

Empore™

Technetium RAD Disks

Method Summary: Test Method TC-196

Rapid Determination of Technetium-99 in Water Using Empore™ Technetium RAD Disks*

Product Description

Empore™ Technetium RAD Disks provide an efficient alternative to conventional radiochemical sample preparation methods that use wet chemistry or packed columns. A proprietary process is used to entrap radium selective adsorbent particles into a matrix of inert PTFE to create a mechanically stable sorbent disk. The disks can be used for purification and concentration of radium from aqueous samples.

Empore technetium RAD disks provide a sample prep solution for large volume aqueous samples and the disk format provides a large surface area for sorbent/sample contact.

Scope and Application

This product is used in place of liquid-liquid extraction, packed columns, or other wet chemistry techniques to quantitatively extract technetium from water samples.

Method Overview

A water sample is passed through an Empore technetium RAD disk with no prior preparation of the sample or the disk. The loaded disk may be dried and placed into a planchet for direct counting in a gas proportional counter or placed wet in a scintillation vial and counted with a liquid scintillation counter.

Interferences

Most ions found in drinking water, surface water and ground water do not interfere with technetium adsorption. Nitrate levels up to 2000 mg/L do not interfere when disks are counted by liquid scintillation.

Safety

No significant safety concerns are associated with this method other than the normal precautions needed for handling radioactive materials.

Apparatus and Materials

- 47 mm Empore technetium RAD disks
- 47 mm single or multiple station vacuum manifold with filter support
- Beta detector – (low background gas flow proportional counter or liquid scintillation counter)
- 50 mm planchets or liquid scintillation vials with scintillation cocktail

Reagents

No reagents are required for this procedure.

Sample Collection, Preservation, and Handling

No special collection, preservation or handling steps are necessary for this procedure. No “wetting” of the disk with methanol or other alcohol is necessary. Samples should not be acidified with nitric acid because of possible interference by nitrate ions.

*This method was developed by Argonne National Laboratories in cooperation with 3M.

Procedure

1. Measure the sample aliquot. Depending on the activity present and the analytical detection limit required, this may vary from 100 mL or less to several liters.
2. If there is particulate matter present in the sample, use a prefilter to remove any potential beta emitting interfering solids.
3. Mount an Empore technetium RAD disk in the filter support. Place the side marked "Side Down" against the filter support.
4. Pull the sample aliquot through the disk at a nominal flow rate of 50 mL/min. No adjustment of pH or wetting of the disk is necessary.

Counting Options

Disks may be counted by either proportional or scintillation counting.

For use with a scintillation counter, place disk into a vial containing scintillation cocktail.

For use with a gas proportional counter, rinse the disk with 5 mL of acetone while it is still in the manifold, remove the disk from the manifold and dry in a 60°C oven for 15 minutes. Mount the disk in a planchet obscuring "This Side Down."

Reference

S. C. Goheen, editor, *DOE Methods for Evaluating Environmental and Waste Management Samples*. Battelle Press, Columbus, OH (1997). Method RS551, Rapid isolation and measurement of technetium-99 using 3M Empore™ Technetium Rad Disks.

Note: Empore Solid Phase Extraction 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.

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