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Note

Styragel as packing for aqueous gel permeation chromatography

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Crosslinked porous polystyrene gels (Styragel®; Waters Ass., Milford, Mass., U.S.A.) have been widely used for polymer fractionation since the introduction of gel permeation chromatography (GPC) by Moore[1]. They have been used exclusively with organic solvents. Their use in aqueous systems has been considered non-feasible

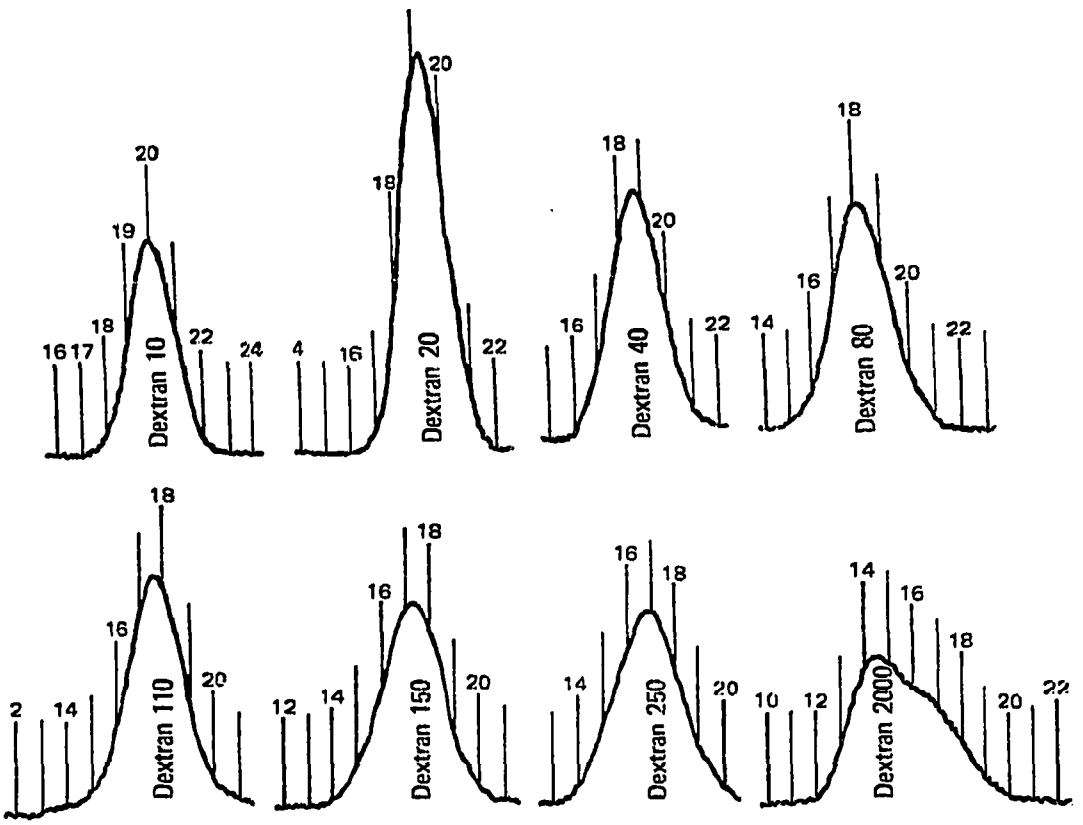

Fig. 1. Chromatograms of dextran. Concentration, 0.25%; solvent, 0.1% sodium lauryl sulfate in distilled water; flow-rate, 0.1 ml/min; injection, 20 µl; pressure, *ca.* 500 p.s.i.; column, 12 ft. × 0.04 in. I.D. packed with Styragel of 10^4, 10^5 and 10^6 Å; temperature, 75 °F; chart speed, 0.2 in./min; detector, differential refractometer; attenuation, 8×.

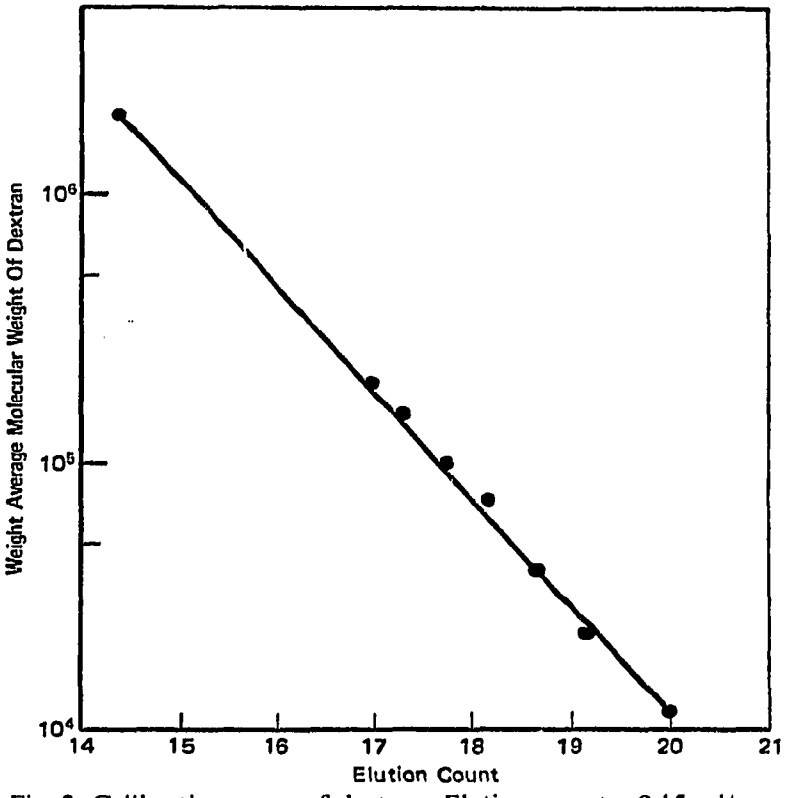

Fig. 2. Calibration curve of dextran. Elution counts: 0.15 ml/count.

owing to their hydrophobic nature. However, Small[2] has worked with solid polystyrene beads using an aqueous surfactant solution in hydrodynamic chromatography.

Styragel can sustain a higher pressure than Sephadex® (Pharmacia, Uppsala, Sweden). It is relatively free of adsorption and has better resolution than porous glass beads. These advantages make the use of Styragel in aqueous systems highly desirable.

The columns were packed with Styragel of 10^4, 10^5, and 10^6 Å and 0.1 % sodium lauryl sulfate aqueous solution was used as the eluent. Separation of a series of dextran standards is demonstrated in Fig. 1. The conventional plot of the logarithm of the molecular weight *vs.* the elution count is shown in Fig. 2. A relatively linear relationship is observed. Dextran 2000 shows a bimodal distribution, which is supported by studies using Sepharose® (Pharmacia) gels[3].

The Styragel column was subjected to pressures of up to 2400 p.s.i.g. for more than two weeks and no change in elution or pressure drop was noticed. A preliminary study showed promising application of this system to the determination of molecular size and size distribution of many of the water-soluble polymers.

REFERENCES

1 J. C. Moore, *J. Polymer Sci., Part A-2*, (1964) 835.
2 H. Small, *J. Colloid Interface Sci.*, 48 (1974) 147.
3 I. T. Takahashi and J. Peters (Dow Chemical Company), private communication.