4.038 Oxidative Potential Evolution of Particulate Trimethylamine during Ozonolysis.

Early Career Scientist

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Abstract:

ABSTRACT
Amines in the atmosphere have attracted widespread attention because they contribute to the nitrogen cycle[1], new particle formation[2-4], and brown carbon[5], as well as having their own inherent toxicity[6]. In this study, the ozonolysis of particulate trimethylamine (TMA), which was produced via heterogeneous uptake of TMA onto $(NH_4)_2SO_4$, NH_4HSO_4, NH_4NO_3 and NH_4Cl or neutralization of TMA and H_2SO_4, was investigated using *in situ* attenuated total reflection Fourier transform infrared spectroscopy (ATR-FTIR) and proton transfer reaction mass spectrometry (PTR-MS). DTT assay tests were performed to assess oxidative potential changes due to O_3 oxidation. Products including HCOOH, HCHO, $CH_3N=CH_2$, $(CH_3)_2NCHO$, CH_3NO_2, $CH_3N(OH)CHO$, CH_3NHOH and H_2O were identified on all the substrates exposed to ppbv level of O_3. Compared with ammonium and aminium salts, the oxidation potential of particulate aminium after ozone oxidation increased significantly, with a DTT loss rate that increased from $0\pm4.14\times10^{-6}$ to $5.92\pm2.80\times10^{-3}$ $pmol\cdot min^{-1}\cdot\mu g^{-1}$. Our results reveal that the oxidation of particulate amines is a potential degradation pathway for amines in the atmosphere and that the oxidation products in the particle phase are associated with modification of the adverse health impacts of aerosol particles.

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