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Kinetics and Mechanism of Oxidation of L-Isoleucine and L-Ornithine Hydrochloride by Sodium N-Bromobenzenesulphonamide in Perchloric Acid Medium

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Abstract: Kinetic studies of the oxidation of L-isoleucine (ISL) and L-ornithine hydrochloride (ORH) by sodium N-bromobenzenesulphonamide (bromamine-B or BAB) were studied in aqueous perchloric acid medium. The rate shows first-order dependence on both $[BAB]_0$ and $[\text{amino acid}]_0$ and inverse first-order dependence on $[H^+]$ for ISL and first-order dependence on $[H^+]$ for ORH. The rate of reaction decreased with decreases in the dielectric constant of the medium. The addition of benzenesulphonamide (BSA), which is one of the reaction products, had no significant effect on the reaction rate. The rate remained unchanged with the variation in the ionic strength of the medium for ISL, whereas the rate decreased with increases in the ionic strength of the medium for ORH. Isovaleronitrile and 3-(methylamino)propionitrile were identified as the products. Thermodynamic parameters were computed by studying the reactions at different temperatures (298-316 K). The rate laws derived are in excellent agreement with the experimental results. Plausible mechanisms are suggested.

Key Words: Bromamine-B, Oxidation, Kinetics, Amino acids

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