

Excess Properties of Binary and Ternary Mixtures Containing Dibutyl Ether (DBE), 1-Butanol and 2,2,4-Trimethylpentane at 298.15 K.

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The use of oxygenated compounds as gasoline-blending agents has been proposed to reduce emissions of new reformulated gasoline. Ether + alcohol + alkane mixtures are of interest as model mixtures for gasoline in which the alcohol and the ether act as non-polluting, high octane number blending agents. From this point of view the study of the ternary mixture dibutyl ether + 1-butanol + isooctane is very interesting. Isooctane is a usual compound of gasoline; dibutyl ether (DBE) is used as a blending agent in reformulated gasoline and 1-butanol is a basic component in the synthesis of the ether, and therefore is always contained as an impurity. Experimental excess enthalpies and volumes of the ternary system dibutyl ether DBE + 1-butanol + Isooctane and the corresponding binary systems at 298.15 K are reported. Excess enthalpies and volumes have been measured with a new quasi-isothermal flow calorimeter recently built at the University of Burgos. Based on a calorimeter model 6020E from Hart Scientific, Utah, U.S.A, this calorimeter was modified in order to improve the control and data acquisition process, based on previous experience [1], [2]. To check the above built apparatus two systems traditionally considered as test systems for calorimetric techniques, cyclohexane + hexane and benzene + cyclohexane at 298.15 K, have been used. Excess volumes have been measured using an Anton Paar DMA 602 vibrating-tube densitometer. The experimental data have been fitted using a polynomial equation for binary and ternary systems. The values of the standard deviation indicate the agreement between the experimental results and the fitted ones. The experimental results are also used to test the applicability of the modified UNIFAC model for correlating excess enthalpies. We acknowledge support for this research to the Dirección General de Investigación, Ministerio de Educación y Ciencia, Spain, Project ENE2006-12620, and to the Consejería de Educación, Junta de Castilla y León, Spain, Project BU015A06.

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