

THERMODYNAMICS PHASE BEHAVIOR OF FLUOROPOLYMERS MIXTURES WITH SUPERCRITICAL FLUID SOLVENTS

Hun-Soo Byun[†]

Department of Chemical Engineering, Yosu National University, Yosu, Chonnam 550-749, South Korea

ABSTRACT

The impact of polymer backbone architecture on fluoropolymer solubility in supercritical fluid solvents is studied by systematically varying the chemical type of the repeat units in the main chain. Cloud-point experimental data were presented at temperatures to 215 °C and pressures up to 2,500 bar for poly(vinyl fluoride) and poly(vinylidene fluoride) in CO₂, CHClF₂, and dimethyl ether with ethanol, propanol, butanol, pentanol, heptanol and octanol. Poly(vinyl fluoride) does not dissolve in CO₂ even at 215 °C and 2,500 bar, but poly(vinylidene fluoride) does dissolve in CHClF₂ at 185 °C and pressures of 800 bar. To dissolve poly(vinylidene fluoride) in dimethyl ether, pressures in excess of 200 bar and temperatures in excess of 165 °C are needed. The impact of fluoropolymer solubility shows the cloud-point behavior of the poly(vinylidene fluoride) [Mw = 180,000 and 275,000] – carbon dioxide, dimethyl ether, fluoroform and CHClF₂ systems initial reference for binary poly(vinylidene fluoride) [Mw = 180,000 and 275,000] - supercritical fluid solvents phase behavior. The carbon dioxide and fluoroform are poor quality solvents for poly(vinylidene fluoride) because pressures in the range of 1500 bar are needed to obtain a single phase. The experimental cloud-point data shows the ternary poly(vinylidene fluoride) – CHF₃ – CHClF₂ system. Also, CHClF₂ is used as a cosolvent to reduce the impact of dipolar CHF₃-CHF₃ interaction on the poly(vinylidene fluoride)-CHF₃ phase behavior.

*** Poster Presentation**

*** Topics : Thermodynamics and high pressure equilibria**