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Study of aggregation in polysaccharides by triple detection HPLC

DAVID NORWOOD, Southeastern Louisiana University, LIZ SERPAS, ERICA SHARP — It has been observed that various species of the polysaccharide carrageenan undergo a change in conformation under varying conditions of temperature and added salt. The change is from a random coil (under conditions of high temperature or low salt) to a helix (under conditions of low temperature or high salt). It is a point of contention as to whether the helix is formed of one coil wrapping upon itself or two coils wrapping around one another. We present the results of a study of this conformation change using viscometry and multi-angle laser light scattering (MALLS) incorporating size-exclusion chromatography (SEC). In previous research, our batch light scattering results showed a clear increase in molecular weight and radius of gyration when NaCl was added to varying concentrations of iota-carrageenan, which could be interpreted as the conformation change described. However, estimates of persistence length ($\sim R_G^2 / M_W$) calculated using MALLS data show no strong variation when increasing added salt. This suggests that the molecular weight increase reflects an aggregation of polymer molecules instead of a change in conformation. However, SEC results show very little variation in molecular weight and radius of gyration, and instead, show behavior typical of linear polyelectrolytes. Resolution of these different results suggests a loose aggregation of polymer molecules that preserves the overall structure rather than a significant change in polymer architecture. We present viscometry and dynamic light scattering results that confirm these conclusions.

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