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{ The Effects of Molar Ratios and Temperatures on The Physicochemical Properties of Potassium Carbonate and Ethylene Glycol Mixture of Deep Eutectic Solvents (DES) }

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**THE EFFECTS OF MOLAR RATIOS AND TEMPERATURES ON
THE PHYSICOCHEMICAL PROPERTIES OF POTASSIUM
CARBONATE AND ETHYLENE GLYCOL MIXTURE OF DEEP
EUTECTIC SOLVENTS(DES)**

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ABSTRACT

THE EFFECTS OF MOLAR RATIOS AND TEMPERATURES ON THE PHYSICOCHEMICAL PROPERTIES OF POTASSIUM CARBONATE AND ETHYLENE GLYCOL MIXTURES IN DEEP EUTECTIC SOLVENT(DES)

This study examines at the impact of molar ratio and temperature on the physicochemical properties of deep eutectic solvents (DES) prepared by potassium carbonate (PC) and ethylene glycol (EG). Two molar ratios, 1:8 and 1:16 (PC:EG), were chosen to investigate composition affects solvent behaviour. The DES samples were produced using heating and stirring procedure and allowed to settle before examination. The physicochemical properties investigated are pH, hydrogen bonding, viscosity, density, and ionic conductivity. Temperatures were measured between 30°C to 70 °C. Fourier Transform Infrared (FTIR) spectroscopy was utilized to confirm the hydrogen bonds between PC and EG. The findings indicate that both molar ratios successfully generated stable and homogeneous DES without phase separation. Strong hydrogen bonding was detected by FTIR, with the 1:16 molar ratio exhibiting increased hydrogen bonding due to the higher EG concentration. The pH data demonstrate that all DES samples were alkaline, with the 1:8 molar ratio having higher pH values due to its increased potassium carbonate content. Viscosity and density decreased as temperature raised for both molar ratios, however ionic conductivity increased due to greater ion mobility. The 1:16 DES had lower viscosity and stronger conductivity than the 1:8 DES, making it better preferred for fluidity-responsive applications. Throughout this study, it is evident that the physicochemical properties of PC-EG DES are controlled by both molar ratio and temperature.

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