



EiChroM
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ideas

PUBLISHED BY EICHROM INDUSTRIES, INC.



Volume 3

Issue No. 1

April 1996

Eichrom's Sr resin is one of our most popular products. This product has greatly simplified the process of analyzing radioactive strontium, improved recoveries and results, eliminated the need for noxious chemical reagents like fuming nitric acid and minimized the production of mixed waste. It typifies the benefits of Eichrom's extraction chromatographic technology.

As we reported in our last issue of this newsletter, the American Society for Tests and Materials (ASTM) has approved a standard test method for radioactive strontium in water (D5811-95) that uses Eichrom's Sr Resin. The approval, in October of 1995, caps a decade long effort by ASTM's D19.04 Subcommittee. On behalf of Eichrom, I want to thank everyone who worked so relentlessly on this process. We also thank all of our customers who participated in the multi-laboratory collaborative test that validated the method.

The support within the radioanalytical community for performance-based methods is almost unanimous. However, in some limited cases, internal validation of these methods is not sufficient. The existence of ASTM and its committees is critical to the external validation of efficient, innovative methods by non-regulatory experts.

There are several other methods presently under evaluation by the D19.04 Subcommittee.

In addition, several other subcommittees are developing and evaluating radiochemical methods. The outcome of these efforts will be validation of methods that will lower the cost and improve the efficiency of radioanalytical laboratories.

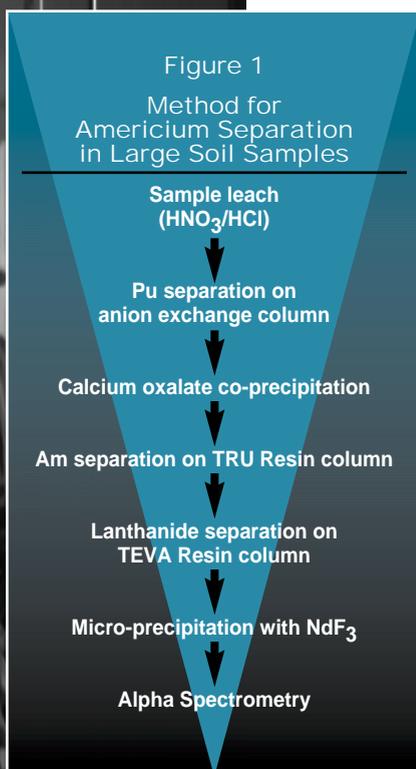
As you are aware, the work of the ASTM benefits all of us. Eichrom will continue to support the ASTM process to ensure that the best methods for radiochemical analysis are evaluated and approved. All of us here at Eichrom hope that you, the radioanalytical community, will continue to support these efforts by participating in ASTM committees and through involvement in multi-laboratory collaborative tests.

Scott Wallace
 President

“Eichrom will continue to support the ASTM process to ensure that the best methods for radiochemical analysis are evaluated and approved.”

Americium Separation

In Large Soil Samples (up to 50g)



At Eichrom's workshop at the Bioassay Conference in Boston last November, Dr. Anna Berne of the DOE Environmental Measurements Laboratory reported on a new method for measuring actinides, including americium, in large soil samples. Dr. Berne's method achieves acceptable chemical recoveries even for very large soil samples and samples high in calcium content. Dr. Berne's results for a variety of soil samples are summarized in Table 1.

Her results were extremely reproducible even when

sample sizes varied. The results obtained using this method also showed excellent agreement with results obtained by a previous traditional technique.

The method is summarized in Figure 1. An aliquot of the soil is leached with HNO₃/HCl mixture several times.

Appropriate tracers (e.g. Pu²³⁶ and Am²⁴³) are added to the sample before the first treatment with the leaching mixture.

The filtrates from all leaching steps are combined, evaporated to dryness and re-dissolved in 50-100 mL 7.5M HNO₃.

The oxidation state of Pu is adjusted to +4

Table 1: Summary of the results

| Sample Size (grams) | Ca Content (mg) |
|-------------------------------|-----------------|
| Japanese ref. material | |
| 4 | 350 |
| 4 | 350 |
| 4 | 350 |
| 4 | 350 |
| 4 | 350 |
| 9309-So | |
| 30 | 110 |
| 30 | 110 |
| 9509-So | |
| 20 | 200+N/A |
| 35 | 200+N/A |
| 50 | 200+N/A |
| 9603-So | |
| 20 | 330 |
| 35 | 460 |
| 50 | 570 |

new

methods

Events Calendar

using $\text{NH}_2\text{OH}\cdot\text{HCl}/\text{HNO}_3$. Pu (and some Th) is extracted from the solution using an anion exchange resin. The eluate and subsequent wash contains Am and the rest of the matrix. Americium is separated from all other ions in three steps:

- 1) co-precipitation with calcium oxalate,
- 2) separation of Am from other actinides on TRU Resin, and 3) separation of Am from the lanthanide elements on TEVA Resin. Am eluted from the TEVA column is mounted by a NdF_3 micro-precipitation and counted on alpha-spectrometer.

This method combines the classical means of sample purification required by the larger aliquots of soil with time- and waste-reducing

use of Eichrom Resin columns. It is estimated that for a batch of four to eight samples, once the Pu procedure is completed, the number of man-hours for the analysis can be as little as 6.5 h. The total time for the determination is about 4 days, from the first oxalate co-precipitation to the point of submission for alpha-spectrometry.

Results of ^{241}Am determination in soil aliquots up to 50g

| Count | Spike Recovery (%) | ^{241}Am (Bq/kg) | Average ¹ (Bq/kg) | Traditional Method ¹ |
|-------|--------------------|---------------------------|------------------------------|---------------------------------|
| 87 | | 2.13 | 2.36 ±0.14 | N/A |
| 81 | | 2.37 | (±6.0%) | |
| 70 | | 2.40 | | |
| 87 | | 2.52 | | |
| 82 | | 2.38 | | |
| 70 | | 0.24 | 0.234 ±0.006 | 0.25 |
| 60 | | 0.23 | (±2.7%) | |
| 87 | | 1.95 | 1.93 ±0.18 | 1.79±0.07 |
| 73 | | 1.75 | (±9.4%) | (±4%) |
| 61 | | 2.11 | | |
| 70 | | 4.25 | 3.97±0.26 | N/A |
| 46 | | 3.73 | (±6.7%) | |
| 46 | | 3.93 | | |

¹The reported uncertainty is the standard deviation of the average. Total counting error, for tracer and analyte combined, was not greater than 7% for each of the individual measurements.

Below is the calendar for Eichrom's regional Users' Seminars. The meetings are free of charge and lunch will be provided. Speakers will include Dr. Bill Burnett of Florida State University, customers, and Eichrom personnel. Invitation packages containing a tentative agenda, details regarding the location and a fax-back registration form will be mailed separately. In the meantime, if you are interested in making a presentation at one of these meetings, please contact Susan Rajkovich at (800) 422-6693 or (708) 963-0320.

May 2, 1996

- ◆ ATLANTA, GEORGIA
Stouffer Concourse Hotel
One Hartsfield Centre Parkway
Atlanta GA 30354
(404) 209-9999

May 30, 1996

- ◆ OAKLAND, CALIFORNIA
Oakland Airport Hilton
One Hegenberger Road
Oakland, CA 94621
(510) 635-5000

July 30, 1996

- ◆ DENVER, COLORADO
Marriott Denver West
1717 Denver West Blvd.
Golden, CO 80401
(303) 279-9100

August 13, 1996

- ◆ CINCINNATI, OHIO
Westin Hotel
21 East 5th Street
Cincinnati, OH 45202
(513) 621-7700



Analytical Grade Ion Exchange Resins

The customer response to Eichrom's new product line of ion exchange resins — anion and cation — has been tremendous. Because of the success of this product line, we are now offering both types of resins in case and drum quantities for further savings to you. Cases contain nine 500 gram bottles; the drum size is 10 kg. For part numbers and pricing on these bulk quantities, please call your Eichrom representative. Below is a listing of the expanded ion exchange product line. For additional items not listed, please call Eichrom at (800) 422-6693 or (708) 963-0320 or contact your local representative.



Anion Exchange Resins

| Eichrom Part Number | Eichrom Product Description | Ionic Form | Size | Wet Mesh Size | Comparable Bio-Rad® Part Number | Bio-Rad® Product Description |
|---------------------|---|------------|-------|---------------|---------------------------------|------------------------------|
| A8-B500-C-CL | Analytical Grade Anion Exchange 1 x 8 Resin | Chloride | 500 g | 50-100 | 140-1431 | AG® 1-X8 |
| A8-B500-M-CL | Analytical Grade Anion Exchange 1 x 8 Resin | Chloride | 500 g | 100-200 | 140-1441 | AG® 1-X8 |
| A8-B500-F-CL | Analytical Grade Anion Exchange 1 x 8 Resin | Chloride | 500 g | 200-400 | 140-1451 | AG® 1-X8 |
| A4-B500-C-CL | Analytical Grade Anion Exchange 1 x 4 Resin | Chloride | 500 g | 50-100 | 140-1331 | AG® 1-X4 |
| A4-B500-M-CL | Analytical Grade Anion Exchange 1 x 4 Resin | Chloride | 500 g | 100-200 | 140-1341 | AG® 1-X4 |

Cation Exchange Resins

| Eichrom Part Number | Eichrom Product Description | Ionic Form | Size | Wet Mesh Size | Comparable Bio-Rad® Part Number | Bio-Rad® Product Description |
|---------------------|---|------------|-------|---------------|---------------------------------|------------------------------|
| C8-B500-C-H | Analytical Grade Cation Exchange 8% Crosslinked | Hydrogen | 500 g | 50-100 | 142-1431 | AG® 50W-X8 |
| C8-B500-M-H | Analytical Grade Cation Exchange 8% Crosslinked | Hydrogen | 500 g | 100-200 | 142-1441 | AG® 50W-X8 |
| C4-B500-M-H | Analytical Grade Cation Exchange 4% Crosslinked | Hydrogen | 500 g | 100-200 | 142-1341 | AG® 50W-X4 |

This resin cross-reference should be used strictly as a product guide and should not be construed as a list of equivalents. Please call Eichrom for complete product specifications. **Please call Eichrom for the availability of additional resins and mesh sizes.** Bio-Rad® and AG® are registered trademarks of Bio-Rad® Laboratories.

Frequently Asked QUESTIONS

...About
*Eichrom
Resins &
Pre-packed
Columns*



If you have a specific question about Eichrom resins or pre-packed columns, please call us at: 1-800-422-6693 or 1-708-963-0320, or contact your local representative.



1 What is the optimum particle size?

It depends on the application, but for those in production situations generally the 100–150 μm particle size which flows approximately 0.7–0.8 mL/min is best. For those making very small columns, 50–100 μm particle size, which flows approximately 0.2 mL/min is best. Those using vacuum systems should use either the 50–100 μm (SPS) particle size or the 20–50 μm (FPS) particle size.

2 What is a free column volume (FCV)?

A free column volume (FCV) represents the interstitial space or void volume in a chromatographic column. This is used as a measure of the amount of mobile phase passed through the column relative to its size. For Eichrom's extraction chromatographic materials, the void volume is roughly 65% of the bed volume or 1 FCV = 0.65 mL/mL of resin bed.

3 What is the FCV of a standard 2 mL column?

Since our pre-packed columns have a bed volume of 2 mL, 1 FCV = 1.3 mL.

4 Are pre-packed columns available in different column sizes and/or different resin particle sizes?

Depending on the quantity, Eichrom will accommodate special orders which would include both different particle sizes and different column sizes.

5 In what solution are the 2 mL columns packed?

The columns are packed in 0.1M HNO_3 .

6 How much resin is contained in a pre-packed column?

All standard pre-packs contain 2 mL of resin. For most of the products, this equates to approximately 0.7 gram. For a few, however, the densities differ. A 2 mL Nickel Column contains approximately 0.5 gram of resin. Pre-filter columns contain approximately 0.45 gram. Tritium columns contain approximately 0.8 mL Diphonix® Resin, 0.8 mL Eichrom anion exchange resin and 0.4 mL pre-filter material.

7 Can the frits in the column be removed or are they necessary?

The bottom frit is necessary to hold the resin inside the column. The top frit keeps the resin bed in place during shipping, but may be removed at the time of analysis. If the top frit does not meet your needs you can replace it with glass wool, glass beads, etc.

8 Can columns be re-used?

Eichrom does not recommend re-using columns because of the possibility of cross-contamination.

9 Can you let a column run dry?

You should not let your columns run dry since this can cause channeling effects and will often cause the column to flow improperly.

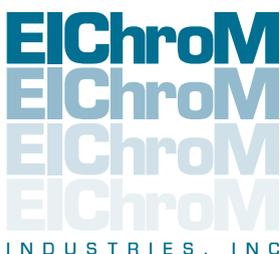
10 When colors appear on the column during separation does this necessarily mean anything?

Do not mistake colored bands that may appear on a column during separation as certain ions. Often the color means nothing.



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Announcements

NEW COLUMNS AND...

As many of you are already aware, Eichrom has selected a new source for its columns used to produce its extraction chromatographic products. The new column design has an outer diameter which is slightly larger (the inner diameter remains unchanged) and a reconfigured tip to eliminate air bubbles. The new columns are currently being used in column packing operations. Based on inventory turnover, the new columns will appear in customer laboratories within 2-3 months.

NEW COLOR CODING SYSTEM FOR COLUMNS

In conjunction with the new columns, Eichrom now provides a color coding system for its extraction chromatographic columns. This product improvement comes as a result of feedback from our customers to make identification of the columns easier. The caps on each of the pre-packed columns will be color coded (see table at right) and a colored dot will appear on the outside label of each package of columns. The lot number will continue to appear on each column for individual column identification.

| Column Type | Color Designation |
|------------------|-------------------|
| TRU | Blue |
| Sr | Red |
| TEVA | Yellow |
| UTEVA | Orange |
| Ni | Pink |
| Ln | Purple |
| Actinide | Green |
| Pb | Black |
| Tritium | Clear |
| Pre-filter | Clear |

Eichrom encourages suggestions for product improvements such as the color coding system, since it benefits everyone.

For additional information, contact:

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