TRISKEM INFOS

TRISKEM SHARING INNOVATION

NEW PRODUCTS

Specific Ra and U NucFilms discs

TrisKem International is increasing its offer in including products dedicated to radium and uranium determination in waters. You want to perform rapid analysis of Radium and/or Uranium in water ? Try the Ra and U NucFilm discs. The active surface is made of a thin layer coated on a polyamide or polycarbonate disc depending on the radionuclides to analyse. Radium and Uranium are sorbed on the thin layer by simple contact between the active surface and the water sample. The standard dimensions of the discs allow direct counting in alpha chamber. This technology has been developped by NucFilm Gmbh.

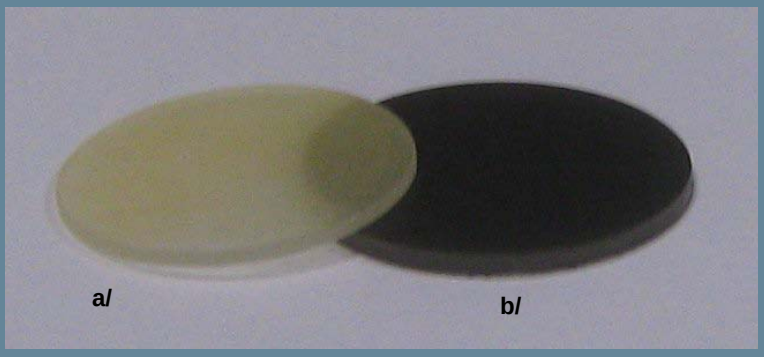


Figure 1 : a/ Ra NucFilm disc, b/ U Nucfilm disc

	Ra NucFilm	U NucFilm
Physical and chemical properties		
∅ disc (mm)	24.5	24.5
∅ active (mm)	24	24
Disc thickness (mm)	1.6	1.1
Support	Polyamid66	Polycarbonate
Active componant	MnO_2	Diphonix® Resin
Single absorbing side, back side writeable		
Operating conditions		
Recommended T of use (°C)	/	/
Recommended pH of use	4-8	2-3
Storage : Dry and dark		

(NEXT) PAGE 2

EDITO

We are glad to inform you that our certification ISO 9001-2008 had been renewed last May. You will find our updated certificate on our website www.triskem-international.com.

Our objective to develop partnerships with universities and industries remains strong. Our last new products consist on thin layers deposited on discs for the measurement of Ra and U in waters. You'll find more information Page 2 as well as on the technical sheets and associated methods available for loading on our website.

We'll be glad to meet you at the different conferences and meetings coming (see page 4 for details of events).

Aude Bombard
Product manager

Users' Group Meeting

On September 14th 2010

Chester, UK

Do not hesitate to register !!
Registering form Page 4

N°4
July
2010

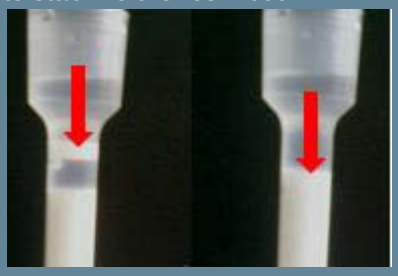
TRISKEM INFOS
Publication Manager : Michaela Langer • Writting : Aude Bombard
Graphic Designer : Essentiel – Rennes • ISSN 1968-9225

Tips and tricks

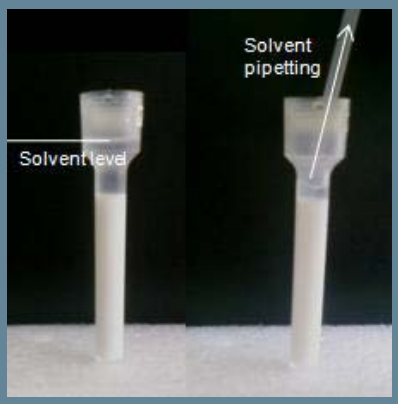
- If you store the resins in a fridge, let them come back to room temperature (20-25°C) before use otherwise you might observe significant changes in flow rates and chemical recoveries.

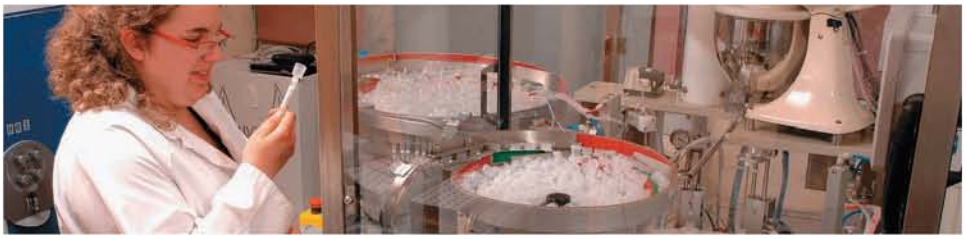
- **2mL columns preparation**

1/ There is a void between top of resin and upper frit to allow any air bubble to end in this solvent space. Upper frit can be pushed down right above the resin front to eliminate air bubble if any and to stabilize the resin bed.



2/ Our columns are packed by an automated machine. Then there might be “free” resin on top of the columns. This relicate can be eliminated by pipetting it along with some solvent.





Discs absorption for Ra : Ra-NucfilmDiscs

MnO_2 is renowned for efficiently adsorbing Ra even at high Ca concentration. Recent improvements in the fabrication of MnO_2 layers based on anterior works (1-5) now allow the fabrication of selectively adsorbing MnO_2 coated as a thin film onto the surface of a polyamide disc. These coated substrates are available as Ra -NucfilmDiscs.

Due to their high selectivity for Ra the discs allow the direct determination of Ra isotopes in water samples without applying additional radiochemical separation methods. The discs are contacted with the untreated water samples (pH 4 – 8, typical volume = 100 mL) under stirring for 6h. Under these conditions the Ra extraction is typically greater than 90%.

The dried disc can then be measured with a solid state alpha detector. The energy resolution of the obtained sources is very good as demonstrated in Fig.2.

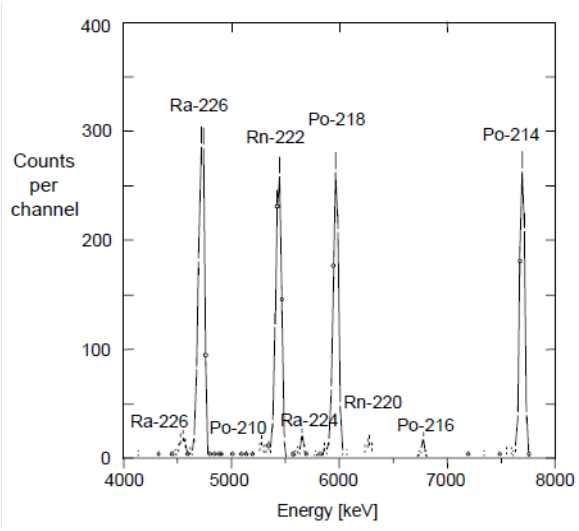


Figure 2: Alpha spectrum of a radium adsorbing thin film exposed to a Portuguese mineral water.

Apart from Ra, Po is also adsorbed with high efficiency. Uranium adsorption is in general low, less than 5% of the U-238 or U-234 activities present in the sample are adsorbed. There are large variations in this adsorption efficiency, these variations may be due to differences in the chemical form in which uranium is present in the sample; CO_3^{2-} forms quite stable anionic or neutral complexes with the uranyl cation (UO_2^{2+}), which are not adsorbed by the MnO_2. Carbonate thus helps avoiding U adsorption; the same applies for Th (6).

The Ra-NucFilm discs can also be used for the determination of Ra-228 by following the ingrowth of Th-228 over an extended period (7).

For more information, do not hesitate to contact us and/or to load technical data sheet from our website
www.triskem-international.com

Discs absorption for U : U-NucfilmDiscs

U-Nucfilm discs are based on finely ground Diphonix resin® (8, 9) that has been immobilized on a polycarbonate disc in the form of a thin layer (Uranium is adsorbed very close to the surface, within about 1 µm.). The Diphonix resin® is a very strong cation exchange resin containing diphosphonate groups, which determine the resins selectivity for actinides, and sulfonate groups for increased absorption kinetics. It showed to have the required selectivity for U, while Ra adsorption is very low (8, 9). Additionally it allows working at low pH and thus eliminating potential interference of the U extraction by its complexation by dissolved CO_3^{2-}.

U adsorption is considerably slower on these films than the Ra adsorption on MnO_2 films; it takes about 20h until equilibrium is reached (4h to 50% equilibrium).

After 20h a 24 mm diam. disc exposed to an acidified, stirred 100 mL sample takes up typically more than 90% of the U. The pH can be adjusted with a wide range of different acids (e.g. formic, citric or nitric acid) and should be kept below pH 3, preferably at pH 2. It is recommended to use formic acid.

After drying the exposed disc can be measured with a solid state alpha detector. As shown in Fig.3 energy resolution is not quite as good as for the MnO_2 films. Using a 900 mm^2 detector and a detector to sample distance of 10 mm the uranium peaks can be fitted with the sum of a gaussian and an exponential tailing of gaussian: FWHM 30 to 40 keV and tailing: 30 to 50 keV to 1/2 peak maximum, nevertheless the U-234 and U-238 peaks are clearly separated.

The analysis of a 100 mL sample (counting time t=80000 s, 900 mm^2 Si-detector at 10 mm distance) typically results in a detection limit (LLD) of about 10 $mBq.L^{-1}$ for U-234 and U-238.

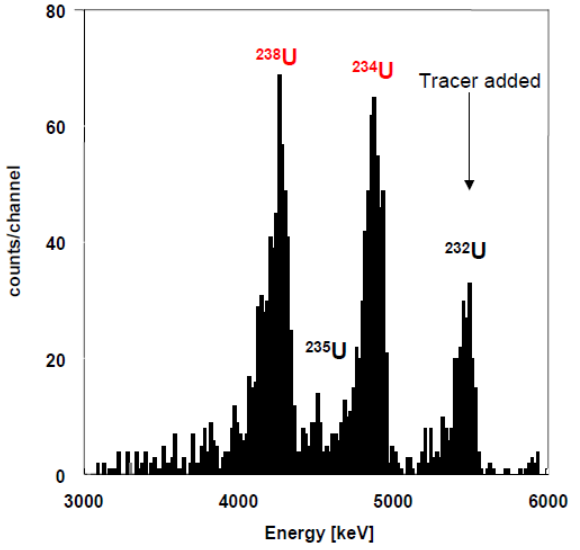


Figure 3: Alpha spectrum of a mineral water sample ("Aproz Ancienne", Valais, Switzerland) obtained using a U-Nucfilm disc; Counting conditions: 900 mm2 Si-detector at a distance of approx. 11 mm, acquisition time : 80'000 s. Added tracer activity is 200 $mBq.L^{-1}$.

Bibliography

(1) Glöbel, B. and Berlich, J., Eine einfache und schnelle Methode zur Bestimmung von 226Ra in wässrigen Proben, In: Proc. Fachgespräch Ueberwachung der Umweltradioaktivität, 22-24 March 1983, Karlsruhe, 1983

(2) Moore, W.S. and Reid, D.F., Extraction of Radium from Natural Waters Using Manganese Impregnated Acrylic Fibers, J. Geophys. Res. 78, 8880-8886, 1973

(3) Surbeck H., Piller, G. and Ferreri, G., Die Suche nach Radonquellen, In: Tagungsbericht "Radon und die Strahlungsbelastung der Lunge", Crameri, R. and Burkart, W.(Eds.), PSI-Bericht Nr.22, Villigen, Switzerland, 1989.

(4) Surbeck, H., Determination of natural radionuclides in drinking water, a tentative protocol, Sci.Total Environment, 173/174, 91-99, 1995.

(5) Moon D.S., Burnett W.C., Nour S., Horwitz E.P., Bond A., Preconcentration of Radium Isotopes from Natural Waters Using MnO2 resin, Applied Radiation and Isotopes, 59, 255 – 262, 2003

(6) Morvan K., Andres Y., Mokili B. and Abbe J.C., Determination of Radium-226 in Aqueous Solutions by α-Spectrometry, Anal. Chem., 73 (17), 4218–4224, 2001

(7) Eikenberg, J., Tricca, A., Vezzu, G., Bajo, S., Ruethi, M. and Surbeck, H., Determination of Ra-228, Ra-226 and Ra-224 in natural water via adsorption on MnO2-coated discs, J. Environmental Radioactivity, 54, 109-131, 2001

(8) Horwitz, E.P., Chiarizia, R., Diamond, H. Gatrone, R.C., Alexandratos, S.D., Trochimzuk, A.Q. and Creek, D.W., Uptake of Metal Ions by a New Chelating Ion Exchange Resin, Solv. Extr. Ion Exch., 11, 943, 1993

(9) Diphonix® Resin: A Review of its properties and applications Chiarizia R. et al., Sep. Sci. Technol., 32, 1 – 35, 1997

IN BRIEF

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.

Users' Group Meeting

In order to give as many people as possible the possibility to participate we decided to hold our Users Group Meeting on the 14th of September in the Best Western Premier Queen Hotel in Chester (UK), just before the 11th ERA conference taking place in Chester from the 15th – 17th of September in the same hotel. Registration will start at 11:30h; you are then cordially invited to join us for lunch. The meeting will start at 14h and last until about 17:30h.

You will find below the registration form. In case you'd like to participate to the meeting please be so kind as to return us the filled form by e-mail, fax or postal mail.

We cordially invite you to attend our Users Group Meeting, and to also participate by presenting your work during the meeting!

We are very much looking forward to meeting and discussing with you.

AGENDA

° LSC 2010 - Advances in Liquid Scintillation Spectrometry – 6-10 September 2010, Paris (France)
http://www.nucleide.org/LSC2010/index.htm

° TrisKem International-Users' Group Meeting – 14 September 2010, Chester (UK)
contact@triskem.fr

° 11th International Symposium on Environmental Radiochemical Analysis – 15-17 September 2010, Chester (UK)
http://www.rsc.org/ConferencesAndEvents/MemberEvents/ERA/index.asp

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

REGISTRATION USERS GROUP MEETING CHESTER – 14.09.2010

Please fill in capital letters

Last Name*:					
First Name*:					
Company / Organization / Department*:					
Address*:					
ZIP Code*:		Country*:		Phone*:	
City*:		e-mail*:		Fax:	

I would like to give a presentation entitled:

I would like to join for lunch*: Yes ☐ No ☐

Please indicate if you have special wishes for the lunch (vegetarian, allergies, no fish,...)	

Name*: Date*:

*obligatory

Important:

Abstract deadline: **02.08.2010**

Registration deadline: **03.09.2010**

We would like to ask the presenters to be so kind as to send us their presentations before the **03.09.2010** in order to allow us to include them into the meeting booklet.

DO NOT HESITATE TO CONTACT US FOR MORE INFORMATION

TRISKEM INTERNATIONAL
Parc de Lormandière Bât. C • Rue Maryse Bastié • Campus de Ker Lann • 35170 Bruz • FRANCE
Tel +33 (0)2.99.05.00.09 • Fax +33 (0)2.99.05.07.27
www.triskem-international.com • email : contact@triskem.fr