^{13}C Enriched Substrates for Hyperpolarization

Catalog No.	Name (Label Position)
CLM-245	Acetone (2-^{13}C, 99%)
CLM-116	L-Alanine (1-^{13}C, 99%)
CLM-113	Acetic acid (1,2-$^{13}C_2$, 99%)
CLM-317	Acetic acid (1-^{13}C, 99%)
CLM-318	Acetic acid (2-^{13}C, 99%)
CLM-1189*	D-Mannitol (1-^{13}C, 98%)
CLM-4761	DMSO ($^{13}C_2$, 99%)
CLM-7350	Ethyl pyruvate (1-^{13}C, 99%)
CLM-1527	Fructose (2-^{13}C, 99%)
CLM-4454	Fumaric acid (1,4-$^{13}C_2$, 99%)
CDLM-8473	Fumaric acid (1,4-$^{13}C_2$, 99%; 2,3-D_2, 98%)
CDLM-6062	Fumaric acid (1-^{13}C, 99%; 2,3-D_2, 98%)
CLM-420	D-Glucose (1-^{13}C, 98-99%)
CDLM-3813*	D-Glucose ($^{13}C_6$, 99%; D_7, 97%+)
CLM-2717	D-Glucose (1-^{13}C, 99%; 6-^{13}C, 97%+)
CLM-674*	L-Glutamic acid (1-^{13}C, 99%)
CLM-1166	L-Glutamine (5-^{13}C, 99%)
CLM-2093	α–Ketoisocaproate, sodium salt (1-^{13}C, 99%)
CLM-646	Propionic acid (1-^{13}C, 99%)
CLM-647	Propionic acid ($^{13}C_3$, 99%)
CLM-8077	Pyruvic acid (1-^{13}C, 99%)

Catalog No.	Name (Label Position)
CLM-8849	Pyruvic acid (2-^{13}C, 99%)
CLM-156*	Sodium acetate (1-^{13}C, 99%)
CLM-381*	Sodium acetate (2-^{13}C, 99%)
CLM-440*	Sodium acetate (1,2-$^{13}C_2$, 99%)
CLM-441*	Sodium bicarbonate (^{13}C, 99%)
CLM-1256*	Sodium butyrate (1-^{13}C, 99%)
CLM-1577*	Sodium L-lactate (1-^{13}C, 99%)
CLM-1578*	Sodium L-lactate (3-^{13}C, 98%)
CLM-1579	Sodium L-lactate ($^{13}C_3$, 98%)
CLM-1506	Sodium propionate (2-^{13}C, 99%)
CLM-1865*	Sodium propionate ($^{13}C_3$, 99%)
CLM-3042	Sodium propionate (2,3-$^{13}C_2$, 99%)
CLM-771*	Sodium propionate (1-^{13}C, 99%)
CLM-1082*	Sodium pyruvate (1-^{13}C, 99%)
CLM-1575*	Sodium pyruvate (3-^{13}C, 99%)
CLM-1580	Sodium pyruvate (2-^{13}C, 99%)
CLM-3507	Sodium pyruvate (1,2-$^{13}C_2$, 99%)
CLM-1084	Succinic acid (1,4-$^{13}C_2$, 99%)
CLM-8493	Succinic acid (1-^{13}C, 99%)
CLM-311	Urea (^{13}C, 99%)

*Microbiological and pyrogen tested (MPT) grade available. MPT-grade products are research-grade products that are tested in the bulk form for *S. aureas, P. aeruginosa, E. coli, Salmonella,* aerobic bacteria, yeast and mold and for bacterial endotoxins. Package sizes typically include 1.0 and 2.0 g.

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Pyruvic Acid (1-^{13}C)

CIL supplies pyruvic acid (1-^{13}C) to research groups world-wide that are either developing and/or applying dissolution DNP techniques to study metabolism. To satisfy the need for the ever-increasing amounts of pyruvic acid (1-^{13}C) being used in investigations, CIL has developed a robust, synthetic process that is readily scalable. This process has recently been optimized so that CIL is now able to offer product with high chemical purity and exceptional lot-to-lot consistency.

Research Grade

Catalog No. CLM-8077

QC Testing for Research-Grade Pyruvic Acid (1-^{13}C)*

QC Test	Result*
^{13}C NMR for Identification	Conforms
1H NMR for Chemical Purity	Pass
GC/MS for Isotopic Enrichment	99.1%
HPLC for Chemical Purity	98.0%
Karl Fischer Titration for Total Water Content	3383 ppm
Titration for Chemical Purity	99.8%

*Results for Lot PR-24550 are shown. Actual results may vary.

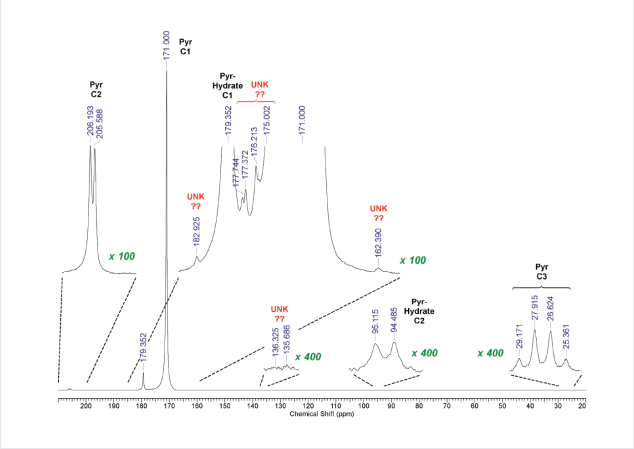
cGMP Grade

Catalog No. CLM-8077-CTM

Product Specifications for CTM-Grade Material**

Tests	Method	Acceptance Criteria
Identification	^{13}C NMR	Conforms
Identification	1H NMR	Conforms
Identification	IR	Conforms
Appearance	Visual inspection	Colorless to yellow, clear, viscous liquid
Isotopic Enrichment	GC/MS	>98%
Residual Solvents	HS-GC	Acetone:<5000 µg/g Acetonitrile: <200 µg/g
HPLC for Related Impurities	HPLC	AH113462/E: <3.00% Area
HPLC for Related Impurities Total Unidentified Impurities	HPLC	<2.00% area
Water Content	IR	<4.5% (w/w)
Assay	HPLC	89.0-103.5%
Bacterial endotoxin	USP <85>	<25 EU/mL
Total Aerobic Microbial Count (TAMC)	USP <61>	<10 CFU/mL

**Products prepared under the CTM classification may conform to materials suitable for Phase 1 Clinical Trials as described in Section 19 of the ICH Guidance Q7A, "cGMP Guidance for Active Pharmaceutical Ingredients (APIs)."



^{13}C DNP spectrum of pyruvic acid (1-^{13}C). First scan of CIL's pyruvic acid (1-^{13}C) was provided by Karlos Moreno and Matthew Merritt from the UTSW Medical Center in Dallas, TX.

cGMP Capabilities

CIL has been manufacturing cGMP products since 1994 and has been continuously increasing the cGMP product offering throughout the years in an effort to support clinical research. CIL is ISO 13485 certified and its facilities are inspected by the FDA on an ongoing basis. CIL's state-of-the-art cGMP production and quality control suite occupies over 10,000 square feet in CIL's Tewksbury, MA, location.

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