Geophysical Research Abstracts, Vol. 9, 09179, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09179

Temperatur dependent rate coefficients of the a-pinene + ozone reaction

R. Tillmann (1), **T. F. Mentel** (1), A. Kiendler-Scharr (1), T. Brauers (1), H. Saathoff (2)

(1) Forschungszentrum Juelich, ICG-II:Troposphaere, 52425 Juelich, Germany, (2) Forschungszentrum Karlsruhe, IMK-AAF, 76021 Karlsruhe, Germany

a-Pinene is the most abundant monoterpene in the troposphere and its oxidation is a significant source for secondary organic aerosols (SOA). We investigated the rate coefficients of the a-pinene ozonolysis at atmospheric pressure and as a function of temperature over a range of 243-303 K. The experiments were conducted under temperature controlled conditions in the atmospheric simulation chamber AIDA (Research Center Karlsruhe). Cyclohexane was used as an OH-scavenger. a-Pinene and ozone were measured by proton-transfer-reaction-mass-spectrometry and UV-absorption, respectively.

A sub-set of differential equations from Master Chemical Mechanism (Vers. 3.1) was fitted to the measured time series of a-pinene and ozone, with the rate coefficients of the (a-pinene + O3)-reaction and of the wall loss process for O3 as free parameters. The functional dependence of k(a-pinene + O3) versus the reaction temperature is expressed in Arrhenius form: the parameters are A = (1.5 +/- 0.4)x10-15 cm3 molecules-1 s-1 and Ea/R = (-857 +/- 71) K. The errors were determined by means of a bootstrap-analysis.

In this study we determined the Arrhenius parameters for the first time at temperatures lower than 276 K. The a-pinene-ozonolysis at low temperatures is expected to be of atmospheric relevance in the upper troposphere of the tropical regions. We emphasize the potential SOA-production through this reaction at these altitudes and will show highly time resolved, temperature dependent SOA-yields of the a-pinene ozonolysis.