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CO₂ absorption using aqueous potassium lysinate solutions: Vapor - liquid equilibrium data and modelling

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ABSTRACT

The solubility of CO₂ in aqueous potassium lysinate (LysK) solutions was measured in a stirred reactor at temperatures from 298 to 353 K, for 9.0, 17.4, 25.3, 33.1 and 41.2 mass% LysK and CO₂ partial pressures up to 110 kPa. The vapor-liquid equilibrium (VLE) data were interpreted using the modified Kent-Eisenberg model. The apparent equilibrium constants of carbamate hydrolysis and amino acid deprotonation were correlated as a function of temperature, CO₂ loading (expressed as mole CO₂ per mole LysK) and LysK concentration to fit the experimental solubility data. The proposed model satisfactorily predicted the VLE data for the H₂O-LysK-CO₂ system, especially at moderate to high CO₂ loading, with an average absolute deviation within 3.2%. Liquid species in the CO₂-loaded LysK solutions were also qualitatively characterized by ¹³C NMR experiments.

Key Words : CO₂ solubility; Amino acid salt; CO₂ absorption; Vapor-liquid equilibrium; Kent-Eisenberg model

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