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SAMPLE PREP
Market Bulletin

Oil and Grease

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Introduction

Accelerated Solvent Extraction (ASE®) and AutoTrace® 280 Sample Prep for PAH and TPH Analysis

Polycyclic aromatic hydrocarbons (PAHs) are compounds found in oil, coal, and tar deposits. They consist of bound aromatic rings, and have been identified as potentially carcinogenic and mutagenic to humans and other animals. PAH pollutants can be found in soil, sediment, sludge, water, and food products, including various animal tissues. Total petroleum hydrocarbons (TPH) is a term used to describe a large family of chemical compounds found in crude oil (including PAHs).

With increased concern about the environmental impact of recent oil spills, laboratories have been working hard to provide analysis on oil and grease samples quickly. ASE and AutoTrace 280 provide fast, automated sample preparation for these types of samples. Many laboratories have already purchased these systems to dramatically increase their throughput of hydrocarbon contaminated samples. ASE extracts PAHs from soil, sediment, sludge, food and animal tissue, quickly and using low amounts of organic solvents. ASE is accepted under EPA method 3545A. AutoTrace 280 extracts TPH from water samples using automated solid-phase extraction technology. AutoTrace 280 is accepted under EPA method 1664A for extraction of oil and grease from water samples using either SPE disk or cartridge.

ASE and AutoTrace 280 Features and Benefits to Oil and Grease Analysis

Features Unique to ASE	Benefits to Oil and Grease Analysis
True Walk-away Automation	Overnight Extraction = Higher Productivity
Automated Solvent Mixing	Automated Method Development
Flow-through Design	Removal of Interferences During Extraction
Combined Static/Dynamic Extractions	Exhaustive Extraction = Increased Recoveries
Automatic Rinsing	System Rinsed with Any Solvent Automatically
Low Solvent Use	Reduced Sample Costs
Features Unique to AutoTrace 280	**Benefits to Oil and Grease Analysis**
Positive Pressure	Controllable Flow Rate = Higher Recoveries
6-sample Capacity	Increased Throughput
Elution Solvent Volumes can be Set by User	Consistent Final Volumes
SPE Disk or Cartridge Configuration Available	Flexible for Customer Preference
Low Solvent Use	Reduced Sample Costs

ASE Details

Overnight Extraction = Higher Productivity

True walk-away automation is very beneficial to labs extracting PAHs because it will increase throughput as sample prep tends to be the bottleneck in the process. It is important to understand that an entire rack of 24 samples can be set up at the beginning of the day and another rack of 24 samples can be set up to run overnight providing extracts that are ready for analysis first thing in the morning. With minimal user intervention, 48 samples or more per day can be extracted and ready for analysis. No other sample preparation process available offers this type of automation.

Automated Method Development

ASE instrumentation can be programmed to deliver solvents in the ratios desired for the type of extractions needed. This automation simplifies method development because each cell can be extracted with a different solvent or solvent mixture. Different batches of samples can be processed as part of the same sample batch because the solvent composition can be programmed to change for the samples being extracted. The method will tell the system to automatically change solvents and rinse the lines with any solvent needed. No other sample preparation system offers this level of flexibility and usability.

Removal of Interferences During Extraction

Solvent enters the top of the ASE extraction cell and exits the bottom along with the analytes. This design allows various adsorbents to be added to the bottom of the cell to remove unwanted co-extractables. The ASE system design can therefore help eliminate post-extraction cleanup steps and speed the sample prep process. This capability is especially important to laboratories performing PAH extraction from animal tissue—a sample that often has contaminants that interfere with analysis. (See Tech Note 210 under *ASE PAH/TPH Application Notes*)

Exhaustive Extraction = Increased Recoveries

ASE is the only extraction method that provides both a dynamic and static extraction in the same extraction run. Dynamic extraction is the ability to introduce fresh solvent during the extraction process. This ensures that the extraction solvent will not become oversaturated with the analyte, decreasing its ability to remove more analyte. Static extraction is holding the extraction solvent and sample for a set period of time to maximize the solubility of the analytes. Performing both dynamic and static extractions is what defines ASE as an exhaustive extraction technique, and provides maximum analyte recoveries.

Automatic Rinsing

The automatic rinse function allows the user to set up different batches of samples for the same extraction run using different solvents for each batch. The system will automatically change solvents and rinse the entire system with the next solvent to be used. There is no need for user intervention. This is important to laboratories extracting PAHs from various sample matrices. Up to 24 samples can be extracted with any number of combinations of sample matrices and/or extraction methods. ASE is the only extraction method to offer automatic rinsing.

AutoTrace 280 Details

Controllable Flow Rate = Higher Recoveries

Using positive pressure for sample pumping and elution gives a constant controllable flow, which allows total petroleum hydrocarbons (TPH) more time to bind to the SPE material. This allows for better recoveries with higher reproducibility than vacuum systems. AutoTrace 280 is the only large-volume automated SPE system to use positive pressure rather than vacuum for disk or cartridge extraction.

Increased Throughput

The AutoTrace 280 allows six samples to be loaded simultaneously onto SPE cartridge or disks, enabling automated sequential sample elution. This increases sample throughput dramatically, which is very important when extracting large batches of oil and grease samples. AutoTrace 280 is the only automated SPE system that offers the ability to extract six samples in a single system.

Consistent Final Volumes

Having the ability to control the final volume of the extracts is very helpful when extracting TPH from water. The final volumes are consistent, and smaller final volumes translate into lower evaporation times and faster results. Vacuum systems have inconsistent final volumes. Only AutoTrace 280 offers this feature.

Flexible for Customer Preference

The AutoTrace 280 is the only automated SPE extraction system to offer customers a choice of ordering an SPE disk or cartridge configuration. Flexibility is important for customers when choosing the right extraction system for their needs. That is why Dionex offers many different configurations for the AutoTrace 280.

ASE-PAH/TPH Application Notes

AN 313: Extraction of PAHs from Environmental Samples Using Accelerated Solvent Extraction (ASE)

Overview: The procedures described in this application note meet the requirements for the extraction of PAHs from solid waste as described in U.S. EPA Method 3545. This method is applicable to solid wastes including soils, sludges, and sediments.

AN 324: Accelerated Solvent Extraction (ASE) of Hydrocarbon Contaminants (BTEX, Diesel, and TPH) in Soils

Overview: This note reports the use of ASE for the extraction of diesel fuel, gasoline (BTEX), and total petroleum hydrocarbons (TPH) from soils.

AN 338: Extraction of Total Petroleum Hydrocarbon Contaminants (Diesel and Waste Oil) in Soils by Accelerated Solvent Extraction (ASE)

Overview: This application note reports on the use of ASE for the extraction of diesel range organics (DRO), waste oil organics (WOO), and total petroleum hydrocarbons (TPH, the sum of DRO and WOO) from soils.

AN 359: Extraction of Contaminants, Pollutants, and Poisons from Animal Tissue Using Accelerated Solvent Extraction (ASE)

Overview: This application note details procedures for extracting the following contaminants from animal tissues:

- Dioxins/Furans
- Polybrominated Flame Retardants (PBDE)
- PCBs
- Pesticides
- PAHs
- Organotin

TN 210: Accelerated Solvent Extraction (ASE) Techniques for In-line Selective Removal of Interferences

Overview: This technical note summarizes seven ASE procedures developed to remove co-extractable material from various matrices, including procedures to selectively extract polar compounds from lipid-rich samples and to fractionate lipids from biological samples. This note serves as a guide to develop ASE methods.

AutoTrace 280 TPH Application Notes

AN 817: EPA Method 1664A–Extraction of Oil and Grease from Water Samples Using AutoTrace 280 Solid-Phase Extraction Cartridge Configuration

Overview: This application note describes the use of the AutoTrace 280 instrument to extract oil and grease from water samples in accordance with the EPA Method 1664, Revision A.

AN 818: EPA Method 1664A–Extraction of Oil and Grease from Water Samples Using AutoTrace 280 Solid-Phase Extraction Disk Configuration

Overview: This application note describes the use of the AutoTrace 280 instrument to extract oil and grease from water samples in accordance with the EPA Method 1664, Revision A.

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Customer References

Names of scientists using ASE and AutoTrace for extraction of PAH and TPH can be obtained by contacting the Salt Lake Technical Center directly or via email asesupport@dionex.com.

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