a (S_1). $P_2 =$ Whatman No. 3 (S_2) (descending).

Length of run: 30–35 cm.

Time of run: 7 h (P_2).

Detection: 0.05% Pinacrytol Yellow, then U.V. viewing.

| Acid | R_F | | Fluorescence* |
|------------------------------------|----------|----------|---------------|
| | S_1P_1 | S_2P_2 | |
| Naphthalene-1-sulphonic | 0.71 | 0.78 | bo |
| Naphthalene-2-sulphonic | 0.64 | 0.78 | yo |
| Naphthalene-1,3-disulphonic | 0.62 | 0.66 | o |
| Naphthalene-1,5-disulphonic | 0.86 | 0.46 | y |
| Naphthalene-1,6-disulphonic | 0.81 | 0.47 | o** |
| Naphthalene-1,7-disulphonic | 0.86 | 0.51 | ro |
| Naphthalene-2,6-disulphonic | 0.76 | 0.46 | o |
| Naphthalene-2,7-disulphonic | 0.76 | 0.46 | o |
| Naphthalene-1,3,5-trisulphonic | 0.96 | 0.27 | y |
| Naphthalene-1,3,6-trisulphonic | 0.88 | 0.24 | o |
| Naphthalene-1,3,7-trisulphonic | 0.96 | 0.27 | y |
| Naphthalene-1,3,5,7-tetrasulphonic | 0.98 | 0.15 | o |

* b = brown, y = yellow, o = orange, r = red.

** On drying fluorescence changes to red to violet-brown in colour.

TABLE 24

 R_F VALUES OF SOME 2-NAPHTHOLMONOSULPHONIC ACIDS(J. LATINÁK, *Collection Czechoslov. Chem. Commun.*, 26 (1961) 403)Solvents: $S_1 = n$ -Butanol-acetic acid-water (4:1:5). $S_2 = n$ -Propanol-aqueous NaHCO_3 (2:1).Paper: $P_1 =$ Whatman No. 4 (descending). $P_2 =$ Whatman No. 1 (descending).Impregnation: $I_1 =$ No impregnation. $I_2 =$ Aqueous 5% NaHCO_3 .

Length of run: 35 cm.

Detection: U.V. light in NH_3 fumes; diazotised *p*-nitroaniline before and after NH_3 or 1% NaOH treatment.

| 2-Naphthol-sulphonic acid | R_F | | | |
|---------------------------|-------------|-------------|-------------|-------------|
| | $S_1P_1I_1$ | $S_1P_2I_1$ | $S_2P_2I_1$ | $S_2P_2I_2$ |
| 2,3- | 0.68 | 0.54 | 0.76 | 0.85 |
| 2,4- | 0.54 | 0.39 | 0.68 | 0.55 |
| 2,5- | 0.47 | 0.34 | 0.66 | 0.60 |
| 2,6- | 0.47 | 0.35 | 0.65 | 0.60 |
| 2,7- | 0.48 | 0.36 | 0.65 | 0.65 |
| 2,8- | 0.54 | 0.40 | 0.66 | 0.68 |
| 2,1- | 0.71 | 0.57 | 0.75 | 0.95 |

TABLE 25

 R_F VALUES OF SOME 2-NAPHTHOLSULPHONIC ACIDS(J. LATINÁK, *Collection Czechoslov. Chem. Commun.*, 26 (1961) 403)Solvent: S_1 = *n*-Propanol-aqueous NaHCO_3 (2:1).

Paper: Whatman No. 4 (descending).

Impregnation: I_1 = No impregnation. I_2 = 5% aqueous NaHCO_3 .

Length of run: >35 cm.

Detection: D_1 = U.V. light fluorescence in NH_3 fumes. D_2 = Diazotised *p*-nitroaniline, original colour. D_3 = Diazotised *p*-nitroaniline, after NH_3 fume exposure or 1% NaOH spray.

| 2-Naphthol- sulphonic acid | R_F^a | | | | Colour ^c | | |
|----------------------------------|----------|----------|-----------|-----------|---------------------|-------|-------|
| | S_1I_1 | S_1I_2 | S_1I_1b | S_1I_2b | D_1 | D_2 | D_3 |
| 2,3,6,8- | 0.03 | 0.02 | — | — | lg | or | or-v |
| 2,1,3,6- | 0.07 | 0.04 | — | — | lnb | od | rvd |
| 2,4,8- | 0.09 | 0.06 | — | — | lnb | or | or |
| 2,5,7- | 0.13 | 0.11 | 0.08 | 0.11 | bg | o | rv |
| 2,6,8- | 0.13 | 0.12 | — | — | lb | yo | yo |
| 2,3,6- | 0.16 | 0.10 | 0.10 | 0.16 | lb | ro | rar |
| 2,3,7- | 0.19 | 0.14 | 0.12 | 0.19 | bg-gb | or | vb |
| 2,3,8- | 0.19 | 0.15 | — | — | bg-gb | ro | ro |
| 2,3,5- | 0.23 | 0.15 | 0.17 | 0.25 | bg-gb | or | rv |
| 2,1,5- | 0.30 | 0.45 | — | — | bv | wrod | wod |
| 2,1,6- | 0.30 | 0.45 | — | — | rv | wrod | word |
| 2,1,7- | 0.33 | 0.51 | — | — | v | wrod | wod |
| 2,3- | 0.74 | 0.84 | 0.83 | 0.74 | lb | rar | rar |
| 2,4- | 0.66 | 0.54 | 0.73 | 0.53 | drv | rar | bv |
| 2,5- | 0.63 | 0.62 | 0.73 | 0.54 | lb | vre | rv |
| 2,6- | 0.63 | 0.61 | 0.69 | 0.53 | dbv | ro | rv |
| 2,7- | 0.63 | 0.65 | 0.66 | 0.46 | lvb | o | rv |
| 2,8- | 0.65 | 0.68 | — | — | lb | yo | yo |
| 2,1- | 0.74 | 0.94 | — | — | wdv | wor | wor |
| 2- | 0.90 | 0.97 | — | — | dv | ro | ro |

a Values for 2-naphthol-di- and -trisulphonic acids calculated from $R_{2,6}$ values ($R_{2,6} = R_F$ of sulphonic acid/ R_F of the 2,6 acid).

b R_F values of iodo-derivatives.

c b = blue; d = dark; g = green; l = light; n = navy; o = orange; r = red; ra = raspberry; v = violet; w = weak; y = yellow.

d Spot only visible after longer time.

e Spot with orange edge.

TABLE 26

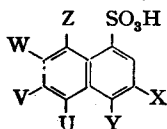
 R_F VALUES (RELATIVE) OF SOME NITRONAPHTHALENESULPHONIC ACIDS(J. HORYNA AND V. HANOUSEK, *Collection Czechoslov. Chem. Commun.*, 26 (1961) 79)Solvent: *n*-Butanol-ethanol-2.5% NH_4OH -water (60:20:4:16).

Paper: Whatman No. 1 (descending).

Impregnation: 2% $(\text{NH}_4)_2\text{SO}_4$ solution; only 4 cm wide strip at start.

Time of run: 50 h.

Detection: Sprayed with 20% aqueous hydrogen sulphite solution and developed in a stream of nitrogen (fluorescence in U.V. light).



I. U = SO_3H ; X = NO_2 *
 II. U = SO_3H ; Y = NO_2
 III. V = SO_3H ; Z = NO_2

IV. V = SO_3H ; X = NO_2
 V. U = NO_2
 VI. U = SO_3H ; X, Z = NO_2
 VII. V = SO_3H ; X, W = NO_2

| Compound | R_Y^{**} | Colour*** |
|----------|------------|-----------|
| I | 0.24 | bv |
| II | 0.16 | g |
| III | 0.18 | bg |
| IV | 0.25 | v |
| V | 1.00 | gshb |
| VI | 0.20 | gshb |
| VII | 0.33 | v |

* Other letters = H; this applies to all formulae.

* $R_Y = R_F$ compound / R_F compound V.

** b = blue; g = green; v = violet; gsh = greenish.

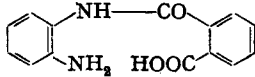
TABLE 27

 R_F VALUES OF SOME IMIDAZOLE DERIVATIVES(J. ARIENT AND J. MARHAN, *Collection Czechoslov. Chem. Commun.*, 26 (1961) 98)

Solvent: Cyclohexane-pyridine (3:1).

Paper: Whatman No. 1.

Detection: U.V. fluorescence; diazotisation with nitrous fumes, then coupling with alkaline R-salt solution.

| Compound | R_F | Colour of fluorescence* |
|--|-------|-------------------------|
| 2-(<i>o</i> -Carboxyphenyl)-benzimidazole | 0.2 | b |
| Intermediate I  | 0.25 | nil** |
| N-(<i>o</i> -Aminophényl)-phthalimide·HCl | 0.45 | nil** |
| <i>o</i> -Di-(2-benzimidazolyl)-benzene | 0.65 | yg |
| 1,2-Benzoylene-benzimidazole | 0.8 | y |

* b = blue; yg = yellow-green; y = yellow.

** After diazotisation and then coupling with R-salt a red colour results.