Cambridge Isotope Laboratories, Inc.
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RESEARCH PRODUCTS

Foodomics

Standards for Identification and Quantification

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Foodomics, a term coined in 2009 by Cifuentes,[1] is a discipline that studies food and nutrition in relation to its impact on a consumer's health and disease. Applicable applications include, but are not limited by, the evaluation of food composition, safety, quality, additives, adulterants, and contaminants. Such studies integrate information from multiple research areas (spanning 'omics and environmental). A blend of analytical technologies has been utilized therein to obtain deeper insights into the impact/mechanisms that the compounds in food/beverage samples have on biological systems.

Cambridge Isotope Laboratories, Inc. (CIL) is pleased to offer a multitude of highly characterized stable isotope-labeled and unlabeled standards in their neat and/or solution form for food and beverage analysis. The following presents a sampling of our chemical standards to aid foodomics research and testing. Please see **isotope.com/products** for a comprehensive list of our offerings and for additional information on those presented below.

Reference

1. Cifuentes, A. **2009**. Food analysis and foodomics. *J Chromatogr A, 1216(43),* 7109.

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Metabolic Biomolecules

Metabolomics is conventionally used to study the small molecules (called metabolites) present in biological systems. These metabolites are complex (due, for example, to diversity of physicochemical properties, structure, concentration) and are categorized according to their chemical structures in what is referred to as metabolic class (e.g., amino acids, fatty acids and lipids, vitamins). Metabolites are used as internal standards within metabolomic methods in food science to, for example, assess nutritional content, study dietary intake, screen for candidate or valid health/disease biomarkers, and gain insights into pathway mechanisms affecting human nutrition, among other purposes.
The following sections outline example biochemical standards spanning a number of metabolic classes pertaining to the foodomics research and testing sector.

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Amino Acids and Derivatives

Amino acids are building blocks of peptides and proteins. These starting materials serve as key intermediates in various metabolic pathways (e.g., citric acid cycle, urea cycle) and are required for the proper functioning of biological systems. The analysis of amino acids/proteins in food (e.g., eggs, fish, turkey) and feed (e.g., animal food) is conducted for a variety of reasons, spanning from nutritional assessment to process quality control (e.g., protein hydrolysis, oxidative degradation). To complement method development and testing in this research space, CIL offers a plethora of stable isotope-labeled (and unlabeled) free amino acids with uniform or positional labeling patterns of different stereochemical orientations (i.e., D, L, and DL).

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-8756	β-Alanine (βAla)	$^{13}C_3$, 99%	neat	–	107-95-9
NLM-1656	β-Alanine (βAla)	^{15}N, 98%	neat	204451-53-6	107-95-9
CNLM-3946	β-Alanine (βAla)	$^{13}C_3$, 98%; ^{15}N, 96%	neat	285978-07-6	107-95-9
CLM-2184	L-Alanine (Ala)	$^{13}C_3$, 99%	neat	100108-77-8	56-41-7
CDLM-8649	L-Alanine (Ala)	3-^{13}C, 99%; 2-D, 96%	neat	160033-81-8	56-41-7
CNLM-534-H	L-Alanine (Ala)	$^{13}C_3$, 99%; ^{15}N, 99%	neat	202407-38-3	56-41-7
CLM-2265-H	L-Arginine·HCl (Arg)	$^{13}C_6$, 99%	neat	201740-91-2	1119-34-2
DLM-541	L-Arginine·HCl (Arg)	D_7, 98%	neat	204244-77-9	1119-34-2
CNLM-539-H	L-Arginine·HCl (Arg)	$^{13}C_6$, 99%; $^{15}N_4$, 99%	neat	202468-25-5	1119-34-2
CLM-8699-H	L-Asparagine·H_2O (Asn)	$^{13}C_4$, 99%	neat	–	5794-13-8
NLM-3286	L-Asparagine·H_2O (Asn)	$^{15}N_2$, 98%	neat	287484-32-6	5794-13-8
CNLM-3819	L-Asparagine·H_2O (Asn)	$^{13}C_4$, 99%; $^{15}N_2$, 99%	neat	202406-87-9	5794-13-8
DLM-832	DL-Aspartic acid (Asp)	2,3,3-D_3, 98%	neat	14341-75-4	617-45-8
CLM-1801-H	L-Aspartic acid (Asp)	$^{13}C_4$, 99%	neat	55443-54-4	56-84-8
DLM-546	L-Aspartic acid (Asp)	2,3,3-D_3, 98%	neat	3842-25-9	56-84-8
CNLM-544-H	L-Aspartic acid (Asp)	$^{13}C_4$, 99%; ^{15}N, 99%	neat	202468-27-7	56-84-8
CLM-4899	L-Citrulline (Cit)	ureido-^{13}C, 99%	neat	94740-46-2	372-75-8
DLM-6039	L-Citrulline (Cit)	4,4,5,5-D_4, 95%	neat	1217474-00-4	372-75-8
CLM-3852	L-Cysteine (Cys)	1-^{13}C, 99%	neat	224054-24-4	52-90-4
CLM-4320-H	L-Cysteine (Cys)	$^{13}C_3$, 99%	neat	202114-66-7	52-90-4
CNLM-3871-H	L-Cysteine (Cys)	$^{13}C_3$, 99%; ^{15}N, 99%	neat	202406-97-1	52-90-4
DLM-335	DL-Glutamic acid (Glu)	2,4,4-D_3, 98%	neat	96927-56-9	617-65-2
CLM-1800-H	L-Glutamic acid (Glu)	$^{13}C_5$, 99%	neat	55443-55-5	56-86-0
CNLM-554-H	L-Glutamic acid (Glu)	$^{13}C_5$, 99%; ^{15}N, 99%	neat	–	56-86-0
CDNLM-6804	L-Glutamic acid (Glu)	$^{13}C_5$, 97%; D_5, 97%; ^{15}N, 97%	neat	1420815-74-2	56-86-0
DLM-1826	L-Glutamine (Gln)	2,3,3,4,4-D_5, 97%	neat	14341-78-7	56-85-9
NLM-1328	L-Glutamine (Gln)	$^{15}N_2$, 98%	neat	204451-48-9	56-85-9
CNLM-1275	L-Glutamine (Gln)	$^{13}C_5$, 99%; $^{15}N_2$, 99%	neat	285978-14-5	56-85-9
CLM-1017	Glycine (Gly)	$^{13}C_2$, 97%	neat	67836-01-5	56-40-6
NLM-202	Glycine (Gly)	^{15}N, 98%	neat	7299-33-4	56-40-6
CNLM-1673-H	Glycine (Gly)	$^{13}C_2$, 99%; ^{15}N, 99%	neat	211057-02-2	56-40-6
CLM-1512	L-Histidine·HCl·H_2O (His)	ring-2-^{13}C, 99% (<5% D)	neat	2483735-43-7	5934-29-2
CLM-2264	L-Histidine·HCl·H_2O (His)	$^{13}C_6$, 97% (<5% D)	neat	201740-88-7	5934-29-2
NLM-1513	L-Histidine·HCl·H_2O (His)	$^{15}N_3$, 98% (<5% D)	neat	–	5934-29-2

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Amino Acids and Derivatives *(continued)*

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
CNLM-4645	L-Homoarginine·HCl (Harg)	$^{13}C_7$, 98%; $^{15}N_4$, 98%	neat	2483830-23-3	1483-01-8
CLM-2248-H	L-Isoleucine (Ile)	$^{13}C_6$, 99%	neat	201740-82-1	73-32-5
DLM-141	L-Isoleucine (Ile)	D_{10}, 98%	neat	35045-71-7	73-32-5
CNLM-561-H	L-Isoleucine (Ile)	$^{13}C_6$, 99%; ^{15}N, 99%	neat	202406-52-8	73-32-5
CLM-2262-H	L-Leucine (Leu)	$^{13}C_6$, 99%	neat	201740-84-3	61-90-5
DLM-1259	L-Leucine (Leu)	5,5,5-D_3, 99%	neat	87828-86-2	61-90-5
DLM-567	L-Leucine (Leu)	D_{10}, 98%	neat	106972-44-5	61-90-5
DLM-9496	D-Lysine·2HCl (Lys)	3,3,4,4,5,5,6,6-D_8, 99% (>95% D)	neat	–	10303-72-7
CLM-2247-H	L-Lysine·2HCl (Lys)	$^{13}C_6$, 99%	neat	201740-81-0	657-26-1
DLM-2640	L-Lysine·2HCl (Lys)	4,4,5,5-D_4, 96%	neat	203633-22-1	657-26-1
CNLM-291-H	L-Lysine·2HCl (Lys)	$^{13}C_6$, 99%; $^{15}N_2$, 99%	neat	202406-54-0	657-26-1
CLM-206	L-Methionine (Met)	methyl-^{13}C, 99%	neat	49705-26-2	63-68-3
CLM-893-H	L-Methionine (Met)	$^{13}C_5$, 99%	neat	202326-57-6	63-68-3
CDLM-8885	L-Methionine (Met)	methyl-$^{13}CH_3$, 99%; 2,3,3,4,4-D_5, 98%	neat	2483824-33-3	63-68-3
CNLM-10424	β-*N*-Methylamino-L-alanine (BMAA)	$^{13}C_3$, 99%; $^{15}N_2$, 98% (Patent No. US 11,370,812 B2)	neat	2177248-46-1	15920-93-1
CLM-1036	L-Ornithine·HCl (Orn)	1,2-$^{13}C_2$, 99%	neat	224054-19-7	3184-13-2
CLM-4724-H	L-Ornithine·HCl (Orn)	$^{13}C_5$, 99%	neat	943962-21-8	3184-13-2
DLM-2969	L-Ornithine·HCl (Orn)	3,3,4,4,5,5-D_6, 98%	neat	347841-40-1	3184-13-2
CLM-762	L-Phenylalanine (Phe)	1-^{13}C, 99%	neat	81201-86-7	63-91-2
DLM-1258	L-Phenylalanine (Phe)	ring-D_5, 98%	neat	56253-90-8	63-91-2
NLM-108	L-Phenylalanine (Phe)	^{15}N, 98%	neat	29700-34-3	63-91-2
DLM-2657	DL-Proline (Pro)	2,3,3,4,4,5,5-D_7, 97%	neat	65807-21-8	609-36-9
CLM-2260-H	L-Proline (Pro)	$^{13}C_5$, 99%	neat	201740-83-2	147-85-3
DLM-487	L-Proline (Pro)	D_7, 97%	neat	39063-89-3	147-85-3
NLM-835	L-Proline (Pro)	^{15}N, 98%	neat	–	147-85-3
DLM-6874	Sarcosine·HCl (Sar)	methyl-D_3, 98%	neat	347840-04-4	637-96-7
CNLM-9683	Sarcosine methyl ester·HCl (Sar)	$^{13}C_3$, 99%; ^{15}N, 98% (CP 97%)	neat	945218-53-1	13515-93-0
DLM-1073	DL-Serine (Ser)	2,3,3-D_3, 98%	neat	70094-78-9	302-84-1
DLM-582	L-Serine (Ser)	2,3,3-D_3, 98%	neat	105591-10-4	56-45-1
CNLM-474-H	L-Serine (Ser)	$^{13}C_3$, 99%; ^{15}N, 99%	neat	202407-34-9	56-45-1
CDNLM-6813	L-Serine (Ser)	$^{13}C_3$, 97%; D_3, 97%; ^{15}N, 97%	neat	1994299-33-0	56-45-1
CLM-2261	L-Threonine (Thr)	$^{13}C_4$, 97%	neat	55443-53-3	72-19-5
DLM-1693	L-Threonine (Thr)	D_5, 98%	neat	–	72-19-5
CDLM-9307	L-Threonine (Thr)	4-^{13}C, 97%; 2,3-D_2, 96%	neat	1449582-87-9	72-19-5
CLM-4290-H	L-Tryptophan (Trp)	$^{13}C_{11}$, 99%	neat	202114-65-6	73-22-3
DLM-1092	L-Tryptophan (Trp)	indole-D_5, 98%	neat	62595-11-3	73-22-3
NLM-800	L-Tryptophan (Trp)	$^{15}N_2$, 98%	neat	204634-20-8	73-22-3
CLM-1542	L-Tyrosine (Tyr)	ring-$^{13}C_6$, 99%	neat	201595-63-3	60-18-4
DLM-451	L-Tyrosine (Tyr)	ring-D_4, 98%	neat	62595-14-6	60-18-4
DNLM-7373	L-Tyrosine (Tyr)	D_7, 97%; ^{15}N, 98%	neat	–	60-18-4
CLM-2249-H	L-Valine (Val)	$^{13}C_5$, 99%	neat	55443-52-2	72-18-4
DLM-311	L-Valine (Val)	D_8, 98%	neat	203784-63-8	72-18-4
CNLM-442-H	L-Valine (Val)	$^{13}C_5$, 99%; ^{15}N, 99%	neat	202407-30-5	72-18-4

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Featured Mixtures

Catalog No.	Description	No. of Metabolites	Unit Size
MSK-A2	Metabolomics Amino Acid Mix	17	1.2 mL
MSK-CAA	Canonical Amino Acid Mix	20	1 vial
MSK-NCAA	Non-canonical Amino Acid Mix	7	1 vial
MSK-CNCAA	Canonical/Non-canonical Amino Acid Mix Sets	20 (in NCAA), 7 (in CNCAA)	2 × 1 vial
MSK-MSM1	Metabolomics Screening and Monitoring Standards Mix 1	14	1 vial
NSK-A	Amino Acid Standards Mix Set A	12	1 vial, 10 vials
NSK-A1	Amino Acid Standards Mix Set A1	12	1 vial, 10 vials
NSK-AA3	3-Plex Amino Acid Standards Mix	3	1 vial, 10 vials
NSK-AA3-10X	3-Plex Amino Acid Standards Mix (10X)	3	1 vial, 10 vials
NSK-AB	Standards Mix Sets A and B	12 (in A), 8 (in B)	2 × 10 vials
NSK-BCAA	Branched-chain Amino Acid Standards Mix	4	1 vial

***Note**: Companion unlabeled standard mixtures and sets may be available; please inquire.*

CLICK HERE for information about our "Metabolomics Amino Acid Mixtures."

CLICK HERE for information about our "MS/MS Screening Mixtures and Standards."

Example References

Weber, P. **2022**. Determination of amino acids in food and feed by microwave hydrolysis and UHPLC-MS/MS. *J Chromatogr B Analyt Technol Biomed Life Sci, 1209,* 123429-123437.

Tang, M.; Weaver, N.E.; Berman, L.M.; et al. **2021**. Different blood metabolomics profiles in infants consuming a meat- or dairy-based complementary diet. *Nutrients,13(2),* 388.

Reitelseder, S.; Tranberg, B.; Agergaard, J.; et al. **2020**. Phenylalanine stable isotope tracer labeling of cow milk and meat and human experimental applications to study dietary protein-derived amino acid availability. *Clin Nutr, 39(12),* 3652-3662.

Barbas-Bernardos, C.; Garcia-Perez, I.; Lorenzo, M.P.; et al. **2020**. Development and validation of a high performance liquid chromatography-tandem mass spectrometry method for the absolute analysis of 17 α D-amino acids in cooked meals. *J Chromatogr A, 1611,* 460598.

Alcock, R.D.; Shaw, G.C.; Tee, N.; et al. **2019**. Plasma amino acid concentrations after the ingestion of dairy and collagen proteins, in healthy active males. *Front Nutr, 6,* 163.

Shivakumar, N.; Kashyap, S.; Kishore, S.; et al. **2019**. Protein-quality evaluation of complementary foods in Indian children. *Am J Clin Nutr, 109(5),* 1319-1327

Caffeine and Its Metabolites

Caffeine is a psychoactive stimulant of the central nervous system that is extensively consumed worldwide. MS-based research into the kinetics/metabolism of this compound and its metabolites (e.g., paraxanthine, theobromine, theophylline) has revealed insight into its health impact and abuse in humans. Studies further suggest an influence on pharmacological activity and neurodegeneration; thus, strengthening a need for its robust and accurate analysis in food and beverage products. To support such endeavors, CIL offers stable isotope-labeled caffeine and a collection of its isotopically labeled metabolites as neat standards.

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-728	Caffeine (CAF)	3-methyl-^{13}C, 99%	neat	202282-98-2	58-08-2
CLM-514	Caffeine (CAF)	trimethyl-$^{13}C_3$, 99%	neat	78072-66-9	58-08-2
NLM-332	Caffeine (CAF)	1,3-$^{15}N_2$, 99%	neat	–	58-08-2
CNLM-333	Caffeine (CAF)	2-^{13}C, 99%; 1,3-$^{15}N_2$, 98%	neat	–	58-08-2
CLM-522	Ethyl acetoacetate (EAA)	1,3-$^{13}C_2$, 99%	neat	77504-73-5	141-97-9
CLM-523	Ethyl acetoacetate (EAA)	2,4-$^{13}C_2$, 99%	neat	77504-74-6	141-97-9
DLM-10436	Theobromine (TBR)	7-methyl-D_3, 98%	neat	65566-69-0	83-67-0
DLM-8565	Theobromine (TBR)	dimethyl-D_6, 98%	neat	–	83-67-0
CLM-6154	Theophylline (TPH)	dimethyl-$^{13}C_2$, 99%	neat	170745-59-2	58-55-9
CNLM-444	Theophylline (TPH)	2-^{13}C, 99%; 1,3-$^{15}N_2$, 98%	neat	84718-95-6	58-55-9

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Carbohydrates

Carbohydrates are organic compounds that are structurally classified as polyhydroxy aldehydes or ketones. These are integral biomolecules to the functional process of living systems (e.g., cell-to-cell signaling, immune responses, protein folding) and are contained in natural/processed food and beverages in their simple or complex form. The identity and concentration of carbohydrates is an important aspect of food science for a number of reasons (e.g., nutritional labeling, quality control). To aid these and other research activities, CIL offers a number of stable isotope-labeled carbohydrates spanning several of its subclasses (e.g., monosaccharides, disaccharides, polysaccharides, sugar alcohols). These standards are available in various labeling patterns in their neat form.

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-715	D-Arabinose (Ara)	1-^{13}C, 99%	neat	70849-23-9	10323-20-3
CLM-1288	D-Arabinose (Ara)	2-^{13}C, 98%	neat	101615-87-6	10323-20-3
CLM-8477	D-Arabinose (Ara)	U-$^{13}C_5$, 99%	neat	–	10323-20-3
CLM-1118	D-Erythrose (Ery)	1-^{13}C, 99% (1.2% in water)	neat	70849-19-3	583-50-6
CLM-1387	D-Erythrose (Ery)	2-^{13}C, 99% (1.2% in water)	neat	83434-88-2	583-50-6
CLM-7863	D-Erythrose (Ery)	U-$^{13}C_4$, 98% (1.2% in water)	neat	–	583-50-6
CLM-9207	Erythritol (Ery-ol)	U-$^{13}C_4$, 99%	neat	–	149-32-6
CLM-1553	D-Fructose (Fru)	U-$^{13}C_6$, 99%	neat	201595-65-5	57-48-7
DLM-1389	D-Fructose (Fru)	6,6-D_2, 98%	neat	285979-75-1	57-48-7
CLM-8962	D-Fructose-1,6-bisphosphate, sodium salt hydrate (FBP)	U-$^{13}C_6$, 98%	neat	–	41012-14-0
CLM-8616	D-Fructose-6-phosphate·2Na^+·xH_2O (F6P)	U-$^{13}C_6$, 99% (may contain up to ~10% $^{13}C_6$ glucose-6-phosphate)	neat	–	–
CLM-1570	D-Galactose (Gal)	U-$^{13}C_6$, 99%	neat	74134-89-7	59-23-4
CLM-1396	D-Glucose (Glc)	U-$^{13}C_6$, 99%	neat	110187-42-3	50-99-7
DLM-2062	D-Glucose (Glc)	1,2,3,4,5,6,6-D_7, 97%	neat	66034-51-3	50-99-7
CDLM-3813	D-Glucose (Glc)	U-$^{13}C_6$, 99%; 1,2,3,4,5,6,6-D_7, 97%	neat	201417-01-8	50-99-7
CLM-2642	D-Maltose·H_2O (Mal)	U-$^{13}C_{12}$, 99%	neat	2483735-61-9	6363-53-7
CLM-10759	Maltotetraose (M4)	U-$^{13}C_{24}$, 99% (CP 90%)	neat	2483735-25-5	34612-38-9
CLM-768	D-Ribose (Rib)	1-^{13}C, 99%	neat	70849-24-0	50-69-1
CLM-1066	D-Ribose (Rib)	5-^{13}C, 99%	neat	139657-62-8	50-69-1
CLM-3652	D-Ribose (Rib)	U-$^{13}C_5$, 98%	neat	202114-47-4	50-69-1
DLM-3321	Sorbitol (Sor)	D_8, 98%	neat	287962-59-8	50-70-4
CLM-10823	D-Sucrose (Suc)	glucose-1,2-$^{13}C_2$, 99%	neat	2483735-30-2	57-50-1
CLM-9811	D-Sucrose (Suc)	fructose-$^{13}C_6$, 98%	neat	–	57-50-1
CLM-8091	D-Sucrose (Suc)	glucose-$^{13}C_6$, 98%	neat	–	57-50-1
CLM-2456	D-Xylose (Xyl)	1,2-$^{13}C_2$, 99%	neat	201741-00-6	58-86-6
CLM-7608	D-Xylitol (Xyl-ol)	U-$^{13}C_5$, 99%	neat	–	87-99-0

Example References

Francey, C.; Cros, J.; Rosset, R.; et al. **2019**. The extra-splanchnic fructose escape after ingestion of a fructose-glucose drink: An exploratory study in healthy humans using a dual fructose isotope method. *Clin Nutr ESPEN, 29,* 125-132.

Trimigno, A.; Münger, L.; Picone, G.; et al. **2018**. GC-MS based metabolomics and NMR spectroscopy investigation of food intake biomarkers for milk and cheese in serum of healthy humans. *Metabolites, 8(2),* 26.

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Elements and Their Compounds

CIL offers an extensive inventory of stable isotope-labeled elements and their compounds. These materials are amenable for a wide range of applications, encompassing 'omics (foodomics included), agriculture, botany, and conductivity measurements, all enabled through element-specific detection methods. In foodomic science, the presence and concentration of elements (e.g., trace and heavy metals) is important to, for example, determining exposure levels and their risk or benefit to human health. In application, the isotope-labeled elements or compounds could be used as matrix spike standards in the qualitative/quantitative analyses of food and feed products, dietary supplements, beverages, and biosamples.

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
CDLM-4389*	Cadmium oxide (CdO)	cadmium-106 oxide	neat	419569-37-2	1306-19-0
CDLM-2435*	Cadmium oxide (CdO)	cadmium-113 oxide	neat	419569-31-6	1306-19-0
CULM-463*	Copper metal (Cu)	copper-63 metal	neat	14191-84-5	7440-50-8
CULM-748*	Copper metal (Cu)	copper-65 metal	neat	14119-06-3	7440-50-8
CULM-2099*	Copper oxide (CuO)	copper-63 oxide	neat	–	1317-38-0
CULM-4577*	Copper oxide (CuO)	copper-65 oxide	neat	–	1317-38-0
FLM-1261*	Iron metal (Fe)	iron-54 metal	neat	13982-24-6	7439-89-6
FELM-2490*	Iron metal (Fe)	iron-56 metal	neat	14093-02-8	7439-89-6
FLM-1812*	Iron metal (Fe)	iron-57 metal	neat	14762-69-7	7439-89-6
FELM-4206*	Iron metal (Fe)	iron-58 metal	neat	13968-47-3	7439-89-6
FELM-3909*	Iron oxide (Fe_2O_3)	iron-54 oxide	neat	–	1309-37-1
FLM-1272*	Iron oxide (Fe_2O_3)	iron-57 oxide	neat	–	1309-37-1
FELM-3735*	Iron oxide (Fe_2O_3)	iron-58 oxide	neat	–	1309-37-1
PBLM-3983*	Lead metal (Pb)	lead-204 metal	neat	–	7439-92-1
PBLM-3662*	Lead metal (Pb)	lead-206 metal	neat	–	7439-92-1
PBLM-3977*	Lead metal (Pb)	lead-207 metal	neat	–	7439-92-1
PBLM-836*	Lead metal (Pb)	lead-208 metal	neat	–	7439-92-1
MGLM-4321*	Magnesium metal (Mg)	magnesium-26 metal	neat	–	7439-95-4
MGLM-2460*	Magnesium oxide (MgO)	magnesium-26 oxide	neat	–	1309-48-4
NLM-363	Nitrogen (N_2)	$^{15}N_2$, 98%	neat	29817-79-6	7727-37-9
OLM-212	Oxygen (O_2)	$^{18}O_2$, 97%	neat	32767-18-3	7782-44-7
KLM-4221*	Potassium chloride (KCl)	potassium-41 chloride	neat	–	7447-40-7
CHLM-1224	Sodium chloride (NaCl)	^{35}Cl, 99%	neat	20510-55-8	7647-14-5
ZNLM-8248*	Zinc metal (Zn)	zinc-64 metal	neat	–	7440-66-6
ZNLM-4641*	Zinc metal (Zn)	zinc-68 metal	neat	14378-35-9	7440-66-6

**Enrichment to be provided at time of request.*

Example Reference

Fernández-Menéndez, S.; Fernández-Sánchez, M.L.; Peixoto, R.R.A.; et al. **2018**. *In vivo* study of the effect of lactoferrin on iron metabolism and bioavailability from different iron chemical species for formula milk fortification. *Electrophoresis, 39(13),* 1702-1713.

Fatty Acids and Lipids

Fatty acids and lipids are important biological compounds that are essential to the regulation and control of cellular functions and metabolic pathways. These are present in a variety of foods (e.g., animal fat, fish and vegetable oil, fruits, nuts/seeds) and are analyzed at qualitative/quantitative levels in foodomics research. To support these and other initiatives (e.g., structure and physicochemical property analysis), CIL is pleased to offer a multitude of stable isotope-labeled (and unlabeled) fatty acids and lipids. The fatty acids cover saturated and unsaturated classes, while the lipids include ceramides (e.g., *N*-palmitoyl-D-sphingosine, *N*-oleoyl-D-sphingosine) and triacylglycerides (e.g., tripalmitin, tristearin, triolein). These standards are available in various labeling patterns (i.e., uniform, partial) and forms (i.e., free acid, salt, ester).

▼ **CLICK HERE** for information about our "Stable Isotopes for Lipidomics."

Featured Products

Catalog No.	Compound (Abbr. or Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
DLM-1234	Arachidic acid (20:0)	methyl-D_3, 98% (CP 97%)	neat	202480-70-4	506-30-9
DLM-1661-N	Arachidonic acid (20:4)	5,6,8,9,11,12,14,15-D_8, 98%	neat	69254-37-1	506-32-1
DLM-1508	Butyric acid (4:0)	D_7, 98%	neat	73607-83-7	107-92-6
DLM-10279	Coenzyme Q10 (ubiquinone)	dimethoxy-D_6, methyl-D_3, 98% (CP 97%)	neat	–	303-98-0
DLM-270	Decanoic acid (10:0)	D_{19}, 98%	neat	88170-22-3	334-48-5
CLM-8388	Docosahexaenoic acid (22:6)	U-$^{13}C_{22}$, 99% (may contain ≤5% $^{13}C_{22}$ DPA "docosapentanoic acid")	neat	–	6217-54-5
DLM-9951	Docosanoic acid (22:0)	D_4, 98%	neat	–	112-85-6
DLM-9720	*cis*-5,8,11,14,17-Eicosapentaenoic acid (20:5)	19,19,20,20,20-D_5, 98%	neat	1197205-73-4	10417-94-4
DLM-6013	Ethylmalonic acid (EMA)	methyl-D_3, 98%	neat	70907-93-6	601-75-2
DLM-563	Lauric acid (12:0)	D_{23}, 98%	neat	59154-43-7	143-07-7
CLM-6855	Linoleic acid (18:2)	U-$^{13}C_{18}$, 98% (CP 94%) <10% *cis/trans* isomer	neat	287111-25-5	60-33-3
CLM-8386	Linolenic acid (18:3)	U-$^{13}C_{18}$, 98% (CP 95%)	neat	–	463-40-1
CLM-3665	Myristic acid (14:0)	1,2,3-$^{13}C_3$, 99%	neat	–	544-63-8
DLM-1039	Myristic acid (14:0)	methyl-D_3, 98%	neat	62217-71-4	544-63-8
DLM-208	Myristic acid (14:0)	D_{27}, 98%	neat	60658-41-5	544-63-8
CLM-2721	Octanoic acid (8:0)	1,2,3,4-$^{13}C_4$, 99%	neat	159118-65-7	124-07-2
CLM-3707	2-Octanoyl-1,3-distearin (TG(8:0/18:0/18:0))	octanoic-1-^{13}C, 99%	neat	121043-30-9	66411-61-8
CLM-460	Oleic acid (18:1)	U-$^{13}C_{18}$, 98%	neat	287100-82-7	112-80-1
CLM-409	Palmitic acid (16:0)	U-$^{13}C_{16}$, 98%	neat	56599-85-0	57-10-3
DLM-215	Palmitic acid (16:0)	D_{31}, 98%	neat	39756-30-4	57-10-3
CLM-2241	Palmitoleic acid (16:1)	U-$^{13}C_{16}$, 98% (CP 97%)	neat	2483735-57-3	373-49-9
DLM-572	Pentanoic acid (5:0)	D_9, 98%	neat	–	109-52-4
CLM-9668	DL-α-Phosphatidylcholine, dipalmitoyl (DPPC 32:0)	U-$^{13}C_{40}$, 98% (CP 95%)	neat	–	2644-64-6
CLM-3943	Potassium palmitate (16:0)	U-$^{13}C_{16}$, 98%	neat	1458714-74-3	2624-31-9
CLM-1948	Sodium octanoate (8:0)	1-^{13}C, 99%	neat	201612-61-5	1984-06-1
CLM-6059	Sodium palmitate (16:0)	U-$^{13}C_{16}$, 98%	neat	–	408-35-5
DLM-1154	Stearic acid (18:0)	methyl-D_3, 98%	neat	62163-39-7	57-11-4
DLM-379	Stearic acid (18:0)	D_{35}, 98%	neat	17660-51-4	57-11-4
CLM-162	Trioctanoin (TG(8:0/8:0/8:0))	1,1,1-$^{13}C_3$, 99%	neat	65402-55-3	538-23-8
CLM-163	Triolein (TG(18:1/18:1/18:1))	1,1,1-$^{13}C_3$, 99%	neat	82005-46-7	122-32-7

Featured Mix and Extracts

Catalog No.	Description	No. of Metabolites	Unit Size
MSK-SBCFA	Short-/Branched-chain Fatty Acid Mix	8	1 vial
CLM-8455	Fatty Acid Algal Extract (U-^{13}C, 98%)	5-10	0.25 g, 1 g
CDLM-8376	Fatty Acid Algal Extract (U-^{13}C, 98%; U-D, 97%)	5-10	0.25 g, 1 g
CLM-8381	Fatty Acid, Methyl Ester Algal Extract (U-^{13}C, 98%) (unlabeled terminal ester) CP 95%	5-10	0.25 g, 1 g
DLM-8375	Triglyceride Algal Extract (U-D, 97%)	5-10	0.25 g, 1 g

***Note**: Companion unlabeled standard mixtures and extracts may be available; please inquire.*

Example Reference

Chung, J.O.; Koutsari, C.; Blachnio-Zabielska, A.U.; et al. **2018**. Effects of meal ingestion on intramyocellular ceramide concentrations and fractional de novo synthesis in humans. *Am J Physiol Endocrinol Metab, 314(2),* E105-E114.

Organic Acids and Their Conjugate Salts

Organic acids (OAs) play essential roles in energy metabolism pathways (e.g., glycolysis, tricarboxylic acid cycle), with the short-chained OAs having emerged as important regulators of host immune response and transcriptional regulation. These biochemicals are present in many foods naturally and are being utilized in industrial food and beverage production as preservatives, acidulants, and/or as flavorants. To help facilitate their qualitative/quantitative analysis in metabolic and foodomic studies, CIL is pleased to offer a collection of stable isotope-labeled (and unlabeled) OAs along with their conjugate salts in their free and/or mixture form. These standards encompass monocarboxylic (e.g., acetic, lactic), dicarboxylic (e.g., malic, succinic), and tricarboxylic (e.g., cis-aconitic, citric) acids.

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
DLM-3487	Citric acid (CA)	2,2,4,4-D_4, 98%	neat	147664-83-3	77-92-9
CLM-7933	Creatine (Cre)	guanidino-^{13}C, 99%	neat	–	57-00-1
DLM-1302	Creatine (Cre)	methyl-D_3, 98% (CP 97%)	neat	–	57-00-1
DLM-3106	Glutaric acid (GA)	2,2,4,4-D_4, 98%	neat	19136-99-3	110-94-1
DLM-2738	Homovanillic acid (HVA)	phenyl-D_3, 2,2-D_2, 96%	neat	53587-32-9	306-08-1
COLM-376	Homovanillic acid (HVA)	ring-$^{13}C_6$, 99%; 4-hydroxy-^{18}O, 90%	neat	–	306-08-1
CLM-10351	DL-2-Hydroxyglutaric acid (2-HG), disodium salt	$^{13}C_5$, 99%	neat	2482467-23-0	40951-21-1
DLM-9104	(*RS*)-2-Hydroxyglutaric acid (2-HG), disodium salt	2,3,3-D_3; OD, 98% (CP 95%)	neat	2483831-91-8	40951-21-1
CLM-1896	Indole-3-acetic acid (IAA)	phenyl-$^{13}C_6$, 99%	neat	100849-36-3	87-51-4
CLM-4442	α-Ketoglutaric acid (AKG), disodium salt	1,2,3,4-$^{13}C_4$, 99% (CP 97%)	neat	6363-53-7	305-72-6
DLM-9045	DL-Malic acid (Mali)	2,3,3-D_3, 98%	neat	104596-63-6	617-48-1
CLM-751	Malonic acid (MA)	2-^{13}C, 99%	neat	55514-11-9	141-82-2
CLM-6123	Malonic acid (MA)	$^{13}C_3$, 99%	neat	102342-85-8	141-82-2
CLM-4285	3-Methylglutaconic acid (3-MGA)	2,4-$^{13}C_2$, 3-methyl-^{13}C, 99% (*cis/trans* mix)	neat	1255644-45-1	5746-90-7
DLM-387	Methylmalonic acid (MMA)	methyl-D_3, 98%	neat	42522-59-8	516-05-2
NLM-1048	Orotic acid (Oro)·H_2O	1,3-$^{15}N_2$, 98%	neat	–	50887-69-9
CLM-4449	Oxalic acid (OAA), disodium salt	1,2-$^{13}C_2$, 99%	neat	260429-91-2	62-76-0
CLM-3398	Potassium phosphoenol pyruvate (PEP)	2,3-$^{13}C_2$, 99%	neat	201996-39-6	4265-07-0
DLM-1919	Propionic acid (PPA)	D_5, 98%	neat	60153-92-6	79-09-4
CDLM-3457	Sodium acetate (AcOH)	1,2-$^{13}C_2$, 99%; D_3, 98%	neat	123333-80-2	127-09-3
CLM-3853	Sodium D-3-hydroxybutyrate (3-HB)	$^{13}C_4$, 99% (CP 97%)	neat	2483735-72-2	13613-65-5
CLM-583	Sodium formate (FA)	^{13}C, 99%	neat	23102-86-5	141-53-7
DLM-831	Succinic acid (Suc)	D_6, 98%	neat	21668-90-6	110-15-6
CLM-6755	Succinylacetone (SUAC)	3,4,5,6,7-$^{13}C_5$, 99%	neat	881835-86-5	51568-18-4
NLM-1697	Uric acid (UA)	1,3-$^{15}N_2$, 98%	neat	62948-75-8	69-93-2
DLM-4794	DL-Vanilmandelic acid (VMA)	ring-D_3, 98%	neat	58346-08-0	55-10-7

Featured Mixture

Catalog No.	Description	No. of Metabolites	Unit Size
MSK-OA	Organic Acid Mix	33	1 vial

***Note**: Companion unlabeled standard mixture may be available; please inquire.*

Example Reference

DeArmond, P.D.; Bunch, D.R. **2022**. Quantitation of non-derivatized free amino acids for detecting inborn errors of metabolism by incorporating mixed-mode chromatography with tandem mass spectrometry. *J Mass Spectrom Adv Clin Lab, 25,* 1-11.

▼
CLICK HERE
for information about our "Metabolomics Organic Acid Mixtures."

▼
CLICK HERE
for Application Note 47 "Organic Acid Quantitation in Mouse Muscle by Ion Chromatography-Mass Spectrometry with Isotopically Labeled Standards"

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

For research use only. Not for use in diagnostic procedures.

Other Compounds

CIL offers a breadth of additional compounds that could find utility in qualitative and quantitative foodomics analysis. These are available in various labeling patterns in neat and/or solution form.

Featured Products

Catalog No.	Compound (Abbr. or Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-813-1.2	Acrylamide (AA)	1,2,3-$^{13}C_3$, 99% (100 ppm hydroquinone)	1 mg/mL in methanol	287399-26-2	79-06-1
DLM-821	Acrylamide (AA)	2,3,3-D_3, 98%	neat	122775-19-3	79-06-1
CLM-1541	4-Aminobenzoic acid (PABA)	$^{13}C_6$, 99%	neat	161406-19-5	150-13-0
DLM-8936	4-Aminobenzoic acid (PABA)	D_4, 98%	neat	350820-01-8	150-13-0
DLM-7170-A-1.2	1-Aminohydantoin hydrochloride (AHD)	(5,5-D_2, 96%)	100 µg/mL in water	1188263-75-3	2827-56-7
CLM-4748-1.2	1,6-Anhydro-β-D-glucose (levoglucosan)	$^{13}C_6$, 98%	100 µg/mL in dimethyl sulfoxide	–	498-07-7
CLM-714	Aniline (benzenamine)	$^{13}C_6$, 99%	neat	100849-37-4	62-53-3
DLM-1598-1.2	*n*-Butanol (1-butanol)	D_{10}, 98%	2 mg/mL in methanol	34193-38-9	71-36-3
CLM-9256	(±)-Catechin (C)	2,3,4-$^{13}C_3$, 99% (CP 97%)	neat	1261254-33-4	18829-70-4
CLM-10554	(±)-Catechin gallate (CG)	2,3,4-$^{13}C_3$, 99% (CP 97%)	neat	1217780-28-3	
DLM-119-1.2	(±)-Chloramphenicol (chloromycetin)	ring-D_4, benzyl-D, 98%	100 µg/mL in acetonitrile	1420043-66-8	56-75-7
DLM-263-1.2	Chlorobenzene (monochlorbenzol)	D_5, 99%	2 mg/mL in methanol	3114-55-4	108-90-7
CLM-8316-1.2	Desethyldesisopropylhydroxyatrazine (ammeline)	ring-$^{13}C_3$, 99%	100 µg/mL in water: diethylamine (4:1 v/v)	–	645-92-1
DLM-1632-1.2	Diethylene glycol (2,2′-oxydiethanol)	D_8, 98% (CP 95%)	1 mg/mL in methanol	102867-56-1	111-46-6
DLM-2943-1.2	2,6-Di(*t*-butyl)-4-methylphenol (BHT)	D_{21}, 98%	100 µg/mL in nonane	64502-99-4	128-37-0
CLM-9257	(±)-Epicatechin (EC)	2,3,4-$^{13}C_3$, 99% (CP 97%)	neat	1217780-28-3	17334-50-8
CLM-10553	(±)-Epicatechin gallate (ECG)	2,3,4-$^{13}C_3$, 99% (CP 97%)	neat	–	
CLM-10555	(±)-Epigallocatechin (EGC)	2,3,4-$^{13}C_3$, 99% (CP 97%)	neat	–	188819-07-0
CLM-10551	(±)-Epigallocatechin gallate (EGCG)	2,3,4-$^{13}C_3$, 99% (CP 97%)	neat	–	
CLM-9756	Galangin (GG)	2,3,4-$^{13}C_3$, 99% (CP 95%)	neat	–	548-83-4
CLM-10556	(±)-Gallocatechin (GC)	2,3,4-$^{13}C_3$, 99% (CP 97%)	neat	–	
CLM-10552	(±)-Gallocatechin gallate (GCG)	2,3,4-$^{13}C_3$, 99% (CP 97%)	neat	–	
CLM-11040	Kaempferol (Kmp)	U-^{13}C, 98%	neat	–	520-18-3
DLM-4412	(-)-Menthol (levomenthol)	1,2,6,6-D_4, 98%	neat	1450828-98-4	2216-51-5
CLM-9754	Myricetin (Myr)	2,3,4-$^{13}C_3$, 99% (CP 95%)	neat	–	529-44-2
CLM-3733-1.2	*o*-Phenylphenol (2-biphenylol)	phenyl-$^{13}C_6$, 99%	100 µg/mL in nonane	287389-48-4	90-43-7
CLM-3748-1.2	*p*-Phenylphenol (4-phenylphenol)	phenyl-$^{13}C_6$, 99% (CP 96%)	100 µg/mL in nonane	446276-69-3	92-69-3
DLM-1158-1.2	Quinoline (QN)	D_7, 98% (CP 97%)	2 mg/mL in methanol	34071-94-8	91-22-5
CLM-9259	Resveratrol (RESV)	4-hydroxyphenyl-$^{13}C_6$, 99%	neat	1185247-70-4	501-36-0
CLM-6944-1.2	Sulfamethoxazole (SMX)	ring-$^{13}C_6$, 99%	100 µg/mL in acetonitrile	1196157-90-0	723-46-6
DLM-3330-1.2	*o*-Toluidine (1-amino-2-methylbenzene)	D_9, 98%	2 mg/mL in methanol	194423-47-7	95-53-4
DLM-6083-1.2	2,4,6-Trichloroanisole (1,3,5-trichloro-2-methoxybenzene)	D_5, 98%	1 mg/mL in methanol-OD	352439-08-8	87-40-1
DLM-2080-1.2	1,2,3-Trichloropropane (trichlorohydrin)	D_5, 98% (CP 95%)	1 mg/mL in methanol	203578-27-2	96-18-4
DLM-10255-1.2	Uracil (2,4-dihydroxypyrimidine)	D_4, 98%	1000 µg/mL in methanol: water (1:1 v/v)	24897-55-0	66-22-8
DLM-4444	Urethane (ethyl carbamate)	ethyl-D_5, 98%	neat	73962-07-9	51-79-6
CLM-1515	Vanillin (VA)	ring-$^{13}C_6$, 99%	neat	201595-58-6	121-33-5

Example References

Mesias, M.; Delgado-Andrade, C.; Morales, F.J. **2020**. Process contaminants in battered and breaded foods prepared at public food service establishments. *Food Control, 114,* 107217.

Hai, Y.D.; Tran-Lam, T.T.; Nguyen, T.Q.; et al. **2019**. Acrylamide in daily food in the metropolitan area of Hanoi, Vietnam. *Food Addit Contam Part B Surveill, 12(3),* 159-166.

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

For research use only. Not for use in diagnostic procedures.

"We have been utilizing CIL's D- and ^{13}C-labelled starting materials for many years in the synthesis of our standard compounds. The years of experience with CIL have demonstrated that they are at the forefront for quality, quantity, and turnaround. Further to that, we highly value CIL's communication, expertise, and assistance which they freely provide. The synthesis department at aromaLAB synthesises D- and ^{13}C-labelled standards for a variety of analytical purposes with our focal area being food-based analyses. Alike other companies, our customers require products of the highest quality there is no better company to partner with than CIL for delivering superior starting materials in a timely manner."

Michael Cappi, PhD
Head of Synthesis Department, aromaLAB GmbH (Germany)

Vitamins and Their Metabolites

Vitamins are organic compounds that directly or indirectly participate in organisms' biochemical reactions. These are divided into two classes, based on their solubility in fat (includes A, D, E, and K) and water (includes B and C), and can be obtained through a variety of sources (e.g., carrots and tuna for A, animal products for the Bs, citrus fruits for C, sunlight for D). CIL offers stable isotope-labeled (and unlabeled) vitamins as neat compounds and/or as solutions at specified concentrations for food-science research. The standards help facilitate accurate/precise quantification and food testing of vitamins in biological matrices and food-related products.

CLICK HERE for information about our "Vitamins and Their Metabolites."

Featured Products

Catalog No.	Compound (Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-9641	β-Carotene (provitamin A)	12,12′,13,13′,14,14′,15,15′,20,20′-$^{13}C_{10}$, 99% (CP 97%)	neat	–	7235-40-7
DLM-9114	25-Hydroxyvitamin D_2 (25-hydroxyergocalciferol)	6,19,19-D_3, 97%	neat	1217467-39-4	21343-40-8
DLM-9107	1,25-Dihydroxyvitamin D_3 (1,25-dihydroxycholecalciferol)	6,19,19-D_3, 97% (CP 95%)	neat	128726-16-0	32222-06-3
CLM-10266-C	3-*epi*-25-Hydroxyvitamin D_3 (3-*epi*-25-hydroxycholecalciferol)	23,24,25,26,27-$^{13}C_5$, 99% (CP 96%)	100 µg/mL in ethanol	2482467-12-7	73809-05-9
DLM-9111	3-*epi*-25-Hydroxyvitamin D_3 (3-*epi*-25-hydroxycholecalciferol)	6,19,19-D_3, 98%	neat	–	73809-05-9
CLM-11663-B	24*R*,25-Dihydroxyvitamin D_3 (24*R*,25-dihydroxycholecalciferol)	25,26,27-$^{13}C_3$, 98%	50 µg/mL in ethanol	–	55721-11-4
DLM-9404	24*R*,25-Dihydroxyvitamin D_3 (24*R*,25-dihydroxycholecalciferol)	26,26,26,27,27,27-D_6, 98% (CP 97%)	neat	–	55721-11-4
DLM-9116	25-Hydroxyvitamin D_3 (25-hydroxycholecalciferol)	6,19,19-D_3, 97%	neat	140710-94-7	19356-17-3
DLM-7708	25-Hydroxyvitamin D_3 monohydrate (25-hydroxycholecalciferol)	26,26,26,27,27,27-D_6, 98% (CP 97%)	neat	2483831-70-3	63283-36-3
CLM-9548	5-Methyltetrahydrofolic acid (prefolic A)	glutamic acid-$^{13}C_5$, 99% (CP 95%)	neat	–	134-35-0
DLM-11656	5-Methyltetrahydrofolic acid (prefolic A)	methyl-D_3, 98%	neat	–	134-35-0
CLM-10259	Vitamin A (retinol)	12,13,14,20-$^{13}C_4$, 99% (50 ppm BHT) (CP 95%)	neat	–	68-26-8
DLM-9305	Vitamin A (retinol)	10,19,19,19-D_4, 96% (50 ppm BHT) (CP 95%)	neat	–	68-26-8
DLM-8113	Vitamin A (retinol)	19,19,19,20,20,20-D_6, 96% (50 ppm BHT) (CP 95%)	neat	–	68-26-8
CLM-8870	Vitamin A acetate (retinol acetate)	12,13,14,20-$^{13}C_4$, 99%	neat	–	127-47-9
CLM-7277	Vitamin A acetate (retinol acetate)	8,9,10,11,12,13,14,15,19,20-$^{13}C_{10}$, 99%	neat	–	127-47-9
DLM-2244	Vitamin A acetate (retinol acetate)	10,19,19,19-D_4, 96% (3-4% *cis*)	neat	118139-40-5	127-47-9
DLM-3828	Vitamin A acetate (retinol acetate)	19,19,19,20,20,20-D_6, 96% (3-4% *cis*)	neat	–	127-47-9
DLM-7720	Vitamin A (retinoic acid)	19,19,19,20,20,20-D_6, 96%	neat	2483831-72-5	302-79-4
CLM-10772	Vitamin A aldehyde (retinal)	12,13,14,20-$^{13}C_4$, 96%	neat	–	116-31-4
DLM-7719	Vitamin A aldehyde (retinal)	19,19,19,20,20,20-D_6, 96%	neat	2483831-71-4	116-31-4

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

For research use only. Not for use in diagnostic procedures.

Vitamins and Their Metabolites *(continued)*

Catalog No.	Compound (Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
DLM-4902	Vitamin A palmitate (retinyl palmitate)	10,19,19,19-D_4, 96% (all *trans*, <4% *cis*, 50 ppm BHT)	neat	2483831-50-9	79-81-2
CLM-7667	Vitamin B_1 (thiamine)·HCl	4,5,4-methyl-$^{13}C_3$, 99% (CP 97%)	neat	–	67-03-8
DLM-8741	Vitamin B_1 (thiamine) pyrophosphate chloride	pyrimidyl-methyl-D_3, 98%	neat	2483831-79-2	154-87-0
CNLM-8851	Vitamin B_2 (riboflavin)	$^{13}C_4$, 99%; $^{15}N_2$, 98% (CP 97%)	neat	1217461-14-7	83-88-5
CLM-9925	Vitamin B_3 (nicotinamide)	$^{13}C_6$, 99%	neat	98-92-0	98-92-0
DLM-6883	Vitamin B_3 (nicotinamide)	D_4, 98%	neat	347841-88-7	98-92-0
CNLM-9757	Vitamin B_3 (nicotinamide)	2,6-carbonyl-$^{13}C_3$, 99%; ring-1-^{15}N, 98%	neat	2117346-85-5	98-92-0
CNLM-7694	Vitamin B_5, calcium salt·H_2O (calcium pantothenate)	β-alanyl-$^{13}C_3$, 99%; ^{15}N, 98%	neat	2483835-09-5	305808-23-5
DLM-9069	Vitamin B_6 (pyridoxal)	methyl-D_3, 98%	neat	1173023-49-8	66-72-8
CLM-7563	Vitamin B_6 (pyridoxine)·HCl	4,5-bis(hydroxymethyl)-$^{13}C_4$, 99%	neat	–	58-56-0
DLM-9121	Vitamin B_6 (pyridoxine)·HCl	methyl-D_3, 98% (CP 96%)	neat	1189921-12-7	58-56-0
DLM-9119	Vitamin B_6 (pyridoxamine)·2HCl	methyl-D_3, 98%	neat	1173023-45-4	524-36-7
DLM-9793-N	Vitamin B_6 phosphate (pyridoxal phosphate)	methyl-D_3, 97% (CP 97%) mix of 5-,3-isomers	neat	1354560-58-9	54-47-7
DLM-11662	Vitamin B_6 phosphate (pyridoxal phosphate)	methyl-D_3, 5-hydroxymethyl-D_2, 98%	neat	–	54-47-7
DLM-8806	Vitamin B_7 (biotin)	ring-6,6-D_2, 98% (CP 97%)	neat	1217481-41-8	58-85-5
DLM-9751	Vitamin B_7 (biotin)	3′,3′,4′,4′-D_4, 98% (CP 95%)	neat	1217850-77-5	58-85-5
CLM-7861-N	Vitamin B_9 (folic acid)	glutamic acid-$^{13}C_5$, 99% (CP 95%)	neat	1207282-75-4	59-30-3
CLM-7861	Vitamin B_9 (folic acid)	glutamic acid-$^{13}C_5$, 95% (contains ~10% H_2O)	neat	1207282-75-4	59-30-3
CNLM-9564	Vitamin B_9 (folic acid)	glutamic acid-$^{13}C_5$, 99%; ^{15}N, 98% (CP 95%)	neat	–	59-30-3
CLM-9770-E	Vitamin B_{12} (cyanocobalamin)	$^{13}C_7$, 99% (CP 95%)	1 µg/mL in methanol	–	68-19-9
CLM-3085	Vitamin C (L-ascorbic acid)	1-^{13}C, 99%	neat	178101-88-7	50-81-7
CLM-7283	Vitamin C (L-ascorbic acid)	U-$^{13}C_6$, 98%	neat	–	50-81-7
DLM-8985	Vitamin D_2 (ergocalciferol)	6,19,19-D_3, 97%	neat	1217448-46-8	50-14-6
CLM-10469-C	Vitamin D_3 (cholecalciferol)	25,26,26-$^{13}C_3$, 98% (CP 97%)	100 µg/mL in ethanol	–	67-97-0
CLM-10470-C	Vitamin D_3 (cholecalciferol)	23,24,25,26,26-$^{13}C_5$, 98% (CP 97%)	100 µg/mL in ethanol	2483734-99-0	67-97-0
DLM-8853	Vitamin D_3 (cholecalciferol)	6,19,19-D_3, 97% (CP 97%)	neat	80666-48-4	67-97-0
DLM-10749-C	Vitamin D_3 (cholecalciferol)	26,26,26,27,27,27-D_6, 98% (CP 95%)	100 µg/mL in ethanol	118584-54-6	67-97-0
CLM-10275	Vitamin E (α-tocopherol)	phenyl-$^{13}C_6$, 99% (CP 96%)	neat	–	59-02-9
DLM-9126	Vitamin E (α-tocopherol)	5-methyl-D_3, 7-methyl-D_3, 98%	neat	113892-08-3	59-02-9
DLM-8847	Vitamin E (α-tocopherol) acetate	acetyl-D_3, 98%	neat	–	52225-20-4
DLM-11564	Vitamin E (α-tocopherol) acetate	phenyl-5,7-dimethyl-D_6, 98% (CP 95%)	neat	143731-16-2	58-95-7
DLM-7702	Vitamin K_1 (phylloquinone)	ring-D_4, 98%	neat	–	84-80-0
DLM-9130	Vitamin K_1 (phylloquinone)	D_7, 99% (CP 97%)	neat	1233937-39-7	84-80-0
DLM-10379	Vitamin K_2 (menaquinone MK-4)	5,6,7,8-D_4, 2-methyl-D_3, 98% (CP 95%)	neat	–	863-61-6
DLM-10380	Vitamin K_2 (menaquinone MK-7)	5,6,7,8-D_4, 2-methyl-D_3, 98% (CP 95%)	neat	–	2124-57-4
DLM-10381	Vitamin K_2 (menaquinone MK-9)	5,6,7,8-D_4, 2-methyl-D_3, 98% (CP 95%)	neat	–	523-39-7
DLM-9132	Vitamin K_3 (menadione)	D_8, 98% (CP 97%)	neat	478171-80-1	58-27-5

Example References

Huang, J.; Cui, L.; Natarajan, M.; et al. **2022**. The ratio of nicotinic acid to nicotinamide as a microbial biomarker for assessing cell therapy product sterility. *Mol Ther Methods Clin Dev, 25,* 410-424.

Marshall, J.; Zhang, H.; Khazaei, H.; et al. **2021**. Targeted quantification of B vitamins using ultra-performance liquid chromatography-selected reaction monitoring mass spectrometry in faba bean seeds. *J Food Compost Anal, 95,* 103687.

Zhang, H.: De Silva, D.; Dissanayaka, D.; et al. **2021**. Validated B vitamin quantification from lentils by selected reaction monitoring mass spectrometry. *Food Chem, 359,* 129810-129818.

Shetty, S.A.; Young, M.F.; Taneja, S.; et al. **2020**. Quantification of B-vitamins from different fresh milk samples using ultra-high performance liquid chromatography mass spectrometry/selected reaction monitoring methods. *J Chromatogr A, 1609,* 460452.

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Food Contaminants

In addition to the nutrients and natural components of food, we must also consider the effects of additives, contaminants, and adulterants in food. Testing for the presence of contaminants and metabolites has become increasingly more routine and, in many cases, drives the implementation of new regulations and/or acceptable daily intake levels. The following sections outline example products for a number of environmental-contaminant classes pertaining to the foodomics research sector.

Click on the thumbnail or visit **isotope.com** for more information.

Bisphenols

Bisphenol A (BPA) is a synthetic compound that has long been used in the production of polycarbonate plastics and epoxy resins, largely as a component in food and beverage containers. BPA can mimic estrogen in the body, potentially interfering with functionality of the endocrine system. BPA has been banned for use in certain products related to food and beverage consumption, and manufacturers have turned to other bisphenol compounds as alternatives. CIL offers stable-isotope labeled and native bisphenol and bisphenol-related compounds, including glucuronide conjugated standards, bissulfate conjugated standards, and bisphenol diglycidyl ethers.

▼
CLICK HERE for information about our "Bisphenols and Related Products."

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-4325-1.2	Bisphenol A (BPA)	ring-$^{13}C_{12}$, 99%	100 µg/mL in acetonitrile	263261-65-0	80-05-7
DLM-2774-1.2	Bisphenol A (BPA)	ring-3,3′,5,5′-D_4, 97%	100 µg/mL in methanol-OD	347841-41-2	80-05-7
ULM-7106-1.2	Bisphenol A (BPA)	unlabeled	100 µg/mL in acetonitrile	–	80-05-7
CLM-9319-1.2	Bisphenol S (BPS)	ring-$^{13}C_{12}$, 99%	100 µg/mL in methanol	–	80-09-1
DLM-10923-1.2	Bisphenol S (BPS)	ring-D_8, 98%	100 µg/mL in methanol-OD	2483831-28-1	80-09-1
ULM-9320-1.2	Bisphenol S (BPS)	unlabeled	100 µg/mL in methanol	–	80-09-1
CLM-9866-1.2	Bisphenol F (BPF)	ring-$^{13}C_{12}$, 99%	100 µg/mL in acetonitrile	–	620-92-8
DLM-10924-1.2	Bisphenol F (BPF)	D_{10}, 98%	100 µg/mL in methanol-OD	1794786-93-8	620-92-8
ULM-9827-1.2	Bisphenol F (BPF)	unlabeled	100 µg/mL in acetonitrile	–	620-92-8
DLM-9193-1.2	Bisphenol A diglycidyl ether (BADGE)	diglycidyl-D_{10}, 98%	100 µg/mL in acetonitrile	–	1675-54-3
ULM-9857-1.2	Bisphenol A diglycidyl ether (BADGE)	unlabeled	100 µg/mL in acetonitrile	–	1675-54-3
CLM-9867-1.2	Bisphenol F diglycidyl ether (BFDGE)	ring-$^{13}C_{12}$, 99%	100 µg/mL in acetonitrile	–	2095-03-6
ULM-9868-1.2	Bisphenol F diglycidyl ether (BFDGE)	unlabeled	100 µg/mL in acetonitrile	–	2095-03-6

Example Reference

Siracusa, J.S.; Yin, L.; Measel, E.; et al. **2018**. Effects of bisphenol A and its analogs on reproductive health: A mini review. *Reprod Toxicol, 79,* 96-123.

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Cannabinoids

Research suggests that the cannabis plant produces between 80-100 cannabinoids, with the main ones being tetrahydrocannabinol (THC) and cannabidiol (CBD). THC is the compound responsible for the psychoactive effects associated with cannabis use, whereas CBD is associated with antipsychoactive effects. Human use of cannabinoids occurs via recreational, medicinal, and synthetic routes. CBD has been gaining popularity for use in a variety of topical and ingestible wellness products, with the proposed benefits of providing relief from mild pain or discomfort, stress, and occasional sleeplessness. CIL has developed stable isotope-labeled and native standards of THC, CBD, and other cannabinoids to assist researchers with their testing needs.

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
DLM-10854-1.2	Cannabichromene (CBC)	methyl-D_3, 98%	100 µg/mL in methanol	–	20675-51-8
ULM-10878-1.2	Cannabichromene (CBC)	unlabeled	1000 µg/mL in methanol	–	20675-51-8
DLM-10855-1.2	Cannabidiol (CBD)	D_3, 98%	100 µg/mL in methanol	–	13956-29-1
ULM-10876-1.2	Cannabidiol (CBD)	unlabeled	1000 µg/mL in methanol	–	13956-29-1
DLM-11140-1.2	Cannabidivarin (CBDV)	methyl-D_3, 98%	100 µg/mL in methanol	–	24274-48-4
ULM-11132-1.2	Cannabidivarin (CBDV)	unlabeled	1000 µg/mL in methanol	–	24274-48-4
DLM-10853-1.2	Cannabigerol (CBG)	methyl-D_3, 98%	100 µg/mL in methanol	–	25654-31-3
ULM-10877-1.2	Cannabigerol (CBG)	unlabeled	1000 µg/mL in methanol	–	25654-31-3
DLM-10847-1.2	Cannabinol (CBN)	methyl-D_3, 98%	100 µg/mL in methanol	–	521-35-7
ULM-10875-1.2	Cannabinol (CBN)	unlabeled	1000 µg/mL in methanol	–	521-35-7
DLM-10915-1.2	Cannabivarin (CBV)	methyl-D_3, 98% (CP 97%)	100 µg/mL in methanol	–	33745-21-0
ULM-10916-1.2	Cannabivarin (CBV)	unlabeled	1000 µg/mL in methanol	–	33745-21-0
DLM-10846-1.2*	δ-9-*trans*-Tetrahydrocannabinol (THC)	methyl-D_3, 98%	100 µg/mL in methanol	–	1972-08-3
ULM-10874-1.2*	δ-9-*trans*-Tetrahydrocannabinol (THC)	unlabeled (CP 95%)	1000 µg/mL in methanol	–	1972-08-3
DLM-10707-1.2	Tetrahydrocannabivarin (THCV)	propyl-3,3,3-D_3, 98% (CP 97%)	100 µg/mL in methanol	–	31262-37-0
ULM-11131-1.2	Tetrahydrocannabivarin (THCV)	unlabeled	1000 µg/mL in methanol	–	31262-37-0

**Controlled substance.*

Chlorate/Perchlorate

Chlorate is a contaminant found in water and food products that have been treated with chlorinated disinfectants or exposed to pesticide formulations containing the compound. Chlorate has been identified as potentially harmful to human health, especially within the thyroid system. Guidelines have been established for chlorate levels in food and drinking water.

▼ **CLICK HERE** for information about "Chlorate Standards for Food and Water Testing."

Featured Products

Catalog No.	Compound (Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
OLM-7310-1.2	Perchloric acid, sodium salt (sodium perchlorate)	$^{18}O_4$, 90%	100 µg/mL in water	–	7601-89-0
ULM-7312-1.2	Perchloric acid, sodium salt (sodium perchlorate)	unlabeled	100 µg/mL in water	–	7601-89-0
OLM-10485-1.2	Potassium chlorate (chloric acid, potassium salt)	$^{18}O_3$, 98% (CP 90%)	100 µg/mL in ^{18}O water	–	3811-04-9
ULM-10486-1.2	Potassium chlorate (chloric acid, potassium salt)	unlabeled	100 µg/mL in ^{18}O water	–	3811-04-9
OLM-8283-18O-1.2	Potassium bromate (bromic acid, potassium salt)	$^{18}O_3$, 98% (CP 90%)	100 µg/mL in ^{18}O water	–	7758-01-2
ULM-8451-1.2	Potassium bromate (bromic acid, potassium salt)	unlabeled	100 µg/mL in water	–	7758-01-2

Example Reference

Nizński, P.; Błażewicz, A.; Kończyk, J.; et al. **2020**. Perchlorate – properties, toxicity and human health effects: an updated review. *Rev Environ Health, 36(2),* 199-222.

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

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Chloropropanols

Chloropropanols have been of increased interest for detection in food, with a focus on oyster and soy sauces. It is thought that the compounds are formed during the production of hydrolyzed vegetable protein in the presence of hydrochloric acid. The major chloropropanols that can be found in foods are 3-chloro-1,2-propanediol (3-MCPD) and 1,3-dichloro-2-propanol (1,3-DCP). 3-MCPD has been shown to cause cancer in laboratory animals that consumed large amounts over their lifetimes,[1] and although people generally consume low amounts of these contaminants in food, there is still concern over the potential health risk.

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
DLM-4633-1.2	3-Chloro-1,2-propanediol (3-MCPD)	propane-D_5, 98%	1 mg/mL in methanol	342611-01-2	96-24-2
ULM-7998-1.2	3-Chloro-1,2-propanediol (3-MCPD)	unlabeled	1 mg/mL in methanol	–	96-24-2
DLM-2112-1.2	1,3-Dichloro-2-propanol (1,3-DCP)	D_5, 98%	1 mg/mL in methanol	1173020-20-6	96-23-1
ULM-8092-1.2	1,3-Dichloro-2-propanol (1,3-DCP)	unlabeled	1 mg/mL in methanol	–	96-23-1

Reference

1. 3-Monochloropropane-1,2-diol (MCPD) esters and glycidyl esters. **Click here for more information.**

Cyanotoxins

Cyanotoxins are toxic bioactive compounds that are released from planktonic cyanobacteria (blue-green algae) under certain conditions. This can result in harmful algal blooms (HABs) that contaminate water systems and bioaccumulate in aquatic vertebrates/invertebrates. Cyanotoxins are also potentially an issue for health and dietary food supplements derived from algae.

CLICK HERE for information about our "Cyanotoxins."

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
DLM-10260-0.025MG	Microcystin-LR, ethylated (MC-LR, ethylated)	D_5, 98%	neat	–	–
NLM-10295-1.2	Microcystin-LR (MC-LR)	$^{15}N_{10}$, 98%	10 µg/mL in methanol:water (1:1)	–	101043-37-2
ULM-10342-1.2	Microcystin-LR (MC-LR)	unlabeled	10 µg/mL in methanol:water (1:1)	–	101043-37-2
NLM-10340-1.2	Microcystin-RR (MC-RR)	$^{15}N_{13}$, 98%	10 µg/mL in methanol:water (1:1)	–	111755-37-4
ULM-10341-1.2	Microcystin-RR (MC-RR)	unlabeled	10 µg/mL in methanol:water (1:1)	–	111755-37-4
NLM-10343-1.2	Microcystin-YR (MC-YR)	$^{15}N_{10}$, 98%	10 µg/mL in methanol:water (1:1)	–	101064-48-6
ULM-10344-1.2	Microcystin-YR (MC-YR)	unlabeled	10 µg/mL in methanol:water (1:1)	–	101064-48-6
NLM-10345-1.2	Microcystin-LA (MC-LA)	$^{15}N_7$, 98%	10 µg/mL in methanol:water (1:1)	–	96180-79-9
ULM-10346-1.2	Microcystin-LA (MC-LA)	unlabeled	10 µg/mL in methanol:water (1:1)	–	96180-79-9
CNLM-10424-1.2	β-*N*-Methylamino-L-alanine (BMAA)	$^{13}C_3$, 99%; $^{15}N_2$, 98% (Patent No. US 11,370,812 B2)	100 µg/mL in 0.1 M HCl	–	15920-93-1
ULM-10493-1.2	β-*N*-Methylamino-L-alanine (BMAA)	unlabeled	100 µg/mL in 0.1 M HCl	–	16012-55-8

Example Reference

Díez-Quijada, L.; Prieto, A.I.; Guzmán-Guillén, R.; et al. **2019**. Occurrence and toxicity of microcystin congeners other than MC-LR and MC-RR: A review. *Food Chem Toxicol, 125,* 106-132.

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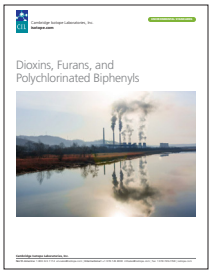
Dioxins/Furans

Dioxins and furans are a family of toxic substances that can be found as byproducts in commercial organochlorine pesticide formulations, chlorine-bleached pulp and paper products, and incineration of organic material in the presence of chlorine. The compounds can build up in the fatty tissues of animals, leading to the main source of human exposure through ingestion of contaminated pork, beef, poultry, fish, and dairy products. CIL offers stable-isotope labeled and native individual dioxin and furan standards, and has for many decades collaborated with regulators to develop standard mixtures used in US EPA, European, and Japanese standardized methods. CIL also offers mixtures containing dioxins, furans, and PCBs as well as standard mixtures for food/feed testing.



Click on the thumbnail for more information.

Featured Products

Catalog No.	Description	Amount
EDF-9999	Method 1613 Calibration Solutions (CS1-CS5)*	5 × 0.2 mL in nonane
EDF-4052	Method 23 Calibration Solutions (CS1-CS5)*	5 × 0.2 mL in nonane
EDF-5006	Method 8290 Calibration Solutions (CS1-CS5)*	5 × 0.2 mL in nonane
EDF-4095	Modified Method 8280 Calibration Solutions (CS1-CS5)*	5 × 0.2 mL in nonane
EDF-4947	EN-1948 Calibration Solutions (CS1-CS5)*	5 × 0.2 mL in nonane
EDF-5187	JIS Dioxin/Furan Calibration Solutions (CS1-CS5)*	5 × 0.2 mL in nonane
EDF-5581	PCDD/F and NO PCB Labeled Mixture	1.2 mL in nonane
EDF-5579	PCDD/F and NO PCB Native Mixture	1.2 mL in isooctane/nonane
EDF-5554	Dioxin and Furan Food/Feed/QQQ Calibration Series (CS1-CS8)*	8 × 0.25 mL in nonane
EDF-5407	Bromodioxin/Furan Calibration Standard Solutions (CS1-CS5)*	5 × 0.2 mL in nonane/toluene

**Standard method supporting solutions are also available.*

Example References

https://www.nemi.gov/methods/method_summary/5350/
https://www.epa.gov/emc/method-23-dioxins-and-furans
https://www.epa.gov/sites/production/files/2016-01/documents/sw846method8290a.pdf
https://www.epa.gov/sites/production/files/2015-12/documents/8280b.pdf
https://www.en-standard.eu/
https://infostore.saiglobal.com/en-us/Standards/Product-Details-625633_SAIG_JSA_JSA_1436541/?ProductID=625633_SAIG_JSA_JSA_1436541
https://infostore.saiglobal.com/en-us/Standards/Product-Details-625680_SAIG_JSA_JSA_1436641/?ProductID=625680_SAIG_JSA_JSA_1436641

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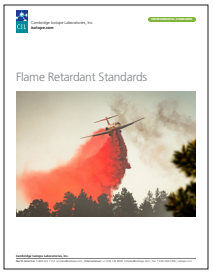
Flame Retardants

Flame retardants (FRs) have been used for decades in electronics, textiles, and other industrial products, and many have demonstrated "POPs" characteristics for stability, toxicity, long-range transport, and bioaccumulation. FRs have long been detected in the environment, and studies have shown their presence in food as well, often due to contact with packaging and food handling equipment. CIL offers stable isotope-labeled and native brominated diphenyl ether (BDE) standards and standard mixtures, BDE metabolites, US EPA Method 1614 and RoHS BDE standard mixtures, alternative halogenated flame retardants, polybrominated biphenyls (PBB), phosphate flame retardants (PFR), and multiclass BFR calibration and spiking mixtures.



Click on the thumbnail for more information.

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
EO-5279	Method 1614 Calibration Solutions (CS1-CS5)*			–	–
EO-5402	RoHS PBDE Calibration Solutions (CS1-CS5)*			–	–
EO-5319-A	CDC BFR Calibration Standards (CS1-CS10)			–	–
EO-5320-A	CDC BFR Spiking Standard			–	–
EO-5617	CDC BFR PAR Solution			–	–
ES-5529	Phosphorus Flame-Retardant Standard Mixture	D, 98%		–	–
ES-5530	Phosphorus Flame-Retardant Standard Mixture	unlabeled		–	–
EO-5003	DecaBDE (BDE-209)	$^{13}C_{12}$, 99%	50 µg/mL in nonane	–	1163-19-5
BDE-209-CS	DecaBDE (BDE-209)	unlabeled	50 µg/mL in nonane	–	1163-19-5
CLM-7102-1.2	Hexabromocyclododecane (HBCD) unequal mix of 3 isomers	$^{13}C_{12}$, 99%	50 µg/mL in toluene	–	25637-99-4
CLM-7922-0.5	α-Hexabromocyclododecane (α-HBCD)	$^{13}C_{12}$, 99%	50 µg/mL in toluene	–	134237-50-6
ULM-4834-1.2	α-Hexabromocyclododecane (α-HBCD)	unlabeled	50 µg/mL in toluene	–	134237-50-6
CLM-7923-1.2	β-Hexabromocyclododecane (β-HBCD)	$^{13}C_{12}$, 99%	50 µg/mL in toluene	–	134237-51-7
ULM-4835-1.2	β-Hexabromocyclododecane (β-HBCD)	unlabeled	50 µg/mL in toluene	–	134237-51-7
CLM-7924-1.2	γ-Hexabromocyclododecane (γ-HBCD)	$^{13}C_{12}$, 99%	50 µg/mL in toluene	–	134237-52-8
ULM-4836-1.2	γ-Hexabromocyclododecane (γ-HBCD)	unlabeled	50 µg/mL in toluene	–	134237-52-8
CLM-4694-1.2	Tetrabromobisphenol A (TBBPA)	ring-$^{13}C_{12}$, 99%	50 µg/mL in methanol	1352876-39-1	79-94-7
ULM-8734-1.2	Tetrabromobisphenol A (TBBPA)	unlabeled	50 µg/mL in methanol	–	79-94-7

**Standard method supporting solutions are also available.*

Example Reference

https://www.epa.gov/sites/production/files/2015-08/documents/method_1614a_2010.pdf

Melamine and Melamine Byproducts

Melamine and cyanuric acid have been identified as the source of two notable human- and pet-food poisonings. Manufacturers sometimes illegally add melamine to food and beverage products to artificially boost protein values. Melamine contains small amounts of cyanuric acid and, when hydrogen bonded with one another, highly insoluble melamine cyanurate crystals form in the kidneys. These crystals have led to numerous cases of renal failure and even death to both humans and animals.

▼ **CLICK HERE** for information about our "Melamine and Melamine Byproduct Standards."

Featured Products

Catalog No.	Compound (Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
CNLM-8150-1.2	Melamine (2,4,6-triamino-1,3,5-triazine)	$^{13}C_3$, 99%; amino-$^{15}N_3$, 98%	100 µg/mL in water	–	108-78-1
CNLM-8150-10X-1.2	Melamine (2,4,6-triamino-1,3,5-triazine)	$^{13}C_3$, 99%; amino-$^{15}N_3$, 98%	1000 µg/mL in water	–	108-78-1
ULM-8156-1.2	Melamine (2,4,6-triamino-1,3,5-triazine)	unlabeled	100 µg/mL in water	–	108-78-1
CNLM-4661-1.2	Cyanuric acid (isocyanursaeure)	$^{13}C_3$, 99%; amino-$^{15}N_3$, 98%	100 µg/mL in water	–	108-80-5
CNLM-4661-10X-1.2	Cyanuric acid (isocyanursaeure)	$^{13}C_3$, 99%; amino-$^{15}N_3$, 98%	1000 µg/mL in water	–	108-80-5
ULM-8157-1.2	Cyanuric acid (isocyanursaeure)	unlabeled	100 µg/mL in water	–	108-80-5

Example Reference

Zhu, H.; Kannan, K. **2019**. Melamine and cyanuric acid in foodstuffs from the United States and their implications for human exposure. *Environ Int, 130,* 104950.

Nitrofuran Metabolites

Nitrofuran drugs have been used in veterinary applications as antimicrobial treatments, as well as prophylactic growth promoters. While many of these compounds are now banned in food-producing species such as pigs, cattle, turkeys, chicken, goats, and sheep, the concern remains for potential illegal use in these species. Several nitrofuran metabolites such as AHD, AOZ, AMOZ, and SEM remain important markers to determine potential illegal use of nitrofuran drug use.

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
DLM-7170-A-1.2	1-Aminohydantoin hydrochloride (AHD)	5,5-D_2, 98%	100 µg/mL in water	1188263-75-3	2827-56-7
ULM-7188-1.2	1-Aminohydantoin hydrochloride (AHD)	unlabeled	100 µg/mL in methanol	–	2827-56-7
DLM-7171-1.2	3-Amino-2-oxazolidone (AOZ)	ring-D_4, 98%	100 µg/mL in acetonitrile-d_3	1188331-23-8	80-65-9
ULM-7189-1.2	3-Amino-2-oxazolidone (AOZ)	unlabeled	100 µg/mL in methanol	–	80-65-9
DLM-7172-1.2	5-(4-Morpholinylmethyl)-3-amino-2-oxazolidinone (AMOZ)	4,4,5,5′,5′-D_5, 98%	100 µg/mL in acetonitrile-d_3	1017793-94-0	43056-63-9
ULM-7190-1.2	5-(4-Morpholinylmethyl)-3-amino-2-oxazolidinone (AMOZ)	unlabeled	100 µg/mL in methanol	–	43056-63-9
CNLM-7221-1.2	Semicarbazide hydrochloride (SEM)	^{13}C, 99%; $^{15}N_2$, 98%	100 µg/mL in methanol	–	563-41-7
ULM-7187-1.2	Semicarbazide hydrochloride (SEM)	unlabeled	100 µg/mL in methanol	–	563-41-7

Nitrosamines

Nitrosamines are a group of organic compounds which may be found in processed foods and beverages, as well as cosmetics and tobacco. Many of the compounds within this class are suspected carcinogens, with human exposure mainly occurring from use of tobacco products and consumption of cured and processed foods. CIL provides a range of nitrosamine standards to assist researchers, offering both native and stable isotope-labeled internal standards for accurate, low-level detection in various matrices.

CLICK HERE for information about our "Nitrosamines."

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
CDLM-7279-S	*N*-Nitrosodimethylamine (NDMA)	$^{13}C_2$, 99%; D_6, 98%	1 mg/mL in methylene chloride-d_2	2483824-56-0	62-75-9
DLM-2130-S	*N*-Nitrosodimethylamine (NDMA)	D_6, 98%	1 mg/mL in methylene chloride-d_2	17829-05-9	62-75-9
NLM-7647-S	*N*-Nitrosodimethylamine (NDMA)	$^{15}N_2$, 98%	1 mg/mL in methylene chloride	–	62-75-9
ULM-9042-S	*N*-Nitrosodimethylamine (NDMA)	unlabeled	1 mg/mL in methylene chloride	–	62-75-9
DLM-7982-S	*N*-Nitrosodiethylamine (NDEA)	D_{10}, 98%	1 mg/mL in methylene chloride-d_2	1219794-54-3	55-18-5
ULM-7984-1.2	*N*-Nitrosodiethylamine (NDEA)	unlabeled	1 mg/mL in methylene chloride	–	55-18-5
CLM-10856-1.2	*N*-Nitroso-*N*-methyl-4-aminobutyric acid (NMBA)	1,2,3,4-$^{13}C_4$, 99%	1 mg/mL in methylene chloride	2483735-31-3	61445-55-4
ULM-10857-1.2	*N*-Nitroso-*N*-methyl-4-aminobutyric acid (NMBA)	unlabeled	1 mg/mL in methylene chloride	–	61445-55-4

Example Reference

Beard, J.C.; Swager, T.M. **2021**. An organic chemist's guide to *N*-nitrosamines: Their structure, reactivity, and role as contaminants. *J Org Chem, 86(3),* 2037-2057.

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

For research use only. Not for use in diagnostic procedures.

Parabens

Parabens are a class of 4-hydroxybenzoate alkyl esters commonly used as preservatives in the cosmetic, pharmaceutical, and food industries as antimicrobial agents. There is growing concern over the estrogen-like behavior of parabens and their metabolites, causing many consumers and manufacturers to seek paraben-free alternatives. CIL offers stable isotope-labeled and native paraben and paraben metabolite standards, as well as mixtures combined with other phenolic compounds.

CLICK HERE for information about our "Parabens."

Featured Products

Catalog No.	Compound (Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-8249-1.2	Methyl paraben (methyl 4-hydroxybenzoate)	ring-$^{13}C_6$, 99%	1 mg/mL in methanol	–	99-76-3
DLM-10921-1.2	Methyl paraben (methyl 4-hydroxybenzoate)	ring-D_4, 98%	1 mg/mL in methanol-OD	362049-51-2	99-76-3
ULM-8250-1.2	Methyl paraben (methyl 4-hydroxybenzoate)	unlabeled	1 mg/mL in methanol	–	99-76-3
CLM-9763-1.2	*n*-Propyl paraben (*n*-propyl 4-hydroxybenzoate)	ring-$^{13}C_6$, 99%	1 mg/mL in methanol	–	94-13-3
DLM-10922-1.2	*n*-Propyl paraben (*n*-propyl 4-hydroxybenzoate)	ring-D_4, 98%	1 mg/mL in methanol-OD	1219802-67-1	94-13-3
ULM-9762-1.2	*n*-Propyl paraben (*n*-propyl 4-hydroxybenzoate)	unlabeled	1 mg/mL in methanol	–	94-13-3
CLM-8285-1.2	*n*-Butyl paraben (*n*-butyl 4-hydroxybenzoate)	ring-$^{13}C_6$, 99%	1 mg/mL in methanol	–	94-26-8
ULM-8287-1.2	*n*-Butyl paraben (*n*-butyl 4-hydroxybenzoate)	unlabeled	1 mg/mL in methanol	–	94-26-8
CLM-4745-1.2	4-Hydroxybenzoic acid	ring-$^{13}C_6$, 99%	1 mg/mL in methanol	287399-29-5	99-96-7
ULM-8251-1.2	4-Hydroxybenzoic acid	unlabeled	1 mg/mL in methanol	–	99-96-7

Per- and Polyfluoroalkyl Substances (PFAS)

PFAS have been one of the most discussed classes of chemical pollutants in recent years, and many have been scrutinized and even withdrawn from production over the past two decades. PFAS have been largely detected in water samples near manufacturing sites, including drinking water sources. PFAS have also been used in food packaging materials as they are resistant to saturation by oil and steam, leading to contact food contamination. CIL offers stable isotope-labeled and native standards for many of the traditional PFAS classes, as well as emerging fluoropolymer classes. CIL also offers several native and labeled multicomponent standard mixtures, including US EPA Method 537 and 537.1 mixtures.

CLICK HERE for information about our "Per- and Polyfluoroalkyl Substances."

Featured Products

Catalog No.	Description	Amount
ES-5631	Method 537.1 Analyte Primary Dilution Standard (PDS)	1.2 mL in methanol (with 4 molar equivalents NaOH)
ES-5610-A	Method 537.1 Internal Standard Primary Dilution Standard (ISPDS)	1.2 mL in methanol (with 4 molar equivalents NaOH)
ES-5632	Method 537.1 Surrogate Primary Dilution Standard (SUR PDS)	1.2 mL in methanol (with 4 molar equivalents NaOH)
ES-5587	Perfluoroalkylcarboxylic acid (PFCA) C_4-C_{14} Native Mixture	1.2 mL in methanol
ES-5576	Perfluoroalkylsulfonate (PFAS) C_4-C_{10} Native Mixture	1.2 mL in methanol
ES-5636	PFAS EF-28 Native Mixture	1.2 mL in methanol
ES-5639	PFAS Superfund Mixture 1	1.2 mL in methanol (with 4 molar equivalents NaOH)
ES-5640	PFAS SIL Superfund Mixture 1	1.2 mL in methanol (with 4 molar equivalents NaOH)
ES-5641	PFAS SIL Superfund Mixture 2	1.2 mL in methanol (with 4 molar equivalents NaOH)
ES-5570	PFOS/PFOA Calibration Series CS1-CS5	5 × 0.25 mL in methanol
ES-5571	PFOS/PFOA Extraction Standard Mixture	3 mL in methanol
ES-5572	PFOS/PFOA Injection Standard Mixture	3 mL in methanol
ES-5573	PFOS/PFOA Native Standard Mixture	1.2 mL in methanol

Method 537.1 Reference

https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=343042&Lab=NERL

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

For research use only. Not for use in diagnostic procedures.

Pesticides, Insecticides, Herbicides, and Metabolites

Pesticides, herbicides, and insecticides are essential to agricultural productivity and general pest control, though the effects of using these chemicals can be of high concern. Many have been found to be toxic to humans and animals and, as such, have been banned from use in numerous countries. CIL offers stable-isotope labeled and native individual standards and standard mixtures for many pesticide, herbicide, and insecticide classes, including organochlorine (OC) pesticides, organophosphate (OP) pesticides, crop-protection herbicides, toxaphenes, neonicotinoids, carbamates, pyrethroids, triazines, fungicides, and cannabis-specific pesticide standards.

▼ **CLICK HERE** for information about "Glyphosate, Glufosinate, and Dicamba."

▼ **CLICK HERE** for information about our "Pyrethroids."

▼ **CLICK HERE** for information about our "Neonicotinoid Pesticides."

▼ **CLICK HERE** for information about our "Toxaphene Congeners."

Click on the thumbnail for more information.

Featured Mixtures

Catalog No.	Description	Amount
ES-5464-A	Expanded POPs Pesticides Calibration Solutions with Endosulfan Sulfate (CS1-CS6)	6 × 0.2 mL in nonane/isooctane
ES-5465-A	Expanded POPs Pesticides Cleanup Spike with Endosulfan Sulfate (100 ng/mL)	1.2 mL in nonane
ES-5466	Expanded POPs Pesticides Sampling Spike	1.2 mL in nonane
ES-5467-A	Expanded POPs Pesticides PAR Solution with Endosulfan Sulfate	1.2 mL in nonane/isooctane
ES-5634	JECS Labeled Neonicotinoid Mixture	1.2 mL in methanol
ES-5627	JECS Native Neonicotinoid Mixture	1.2 mL in methanol
ES-5516	EPA Method 1699 Labeled Pesticide Stock Solution	0.5 mL in nonane
ES-5543	US EPA Method 8276 Toxaphene Composite Stock Standard	1.2 mL in nonane
ES-5545	US EPA Method 8276 Toxaphene Injection Internal Standard	1.2 mL in nonane

Featured Pesticides

Catalog No.	Compound (Abbr. or Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-1911-1.2	Carbofuran (furadan)	ring-$^{13}C_6$, 99%	100 µg/mL in 1,4-dioxane	2483735-48-2	1563-66-2
ULM-7419-1.2	Carbofuran (furadan)	unlabeled	100 µg/mL in 1,4-dioxane	–	1563-66-2
CLM-8087-1.2	*cis*-Chlordane (α-chlordane)	$^{13}C_{10}$, 99%	100 µg/mL in nonane	475275-01-5	5103-71-9
ULM-2419-1.2	*cis*-Chlordane (α-chlordane)	unlabeled	100 µg/mL in nonane	–	5103-71-9
CLM-4792-1.2	*trans*-Chlordane (γ-chlordane)	$^{13}C_{10}$, 99%	100 µg/mL in nonane	1262969-05-0	5103-74-2
ULM-2420-1.2	*trans*-Chlordane (γ-chlordane)	unlabeled	100 µg/mL in nonane	–	5103-74-2
CLM-4692-1.2	2,4′-DDT (*o,p*′-DDT)	ring-$^{13}C_{12}$, 99%	100 µg/mL in nonane	1396995-26-8	789-02-6
ULM-6134-1.2	2,4′-DDT (*o,p*′-DDT)	unlabeled	100 µg/mL in nonane	–	789-02-6
CLM-1627-1.2	4,4′-DDE (*p,p*′-DDE)	ring-$^{13}C_{12}$, 99%	100 µg/mL in nonane	201612-50-2	72-55-9
ULM-6137-1.2	4,4′-DDE (*p,p*′-DDE)	unlabeled	100 µg/mL in nonane	–	72-55-9
CLM-1281-1.2	4,4′-DDT (*p,p*′-DDT)	ring-$^{13}C_{12}$, 99%	100 µg/mL in nonane	104215-84-1	50-29-3
ULM-6135-1.2	4,4′-DDT (*p,p*′-DDT)	unlabeled	100 µg/mL in nonane	–	50-29-3
CLM-4782-1.2	Endrin (hexadrin)	$^{13}C_{12}$, 99%	100 µg/mL in nonane	475274-99-8	72-20-8
ULM-7444-1.2	Endrin (hexadrin)	unlabeled	100 µg/mL in nonane	–	72-20-8
CLM-351-1.2	Hexachlorobenzene (perchlorobenzene)	$^{13}C_6$, 99%	100 µg/mL in nonane	93952-14-8	118-74-1
ULM-6130-1.2	Hexachlorobenzene (perchlorobenzene)	unlabeled	100 µg/mL in nonane	–	118-74-1
CLM-2050-1.2	Pentachlorobenzene (PeCB)	$^{13}C_6$, 99%	100 µg/mL in isooctane	2483735-54-0	608-93-5
ULM-7234-1.2	Pentachlorobenzene (PeCB)	unlabeled	100 µg/mL in isooctane	–	608-93-5
CLM-1955-1.2	Pentachloronitrobenzene (quintozene)	$^{13}C_6$, 99%	100 µg/mL in nonane	362044-64-2	82-68-8
ULM-7597-1.2	Pentachloronitrobenzene (quintozene)	unlabeled	100 µg/mL in nonane	–	82-68-8
CLM-661-1.2	Pentachlorophenol (chlorophen)	$^{13}C_6$, 99%	100 µg/mL in nonane	85380-74-1	87-86-5
ULM-6894-1.2	Pentachlorophenol (chlorophen)	unlabeled	100 µg/mL in nonane	–	87-86-5
CLM-4551-1.2	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	ring-$^{13}C_6$, 99%	100 µg/mL in methylene chloride	1216572-34-7	93-76-5
ULM-7213-1.2	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	unlabeled	100 µg/mL in methylene chloride	–	93-76-5

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

For research use only. Not for use in diagnostic procedures.

Featured Insecticides

Catalog No.	Compound (Abbr. or Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
CDLM-9820-1.2	Aldicarb (temik)	$^{13}C_2$, 98%; D_3, 98%	100 µg/mL in acetonitrile	2483824-09-3	116-06-3
ULM-9823-1.2	Aldicarb (temik)	unlabeled	100 µg/mL in acetonitrile	–	116-06-3
CLM-4725-1.2	Aldrin (HHDN)	$^{13}C_{12}$, 99%	100 µg/mL in nonane	475274-95-4	309-00-2
ULM-7441-1.2	Aldrin (HHDN)	unlabeled	100 µg/mL in nonane	–	309-00-2
DLM-4360-1.2	Chlorpyrifos (dursban)	diethyl-D_{10}, 98% (CP 97%)	100 µg/mL in nonane	285138-81-0	2921-88-2
ULM-7489-1.2	Chlorpyrifos (dursban)	unlabeled	100 µg/mL in nonane	–	2921-88-2
CLM-4726-1.2	Dieldrin (HEOD)	$^{13}C_{12}$, 98%	100 µg/mL in nonane	475274-95-4	60-57-1
ULM-7230-1.2	Dieldrin (HEOD)	unlabeled	100 µg/mL in nonane	–	60-57-1
DLM-10035-1.2	Fenvalerate (pydrin)	D_6, 98%	100 µg/mL in nonane	82523-66-8	51630-58-1
ULM-10022-1.2	Fenvalerate (pydrin)	unlabeled	100 µg/mL in nonane	–	51630-58-1
CNLM-9636-MT-1.2	Fipronil	$^{13}C_4$, 99%; $^{15}N_2$, 98%	100 µg/mL in methyl *tert*-butyl ether	2446366-92-2	120068-37-3
ULM-9635-MT-1.2	Fipronil	unlabeled	100 µg/mL in methyl *tert*-butyl ether	–	120068-37-3
CLM-2482-1.2	α-HCH (α-BHC)	$^{13}C_6$, 99%	100 µg/mL in nonane	222966-66-7	319-84-6
ULM-7232-1.2	α-HCH (α-BHC)	unlabeled	100 µg/mL in nonane	–	319-84-6
CLM-3623-1.2	β-HCH (β-BHC)	$^{13}C_6$, 99%	50 µg/mL in nonane	222966-68-9	319-85-7
ULM-6132-1.2	β-HCH (β-BHC)	unlabeled	50 µg/mL in nonane	–	319-85-7
CLM-1282-1.2	γ-HCH (γ-BHC) (lindane)	$^{13}C_6$, 99%	100 µg/mL in nonane	104215-85-2	58-89-9
CDLM-624-1.2	γ-HCH (γ-BHC) (lindane)	$^{13}C_6$, 99%; D_6, 99%	100 µg/mL in nonane	201417-04-1	58-89-9
ULM-6133-1.2	γ-HCH (γ-BHC) (lindane)	unlabeled	100 µg/mL in nonane	–	58-89-9
CLM-3648-1.2	Δ-HCH (Δ-BHC)	$^{13}C_6$, 99%	100 µg/mL in nonane	–	319-86-8
ULM-7233-1.2	Δ-HCH (Δ-BHC)	unlabeled	100 µg/mL in nonane	–	319-86-8
CLM-4759-1.2	Heptachlor (3-chlorochlordene)	$^{13}C_{10}$, 99%	100 µg/mL in nonane	2483736-21-1	76-44-8
ULM-2424-1.2	Heptachlor (3-chlorochlordene)	unlabeled	100 µg/mL in nonane	–	76-44-8
CLM-10767-1.2	Imidacloprid	pyridylmethyl-$^{13}C_6$, 99%	100 µg/mL in methanol	2484171-01-7	138261-41-3
DLM-8512-1.2	Imidacloprid	4,4,5,5-D_4, 98%	100 µg/mL in methanol	1015855-75-0	138261-41-3
ULM-8513-1.2	Imidacloprid	unlabeled	100 µg/mL in methanol	–	138261-41-3
CLM-4727-1.2	Isodrin	$^{13}C_{12}$, 99% (CP 95%)	100 µg/mL in nonane	475274-98-7	465-73-6
ULM-7442-1.2	Isodrin	unlabeled	100 µg/mL in nonane	–	465-73-6
CLM-4814-1.2	Kepone (chlordecone)	$^{13}C_{10}$, 99%	100 µg/mL in nonane	2483736-05-4	143-50-0
ULM-2301-1.2	Kepone (chlordecone)	unlabeled	100 µg/mL in nonane	–	143-50-0
CLM-4683-1.2	Methoxychlor (DMDT)	ring-$^{13}C_{12}$, 99%	100 µg/mL in nonane	2483735-96-0	72-43-5
ULM-7440-1.2	Methoxychlor (DMDT)	unlabeled	100 µg/mL in nonane	–	72-43-5
CLM-4813-1.2	Mirex (dechlorane)	$^{13}C_{10}$, 98%	100 µg/mL in nonane	2483736-04-3	2385-85-5
ULM-2427-1.2	Mirex (dechlorane)	unlabeled	100 µg/mL in nonane	–	2385-85-5
CLM-7322-1.2	*cis*-Permethrin (CPM)	phenoxy-$^{13}C_6$, 99%	50 µg/mL in nonane	–	61949-76-6
ULM-8526-1.2	*cis*-Permethrin (CPM)	unlabeled	50 µg/mL in nonane	–	61949-76-6
CLM-7323-1.2	*trans*-Permethrin (TPM)	phenoxy-$^{13}C_6$, 99%	50 µg/mL in nonane	–	51877-74-8
ULM-8527-1.2	*trans*-Permethrin (TPM)	unlabeled	50 µg/mL in nonane	–	51877-74-8
DLM-10036-1.2	Permethrin (*cis*/*trans* mix)	D_6, 98%	100 µg/mL in nonane	82523-59-9	52645-53-1
ULM-10018-1.2	Permethrin (*cis*/*trans* mix)	unlabeled (CP 95%)	100 µg/mL in nonane	–	52645-53-1

Example Reference

Morgan, M.K.; MacMillan, D.K.; Zehr, D.; et al. **2018**. Pyrethroid insecticides and their environmental degradates in repeated duplicate-diet solid food samples of 50 adults. *J Expo Sci Environ Epidemiol, 28(1),* 40-45.

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

For research use only. Not for use in diagnostic procedures.

Featured Herbicides

Catalog No.	Compound (Abbr. or Alt. Name)	Description	Concentration	Labeled CAS	Unlabeled CAS
CLM-4546-1.2	Acetochlor (AC)	ring-$^{13}C_6$, 99%	100 µg/mL in acetonitrile	2483735-83-5	34256-82-1
ULM-9824-1.2	Acetochlor (AC)	unlabeled	100 µg/mL in acetonitrile	–	34256-82-1
CLM-3737-1.2	Atrazine (gesaprim)	ring-$^{13}C_3$, 99%	100 µg/mL in nonane	1443685-80-0	1912-24-9
DLM-1149-1.2	Atrazine (gesaprim)	ethylamine-D_5, 98%	100 µg/mL in nonane	163165-75-1	1912-24-9
ULM-7235-1.2	Atrazine (gesaprim)	unlabeled	100 µg/mL in nonane	–	1912-24-9
CLM-9914-1.2	Dicamba (3,6-dichloro-2-methoxybenzoic acid)	ring-$^{13}C_6$, 99%	100 µg/mL in methanol	1173023-06-7	1918-00-9
ULM-9911-1.2	Dicamba (3,6-dichloro-2-methoxybenzoic acid)	unlabeled	100 µg/mL in methanol	–	1918-00-9
CLM-1858-1.2	2,4-Dichlorophenoxyacetic acid (2,4-D)	ring-$^{13}C_6$, 99%	100 µg/mL in acetonitrile	150907-52-1	94-75-7
DLM-1146-5	2,4-Dichlorophenoxyacetic acid (2,4-D)	ring-D_3, 98%	neat	202480-67-9	94-75-7
ULM-7418-1.2	2,4-Dichlorophenoxyacetic acid (2,4-D)	unlabeled	100 µg/mL in acetonitrile	–	94-75-7
CNLM-4666-1.2	Glyphosate (*N*-(phosphonomethyl) glycine)	2-^{13}C, 99%; ^{15}N, 98% (CP 96%)	100 µg/mL in water	285978-24-7	1071-83-6
CNLM-6792-1.2	Glyphosate (*N*-(phosphonomethyl) glycine)	$^{13}C_3$, 99%; ^{15}N, 98%	100 µg/mL in water	–	1071-83-6
ULM-6876-1.2	Glyphosate (*N*-(phosphonomethyl) glycine)	unlabeled	100 µg/mL in water	–	1071-83-6
DLM-11078-1.2	DL-Glufosinate·HCl (phosphinothricin)	2,3,3,4,4-D_5, methyl-D_3, 98% (CP 95%)	100 µg/mL in water	–	59542-49-3
ULM-11153-1.2	Glufosinate, ammonium salt (phosphinothricin)	unlabeled	100 µg/mL in water	–	59542-49-3

Phthalates and Phthalate-Replacement Products

Phthalates are a class of industrial chemicals used to increase the flexibility, durability, transparency, and longevity of plastics. The main source of food contamination occurs through contact with packaging and food-handling equipment. Phthalates have been associated with causing reproductive and endocrine-related health issues in humans, and regulations for certain phthalates have been enacted. CIL offers stable isotope-labeled and native phthalates and phthalate metabolites, as well as phthalate-related compounds. A mixture of phthalate and phthalate-replacement metabolites is also available.

▼ **CLICK HERE** for information about our "Phthalates, Related Plasticizers, and Metabolites."

Featured Products

Catalog No.	Compound (Abbreviation)	Description	Concentration	Labeled CAS	Unlabeled CAS
ES-5633	JECS Phthalate/Phthalate Replacement Metabolites Native Mix			–	–
DLM-1368-1.2	Bis(2-ethylhexyl) phthalate (DEHP)	ring-D_4, 98%	100 µg/mL in nonane	93951-87-2	117-81-7
ULM-6241-1.2	Bis(2-ethylhexyl) phthalate (DEHP)	unlabeled	1000 µg/mL in nonane	–	117-81-7
CLM-4584-MT-1.2	Mono-2-ethylhexyl phthalate (MEHP)	ring-1,2-$^{13}C_2$, dicarboxyl-$^{13}C_2$, 99%	100 µg/mL in methyl *tert*-butyl ether	959266-61-6	4376-20-9
ULM-4583-MT-1.2	Mono-2-ethylhexyl phthalate (MEHP)	unlabeled	100 µg/mL in methyl *tert*-butyl ether	–	4376-20-9
CLM-10192-1.2	Mono-(4-methyl-7-carboxyheptyl) phthalate (cx-MINP)	ring-1,2-$^{13}C_2$, dicarboxyl-$^{13}C_2$, 99%	100 µg/mL in methyl *tert*-butyl ether	2482466-99-7	936022-02-5
ULM-10193-1.2	Mono-(4-methyl-7-carboxyheptyl) phthalate (cx-MINP)	unlabeled	100 µg/mL in methyl *tert*-butyl ether	–	936022-02-5
CLM-10592-1.2	Cyclohexane-1,2-dicarboxylic acid, di-(4-methyloctyl) ester (DINCH)	$^{13}C_4$, 99%	100 µg/mL in methyl *tert*-butyl ether	2483735-13-1	166412-78-8
ULM-10591-1.2	Cyclohexane-1,2-dicarboxylic acid, di-(4-methyloctyl) ester (DINCH)	unlabeled	100 µg/mL in methyl *tert*-butyl ether	–	166412-78-8
CLM-10299-1.2	Cyclohexane-1,2-dicarboxylic acid, mono-(4-methyloctyl) ester (MINCH)	$^{13}C_4$, 99%	100 µg/mL in methyl *tert*-butyl ether	–	1889286-78-5
ULM-10300-1.2	Cyclohexane-1,2-dicarboxylic acid, mono-(4-methyloctyl) ester (MINCH)	unlabeled	100 µg/mL in methyl *tert*-butyl ether	–	1889286-78-5

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

For research use only. Not for use in diagnostic procedures.

Polychlorinated Biphenyls (PCBs)

PCBs are a class of synthetic chemicals that were widely used in electrical equipment, such as transformers and capacitors. PCBs were banned from production in most countries in the 1970s, though large-scale contamination of the environment remains a problem today. The compounds accumulate within the food chain, with the highest concentrations being in the fatty tissues of animals, dairy products, and fish. Ingestion of these contaminated food sources accounts for over 90% of human exposure to PCBs.[1] CIL offers stable isotope-labeled and native individual PCB standards, as well as US EPA Method 1668, CEN Method EN-1948-4, WHO "dioxin-like" and "non-dioxin-like" mixtures, and combined dioxin, furan, and PCB mixtures.

Featured Products

Catalog No.	Description	Amount
EC-4976	Method 1668A/B/C Calibration Solutions (CS1-CS5)*	5 × 0.2 mL in nonane
EC-5385	EN-1948-4 Marker PCB Calibration Series (CS1-CS6)*	6 × 0.2 mL in isooctane/nonane
EC-5618	DL-12 and Marker-6 PCB Standard Mixture (^{13}C, 99%)	1.2 mL in nonane
EC-5619	DL-12 and Marker-6 PCB Standard Mixture (unlabeled)	1.2 mL in nonane
EC-5583	MO and NDL PCB Mixture ($^{13}C_{12}$, 99%)	1.2 mL in nonane
EC-5582	MO and NDL PCB Mixture (unlabeled)	1.2 mL in nonane
EDF-5581	PCDD/F and NO PCB Labeled Mixture	1.2 mL in nonane
EDF-5579	PCDD/F and NO PCB Native Mixture	1.2 mL in isooctane/nonane
EDF-5443-A	Two Column Dioxin/Furan/PCB Revision A Calibration Solutions (CS1-CS6)	6 × 0.2 mL in nonane
EDF-5444-C	Two Column Dioxin/Furan/PCB Cleanup Spike	0.6 mL in nonane

**Standard method supporting solutions are also available.*

Example References

1. Roveda, A.M.; Veronesi, L.; Zoni, R.; et al. **2006**. Exposure to polychlorinated biphenyls (PCBs) in food and cancer risk: recent advances. *Ig Sanita Pubbl, 62(6),* 677-96.

2. https://www.epa.gov/sites/production/files/2015-09/documents/method_1668c_2010.pdf

3. https://shop.bsigroup.com/ProductDetail?pid=000000000030277469

Chemical purity (CP) is 98% or greater, unless otherwise indicated.

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Please visit isotope.com for a complete list of isotope-labeled compounds.

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