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Wet Flue Gas Desulfurization Using a New O-Element Design Which Replaces the Venturi Scrubber

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Abstract : Scrubbing by a liquid spraying is one of the most effective processes used for removal of fine particles and soluble gas pollutants (such as SO2, HCl, HF) from the flue gas. There are many configurations of scrubbers designed to provide contact between the liquid and gas stream for effectively capturing particles or soluble gas pollutants, such as spray plates, packed bed towers, jet scrubbers, cyclones, vortex and venturi scrubbers. The primary function of venturi scrubber is the capture of fine particles as well as HCl, HF or SO2 removal with effect of the flue gas temperature decrease before input to the absorption column. In this paper, sulfur dioxide (SO2) from flue gas was captured using new design replacing venturi scrubber (1st degree of wet scrubbing). The flue gas was prepared by the combustion of the carbon disulfide solution in toluene (1:1 vol.) in the flame in the reactor. Such prepared flue gas with temperature around 150 °C was processed in designed laboratory O-element scrubber. Water was used as absorbent liquid. The efficiency of SO2 removal, pressure drop and temperature drop were measured on our experimental device. The dependence of these variables on liquid-gas ratio was observed. The average temperature drop was in the range from 150 °C to 40 °C. The pressure drop was increased with increasing of a liquid-gas ratio, but not as much as for the common venturi scrubber designs. The efficiency of SO2 removal was up to 70 %. The pressure drop of our new designed wet scrubber is similar to commonly used venturi scrubbers; nevertheless the influence of amount of the liquid on pressure drop is not so significant.

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