RiO5 METHOD (2)

K. Buesseler
Woods Hole Oceanographic Institution
kbuesseler@whoi.edu

^{137}**Cesium** — Column Chemistry — 20 liter Seawater Samples

AMP-PAN

^{137}Cesium Column Chemistry for 20 liter Seawater Samples

Disclaimer

It is the responsibility of the analyst to follow established safety and health practices. Although each laboratory identified as the source has tested the methods, each user should perform an individual validation procedure.

Table of Contents

1 SCOPE

This method requires approximately 20 L seawater sample (filter or unfiltered) where water acidified then processed through a column of AMP-PAN resin. Cs chemical recoveries are monitored by sampling before and after column using stable Cs as yield monitor measured by ICP-MS. Average chemical recoveries are > 90%.

2 EQUIPMENT and CHEMICAL REAGENTS

2.1 Equipment and consumables

- Pipette (1 mL)
- Plastic graduated cylinder
- 2 plastic squeeze bottles
- pH meter
- Bio-Rad 10 ml column (#737-1012)
- Acid bottle top dispenser
- Cubitainers with caps and spigots
- Waterproof marker
- Acrylic snap vials (large counting vials)
- 3 ml ICP snap vials
- Tygon tubing, 3/8" & 1/8" I.D.
- Master-Flex tubing 6424-15
- AMP-PAN resin (Czech Technical University, Prague)
- Safety gloves and glasses
- 50 ml plastic beaker

2.2 Tracers

- Stable Cesium carrier (0.5-0.7 mg/ml), J.T. Baker

2.3 Chemical reagents

- Concentrated Nitric Acid

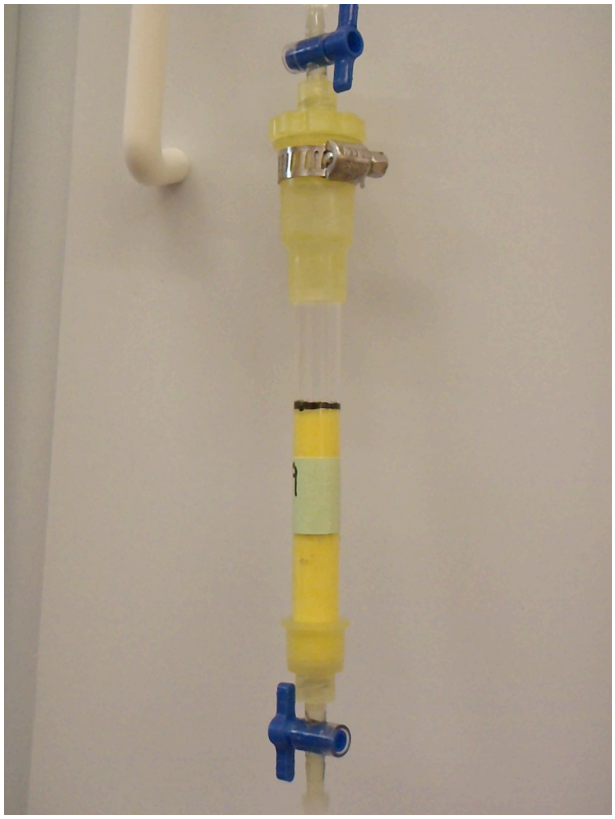
3 PROCEDURE

1. **Cs-1** Fill a labeled twenty-liter cubitainer with sample water. Either tare cubitainer or gross weight at sea or measure volume. For volume, do the following: It is important to fill each cubitainer equally and save one full cubitainer to weigh ashore to establish a good sample weight. Then pour (or siphon) off exactly 1 liter to both know the sample volume and to make room for reagents.
2. **Cs-2** Acidify 20 liter samples with **6 ml/liter** concentrated Nitric acid to pH around 1-2.
3. **Cs-3** Spike with 1ml of Cs carrier (1 mg/ml) using calibrated pipette, cap cubitainer and agitate to mix. Equilibrate for at least 1 hour.
4. **Cs-4** Take 1 ml aliquot of sample w/ carrier and store in labeled 3 ml ICP vial for recovery analysis.
5. **Cs-5** Fill Bio-Rad column to graduated 5 ml mark with AMP-PAN in 0.1N HNO3. Drain column to resin interface and place top frit over AMP-PAN. Turn on pump with column top off to purge air from tubing and fill top of reservoir. Turn off pump and secure top of column with clamp.
6. **Cs-6** Attach spigot top with peristaltic line, open all stopcocks and process through column. Adjust pump to 50-60 ml/min-flow rate through column and collect in waste cubitainer.
7. **Cs-7** When column is finished, remove 1 ml aliquot from eluted sample and store in labeled 3 ml ICP vial for ICP recovery.
8. **Cs-8** Remove AMP-PAN into labeled acrylic snap vial.
9. **Cs-9** Dry resin at low temperature for Gamma analysis.
10. **Cs-10** Cesium recovery is determined from ICP analysis of stable cesium in initial and final aliquots.

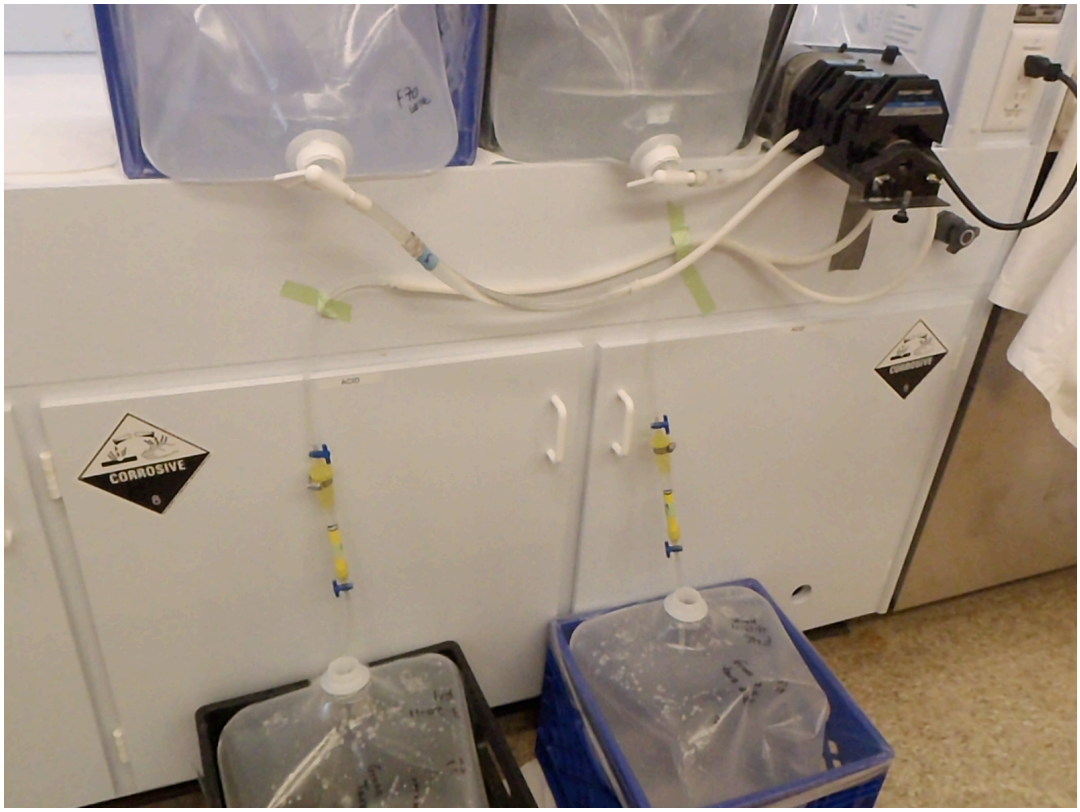
4 REFERENCES

Pike, S., Buesseler, K., Breier, C., Dulaiova, H., Stastna, K., and Sebesta, F.: Extraction of cesium in seawater off Japan using AMP-PAN resin and quantification via gamma spectroscopy and inductively coupled mass spectrometry, J. Radioanal. Nucl. Ch., 296, 369–374, 2013.

5 IMAGES



Picture 1. AMP-PAN column.



Picture 2. Samples filtering through AMP-PAN.