

HUMAN HEALTH

ENVIRONMENTAL HEALTH

SCINTILLATING RESULTS AT YOUR LOWEST CONCENTRATIONS



Quantulus™ GCT and Tri-Carb®
Liquid Scintillation Counters


PerkinElmer®
For the Better

IT'S LIQUID SCINTILLATION
COUNTING WITH
CONFIDENCE

Count on the industry leader in LSC

Whether you're in drug discovery, environmental protection, energy production, or performing basic research, your industry has some of the strictest regulations in the world. So to enable better decisions on drug pathways, protect your lab environment, or determine contamination in the natural world, you need the most sensitive, stable, accurate liquid scintillation technology available. Systems you can have *confidence* in.

That's why research and environmental labs around the world recognize one top brand for their liquid scintillation application needs — our Tri-Carb® and Quantulus™ GCT families of liquid scintillation counters. Tri-Carb LSC systems are newly redesigned with enhanced features and optional Alpha and Beta discrimination counting mode. And the new Quantulus GCT, with patent-pending technology, delivers the same ultralow-level sensitivity you trust, but in a lighter benchtop footprint that fits any lab.

Not only are these the most sensitive detectors on the market, capable of meeting the requirements of your most demanding application, but they're also backed by our more than 60 years' experience and innovation in liquid scintillation analysis.

Plus, we offer high-quality, optimized liquid scintillation cocktails and counting supplies to complement your LSC instrumentation and ensure optimum counting results with your application. You choose the LSC that's right for you, whatever your application needs — based on your budget today and the options you may want to add later.

Put it all together, and this is LSC technology and expertise you can *count* on.

Proven Technology Is Built Right In

We're the industry leader in low-level detection and the only source for the world's top LSC brand. Its advanced design and broad range of features enable you to choose the LSC system that's right for the work you do.

Research & Development

Tri-Carb 4810TR

An excellent choice for labs doing basic research applications – an economical CPM/direct DPM instrument that can be expanded for more sophisticated applications.

Research & Development

Tri-Carb 4910TR

The ideal LSC system for more sophisticated research applications and demanding DPM counting — versatile enough to expand for environmental applications.

Environmental & Research

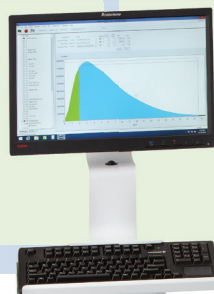
Tri-Carb 5110TR

Sophisticated LSC suited for the most demanding research applications, expandable for environmental assays.

Environmental

Quantulus GCT 6220

A premium instrument for multiuser labs that perform environmental and routine counting for research applications. Especially well-suited for environmental applications that need to detect extremely low-level Alpha and Beta radioactivity.



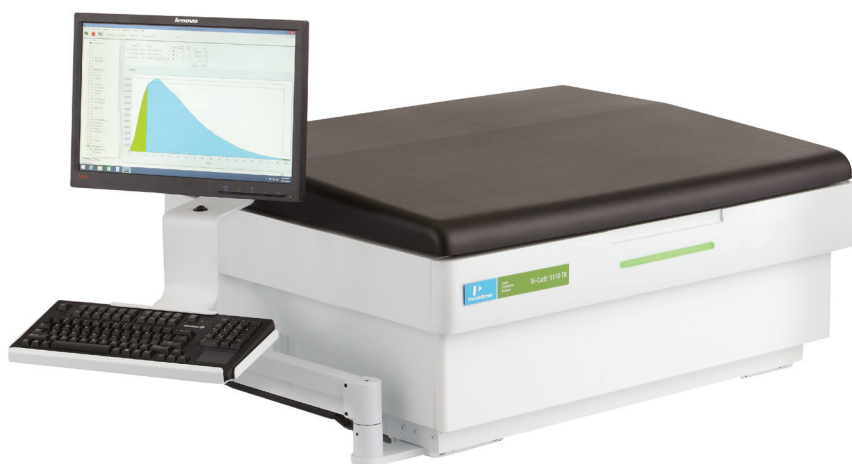
THE LSC FAMILY YOU CAN COUNT ON TIME AFTER TIME

Tri-Carb 4810TR

*The affordable, powerful solution
for basic research*

The LSC systems most frequently cited in scientific literature, our Tri-Carb computer-controlled benchtop liquid scintillation counters are the most versatile and sensitive instruments available for detecting small amounts of alpha and beta radioactivity.

Choose the Tri-Carb LSC that best meets your applications requirements now, and expand the system later with the features that best meet your future research or environmental analysis needs. You'll be confident knowing that all our Tri-Carb instruments are designed and manufactured under an ISO 9001 certified system, and they're tested to ensure they conform with appropriate UL, EU, and IEC standards. So you can count on these systems today – and for years to come.



The Tri-Carb 4810TR is ready to go for basic research and CPM/direct DPM applications and can be expanded for more demanding applications when the need arises. With the Tri-Carb 4810TR, you get many of the performance advantages of a more fully featured Tri-Carb system — a superb value in a completely integrated system. The system boasts a built-in computer that runs the Microsoft® Windows® 8.1 operating system, with 4 GB of RAM and 250 GB of hard disk (minimum), four high-speed USB ports, and Dual Gigabit Ethernet support for easy networking. The logical, easy-to-use QuantaSmart™ feature provides an interface for uncomplicated data management, multitasking, security, and networking while minimizing counting errors and enabling automatic, reliable, easy-to-read reports.

The system also delivers:

- TR-LSC® electronic background discrimination
- Live spectral display and plotting
- Sample nuclide library with preset or user-defined radionuclide settings for three separate regions
- Direct DPM for easy single-label DPM without the need to store quench standards
- 15 user acquisition protocols with the ability to define unlimited assays
- Chemiluminescence detection (with optional correction)
- Single-photon counting for bioluminescence assays
- Instrument operational-status LED indicator for clear assay status updates at a glance
- A fold-away ergonomic arm that provides the flexibility to enter data either sitting or standing



Tri-Carb 4910TR

Versatility and value for research applications

The midrange Tri-Carb 4910TR is a workhorse for more demanding DPM and environmental applications. You get all the popular standard features you need for many research and environmental applications and the versatility to expand the instrument capability for environmental analysis with the optional ultralow-level and alpha/beta discrimination features. The Tri-Carb 4910TR delivers all the features of the Tri-Carb 4810TR, plus:

- Color-corrected single- and dual-label DPM
- Replay sample recall and reprocessing without recounting
- 30 user protocols with unlimited assays

Popular options include 2D barcode reader and work-list options for positive sample ID, IPA software, ultralow-level and alpha/beta discrimination count modes, and triple-label DPM.

Direct DPM Results for ³H and ¹⁴C

Radionuclide/Cocktail	tSIE	Direct DPM	Actual DPM	% Recovery
¹⁴ C in toluene measured in large glass vials	691	120,701	120,300	100.33
	422	120,999	120,300	100.58
	255	123,389	120,300	102.70
¹⁴ C in Ultima Gold measured in small glass vials	535	37,259	38,100	97.79
	277	38,419	38,100	100.84
³ H in toluene measured in large glass vials	705	245,390	247,009	99.34
	428	246,980	247,009	99.99
	152	248,408	247,009	100.5
³ H in Ultima Gold measured in small glass vials	509	46,299	45,536	101.67
	253	47,251	45,536	103.87
³ H in Ultima Gold measured in small plastic vials	592	45,907	45,536	100.81
	258	44,782	45,536	98.34

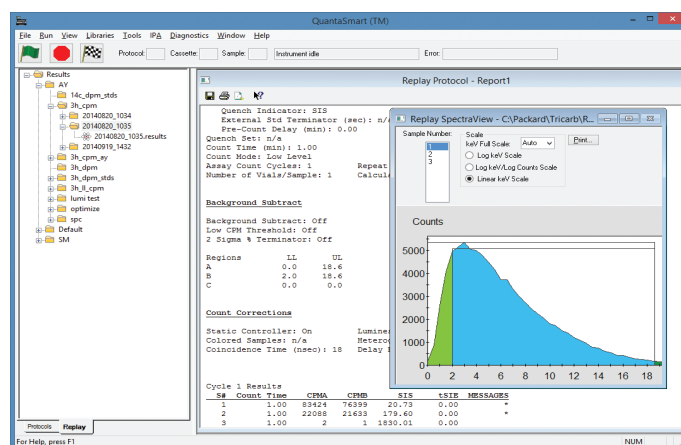
Tri-Carb 5110TR

Unmatched features for research and environmental labs

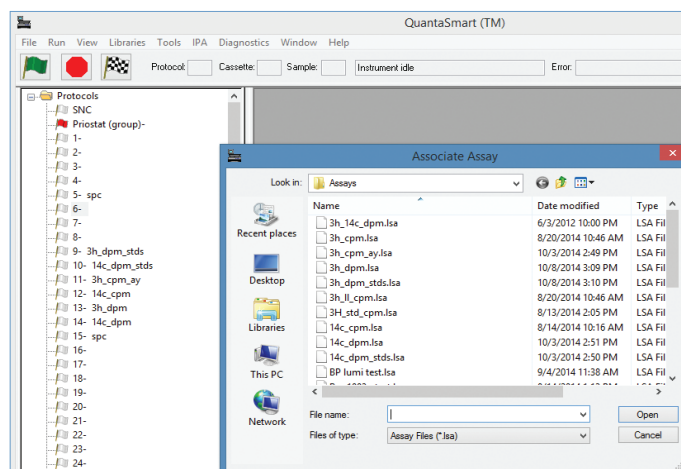
The Tri-Carb 5110TR is the perfect system for advanced research and environmental work in a multiuser lab, providing all the versatility and flexibility of the Tri-Carb 4910TR, plus:

- Instrument Performance Assessment (IPA) for monitoring eight critical parameters historically
- Triple-label DPM for counting three radionuclides in the same sample
- High-sensitivity count mode for reduced backgrounds
- Work-list software for positive sample identification
- Sample PrioStat™ Special Function Interrupt mode for manual preview of sample counting to verify settings before actual acquisition
- 60 user protocols with unlimited assays

Other options include 2D barcode reader and ultralow level and alpha/beta discrimination count modes.



Replay post-processing allows recall of sample data for validation of results.



Associate assay dialogue. Unlimited assays can be defined and simply associated with the numeric protocols in the protocol tree for counting.

DELIVERING THE HIGHEST LEVELS OF LOW-LEVEL DETECTION

Quantulus GCT

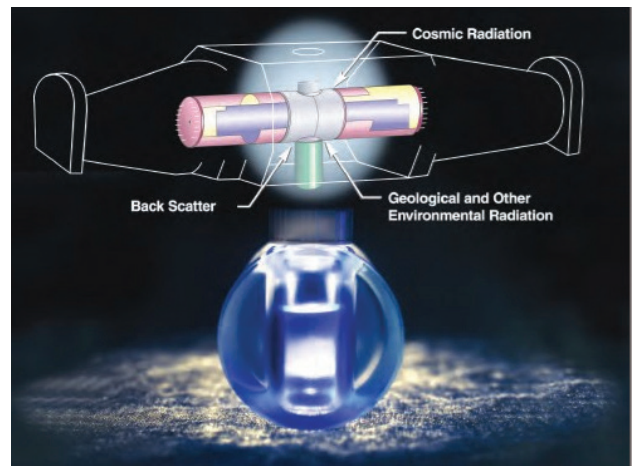
The premium LSC for environmental and research use

With its extremely high sensitivity and unmatched detection of low-level Alpha and Beta radioactivity, the Quantulus™ GCT 6220 is an ideal solution for even the most demanding environmental applications.

In the Quantulus GCT 6220, a unique Bismuth Germanium Oxide (BGO) detector guard completely surrounds the sample. The BGO guard works in conjunction with patent-pending Guard Compensation Technology (GCT) background reduction to further lower the instrument background, enhancing sensitivity to accurately measure near-background sample activity. This sophisticated technology is designed to use ordinary glass or plastic vials so counting is easy and inexpensive.

The Quantulus GCT 6220 delivers all the sophisticated features of the Tri-Carb 5110TR system, plus:

- Bismuth germanium oxide (BGO)
- Guard Compensation Technology (GCT)
- Pulse Amplitude Comparator (PAC)
- Pulse Shape Analyzer (PSA)
- Temperature control for very reproducible counting
- Transportable, space-saving benchtop design
- Measures ^3H water samples to less than 1 Bq/L
- ^{14}C benzene sample-dating up to 51,000 years
- Measures ^{14}C in bioethanol concentration less than 1%
- Optional 2D barcode reader and alpha/beta discrimination count mode



Surround TR-LSC technology eliminates background by using the sample chamber as the detector guard. Background events interact with the BGO guard and are rejected by TR-LSC and GCT before they interfere with sample counts.

Tri-Carb and Quantulus GCT System Configurations at a Glance

While the Quantulus GCT 6220TR is particularly well suited for the detection of extremely low-level Alpha and Beta applications, its high sample capacity allows a greater throughput than the original Quantulus system. This means more flexibility to address an increased number of demanding liquid scintillation counting applications.

The system is ideal for:

- Radiocarbon dating of archaeological samples
- Tritium, radon, radium, and uranium measurements in drinking water
- Strontium in food
- ¹⁴C in food, alcohol, and biofuels
- Evaluations of tritium and ¹⁴C emissions from nuclear power plants
- Monitoring of radioactivity during decommissioning of nuclear reactors
- Tracer measurements in oil exploration
- ADME Studies

Feature	Tri-Carb 4810TR	Tri-Carb 4910TR	Tri-Carb 5110TR	Quantulus GCT 6220
Built-in computer with Windows® 8.1 operating system, 4 GB RAM (minimum), and 250 GB hard disk (minimum), three high-speed USB ports, and Dual Gigabit Ethernet support	S	S	S	S
19-inch-wide LCD monitor with DVI-D video output, keyboard, and ergonomic arm	S	S	S	S
QuantaSmart software for Windows® 8.1 operating system	S	S	S	S
LED System Status Indicator	S	S	S	S
TR-LSC background electronics	S	S	S	S
Spectraworks™ software	O	O	O	S
EasyView Spectrum Analysis	O	O	O	S
High-sensitivity count mode (HSCM)	O	O	S	NA
Ultralow-level count mode (ULLCM)	NA	O	O	S
BGO detector guard	NA	NA	NA	S
Live spectral display and plotting	S	S	S	S
Enhanced Security (21 CFR Part 11 compatibility)	NA	O	O	O
2D barcode reader	O	O	O	O
Sample numeric data screening	S	S	S	S
Direct DPM	S	S	S	S
Single/dual color-corrected DPM	O	S	S	S
Triple-label DPM	O	O	S	S
Varisette sample changer	O	S	S	S
Enhanced replay sample recall and reprocessing	O	S	S	S
Group PrioStat automatic priority interrupt	S	S	S	S
Luminescence correction	O	O	S	S
Single-photon counting for bioluminescence assays	S	S	S	S
Sample PrioStat manual special-function interrupt	NA	O	S	S
Alpha/Beta discrimination (PSA)	NA	O	O	S
Pulse amplitude comparison (PAC) when purchased with LLCM	NA	O	O	S
Patent-pending Guard Compensation Technology	NA	NA	NA	S
Number of user-acquisition protocols with unlimited assays	15 60 optional	30 60 optional	60	60
Enhanced IPA (Instrument Performance Assessment)	NA	O	S	S
Worklist	O	O	S	S
Temperature Control	O	O	O	S

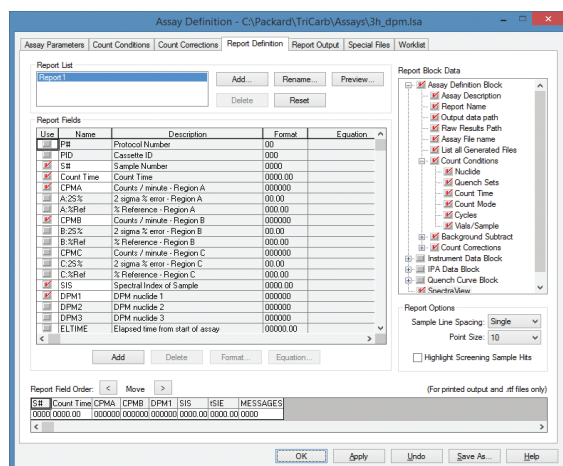
S = Standard O = Optional NA = Not Available

SOFTWARE THAT BRINGS OUT THE BEST IN YOU

Software that's not just smart – it's QuantaSmart

All LSC systems include QuantaSmart system software running under the Windows® 8.1 operating system, enabling robust multitasking and easy networking in a secure environment. Additional applications can be run on the internal PC and data can be transferred automatically through the three high-speed USB ports to the application for data reduction.

QuantaSmart software is based on an intuitive dialogue interface that reduces the chance of assay setup errors. Cautions are issued for incompletely defined assays, missing standards, or incorrect count modes. And because it's designed for compliance with GLP, the software stores all sample data for the life of the instrument in an incorruptible form. And QuantaSmart also reports all acquisition parameters, including drive and path of electronically stored data, instrument serial and model number, software version number, and calibration data.



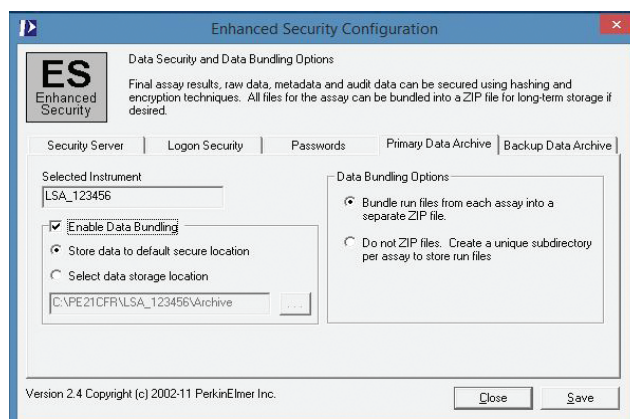
Printed and electronic report content is user defined and can be previewed.

Keep pace with your most stringent regulations

The Enhanced Security option delivers three separate 21 CFR Part 11 compatible features: Instrument Access Security limits an instrument's use to only those individuals who are authorized to access it. The Data Security and Verification feature allows you to be sure your data hasn't been tampered with. And Audit Logs capability provides an audit trail record of events for each instrument.

Enhanced Security is easy to implement: Use the 21 CFR Part 11 Configuration program to enable the feature and implement settings for secure data storage, and your data is then stored as data bundles (all data related to an assay or protocol) in a secure location for verification.

Additional applications can be run on the internal PC, and data can be transferred automatically to the application for data reduction through the three high-speed USB ports.



The Enhanced Security configuration program provides the ability to configure logon security passwords and provides options for secure data storage of all data associated with an assay (data bundles).

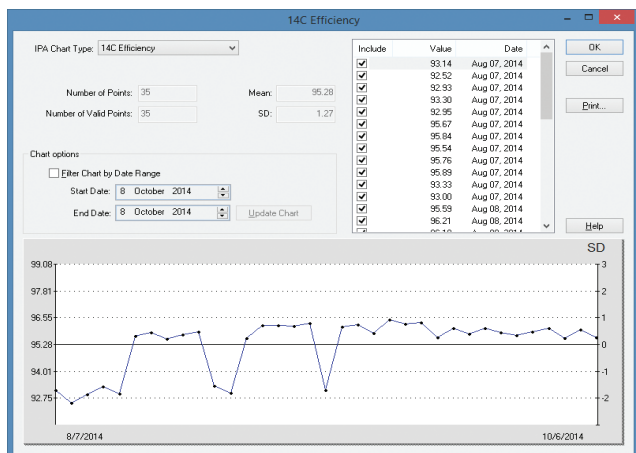
Keep an eye on performance

The Instrument Performance Assessment (IPA) feature monitors eight critical instrument performance parameters to support the validity of experimental data. It employs highly sensitive counting conditions to detect even the smallest change in performance. In addition, an IPA database of historical charts and tables is standard on the Tri-Carb 5110 and Quantulus 6220 model systems.

IPA is automatically initiated, but the instrument operator can initiate IPA any time, on demand, by activating the SNC/IPA protocol flag. And with IPA, performance record-keeping is as easy as printing out IPA files or saving IPA data electronically. Calibration and reference sources supplied with each LSC system, so no other calibration standards need to be purchased.

What's more, IPA serves as an incorruptible early warning system, alerting you of any change in your system's performance – before it affects your results.

Eight critical IPA parameters can be defined to monitor instrument lifetime performance.



Historical archive of IPA data.

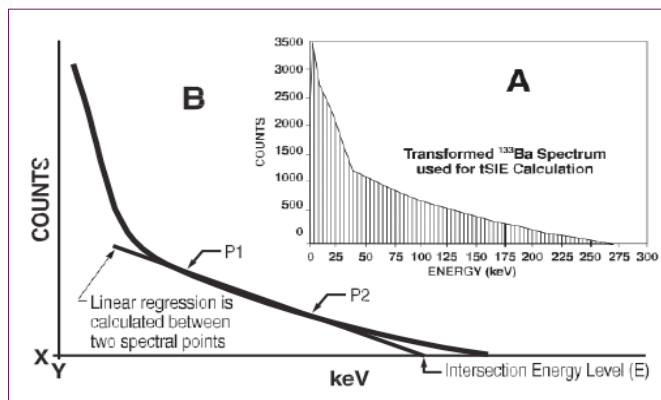
Fast, accurate, and sensitive quench measurements

All liquid scintillation samples exhibit some degree of quenching, which affects sample count rate. External standardization is a good method of quench correction, independent of sample count rates. The Transformed Spectral Index of the External Standard (tSIE) is determined by evaluating the sample's spectrum and the Compton electron spectrum of the ¹³³Ba external standard source with the multichannel analyzer (MCA). In this way, you can overcome the interferences that affect external standard quench measurements to yield the highest accuracy in the shortest time – eliminating repeat measurements.

Plus, our optional SpectraBase spectrum-based library conveniently stores quench standards in a spectral library for use with any assay and allows recall of sample data and quench standards for reprocessing. And a barcode-based sample tracking option handles numeric, alphanumeric, and byte data and imports it into the sample work list or file.

tSIE Dynamic Range

Sample	³ H % EFF	% Rec	% CV	tSIE
1	58.47	99.94	0.362	815.2
2	55.78	99.77	0.2	725.9
3	44.49	100.23	0.224	472.2
4	24.77	99.82	0.304	231.1
5	18.07	99.42	0.303	177.1
6	10.81	99.6	0.318	119.8
7	6.15	99.29	0.64	83.59
8	3.32	99	0.381	58.75



The tSIE value is the intersection energy level (E) of the regression multiplied by the instrument calibration factor. tSIE is ideal for accurate quench determination of difficult-to-measure low energy beta radionuclides.

COMPLETE SOLUTIONS BRING ABOUT THE BEST RESULTS

Keeping you and your lab safer

Occupational safety in laboratories is critically important. Traditional cocktail formulations contain flammable, toxic solvents that permeate through polyethylene and may represent a hazard to laboratory workers, create disposal problems, and add hidden costs. Our safer cocktails have many of the properties you're looking for in a responsible cocktail solution, including:

- Very high flash point based on high flash-point solvent
- Low vapor pressure
- Low volatility
- Lower toxicity compared to LSC cocktails based on low flash-point solvent
- High counting efficiency
- High quench resistance



Optimal safety and performance

The Ultima Gold™ line of safer cocktails is ideal for a wide range of routine and specialized counting. Available in seven varieties, each developed for specific sample types (aqueous or organic), sample size (high volume or microplates), and applications (low-level environmental monitoring to alpha/beta discrimination). The OptiPhase™ family of safer cocktails for multipurpose counting delivers six varieties developed specifically for very high counting capacity, high ionic strength solutes, filters membranes, and radon counting.

The classical cocktails you've come to rely on

We also offer classical liquid scintillation cocktail formulations that are optimized for the highest counting efficiency and maximum sample holding capacity. Our prepared cocktails are easy to use, save preparation time, and minimize laboratory errors. And our carefully controlled blending and quality-assurance procedures provide high performance, batch homogeneity, and lot-to-lot uniformity.

The perfect vial for the work you do

Our high-quality vials are designed for a variety of sample types and range of sample volumes (4 mL to 20 mL) available with patented antistatic treatment. Glass vials are manufactured from low-potassium glass tubing, and the tube diameter and wall thickness are closely quality controlled, giving you exceptional counting reproducibility. These vials are chemically inert for use with aggressive reagents and solubilizers.

Our plastic vials are injection-molded to exacting specifications from virgin, high-density polyethylene that provides lower background level and higher counting efficiency than glass vials. And we offer a specialized low-diffusion polyethylene vial with aluminum foiled cap that reduces cocktail diffusion, enabling long-term low measurements that reach the lowest detectable activity level.

What's more, all our caps are recessed to assure reliable loading and transfers in automatic sample changers, with no skipping or jamming. These caps come unlined, foiled lined (for an airtight seal), or poly-cone lined (for use with aggressive reagents).



Standards of measurement

We supply a wide variety of Quench and Unquenched standards to establish efficiency and quench correlation curves to improve your counting accuracy.

Everything You Need Under One Roof

When you engage with OneSource[®], our laboratory services team, you're benefiting from multivendor service and support from the absolute best in the business. Thousands of certified technicians in the field who are familiar with all the techniques you employ. More than 500,000 multivendor assets serviced. And operations in more than 120 countries across the globe.

OneSource helps reduce lab complexities and increase efficiencies, offering services for information management, compliance, scientific support and lab relocation, and asset management, including multivendor instrument service and repair. And our deep-seated knowledge of our customers' business requirements uniquely qualifies us to help empower your science and drive your business.

For more information, visit www.perkinelmer.com/liquid-scintillation

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