2. Although homogeneous photochemical processes are important (Alkezweeny, 1980), heterogeneous mechanisms may play a greater role in urban than in power plant and smelter plumes (close to the source). Thus, whereas power plant and smelter plume data suggested very low oxidation rates under conditions where homogeneous processes are not expected to be significant, the urban plume data in Table 6 indicate that quite high oxidation rates have been observed in the wintertime at latitudes greater than 45°N (see, for example, the results of Benarie et al., Elshout et al., Prahm et al., and Smith and Jeffrey). Alkezweeny (1980) also has noted in his own data that high oxidation rates seem to be associated with high aerosol loadings.

3. There is some indication that temperature may have an effect on the conversion rate, although, as with chimney plume studies, the information is conflicting (compare Benaire et al. with Meszaros et al.). There is also confusion on the correlation of conversion rate and relative humidity (compare Benaire et al. with Smith and Jeffrey).

Before drawing any conclusions on the seasonal dependence of the SO_2 transformation rate from the above data, one must mention the possibly important role of clouds (both precipitating and fair weather) in converting SO_2 to sulfates. Recently, there has been a considerable amount of speculation that in-cloud processes contribute significantly to SO_2 oxidation. Laboratory studies have suggested that the observed sulfate concentration in rainwater can be accounted for by the oxidation of SO_2 in cloud droplets, especially by hydrogen peroxide and ozone (Penkett et al., 1979; Martin and Damschen, 1981), conversion rates as high as several percent per minute being inferred by this mechanism under atmospheric conditions. Limited field measurements (Hegg and Hobbs, 1978, 1981; Newman, 1979; Hales and Dana, 1979b; Alkezweeny, 1981) and mathematical modelling results (Scott, 1980; McNaughton and Scott, 1980; Fisher, 1980) also support higher in-cloud conversion rates than the values generally observed in plumes. Work is currently in progress by several groups of researchers to examine the role of clouds in atmospheric chemistry and transport.