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Conductometric and refractometric study of 1-Ethyl-3-methylimidazolium Bromide ionic liquid in water+ethanol/propanol mixtures at T=(298.2, 308.2 and 318.2)K

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**Conductometric and refractometric study of 1-Ethyl-3-methylimidazolium Bromide ionic liquid in Water +Ethanol/ Propanol mixtures at T = (298.2, 308.2 and 318.2) K**

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**Abstract**

In this work, thermophysical properties such as conductivity ( $\Lambda$ ) and refractive index ( $n_D$ ) of 1-Ethyl-3-methylimidazolium Bromide, [EMIm]Br, in ternary mixtures of [EMIm]Br + ethanol/ 1- propanol + water have been measured at T=(298.2, 308.2 and 318.2)K and P= 0.1MPa. The conductometric measurements were performed for [EMIm]Br ionic liquid from 0.0001 to 0.2 mol kg<sup>-1</sup> in different mass fractions of 1-propanol and ethanol in water + ethanol/ 1-propanol mixtures ((w/w)% =  $w_{\text{alcohol}} / w_{\text{mixture}} = 10\%, 20\% \text{ and } 30\%$ ) at T = (298.2, 308.2 and 318.2) K. Ion association constants ( $K_a$ ) and limiting molar conductivities ( $\Lambda_0$ ) of [EMIm]Br were obtained by using Fuoss Onsager equation. The critical aggregation concentration (cac) and the degree of ionization ( $\alpha$ ) were determined by conductivity measurements. The obtained parameters were used to calculate the standard Gibbs free energy of aggregation ( $\Delta G^0$ ). In addition, refractive indices ( $n_D$ ) of [EMIm]Br were measured for the binary and ternary water + [EMIm]Br + ethanol/ 1-propanol mixtures at T = (298.2, 308.2 and 318.2) K. The obtained results were compared to the predicted values using the Lorentz-Lorenz equations. Excess refractive index ( $n_D^E$ ) for binary and ternary mixtures and regression parameters of the Redlich–Kister and Cibulka equations were obtained at different temperatures.

**Keywords,** Conductivity; Refractive index; 1-Ethyl-3-methylimidazolium Bromide;

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