

2.101 Ionization Efficiency of Evolved Gas from Aerosol Particles in a Thermal Desorption Aerosol Mass Spectrometer.

Presenting Author:

Kento Uchida, Graduate School of Science, Tokyo Metropolitan University, Hachioji, Tokyo, Japan. , reachken119@gmail.com

Co-Authors:

Yu Ide, Graduate School of Science, Tokyo Metropolitan University, Hachioji, Tokyo, Japan.

Nobuyuki Takegawa, Graduate School of Science, Tokyo Metropolitan University, Hachioji, Tokyo, Japan.

Abstract:

Abstract.

Thermal desorption aerosol mass spectrometers (TDMSs), including the Aerodyne aerosol mass spectrometer (AMS), have been widely used for quantitative analysis of aerosol chemical composition. The ionization efficiency of evolved gas from aerosol particles is a key parameter for the quantification. However, physical and chemical mechanisms affecting the ionization efficiency are not fully understood. We have performed laboratory experiments to investigate the ionization efficiency of selected compounds using the particle trap laser desorption mass spectrometer (PT-LDMS). Ammonium chloride (NH_4Cl) and ammonium iodide (NH_4I) are used as test compounds because the thermal decomposition products of these compounds are expected to be simple (dominated by ammonia (NH_3) and hydrogen halide (HX)). The ionization efficiency of NH_3 relative to HX (relative ionization efficiency) was measured by altering the geometric relationship between the ionizer and vaporization point. The relative ionization efficiency tended to increase with increasing the divergence angle of evolved gas plumes. This result suggest that spatial broadening of gas molecules could be an important factor affecting the ionization efficiency.