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Study on absorption and spectral properties of H₂S in carboxylate protic ionic liquids with low viscosity

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ABSTRACT. The exorbitant price and high viscosity are two major disadvantages for ionic liquids (ILs), which influence their practical applications in gas separation. Here we synthesized ten carboxylate protic ionic liquids (PILs), containing *N*-ethylmorpholine acetate, *N*-ethylmorpholine propionate, *N*-ethylmorpholine butyrate, *N*-ethylmorpholine methoxylacetate, 4-(2-hydroxyethyl) morpholine acetate, and 4-(2-hydroxyethyl) morpholine methoxyacetate, triethylamine acetate, triethylamine propionate, triethylamine propionate, and triethylamine methoxylacetate, with low cost and viscosity for absorption of H₂S. The densities and viscosities of these carboxylate PILs were measured in the temperature range of (298.2 to 333.2) K at atmospheric pressure. The solubility of H₂S in these PILs was determined using an isochoric saturation technique at 298.2 ~ 318.2 K and 0 ~ 1.096 bar. It was found that the solubility of H₂S in these PILs increased with the increasing pressure and length of the alkyl chains on the carboxylic acid. The absorption processes obeyed Henry's law within the given experimental conditions and Henry's constants were calculated from solubility data. In addition, the FTIR and

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