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Oxidation of monoterpenes in the presence of aqueous sulphate

R. Tillmann, **Th. F. Mentel**, A. Kiendler-Scharr

ICG-II: Troposphaere, Forschungszentrum Juelich, 52425 Juelich

Mass spectroscopic methods may help to determine mass balance between gas- and particulate phase with high sensitivity and good time resolution. This can be achieved even if full organic speciation is not possible.

We investigated the partitioning of the ozonolysis products of monoterpenes between gas and particulate phase. The experiments were performed in the large Aerosol Chamber in Juelich. Sabinene and a-Pinene were chosen as reactants; aqueous ammonium bisulphate served as seed aerosol. The gas-phase products were measured by PTRMS. The condensation of oxidation products onto the sulphate particles was monitored by AMS (Aerosol Mass Spectrometry). From the PTR-mass spectra the fragmentation patterns and product masses were identified by linear regression analysis and by correlation analysis, respectively. We derived the fraction of carbon per consumed monoterpene which remained in the gas phase by attributing carbon numbers to the product masses. Similar, the fraction of carbon which appeared in the particulate phase was derived from the AMS-data. For a-Pinene and Sabinene a total carbon recoveries of 0.56-0.69 (0.38-0.45 + 0.18-0.24) and 0.58(0.50 + 0.08) were achieved, respectively. The initial mixing ratios were 50 ppb ozone and 37 ppb of a-Pinene. The Sabinene oxidation was performed at the initial mixing ratio of 12 ppb with 90 ppb of ozone.

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