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● Liquid Scintillation Cocktails

● EDITO

In December 2009 we introduced a new range of products dedicated to liquid scintillation counting. These are provided by Meridian Biotechnologies Ltd (UK) and include liquid scintillation cocktails, consumables for oxidizers/pyrolyzers, tissue solubilisers solutions and plastic and glass scintillation vials in 7, 8 and 20mL.

Two ranges of standard liquid scintillation cocktails are available, Gold Star and ProSafe+, in addition to other technique-specific LSC cocktails (e.g. CarbonCount,..).

Gold Star cocktails are standard DIN/NPEs-based cocktails designed for high sample capacity and counting efficiency. Gold Star cocktail is the most popular (similar to Ultima Gold XR and HiSafe3) and Gold Star LT2, is used for low level tritium and alpha/beta discrimination counting.

Gold Star LSC cocktails' performance with aqueous phases is presented Fig. 1. Aqueous solutions that have been tested are typical elution conditions encountered when using our resins (ca. SR, TRU, NI). For salt solutions and acidic solutions of pH > 0.5, the volume ratio of solution to LSC cocktail can be up to 1. For highly acidic solutions (ca. 4M HNO₃), the maximum volume of solution accepted by 10mL of LSC cocktail is 2.25 mL.

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Dear customers,

2011 – a year full of events which have had a significant impact on our profession. Between the accident in Fukushima and the Euro crises, the nuclear industry, its subcontractors as well as the radio-analytical services have gone through a difficult time.

Nevertheless we should be aware of the importance of radio-chemists and their know-how ; taking into account the advance in environmental monitoring, new separation techniques in the field of decommissioning and of course the improvements in cancer diagnosis and therapy.

In 2012 our innovative projects and collaborations will be again requested. I look forward to meeting you and to construct together a positive future.

In this sense I wish all of us a nice a relaxing end of the year 2011 and that our wishes and projects will come through in 2012.

Michaela Langer
TRISKEM CEO



Happy Holidays and Best Wishes for year 2012

Please note that TrisKem will be closed from 26th to 30th December included



Tips and Tricks

• Reminder

In order to have optimum results/separation, it is important to **perform the separation within 20-25°C** on TRU and RE Resins whenever possible (Cf. « Tips and Tricks » July 2011).

• Cartridges: flow valves for flow-rate regulation coming soon.

We had numerous requests about accessories that could help regulating the flow-rate of cartridges when used with a vacuum-box (fig. 3):

Appropriate flow valves will be available starting in January 2012 under the reference AC-12-VALVE (bag of 12 units).

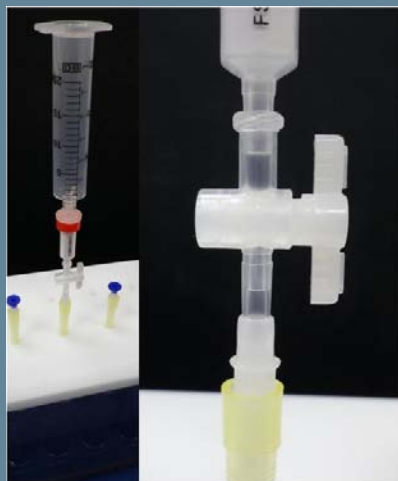


Figure 3: Details of a flow valve.

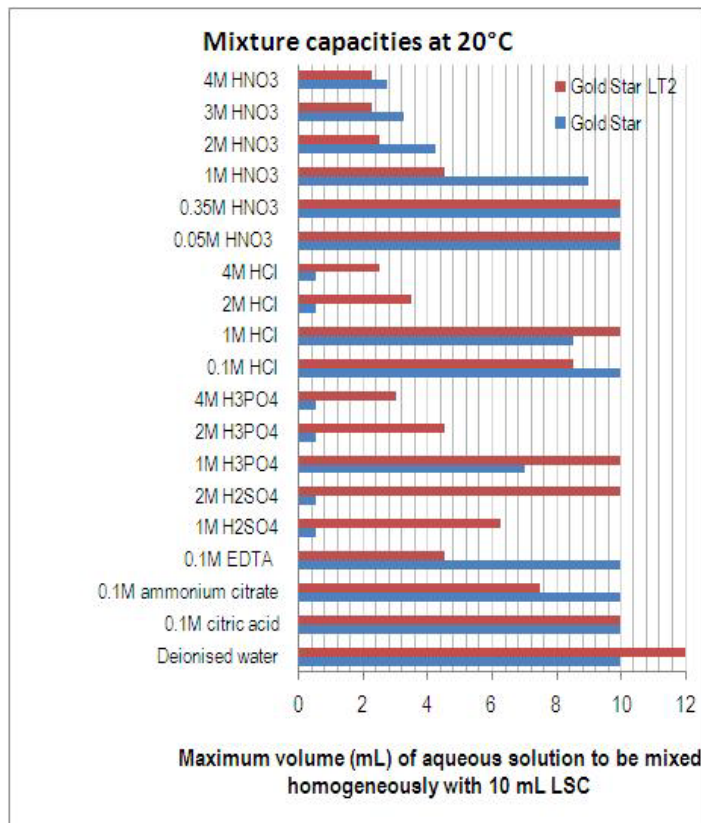


Figure 1: Comparison of the capacity of 10mL of Gold Star and Gold Star LT2 LSC cocktails mixed with different aqueous solutions.

Depending on the nature of the aqueous solution, the capacity of the LSC cocktail will be temperature dependent.

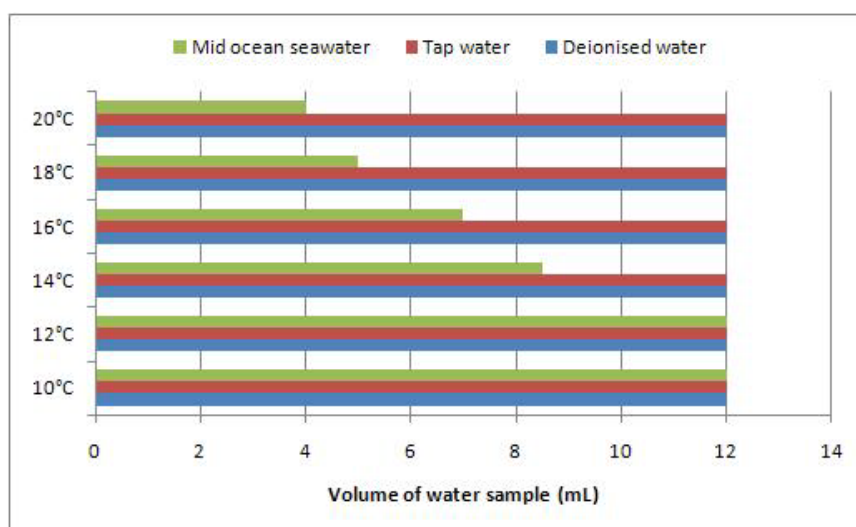


Figure 2: Capacity of 10mL Gold Star LT2 LSC cocktail mixed with samples of various waters at different temperatures.

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



Gold Star LT2 LSC Cocktail (GS-LT2) is mainly used for the determination of very low tritium activity levels in water samples (Fig. 2, Tab. 1).

Ratio (mL) Water : GS-LT2	Optimised window (0.5 – 4.5 keV)				
	% 3H Eff	Bkg (cmp)	E ² /B	E ² V ² /B	MDA (Bq.L ⁻¹)
8 :12	33%	3.1	351	22.482	1.19
10 :10	28%	3.2	245	24.500	1.43
11 :9	25%	3.2	195	23.630	1.60

Table 1 : Comparison of ³H counting results with different water : GS-LT2 ratios. (Measured in a Tri-Carb 2770TR/SL @ 14°C in Low Level counting mode – all samples in duplicate, 500 minutes count time).

For salt rich samples such as sea water the capacity of the LSC cocktail shows very strong temperature dependence. For the other water samples tested, 10mL GS-LT2 LSC cocktail can accept up to 12 mL of water samples independent of temperature.

GS-LT2 LSC cocktail can also be use for direct measurement of tritium in urine. In this case, up to 6mL of urine can be mixed with 10mL GS-LT2 LSC cocktail. However 2.5 to 3.0 mL is the ideal urine sample volume to be mixed with 10mL cocktail in order to minimize colour quench and prevent urine protein precipitation.

GS-LT2 LSC cocktail is also ideally suited for activity determination based on alpha-beta discrimination LSC.

ProSafe LSC cocktails are the other family of scintillation cocktails we provide. This is a new generation of LSC cocktails that is free of NPEs (Nonylphenol ethoxylates), making ProSafe cocktails more friendly towards the environment. Various ProSafe LSC cocktails are available:

- **ProSafe +** : standard use,
- **ProSafe HC+** : high mixing capacity with concentrated salt or acidic aqueous solutions (Fig. 4),
- **ProScint Rn** (replaces ProSafe Rn): specific for the determination of radium *via* measurement of radon,
- **ProSafe FC+** : specific for filter counting,
- **ProSafe TS+**: specific to the use in combination with solubilisers.

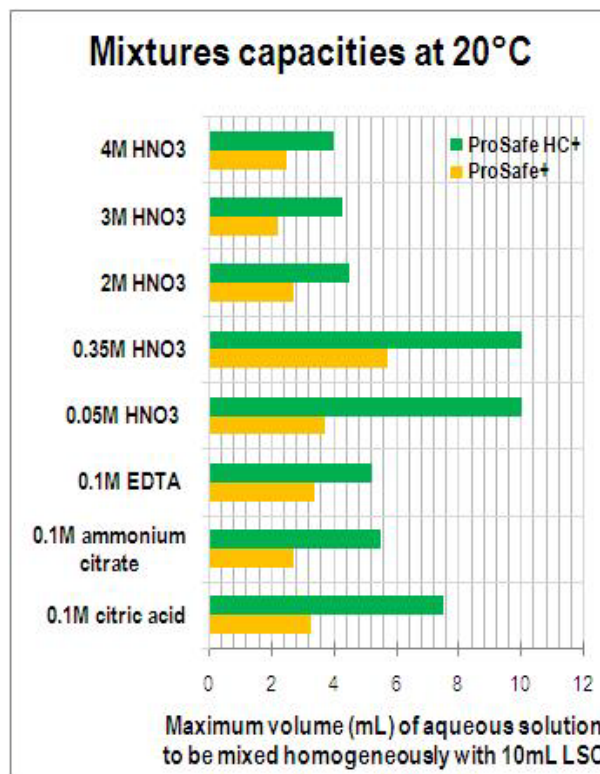


Figure 4: Comparison of mixture capacities of 10mL ProSafe+ and ProSafe HC+ LSC cocktails with various aqueous solutions.

Figure 4 shows that the capacity of ProSafe HC+ LSC cocktail is almost two times higher than that of ProSafe+.

As well as Gold Star and ProSafe, other products available include CarbonTrap and CarbonCount, used in oxidizer/pyrolyser devices to trap and count ¹⁴CO₂. Solubiliser solutions for biological tissues digestion are also available (GoldiSol, Aquigest and Hyamine Hydroxide).

For counting, polyethylene and borosilicate glass (low ⁴⁰K level) scintillation vials of 7, 8 and 20mL are available.



For more information on LSC cocktails, visit this link
http://www.triskem-international.com/en/full_technical%20information%20Meridian.asp



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

° LSC users meeting Germany – 11-12/05/2012, Braunschweig (Germany)

° Sakharov Readings – May 2012, Minsk (Belarus)

° VII jornadas sobre calidad – 29/05-01/06/2012, Tarragona (Spain)
<http://dio.urv.cat/jcalidadtqn2012/>

° PROCORAD – 20-22/06/2012, Sophia-Antipolis (France)
http://www.procorad.org/uk/avenir_reunion/

° NRC8 – 16-21/09/2012, Lake Como (Italy)
<http://nrc8.mi.infn.it/>

° Jahrestagung FV Strahlenschutz – 17-20/09/2012, Karlsruhe (Germany)
<http://www.fs-2012.de/>

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



^3H - ^{14}C - ^{129}I Extraction systems

Raddec International Ltd has continued in its commitment to develop robust instrumentation and techniques for the extraction of ^3H and ^{14}C . The company has supplied over 50 Pyrolyser units to government departments, research and industrial laboratories both within the UK and abroad. Pyrolyser systems are now installed or planned in laboratories in Sweden, USA, Switzerland, China and South Korea. In 2011, Raddec Ltd incorporated the Nanodac™ controller as standard equipment on the Pyrolyser furnace. This permits the logging of temperature profiles, set-points and air / O_2 status over a run cycle. Run data for up to one year can be stored on the system and downloaded via USB connection for off-line analysis and archiving, providing a valuable Quality Control tool. This, coupled with the 3504 controller (which stores up to 10 predefined editable run profiles and permits automatic switching of air and O_2), provides even greater ease of use whilst meeting the stringent demands of an accredited laboratory. Development of techniques using the Pyrolyser furnace has continued. A technical review of $^3\text{H}/^{14}\text{C}$ analysis using the Pyrolyser furnace has now been published¹ and optimisation of techniques² for the rapid analysis of ^{36}Cl and ^{129}I incorporating the CL resin and compatible scintillant formulation are ongoing (in collaboration with Triskem and Meridian Ltd).

In early 2012, Raddec Ltd will release the next generation of systems for extraction of ^3H and ^{14}C . The Hyperbaric Oxidiser (HBO)³ represents a significant refinement of earlier technologies that had largely disappeared from the marketplace. It is a closed-system oxidative combustion device that uses pressurised oxygen to promote the rapid and complete oxidation of samples. The pressure vessel is a 5 litre heavy gauge stainless steel cylinder fitted with a hinged door to enable easy loading of samples. The door incorporates a novel locking mechanism with three interlocks to ensure safe operation. The significant excess of oxygen ensures a very



rapid and effective combustion of a wide range of combustible samples including oil, rubbers, plastics, paper, wood, vegetation, wet fish, sea-weed etc with sample sizes as large as 40g. The HBO system incorporates a range of temperature and pressure sensors that are integrated into a software monitoring system (National Instruments LabVIEW) to log the combustion process. The complete combustion of a sample takes approximately one minute after which the integrated gas handling / collection system, with vacuum purge, collects water and CO_2 into separate traps which are then available for analysis by LSC or ^3He in-growth mass spectrometry.

Further details of the Pyrolyser and HBO systems can be found at www.raddec.com.

1. Warwick P.E., Kim D., Croudace I.W. & Oh J. (2010). Effective desorption of tritium from diverse solid matrices and its application to routine analysis of decommissioning materials. *Analytica Chimica Acta*, 676, 93 – 102.
2. Zhou, W.J. et al (2010) Preliminary Study Of Radioisotope I-129 Application In China Using the Xi'an Accelerator Mass Spectrometer (Jan 2010), INCS, 7, 8-23, www.incs.ege.edu.tr/25th%20Issue.pdf
3. Croudace I.W., Warwick P.E. and Marsh R. (2011) Advances in tritium extraction methods to aid efficient waste characterisation. *Nuclear Future*, 7, 48-53.

DO NOT HESITATE TO CONTACT US FOR MORE INFORMATION

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