PRODUCT SHEET

SR Resin

Main Applications

- Separation of strontium
- Separation of lead/polonium
- Separation of barium/radium

Packing

Order N°.	Form	Particle size
SR-B25-A, SR-B50-A, SR-B-100-A, SR-B200-A	25g, 50g, 100g and 200g bottles SR resin	100-150 µm
SR-C20-A, SR-C50-A	20, 50 und 200 2 mL SR resin columns	100-150 µm
SR5-C20-A, SR8-C20-A , SR10-C20-A	20 5, 8 und 10 mL SR resin columns	100-150 µm
SR-B10-S,SR-B25-S, SR-B50-S, SR-B100-S, SR-B200-S	10g, 25g, 50g, 100g und 200g bottles SR resin	50-100 µm
SR-R10-S	10 2ml cartridges SR resin	50-100 µm
SR-B10-F	10g bottle SR resin	20-50 µm

Physical and chemical properties

Density : 0,33 g/ml

Capacity : 27 mg Sr/g resin SR

Conversion factor D_W/k' : 2,17

Conditions of utilization

Recommended T of utilization : /

Flow rate : A grade: 0.6 – 0.8 mL/min, utilization with vacuum or with pressure for s grade resin

Storage : Dry and dark, T<30°C

For additional information see enclosed literature study

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PRODUCT SHEET

Methods*

Reference	Description	Matrix	Analytes	Support
SRW01	Strontium in water	water	Sr	columns
ACW17 VBS	Am,Pu, U, Np, Th and Sr (Vacuum Box System)	water	Am, Pu, U, Np, Th and Sr	cartridges
OTW01	Pb-210 and Po-210 in water	water	Pb, Po	columns, cartridges
Application note: 503	SrRSA: Strontium Isotope Residual Salt Analysis	cores, water	Sr	cartridges

*developped by Eichrom Technologies Inc.

LITERATURE STUDY

SR RESIN

The SR resin is mainly used for the separation of strontium. The extractant used is a crown-ether (4,4'(5')-di-t-butylcyclohexano-18-crown-6) diluted in octanol (figure 1). The size of the cavity is 2,6 to 3,2Å (∅ Sr^{2+} = 2,24Å) (1).

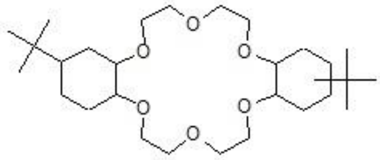

Fig. 1 : *4,4'(5')-di-t-butylcyclohexano-18-crown-6 (2).*

The concentration of the crown on the resin is 1M. The experimental capacity of the SR resin is reported to be 8mg Sr/mL resin (2).

Dietz and Jensen (3) calculated the structure of the Sr / nitrate / crownether complex on the resin from EXAFS data, fig. 2 shows the schematic structure.

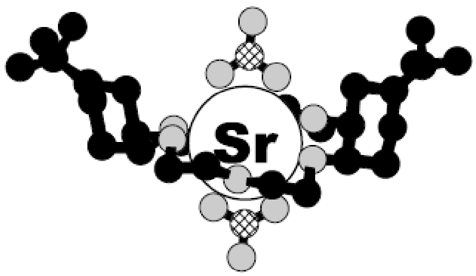

Fig. 2: *Schematic structure of the $Sr(NO_3)_2$(DtBuCH18C6) complex sorbed onto the resin. Carbon atoms are shown in black, oxygen atoms are shown in grey, and nitrogen atoms are shown in white with crosshatching (3).*

The extraction equilibrium is assumed to be:

$$Sr^{2+} + 2NO_3^- + \bar{E} \Leftrightarrow \overline{Sr(NO_3)_2E}$$

with E = crownether.

The k' curves of the SR resin are presented in figures 3 a and b. These curves were obtained with spiked nitric acid solutions.

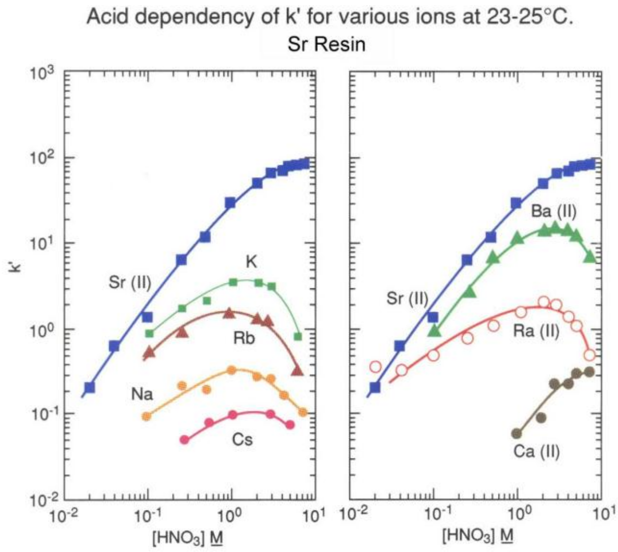

Fig. 3a: *k' values of different elements on SR resin (2).*

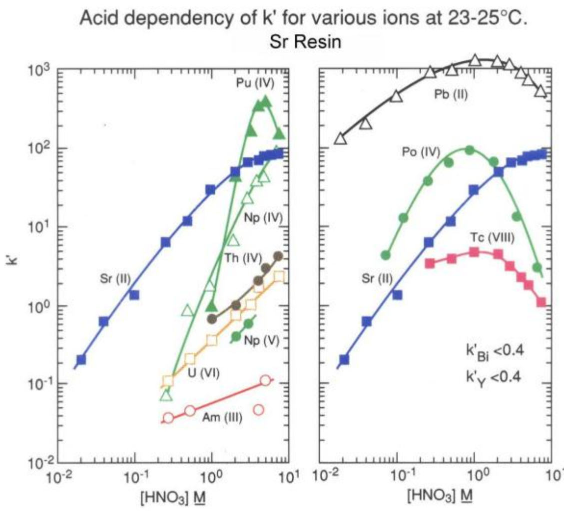

Fig. 3b: *k' values of different elements on SR resin (2).*

According to the curves in figures 3 a and b, the affinity of strontium for SR resin is increasing with the concentration of nitric acid, to reach a maximum k'_{Sr} ~ 90 between 3 and 8M HNO_3. Except barium, all alkaline and alkaline earth elements do not show affinity for the resin, especially in 8M HNO_3.

Calcium, which is a chemical analogue of strontium, shows very little affinity for SR resin: $k'_{Ca,max}$ < 0.3 over the all acidity domain. However, a study conducted at BNFL (UK) showed that when the amount of calcium in the sample to pass on a 2mL column is greater than 300mg, the chemical recovery of strontium decreases (figures 4 and 5).

A similar study was conducted to measure the effects of stable strontium contents. If more than 8mg of stable strontium are present in the sample, the chemical yield in strontium will decrease significantly (figure 6). It is then important to adjust the amount of strontium carrier for the amount of strontium in the sample to not exceed 8mg Sr/2 mL resin.

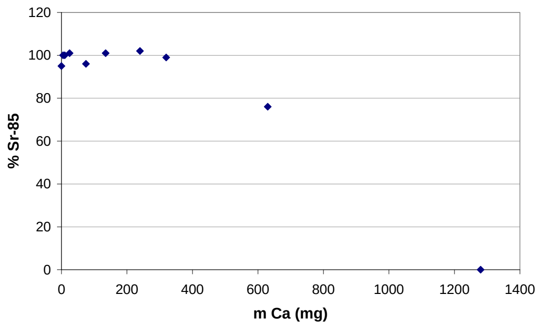

Fig. 4 : *Calcium interference on Sr-85 chemical yield (BNFL study).*

Barium has an affinity for SR resin between 1 to 5M HNO_3, where 10 < k'_{Ba} <20. Decontamination of barium in strontium samples is achieved by loading the sample in 8M HNO_3.

Potassium shows very small affinity for the resin. However, if its concentration is larger than 0.01M, which is often the case in soil, vegetables and other environmental matrices, it affects the strontium uptake (figure 5). In these cases, it is advisable to perform an earth alkaline oxalate or phosphate precipitation to eliminate potassium, prior to the load.

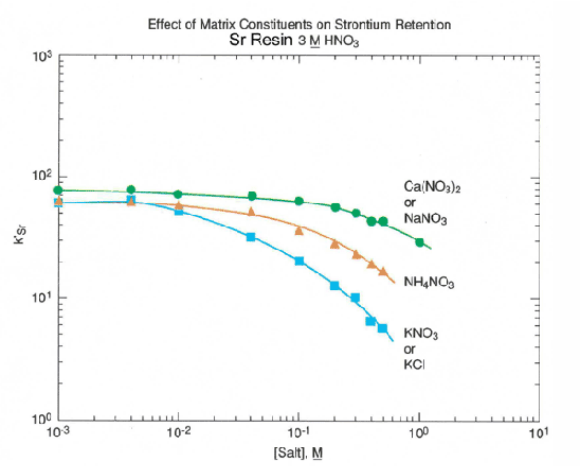

Fig. 5 : *Interference of different elements on strontium uptake (2).*

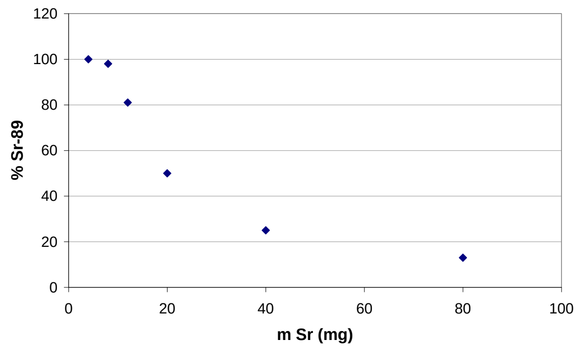

Fig. 6 : *Stable strontium interference on Sr-89 chemical recovery (BNFL study).*

Tetravalent actinides like Pu and Np shown high affinity for the resin (figure 3). However, their uptake might be blocked using a complexing agent like oxalic acid. The other actinides as U(VI), Am(III), Th(IV) or Np(V) have little or no affinity for the SR resin (figures 3).

Further applications of SR resin include lead and polonium separation from environmental and biological samples (4, 5) and the separation of radium from barium (6).

Bibliography

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