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Density, Viscosity and Molecular Interaction of Binary System Tetraethylene Glycol + Dimethyl Sulfoxide at $T = (293.15 \text{ to } 318.15) \text{ K}$

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ABSTRACT

Density (ρ) and dynamic viscosity (η) for the binary system of tetraethylene glycol (TeEG) and dimethyl sulfoxide (DMSO) were measured at $T = (293.15 \text{ to } 318.15) \text{ K}$ with the step of 5 K and surrounding ambient pressure. From experimental ρ and η values, the excess molar volumes (V_m^E), apparent molar volumes ($V_{\phi,1}$ and $V_{\phi,2}$), partial molar volumes (\bar{V}_1 and \bar{V}_2), viscosity deviations ($\Delta\eta$) and the thermal expansion coefficient (α_p) were calculated. The pure solvents and other concentrations were characterized using UV-Vis, fluorescence, FTIR, and $^1\text{H-NMR}$ spectral technologies, and the spectral results illuminated that hydrogen bonds were formed between TeEG and DMSO.

Keywords. Density; Dynamic viscosity; Dimethyl Sulfoxide; Tetraethylene glycol; Excess properties.

1 Introduction

SO_2 , as an essential air pollutant, is an enormous detriment to the human being and the environment, which is produced by the burning of fossil fuels and can result in acid rain and smog [1]. Fortunately, flue gas desulfurization (FGD) has been widely used in industrial processes for SO_2 capture. Although some industrial technologies are used for FGD, including limestone scrubbing and amine scrubbing

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