EXCESS HEAT OF MIXING OF α–PICOLINE WITH n–ALKANES
Comparison with the Prigogine-Flory-Patterson theory and the extended real associated solution method

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The excess heats of mixing for binary mixtures α-picoline +n–alkanes (C₆ to C₁₀) at 298.15 K were measured and a comparison was made with the Prigogine–Flory–Patterson theory and the extended real associated solution method.

Keywords: α-picoline with n-alkanes, extended real associated solution method, Prigogine–Flory–Patterson theory

Introduction

As an extension of our investigations of the effects of the chain length of an n–alkane, and the number and positions of methyl groups in a pyridine base ring [1, 2], excess molar heats of mixing $H^E$ for α-picoline +n-alkane, (C₆ to C₁₀) have been measured at 298.15 K. For the α-picoline +n–nonane system, no $H^E$ values were available in the literature. The systems α-picoline +n–hexane, n–heptane, n–octane and n–decane were investigated [3].

Experimental

The α-picoline used in the present work was the same as that used in our previous study [4]. Its purity as determined by glc was better than 99.99%.
The $n$-hexane, $n$-heptane, $n$-octane, $n$-nonane and $n$-decane were the same as those used in [5]. Water content was checked with Fischer’s reagent and was on the limit of detectability. The purity as determined by glc was better than 99.95%.

The heats of mixing were measured with a UNIPAN type 600 flow microcalorimeter [6]. The precision of the $H^E$ determination is estimated to be $\pm 2 \text{ J.mol}^{-1}$.

Results and discussion

The experimental $H^E$ results for the binary systems at 298.15 K are presented in Table 1. The Redlich–Kister equation was fitted to the data by using

$$H^E(\text{J.mol}^{-1}) = x_1 x_2 \sum_{i=1}^{3} A_i (2x - 1)^{i-1}$$

The constants $A_i$ and the standard errors are given in Table 1; $x_1$ and $x_2$ are the mole fractions of the components of the binary mixtures. No measurements for $H^E$ for $\alpha$-picoline + $n$-nonane at 298.15 K have been reported in the literature.

Fig. 1 Excess molar enthalpy $H^E$ for binary mixture of $\alpha$–picoline with $n$–hexane at 298.15 K, $x_1$ mole fraction of $\alpha$–picoline: • experimental data, (-----) calculated from P–F–P theory, (-----) calculated from ERAS method.

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