Geophysical Research Abstracts,
Vol. 11, EGU2009-6680, 2009
EGU General Assembly 2009

Measurement of uptake coefficients of HO2 radical with aerosol particles sampled in the ambient air

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HOx(=OH+ HO2) radicals play a central role in the tropospheric chemistry. The total concentration of HOx radicals is determined by the balance of sources and sinks. Recent field measurements of HOx radicals suggested that the heterogeneous loss of HO2 by aerosol particles was potentially important HOx sink in the troposphere. However, there are a few data to assess the contribution to HO2 loss by aerosols. In this study, the HO2 uptake coefficients for aerosol particles sampled by filter in ambient air were measured using an aerosol flow tube (AFT) coupled with a chemical conversion/laser-induced fluorescence (CC/LIF) technique at 760Torr and 298K. Aerosol particles were regenerated by atomizer using the water extract of PM2.5 sampled on filter at three sites(Taishan and Mangshan in China, and Yokosuka in Japan). The CC/LIF technique enabled experiments at HO2 radical concentrations similar to those in the atmosphere (-10$\hat{8}$ molecules/cm$\hat{3}$). The uptake coefficients of HO2 by sampled aerosol particles were in the range of 0.1-0.4 at 75% of relative humidity. To assess the impact of the heterogeneous loss for HO2, we carried out box model calculations for the diurnal variation of HO2 concentration.