3. There is no basis to assume that the rate equation observed for laboratory-generated carbon (soot) applies to atmospheric carbon.

4. The rates for the HO_2 and CH_3O_2 reactions recommended by Calvert et al. (1978) are not well established.

It is very likely that the rates estimated for Mn(II) catalysis, Fe(III) catalysis, and C (soot) catalysis are gross over-estimates. Also, the HO_2 and CH_3O_2 rates may be too high.

Uncritical acceptance of all of the rates, at a pH = 3, and $[H_2O_2]$ = 10 ppb, would lead to the SO_2 conversion rate exceeding 40% h^{-1}. However, if only the well-established rates are considered, the SO_2 conversion rate becomes $\sim$1.1% h^{-1}.

2.3.7 Field Measurements on the Rate of SO_2 Oxidation

The majority of SO_2 oxidation studies in the atmosphere have been only carried out in recent years and of those, most have involved power plant plumes. One reason for the late start in this research area has been the lack of adequate measurement technology for particulate sulfur, but recent developments Huntzicker et al. (1978), Cobourn et al. (1978) seem to have alleviated this problem. A summary of SO_2 oxidation rates based on field measurements in power plant, smelter and urban plume studies carried out from 1975 to the present is given in Table 16-1. The rates of SO_2 oxidation in industrial plant plumes consistently range from 0 to 10%/h, with urban plumes showing only a slightly greater maximum rate of 13%/h. The pre-1975 studies, Gartrell et al. (1963),