Influence of Additives with Amine and Hydroxyl Groups on Aqueous Ammonia Absorbent for CO_2 Capture

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Aqueous ammonia absorbent (10 wt%) was modified with four kinds of additives (1 wt%), i.e. 2-Amino-2-Methyl-1-Propanol (AMP), 2-Amino-2-Methyl-1,3-Propandiol (AMPD), 2-Amino-2-Ethyl-1,3-Propandiol (AEPD), Tri(Hydroxymethyl) AminoMethane (THAM), for CO2 capture. The loss of ammonia by vaporization was reduced by additives, while the removal efficiency of CO2 was improved. These results were related to the interactions between ammonia and additives/or absorbents and CO2, as proven by FT-IR spectra and computational calculation. In addition, overall mass transfer coefficients, reaction constants, and activation energies of pristine and additive-modified ammonia absorbents were obtained, using a stirred cell. These experimental and theoretical findings demonstrate that additives including amine and hydroxyl group are suitable for modifying aqueous ammonia absorbent for CO2 removal.