Tri-Carb Family of Liquid Scintillation Analyzers

For Research, Environmental or Drug Discovery Applications
Count on PerkinElmer for all your liquid scintillation needs

Research and environmental labs around the world recognize and use one top brand for their liquid scintillation application needs—the Tri-Carb® family of liquid scintillation analyzers from PerkinElmer.

Why? Our field-proven Tri-Carb scintillation analyzers have a strong reputation for high performance liquid scintillation counting and superior reliability. They are the most sensitive detectors on the market, with models capable of meeting the requirements of even the most demanding application.

PerkinElmer’s 50 years of experience and innovation in liquid scintillation analysis result in unmatched service and applications expertise. Plus, we offer high quality, optimized liquid scintillation cocktails and counting supplies to complement your LSA and ensure optimum counting results with your application. You choose the LSA that’s right for you, whatever your application needs—based on your budget today and the options you may want to add later.
scintillation needs

Proven technology and expertise are built into every PerkinElmer LSA.

When you need an LSA for your research or environmental lab, turn to PerkinElmer, the industry leader in low-level detection and the only source for the world's top LSA brand. PerkinElmer's thoughtful design and product range let you choose the Tri-Carb LSA that's right for you.

NEW MODELS! NEW FEATURES!
- 2D barcode reader automates sample tracking
- Sample activity data screening
- Improved light blocking lid
- LCD monitor and dedicated arm
- Improved Replay sample post-processing functionality
- Enhanced report options and spectral display
- Improved data acquisition and analysis

Tri-Carb 3110TR
Top of the line, fully loaded LSA suited for the most demanding research applications. Can be expanded for environmental applications.

Tri-Carb 2910TR
A moderately priced LSA for more sophisticated research applications and demanding DPM counting. More versatile than the 2810TR, the 2910TR can be expanded for environmental applications.

Tri-Carb 2810TR
An economical CPM/single label DPM instrument. The top choice for labs doing basic research applications, it can be expanded for more sophisticated applications.

Tri-Carb 3180TR/SL
A premium instrument for multi-user labs doing both low level environmental and routine counting of higher activity levels for research applications. Especially well suited for the detection of extremely low level alpha and beta radioactivity.
The Tri-Carb family — research & environmental systems

The Tri-Carb family from PerkinElmer is a range of computer-controlled benchtop liquid scintillation analyzers most frequently cited in the scientific literature. They are the most versatile and sensitive instruments available for detecting small amounts of alpha, beta and gamma radioactivity.

Tri-Carbs are the latest in LSA technology. Built on a modern Windows® operating system platform, their performance and reliability is unmatched by any other commercially available LSA.

Exclusive software and hardware features are built into every Tri-Carb LSA:

**Space saving integrated PC Control** for convenient networking, data reduction and data storage.

**2D barcode reader option provides automated sample tracking**

- 2D barcode is placed on the vial cap and read before sample loading.
- QR Code is capable of handling numeric, alphanumerical and byte data as well as kanji and kana characters.
- Barcode data are imported directly into the sample worklist or can be saved to a file.

Barcodes are used to create new or verify existing worklists.

Barcode settings are defined in the assay parameters dialogue.

2D barcodes are read automatically during sample loading and imported into the worklist. (The worklist feature is an option on some models.)
High Dynamic Range Quench Monitoring

- Features a $^{133}$Ba source whose Compton spectral shift mimics quenching of low energy beta radionuclides.
- tSIE (transformed Spectral Index of the External Standard) quench monitor utilizes a large portion of the $^{133}$Ba spectrum for improved accuracy and precision and worry free DPM calculations even for low activity samples.

Intelligent Sample Changer and Safe Gravity Feed Sample Loading

- Automatic 2D barcode reader option for worry free sample tracking.
- Protocol system provides for unattended counting with automatic protocol recognition and termination.
- Sturdy cassette system that is permanently labeled for positive sample ID.
- Varivette feature (option on some models) allows direct counting of large and small vials in dedicated cassettes.

<table>
<thead>
<tr>
<th>Sample</th>
<th>$^3$H</th>
<th>% EFF</th>
<th>% Rec</th>
<th>% CV</th>
<th>tSIE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58.47</td>
<td>99.94</td>
<td>0.362</td>
<td>815.2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>55.78</td>
<td>99.77</td>
<td>0.200</td>
<td>725.9</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>44.49</td>
<td>100.23</td>
<td>0.224</td>
<td>472.2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>24.77</td>
<td>99.82</td>
<td>0.304</td>
<td>231.1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>18.07</td>
<td>99.42</td>
<td>0.303</td>
<td>177.1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>10.81</td>
<td>99.60</td>
<td>0.318</td>
<td>119.8</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>6.15</td>
<td>99.29</td>
<td>0.640</td>
<td>83.59</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>3.32</td>
<td>99.00</td>
<td>0.381</td>
<td>58.75</td>
<td></td>
</tr>
</tbody>
</table>

tSIE is an accurate monitor of quench for low energy beta radionuclides like $^3$H.

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.
PerkinElmer’s instruments are the most cited liquid scintillation analyzers worldwide. Our current application bibliography, available on request, cites over 1,000 articles in open scientific literature, describing results of research conducted using liquid scintillation analyzers. We continually publish application papers from researchers and our own application specialists help inform researchers about the latest in liquid scintillation technology. To see our literature visit www.perkinelmer.com/radioactivity.

**SpectraBase Spectrum-Based Library Storage of Standards and Samples**
- Quench standards are conveniently stored in a spectral library for use with any assay.
- SpectraBase storage allows recall of sample data and quench standards for Replay™ reprocessing (optional feature on some models).

**QuantaSmart™ Instrument and Data Reduction Software**
- Proven, simple-to-use intelligent software for the Windows® XP operating system that warns the user of incomplete or incorrect setup.
- Enhanced Security option (21 CFR Part 11 compatible) for regulatory compliance. (This option is not available for the Tri-Carb 2810TR.)
- Data Screening feature screens numeric values against user defined thresholds.
- IPA™ (Instrument Performance Assessment) provides a historical record of instrument performance to support GLP compliance. (IPA is optional on some models.)
- User defined custom report content and formatting with print preview.

**Quick Glance**

**Tri-Carb Bibliography and Application Notes**

Historical archive of IPA data.

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

Common operator error warning.
QuantaSmart Enhanced Security option (21 CFR Part 11 compatibility)
- There are three features to the Enhanced Security option that are compatible with 21 CFR Part 11 requirements:
  - **Instrument access security.** Instrument access security is a way of limiting an instrument’s use only to people who are authorized to use it.
  - **Data security & verification.** Data verification allows you to be sure that your data has not been tampered with.
  - **Audit logs.** An audit log is a record of events that occur on an instrument.
- Enhanced Security is seamlessly integrated into the QuantaSmart software and is easy to implement.

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).

Data Screening is standard on all Tri-Carb Scintillation Analyzers.

- **Low** - Sample value less than screen value.
- **High** - Sample value greater than screen value.
- **In Range** - Sample value within range requested.
- **(User Defined)** - Can also be entered by user.

- **Less Than** - Test value is less than computed value.
- **Greater Than** - Test value is greater than computed value.
- **Between** - Test value lies between a range of values.

Data bundles can be checked for changes with the unique data verification program.
A range of Tri-Carb LSAs...
...for every application need.

Choose the Tri-Carb LSA that best meets your applications requirements now. Expand the system later with features that satisfy your future research or environmental analysis needs.

Tri-Carb products are designed and manufactured under an ISO 9001 certified system. They are designed, built, and tested in conformance with appropriate CSA, FCC, EU, and IEC standards.

**Tri-Carb 2810TR**
**Liquid Scintillation Analyzer**
**Affordable and Powerful for Basic Research**

The Tri-Carb 2810TR economizes on price, not performance. The 2810TR is ready to go for basic research CPM/single label DPM applications and can be expanded for more demanding applications. When you choose the 2810TR, you spend your budget dollars on only what you need—the basics—yet you get all the performance advantages of a more fully loaded Tri-Carb—all at a truly superb price.

**Standard Features**
- Complete system with built-in Pentium® PC, monitor and printer.
- Logical, easy-to-use QuantaSmart instrument software for the Windows® XP operating system.
- TR-LSC® electronic background discrimination.
- Live spectral display and plotting.
- Sample nuclide library with preset or user-defined radionuclide settings for 3 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 (correction optional).
- Single photon counting for bioluminescence assays.
- Easy networking with optional Ethernet adapter.
- Sample numeric value screening against user defined thresholds.
- Custom printed and electronic report output.

Popular options include 2D barcode reader and worklist options for positive sample ID, IPA, ultra low level and alpha/beta discrimination count mode and triple label DPM.

**Direct DPM results for $^3$H and $^{14}$C**

<table>
<thead>
<tr>
<th>Radionuclide/ Cocktail</th>
<th>tSIE</th>
<th>Direct DPM</th>
<th>Actual DPM</th>
<th>% Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{14}$C in toluene</td>
<td>691</td>
<td>120,701</td>
<td>120,300</td>
<td>100.33</td>
</tr>
<tr>
<td>measured in large glass vials</td>
<td>422</td>
<td>120,999</td>
<td>120,300</td>
<td>100.58</td>
</tr>
<tr>
<td></td>
<td>255</td>
<td>123,389</td>
<td>120,300</td>
<td>102.7</td>
</tr>
<tr>
<td>$^{14}$C in Ultima Gold</td>
<td>535</td>
<td>37,259</td>
<td>38,100</td>
<td>97.79</td>
</tr>
<tr>
<td>measured in small glass vials</td>
<td>277</td>
<td>38,419</td>
<td>38,100</td>
<td>100.84</td>
</tr>
<tr>
<td>$^{3}$H in toluene</td>
<td>705</td>
<td>245,390</td>
<td>247,009</td>
<td>99.34</td>
</tr>
<tr>
<td>measured in large glass vials</td>
<td>428</td>
<td>246,980</td>
<td>247,009</td>
<td>99.99</td>
</tr>
<tr>
<td></td>
<td>152</td>
<td>248,408</td>
<td>247,009</td>
<td>100.5</td>
</tr>
<tr>
<td>$^{3}$H in Ultima Gold</td>
<td>509</td>
<td>46,299</td>
<td>45,536</td>
<td>101.67</td>
</tr>
<tr>
<td>measured in small glass vials</td>
<td>253</td>
<td>47,251</td>
<td>45,536</td>
<td>103.87</td>
</tr>
<tr>
<td>$^{3}$H in Ultima Gold</td>
<td>592</td>
<td>45,907</td>
<td>45,536</td>
<td>100.81</td>
</tr>
<tr>
<td>measured in small plastic vials</td>
<td>258</td>
<td>44,782</td>
<td>45,536</td>
<td>98.34</td>
</tr>
</tbody>
</table>

**Tri-Carb 2910TR**
**Liquid Scintillation Analyzer**
**Versatility with Value for More Research Applications**

The popular moderately priced Tri-Carb 2910TR is a workhorse for more demanding DPM and environmental applications. When you choose the 2910TR, you get the standard features required for many research applications and the versatility to expand the instrument capability for environmental analysis with the optional ultra low level and alpha/beta discrimination features.

**Standard Features**
- All the features of the 2810TR 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 worklist options for positive sample ID, IPA, ultra low level and alpha/beta discrimination count mode and triple label DPM.
Tri-Carb 3110TR Liquid Scintillation Analyzer

Unmatched Standard Features for Research Labs

The Tri-Carb 3110TR is the perfect system for both advanced research and environmental work. This is the LSA to choose when you need every option to meet a wide range of possible applications in a multi-user lab, providing maximum versatility and flexibility.

Standard Features

The 3110TR combines all the 2810TR and 2910TR features plus:

- IPA (Instrument Performance Assessment) monitors eight critical parameters historically.
- Triple label DPM for counting three radionuclides in the same sample.
- High sensitivity count mode for reduced backgrounds and higher sensitivity.
- Worklist software for positive sample ID.
- Sample PrioStat™ special function interrupt mode for manual preview of sample counting to verify settings before actual acquisition.
- 60 user protocols with unlimited assays.

Popular options include 2D barcode reader and ultra low level and alpha/beta discrimination count modes.

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

Sample and quench standard libraries are spectrum based and easy to use on the Tri-Carb system.

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

Eight critical IPA parameters can be defined to monitor instrument lifetime performance.
For environmental labs  
— Tri-Carb 3180TR/SL

The Tri-Carb 3180TR/SL is unmatched in low level performance, when extremely high sensitivity, low background counting is a must for demanding environmental applications. Applications range from radiocarbon dating of archaeological samples; tritium, radon, radium and uranium measurements in drinking water; strontium in food; \(^{14}\text{C}\) in food, alcohol and biofuels; to evaluations of tritium and \(^{14}\text{C}\) emissions from nuclear power plants; monitoring of radioactivity during decommissioning of nuclear reactors; and tracer measurements in oil exploration.

**Tri-Carb 3180TR/SL**  
Liquid Scintillation Analyzer  
Premium LSA for Environmental and Research Use

When low level environmental counting is done (especially in glass vials) in a multi-user lab that also routinely counts higher activity levels for research applications, choose the Tri-Carb 3180TR/SL. The 3180TR/SL provides a high sample capacity for maximum throughput, yet accommodates the needs of environmental counting with minimum counter optimization. It is especially well suited for the detection of extremely low level alpha and beta radioactivity and handles the most demanding environmental, ADME, and food adulteration applications.

In the Tri-Carb 3180TR/SL, a unique BGO (Bismuth Germanium Oxide) detector guard completely surrounds the sample. The BGO guard works in conjunction with patented TR-LSC background reduction electronics to further lower the instrument background, raising sensitivity to accurately measure near background sample activity. This surround TR-LSC design is designed to use ordinary glass or plastic vials so counting is easy and inexpensive.

**Standard Features**

All the sophisticated features of the 3110TR plus:

- BGO sample detector guard surrounds the sample for superior background reduction.
- Temperature control allows for very reproducible counting.
- Transportable, space saving bench top design.
- Measures \(^{3}\text{H}\) water samples to less than 2 Bq/L.
- \(^{14}\text{C}\) benzene samples can be dated to over 51,000 years.

Popular options include the 2D barcode reader and alpha/beta discrimination count modes.

<table>
<thead>
<tr>
<th>Ratio, Sample Type</th>
<th>8:12 water</th>
<th>10:10 water</th>
<th>11:9 water</th>
<th>8:12 sea water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass</td>
<td>1.43</td>
<td>1.26</td>
<td>1.24</td>
<td>1.47</td>
</tr>
<tr>
<td>Plastic</td>
<td>1.22</td>
<td>1.11</td>
<td>1.06</td>
<td>1.35</td>
</tr>
</tbody>
</table>

Detect very low \(^{3}\text{H}\) levels in water using a compact counter under normal laboratory conditions. (Data acquired at Scottish Research and Reactor Center, East Kilbride, Scotland.)

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 before they interfere with sample counts.
measures up.

Tri-Carb 2910TR.

The worklist can be created automatically with the optional 2D barcode reader to ensure positive sample tracking.

### Tri-Carb System Configurations

<table>
<thead>
<tr>
<th>Tri-Carb Feature</th>
<th>2810TR</th>
<th>2910TR</th>
<th>3110TR</th>
<th>3180TR/SL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built-in Pentium® computer/monitor/printer/DVD R/W</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>QuantaSmart Software for Windows® XP operating system</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>TR-LSC background electronics</td>
<td>O</td>
<td>O</td>
<td>S</td>
<td>NA</td>
</tr>
<tr>
<td>HSCM (High Sensitivity Count Mode)</td>
<td>NA</td>
<td>O</td>
<td>S</td>
<td>NA</td>
</tr>
<tr>
<td>ULLCM (Ultra Low Level Count Mode)</td>
<td>NA</td>
<td>O</td>
<td>O</td>
<td>S</td>
</tr>
<tr>
<td>BGO detector guard</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>S</td>
</tr>
<tr>
<td>Live spectral display and plotting</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Enhanced Security (21 CFR Part 11 Compatibility)</td>
<td>NA</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2D Barcode reader</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Sample numeric data screening</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Direct DPM</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
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<tr>
<td>Single/dual color-corrected DPM</td>
<td>O</td>
<td>S</td>
<td>S</td>
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<td>Triple Label DPM</td>
<td>O</td>
<td>O</td>
<td>S</td>
<td>S</td>
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<td>Varisette sample changer</td>
<td>O</td>
<td>O</td>
<td>S</td>
<td>S</td>
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<tr>
<td>Replay sample recall and reprocessing</td>
<td>O</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Group PrioStat automatic priority interrupt</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
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<tr>
<td>Luminescence correction</td>
<td>O</td>
<td>O</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Single photon counting for bioluminescence assays</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Sample PrioStat manual special function interrupt</td>
<td>NA</td>
<td>O</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Alpha/Beta discrimination</td>
<td>NA</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>No. of user acquisition protocols with unlimited assays</td>
<td>15, 60</td>
<td>30, 60</td>
<td>60</td>
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</tr>
<tr>
<td></td>
<td>optional</td>
<td>optional</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S = standard      O = Optional      NA = Not Available
PerkinElmer Liquid Scintillation Cocktails and Vials

Designed for PerkinElmer LSAs

Safer and Classic Liquid Scintillation Cocktails

A complete range of safer and classical cocktails is available that is unmatched in quality, batch-to-batch consistency and performance. PerkinElmer is the only provider of both general purpose and specialty cocktails and vials to fit almost every LSA application. The Ultima Gold™ and OptiPhase™ families of safer LSC cocktails have become the clear choice, worldwide, for high performance, safety and value.

Key Features

- High flash points for greater safety.
- Biodegradable to comply with concerns about disposal.
- Expiry dates are clearly indicated to satisfy GLP.
- Broad range includes cocktails for both general and specialist areas of LSC.
  - Ultima Gold and OptiPhase HiSafe 2 for routine counting applications.
  - Ultima Gold XR and OptiPhase HiSafe 3 for large volume and/or concentrated samples.
  - Ultima Gold AB for alpha/beta separation.
  - Ultima Gold LLT for counting low levels of tritium in water.
  - Ultima Gold F and OptiScint HiSafe for samples in organic solvents.

Glass, Plastic, Copper-Teflon® Counting Vials and Other Supplies

To complement the range of LSC cocktails, PerkinElmer also offers:

- Comprehensive range of vials available in glass, plastic and copper-Teflon®.
- Sizes from 3 mL up to 20 mL.
- Anti-static versions of every plastic vial.
- Standards and supplies.
  - 'H and 'C Ultima Gold and toluene-based quench standards for library storage of quench curves.
  - Internal standard kits of 'H and 'C.
  - Dispensette® for accurate and reproducible cocktail dispensing.

LSA Reliability and Performance You Can Count On

Make the only choice, Tri-Carb LSAs, only from PerkinElmer. You’ll get superior low level sensitivity and performance for every research or environmental application challenging your lab. For more information or for help placing an order, call 1-800-762-4000 or visit www.perkinelmer.com/radioactivity.