Application Note

Analysis of Chlorinated Acids in Drinking Water with Semi-Automated Solid Phase Extraction (EZSpe®) Using EPA Method 515.2

Introduction

This application note describes the analysis of a number of chlorinated acids in drinking water samples using US EPA method 515.2. This note focuses on the Solid Phase Extraction step of this method. Other steps are involved before and after this SPE step which can be found in the method.

To meet demands for a low cost method that requires less financial investment than automated systems, FMS developed a simple semi - automated system which is fast, inexpensive and yields high quality data.
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Instrumentation

- FMS EZSpe® System
- FMS SuperVap®
- Vacuum pump
- Agilent 7890A GC with uECD

Consumables

- FMS, Inc. 1 g polystyrene/DVB cartridge
- Ultra pure DI water
- Fisher Sulfuric Acid
- Fisher Pesticide Grade Methanol
- Fisher Methyl-tert-Butyl-Ether (MBTE, HPLC grade)
- Standard Analyte Solutions

Procedure

- 6 samples (250 mL water each, spiked) undergo manual hydrolysis and separation as per method. After this step pH is ~ 1.
- Cartridges are installed in each of the six positions
- Put sample bottles in place and fill automated rinse bottles with 4 mL MTBE

Stage 1:

- Vacuum is turned on
- Cartridges are conditioned with 20 mL of 10% methanol in MBTE (2 min soak)
- Cartridges are dried under vacuum for 5 min
- Cartridges are conditioned with 20 mL methanol and 20 mL DI water
- Samples are loaded across cartridges under vacuum
- Cartridges are dried under vacuum for 20 min
- Sample bottles are automatically rinsed from the rinse bottles with 4 mL MBTE

Stage 2:

- Elute cartridges with 2 mL 10% methanol in MBTE (one min soak) and collect
- Repeat this step
- Sample bottle rinses (4 mL MBTE) are loaded across the cartridges and collected

Post SPE steps

- Esterification and concentration as per method

Analysis

- Analysis done with GC-ECD.

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Table 1 with recoveries for 515.2 Analytes at 0.25-2.5 ug/L

Compound name	Average (%)
Acifluorfen	76
Bentazon	72
2,4-D	99
2,4-DB	78
Dicamba	106
3,5-Dichlorobenzoic Acid	122
Dichlorprop	102
Dinoseb	90
5-Hydroxydicamba	92
Pentachlorophenol	101
Picloram	96
2,4,5-T	112
2,4,5-TP	99

Conclusions

The results of these water samples demonstrate the ability of the FMS EZSpe system to deliver accurate and reliable results. Recoveries are well within the method's 60-140% acceptance window. The semi-automated EZSpe is superior to traditional, time-consuming, inconsistent and expensive liquid/liquid extractions.

References

US EPA Method 515.2

FMS EZSpe system

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