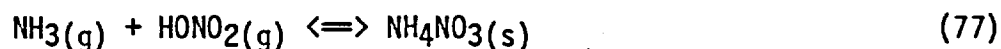


There have been a limited number of measurements of nitric acid and particulate nitrate concentrations in ambient air, and of these measurements many have identified the particulate nitrate as NH_4NO_3 , suggesting that the aerosol may consist of solid NH_4NO_3 or NH_4^+ and NO_3^- in solution in approximate stoichiometric balance. It is difficult to estimate the relative importance of the paths in Figure 4 for several reasons. First, the rate of reaction of nitric acid and ammonia is not well known, although the forward reaction is probably rapid, and in fact, can be presumed to be in equilibrium with the dissociation of solid ammonium nitrate (Bradner et al., 1962; Morris and Niki, 1971; Stelson et al., 1979).



Second, the rate of absorption of NO and NO_2 into existing particles depends on the composition and size of each particle and cannot generally be predicted a priori. In either case it is apparent that the presence of NH_3 is required, either to form NH_4NO_3 or to neutralize the acidity of a liquid droplet in which NO and NO_2 dissolve.

The current state of understanding of atmospheric inorganic nitrate formation can be summarized as follows. The principal gas-phase nitrate forming reaction is reaction 38. The nitric acid vapor formed in reaction 38 probably reacts rapidly with ammonia to form small particles of solid ammonium nitrate such that the equilibrium of reaction 77 is established. In competition with the nitric acid/ammonium nitrate path is the path consisting of direct absorption of NO and NO_2 into aqueous droplets. The relative rates of these two paths cannot be determined in general. Although measurements of particulate organic nitrate levels have been reported (Grosjean, 1979), the mechanisms of formation of organic aerosol nitrates have not been fully identified.

SO_2 -OXIDANT CHEMISTRY IN THE LOWER TROPOSPHERE

The chemical transformation of sulfur dioxide in the atmosphere has been studied extensively over the past 20 years. Recent reviews (Calvert et al., 1978; Middleton et al., 1980; and Moller, 1980), which consider analysis