TRISKEM INFOS

TRISKEM SHARING INNOVATION

NEW PRODUCTS

CU Resin

TrisKem International is increasing its offer in including CU Resin. CU Resin as CL Resin is the second product issued from our R&D work. CU Resin is used for the selective separation of copper, and more particularly for the separation of Cu-64 and Cu-67 radio-isotopes.

The CU resin has been characterized for different elements, especially for those representative of Zinc or enriched Nickel targets, and for different acidic media.

CU Resin retains selectively copper from pH 2 to 5 for HCl, HNO_3 and H_2SO_4 acids over all the tested cations including Ni and Zn. In HCl and H_2SO_4 media, iron is co-extracted but in a lesser extent : the selectivity Cu/Fe, $\alpha_{Cu/Fe}$, decreases as pH increases ($\alpha_{Cu/Fe}$ is about 1000 at pH 2 and about 70 at pH 5) (fig 1).

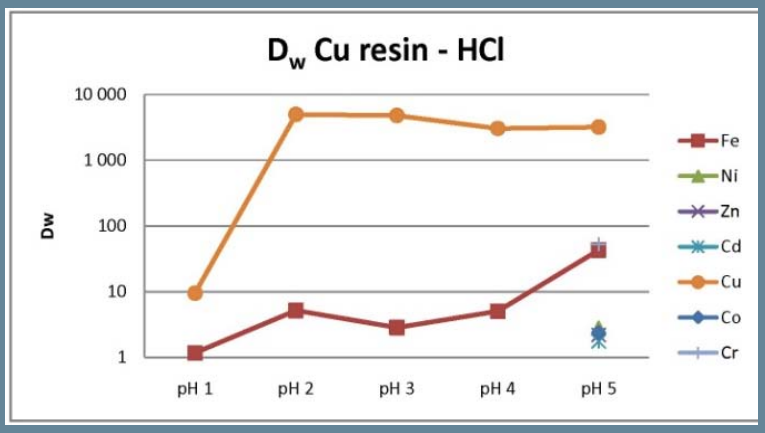

Figure 1: D_W of Cu and selected elements on Cu resin in HCl in varying pH values (1).

Cu uptake is generally high at pH values greater than 2 while it can be easily eluted with mineral acids of concentrations greater than 0.1M.

Main application of the CU resin is the separation of Cu isotopes (e.g. Cu-64, Cu-67) from irradiated targets (typically Zn or Ni targets). Accordingly, besides having high selectivity for Cu over Ni and Zn, the resin also has to be robust against interference by elevated amounts of Zn and Ni. Figures 2a and 2b summarize the influence of Zn or Ni on...

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EDITO

It has been four years since TrisKem International exists and insures quality of its manufacturing.

Regularly audited, TrisKem is eager to supply high quality products through its Sales Department attentive to your demands and through its Technical Support Service for any of your requests; it is then naturally that we passed the follow-up of our ISO 9001-2008 certification last May. Our certificate is available on our website at

www.triskem-international.com.

Customer focus, technological and regulatory monitoring… constitute partly the basement of the information you will find in this issue regarding our new CU Resin, about the tips and tricks developed Page 2 and other product information given.

We are looking forward to exchanging with you during the different conferences and congresses we'll be attending during this second half of 2011 (Cf. page 4).

Céline Vignaud
Administrative manager

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Tips and tricks

- **TRU Resin and temperature**

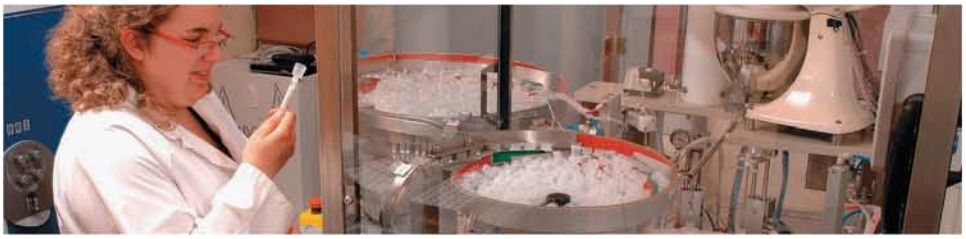
In the TrisKemInfo N°4, we indicated that the best temperature range of the resin was 20-25°C. Regarding TRU Resin, we have observed significant change in radionuclide recovery when temperature is above 26°C. Below 18°C, the performance of the resin remains the same but the flow rate is lower than 0.6mL/min. It is then important to ***perform the separation within 20-25°C*** whenever possible.

- **Pre-conditionned columns solvent**

The columns manufactured since June 2011 are wetted with 0.01M HNO_3 (instead of 0.1M HNO_3) for all resins except NI Resin. This does not affect the characteristics of the resins but allows a more "friendly" chemical classification, hence their transport and use. You'll find information about the columns solution on the corresponding **MSDS**.

- **SR Resin and photosensitivity**

Technical support and customer focus have reported that SR Resin in bottles was becoming photosensitive in time of prolonged storage (above 3 years). To protect SR Resin packed in bottles from this effect, it will soon be packed in Amber HDPE bottles.



...on the Cu extraction. As can be seen even high amounts of both elements interfere only slightly with the Cu uptake in HCl at pH 2, even at 1g of Ni or Zn per g of CU resin employed the D_W(Cu) remains greater than 1000.

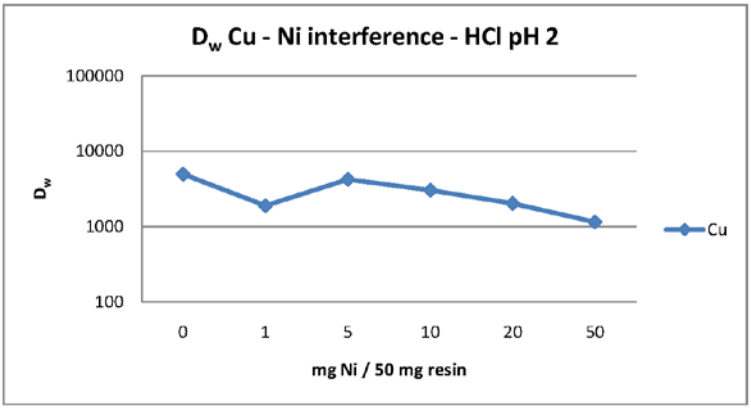


Figure 2a: D_W of Cu on CU Resin in HCl at pH 2 in presence of various amounts of Ni (1).

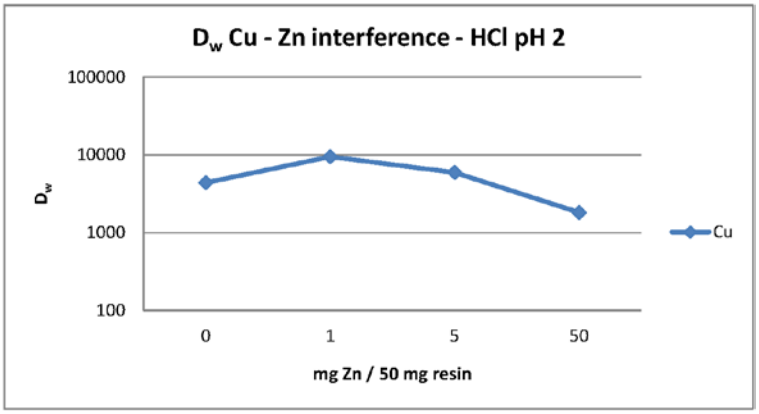


Figure 2b: D_W of Cu on CU Resin in HCl at pH 2 in presence of various amounts of Zn (1).

A method for the separation of Cu from Ni and Zn targets was optimized using simulated target solutions (1). Two types of solutions were tested:

- simulated Ni target solutions containing 10 µg each of Cu, Co, Zn and 200 mg of Ni in 5 mL HCl at pH 2,

- simulated Zn target solutions containing 10 µg each of Cu, Co, Ni and 200 mg Zn in 5 mL HCl at pH 2)

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www.triskem-international.com

For both simulated target solutions, Ni, Zn and Co are quantitatively removed from the column during sample solution loading and rinsing whereas Cu is recovered in high yield (>85%) in 1 – 1.5 mL 8M HCl (2,3).

Further optimisation of the elution conditions led to the method shown in Figure 3 (2).

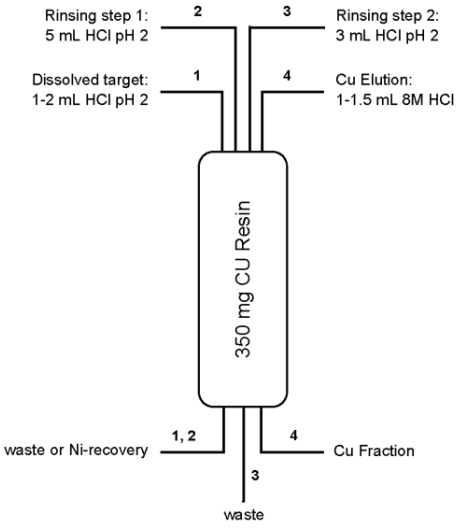

Fig. 3: Optimized Cu separation method (2, 3).

The method can be performed at elevated flow rates (e.g. using a vacuum box) without impacting its performance. Loading of the column and Cu elution should be done at approx. 1 mL/min, rinsing of the column can be done at up to 6 mL/min; the final Cu fraction can thus be obtained in 3 – 5 minutes.

Element	Decontamination factor
Ni	> 20000
Zn	> 40000
Ga	> 10000
Co	> 30000
Au	> 30000

Table 1: Decontamination factors of selected elements (3).

Overall decontamination factors obtained are high (Table 1). Cu yields were found to be in the order of 90% in 1 mL of 8M HCl and > 95% in 1.5 mL 8M HCl; Cu is thus recovered near quantitatively in a very small volume.

With respect to the high pricing of some target materials, like isotopically enriched Ni-64, it is very important to assure quantitative recovery of these materials. Experiments show approx. 100% of the Ni is contained in the eluate from the sample loading and the first rinsing step, Ni can thus be quantitatively recovered in a very small volume allowing for easy additional purification if necessary.

For certain applications the Cu eluate might be too acidic, in these cases (alternative to evaporation of the Cu fraction and redissolution in a more suitable solvent) it is possible to convert the Cu eluate using a small anion exchange column. Fig. 4 schematically shows such a conversion method using anion exchange resin (AIX resin). In addition to the converting the Cu elute from high acid conditions to low acid or neutral conditions the conversion step also further concentrates the Cu and increases Ni, Zn, Au and organic impurity decontamination.

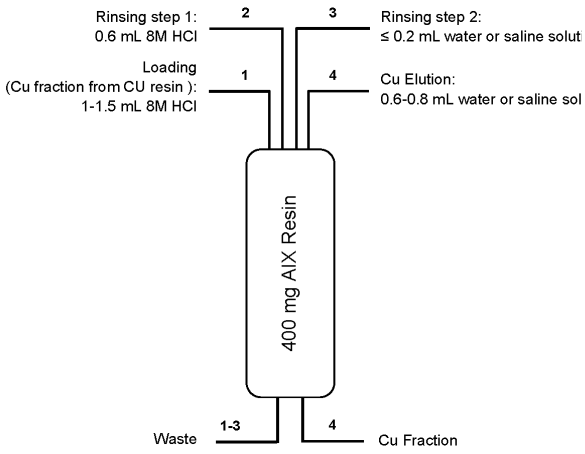

Fig. 4: Conversion step using anion exchange, A8 resin (Eichrom Technologies), 100 – 200 mesh (2, 3).

For more info on CU Resin, :
http://www.triskem-international.com/en/iso_album/ft_resine_cu_en_101130.pdf

You can find former issues of our newsletter on our website. Would you stop receiving the TrisKem Infos, please advise us by either contacting us at *contact@triskem.fr* or by phone to +33 (0)2 99 05 00 09.

AGENDA

° 19th International Symposium on Radiopharmaceutical Sciences – 28/08-02/09/2011, Amsterdam (Netherland) *http://www.isrs2011.org/*

° 7th International Conference on Isotopes – 4-8/09/2011, Moscow (Russia) *http://www.isotop.ru/en/events/information-for-participants/information-for-participants-2/*

° 3rd International Nuclear Chemistry Congress – 18-23/09/2011, Palermo (Italy) *http://3rdincc.mi.infn.it/*

° Workshop: Gestione in qualità di un laboratorio di radiometria: : applicazioni della ISO 17025 – 29-30/09/2011, Urbino (Italy) *http://www.anpeq.it/urbino_2011.pdf*

You will find the update on our participations to conferences on our website

It was further tested whether the developed method could also be applied to other matrices and applications (3). It could be shown that that Cu is quantitatively extracted from 10 mL acidified (pH 2.3) sea water. The Cu was then eluted with greater 95% yield in 1 mL 8M HCl, obtained Cu fraction is very pure (Fig 5).

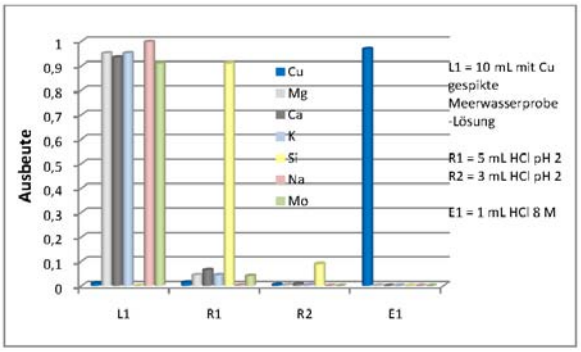

Fig. 5: Elution study Cu spiked sea water sample (3)

Bibliography

(1) C. Dirks, B. Scholten, S. Happel, A. Zulauf, A. Bombard, H. Jungclas: Characterisation of a Cu selective resin and its application to the production of 64Cu. J Radioanal. Nucl. Chem, 286 (2010) 671-674, DOI 10.1007/s10967-010-0744-9, (2010). TrisKem Referenz: T-DC110.

(2) C. Dirks, S. Happel: Characterization of a Cu selective resin and its application to the production of Cu-64. Presentation at the TrisKem International users group meeting, 14/09/2010, Chester (UK); available online: http://www.triskem-international.com/iso_album/ugm_chester_10_dirks_happel_cu_resin.pdf

(3) Diploma thesis C. Dirks: Charakterisierung eines extraktions chromatographischen Harzes zur selektiven Kupfer Trennung. Philipps-University Marburg December 2010. TrisKem Referenz: T-DC210.

IN BRIEF

DGA Resin

DGA Resin, dedicated to the separation of actinides, more particularly to Americium separation, had been available in 50-100 µm particle size in bottles and cartridges. Since July 2011, DGA resin becomes available upon request in 100-150 µm particle size (DN-A) suited for column packing and gravimetric flow.

For column packing, the DGA Resin needs to be wetted for about 12h in 2-3M HNO3. In chemical classification, this acidic concentration is considered “dangerous” and would need special shipping. In our sales policy, shipment is supported by the customer. For this reason, we have decided for the moment to provide DGA 100-150 µm only as bottles to avoid any increase of the delivery cost for the customer.

DO NOT HESITATE TO CONTACT US FOR MORE INFORMATION

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