

Mixed gels formed with Konjac Mannan and Xanthan Gum

Introduction:

mixtures of Konjac Mannan and Xanthan have been reported to form thermally reversible gels much more stronger and have higher melting point. Previous works suggested that intermolecular binding involves co-crystallization of sections of the disordered Xanthan chain with the structurally similar segments of the Konjac Mannan. The aim of this study has been to provide further evidence of these intermolecular binding and to shed further light on the gelation mechanism.

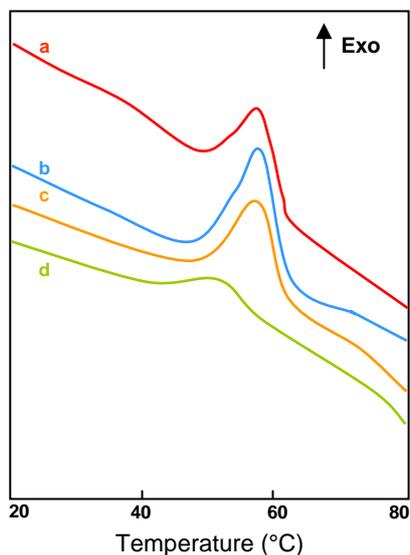


Figure 1 – DSC cooling curves for (a) 25/75, (b) 50/50, (c) 75/25 and (d) 100/0 xanthan + KM solutions at 1.2 wt% total polymer concentration.

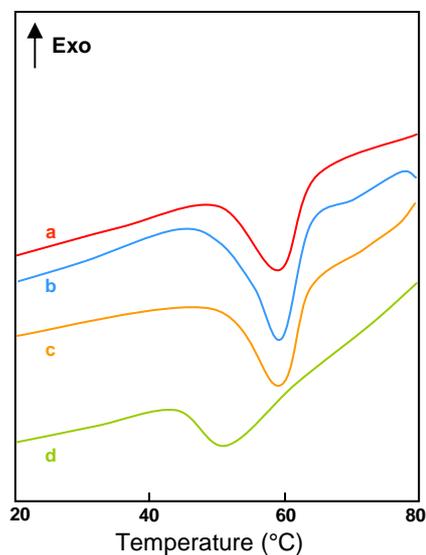


Figure 2 – DSC heating curves for (a) 25/75, (b) 50/50, (c) 75/25 and (d) 100/0 xanthan + KM solutions at 1.2 wt% total polymer concentration

Experimental

Xanthan and Konjac Mannan were dissolved together in water at varying ratios but a total polysaccharide content of 1.0wt%, by heating at 95°C for 30 minutes with vigorous stirring. The solutions were then equilibrated in a water bath for 2 hours at 25°C. DSC measurements were made on Konjac Mannan, Xanthan and mixtures. Polysaccharides were dissolved individually at 95°C and were then mixed thoroughly in varying proportions to give a total polysaccharide concentration of 1.2wt% in water or electrolyte. The DSC cooling and heating thermograms were monitored at a scan of 0.2°C/min and samples were subjected to an initial cycle of heating and cooling prior to recording the curves in order to ensure the same thermal history.

Results

The DSC cooling and heating curves for Xanthan + KM solutions at 1.2 wt% total polysaccharide concentration and at varying ratios are given in Fig. A and B. An increased enthalpy change was noted with a T_m for the cooling curve of 57°C and for the heating curve of 59°C. The start of the transition on the cooling curve occurs at about 62-66°C which corresponds closely to the gelation temperature obtained by rheological measurements and to the onset of chain aggregation as monitored by ESR spectroscopy. The DSC data thus provide further evidence of intermolecular binding.

Adapted from: P. Williams¹, S. Clegg¹, D. H. Day, G.O Philips and K. Nishinari² Food Polymers, Gels and Colloids, Ed. E. Dickinson – Royal Society of Chemistry, (1991) p 335-348.

μSC
-40°C to 200°C



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