

eichrom®

A BRAND OF
EICHROM TECHNOLOGIES



Eichrom 101: EXC Resins



PRODUCTS

TECHNICAL INFO

RESOURCES

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CONTACT

RADIOCHEMISTRY

ION EXCHANGE RESINS

NUCLEAR MEDICINE

ALL PRODUCTS

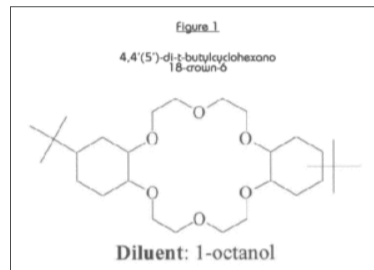
Our Products

| Product Name | Applications | | |
|------------------|---|--------------------------------|------------------------------|
| Accessories | Plastic accessories for columns and cartridges | Technical Info | Part Numbers |
| Resolve™ Filters | Alpha spectroscopy source preparation | Technical Info | Part Numbers |
| Actinide Resin | Group actinide separations/gross alpha measurements | Technical Info | Part Numbers |
| Cl Resin | Cl, I | Technical Info | Part Numbers |
| Co Resin | Co | Technical Info | Part Numbers |

Part Numbers & Descriptions

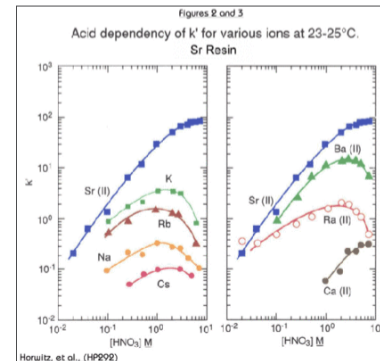
Methods using SR Resins

SR Resin Bibliography



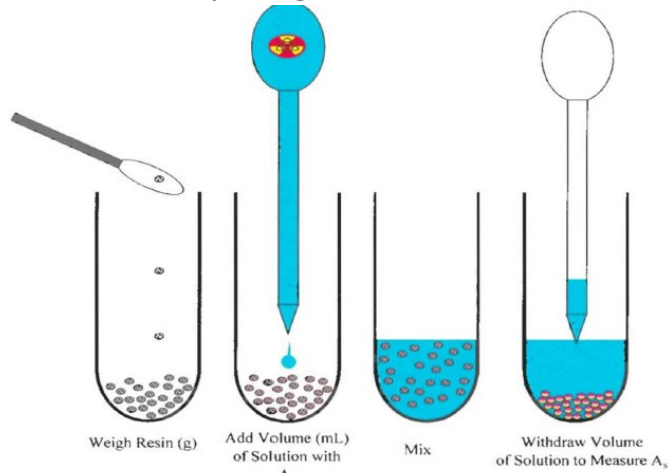
Eichrom's Sr Resin contains 4,4'(5')-di-t-butylcyclohexano 18-crown-6 (crown ether) in 1-octanol (Figure 1.) on an inert polymeric support. The bed density of Sr Resin is approximately 0.35 g/mL.

Figures 2 through 5 show the acid dependency of k' for strontium on Sr Resin, plotted with curves for various other elements. Horwitz, et al. reported these data from studies performed with experimental batches of Sr Resin. Eichrom's commercial product conforms to established specifications that ensure proper performance of Eichrom issued methods. Please refer to our product specifications for details.



Characterizing Resins

Batch dry weight distribution ratio.



$$D_w = \frac{A_0 - A_s}{w(g)} / \frac{A_s}{v(\text{mL})}$$

Peak maximum positions:

D_w = mL eluate/grams resin (measured by batch contact)

D_v = mL eluate/mL resin

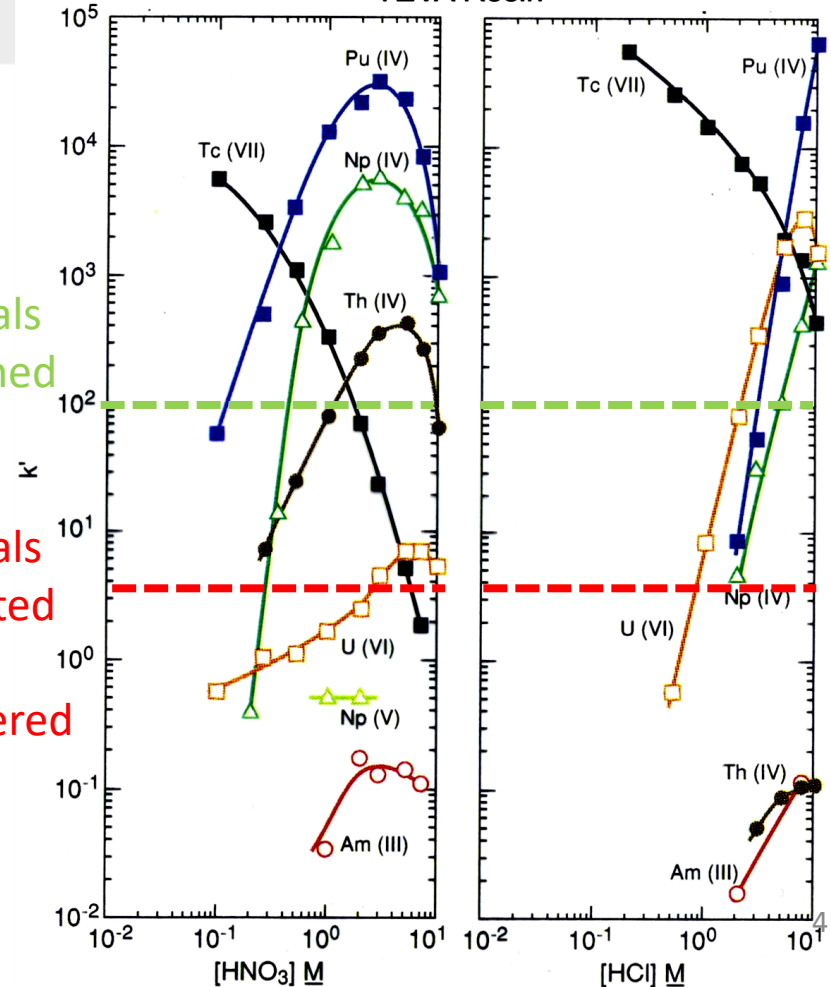
k' = free column volumes

↑
Metals retained

↓
Metals rejected or recovered

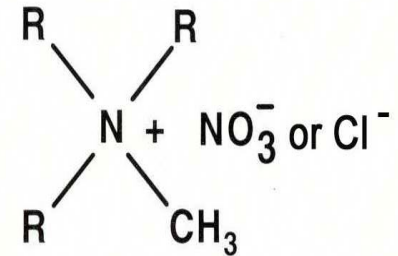
Acid dependency of k' for various ions at 23°C.

TEVA Resin

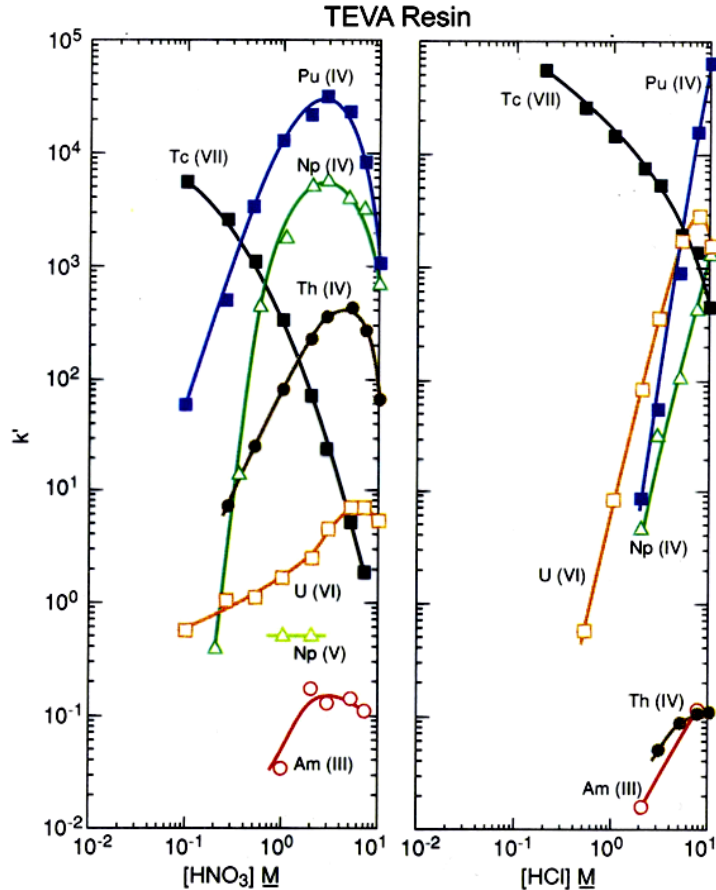


TEVA Resin (Pu(IV), Th(IV), Np(IV), TcO₄⁻)

Trialkylmethylammonium Nitrate or Chloride



Acid dependency of k' for various ions at 23°C.



Almost always used first in stacks of multiple cartridges.

Retains Pu(IV), Th(IV), and Np(IV).

Sensitive to phosphate

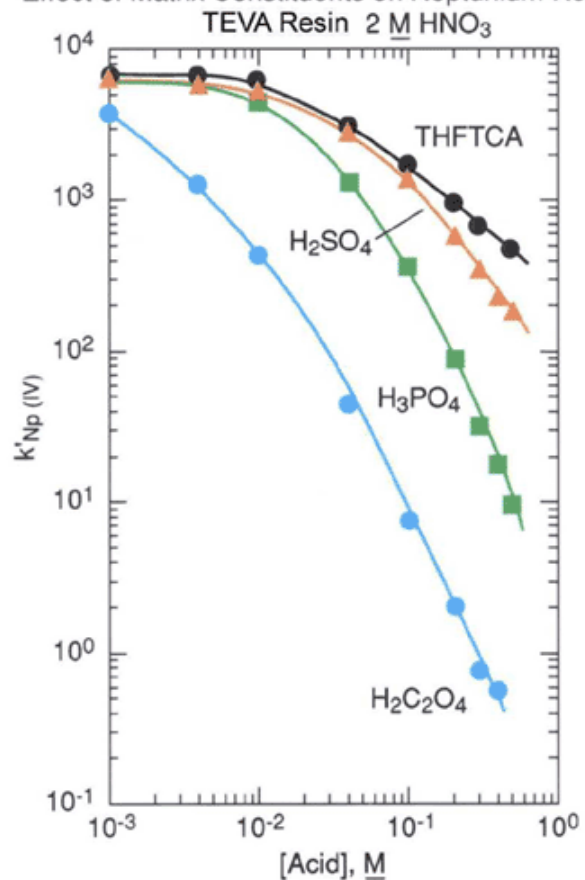
Don't use pure water to strip metal ions. (gets soapy and clogs resin).

Dilute HCl/HF works best for Pu(IV)/Np(IV).

0.05M HCl-0.05M HF-0.03M TiCl_3 .

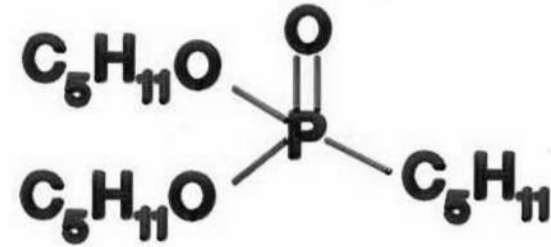
Figure 5

Effect of Matrix Constituents on Neptunium Retention

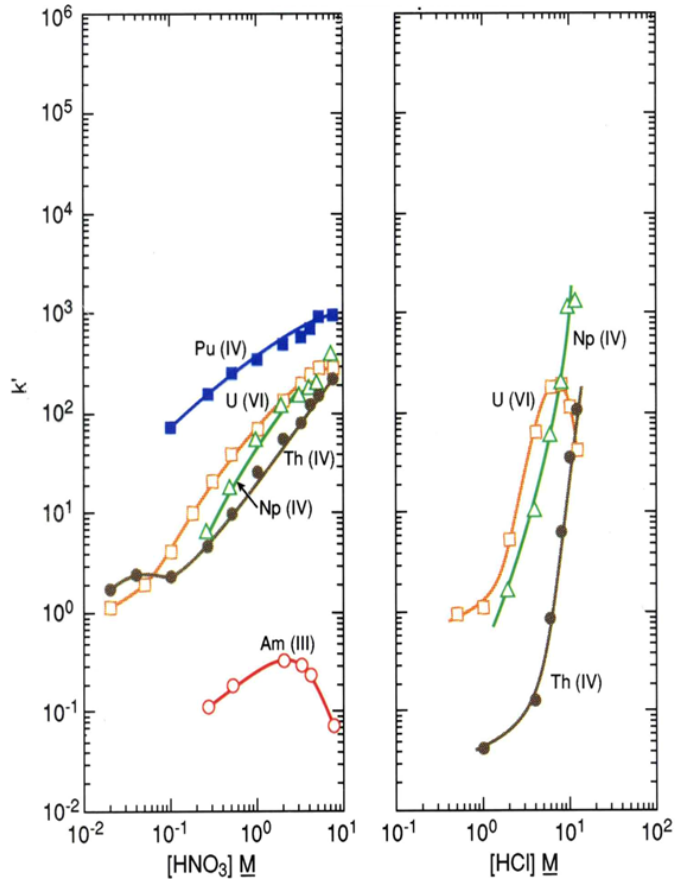


UTEVA Resin (uranium)

Extractant: Diamyl Amylphosphonate (DAAP)



UTEVA Resin (uranium)



Similar to TEVA, but also retains U(VI).

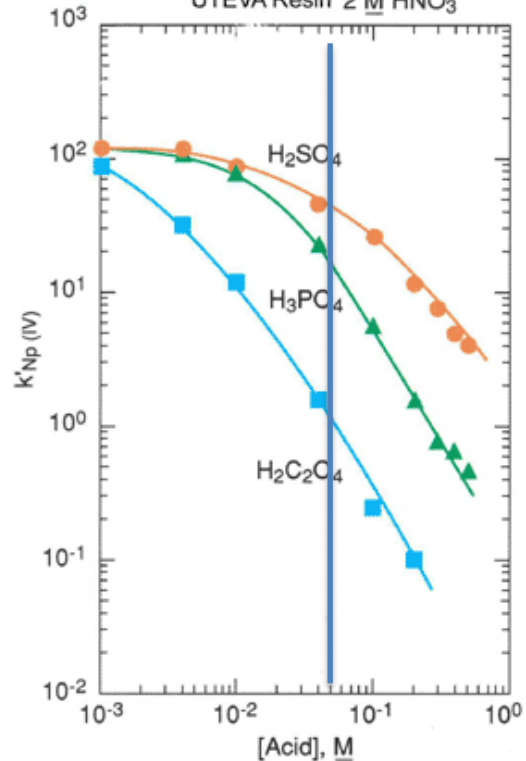
Retains Pu(IV), Th(IV), and Np(IV).

Sensitive to phosphate

Remove Th(IV), Pu(IV), and Np(IV) with 5M HCl-0.05M oxalic acid.

Figure 4

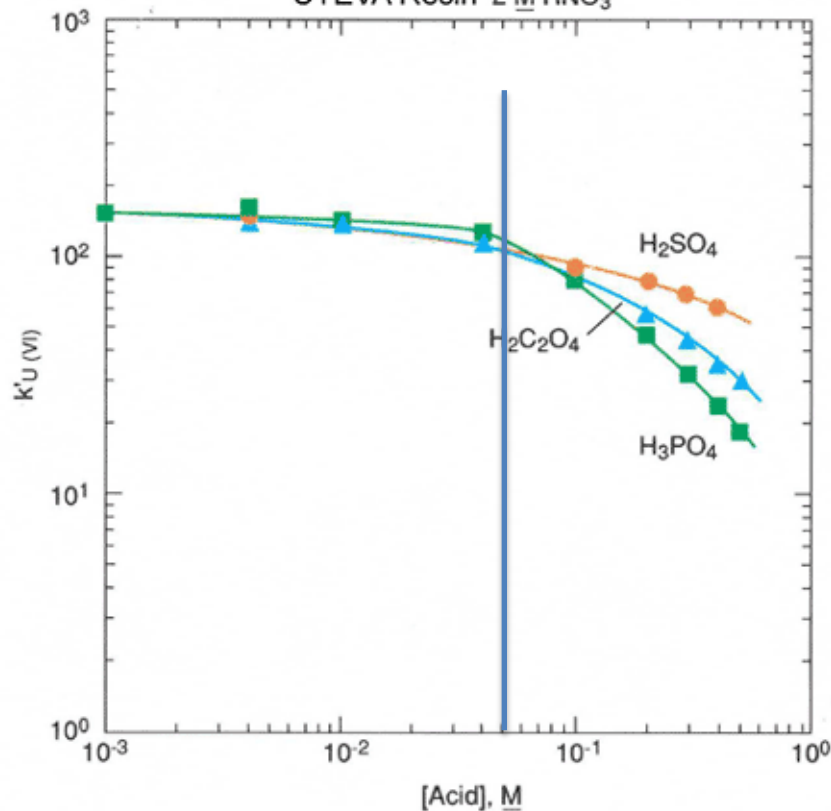
Effect of Matrix Constituents on Neptunium Retention
UTEVA Resin 2 M HNO₃



Unpublished data (Horwitz, et al.)

Figure 5

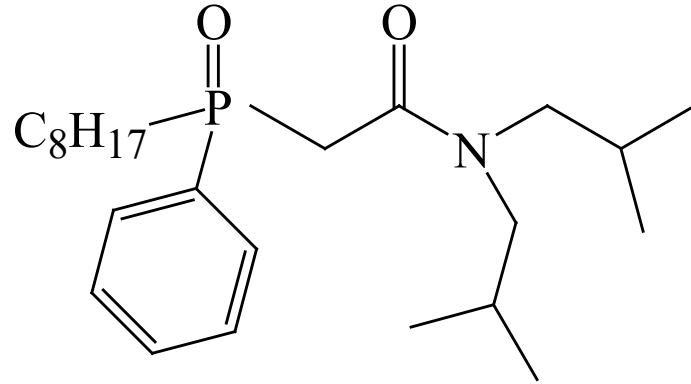
Effect of Matrix Constituents on Uranium Retention
UTEVA Resin 2 M HNO₃



Unpublished data (Horwitz, et al.)

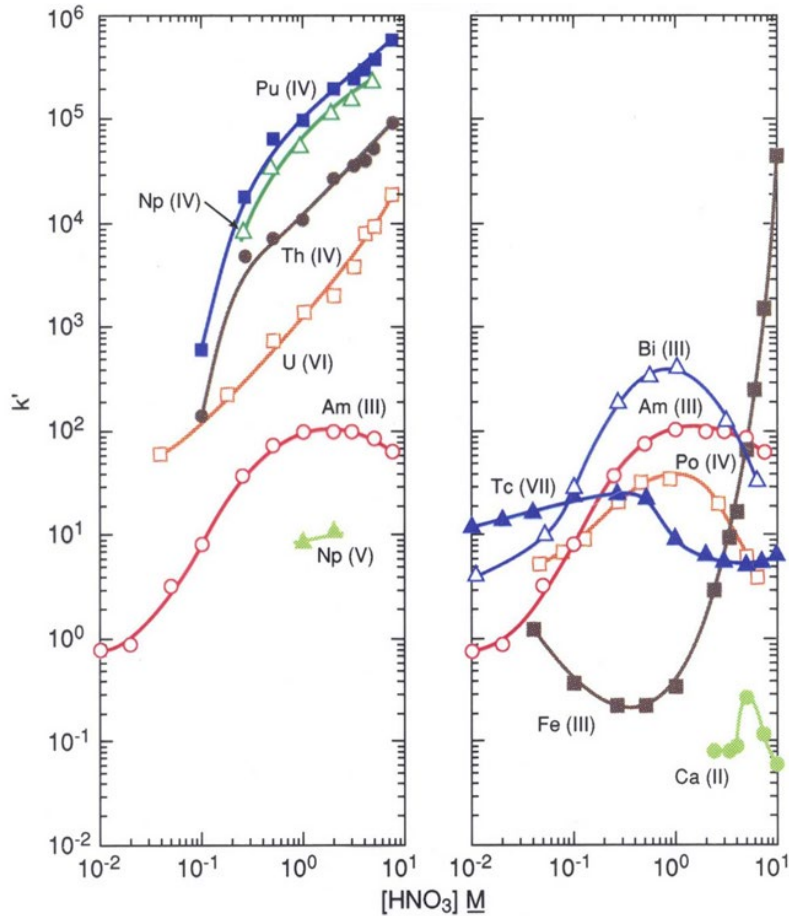
TRU Resin (Am, other actinides, Fe)

Extractant: CMPO



Diluent: TBP

TRU Resin



Similar to UTEVA, but also retains Am(III).

Often used after TEVA removes (IV) metals

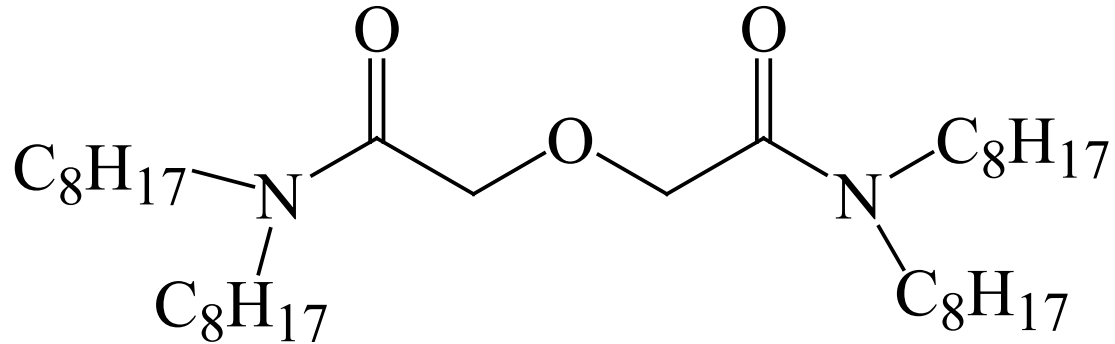
Am(III) retention sensitive to large amounts of Fe(III). Limit or reduce to Fe(II).

Remove Am(III) with 4M HCl.

Remove Th(IV), Pu(IV), and Np(IV) with HCl-HF mixtures.

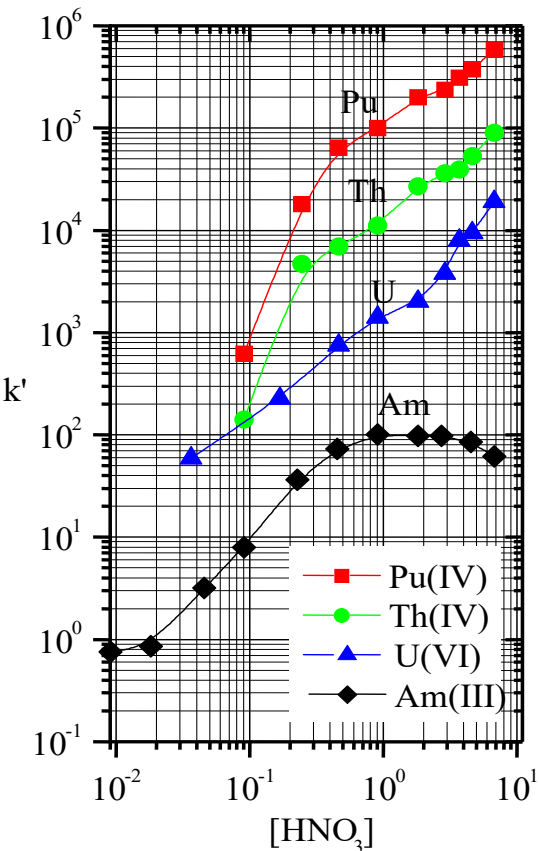
Remove U(VI) with bioxalate or carbonate.

DGA Resin (Am, Y-90, Ac-228)

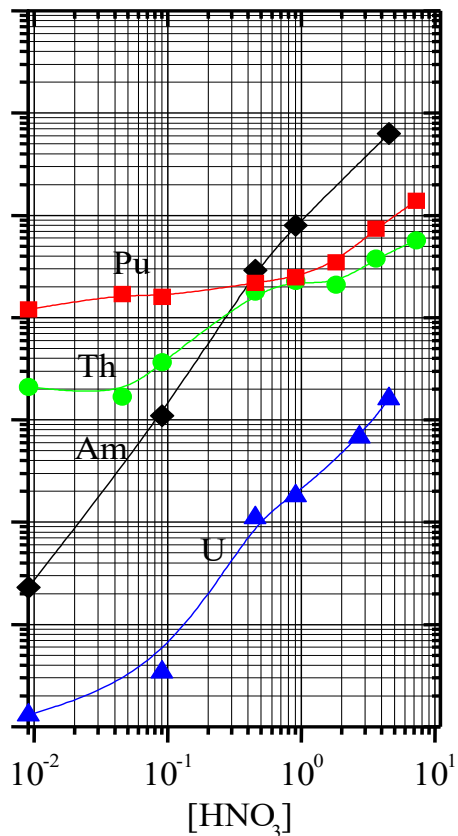


TRU Resin vs. DGA Resins

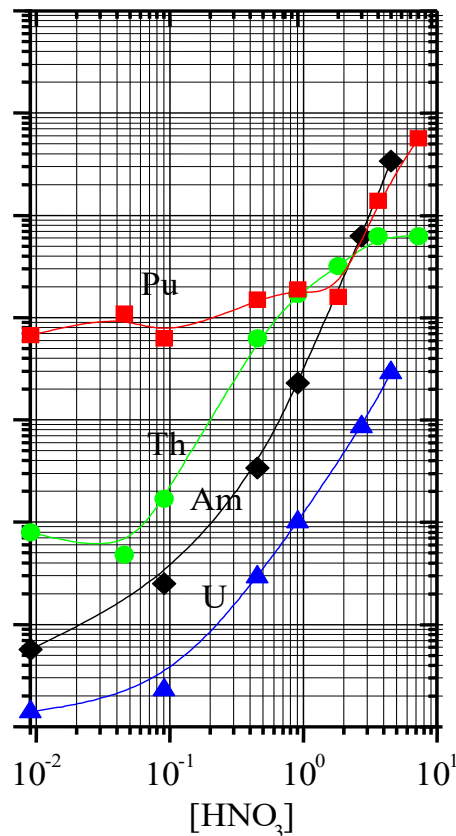
TRU Resin



DGA Resin, Normal



DGA Resin, Branched



Similar to TRU, but stronger Am(III) and lanthanides(III) retention.

Not sensitive to Fe(III)

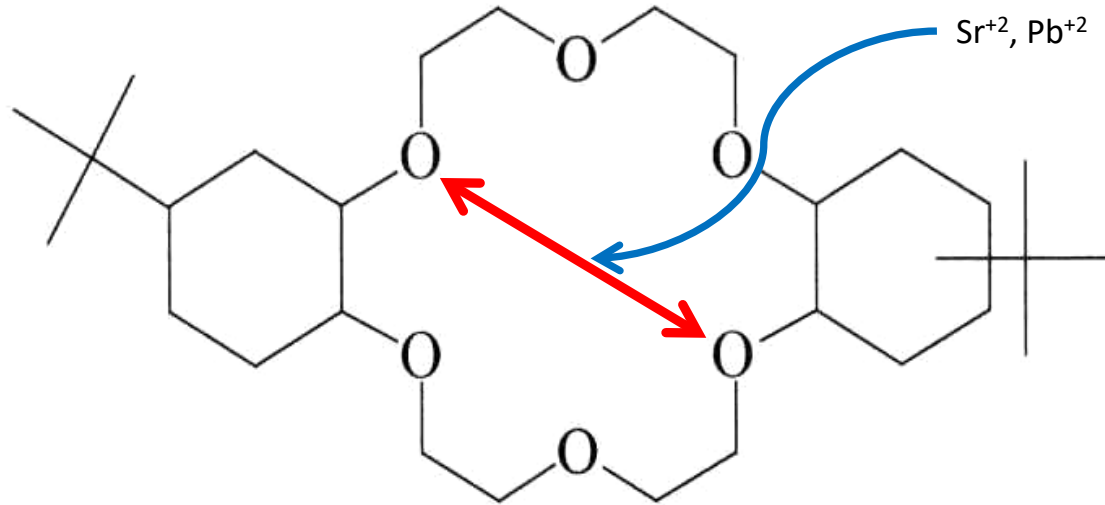
Sensitive to Ca(II)

Remove U(VI) with 0.1-0.5M HNO₃.

Recover Am(III) with 0.1M HCl.

Sr Resin (Sr-89/90, Pb isotopes)

Extractant: di-t-butylcyclohexano 18-crown-6

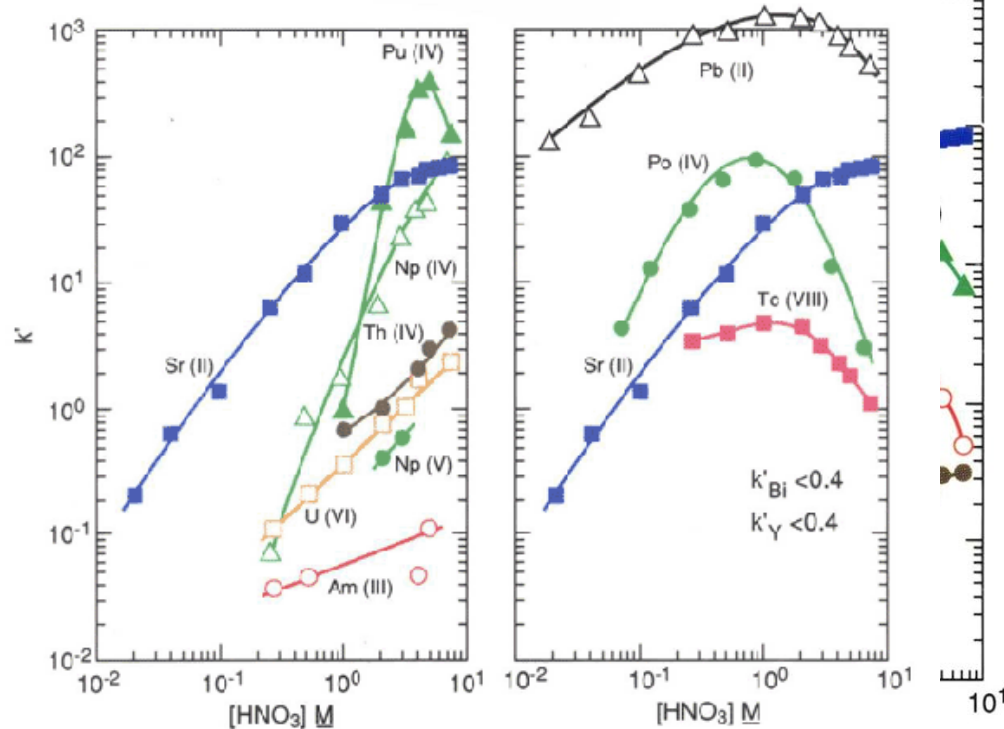


Diluent: 1-octanol

Sr Resin (Sr-89/90, Pb isotopes)

Figures 4 and 5

Acid dependency of k' for various ions at 23-25°C.
Sr Resin



Horwitz (HP199)

Retains Sr(II) and Pb(II).

Sensitive to high K^+ and very high Ca^{2+} .

Can separate Ra^{2+} from Ba^{2+}

Almost always used last in stacks of multiple cartridges.

Remove Ba^{2+} with 8M HNO_3

Remove (IV) metals with 3M HNO_3 -0.05M Oxalic acid.

Recover Sr in 0.05M HNO_3 .

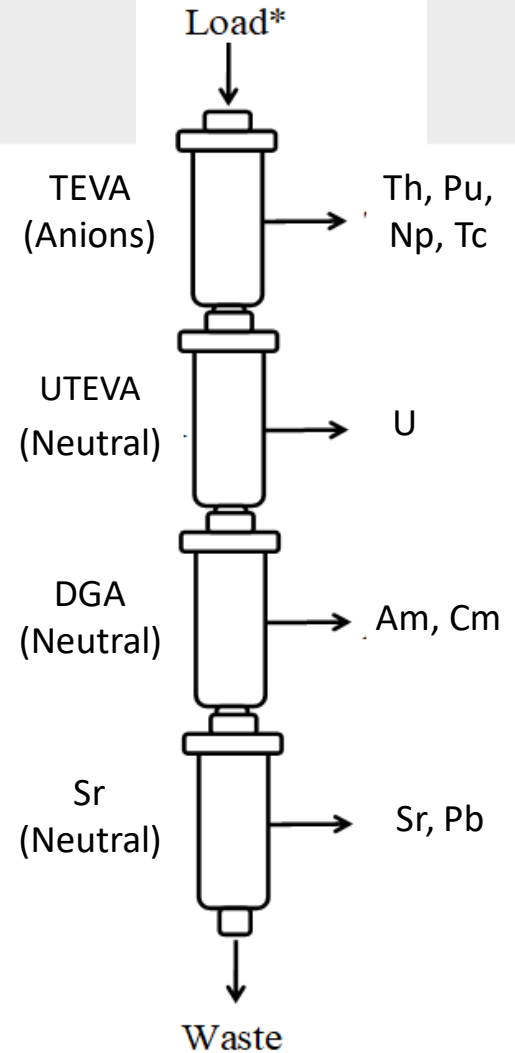
Recover Pb in 6-8M HCl or buffer.

Multi-dimensional separations

- Different column materials can be stacked
- Analysis of multiple analytes from a single sample preparation



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Questions????

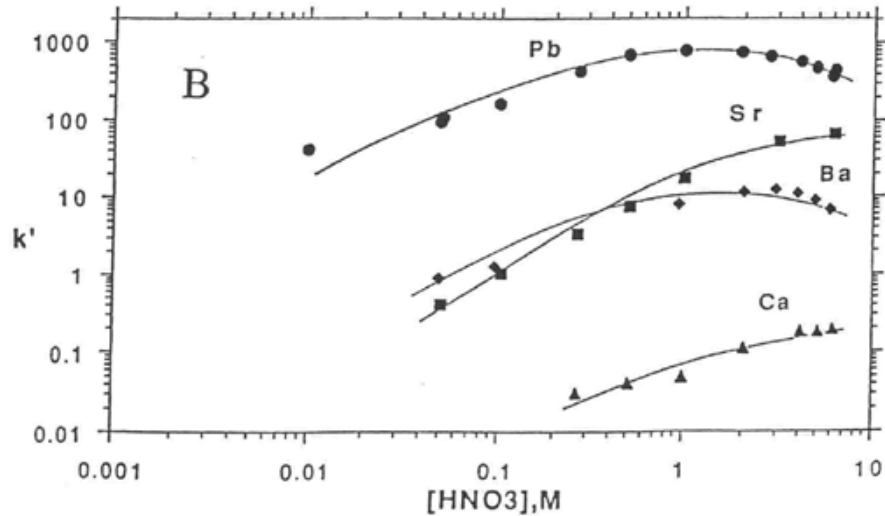
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Sr Resin (Sr-89/90, Pb isotopes)

Figure 3

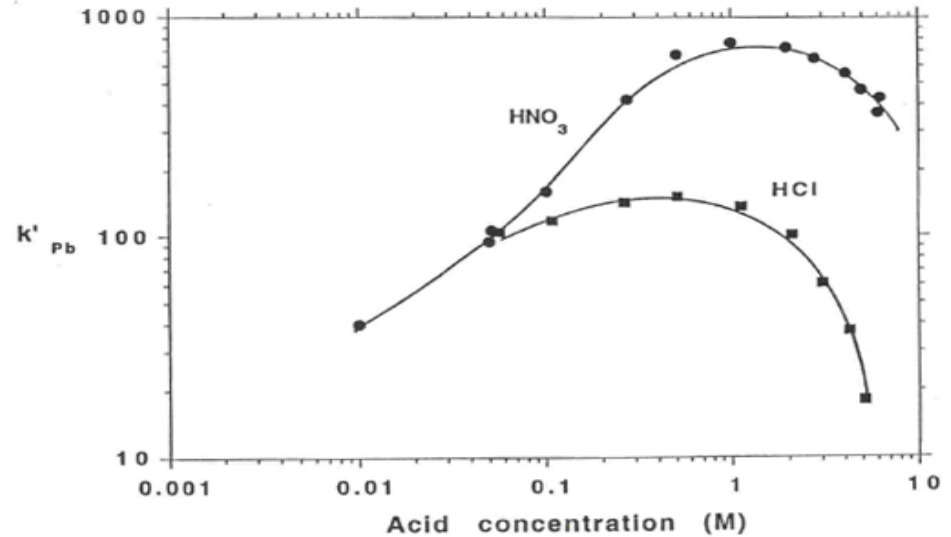
Nitric Acid Dependency of k' for Selected Divalent Metal Ions of Pb Resin



Horwitz, et al. (HP 194)

Figure 5

Nitric Acid and Hydrochloric Acid Dependencies of k' for Lead on Pb Resin



Horwitz, et al. (HP194)