

Analyzing Volatile Organic Compounds (VOCs) in Drinking Water in Oswego City

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Abstract

Volatile Organic Compounds (VOCs) are chemical compounds that evaporate at relatively low temperatures. Drinking water that contains VOCs can increase human risk for a variety of health problems. Although many VOCs found in drinking water are due to contamination, others may be formed when drinking water is treated with chlorine. The chlorine reacts with organic materials found in raw water and forms certain VOCs known as disinfection by-products. Maximum Contamination Level (MCL) reported by Environmental Protection Agency (EPA) is the amount of a VOC that is allowed into drinking water for it to be safe for humans and not be at risk for health issues.

The purpose of this project was to develop an extraction procedure and analytical method for analyzing volatile organic compounds (VOCs) in drinking water samples from different sources of the city of Oswego, NY and some parts of Fulton, NY. Solid phase microextraction (SPME) was used for extracting VOCs from water samples and a gas chromatograph coupled to mass spectrometer (GC/MS) was used for analyzing the extracted compounds.

The drinking water samples were collected from 33 different locations in the cities of Oswego, NY and Fulton, NY from the tap waters into amber bottles. The raw samples were taken from the water plant before treatment. After extracting VOCs by SPME, the fiber was injected into the GC/MS to start the analysis. Same procedures were performed on the standard solutions to build the calibration graphs. The mass spectra and retention times were used for identification of VOCs in water samples. The peak areas and the calibration graphs were used for quantification of VOCs in the samples. Based on the results, only nine VOCs (methylene chloride, bromodichloromethane, dibromochloromethane, chloroform, bromoform, toluene, ethyl benzene, p-xylene, and o-xylene) were detected in drinking water samples with concentrations lower than their MCL values.

Key word: Water analysis, VOC's (volatile organic compounds), Gas chromatography- Mass spectrometry (GC-MS), Solid phase micro extraction (SPME).