



# Stable Isotope-Labeled Products

## For Metabolic Research



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## Stable Isotopes in Metabolism

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Recent advances in MS and NMR technologies have greatly enhanced metabolite analysis. Hundreds to thousands of metabolites can now be measured simultaneously with unprecedented accuracy from exceedingly small amounts of biological material. These technical developments have given rise to the field of metabolomics, which generally aims to assess metabolic regulation as a function of health and disease. Metabolomic analyses can be performed in either of two ways: with stable isotopic tracers or without. When metabolomics is performed without stable isotopic tracers, only metabolite concentrations can be determined. When metabolomics is performed with stable isotopic tracers, however, both metabolite concentrations and pathway activities (i.e., metabolic fluxes) can be assessed. The latter provides a much richer understanding of metabolism.

While measuring metabolite concentrations without isotopes can certainly be insightful, such measurements reveal only part of the story. They provide a mere snapshot of metabolism that cannot be translated into a dynamic map of metabolite traffic on biochemical routes. When comparing two sample groups, for example, an elevated metabolite level may indicate increased or decreased pathway flux. This is because metabolites can accumulate not only due to increased production, but also due to decreased consumption. Yet, the difference between increased production and decreased consumption may yield entirely different experimental interpretations. In a biomedical context, for instance, increased production of a metabolite may suggest pharmacological inhibition of the pathway as a therapeutic strategy. Thus, to understand pathway regulation and metabolic mechanisms of disease, the application of isotopic tracers is required.

In addition to enabling assessment of metabolic fluxes, isotopic tracers also add biochemical resolution to metabolomic analyses. Most metabolites lie at the intersection of multiple metabolic pathways. Without isotopic labeling, only a single metabolite pool is measured. It is not possible to distinguish the amount of this pool that is associated with one metabolic pathway relative to another. By using isotopic tracers, on the other hand, the fraction of the metabolic pool associated with a specific pathway can be delineated with labeling. As an example, palmitate can be synthesized from numerous metabolic substrates such as glucose, glutamine, acetate, etc. Stable isotopic tracers enable the fraction of palmitate produced from each precursor to be quantified.

Importantly, most modern MS and NMR instrumentation is well suited for the analysis of stable isotopes. Although processing of the data can be complicated, there are an increasing number of user-friendly software platforms (some commercial and some freely available). Moreover, when the appropriate isotopic tracer is selected, simple qualitative analyses of the data is often sufficient to yield important insight into metabolic pathway activities. Finally, it is worth noting that isotopic tracing experiments are not limited to micro-organisms that can be grown in defined media. To the contrary, some of the most widely used applications of isotope labeling have been in mammalian cell culture, plant and animal models, and in human patients.

## Amino Acids and Derivatives

| Catalog No.  | Description  |
|--------------|--|
| DLM-7476     | ADMA·HCl·XH <sub>2</sub> O (asymmetric dimethylarginine) (2,3,3,4,4,5,5-D <sub>7</sub> , 98%) may be hydrate                                     |
| CLM-1655     | D-Alanine (1- <sup>13</sup> C, 99%)  |
| CLM-2495     | D-Alanine (3- <sup>13</sup> C, 99%)  |
| DLM-7326     | D-Alanine (D <sub>7</sub> , 98%) <5% L   |
| NLM-6762     | D-Alanine ( <sup>15</sup> N, 98%)  |
| NLM-3289     | D-Alanine, N-acetyl ( <sup>15</sup> N, 98%)  |
| CLM-705      | DL-Alanine (1- <sup>13</sup> C, 99%)   |
| CLM-115      | DL-Alanine (2- <sup>13</sup> C, 99%)   |
| CLM-707      | DL-Alanine (3- <sup>13</sup> C, 99%)   |
| CLM-4514     | DL-Alanine ( <sup>13</sup> C <sub>3</sub> , 98%)   |
| DLM-2760     | DL-Alanine (2-D, 98%)  |
| DLM-176      | DL-Alanine (3,3,3-D <sub>3</sub> , 98%)  |
| DLM-1276     | DL-Alanine (2,3,3,3-D <sub>4</sub> , 97-98%)   |
| NLM-706      | DL-Alanine ( <sup>15</sup> N, 98%)   |
| CLM-116      | L-Alanine (1- <sup>13</sup> C, 99%)  |
| CLM-2016     | L-Alanine (2- <sup>13</sup> C, 99%)  |
| CLM-117      | L-Alanine (3- <sup>13</sup> C, 99%)  |
| CLM-2734     | L-Alanine (2,3- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-2184-H   | L-Alanine ( <sup>13</sup> C <sub>3</sub> , 99%)  |
| DLM-3101     | L-Alanine (2-D, 96-98%)  |
| DLM-248      | L-Alanine (3,3,3-D <sub>3</sub> , 99%)   |
| DLM-250      | L-Alanine (2,3,3,3-D <sub>4</sub> , 98%)   |
| DLM-251      | L-Alanine (D <sub>7</sub> , 98%)   |
| NLM-454      | L-Alanine ( <sup>15</sup> N, 98%)  |
| OLM-7460     | L-Alanine ( <sup>18</sup> O <sub>2</sub> , 90%)  |
| CDLM-8649    | L-Alanine (3- <sup>13</sup> C, 99%; 2-D, 96%)  |
| CDLM-3439    | L-Alanine (3- <sup>13</sup> C, 99%; 3,3,3-D <sub>3</sub> , 98%)  |
| CNLM-6993    | L-Alanine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-3594    | L-Alanine (2- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-534-H   | L-Alanine ( <sup>13</sup> C <sub>3</sub> , 99%; <sup>15</sup> N, 99%)  |
| DNLM-7178    | L-Alanine (2,3,3,3-D <sub>4</sub> , 98%; <sup>15</sup> N, 98%)   |
| CDNLM-6800   | L-Alanine ( <sup>13</sup> C <sub>3</sub> , 97-99%; D <sub>4</sub> , 97-99%; <sup>15</sup> N, 97-99%)   |
| DLM-9799     | DL-2-Aminoadipic acid (2,5,5-D <sub>3</sub> , 98%)   |
| CLM-535      | 5-Aminolevulinic acid·HCl (4- <sup>13</sup> C, 99%)  |
| CLM-1371     | 5-Aminolevulinic acid·HCl (5- <sup>13</sup> C, 99%) CP 96%   |
| CLM-1268     | L-Arginine·HCl (1- <sup>13</sup> C, 99%)   |
| CLM-2070     | L-Arginine·HCl (guanido- <sup>13</sup> C, 99%)   |
| CLM-2051     | L-Arginine·HCl (1,2- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-2265-H   | L-Arginine·HCl ( <sup>13</sup> C <sub>6</sub> , 99%)   |
| DLM-6038     | L-Arginine·HCl (4,4,5,5-D <sub>4</sub> , 94%) <5% D  |
| DLM-541      | L-Arginine·HCl (D <sub>7</sub> , 98%)  |
| NLM-1267     | L-Arginine·HCl (α- <sup>15</sup> N, 98%)   |
| NLM-395      | L-Arginine·HCl (guanido- <sup>15</sup> N <sub>2</sub> , 98%)   |
| NLM-396      | L-Arginine·HCl ( <sup>15</sup> N <sub>4</sub> , 98%)   |
| CNLM-7819    | L-Arginine·HCl (1- <sup>13</sup> C, 99%; α- <sup>15</sup> N, 98%)  |
| CNLM-539-H   | L-Arginine·HCl ( <sup>13</sup> C <sub>6</sub> , 99%; <sup>15</sup> N <sub>4</sub> , 99%)   |
| DNLM-7543    | L-Arginine·HCl (D <sub>7</sub> , 98%; <sup>15</sup> N <sub>4</sub> , 98%)  |
| CDNLM-6801   | L-Arginine·HCl ( <sup>13</sup> C <sub>6</sub> , 97-99%; D <sub>7</sub> , 97-99%; <sup>15</sup> N <sub>4</sub> , 97-99%)                          |
| ULM-8347     | L-Arginine·HCl (unlabeled)   |
| CNLM-9007-CA | L-Argininosuccinic acid, barium salt·2H <sub>2</sub> O (arginine- <sup>13</sup> C <sub>6</sub> , 99%; <sup>15</sup> N <sub>4</sub> , 99%) CP 90% |
| ULM-9008-CA  | L-Argininosuccinic acid, barium salt·3H <sub>2</sub> O (unlabeled) CP 90%  |

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

| Catalog No. | Description  |
|-------------|--|
| CLM-8699-H  | L-Asparagine·H <sub>2</sub> O ( <sup>13</sup> C <sub>4</sub> , 99%)  |
| DLM-6844    | L-Asparagine·H <sub>2</sub> O (2,3,3-D <sub>3</sub> , 94%)   |
| NLM-120     | L-Asparagine·H <sub>2</sub> O (amide- <sup>15</sup> N, 98%)  |
| NLM-3286    | L-Asparagine·H <sub>2</sub> O ( <sup>15</sup> N <sub>2</sub> , 98%)  |
| CNLM-7818   | L-Asparagine·H <sub>2</sub> O (1,4- <sup>13</sup> C <sub>2</sub> , 99%; α- <sup>15</sup> N, 98%)                                       |
| CNLM-3819-H | L-Asparagine·H <sub>2</sub> O ( <sup>13</sup> C <sub>4</sub> , 99%; <sup>15</sup> N <sub>2</sub> , 99%)                                |
| DNLM-6932   | L-Asparagine·H <sub>2</sub> O (2,3,3-D <sub>3</sub> , 98%; <sup>15</sup> N <sub>2</sub> , 98%)   |
| CDNLM-6802  | L-Asparagine·H <sub>2</sub> O ( <sup>13</sup> C <sub>4</sub> , 97-99%; D <sub>3</sub> , 97-99%; <sup>15</sup> N <sub>2</sub> , 97-99%) |
| CLM-865     | DL-Aspartic acid (3- <sup>13</sup> C, 99%)   |
| CLM-518     | DL-Aspartic acid (4- <sup>13</sup> C, 99%)   |
| DLM-832     | DL-Aspartic acid (2,3,3-D <sub>3</sub> , 98%)  |
| DLM-8599    | DL-Aspartic acid, N-acetyl (aspartate-2,3,3-D <sub>3</sub> , 98%) CP 97%   |
| CLM-3616    | L-Aspartic acid (1- <sup>13</sup> C, 99%)  |
| CLM-3617    | L-Aspartic acid (2- <sup>13</sup> C, 99%)  |
| CLM-627     | L-Aspartic acid (3- <sup>13</sup> C, 98-99%)   |
| CLM-519     | L-Aspartic acid (4- <sup>13</sup> C, 99%) CP 96%   |
| CLM-4455    | L-Aspartic acid (1,4- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-1801-H  | L-Aspartic acid ( <sup>13</sup> C <sub>4</sub> , 99%)  |
| DLM-546     | L-Aspartic acid (2,3,3-D <sub>3</sub> , 98%)   |
| NLM-718     | L-Aspartic acid ( <sup>15</sup> N, 98%)  |
| CNLM-7817   | L-Aspartic acid (1,4- <sup>13</sup> C <sub>2</sub> , 99%; <sup>15</sup> N, 98%)  |
| CNLM-544-H  | L-Aspartic acid ( <sup>13</sup> C <sub>4</sub> , 99%; <sup>15</sup> N, 99%)  |
| DNLM-6931   | L-Aspartic acid (2,3,3-D <sub>3</sub> , 98%; <sup>15</sup> N, 98%)   |
| CDNLM-6803  | L-Aspartic acid ( <sup>13</sup> C <sub>4</sub> , 97-99%; D <sub>3</sub> , 97-99%; <sup>15</sup> N, 97-99%)                             |
| ULM-8676    | L-Aspartic acid (unlabeled)  |
| CLM-4899    | L-Citrulline (ureido- <sup>13</sup> C, 99%)  |
| DLM-3860    | L-Citrulline (5,5-D <sub>2</sub> , 98%)  |
| DLM-6039    | L-Citrulline (4,4,5,5-D <sub>4</sub> , 95%)  |
| NLM-6850    | L-Citrulline (ureido- <sup>15</sup> N, 98%)  |
| CDLM-7879   | L-Citrulline (ureido- <sup>13</sup> C, 99%; 5,5-D <sub>2</sub> , 98%)  |
| CDLM-7139   | L-Citrulline (5- <sup>13</sup> C, 99%; 4,4,5,5-D <sub>4</sub> , 95%)   |
| CDLM-4211   | Cycloleucine (carboxyl- <sup>13</sup> C, 99%; 2,2,5,5-D <sub>4</sub> , 96%)  |
| DLM-6108    | DL-Cystathionine (3,3,4,4-D <sub>4</sub> , 98%)  |
| CLM-3790    | DL-Cysteine (1- <sup>13</sup> C, 99%)  |
| CLM-898     | DL-Cysteine (3- <sup>13</sup> C, 99%)  |
| DLM-899     | DL-Cysteine (3,3-D <sub>2</sub> , 98%)   |
| CLM-3852    | L-Cysteine (1- <sup>13</sup> C, 99%)   |
| CLM-1868    | L-Cysteine (3- <sup>13</sup> C, 99%)   |
| CLM-4320-H  | L-Cysteine ( <sup>13</sup> C <sub>3</sub> , 99%)   |
| DLM-769     | L-Cysteine (3,3-D <sub>2</sub> , 98%)  |
| DLM-6901    | L-Cysteine (2,3,3-D <sub>3</sub> , 98%)  |
| NLM-2295    | L-Cysteine ( <sup>15</sup> N, 98%)   |
| DLM-2942    | L-Cysteine, S-methyl (S-methyl-D <sub>3</sub> , 98%)   |
| CNLM-7815   | L-Cysteine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)   |
| CNLM-3871-H | L-Cysteine ( <sup>13</sup> C <sub>3</sub> , 99%; <sup>15</sup> N, 99%)   |
| DNLM-6902   | L-Cysteine (2,3,3-D <sub>3</sub> , 98%; <sup>15</sup> N, 98%)  |
| CDNLM-6809  | L-Cysteine ( <sup>13</sup> C <sub>3</sub> , 97-99%; D <sub>3</sub> , 97-99%; <sup>15</sup> N, 97-99%)                                  |
| DLM-8738    | S-Sulfo-DL-cysteine (2,3,3-D <sub>3</sub> , 99%)   |
| DLM-1000    | DL-Cystine (3,3,3',3'-D <sub>4</sub> , 98%)  |
| NLM-1668    | DL-Cystine ( <sup>15</sup> N <sub>2</sub> , 95%)   |

Continued ►

## Amino Acids and Derivatives (continued)

| Catalog No. | Description  |
|-------------|--|
| CLM-520     | L-Cystine (3,3'- <sup>13</sup> C <sub>2</sub> , 99%)   |
| DLM-9812    | L-Cystine (3,3,3',3'-D <sub>4</sub> , 98%)   |
| NLM-3818    | L-Cystine ( <sup>15</sup> N <sub>2</sub> , 98%)  |
| CNLM-4244-H | L-Cystine ( <sup>13</sup> C <sub>6</sub> , 99%; <sup>15</sup> N <sub>2</sub> , 99%)                                  |
| CDNLM-8659  | L-Cystine ( <sup>13</sup> C <sub>6</sub> , 98%; D <sub>6</sub> , 98%; <sup>15</sup> N <sub>2</sub> , 98%) CP 95%     |
| DLM-8516    | N,N-Dimethylglycine·HCl (D <sub>6</sub> , 99%)   |
| CLM-3632    | DL-Glutamic acid (3- <sup>13</sup> C, 99%)   |
| DLM-335     | DL-Glutamic acid (2,4,4-D <sub>3</sub> , 98%)  |
| DLM-357     | DL-Glutamic acid (2,3,3,4,4-D <sub>5</sub> , 97%)  |
| CLM-674     | L-Glutamic acid (1- <sup>13</sup> C, 99%)  |
| CLM-2474    | L-Glutamic acid (2- <sup>13</sup> C, 99%)  |
| CLM-4742    | L-Glutamic acid (3- <sup>13</sup> C, 99%)  |
| CLM-2431    | L-Glutamic acid (4- <sup>13</sup> C, 98-99%)   |
| CLM-613     | L-Glutamic acid (5- <sup>13</sup> C, 99%)  |
| CLM-2024    | L-Glutamic acid (1,2- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-3646    | L-Glutamic acid (3,4- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-1800-H  | L-Glutamic acid ( <sup>13</sup> C <sub>5</sub> , 99%)  |
| DLM-3725    | L-Glutamic acid (2,4,4-D <sub>3</sub> , 97-98%)  |
| DLM-556     | L-Glutamic acid (2,3,3,4,4-D <sub>5</sub> , 97-98%)  |
| NLM-135     | L-Glutamic acid ( <sup>15</sup> N, 98%)  |
| CNLM-7812   | L-Glutamic acid (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-554-H  | L-Glutamic acid ( <sup>13</sup> C <sub>5</sub> , 99%; <sup>15</sup> N, 99%)  |
| DNLM-6996   | L-Glutamic acid (2,3,3,4,4-D <sub>5</sub> , 98%; <sup>15</sup> N, 98%)   |
| CDNLM-6804  | L-Glutamic acid ( <sup>13</sup> C <sub>5</sub> , 97-99%; D <sub>5</sub> , 97-99%; <sup>15</sup> N, 97-99%)           |
| CLM-3721    | DL-Glutamic acid·H <sub>2</sub> O (1- <sup>13</sup> C, 99%)  |
| OLM-8028    | L-Glutamic acid·HCl ( <sup>17</sup> O <sub>4</sub> , ~30%)   |
| CLM-3612    | L-Glutamine (1- <sup>13</sup> C, 99%)  |
| CLM-3613    | L-Glutamine (2- <sup>13</sup> C, 99%)  |
| CLM-770     | L-Glutamine (4- <sup>13</sup> C, 99%)  |
| CLM-1166    | L-Glutamine (5- <sup>13</sup> C, 99%)  |
| CLM-2001    | L-Glutamine (1,2- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-3641    | L-Glutamine (3,4- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-1822-H  | L-Glutamine ( <sup>13</sup> C <sub>5</sub> , 99%)  |
| DLM-1826    | L-Glutamine (2,3,3,4,4-D <sub>5</sub> , 97%)   |
| NLM-1016    | L-Glutamine (α- <sup>15</sup> N, 98%)  |
| NLM-557     | L-Glutamine (amide- <sup>15</sup> N, 98%)  |
| NLM-1328    | L-Glutamine ( <sup>15</sup> N <sub>2</sub> , 98%)  |
| CNLM-7813   | L-Glutamine (1- <sup>13</sup> C, 99%; α- <sup>15</sup> N, 98%)   |
| CNLM-1275-H | L-Glutamine ( <sup>13</sup> C <sub>5</sub> , 99%; <sup>15</sup> N <sub>2</sub> , 99%)                                |
| DNLM-6997   | L-Glutamine (2,3,3,4,4-D <sub>5</sub> , 97-98%; <sup>15</sup> N <sub>2</sub> , 97-98%)                               |
| CDNLM-6805  | L-Glutamine ( <sup>13</sup> C <sub>5</sub> , 97-99%; D <sub>5</sub> , 97-99%; <sup>15</sup> N <sub>2</sub> , 97-99%) |
| CLM-422     | Glycine (1- <sup>13</sup> C, 99%)  |
| CLM-136     | Glycine (2- <sup>13</sup> C, 99%)  |
| CLM-1017    | Glycine (1,2- <sup>13</sup> C <sub>2</sub> , 97-99%)   |
| DLM-1674    | Glycine (2,2-D <sub>2</sub> , 98%)   |
| DLM-280     | Glycine (D <sub>5</sub> , 98%)   |
| NLM-202     | Glycine ( <sup>15</sup> N, 98%)  |
| CNLM-507    | Glycine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-508    | Glycine (2- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-1673-H | Glycine ( <sup>13</sup> C <sub>2</sub> , 99%; <sup>15</sup> N, 99%)  |
| DNLM-6862   | Glycine (2,2-D <sub>2</sub> , 98%; <sup>15</sup> N, 98%)   |
| CDNLM-6799  | Glycine ( <sup>13</sup> C <sub>2</sub> , 97-99%; 2,2-D <sub>2</sub> , 97-99%; <sup>15</sup> N, 97-99%)               |
| CNLM-7175   | Glycine·HCl, ethyl ester ( <sup>13</sup> C <sub>2</sub> , 98%; <sup>15</sup> N, 98%)                                 |
| CLM-2636    | DL-Histidine (ring-2- <sup>13</sup> C, 99%)  |
| NLM-138     | DL-Histidine·2HCl (α- <sup>15</sup> N, 98%)  |

| Catalog No. | Description   |
|-------------|---|
| NLM-4649    | L-Histidine (ring-ε- <sup>15</sup> N, 98%) (<5% D)  |
| NLM-4457    | L-Histidine (ring-II- <sup>15</sup> N, 98+%) (<5% D)  |
| NLM-9585    | L-Histidine (ring- <sup>15</sup> N <sub>2</sub> , 98%)  |
| DLM-8691    | π-Methyl-L-histidine (methyl-D <sub>3</sub> , 98%)  |
| DLM-2949    | τ-Methyl-L-histidine (methyl-D <sub>3</sub> , 98%)  |
| CLM-1512    | L-Histidine·HCl·H <sub>2</sub> O (ring-2- <sup>13</sup> C, 99%) <5% D   |
| DLM-7855    | L-Histidine·HCl·H <sub>2</sub> O (ring-2,4-D <sub>2</sub> ; α,β,β-D <sub>3</sub> , 98%)   |
| NLM-2245    | L-Histidine·HCl·H <sub>2</sub> O (α- <sup>15</sup> N, 98%)  |
| NLM-846     | L-Histidine·HCl·H <sub>2</sub> O (ring-II- <sup>15</sup> N, 98%) <5% D  |
| DNLM-7366   | L-Histidine·HCl·H <sub>2</sub> O (D <sub>5</sub> , 98%; <sup>15</sup> N <sub>3</sub> , 98%)   |
| CDNLM-6806  | L-Histidine·HCl·H <sub>2</sub> O<br>( <sup>13</sup> C <sub>6</sub> , 97-99%; D <sub>5</sub> , 97-99%; <sup>15</sup> N <sub>3</sub> , 97-99%) CP 95% |
| CNLM-4645   | L-Homoarginine·HCl ( <sup>13</sup> C <sub>7</sub> , 98%; <sup>15</sup> N <sub>4</sub> , 98%)  |
| DLM-8259    | DL-Homocysteine (3,3,4,4-D <sub>4</sub> , 98%)  |
| DLM-3619    | DL-Homocystine (3,3,3',3',4,4,4',4'-D <sub>8</sub> , 98%)   |
| NLM-2466    | L-Homoserine ( <sup>15</sup> N, 95-99%) CP 97%  |
| CLM-8742    | L-Allo-isoleucine ( <sup>13</sup> C <sub>6</sub> , 97-99%)  |
| DLM-1505    | L-Allo-isoleucine (D <sub>10</sub> , 98%)   |
| CNLM-8670   | L-Allo-isoleucine ( <sup>13</sup> C <sub>6</sub> , 97-99%; <sup>15</sup> N, 97-99%)   |
| CLM-1026    | L-Isoleucine (1- <sup>13</sup> C, 99%)  |
| CLM-2248-H  | L-Isoleucine ( <sup>13</sup> C <sub>6</sub> , 99%)  |
| DLM-141     | L-Isoleucine (D <sub>10</sub> , 98%)  |
| NLM-292     | L-Isoleucine ( <sup>15</sup> N, 98%)  |
| CNLM-7810   | L-Isoleucine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-561-H  | L-Isoleucine ( <sup>13</sup> C <sub>6</sub> , 99%; <sup>15</sup> N, 99%)  |
| DNLM-7325   | L-Isoleucine (D <sub>10</sub> , 98%; <sup>15</sup> N, 98%)  |
| CDNLM-6807  | L-Isoleucine ( <sup>13</sup> C <sub>6</sub> , 97-99%; D <sub>10</sub> , 97-99%; <sup>15</sup> N, 97-99%)  |
| CLM-204     | DL-Leucine (1- <sup>13</sup> C, 99%)  |
| CLM-207     | DL-Leucine (2- <sup>13</sup> C, 99%)  |
| DLM-9423    | DL-Leucine (D <sub>10</sub> , 98%)  |
| NLM-355     | DL-Leucine ( <sup>15</sup> N, 98%)  |
| CLM-468     | L-Leucine (1- <sup>13</sup> C, 99%)   |
| CLM-2014    | L-Leucine (2- <sup>13</sup> C, 99%)   |
| CLM-3524    | L-Leucine (1,2- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-2262-H  | L-Leucine ( <sup>13</sup> C <sub>6</sub> , 99%)   |
| DLM-1259    | L-Leucine (5,5,5-D <sub>3</sub> , 99%)  |
| DLM-4212    | L-Leucine (isopropyl-D <sub>7</sub> , 98%)  |
| DLM-567     | L-Leucine (D <sub>10</sub> , 98%)   |
| NLM-142     | L-Leucine ( <sup>15</sup> N, 98%)   |
| OLM-2041    | L-Leucine ( <sup>18</sup> O <sub>2</sub> , 94%)   |
| CNLM-615    | L-Leucine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)   |
| CNLM-3450   | L-Leucine (2- <sup>13</sup> C, 99%; <sup>15</sup> N, 95-99%)  |
| CNLM-281-H  | L-Leucine ( <sup>13</sup> C <sub>6</sub> , 99%; <sup>15</sup> N, 99%)   |
| DNLM-4642   | L-Leucine (D <sub>10</sub> , 98%; <sup>15</sup> N, 97%)   |
| CDNLM-6808  | L-Leucine ( <sup>13</sup> C <sub>6</sub> , 97-99%; D <sub>10</sub> , 97-99%; <sup>15</sup> N, 97-99%)   |
| ULM-8203    | L-Leucine (unlabeled)   |
| CLM-749     | DL-Lysine·2HCl (1- <sup>13</sup> C, 99%)  |
| DLM-8941    | DL-Lysine·2HCl (4,4,5,5-D <sub>4</sub> , 96-98%)  |
| NLM-1031    | DL-Lysine·2HCl (ε- <sup>15</sup> N, 98%)  |
| CNLM-3452   | DL-Lysine·2HCl (1- <sup>13</sup> C, 99%; ε- <sup>15</sup> N, 99%)   |
| CNLM-3453   | DL-Lysine·2HCl (2- <sup>13</sup> C, 99%; ε- <sup>15</sup> N, 99%)   |
| CLM-653     | L-Lysine·2HCl (1- <sup>13</sup> C, 99%)   |
| CLM-632     | L-Lysine·2HCl (6- <sup>13</sup> C, 99%)   |
| CLM-2247-H  | L-Lysine·2HCl ( <sup>13</sup> C <sub>6</sub> , 99%)   |
| DLM-2640    | L-Lysine·2HCl (4,4,5,5-D <sub>4</sub> , 96-98%)   |

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



## Amino Acids and Derivatives (continued)

| Catalog No. | Description  | Catalog No. | Description  |
|-------------|--|-------------|--|
| DLM-2641    | L-Lysine-2HCl (3,3,4,4,5,5,6,6-D <sub>8</sub> , 98%)   | DLM-2984    | L-Phenylalanine (2-D, 95%)   |
| DLM-570     | L-Lysine-2HCl (D <sub>9</sub> , 98%)   | DLM-2985    | L-Phenylalanine (3,3-D <sub>2</sub> , 98%)   |
| NLM-143     | L-Lysine-2HCl (α- <sup>15</sup> N, 95-99%)   | DLM-1258    | L-Phenylalanine (ring-D <sub>5</sub> , 98%)  |
| NLM-1554    | L-Lysine-2HCl ( <sup>15</sup> N <sub>2</sub> , 98%)  | DLM-372     | L-Phenylalanine (D <sub>8</sub> , 98%)   |
| NLM-631     | L-Lysine-2HCl (ε- <sup>15</sup> N, 98%)  | NLM-108     | L-Phenylalanine ( <sup>15</sup> N, 98%)  |
| CNLM-7821   | L-Lysine-2HCl (1- <sup>13</sup> C, 99%; α- <sup>15</sup> N, 98%)   | CNLM-7611   | L-Phenylalanine (2,3- <sup>13</sup> C <sub>2</sub> , 99%; <sup>15</sup> N, 98%)                            |
| CNLM-3454   | L-Lysine-2HCl (6- <sup>13</sup> C, 99%; ε- <sup>15</sup> N, 98%)   | CNLM-575-H  | L-Phenylalanine ( <sup>13</sup> C <sub>9</sub> , 99%; <sup>15</sup> N, 99%)                                |
| CNLM-291-H  | L-Lysine-2HCl ( <sup>13</sup> C <sub>6</sub> , 99%; <sup>15</sup> N <sub>2</sub> , 99%)                                | DNLM-7180   | L-Phenylalanine (D <sub>8</sub> , 98%; <sup>15</sup> N, 98%)   |
| DNLM-7545   | L-Lysine-2HCl (D <sub>9</sub> , 98%; <sup>15</sup> N <sub>2</sub> , 98%)   | CDNLM-6811  | L-Phenylalanine ( <sup>13</sup> C <sub>9</sub> , 97-99%; D <sub>8</sub> , 97-99%; <sup>15</sup> N, 97-99%) |
| CDNLM-6810  | L-Lysine-2HCl ( <sup>13</sup> C <sub>6</sub> , 97-99%; D <sub>9</sub> , 97-99%; <sup>15</sup> N <sub>2</sub> , 97-99%) | ULM-8205    | L-Phenylalanine (unlabeled)  |
| ULM-8766    | L-Lysine-2HCl (unlabeled)  | CLM-2479    | DL-Proline (1- <sup>13</sup> C, 99%)   |
| CLM-7356    | D-Methionine (1- <sup>13</sup> C, 99%) CP 96%  | DLM-2657    | DL-Proline (2,3,3,4,4,5,5-D <sub>7</sub> , 97-98%)   |
| CLM-6191    | DL-Methionine (1- <sup>13</sup> C, 99%)  | CLM-510     | L-Proline (1- <sup>13</sup> C, 99%)  |
| DLM-2933    | DL-Methionine (3,3,4,4-D <sub>4</sub> , 98%)   | CLM-2260-H  | L-Proline ( <sup>13</sup> C <sub>5</sub> , 99%)  |
| DLM-9019    | DL-Methionine (3,3,4,4-D <sub>4</sub> ; methyl-D <sub>3</sub> , 98%)   | DLM-487     | L-Proline (D <sub>7</sub> , 97-98%)  |
| CLM-3267    | L-Methionine (1- <sup>13</sup> C, 99%)   | NLM-835     | L-Proline ( <sup>15</sup> N, 98%)  |
| CLM-206     | L-Methionine (methyl- <sup>13</sup> C, 99%)  | CNLM-7822   | L-Proline (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CLM-893-H   | L-Methionine ( <sup>13</sup> C <sub>5</sub> , 99%)   | CNLM-436-H  | L-Proline ( <sup>13</sup> C <sub>5</sub> , 99%; <sup>15</sup> N, 99%)                                      |
| DLM-431     | L-Methionine (methyl-D <sub>3</sub> , 98%)   | DNLM-7562   | L-Proline (D <sub>7</sub> , 98%; <sup>15</sup> N, 98%)   |
| DLM-6797    | L-Methionine (2,3,3,4,4-D <sub>5</sub> ; methyl-D <sub>3</sub> , 98%)  | CDNLM-6812  | L-Proline ( <sup>13</sup> C <sub>5</sub> , 97-99%; D <sub>7</sub> , 97-99%; <sup>15</sup> N, 97-99%)       |
| NLM-752     | L-Methionine ( <sup>15</sup> N, 96-98%)  | ULM-8333    | L-Proline (unlabeled)  |
| CDLM-760    | L-Methionine (1- <sup>13</sup> C, 99%; methyl-D <sub>3</sub> , 98%)  | DLM-6874    | Sarcosine-HCl (N-methylglycine-HCl) (methyl-D <sub>3</sub> , 98%)  |
| CDLM-9289   | L-Methionine (methyl- <sup>13</sup> C, 99%; methyl-D <sub>3</sub> , 98%)   | CNLM-9699   | Sarcosine-HCl (N-methylglycine-HCl) ( <sup>13</sup> C <sub>3</sub> , 99%; <sup>15</sup> N, 98%)            |
| CDLM-8885   | L-Methionine (2,3,3,4,4-D <sub>5</sub> , 98%; methyl- <sup>13</sup> CH <sub>3</sub> , 99%)                             | CLM-1075    | DL-Serine (1- <sup>13</sup> C, 99%)  |
| CNLM-7807   | L-Methionine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)   | CLM-496     | DL-Serine (2- <sup>13</sup> C, 99%)  |
| CNLM-9774   | L-Methionine (1,2,3,4- <sup>13</sup> C <sub>4</sub> , 99%; <sup>15</sup> N, 98%)                                       | CLM-497     | DL-Serine (3- <sup>13</sup> C, 99%)  |
| CNLM-759-H  | L-Methionine ( <sup>13</sup> C <sub>5</sub> , 99%; <sup>15</sup> N, 99%)   | DLM-1073    | DL-Serine (2,3,3-D <sub>3</sub> , 98%)   |
| DNLM-7179   | L-Methionine (D <sub>8</sub> , 98%; <sup>15</sup> N, 98%)  | NLM-1531    | DL-Serine ( <sup>15</sup> N, 98%)  |
| CDNLM-6798  | L-Methionine ( <sup>13</sup> C <sub>5</sub> , 97-99%; D <sub>8</sub> , 97-99%; <sup>15</sup> N, 97-99%)                | CNLM-4207   | DL-Serine ( <sup>13</sup> C <sub>3</sub> , 98%; <sup>15</sup> N, 98%)                                      |
| CLM-8002    | L-Methionine sulfone (1- <sup>13</sup> C, 99%)   | CLM-1573    | L-Serine (1- <sup>13</sup> C, 99%)   |
| CNLM-10424  | β-N-Methylamino-L-alanine ( <sup>13</sup> C <sub>3</sub> , 99%; <sup>15</sup> N <sub>2</sub> , 98%)                    | CLM-2013    | L-Serine (2- <sup>13</sup> C, 99%)   |
| ULM-10493   | β-N-Methylamino-L-alanine HCl (unlabeled) CP 97%   | CLM-1572    | L-Serine (3- <sup>13</sup> C, 99%)   |
| CLM-7104    | 3-Nitro-L-tyrosine (ring- <sup>13</sup> C <sub>6</sub> , 99%) CP 94%   | CLM-1574-H  | L-Serine ( <sup>13</sup> C <sub>3</sub> , 99%)   |
| CLM-1036    | L-Ornithine-HCl (1,2- <sup>13</sup> C <sub>2</sub> , 99%)  | DLM-161     | L-Serine (3,3-D <sub>2</sub> , 98%)  |
| CLM-4724-H  | L-Ornithine-HCl ( <sup>13</sup> C <sub>5</sub> , 99%)  | DLM-582     | L-Serine (2,3,3-D <sub>3</sub> , 98%)  |
| DLM-4261    | L-Ornithine-HCl (5,5-D <sub>2</sub> , 98%)   | NLM-2036    | L-Serine ( <sup>15</sup> N, 98%)   |
| DLM-6046    | L-Ornithine-HCl (4,4,5,5-D <sub>4</sub> , 95%)   | OLM-9960    | L-Serine (carboxyl- <sup>18</sup> O <sub>2</sub> , 95%)  |
| DLM-2969    | L-Ornithine-HCl (3,3,4,4,5,5-D <sub>6</sub> , 98%)   | CNLM-7814   | L-Serine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)   |
| DLM-6669    | L-Ornithine-HCl (D <sub>7</sub> , 98%)   | CNLM-474-H  | L-Serine ( <sup>13</sup> C <sub>3</sub> , 99%; <sup>15</sup> N, 99%)                                       |
| NLM-2212    | L-Ornithine-HCl (α- <sup>15</sup> N, 98%)  | DNLM-6863   | L-Serine (2,3,3-D <sub>3</sub> , 98%; <sup>15</sup> N, 98%)  |
| NLM-2174    | L-Ornithine-HCl (5- <sup>15</sup> N, 98%)  | CDNLM-6813  | L-Serine ( <sup>13</sup> C <sub>3</sub> , 97-99%; D <sub>3</sub> , 97-99%; <sup>15</sup> N, 97-99%)        |
| NLM-3610    | L-Ornithine-HCl ( <sup>15</sup> N <sub>2</sub> , 98%)  | CLM-3949    | Sodium glutamate·XH <sub>2</sub> O ( <sup>13</sup> C <sub>5</sub> , 97-98%) may be hydrate                 |
| CDLM-3873   | L-Ornithine-HCl (5- <sup>13</sup> C, 99%; 4,4,5,5-D <sub>4</sub> , 95%)  | CLM-447     | L-Threonine (1- <sup>13</sup> C, 99%)  |
| CNLM-7578-H | L-Ornithine-HCl ( <sup>13</sup> C <sub>5</sub> , 99%; <sup>15</sup> N <sub>2</sub> , 99%)                              | CLM-2261    | L-Threonine ( <sup>13</sup> C <sub>4</sub> , 97-99%)   |
| DLM-4526    | D-Phenylalanine (ring-D <sub>5</sub> , 97%)  | DLM-1693    | L-Threonine (D <sub>5</sub> , 98%)   |
| CLM-761     | DL-Phenylalanine (1- <sup>13</sup> C, 99%)   | NLM-742     | L-Threonine ( <sup>15</sup> N, 98%)  |
| DLM-2983    | DL-Phenylalanine (2-D, 98%)  | CDLM-9307   | L-Threonine (4- <sup>13</sup> C, 97%; 2,3-D <sub>2</sub> , 96-98%)   |
| DLM-2986    | DL-Phenylalanine (ring-D <sub>5</sub> , 98%)   | CNLM-587    | L-Threonine ( <sup>13</sup> C <sub>4</sub> , 97-99%; <sup>15</sup> N, 97-99%)                              |
| NLM-3434    | DL-Phenylalanine ( <sup>15</sup> N, 98%)   | DNLM-7367   | L-Threonine (D <sub>5</sub> , 97%; <sup>15</sup> N, 98%)   |
| CLM-762     | L-Phenylalanine (1- <sup>13</sup> C, 99%)  | CDNLM-6814  | L-Threonine ( <sup>13</sup> C <sub>4</sub> , 97-99%; D <sub>5</sub> , 97-99%; <sup>15</sup> N, 97-99%)     |
| CLM-1631    | L-Phenylalanine (2- <sup>13</sup> C, 99%) CP 97%   | ULM-8800    | L-Threonine (unlabeled)  |
| CLM-1053    | L-Phenylalanine (3- <sup>13</sup> C, 99%)  | CLM-778     | L-Tryptophan (1- <sup>13</sup> C, 99%)   |
| CLM-1055    | L-Phenylalanine (ring- <sup>13</sup> C <sub>6</sub> , 99%)   | CLM-1543    | L-Tryptophan (indole-2- <sup>13</sup> C, 98%)  |
| CLM-2250-H  | L-Phenylalanine ( <sup>13</sup> C <sub>9</sub> , 99%)  |             |  |

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

Continued ►

## Amino Acids and Derivatives *(continued)*

| Catalog No. | Description  |
|-------------|--|
| CLM-716     | L-Tryptophan (indole-3- <sup>13</sup> C, 95-99%)   |
| CLM-717     | L-Tryptophan (indole-4- <sup>13</sup> C, 99%) CP 95%   |
| CLM-4290-H  | L-Tryptophan ( <sup>13</sup> C <sub>11</sub> , 99%)  |
| DLM-1092    | L-Tryptophan (indole-D <sub>5</sub> , 98%)   |
| DLM-6903    | L-Tryptophan (D <sub>8</sub> , 97-98%)   |
| NLM-1208    | L-Tryptophan (indole- <sup>15</sup> N, 98%)  |
| NLM-1695    | L-Tryptophan (α- <sup>15</sup> N, 95-99%)  |
| NLM-800     | L-Tryptophan ( <sup>15</sup> N <sub>2</sub> , 98%)   |
| CNLM-2475-H | L-Tryptophan ( <sup>13</sup> C <sub>11</sub> , 99%; <sup>15</sup> N <sub>2</sub> , 99%)                                |
| DNLM-6904   | L-Tryptophan (D <sub>8</sub> , 98%; <sup>15</sup> N <sub>2</sub> , 98%)  |
| CDNLM-6816  | L-Tryptophan ( <sup>13</sup> C <sub>11</sub> , 97-99%; D <sub>8</sub> , 97-99%; <sup>15</sup> N <sub>2</sub> , 97-99%) |
| CLM-7103    | 3-Chloro-L-tyrosine (ring- <sup>13</sup> C <sub>6</sub> , 99%) CP 95%  |
| CLM-448     | DL-Tyrosine (1- <sup>13</sup> C, 99%)  |
| DLM-137     | DL-Tyrosine (3,3-D <sub>2</sub> , 98%)   |
| DLM-2914    | DL-Tyrosine (ring-3,5-D <sub>2</sub> , 98%)  |
| CLM-776     | L-Tyrosine (1- <sup>13</sup> C, 99%)   |
| CLM-437     | L-Tyrosine (2- <sup>13</sup> C, 99%)   |
| CLM-3378    | L-Tyrosine (3- <sup>13</sup> C, 99%)   |
| CLM-622     | L-Tyrosine (phenol-4- <sup>13</sup> C, 95-99%)   |
| CLM-623     | L-Tyrosine (phenol-3,5- <sup>13</sup> C <sub>2</sub> , 95-99%)   |
| CLM-1542    | L-Tyrosine (ring- <sup>13</sup> C <sub>6</sub> , 99%)  |
| CLM-2263-H  | L-Tyrosine ( <sup>13</sup> C <sub>9</sub> , 99%)   |
| DLM-2317    | L-Tyrosine (3,3-D <sub>2</sub> , 98%)  |
| DLM-449     | L-Tyrosine (ring-3,5-D <sub>2</sub> , 98%)   |
| DLM-2917    | L-Tyrosine (ring-2,6-D <sub>2</sub> , 2-D, 98%)  |
| DLM-451     | L-Tyrosine (ring-D <sub>4</sub> , 98%)   |
| DLM-589     | L-Tyrosine (D <sub>7</sub> , 98%)  |

| Catalog No. | Description   |
|-------------|---|
| NLM-590     | L-Tyrosine ( <sup>15</sup> N, 98%)  |
| OLM-621     | L-Tyrosine (phenol- <sup>17</sup> O, 35-40%)  |
| OLM-8696    | L-Tyrosine (phenol- <sup>18</sup> O, 85-90%)  |
| CDLM-2369   | L-Tyrosine (ring- <sup>13</sup> C <sub>6</sub> , 99%; 3,3-D <sub>2</sub> , 30%)                       |
| CNLM-7809   | L-Tyrosine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-7610   | L-Tyrosine (2,3- <sup>13</sup> C <sub>2</sub> , 99%; <sup>15</sup> N, 98%)                            |
| CNLM-439-H  | L-Tyrosine ( <sup>13</sup> C <sub>9</sub> , 99%; <sup>15</sup> N, 99%)                                |
| DNLM-7373   | L-Tyrosine (D <sub>7</sub> , 98%; <sup>15</sup> N, 98%)   |
| CDNLM-6815  | L-Tyrosine ( <sup>13</sup> C <sub>9</sub> , 97-99%; D <sub>7</sub> , 97-99%; <sup>15</sup> N, 97-99%) |
| CLM-166     | DL-Valine (1- <sup>13</sup> C, 99%)   |
| CLM-3277    | DL-Valine (2- <sup>13</sup> C, 99%)   |
| DLM-311     | DL-Valine (D <sub>8</sub> , 98%)  |
| NLM-236     | DL-Valine ( <sup>15</sup> N, 98%)   |
| CLM-470     | L-Valine (1- <sup>13</sup> C, 99%)  |
| CLM-3050    | L-Valine (2- <sup>13</sup> C, 99%)  |
| CLM-9217    | L-Valine (dimethyl- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-2249-H  | L-Valine ( <sup>13</sup> C <sub>5</sub> , 99%)  |
| DLM-7732    | L-Valine (3-D, 98%)   |
| DLM-4364    | L-Valine (2,3-D <sub>2</sub> , 98%)   |
| DLM-488     | L-Valine (D <sub>8</sub> , 98%)   |
| NLM-316     | L-Valine ( <sup>15</sup> N, 98%)  |
| CNLM-3466   | L-Valine (1- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-8678   | L-Valine (2- <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)  |
| CNLM-442-H  | L-Valine ( <sup>13</sup> C <sub>5</sub> , 99%; <sup>15</sup> N, 99%)                                  |
| DNLM-4643   | L-Valine (D <sub>8</sub> , 96%; <sup>15</sup> N, 96%)   |
| CDNLM-4281  | L-Valine ( <sup>13</sup> C <sub>5</sub> , 95-97%; 2,3-D <sub>2</sub> , 97%; <sup>15</sup> N, 96-99%)  |
| CDNLM-6817  | L-Valine ( <sup>13</sup> C <sub>5</sub> , 97-99%; D <sub>8</sub> , 97-99%; <sup>15</sup> N, 97-99%)   |

## Carbohydrates

| Catalog No. | Description  |
|-------------|--|
| CLM-7642    | D-Arabinitol (U- <sup>13</sup> C <sub>5</sub> , 98%)   |
| CLM-715     | D-Arabinose (1- <sup>13</sup> C, 99%)  |
| CLM-1288    | D-Arabinose (2- <sup>13</sup> C, 98%)  |
| CLM-8477    | D-Arabinose (U- <sup>13</sup> C <sub>5</sub> , 99%)  |
| DLM-1379    | D-Arabinose (2-D, 97%)   |
| CLM-1824    | 2-Deoxy-D-glucose (1- <sup>13</sup> C, 99%)  |
| CLM-2122    | 2-Deoxy-D-glucose (6- <sup>13</sup> C, 99%)  |
| CLM-10466   | 2-Deoxy-D-glucose (U- <sup>13</sup> C <sub>6</sub> , 99%)  |
| DLM-6732    | 2-Deoxy-D-glucose (1-D, 98%)   |
| DLM-6940    | 2-Deoxy-D-glucose (D <sub>8</sub> , 98%)   |
| CLM-9601    | 2-Deoxy-D-glucose-6-phosphate, disodium salt (6- <sup>13</sup> C, 99%)   |
| CLM-7266    | 2-Deoxyribose (1- <sup>13</sup> C, 99%)  |
| CLM-1118    | D-Erythrose (1- <sup>13</sup> C, 99%) 1.2% in H <sub>2</sub> O   |
| CLM-1387    | D-Erythrose (2- <sup>13</sup> C, 99%) 1.2% in H <sub>2</sub> O   |
| CLM-8944    | D-Erythrose (4- <sup>13</sup> C, 99%) 1.2% in H <sub>2</sub> O   |
| CLM-7863    | D-Erythrose (U- <sup>13</sup> C <sub>4</sub> , 98%) 1.2% in H <sub>2</sub> O   |
| CLM-6678    | D-Fructose-1,6-bisphosphate, sodium salt, hydrate (1- <sup>13</sup> C, 99%)  |
| CLM-8962    | D-Fructose-1,6-bisphosphate, sodium salt, hydrate (U- <sup>13</sup> C <sub>6</sub> , 98%)  |
| CLM-8616    | D-Fructose-6-phosphate-2Na <sup>+</sup> ·XH <sub>2</sub> O (U- <sup>13</sup> C <sub>6</sub> , 99%) may contain up to ~10% <sup>13</sup> C <sub>6</sub> glucose-6-phosphate |

| Catalog No. | Description   |
|-------------|---|
| CLM-1201    | D-Fructose (1- <sup>13</sup> C, 99%)  |
| CLM-1527    | D-Fructose (2- <sup>13</sup> C, 99%)  |
| CLM-7660    | D-Fructose (3- <sup>13</sup> C, 99%)  |
| CLM-7661    | D-Fructose (4- <sup>13</sup> C, 99%)  |
| CLM-7662    | D-Fructose (5- <sup>13</sup> C, 99%)  |
| CLM-1388    | D-Fructose (6- <sup>13</sup> C, 99%)  |
| CLM-2462    | D-Fructose (1- <sup>13</sup> C, 99%; 6- <sup>13</sup> C, 97%)                             |
| CLM-528     | D-Fructose (1,2- <sup>13</sup> C <sub>2</sub> , 99%)                                      |
| CLM-10546   | D-Fructose (4,5- <sup>13</sup> C <sub>2</sub> , 99%)                                      |
| CLM-8415    | D-Fructose (1,2,3- <sup>13</sup> C <sub>3</sub> , 99%)                                    |
| CLM-1553    | D-Fructose (U- <sup>13</sup> C <sub>6</sub> , 99%)  |
| DLM-6050    | D-Fructose (1-D, 97%)   |
| DLM-1389    | D-Fructose (6,6-D <sub>2</sub> , 98%)   |
| CLM-3705    | L-Fucose (1- <sup>13</sup> C, 99%)  |
| CLM-219     | L-Fucose (6- <sup>13</sup> C, 99%)  |
| CLM-9605    | L-Fucose (U- <sup>13</sup> C <sub>6</sub> , 99%)  |
| CLM-8998    | D-Galactose-1-phosphate, dipotassium salt (1- <sup>13</sup> C, 99%)                       |
| CLM-9873    | D-Galactose-1-phosphate, dipotassium salt (1,2- <sup>13</sup> C <sub>2</sub> , 99%)       |
| CLM-9874    | D-Galactose-1-phosphate, dipotassium salt (galactose- <sup>13</sup> C <sub>6</sub> , 99%) |

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

## Carbohydrates (continued)

| Catalog No.  | Description  |
|--------------|--|
| CLM-744      | D-Galactose (1- <sup>13</sup> C, 99%)  |
| CLM-745      | D-Galactose (2- <sup>13</sup> C, 99%)  |
| CLM-4217     | D-Galactose (1,2- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-1570     | D-Galactose (U- <sup>13</sup> C <sub>6</sub> , 99%)  |
| DLM-1390     | D-Galactose (1-D, 98%)   |
| DLM-1391     | D-Galactose (2-D, 98%)   |
| CLM-9452     | α-D-Glucopyranosyl-1-phosphate, dipotassium salt monohydrate ( <sup>13</sup> C <sub>6</sub> , 99%)           |
| CLM-9883     | D-Glucosamine-HCl ( <sup>13</sup> C <sub>6</sub> , 99%)  |
| CLM-4819     | D-Glucose (U- <sup>12</sup> C <sub>6</sub> , 99.9%)  |
| CLM-420      | D-Glucose (1- <sup>13</sup> C, 98-99%)   |
| CLM-746      | D-Glucose (2- <sup>13</sup> C, 99%)  |
| CLM-1393     | D-Glucose (3- <sup>13</sup> C, 99%)  |
| CLM-1394     | D-Glucose (4- <sup>13</sup> C, 99%)  |
| CLM-1395     | D-Glucose (5- <sup>13</sup> C, 98%)  |
| CLM-481      | D-Glucose (6- <sup>13</sup> C, 99%)  |
| CLM-2717     | D-Glucose (1- <sup>13</sup> C, 99%; 6- <sup>13</sup> C, 97%)   |
| CLM-504      | D-Glucose (1,2- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-8942     | D-Glucose (2,3- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-6750     | D-Glucose (3,4- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-8787     | D-Glucose (4,5- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-4673     | D-Glucose (1,2,3- <sup>13</sup> C <sub>3</sub> , 99%)  |
| CLM-8770     | D-Glucose (4,5,6- <sup>13</sup> C <sub>3</sub> , 98%)  |
| CLM-8946     | D-Glucose (2,3,4,5,6- <sup>13</sup> C <sub>5</sub> , 99%)  |
| CLM-1396     | D-Glucose (U- <sup>13</sup> C <sub>6</sub> , 99%)  |
| DLM-1150     | D-Glucose (1-D, 98%)   |
| DLM-1271     | D-Glucose (2-D, 98%)   |
| DLM-3557     | D-Glucose (3-D, 97-98%)  |
| DLM-9294     | D-Glucose (4-D, 98%)   |
| DLM-6754     | D-Glucose (5-D, 98%)   |
| DLM-349      | D-Glucose (6,6-D <sub>2</sub> , 99%)   |
| DLM-2062     | D-Glucose (1,2,3,4,5,6,6-D <sub>7</sub> , 97-98%)  |
| DLM-9047     | D-Glucose (U-D <sub>12</sub> , 98%)  |
| CDLM-6064    | D-Glucose (1- <sup>13</sup> C, 99%; 1-D, 98%)  |
| CDLM-999     | D-Glucose (1- <sup>13</sup> C, 98%; 2-D, 98%)  |
| CDLM-4895    | D-Glucose (1- <sup>13</sup> C, 99%; 6- <sup>13</sup> C, 97%; 6,6-D <sub>2</sub> , 98%)                       |
| CDLM-3813-50 | D-Glucose (U- <sup>13</sup> C <sub>6</sub> , 98%; 1,2,3,4,5,6,6-D <sub>7</sub> , 50%)                        |
| CDLM-3813    | D-Glucose (U- <sup>13</sup> C <sub>6</sub> , 99%; 1,2,3,4,5,6,6-D <sub>7</sub> , 97-98%)                     |
| CLM-1966     | L-Glucose (1- <sup>13</sup> C, 99%)  |
| CLM-1399     | L-Glucose (2- <sup>13</sup> C, 99%)  |
| CLM-8813     | D-Glucose-1-phosphate, dicyclohexylammonium salt, monohydrate (U- <sup>13</sup> C <sub>6</sub> , 99%) CP 95% |
| CLM-8367     | D-Glucose-6-phosphate, disodium salt, hydrate (U- <sup>13</sup> C <sub>6</sub> , 99%)                        |
| DLM-7826     | <i>myo</i> -Inositol (2-D, 91%)  |
| DLM-2725     | <i>myo</i> -Inositol (1,2,3,4,5,6-D <sub>6</sub> , 98%)  |
| CLM-4518     | Lactose ureide-2H <sub>2</sub> O (ureide- <sup>13</sup> C, 99%)  |
| ULM-4519     | Lactose ureide-2H <sub>2</sub> O (unlabeled)   |
| CLM-4423     | Lactose-H <sub>2</sub> O (glucose- <sup>13</sup> C <sub>6</sub> , 98%)                                       |
| CLM-1127     | D-Lyxose (1- <sup>13</sup> C, 99%)   |
| CLM-1525     | D-Lyxose (2- <sup>13</sup> C, 99%)   |
| CLM-1128     | D-Lyxose (5- <sup>13</sup> C, 99%)   |
| DLM-1187     | D-Lyxose (1-D, 98%)  |

| Catalog No. | Description   |
|-------------|---|
| DLM-1188    | D-Lyxose (2-D, 98%)   |
| CLM-2470    | L-Lyxose (1,2- <sup>13</sup> C <sub>2</sub> , 99%)                  |
| CLM-2642    | D-Maltose-H <sub>2</sub> O (U- <sup>13</sup> C <sub>12</sub> , 99%) |
| CLM-1189    | D-Mannitol (1- <sup>13</sup> C, 98%)                                |
| CLM-4416    | D-Mannitol (2- <sup>13</sup> C, 99%)                                |
| CLM-6733    | D-Mannitol (U- <sup>13</sup> C <sub>6</sub> , 99%)                  |
| CLM-358     | D-Mannose (1- <sup>13</sup> C, 99%)                                 |
| CLM-1523    | D-Mannose (2- <sup>13</sup> C, 99%)                                 |
| CLM-9064    | D-Mannose (3- <sup>13</sup> C, 99%)                                 |
| CLM-9394    | D-Mannose (4- <sup>13</sup> C, 99%)                                 |
| CLM-9063    | D-Mannose (5- <sup>13</sup> C, 99%)                                 |
| CLM-1192    | D-Mannose (6- <sup>13</sup> C, 99%)                                 |
| CLM-6567    | D-Mannose (U- <sup>13</sup> C <sub>6</sub> , 99%)                   |
| DLM-1193    | D-Mannose (1-D, 98%)  |
| DLM-1194    | D-Mannose (2-D, 98%)  |
| DLM-1195    | D-Mannose (6,6-D <sub>2</sub> , 98%)                                |
| CLM-1218    | L-Mannose (1- <sup>13</sup> C, 99%)                                 |
| CLM-1196    | D-Ribitol (1- <sup>13</sup> C, 99%)                                 |
| CLM-768     | D-Ribose (1- <sup>13</sup> C, 99%)                                  |
| CLM-1069    | D-Ribose (2- <sup>13</sup> C, 99%)                                  |
| CLM-1066    | D-Ribose (5- <sup>13</sup> C, 99%)                                  |
| CLM-4602    | D-Ribose (1,2- <sup>13</sup> C <sub>2</sub> , 99%)                  |
| CLM-4830    | D-Ribose (2,3,4,5- <sup>13</sup> C <sub>4</sub> , 99%)              |
| CLM-3652    | D-Ribose (U- <sup>13</sup> C <sub>5</sub> , 98%)                    |
| DLM-1070    | D-Ribose (1-D, 98%)   |
| DLM-1197    | D-Ribose (2-D, 98%)   |
| DLM-6559    | D-Ribose (3-D, 98%)   |
| DLM-7778    | D-Ribose (5,5-D <sub>2</sub> , 98%)                                 |
| CLM-8780    | Sodium D-gluconate (1- <sup>13</sup> C, 99%)                        |
| CLM-8781    | Sodium D-gluconate (U- <sup>13</sup> C <sub>6</sub> , 99%)          |
| CLM-1565    | D-Sorbitol (1- <sup>13</sup> C, 99%)                                |
| CLM-8529    | D-Sorbitol (U- <sup>13</sup> C <sub>6</sub> , 98%)                  |
| CLM-9811    | D-Sucrose (fructose- <sup>13</sup> C <sub>6</sub> , 98%)            |
| CLM-8091    | D-Sucrose (glucose- <sup>13</sup> C <sub>6</sub> , 98%)             |
| CLM-7757    | D-Sucrose ( <sup>13</sup> C <sub>12</sub> , 98%)                    |
| CLM-1203    | D-Talitol (1- <sup>13</sup> C, 99%)                                 |
| CLM-1204    | D-Talose (2- <sup>13</sup> C, 99%)                                  |
| CLM-1139    | D-Threose (1- <sup>13</sup> C, 99%) 1.8% in H <sub>2</sub> O        |
| CLM-1207    | D-Threose (2- <sup>13</sup> C, 99%) 1.8% in H <sub>2</sub> O        |
| CLM-1295    | D-Xylitol (1- <sup>13</sup> C, 99%)                                 |
| CLM-1214    | D-Xylitol (5- <sup>13</sup> C, 99%)                                 |
| CLM-7608    | D-Xylitol (U- <sup>13</sup> C <sub>5</sub> , 99%)                   |
| CLM-1140    | D-Xylose (1- <sup>13</sup> C, 99%)                                  |
| CLM-1524    | D-Xylose (2- <sup>13</sup> C, 99%)                                  |
| CLM-8593    | D-Xylose (3- <sup>13</sup> C, 99%)                                  |
| CLM-9083    | D-Xylose (4- <sup>13</sup> C, 99%)                                  |
| CLM-1219    | D-Xylose (5- <sup>13</sup> C, 99%)                                  |
| CLM-2456    | D-Xylose (1,2- <sup>13</sup> C <sub>2</sub> , 99%)                  |
| CLM-6140    | D-Xylose (U- <sup>13</sup> C <sub>5</sub> , 99%)                    |
| DLM-1215    | D-Xylose (1-D, 99%)   |
| DLM-1216    | D-Xylose (2-D, 98%)   |
| DLM-7121    | D-Xylose (D <sub>6</sub> , 98%)                                     |

## Fatty Acids and Lipids

| Catalog No. | Description  |
|-------------|--|
| DLM-1234    | Arachidic acid (methyl-D <sub>3</sub> , 98%) CP 97%  |
| DLM-1233    | Arachidic acid (D <sub>39</sub> , 98%)   |
| DLM-1661-N  | Arachidonic acid (5,6,8,9,11,12,14,15-D <sub>8</sub> , 98%)                                    |
| CLM-9666    | Butyric acid (1- <sup>13</sup> C, 99%)   |
| CLM-9768    | Butyryl coenzyme A, lithium salt (butyryl- <sup>13</sup> C <sub>4</sub> , 99%) CP 95%          |
| CLM-9950    | Decanoic acid ( <sup>13</sup> C <sub>10</sub> , 98%)   |
| DLM-2006    | Decanoic acid (methyl-D <sub>3</sub> , 98%)  |
| DLM-270     | Decanoic acid (D <sub>19</sub> , 98%)  |
| ULM-9721    | <i>N</i> -Decanoyl-D-sphingosine (ceramide D18:1/10:0) (unlabeled) CP 97%                      |
| CLM-8388    | Docosahexaenoic acid (U- <sup>13</sup> C <sub>22</sub> , 99%)                                  |
| DLM-10012   | Docosahexaenoic acid (21,21,22,22,22-D <sub>5</sub> , 98%)                                     |
| ULM-10013   | Docosahexaenoic acid (unlabeled)   |
| DLM-10015   | Docosahexaenoic acid, ethyl ester (21,21,22,22,22-D <sub>5</sub> , 98%) CP 95%                 |
| ULM-10016   | Docosahexaenoic acid, ethyl ester (unlabeled) CP 95%   |
| CLM-8398    | Docosahexaenoic acid, methyl ester (docosahexaenoate-U- <sup>13</sup> C <sub>22</sub> , 99%)   |
| DLM-10014   | Docosahexaenoic acid, methyl ester (21,21,22,22,22-D <sub>5</sub> , 98%) CP 97%                |
| CLM-9909    | Docosanoic acid (1,2,3,4,5,6- <sup>13</sup> C <sub>6</sub> , 99%) CP 95%                       |
| DLM-9180    | Docosanoic acid (22,22,22-D <sub>3</sub> , 98%)  |
| DLM-9951    | Docosanoic acid (3,3,5,5-D <sub>4</sub> , 98%) CP 95%  |
| DLM-4703    | Docosanoic acid (D <sub>43</sub> , 98%)  |
| DLM-2274    | Dodecylphosphocholine (D <sub>38</sub> , 98%)  |
| DLM-9720    | <i>cis</i> -5,8,11,14,17-Eicosapentaenoic acid (19,19,20,20,20-D <sub>5</sub> , 98%)           |
| ULM-10024   | <i>cis</i> -5,8,11,14,17-Eicosapentaenoic acid (unlabeled)                                     |
| CLM-8389    | Eicosapentaenoic acid (U- <sup>13</sup> C <sub>20</sub> , 98%)                                 |
| CLM-8399    | Eicosapentaenoic acid, methyl ester (eicosapentaenoate-U- <sup>13</sup> C <sub>20</sub> , 90%) |
| CLM-8274    | Ethyl hexanoate (hexanoate- <sup>13</sup> C <sub>6</sub> , 99%)                                |
| CLM-4338    | DL-Glycerol (1- <sup>13</sup> C, 99%) aqueous solution   |
| CLM-1397    | Glycerol (2- <sup>13</sup> C, 99%)   |
| CLM-1857    | Glycerol (1,3- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-1510    | Glycerol ( <sup>13</sup> C <sub>3</sub> , 99%)   |
| DLM-10430   | Glycerol (2-D, 95-98%) aqueous solution  |
| DLM-1229    | Glycerol (1,1,2,3,3-D <sub>5</sub> , 99%)  |
| DLM-558     | Glycerol (D <sub>8</sub> , 99%)  |
| DLM-1326    | Glycerol [(OD) <sub>3</sub> , 98%]   |
| CDLM-7745   | Glycerol ( <sup>13</sup> C <sub>3</sub> , 99%; D <sub>8</sub> , 98%) CP 95%                    |
| DLM-1308    | Heptadecanoic acid (methyl-D <sub>3</sub> , 98%)   |
| DLM-6905    | Heptadecanoic acid (D <sub>33</sub> , 98%)   |
| DLM-1820    | Heptanoic acid (2,2,3,3-D <sub>4</sub> , 98%)  |
| DLM-2731    | Heptanoic acid (D <sub>13</sub> , 98%)   |
| CLM-9790    | Hexacosanoic acid (1,2,3,4,5,6- <sup>13</sup> C <sub>6</sub> , 99%)                            |
| DLM-9953    | Hexacosanoic acid (3,3,5,5-D <sub>4</sub> , 98%) CP 95%  |
| DLM-8510    | Hexacosanoic acid (12,12,13,13-D <sub>4</sub> , 98%)   |
| DLM-2922    | DL-3-Hydroxymyristic acid (2,2,3,4,4-D <sub>5</sub> , 96%)                                     |
| CLM-2095    | Isovaleric acid (1- <sup>13</sup> C, 99%)  |
| DLM-2938    | Isovaleric acid (D <sub>9</sub> , 98%)   |
| CLM-1586    | Lauric acid (1- <sup>13</sup> C, 99%)  |
| DLM-3062    | Lauric acid (methyl-D <sub>3</sub> , 99%)  |
| DLM-563     | Lauric acid (D <sub>23</sub> , 98%)  |

| Catalog No. | Description  |
|-------------|--|
| CLM-9688    | Linoleic acid (18:2) (1- <sup>13</sup> C, 99%)   |
| CLM-6855    | Linoleic acid (18:2) (U- <sup>13</sup> C <sub>18</sub> , 98%) <10% <i>cis,trans</i> isomer CP 94%                |
| CLM-2119    | Linoleic acid (18:2), ethyl ester (1- <sup>13</sup> C, 99%)  |
| CLM-3960    | Linoleic acid (18:2), ethyl ester (linoleate-U- <sup>13</sup> C <sub>18</sub> , 98%) CP 95%                      |
| DLM-227     | Linoleic acid (18:2), ethyl ester (17,17,18,18,18-D <sub>5</sub> , 98%)  |
| DLM-766     | Linoleic acid (18:2), ethyl ester (D <sub>31</sub> , 98%) CP 95%   |
| CLM-8395    | Linoleic acid (18:2), methyl ester (linoleate-U- <sup>13</sup> C <sub>18</sub> , 98%) CP 95%                     |
| DLM-9663    | Linoleic acid (18:2), methyl ester (D <sub>31</sub> , 98%) CP 95%  |
| CLM-6229    | Linoleic acid (18:2), potassium salt (1- <sup>13</sup> C, 99%)   |
| CLM-8835    | Linoleic acid (18:2), potassium salt (U- <sup>13</sup> C <sub>18</sub> , 98%) (may have up to 5% isomers) CP 97% |
| CLM-8386    | Linolenic acid (18:3) (U- <sup>13</sup> C <sub>18</sub> , 98%) CP 95%  |
| DLM-9348    | Linolenic acid (18:3) (17,17,18,18,18-D <sub>5</sub> , 98%) CP 90%   |
| DLM-2351    | Linolenic acid (18:3), ethyl ester (17,17,18,18,18-D <sub>5</sub> , 98%) CP 95%                                  |
| CLM-8396    | Linolenic acid (18:3), methyl ester (linolenate-U- <sup>13</sup> C <sub>18</sub> , 98%) CP 95%                   |
| CLM-9792    | Lyso-PC 26:0 (hexacosanoyl-1,2,3,4,5,6- <sup>13</sup> C <sub>6</sub> , 99%)                                      |
| ULM-9791    | Lyso-PC 26:0 (unlabeled)   |
| DLM-8375    | Mixed triglycerides (U-D, 97%)   |
| CLM-1844    | Myristic acid (1- <sup>13</sup> C, 99%)  |
| CLM-3665    | Myristic acid (1,2,3- <sup>13</sup> C <sub>3</sub> , 99%)  |
| DLM-1039    | Myristic acid (methyl-D <sub>3</sub> , 98%)  |
| DLM-7487    | Myristic acid (13,13,14,14,14-D <sub>5</sub> , 98%)  |
| DLM-208     | Myristic acid (D <sub>27</sub> , 98%)  |
| CLM-6228    | Myristic acid, potassium salt (1- <sup>13</sup> C, 99%)  |
| CLM-8695    | Myristic acid, sodium salt (1,2,3- <sup>13</sup> C <sub>3</sub> , 99%)   |
| CLM-8724    | Nonanoic acid (U- <sup>13</sup> C <sub>9</sub> , 98%)  |
| DLM-7490    | Nonanoic acid (9,9,9-D <sub>3</sub> , 98%)   |
| DLM-9501    | Nonanoic acid (D <sub>17</sub> , 98%)  |
| CLM-293     | Octanoic acid (1- <sup>13</sup> C, 99%)  |
| CLM-3827    | Octanoic acid (1,2- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-2721    | Octanoic acid (1,2,3,4- <sup>13</sup> C <sub>4</sub> , 99%)  |
| CLM-3981    | Octanoic acid ( <sup>13</sup> C <sub>8</sub> , 99%)  |
| DLM-619     | Octanoic acid-D <sub>15</sub> (D, 98%)   |
| CLM-3707    | 2-Octanoyl-1,3-distearin (octanoic-1- <sup>13</sup> C, 99%)  |
| CLM-4258    | 2-Octanoyl-1,3-distearin (octanoyl-1,2- <sup>13</sup> C <sub>2</sub> , 99%)                                      |
| ULM-9722    | <i>N</i> -Octanoyl-D-sphingosine (ceramide D18:1/8:0) (unlabeled)  |
| DLM-6726    | <i>N</i> -Octyl β-glucoside (D <sub>24</sub> , 98%)  |
| CLM-2492    | Oleic acid (methyl- <sup>13</sup> C, 99%)  |
| CLM-149     | Oleic acid (1- <sup>13</sup> C, 99%)   |
| CLM-460     | Oleic acid (U- <sup>13</sup> C <sub>18</sub> , 98%)  |
| DLM-689     | Oleic acid (9,10-D <sub>2</sub> , 97%)   |
| DLM-1891    | Oleic acid (D <sub>33</sub> , 98%)   |
| DLM-8747    | Oleic acid, ethyl ester (D <sub>33</sub> , 98%) CP 95%   |
| CLM-4337    | Oleic acid, methyl ester (oleate-U- <sup>13</sup> C <sub>18</sub> , 98%)   |
| CLM-4477    | Oleic acid, potassium salt (1- <sup>13</sup> C, 99%)   |
| CLM-8856    | Oleic acid, potassium salt (U- <sup>13</sup> C <sub>18</sub> , 98%) CP 95%                                       |
| DLM-8837    | Oleic acid, potassium salt (15,15,16,16,17,17,18,18,18-D <sub>9</sub> , 98%)                                     |

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



## Fatty Acids and Lipids (continued)

| Catalog No. | Description   |
|-------------|---|
| CLM-6230    | Oleic acid, sodium salt (1- <sup>13</sup> C, 99%)   |
| CLM-8763    | Oleic acid, sodium salt (U- <sup>13</sup> C <sub>18</sub> , 98%)  |
| CLM-9583    | <i>N</i> -Oleoyl-D-sphingosine (ceramide d18:1/18:1 (9z)) (oleoyl-U- <sup>13</sup> C <sub>18</sub> , 99%) CP 95%  |
| ULM-9581    | <i>N</i> -Oleoyl-D-sphingosine (ceramide d18:1/18:1 (9z)) (unlabeled) CP 95%                                      |
| CLM-150     | Palmitic acid (1- <sup>13</sup> C, 99%)   |
| CLM-2120    | Palmitic acid (2- <sup>13</sup> C, 99%)   |
| CLM-214     | Palmitic acid (1,2- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-7896    | Palmitic acid (1,2,3,4- <sup>13</sup> C <sub>4</sub> , 99%)   |
| CLM-409     | Palmitic acid (U- <sup>13</sup> C <sub>16</sub> , 98%)  |
| DLM-8673    | Palmitic acid (12-D, 98%)   |
| DLM-1153    | Palmitic acid (2,2-D <sub>2</sub> , 98%)  |
| DLM-2890    | Palmitic acid (9,9-D <sub>2</sub> , 98%)  |
| DLM-2891    | Palmitic acid (13,13-D <sub>2</sub> , 98%)  |
| DLM-611     | Palmitic acid (methyl-D <sub>3</sub> , 98%)   |
| DLM-2893    | Palmitic acid (7,7,8,8-D <sub>4</sub> , 98%)  |
| DLM-2894    | Palmitic acid (11,11,12,12-D <sub>4</sub> , 98%)  |
| DLM-9424    | Palmitic acid (13,13,14,14,15,15,16,16,16-D <sub>9</sub> , 98%)   |
| DLM-2895    | Palmitic acid (9,9,...16,16,16-D <sub>17</sub> , 98%) CP 97%  |
| DLM-215     | Palmitic acid (D <sub>31</sub> , 98%)   |
| CLM-3957    | Palmitic acid, ethyl ester (palmitate-U- <sup>13</sup> C <sub>16</sub> , 98%) CP 95%                              |
| DLM-8793    | Palmitic acid, ethyl ester (D <sub>31</sub> , 98%)  |
| CLM-8390    | Palmitic acid, methyl ester (palmitate-U- <sup>13</sup> C <sub>16</sub> , 98%)                                    |
| CLM-2241    | Palmitoleic acid (U- <sup>13</sup> C <sub>16</sub> , 98%) CP 97%  |
| CLM-3958    | Palmitoleic acid, ethyl ester (palmitoleate-U- <sup>13</sup> C <sub>16</sub> , 98%) CP 97%                        |
| CLM-8391    | Palmitoleic acid, methyl ester (palmitoleate-U- <sup>13</sup> C <sub>16</sub> , 98%) CP 97%                       |
| CLM-9582    | <i>N</i> -Palmitoyl-D-sphingosine (ceramide d18:1/16:0) (palmitoyl-U- <sup>13</sup> C <sub>16</sub> , 99%) CP 95% |
| ULM-9580    | <i>N</i> -Palmitoyl-D-sphingosine (ceramide d18:1/16:0) (unlabeled) CP 95%  |
| DLM-1307    | Pentadecanoic acid (methyl-D <sub>3</sub> , 98%)  |
| DLM-572     | Pentanoic acid (D <sub>9</sub> , 98%)   |
| DLM-4341    | DL- $\alpha$ -Phosphatidylcholine, dihexanoyl (DHPC) (D <sub>40</sub> , 98%) CP 95%                               |
| DLM-605     | L- $\alpha$ -Phosphatidylcholine, dimyristoyl (DMPC) (dimyristoyl-D <sub>54</sub> , 97%) CP 95%                   |
| CLM-9668    | DL- $\alpha$ -Phosphatidylcholine, dipalmitoyl (DPPC) (U- <sup>13</sup> C <sub>40</sub> , 98%) CP 95%             |
| DLM-8256    | DL- $\alpha$ -Phosphatidylcholine, dipalmitoyl (DPPC) (D <sub>80</sub> , 98%) CP 95%                              |
| DLM-606     | L- $\alpha$ -Phosphatidylcholine, dipalmitoyl (DPPC) (dipalmitoyl-D <sub>62</sub> , 98%) CP 95%                   |
| DLM-7557    | L-Phosphatidylglycerol, dipalmitoyl (DPPG) (dipalmitoyl-D <sub>62</sub> , 98%)                                    |

| Catalog No. | Description   |
|-------------|---|
| DLM-6998    | Phytanic acid (3-methyl-D <sub>3</sub> , 98%) CP 95%                                |
| CLM-1889    | Potassium palmitate (1- <sup>13</sup> C, 99%)                                       |
| CLM-6865    | Potassium palmitate (1,2,3,4- <sup>13</sup> C <sub>4</sub> , 99%)                   |
| CLM-3943    | Potassium palmitate (U- <sup>13</sup> C <sub>16</sub> , 98%)                        |
| DLM-3773    | Potassium palmitate (2,2-D <sub>2</sub> , 97%)                                      |
| DLM-6199    | Potassium palmitate (methyl-D <sub>3</sub> , 98%)                                   |
| DLM-6033    | Potassium palmitate (7,7,8,8-D <sub>4</sub> , 98%)                                  |
| DLM-8302    | Pristanic acid (2-methyl-D <sub>3</sub> , 98%) CP 95%                               |
| DLM-197     | Sodium dodecyl sulfate (D <sub>25</sub> , 98%)                                      |
| CLM-1948    | Sodium octanoate (1- <sup>13</sup> C, 99%)  |
| CLM-3876    | Sodium octanoate (1,2,3,4- <sup>13</sup> C <sub>4</sub> , 99%)                      |
| CLM-3980    | Sodium octanoate (2,4,6,8- <sup>13</sup> C <sub>4</sub> , 99%)                      |
| CLM-9617    | Sodium octanoate ( <sup>13</sup> C <sub>8</sub> , 99%)                              |
| CLM-174     | Sodium palmitate (1- <sup>13</sup> C, 99%)  |
| CLM-6059    | Sodium palmitate (U- <sup>13</sup> C <sub>16</sub> , 98%)                           |
| ULM-9579    | Sphingosine (unlabeled) CP 95%  |
| CLM-490     | Stearic acid (methyl- <sup>13</sup> C, 99%)   |
| CLM-676     | Stearic acid (1- <sup>13</sup> C, 99%)  |
| CLM-6990    | Stearic acid (U- <sup>13</sup> C <sub>18</sub> , 98%) CP 97%                        |
| DLM-1154    | Stearic acid (methyl-D <sub>3</sub> , 98%)  |
| DLM-2712    | Stearic acid (17,17,18,18,18-D <sub>5</sub> , 98%)                                  |
| DLM-379     | Stearic acid (D <sub>35</sub> , 98%)  |
| CLM-8731    | Stearic acid, ethyl ester (stearate-U- <sup>13</sup> C <sub>18</sub> , 98%)         |
| CLM-8394    | Stearic acid, methyl ester (stearate-U- <sup>13</sup> C <sub>18</sub> , 98%) CP 95% |
| CLM-6227    | Stearic acid, potassium salt (1- <sup>13</sup> C, 99%)                              |
| CLM-10365   | Stearic acid, sodium salt (U- <sup>13</sup> C <sub>18</sub> , 98%) CP 97%           |
| CLM-9932    | Tetracosanoic acid (1,2,3,4,5,6- <sup>13</sup> C <sub>6</sub> , 99%) CP 96%         |
| DLM-9952    | Tetracosanoic acid (3,3,5,5-D <sub>4</sub> , 98%) CP 95%                            |
| DLM-9179    | Tetracosanoic acid (9,9,10,10-D <sub>4</sub> , 98%)                                 |
| DLM-7302    | Tetracosanoic acid (D <sub>47</sub> , 98%)  |
| CNLM-8110   | Tiglylglycine (glycine- <sup>13</sup> C <sub>2</sub> , 98%; <sup>15</sup> N, 98%)   |
| DLM-1392    | Tridecanoic acid (D <sub>25</sub> , 98%)  |
| CLM-162     | Triolein (1,1,1- <sup>13</sup> C <sub>3</sub> , 99%)                                |
| CLM-163     | Triolein (1,1,1- <sup>13</sup> C <sub>3</sub> , 99%)                                |
| CLM-164     | Tripalmitin (1,1,1- <sup>13</sup> C <sub>3</sub> , 99%)                             |
| CLM-350     | Tripalmitin (2,2,2- <sup>13</sup> C <sub>3</sub> , 99%)                             |
| CLM-8445    | Tripalmitin (glyceryl- <sup>13</sup> C <sub>3</sub> , 99%)                          |
| CLM-9468    | Tripalmitin (1,1,1,2,2,2,3,3,3,4,4,4- <sup>13</sup> C <sub>12</sub> , 99%)          |
| DLM-9986    | Tripalmitin (glyceryl-D <sub>5</sub> , 98-99%)                                      |
| DLM-9462    | Tripalmitin (trispalmitoyl-D <sub>93</sub> , 98%)                                   |
| DLM-9044    | Tripalmitin (D <sub>98</sub> , 98%)   |
| DLM-7875    | Tristearin (tristearoyl-D <sub>105</sub> , 98%)                                     |

## MRS/MRI Tracers

| Catalog No.            | Description  |
|------------------------|--|
| CLM-317                | Acetic acid (1- <sup>13</sup> C, 99%)                                  |
| CLM-318                | Acetic acid (2- <sup>13</sup> C, 99%)                                  |
| CLM-113                | Acetic acid (1,2- <sup>13</sup> C <sub>2</sub> , 99%)                  |
| CLM-548                | Choline chloride (1,2- <sup>13</sup> C <sub>2</sub> , 99%)             |
| CLM-344 <sup>†</sup>   | Ethanol (1- <sup>13</sup> C 99%) <6% H <sub>2</sub> O                  |
| CLM-130 <sup>†</sup>   | Ethanol (2- <sup>13</sup> C, 99%) <6% H <sub>2</sub> O                 |
| CLM-551 <sup>†</sup>   | Ethanol (1,2- <sup>13</sup> C <sub>2</sub> , 99%) <6% H <sub>2</sub> O |
| CLM-2291               | Ethanolamine ( <sup>13</sup> C <sub>2</sub> , 99%)                     |
| CLM-3911               | Ethanolamine-HCl (1- <sup>13</sup> C, 99%)                             |
| CLM-274                | Ethanolamine-HCl (1,2- <sup>13</sup> C <sub>2</sub> , 99%)             |
| CLM-522                | Ethyl acetoacetate (1,3- <sup>13</sup> C <sub>2</sub> , 99%)           |
| CLM-523                | Ethyl acetoacetate (2,4- <sup>13</sup> C <sub>2</sub> , 99%)           |
| CLM-1529               | Fumaric acid ( <sup>13</sup> C <sub>4</sub> , 99%)                     |
| CLM-4338 <sup>†</sup>  | DL-Glycerol (1- <sup>13</sup> C, 99%)                                  |
| CLM-1397               | Glycerol (2- <sup>13</sup> C, 99%)                                     |
| CLM-1857               | Glycerol (1,3- <sup>13</sup> C <sub>2</sub> , 99%)                     |
| DLM-10430 <sup>†</sup> | Glycerol (2-D, 95-98%)   |
| DLM-1229               | Glycerol (1,1,2,3,3-D <sub>5</sub> , 99%)                              |
| CLM-9675               | 1,2-Glycerol carbonate (carbonyl- <sup>13</sup> C, 99%) CP >97%        |
| CLM-8065               | L-Malic acid ( <sup>13</sup> C <sub>4</sub> , 99%)                     |
| CLM-1189               | D-Mannitol (1- <sup>13</sup> C, 98%)                                   |
| CLM-646                | Propionic acid (1- <sup>13</sup> C, 99%)                               |
| CLM-647                | Propionic acid ( <sup>13</sup> C <sub>3</sub> , 99%)                   |

➤ Please visit [isotope.com](http://isotope.com) for a complete listing of MRS/MRI products.

## Organic Acids

| Catalog No. | Description  |
|-------------|--|
| CLM-317     | Acetic acid (1- <sup>13</sup> C, 99%)  |
| CLM-318     | Acetic acid (2- <sup>13</sup> C, 99%)  |
| CLM-113     | Acetic acid (1,2- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-9878    | <i>trans</i> -Aconitic acid (2,4,4'- <sup>13</sup> C <sub>3</sub> , 99%) CP 95%                  |
| DLM-2115    | Adipic acid (D <sub>10</sub> , 98%)  |
| CLM-7337    | Citric acid (1,5- <sup>13</sup> C <sub>2</sub> , 98%)  |
| CLM-148     | Citric acid (2,4- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-9876    | Citric acid (1,5,6-carboxyl- <sup>13</sup> C <sub>3</sub> , 99%)                                 |
| CLM-9021    | Citric acid ( <sup>13</sup> C <sub>6</sub> , 99%) CP 97%   |
| DLM-3487    | Citric acid (2,2,4,4-D <sub>4</sub> , 98%)   |
| CLM-7933    | Creatine (guanidino- <sup>13</sup> C, 99%)   |
| DLM-1302    | Creatine (methyl-D <sub>3</sub> , 98%) CP 97%  |
| DLM-3653    | Creatinine (N-methyl-D <sub>3</sub> , 98%)   |
| CLM-1529    | Fumaric acid ( <sup>13</sup> C <sub>4</sub> , 99%)   |
| DLM-1539    | Fumaric acid (2,3-D <sub>2</sub> , 98%)  |
| DLM-7654    | Fumaric acid (D <sub>4</sub> , 98%)  |
| CDLM-6062   | Fumaric acid (1- <sup>13</sup> C, 99%; 2,3-D <sub>2</sub> , 98%)                                 |
| CDLM-8473   | Fumaric acid (1,4- <sup>13</sup> C <sub>2</sub> , 99%; 2,3-D <sub>2</sub> , 98%)                 |
| CLM-373     | Homovanillic acid (1,2- <sup>13</sup> C <sub>2</sub> , 98-99%)                                   |
| DLM-2738    | Homovanillic acid (phenyl-D <sub>3</sub> , 2,2-D <sub>2</sub> , 96-98%)                          |
| COLM-376    | Homovanillic acid (ring- <sup>13</sup> C <sub>6</sub> , 99%; 4-hydroxy- <sup>18</sup> O, 90-95%) |
| CLM-10351   | DL-2-Hydroxyglutaric acid, disodium salt ( <sup>13</sup> C <sub>5</sub> , 99%)                   |
| ULM-10479   | DL-2-Hydroxyglutaric acid, disodium salt (unlabeled)   |

<sup>†</sup> Compounds available in solution only.

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

| Catalog No.           | Description  |
|-----------------------|--|
| CLM-8077              | Pyruvic acid (1- <sup>13</sup> C, 99%)   |
| CLM-8849              | Pyruvic acid (2- <sup>13</sup> C, 99%) CP 95%                                      |
| CLM-9505              | Pyruvic acid (1,2- <sup>13</sup> C <sub>2</sub> , 99%)                             |
| CLM-156               | Sodium acetate (1- <sup>13</sup> C, 99%)   |
| CLM-381               | Sodium acetate (2- <sup>13</sup> C, 99%)   |
| CLM-440               | Sodium acetate (1,2- <sup>13</sup> C <sub>2</sub> , 99%)                           |
| CLM-1256              | Sodium butyrate (1- <sup>13</sup> C, 99%)  |
| CLM-10426             | Sodium butyrate ( <sup>13</sup> C <sub>4</sub> , 99%)                              |
| CLM-3706              | Sodium D-3-hydroxybutyrate (2,4- <sup>13</sup> C <sub>2</sub> , 99%)               |
| CLM-1577 <sup>†</sup> | Sodium L-lactate (1- <sup>13</sup> C, 99%) 20% w/w in H <sub>2</sub> O             |
| CLM-1578 <sup>†</sup> | Sodium L-lactate (3- <sup>13</sup> C, 98%) 20% w/w in H <sub>2</sub> O             |
| CLM-1579 <sup>†</sup> | Sodium L-lactate ( <sup>13</sup> C <sub>3</sub> , 98%) 20% w/w in H <sub>2</sub> O |
| DLM-9071 <sup>†</sup> | Sodium L-lactate (3,3,3-D <sub>3</sub> , 98%) 20% w/w in H <sub>2</sub> O          |
| CLM-771               | Sodium propionate (1- <sup>13</sup> C, 99%)  |
| CLM-1506              | Sodium propionate (2- <sup>13</sup> C, 99%)  |
| CLM-4573              | Sodium propionate (3- <sup>13</sup> C, 99%)  |
| CLM-3042              | Sodium propionate (2,3- <sup>13</sup> C <sub>2</sub> , 99%)                        |
| CLM-1865              | Sodium propionate ( <sup>13</sup> C <sub>3</sub> , 99%)                            |
| CLM-1082              | Sodium pyruvate (1- <sup>13</sup> C, 99%)  |
| CLM-1580              | Sodium pyruvate (2- <sup>13</sup> C, 99%)  |
| CLM-1575              | Sodium pyruvate (3- <sup>13</sup> C, 99%)  |
| CLM-1565              | D-Sorbitol (1- <sup>13</sup> C, 99%)   |
| CLM-8529              | D-Sorbitol ( <sup>13</sup> C <sub>6</sub> , 98%)                                   |
| CLM-9371              | Succinic acid, disodium salt (2,3- <sup>13</sup> C <sub>2</sub> , 99%)             |

| Catalog No. | Description   |
|-------------|---|
| DLM-9104    | (RS)-2-Hydroxyglutaric acid, disodium salt (2,3,3-D <sub>3</sub> ; OD, 98%) CP 95%  |
| CLM-6820    | α-Ketobutyric acid, sodium salt (methyl- <sup>13</sup> C, 99%)  |
| CLM-6164    | α-Ketobutyric acid, sodium salt ( <sup>13</sup> C <sub>4</sub> , 98%)   |
| CDLM-7318   | α-Ketobutyric acid, sodium salt (methyl- <sup>13</sup> C, 99%; 3,3-D <sub>2</sub> , 98%)  |
| CDLM-7353   | α-Ketobutyric acid, sodium salt (4- <sup>13</sup> C, 99%; 3,3,4,4-D <sub>4</sub> , 98%)   |
| CDLM-4611   | α-Ketobutyric acid, sodium salt ( <sup>13</sup> C <sub>4</sub> , 98%; 3,3-D <sub>2</sub> , 98%)                                       |
| CLM-2411    | α-Ketoglutaric acid ( <sup>13</sup> C <sub>5</sub> , 99%) CP >90%   |
| DLM-9476    | α-Ketoglutaric acid (D <sub>6</sub> , 98%)  |
| CLM-4442    | α-Ketoglutaric acid, disodium salt (1,2,3,4- <sup>13</sup> C <sub>4</sub> , 99%) CP 97%   |
| CLM-2093    | α-Ketoisocaproic acid, sodium salt (1- <sup>13</sup> C, 99%)  |
| CLM-4826    | α-Ketoisocaproic acid, sodium salt (1,2- <sup>13</sup> C <sub>2</sub> , 99%)  |
| DLM-1944    | α-Ketoisocaproic acid, sodium salt (methyl-D <sub>3</sub> , 98%)  |
| DLM-4214    | α-Ketoisocaproic acid, sodium salt (isopropyl-D <sub>3</sub> , 98%)   |
| CLM-6821    | α-Ketoisovaleric acid, sodium salt (dimethyl- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-4418    | α-Ketoisovaleric acid, sodium salt ( <sup>13</sup> C <sub>5</sub> , 98%)  |
| DLM-4646    | α-Ketoisovaleric acid, sodium salt (D <sub>7</sub> , 98%)   |
| CDLM-7317   | α-Ketoisovaleric acid, sodium salt (3-methyl- <sup>13</sup> C, 99%; 3,4,4,4-D <sub>4</sub> , 98%)                                     |
| CDLM-8446   | α-Ketoisovaleric acid, sodium salt (dimethyl- <sup>13</sup> C <sub>2</sub> , 98%; 3-methyl-D <sub>2</sub> , 4,4-D <sub>2</sub> , 98%) |
| CDLM-7354   | α-Ketoisovaleric acid, sodium salt (3-methyl- <sup>13</sup> C, 99%; 3-methyl-D <sub>2</sub> , 3,4,4,4,4-D <sub>4</sub> , 98%)         |

## Organic Acids (continued)

| Catalog No. | Description  |
|-------------|--|
| CDLM-8100   | $\alpha$ -Ketoisovaleric acid, sodium salt (1,2,3,4- <sup>13</sup> C <sub>4</sub> , 99%; 3,4',4',4'-D <sub>4</sub> , 97-98%) |
| CDLM-4418   | $\alpha$ -Ketoisovaleric acid, sodium salt ( <sup>13</sup> C <sub>5</sub> , 98%; 3-D, 98%)                                   |
| DLM-7374    | Kynurenic acid (ring-D <sub>5</sub> , 98%)   |
| DLM-1129    | Maleic acid (2,3-D <sub>2</sub> , 98%)   |
| CLM-310     | Maleic anhydride (1,4- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-312     | Maleic anhydride (2,3- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-6019    | Maleic anhydride ( <sup>13</sup> C <sub>4</sub> , 99%)   |
| DLM-1853    | Maleic anhydride (D <sub>2</sub> , 98%)  |
| DLM-9045    | DL-Malic acid (2,3,3-D <sub>3</sub> , 98%)   |
| CLM-8065    | L-Malic acid ( <sup>13</sup> C <sub>4</sub> , 99%)   |
| CLM-4285    | 3-Methylglutaconic acid (2,4- <sup>13</sup> C <sub>2</sub> , 3-methyl- <sup>13</sup> C, 99%)                                 |
| DLM-387     | Methylmalonic acid (methyl-D <sub>3</sub> , 98%)   |
| CNLM-9247   | 3-Methyluric acid (2,4,5,6- <sup>13</sup> C <sub>4</sub> , 99%; 1,3,9- <sup>15</sup> N <sub>3</sub> , 98%)                   |
| NLM-1048    | Orotic acid-H <sub>2</sub> O (1,3- <sup>15</sup> N <sub>2</sub> , 98%)   |
| CLM-3551    | Potassium phosphoenol pyruvate (2- <sup>13</sup> C, 99%)   |
| CLM-2723    | Potassium phosphoenol pyruvate (3- <sup>13</sup> C, 99%)   |
| CLM-3398    | Potassium phosphoenol pyruvate (2,3- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-646     | Propionic acid (1- <sup>13</sup> C, 99%)   |
| CLM-647     | Propionic acid ( <sup>13</sup> C <sub>3</sub> , 99%)   |
| DLM-2488    | Propionic acid (2,2-D <sub>2</sub> , 98%)  |
| DLM-1137    | Propionic acid (methyl-D <sub>3</sub> , 98%)   |
| DLM-1919    | Propionic acid (D <sub>5</sub> , 98%)  |
| DLM-599     | Propionic acid (D <sub>6</sub> , 98%)  |
| CLM-8077    | Pyruvic acid (1- <sup>13</sup> C, 99%)   |
| CLM-8849    | Pyruvic acid (2- <sup>13</sup> C, 99%) CP 95%  |
| CLM-9505    | Pyruvic acid (1,2- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-2471    | Sodium acetate – <sup>13</sup> C depleted (1,2- <sup>12</sup> C <sub>2</sub> , 99.95%)                                       |
| CLM-156     | Sodium acetate (1- <sup>13</sup> C, 99%)   |
| CLM-381     | Sodium acetate (2- <sup>13</sup> C, 99%)   |
| CLM-440     | Sodium acetate (1,2- <sup>13</sup> C <sub>2</sub> , 99%)   |
| DLM-3126    | Sodium acetate (D <sub>3</sub> , 99%)  |
| OLM-1077    | Sodium acetate ( <sup>18</sup> O <sub>2</sub> , 95%)   |
| CDLM-611    | Sodium acetate (1- <sup>13</sup> C, 99%; D <sub>3</sub> , 98%)   |
| CDLM-1240   | Sodium acetate (2- <sup>13</sup> C, 99%; D <sub>3</sub> , 98%)   |
| CDLM-3457   | Sodium acetate (1,2- <sup>13</sup> C <sub>2</sub> , 99%; D <sub>3</sub> , 98%)   |

| Catalog No.            | Description  |
|------------------------|--|
| CLM-1256               | Sodium butyrate (1- <sup>13</sup> C, 99%)  |
| CLM-4780               | Sodium butyrate (2- <sup>13</sup> C, 99%)  |
| DLM-641                | Sodium butyrate (3,3,4,4,4-D <sub>5</sub> , 98%)                                   |
| DLM-7616               | Sodium butyrate (D <sub>7</sub> , 98%)   |
| CLM-3706               | Sodium D-3-hydroxybutyrate (2,4- <sup>13</sup> C <sub>2</sub> , 99%)               |
| CLM-3853               | Sodium D-3-hydroxybutyrate ( <sup>13</sup> C <sub>4</sub> , 99%) CP 97%            |
| DLM-10415 <sup>†</sup> | Sodium DL-3-hydroxybutyrate (D <sub>4</sub> , 98%) CP 95%                          |
| CLM-583                | Sodium formate ( <sup>13</sup> C, 99%)   |
| OLM-8123               | Sodium formate ( <sup>18</sup> O <sub>2</sub> , 95%)                               |
| CLM-1577               | Sodium L-lactate (1- <sup>13</sup> C, 99%) 20% w/w in H <sub>2</sub> O             |
| CLM-1578               | Sodium L-lactate (3- <sup>13</sup> C, 98%) 20% w/w in H <sub>2</sub> O             |
| CLM-1579               | Sodium L-lactate ( <sup>13</sup> C <sub>3</sub> , 98%) 20% w/w in H <sub>2</sub> O |
| DLM-9071               | Sodium L-lactate (3,3,3-D <sub>3</sub> , 98%) 20% w/w in H <sub>2</sub> O          |
| CLM-771                | Sodium propionate (1- <sup>13</sup> C, 99%)  |
| CLM-1506               | Sodium propionate (2- <sup>13</sup> C, 99%)  |
| CLM-4573               | Sodium propionate (3- <sup>13</sup> C, 99%)  |
| CLM-3042               | Sodium propionate (2,3- <sup>13</sup> C <sub>2</sub> , 99%)                        |
| CLM-1865               | Sodium propionate ( <sup>13</sup> C <sub>3</sub> , 99%)                            |
| DLM-1601               | Sodium propionate (D <sub>5</sub> , 98%)   |
| CLM-1082               | Sodium pyruvate (1- <sup>13</sup> C, 99%)  |
| CLM-1580               | Sodium pyruvate (2- <sup>13</sup> C, 99%)  |
| CLM-1575               | Sodium pyruvate (3- <sup>13</sup> C, 99%)  |
| CLM-3507               | Sodium pyruvate (2,3- <sup>13</sup> C <sub>2</sub> , 99%)                          |
| CLM-2440               | Sodium pyruvate ( <sup>13</sup> C <sub>3</sub> , 99%)                              |
| DLM-6068               | Sodium pyruvate (D <sub>3</sub> , 97-98%)  |
| CLM-1084               | Succinic acid (1,4- <sup>13</sup> C <sub>2</sub> , 99%)                            |
| CLM-1199               | Succinic acid (2,3- <sup>13</sup> C <sub>2</sub> , 99%)                            |
| DLM-584                | Succinic acid (D <sub>4</sub> , 98%)   |
| DLM-831                | Succinic acid (D <sub>6</sub> , 98%)   |
| DLM-2307               | Succinic acid, disodium salt (D <sub>4</sub> , 75%) CP 95%                         |
| CLM-3399               | Valproic acid (1,2,3,3'- <sup>13</sup> C <sub>4</sub> , 99%)                       |
| DLM-4291               | Valproic acid (4,4,4',4'-D <sub>4</sub> , 98%)                                     |
| DLM-7876               | Valproic acid (propyl-1,1-D <sub>2</sub> , pentanoic-3,3-D <sub>2</sub> , 98%)     |
| DLM-8875               | Valproic acid (D <sub>15</sub> , 98%)  |

## Other Compounds

| Catalog No. | Description  |
|-------------|--|
| CLM-173     | Acetaldehyde (1,2- <sup>13</sup> C <sub>2</sub> , 99%)   |
| DLM-112     | Acetaldehyde (D <sub>4</sub> , 99%)  |
| CLM-1220    | <i>N</i> -Acetylglucosamine ( <i>N</i> -acetyl-1- <sup>13</sup> C, 99%)  |
| CLM-1827    | <i>N</i> -Acetylglucosamine ( <sup>13</sup> C <sub>6</sub> , 99%)  |
| NLM-8810    | <i>N</i> -Acetylglucosamine ( <sup>15</sup> N, 98%)  |
| DLM-9262    | <i>N,N'</i> -bis(3-Aminopropyl)-1,4-butanediamine-4HCl (1,1,2,2,3,3,4,4-D <sub>8</sub> , 97%) CP 95%             |
| ULM-10265   | <i>N,N'</i> -bis(3-Aminopropyl)-1,4-butanediamine-4HCl (unlabeled) CP 95%  |
| CLM-9435    | <i>N</i> -(3-Aminopropyl) butane-1,4-diamine-3HCl (spermidine-3HCl) ( <sup>13</sup> C <sub>4</sub> , 99%) CP 95% |

| Catalog No. | Description   |
|-------------|---|
| DLM-9261    | <i>N</i> -(3-Aminopropyl) butane-1,4-diamine-3HCl (1,1,2,2,3,3,4,4-D <sub>8</sub> , 98%) CP 95% |
| ULM-10264   | <i>N</i> -(3-Aminopropyl) butane-1,4-diamine (unlabeled) CP 95%                                 |
| NLM-467     | Ammonium chloride ( <sup>15</sup> N, 99%)   |
| NLM-390     | Ammonium nitrate ( <sup>15</sup> N <sub>2</sub> , 98%)  |
| NLM-390-10  | Ammonium nitrate ( <sup>15</sup> N <sub>2</sub> , 10%)  |
| NLM-390-5   | Ammonium nitrate ( <sup>15</sup> N <sub>2</sub> , 5%)   |
| NLM-711     | Ammonium nitrate (ammonium- <sup>15</sup> N, 98%)   |
| NLM-711-10  | Ammonium nitrate (ammonium- <sup>15</sup> N, 10%)   |
| NLM-712     | Ammonium nitrate (nitrate- <sup>15</sup> N, 98%)  |
| NLM-712-10  | Ammonium nitrate (nitrate- <sup>15</sup> N, 10%)  |

<sup>†</sup> Compounds available in solution only.

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

Continued ►

## Other Compounds (continued)

| Catalog No. | Description  |
|-------------|--|
| DLM-1100    | Ammonium sulfate (D <sub>8</sub> , 98%)  |
| NLM-713     | Ammonium sulfate ( <sup>15</sup> N <sub>2</sub> , 99%)   |
| NLM-713-10  | Ammonium sulfate ( <sup>15</sup> N <sub>2</sub> , 10%)   |
| NLM-713-5   | Ammonium sulfate ( <sup>15</sup> N <sub>2</sub> , 5%)  |
| CLM-8141    | Arsenobetaine bromide (carboxymethyl- <sup>13</sup> C <sub>2</sub> , 99%)                                |
| CNLM-9695   | 5-Azacytosine (4,6- <sup>13</sup> C <sub>2</sub> , 98%; <sup>15</sup> N <sub>4</sub> , 98%)              |
| NLM-499     | Calcium nitrate ( <sup>15</sup> N <sub>2</sub> , 98%)  |
| NLM-499-10  | Calcium nitrate ( <sup>15</sup> N <sub>2</sub> , 10%)  |
| DLM-9786    | <i>p</i> -Cresol sulfate, potassium salt (D <sub>7</sub> , 98%) CP 97%                                   |
| DLM-4       | Deuterium oxide (D, 99.9%)   |
| DLM-4-99.8  | Deuterium oxide (D, 99.8%)   |
| DLM-4-99    | Deuterium oxide (D, 99%)   |
| CLM-9255    | 1,3-Diaminobenzene ( <sup>13</sup> C <sub>6</sub> , 99%) CP 95%  |
| CLM-344     | Ethanol (1- <sup>13</sup> C, 99%) <6% H <sub>2</sub> O   |
| CLM-130     | Ethanol (2- <sup>13</sup> C, 99%) <6% H <sub>2</sub> O   |
| CLM-551     | Ethanol (1,2- <sup>13</sup> C <sub>2</sub> , 99%) <6% H <sub>2</sub> O                                   |
| CLM-2291    | Ethanolamine ( <sup>13</sup> C <sub>2</sub> , 99%)   |
| DLM-552     | Ethanolamine (1,1,2,2-D <sub>4</sub> , 98%)  |
| NLM-8722    | Ethanolamine ( <sup>15</sup> N, 98%)   |
| CLM-3911    | Ethanolamine-HCl (1- <sup>13</sup> C, 99%)   |
| CLM-274     | Ethanolamine-HCl (1,2- <sup>13</sup> C <sub>2</sub> , 99%)   |
| NLM-6723    | Guanidine-HBr ( <sup>15</sup> N <sub>3</sub> , 98%)  |
| CLM-9260    | 4-Hydroxy-3-methoxycinnamic acid (ferulic acid) (1',2',3'- <sup>13</sup> C <sub>3</sub> , 99%)           |
| CNLM-10399  | DL-3-Hydroxykynurenine (1,2,3- <sup>13</sup> C <sub>3</sub> , 98%; α-amino- <sup>15</sup> N, 98%) CP 95% |
| DLM-7842    | L-Kynurenine sulfate (ring-D <sub>4</sub> , 3,3-D <sub>2</sub> , 97%) CP 95%                             |

| Catalog No. | Description   |
|-------------|---|
| CLM-359     | Methanol ( <sup>13</sup> C, 99%)  |
| DLM-1211    | Methanol (D, 98%)   |
| DLM-1209    | Methanol (D <sub>2</sub> , 98%)   |
| CDLM-1035   | Methanol ( <sup>13</sup> C, 99%; D <sub>3</sub> , 98%)  |
| DLM-651     | Methyl formate (formyl-D, 99%)  |
| CLM-10410   | Porphobilinogen (propanoic-1,2- <sup>13</sup> C <sub>2</sub> , 99%) CP 95%                          |
| NLM-765     | Potassium nitrate ( <sup>15</sup> N, 99%)   |
| NLM-765-10  | Potassium nitrate ( <sup>15</sup> N, 10%)   |
| CLM-222     | Potassium thiocyanate ( <sup>13</sup> C, 95-99%) CP 95%   |
| CNLM-3952   | Potassium thiocyanate ( <sup>13</sup> C, 99%; <sup>15</sup> N, 98%)                                 |
| DLM-3579    | Serotonin creatinine sulfate complex (α,α,β,β-D <sub>4</sub> , 98%)                                 |
| CLM-441     | Sodium bicarbonate ( <sup>13</sup> C, 99%)  |
| CLM-9676    | Sodium isopropyl carbonate (carbonyl- <sup>13</sup> C, 99%)   |
| NLM-157     | Sodium nitrate ( <sup>15</sup> N, 98%)  |
| CLM-3780    | Sodium dichloroacetate ( <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-10417   | Toxoflavin (3,4α,5,8α- <sup>13</sup> C <sub>4</sub> , 98%) CP 95%                                   |
| CNLM-9258   | 1,2,4-Triazole (3,5- <sup>13</sup> C <sub>2</sub> , 99%; 1,2,4- <sup>15</sup> N <sub>3</sub> , 98%) |
| DLM-4779    | Trimethylamine <i>N</i> -oxide (D <sub>9</sub> , 98%)   |
| CLM-311     | Urea ( <sup>13</sup> C, 99%)  |
| DLM-1269    | Urea (D <sub>4</sub> , 98%)   |
| NLM-233     | Urea ( <sup>15</sup> N <sub>2</sub> , 98%)  |
| NLM-233-10  | Urea ( <sup>15</sup> N <sub>2</sub> , 10%)  |
| NLM-233-5   | Urea ( <sup>15</sup> N <sub>2</sub> , 5%)   |
| OLM-655     | Urea ( <sup>18</sup> O, 95%)  |
| CNLM-234    | Urea ( <sup>13</sup> C, 99%; <sup>15</sup> N <sub>2</sub> , 98%)                                    |
| COLM-4861   | Urea ( <sup>13</sup> C, 99%; <sup>18</sup> O, 98%)  |
| CNOLM-8871  | Urea ( <sup>13</sup> C, 99%; <sup>15</sup> N <sub>2</sub> , 99%; <sup>18</sup> O, 99%)              |

## Steroids and Hormones

| Catalog No.            | Description   |
|------------------------|---|
| DLM-8438*              | Aldosterone (2,2,4,6,6,17,21,21-D <sub>8</sub> )                                      |
| ULM-9134 <sup>††</sup> | Aldosterone (unlabeled) CP 95%  |
| CLM-10548              | 5α-Androstan-3,17-dione (androstenedione) (2,3,4- <sup>13</sup> C <sub>3</sub> , 98%) |
| ULM-8794*              | 5α-Androstan-3,17-dione (androstenedione) (unlabeled)                                 |
| DLM-9769*              | 5α-Androstan-3α-ol-17β-diol (16,16,17-D <sub>3</sub> , 98%)                           |
| ULM-9752*              | 5α-Androstan-3α-ol-17β-diol (unlabeled)   |
| DLM-10269              | 5α-Androstan-3β-ol-17-one (epiandrosterone) (2,2,4,4-D <sub>4</sub> , 98%)            |
| ULM-10270              | 5α-Androstan-3β-ol-17-one (epiandrosterone) (unlabeled)                               |
| DLM-8750               | 5β-Androstan-3α-ol-17-one (etiocholanolone) (16,16-D <sub>2</sub> , 98%)              |
| DLM-10008*             | 5β-Androstan-3α-ol-17-one (etiocholanolone) (2,2,3,4,4-D <sub>5</sub> , 98%)          |
| ULM-10009*             | 5β-Androstan-3α-ol-17-one (etiocholanolone) (unlabeled)                               |
| DLM-9787               | Androstenediol glucuronide, sodium salt (16,16,17-D <sub>3</sub> , 98%) CP 97%        |
| DLM-10397              | 4-Androsten-11β,17β-diol-3-one (9,11,12,12-D <sub>4</sub> , 98%) CP 95%               |

| Catalog No.             | Description  |
|-------------------------|--|
| DLM-10396               | 4-Androsten-11β-ol-3,17-dione (9,11,12,12-D <sub>4</sub> , 98%)                |
| DLM-9697                | 4-Androsten-11β-ol-3,17-dione (2,2,4,6,6,16,16-D <sub>7</sub> , 98%)           |
| DLM-10401               | 5-Androsten-3β,17β-diol (16,16,17-D <sub>3</sub> , 98%) CP 95%                 |
| CLM-9135*               | 4-Androstene-3,17-dione (2,3,4- <sup>13</sup> C <sub>3</sub> , 98%)            |
| DLM-8330                | 4-Androstene-3,17-dione (2,2,4,6,6-D <sub>5</sub> , 98%)                       |
| DLM-7976                | 4-Androstene-3,17-dione (2,2,4,6,6,16,16-D <sub>7</sub> , 97%)                 |
| ULM-8472*               | 4-Androstene-3,17-dione (unlabeled)  |
| DLM-10420 <sup>††</sup> | 4-Androstene-6β,17β-diol-3-one (16,16,17-D <sub>3</sub> , 98%)                 |
| DLM-7937                | Androsterone (5α-androstan-3α-ol-17-one) (16,16-D <sub>2</sub> , 98%)          |
| DLM-10402 <sup>††</sup> | Androsterone (5α-androstan-3α-ol-17-one) (2,2,4,4-D <sub>4</sub> , 98%) CP 95% |
| ULM-10403*              | Androsterone (5α-androstan-3α-ol-17-one) (unlabeled)                           |
| DLM-9137                | Androsterone glucuronide, sodium salt (2,2,4,4-D <sub>4</sub> , 98%)           |
| ULM-9138                | Androsterone glucuronide, sodium salt (unlabeled)                              |
| DLM-4700                | Cholestane (3,3-D <sub>2</sub> , 98%)  |
| DLM-8276                | Cholestenone (2,2,4,6,6-D <sub>5</sub> , 98%)                                  |
| CLM-804                 | Cholesterol (3,4- <sup>13</sup> C <sub>2</sub> , 99%)                          |
| CLM-9139*               | Cholesterol (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%)                        |
| CLM-9587*               | Cholesterol (23,24,25,26,27- <sup>13</sup> C <sub>5</sub> , 99%)               |
| DLM-1831                | Cholesterol (3-D, 97%)   |

\* Compounds available in dry and solution forms.

† Compounds available in solution only.

†† Compounds available in dry and solution forms; chemical purity varies 95-98%.

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

## Steroids and Hormones (continued)

| Catalog No.            | Description  |
|------------------------|--|
| DLM-7260               | Cholesterol (25,26,26,26-D <sub>4</sub> , 98%)   |
| DLM-2607 <sup>††</sup> | Cholesterol (2,2,3,4,4,6-D <sub>6</sub> , 97-98%)  |
| DLM-3057               | Cholesterol (25,26,26,26,27,27,27-D <sub>7</sub> , 98%)  |
| OLM-7695               | Cholesterol ( <sup>18</sup> O, 80%)  |
| ULM-9140*              | Cholesterol (unlabeled)  |
| CLM-3361               | Cholesterol-3-octanoate (octanoate-1- <sup>13</sup> C, 99%)  |
| DLM-10416              | Cholesterol-3-sulfate, sodium salt (25,26,26,26,27,27,27-D <sub>7</sub> , 98%)                     |
| DLM-7347               | Corticosterone (2,2,4,6,6,17 $\alpha$ ,21,21-D <sub>8</sub> , 97-98%)                              |
| ULM-9988*              | Corticosterone (unlabeled)   |
| CLM-10371 <sup>†</sup> | Cortisol (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%)   |
| DLM-2615               | Cortisol (1,2-D <sub>2</sub> , 98%)  |
| DLM-2057               | Cortisol (9,12,12-D <sub>3</sub> , 98%)  |
| DLM-2218               | Cortisol (9,11,12,12-D <sub>4</sub> , 98%)   |
| ULM-9141*              | Cortisol (unlabeled)   |
| CLM-10536 <sup>†</sup> | Cortisone (2,3,4- <sup>13</sup> C <sub>3</sub> , 98%) CP 97%                                       |
| DLM-8863               | Cortisone (1,2-D <sub>2</sub> , 98%) CP 95%  |
| DLM-9142*              | Cortisone (2,2,4,6,6,12,12-D <sub>7</sub> )  |
| DLM-9976               | Cortisone (2,2,4,6,6,9,12,12-D <sub>8</sub> , 98%)   |
| ULM-9202*              | Cortisone (unlabeled)  |
| CLM-10537 <sup>†</sup> | Cortisone 21-sulfate, sodium salt (2,3,4- <sup>13</sup> C <sub>3</sub> , 98%) CP 95%               |
| DLM-4216               | 7-Dehydrocholesterol (25,26,26,26,27,27,27-D <sub>7</sub> , 98%)                                   |
| CLM-10549*             | Dehydroepiandrosterone (DHEA) (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%)                          |
| DLM-7714               | Dehydroepiandrosterone (DHEA) (16,16-D <sub>2</sub> , 97%)   |
| DLM-8049 <sup>††</sup> | Dehydroepiandrosterone (DHEA) (2,2,3,4,4,6-D <sub>6</sub> , 97-99%) CP 97%                         |
| ULM-9143*              | Dehydroepiandrosterone (DHEA) (unlabeled)  |
| DLM-8701               | Dehydroepiandrosterone sulfate, sodium salt (DHEAS) (16,16-D <sub>2</sub> , 97%)                   |
| DLM-8337*              | Dehydroepiandrosterone sulfate, sodium salt (DHEAS) (2,2,3,4,4,6-D <sub>6</sub> , 95%)             |
| ULM-9144*              | Dehydroepiandrosterone sulfate, sodium salt (DHEAS) (unlabeled)                                    |
| CLM-10384*             | 11-Deoxycortisol (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%) CP 97%                                |
| DLM-7209               | 11-Deoxycortisol (21,21-D <sub>2</sub> , 96%)  |
| DLM-8336*              | 11-Deoxycortisol (2,2,4,6,6-D <sub>5</sub> , 98%)  |
| ULM-9145*              | 11-Deoxycortisol (unlabeled)   |
| DLM-8305               | 21-Deoxycortisol (2,2,4,6,6,21,21,21-D <sub>8</sub> , 97%)   |
| ULM-9987*              | 21-Deoxycortisol (unlabeled)   |
| DLM-170*               | Diethylstilbestrol ( <i>cis/trans</i> mix) (ring-3,3',5,5'-diethyl-1,1,1',1'-D <sub>8</sub> , 98%) |
| CLM-9146*              | 5 $\alpha$ -Dihydrotestosterone (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%) CP 97%                 |
| DLM-9041               | 5 $\alpha$ -Dihydrotestosterone (2,2,4,4-D <sub>4</sub> , 98%) CP 95%                              |
| ULM-8364*              | 5 $\alpha$ -Dihydrotestosterone (unlabeled)  |
| DLM-3023               | Dihydrotestosterone (16,16,17-D <sub>3</sub> , 98%)  |
| CLM-9222               | L-3,3'-Diiodothyronine (T2) (phenoxy- <sup>13</sup> C <sub>6</sub> , 99%) CP 97%                   |
| ULM-9223               | L-3,3'-Diiodothyronine (T2) (unlabeled)  |
| CLM-7401               | L-Dopa (1- <sup>13</sup> C, 99%)   |
| CLM-1007               | L-Dopa (ring- <sup>13</sup> C <sub>6</sub> , 99%)  |
| CLM-7824               | L-Dopa (1- <sup>13</sup> C, ring- <sup>13</sup> C <sub>6</sub> , 99%)                              |
| DLM-2084               | L-Dopa (ring-D <sub>3</sub> , 98%)   |

\* Compounds available in dry and solution forms.

<sup>†</sup> Compounds available in solution only.<sup>††</sup> Compounds available in dry and solution forms; chemical purity varies 95-98%.

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

| Catalog No.            | Description  |
|------------------------|--|
| COLM-2232              | L-Dopa (2,3- <sup>13</sup> C <sub>2</sub> , 97%; 4-hydroxy- <sup>18</sup> O, 95%)  |
| CLM-7768               | Epicholesterol (3,4- <sup>13</sup> C <sub>2</sub> , 99%)   |
| DLM-9088               | DL-Epinephrine (ring-D <sub>3</sub> , 1,2,2-D <sub>3</sub> , 98%)  |
| CNLM-7889              | DL-Epinephrine (1,2- <sup>13</sup> C <sub>2</sub> , 99%; <sup>15</sup> N, 98%)   |
| CLM-803*               | Estradiol (3,4- <sup>13</sup> C <sub>2</sub> , 99%)  |
| DLM-3694               | Estradiol (16,16,17-D <sub>3</sub> , 98%) CP 95%   |
| DLM-2487               | Estradiol (2,4,16,16-D <sub>4</sub> , 95-97%)  |
| ULM-7449*              | Estradiol (unlabeled)  |
| CLM-9147*              | Estriol (16 $\alpha$ -hydroxyestradiol) (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%) CP 97%                                 |
| DLM-8586               | Estriol (2,4,16-D <sub>3</sub> , 98%)  |
| DLM-8343               | Estriol (2,4,17-D <sub>3</sub> , 98%) CP 96%   |
| CLM-673 <sup>††</sup>  | Estrone (3,4- <sup>13</sup> C <sub>2</sub> , 99%)  |
| CLM-9148*              | Estrone (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%)  |
| DLM-3976               | Estrone (2,4,16,16-D <sub>4</sub> , 97%)   |
| CLM-8033               | DL-Estrone 3-methyl ether (13,14,15,16,17,18- <sup>13</sup> C <sub>6</sub> , 99%)  |
| DLM-4691               | 17 $\alpha$ -Ethinylestradiol (2,4,16,16-D <sub>4</sub> , 97-98%)  |
| ULM-10267              | 7 $\alpha$ -Hydroxycholesterol (unlabeled)   |
| DLM-8646               | 7 $\beta$ -Hydroxycholesterol (25,26,26,26,27,27,27-D <sub>7</sub> , 98%) CP 97%   |
| ULM-10268              | 7 $\beta$ -Hydroxycholesterol (unlabeled)  |
| DLM-9150 <sup>††</sup> | 18-Hydroxycorticosterone (9,11,12,12-D <sub>4</sub> , 98%) CP 95%  |
| ULM-9151*              | 18-Hydroxycorticosterone (unlabeled) CP 95%  |
| DLM-9149               | 6 $\beta$ -Hydroxycortisol (9,11,12,12-D <sub>4</sub> ) CP 95%   |
| CLM-8012               | DL-2-Hydroxyestradiol (13,14,15,16,17,18- <sup>13</sup> C <sub>6</sub> , 99%)  |
| CLM-8016               | DL-2-Hydroxyestrone-3-methyl ether (13,14,15,16,17,18- <sup>13</sup> C <sub>6</sub> , 99%)                                 |
| CLM-9153*              | 16 $\alpha$ -Hydroxyestrone (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%)  |
| ULM-9152*              | 16 $\alpha$ -Hydroxyestrone (unlabeled)  |
| CLM-8013               | DL-4-Hydroxyestrone (13,14,15,16,17,18- <sup>13</sup> C <sub>6</sub> , 99%)  |
| DLM-7206               | 17 $\alpha$ -Hydroxypregnenolone (21,21,21-D <sub>3</sub> , 97%)   |
| CDLM-9154*             | 17 $\alpha$ -Hydroxypregnenolone (20,21- <sup>13</sup> C <sub>2</sub> , 98%; 16,16-D <sub>2</sub> , 98%)                   |
| ULM-9155*              | 17 $\alpha$ -Hydroxypregnenolone (unlabeled)   |
| CLM-9157*              | 17 $\alpha$ -Hydroxyprogesterone (2,3,4- <sup>13</sup> C <sub>3</sub> , 98%)   |
| DLM-6598               | 17 $\alpha$ -Hydroxyprogesterone (2,2,4,6,6,21,21,21-D <sub>8</sub> , 98%)   |
| ULM-9156*              | 17 $\alpha$ -Hydroxyprogesterone (unlabeled)   |
| DLM-8647               | 7-Ketocholesterol (25,26,26,26,27,27,27-D <sub>7</sub> , 99%)  |
| DLM-10395              | 11-Ketotestosterone (16,16,17-D <sub>3</sub> , 98%) CP 95%   |
| DLM-7101               | Melatonin (acetyl-D <sub>3</sub> , 98%)  |
| CLM-8015               | DL-2-Methoxyestradiol (13,14,15,16,17,18- <sup>13</sup> C <sub>6</sub> , 99%)  |
| CLM-8014               | DL-2-Methoxyestrone (13,14,15,16,17,18- <sup>13</sup> C <sub>6</sub> , 99%)  |
| CLM-8017               | DL-4-Methoxyestrone (13,14,15,16,17,18- <sup>13</sup> C <sub>6</sub> , 99%)  |
| DLM-2646               | 5-Methoxytryptamine-HCl ( $\alpha$ , $\alpha$ , $\beta$ , $\beta$ -D <sub>4</sub> , 98%)                                   |
| CLM-2468               | Norethindrone (ethynyl- <sup>13</sup> C <sub>2</sub> , 99%)  |
| DLM-3979*              | 19-Nortestosterone (16,16,17-D <sub>3</sub> , 98%)   |
| DLM-3754               | 5 $\alpha$ -Pregnan-3 $\alpha$ -ol-20-one (17,21,21,21-D <sub>4</sub> , 96-98%) CP 95%                                     |
| DLM-7492               | 5 $\alpha$ -Pregnan-3 $\beta$ -ol-20-one (17 $\alpha$ ,21,21,21-D <sub>4</sub> , 97%) CP 96%                               |
| ULM-8242               | 5 $\alpha$ -Pregnan-3 $\beta$ -ol-20-one (unlabeled)   |
| DLM-2294               | 5 $\beta$ -Pregnan-3 $\alpha$ -ol-20-one (17,21,21,21-D <sub>4</sub> , 96-98%)   |
| DLM-8751               | 5 $\beta$ -Pregnan-3 $\alpha$ ,11 $\beta$ ,17 $\alpha$ ,21-tetrol-20-one (9,11 $\alpha$ ,12-D <sub>3</sub> , 95%)          |
| DLM-8753               | 5 $\beta$ -Pregnan-3 $\alpha$ ,17 $\alpha$ , 20-triol (20,21,21,21-D <sub>4</sub> , 98%) mix of 20 $\alpha$ and 20 $\beta$ |

Continued ►



## Steroids and Hormones (continued)

| Catalog No. | Description   |
|-------------|---|
| DLM-3910    | 5 $\alpha$ -Pregnane-3 $\alpha$ ,21-diol-20-one (17,21,21-D <sub>3</sub> , 95%)   |
| DLM-3816    | 5 $\alpha$ -Pregnane-3,20-dione (1,2,4,5,6,7-D <sub>6</sub> , 95%)  |
| ULM-10385   | 5 $\alpha$ -Pregnane-3 $\alpha$ ,21-diol-20-one (unlabeled)   |
| DLM-9901    | 5 $\beta$ -Pregnane-3,20-dione (2,2,4,4,17 $\alpha$ ,21,21,21-D <sub>8</sub> , 98%) CP 97%  |
| CLM-10411   | 5 $\beta$ -Pregnane-3 $\alpha$ ,20 $\alpha$ -diol (2,3,4,20,21- <sup>13</sup> C <sub>5</sub> , 99%) CP 95%                          |
| DLM-10413   | 5 $\beta$ -Pregnane-3 $\alpha$ ,20 $\alpha$ -diol (2,2,3,4,4-D <sub>5</sub> , 98%)  |
| CLM-10412   | 5 $\beta$ -Pregnane-3 $\alpha$ ,20 $\alpha$ -diol glucuronide, sodium salt (2,3,4,20,21- <sup>13</sup> C <sub>5</sub> , 99%) CP 95% |
| CLM-10010*  | 4-Pregnen-21-ol-3,20-dione (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%)  |
| DLM-7228    | 4-Pregnen-21-ol-3,20-dione (2,2,4,6,6,17,21,21-D <sub>8</sub> , 96%) CP 97%   |
| ULM-10011*  | 4-Pregnen-21-ol-3,20-dione (unlabeled)  |
| CDLM-9158*  | Pregnenolone (20,21- <sup>13</sup> C <sub>2</sub> , 98%; 16,16-D <sub>2</sub> , 98%)  |
| DLM-6896    | Pregnenolone (17,21,21,21-D <sub>4</sub> , 98%)   |
| ULM-9159*   | Pregnenolone (unlabeled)  |
| CDLM-9160   | Pregnenolone sulfate, sodium salt (20,21- <sup>13</sup> C <sub>2</sub> , 99%; 16,16-D <sub>2</sub> , 98%)                           |
| ULM-9161    | Pregnenolone sulfate, sodium salt (unlabeled)   |
| CLM-457     | Progesterone (3,4- <sup>13</sup> C <sub>2</sub> , 90%)  |
| CLM-9162*   | Progesterone (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%)  |
| CLM-10414   | Progesterone (2,3,4,20,21- <sup>13</sup> C <sub>5</sub> , 99%)  |
| DLM-7953*   | Progesterone (2,2,4,6,6,17 $\alpha$ ,21,21,21-D <sub>9</sub> , 98%)   |

| Catalog No. | Description  |
|-------------|--|
| DLM-3627†   | Prostaglandin A2 (3,3,4,4-D <sub>4</sub> , 98%)  |
| DLM-3728†   | Prostaglandin E1 (3,3,4,4-D <sub>4</sub> , 98%)  |
| DLM-3628†   | Prostaglandin E2 (3,3,4,4-D <sub>4</sub> , 98%)  |
| DLM-3558†   | Prostaglandin-F2 $\alpha$ (3,3,4,4-D <sub>4</sub> , 98%)   |
| DLM-4200†   | 9 $\alpha$ ,11 $\alpha$ -Prostaglandin F2 (3,3',4,4'-D <sub>4</sub> , 98%)                           |
| DLM-7457    | Sodium 17 $\beta$ -estradiol 3-sulfate (2,4,16,16-D <sub>4</sub> , 98%) stabilized with 50% w/w tris |
| DLM-9503    | Stigmastanol (2,2,3,4,4-D <sub>5</sub> , 98%)  |
| CLM-159     | Testosterone (3,4- <sup>13</sup> C <sub>2</sub> , 99%)   |
| CLM-9164*   | Testosterone (2,3,4- <sup>13</sup> C <sub>3</sub> , 99%)   |
| DLM-683     | Testosterone (1,2-D <sub>2</sub> , 98%)  |
| DLM-6224*   | Testosterone (16,16,17-D <sub>3</sub> , 98%)   |
| DLM-8085*   | Testosterone (2,2,4,6,6-D <sub>5</sub> , 98%)  |
| DLM-8265    | Testosterone diacetate (testosterone-D <sub>4</sub> , acetate methyl-D <sub>6</sub> , 98%)           |
| ULM-9163    | 3 $\alpha$ ,5 $\beta$ -Tetrahydroaldosterone (unlabeled)   |
| CLM-6725    | L-Thyroxine (tyrosine-ring- <sup>13</sup> C <sub>6</sub> , 99%) CP 90%                               |
| CLM-8931    | L-Thyroxine (ring- <sup>13</sup> C <sub>12</sub> , 99%) CP 97%                                       |
| ULM-8184    | L-Thyroxine (unlabeled)  |
| CLM-7185*   | 3,3',5-Triiodo-L-thyronine-HCl (ring- <sup>13</sup> C <sub>6</sub> , 99%) CP >95%                    |
| DLM-6989    | Tryptamine-HCl ( $\alpha$ , $\alpha$ , $\beta$ , $\beta$ -D <sub>4</sub> , 97%)                      |

## Vitamins and Metabolites

| Catalog No. | Description   |
|-------------|---|
| CLM-3085    | L-Ascorbic acid (1- <sup>13</sup> C, 99%)   |
| CLM-7283    | L-Ascorbic acid (U- <sup>13</sup> C <sub>6</sub> , 98%)   |
| CLM-6126    | $\beta$ -Carotene (10,10',11,11'- <sup>13</sup> C <sub>4</sub> , 99%)                               |
| CLM-9641    | $\beta$ -Carotene (12,12',13,13',14,14',15,15',20,20'- <sup>13</sup> C <sub>10</sub> , 99%) CP >97% |
| DLM-3829    | $\beta$ -Carotene (19,19,19,19',19',19'-D <sub>6</sub> , 98%)                                       |
| DLM-2439    | $\beta$ -Carotene (10,10',19,19,19,19',19',19'-D <sub>8</sub> , 97%)                                |
| ULM-9106*   | 1,25-Dihydroxyvitamin D2 (unlabeled) CP 95%   |
| ULM-9109*   | 24,25-Dihydroxyvitamin D2 (unlabeled)   |
| DLM-9107*   | 1,25-Dihydroxyvitamin D3 (6,19,19-D <sub>3</sub> , 97%) CP 95%                                      |
| ULM-9108*   | 1,25-Dihydroxyvitamin D3 (unlabeled) CP 95%   |
| DLM-9404    | 24R,25-Dihydroxyvitamin D3 (26,26,26,27,27,27-D <sub>6</sub> , 98%) CP 97%                          |
| DLM-9114*   | 25-Hydroxyvitamin D2 (6,19,19-D <sub>3</sub> , 97%)   |
| ULM-9115*   | 25-Hydroxyvitamin D2 (unlabeled)  |
| DLM-9481    | 3- <i>epi</i> -25-Hydroxyvitamin D2 (6,19,19-D <sub>3</sub> , 98%)                                  |
| ULM-9110*   | 3- <i>epi</i> -25-Hydroxyvitamin D2 (unlabeled)   |
| CLM-10025*  | 25-Hydroxyvitamin D3 (23,24,25,26,27- <sup>13</sup> C <sub>5</sub> , 99%) CP 95%                    |
| DLM-9116*   | 25-Hydroxyvitamin D3 (6,19,19-D <sub>3</sub> , 97%)   |
| ULM-9117*   | 25-Hydroxyvitamin D3 (unlabeled)  |
| CLM-10266   | 3- <i>epi</i> -25-Hydroxyvitamin D3 (23,24,25,26,27- <sup>13</sup> C <sub>5</sub> , 99%)            |
| DLM-9111*   | 3- <i>epi</i> -25-Hydroxyvitamin D3 (6,19,19-D <sub>3</sub> , 98%)                                  |
| ULM-9112*   | 3- <i>epi</i> -25-Hydroxyvitamin D3 (unlabeled)   |

| Catalog No. | Description  |
|-------------|--|
| DLM-7708*   | 25-Hydroxyvitamin D3 monohydrate (26,26,26,27,27,27-D <sub>6</sub> , 98%) CP 97%   |
| CLM-7613    | <i>trans</i> -Lycopene (8,8',9,9',10,10',11,11',19,19'- <sup>13</sup> C <sub>10</sub> , 99%)                                       |
| CLM-9548    | 5-Methyltetrahydrofolic acid (glutamic acid- <sup>13</sup> C <sub>5</sub> , 99%) CP 95%  |
| CLM-7321-N  | 5-Methyltetrahydrofolic acid, calcium salt (glutamic acid- <sup>13</sup> C <sub>5</sub> , 98%) CP 95%                              |
| CLM-7321    | (6S)-5-Methyltetrahydrofolic acid, calcium salt (glutamic acid- <sup>13</sup> C <sub>5</sub> , 90%) contains ~10% H <sub>2</sub> O |
| CNLM-9757   | Nicotinamide (2,6,carbonyl- <sup>13</sup> C <sub>3</sub> , 99%; ring-1- <sup>15</sup> N, 98%)                                      |
| DLM-9793-N  | Pyridoxal phosphate (mix of 5-,3-isomers) (methyl-D <sub>3</sub> , 97%)  |
| CLM-7563    | Pyridoxine-HCl (4,5- <i>bis</i> -(hydroxymethyl)- <sup>13</sup> C <sub>4</sub> , 99%)  |
| DLM-8754    | Pyridoxine-HCl (5-hydroxymethyl-D <sub>2</sub> , 98%)  |
| CLM-320     | Retinal (10- <sup>13</sup> C, 99%)   |
| CLM-325     | Retinal (11- <sup>13</sup> C, 99%)   |
| CLM-326     | Retinal (14- <sup>13</sup> C, 99%)   |
| CLM-327     | Retinal (15- <sup>13</sup> C, 99%)   |
| DLM-7719    | Retinal (D <sub>6</sub> , 96%)   |
| CLM-331     | Retinoic acid (10- <sup>13</sup> C, 99%)   |
| CLM-328     | Retinoic acid (11- <sup>13</sup> C, 98%)   |
| CLM-329     | Retinoic acid (14- <sup>13</sup> C, 99%)   |
| CLM-330     | Retinoic acid (15- <sup>13</sup> C, 99%)   |
| CLM-4343    | Retinoic acid (10,11,14,15- <sup>13</sup> C <sub>4</sub> , 99%)  |
| DLM-7720    | Retinoic acid (D <sub>6</sub> , 96%)   |

\* Compounds available in dry and solution forms.

† Compounds available in solution only.

†† Compounds available in dry and solution forms; chemical purity varies 95-98%.

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

## Vitamins and Metabolites (continued)

| Catalog No. | Description   |
|-------------|---|
| DLM-9305    | Retinol (10,19,19,19-D <sub>4</sub> , 96%)  |
| DLM-8113    | Retinol (19,19,19,20,20,20-D <sub>6</sub> , 96%)  |
| DLM-9306    | Retinol (10,14,19,19,19,20,20,20-D <sub>8</sub> , 90%) CP 96%   |
| DLM-4902    | Retinyl palmitate (10,19,19,19-D <sub>4</sub> , 96%) (50 ppm BHT) all <i>trans</i> , <4% <i>cis</i>   |
| CLM-8870    | Vitamin A acetate (12,13,14,20- <sup>13</sup> C <sub>4</sub> , 99%)   |
| CLM-4831    | Vitamin A acetate (8,9,10,12,13,14,19,20- <sup>13</sup> C <sub>8</sub> , 99%)   |
| CLM-7277    | Vitamin A acetate (8,9,10,11,12,13,14,15,19,20- <sup>13</sup> C <sub>10</sub> , 99%)  |
| DLM-2244    | Vitamin A acetate (10,19,19,19-D <sub>4</sub> , 96%) 3-4% <i>cis</i>  |
| DLM-3828    | Vitamin A acetate (19,19,19,20,20,20-D <sub>6</sub> , 96%) 3-4% <i>cis</i>  |
| DLM-4203    | Vitamin A acetate (10,14,19,19,19,20,20,20-D <sub>8</sub> , 90%) 3-4% <i>cis</i>  |
| CLM-7667    | Vitamin B <sub>1</sub> hydrochloride (thiamine hydrochloride) (4,5,4-methyl- <sup>13</sup> C <sub>3</sub> , 99%) CP 97%   |
| ULM-10004   | Vitamin B <sub>1</sub> hydrochloride (thiamine hydrochloride) (unlabeled)   |
| DLM-8741    | Vitamin B <sub>1</sub> pyrophosphate (thiamine pyrophosphate) (thiazole-methyl-D <sub>3</sub> , 95%)  |
| CNLM-8851   | Vitamin B <sub>2</sub> (riboflavin) ( <sup>13</sup> C <sub>4</sub> , 99%; <sup>15</sup> N <sub>2</sub> , 98%) CP >97%   |
| ULM-9123    | Vitamin B <sub>2</sub> (riboflavin) (unlabeled) CP 97%  |
| CLM-9925    | Vitamin B <sub>3</sub> (nicotinamide) ( <sup>13</sup> C <sub>6</sub> , 99%)   |
| DLM-6883    | Vitamin B <sub>3</sub> (nicotinamide) (D <sub>4</sub> , 98%)  |
| CNLM-9512   | Vitamin B <sub>3</sub> (nicotinic acid) (2,6,carboxyl- <sup>13</sup> C <sub>3</sub> , 99%; <sup>15</sup> N, 98%) CP 97%   |
| CNLM-7694   | Vitamin B <sub>5</sub> , calcium salt·H <sub>2</sub> O (calcium pantothenate·H <sub>2</sub> O) (β-alanyl- <sup>13</sup> C <sub>3</sub> , 99%; <sup>15</sup> N, 98%) |
| ULM-10003   | Vitamin B <sub>5</sub> , calcium salt·H <sub>2</sub> O (calcium pantothenate·H <sub>2</sub> O) (unlabeled)  |
| DLM-9069    | Vitamin B <sub>6</sub> (pyridoxal) (methyl-D <sub>3</sub> , 98%)  |
| ULM-9118    | Vitamin B <sub>6</sub> (pyridoxal·HCl) (unlabeled)  |
| DLM-9119    | Vitamin B <sub>6</sub> (pyridoxamine·2HCl) (methyl-D <sub>3</sub> , 98%)  |
| ULM-9120    | Vitamin B <sub>6</sub> (pyridoxamine·2HCl) (unlabeled)  |
| DLM-9121    | Vitamin B <sub>6</sub> (pyridoxine·HCl) (methyl-D <sub>3</sub> , 98%) CP 96%  |
| ULM-9122    | Vitamin B <sub>6</sub> (pyridoxine·HCl) (unlabeled) CP 96%  |
| DLM-8806    | Vitamin B <sub>7</sub> (biotin) (ring-6,6-D <sub>2</sub> , 98%) CP 97%  |
| DLM-9751    | Vitamin B <sub>7</sub> (biotin) (3',3',4',4'-D <sub>4</sub> , 98%) CP 95%   |
| ULM-9129    | Vitamin B <sub>7</sub> (biotin) (unlabeled)   |

| Catalog No. | Description  |
|-------------|--|
| CLM-7861    | Vitamin B <sub>9</sub> (folic acid) (glutamic acid- <sup>13</sup> C <sub>5</sub> , 95%) contains ~10% H <sub>2</sub> O |
| CLM-7861-N  | Vitamin B <sub>9</sub> (folic acid) (glutamic acid- <sup>13</sup> C <sub>5</sub> , 99%) CP 95%                         |
| CNLM-9564   | Vitamin B <sub>9</sub> (folic acid) (glutamic acid- <sup>13</sup> C <sub>5</sub> , 99%; <sup>15</sup> N, 98%) CP 95%   |
| CLM-9770†   | Vitamin B <sub>12</sub> (cyanocobalamin) ( <sup>13</sup> C <sub>7</sub> , 99%) CP 95%                                  |
| ULM-10005†  | Vitamin B <sub>12</sub> (cyanocobalamin) (unlabeled)   |
| DLM-8985*   | Vitamin D <sub>2</sub> (ergocalciferol) (6,19,19-D <sub>3</sub> , 97%)   |
| ULM-9124*   | Vitamin D <sub>2</sub> (ergocalciferol) (unlabeled)  |
| DLM-10478†  | Vitamin D <sub>2</sub> sulfate, sodium salt (6,19,19-D <sub>3</sub> , 98%) CP 97%                                      |
| ULM-10477†  | Vitamin D <sub>2</sub> sulfate, sodium salt (unlabeled) CP 97%   |
| CLM-7850    | Vitamin D <sub>3</sub> (cholecalciferol) (23,24- <sup>13</sup> C <sub>2</sub> , 99%) CP 90%                            |
| CLM-10470†  | Vitamin D <sub>3</sub> (cholecalciferol) (23,24,25,26,26- <sup>13</sup> C <sub>5</sub> , 98%) CP 97%                   |
| DLM-8853†   | Vitamin D <sub>3</sub> (cholecalciferol) (6,19,19-D <sub>3</sub> , 97%) CP 97%   |
| ULM-9125*   | Vitamin D <sub>3</sub> (cholecalciferol) (unlabeled)   |
| DLM-10476†  | Vitamin D <sub>3</sub> sulfate, sodium salt (26,26,26,27,27-D <sub>6</sub> , 98%) CP 97%                               |
| DLM-10475†  | Vitamin D <sub>3</sub> sulfate, sodium salt (6,19,19-D <sub>3</sub> , 98%) CP 97%                                      |
| ULM-10474†  | Vitamin D <sub>3</sub> sulfate, sodium salt (unlabeled) CP 97%   |
| CLM-10273   | Vitamin E (α-tocopherol) ( <sup>13</sup> C <sub>3</sub> , 99%) CP 96%  |
| CLM-10275   | Vitamin E (α-tocopherol) ( <sup>13</sup> C <sub>6</sub> , 99%) CP 96%  |
| CLM-10276   | Vitamin E (α-tocopherol) ( <sup>13</sup> C <sub>9</sub> , 99%) CP 96%  |
| CLM-10274   | Vitamin E ((+/-)-α-tocopherol) (all rac) ( <sup>13</sup> C <sub>3</sub> , 99%) CP 96%                                  |
| DLM-9126    | Vitamin E (α-tocopherol) (5-methyl-D <sub>3</sub> , 7-methyl-D <sub>3</sub> , 98%)                                     |
| ULM-9127    | Vitamin E (α-tocopherol) (unlabeled) CP 96%  |
| DLM-8847    | Vitamin E acetate (tocopherol acetate) (acetyl-D <sub>3</sub> , 98%)   |
| CLM-9566    | Vitamin K <sub>1</sub> (phyllquinone) (4α,5,6,7,8,8α- <sup>13</sup> C <sub>6</sub> , 99%)                              |
| DLM-7702    | Vitamin K <sub>1</sub> (phyllquinone) (ring-D <sub>4</sub> , 98%)  |
| DLM-9130    | Vitamin K <sub>1</sub> (phyllquinone) (D <sub>7</sub> , 99%) CP 97%  |
| ULM-9131    | Vitamin K <sub>1</sub> (phyllquinone) (unlabeled) CP 97%   |
| DLM-9132    | Vitamin K <sub>3</sub> (menadione) (D <sub>8</sub> , 98%) CP 97%   |
| ULM-9133    | Vitamin K <sub>3</sub> (menadione) (unlabeled) CP 97%  |

## Water

| Catalog No. | Description  |
|-------------|--|
| DLM-4-70    | Deuterium oxide (D, 70%)                           |
| DLM-4-99    | Deuterium oxide (D, 99%)                           |
| DLM-4-99.8  | Deuterium oxide (D, 99.8%)                         |
| DLM-4       | Deuterium oxide (D, 99.9%)                         |
| DLM-6       | Deuterium oxide "100%" (D, 99.96%)                 |
| DLM-11      | Deuterium oxide (D, 99.9%) low paramagnetic        |
| DOLM-242    | Water (D <sub>2</sub> , 98%; <sup>18</sup> O, 97%) |

| Catalog No. | Description                      |
|-------------|----------------------------------|
| OLM-240-10  | Water ( <sup>18</sup> O, 10%)    |
| OLM-240-97  | Water ( <sup>18</sup> O, 97%)    |
| OLM-240-99  | Water ( <sup>18</sup> O, 99%)    |
| OLM-782-10  | Water ( <sup>17</sup> O, 10%)    |
| OLM-782-20  | Water ( <sup>17</sup> O, 20%)    |
| OLM-782-40  | Water ( <sup>17</sup> O, 35-40%) |
| OLM-782-70  | Water ( <sup>17</sup> O, 70%)    |
| OLM-782-85  | Water ( <sup>17</sup> O, 85%)    |
| OLM-782-90  | Water ( <sup>17</sup> O, 90%)    |

► Custom double-labeled water (<sup>18</sup>O; D) also available. Please inquire for details.

\* Compounds available in dry and solution forms.

† Compounds available in solution only.

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

Continued ►

## Research Use of Products

CIL manufactures highly pure research biochemicals that are produced for research applications. As a service to our customers, some of these materials have been tested for the presence of *S. aureus*, *P. aeruginosa*, *E. coli*, *Salmonella sp*, aerobic bacteria, yeast and mold as well as, the presence of endotoxin in the bulk material by taking a random sample of the bulk product. Subsequent aliquots are not retested. Presence of endotoxin is assessed by determining endotoxin content following established protocols and standardized limulus amebocyte lysate (LAL) reagents. These tests are provided at no charge for any materials listed in our catalog or website that is designated as "MPT" (microbiologically and pyrogen tested) in the item product number (i.e, DLM-349-MPT).

CIL is able to provide microbiological testing for other products. Depending on the compound and the quantity ordered, an additional charge may apply. Please note that microbiological-tested products are not guaranteed to be sterile and pyrogen-free when received by the customer, and microbiological testing does not imply suitability for any desired use. If the product must be sterile and pyrogen-free for a desired application, CIL recommends that the product be packaged or formulated into its ultimate dose form by the customer or appropriate local facility. The product should always be tested by a qualified pharmacy/facility prior to actual use.

CIL research products are labeled "For research use only. Not for use in diagnostic procedures." Persons intending to use CIL products in applications involving humans are responsible for complying with all applicable laws and regulations including but not limited to the US FDA, other local regulatory authorities and institutional review boards concerning their specific application or desired use.

It may be necessary to obtain approval for using these research products in humans from the US FDA or the comparable governmental agency in the country of use. CIL will provide supporting information, such as lot-specific analytical data and test method protocols, to assist medical research groups in obtaining approval for the desired use. An Enhanced Technical Data Package (EDP) is also available (see page 18 for more information).

CIL will allocate a specific lot of a product to customers who are starting long-term projects requiring large amounts of material. Benefits from this type of arrangement include experimental consistency arising from use of only one lot, no delay in shipments, and guaranteed stock. Please note that some CIL products have a specific shelf life and cannot be held indefinitely. If interested, please contact your sales manager for further details.

Because of increasing regulatory requirements, CIL manufactures different grades of materials to help researchers with those requirements. Listed below are the grades of materials that CIL currently manufactures:

| Catalog No.                   | Description                                |
|-------------------------------|--|
| CLM-XXX- <b>PK</b>            | Research grade                             |
| CLM-XXX- <b>MPT-<b>PK</b></b> | Microbiologically and Pyrogen Tested       |
| CLM-XXX- <b>CTM</b>           | Manufactured following ICH Q7, Section XIX |
| CLM-XXX- <b>GMP</b>           | Good Manufacturing Practices grade         |

► **For more information on controls in manufacturing and testing of the different grades, go to: [Search](#) → [Literature](#) → [Product Quality Designations from the isotope.com home page.](#)**



## cGMP Production Capabilities

With increasing requirements from institutional review boards (IRBs) and governmental agencies, partnering with CIL for your next stable isotope cGMP (current good manufacturing practices) project can help ensure your regulatory compliance. With the world's largest  $^{13}\text{C}$  and  $^{18}\text{O}$  isotope-separation plants, CIL is able to provide the raw materials necessary for your project. Your compound of interest most likely already appears in CIL's extensive list of research compounds – if not, CIL's team of PhD chemists can determine the best method of synthesis for incorporating  $^{13}\text{C}$ ,  $^{15}\text{N}$ , D,  $^{17}\text{O}$ , and/or  $^{18}\text{O}$  into your compound.

CIL has manufactured bulk active pharmaceutical ingredients (APIs) since 1994. It recently added a 15,000-square-foot, state-of-the-art cGMP facility to complement its existing cGMP facilities. An additional team of experts – specializing in synthetic chemistry, customer support, quality control, and quality assurance – serves to provide technical guidance from beginning to end of your project.

Partner with CIL to help you meet your increasing regulatory compliance requirements.

### Products of Interest

| Catalog No.  | Description                                     |
|--------------|---|
| CLM-804-CTM  | Cholesterol ( $3,4\text{-}^{13}\text{C}_2$ )    |
| DLM-4-70-CTM | Deuterium oxide (D, 70%)                        |
| CLM-1396-CST | D-Glucose ( $^{13}\text{C}_6$ )                 |
| CLM-420-CST  | D-Glucose ( $1\text{-}^{13}\text{C}$ )          |
| DLM-349-CTM  | D-Glucose ( $6,6\text{-D}_2$ )                  |
| DLM-1229-CST | Glycerol ( $1,1,2,3,3\text{-D}_5$ )             |
| CLM-2262-CTM | L-Leucine ( $^{13}\text{C}_6$ )                 |
| DLM-1259-CTM | L-Leucine ( $5,5,5\text{-D}_3$ )                |
| CLM-762-CTM  | L-Phenylalanine ( $1\text{-}^{13}\text{C}$ )    |
| CLM-8077-CTM | Pyruvic acid ( $1\text{-}^{13}\text{C}$ )       |
| CLM-156-CTM  | Sodium acetate ( $1\text{-}^{13}\text{C}$ )     |
| CLM-440-CTM  | Sodium acetate ( $1,2\text{-}^{13}\text{C}_2$ ) |
| CLM-3276-GMP | Uracil ( $2\text{-}^{13}\text{C}$ )             |
| CLM-311-GMP  | Urea ( $^{13}\text{C}$ )                        |

► Other products may be available as CTM/cGMP. Please inquire for details.



### Manufacturing Capabilities

- Dedicated development facility
- Five production and two isolation suites
- Dedicated packaging room
- Production scale from milligrams to multikilograms
- Clinical trials to bulk API
- Customizable projects to meet your needs

### Analytical Services

- Fully equipped, cGMP-dedicated analytical facility
- Method development and validation
- Raw material and final product testing
- Wet chemistry and compendial methods
- Stability studies and chambers
- Analytical instrumentation:
  - High-field NMR ( $^1\text{H}$ , D,  $^{13}\text{C}$ ,  $^{15}\text{N}$ , multinuclear)
  - HPLC with UV, RI, ELSD, DA, Pickering, and MS detection
  - GC with FID, ECD, and MS detection
  - KF
  - FT-IR
  - Polarimetry
  - TOC

### Quality and Compliance

- Drug master files
- FDA-audited facility
- QA release of API product
- Follows FDA and ICH guidances
- CMC sections for NDA or IND

## Enhanced Data Package (EDP)

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CIL offers the option of an Enhanced Data Package (EDP). This technical data package is available for most MPT products. It includes all of the data currently included with the MPT products, as well as the additional information listed below. You have the option of purchasing this package at the time of order or at a later date.

*Please note that if you choose to purchase at a later date, some of the information listed below may not be available. Also, the EDP may not be available for all lots. In some cases, only a partial EDP may be available. Please confirm availability and content prior to order.*

### EDP Contents

- Product description: structural formula, stereochemical description, molecular formula.
- Product physical properties: melting point, pH, optical rotation (mix of literature or measured values).
- Outline of the synthesis route (including details of solvents used).
- Data used to confirm structure and chemical purity.
- Additional testing data: products with an EDP have been tested to the specifications/monograph similar to those detailed in the USP or EP, but not using compendia methods.
- Impurities: available data on impurities detected and identified together with the method of detection and the cutoff applied.
- Residual solvents: measured residual solvents from the final synthetic step and purification.
- Certificates of Analysis of raw materials, where appropriate.
- Informal stability data: estimated and measured.
  - This will be either actual shelf life data, if it can be obtained from CIL history or by analysis of in-stock batches, or
  - If no data is available, CIL will commit to assaying the batch provided after six months and one year. Data will be provided after one year, unless the batch fails assay after six months. This option will not be available if the Enhanced Data Package is ordered at a later date.



## Application Note Examples

### Application Note 44

#### Pathway-Targeted Metabolomic Analysis in Oral/Head and Neck Cancer Cells Using Ion Chromatography-Mass Spectrometry



Metabolomics aims to measure a wide breadth of small molecules (metabolome) in the context of physiological stimuli or disease states. The general problems encountered when characterizing the metabolome are the highly complex nature and the wide concentration range of the compounds. Separation science

plays an important role in metabolomics by reducing the sample complexity to achieve a comprehensive profiling analysis. The strength of mass spectrometry (MS)-based metabolomics is best realized when coupled to a separation technique such as capillary

electrophoresis, gas chromatography (GC), or liquid chromatography (LC). Ion chromatography (IC) or ion-exchange chromatography offers an excellent complementary platform for separation of charged and polar compounds. Because of its unique selectivity, IC has been coupled with MS for targeted screening and quantification of metabolites such as carbohydrates, organic acids, sugar phosphates, and nucleotides in biological samples. Metabolomics is now widely used in the characterization and diagnostic research of an ever-increasing number of diseases. [Read more at isotope.com](http://isotope.com).

### Application Note 43

#### Analysis of Whole-Body Branched-Chain Amino Acid Metabolism in Mice Utilizing 20% Leucine $^{13}\text{C}_6$ and 20% Valine $^{13}\text{C}_5$ Mouse Feed



Cancer cells have altered metabolism relative to normal cells. To date, most cancer metabolism research has focused on understanding the mechanisms of cell autonomous metabolic alterations such as the influence of different oncogenic signals on nutrient utilization and the effects of altered regulation of specific enzymes

on metabolic fluxes through different pathways (Cairns, et al., 2011). While these studies have provided insight into metabolic needs of proliferating cancer cells (Vander Heiden, et al., 2009), they do not address potential interactions between tumor and normal tissues. Research on whole-body metabolic alterations

associated with type 2 diabetes (T2DM) provides insight into how altered metabolite sensing can affect the metabolism of specific tissues. Intriguingly, there are clear epidemiological connections between diabetes and several types of cancer, especially pancreatic adenocarcinoma (PDAC) (Everhart and Wright, 1995; Wang, et al., 2003). Indeed, epidemiologic evidence indicates that pancreatic cancer can be both a consequence of longstanding diabetes (Ben, et al., 2011) and cause of new-onset cases (Huxley, et al., 2005). Methods to study metabolism across tissues are needed to understand how whole-body metabolic alterations influence tumor metabolism, and to understand the systemic changes associated with metabolic disease. [Read more at isotope.com](http://isotope.com).

### Application Note 31

#### Tracing Lipid Disposition *in vivo* Using Stable Isotope-Labeled Fatty Acids and Mass Spectrometry



Lipids are ubiquitous molecules which serve a variety of important biological functions, including energy storage (triglycerides), modulation of cellular membrane structure and function (phospholipids and cholesterol), intracellular signaling and hormonal regulation. Dysfunctions of lipid metabolism contribute

to a variety of diseases including, among others, atherosclerosis, hypertriglyceridemia and type 2 diabetes. As such, understanding

the synthesis, regulation and transport of lipids in the body is important to developing new and improved therapies for these diseases. Stable isotopes have been used to study several aspects of lipid metabolism including the synthesis and disposition of cholesterol, phospholipids and VLDL triglycerides. In this application note, we highlight some of the advantages and experimental considerations for using stable isotope-labeled fatty acids as substrates to study lipid metabolism *in vivo* in mice. [Read more at isotope.com](http://isotope.com).

Please visit [isotope.com](http://isotope.com) for a list of additional compounds.



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