

Usenko, Sascha; Hageman, Kimberly; Schmedding, Dave; Wilson, Glenn; Simonich, Staci. 2005. Trace Analysis of Semivolatile Organic Compounds in Large Volume Samples of Snow, Lake Water, and Groundwater. *Environ. Sci. Technol.* 39: 6006-6015

Abstract:

An analytical method was developed for the trace analysis of a wide range of semivolatile organic compounds (SOCs) in 50-L high-elevation snow and lake water samples. The method was validated for 75 SOCs from seven different chemical classes (polycyclic aromatic hydrocarbons, organochlorine pesticides, amides, triazines, polychlorinated biphenyls, thiocarbamates, and phosphorothioates) that covered a wide range of physical-chemical properties including 7 orders of magnitude of octanol-water partition coefficient ($\log K_{ow}$) 1.4-8.3). The SOCs were extracted using a hydrophobically and hydrophilically modified divinylbenzene solid-phase extraction device (modified Speedisk). The average analyte recovery from 50 L of reverse osmosis water, using the modified Speedisk, was 99% with an average relative standard deviation of 4.8%. Snow samples were collected from the field, melted, and extracted using the modified Speedisk and a poly-(tetrafluoroethylene) remote sample adapter in the laboratory. Lake water was sampled, filtered, and extracted in situ using an Infiltrax 100 fitted with a 1- μ m glass fiber filter to trap particulate matter and the modified Speedisk to trap dissolved SOCs. The extracts were analyzed by gas chromatographic mass spectrometry with electron impact ionization and electron capture negative ionization using isotope dilution and selective ion monitoring. Estimated method detection limits for snow and lake water ranged from 0.2 to 125 pg/L and 0.5-400 pg/L, respectively. U.S. historic and current-use pesticides were identified and quantified in snow and lake water samples collected from Rocky Mountain National Park, CO. The application of the analytical method to the analysis of SOCs in large-volume groundwater samples is also shown.