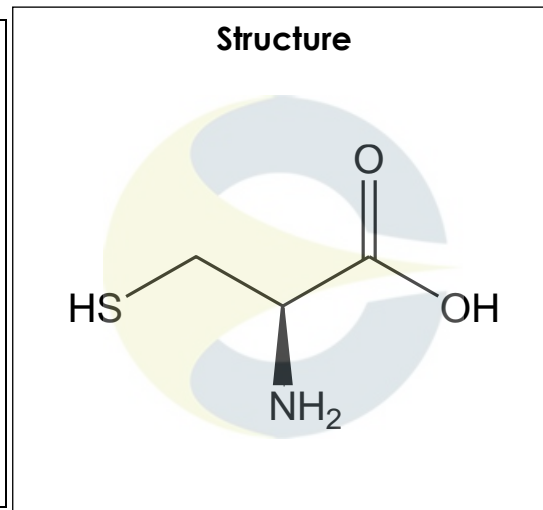


Certificate of Analysis

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PRODUCT NAME	L-Cysteine
PART NUMBER	00031031
STANDARD TYPE	Primary (P)
LOT NUMBER	00031031-30V
REPORT NUMBER	CDXA-RSS-4414-02
SAMPLE NUMBER	CDXA-11-1640
DATE OF SAMPLE	03/09/2011
DATE OF RE-EVALUATION	12/21/2015 (1 st); 01/31/2020(2 nd)
DATE OF REPORT	03/12/2020



CHEMICAL NAMES	(R)-2-Amino-3-mercaptopropanoic acid; (R)-Cysteine; Thioisoserine
CHEMICAL FORMULA	C ₃ H ₇ NO ₂ S
MOLECULAR WEIGHT (MW)	121.16
CHEMICAL FAMILY	Amino acids
CAS NUMBER	[52-90-4]
EC#(EINECS)	200-158-2
RTECS	HA1600000

ANALYTICAL RESULTS

TEST	METHOD	SPECIFICATION	RESULT
Adjusted Purity	NA	NA	97.8%
HPLC	0.700.10.2.METH46	NA	97.9%
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-4.0-000115	NA	Ethanol – 0.1%
Water	0.700.12.37	NA	ND
Appearance	NA	NA	White powder

ADJUSTED PURITY: 97.8% IS BASED ON (100 - 0.1 SOLVENTS - 0.0 WATER) X 97.9% HPLC

STORAGE CONDITIONS

STORAGE	+4 °C in a dry place.
EXPIRATION DATE	01/2025 under the above conditions.

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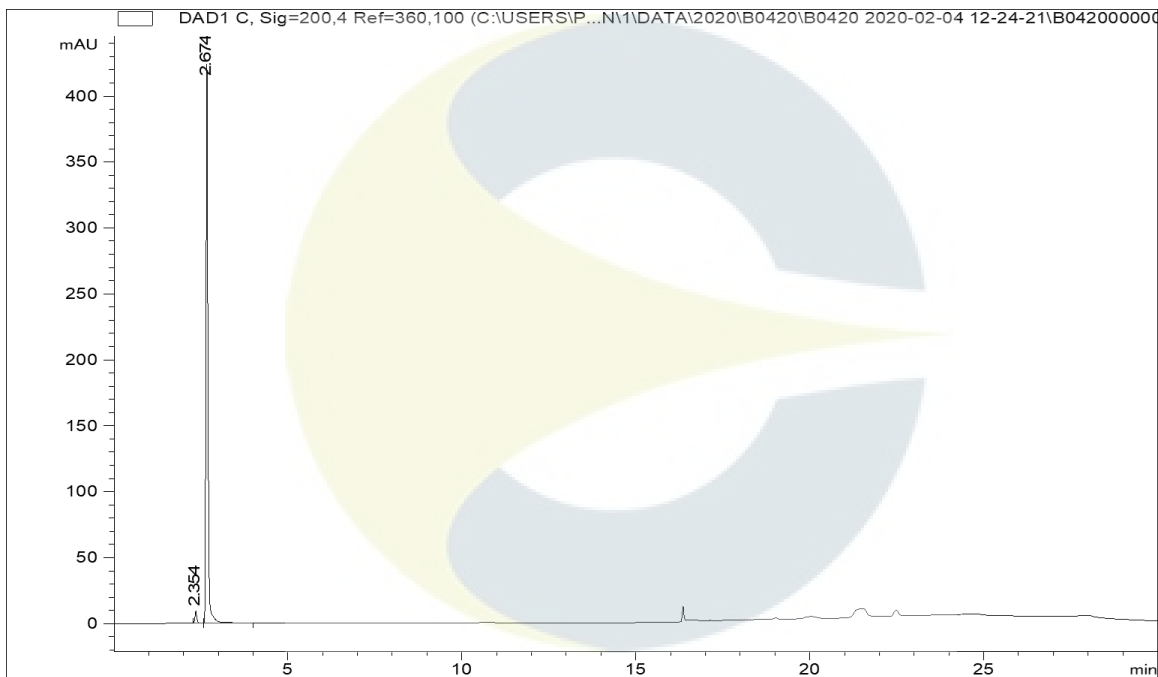
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ANALYTICAL CONDITIONS

INSTRUMENT	AGILENT 1260 HPLC UV-VIS (DAD); Agilent 6510 Q-TOF
COLUMN	Phenomenex Synergi Hydro-RP 250 x 4.6 mm, 4 μm particle size
MOBILE PHASE	A – 10 mM KH ₂ PO ₄ , pH 2.9; B – Acetonitrile; 0% B for 10 min then increasing to 30% B over 10 minutes. Hold at 30% B for 4 minutes.
COLUMN TEMP.	22 °C
FLOW RATE	1.0 mL/minute
INJECTION VOL.	2.0 μL
INJECTION CONC.	1.2 mg/mL in Milli-Q water
DETECTION	200 ± 2 nm

HPLC CHROMATOGRAM OF L-CYSTEINE (CDXA-11-1640)

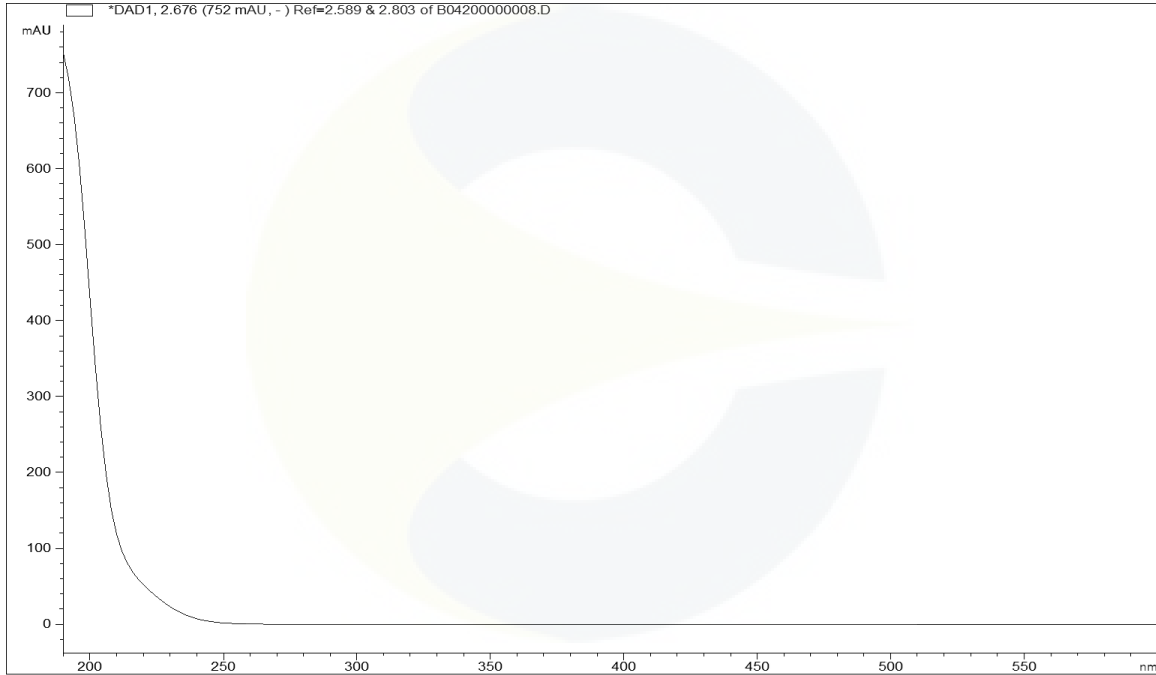


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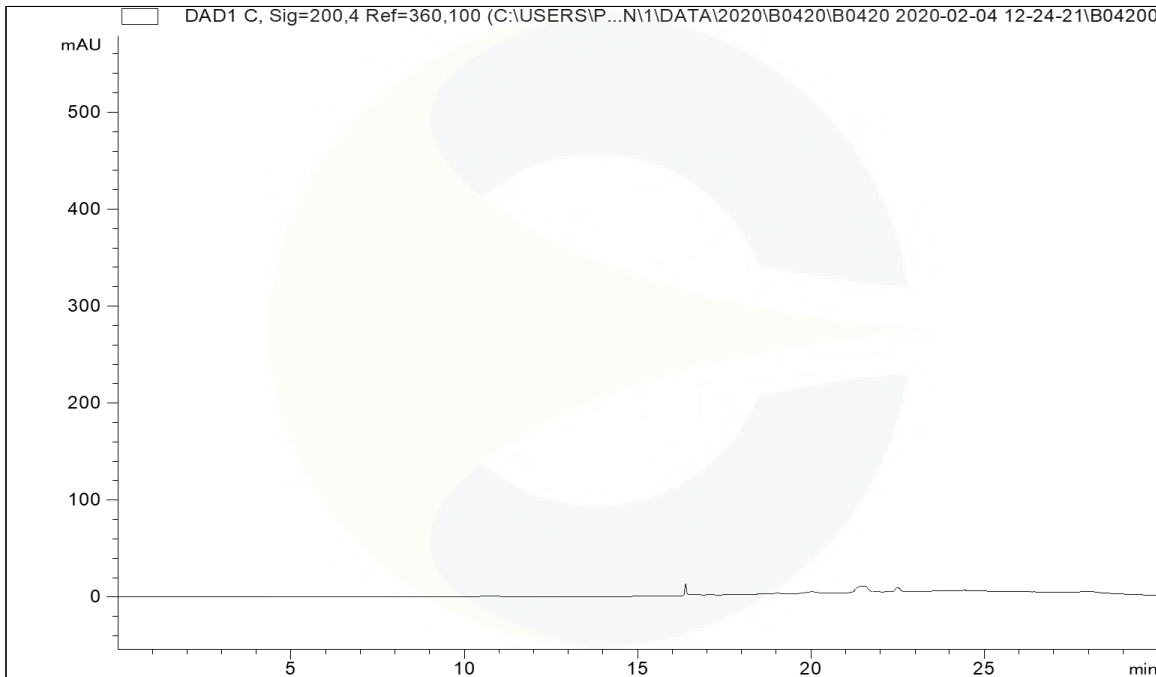
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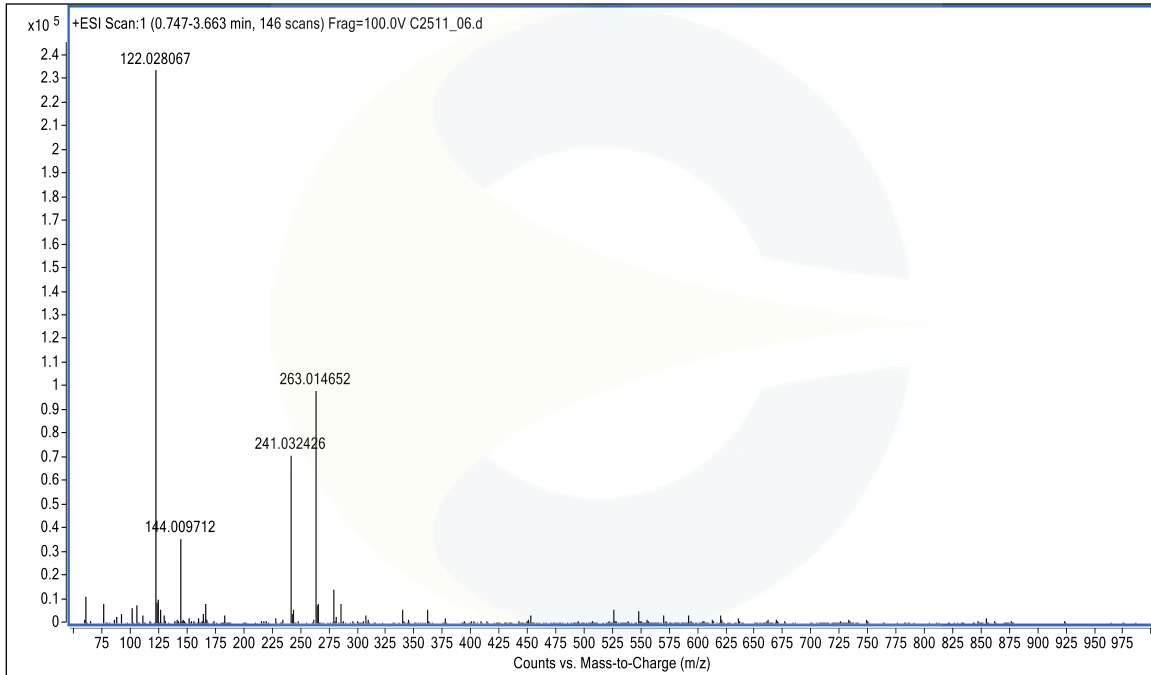
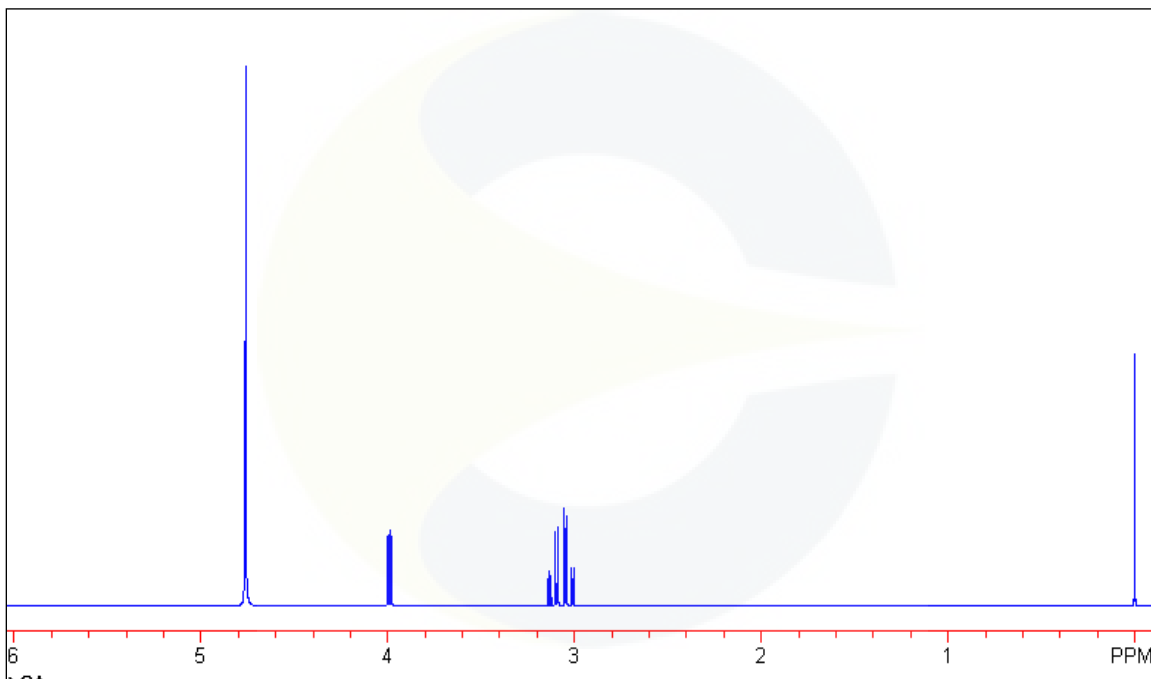
UV SPECTRUM AT RT = 2.7 MINUTES



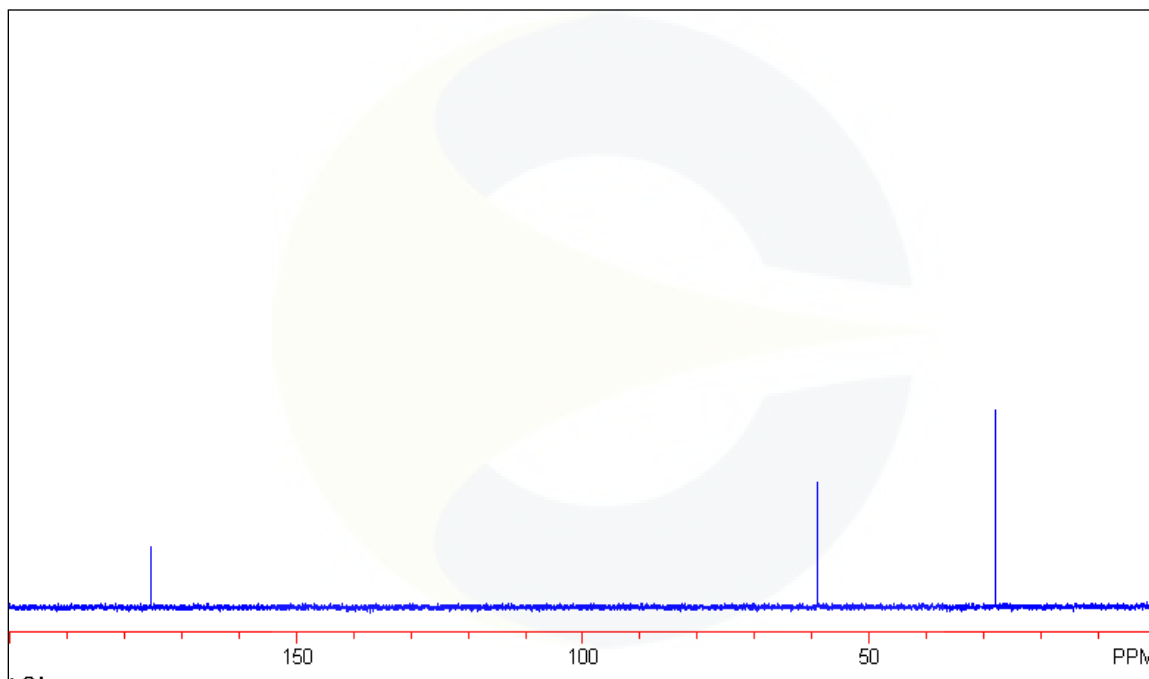
HPLC CHROMATOGRAM OF DILUENT BLANK



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MASS SPECTRUM OF L-CYSTEINE (CDXA-11-1640)**¹H-NMR SPECTRUM OF L-CYSTEINE (CDXA-11-1640) IN D₂O**

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¹³C-NMR SPECTRUM OF L-CYSTEINE (CDXA-11-1640) IN D₂O

REVISION HISTORY

<u>Revision History</u>	<u>Date of Revision</u>	<u>Document/Changes</u>
00	05/13/2011	New report
01	01/25/2016	Passed re-evaluation by HPLC, KF. Updated expiration date and melting point.
02	03/12/2020	Passed re-evaluation by HPLC, KF. Updated expiration date, analytical results, analytical conditions, and chromatograms. Removed melting point.

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