High Efficiency Wet Scrubbing System Utilizing Impeller

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This research paper aims to effectively tackle modern day problems of industrial pollutants such as NOx or SOx and fine dust by combining the principles of a wet scrubber and an impeller. Imbedding an impeller in a wet scrubber allows us to scatter the scrubbing liquid of a wet scrubber into small droplets which increases the gas-liquid contact, therefore highly increasing the efficiency of a wet scrubber. Between different industrial air purifiers is a bubble column reactor, which also utilizes a scrubbing liquid. However, results showed that it is unsuitable for handling high flow rates of contaminated gas. Trial and error was made in changing the variables that determine the physical characteristics and the performance of an impeller, concluding in three models by changing the shape of the impeller's wings and the angle of the wing. Additional primary scattering devices were designed to increase gas-liquid contact, and efficiency was further improved by surrounding the outer part of an impeller with a mesh. This research used acrylic as material of the impeller because the it is in constant contact with liquid and needs good durability. The degree of scattering of the absorbent and the degree of gas-liquid contact was evaluated by calculating the removed percentage of the NO gas which was filled in the wet scrubber by scattering Fe(II)EDTA through the impeller, comparing the highest efficiency between three impeller models. Result of experiment shows that the newly proposed wet impeller scrubber can effectively treat contaminated air at a high flow rate.

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