



CUSTODION™ SPME Syringe for Rapid Sample Collection and Sample Preparation of Drinking Water for the GC–MS Determination of Trihalomethanes

Douglas W. Later, Edgar D. Lee, Joseph L. Oliphant, and Christopher R. Bowerbank

Torion® Technologies Inc.

The CUSTODION™ SPME Syringes are a series of novel solid phase micro extraction syringes that incorporate Supelco Analytical's® (Bellefonte, Pennsylvania) SPME fiber technology. The SPME syringes are fabricated with injection-molded components and the device resembles a ball-point pen. The Supelco Analytical® SPME fiber assembly is housed inside the syringe.

The push button trigger on top of the syringe (see Figure 1) enables the SPME fiber to be withdrawn into a protective metal sheath after sampling and while being inserted into the heated injection port of a GC or GC–MS. Target analytes in air, headspace, liquid, or dissolved solid samples are quickly trapped on the active coated surface of the SPME fiber, which is mounted inside the easy-to-operate syringe. The CUSTODION SPME syringes are designed for easy singlehanded operation when wearing protective gloves.



Figure 1: The SPME syringe holder is fabricated with rugged injection-molded Ultem® components. The devices are approximately 7" (18 cm) in length and are lightweight at only 1.8 ounces (50 grams).

Experimental Conditions

A divinylbenzene/polydimethylsiloxane (DVB/PDMS, 65 μm d_p) SPME phase was exposed to the headspace above drinking water samples for replicate 1 min intervals following sample agitation between each sampling, for a total of 5 min sampling time. Concentrations of 10, 20, 100, and 500 ppb for each of the four trihalomethanes (THMs) were tested in this manner with freshly prepared standards from a 2000 ppm stock solution. The analysis was performed on a GUARDION™-7 GC–TMS system.

- Matrix: Drinking water
- Analytical column: MTX-5 (5 m \times 100 μm I.D., 0.25 μm d_p)
- GC Temperature Conditions: 40–280°C, 2°C/s
- Scan range: 50–400 m/z
- Carrier gas: Ultra-High Purity (UHP) Helium
- Detector: Toroidal ion trap mass spectrometer (TMS)

Results

Figure 2 shows the GC–TMS separation of trihalomethanes spiked into a drinking water sample. All four THMs were detected and positively identified by the GUARDION-7 compound library at 100 and 10 ppb. The CUSTODION SPME syringe fiber was used to collect only the headspace of the drinking water sample and was not exposed directly to the water.

Conclusions

The CUSTODION SPME syringes provide a quick, easy, and reliable technique for sample collection and preparation. The trigger button activation of the SPME holder allows for single handed operation during sampling and analysis. The EPA drinking water standard is 80 ppb total cumulative concentration for the four

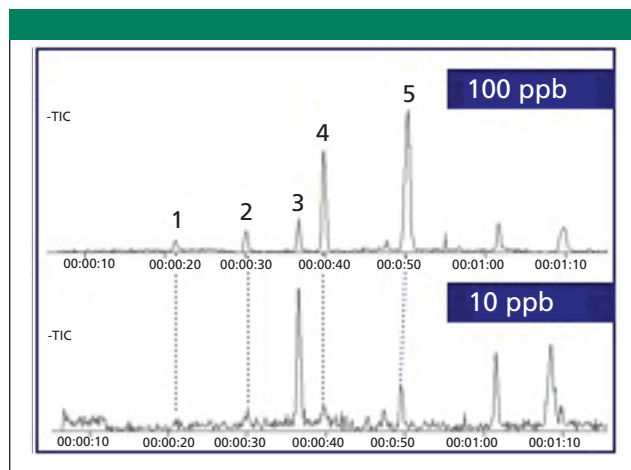


Figure 2: Chromatogram of low level detection of THMs in drinking water. Peaks: (1) chloroform, (2) bromodichloromethane, (3) toluene [contaminant in drinking water used to prepare THM samples], (4) dibromochloromethane, and (5) bromoform.

THMs. At detection levels for the individual THMs of ~10 ppb, as shown here, this method can be easily used to determine compliance of drinking water samples in the field at the point source in less than 5 min.

Acknowledgements

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Torion® Technologies Inc.
796 East Utah Valley Drive, Suite 200,
American Fork, Utah 84003
www.torion.com