



Determination of Phenols in Drinking Water by Solid-Phase Extraction (SPE) and Capillary Column Gas Chromatography (GC/MS) Product Enviro-Clean® ECDVB156

Method 528 Revision 1.0

Reagents

Methylene Chloride

Methanol

Anhydrous Sodium Sulfate 5 g in a 6 ml cartridge ECSS15M6

Enviro-Clean® ECDVB156 500mg. in a 6 mL cartridge

Method Summary

A one liter water sample of drinking water is extracted by drawing through a UCT Enviro-Clean® 6 mL cartridge containing 500 mg of polystyrene divinyl benzene copolymer. The phenolic compounds are eluted from the solid-phase using a small quantity of methylene chloride. An aliquot of the concentrated extract is injected into a high resolution fused silica capillary column of a GC/MS system. Respective phenols are identified by comparing their mass spectra and retention times by comparison to standards.

Condition Cartridge

- Adjust the pH of the water sample to 2 or less by the addition of 6N HCl acid
- Rinse the cartridge with three, 3 mL aliquots of methylene chloride, then draw to waste
- Rinse the cartridge with three, 3 mL aliquots of methanol then draw to waste. After the third rinse, leave enough methanol in the cartridge to cover the frit. **Do not let the cartridge dry out at this point.**
- Rinse the cartridge with three, 3 mL aliquots of 0.05N HCl. **Turn off the vacuum before the HCl solution drops below the level of the frit**

Sample Addition

- Add the water sample to the cartridge and adjust the vacuum such that the flow rate is about 20 mL/minute (50 minutes for a 1 liter sample). Allow the cartridge to dry for at least 10-15 minutes before proceeding to the next step. A dry cartridge is important for good recoveries.

Extract Elution

- Rinse the inside of the sample bottle a 10 mL portion of methylene chloride and add this to the cartridge and draw this through to the collection tube in a dropwise fashion
- Add 2-3 mL of methylene chloride to the cartridge then slowly draw this through to the collection tube in a dropwise fashion.

Eluate Drying

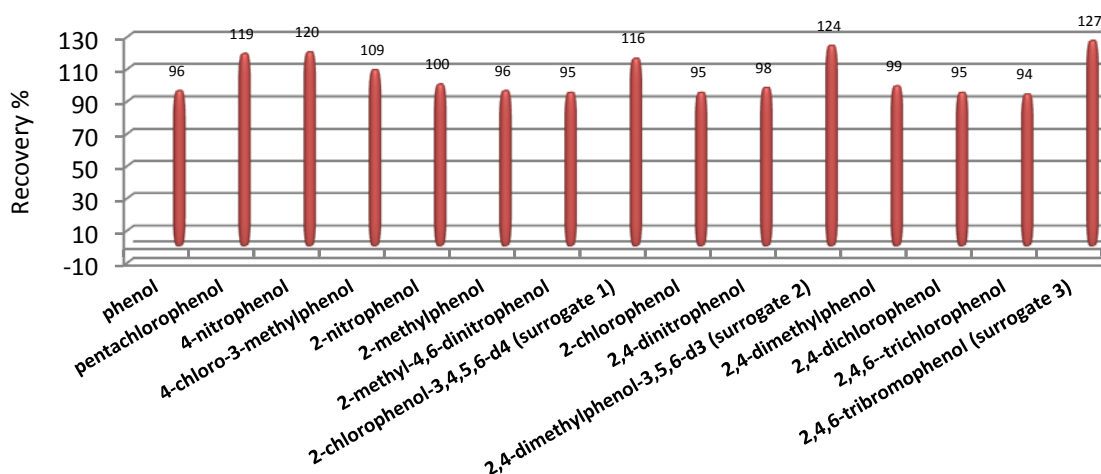
- Dry the eluate by passing through prerinsed anhydrous sodium sulfate column UCT Part number ECSS15M6 and collect eluate in a clean tube
- Rinse the sodium sulfate column with a two, 3 mL aliquots of methylene chloride and collect in the tube
- Concentrate the extract to about 0.9 mL in a warm water bath (40°C) under a gentle stream of nitrogen
- Adjust final volume to 1.0 mL with methylene chloride

Analysis

- Analyze the extract with GC/MS

Phenolic Analyte	CAS NUMBER
phenol	108-95-2
pentachlorophenol	87-86-5
4-nitrophenol	93951-79-2
4-chloro-3-methylphenol	59-50-7
2-nitrophenol	88-75-5
2-methylphenol (o-cresol)	95-48-7
2-methyl-4,6-dinitrophenol	534-52-1
2-chlorophenol-3,4,5,6-d4 (surrogate 1)	
2-chlorophenol	95-57-8
2,4-dinitrophenol	51-28-5
2,4-dimethylphenol-3,5,6-d3 (surrogate 2)	
2,4-dimethylphenol	105-67-9
2,4-dichlorophenol	120-83-2
2,4,6--trichlorophenol	88-06-2
2,4,6-tribromophenol (surrogate 3)	

EPA Method 528 Recovery UCT Enviro-Clean DVB Cartridge



UCT Product Enviro-Clean® ECDVB156

Results show that the UCT Product Enviro-Clean® ECDVB156 styrene divinyl benzene cartridge yields excellent recoveries of phenolic compounds

J. W. Munch, April 2000, National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, OH 45268