6.180 Universal Spot Sampler: a new approach with unlimited possibilities for the chemical characterization of ambient aerosols.

Presenting Author:
Arantzazu Eiguren-Fernandez, Aerosol Dynamics Inc., arantza@aerosol.us

Co-Authors:
Patricia Keady, Aerosol Devices Inc.
Gregory Lewis, Aerosol Dynamics Inc.
Christopher Hare, Aerosol Devices Inc.
Susanne Hering, Aerosol Dynamics inc.

Abstract:

Here we present a new approach for the time-resolved collection of concentrated samples of ambient aerosol particles. The Universal Spot Sampler combines the simplicity of filter sampling with the completeness and automatization of real-time instruments. The system used a three-stage, laminar-flow water “moderated” condensation technique to collect airborne particles as concentrated dry spots (1-mm dia.) or liquid suspensions. Up to 33 uninterrupted, dry samples can be collected for periods of time ranging from minutes, to hours, to a day. Different collection matrices are available depending on the analysis conducted in the laboratory for chemical characterization. The system is field deployable and can run unattended for weeks. The Universal Spot Sampler has been validated for time-resolved characterization of ambient concentrations of polycyclic aromatic hydrocarbons, and sulfate and nitrate. Dry samples collected with the Universal Spot samples have also been analyzed by 2D-Thermodesorption gas chromatography (2D-TDGC-MS) and nano-Direct ElectroSpray Ionization (nanoDESI) for characterization of the organic composition of airborne particle samples, and by Laser Induced Breakdown spectroscopy (LIBS) for elemental analysis.

The Universal Spot Sampler is also capable of collecting soluble and insoluble constituents of particles as concentrated liquid suspensions (~400 µL) eliminating the extraction and pre-concentration steps required for the analysis of samples collected on filters. Liquid samples can be directly analyzed on-line by liquid chromatography to identify and quantify water soluble inorganics and organics, as well as bioaerosols. Anions, cations and carbohydrates have been easily measured by ion chromatography.

These are only few examples of the possibilities that the Universal Spot Sampler can provide to the atmospheric aerosol research community for better characterization of the chemical properties of ambient particulate matter, in a time-resolved manner.