PRODUCT SHEET

TK400 Resin

Main Applications

- Separation of protactinium
- Separation of niobium

Packing

Order N°.	Form	Particle size
TK400-B25-A, TK400-B50-A, TK400-B-100-A, TK400-B200-A	25g, 50g, 100g and 200g bottles TK400 Resin	100-150 µm
TK400-C20-A, TK400-C50-A	20 and 50 2 mL TK400 Resin columns	100-150 µm
TK400-B10-S, TK400-B25-S, TK400-B50-S, TK400-B100-S, TK400-B200-S	25g, 50g, 100g and 200g bottles TK400 Resin	50-100 µm
TK400-R10-S	10 2mL TK400 Resin cartridges	50-100 µm

Physical and chemical properties

Density: 0.382 g/mL TK400 Resin

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

For additional information see enclosed literature study

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PRODUCT SHEET

TK400 RESIN

The TK400 Resin is an extraction chromatographic resin that is comprised of octanol impregnated onto an inert support. Knight et al.[1] showed that long-chained alcohols, especially octanol, show very interesting selectivity towards Pa at high HCl concentrations, allowing for facile Pa/Np separation using column chromatography. Jerome et al.[2] characterized the TK400 Resin with respect to its selectivity for a number of elements including Pa, Np, U and Th (Fig. 1).

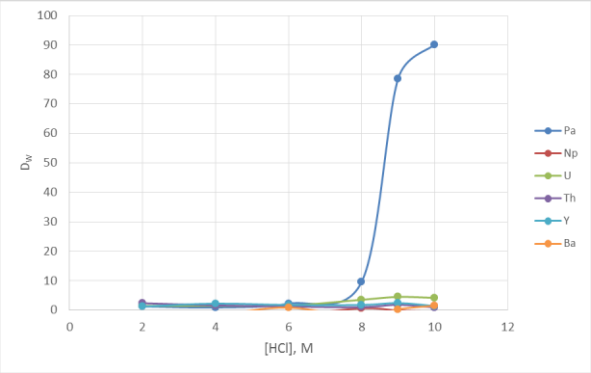

Figure 1 : D_W values of selected elements on TK400 Resin in HCl at varying concentration, data provided by Jerome et al.[2]

They found that Pa retention sharply increases at high (≥ 9M) HCl concentrations whereas other elements tested are not retained.

At HCl concentrations < 8M HCl on the other hand D_W values of Pa were found to be low allowing for its elution in a small volume. Ostapenko et al.[3] found a similar trend for Pa retention with k' values being high for Pa at high HCl concentrations (9M). These results correspond overall well to the selectivity observed by Knight et al. when performing Np/Pa separation (Fig. 2).

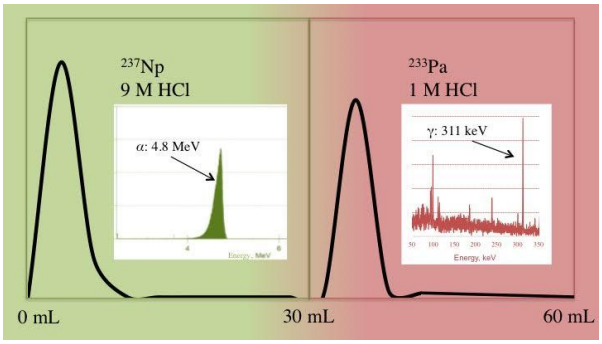

Figure 2 : Elution study, Np/Pa separation on octanol resin (taken from Knight et al.[1])

Figure 3 shows D_W values of an additional set of elements in HCl on the TK400 Resin determined by Dirks et al.[4]. The resin shows high selectivity for Nb at high HCl concentrations over other elements tested such as Ta, Zr, Hf and lanthanides which are not, or only very poorly as in the case of Ta, retained by the resin.

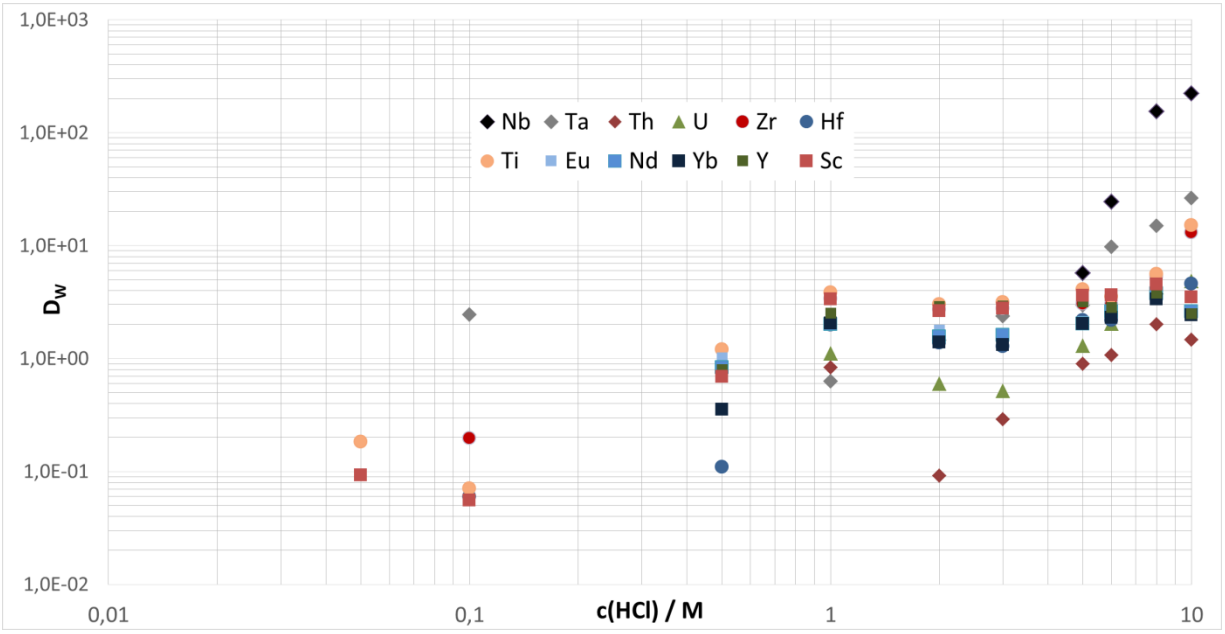

Figure 3: D_W values of selected elements on TK400 Resin in HCl at varying concentration taken from Dirks et al.[4]

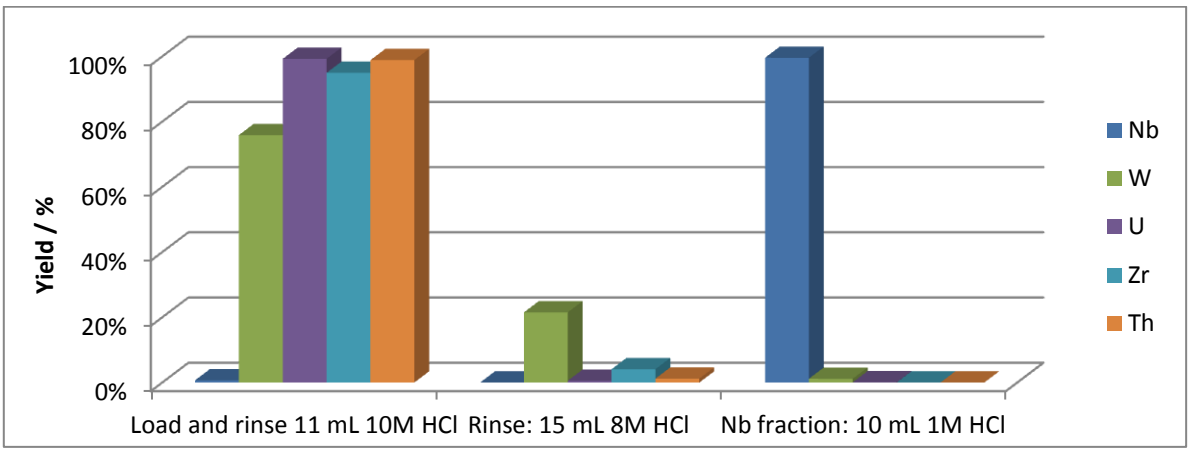

Figure 4: Elution study, Nb separation from selected cations, 2 mL TK400 column

With respect to its selectivity the TK400 Resin shows the potential for allowing a number of interesting separations such as Nb/Zr and Pa/U/Th. The results of an elution study on the separation of Nb from a number of elements, including Zr, and the separation method used to obtain these results are shown in Fig. 4 and Fig. 5, respectively. Jerome et al.[2] employed the TK400 Resin for the separation of Pa from its descendants following the procedure shown in Fig. 6. They found that U, Th, Ac, Ra and Pb were removed from the resin during load and rinse, allowing for obtaining a clean Pa fraction with high chemical yield (~83%).

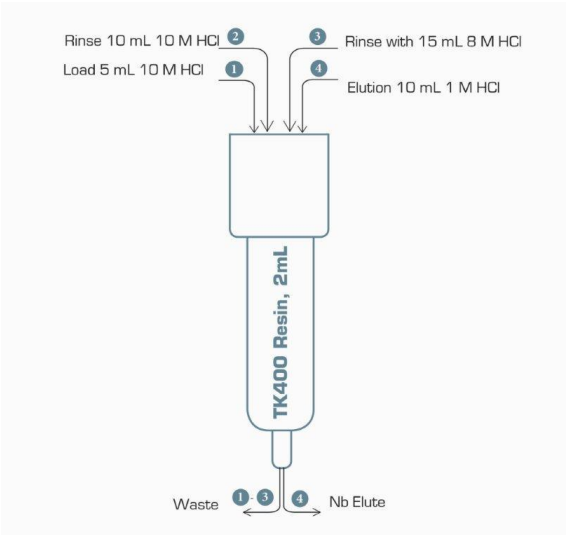

Figure 5: Nb separation on TK400 Resin

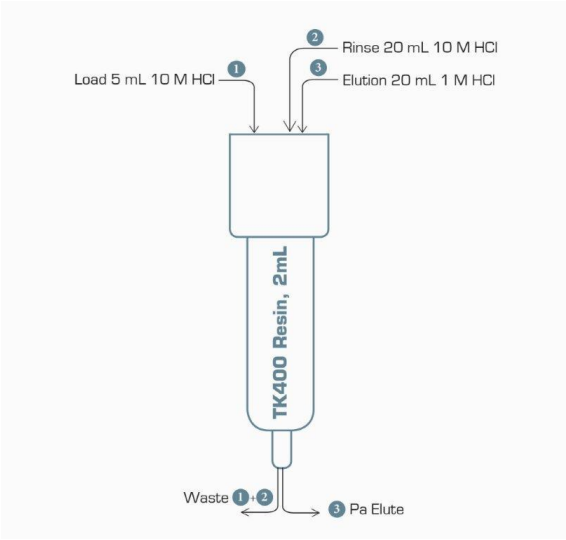

Figure 6: Pa separation from its descendants following Jerome et al.[2]

Bibliography

(1) A.K. Knight et al.: “A chromatographic separation of neptunium and protactinium using 1-octanol impregnated onto a solid phase support”, J Radioanal Nucl Chem (2016) 307:59–67

(2) S. Jerome et al.: ”Isolation and purification of Protactinium-231”, submitted to the ICRM 2017 conference, 15 – 19.05. 2017, Buenos Aires,

(3) V. Ostapenko et al.: “Sorption of protactinium(V) on extraction chromatographic resins from nitric and hydrochloric solutions”, J Radioanal Nucl Chem, (2016), DOI 10.1007/s10967-016-4996-x

(4) C. Dirks et al.: “New developments – TrisKem”, presented at the RANC 2016 conference, 10-16.04.16 - Budapest, Hungary