TRISKEM INFOS

TRISKEM SHARING INNOVATION

NEW PRODUCTS

LIQUID SCINTILLATION COCKTAILS

TrisKem International has increased its number of references with liquid scintillation cocktails and associated accessories such as scintillation vials. The products are made in Great Britain by Merdian. Do not hesitate to contact us for the price-list which is reviewed quarterly to remain closest to our supplier pricing.

2 types of liquid scintillation cocktails are available: ProSafe and Gold Star cocktails.

- **ProSafe cocktails**

ProSafe cocktails are high flashpoint, PXE based, 100% biodegradable, high performance LSC cocktails. They were especially designed to be in accordance with the EC Directive 2003/53/EEC.

ProSafe cocktails do not contain any Nonyl Phenol Ethoxylates (NPEs) or other Alkyl Phenol Ethoxylates (APEs) which produce endocrine disrupting metabolites upon biodegradation and are thus suitable for drain disposal, depending on radionuclide content of the counting samples and local radiation protection regulations.

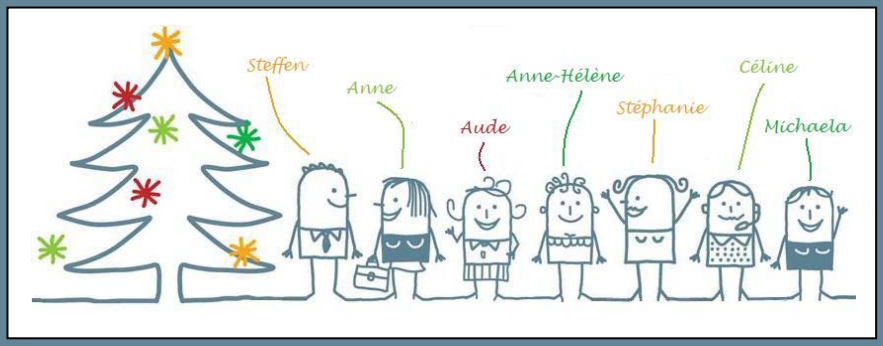
Different ProSafe cocktails are available to cover a wide range of sample type counting:

- ProSafe FC
- ProSafe HC
- ProSafe
- ProFlow G General purposes
- ProFlow P Phosphate Gradients

- GoldStar Cocktails

GoldStar and GoldFlow cocktails are classical… **(NEXT) PAGE 2**

Please note that TrisKem will be closed from 24th December to the 1st January included.



We wish you a merry Christmas, a good start into the New Year and a happy and successful year 2010!

EDITORIAL

As the year 2009 draws to a close we would like to take the opportunity to thank you for your loyalty and trust.

It is now almost 3 years we have been producing SR, TEVA, TRU and UTEVA Resins, ensuring performance and quality to respect your procedures. With these same performance and quality criteria, we have extended our range of references with products dedicated to liquid scintillation. We now provide liquid scintillation cocktails, scintillation vials, solubilizers, carbon trap solution,…(*Cf.* Pages 1 and 2). We hope these new products will meet your requirements.

You will find in this issue information regarding Actinide Resin: characteristics and different applications.

We'll be very happy to meet you in the different conferences held in 2010 and to which we'll be participating. You will find the details of these conferences page 4.

Aude Bombard
Product Manager

N°3 December 2009

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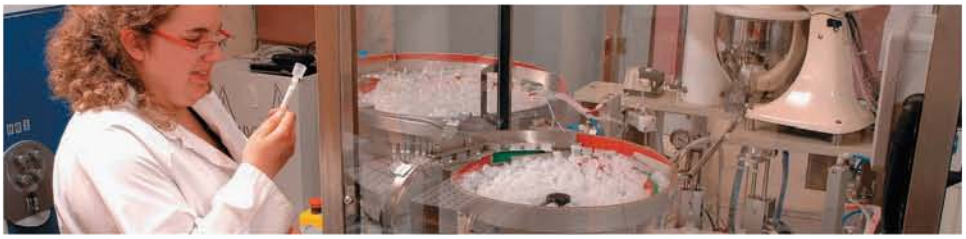
NEED TO TEST THE LIQUID SCINTILLATION COCKTAILS BEFORE USING THEM IN ROUTINE?

- Do not hesitate to ask for **samples** to test them for your applications.
- Our 2010 pricelists for resins and accessories and liquid scintillation cocktail are now **available**.
- Do not hesitate to contact our technical support regarding any demand/request when implementing new procedure.

You may send your demands at contact@triskem.fr or call us at +33 (0)2 99 05 00 09.



- **Gold Star Cocktails**

GoldStar and GoldFlow cocktails are classical high flashpoint DIN based, biodegradable multipurpose LSC cocktails designed for high sample capacity and counting efficiency. GoldStar cocktails contain NPEs and are thus not drain disposable.

The available cocktails are:

- Gold Star
- Gold Flow
- Gold Star LT^2

Gold Star LT^2 cocktail can be used for the counting of tritium in aqueous and urine samples. It can also be used in case of an α/β discrimination.
The main applications are the liquid scintillation counting of organic and aqueous samples.

- Radon (Rn) Cocktails

These cocktails were designed for the measurement of radon in aqueous samples. Two cocktails are available:

- RadonCount
- ProSafe Rn

The Table below shows the use equivalence of the cocktails.

Meridian	PerkinElmer
ProSafe	Ultima Gold / Hi-Safe 2
ProSafe HC / Gold Star	Ultima Gold XR / Hi-Safe 3
ProSafe FC	Ultima Gold MV / Supermix / Filter-Count
Gold Star LT2	Ultima Gold AB / Ultima Gold LLT / Tri-Safe
ProSafe TS	Hionic Fluor
ProSafe Rn	Ultima Gold F / Scint Hi-Safe / High Efficiency Mineral Oil Scintillator
RadonCount	Insta-Fluor Plus / OptiScint Safe
ProFlow G/Gold Flow	Ultima-Flow M / Opti-Flow Safe I
ProFlow P	Ultima-Flo AP / Ultima-Flo AF
CarbonCount	Permafluor E+ / Optisorb-S
CarbonTrap	Carbosorb E / Optisorb-1
GoldiSol	Soluene-350 / Optisolve
AquiGest	SOLVABLE
Hyamine hydroxide	Hyamine hydroxide

Do not hesitate to contact us for more information or to visit the technical sheets of the Liquid scintillation products at www.triskem-international.com

ACTINIDE Resin

The Actinide Resin (AC resin, in the literature also referred to as DIPEX™ resin) is mainly used for the preconcentration and separation of actinides from acidic solutions obtained from environmental samples (soil and large volume water samples) [1] [2] [3]. The AC Resin shows a higher affinity for actinides in general and in particular a better selectivity for americium, compared to its ion exchange analogue Diphonix®. This high affinity is also used for the determination of the gross alpha activity of urine and water samples [4] [5].

The AC Resin is composed of an inert support which is impregnated with bis(2-ethylhexyl) methanediphosphonic acid (H_2DEH[MDP]) (Figure 1).

Horwitz et al. [1] studied the extraction characteristics of the resin in hydrochloric acid. The extraction equilibrium of Am(III) and Fe(III) is reached within 20 min, 30 min respectively, independent of the hydrochloric acid concentration.

The figures 2a and 2b show that the retention of actinides and various other elements frequently found in environmental samples (Ca, Fe,…) is very strong at pH 2 and is then diminishing more or less distinctively with increasing acid concentration. The elements shown in fig. 2b represent potential interferents for the uptake of actinides, especially at pH 1 or 2. Bi(III), Fe(III), Ti(IV), Eu(III) and Fe(II) can interfere over the whole acid range. It should be noted that Ra(II) is also very well fixed at pH 2.

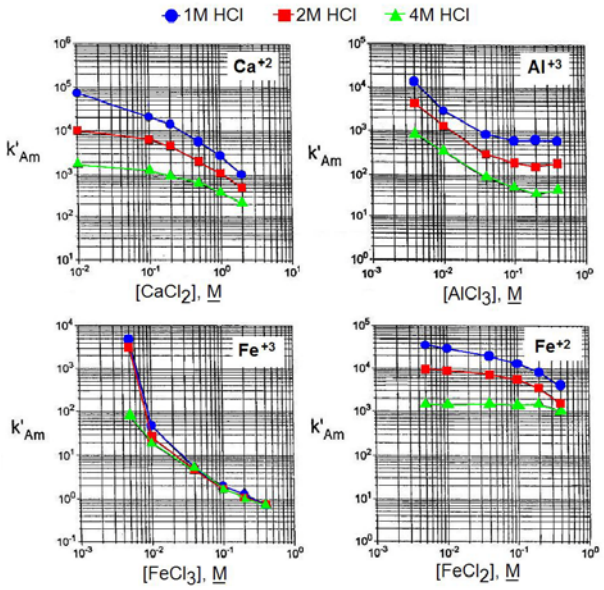


Figure 3 : Actinide Resin selectivity for Am(III) in presence of Ca(II), Al(III), Fe(II) et Fe(III) in 1M, 2M and 4M HCl [1].

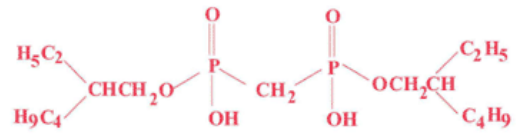


Figure 1 : P,P'-di(2-ethylhexyl) methanediphosphonic acid or (H_2DEH[MDP]) [1] [2] molecules.

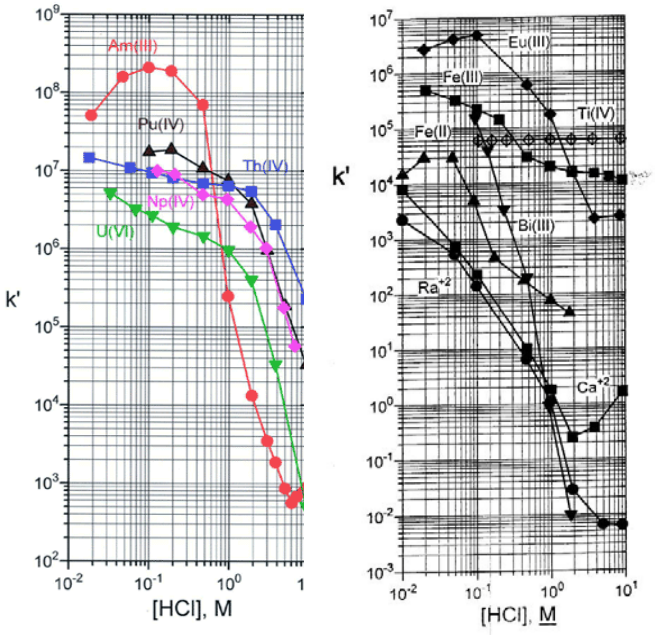


Figure 2a : Retention curves of actinides in HCl [1] .
Figure 2b : Retention curves of different elements in HCl [1].

With regard to the high selectivity of the resin for Am the authors also evaluated the impact of several interferents, namely Ca, Al and Fe, on the Am uptake (Fig. 3). The interference shown by the elements increases in the order Fe(II)<Ca(II)<Al(III)<Fe(III). Fe(II) shows very little impact on the Am uptake, the capacity factor k' of Am(III) remains greater than 10E3M for all HCl concentrations and Fe(II) concentrations between 10E-2M and 2M. For Ca the k'_{Am} remains greater than 100 at Ca concentrations between 10E-2 and 2M. Fe(III) concentrations equal to or higher than 10E-2M on the other hand efficiently prevent the retention of Am, independent of the concentration of HCl.

AGENDA

° NORM VI-6th International Symposium on Naturally Occurring Radioactive Material – 22-26 March 2010, Marrakech (Marocco)
http://www.norm6.ma/

° 16th Radiochemical Conference – 18-23 April 2010, Marianske Lazne (Czeck Republic)
http://www.radchem.cz/

° Procorad - 23-25 June 2010, Frascati (Italy)
http://www.procorad.org/uk/avenir_reunion/

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

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

° TrisKem International – Users' Group Meeting – 18 September 2010, Chester (UK)
contact@triskem.fr

IN BRIEF

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The AC Resin is robust against the interference of HF which is often used for total dissolution of soil samples [1]. The authors additionally studied the behavior of Ti(IV) since it is strongly retained on the resin (k'~6x10E4) and can thus interfere with the retention of the actinides. For both of the HCl concentrations tested in the study the HF shows very little impact on the retention of the actinides. At HF concentrations greater than 1M the k' values start to diminish, but remain, even at a HF concentrations as high as 4M, greater than k'~10E3.

The interference caused by selected anions (sulfate and phosphate) were evaluated for Np(IV). The capacity factor k'Np(IV) drops from 5x10E7 to 2x10E4 in 1M HCl and from 10E6 to 2x10E4 in 3M HCl. There is thus a distinct impact of both anions on the retention, nevertheless, the k' remains greater than 10E4, strong Np retention is thus ensured even at sulfate or phosphate concentrations up to 4M.

The resin is used to concentrate actinides from leached soil samples (up to 5g of soil[1] [2]), water samples (up to 100L[1] [2] [3] [4]) or urine[4]. For aqueous samples it was found that the extraction is quantitative for resin to sample ratios up to 250mg of resin/L of sample [1] [2]; Eikenberg et al. established that a ration of 400mg of resin/L is necessary for urine samples[4]. The measurement of the actinides after their extraction can then be performed by different methods (see Technical Sheet of the Actinide Resin at http://www.triskem-international.com/en/full_technical information resins.asp).

The water samples are acidified to pH 2 and a known quantity of resin is added to the sample (note: in order to assure quantitative Ra extraction the amount of resin needs to be adjusted for very Ca rich samples). The extraction of the alpha emitters is performed in batch mode under stirring for 30 min up to overnight. The resin is then filtered using a cellulose acetate filter and allowed to dry. It is then transferred, either with or without the filter, into a scintillation vial. A LSC cocktail is added and the sample is shaken vigorously. The cocktail dissolves the extractant from the resin (including the extracted cations) while the stripped resin settles down at the bottom of the vial; the filter becomes translucent in contact with the cocktail and is thus not interfering with the subsequent LSC measurement. The described method allowed obtaining a detection limit of 30 mBq/L for a 4h counting time using a sample volume of 100 mL and its accuracy was shown by the successful participation to a OPRI intercomparison exercise[5].

Kwakman[5] also tested his method on the cooling water of nuclear installations and found that numerous beta emitters were also extracted onto the resin. Studies on the use of the AC resin for the determination of the gross alpha and beta activity are currently under way.

Finally the characterization of the resin by Horwitz et al.[1] indicated that it might be possible to use it for the separation of radium and actinium. Both elements are retained at pH 1 – 2, Ra can then be eluted using 1M HCl.

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