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Analysis of Infant Drinking Water by EPA Method 524.2 with AQUATek100 Autosampler and Stratum Purge and Trap Concentrator

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With Americans becoming increasingly health conscious and concerned with their exposure to chemicals, businesses have made movements to create more products that are safer for the consumer and the environment. Due to their increased susceptibility to the adverse effects of potentially harmful chemicals, such as volatile organic compounds (VOCs), the market for chemically safe infant and child products is larger than ever.

Unlike tap water, which is regulated by the U.S. EPA, bottled water is regulated by the FDA as a beverage and has much less stringent testing requirements with regards to the frequency and transparency of testing. For this study, infant drinking water samples were analyzed by GC–MS utilizing a Stratum Purge and Trap Concentrator (PTC) in conjunction with an AQUATek 100 Autosampler. This set-up allows for complete automation of sample preparation for the analysis of liquid samples for purge and trap. Utilizing an Agilent 7890/5975 GC–MS, a linear calibration was performed and percent relative standard deviation (%RSD) was determined for the full list of compounds. A 25mL purge volume was used and all performance criteria of U.S. EPA Method 524.2 (1) were met.

Experimental Conditions

The Stratum PTC and AQUATek 100 Autosampler were coupled to an Agilent 7890/5975 GC–MS for analysis. Teledyne Tekmar's proprietary #9 trap was the analytical trap of choice. The GC was configured with a Restek Rtx-624 20m × 0.18mm × 1.0 µm column.

Samples were transferred to headspace free 40 mL vials for analysis. The internal standard (IS) and surrogate standards (SS) were prepared in methanol at a 25 ppm concentration and transferred to the standard vessel on the AQUATek 100. A 5 µL volume of IS/SS was added to each sample, bringing the final concentration of 5 ppb. Agilent Chemstation software was used to process the calibration data.

Results and Conclusions

A total ion chromatogram (TIC) of the infant water samples can be found in Figure 1. No contaminants from the Method 524.2 list were found above the reporting limit. Figure 2 shows that, while not a target analyte, a hydrocarbon monomer was found in all infant water samples. This is likely due to the off-gassing of their high-density polyethylene containers. Water samples from other containers had no monomer contamination.

Accuracy and precision are critical when dealing with drinking water analyses due to the impact on public health and safety, especially with products designed for infants and children. U.S. EPA method 524.2 (1) requires strict performance criteria as a result of the development and advancement of Purge and Trap technology. This study demonstrates the capabilities of the Teledyne Tekmar Stratum PTC and AQUATek 100 Autosampler coupled with an Agilent 7980/5975 GC–MS to meet these stringent requirements. Although the FDA does not require the same testing protocol as the EPA, analysis of infant drinking water samples found no VOC contaminants on the U.S. EPA 524.2 list at reportable levels.

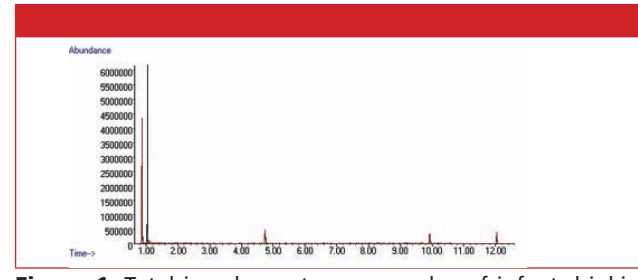

Figure 1: Total ion chromatogram overlay of infant drinking water samples.

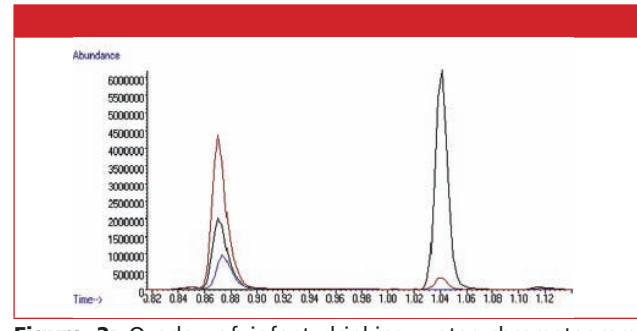

Figure 2: Overlay of infant drinking water chromatograms, isolating hydrocarbon contaminant.

References

(1) USEPA Method 524.2, "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry (GC–MS)," Revision 4.1, (1995).

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