The Use of "Biogel-P" in the Gel Filtration of Polysaccharides

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LATHE and RUTHVEN[1] suggested that columns of swollen starch might provide a simple chromatographic method for determining the molecular size of proteins and polysaccharides. Gel filtration on cross-linked dextrans ("Sephadex") has, however, been much more successful, particularly for proteins,[2–5] and molecular weights of up to 225,000 can now be determined.[6] Cross-linked polyacrylamide gels have been used for gel-filtration studies on proteins.[7] These are now available commercially ("Bio-Gel P") and they offer the opportunity of studying the gel-filtration behaviour of polysaccharides on noncarbohydrate material.

Accordingly, we have examined different grades of "Biogel-P" for their possible application to the estimation of the molecular size of polysaccharides. For "Bio-Gel P 300" the empirical relationship between log $\overline{M}_n$ and elution volume[2,8] is linear for values of $\overline{M}_n$ between 5000 and 125,000; although the useful working range extends slightly beyond these values (cf. ref. 9) the exclusion limit of "Biogel-P 300" for polysaccharides appears to fall considerably below the value of 300,000 quoted commercially and found, presumably, for proteins. We have used columns measuring 2·5 × 50 cm. and 5·0 × 50 cm. at a loading of 2—10 mg. of polysaccharide. Calibration can be effected with dextran fractions having known values of $\overline{M}_n$ and,

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when molar sodium chloride is used as eluant, we have found such a calibration to be valid for acidic polysaccharides. Thus two gum fractions (obtained[10] from *Acacia senegal* gum), for which osmotic-pressure measurement had indicated $\overline{M}_n$ 105,000 and 37,000, respectively, gave $\overline{M}_n$ = 99,000 ± 10,000 and $\overline{M}_n$ = 35,000 ± 3,000 by gel filtration. A sample of the degraded (autohydrolysis) gum, having $\overline{M}_n$ = 4400 (periodate end-group analysis, as formaldehyde) gave $\overline{M}_n$ = 4800 ± 500 by gel filtration. The elution pattern of a de-ionised sample of the whole gum indicated that the molecular-weight distribution extended over a very wide range.

More experiments with "Bio-Gel P" materials are necessary to assess the importance of their application in fractionation and degradative studies and to establish their validity, applicability, and useful working range for molecular-weight estimations of polysaccharides.

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[10] D. M. W. Anderson and J. F. Stoddart, forthcoming publication.