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Evaluation of solid sorbents for acid flue gas emissions treatment.

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ABSTRACT

Removal of acid gases from exhaust emissions still represents a challenge for many industrial sectors, in particular for waste to energy facilities. In dry sorption processes, the efficiency of solid reagents is influenced by the specific surface area of the solid, the degree to which it is mixed with the gas, the concentration of the gas to be adsorbed, the temperature and humidity of the gas flow and the concentration of the reagent. Recently, new formulation of calcium- and sodium-based sorbents have been investigated. The objective of the present study is the characterization of the dry sorption capacity of HCl gaseous emissions of five different formulations of calcium-based sorbents based on the same operating conditions. To this end, an experimental installation was designed and applied. Scanning electronic microscopy (SEM) analyses were also carried out. The results showed a sorption capacity range of 8.1 – 10.8 mg Cl□mg sorbent-1 after 30 minutes. Samples C1 and C5 showed the highest sorption capacity. Samples C2 and C3 showed variable trends during the tests. Overall, for all the samples, the variance of sorption capacity increased with time. The possible reasons of such differences could be connected to the chemical composition, heterogeneous size distribution, and particle agglomeration effects.

KEYWORDS: Flue gas treatment; HCl; calcium hydroxide, sodium bicarbonate; Chemisorption.

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