Empore™
Cation Exchange-SR Extraction Disks for Environmental Analysis
For use with 47 mm and 90 mm extraction apparatus

Instructions for Use
Note: Empore Sample Preparation Products are intended for solid phase extraction during scientific research only. These products are not intended for use in medical devices or in assessment and treatment of clinical patients.

General Product Characteristics

**Description:**
Empore Cation Exchange Disks are a unique product for the solid phase extraction of cationic analytes, such as primary, secondary and tertiary amines from aqueous samples. A proprietary process is used to entrap adsorbent particles into a matrix of inert PTFE to create a mechanically stable sorbent disk.

**Formulation:**
90% or greater adsorbent particle
10% or less PTFE

**Product Characteristics:**
*Thickness*: 0.5 mm ± 0.05 mm
*SPE Flow Rate*: 10 min/L DI H₂O @ 25°C
@ 20 in. Hg (47 mm disk)
*Solvents*: Compatible with all organic solvents
*pH*: Stable between 1 and 14.
Suggested Application Procedures

General: Water Analysis

Empore™ Extraction Disks provide a rapid, efficient alternative to liquid/liquid extraction for sample preparation. The disks can be used for purification and concentration of samples prior to final analysis. Advantages of Empore Extraction Disks include reduced solvent usage and rapid sample throughput.

The enclosed instructions are general guidelines for use. Sample volume, solvent type, pH adjustments and conditioning may be changed to adapt to specific methods as needed. With slight modifications, these instructions can be adapted for use with non-aqueous sample matrices.

Extraction Equipment

- 47 mm or 90 mm Empore™ Cation Exchange-SR Extraction Disks.
- 47 mm or 90 mm glass filtration apparatus or multistation extraction apparatus.
- Vacuum source (≤ 20 in. Hg).

Sample Preparation

- Adjust sample pH as necessary to ensure that analytes are ionic. A general guide is to lower sample pH at least two units below the pKₐ of the analytes being extracted.
- Dilute sample as needed to reduce ionic strength to < 5 x 10⁻⁵ M.
Sample Preparation (continued)

- Filter Aid 400 (Cat # FA400) and/or prefiltration may be helpful if the sample contains excessive suspended solids.

Suggested Vacuum Apparatus

![Diagram of a vacuum apparatus with labeled parts: Reservoir, Clamp, Disk Support, Gasket, Glass Support Base, Extraction Manifold, Collection Vile, Vent Discharge Kit.]

Extraction Disk Conditioning

Disk conditioning is critical for a successful extraction. Conditioning provides a good interface between the sorbent and the sample matrix. **FAILURE TO CONDITION THE EXTRACTION DISKS PROPERLY WILL RESULT IN ERRATIC AND LOW RECOVERIES.**

1. Center the extraction disk on the base of the filtration apparatus and assemble the reservoir.
Extraction Disk Conditioning (continued)

2. Wash the disk with 10 or 15 mL* of acetone, ** allow to soak for 30 seconds and evacuate to dryness. (optional)

3. Wet the disk with 10 or 15 mL* methanol, allow to soak for 30 seconds and evacuate to dryness. (optional)

4. Add 10 or 15 mL* of reagent water, allow to soak for 30 seconds, and evacuate.

5. Add 10 or 15 mLs* of 50% (v/v) HNO₃ to the disk, allow to soak for 30 seconds, and evacuate.

6. Wash disk with 2 successive 20 mL aliquots of reagent water. (Use 2 successive 10 mL aliquots of acetone if the sample matrix is non-aqueous).

* Note: Suggested solvent volumes will vary according to the disk diameter and the amount of Filter Aid 400 filter material. A general guide for solvent volumes is to completely cover the disk and bed of filter material, such that 2 - 3 mm of solvent is above the surface. Repeat with second aliquot.

** If desired, place a vial in the vacuum apparatus to collect and dispose of wash and conditioning solvents. Remove vial prior to sample extraction.

Sample Extraction

- Dilute the sample as necessary to keep ionic strength <0.1 M (1 liter maximum sample size).

- Pour the sample into the reservoir and apply full vacuum. Recoveries are not affected by flow rate. Flow rate is dependent on vacuum source and particulate content of the sample.
Sample Extraction (continued)

- After sample extraction is complete, remove as much residual water as possible from the disk by applying vacuum to dry the disk for 5-20 minutes.

Sample Elution

Eluting twice with 10 or 15 mL* solvent is recommended. (Use 10 mL of solvent for 25 or 47 mm disks and 15 mL of solvent for 90 mm disks). Smaller volumes of solvent may be used if the elution technique has been perfected. Elution is often encouraged by the selection of high selectivity counterion, high ionic strength, and a pH adjusted to at least 2 units above the pKₐ of the analytes extracted. An effective elution solvent for metals is 50% (v/v) HNO₃ and 0.01N NaOH is an effective elution solvent for non-metal analytes. Very strong bases such as quaternary amines may be difficult to elute from cation exchange disks.

- Place tip of filter base into the collection vessel (see diagram).

- Add 10 mL or 15 mL* elution solvent to sample container, rinsing down the sides. Transfer solvent from sample container in reservoir with a pipette, washing the walls of the reservoir in the process.

- Apply vacuum and pull approximately 1 mL elution solvent through the disk. Vent the vacuum and allow the disk to soak 30-60 seconds before applying vacuum to dry the disk.
Sample Elution (continued)

- Repeat above process with a second aliquot of eluting solvent.
- A third aliquot of elution solvent may be used as a final rinse of the reservoir and disk to enhance recoveries.
- An intermediate wash with methanol or another organic solvent will remove neutral organics. Electrostatic forces will not be disturbed by this step. If all liquid has left the surface of the disk, a pre-wet with a minimum amount of methanol may be helpful to overcome surface tension effects. Simply wet the disk with enough methanol to cover the surface, then add the elution solvent.

General Information

Handling and Storage
The disks may be handled in the same manner as any filter membrane. Because of the adsorptive properties of the disk, desiccator storage away from laboratory air at room temperature is recommended.

Recommended Usage
Empore™ Extraction Disks are used in a manner similar to membrane filters. Filtration equipment is available from a number of different suppliers and include in-line filter holders, glass filtration apparatus, and multiple filtration manifolds. Buchner funnels are not recommended.

Applications
Empore™ Cation Exchange Extraction Disks may be used for extraction of primary, secondary and tertiary amines from water samples or soil extracts.
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