

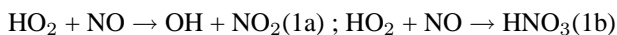


## Nitric acid formation in the HO<sub>2</sub> + NO reaction: parametrisation in the pressure and temperature ranges of the troposphere

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We have previously reported the observation of a minor channel (1b) forming nitric acid in the reaction of HO<sub>2</sub> with NO [1]:



The branching ratio  $\beta = k_{1b}/k_{1a}$  for the new reaction (1b) was found to range from *ca* 0.2 to 0.8 from 300 K to 200 K, at a pressure of 200 Torr. This reaction is a chain termination process which can significantly influence the tropospheric concentrations of HO<sub>x</sub> (OH, HO<sub>2</sub>), NO<sub>x</sub>, NO<sub>y</sub> and related species. Further experiments have shown that the branching ratio  $\beta$  was also pressure dependent; this ratio has been investigated in the temperature and pressure ranges 220-310K and 100-600 Torr, respectively, in order to provide a parametrisation for modelling of the tropospheric composition. The experiments have been carried out in a turbulent flow reactor coupled to a chemical ionisation mass spectrometer for the analysis of both radical and molecular species. The detection sensitivity for the key HNO<sub>3</sub> species has been increased by amplification of the HNO<sub>3</sub> formation in the reactor by adding CO and O<sub>2</sub> to the flow of the co-reactants HO<sub>2</sub> and NO and of N<sub>2</sub> used as carrier gas. A complete and consistent set of  $\beta$  values have been determined in the temperature and pressure ranges mentioned above. The best fit of the parametrisation to the experimental plots could be expressed as:  $\beta(P,T) = a/T + b \times P - c$ , where *a*, *b* and *c* are fixed parameters. The experimental data will be presented in details as well as model calculations from other groups showing the impact of this new reaction on the tropospheric composition.

[1] N. Butkovskaya et al., J. Phys. Chem. A 109, 6509, 2005.