

AN EVALUATION OF POSSIBLE MECHANISMS FOR CONVERSION  
OF SULFUR DIOXIDE TO SULFURIC ACID AND  
SULFATE AEROSOLS IN THE TROPOSPHERE

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ABSTRACT

The mechanisms and rates of conversion of sulfur dioxide to sulfur trioxide, sulfuric acid, and other "sulfate" aerosol precursors are considered in view of current knowledge related to atmospheric reactions and chemical kinetics. Several heterogeneous pathways exist for  $\text{SO}_2$  oxidation promoted on solid catalyst particles and in aqueous aerosol solutions in ambient air. The rates of these processes are of questionable significance in  $\text{SO}_2$ -containing gases which are well removed from pollutant sources and highly diluted through turbulent diffusion and transport mechanisms. Computer simulations of the rates of  $\text{SO}_2$  removal reactions show that several homogeneous pathways for  $\text{SO}_2$  conversion to acid precursor are expected to be important in atmospheres containing even low levels of  $\text{NO}$ ,  $\text{NO}_2$ , and oxidizable organic matter. Mechanistic considerations allow some reasonable speculation about the nature of the initial products of the  $\text{SO}_2$  reactions which lead ultimately to acids and various sulfate salts.