

Removal of Gaseous Pollutant from the Flue Gas in a Submerged Self-Priming Venturi Scrubber

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Abstract : Hydrogen chloride is the most common acid gas emitted by the industries. HCl gas is listed as Title III hazardous air pollutant. It causes severe threat to the human health as well as environment. So, removal of HCl from flue gases is very imperative. In the present study, submerged self-priming venturi scrubber is chosen to remove the HCl gas with water as a scrubbing liquid. Venturi scrubber is the most popular device for the removal of gaseous pollutants. Main mechanism behind the venturi scrubber is the polluted gas stream enters at converging section which accelerated to maximum velocity at throat section. A very interesting thing in case of submerged condition, venturi scrubber is submerged inside the liquid tank and liquid is entered at throat section because of suction created due to large pressure drop generated at the throat section. Maximized throat gas velocity atomizes the entered liquid into number of tiny droplets. Gaseous pollutant HCl is absorbed from gas to liquid droplets inside the venturi scrubber due to interaction between the gas and water. Experiments were conducted at different throat gas velocity, water level and inlet concentration of HCl to enhance the HCl removal efficiency. The effect of throat gas velocity, inlet concentration of HCl, and water level on removal efficiency of venturi scrubber has been evaluated. Present system yielded very high removal efficiency for the scrubbing of HCl gas which is more than 90%. It is also concluded that the removal efficiency of HCl increases with increasing throat gas velocity, inlet HCl concentration, and water level height.

Keywords : air pollution, HCl scrubbing, mass transfer, self-priming venturi scrubber

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