



PRODUCT SHEET

GoldStar LT² Cocktail

Main Applications

Liquid scintillation counting of urine and aqueous samples, α/β discrimination liquid scintillation counting.

Packing

Order N°.	Description	Packing
ME-COC-GLT2	Gold Star LT ² – Low Tritium at Low Temperature – Aluminium bottles	Box with 4 x 2.5 L aluminium bottles
ME-COC-GLTG	Gold Star LT ² – Low Tritium at Low Temperature – Glass bottles	Box with 4 x 2.5 L glass bottles

Physical and chemical properties

Solvent : DIN

Flash point : 140 °C

Conditions of utilization

Recommended T of utilization: 10 – 20°C

Storage: Dry and dark, T<30°C

TECHNICAL INFORMATION

GoldStar LT² (Low Tritium @ Low Temperature)

GoldStar LT² is a high performance cocktail that will accept up to 12mL water in 10mL of cocktail. It has especially been designed for high water and urine capacity at various temperatures, including low temperatures, and high tritium counting efficiency, in order to allow its use, amongst others, for low level tritium measurement.



The cocktail can take up to 12mL of water samples with low matrix content (e.g. tap or deionised water) per 10 mL of cocktail at temperatures between 10°C and 20°C. For matrix rich water samples like sea water the uptake shows a very strong temperature dependency with low temperatures resulting in very high sample uptake (Fig. 1).

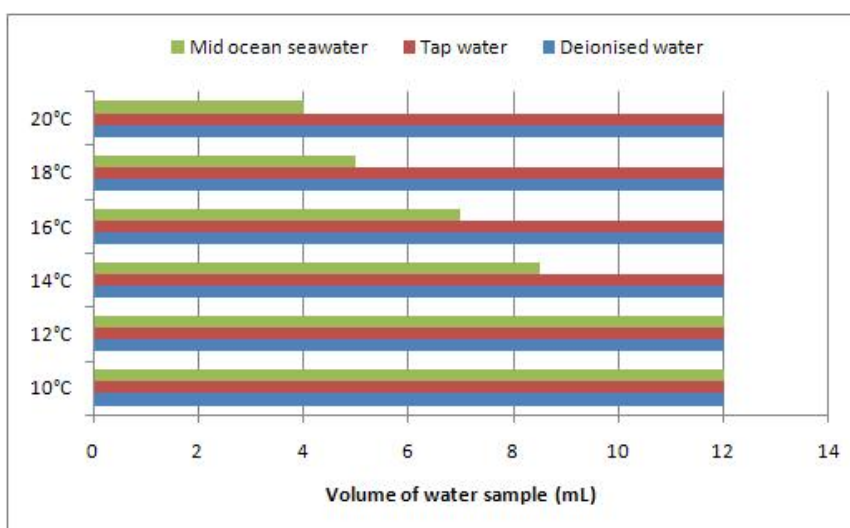


Figure 1: Uptake of various types of water samples in 10 mL GoldStar LT² at varying temperatures

Samples are stable even at 10°C and the cocktail shows no permeation through plastic vials, thus allowing extended-time counting which, in combination with its low background in an optimized Tritium window, allows obtaining very low detection limits.

The cocktails can take up more than 3 mL of urine in 10mL of cocktail, nevertheless due to increasing quench with increasing urine volume it was found that 2.5 – 3 mL of urine in 10 mL of cocktail gave optimum performance.

Figure 2 compares the uptake of samples of various mineral acids and acid concentration in Goldstar LT² and GoldStar; in general GoldStar LT² allows working at higher acid concentrations than GoldStar.

TECHNICAL INFORMATION

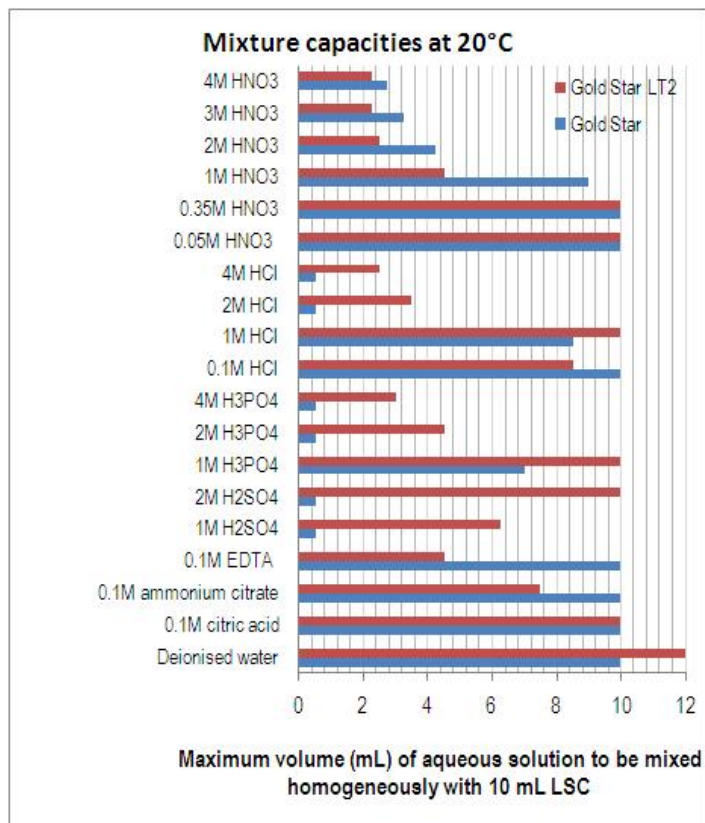


Figure 2: Comparison of the capacity of 10mL of Gold Star and Gold Star LT2 LSC cocktails mixed with different aqueous solutions.

Table 1 shows the result of a series of experiments performed by James Thomson (Meridian Biotechnologies Ltd.) testing the maximum accepted volume of four liquid scintillation cocktails for aqueous solutions most commonly used for radionuclide elution from our extraction chromatographic resins.

Table 1: Uptake of typical eluting agents in 10 mL of four different Meridian LSC cocktails at 20°C

Capacities @20° C	Gold Star	Gold Star LT2	ProSafe+	ProSafe HC+
0.1M citric acid	10.0 ml	0.75 - 10.0 ml	3.25 ml	7.5 ml
0.1M ammonium citrate	10.0 ml	1.25 - 7.5 ml	2.75 ml	5.5 ml
0.1M EDTA	10.0 ml	2.25 - 4.5 ml	3.40 ml	5.25 ml
0.05M HNO ₃	10.0 ml	10.0 ml	3.75 ml	10.0 ml
0.35M HNO ₃	10.0 ml	10.0 ml	5.75 ml	10.0 ml
2M HNO ₃	4.25 ml	2.75 ml	2.75 ml	4.5 ml
3M HNO ₃	3.25 ml	2.25 ml	2.25 ml	4.25 ml
4M HNO ₃	2.75 ml	2.25 ml	2.50 ml	4.0 ml

TECHNICAL INFORMATION

The performance of GoldStar LT² in terms of background count rate, quench and MDA (minimum detectable activity) obtained was compared to the performance of Ultima Gold LLT and Ultima Gold uLLT (Fig. 3, tables 2 and 3); very similar results were found.

Low Level Counting Data Conditions A

1. TriCarb 2550 TR
2. 10 ml DI water
3. Low level count mode
4. 0.5 – 4.5 keV window
5. 300 minutes count time
6. Temp 11°C

	Gold Star LT ²	Ultima Gold LLT
cpm	2.9	2.5
tSIE	285	285
MDA	0.29 Bq/L	0.27 Bq/L
LLD	1.53 Bq/L	1.43 Bq/L

Table 2: Results obtained with low level counting data conditions A

Low Level Counting Data Conditions B

1. Quantulus
2. Channels 5-170 (optimised Tritium region)
3. 10 ml DI water
4. 600 mins count time
5. Temp 18°C

	Gold Star LT ²	Ultima Gold uLLT
cpm	0.84 ± 0.04	0.70 ± 0.03

Table 3: Results obtained with low level counting data conditions B

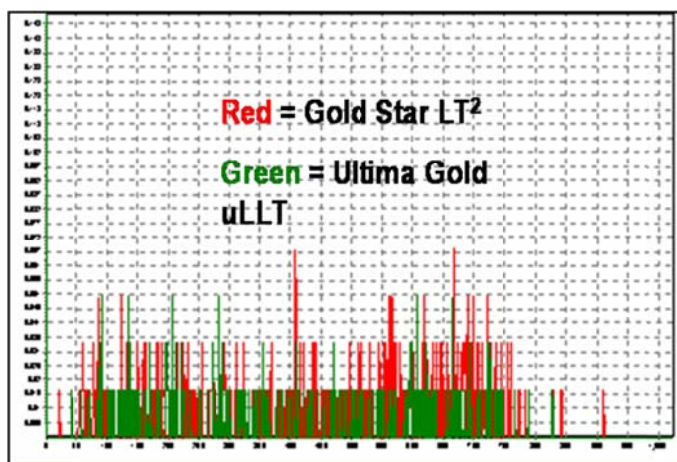


Figure 3 : Counting spectra comparison depending on LSC used

Table 4 compares the counting efficiency, background count rate, figures of merit (E^2/B , E^2V^2/B , with E = counting efficiency, B = background count rate and V = sample volume) and MDA obtained using the GoldStar LT² cocktail at varying water/cocktail ratios; a ratio of 8 mL sample and 12 mL cocktail results, due to higher counting efficiency at comparable background count rates, in an optimum MDA.

Water: Cocktail ratio	Cocktail	Optimised Window (0.5-4.5 keV)				MDA (Bq/Lt)
		% ³ H Eff	Bkg	E ² /B	E ² V ² /B	
8 ml : 12 ml	Gold Star LT ²	33%	3.1 cpm	351	22,482	1.19
10 ml : 10 ml	Gold Star LT ²	28%	3.2 cpm	245	24,500	1.43
11 ml : 9 ml	Gold Star LT ²	25%	3.2 cpm	195	23,630	1.60

Table 4: Tri-Carb 2770TR/SL (operated at 14°C) Low Level Count Mode, all samples in duplicate, 500 minute count time

TECHNICAL INFORMATION

Besides a high capacity for water and urine samples it also has very good α/β spill-over characteristics and is thus well suited for α/β discrimination counting. Table 6 compares typical sample uptake ranges and misclassification ranges observed for GoldStar LT² alone and mixed with increasing volumes of non-water miscible Ultima Gold F cocktail; the ratio of the mixtures ranged from 85% LT2 / 15% UG F to 50% LT2 / 50% UG F.

Type of Sample	Gold StarLT2	85% (v/v) LT2 +15% (v/v) UG F	75% (v/v) LT2 +25% (v/v) UG F	50% (v/v) LT2 +50% (v/v) UG F
Water				
Sample Uptake Range (mL)	10.00 ml	10.00 ml	3.00 ml	0.80 ml
Misclassification Range (%)	0.75 - 1.90	0.70 - 1.75	0.59 - 0.69	0.43 - 0.48
1.0 M HCl				
Sample Uptake Range (mL)	10.0 ml	2.60 ml	1.60 ml	0.60 ml
Misclassification Range (%)	0.88 - 1.75	0.65 - 0.80	0.65 - 0.76	0.43 - 0.53
2.0 M HCl				
Sample Uptake Range (mL)	3.50 ml	1.80 ml	1.30 ml	0.50 ml
Misclassification Range (%)	0.62 - 1.10	0.57 - 0.77	0.50 - 0.60	0.39 - 0.49
1.0 M HNO₃				
Sample Uptake Range (mL)	4.50 ml	2.20 ml	1.60 ml	0.60 ml
Misclassification Range (%)	0.76 - 3.96	0.67 - 1.52	0.56 - 1.00	0.48 - 0.54
2.0 M HNO₃				
Sample Uptake Range (mL)	2.50 ml	1.80 ml	1.40 ml	0.60 ml
Misclassification Range (%)	0.78 - 4.22	0.61 - 1.92	0.71 - 1.18	0.55 - 0.63

Table 5: Typical percentage of misclassification using a Tri-Carb 2550TR/AB and Time-Resolved Pulse Decay Analysis and maximum sample uptake per 10 mL cocktail at 20 °C

In addition to glass bottles the cocktail can also be delivered in aluminium containers in order to prevent contamination by Tritium or other radioisotopes during storage.