Abstract

Gas emissions of SO_2, NOx, THC and CO, and reactor scale effects were evaluated for the process of absorption of SO_2 by limestone in atmospheric bubbling fluidized bed combustion of high ash high sulfur coal. Two different fluidized bed reactor plants were used: a bench cylindrical section reactor 0.16 m internal diameter, and a pilot square section reactor 0.5 x 0.5 m. Air excess, fluidization velocity (U/U_{mf}), particle size and process temperature were established having in view typical operational conditions. The parameters varied for analysis were the *Ca/S* feeding ratio, height of the bed, and geometry of the reactor. The first was varied by controlling the feed rates of coal and limestone, and the second by controlling the height of the expanded bed. Gas concentrations were measured at the reactors exit (SO_2, O_2, CO, CO_2, NO_x and *THC*). Size distributions and chemical composition were determined for the bed, overflow and elutriated materials. The results obtained in the bench plant were compared to those obtained in the pilot plant. The differences found between the results of the two plants were attributed mainly to differences in operational conditions. The effect of scale, for the dimensions of the plants considered in this work, resulted not significant.

Keywords: scale effect; sulfur absorption; limestone conversion; mineral coal; fluidized bed combustion; gas emissions.