

Analysis of Pesticides and Flame Retardants in Drinking Water with Semi-Automated Solid Phase Extraction (EZSpe[®]) Using EPA Method 527

Introduction

This application note describes the analysis of a number of pesticides and flame retardants in drinking water samples using US EPA method 527. The method uses Solid Phase Extraction and is of particular interest to environmental laboratories.

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.

Instrumentation

- FMS EZSpe[®] System
- FMS SuperVap[®]
- Vacuum pump
- Thermo DSQ low resolution GC/MS

Consumables

- FMS, Inc. 1 g SDVB cartridge
- Ultra pure DI water
- L-Ascorbic Acid
- Trisodium-EDTA
- Potassium Dihydrogen Citrate
- Fisher Pesticide Grade Dichloromethane
- Fisher Pesticide Grade Ethyl Acetate
- Fisher Pesticide Grade Methanol
- 527 Standard Analyte Solutions

Procedure

- 6 samples (1L water each) add L-Ascorbic Acid, Trisodium-EDTA and Potassium Dihydrogen Citrate (pH ~ 4)
- Spike relevant standards
- Cartridges are installed in each of the six positions
- Fill rinse bottles with 5 mL EtOAc

Stage 1:

- Vacuum is turned on
- Cartridges are conditioned with 5 mL of 50/50 DCM/EtOAc (1 min soak)
- Cartridges are conditioned with 10 mL methanol (1 min soak)
- Cartridges are conditioned with 2 x 10 mL water (keep wet)
- Cartridges are dried under vacuum for 10 min
- Samples are loaded across cartridges under vacuum at 10-15 mL/min
- Sample bottles are automatically rinsed from the rinse bottles with 5 mL EtOAc

Stage 2:

- Elute cartridges with 5 mL EtOAc from sample bottles (one min soak) and collect
- Same step for 5 mL dichloromethane
- Pull twice 5 mL of 50/50 DCM/EtOAc across cartridges and collect
- Extracts are dried over sodium sulfate or in line cartridges can be used downstream from SDVB cartridges

FMS SuperVap[®]

- Pre-heat temp: 40 °C
- Pre-heat time: 15 minutes
- Heat in Sensor mode at 40 °C under nitrogen (7-10 psi)
- Direct to GC Vial Vessel Reduce to 1 mL
- Samples are now ready for analysis

Analysis

- Analysis done with low res GC/MS



Table 1 with recoveries for 527 Analytes at 0.25-2.5 ug/L

Compound name	Average (%)
Atrazine	102
BDE-100	84
BDE-153	93
BDE-47	76
BDE-99	78
Bifenthrin	91
Bromacil	113
Chlorpyrifos	91
Dimethoate	109
Esbiol	111
Malathion	102
Nitrophen	107
Oxychlorane	89
Prometryn	97
Propazine	88
Terbufos-sulfone	102
Thiobencarb	90
Vinclozolin	110

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 50-150% acceptance window. The semi-automated EZSpe is superior to traditional, time-consuming, inconsistent and expensive liquid/liquid extractions.

References

US EPA Method 527



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FMS EZSpe system