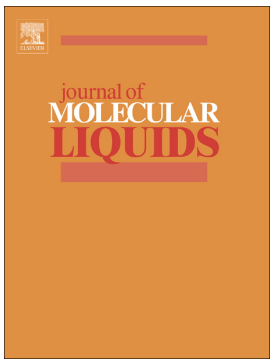

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PII:	S0167-7322(17)33377-9
DOI:	doi:10.1016/j.molliq.2017.09.097
Reference:	MOLLIQ 7934
To appear in:	*Journal of Molecular Liquids*
Received date:	27 July 2017
Revised date:	16 September 2017
Accepted date:	22 September 2017

Please cite this article as: Heng-jie Guo, Xin Dang, Feng Yang, Duan-lin Cao, Yong-xiang Li, Wang-hua Hu, Zhen-ming Jiang, Zhi-hua Li, Zi-yang Li, Luo-wen Zhang , Solubility and thermodynamic properties of a kind of explosives in four binary solvents. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:10.1016/j.molliq.2017.09.097

Solubility and thermodynamic properties of a kind of explosives in four binary solvents

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ABSTRACT: The solubility values of 1-methyl-3,4,5-trinitropropyrazole (MTNP) in four different binary solvents of water + (methanol, ethanol, 1-propanol and 2-propanol) at nine different temperatures from (283.15 to 323.15) K were firstly measured by a gravimetric method under atmospheric pressure. The experimental data showed that the solubility of MTNP increases with the increasing temperature in binary solvent mixtures. Besides, the dissolving capacity of MTNP decreased with the increasing water mole fraction ranging from 0.1000 to 0.7000 at a temperature. Additionally, results of these measurements were correlated by the modified Apelblat equation, vant't Hoff equation, CNIBS/R-K model and Jouyban-Acree model, and all of the models provided a satisfactory results in binary solvents. In addition, the thermodynamic properties of solution in different binary solvent mixtures, such as enthalpy, Gibbs energy and entropy can be calculated by the vant't Hoff equation and the Gibbs equation. Apparent thermodynamic quantities of mixing were also calculated for MTNP using values of the ideal solubility reported in the literature. Solid-liquid surface tension and surface entropy factor of MTNP were estimated by using the experimental solubility data.

Keywords: Solubility; 1-methyl-3,4,5-trinitropyrazole; Measurement; Correlation; Thermodynamic

1.INTRODUCTION

At present, 2-methyl-1,3,5-trinitrobenzene (TNT) is widely used both in the domestic and overseas as a kind of castable explosives carrier. Because of its defects of oil impregnate, contraction