

Analysis of Organochlorine Pesticides in Drinking Water with Semi-Automated Solid Phase Extraction (EZSpe[®])

Introduction

Organochlorine pesticides are man-made organic chemicals with a history of wide spread use in both the United States and elsewhere. Since they tend to persist in the environment, they have found their way into sediments and drinking water supplies posing serious health risks. Organochlorines have a wide range of both acute and chronic health effects, including cancer, neurological damage, and birth defects. Many organochlorines are also suspected endocrine disruptors.

To meet demands for a low cost method (similar to EPA method 508) 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
- Agilent 7890A GC with uECD

Consumables

- FMS, Inc. 1 g C-18 cartridge
- FMS sodium sulfate column
- Ultra pure DI water
- Fisher 6 N Hydrochloric Acid
- Fisher Pesticide Grade Methanol
- Fisher Pesticide Grade Dichloromethane

- Surrogate spiking solution (2 analytes)
- Pesticide spiking solution (20 analytes)

Procedure

- 6 samples (1L water each) are prepared and acidified with 1 mL HCl till pH ~ 2
- Add 5-10 mL methanol and spike with both standards
- Put sample bottles in place and fill dichloromethane rinse bottles with 25 mL solvent
- Cartridges are installed in each of the six positions.

Stage 1:

- Vacuum is turned on
- Cartridges are conditioned with 5 mL dichloromethane, methanol and water
- Samples are loaded across cartridges under vacuum
- Cartridges are dried under vacuum for 10 min
- Sample bottles are automatically rinsed from the rinse bottles with 25 mL dichloromethane

Stage 2:

- Dichloromethane from sample bottles is loaded across the C18 cartridge and sodium sulfate cartridge and the eluent is collected for analysis into Direct to GC Vial Collection Vessels

FMS SuperVap[®]

- Pre-heat temp: 50 °C
- Pre-heat time: 15 minutes
- Heat in Sensor mode at 50 °C under nitrogen (7-10 psi)
- Direct to GC Vial Vessel Reduce to 1 mL
- Samples are now ready for analysis



Table 1 with recoveries for OCPs and PCB-209

Compound name	Average (%)
TCMX	68
Alpha - BHC	83
Beta- BHC	92
Gamma- BHC (Lindane)	84
Delta- BHC	99
Heptachlor	83
Aldrin	79
Heptachlor Epoxide	91
Endosulfan I	88
4, 4- DDE	86
Dieldrin	87
Endrin	72
Endosulfan II	91
Endrin Aldehyde	117
4, 4 -DDD	83
Endosulfan sulfate	94
4,4 -DDT	97
Endrin Ketone	112
Methoxychlor	90
PCB-209	79

Conclusions

The results of five water samples demonstrate the ability of the FMS EZSpe system to deliver accurate results with excellent reproducibility. The semi-automated EZSpe is superior to traditional, time-consuming, inconsistent and expensive liquid/liquid extractions.



FMS EZSPE System

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