

Liquid Scintillation Counting Standards



Eckert & Ziegler Analytix manufactures a complete range of NIST traceable Standards for the calibration of Liquid Scintillation Counters (LSC). Our LSC Standards are calibrated in an ISO9001 certified and ISO17025 accredited laboratory using state of the art equipment, operated by experienced, professional staff.

We offer unquenched Tritium and Carbon-14 Standards and a wide range of quenched Standards for the verification and calibration of LSC instruments from all major manufacturers. Providing the LSC community with customized, NIST traceable, quenched LSC standards is one of our core strengths. For counting efficiency calibration by internal standardization we provide all common nuclides in form of NIST traceable standardized solutions.

Unquenched LSC Standards

This unquenched Liquid Scintillation Counting Set of 3 Standards contains 1 Carbon-14, Tritium (H-3) and 1 Background Standard.

The set is designed for establishing the optimum LSC operating settings and verify longterm stability. It can be used with all common LSC instruments.

The standards are available in 20 ml and 7 ml Argon purged, flame sealed borosilicate glass LSC vials.

Chemical form: C-14 or H-3 labeled toluene in toluene based scintillator, PPO/bis-MSB in scintillation grade toluene.



Product Code	SET-H3C14-LSC-20FST	SET-H3C14-LSC-7FST
	20 ml unquenched LSC Standard Set	7 ml unquenched LSC Standard Set
Nuclides	Carbon-14 and Tritium (H-3)	Carbon -14 and Tritium (H-3)
C-14 Activity	1.67 kBq (100,000 dpm) +/-10%, calibrated, NIST traceable	1.67 kBq (100,000 dpm) +/-10%, calibrated, NIST traceable
Active volume	15 ml C-14 labeled toluene in toluene based scintillator	5 ml C-14 labeled toluene in toluene based scintillator
H-3 Activity	4.17 kBq (250,000 dpm) +/- 10%	4.17 kBq (250,000 dpm) +/- 10%
Active volume	15 ml H-3 labeled toluene in toluene based scintillator	5 ml H-3 labeled toluene in toluene based scintillator
BKG-Standard	Background Standard, 15ml toluene based scintillator	Background Standard, 15ml toluene based scintillator

Unquenched Standards for Beckman Coulter LSC

Product Code	LSCBC566321	LSCBC594946
	20 ml unquenched Standard Set Recommended for Beckman Coulter LSC Instruments	7 ml unquenched Standard Set Recommended for Beckman Coulter LSC Instruments
Nuclides	Carbon-14 and Tritium (H-3)	Carbon -14 and Tritium (H-3)
C-14 Activity	1.67 kBq +/-10% (100,000 dpm) - calibrated, NIST traceable	750 Bq +/-10% (45,000 dpm) - calibrated, NIST traceable
Active volume	15 ml C-14 labeled toluene in toluene based scintillator	5 ml C-14 labeled toluene in toluene based scintillator
H-3 Activity	1.67 kBq +/-10% (100,000 dpm) - calibrated, NIST traceable	1.67 kBq +/-10% (100,000 dpm) - calibrated, NIST traceable
Active volume	15ml, H-3 labeled toluene in toluene based scintillator	5ml H-3 labeled toluene in toluene based scintillator
BKG-Standard	Background Standard, 15ml toluene based scintillator	Background Standard, 15ml toluene based scintillator

Quenched LSC Standards - Toluene

Quenched Liquid Scintillation Counting Sets contain 10 Standards. Each standard contains the same amount of radioactivity but with progressively higher levels of quenching agent nitromethane.

Toluene based LSC Standards are designed to establish counting efficiency correlation curves which are applicable to a wide range of scintillations cocktails and quenching agents. The standards are available in 20 ml and 7ml Argon purged, flame sealed borosilicate glass LSC vials.

The Transformed External Standard Spectrum (tSIE) value is approx. 150 to 1000.



Chemical Form: C-14 or H-3 labeled toluene in toluene based scintillator,
PPO/bis-MSB in scintillation grade toluene, quenching agent nitromethane.

	C-14 Standards	H-3 Standards
Product Code	SET-C14-LSC-20FST	SET-H3-LSC-20FST
Product	Set of 10 quenched C-14 Standards- 20 ml vials	Set of 10 quenched H-3 Standards- 20 ml vials
Nuclide	Carbon -14	H-3 (Tritium)
C-14 Activity	1.67 kBq +/-10% (100,000 dpm) per vial, calibrated, NIST traceable	4.17 kBq +/-10% (250,000 dpm) per vial, calibrated, NIST traceable
Active volume	15 ml C-14 labeled toluene in toluene based scintillator	15 ml H-3 labeled toluene in toluene based scintillator

	SET-C14-LSC-7FST	SET-H3-LSC-7FST
C-14	Set of 10 quenched C-14 Standards- 7 ml vials	Set of 10 quenched H-3 Standards- 7 ml vials
Nuclide	Carbon -14	H-3 (Tritium)
Activity	1.67 kBq +/-10% (100,000 dpm) per vial, calibrated, NIST traceable	4.17 kBq +/-10% (250,000 dpm) per vial, calibrated, NIST traceable
Active volume	5 ml C-14 labeled toluene in toluene based scintillator	5 ml H-3 labeled toluene in toluene based scintillator

	C-14 Standards for Low Level counting	H-3 Standards Low Level counting
Product Code	SET-C14-LSC-20FST-LOW	SET-H3-LSC-20FST-LOW
Product	Set of 10 quenched C-14 Standards- 20 ml vials	Set of 10 quenched H-3 Standards- 20 ml vials
Nuclide	Carbon -14	H-3 (Tritium)
Activity	333 Bq +/-10% (20,000 dpm) per vial, calibrated, NIST traceable	500 Bq +/-10% (30,000 dpm) per vial, calibrated, NIST traceable
Active volume	15 ml C-14 labeled toluene in toluene based scintillator	15 ml H-3 labeled toluene in toluene based scintillator

Quenched Standards for Beckman Coulter LSC - Toluene

	C-14 Standards for Beckman Coulter LSC	H-3 Standards for Beckman Coulter LSC
Product Code	LSCBC566681	LSCBC566680
Product	Set of 10 quenched C-14 Standards - 20 ml vials	Set of 10 quenched H-3 Standards - 20 ml vials
Nuclide	Carbon -14	H-3 (Tritium)
Activity	2.50 kBq +/-10% (150,00 dpm) per vial, calibrated, NIST traceable	8.33 kBq +/-10% (500,000 dpm) per vial, calibrated, NIST
Active volume	15 ml C-14 labeled toluene in toluene based scintillator	15 ml H-3 labeled toluene in toluene based scintillator
Product Code	LSCBC566682	LSCBC566683 Set of 10 quenched H-3 LSC Standards - 7 ml vials
Product	Set of 10 quenched C-14 Standards - 7 ml vials	Set of 10 quenched H-3 LSC Standards - 7 ml vials
Nuclide	Carbon -14	H-3 (Tritium)
Activity	2.25 kBq +/-10% (135,000 dpm) per vial, calibrated, NIST traceable	8.33 kBq +/-10% (500,000 dpm) per vial, calibrated, NIST traceable
Active volume	5 ml C-14 labeled toluene in toluene based scintillator	5 ml H-3 labeled toluene in toluene based scintillator

Quenched Standards - Ultima Gold

Quenched liquid Scintillation Counting Sets contain 10 Standards. Each standard contains the same amount of radioactivity but with progressively higher levels of quenching agent nitromethane. These LSC Standards are designed to establish counting efficiency correlation curves which are applicable to Ultima Gold LSC cocktails. The 'Transformed External Standard Spectrum (tSIE)' is approx. 150-650. The standards are available in 20ml and 7 ml, flame sealed borosilicate glass LSC vials.

Chemical form: C-14 labeled glucose or Tritiated (H-3) water in Ultima Gold scintillation cocktail.
Quenching agent nitromethane.

	C-14 Standards	H-3 Standards
Product Code	SET-C14-LSC-20FSUG	SET-H3-LSC-20FSUG
Product	Set of 10 quenched C-14 Standards - 20 ml vials	Set of 10 quenched H-3 Standards - 20 ml vials
Nuclide	Carbon -14	H-3 (Tritium)
Activity	1.67 kBq +/-10% (100,000 dpm) per vial, calibrated, NIST traceable	4.17 kBq +/-10% (250,000 dpm) per vial, calibrated, NIST traceable
Active volume	15 ml C-14 labeled glucose in Ultima Gold scintillation cocktail.	15 ml Tritiated water (H-3) in Ultima Gold scintillation cocktail.
Product Code	SET-C14-LSC-7FSUG	SET-H3-LSC-7FSUG
Product	Set of 10 quenched C-14 Standards - 7 ml vials	Set of 10 quenched H-3 Standards - 7 ml vials
Nuclide	Carbon -14	H-3 (Tritium)
Activity	1.67 kBq +/-10% (100,000 dpm) per vial, calibrated, NIST traceable	4.17 kBq +/-10% (250,000 dpm) per vial, calibrated, NIST traceable
Active volume	5 ml C-14 labeled glucose in Ultima Gold scintillation cocktail.	5 ml Tritiated water (H-3) in Ultima Gold scintillation cocktail.

Standards for Low Level counting – Ultima Gold

	C-14 Standards for Low Level counting	H-3 Standards Low Level counting
Product Code	SET- C14- LSC-20FSUG-LOW	SET- H3- LSC-20FSUG-LOW
Product	Set of 10 quenched C-14 Standards - 20 ml vials	Set of 10 quenched H-3 Standards - 20 ml vials
Nuclide	Carbon-14	H-3 (Tritium)
Activity	333 Bq +/-10% (20,000 dpm) per vial, calibrated, NIST traceable	500 Bq +/-10% (30,000 dpm) per vial, calibrated, NIST traceable
Active volume	15 ml C-14 labeled glucose in Ultima Gold scintillation cocktail.	15 ml Tritiated water (H-3) in Ultima Gold scintillation cocktail.

LSC Alpha/Beta Standards – Ultima Gold AB

This Quenched Liquid Scintillation Counting Set of 3 Standards contains 1 Americium - 241, 1 Chlorine - 36 and 1 Background Standard.

The set is used to optimize the pulse discrimination parameter for alpha/beta separation.

The standards are available in 20 ml, flame sealed borosilicate glass LSC vials.

Other nuclides and cocktails are available on request.

Alpha / Beta LSC Standard Set	
Product Code	SET-AM1CL6 - LSC-20FSUGAB
Am-241/Cl-36/BKG	Alpha/Beta Standard Set - 20 ml vials
Nuclide	Am-241
Am-241 activity	1.67 kBq +/-10% (100,000 dpm) per vial, calibrated, NIST traceable
Active volume	15 ml
Vial Type	20 ml Flame sealed borosilicate glass ampoule
Chemical Form	Americium Chloride in Ultima Gold AB scintillation cocktail.
Nuclide	Cl-36
Cl-36 activity	1.67 kBq +/-10% (100,000 dpm) per vial, calibrated, NIST traceable
Active volume	15 ml
Vial Type	20 ml Flame sealed borosilicate glass ampoule
Chemical Form	Sodium Carbonate in Ultima Gold AB scintillation cocktail.
BKG- Standard	Background Standard
Volume	15 ml
Vial Type	20 ml Flame sealed borosilicate glass ampoule
Chemical Form	Ultima Gold AB scintillation cocktail



Single LSC Standards

Unquenched Single LSC Standards – Toluene based scintillator

Unquenched LSC Standards in Flame Sealed Borosilicate Glass Ampoules

All standards are calibrated, NIST traceable, measurement uncertainty <4% (k=2)

Customized standards are available on request.

Nuclide	Product Code	Activity	DPM	Vial	Active Volume	Chemical Form
C-14	C14-LSC- 20FST-666BQ	666 Bq +/- 10%	40,000	20 ml	15 ml	C-14 labeled toluene
C-14	C14-LSC- 20FST-1666BQ	1,666 Bq +/- 10%	100,000	20 ml	15 ml	C-14 labeled toluene
C-14	C14-LSC- 20FST-666BQ	666 Bq +/- 10%	40,000	20 ml	15 ml	C-14 labeled toluene
C-14	C14-LSC- 20FST-1666BQ	1,666 Bq +/- 10%	100,000	7 ml	5 ml	C-14 labeled toluene
H-3	H3-LSC- 20FST-1666BQ	1,333 Bq +/- 10%	80,000	20 ml	15 ml	Tritium labeled toluene
H-3	H3-LSC- 20FST-1666BQ	1,666 Bq +/- 10%	100,000	20 ml	15 ml	Tritium labeled toluene
H-3	H3-LSC- 7FST-1666BQ	1,666 Bq +/- 10%	100,000	7 ml	5 ml	Tritium labeled toluene
H-3	H3-LSC- 20FST-4167BQ	4,167 Bq +/- 10%	250,000	20 ml	15 ml	Tritium labeled toluene
H-3	H3-LSC- 7FST-1666BQ	4,167 Bq +/- 10%	250,000	7 ml	5 ml	Tritium labeled toluene

Single LSC Standards

Quenched single LSC Standards in Ultima Gold Cocktail

Flame Sealed Borosilicate Glass Ampoules, Argon purged

All standards are calibrated, NIST traceable, measurement uncertainty <4% (k=2)

The tSIE quench value is approx. 750.

Nuclide	Product Code	Activity	DPM	Vial	Active Volume	Chemical Form
Am-241	AM1-LSC-20FSUG-1666BQ	1,666 Bq +/- 10%	100,000	20 ml	15 ml	Americium Chloride
Am-241	AM1-LSC-7FSLUG-1666BQ	1,666 Bq +/- 10%	100,000	7 ml	5 ml	Americium Chloride
C-14	C14-LSC-20FSLUG-333BQ	333 Bq +/- 10%	20,000	20 ml	15 ml	Sodium Carbonate
C-14	C14-LSC-20FSLUG-1666BQ	1,666 Bq +/- 10%	100,000	20 ml	15 ml	Sodium Carbonate
C-14	C14-LSC-7FSLUG-1666BQ	1,666 Bq +/- 10%	100,000	7 ml	5 ml	Sodium Carbonate
C-36	CL6-LSC-20FSUG-1666BQ	1,666 Bq +/- 10%	100,000	20 ml	15 ml	Sodium Chloride
C-36	CL6-LSC-20FSUG-1666BQ	1,666 Bq +/- 10%	100,000	7 ml	5 ml	Sodium Chloride
H-3	H3-LSC-20FSUG-500BQ	500 Bq +/- 10%	30,000	20 ml	15 ml	Tritium in H ₂ O
H-3	H3-LSC-20FSUG-1666BQ	1,666 Bq +/- 10%	100,000	20 ml	15 ml	Tritium in H ₂ O
H-3	H3-LSC-7FSUG-1666BQ	1,666 Bq +/- 10%	100,000	7 ml	5 ml	Tritium in H ₂ O
Ni-63	NI3-LSC-20FSUG-1666BQ	1,666 Bq +/- 10%	100,000	20 ml	15 ml	Nickel Chloride
Ni-63	NI3-LSC-7FSUG-1666BQ	1,666 Bq +/- 10%	100,000	7 ml	5 ml	Nickel Chloride
Sr-90	SR9-LSC-20FSUG-1666BQ	1,666 Bq +/- 10%	100,000	20 ml	15 ml	Strontium Chloride
Sr-90	SR9-LSC-7FSUG-1666BQ	1,666 Bq +/- 10%	100,000	7 ml	5 ml	Strontium Chloride

Internal Standards for LSC Counting Efficiency Calibration

Eckert & Ziegler Analytics offers a wide range of NIST traceable, calibrated solutions for the determination of the counting efficiency by internal standardization. They are provided in a 10 ml flame sealed glass ampoule with an active volume of 10 ml. Customized solutions are available on request.

Nuclide	Product Code	Activity kBq/g	Total Activity kBq	Activity DPM/g	Measurement Uncertainty (k=2)	Chemical Form
H-3 (Tritium)	8003-10FSA-400KBQ	40	400	2.4×10^6	<3.5%	Tritium in H ₂ O
H-3 (Tritium)	8003-10FSA-400KBQ	40	400	2.4×10^6	<3.5%	Tritium in Toluene
C-14	8014-10FSA-100KBQ	10	100	6×10^5	<4%	C-14 in Toluene
C-14	8014-10FSA-100KBQ	10	100	6×10^5	<4%	C-14 labeled glucose (50 ug/g) + formaldehyde (1ug/g) in H ₂ O
C-14	8014-10FSA-100KBQ	10	100	6×10^5	<4%	Na ₂ CO ₃ in 0.001M NaOH, 30 ug/g Na
Am-241	8241-10FSA-100KBQ	10	100	6×10^5	<2%	Americium Chloride in 1M HCl, no carrier added
Ca-45	8045-10FSA-100KBQ	10	100	6×10^5	<6%	Calcium Chloride in 0.1 M HCl, 30 ug/g Ca
Cd-109	8109-10FSA-100KBQ	10	100	6×10^5	<2%	Cadmium Chloride in 0.1 M HCl 30 ug/g Cd
Cl-36	8036-10FSA-100KBQ	10	100	6×10^5	<4%	Sodium Chloride in 0.0005M NaOH, 30ug/g Cl
Co-60	8060-10FSA-100KBQ	10	100	6×10^5	<1.5%	Cobalt Chloride in 0.1 M HCl, 30 ug/g Co
Cr-51	8051-10FSA-100KBQ	10	100	6×10^5	<2%	Chromium Chloride in 0.1 M HCl, 30 ug/g Co
Cs-137	8137-10FSA-100KBQ	10	100	6×10^5	<2%	Cesium Chloride in 0.1 M HCl, 30 ug/g Cs
Fe-55	8055-10FSA-100KBQ	10	100	6×10^5	<4%	Ferric Chloride in 0.1 M HCl, 30 ug/g Fe
I-125	8125-10FSA-100KBQ	10	100	6×10^5	<3.5%	Sodium Iodide in 0.1 M NaOH + 0.0006M Na ₂ SO ₃ , 30 ug/g I
I-129	8129-10FSA-100KBQ	10	100	6×10^5	<3.5%	Sodium Iodide in 0.1 M NaOH + 0.0006M Na ₂ SO ₃ , 30 ug/g I
Ni-63	8063-10FSA-100KBQ	10	100	6×10^5	<3%	Nickel Chloride in 0.1 M HCl, 30 ug/g Ni
S-35	8035-10FSA-100KBQ	10	100	6×10^5	<3.5%	Sodium Sulfate in H ₂ O 30 ug/g S
Sr-90	8090-10FSA-100KBQ	10	100	6×10^5	<2%	Strontium Chloride in 0.1 M HCl, 30 ug/g Sr
Tc-99	8099-10FSA-100KBQ	10	100	6×10^5	<3%	Technetium Pertechnetate in 0.001 M NaOH, no carrier added

Low-Background (dead) Water

This freshwater is collected from an artesian well that is screened at a depth of > 100 m below the water table. Based upon hydraulic conductivity, this water has not been in contact with the atmosphere for several thousand years and should therefore contain undetectable amounts of tritium. Analysis of this water by the University of Miami Tritium Laboratory indicates that the tritium levels are below their detection limit (< 0.1 TU) This water is suitable for use as analytical instrument, field and equipment blanks. The water will be delivered in 1 liter polyethene bottles. A copy of the batch analysis will be provided.

Product Code: BGW-1LB

1 Liter Low-Background Water

Tritium (H-3) activity less than 0.006 Bq/kg

Batch Analysis Certificate provided

Customized LSC Standards and Calibrated Solutions

Eckert & Ziegler Analytics provides customized, NIST traceable LSC Standards for most applications. Please contact us with your requirements.

We will need the following information for a quotation:

- Set of sources or single standard
- Nuclide(s)
- Activity per nuclide
- Scintillation cocktail
- Active and total volume
- Vial type
- Quench tSIE value/range
- Other specific requirements



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