Geophysical Research Abstracts, Vol. 8, 02198, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02198

Investigating the composition of secondary organic aerosol from smog chamber studies: low molecular weight and heterogeneous reaction products.

J. Hamilton, P. Webb, A. Lewis

Department of Chemistry, University of York, York, YO10 5DD, UK.

(jfh2@york.ac.uk / Phone: +44 1904432575)

The composition and source of the organic fraction in atmospheric aerosols (OA) is currently poorly understood. To understand the formation and aging processes of aerosols, it is vital to determine the chemical composition of OA, however to date only a fraction has been identified. Direct thermal desorption (TD) coupled to comprehensive gas chromatography-time of flight mass spectrometry (GCXGC-TOF/MS) has been developed to analyse the complex mixture of organic compounds found in atmospheric aerosol. Over 10,000 individual organic components were isolated from around 10μg of aerosol material, collected in central London, in a single procedure.

To simplify the complex nature of atmospheric OA, studies were carried out of the secondary organic aerosol (SOA) produced during controlled photo-smog chamber experiments of a single precursor gas. Aerosol formed during the photo-oxidation of toluene in a large volume smog chamber, was analysed using GCXGC-TOF/MS and a total of 250 individual analytes could be resolved. Only around 10 % of the total aerosol mass could be quantified. In addition, a large number of lower concentration species were observed and interpretation of their mass spectra suggests these species may be fragments of larger molecules broken down during the thermal desorption stage.

The formation of oligomeric structures formed by heterogeneous reactions within SOA was investigated during the ozonolysis of cyclohexene. SOA samples were collected during the first hour after aerosol production commenced. Compounds of up to 300 Da were observed using liquid chromatography and ion-trap mass spectrometry

has allowed preliminary structural information to be obtained. These results indicate that the process of incorporating more volatile species into SOA through heterogeneous reactions occurs from an early stage in the aging process.