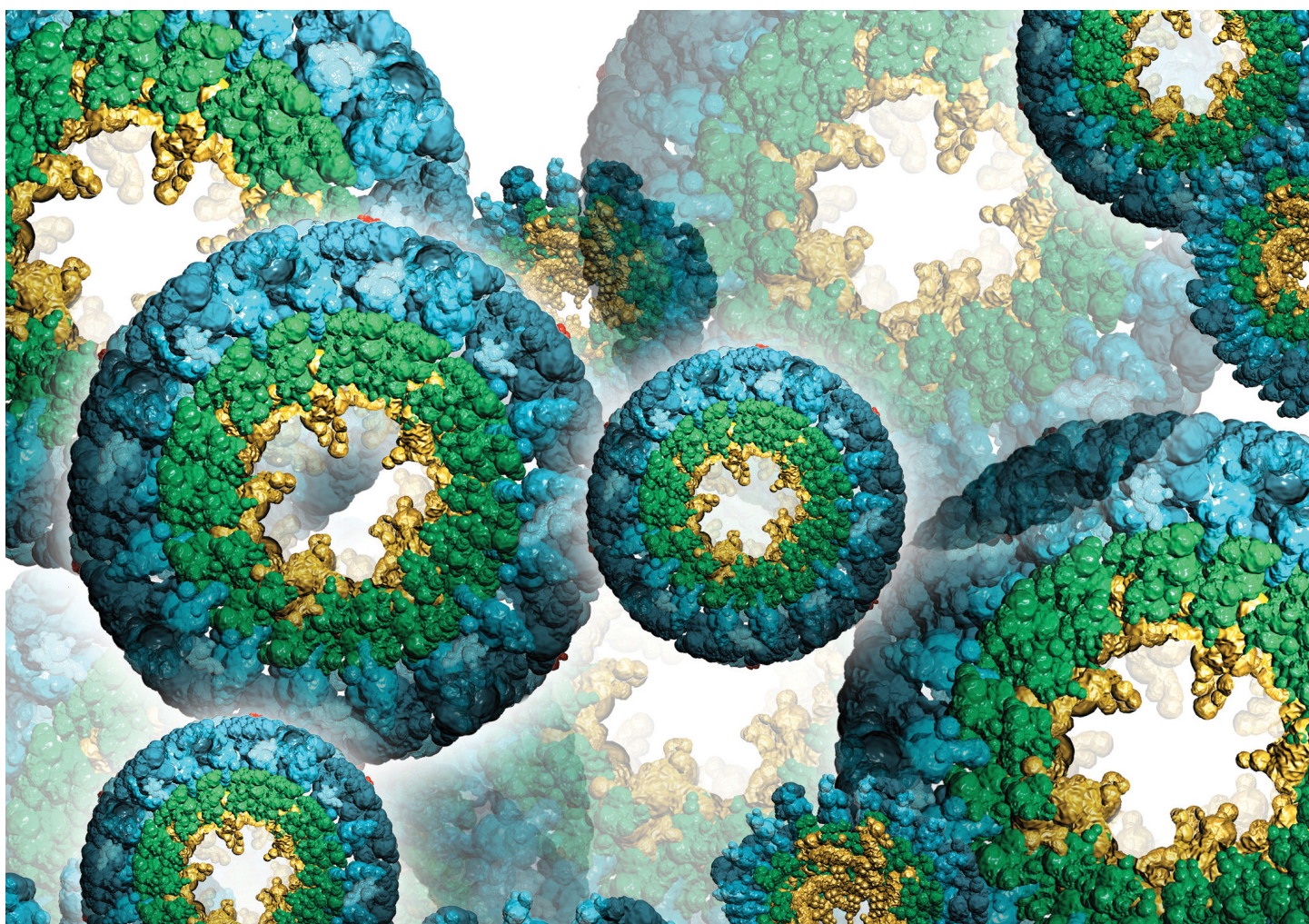




Cambridge Isotope Laboratories, Inc.
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CHROMSERVIS®

Stable Isotope-Labeled Peptide and Protein Reagents/Kits



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Stable Isotope-Labeled Peptide and Protein Reagents/Kits

Mass spectrometry (MS) and nuclear magnetic resonance (NMR) spectroscopy have benefitted greatly from the use of isotope-enriched peptides and proteins. Within the MS field, isotope dilution mass spectrometry (IDMS) is largely considered the gold standard for quantitative analysis of peptides and proteins. In contrast, biomolecular NMR spectroscopy typically requires isotopic enrichment of protein and nucleic acids for determination of molecular structure and dynamics. Regardless if MS or NMR is used, labeled proteins are produced *in vivo* using recombinant cells grown in isotopic cell culture media or *in situ* using cell-free synthesis. Cambridge Isotope Laboratories, Inc. (CIL) is pleased to offer stable isotope-labeled peptide and protein reagents and kits to aid researchers in the scientific community.

Overview

- Peptide synthesis
 - Protected amino acids and preloaded resins
- Protein expression starting materials
 - Cell growth media
 - Cell-free protein expression kits
- Isotope-labeled peptides and proteins
- QC and quantitation kits for peptide/protein analysis

Peptide Reagents and Kits

Protected Amino Acids

CIL offers more than 130 isotope-enriched protected amino acids for the solid-phase synthesis of stable isotope-labeled peptides. Each compound has undergone extensive quality control testing for identity, chemical purity, and isotopic enrichment. The chemical purities are ≥98%, unless otherwise specified, while the “H” in the catalog number denotes a highly enriched amino acid of ≥99%. Package sizes range from 50 mg to 1 g; however, alternate sizes may be available. Please inquire or visit isotope.com for pricing and delivery.

Catalog No.	Description	Mass Shift from Unlabeled (Da)
CLM-818	L-Alanine-N-Fmoc (1- ¹³ C, 99%)	+1
CLM-3638	L-Alanine-N-Fmoc (2- ¹³ C, 99%)	+1
CLM-1142	L-Alanine-N-Fmoc (3- ¹³ C, 99%)	+1
NLM-614	L-Alanine-N-Fmoc (¹⁵ N, 98%)	+1
CLM-7785	L-Alanine-N-Fmoc (¹³ C ₃ , 97-99%)	+3
DLM-7316	L-Alanine-N-Fmoc (3,3,3-D ₃ , 98%)	+3
DLM-8168	L-Alanine-N-Fmoc (2,3,3,3-D ₄ , 98%)	+4
CNLM-4355-H	L-Alanine-N-Fmoc (¹³ C ₃ , 99%; ¹⁵ N, 99%)	+4
CDNLM-7852	L-Alanine-N-Fmoc (¹³ C ₃ , 97-99%; D ₄ , 97-99%; ¹⁵ N, 97-99%)	+8

Note: If equipped to perform Fmoc or Boc protection, please refer to our offering of free amino acids in our “Stable Isotope Standards for Mass Spectrometry” catalog.

Protected Amino Acids *(continued)*

Catalog No.	Description	Mass Shift from Unlabeled (Da)
CLM-2150	L-Alanine- <i>N</i> - <i>t</i> -Boc (1- ¹³ C, 99%)	+1
CLM-2011	L-Alanine- <i>N</i> - <i>t</i> -Boc (2- ¹³ C, 98-99%)	+1
CLM-2151	L-Alanine- <i>N</i> - <i>t</i> -Boc (3- ¹³ C, 99%)	+1
DLM-649	L-Alanine- <i>N</i> - <i>t</i> -Boc (2-D, 98%)	+1
NLM-1903	L-Alanine- <i>N</i> - <i>t</i> -Boc (¹⁵ N, 98%)	+1
CNLM-6014	L-Alanine- <i>N</i> - <i>t</i> -Boc (2- ¹³ C, 99%; ¹⁵ N, 96-99%)	+2
CLM-3589	L-Alanine- <i>N</i> - <i>t</i> -Boc (¹³ C ₃ , 97-99%)	+3
DLM-2793	L-Alanine- <i>N</i> - <i>t</i> -Boc (3,3,3-D ₃ , 99%)	+3
CNLM-2394	L-Alanine- <i>N</i> - <i>t</i> -Boc (¹³ C ₃ , 97-99%; ¹⁵ N, 97-99%)	+4
NLM-8841	L-Arginine- <i>N</i> -Fmoc, PBF-OH (¹⁵ N ₄ , 98%) contains solvent*	+4
CLM-8475-H	L-Arginine- <i>N</i> -Fmoc, PBF-OH (¹³ C ₆ , 99%) contains solvent*	+6
CNLM-8474-H	L-Arginine- <i>N</i> -Fmoc, PBF-OH (¹³ C ₆ , 99%; ¹⁵ N ₄ , 99%) contains solvent*	+10
NLM-4204	L-Asparagine- <i>N</i> -Fmoc, <i>N</i> -β-trityl (¹⁵ N ₂ , 98%)	+2
CNLM-4354	L-Asparagine- <i>N</i> -Fmoc (¹³ C ₄ , 97-99%; ¹⁵ N ₂ , 97-99%)	+6
CNLM-6193-H	L-Asparagine- <i>N</i> -Fmoc, <i>N</i> -β-trityl (¹³ C ₄ , 99%; ¹⁵ N ₂ , 99%)	+6
CLM-4249	L-Aspartic acid- <i>N</i> -α-CBZ (¹³ C ₄ , 97-99%)	+4
CNLM-4788	L-Aspartic acid- <i>N</i> -Fmoc (¹³ C ₄ , 97-99%; ¹⁵ N, 97-99%)	+5
NLM-647	L-Aspartic acid- <i>N</i> -Fmoc, β- <i>O</i> - <i>t</i> -butyl ester (¹⁵ N, 98%)	+1
CNLM-4752-H	L-Aspartic acid- <i>N</i> -Fmoc, β- <i>O</i> - <i>t</i> -butyl ester (¹³ C ₄ , 99%; ¹⁵ N, 99%)	+5
NLM-3493	L-Aspartic acid- <i>N</i> - <i>t</i> -Boc (¹⁵ N, 98%)	+1
NLM-1908	L-Aspartic acid- <i>N</i> - <i>t</i> -Boc, β-benzyl ester (¹⁵ N, 98%)	+1
CNLM-2392	L-Aspartic acid- <i>N</i> - <i>t</i> -Boc, β-benzyl ester (¹³ C ₄ , 97-99%; ¹⁵ N, 97-99%)	+5
DLM-4721	L-Cysteine- <i>N</i> -Fmoc, <i>S</i> -trityl (3,3-D ₂ , 98%)	+2
CNLM-4722-H	L-Cysteine- <i>N</i> -Fmoc, <i>S</i> -trityl (¹³ C ₃ , 99%; ¹⁵ N, 99%)	+4
CLM-1901	L-Cysteine- <i>N</i> - <i>t</i> -Boc, <i>S</i> -benzyl (3- ¹³ C, 99%)	+1
NLM-3874	L-Cysteine- <i>N</i> - <i>t</i> -Boc, <i>S</i> - <i>p</i> -Mebz (¹⁵ N, 98%)	+1
NLM-8960	L-Glutamic acid- <i>N</i> -Fmoc, γ- <i>t</i> -butyl ester (¹⁵ N, 98%)	+1
CNLM-4753-H	L-Glutamic acid- <i>N</i> -Fmoc, γ- <i>t</i> -butyl ester (¹³ C ₅ , 99%; ¹⁵ N, 99%) CP 96%	+6
NLM-1907	L-Glutamic acid- <i>N</i> - <i>t</i> -Boc, γ-benzyl ester (¹⁵ N, 98%)	+1
CLM-2008	L-Glutamic acid- <i>N</i> - <i>t</i> -Boc, γ-benzyl ester (1,2- ¹³ C ₂ , 99%)	+2
CNLM-4356-H	L-Glutamine- <i>N</i> -Fmoc (¹³ C ₅ , 99%; ¹⁵ N ₂ , 99%)	+7
CNLM-7252-H	L-Glutamine- <i>N</i> -Fmoc, <i>N</i> -γ-trityl (¹³ C ₅ , 99%; ¹⁵ N ₂ , 99%)	+7
NLM-3419	L-Glutamine- <i>N</i> - <i>t</i> -Boc (α- ¹⁵ N, 98%)	+1
CLM-1902	L-Glutamine- <i>N</i> - <i>t</i> -Boc (1,2- ¹³ C ₂ , 99%)	+2
CLM-3639	Glycine- <i>N</i> -Fmoc (1- ¹³ C, 99%)	+1
CLM-2387	Glycine- <i>N</i> -Fmoc (2- ¹³ C, 99%)	+1
NLM-694	Glycine- <i>N</i> -Fmoc (¹⁵ N, 98%)	+1
CLM-7547	Glycine- <i>N</i> -Fmoc (¹³ C ₂ , 97-99%)	+2
DLM-7339	Glycine- <i>N</i> -Fmoc (2,2-D ₂ , 98%)	+2
CNLM-7697	Glycine- <i>N</i> -Fmoc (1- ¹³ C, 99%; ¹⁵ N, 98%)	+2
CNLM-7698	Glycine- <i>N</i> -Fmoc (2- ¹³ C, 99%; ¹⁵ N, 98%)	+2
CNLM-4357-H	Glycine- <i>N</i> -Fmoc (¹³ C ₂ , 99%; ¹⁵ N, 99%)	+3
CDNLM-7853	Glycine- <i>N</i> -Fmoc (¹³ C ₂ , 97-99%; 2,2-D ₂ , 97-99%; ¹⁵ N, 97-99%)	+5
CLM-2152	Glycine- <i>N</i> - <i>t</i> -Boc (1- ¹³ C, 99%)	+1
CLM-1900	Glycine- <i>N</i> - <i>t</i> -Boc (2- ¹³ C, 99%)	+1
NLM-2109	Glycine- <i>N</i> - <i>t</i> -Boc (¹⁵ N, 98%)	+1
DLM-2153	Glycine- <i>N</i> - <i>t</i> -Boc (2,2-D ₂ , 98%)	+2
CNLM-9686	Glycine- <i>N</i> - <i>t</i> -Boc (2- ¹³ C, 99%; ¹⁵ N, 98%)	+2
CNLM-2412	Glycine- <i>N</i> - <i>t</i> -Boc (¹³ C ₂ , 97-99%; ¹⁵ N, 97-99%)	+3
NLM-8010	L-Histidine- <i>N</i> -Fmoc, <i>N</i> -IM-trityl (¹⁵ N ₃ , 98%)	+3

*Solvent composition varies by lot; please inquire for details.

Protected Amino Acids *(continued)*

Catalog No.	Description	Mass Shift from Unlabeled (Da)
CLM-8043	L-Isoleucine- <i>N</i> -Fmoc (1- ¹³ C, 99%)	+1
NLM-391	L-Isoleucine- <i>N</i> -Fmoc (¹⁵ N, 98%)	+1
CLM-7794	L-Isoleucine- <i>N</i> -Fmoc (¹³ C ₆ , 97-99%)	+6
CNLM-4346-H	L-Isoleucine- <i>N</i> -Fmoc (¹³ C ₆ , 99%; ¹⁵ N, 99%)	+7
NLM-2167	L-Isoleucine- <i>N</i> - <i>t</i> -Boc (¹⁵ N, 98%)	+1
CLM-3691	L-Leucine- <i>N</i> -Fmoc (1- ¹³ C, 99%)	+1
NLM-2397	L-Leucine- <i>N</i> -Fmoc (¹⁵ N, 98%)	+1
CLM-7546	L-Leucine- <i>N</i> -Fmoc (1,2- ¹³ C ₂ , 99%)	+2
DLM-7202	L-Leucine- <i>N</i> -Fmoc (5,5,5-D ₃ , 98%)	+3
CLM-3683	L-Leucine- <i>N</i> -Fmoc (¹³ C ₆ , 97-99%)	+6
CNLM-4345-H	L-Leucine- <i>N</i> -Fmoc (¹³ C ₆ , 99%; ¹⁵ N, 99%)	+7
DLM-7575	L-Leucine- <i>N</i> -Fmoc (D ₁₀ , 98%)	+10
CDNLM-7854	L-Leucine- <i>N</i> -Fmoc (¹³ C ₆ , 97-99%; D ₁₀ , 97-99%; ¹⁵ N, 97-99%)	+17
CLM-2155	L-Leucine- <i>N</i> - <i>t</i> -Boc:H ₂ O (1- ¹³ C, 99%)	+1
CLM-2010	L-Leucine- <i>N</i> - <i>t</i> -Boc:H ₂ O (2- ¹³ C, 99%)	+1
NLM-1904	L-Leucine- <i>N</i> - <i>t</i> -Boc:H ₂ O (¹⁵ N, 98%)	+1
DLM-2736	L-Leucine- <i>N</i> - <i>t</i> -Boc:H ₂ O (5,5,5-D ₃ , 98%)	+3
CNLM-2396	L-Leucine- <i>N</i> - <i>t</i> -Boc:H ₂ O (¹³ C ₆ , 97-99%; ¹⁵ N, 97-99%)	+7
DLM-3650	L-Leucine- <i>N</i> - <i>t</i> -Boc:H ₂ O (D ₁₀ , 98%)	+10
NEW! CNLM-11083	L-Lysine- α - <i>N</i> -Fmoc, ϵ - <i>N</i> -Fmoc (¹³ C ₆ , 99%; ¹⁵ N ₂ , 99%)	+8
CLM-6194	L-Lysine- α - <i>N</i> -Fmoc, ϵ - <i>N</i> - <i>t</i> -Boc (1- ¹³ C, 99%)	+1
NLM-4631	L-Lysine- α - <i>N</i> -Fmoc, ϵ - <i>N</i> - <i>t</i> -Boc (¹⁵ N ₂ , 96-98%)	+2
CLM-7865-H	L-Lysine- α - <i>N</i> -Fmoc, ϵ - <i>N</i> - <i>t</i> -Boc (¹³ C ₆ , 99%)	+6
CNLM-4754-H	L-Lysine- α - <i>N</i> -Fmoc, ϵ - <i>N</i> - <i>t</i> -Boc (¹³ C ₆ , 99%; ¹⁵ N ₂ , 99%)	+8
CLM-8166	L-Methionine- <i>N</i> -Fmoc (1- ¹³ C, 99%)	+1
NLM-4632	L-Methionine- <i>N</i> -Fmoc (¹⁵ N, 98%)	+1
CLM-1141	L-Methionine- <i>N</i> -Fmoc (methyl- ¹³ C, 99%)	+1
CNLM-4358-H	L-Methionine- <i>N</i> -Fmoc (¹³ C ₅ , 99%; ¹⁵ N, 99%)	+6
CLM-2156	L-Methionine- <i>N</i> - <i>t</i> -Boc (methyl- ¹³ C, 98%)	+1
CLM-4824	L-Phenylalanine- <i>N</i> -Fmoc (1- ¹³ C, 99%)	+1
NLM-1265	L-Phenylalanine- <i>N</i> -Fmoc (¹⁵ N, 98%)	+1
DLM-7786	L-Phenylalanine- <i>N</i> -Fmoc (ring-D ₅ , 98%)	+5
CLM-3684	L-Phenylalanine- <i>N</i> -Fmoc (ring- ¹³ C ₆ , 99%)	+6
DLM-8752	L-Phenylalanine- <i>N</i> -Fmoc (D ₈ , 98%)	+8
CNLM-4362-H	L-Phenylalanine- <i>N</i> -Fmoc (¹³ C ₉ , 99%; ¹⁵ N, 99%)	+10
CLM-2170	L-Phenylalanine- <i>N</i> - <i>t</i> -Boc (1- ¹³ C, 99%)	+1
CLM-2009	L-Phenylalanine- <i>N</i> - <i>t</i> -Boc (2- ¹³ C, 99%)	+1
NLM-1905	L-Phenylalanine- <i>N</i> - <i>t</i> -Boc (¹⁵ N, 98%)	+1
DLM-2157	L-Phenylalanine- <i>N</i> - <i>t</i> -Boc (ring-D ₅ , 98%)	+5
CLM-2061	L-Phenylalanine- <i>N</i> - <i>t</i> -Boc (ring- ¹³ C ₆ , 99%)	+6
CLM-7859	L-Phenylalanine- <i>N</i> - <i>t</i> -Boc (¹³ C ₉ , 97-99%)	+9
CNLM-2393	L-Phenylalanine- <i>N</i> - <i>t</i> -Boc (¹³ C ₉ , 97-99%; ¹⁵ N, 97-99%)	+10
CLM-8044	L-Proline- <i>N</i> -Fmoc (1- ¹³ C, 99%)	+1
NLM-3906	L-Proline- <i>N</i> -Fmoc (¹⁵ N, 98%)	+1
NLM-2329	L-Proline- <i>N</i> - <i>t</i> -Boc (¹⁵ N, 96%)	+1
CNLM-4347-H	L-Proline- <i>N</i> -Fmoc (¹³ C ₅ , 99%; ¹⁵ N, 99%)	+6
CNLM-8403-H	L-Serine- <i>N</i> -Fmoc (¹³ C ₃ , 99%; ¹⁵ N, 99%)	+4
CLM-8167	L-Serine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (1- ¹³ C, 99%)	+1
NLM-4630	L-Serine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (¹⁵ N, 98%)	+1
CNLM-4755-H	L-Serine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (¹³ C ₃ , 99%; ¹⁵ N, 99%)	+4
CLM-2007	L-Serine- <i>N</i> - <i>t</i> -Boc, <i>O</i> -benzyl ether (2- ¹³ C, 99%)	+1
CLM-756	L-Serine- <i>N</i> - <i>t</i> -Boc, <i>O</i> -benzyl ether (3- ¹³ C, 99%)	+1

Chemical purity (CP) is 98% or greater, unless otherwise indicated. For research use only. Not for diagnostic procedures.

Protected Amino Acids *(continued)*

Catalog No.	Description	Mass Shift from Unlabeled (Da)
NLM-2025	L-Serine- <i>N</i> - <i>t</i> -Boc, <i>O</i> -benzyl ether (¹⁵ N, 98%)	+1
NLM-8170	L-Threonine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (¹⁵ N, 98%)	+1
CNLM-7615	L-Threonine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (¹³ C ₄ , 97-99%; ¹⁵ N, 97-99%)	+5
CNLM-7615-H	L-Threonine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (¹³ C ₄ , 99%; ¹⁵ N, 99%)	+5
NLM-3681	L-Threonine- <i>N</i> - <i>t</i> -Boc, <i>O</i> -benzyl ether (¹⁵ N, 98%)	+1
NLM-3423	L-Tryptophan- <i>N</i> -Fmoc (α- ¹⁵ N, 98%)	+1
DLM-6113	L-Tryptophan- <i>N</i> -Fmoc (indole-D ₅ , 98%)	+5
CNLM-6077	L-Tryptophan- <i>N</i> -Fmoc (¹³ C ₁₁ , 97-99%; ¹⁵ N ₂ , 97-99%)	+13
CLM-2194	L-Tryptophan- <i>N</i> - <i>t</i> -Boc (1- ¹³ C, 99%)	+1
NLM-1906	L-Tyrosine- <i>N</i> - <i>t</i> -Boc, <i>O</i> -benzyl ether (¹⁵ N, 98%)	+1
DLM-2303	L-Tyrosine- <i>N</i> - <i>t</i> -Boc, <i>O</i> -benzyl ether (ring-D ₄ , 98%)	+4
NEW! CLM-11065	L-Tyrosine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (¹³ C ₉ , 99%) CP 94%	+9
NLM-8169	L-Tyrosine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (¹⁵ N, 98%)	+1
CNLM-4349-H	L-Tyrosine- <i>N</i> -Fmoc, <i>O</i> - <i>t</i> -butyl ether (¹³ C ₉ , 99%; ¹⁵ N, 99%)	+10
CLM-3640	L-Valine- <i>N</i> -Fmoc (1- ¹³ C, 99%)	+1
NLM-4243	L-Valine- <i>N</i> -Fmoc (¹⁵ N, 98%)	+1
CLM-7793	L-Valine- <i>N</i> -Fmoc (¹³ C ₅ , 97-99%)	+5
CNLM-4348-H	L-Valine- <i>N</i> -Fmoc (¹³ C ₅ , 99%; ¹⁵ N, 99%)	+6
DLM-7784	L-Valine- <i>N</i> -Fmoc (D ₈ , 98%)	+8
CLM-2158	L-Valine- <i>N</i> - <i>t</i> -Boc (1- ¹³ C, 99%)	+1
NLM-2060	L-Valine- <i>N</i> - <i>t</i> -Boc (¹⁵ N, 98%)	+1
CNLM-2395	L-Valine- <i>N</i> - <i>t</i> -Boc (¹³ C ₅ , 97-99%; ¹⁵ N, 97-99%)	+6
DLM-3651	L-Valine- <i>N</i> - <i>t</i> -Boc (D ₈ , 98%)	+8

"H" denotes an enrichment of ≥99%, as measured by GC-MS.

► **Please inquire if you desire an alternate labeling pattern or protecting group. For complete listing and additional information, please visit the "Amino Acids" section of isotope.com/products.**

Example References

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Application Note

Percy, A.; Singh, S.; White, T. **2022**. Selection and synthesis to analysis: stable isotope-labeled peptides for proteomic applications. (CIL application note #53)

“The commercial availability of stable isotope-labeled amino acids with very high isotopic purity has revolutionized quantitative proteomics. From their use in metabolic labeling of cells and rodents for differential discovery proteomics, to their use in synthetic peptides as internal standards for targeted analysis of proteins, isotopically labeled amino acids make it possible to measure, with very high precision, changes in the levels of peptides and the proteins they are derived from in highly complex samples such as cell lysates, tissue, and plasma. Cambridge Isotope Labs has been and continues to be a leader in the commercial production of labeled amino acids and other labeled compounds.”

Stephen A. Carr, PhD

Senior Director of Proteomics, Broad Institute of MIT and Harvard

Chemical purity (CP) is 98% or greater, unless otherwise indicated. For research use only. Not for diagnostic procedures.

Preloaded Resins

Through collaboration with Biosynth, CIL is pleased to offer synthesis-ready, preloaded resins to aid the solid-phase synthesis of stable isotope-labeled tryptic peptides. The resins are prepared from isotopically labeled, protected amino acids with the highest chemical, isotopic, and chiral purity available. Please inquire for pricing and unit sizes.



Catalog No.	Description	Structure	Mass Shift from Unlabeled (Da)
SRPR-Ala-D	Preloaded L-Ala (3,3,3-D ₃ , 98%) 2-ClTrt resin		+3
SRPR-Arg-CN	Preloaded L-Arg, PBF-OH (¹³ C ₆ , 99%; ¹⁵ N ₄ , 99%) 2-ClTrt resin		+10
SRPR-Lys-CN	Preloaded L-Lys, ε-N-t-Boc (¹³ C ₆ , 99%; ¹⁵ N ₂ , 99%) 2-ClTrt resin		+8
SRPR-Tyr-CN	Preloaded L-Tyr, O-t-butyl ether (¹³ C ₉ , 99%; ¹⁵ N, 99%) 2-ClTrt resin		+10

► Please contact us if an alternate preloaded resin would be beneficial to your research needs.

Example Reference

Renuse, S.; Vanderboom, P.M.; Maus, A.D.; et al. **2021**. A mass spectrometry-based targeted assay for detection of SARS-CoV-2 antigen from clinical specimens. *EBioMedicine*, 69, 103465-103476.

Isotope-Labeled Peptides

Catalog No.	Description	Structure	Mass Shift from Unlabeled (Da)
CLM-7254	O,O'-Dityrosine (ring- ¹³ C ₁₂ , 99%)		+12
CNLM-6245	Glutathione (GSH) (glycine- ¹³ C ₂ , 98%; ¹⁵ N, 96-99%) 65-70% net peptide/peptide purity 85-90%		+3
CNLM-6245-HP	Glutathione (GSH) (glycine- ¹³ C ₂ , 98%; ¹⁵ N, 96-99%) 90% net peptide/peptide purity 95%		+3
CNLM-8782	Glutathione disulfide (GSSG) (glycines- ¹³ C ₂ , 98%; ¹⁵ N, 96-99%) 65-70% net peptide/peptide purity 90%		+6

Example References

Jang, A.; Petrova, B.; Cheong, T.-C.; et al. **2022**. Choroid plexus-CSF-targeted antioxidant therapy protects the brain from toxicity of cancer chemotherapy. *Neuron*, 110(20), 3288-3301.

Petrova, B.; Warren, A.; Vital, N.Y.; et al. **2021**. Redox metabolism measurement in mammalian cells and tissues by LC-MS. *Metabolites*, 11(5), 313-328.

Li, F.; Cui, L.; Yu, D.; et al. **2019**. Exogenous glutathione improves intracellular glutathione synthesis via the γ-glutamyl cycle in bovine zygotes and cleavage embryos. *J Cell Physiol*, 234(5), 7384-7394.

Lutchmansingh, F.K.; Hsu, J.W.; Bennett, F.I.; et al. **2018**. Glutathione metabolism in type 2 diabetes and its relationship with microvascular complications and glycemia. *PLoS One*, 13(6), e0198626.

Nazari, M.; Bokhart, M.T.; Loziuk, P.L.; et al. **2018**. Quantitative mass spectrometry imaging of glutathione in healthy and cancerous hen ovarian tissue sections by infrared matrix-assisted laser desorption electrospray ionization (IR-MALDESI). *Analyst*, 143(3), 654-661.

D'Allesandro, A.; Nemkov, T.; Yoshida, T.; et al. **2017**. Citrate metabolism in red blood cells stored in additive solution-3. *Transfusion*, 57(2), 325-336.

Wisniewski, A.V.; Liu, J.; Nassar, A.F. **2016**. Identification of novel reaction products of methylene-bis-phenylisocyanate ("MDI") with oxidized glutathione in aqueous solution and also during incubation of MDI with a murine hepatic S9 fraction. *Toxicol In Vitro*, 36, 97-104.



PeptiQuant™ Plus Assay Kits

CIL offers PeptiQuant™ Assay Kits from MRM Proteomics Inc. for QC and biomarker assessment using bottom-up LC-MS/MS methodologies. The QC kits are designed to evaluate the performance of an LC-MS platform, either alone or in combination with a human or mouse plasma proteomic workflow. The biomarker assessment kits (BAKs) are intended to help researchers screen target panels of candidate protein disease biomarkers in human or mouse plasma samples.

Regarding the methodology, PeptiQuant Plus kits employ mixtures of synthetic SIS and natural (NAT) peptides in the post-digestion spike of sample or surrogate matrices. Quantitation is performed via forward curves (approaches described in PubMed IDs: **27341553** and **28516774**). These kits have been rigorously characterized according to the complete set of CPTAC (Clinical Proteomic Tumor Analysis Consortium) guidelines and are available for viewing on the CPTAC Assay Portal.

Quality Control (QC) Kits

Catalog No.	Description	Unit Size
LCMSP-QC-6490-INJ	PeptiQuant Plus Human Plasma Daily QC Kit for Agilent 6490 QqQ and 1290 UPLC	10, 20, or 50 injections
LCMSP-QC-6495-INJ	PeptiQuant Plus Human Plasma Daily QC Kit for Agilent 6495 QqQ and 1290 UPLC	10, 20, or 50 injections
LCMSP-QC-6500-INJ	PeptiQuant Plus Human Plasma Daily QC Kit for SCIEX QTRAP® 6500 and 1290 UPLC	10, 20, or 50 injections
LCMSP-QC-QE-INJ	PeptiQuant Plus Human Plasma Daily QC Kit for Thermo Scientific™ Q Exactive™ Plus and 1290 UPLC	10, 20, or 50 injections
WFPK-A6490-P	PeptiQuant Plus Human Plasma Workflow QC Kit for Agilent 6490 QqQ and 1290 UPLC	1 or 2 runs
WFPK-A6495-P	PeptiQuant Plus Human Plasma Workflow QC Kit for Agilent 6495 QqQ and 1290 UPLC	1 or 2 runs
WFPK-SC6500-P	PeptiQuant Plus Human Plasma Workflow QC Kit for SCIEX QTRAP 6500 and 1290 UPLC	1 or 2 runs
WFPK-QE-P	PeptiQuant Plus Human Plasma Workflow QC Kit for Thermo Scientific Q Exactive Plus and 1290 UPLC	1 or 2 runs

Biomarker Assessment Kits (BAKs)

	BAK-A6490-125	PeptiQuant Plus Human Plasma Proteomics Kit for Agilent 6490 QqQ and 1290 UPLC	20, 50, or 100 samples
NEW!	BAK-A6490-270	Expanded PeptiQuant Plus Human Plasma Proteomics Kit for Agilent 6490 QqQ and 1290 UPLC	20, 50, or 100 samples
	BAK-A6495-125	PeptiQuant Plus Human Plasma Proteomics Kit for Agilent 6495 QqQ and 1290 UPLC	20, 50, or 100 samples
NEW!	BAK-A6495-270	Expanded PeptiQuant Plus Human Plasma Proteomics Kit for Agilent 6495 QqQ and 1290 UPLC	20, 50, or 100 samples
	BAK-SC6500-125	PeptiQuant Plus Human Plasma Proteomics Kit for SCIEX QTRAP 6500 and 1290 UPLC	20, 50, or 100 samples
NEW!	BAK-SC6500-270	Expanded PeptiQuant Plus Human Plasma Proteomics Kit for SCIEX QTRAP 6500 and 1290 UPLC	20, 50, or 100 samples
	BAK-QE-125	PeptiQuant Plus Human Plasma Proteomics Kit for Thermo Scientific Q Exactive Plus and 1290 UPLC	20, 50, or 100 samples
NEW!	BAK-QE-270	Expanded PeptiQuant Plus Human Plasma Proteomics Kit for Thermo Scientific Q Exactive Plus and 1290 UPLC	20, 50, or 100 samples
	BAK-TQXS-125	PeptiQuant Plus Human Plasma Proteomics Kit for Waters Xevo TQ-XS and Acquity UPLC I	20, 50, or 100 samples
	M-BAK-A6490-125*	PeptiQuant Plus Mouse Plasma Proteomics Kit for Agilent 6490 QqQ and 1290 UPLC	20, 50, or 100 samples
	M-BAK-A6495-125*	PeptiQuant Plus Mouse Plasma Proteomics Kit for Agilent 6495 QqQ and 1290 UPLC	20, 50, or 100 samples
	M-BAK-6545-125-2	PeptiQuant Plus Mouse Plasma Proteomics Kit for Agilent 6545 Q-TOF and 1290 UPLC	20, 50, or 100 samples
	M-BAK-SC6500-125*	PeptiQuant Plus Mouse Plasma Proteomics Kit for SCIEX QTRAP 6500 and 1290 UPLC	20, 50, or 100 samples
	M-BAK-QE-125*	PeptiQuant Plus Mouse Plasma Proteomics Kit for Thermo Scientific Q Exactive Plus and 1290 UPLC	20, 50, or 100 samples

*Alternate sets of 125 target proteins are available (see [product flyer](#) for details).

➤ **Please inquire if an alternate LC-MS/MS platform is desired from the current panel offerings. Visit the “MRM PeptiQuant Assay Kits” section of isotope.com/products for complete product listings.**

PeptiQuant is a trademark of MRM Proteomics Inc.

PeptiQuant™ Plus Assay Kits *(continued)*

Example References

- Stakhneva, E.M.; Kashtanova, E.V.; Polonskaya, Y.V.; et al. **2022**. The search for associations of serum proteins with the presence of unstable atherosclerotic plaque in coronary atherosclerosis. *Int J Mol Sci*, 23(21), 12795-12805.
- Richard, V.R.; Gaither, C.; Popp, R.; et al. **2022**. Early prediction of COVID-19 patient survival by targeted plasma multi-omics and machine learning. *Mol Cell Proteomic*, 21(10), 100277-100290.
- Pastushkova, L.K.; Goncharov, I.N.; Koloteva, M.I.; et al. **2022**. Characteristics of blood plasma proteome changes associated with the hemorrhagic purpura of cosmonauts on the first day after long-term space missions. *Life Sci Space Res*, 33, 7-12.
- Gaither, C.; Popp, R.; Zahedi, R.P.; et al. **2022**. Multiple reaction monitoring-mass spectrometry enables robust quantitation of plasma proteins regardless of whole blood processing delays that may occur in the clinic. *Mol Cell Proteomics*, 21(5), 100212-100223.
- Brzhozovskiy, A.; Kononikhin, A.; Bugrova, A.E.; et al. **2022**. The parallel reaction monitoring-parallel accumulation-serial fragmentation (prm-PASEF) approach for multiplexed absolute quantitation of proteins in human plasma. *Anal Chem*, 94(4), 2016-2022.
- Percy, A.J.; Borchers, C.H. **2021**. Detailed method for performing the ExSTA approach in quantitative bottom-up plasma proteomics. *Methods Mol Biol*, 2228, 353-384.
- Ayton, S.; Janelidze, S.; Roberts, B.; et al. **2021**. Acute phase markers in CSF reveal inflammatory changes in Alzheimer's disease that intersect with pathology, APOE ε4, sex and age. *Prog Neurobiol*, 101904-101915.
- Tilburg, J.; Michaud, S.A.; Maracle, C.X.; et al. **2020**. Plasma protein signatures of a murine venous thrombosis model and Slc44a2 knockout mice using quantitative-targeted proteomics. *Thromb Haemost*, 120(3), 423-436.
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- Percy, A.J.; Mohammed, Y.; Yang, J.; et al. **2015**. A standardized kit for automated quantitative assessment of candidate protein biomarkers in human plasma. *Bioanalysis*, 7(23), 2991-3004.

Application Note

Percy, A.J.; Trouvé, R.; Lehmann, S.; et al. **2021**. Translation and implementation of the PeptiQuant™ Plus Human Plasma BAK-270. (CIL application note #50)

“The PeptiQuant Plus Platform Performance Kit has proven to be a vital component of our everyday quality assurance that enables us to deliver high-quality targeted proteomics data in an accurate and timely manner. This kit has a ‘dilute and shoot’ operation and comes with vendor-specific LC-MRM/MS parameters and a Skyline analysis file for quick input and results output. Altogether, the performance kit is an excellent means to rapidly assess LC-MS performance that should become a routine staple in a proteomic user’s toolbox.”

– Tasso Miliotis, PhD
Associate Principal Scientist at AstraZeneca Gothenburg (Sweden)

“PeptiQuant Plus Assay Kits contain all the essential materials, including the standards and methods, for performing absolute protein quantification by LC-MRM/MS in a standardized way. The standard protocol helped us reduce the assay development time, while improve the reproducibility and precision of multiplex protein quantification. In addition to the biomarker assessment kits, the quality control kits enable the instrument performance and assay reproducibility to be monitored and assessed, which ultimately provided us confidence in the reliability of the quantification results.”

– Elaine Wong, PhD
Scientific Officer at Queen Mary Hospital, Fu Lam (Hong Kong)

Protein Expression Reagents and Kits

Cell Growth Media

A diverse array of isotope-labeled prokaryotic and eukaryotic cell growth media for the production of isotope-enriched recombinant protein is available from CIL.

Bacterial Cell Growth Media

Celtone®, BioExpress®, *E. coli*-OD2, and Spectra 9

Catalog No.	Description
CGM-1030P-C	Celtone Base Powder (¹³ C, 98%)
CGM-1030P-D	Celtone Base Powder (D, 97%)
CGM-1030P-N	Celtone Base Powder (¹⁵ N, 98%)
CGM-1030P-CN	Celtone Base Powder (¹³ C, 98%; ¹⁵ N, 98%)
CGM-1030P-DN	Celtone Base Powder (D, 97%; ¹⁵ N, 98%)
CGM-1030P-CDN	Celtone Base Powder (¹³ C, 98%; D, 97%; ¹⁵ N, 98%)
CGM-1030P-U	Celtone Base Powder (unlabeled)
CGM-1050P-C	Celtone Plus Base Powder (¹³ C, 97-99%)
CGM-1050P-D	Celtone Plus Base Powder (D, 97%)
CGM-1050P-N	Celtone Plus Base Powder (¹⁵ N, 97-99%)
CGM-1050P-DN	Celtone Plus Base Powder (D, 97-99%; ¹⁵ N, 97-99%)
CGM-1050P-CDN	Celtone Plus Base Powder (¹³ C, 97-99%; D, 97-99%; ¹⁵ N, 97-99%)
CGM-1050P-U	Celtone Plus Base Powder (unlabeled)
CGM-1040-C	Celtone Complete Medium (¹³ C, 98%)
CGM-1040-D	Celtone Complete Medium (D, 97%)
CGM-1040-N	Celtone Complete Medium (¹⁵ N, 98%)
CGM-1040-CN	Celtone Complete Medium (¹³ C, 98%; ¹⁵ N, 98%)
CGM-1040-DN	Celtone Complete Medium (D, 97%; ¹⁵ N, 98%)
CGM-1040-CDN	Celtone Complete Medium (¹³ C, 98%; D, 97%; ¹⁵ N, 98%)
CGM-1040-U	Celtone Complete Medium (unlabeled)
CGM-1000-C	BioExpress Cell Growth Media (¹³ C, 98%) 10x concentrate
CGM-1000-D	BioExpress Cell Growth Media (D, 98%) 10x concentrate
CGM-1000-N	BioExpress Cell Growth Media (¹⁵ N, 98%) 10x concentrate
CGM-1000-CD	BioExpress Cell Growth Media (¹³ C, 98%; D, 98%) 10x concentrate
CGM-1000-CN	BioExpress Cell Growth Media (¹³ C, 98%; ¹⁵ N, 98%) 10x concentrate
CGM-1000-DN	BioExpress Cell Growth Media (D, 98%; ¹⁵ N, 98%) 10x concentrate
CGM-1000-CDN	BioExpress Cell Growth Media (¹³ C, 98%; ¹⁵ N, 98%; D 98%) 10x concentrate
CGM-1000-U	BioExpress Cell Growth Media (unlabeled) 10x concentrate
CGM-1020-SL-C	<i>E. coli</i> -OD2 (¹³ C, 98%)
CGM-1020-SL-D	<i>E. coli</i> -OD2 (D, 98%)
CGM-1020-SL-N	<i>E. coli</i> -OD2 (¹⁵ N, 98%)
CGM-1020-SL-CN	<i>E. coli</i> -OD2 (¹³ C, 98%; ¹⁵ N, 98%)
CGM-1020-SL-CDN	<i>E. coli</i> -OD2 (¹³ C, 98%; D, 98%; ¹⁵ N, 98%)
CGM-1020-SL-U-S	<i>E. coli</i> -OD2 (unlabeled)
CGM-3030-C	Spectra 9 (¹³ C, 98%)
CGM-3030-D	Spectra 9 (D, 97%)
CGM-3030-N	Spectra 9 (¹⁵ N, 98%)
CGM-3030-CN	Spectra 9 (¹³ C, 98%; ¹⁵ N, 98%)
CGM-3030-DN	Spectra 9 (D, 97%; ¹⁵ N, 98%)
CGM-3030-CDN	Spectra 9 (¹³ C, 98%; D, 97%; ¹⁵ N, 98%)
CGM-3030-U	Spectra 9 (unlabeled)

Protein Expression Reagents and Kits *(continued)*

Minimal Media Reagents

For *E. coli* Growths

Catalog No.	Description
NLM-467	Ammonium chloride (^{15}N , 99%)
NLM-713	Ammonium sulfate ($^{15}\text{N}_2$, 99%)
DLM-4-99	Deuterium oxide (D, 99%)
DLM-4-99.8	Deuterium oxide (D, 99.8%)
DLM-4	Deuterium oxide (D, 99.9%)
CLM-1396	D-Glucose ($^{13}\text{C}_6$, 99%)
DLM-2062	D-Glucose (1,2,3,4,5,6,6- D_7 , 97-98%)
CDLM-3813	D-Glucose ($^{13}\text{C}_6$, 99%; 1,2,3,4,5,6,6- D_7 , 97-98%)
CLM-1510	Glycerol ($^{13}\text{C}_3$, 99%)
DLM-558	Glycerol (D_8 , 99%)

Insect Cell Growth Media

BioExpress® 2000

Catalog No.	Description
CGM-2000-N	BioExpress 2000 (^{15}N , 98%)
CGM-2000-CN	BioExpress 2000 (^{13}C , 98%; ^{15}N , 98%)
CGM-2000-U	BioExpress 2000 (unlabeled)
CGM-2000-CUSTOM	BioExpress 2000 (custom)*

*The labeled amino acids must be specified at the time of request for a custom media quote or order.

Example References

- Minikel, E.V.; Kuhn, E.; Cocco, A.R.; et al. **2019**. Domain-specific quantification of prion protein in cerebrospinal fluid by targeted mass spectrometry. *Mol Cell Proteomics*, 18(12), 2388-2400.
- Lacabanne, D.; Fogeron, M.L.; Wiegand, T.; et al. **2019**. Protein sample preparation for solid-state NMR investigations. *Prog Nucl Magn Reson Spectrosc*, 110, 20-33.
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- Zhang, C.; Gao, S.; Molascon, A.J.; et al. **2014**. Quantitative proteomics reveals histone modifications in crosstalk with H3 lysine 27 methylation. *Mol Cell Proteomics*, 13(3), 749-759.
- Hessling, B.; Büttner, K.; Hecker, M.; et al. **2013**. Global relative quantification with liquid chromatography-matrix-assisted laser desorption/ionization time-of-flight (LC-MALDI-TOF) – cross-validation with LTQ-Orbitrap proves reliability and reveals complementary ionization preferences. *Mol Cell Proteomics*, 12(10), 2911-2920.
- Zhang, C.; Liu, Y.; Andrews, P.C. **2013**. Quantification of histone modifications using ^{15}N metabolic labeling. *Methods*, 61(3), 236-243.
- Saxena, K.; Dutta, A.; Klein-Seetharaman, J.; et al. **2012**. Isotope labeling in insect cells. *Methods Mol Biol*, 831, 37-54.

Application Notes

- Berthold, D.A.; Jeisy, V.J.; Sasser, T.L.; et al. **2007**. Top ten tips for producing ^{13}C , ^{15}N protein in abundance. (CIL application note #15)
- Strauss, A.; Fendrich, G.; Jahnke, W. **2007**. Efficient uniform labeling of proteins expressed in baculovirus-infected insect cells using BioExpress® 2000 (insect cell) medium. (CIL application note #14)
- Rhima, M.; Neil, L.C.; Gardner, K.H. **2003**. Optimization of BioExpress® supplementation of M9 cultures. (CIL application note #12)

Yeast Cell Growth Media

OD2 Media

Catalog No.	Description
CGM-4020-SL-C	Yeast-OD2 (^{13}C , 98%)
CGM-4020-SL-N	Yeast-OD2 (^{15}N , 98%)
CGM-4020-SL-CN	Yeast-OD2 (^{13}C , 98%; ^{15}N , 98%)
CGM-4020-SL-U	Yeast-OD2 (unlabeled)

Mammalian Cell Growth Media

BioExpress® 6000

Catalog No.	Description
CGM-6000-N	BioExpress 6000 (^{15}N , 98%)
CGM-6000-CN	BioExpress 6000 (^{13}C , 98%; ^{15}N , 98%)
CGM-6000-U	BioExpress 6000 (unlabeled)
CGM-6000-CUSTOM	BioExpress 6000 (custom)*

*The labeled amino acids must be specified at the time of request for a custom media quote or order.

BioExpress and Celtone are registered trademarks of Cambridge Isotope Laboratories, Inc.

► Please visit the “Cell Growth Media” section of isotope.com/products for complete product listings and additional information.

Kits for Cell-Free Protein Expression

Wheat Germ Cell-Free Expression Kits (CellFree Sciences, CFS)



Wheat germ cell-free protein expression systems have been used over the years to address many different needs in basic research and applied sciences. CFS is the leading commercial manufacturer of kits and reagents used in wheat germ-based, cell-free protein expression. CFS' proprietary wheat germ embryo extract, WEPRO®, is the critical ingredient that allows reproducible production of protein in high yield.

CFS offers several starter kits to characterize yield and protein quality. These kits enable multiple large-scale reactions that typically yield µg amounts of protein. Each kit contains a positive control that yields about 30 µg of DHFR. The Premium Plus Expression Kit for MS (CFS-EDX-PLUS-MS), for example, is perfectly suited to produce isotope-enriched protein for bottom-up LC-MS studies. Please click on the catalog numbers below for further details into the kit and their specifications.

Catalog No.	Description	Contents	No. of Reactions
Premium ONE Expression Kit			
CFS-EDX-ONE	Premium ONE Expression Kit	Coupled <i>in vitro</i> transcription and translation reaction format for rapid protein expression experiments enabling protein analysis by different detection methods such as SDS-PAGE, Western Blot Analysis, or working with labeled proteins. Kit uses bilayer reaction on 55 µL scale.	24

Premium PLUS Expression Kits

CFS-EDX-PLUS	Premium PLUS Expression Kit	Premixed transcription and translation reagents are for easy handling. Kit uses bilayer reaction format on 226 µL scale. Expression vector, positive control, and split-PCR primers are provided.	8
CFS-PLUS-MS	Premium PLUS Expression Kit for MS	Protein synthesis kit with ¹³ C/ ¹⁵ N-labeled lysine and arginine for MRM-MS. Kit uses bilayer reaction on a 225 µL scale. Wheat germ extract contains ¹³ C- and ¹⁵ N-labeled Lys and Arg. Translation buffer for MS includes 18 unlabeled amino acids, excluding Lys and Arg. Contains an expression vector, a positive control, and a PCR primer set.	16

Protein Research Kits

CFS-PRK-G16	Protein Research Kit G16	Premixed transcription and translation reagents for GST-tag fusion protein expression. Kit uses bilayer reaction format on 226 µL scale. Vectors are not included.	16
CFS-PRK-H16	Protein Research Kit H16	Premixed transcription and translation reagents for His-tag fusion protein expression. Kit uses bilayer reaction format on 226 µL scale. Vectors are not included.	16
CFS-PRK-S16	Protein Research Kit S16	Premixed transcription and translation reagents for easy handling. Kit uses bilayer reaction format on 226 µL scale. Vectors are not included.	16

Disulfide Bond Expression Kits

CFS-EDX-DB	Disulfide Bond PLUS Expression Kit	Modified version of the PLUS Expression Kit coming with DTT-free translation buffer and added PDI/Ero1a enzyme mix to support formation of disulfide bonds. Transcription and translation reagents are premixed for easy handling. Kit uses bilayer reaction on 230 µL scale and contains an expression vector, a positive control, and a PCR primer set.	8
CFS-DBEE	Disulfide Bond Enhancer Enzyme Set	This set provides DTT-free translation buffer (40× concentration; 600 µL volume) and PDI/Ero1a enzyme mix (400 µL) to support formation of disulfide bonds. Intended for use with the WEPRO7240H Core Kit (CFS-C7H).	• 4 for LARGE reaction scale (6 mL) • 20 for MEDIUM reaction scale (1.2 mL) • 100 for SMALL reaction scale (227 µL)

Proteoliposome Expression Kits

CFS-EDX-PLE-PLUS	Proteoliposome PLUS Expression Kit	Starter kit for easy expression of membrane proteins on 240 µL bilayer reaction scale. Small-scale test expression using premixed reagents. Premixed reagents already contain liposomes for easy preparation of proteoliposome complexes.	8
CFS-CPLE-BD	Proteoliposome BD Kit	For the expression of membrane protein on new BD reaction format for direct formation of proteoliposomes. Large-scale expression using dialysis driven expression reaction. Reaction scale is 2.5 mL. Additional reagents are provided for testing expression vector in the absence of liposomes.	• 20 × 227 µL BL reactions • 6 × BD reactions

BL = bilayer reaction format. BD= bilayer-dialysis reaction format.

Chemical purity (CP) is 98% or greater, unless otherwise indicated. For research use only. Not for diagnostic procedures.

Kits for Cell-Free Protein Expression *(continued)*

Catalog No.	Description	Contents	No. of Reactions
FLEXIQuant PLUS Expression Kit			
CFS-FLEX-MS	FLEXIQuant PLUS Expression Kit	Protein synthesis kit with $^{13}\text{C}/^{15}\text{N}$ -labeled lysine and arginine for MRM-MS. Kit uses bilayer reaction on 227 μL scale. This kit provided expression vector and peptide to conduct FLEXIQuant experiments.	8

► Please visit the “CellFree Protein Expression” section of isotope.com/products and cfsience.com for additional information on these and other products (e.g., vector set, transcription and translation reagents).

Example References

- Fogeron, M.L.; Lecoq, L.; Cole, L.; et al. **2021**. Easy synthesis of complex biomolecular assemblies: Wheat germ cell-free protein expression in structural biology. *Front Mol Biosci*, 8, 639587.
- Lacabanne, D.; Fogeron, M.L.; Wiegand, T.; et al. **2019**. Protein sample preparation for solid-state NMR investigations. *Prog Nucl Magn Reson Spectrosc*, 110, 20-33.
- Novikova, I.V.; Sharma, N.; Moser, T.; et al. **2018**. Protein structural biology using cell-free platform from wheat germ. *Adv Struct Chem Imaging*, 4(1), 13.
- Narumi, R.; Masuda, K.; Tomonaga, T.; et al. **2018**. Cell-free synthesis of stable isotope-labeled internal standards for targeted quantitative proteomics. *Synth Syst Biotechnol*, 3(2), 97-104.
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- Harbers, M. **2014**. Wheat germ systems for cell-free protein expression. *FEBS Lett*, 588(17), 2762-73.
- Singh, S.; Springer, M.; Steen, J.; et al. **2009**. FLEXIQuant: a novel tool for the absolute quantification of proteins, and the simultaneous identification and quantification of potentially modified peptides. *J Proteome Res*, 8(5), 2201-2210.
- Goshima, N.; Kawamura, Y.; Fukumoto, A.; et al. **2008**. Human protein factory for converting the transcriptome into an *in vitro*-expressed proteome. *Nat Methods*, 5(12), 1011-1017.

Isotope-Labeled Proteins

CIL is pleased to offer a number of isotope-labeled recombinant proteins from Nexomics Biosciences, Inc. for use as standards in MS and NMR research. In MS studies, these can be added to samples at the beginning of experimental workflows to help control or correct for analytical variability. This is toward improving the accuracy of protein quantification. For NMR spectroscopy, these proteins are used to assess NMR spectrometer performance, aid the development of new pulse sequences, and for training purposes. Please inquire or visit isotope.com for quantity, pricing, and availability.



Catalog No.	Description	Concentration and Composition
NEX-CRP-N-D	Human C-reactive protein (CRP) (^{15}N , 98%) denatured CP 95%	100 $\mu\text{g}/\text{mL}$ in 50 mM sodium acetate (pH 4.0) with 500 mM NaCl and 8 M urea
NEX-CRP-N	Human C-reactive protein (CRP) (^{15}N , 98%) CP 95%	100 $\mu\text{g}/\text{mL}$ in 20 mM Tris-HCl (pH 8.0) with 100 mM NaCl
NEX-UB1-CN	Human ubiquitin (^{13}C , 95%; ^{15}N , 95%)*	0.25, 0.5, or 1 mM in 90% $\text{H}_2\text{O}/10\%$ D_2O with 0.02% NaN_3 and 20 mM sodium phosphate (pH 7.2)
NEX-UB1-N	Human ubiquitin (^{15}N , 95%)*	0.25, 0.5, or 1 mM in 90% $\text{H}_2\text{O}/10\%$ D_2O with 0.02% NaN_3 and 20 mM sodium phosphate (pH 7.2)
NEX-MBP1-CN	<i>E. coli</i> maltose binding protein (^{13}C , 95%; ^{15}N , 95%)*	0.25, 0.5, or 1 mM in 90% $\text{H}_2\text{O}/10\%$ D_2O with 0.02% NaN_3 and 20 mM sodium phosphate (pH 7.2)
NEX-XF1-CN	X-filtered NOESY NMR standard (^{13}C , 95%; ^{15}N , 95%)*	Mixture of labeled and unlabeled 16 kDa protein (<i>A. fulgidus</i> antitoxin vapB21 homodimer). 1 mM protein in 90% $\text{H}_2\text{O}/10\%$ D_2O with 20 mM NH_4OAc (pH 5.5), 100 mM NaCl, 5 mM CaCl_2 , and 0.02% NaN_3
NEX-GB1-CN	GB1 (^{13}C , 95%; ^{15}N , 95%)*	0.25, 0.5, or 1 mM in 50 mM sodium phosphate (pH 5.5), 10% D_2O , 0.02% NaN_3
NEX-CAL-CN	Calbindin-D9k (^{13}C , 95%; ^{15}N , 95%)*	0.25, 0.5, or 1 mM in 50 mM ammonium acetate (pH 6.0), 10% D_2O , 0.02% NaN_3
NEX-SH3-CN	SH3 domain (^{13}C , 95%; ^{15}N , 95%)*	0.25, 0.5, or 1 mM in 50 mM sodium citrate (pH 3.5), 10% D_2O , 0.02% NaN_3

*Alternate labels are available; please inquire.

► Please visit the “Protein Standards” section of isotope.com/products for additional information.

Chemical purity (CP) is 98% or greater, unless otherwise indicated. For research use only. Not for diagnostic procedures.



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