



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 09:04 AM UTC

PDB ID : 1BG6 / pdb_00001bg6
Title : CRYSTAL STRUCTURE OF THE N-(1-D-CARBOXYLETHYL)-L-NORVALINE DEHYDROGENASE FROM ARTHROBACTER SP. STRAIN 1C
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Deposited on : 1998-06-05
Resolution : 1.80 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

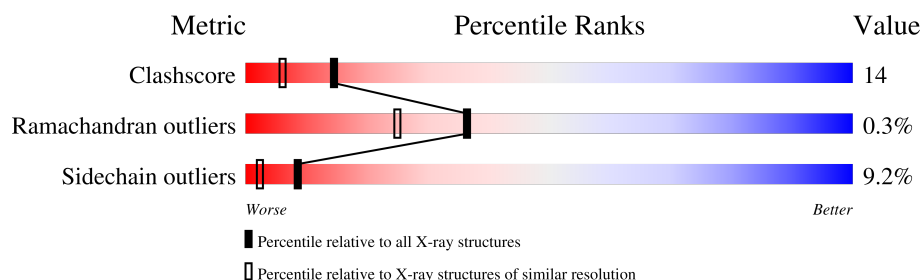
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	359	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2705 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called N-(1-D-CARBOXYLETHYL)-L-NORVALINE DEHYDROGENASE.

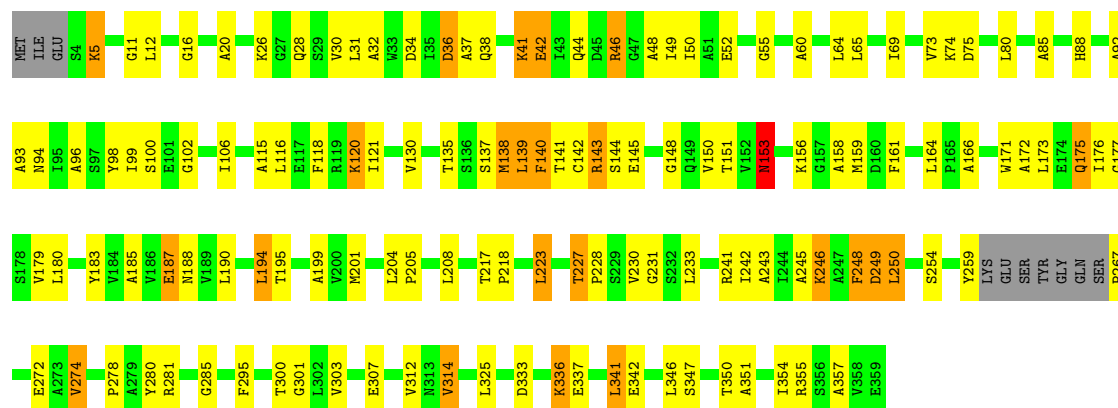
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	349	Total	C	N	O	S	7	0	0
			2592	1649	440	496	7			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	113	Total	O	0	0
			113	113		

Note EDS was not executed.

Chain A: 60% 30% 6%



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	104.90Å 80.00Å 45.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.80	Depositor
% Data completeness (in resolution range)	83.0 (20.00-1.80)	Depositor
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT 5E	Depositor
R, R_{free}	(Not available) , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2705	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	1.88	44/2640 (1.7%)	1.24	13/3598 (0.4%)

All (44) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	138	MET	SD-CE	14.65	2.16	1.79
1	A	98	TYR	CA-C	-8.93	1.41	1.52
1	A	48	ALA	CA-C	-7.55	1.43	1.52
1	A	231	GLY	CA-C	7.16	1.60	1.52
1	A	64	LEU	C-O	-7.00	1.15	1.23
1	A	34	ASP	N-CA	-6.81	1.37	1.46
1	A	274	VAL	N-CA	-6.27	1.38	1.46
1	A	227	THR	CA-C	6.21	1.59	1.52
1	A	106	ILE	CA-CB	-6.18	1.46	1.54
1	A	300	THR	CA-CB	6.05	1.61	1.53
1	A	30	VAL	CA-CB	5.87	1.61	1.54
1	A	52	GLU	CG-CD	5.87	1.66	1.52
1	A	32	ALA	CA-C	-5.85	1.45	1.52
1	A	93	ALA	CA-CB	-5.83	1.44	1.53
1	A	201	MET	CA-C	-5.83	1.44	1.52
1	A	60	ALA	N-CA	-5.82	1.39	1.45
1	A	158	ALA	CA-C	-5.82	1.45	1.52
1	A	138	MET	CG-SD	5.78	1.95	1.80
1	A	303	VAL	CA-CB	5.78	1.57	1.54
1	A	100	SER	CA-C	-5.71	1.45	1.52
1	A	116	LEU	CA-C	-5.62	1.45	1.52
1	A	96	ALA	CA-CB	5.50	1.61	1.53
1	A	357	ALA	CA-CB	-5.49	1.43	1.53
1	A	60	ALA	C-O	5.48	1.30	1.23
1	A	55	GLY	C-O	-5.39	1.17	1.24
1	A	164	LEU	CA-C	5.36	1.58	1.52
1	A	153	ASN	CA-C	-5.32	1.46	1.52
1	A	241	ARG	CA-C	-5.32	1.46	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	102	GLY	CA-C	5.32	1.59	1.51
1	A	199	ALA	CA-CB	-5.31	1.44	1.53
1	A	28	GLN	CA-C	-5.30	1.46	1.52
1	A	314	VAL	N-CA	5.29	1.50	1.46
1	A	121	ILE	CA-C	5.22	1.59	1.52
1	A	354	ILE	CA-CB	-5.17	1.47	1.54
1	A	20	ALA	CA-C	5.17	1.59	1.52
1	A	36	ASP	CA-CB	-5.14	1.46	1.53
1	A	140	PHE	N-CA	-5.14	1.39	1.45
1	A	248	PHE	CA-C	-5.10	1.46	1.52
1	A	115	ALA	CA-CB	5.09	1.61	1.53
1	A	325	LEU	CA-C	5.06	1.59	1.52
1	A	49	ILE	CB-CG2	5.05	1.69	1.52
1	A	80	LEU	CA-C	-5.04	1.46	1.52
1	A	60	ALA	CA-C	-5.03	1.46	1.52
1	A	139	LEU	N-CA	-5.03	1.40	1.46

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	69	ILE	N-CA-C	8.12	118.90	110.62
1	A	73	VAL	N-CA-C	6.57	118.54	111.58
1	A	201	MET	N-CA-C	6.19	120.57	112.89
1	A	285	GLY	N-CA-C	-6.00	104.97	112.23
1	A	5	LYS	N-CA-C	5.97	118.29	109.69
1	A	94	ASN	N-CA-C	5.88	118.64	111.82
1	A	223	LEU	N-CA-C	5.80	117.61	111.28
1	A	175	GLN	N-CA-C	5.52	116.97	111.07
1	A	177	GLY	N-CA-C	5.33	119.33	112.83
1	A	337	GLU	N-CA-C	5.27	119.42	112.89
1	A	295	PHE	N-CA-C	5.24	117.39	111.11
1	A	141	THR	N-CA-C	-5.23	98.86	108.02
1	A	36	ASP	N-CA-C	5.00	116.47	108.41

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen

atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2592	0	2620	73	2
2	A	113	0	0	3	2
All	All	2705	0	2620	73	2

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 14.

All (73) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:138:MET:SD	1:A:138:MET:CE	2.16	1.34
1:A:307:GLU:HB3	1:A:341:LEU:HD22	1.26	1.10
1:A:138:MET:HE3	1:A:140:PHE:H	1.29	0.97
1:A:143:ARG:HH11	1:A:143:ARG:HG2	1.31	0.95
1:A:187:GLU:H	1:A:187:GLU:CD	1.76	0.92
1:A:135:THR:HG21	1:A:183:TYR:HE1	1.35	0.91
1:A:307:GLU:HB3	1:A:341:LEU:CD2	2.01	0.90
1:A:143:ARG:HH11	1:A:143:ARG:CG	1.84	0.89
1:A:153:ASN:HD22	1:A:153:ASN:N	1.69	0.89
1:A:37:ALA:O	1:A:41:LYS:HD2	1.78	0.83
1:A:143:ARG:HG2	1:A:143:ARG:NH1	1.87	0.83
1:A:333:ASP:OD2	1:A:336:LYS:HE3	1.77	0.82
1:A:242:ILE:O	1:A:246:LYS:HG2	1.89	0.73
1:A:135:THR:CG2	1:A:183:TYR:HE1	2.03	0.72
1:A:153:ASN:N	1:A:153:ASN:ND2	2.39	0.68
1:A:179:VAL:HG12	1:A:180:LEU:HG	1.76	0.67
1:A:187:GLU:CD	1:A:187:GLU:N	2.51	0.67
1:A:195:THR:HG22	1:A:195:THR:O	1.93	0.66
1:A:250:LEU:CD1	1:A:250:LEU:N	2.58	0.66
1:A:249:ASP:C	1:A:250:LEU:HD12	2.22	0.64
1:A:139:LEU:HD13	1:A:159:MET:HE2	1.80	0.64
1:A:38:GLN:O	1:A:42:GLU:HG2	1.99	0.62
1:A:137:SER:OG	1:A:159:MET:SD	2.58	0.61
1:A:153:ASN:HD22	1:A:153:ASN:H	1.49	0.59
1:A:223:LEU:HD22	1:A:223:LEU:H	1.67	0.58
1:A:138:MET:CE	1:A:140:PHE:H	2.11	0.58
1:A:307:GLU:CB	1:A:341:LEU:HD22	2.19	0.56
1:A:204:LEU:HB3	1:A:205:PRO:HD3	1.86	0.56
1:A:171:TRP:O	1:A:175:GLN:HG2	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:250:LEU:N	1:A:250:LEU:HD12	2.22	0.55
1:A:153:ASN:ND2	1:A:153:ASN:H	2.03	0.54
1:A:243:ALA:HA	1:A:246:LYS:HG3	1.89	0.54
1:A:223:LEU:CD2	2:A:440:HOH:O	2.57	0.53
1:A:36:ASP:OD1	1:A:36:ASP:C	2.52	0.53
1:A:341:LEU:HD12	1:A:346:LEU:HB2	1.90	0.52
1:A:50:ILE:HD12	1:A:148:GLY:O	2.10	0.52
1:A:350:THR:O	1:A:351:ALA:C	2.53	0.52
1:A:159:MET:HE3	1:A:183:TYR:CE1	2.46	0.51
1:A:188:ASN:OD1	1:A:190:LEU:HB2	2.10	0.51
1:A:248:PHE:O	1:A:250:LEU:CD1	2.58	0.50
1:A:135:THR:HG21	1:A:183:TYR:CE1	2.27	0.49
1:A:223:LEU:HD22	1:A:223:LEU:N	2.27	0.49
1:A:144:SER:HA	1:A:150:VAL:HA	1.95	0.49
1:A:135:THR:CG2	1:A:183:TYR:CE1	2.92	0.47
1:A:120:LYS:HZ2	1:A:120:LYS:HG2	1.42	0.47
1:A:208:LEU:HD23	1:A:230:VAL:HG22	1.96	0.47
1:A:46:ARG:N	1:A:46:ARG:HD3	2.30	0.46
1:A:85:ALA:HA	1:A:88:HIS:CE1	2.50	0.46
1:A:227:THR:HB	1:A:228:PRO:CD	2.46	0.46
1:A:278:PRO:O	1:A:281:ARG:HB2	2.15	0.46
1:A:172:ALA:O	1:A:175:GLN:HB2	2.15	0.46
1:A:242:ILE:O	1:A:246:LYS:CG	2.62	0.45
1:A:248:PHE:C	1:A:250:LEU:HD13	2.42	0.45
1:A:223:LEU:HD22	2:A:440:HOH:O	2.16	0.45
1:A:92:ALA:HB2	1:A:118:PHE:CE1	2.51	0.45
1:A:250:LEU:N	1:A:250:LEU:HD13	2.30	0.45
1:A:312:VAL:HG23	1:A:314:VAL:HG23	1.98	0.45
1:A:242:ILE:HD11	1:A:254:SER:HA	1.99	0.44
1:A:173:LEU:HD23	1:A:176:ILE:HD11	1.99	0.44
1:A:161:PHE:O	1:A:185:ALA:HA	2.16	0.44
1:A:217:THR:HA	1:A:218:PRO:HD3	1.86	0.43
1:A:190:LEU:HA	1:A:190:LEU:HD23	1.77	0.42
1:A:166:ALA:O	2:A:466:HOH:O	2.21	0.42
1:A:267:PRO:HA	1:A:272:GLU:OE2	2.19	0.42
1:A:194:LEU:HD23	1:A:245:ALA:HA	2.00	0.41
1:A:46:ARG:HA	1:A:46:ARG:HD2	1.69	0.41
1:A:99:ILE:HD12	1:A:130:VAL:HG11	2.02	0.41
1:A:142:CYS:HA	1:A:151:THR:O	2.20	0.41
1:A:12:LEU:HD23	1:A:12:LEU:HA	1.90	0.41
1:A:42:GLU:HG2	1:A:42:GLU:H	1.61	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:74:LYS:HG3	1:A:75:ASP:OD2	2.21	0.41
1:A:259:TYR:HE2	1:A:280:TYR:OH	2.04	0.40
1:A:11:GLY:O	1:A:16:GLY:HA3	2.21	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:41:LYS:NZ	2:A:447:HOH:O[4_557]	1.77	0.43
1:A:41:LYS:CE	2:A:447:HOH:O[4_557]	2.05	0.15

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	345/359 (96%)	333 (96%)	11 (3%)	1 (0%)	36 25

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	301	GLY

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	271/280 (97%)	246 (91%)	25 (9%)	8 2

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	LYS
1	A	26	LYS
1	A	31	LEU
1	A	41	LYS
1	A	42	GLU
1	A	44	GLN
1	A	46	ARG
1	A	65	LEU
1	A	120	LYS
1	A	143	ARG
1	A	145	GLU
1	A	153	ASN
1	A	156	LYS
1	A	187	GLU
1	A	194	LEU
1	A	233	LEU
1	A	246	LYS
1	A	249	ASP
1	A	250	LEU
1	A	274	VAL
1	A	336	LYS
1	A	341	LEU
1	A	342	GLU
1	A	347	SER
1	A	355	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	153	ASN
1	A	290	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.