PRODUCT SHEET

TK222 Resin

Main Application:

- Ac separation

Packing

Order N°.	Form	Particle size
TK222-B25-B, TK222-B50-B, TK222-B100-B, TK222-B200-B	25g, 50g, 100g and 200g bottles TK222 Resin	100-200 µm
TK222-C20-B	20 2mL TK222 Resin columns	100-200 µm
TK222-B25-T, TK222-B50-T, TK222-B100-T, TK222-B200-T	25g, 50g, 100g and 200g bottles TK222 Resin	50-100 µm
TK222-R10-T	10 2mL TK222 Resin cartridges Cartridges with other volumes are available upon request	50-100 µm

Physical and chemical properties

Density: 0.36 g/mL TK222 Resin

Conditions of utilization

Recommended T of utilization: room temperature
Flow rate: B grade: ≥0.6 mL/min
Storage: Dry and dark, at room temperature

TRISKEM INTERNATIONAL
ZAC de l'Eperon – 3, rue des Champs Géons – 35170 Bruz – FRANCE
Tel +33 (0)2.99.05.00.09 – Fax +33 (0)2.23.45.93.19 – www.triskem.com – email : contact@triskem.fr
SAS au capital de 100.000 euros – SIRET 493 848 972 00029 – APE 2059Z – TVA intra communautaire FR65 493 848 972

TRISKEM
Expertise in Separation Chemistry

PRODUCT SHEET

TK222 RESIN

The TK222 Resin is based on a mixture of a branched diglocylamide and a phosphine oxide. It also contains a small amount of a long-chained alcohol. Further, the organic phase is impregnated onto an inert support containing aromatic groups for increased stability against radiolysis.

Graphs 1 – 12 show the selectivity of the TK222 Resin for a wide range of elements in HNO_3 (fig. 1 – 6) and HCl (fig. 7 – 12). All D_W values shown in these graphs were obtained through ICP-MS measurements.
Graphs 13 and 14 show the behavior of Ac on TK221 and TK222 (data courtesy of Nora Vajda, RadAnal, all obtained via LSC).

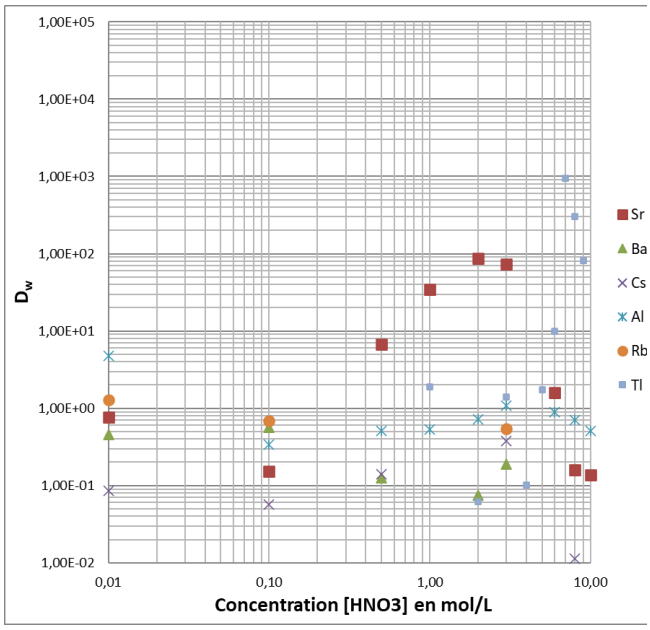

Figure 1: D_W values of selected elements on TK222 in HNO_3

Out of the shown elements only Sr at medium high HNO_3 concentration (2 – 3M) and Tl at elevated concentrations (~8M) are retained.

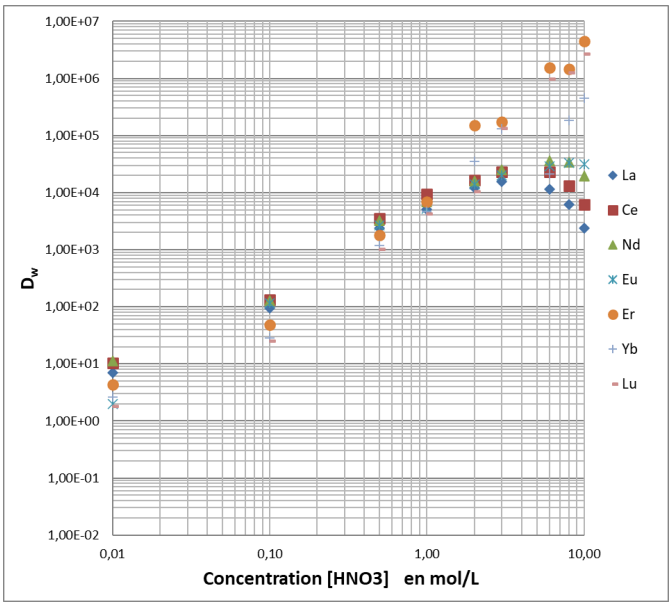

Figure 2: D_W values of selected elements on TK222 in HNO_3

Lanthanides are generally very well retained at elevated HNO_3 concentrations (≥0.5M), this is particularly true for heavy lanthanides. This point is particularly interesting with respect to the separation of lanthanides from Ac. D_W values are generally low at low HNO_3 concentrations.

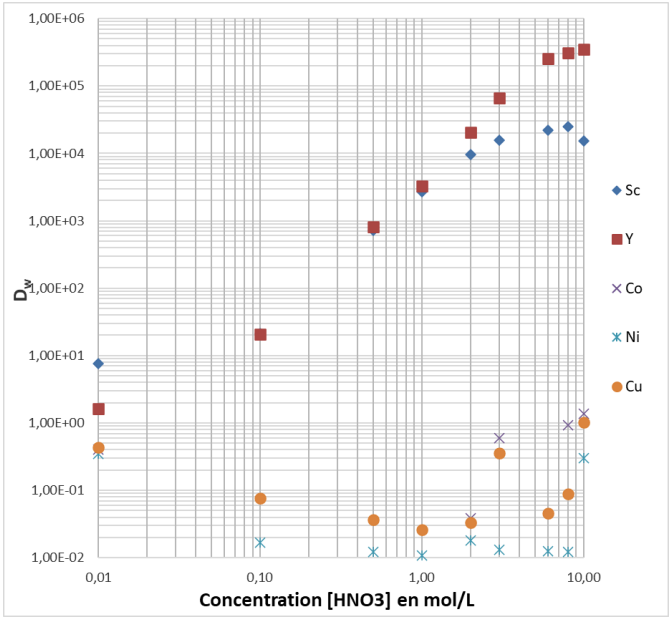

Figure 3: D_W values of selected elements on TK222 in HNO_3

Y and Sc are very well retained at elevated HNO_3 concentrations, while Co, Ni and Cu are not retained.

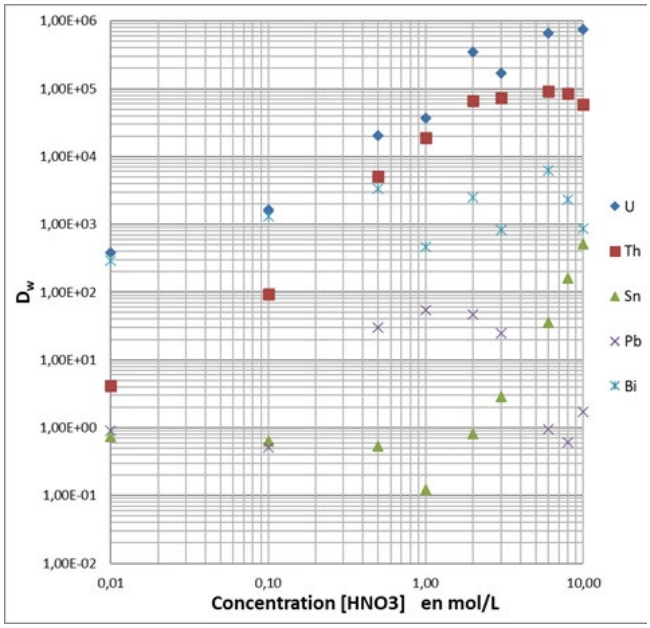

Figure 4: Dw values of selected elements on TK222 in HNO_3

U and Th are very well retained from elevated HNO_3 concentrations. Bi, too is well retained, to a lesser extent than U and Th though. Sn shows some retention at elevated HNO_3. Pb is generally only rather weakly retained with a maximum between 0.5 and 3M HNO_3.

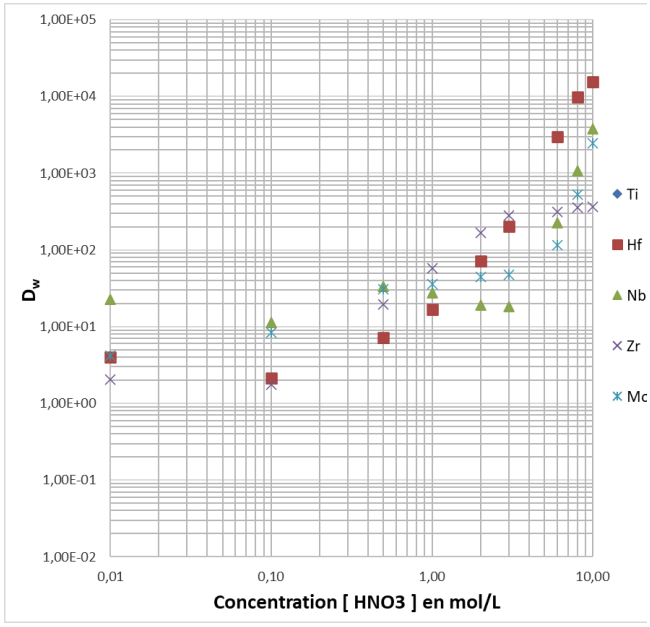

Figure 5: Dw values of selected elements on TK222 in HNO_3

Elements of higher valency such as Hf, Zr, Nb and Mo are well retained from HNO_3 of high concentration.

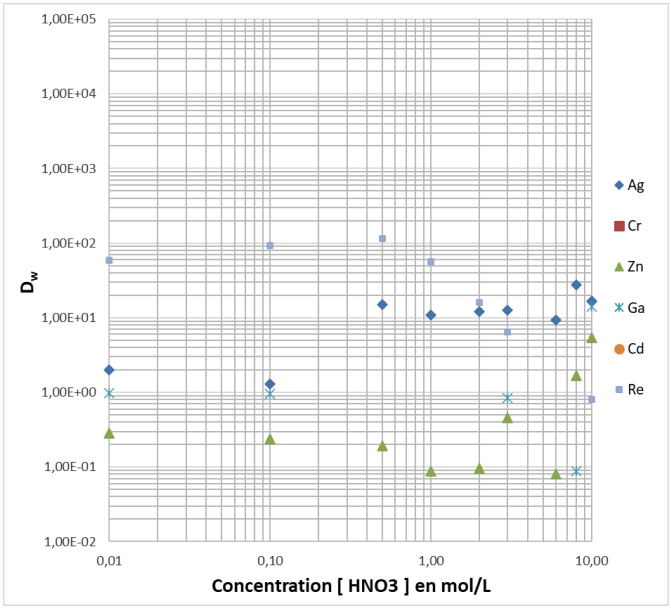

Figure 6: Dw values of selected elements on TK222 in HNO_3

None of the shown elements show significant retention on TK222 from HNO_3.

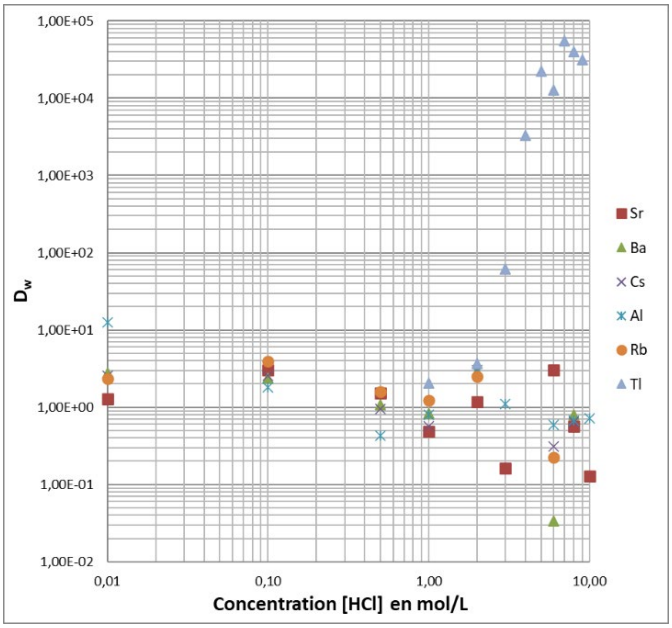

Figure 7: Dw values of selected elements on TK222 in HCl

Out of the shown elements only Tl is well retained at high HCl concentrations.

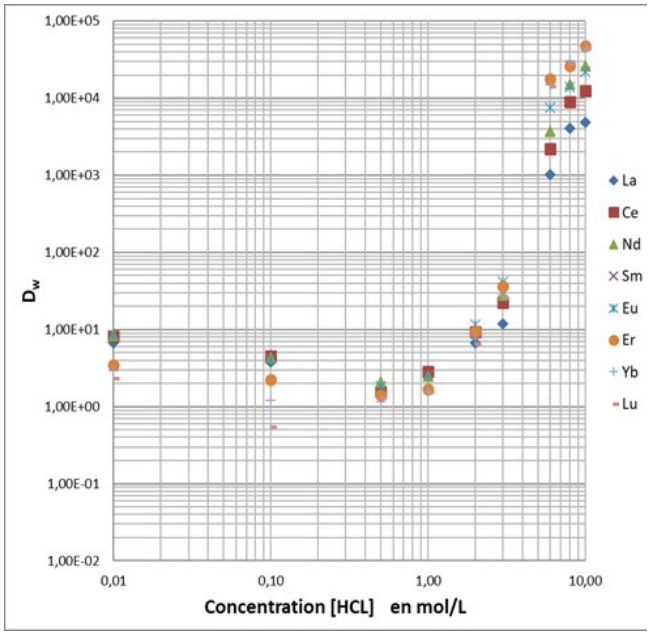

Figure 8: Dw values of selected elements on TK222 in HCl

Lanthanides are strongly retained at high HCl concentrations (≥ 6M) for example. As for HNO_3 this is an important information with respect to the separation of lanthanides from Ac.

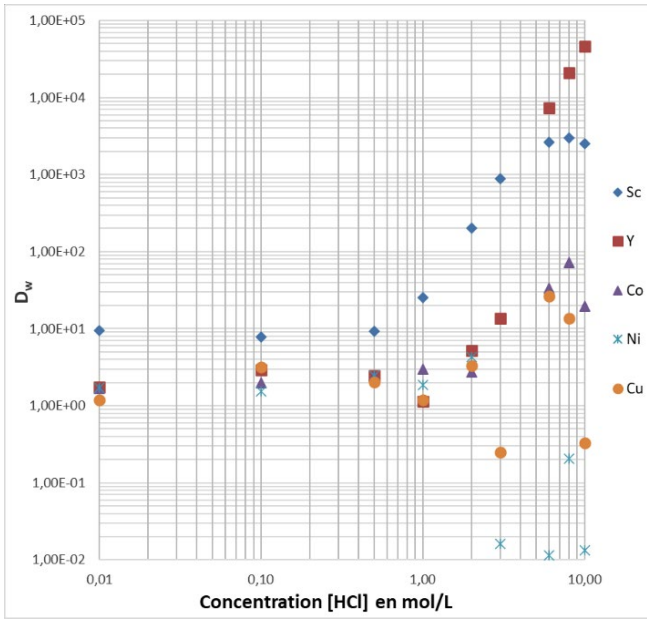

Figure 9: Dw values of selected elements on TK222 in HCl

Like the Lanthanides Y and Sc are very well retained at high HCl concentrations. Co, Ni and Cu are not or only weakly retained.

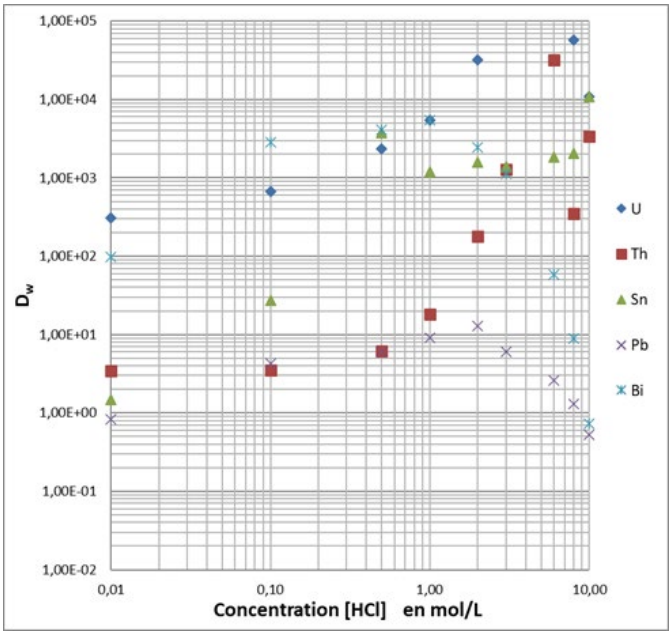

Figure 10: Dw values of selected elements on TK222 in HCl

U, Th and Sn show strong increase of Dw values with increasing HCl concentrations. Pb is only very weakly retained from HCl. Bi is well retained between 0.1M and 2M HCl, its retention then sharply drops with increasing HCl concentration. 10M HCl may e.g. be used to elute Bi from the TK222.

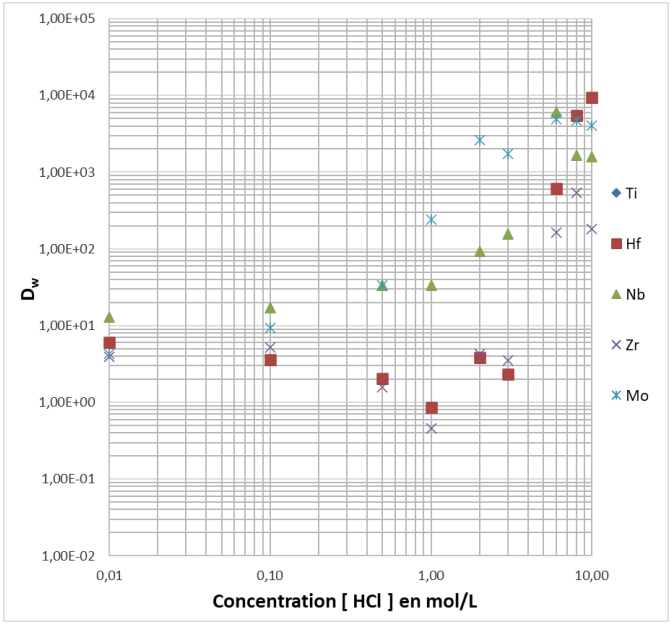

Figure 11: Dw values of selected elements on TK222 in HCl

Like for HNO_3, elements of higher valency like Mo, Nb, Zr and Hf are well retained at high acid concentrations.

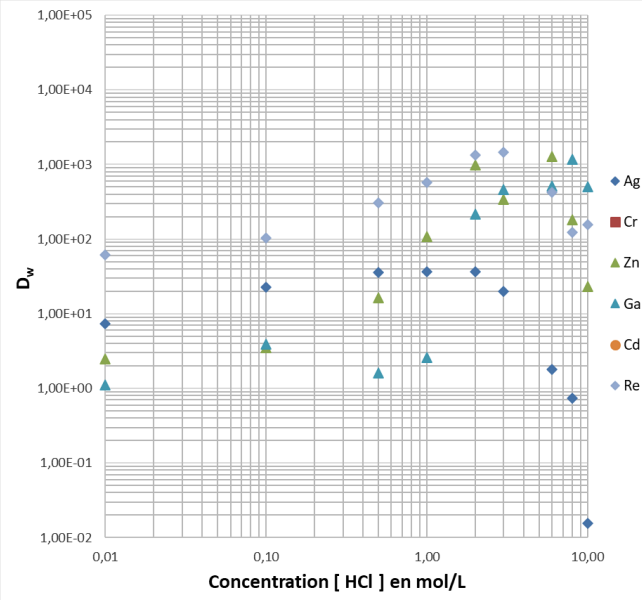

Figure 12: D_W values of selected elements on TK221 and TK222 in HCl

At elevated HCl concentrations Zn and Ga are quite well retained, while the other elements shown are not retained.

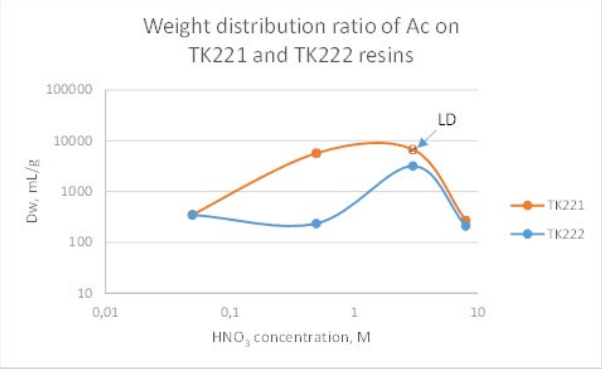

Figure 13: D_W values of Ac on TK221 and TK222 in HNO_3 (data courtesy of N. Vajda, Radanal)

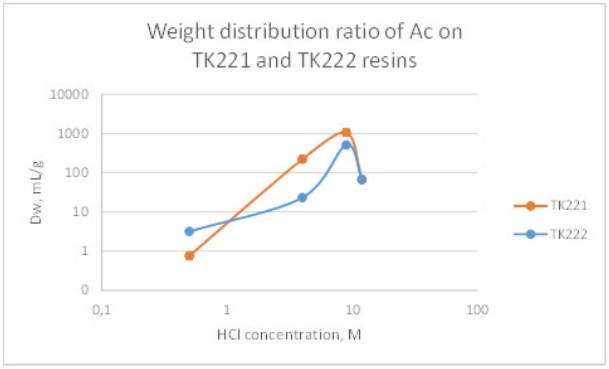

Figure 14: D_W values of Ac on TK222 in HCl (data courtesy of N. Vajda, Radanal)

Fig. 13 and 14 compare D_W values for Ac on TK221 and TK222 from HNO_3 and HCl. As can be seen TK221 retains Ac significantly stronger than the TK222 Resin. The latter is, on the other hand, easier to elute. Both show rather low D_W values at very high HCl concentrations (> 10M), this should, with respect to the resin's selectivity for lanthanides, allow for the separation of Ac from the lanthanides. Elution in HNO_3 will require significantly higher HNO_3 concentrations (≥ 12M HNO_3) to elute Ac.

Fig. 15 and 16 show some elution studies performed with stable elements and ICP-MS measurements.

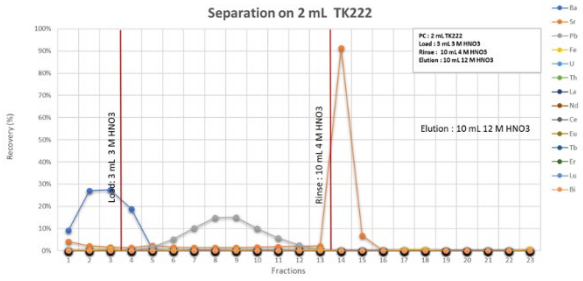

Figure 15: Elution study, 2 mL TK222 cartridge, 1 BV fractions, various elements.

Ba (the same should be true for Ra) and Pb are removed at elevated HNO_3 concentrations (2 – 4M HNO_3), for Sr elution even higher HNO_3 concentrations are required (here 12M HNO_3).
Under these conditions lanthanides, U and Th remain retained on TK222 Resin, while Ac is expected to elute which should result in a suitable separation of Ac from these elements.

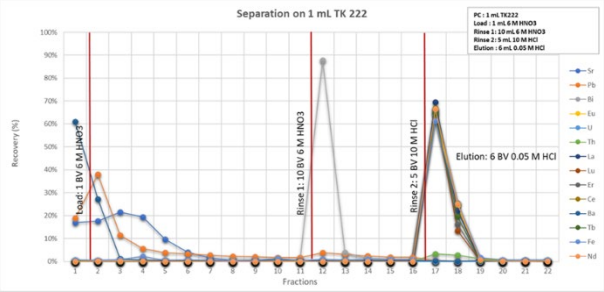

Figure 16: Elution study, 2 mL TK222 cartridge, 1 BV fractions, various elements.

When loading the TK222 Resin from 6M HNO_3, followed by a rinse with the same acid, Pb, Ba and Sr are removed. Bi may then be removed using 10M HCl. As can be seen, under the usual Ac elution conditions (0.05M HCl) lanthanides would co-elute, accordingly they need to be removed as described before via the Ac elution from TK222 (or TK221) in very high HNO_3.