

2.069 Laboratory Evaluation of the Particle Trap Laser Desorption Mass Spectrometer (PT-LDMS): Quantification of Ammonium Nitrate Aerosols.

Early Career Scientist

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Abstract:

Ammonium nitrate (AN) is one of the major inorganic compounds in ambient aerosols. The gas-particle equilibrium of AN aerosols shows strong temperature dependence near ambient conditions. Evaporation of AN particles during sampling and/or analysis could be an important issue for quantifying the mass concentrations of nitrate aerosols, especially for offline and semi-continuous methods. We have performed laboratory experiments to investigate possible effects of evaporation of AN particles in the particle trap laser desorption mass spectrometer (PT-LDMS). In the PT-LDMS, aerosol particles are collected on a particle trap in a vacuum chamber for 7 min and vaporized by a CO₂ laser for the detection by a quadrupole mass spectrometer (QMS). The sensitivity for AN aerosols, which is defined as the ratio of QMS ion signals at the mass-to-charge ratio (m/z) 30 to the mass of nitrate collected on the trap, was measured by altering the time interval between particle collection and laser vaporization. Effects of evaporation on the sensitivity and possible interaction with the surface of the particle trap are discussed.