THE PHYSICOCHEMICAL PROPERTIES OF PC-PEG AT DIFFERENT MOLAR RATIOS AND TEMPERATURE

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ABSTRACT

THE PHYSICOCHEMICAL PROPERTIES OF PC-PEG AT DIFFERENT MOLAR RATIOS AND TEMPERATURE

This research explores the physicochemical properties of potassium carbonate (PC) and polyethylene glycol (PEG) mixtures, with an emphasis on the impact of varying molar ratios (1:2, 1:4, 1:6, 1:8, 1:10, and 1:12) and temperatures (30°C to 70°C). The goal of the investigation is to enhance the understanding of these parameters and their impact functionality including density, viscosity, ionic conductivity, solubility, pH and hydrogen bonding interactions. In order to determine the ideal ratios for creating stable deep eutectic solvents (DES), mixtures were prepared and investigated. It shown that 1:10 and 1:12, which showed better stability and homogeneity compared to the earlier immobilization procedures. Hydrogen bonding in the mixtures was examined using Fourier-transform infrared (FTIR) spectroscopy, which showed that the higher PEG content in the 1:10 and 1:12 molar ratios promoted more robust and broad interactions with PC. Both temperature and the molar ratio had an impact on the mixture's pH at higher temperatures, a higher PEG content lowered the ionic concentration and moved the pH closer to neutral. The findings showed a direct correlation between the PC-PEG mixtures, physicochemical characteristics, temperature, and molar ratio. Thermal expansion caused density to decrease as temperature rose, while viscosity significantly decreased, suggesting that molecules were more mobile at higher temperatures. Stronger hydrogen bonds and molecular packing were responsible for the 1:10 mixture's greater density and viscosity as compared to the 1:12 mixture. The stronger ionic component in the 1:10 mixture increased ionic conductivity, a crucial metric for energy-related applications.

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