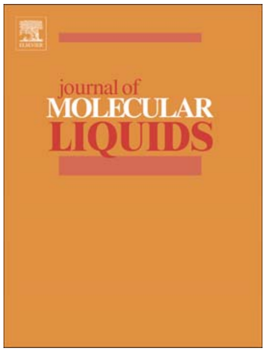
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Soluting-in and Soluting-out of Water-Soluble Polymers in Aqueous Carbohydrate Solutions Studied by Vapor Pressure Osmometry

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ABSTRACT

Precise vapor pressure osmometry measurements at 308.15 K have been performed for ternary systems of carbohydrate in aqueous 0.2 w/w polymer solutions. The polymers are polyethylene glycol 400 (PEG400), polyethylene glycol 10000 (PEG10000) and polypropylene glycol 400 (PPG400), and the carbohydrates are xylose, xylitol, glucose, fructose, sucrose and raffinose. In order to study the soluting-out and soluting-in effects occurring in the polymer-carbohydrate aqueous systems, deviations of vapor-liquid equilibria behavior of these systems from the semi-ideal state have been evaluated. In the case of PPG + carbohydrates aqueous systems, because of unfavorable PPG-carbohydrate interactions, the solutes exclude themselves from the vicinity of each other and therefore aqueous biphasic systems are entropically formed above a critical concentration. The monophasic and biphasic regions of these systems show, respectively, negative and positive deviations from the semi-ideal behavior, which become more negative and more positive with increasing hydrophilicity of the carbohydrates. However, in the case of PEG + carbohydrate aqueous systems, which are completely miscible, because of favorable PEG-carbohydrate interactions, the interaction of each solute with water molecules becomes weaker in the presence of the other solute. These systems show positive deviations from the semi-ideal behavior. By increasing the PEG molar mass and decreasing the hydrophilicity of carbohydrates,

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