



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 06:45 PM UTC

PDB ID : 7CIF / pdb_00007cif
Title : Crystal structure of L-methionine decarboxylase from Streptomyces sp.590 (internal aldimine form).
Authors : Okawa, A.; Shiba, T.; Hayashi, M.; Onoue, Y.; Murota, M.; Sato, D.; Inagaki, J.; Tamura, T.; Harada, S.; Inagaki, K.
Deposited on : 2020-07-07
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
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

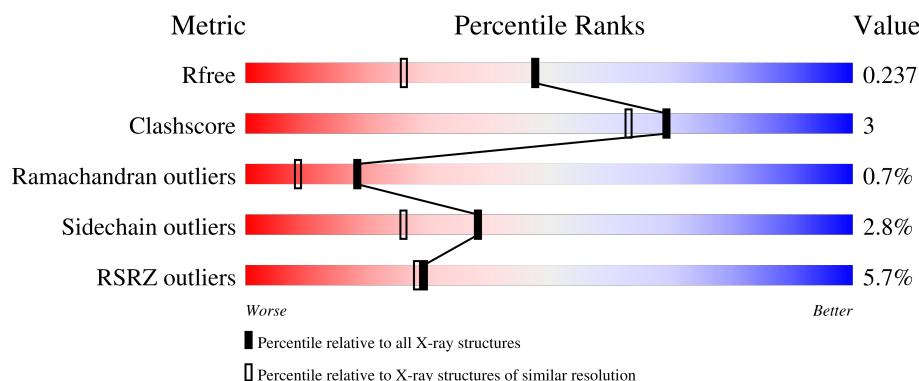
1 Overall quality at a glance

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))
R_{free}	180053	7662 (1.80-1.80)
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)
RSRZ outliers	180081	7663 (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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	557	6% 85% 9% • 6%
1	B	557	4% 83% 10% • 7%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 8502 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 L-methionine decarboxylase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	526	Total	C	N	O	P	S	0	2	0
			4139	2632	722	769	1	15			
1	B	519	Total	C	N	O	P	S	0	0	0
			4082	2598	710	758	1	15			

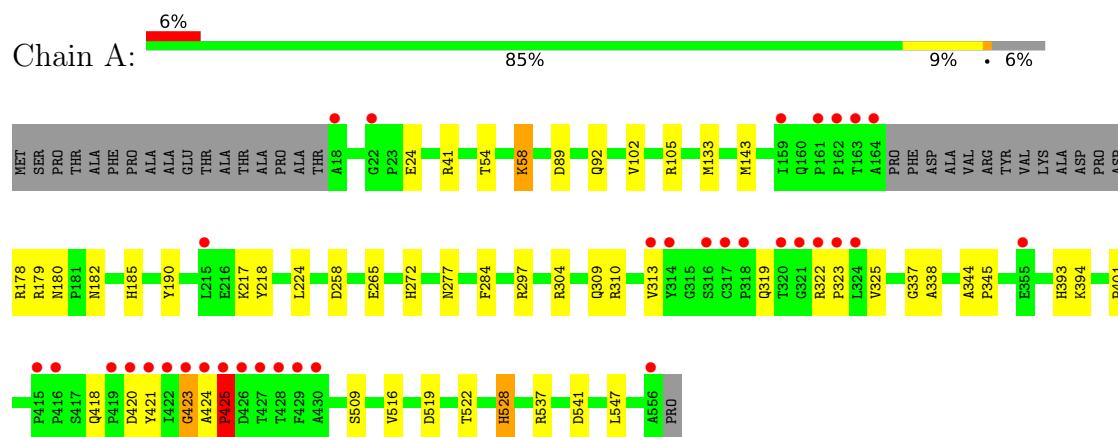
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	132	Total	O	0	0
			132	132		
2	B	149	Total	O	0	0
			149	149		

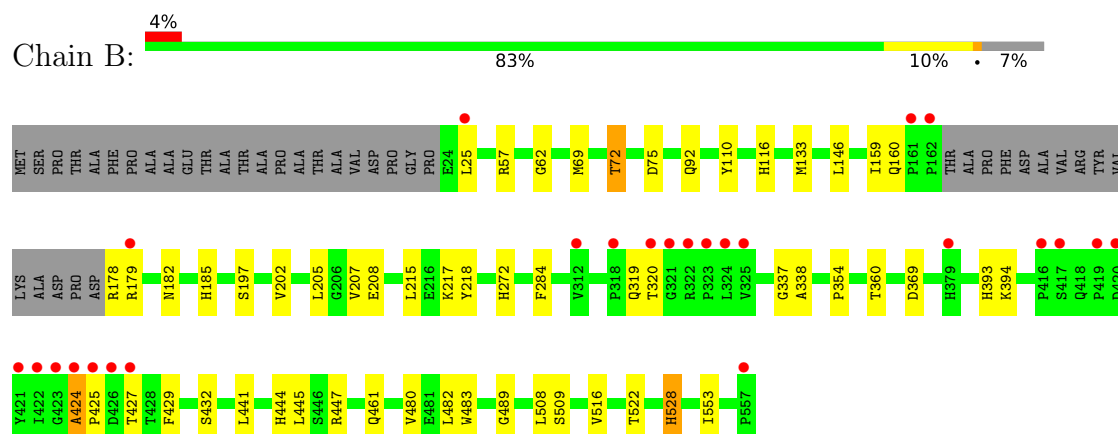
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: L-methionine decarboxylase



• Molecule 1: L-methionine decarboxylase



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	124.63Å 147.50Å 53.90Å 90.00° 99.87° 90.00°	Depositor
Resolution (Å)	19.89 – 1.80 19.89 – 1.80	Depositor EDS
% Data completeness (in resolution range)	98.1 (19.89-1.80) 98.1 (19.89-1.80)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.95 (at 1.80Å)	Xtriage
Refinement program	REFMAC 5.8.0103	Depositor
R, R_{free}	0.190 , 0.231 0.199 , 0.237	Depositor DCC
R_{free} test set	4308 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	28.7	Xtriage
Anisotropy	0.158	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 33.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8502	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.54% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: LLP

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	0.84	0/4234	0.92	2/5773 (0.0%)
1	B	0.87	0/4176	0.94	2/5691 (0.0%)
All	All	0.86	0/8410	0.93	4/11464 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	421	TYR	N-CA-C	7.64	121.43	112.72
1	A	425	PRO	N-CA-C	6.29	125.44	112.47
1	B	483	TRP	CA-C-N	-6.08	113.68	119.76
1	B	483	TRP	C-N-CA	-6.08	113.68	119.76

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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	4139	0	3982	28	0
1	B	4082	0	3931	31	0
2	A	132	0	0	0	0
2	B	149	0	0	2	0
All	All	8502	0	7913	56	0

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 3.

All (56) 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:B:516:VAL:HG22	1:B:522:THR:HG21	1.56	0.88
1:A:143:MET:HE1	1:B:429:PHE:CD1	2.22	0.74
1:A:516:VAL:HG22	1:A:522:THR:HG21	1.69	0.72
1:B:482:LEU:HD11	1:B:553:ILE:HG23	1.74	0.68
1:A:284:PHE:O	1:A:528:HIS:HD2	1.82	0.63
1:B:354:PRO:HB2	1:B:360:THR:HG22	1.81	0.63
1:A:537:ARG:NH1	1:A:541:ASP:OD2	2.32	0.62
1:B:284:PHE:O	1:B:528:HIS:HD2	1.83	0.61
1:B:424:ALA:HB1	1:B:425:PRO:CD	2.33	0.59
1:B:354:PRO:CB	1:B:360:THR:HG22	2.34	0.57
1:B:116:HIS:HD2	1:B:369:ASP:OD2	1.87	0.56
1:A:182:ASN:HD21	1:A:217:LYS:NZ	2.04	0.55
1:B:69:MET:HB2	1:B:72:THR:HG23	1.88	0.55
1:B:69:MET:HB2	1:B:72:THR:CG2	2.37	0.54
1:A:516:VAL:HG23	1:A:519:ASP:HB3	1.90	0.53
1:A:313:VAL:HG12	1:A:325:VAL:HG22	1.89	0.53
1:B:208:GLU:HG3	2:B:627:HOH:O	2.10	0.52
1:A:423:GLY:C	1:A:425:PRO:HD2	2.36	0.51
1:A:102:VAL:HG22	1:A:105:ARG:NH2	2.27	0.49
1:A:537:ARG:HG2	1:A:537:ARG:HH11	1.78	0.48
1:B:218:TYR:OH	1:B:272:HIS:HE1	1.97	0.48
1:A:265:GLU:OE1	1:A:304:ARG:NH1	2.47	0.48
1:A:178:ARG:HD3	1:A:179:ARG:HA	1.96	0.48
1:B:424:ALA:HB1	1:B:425:PRO:HD2	1.97	0.47
1:B:337:GLY:O	1:B:338:ALA:C	2.57	0.47
1:B:509:SER:HB3	1:B:528:HIS:CE1	2.50	0.47
1:A:185:HIS:O	1:A:272:HIS:HD2	1.98	0.47
1:B:202:VAL:HG13	1:B:207:VAL:O	2.14	0.47
1:B:62:GLY:HA3	1:B:508:LEU:HA	1.96	0.47
1:B:146:LEU:HG	1:B:207:VAL:HG21	1.96	0.46
1:B:480:VAL:HG23	1:B:482:LEU:HD13	1.97	0.46
1:B:75:ASP:OD2	1:B:447:ARG:NH2	2.49	0.46
1:B:461:GLN:HE22	1:B:489:GLY:HA2	1.80	0.45
1:A:54:THR:O	1:A:58:LYS:HE3	2.15	0.45
1:A:218:TYR:OH	1:A:272:HIS:HE1	2.00	0.45
1:A:509:SER:HB3	1:A:528:HIS:CE1	2.52	0.45
1:B:444:HIS:HE1	2:B:716:HOH:O	2.01	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:393:HIS:H	1:A:393:HIS:CD2	2.34	0.44
1:A:310[A]:ARG:O	1:A:310[A]:ARG:HG3	2.16	0.44
1:B:110:TYR:CE1	1:B:445:LEU:HD22	2.53	0.44
1:B:133:MET:HE3	1:B:441:LEU:HD12	1.99	0.43
1:A:190:TYR:HB3	1:A:277:ASN:HB3	2.01	0.43
1:B:159:ILE:HG22	1:B:160:GLN:HG2	2.01	0.42
1:A:133:MET:HE2	1:A:133:MET:HB3	1.94	0.42
1:B:393:HIS:CD2	1:B:393:HIS:H	2.37	0.42
1:A:344:ALA:N	1:A:345:PRO:CD	2.81	0.42
1:B:185:HIS:O	1:B:272:HIS:HD2	2.03	0.42
1:B:182:ASN:OD1	1:B:217:LYS:NZ	2.53	0.41
1:A:393:HIS:CD2	1:A:401:PRO:HA	2.55	0.41
1:A:337:GLY:O	1:A:338:ALA:C	2.63	0.41
1:A:258[B]:ASP:OD1	1:A:297:ARG:NH2	2.53	0.41
1:A:143:MET:HE1	1:B:429:PHE:CE1	2.55	0.41
1:B:146:LEU:HD23	1:B:205:LEU:HD12	2.02	0.41
1:A:89:ASP:HB2	1:A:425:PRO:HA	2.03	0.41
1:A:393:HIS:HE1	1:B:432:SER:OG	2.04	0.40
1:A:516:VAL:HG23	1:A:516:VAL:O	2.21	0.40

There are no symmetry-related clashes.

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	523/557 (94%)	497 (95%)	20 (4%)	6 (1%)	11	3
1	B	514/557 (92%)	496 (96%)	17 (3%)	1 (0%)	43	31
All	All	1037/1114 (93%)	993 (96%)	37 (4%)	7 (1%)	18	8

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	425	PRO
1	B	424	ALA
1	A	319	GLN
1	A	323	PRO
1	A	423	GLY
1	A	180	ASN
1	A	424	ALA

5.3.2 Protein sidechains ⓘ

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	426/449 (95%)	414 (97%)	12 (3%)	38	26
1	B	421/449 (94%)	409 (97%)	12 (3%)	37	25
All	All	847/898 (94%)	823 (97%)	24 (3%)	38	26

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	24	GLU
1	A	41	ARG
1	A	58	LYS
1	A	92	GLN
1	A	224	LEU
1	A	309	GLN
1	A	322	ARG
1	A	418	GLN
1	A	420	ASP
1	A	425	PRO
1	A	528	HIS
1	A	547	LEU
1	B	25	LEU
1	B	57	ARG
1	B	72	THR
1	B	92	GLN
1	B	178	ARG

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Mol	Chain	Res	Type
1	B	179	ARG
1	B	197	SER
1	B	215	LEU
1	B	319	GLN
1	B	320	THR
1	B	427	THR
1	B	528	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	92	GLN
1	A	180	ASN
1	A	182	ASN
1	A	184	HIS
1	A	195	HIS
1	A	272	HIS
1	A	279	ASN
1	A	393	HIS
1	A	528	HIS
1	B	59	HIS
1	B	116	HIS
1	B	272	HIS
1	B	279	ASN
1	B	319	GLN
1	B	393	HIS
1	B	444	HIS
1	B	461	GLN
1	B	511	GLN
1	B	528	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	LLP	B	394	1	23,24,25	2.55	4 (17%)	25,32,34	1.51	6 (24%)
1	LLP	A	394	1	23,24,25	2.44	4 (17%)	25,32,34	1.95	8 (32%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	LLP	B	394	1	-	4/16/17/19	0/1/1/1
1	LLP	A	394	1	-	5/16/17/19	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	394	LLP	C3-C2	7.59	1.48	1.41
1	A	394	LLP	C3-C2	6.42	1.47	1.41
1	A	394	LLP	C4-C5	6.07	1.50	1.42
1	A	394	LLP	C4'-NZ	5.46	1.45	1.27
1	B	394	LLP	C4'-NZ	5.30	1.44	1.27
1	B	394	LLP	C4-C5	4.88	1.48	1.42
1	B	394	LLP	C4-C3	4.71	1.48	1.41
1	A	394	LLP	C4-C3	3.86	1.47	1.41

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	394	LLP	C4-C3-C2	-4.48	117.62	120.14
1	A	394	LLP	C6-N1-C2	3.95	126.36	119.20
1	A	394	LLP	C4-C4'-NZ	-3.27	108.96	124.04
1	B	394	LLP	C4-C4'-NZ	-2.94	110.48	124.04
1	A	394	LLP	OP3-P-OP1	2.79	121.71	110.83
1	B	394	LLP	C6-N1-C2	2.74	124.16	119.20
1	B	394	LLP	C4-C3-C2	-2.68	118.63	120.14
1	B	394	LLP	OP3-P-OP4	-2.25	100.80	106.67

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	394	LLP	OP2-P-OP1	2.19	119.36	110.83
1	A	394	LLP	C3-C2-N1	-2.08	118.33	120.96
1	A	394	LLP	O3-C3-C2	2.08	121.89	117.58
1	A	394	LLP	OP4-C5'-C5	-2.07	105.47	109.36
1	B	394	LLP	OP3-P-OP1	2.05	118.82	110.83
1	A	394	LLP	OP3-P-OP4	-2.03	101.37	106.67

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	394	LLP	C4-C4'-NZ-CE
1	B	394	LLP	C4-C4'-NZ-CE
1	A	394	LLP	CG-CD-CE-NZ
1	B	394	LLP	CG-CD-CE-NZ
1	A	394	LLP	C3-C4-C4'-NZ
1	B	394	LLP	CD-CE-NZ-C4'
1	A	394	LLP	CD-CE-NZ-C4'
1	B	394	LLP	C3-C4-C4'-NZ
1	A	394	LLP	C5-C4-C4'-NZ

There are no ring outliers.

No monomer is involved in short contacts.

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

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	525/557 (94%)	0.35	34 (6%) 25 23	17, 31, 69, 146	2 (0%)
1	B	518/557 (92%)	0.24	25 (4%) 35 34	18, 30, 67, 122	0
All	All	1043/1114 (93%)	0.29	59 (5%) 29 28	17, 30, 69, 146	2 (0%)

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	422	ILE	7.0
1	B	422	ILE	6.3
1	A	430	ALA	5.9
1	B	421	TYR	5.7
1	A	419	PRO	5.2
1	A	425	PRO	5.2
1	B	419	PRO	5.1
1	A	424	ALA	5.1
1	A	162	PRO	4.8
1	B	424	ALA	4.7
1	A	324	LEU	4.6
1	A	416	PRO	4.5
1	A	556	ALA	4.5
1	A	429	PHE	4.3
1	B	162	PRO	4.1
1	A	421	TYR	4.0
1	A	323	PRO	3.8
1	A	161	PRO	3.8
1	A	163	THR	3.6
1	B	425	PRO	3.5
1	B	423	GLY	3.5
1	B	324	LEU	3.4
1	A	320	THR	3.4
1	A	317	CYS	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	323	PRO	3.2
1	B	325	VAL	3.2
1	A	164	ALA	3.1
1	B	416	PRO	3.1
1	B	161	PRO	3.1
1	A	427	THR	2.9
1	A	426	ASP	2.8
1	A	18	ALA	2.8
1	A	423	GLY	2.8
1	B	427	THR	2.8
1	A	215	LEU	2.7
1	A	415	PRO	2.7
1	B	420	ASP	2.7
1	B	312	VAL	2.6
1	B	320	THR	2.6
1	B	318	PRO	2.5
1	B	557	PRO	2.5
1	A	318	PRO	2.4
1	A	355	GLU	2.4
1	A	22	GLY	2.4
1	B	379	HIS	2.4
1	A	316	SER	2.4
1	B	25	LEU	2.3
1	A	420	ASP	2.2
1	B	179	ARG	2.2
1	B	322	ARG	2.2
1	A	322	ARG	2.2
1	A	428	THR	2.2
1	A	314	TYR	2.2
1	A	159	ILE	2.2
1	B	417	SER	2.2
1	B	321	GLY	2.1
1	B	426	ASP	2.1
1	A	321	GLY	2.1
1	A	313	VAL	2.1

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	LLP	A	394	24/25	0.96	0.06	21,24,28,28	0
1	LLP	B	394	24/25	0.97	0.06	21,24,26,28	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.