Prediction of Ice Solubility in Non-Polar Fluids

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Hydrofluorocarbons (HFCs) have been used in a wide variety of applications such as refrigerants, working fluids in power cycles, foam blowing agents, solvents and low temperature heat transfer fluids. The relatively low viscosity of HFCs such as 1,1,1,3-pentafluoropropane (245fa) at low temperature make it an ideal low temperature, non-flammable and non-toxic heat transfer fluid. Moisture is always a concern when dealing with low temperature fluids. If the moisture levels are too high ice formation will occur and create a blockage. The solubility of ice in 245fa has been measured from 0 to -70°C. The solubility data has been correlated using various activity coefficient models over the entire temperature range. The best overall activity correlations are presented. Regular solution theory was also employed to predict the ice solubility and compared to the experimental data.