

Analysis of CO₂-loaded ammonia absorbent and its precipitates by FT-IR and NMR measurement

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Ammonia water was investigated as a new absorbent of chemical absorption process for removal of CO₂ in flue gas. Suitable concentration range of ammonia water was decided in the point of view of CO₂ absorption capacity and NH₃ loss due to the formation of NH₄HCO₃ precipitation. Absorption capacity and formation of NH₄HCO₃ precipitation in liquid phase were calculated by Pitzer model for electrolyte solution. CO₂ absorption capacity of 5 mol/kg ammonia water was higher than conventional amine absorbent. The limit of CO₂ loading due to precipitation formation was decided at various absorbent concentrations. Absorber could be operated without precipitation by using less than 9 mol/kg of ammonia water at the typical operating condition of an absorber. The optimum operating conditions of ammonia water absorbent for removal of CO₂ in flue gas were 40°C, 9 mol/kg, and CO₂ absorption capacity was 0.166 kg CO₂/kg solution.