One Step Extraction, Cleanup and Concentration of Pesticides from Soil

Introduction

Pesticides are classes of chemicals that are used to treat or control outbreaks of pests, especially insects. Food production facilities as well as safety and health organizations heavily rely on pesticides to increase food yields and / or control diseases spread by insects. Some pesticides have proven hazardous to other animals or the environment and have either been restricted or banned. The need to monitor food products for pesticides is essential as more pesticides are being discovered to have adverse effects. One class of commonly used pesticides are chlorinated pesticides. These compounds are commonly detected using EPA Method 8081. This method determines the concentrations of various organochlorine pesticides in extracts from solid and liquid matrices, including food products, by GC with electron capture detectors (ECD). This new application speeds up and combines multiple sample prep processes into a single, automated method.

The FMS PLE (Pressurized Liquid Extraction) system performs automated extraction and sample cleanup using the FMS proprietary in-cell column and delivers the concentrated extract ready for injection directly into the GC system. This is a first for analyzing chlorinated pesticides by EPA Method 8081.
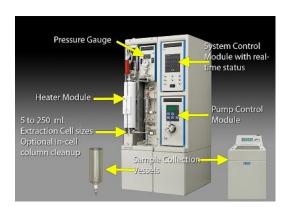
Instrumentation

- FMS, Inc. PowerPrep™ PLE (Pressurized Liquid Extraction) system
- FMS, Inc. 5 gm Acidic InCell Silica Column
- FMS, Inc. PowerVap™ Direct to Vial Concentration system
- Thermo Fisher Scientific Polaris Q GCMS

Method Summary
PowerPrep PLE

1. Extraction solvent: Hexane
2. Extraction temperature: 100 ºC
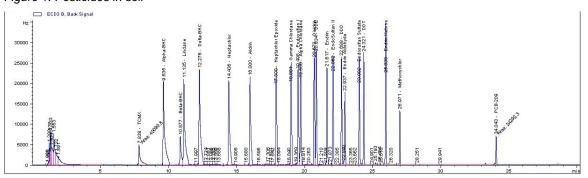3. Extraction pressure: 1500 PSI
4. Extraction time: 20 minutes

Results

Compound	Recovery (µg/mL)	Recovery
TCMX	4.77	95.4%
Alpha-BHC	4.57	91.4%
Beta-BHC	4.44	88.8%
Gamma-BHC	4.44	88.8%
Delta-BHC	4.46	89.2%
Heptachlor	4.68	93.6%
Aldrin	4.26	85.2%
Heptachlor Epoxide	4.75	95.0%
Gamma-Chlordane	4.23	84.6%
Endosulfan	4.39	87.8%
Alpha-Chlordane	4.22	84.4%
Dieldrin	4.65	93.0%
4,4'-DDE	4.33	86.6%
Endrin	5.2	104.0%
Endosulfan II	5.14	102.8%
Endrin Aldehyde	5	100.0%
4,4'-DDD	4.55	91.0%
Endosulfan Sulfate	4.55	91.0%
4,4'-DDT	4.67	93.4%
Endrin Ketone	4.8	96.0%
Methoxychlor	5.11	102.2%
Deca-PCB	5.37	107.4%

Conclusions

The FMS PowerPrep™/PLE system in combination with the FMS 2.5 gm Florisil InCell column and the FMS PowerVap™ Direct to vial Concentration system provides fast, automated extraction, cleanup and concentration of samples with excellent recoveries and high reproducibility. The combination of the FMS PowerPrep™ PLE system and the FMS Teflon InCell column demonstrates consistent, reproducible high throughput for automated one-step sample prep- aration of pesticides extracted from soil samples. The PowerPrep™ PLE system can automatically extract, cleanup and concentrate up to six samples per hour.

Figure 1: Pesticides in soil

For more information contact FMS:
FMS Inc.
580 pleasant Street
Watertown, MA 02472
Phone: 617- 393-2396
Fax: 617-393-0194
Email: onlineinfo@fms-inc.com
Web site: fmsenvironmental.com