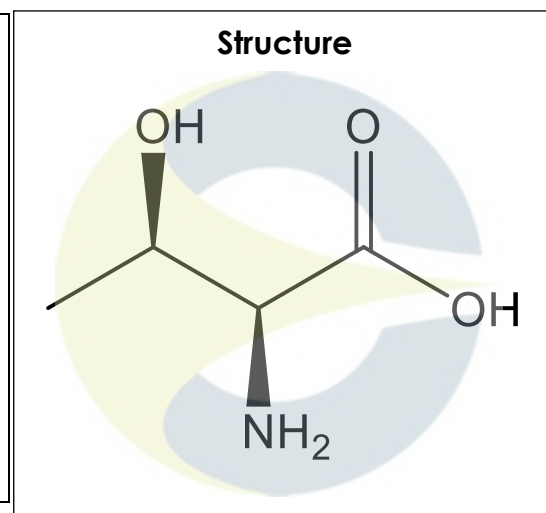


Certificate of Analysis

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PRODUCT NAME	L-Threonine
PART NUMBER	00020261
STANDARD TYPE	Primary (P)
LOT NUMBER	00020261-55V
REPORT NUMBER	CDXA-RSS-6297-02
SAMPLE NUMBER	CDXA-14-5556
DATE OF SAMPLE	09/04/2014
DATE OF RE-EVALUATION	03/25/2019 (1 st); 01/26/2023 (2 nd)
DATE OF REPORT	02/07/2023



CHEMICAL NAMES	2-Amino-3-hydroxybutyric acid; (S)-Threonine; Threonin; Threonine
CHEMICAL FORMULA	C ₄ H ₉ NO ₃
MOLECULAR WEIGHT (MW)	119.12
CHEMICAL FAMILY	Amino acids
CAS NUMBER	[72-19-5]
EC#(EINECS)	200-774-1
RTECS	XO8590000

ANALYTICAL RESULTS

TEST	METHOD	SPECIFICATION	RESULT
Adjusted Purity	NA	≥ 85%	99.9%
HPLC	0.700.10.2.METH46	≥ 90%	99.9%
NMR	99.1-CD-1.0-000122	Conforms to structure	Conforms to structure
Mass Spectrum	Direct Infusion, ESI (-)	Conforms	Conforms
Residual Solvent	99.1-CD-7.0-000115	NA	ND
Water	0.700.12.37	NA	ND
Appearance	NA	NA	White powder

ADJUSTED PURITY: 99.9% IS BASED ON (100 - 0.0 SOLVENTS - 0.0 WATER) X 99.9% HPLC

STORAGE CONDITIONS

STORAGE	Room Temperature in a dry place.
EXPIRATION DATE	01/2028 under the above conditions.

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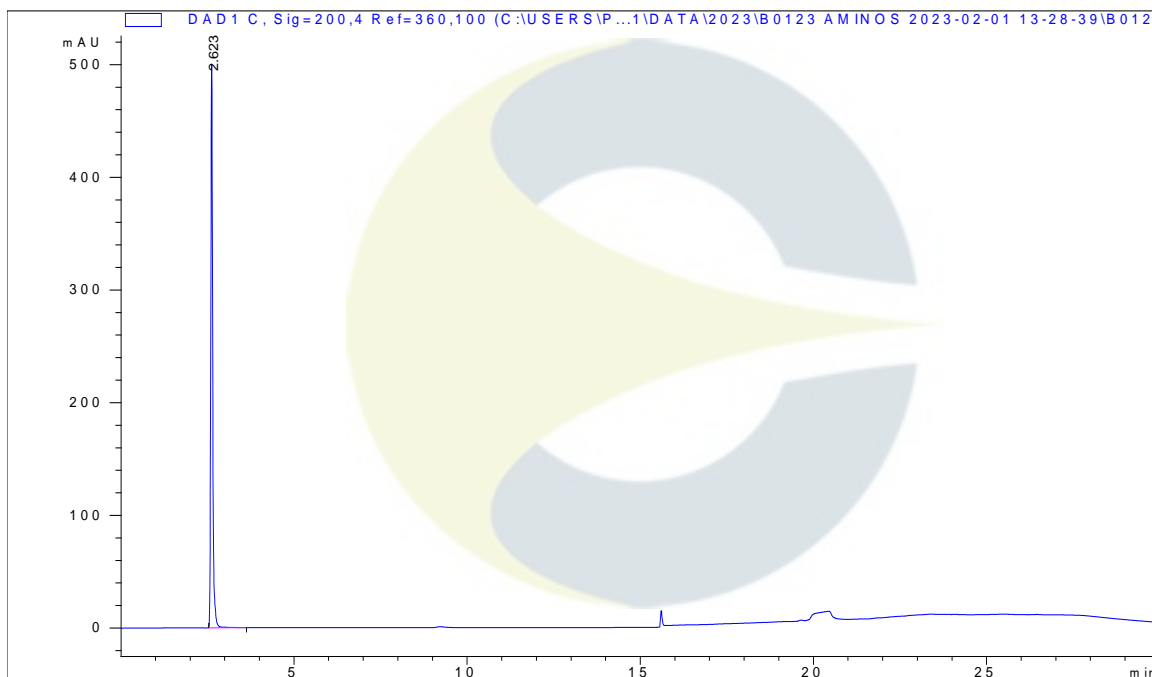
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ANALYTICAL CONDITIONS

INSTRUMENT	AGILENT 1260 HPLC UV-VIS (DAD); AGILENT 6510 QTOF
COLUMN	Phenomenex Synergi Hydro-RP 250 x 4.6 mm, 4 μm particle size
MOBILE PHASE	A – 10 mM Monobasic potassium phosphate (aq) (pH – 2.88), B - Acetonitrile; Isocratic 0% B for 10 minutes, then increasing to 30% B over 10 minutes. Hold at 30% B for 4 minutes, then decreasing to 0% B over 5 minutes.
COLUMN TEMP.	22 °C
FLOW RATE	1.0 mL/minute
INJECTION VOL.	5.0 μL
INJECTION CONC.	5.8 mg/mL in Ultrapure Water
DETECTION	200 ± 2 nm

HPLC CHROMATOGRAM OF L-THREONINE (CDXA-14-5556)



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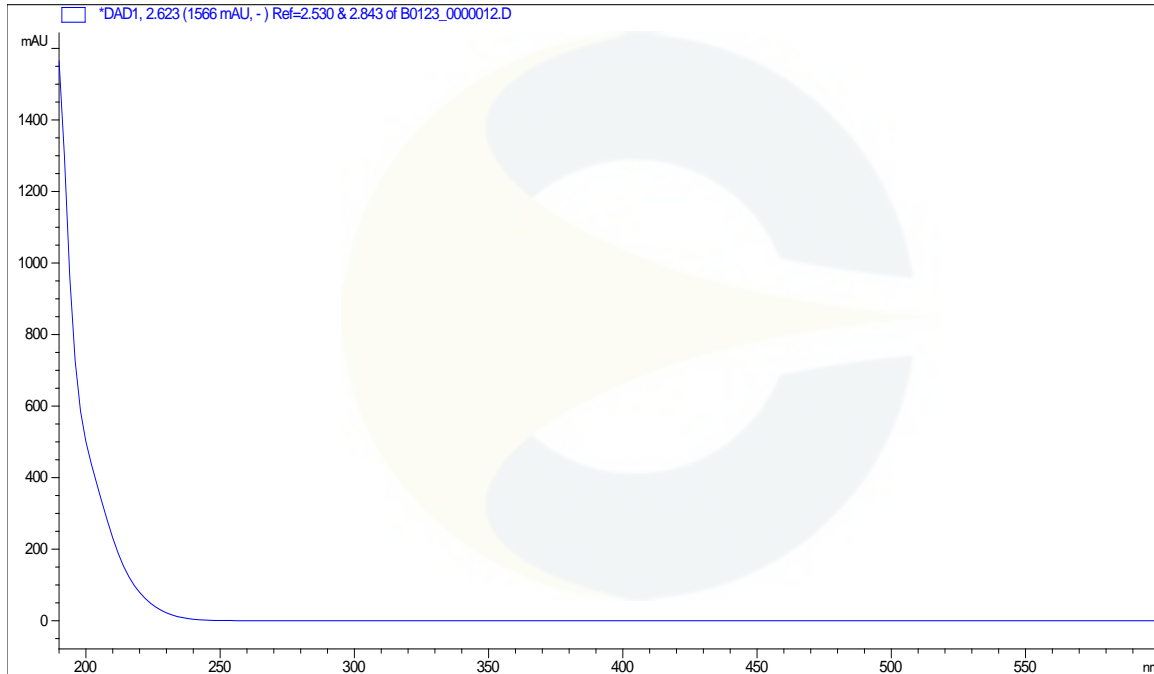
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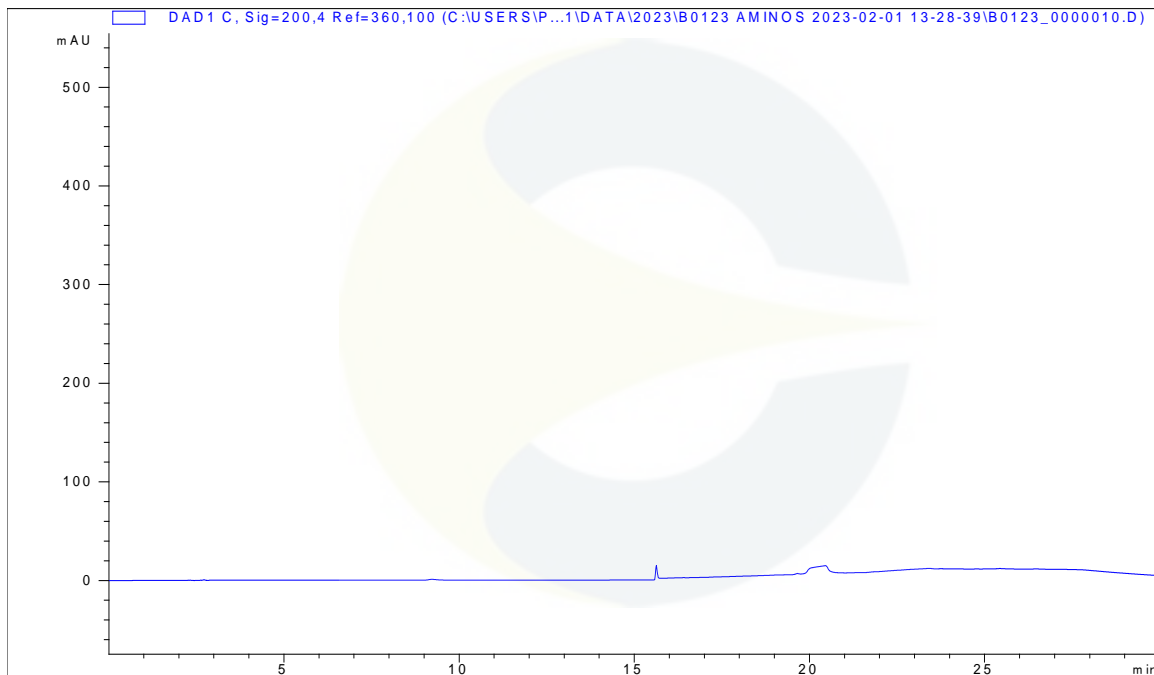
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UV SPECTRUM AT RT = 2.6 MINUTES



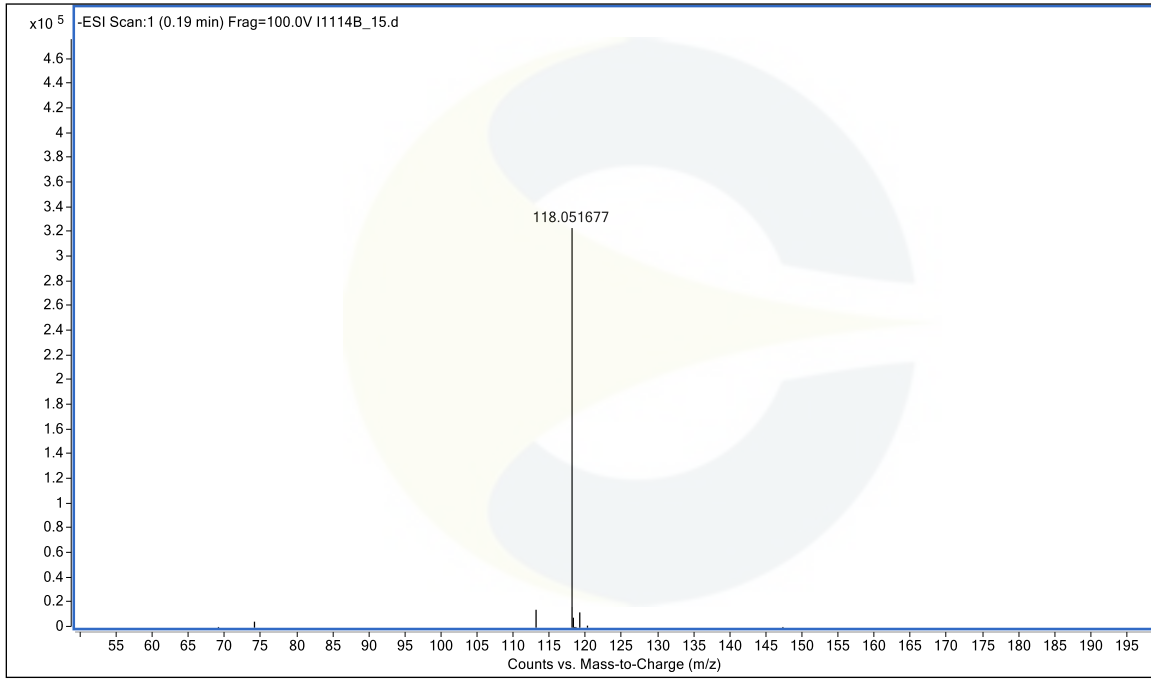
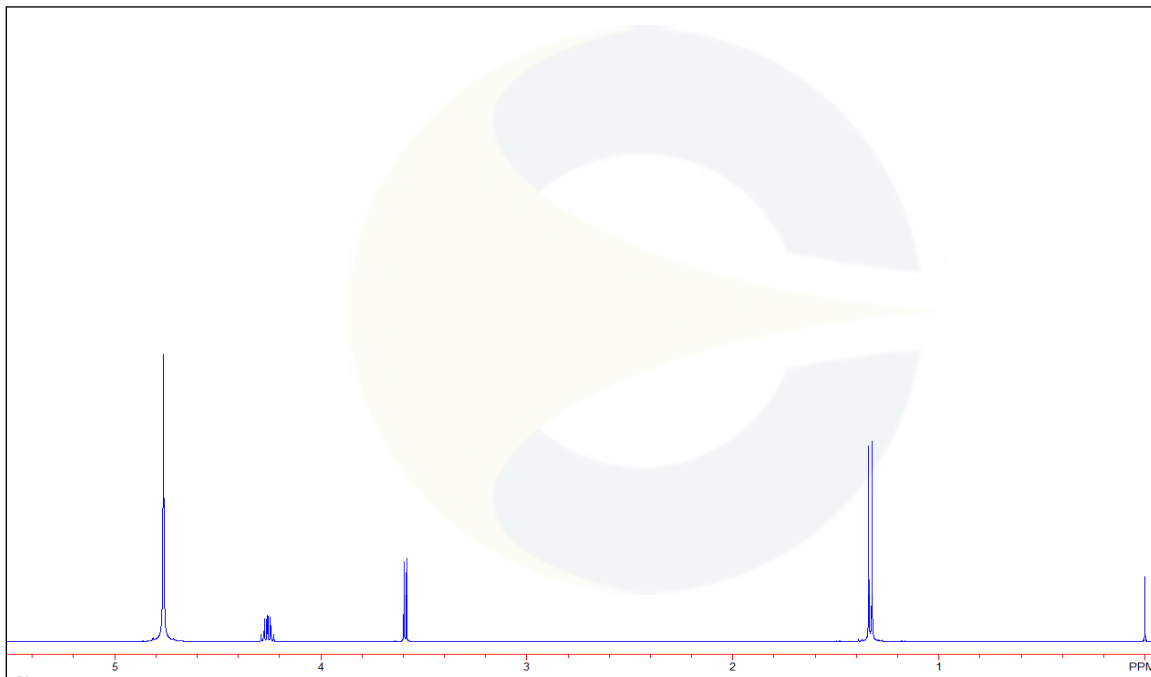
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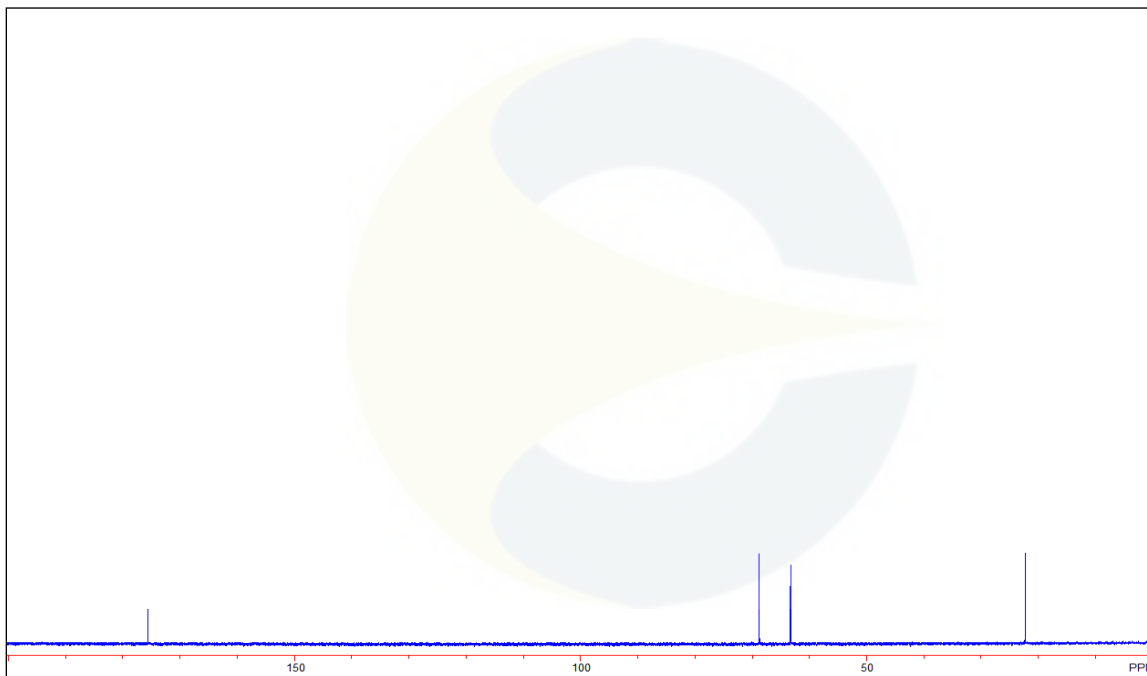
MASS SPECTRUM OF L-THREONINE (CDXA-14-5556) **$^1\text{H-NMR}$ SPECTRUM OF L-THREONINE (CDXA-14-5556) IN D_2O** 

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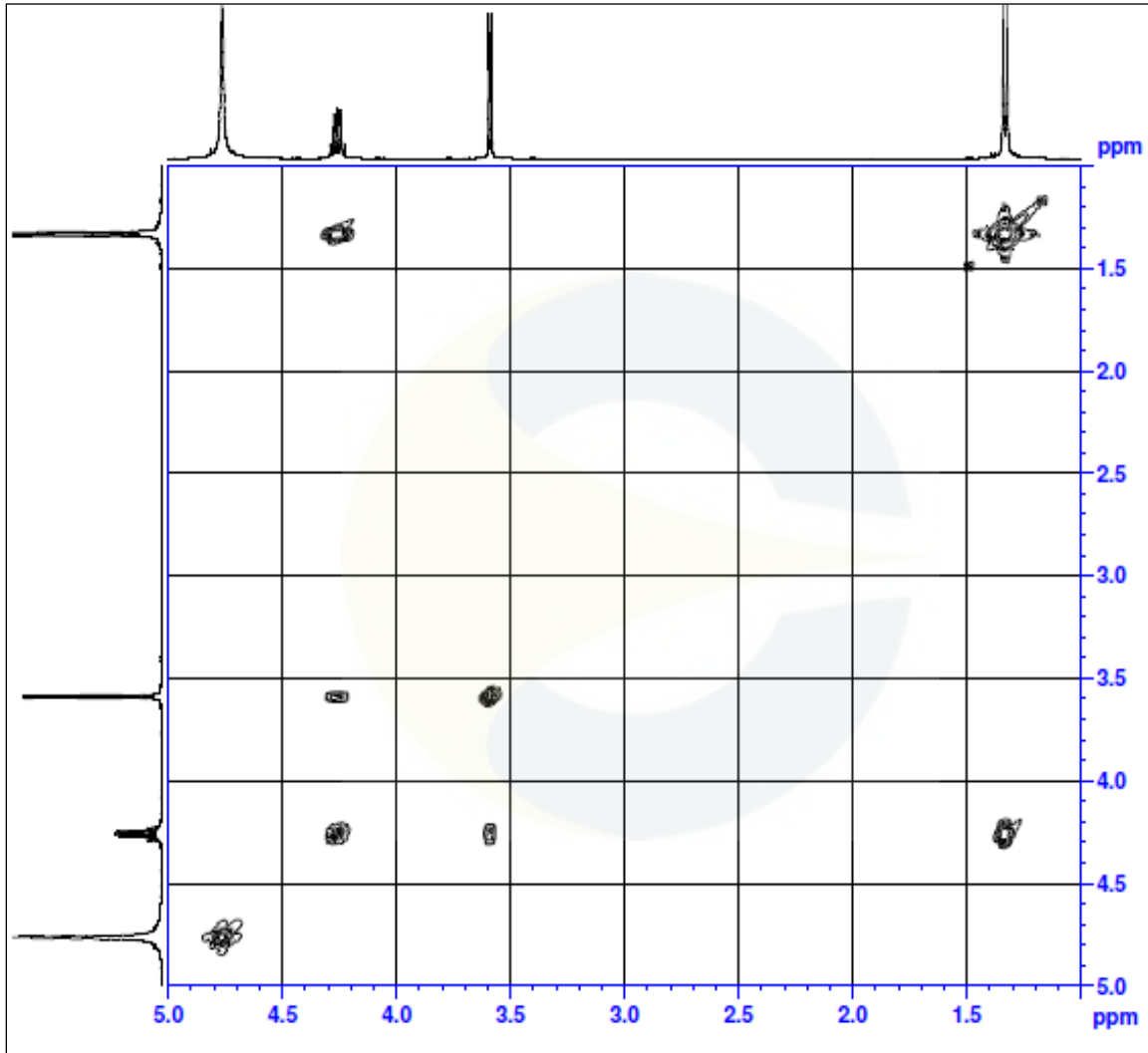
¹³C-NMR SPECTRUM OF L-THREONINE (CDXA-14-5556) IN D₂O



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COSY-NMR SPECTRUM OF L-THREONINE (CDXA-14-5556) IN D₂O

REVISION HISTORY

<u>Revision History</u>	<u>Date of Revision</u>	<u>Document/Changes</u>
00	11/18/2014	New report
01	04/16/2019	Material passed reevaluation by HPLC and KF. Updated analytical results, analytical conditions, chromatograms, and expiration date. Removed melting point
02	02/07/2023	Material passed reevaluation by HPLC and KF. Updated analytical results, conditions, chromatograms, and expiration date.

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