

Intensification of the Measurement of Thermodynamic Properties

Helena Laavi^{C, S}, Juha-Pekka Pokki, Petri Uusi-Kyyny, Kim Younghun and Ville Alopaeus
Aalto University School of Chemical Technology, Biotechnology and Chemical Technology, Espoo, Finland
helena.laavi@aalto.fi

Phase equilibrium and calorimetric measurements provide complementary data for determining thermodynamic properties. The combined use of vapor-liquid equilibrium (VLE) data and excess enthalpies (HE) makes the thermodynamic model more reliable in extrapolation outside the conditions of the measurement. This is important during the tight time schedule of process development. In this work, phase equilibrium and excess enthalpies of binary mixtures were measured by using two apparatuses. The VLE runs were conducted by using a circulation still of the Yerazunis-type. A gas chromatograph was used to analyze the VLE samples. A SETARAM C80 -calorimeter equipped with a flow mixing cells was taken into use. The calorimeter was calibrated by using standard chemical reference systems at 298.15 K, like hexane + cyclohexane and methanol + water. The density meter Anton Paar DMA 512 P was connected in series at the outflow of calorimeter. New phase equilibrium, heat of mixing and density data were measured by using the circulation still, the flow mixing calorimeter and a density meter. The systems measured were binary mixtures of short and long chain alcohols and a ketone with industrial relevance.