

INFLUENCE OF IONIC LIQUIDS ANION-EXCHANGE ON MENSCHUTKIN REACTION RATE CONSTANT

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Room temperature ionic liquids have been proposed as solvents for green processing because of their unique physical properties, such as nonvolatility and nonflammability. The physical properties of ionic liquids can be tuned by varying the structures of their ions in order to optimize the solvent properties for specific applications. Ionic liquids affect reaction rates and selectivity. To understand the effects of ionic liquids on chemical reactions, the rate constants for several elementary reactions in ionic liquids have been studied and compared to those in other solvents. In a number of cases the rate constants in ionic liquids were lower than those in water and polar organic solvents either because of the high viscosity of ionic liquids, which limits the diffusion rate, or because of an apparent lower polarity.

Rate constants for the Menschutkin reaction of benzyl bromide with 1,2-dimethylimidazole have been measured in eight synthesised ionic liquids using spectrophotometric detection. It was found that the wide selection of pure ionic liquids do not absorb light to any significant extent at wavelengths above 260 nm and that the disappearance of benzyl bromide can be followed at 270-280 nm with only minimal interference from absorption of 1,2-dimethylimidazole. Eight rate constants were determined in eight ionic liquids. The ionic liquids behave in this reaction like the polar aprotic solvents and variations within the anion-exchange in ionic liquids indicate significant effect of solvent anion $[(CF_3SO_2)_2N]^- < PF_6^- < BF_4^-$ on measured rate constant. Such determination of anionic influence on rate constant will permit design of ionic liquids by proper choice of anion structure for enhancement of the rates of specific reactions.

ACKNOWLEDGEMENT

This investigation received financial support from the Polish Committee of Scientific Research 3 T09B 080 28.