PRODUCT SHEET

TRU resin

Main Applications

- Separation of actinides
- Separation of iron

Packing

Order N°.	Form	Particle size
TR-B25-A, TR-B50-A, TR-B-100-A, TR-B200-A	25g, 50g, 100g and 200g bottles TRU resin	100-150 µm
TR-C20-A, TR-C50-A	20, 50 and 200 2 mL TRU resin columns	100-150 µm
TR5-C20-A, TR8-C20-A , TR10-C20-A	20 5, 8 and 10 mL TRU resin columns	100-150 µm
TR-B10-S, TR-B25-S, TR-B50-S, TR-B100-S, TR-B200-S	10g, 25g, 50g, 100g and 200g bottles TRU resin	50-100 µm
TR-R10-S	10 x 2ml cartridges TRU resin	50-100 µm
TR-B10-F	10g bottle TRU resin	20-50 µm

Physical and chemical properties

Density : 0,37 g/ml

Capacity : 7 mg Nd/g Resin TRU

Conversion factor D_W/k' : 1,82

Conditions of utilization

Recommended T of utilization : 20-25°C

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

***Note** : Using TRU Resin in conditions below 18°C or above 26°C may have an impact on yields and flow rates. Separations should be performed whenever possible at temperatures between 20-25°C.*

For additional information see enclosed literature study

Methods*

Reference	Description	Matrix	Analytes	Support
ACU02	Americium, Plutonium and Uranium in urine	urine	Am, Pu and U	columns
ACU02 VBS	Americium, Plutonium and Uranium in urine (Vakuum Box System)	urine	Am, Pu and U	cartridges
ACW03	Americium, Plutonium and Uranium in water	water	Am, Pu and U	columns
ACW03 VBS	Americium, Plutonium and Uranium in water (Vakuum Box System)	water	Am, Pu and U	cartridges
ACW04	Americium in water	water	Am colum	ns
ACW16 VBS	Am_Np_Pu_Th_Cm_U in water (Vakuum Box System)	water	Am, Np, Pu, Th, Cm and U	cartridges
ACW17 VBS	Am_Np_Pu_Th_Cm_U_Sr in water (Vakuum Box System)	water	Am, Np, Pu, Th, Cm, U and Sr	cartridges
FEW01	Iron-55 in water	water	Fe-55 columns	

*developped by Eichrom Technologies Inc.

PRODUCT SHEET

TRU RESIN

TRU Resin characteristics and properties are given by the synergistic combination of CMPO (octylphenyl-N,N-di-isobutyl carbamoyle phosphine oxyde) extractant diluted in TBP (fig. 1).

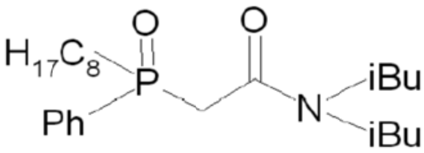

Figure 1: CMPO

Assumed extraction equilibria:

$$Am^{3+} + 3NO_3^- + 3\bar{E} \Leftrightarrow \overline{E_3 \cdot Am(NO_3)_3}$$
(Ln^{3+})

$$Pu^{4+} + 4NO_3^- + 2\bar{E} \Leftrightarrow \overline{E_2 \cdot Pu(NO_3)_4}$$
(Np^{4+})

$$UO_2^{2+} + 2NO_3^- + 2\bar{E} \Leftrightarrow \overline{E_2 \cdot UO_2(NO_3)_2}$$

with E = extractant

TRU Resin is used for the extraction and separation of **TR**ans**U**ranian elements, including americium, contrarily to TEVA or UTEVA Resin. Figures 2 and 3 show the k' values of different elements in HNO_3 and HCl. Transuranium elements show a high affinity for the resin at increasing HNO_3 concentrations. Americium also shows a good affinity for the resin: $k'_{(Am)max}$ ~100 for a concentration of HNO_3 from 1 - 3M. Np (V) is not retained on the TRU Resin at high HNO_3 concentrations whereas Np(IV) is very well fixed under the same conditions.

Fe(III) shows no affinity for the resin in the acidity range of 0.05 - 2M HNO_3. Above 2M HNO_3 Fe(III) affinity is increasing. TRU Resin properties towards Fe can be used for the separation and measurement of Fe-55 (cf Eichrom method FEW01). Fe(III) is fixed on the resin at 8M HNO_3 and eluted with 1-2M HNO_3 solution. Alternatively ascorbic acid can be used for elution since Fe(II) is not retained on the resin.

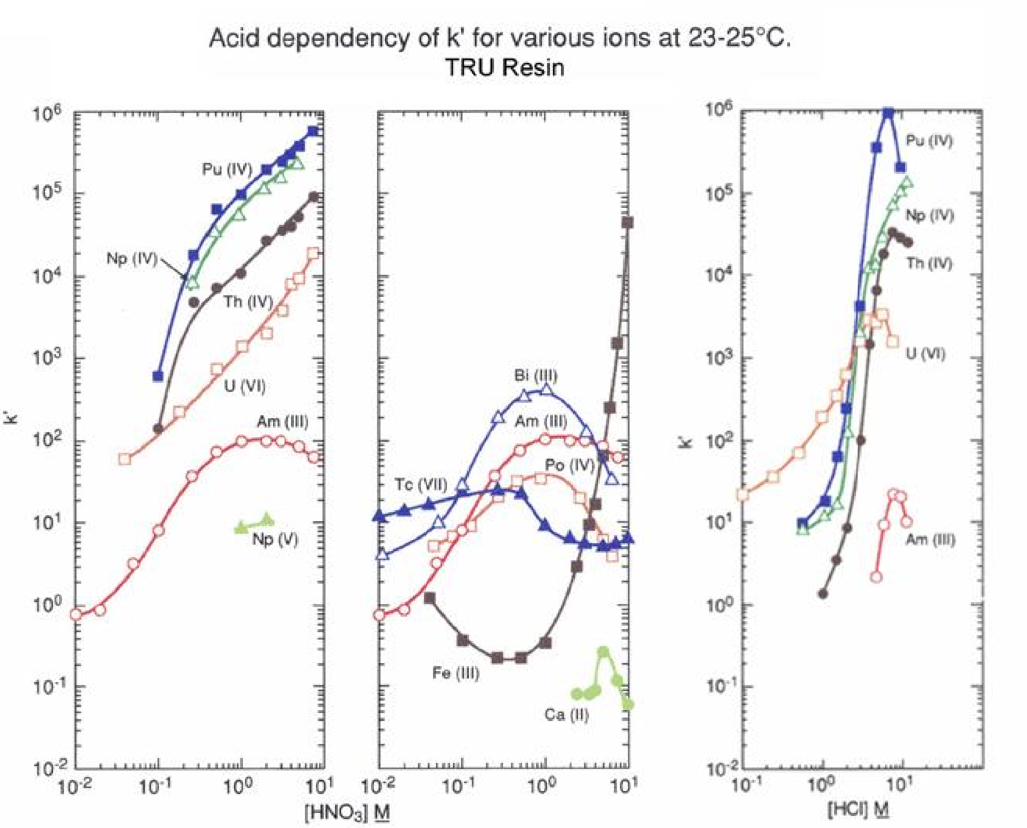

Figure 2 : k' values of different elements in HNO_3 and HCl media on TRU Resin [1]

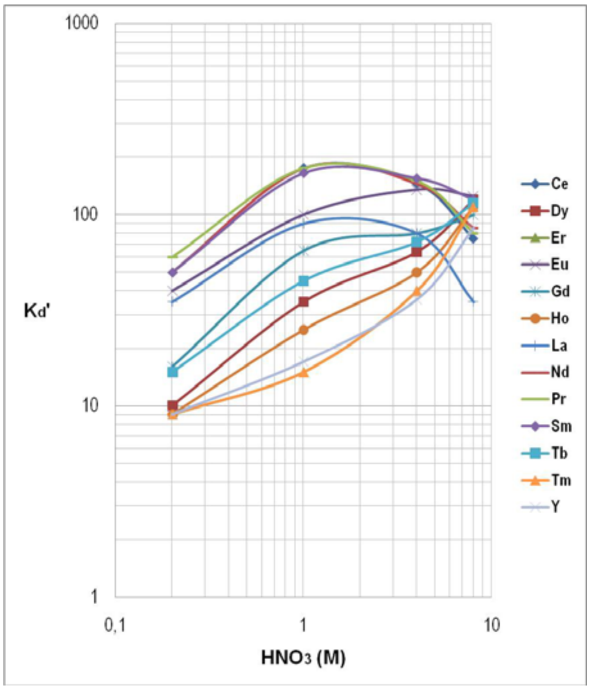

Figure 3 : *k' values of Lanthanides on TRU resin in HNO_3*[2]*.*

In HCl media, Am(III) is not retained on TRU Resin. Pu(IV), Np(IV), Th(IV) and U(VI) show very high affinity for HCl concentrations higher than 3M. Affinity of these elements for the resin is decreasing with decreasing HCl concentration.

Figure 3 shows that the heavier lanthanides are in general better retained than the lighter ones.

Figure 4 shows that Ca and Fe(II) do not interfere Am retention. However, a concentration of Fe(III) greater than 10^{-3}M in 2M HNO_3 prevents any uptake of Am. On the contrary, the presence of more than 0.1M aluminum enhances Am(III) uptake. Phosphates, sulfates and oxalic acid start slightly interfering Am uptake when their concentration is greater than 0.1M (figure 5).
The same salts strongly interfere the uptake of Np(IV), especially oxalate.
However, k' Np(IV) remains greater than 1000 for salt concentrations less than 0.05M for oxalates and 0.3M for sulfates (figure 5).

In 1M HCl medium, Np(IV) shows no affinity for TRU Resin. The use of oxalic acid in a concentration higher than 10^{-2}M in 1M HCl, further facilitates the Np(IV) elution.
In the same acidic medium, U(VI) remains on the resin up until the oxalic acid concentration reaches 0.1M (figure 6) allowing easy Np/U separation in HCl medium.

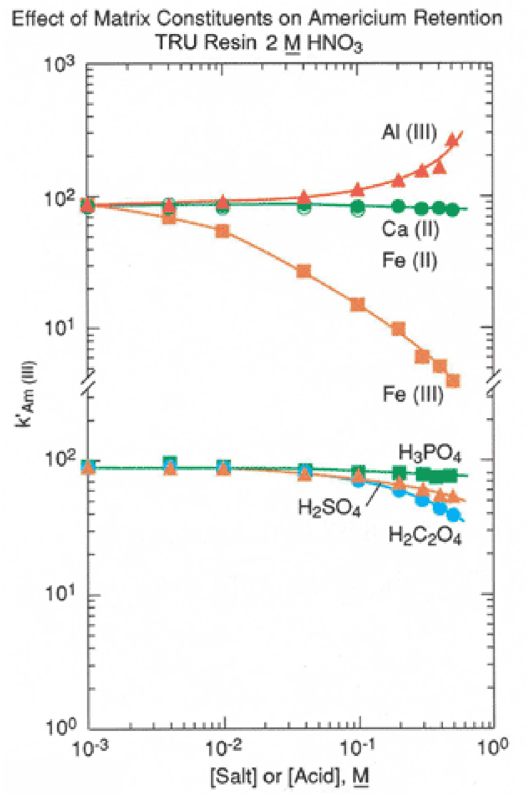

Figure 4 : *Matrix effects on Am(III) retention*[1]*.*

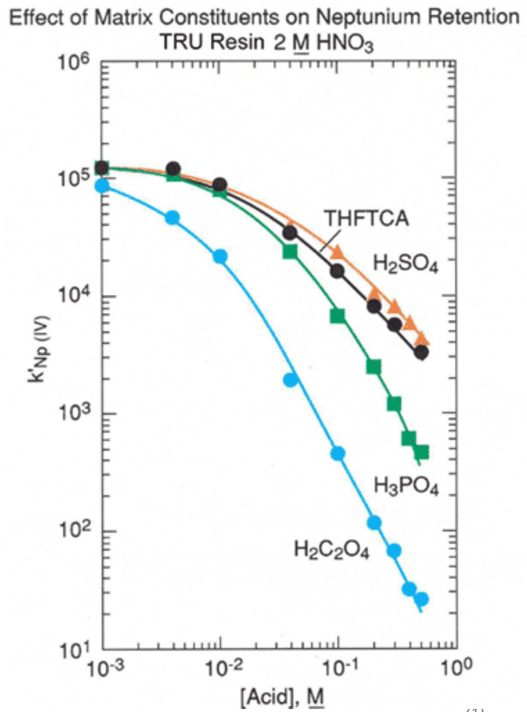

Figure 5 : *Matrix effects on Np(IV) retention*[1]*.*

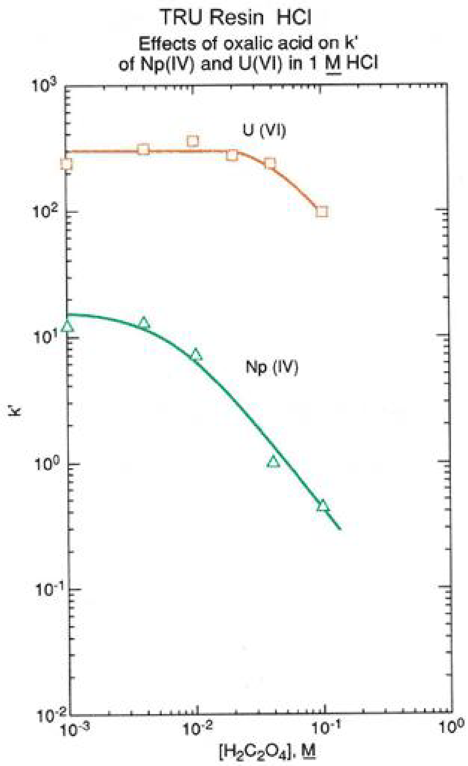

Figure 6 : *Oxalic acid interference on the uptake of Np(IV) and U(VI) (1)*

Bibliography

(1) Horwitz P., Chiarizia R. Dietz M., Diamond H., Nelson, D. ; *Analytica Chimica Acta*, 281, pp. 361-372 (1993)

(2) Huff E.A., Huff D.R., *34th ORNL/DOE Conference on Analytical Chemistry in Energy Technology*, Gatli nburg-TN, USA (1993)