

Aerosol Inlet and Ionization Source for Real-Time Detection of CW and BW Agents.

Peter T. A. Reilly, William A. Harris and William B. Whitten Oak Ridge National Laboratory, Oak Ridge, TN 37831

Novel Aspect: We present a fieldable aerosol inlet and ionization source that permits the detection of both CW and BW agents.

Introduction: Currently detection of CW and BW agents in the field is performed with different techniques. BW agents are detected by pyrolysis and methylation followed by gas phase sampling and EI/CI-based mass analysis of fatty acid esters. CW detection is performed by direct gas-phase analysis. CW agents readily adsorb on ambient airborne particles. Consequently, both of CW and BW analyses may be accomplished with the same technique by sampling aerosols directly into a vaporization chamber attached to the ionization source inside the vacuum and subsequently ionizing the gas plume with EI or CI for subsequent mass analysis in an ion trap mass spectrometer.

Methods: An aerodynamic lens system-based inlet creates a well-collimated beam of airborne particles that passes through the ionization chamber and impact in a small filament-heated cup. The temperature in this chamber can be programmed to rapidly vaporize the semivolatile material associated with the aerosol. The aerosol derived vapor seeps into the ionization chamber to be ionized by EI or CI and subsequently injected into an ion trap for mass analysis including MS/MS.

Preliminary Results: Preliminary results for bacteria heated in vacuum and subsequently ionized by electron impact show much higher mass distributions than are observed through atmospheric pyrolysis/methylation. The observed signatures appear to be unique to the bacteria. This same technique has already been used for analysis of nonrefractory material in ambient aerosols for the last few years. We are applying this technique to develop methodologies for detecting and identifying CW and BW agents in real time using simulants.

KEYWORDS: chemical weapons, biological weapons, ion trap mass spectrometry, Homeland Security, Aerosol Mass Spectrometry

BRIEF: Inlet and Source for CW and BW Detection