

and then hung up to dry. The strips were then passed through a solution of 12% phosphoric acid in 4 *N* HCl and dried at room temperature. Then they were washed with distilled water until free from acid (pH = 4). For further activation, the strips were slowly passed through a 1:3 phosphoric acid solution (containing HCl) at 50°. After drying at room temperature they were again washed with distilled water until free from acid (pH = 4). The strips prepared in this way were used for the separations. Usual methods were employed for the detection of the spots.

In Table I the R_F values of various elements in different valency states are given.

Department of Chemistry, Andhra University,
Waltair, South India (India)

M. N. SASTRI
A. P. RAO

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Structure and chromatographic properties of carbohydrates

II. The liquid-liquid partition mobilities of aldono- γ -lactones*

It is a simple matter to resolve isomeric carbohydrate substances by partition chromatographic means and so the mobilities of compounds depend not only upon fundamental features of the molecules, e.g. molecular weight and "hydrophilic nature" (as determined by the number of unsubstituted hydroxyl groupings present), but upon subtler factors related to configuration and conformation. Little attention has been paid to the correlation of structure with chromatographic properties or to the study of the detailed physical phenomena upon which the mobilities depend. Some interrelationships between the disposition of the hydroxyl groupings on pyranose sugars and their chromatographic behaviour have, however, been noted², and these have lately been reinterpreted in conformational terms³. Thus, free sugars which can assume chair conformations having few axial hydroxyls are less mobile than those which have several. We now note some correlations in the γ -lactone series.

All the measurements (see Table I) were made on Whatman No. 1 papers developed with butan-1-ol-ethanol-water (4:1:5). The members of each group were run together at 25° on one paper and the mobilities quoted in the table are relative to the fastest in each series.

From erythrono- and threono- γ -lactones it is seen that a C₂-C₃ *cis*-diol reduces mobility relative to a *trans*-diol. The pentono- γ -lactones show that the isomer (*lyxo*-) with the configuration which has three hydrophilic groupings on one side of the ring

* For Part I, see ref. 1.

TABLE I
MOBILITIES OF γ -LACTONES
(RELATIVE TO FASTEST ISOMER IN EACH SERIES)

<i>Tetrono-</i>		<i>Pentono-</i>		<i>2-Hydroxy-methyl-pentono-</i>		<i>Hexono-</i>	
Erythrono-	0.78	Ribono-	0.92	Ribono-	0.85	Allono-	0.93
		Arabono-	1.00	Arabono-	0.86	Altrono-	0.92
Threono-	1.00	Xylono-	0.99	Xylono-	1.00	Glucono-	(0.98)
		Lyxono-	0.76	Lyxono-	0.74	Mannono-	0.77
						Gulono-	0.60
						Idono-	1.00
						Galactono-	0.89
						Talono-	(0.89)

travels slowest and that a C_2 - C_3 *cis*-diol (*ribo*-) confers lower mobility than a C_3 - C_4 *cis*-hydroxy-hydroxymethyl system (*xylo*-).

In the 2-C-hydroxymethyl-pentono- γ -lactones⁴ where the situation is complicated by the introduction of another hydrophilic group on the ring, again it is evident that a C_2 - C_3 *cis*-diol has the effect of reducing the rate of travel and that the isomer with the *lyxo*-configuration has lowest mobility.

With the hexono- γ -lactones in which simple relationships between structural features and chromatographic properties could be expected to be masked by complexities introduced by the flexible 1,2-dihydroxyethyl grouping at C_4 , it is still noticeable that when the three oxygenated substituents are on one side of the five-membered ring (mannono- and gulono-), marked reductions in the rates of travel occur. We were not able to determine the mobilities of the gluco- and talo-isomers directly. The figure given for the former is calculated from the relative mobilities of the *gluco*- and *manno*-isomers in this solvent quoted by ABDEL-AKHER AND SMITH⁵. The talono- γ -lactone figure is quoted as 0.89 as it was unresolvable from the *galacto*-isomer. In an acidic solvent it travels 1.06 times faster than its epimer⁶.

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Lawrence Radiation Laboratory,
University of California, Berkeley, Calif., (U.S.A.)

R. J. FERRIER*

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* Permanent address: Chemistry Department, Birkbeck College, Malet Street, London, W.C. 1.