Meridian Biotechnologies Ltd.

Beckman	MERIDIAN	PerkinElmer	PerkinElmer (NEN)	PerkinElmer (Wallac)	PerkinElmer (Lumac)	Roth	Zinsser
LSC cocktails for aqueous samples							
~~Ready Safe~~	**ProSafe+; Gold Star**	Ultima Gold		Hi-Safe 2	~~LumaSafe~~		AquaSafe 300+
							Unisafe 1
					~~Lumagel Safe~~		QuickSafe A
	ProSafe HC+; Gold Star	Ultima Gold XR		Hi-Safe 3	LumaSafe Plus	Rotiszint Eco-Plus	AquaSafe 500+
				~~Hi-Load~~			Aquasafe 800
							Irgasafe Plus
	ProSafe FC	Ultima Gold MV		Supermix			
	Gold Star LT2	Ultima Gold AB					
	Gold Star LT2	Ultima Gold LLT		~~Tri-Safe~~			QuickSafe 400
		Ultima Gold µLLT					
		Opti-Fluor	~~Formula 989~~	~~Hi-Safe~~	~~Safefluor S~~		
		Emulsifier Safe			~~Safefluor-~~		
~~Ready Gel~~		Insta-Gel Plus	Aquassure	~~Optiphase Safe~~	~~Lumagel Plus~~	~~Szintigel Roth~~	Quickszint 1 & 212
			~~Aquasol~~				Quicksafe A
~~Ready Value~~		~~Emul. Scint Plus~~	Aquasol II	~~Optiphase MP~~		~~Rotiszint 22/22X~~	Quickszint 294
							~~Quickszint 402~~
~~Ready Protein*~~		~~Pico-Fluor 15~~	~~Biofluor~~		~~Aqualuma Plus~~		~~Quickszint 1000~~
		Pico-Fluor 30					
		Pico-Fluor 40	Atomlight	~~Optiphase RIA~~	~~Rialuma~~	~~Rotiszint 2200~~	Quickszint 2000
			~~Formula 963~~		~~Aqualuma~~		
	ProSafe TS	Hionic-Fluor				~~Rotiszint Mini~~	
	ProSafe FC	Filter-Count					FilterSafe
							Quickszint 361
LSC cocktails for nonaqueous samples / organic samples							
	ProSafe Rn	Ultima Gold F	Mineral Oil	Scint Hi-Safe		Rotiszint Eco	Quickszint 905
			Scintillator	Betaplate Scint		~~Secure~~	
		Opti-Fluor O			~~Safefluor O~~		Quicksafe-N
~~Ready Organic~~	**RadonCount**	Insta-Fluor Plus	Econofluor-2	~~OptiScint Safe~~	~~Lipoluma Plus~~	~~Rotiszint 1100~~	Quickszint 701 & 501
LSC cocktails for flow detectors							
~~Ready Organic~~		Insta-Fluor Plus			~~Lipoluma Plus~~		Quicksafe Flow 301
	Micro Flow G	Flo-Scint II			~~LumaFlow II~~		Quicksafe Flow 302
~~Ready Flow III~~		Flo-Scint III	~~Atomflow~~	~~Opti-Flow~~	~~LumaFlow III~~	~~Rotiszint 2211~~	~~Quicksafe Flow 303~~
		~~Flo-Scint IV~~			~~LumaFlow IV~~		~~Quicksafe Flow 306~~
					~~LumaFlow A~~		
	ProFlow G/Gold Flow	Ultima-Flo M		~~Opti-Flow Safe I~~	~~LumaSafe Flow M~~		Quicksafe Flow 2
	ProFlow P	Ultima-Flo AP			~~LumaSafe Flow P~~		
	ProFlow P	Ultima-Flo AF			~~LumaSAfe Flow F~~		
Oxidizer reagents							
		Monophase S		~~Optisorb 4~~		~~Rotiszint OPH~~	Oxysolve-T
	CarbonCount	Permafluor E+		~~Optisorb S~~		~~Rotiszint OPC~~	Zintol-X & Zintox-1
	CarbonTrap	Carbosorb E		~~Optisorb 1~~	~~Carbomax Plus~~		Cytosolve C-400
Tissue and gel solubilizers							
~~BTS 450~~	**GoldiSol**	Soluene-350		~~Optisolve~~	~~Lumasolve~~	~~Tissue sol Roth~~	Biolute-S
	AquiGest		Solvable				Biolute-A
Other Reagents							
	Hyamine hydroxide	Hyamine hydroxide					Hyamine hydroxide

~~Cocktail~~

No longer available

~~Cocktail~~

No longer featured on web site

All data collected from respective web sites 9/8/2010

Product Offering

MERIDIAN BIOTECHNOLOGIES Ltd
Vials & Cocktails for Liquid Scintillation

- Standard LSC cocktails
  - Gold Star; Gold Star LT2; Gold Flow & MicroFlow G
- New Generation NPE-free LSC cocktails
  - ProSafe+; ProSafe HC+; ProSafe FC+ & ProSafe TS+
  - ProFlow G+ & ProFlow P+
- Safer solubilisers
  - Goldisol; AquiGest & Hyamine hydroxide
- Oxidiser / Pyrolyser cocktails
  - CarbonTrap & CarbonCount
- Vials
  - Glass & Plastic LSC vials

MERIDIAN BIOTECHNOLOGIES Ltd
Vials & Cocktails for Liquid Scintillation

Product Offering

- Gold Star
  - Standard LSC cocktail based on NPE's
  - Higher H-3 efficiency than Ultima Gold XR
  - Biodegradable but NOT drain disposable

- Gold Star LT2
  - For Low Level H-3 counting at Low Temperatures
  - High capacity for all water types & low background
  - Biodegradable but NOT drain disposable

- Gold Flow
  - Standard flow cocktail based on NPE's
  - Biodegradable but NOT drain disposable
- Micro Flow G
  - Standard flow cocktail for micro-applications

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 ★

MERIDIAN BIOTECHNOLOGIES Ltd
Vials & Cocktails for Liquid Scintillation

Gold Star just got better!

	tSIE (^{3}H Efficiency)	Background (0-18.6 keV)
Current Gold Star	565 (~48%)	14.4 cpm
New Gold Star	618 (~51%)	14.6 cpm

So how does it compare with Ultima Gold XR

Ultima Gold XR #100301	490 (~44%)	14.2 cpm
New Gold Star	618 (~51%)	14.6 cpm

What is new?

Gold Star LT^2

Gold Star LT^2

MERIDIAN BIOTECHNOLOGIES Ltd
Vials & Cocktails for Liquid Scintillation

For Low Tritium levels at Low Temperature.

- 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*
- Recommended for use in Raytests's MALISA low level counter
- *Packaged in aluminium containers to preserve background integrity*
- No diffusion through plastic vials
- High flash point of ~ 140°C

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Vials & Cocktails for Liquid Scintillation

Low Level performance

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Vials & Cocktails for Liquid Scintillation

		Optimised Window (0.5-4.5 keV)				
Water: Cocktail ratio	Cocktail	% ^{3}H Eff	Bkg	E^2/B	E^2V^2/B	MDA (Bq/Lt)
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

Perkin Elmer TriCarb 2250

Operated at 14°C (standard chill pack); Low Level Count Mode; all samples in duplicate; 500 minute count time (5 x 100 minutes); 20 ml glass vials.

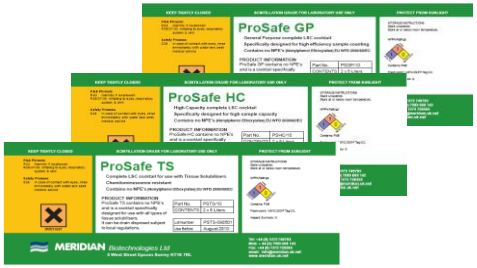
Cocktail	Water	Water: Cocktail ratio	cpm (5 - 170)
Gold Star LT^2	MQ	10 ml : 10 ml	0.84 ± 0.04
Gold Star LT^2	Dead water	10 ml : 10 ml	0.84 ± 0.04

Wallac 1220 Quantulus

Operated at 18°C; dark adapted for 12 hours; 600 minute count time (10 x 60 minutes); standard 3H windows (5-170); 20 ml PE vials

Product Offering

- *ProSafe+ range*
  - All converted from PXE base to DIN base
  - Based on alcohol ethoxylates
  - *Completely NPE-free*
  - Suitable for drain disposal
  - Biodegradable
  - Higher H-3 efficiencies
  - Higher sample capacities
  - Complete range to suit all applications



ProSafe+ Range

- ProSafe+ provides
  high efficiency in routine counting
- ProSafe HC+ (High Capacity)
  provides superior sample capacities
- ProSafe FC+ (Filter Counting)
  suitable for use with wet, dry or moist filters
- ProSafe TS+ (Tissue Solubilisation)
  suitable for use with solubilised samples

ProSafe +

Better counting performance

LSC

	ProSafe	ProSafe+ #110101A	Ultima Gold #100302
Background (0-18.6 keV)	13.9 cpm	16.8 cpm	15.0 cpm
tSIE	574	645	650
^{3}H Efficiency	49%	53%	~54%
Selected capacities			
Deionised water	2.50 ml	3.10 ml	3.20 ml
0.1M PBS (pH 7.2)	3.20 ml	3.50 ml	4.00 ml
2 M H_3PO_4	2.50 ml	3.50 ml	3.50 ml

ProSafe HC+

Better counting performance

LSC

	ProSafe HC	ProSafe HC+ #110101	Ultima Gold XR #100302
Background (0-18.6 keV)	13.9 cpm	12.2 cpm	14.2 cpm
tSIE	485	548	490
^{3}H Efficiency	44%	48%	~44%
Selected capacities			
Deionised water	10.0 ml	10.0 ml	10.0 ml
0.1M PBS (pH 7.2)	10.0 ml	10.0 ml	8.50 ml
0.2 M NaH_2PO_4 (pH 4.9)	10.0 ml	ml	10.0 ml

ProSafe FC+

	ProSafe FC	ProSafe FC+
DI Water	1.40 ml	1.50 ml
0.01M PBS	1.50 ml	1.50 ml
0.1M PBS	1.40 ml	1.50 ml
0.5M PBS	1.40 ml	1.90 ml
0.15M NaCl	1.40 ml	1.70 ml
0.5M NaCl	<0.25 ml	2.0 ml
0.05M Tris-HCl	1.30 ml	1.50 ml
0.25M CH_3COONH_4	1.30 ml	1.30 ml
0.2M NaH_2PO_4	1.30 ml	1.50 ml
0.1M HCl	1.40 ml	1.50 ml
0.1M NaOH	1.30 ml	1.30 ml
1.0M NaOH	1.10 ml	1.80 ml
Urine	1.50 ml	2.0 ml
Bovine serum	0.50 ml	1.0 ml
1.0M H_3PO_4	1.50 ml	1.50 ml
2.0M H_3PO_4	1.30 ml	1.50 ml
4.0M H_3PO_4	1.30 ml	1.10 ml
1.0M HNO_3	1.30 ml	1.40 ml
2.0M HNO_3	1.30 ml	1.30 ml
4.0M HNO_3	1.10 ml	1.30 ml
1.0M HCl	1.40 ml	1.70 ml
2.0M HCl	1.30 ml	1.30 ml
4.0M HCl	1.10 ml	0.90 ml

ProSafe FC+

For counting wet and damp filters
Rapid wetting
Biodegradable
NPE-free
Suitable for drain disposal
High H-3 efficiency

	ProSafe FC	ProSafe FC+
Background	12.0 cpm	18.0 cpm
tSIE	599	713
^3H Efficiency	51%	54%

ProSafe TS+

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Vials & Cocktails for Liquid Scintillation

Designed for use with solubilised samples
NPE-free
Biodegradable & suitable for drain disposal

CLM	5 mins	10 mins	15 mins	20 mins	25 mins	30 mins
1.0 ml Soluene-350	50 cpm	30 cpm	27 cpm	21 cpm	22 cpm	21 cpm
1.0 ml GoldiSol	44 cpm	30 cpm	25 cpm	25 cpm	25 cpm	21 cpm
1.0 ml AquiGest	46 cpm	29 cpm	25 cpm	22 cpm	23 cpm	21 cpm
1.0 ml 0.1N NaOH	36 cpm	27 cpm	21 cpm	21 cpm	18 cpm	19 cpm

	ProSafe TS	**ProSafe TS+**
DI Water	2.20 ml	2.10 ml
0.01M PBS	2.20 ml	2.30 ml
0.1M PBS	2.30 ml	2.80 ml
0.5M PBS	3.25 ml	6.00 ml
0.15M NaCl	2.30 ml	2.30 ml
0.5M NaCl	2.80 ml	5.80 ml
0.05M Tris-HCl	2.20 ml	2.10 ml
0.25M CH_3COONH_4	2.60 ml	3.10 ml
0.2M NaH_2PO_4	2.60 ml	2.90 ml
0.1M HCl	2.20 ml	2.50 ml
0.1M NaOH	2.20 ml	2.10 ml
1.0M NaOH	2.25 ml	4.00 ml
Urine	2.60 ml	3.00 ml
Bovine serum	1.0 ml	1.0 ml

	ProSafe TS	ProSafe TS+
Background	16.0 cpm	16.9 cpm
tSIE	550	584
^3H Efficiency	48%	~50%

MERIDIAN BIOTECHNOLOGIES Ltd
Vials & Cocktails for Liquid Scintillation

ProFlow+ range of flow cocktails

ProFlow G+

For commonly encountered eluents including water/methanol & water/acetonitrile gradients.

ProFlow P+

For ammonium phosphate gradients ranging from 0 to 2M concentration.

ProFlow G+

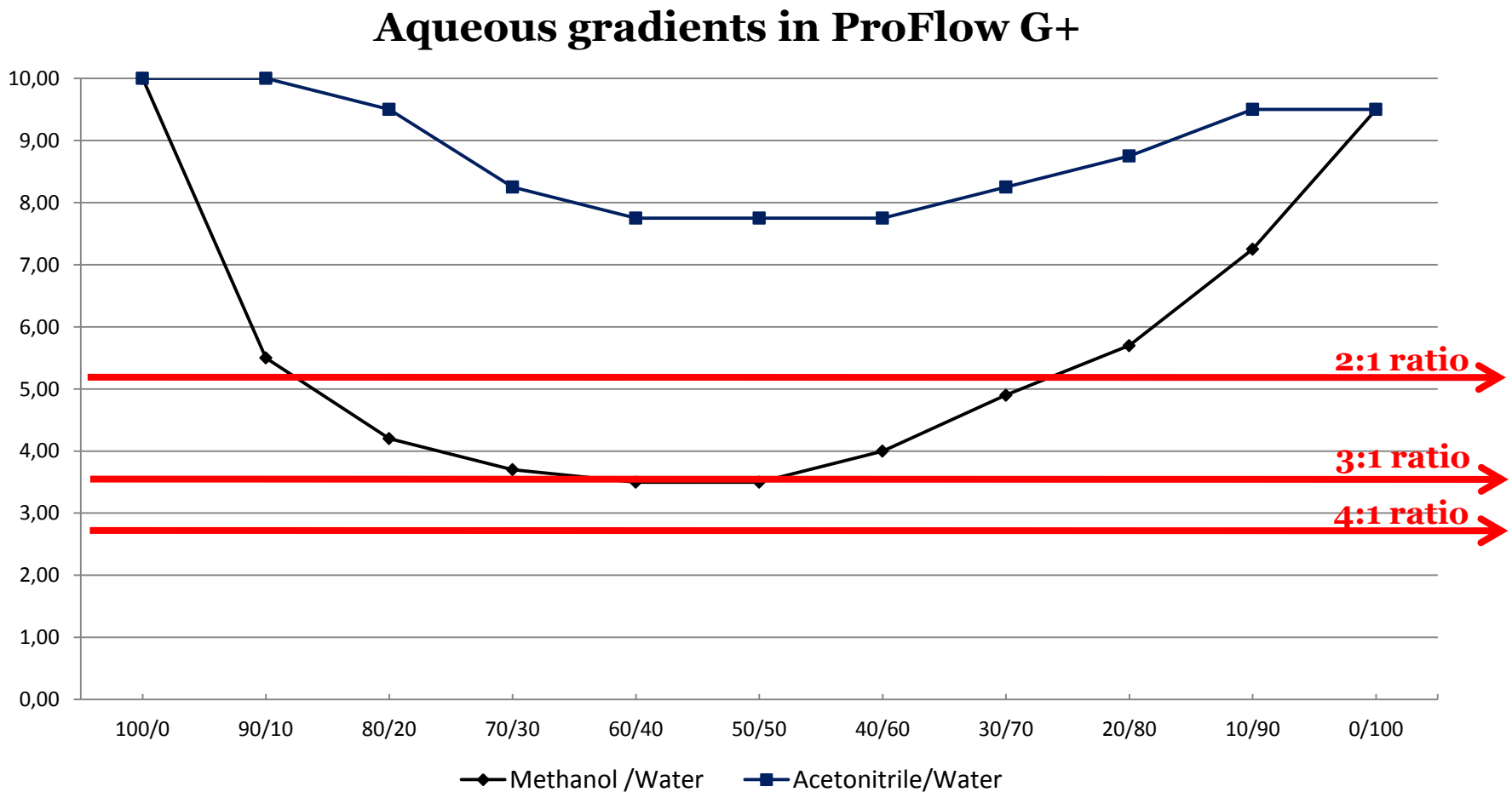
- New generation flow cocktail
- Low viscosity & easy mixing
- NPE-free
- Biodegradable & suitable for drain disposal

	ProFlow G+
Deionised water	9.50 ml
50/50 methanol/water	3.80 ml
50/50 acetonitrile/water	7.25 ml
0.1M NaOH	8.25 ml
0.1M HCl	10.00 ml
0.1M PBS	10.00 ml
0.05M Tris-HCl	10.00 ml

	ProFlow G+
Background	13.8 cpm
tSIE (H-3 efficiency)	460 (47%)

ProFlow G+

Performance with aqueous gradients.



Solubilisers

MERIDIAN BIOTECHNOLOGIES Ltd
Vials & Cocktails for Liquid Scintillation

GoldiSol

Safer solution that is completely Toluene-free and Methanol-free.

- Solubilises most tissue types faster & easier than Soluene-350.
- No frothing when hydrogen peroxide is added.

AquiGest

- Aqueous based – Not classified as Flammable or Toxic.
- Can replace organic solvent based solubilisers.
- Produces tissue digests that are less coloured than those obtained using organic solvent based solubilisers.

Oxidiser cocktails

CarbonTrap

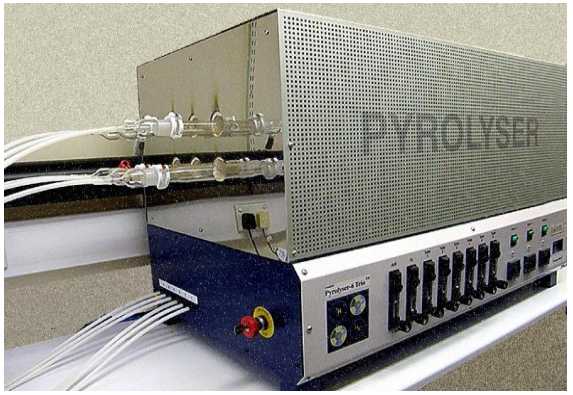
- Trapping radioactive carbon dioxide produced in sample oxidisers and pyrolysers.

CarbonCount

- Counting radioactive carbon dioxide captured in CarbonTrap.

Raddec

Continuing collaboration with Raddec to improve performance in the Pyrolyser.



LSC Vials

Glass

- Low background (14-18 cpm in 0-18.6 keV window) at an economical price.

  Available in cases of 500 with various caps.

Plastic

- HD polyethylene giving low backgrounds (5-7 cpm in 0-18.6keV window).

  Available in 7ml, 8ml & 20 ml.

What have we done recently?

1. **ProSafe range now based on DIN solvent and renamed ProSafe+**
2. **Gold Star just got better.**
3. **Gold Star LT² introduced.**
4. **Micro Flow G for micro-flow applications.**

LSC Counting – Do's and Don'ts

Meridian Biotechnologies Ltd.
(meridian-biotech.com)

The Analysis Path

Sampling
Representative sample

Sample Preparation
Cocktail selection
Capacity
Stability
Colour formation
Chemiluminescence

LSC Analysis
IPA
Trends
Quench Curves

Sampling

Critical that you get a truly representative sample.

Everything after this step can be ruined if the sampling process is flawed in any way.

Remember:

A badly taken sample can only give incorrect results

Sample Preparation

Cocktail selection

Resist temptation to try whatever is in the cupboard.

- **Look in the catalogue or on-line**
- **Call for assistance**

Capacity

- **Check capacity in glass vials to observe suitability**
- **Check capacity with sample at *Counting Temp***

Stability

- **Ensure stability at this temperature for count time**

Sample Preparation

Colour formation

Conc.. Acids will produce colour

- **Conc. HNO_3 will produce yellow/brown**
- **Conc. H_2SO_4 will produce many different colours**

Always dilute acids prior to adding to cocktail

Check stability over time

Some acids (e.g. TCA) can induce chemiluminescence

Sample Preparation

Colour formation

Alkalis can produce colour due to alkaline hydrolysis

Chemiluminescence (0-5keV) can be overcome by:-

- **Neutralising with acid**
- **Allowing to stand and let reaction subside**
- **Use narrower windows to mask problem**
- **Appropriate cocktail selection**
- **Always check for CLM by running a blank with no activity present, especially if the sample is alkaline.**

LSC Analysis

MERIDIAN BIOTECHNOLOGIES Ltd
Vials & Cocktails for Liquid Scintillation

IPA

How often do you run "IPA"?

- **At least once a week recommended**
- **Ensure order is ^{14}C, ^{3}H and Background**
- **Tri-Carbs set for daily IPA if in use and standards left in the instrument**

Trends

How often do you check "Trends"?

- **Regularly check trends to see if background is rising and/or ^{3}H efficiency is dropping**
- **Change may indicate contamination or dirty PMT's**

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Vials & Cocktails for Liquid Scintillation

LSC Analysis

Quench Curves

Do you check a purchased set for errors?

How often do you install quench curves?

- **At least every 6 months**
- **Must be reinstalled after servicing/repairs**

Do you run the standards as samples to verify accuracy?

- **Simple and easy way to verify accuracy**

Where do you store your Quench set?

- **Heat, light and air are a cocktails' worst enemies.**
- **Store in a closed box in a refrigerator when not in use**

LSC Analysis

Quench Curves

Do you use your own in-house prepared quench set?

Preparation

- Use either an analytical balance or a glass-barrelled syringe for weighing/dispensing activity
- Check nature of carrier solvent for volatility-can affect weighing accuracy (e.g. Tritiated Toluene)
- Store activity in a suitable container

Remember

A badly prepared sample can only be counted badly!!!!!

No amount of instrument sophistication can give good results for a badly prepared sample