PRODUCT SHEET

TEVA resin

Main Applications

- Separation of actinides(IV)
- Separation of technetium(VII)
- Americium / lanthanide separation

Packing

Order N°.	Form	Particle size
TE-B25-A, TE-B50-A, TE-B-100-A, TE-B200-A	25g, 50g, 100g and 200g bottles TEVA resin	100-150 µm
TE-C20-A, TE-C50-A	20, 50 and 200 2 mL TEVA resin columns	100-150 µm
TE5-C20-A, TE8-C20-A, TE10-C20-A	20 5, 8 and 10 mL TEVA resin columns	100-150 µm
TE-B10-S, TE-B25-S, TE-B50-S, TE-B100-S, TE-B200-S	25g, 50g, 100g and 200g bottles TEVA resin	50-100 µm
TE-R10-S	10 2ml TEVA resin cartridges	50-100 µm
TE-B10-F	10g bottle TEVA resin	20-50 µm
TE-D10-F, TE-D50-F, TE-D200-F	10, 50 and 200 TEVA resin discs (Ø 47 mm)	20-50 µm

Physical and chemical properties

Density : 0,35 g/ml

Capacity : 70 mg Th/g resin TEVA

Conversion factor D_W/k' : 1,97

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.
Discs: 30 mL/min gravity flow and up to 100mL/min with vacuum

Storage : Dry and dark, T<30°C

For additional information see enclosed literature study

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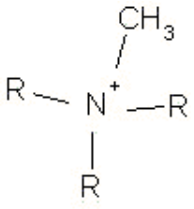
Methods*

Reference	Description	Matrix	Analytes	Support
ACU03	Neptunium and Thorium in urine	urine	Np and Th	columns
ACW01	Uran and Thorium in water	water	U and Th	columns
ACW04	Americium in water	water	Am	columns
ACW08	Thorium and Neptunium in water	water	Np and Th	columns
ACW10	Thorium in water	water	Th	columns
ACW13 VBS	Thorium, Plutonium and Uran in water (Vakuum Box System)	water	Pu, Th and U	cartridges
ACW16 VBS	Am_Np_Pu_Th_Cm_U in water (Vakuum Box System)	water	Am, Cm, Pu, Th and U	cartridges
ACW17 VBS	Am_Np_Pu_Th_Cm_U_Sr in water (Vakuum Box System)	water	Am, Cm, Pu, Th, U and Sr	cartridges
TCS01	Technetium-99 in soil	soil	Tc-99	columns
TCU01	Technetium-99 in urine (TEVA Disk method)	urine	Tc-99	discs
TCW01	Technetium-99 in water	water	Tc-99	columns
TCW02	Technetium-99 in water (TEVA Disk method)	water	Tc-99	discs
Application note: 502	Determination of Thoriumin High Purity Aluminium by ICP-MS	aluminium	Th	bulk

*developped by Eichrom Technologies Inc.

TEVA RESIN

The extractant that gives its specificity to the TEVA resin is a quaternary ammonium salt, also called Aliquat® 336 (fig. 1). TEVA resin is mainly used to fix **TE**tra**V**alent **A**ctinides and technetium.



R = C_8H_{17} et $C_{10}H_{21}$

Figure 1 : *Quaternary ammonium salt Aliquat® 336*

The assumed extraction equilibrium is :

$$Pu^{4+} + 4NO_3^- + 2\overline{E \cdot NO_3} \Leftrightarrow \overline{E_2^+ \cdot Pu(NO_3)_6^{2-}}$$

$$(Th^{4+}, Np^{4+})$$

with E = extractant

The k' values of different radionuclides in HNO_3 and HCl are presented in figure 2. Pu(IV), Np(IV) and Th(IV) show maximum retention in 2-4M HNO_3. In this acidity range Am(III) and U(VI) are not fixed.

k' differences between HNO_3 et HCl media may be used to separate Th from the other actinides. When the sample is loaded on the resin from 4M HNO_3, Pu(IV), Th(IV) and Np(IV) are retained. Th may then be eluted with 6M HCl while Pu(IV) and Np(IV) remain on the resin in these conditions. Pu might be stripped out of the resin with 4M HNO_3 or 8M HCl, after having reduced its oxidation state from +IV to +III.

Matrix effects influence the retention of elements. In the presence of Th(IV) in the sample, the retention of Np(IV) might be affected in 5M HNO_3 whereas the presence of uranium has no effect on Np(IV) retention (fig.3).

Phosphates, sulphates and oxalic acid may interfere in the retention of Np(IV) on the resin according to their concentration in the sample (fig. 4). 0.1M to 0.5M oxalic acid in solution with 0.1M to 0.5M HNO_3 may be used to strip Np(IV) out of the resin.

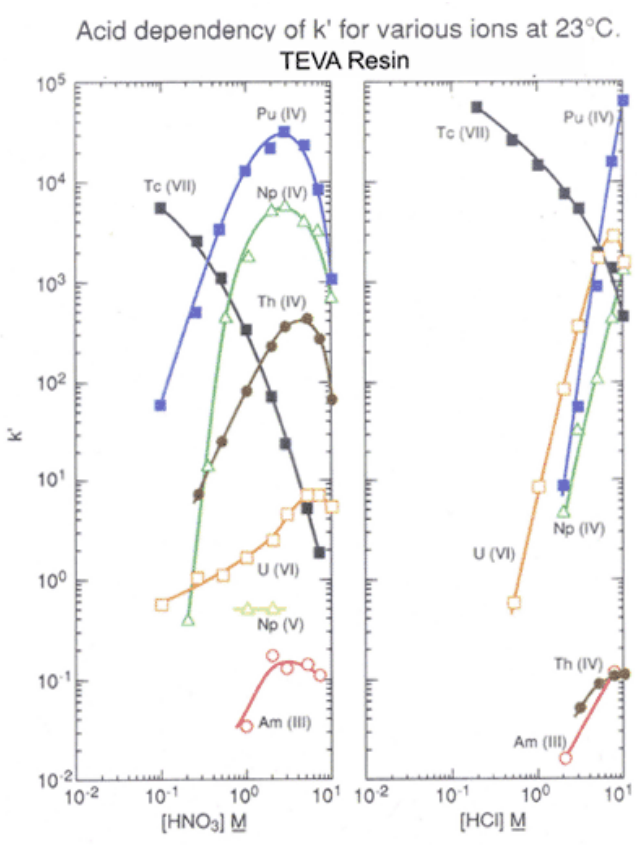


Figure 2 : *k' values of selected elements on TEVA resin in HNO_3 and HCl [1]*

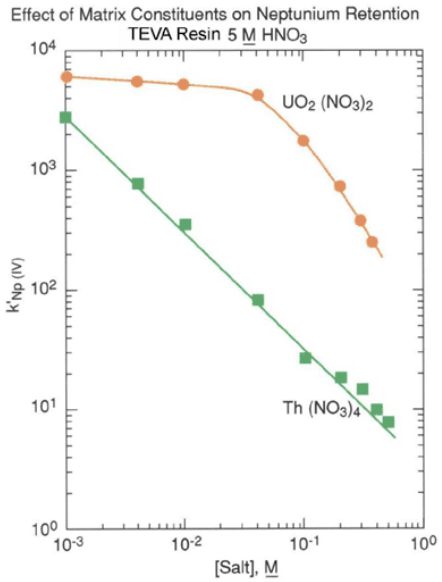


Figure 3 : *U(VI) and Th(IV) interferences on Np(IV) retention[1]*

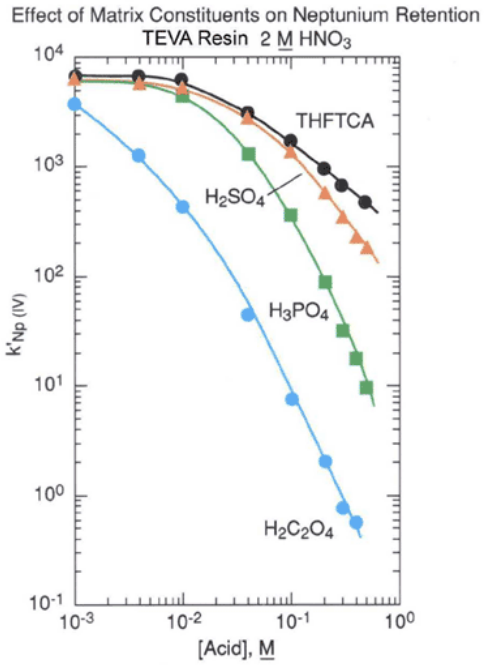


Figure 4 : *Matrix effect on Np(IV) retention.*

Under specific conditions, Am may be fixed on the TEVA resin and separated from light lanthanides (fig. 5). In 1-2M NH_4SCN – 0.1M HCO_2H, Am is fixed on the resin while La - Eu are eluted. Am is then stripped from of the resin with 0.25 - 2M HCl[2,3].

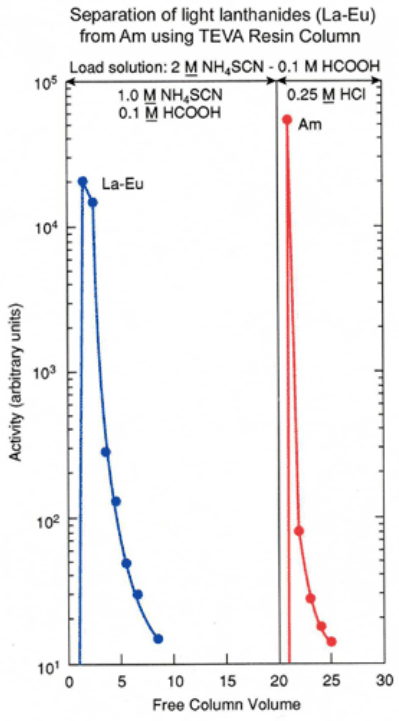


Figure 5 : *Separation of La-Eu and Am on TEVA resin.*

TEVA resin is also known for fixing Technetium in its pertechnetate form (Tc(VII)). Tc(VII) is retained on the resin in an acidity range comprised between 0.1 to 1M H^+ (3E+02<k'<6E+04). In this range the actinides are not well retained on the resin (Fig. 2). This characteristic has been used to isolate Tc-99 from matrices containing actinides. Tc can be stripped from of the resin with 8M HNO_3[4]; alternatively the resin can be extruded into a LSC vial, mixed with a LSC cocktail and directly counted.

TEVA resin is being used to separate Hf from Ti, Zr and REE[5], or to isolate rhenium for measurement by ICP-MS[6]. In both cases, the analyses are made on rock samples. In the first case, the REE, Ti and Hf are loaded onto TEVA resin from 10.5M HCl. REE and Ti are eluted with 10.5M HCl. Hf is then stripped with 9M HCl. TEVA resin has been used to isolate Re, being the superior homolog of Tc, it has a similar chemistry. Tagami et al.[7] have shown that Tc and Re present similar behaviour on TEVA resin.

Bibliography

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