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Gelation of amylose in DMSO-water solutions

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76 Gelation of Amylose in DMSO-Water Solutions. P. Colonna, V.J. Morris* and Christiane Mercier. Institut National de la Recherche Agronomique. Rue de la Géraudière, 44072 Nantes Cédex. France. * Food Research Institute-NORWICH, Colney Lane, NR4 7UA, Norwich, Great-Britain.

The phase diagram for amylose solution at 25°C in the binary solvent system of water-DMSO (dimethylsulfoxyde) has been investigated under various amylose concentrations up to 15% from sol to gel. Amylose gels only at low DMSO concentrations (molar ratio DMSO/water < 1), by phase separation process. Crystallization occurs in the B-type, with one endotherm at 132-161°C (enthalpy change: 8,3-10,5J/g). At a concentration of 10%, gel rigidity increases from 7500 (pure water) to 60000 N.m⁻² (55%DMSO). The phase separation point for the amylose solution agrees with the gel formation point and also the starting point of retrogradation. As DMSO concentration increases, the intrinsic viscosity increases from 120 to 220 mL/g. From static and dynamic light scattering experiments, amylose is shown to exist in random coil at low DMSO concentrations and in expanded coil, induced by high DMSO concentrations. Specific hydrogen bonds should be involved in the preferred conformational isomers for rotations about the glycosidic linkage.