Geophysical Research Abstracts
Vol. 15, EGU2013-6290, 2013
EGU General Assembly 2013

Experimental determination of partition coefficient for β-pinene ozonolysis products in SOA

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In the present study, simultaneous measurement of β-pinene ozonolysis products in the gas phase by Proton Transfer Reaction – Time of Flight Mass Spectrometry (PTR-ToFMS) and particle phase by using an Aerosol Collection Module coupled to a Gas Chromatograph - Mass Spectrometer (ACM-GC-MS) were employed to determine the equilibrium partitioning coefficient (K_p) of several semi-volatile organic species. Mean K_p values of 6.7 $10^{-5} \pm$ 2.5 10^{-5} for nopinone, 4.8 $10^{-4} \pm$ 1.7 10^{-4} for apoverbenone, 7.0 $10^{-4} \pm$ 1.7 10^{-4} for oxonopinone and 1.9 $10^{-3} \pm$ 1.1 10^{-3} for hydroxynopinone were obtained. The results were compared with calculations arising from studies on the gas-particle partitioning, based on the Pankow absorption model. The experimental partition coefficients are two to three orders of magnitudes higher than the calculated values, leading to the conclusion that the amount of semi-volatile organic compounds in secondary organic aerosol (SOA) is currently underestimated by the theory, thus impacting on the modeling of the organic matter in the atmosphere.