

oxidation process. The initial contact of SO_2 with the solid produces a rapid loss of SO_2 from the gas phase; the reaction rate decreases with time. For the capacity-limited reaction, the rate approaches zero; for the catalytic process, the rate levels off for a time and then approaches zero. The latter phenomenon is attributed to a pH decrease caused by sulfuric acid formation.

Urone et al. (1968) and Smith et al. (1969) found a number of solids to be effective in removing SO_2 . In Urone's studies, SO_2 was admitted to a flask containing a powder that was allowed to react with no mixing, and the product and remaining SO_2 were determined. Only the average reaction rates can be calculated from these experiments; more importantly, with this experimental procedure the rates may be diffusion-limited. The highest rate determined was for SO_2 with ferric oxide; the value was >75 percent per minute. Other materials found to be slightly less reactive than ferric oxide were magnetite, lead oxide, lead dioxide, calcium oxide, and aluminum oxide. The rate for the ferric oxide experiment was for 20 mg of ferric oxide in a 2-liter flask, the ferric oxide concentration would thus be 10^7 ug/m^3 . Assuming a direct proportionality between rate and particle concentration, the SO_2 removal rate in the atmosphere would be calculated to be 0.04 percent per hour for 100 ug/m^3 of particles with the same reactivity as ferric oxide. However, since the mass transfer characteristics of the reactor were not reported, these results cannot be considered reliable for estimating rates.