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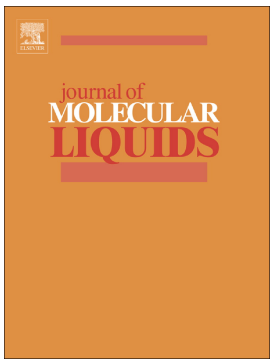

Solubility measurement and correlation for 1-naphthoic acid in nine pure and binary mixed solvents from T=(293.15 to 333.15) K

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ACCEPTED MANUSCRIPT

Solubility measurement and correlation for 1-naphthoic acid in nine pure and binary mixed solvents from T=(293.15 to 333.15) K

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ABSTRACT: In this paper, the measured solubility data and the discussion of thermodynamics for 1-naphthoic acid in common solvents are presented. The gravimetric method was utilized here for obtaining the solubility of 1-naphthoic acid under atmospheric pressure in nine pure and binary mixed solvents from T= (293.15 to 333.15) K. The tested values were regressed by Wilson, NRTL, UNIQUAC, λh, van't Hoff and Apelblat equations. It was figured out that temperature exerted obvious influence on the solubility of 1-naphthoic acid and the five equations had satisfactory accordance with experimental data. Furthermore, the parameters of models and enthalpy, entropy and Gibbs free energy of dissolution were computed and illustrated at the same time. The results may supply a basic theoretical guidance for industry.

Key words: solid-liquid equilibrium; 1-naphthoic acid; solubility; thermodynamic parameters

1. Introduction

1-naphthoic acid, whose molecular formula is $C_{11}H_8O_2$ and CAS Registry No. is 86-55-5, is a kind of acicular crystal. The chemical structure of 1-naphthoic acid is shown in Fig. 1. 1-Naphthoic acid and its derivatives are important intermediates in fine chemical industry which have a wide range of applications in medicine, pesticides, cosmetic pharmacology, photosensitive materials, dyes and organic pigments [1-5]. 1-naphthoic acid can be used for the preparation of highly efficient herbicides and plant growth regulators as well as thermal recording materials and photosensitive materials which have good resistance to plasticizers and solvent resistance [6-8]. In addition, 1-naphthoic is an effective extraction of zinc(II) and Europium(III) into chloroform with a low concentrations of zinc ions [9,10]. For the preparation of 1-naphthoic acid, 1-methylnaphthalene is oxidized by an oxygen-containing gas with a heavy metal catalyst such as organic cobalt and manganese salt. Apart from that, 1-naphthoic acid can be produced under solvent-free

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