COMPARISON OF THE SPME/GC AND HEADSPACE/GC TECHNIQUES FOR ANALYSIS OF CHLORINATED VOLATILE ORGANIC COMPOUNDS (CIVOCs) FROM WATER

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CIVOCs are persistent toxic compounds with an impact on human health (carcinogenic and mutagenic effects) and on environment (ozone depletion) being dispersed in the atmosphere. The technology has to lower the emission of these pollutants to be in acceptance with Clean Air Act.

By the reason of high toxicity of CIVOCs at low concentrations is necessary to improve the methods for analyzing these compounds.

Due to high volatility of these compounds it is quite difficult to apply classic methods of extraction (liquid-liquid extraction or liquid-solid extraction). Therefore, recently new extraction techniques like HEADSPACE, SPME or HEADSPACE-SPME were developed.

To analyze CIVOCs, a gas-chromatograph CP 3800 with FID and ECD detectors equipped with an auto sampler COMBIPAL with of HEAD-SPACE and SPME (Direct SPME and HEAD-SPACE SPME) was used.

SPME Module – contains a syringe with SPME fiber coated with 75 µm of Carboxen Polydimethylsiloxane /CAR/PDMS (Black/plain) and HEAD-SPACE Module contains a 1000 µl syringe with an adjacent inlet for nitrogen purge and an oven to adjust the temperature.

To optimize the method the evolution of detector signal intensity with the operational parameters was measured (Headspace and SPME).

As a result of experiments performed we were able to find the most favorable parameters (temperature, stirring and heating time, sample volume, pH sample).

Comparing the results that were obtained using these two methods, it was shown that:
- both methods are faster than classic methods, does not need solvents and have a high reproducibility and sensitivity
- HEADSPACE is a faster technique in comparison with SPME method;
- SPME has higher sensitivity in comparison with HEADSPACE method.