

Gold Star LT² & Gold Star for environmental analysis

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Gold Star LT²

What is Gold Star LT² ?

Gold Star LT² was developed to measure Low Tritium levels at Low Temperature.

Gold Star LT² is intended for use in environmental studies where the samples are either water or mineral acids.

Gold Star LT²

Gold Star LT² accepts up to 12 ml water in 10 ml cocktail with Tritium counting efficiencies approaching 28%.

At 10 ml water in 10 ml cocktail, using optimised windows and low level count mode, Gold Star LT² provides MDA's approaching 1.4 Bq/Lt.

Gold Star LT²

Performance of Gold Star LT² with various water types at 10° to 20°C

	10°C	12°C	14°C	16°C	18°C	20°C
Deionised water	12.0 ml	12.0 ml	12.0 ml	12.0 ml	12.0 ml	12.0 ml
Tap water	12.0 ml	12.0 ml	12.0 ml	12.0 ml	12.0 ml	12.0 ml
Mid ocean Sea water	12.0 ml	12.0 ml	8.5 ml	7.0 ml	5.0 ml	4.0 ml

Gold Star LT²

Low level LSC counting performance in a Tri-Carb 2250 operated at 12°C.

Count conditions:

- **Low level count mode**
- **3 hours temperature & light adaptation**
- **500 minutes (5 x 100 minutes) count time**
- **20 ml glass vials (all samples in duplicate)**

Optimised Window (0.5-4.5 keV)

Water: Cocktail ratio	Cocktail	% ³H Eff	Bkg	E²/B	E²V²/B	MDA (Bq/Lt)
8 ml : 12 ml	Gold Star LT²	33%	3.1 cpm	351	22,482	1.19
10 ml : 10 ml	Gold Star LT²	28%	3.2 cpm	245	24,500	1.43
11 ml : 9 ml	Gold Star LT²	25%	3.2 cpm	195	23,630	1.60

Gold Star LT²

Low level LSC counting performance in a Quantulus operated at 18°C.

Count conditions:

- **Tritium window 5-170 channels**
- **12 hours temperature & light adaptation**
- **600 minutes (10 x 60 minutes) count time**
- **20 ml PE vials (all samples in duplicate)**

Cocktail	Water	Water: Cocktail ratio	CPM (5 - 170)
Gold Star LT²	MQ	10 ml : 10 ml	0.84 ± 0.04
Gold Star LT²	Dead water	10 ml : 10 ml	0.84 ± 0.04

Gold Star LT²

Gold Star LT² also accepts other aqueous based samples, including mineral acids at concentrations ranging from <0.1M up to 4M.

This sample acceptance capability, combined with the fact that it is based on DIN solvent makes it ideally suited to alpha/beta counting.

Gold Star LT²

Sample acceptance

Sample	Uptake/10ml Gold Star LT ² @ 20°C
0.01M PBS	9.50 ml
0.1M PBS	5.5 ml
0.5M PBS	<0.25 ml
1.0M PBS	<0.25 ml
0.15M NaCl	9.50 ml
0.5M NaCl	6.0 ml
0.05M Tris-HCl	10.0 ml
0.25M CH ₃ COONH ₄	7.0 ml
0.1M HCl	8.5 ml
0.1M NaOH	10.0 ml
1.0M NaOH	<0.25 ml

Sample	Uptake/10ml Gold Star LT ² @ 20°C
0.2M NaH ₂ PO ₄	5.0 ml
Urine	6.0 ml
1.0M H ₃ PO ₄	10.0 ml
2.0M H ₃ PO ₄	4.5 ml
4.0M H ₃ PO ₄	3.0 ml
1.0M HNO ₃	4.5 ml
2.0M HNO ₃	2.5 ml
4.0M HNO ₃	2.5 ml
1.0M HCl	10.0 ml
2.0M HCl	3.5 ml
4.0M HCl	2.5 ml

Gold Star LT²

Gold Star LT² is packaged in 1 Lt and 2.5 Lt aluminium containers.

This prevents potential contamination from airborne Tritium which can penetrate plastics. It also eliminates potential isotopic contamination from prolonged contact with glass bottles.

Dispensers such as the Brand Dispensette III can be attached directly to these aluminium containers without the use of an adaptor.

Gold Star LT²

- **Low background contribution**
- **High capacity for water samples**
- **Stable at temperatures down to 10°C**
- **Compatible with urine samples**
- **Suitable for use with samples in mineral acids up to 4M concentration**
- **Ideal for alpha / beta counting**
- **Packaged in aluminium containers to preserve background integrity**
- **No diffusion through plastic vials**
- **High flash point of ~ 140°C**



What else is new?

Gold Star just got better!

Higher Tritium efficiency

Absolutely no change in composition.

Improvement due to a change in the manufacturing process.

- ✓ **No name change**
- ✓ **No need to re-do SOP's.**





GOLD STAR



Typical Sample Uptake Data

Sample	ml Solute/10 ml Cocktail	
	15 C	20 C
Deionised Water	5.5 ml	> 10.0 ml
0.01M PBS (pH 7.2)	6.5 ml	> 10.0 ml
0.1M PBS (pH 7.2)	> 10.0 ml	> 10.0 ml
0.15M NaCl	6.5 ml	> 10.0 ml
0.5M NaCl	> 10.0 ml	> 10.0 ml
1.0M NaCl	> 10.0 ml	> 10.0 ml
0.1M NaOH	7.0 ml	> 10.0 ml
0.5M NaOH	> 10.0 ml	> 10.0 ml
1.0M NaOH	> 10.0 ml	> 10.0 ml
0.1M HCl	> 10.0 ml	> 10.0 ml
1.0M HCl	> 10.0 ml	8.5 ml
0.05M Tris-HCl (pH 7.4)	6.25 ml	> 10.0 ml
0.25M Ammonium Acetate	> 10.0 ml	> 10.0 ml



GOLD STAR



	tSIE (³H Efficiency)	Background (0-18.6 keV)
Current Gold Star	565 (~48%)	14.4 cpm
New Gold Star	638 (~53%)	14.6 cpm

So how does it compare with Ultima Gold XR

Ultima Gold XR #100301	490 (~44%)	14.2 cpm
New Gold Star	638 (~53%)	14.6 cpm

And how does it compare with Ultima Gold

Ultima Gold #100301	650 (~54%)	15.0 cpm
New Gold Star	638 (~53%)	14.6 cpm





GOLD STAR



New Gold Star =

Ultima Gold Efficiency + Ultima Gold XR capacity



Samples available on request

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