



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 7, 2023 – 02:49 AM EST

PDB ID : 8DL5
Title : Crystal structure of PLP-dependent Mannich cyclase LolT
Authors : Gao, J.; Hai, Y.
Deposited on : 2022-07-06
Resolution : 2.10 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

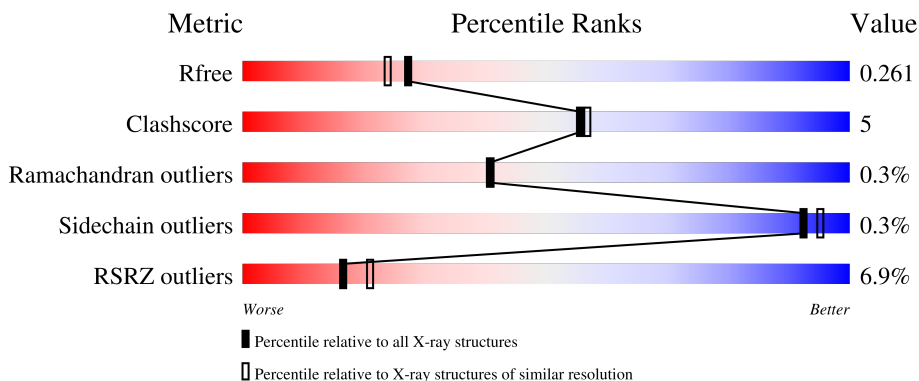
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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	496	
1	B	496	

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 6655 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 Aminotransferase, class V/Cysteine desulfurase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	A	403	Total	C	N	O	P	S	0	0	0
			3212	2057	544	588	1	22			
1	B	408	Total	C	N	O	P	S	0	0	0
			3253	2082	551	597	1	22			

There are 44 discrepancies between the modelled and reference sequences:

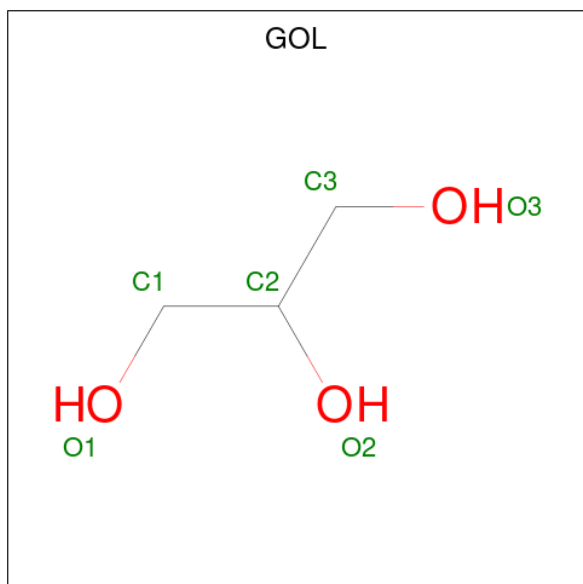
Chain	Residue	Modelled	Actual	Comment	Reference
A	-21	MET	-	expression tag	UNP A0A0A2J6G6
A	-20	GLY	-	expression tag	UNP A0A0A2J6G6
A	-19	SER	-	expression tag	UNP A0A0A2J6G6
A	-18	SER	-	expression tag	UNP A0A0A2J6G6
A	-17	HIS	-	expression tag	UNP A0A0A2J6G6
A	-16	HIS	-	expression tag	UNP A0A0A2J6G6
A	-15	HIS	-	expression tag	UNP A0A0A2J6G6
A	-14	HIS	-	expression tag	UNP A0A0A2J6G6
A	-13	HIS	-	expression tag	UNP A0A0A2J6G6
A	-12	HIS	-	expression tag	UNP A0A0A2J6G6
A	-11	SER	-	expression tag	UNP A0A0A2J6G6
A	-10	SER	-	expression tag	UNP A0A0A2J6G6
A	-9	GLY	-	expression tag	UNP A0A0A2J6G6
A	-8	LEU	-	expression tag	UNP A0A0A2J6G6
A	-7	VAL	-	expression tag	UNP A0A0A2J6G6
A	-6	PRO	-	expression tag	UNP A0A0A2J6G6
A	-5	ARG	-	expression tag	UNP A0A0A2J6G6
A	-4	GLY	-	expression tag	UNP A0A0A2J6G6
A	-3	SER	-	expression tag	UNP A0A0A2J6G6
A	-2	HIS	-	expression tag	UNP A0A0A2J6G6
A	-1	MET	-	expression tag	UNP A0A0A2J6G6
A	0	HIS	-	expression tag	UNP A0A0A2J6G6
B	-21	MET	-	expression tag	UNP A0A0A2J6G6
B	-20	GLY	-	expression tag	UNP A0A0A2J6G6
B	-19	SER	-	expression tag	UNP A0A0A2J6G6

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	SER	-	expression tag	UNP A0A0A2J6G6
B	-17	HIS	-	expression tag	UNP A0A0A2J6G6
B	-16	HIS	-	expression tag	UNP A0A0A2J6G6
B	-15	HIS	-	expression tag	UNP A0A0A2J6G6
B	-14	HIS	-	expression tag	UNP A0A0A2J6G6
B	-13	HIS	-	expression tag	UNP A0A0A2J6G6
B	-12	HIS	-	expression tag	UNP A0A0A2J6G6
B	-11	SER	-	expression tag	UNP A0A0A2J6G6
B	-10	SER	-	expression tag	UNP A0A0A2J6G6
B	-9	GLY	-	expression tag	UNP A0A0A2J6G6
B	-8	LEU	-	expression tag	UNP A0A0A2J6G6
B	-7	VAL	-	expression tag	UNP A0A0A2J6G6
B	-6	PRO	-	expression tag	UNP A0A0A2J6G6
B	-5	ARG	-	expression tag	UNP A0A0A2J6G6
B	-4	GLY	-	expression tag	UNP A0A0A2J6G6
B	-3	SER	-	expression tag	UNP A0A0A2J6G6
B	-2	HIS	-	expression tag	UNP A0A0A2J6G6
B	-1	MET	-	expression tag	UNP A0A0A2J6G6
B	0	HIS	-	expression tag	UNP A0A0A2J6G6

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total C O 6 3 3	0	0

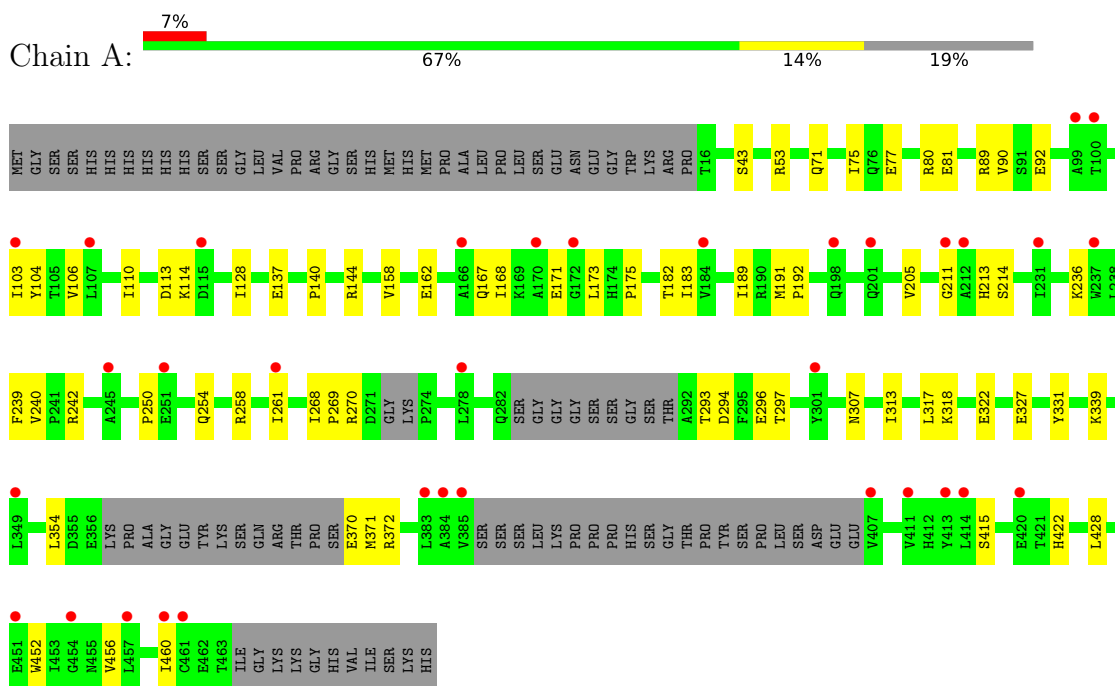
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	74	Total 74	O 74	0	0
3	B	110	Total 110	O 110	0	0

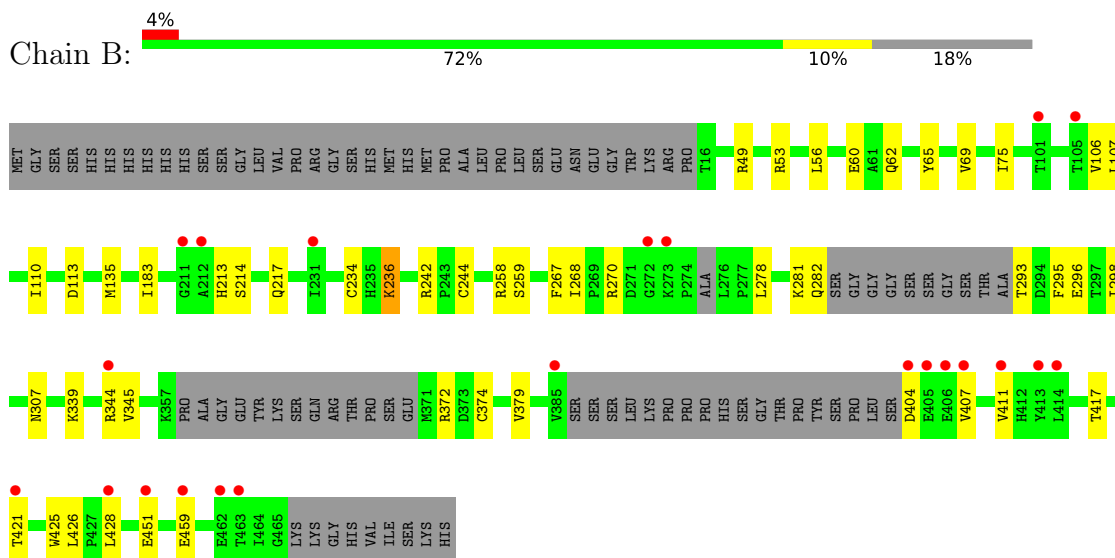
3 Residue-property plots [i](#)

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: Aminotransferase, class V/Cysteine desulfurase



- Molecule 1: Aminotransferase, class V/Cysteine desulfurase



4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	77.84Å 77.84Å 298.84Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	37.66 – 2.10 37.66 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.9 (37.66-2.10) 94.4 (37.66-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.66 (at 2.10Å)	Xtrriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.233 , 0.261 0.233 , 0.261	Depositor DCC
R_{free} test set	3144 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	35.2	Xtrriage
Anisotropy	0.063	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 40.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	0.048 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	6655	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 35.91 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 5.4240e-04.*

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: GOL, 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	0.28	0/3266	0.51	1/4441 (0.0%)
1	B	0.30	1/3307 (0.0%)	0.54	1/4494 (0.0%)
All	All	0.29	1/6573 (0.0%)	0.52	2/8935 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	459	GLU	CD-OE2	6.05	1.32	1.25

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	113	ASP	CB-CG-OD2	-5.07	113.74	118.30
1	A	144	ARG	NE-CZ-NH1	-5.06	117.77	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	236	LLP	Mainchain

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	3212	0	3166	41	0
1	B	3253	0	3208	31	0
2	B	6	0	8	0	0
3	A	74	0	0	2	0
3	B	110	0	0	1	0
All	All	6655	0	6382	66	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 5.

All (66) 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:415:SER:OG	1:B:282:GLN:HG2	1.91	0.71
1:A:268:ILE:HD11	1:A:294:ASP:HB3	1.74	0.70
1:A:370:GLU:HG3	1:A:372:ARG:H	1.56	0.68
1:A:240:VAL:HG11	1:A:313:ILE:HD13	1.76	0.66
1:A:293:THR:HG23	1:A:296:GLU:H	1.60	0.66
1:A:137:GLU:OE2	1:B:258:ARG:NH2	2.26	0.66
1:B:293:THR:HG22	1:B:296:GLU:H	1.63	0.62
1:A:456:VAL:O	1:A:460:ILE:HG13	2.01	0.61
1:B:65:TYR:O	1:B:69:VAL:HG22	2.01	0.60
1:B:62:GLN:HB3	1:B:65:TYR:HB3	1.85	0.58
1:B:75:ILE:HD11	1:B:307:ASN:HB3	1.86	0.58
1:B:345:VAL:HG12	1:B:379:VAL:HG11	1.85	0.58
1:A:114:LYS:HB3	1:A:140:PRO:HB2	1.87	0.57
1:A:189:ILE:HG23	1:A:354:LEU:HD23	1.87	0.57
1:A:183:ILE:HB	1:A:213:HIS:HB2	1.86	0.57
1:A:71:GLN:NE2	3:A:503:HOH:O	2.39	0.55
1:A:189:ILE:HG21	1:A:371:MET:HE3	1.87	0.55
1:A:113:ASP:OD1	1:A:114:LYS:N	2.42	0.53
1:A:53:ARG:NH2	1:B:60:GLU:OE2	2.40	0.53
1:A:158:VAL:O	1:A:162:GLU:HG3	2.09	0.53
1:A:293:THR:O	1:A:297:THR:HG23	2.08	0.53
1:A:81:GLU:HB3	1:A:317:LEU:HD12	1.88	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:168:ILE:HG23	1:A:173:LEU:HB2	1.91	0.53
1:B:293:THR:HG21	3:B:617:HOH:O	2.08	0.53
1:A:103:ILE:HD13	1:A:128:ILE:HD11	1.91	0.52
1:B:183:ILE:HB	1:B:213:HIS:HB2	1.93	0.51
1:A:428:LEU:HG	1:B:282:GLN:NE2	2.26	0.51
1:B:217:GLN:OE1	1:B:374:CYS:HB2	2.12	0.50
1:A:422:HIS:HB3	1:A:452:TRP:CH2	2.47	0.49
1:A:77:GLU:O	1:A:81:GLU:HG3	2.13	0.49
1:B:56:LEU:O	1:B:60:GLU:HG2	2.13	0.49
1:B:259:SER:HB2	1:B:267:PHE:HD1	1.78	0.49
1:A:167:GLN:O	1:A:171:GLU:HG3	2.14	0.48
1:A:75:ILE:HD11	1:A:307:ASN:HB3	1.95	0.47
1:A:104:TYR:HD2	1:A:261:ILE:HG21	1.80	0.47
1:A:137:GLU:CD	1:B:258:ARG:HH22	2.16	0.46
1:B:107:LEU:HB3	1:B:135:MET:HE1	1.97	0.46
1:A:175:PRO:O	1:A:205:VAL:HG22	2.16	0.46
1:B:234:CYS:N	1:B:244:CYS:O	2.48	0.46
1:A:327:GLU:HB3	1:A:331:TYR:CZ	2.50	0.46
1:A:80:ARG:HA	1:A:90:VAL:HG22	1.97	0.45
1:B:404:ASP:O	1:B:407:VAL:HG22	2.16	0.45
1:A:43:SER:O	1:A:239:PHE:HA	2.17	0.45
1:A:318:LYS:HE2	1:A:322:GLU:OE1	2.16	0.45
1:B:411:VAL:HG13	1:B:428:LEU:HD13	1.98	0.44
1:B:417:THR:O	1:B:421:THR:HB	2.16	0.44
1:A:339:LYS:HA	1:A:372:ARG:NH2	2.32	0.44
1:A:137:GLU:HB3	1:B:270:ARG:NH2	2.32	0.44
1:B:106:VAL:O	1:B:110:ILE:HG12	2.18	0.44
1:B:339:LYS:HA	1:B:372:ARG:NH2	2.32	0.44
1:A:182:THR:OG1	1:A:211:GLY:HA2	2.18	0.44
1:B:268:ILE:HD12	1:B:298:ILE:HD11	2.00	0.44
1:B:278:LEU:HD12	1:B:281:LYS:HG3	2.00	0.43
1:B:49:ARG:O	1:B:53:ARG:HG2	2.18	0.43
1:A:258:ARG:HH21	1:A:269:PRO:HA	1.84	0.43
1:A:106:VAL:O	1:A:110:ILE:HG12	2.19	0.43
1:B:344:ARG:HE	1:B:451:GLU:CD	2.22	0.43
1:A:258:ARG:CZ	1:A:270:ARG:HG3	2.49	0.42
1:A:293:THR:HG21	3:A:516:HOH:O	2.20	0.42
1:B:65:TYR:CZ	1:B:69:VAL:HG21	2.54	0.42
1:B:293:THR:HG22	1:B:295:PHE:N	2.34	0.41
1:A:89:ARG:HB2	1:A:92:GLU:HG3	2.01	0.41
1:A:191:MET:HE3	1:A:192:PRO:HD2	2.01	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:425:TRP:O	1:B:426:LEU:HD23	2.21	0.41
1:A:250:PRO:O	1:A:254:GLN:HG3	2.22	0.40
1:B:293:THR:HB	1:B:296:GLU:OE1	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	392/496 (79%)	380 (97%)	11 (3%)	1 (0%)	41	41
1	B	397/496 (80%)	381 (96%)	15 (4%)	1 (0%)	41	41
All	All	789/992 (80%)	761 (96%)	26 (3%)	2 (0%)	41	41

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	214	SER
1	B	214	SER

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	347/425 (82%)	346 (100%)	1 (0%)	92	95

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	352/425 (83%)	351 (100%)	1 (0%)	92	95
All	All	699/850 (82%)	697 (100%)	2 (0%)	92	95

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	242	ARG
1	B	242	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	71	GLN
1	A	307	ASN
1	B	108	HIS
1	B	282	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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	A	236	1	23,24,25	2.61	7 (30%)	25,32,34	1.55	3 (12%)
1	LLP	B	236	1	23,24,25	2.62	6 (26%)	25,32,34	1.49	4 (16%)

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	A	236	1	-	5/16/17/19	0/1/1/1
1	LLP	B	236	1	-	6/16/17/19	0/1/1/1

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	236	LLP	C4-C4'	8.38	1.62	1.46
1	A	236	LLP	C4-C4'	8.26	1.62	1.46
1	B	236	LLP	C4'-NZ	5.19	1.44	1.27
1	A	236	LLP	C4'-NZ	5.16	1.44	1.27
1	A	236	LLP	C4-C5	-3.59	1.37	1.42
1	B	236	LLP	C2'-C2	3.43	1.56	1.50
1	A	236	LLP	C2'-C2	3.36	1.56	1.50
1	B	236	LLP	C4-C5	-3.33	1.37	1.42
1	A	236	LLP	C6-N1	2.83	1.40	1.34
1	B	236	LLP	C6-N1	2.76	1.40	1.34
1	B	236	LLP	C5'-C5	2.11	1.56	1.50
1	A	236	LLP	C4-C3	-2.10	1.37	1.40
1	A	236	LLP	C5'-C5	2.06	1.56	1.50

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	236	LLP	C4-C4'-NZ	-4.99	101.41	124.31
1	B	236	LLP	C4-C4'-NZ	-4.12	105.41	124.31
1	B	236	LLP	OP4-C5'-C5	2.94	114.95	109.35
1	A	236	LLP	C3-C4-C4'	-2.41	115.91	120.41
1	B	236	LLP	C5'-C5-C6	-2.40	115.42	119.37
1	B	236	LLP	C3-C4-C4'	-2.15	116.40	120.41
1	A	236	LLP	OP4-C5'-C5	2.12	113.39	109.35

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	B	236	LLP	C4-C5-C5'-OP4
1	B	236	LLP	C6-C5-C5'-OP4
1	A	236	LLP	C5-C4-C4'-NZ
1	B	236	LLP	C4-C4'-NZ-CE

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Mol	Chain	Res	Type	Atoms
1	A	236	LLP	C3-C4-C4'-NZ
1	B	236	LLP	C3-C4-C4'-NZ
1	A	236	LLP	C6-C5-C5'-OP4
1	A	236	LLP	CD-CE-NZ-C4'
1	A	236	LLP	C4-C5-C5'-OP4
1	B	236	LLP	CD-CE-NZ-C4'
1	B	236	LLP	C5-C4-C4'-NZ

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

1 ligand is 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
2	GOL	B	501	-	5,5,5	0.84	0	5,5,5	1.05	0

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
2	GOL	B	501	-	-	0/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

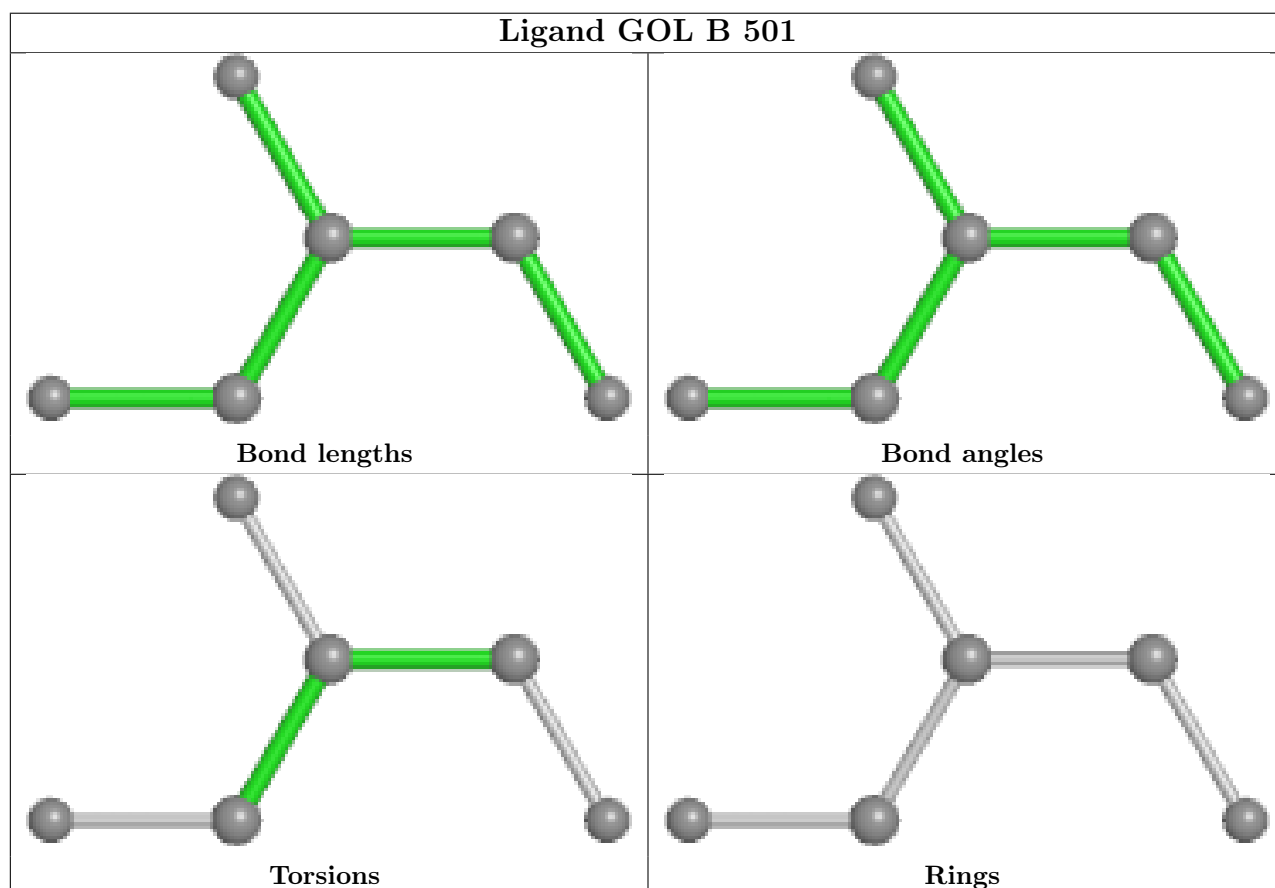
There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

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	402/496 (81%)	0.59	34 (8%) 10 13	26, 44, 67, 85	0
1	B	407/496 (82%)	0.42	22 (5%) 25 31	23, 38, 64, 84	0
All	All	809/992 (81%)	0.51	56 (6%) 16 21	23, 42, 65, 85	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	407	VAL	5.7
1	A	385	VAL	5.2
1	A	407	VAL	5.1
1	A	411	VAL	5.1
1	B	459	GLU	4.3
1	A	461	CYS	4.3
1	B	405	GLU	4.3
1	B	414	LEU	4.2
1	B	411	VAL	4.1
1	A	383	LEU	4.1
1	B	462	GLU	3.9
1	A	460	ILE	3.7
1	A	457	LEU	3.6
1	A	414	LEU	3.4
1	B	273	LYS	3.4
1	B	428	LEU	3.4
1	A	172	GLY	3.3
1	B	413	TYR	3.2
1	B	463	THR	3.2
1	B	404	ASP	3.1
1	A	278	LEU	3.1
1	B	385	VAL	2.9
1	A	166	ALA	2.9
1	B	212	ALA	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	406	GLU	2.8
1	B	101	THR	2.7
1	A	103	ILE	2.7
1	A	261	ILE	2.7
1	A	211	GLY	2.7
1	A	184	VAL	2.7
1	A	349	LEU	2.6
1	B	211	GLY	2.6
1	A	107	LEU	2.6
1	A	212	ALA	2.6
1	B	421	THR	2.5
1	A	245	ALA	2.5
1	A	451	GLU	2.4
1	B	105	THR	2.4
1	A	454	GLY	2.4
1	B	451	GLU	2.3
1	A	170	ALA	2.2
1	A	384	ALA	2.2
1	A	301	TYR	2.2
1	A	100	THR	2.2
1	A	201	GLN	2.2
1	A	198	GLN	2.1
1	B	231	ILE	2.1
1	A	231	ILE	2.1
1	A	115	ASP	2.1
1	A	237	TRP	2.1
1	A	420	GLU	2.1
1	A	251	GLU	2.0
1	A	413	TYR	2.0
1	A	99	ALA	2.0
1	B	344	ARG	2.0
1	B	272	GLY	2.0

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

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(Å ²)	Q<0.9
1	LLP	B	236	24/25	0.95	0.22	28,35,40,44	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
1	LLP	A	236	24/25	0.96	0.20	30,36,45,51	0

6.3 Carbohydrates [i](#)

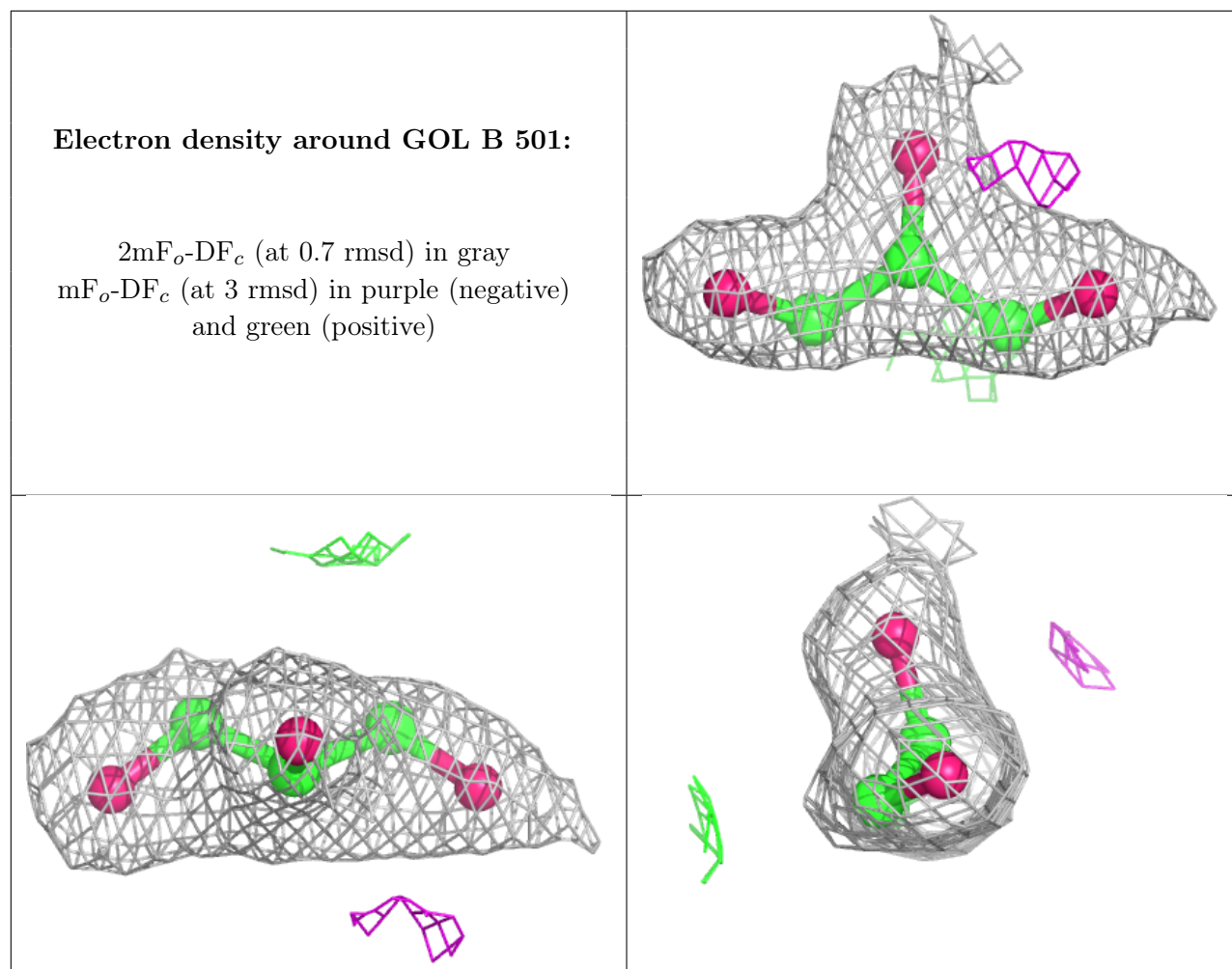
There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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(\AA^2)	Q<0.9
2	GOL	B	501	6/6	0.88	0.17	44,48,54,55	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



6.5 Other polymers [i](#)

There are no such residues in this entry.