LIMESTONE DISSOLUTION IN WET FLUE GAS DESULPHURIZATION

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The wet type limestone scrubbing process is the most commonly used flue gas desulphurization process for treatment of waste gases from power stations and incineration plants. Accurately evaluating the dissolution rate of limestone is important in the development and the efficient operation of the wet scrubbing. The limestone dissolution and SO2 absorptions considering the influence parameters were measured using the jacked stirred vessel in the condition close to the flue gas desulphurization system by assuming as the limiting cases of the well mixed and rigid drops in the scrubber. The results of investigations show that the limestone dissolution is controlled by H+ diffusion at low pH (pH 4) while at high pH (pH 5 to 6), the contribution of OH- dominates the reactions. The dissolution rate is higher for smoother particle size but the behavior of dissolution also depends on impurities in the CaCO3 (such as insoluble salts). Inorganic additives such as Na2SO4, NaCl, MgSO4, and MgCl2 do not influence the dissolution, but Na2SO3 and NH4Cl clearly enhance the dissolution rate as well as organic additives such as adipic and acetic acid. The enhancement due to the increasing buffer capacity in the solution. The mass transfer model for limestone dissolution and SO2 absorption are also developed to describe the dissolution and absorption behavior and verified using the results of the experiment.