

Characterization of aqueous ammonia modified with additives for removal of carbon dioxide

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Aqueous ammonia absorbent (10 wt%) was modified with four kinds of additives (1 wt%) including amine and hydroxyl groups, i.e. 2-amino-2-methyl-1-propanol (AMP), 2-amino-2-methyl-1,3-propanediol (AMPD), 2-amino-2-ethyl-1,3-propanediol (AEPD), and tri (hydroxymethyl) aminomethane (THAM), for CO₂ capture. The loss of ammonia by vaporization was reduced by additives, while the removal efficiency of CO₂ was slightly improved. These results were attributed to the interactions between ammonia and additives or absorbents and CO₂ via hydrogen bonding, as verified by FT-IR spectra and computational calculation. Molecular structures as well as binding energies were obtained from the geometries of (ammonia + additives) and (ammonia + additives + CO₂) at the optimized state. These experimental and theoretical findings demonstrate that additives including amine and hydroxyl group are suitable for modifying aqueous ammonia absorbent for CO₂ removal.