Geophysical Research Abstracts, Vol. 8, 00346, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00346

Particle size change from heterogeneous oxidation by OH radicals of model organic aerosols

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OH oxidation reactions of gas-phase organics have been extensively studied, yet little research has focused on the oxidation of organic aerosols of atmospheric relevance. A recent laboratory study by Molina *et al.* (2004) has indicated that volatilization of gas-phase products arising from OH oxidation of organic films is sufficiently efficient that heterogeneous oxidation may be an important sink for atmospheric organic aerosols. In this study we report the first size changes observed arising from OH oxidation of model organic aerosols. The experiments are conducted using a Tandem Differential Mobility Analyzer (TDMA) and a reaction flow tube. Hydroxyl radicals were produced by photolysis of ozone with UV light in the presence of water vapour and their steady-state concentration was quantified using Chemical Ionization Mass Spectrometry. For 100 nm stearic acid aerosols, mean particle diameters decreased as a function of OH exposure by 25% with a corresponding particle mass decrease of 62% for the maximum OH exposure of 8.5×10^{-8} atm s. The size changes from OH oxidation for other model organic aerosols will also be presented. These results indicate that heterogeneous oxidation may be an important modification process and sink for atmospheric organic aerosols.