

Carbon Dioxide Removal from Off Gases in a Self-Priming Submerged Venturi Scrubber

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Abstract : Carbon dioxide (CO₂) is the most abundant waste produced by human activities. It is estimated to be one of the major contributors of greenhouse effect and also considered as a major air pollutant formed by burning of fossil fuels. The main sources of emissions are flue gas from thermal power plants and process industries. It is also a contributor of acid rain. Its exposure through inhalation can lead to health risks. Therefore, control of CO₂ emission in the environment is very necessary. The main focus of this study is on the removal of carbon dioxide from off gases using a self-priming venturi scrubber in submerged conditions using sodium hydroxide as the scrubbing liquid. A self-priming submerged venturi scrubber is an efficient device to remove gaseous pollutants. In submerged condition, venturi scrubber remains submerged in the liquid tank and the liquid enters at the throat section of venturi scrubber due to the pressure difference which includes the hydrostatic pressure of the liquid and static pressure of the gas. The inlet polluted air stream enters through converging section which moves at very high velocity in the throat section and atomizes the liquid droplets. This leads to absorption of CO₂ from the off gases in scrubbing liquid which resulted in removal of CO₂ gas from the off gases. Detailed investigation on the scrubbing of carbon dioxide has been done in this literature. Experiments were conducted at different throat gas velocities, liquid levels in outer cylinder and CO₂ inlet concentrations to study the carbon dioxide removal efficiency. Experimental results give more than 95% removal efficiency of CO₂ in the self priming venturi scrubber which can meet the environmental emission limit of CO₂ to save the human life.

Keywords : carbon dioxide, scrubbing, pollution control, self-priming venturi scrubber

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