KINETICS OF TRIOCTYLMETHYLAMMONIUM METHYL CARBONATE

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ABSTRACT

Quaternary ammonium compounds (quats) are widely used for a variety of commercial products including fabric softeners, hair conditioners, and cleaners. Industrially these compounds are produced using hazardous reagents like dimethyl sulfate and methyl chloride. We have developed an eco-friendly route for the methylation of tertiary amines to form the quat using dimethyl carbonate (DMC). Previous studies in this lab determined rate constants and energies of activation for the reactions of tributylamine, trihexylamine, and trioctylamine with DMC at three temperatures, using ion exchange HPLC with an acidic eluent to analyze the reaction mixture. Unexpected trends coupled with poor chromatographic resolution for the trioctylamine and corresponding quat led us to repeat that segment of the work. After adding data from three additional temperatures, the new results were consistent with the previous work. Rate constants increased with increasing temperature. The Arrhenius plot yielded an energy of activation of +77 kJ/mole. The composite results for the trioctylamine system clearly indicated data from more than three temperatures are needed to adequately define the Arrhenius plot.