## Viscosity Calculation for Binary Mixtures of Organic Solvents Based on an Improved Eyring-MTSM Model

Xiaojie Wang<sup>s</sup>, Jiajia Yin and Xiaopo Wang<sup>c</sup> School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi, China wangxp@xjtu.edu.cn

Organic solvents, including alkanes, aromatics, alcohols, esters, and ethers, are widely used in industrial production and daily life. Viscosity is a fundamental property used to describe the flow resistance of substances. The viscosity of binary mixtures of organic solvents is particularly important for the study of flow systems, such as crude oil extraction and transportation, nano fluid science, food engineering, and alternative fuel development. On the other hand, the viscosity of the mixtures is beneficial for understanding the intermolecular interactions. As it is impractical and extremely time-consuming to provide viscosity data of any composition at given conditions via the experimental method, many schemes have been proposed to establish a reliable viscosity model for binary mixtures. Recently, the Eyring-MTSM model for calculating viscosities of ionic liquid mixtures was proposed by Atashrouz et al., which consists of four coefficients to give satisfactory results. In this work, an improved Eyring-MTSM model was proposed with only three parameters based on reasonable assumptions. The accuracy of the new model was assessed by comparing experimental viscosities at atmospheric pressure for 176 binary mixtures of organic solvents, and the overall average relative deviation (ARD) between the calculated results and literature data is 0.59 %. In addition, the relationship between the parameters of the new model and the equivalent boiling point was established. Experimental viscosities containing 509 binary mixtures were used to evaluate the reliability of the relations, good agreement was obtained between experimental and calculated values with an ARD of 1.60 %. Furthermore, the improved Eyring-MTSM model was extended to the viscosities at high pressures. The ARD is 1.61 % for the highpressure viscosities of 63 binary mixtures.