



Streamline Sample Preparation for Pollutant and Residue Analysis with Agilent Hydromatrix and Chem Elut Products

Technical Overview

- Bulk Hydromatrix mixed with solid samples simplifies extraction
- Convenient pre-packed Chem Elut cartridges improve throughput
- Environmental extracts are quickly processed with no emulsions

Environmental analysis is plagued by difficult sample preparation. Homogenates of samples containing lipids or other fats readily form emulsions. Other solid samples such as soil and sludge are not readily homogenized and can be difficult to extract directly. Fortunately, these problems are avoided with Chem Elut extraction cartridges or Hydromatrix brand diatomaceous earth. Hydromatrix adsorbs aqueous samples onto specially cleaned and sized particles, and allows fast extraction with no emulsion formation. It can be used as part of a Pressurized Fluid Extraction (PFE) or Matrix Solid Phase Dispersion (MSPD) process. Hydromatrix is packed into Chem Elut cartridges, which improve throughput by minimizing processing time and increase reproducibility by eliminating the sample shaking typically necessary for liquid/liquid extraction.



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General Sample Preparation Methods

General pesticide screen (including carbamates, sulfonyl ureas, organophosphates, benzimidazoles, urea herbicides)

Sample types: Aqueous extracts/homogenates of fruits, vegetables, grains, animal feed

This method is ideal for extraction of a wide variety of polar and nonpolar pesticides, herbicides, and other pollutants from many different sample types. Even fatty samples such as avocado can be easily and quickly extracted with no emulsion formation.

1. Add NaCl solution (20 g/100 mL) to aqueous sample or homogenate (3.3 mL NaCl solution for every 10 mL of sample).
2. Select Chem Elut cartridge based on total sample volume, including NaCl solution. Apply sample to appropriate Chem Elut product by gravity flow only. Note: sample will adsorb onto the packing material, rather than flow through the cartridge. Allow 3-5 minutes for complete adsorption to take place.
3. Apply water-immiscible extraction solvent to Chem Elut under gravity flow. Use 2 aliquots, with each aliquot equal to the original sample volume. Typical choices are dichloromethane, ethyl acetate, methyl t-butyl ether (MTBE), methyl ethyl ketone (MEK), butyl acetate. For polar analytes with poor solubility in these solvents, solvent can be diluted with up to 10% isopropanol. Ensure that the final extraction solvent is water-immiscible.
4. Collect extraction solvent as it passes through Chem Elut cartridge. Extract can now be analyzed directly, or dried down and reconstituted or derivatized.

For additional details and information, see for example: Klein & Alder: Journal of AOAC International, Vol. 86, No. 5, 2003.

Extraction of organic pollutants by Pressurized Fluid Extraction (US EPA SW-846 Method 3545A)

Sample Types: soils, clays, sediments, sludges, and waste solids

This method is ideal for extracting water-insoluble or slightly water-soluble compounds from solids. Analytes include BNAs, OCPs, OPPs, chlorinated pesticides, PCBs, polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, and total petroleum hydrocarbons. Sample drying is not necessary, which improves recovery of volatile OCPs and some semivolative organics. In addition, safety concerns associated with grinding samples containing PCDDs/PCDFs are eliminated.

1. Mix sample with an equal volume of Hydromatrix diatomaceous earth until it forms a free-flowing powder. Load into suitable Pressurized Fluid Extraction cell according to manufacturer's instructions. Hydromatrix is generally considered superior to other solid supports such as sodium sulfate because it is less likely to cause clogging of the frits in the cell.
2. Perform extraction according to equipment manufacturer's instructions. General conditions are:

Semivolatiles, OPPs, OCPs, Herbicides, PCBs

Oven temperature: 100 °C

Pressure: 1500-2000 psi

Static time: 5 min (after 5 min preheat equilibration)

Flush volume: 60% of the cell volume

Nitrogen purge: 60 sec @150 psi (longer for larger cells)

Static cycles: 1

Recommended extraction solvents

OCPs: Acetone/hexane (1:1, v/v)

Semivolatiles: Acetone/dichloromethane (1:1, v/v)

PCBs: Acetone/hexane (1:1, v/v)

OPPs: Methylene chloride

Herbicides: Acetone/dichloromethane/phosphoric acid (250:125:15, v/v/v)

PCDDs/PCDFs

Oven temperature:	150-175 °C
Pressure:	1500-2000 psi
Static time:	5-10 min (after 5 min preheat equilibration)
Flush volume:	60-75% of the cell volume
Nitrogen purge:	60 sec @150 psi (longer for larger cells)
Static cycles:	2 or 3
Recommended solvents:	Toluene

Ordering information

Part number	Description	Units/package
12198001	Chem Elut, 0.3 mL aqueous capacity	100
12198002	Chem Elut, 1 mL aqueous capacity	100
12198003	Chem Elut, 3 mL aqueous capacity	100
12198004	Chem Elut, 3 mL aqueous capacity, buffered to pH 4.5	100
12198005	Chem Elut, 3 mL aqueous capacity, buffered to pH 9	100
12198006	Chem Elut, 5 mL aqueous capacity	100
12198007	Chem Elut, 10 mL aqueous capacity	100
12198008	Chem Elut, 20 mL aqueous capacity	100
12198009	Chem Elut, 50 mL aqueous capacity	50
12198010	Chem Elut, 100 mL aqueous capacity	25
198003	Hydromatrix, bulk 1 kg	1 kg
198004	Hydromatrix, bulk 4 kg	4 kg

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