

H₂S Absorption with Deep Eutectic Solvents: Low Partial Pressure Capture and Thermodynamic Analysis

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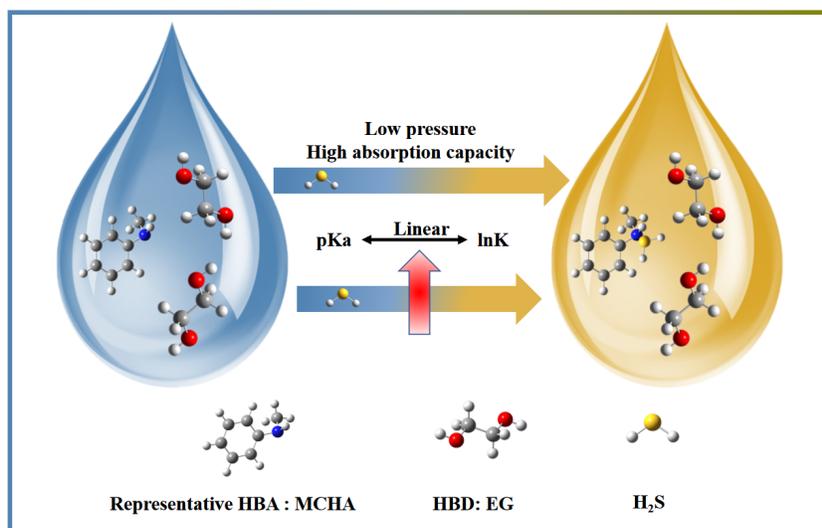
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Abstract

In the present work, a series of deep eutectic solvents (DESs) based on organic amine as hydrogen bond acceptors (HBAs), and ethylene glycol (EG) as hydrogen bond donor (HBD) were prepared for the H₂S absorption. Thermal decomposition temperature, HBA mass ratios, alkalinity and structure effect on absorption behavior were systematically investigated. The reaction mechanism was demonstrated by FT-IR and ¹H NMR spectroscopy. The reaction equilibrium constants, Henry constant, enthalpy and entropy change were calculated based on the thermodynamic model to reveal the interactions between DESs and H₂S. It is found that H₂S absorption capacities of the most of DESs with HBA/HBD mass ratio of 1:4 were close to 1mol /mol at 303.15K and 0.2 bar. The absorption capacity of DESs depends on the alkalinity and structure of HBAs; Additionally, a good linear correlation between the alkalinity of HBA and the absorption equilibrium constant (lnK) of DESs to H₂S was found



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