Title: CO2 binding by Baralyme in three different carrier gases

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Abstract: The absorptive properties of Baralyme and Sodasorb for CO2 in a container were studied by measuring the lifetime T0.5 of the unit, i.e., the time until the exit concentration of CO2 reaches 0.5%. The container size, the inlet gas flow rate, and the inlet CO2 concentration were varied. The experiments were repeated with either He, N2, or SF6 as the inert gas to evaluate the effect of increased gas density due to hyperbaric conditions on scrubber performance. It was found that T0.5 is best described by an exponential function of the type b (ttr)a, where ttr is the transit time of the gas through the container. The exponent a equals about 1.5 and varies relatively little. The constant b, however, is strongly dependent on inert gas density and on CO2 concentration in the inlet gas; it is independent of container size and gas flow rate. In addition, the amount of absorber reaching up to time T0.5 was measured in all conditions. It is strongly dependent on CO2 concentration; however, surprisingly it is nearly independent of inert gas properties. These results are compared with a mathematical model of scrubber behavior that is based on the chemical reaction rate of an imaginary absorber. The model neglects possible effects of CO2 diffusion in the gas phase, of ash formation, and of heat produced by the reaction. Differences between our experimental data and

the model are analyzed as a function of these effects. The results give some simple predictive equations for the lifetime and the amount of absorber reacting.

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