



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:26 AM UTC

PDB ID : 8ETL / pdb_00008etl
Title : Co-crystal structure of Chaetomium glucosidase with compound 24
Authors : Karade, S.S.; Mariuzza, R.A.
Deposited on : 2022-10-17
Resolution : 2.30 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
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
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

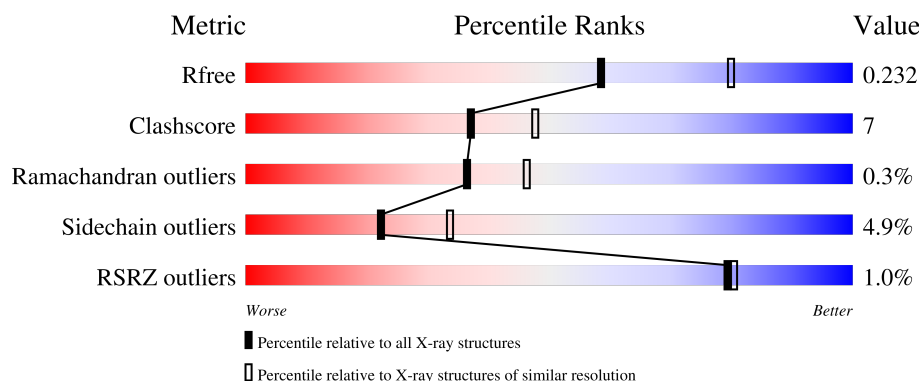
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	819	79% 12% • 7%
1	B	819	77% 15% • 7%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	GOL	B	903	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 12614 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 Chaetomium alpha glucosidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	765	Total	C	N	O	S	0	2	0
			6077	3905	1025	1134	13			
1	B	764	Total	C	N	O	S	0	0	0
			6071	3897	1021	1140	13			

There are 78 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	initiating methionine	UNP G0SFD1
A	0	GLY	-	expression tag	UNP G0SFD1
A	1	ILE	-	expression tag	UNP G0SFD1
A	2	LEU	-	expression tag	UNP G0SFD1
A	3	PRO	-	expression tag	UNP G0SFD1
A	4	SER	-	expression tag	UNP G0SFD1
A	5	PRO	-	expression tag	UNP G0SFD1
A	6	GLY	-	expression tag	UNP G0SFD1
A	7	MET	-	expression tag	UNP G0SFD1
A	8	PRO	-	expression tag	UNP G0SFD1
A	9	ALA	-	expression tag	UNP G0SFD1
A	10	LEU	-	expression tag	UNP G0SFD1
A	11	LEU	-	expression tag	UNP G0SFD1
A	12	SER	-	expression tag	UNP G0SFD1
A	13	LEU	-	expression tag	UNP G0SFD1
A	14	VAL	-	expression tag	UNP G0SFD1
A	15	SER	-	expression tag	UNP G0SFD1
A	16	LEU	-	expression tag	UNP G0SFD1
A	17	LEU	-	expression tag	UNP G0SFD1
A	18	SER	-	expression tag	UNP G0SFD1
A	19	VAL	-	expression tag	UNP G0SFD1
A	20	LEU	-	expression tag	UNP G0SFD1
A	21	LEU	-	expression tag	UNP G0SFD1
A	22	MET	-	expression tag	UNP G0SFD1
A	23	GLY	-	expression tag	UNP G0SFD1

Continued on next page...

Continued from previous page...

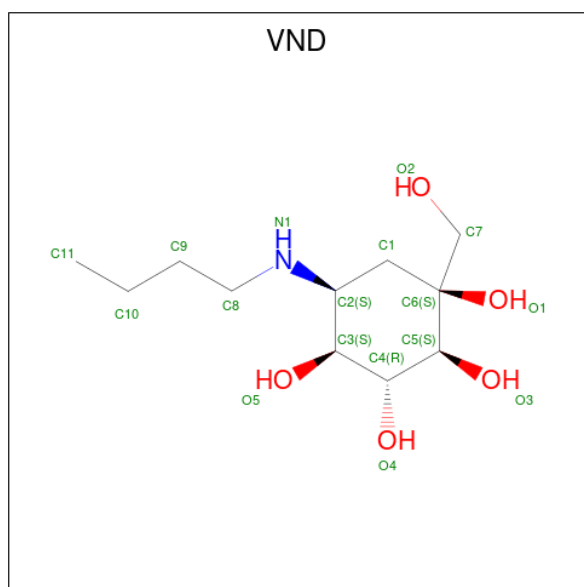
Chain	Residue	Modelled	Actual	Comment	Reference
A	24	CYS	-	expression tag	UNP G0SFD1
A	25	VAL	-	expression tag	UNP G0SFD1
A	26	ALA	-	expression tag	UNP G0SFD1
A	27	GLU	-	expression tag	UNP G0SFD1
A	28	THR	-	expression tag	UNP G0SFD1
A	29	GLY	-	expression tag	UNP G0SFD1
A	810	SER	-	expression tag	UNP G0SFD1
A	811	GLY	-	expression tag	UNP G0SFD1
A	812	HIS	-	expression tag	UNP G0SFD1
A	813	HIS	-	expression tag	UNP G0SFD1
A	814	HIS	-	expression tag	UNP G0SFD1
A	815	HIS	-	expression tag	UNP G0SFD1
A	816	HIS	-	expression tag	UNP G0SFD1
A	817	HIS	-	expression tag	UNP G0SFD1
B	-1	MET	-	initiating methionine	UNP G0SFD1
B	0	GLY	-	expression tag	UNP G0SFD1
B	1	ILE	-	expression tag	UNP G0SFD1
B	2	LEU	-	expression tag	UNP G0SFD1
B	3	PRO	-	expression tag	UNP G0SFD1
B	4	SER	-	expression tag	UNP G0SFD1
B	5	PRO	-	expression tag	UNP G0SFD1
B	6	GLY	-	expression tag	UNP G0SFD1
B	7	MET	-	expression tag	UNP G0SFD1
B	8	PRO	-	expression tag	UNP G0SFD1
B	9	ALA	-	expression tag	UNP G0SFD1
B	10	LEU	-	expression tag	UNP G0SFD1
B	11	LEU	-	expression tag	UNP G0SFD1
B	12	SER	-	expression tag	UNP G0SFD1
B	13	LEU	-	expression tag	UNP G0SFD1
B	14	VAL	-	expression tag	UNP G0SFD1
B	15	SER	-	expression tag	UNP G0SFD1
B	16	LEU	-	expression tag	UNP G0SFD1
B	17	LEU	-	expression tag	UNP G0SFD1
B	18	SER	-	expression tag	UNP G0SFD1
B	19	VAL	-	expression tag	UNP G0SFD1
B	20	LEU	-	expression tag	UNP G0SFD1
B	21	LEU	-	expression tag	UNP G0SFD1
B	22	MET	-	expression tag	UNP G0SFD1
B	23	GLY	-	expression tag	UNP G0SFD1
B	24	CYS	-	expression tag	UNP G0SFD1
B	25	VAL	-	expression tag	UNP G0SFD1
B	26	ALA	-	expression tag	UNP G0SFD1

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	27	GLU	-	expression tag	UNP G0SFD1
B	28	THR	-	expression tag	UNP G0SFD1
B	29	GLY	-	expression tag	UNP G0SFD1
B	810	SER	-	expression tag	UNP G0SFD1
B	811	GLY	-	expression tag	UNP G0SFD1
B	812	HIS	-	expression tag	UNP G0SFD1
B	813	HIS	-	expression tag	UNP G0SFD1
B	814	HIS	-	expression tag	UNP G0SFD1
B	815	HIS	-	expression tag	UNP G0SFD1
B	816	HIS	-	expression tag	UNP G0SFD1
B	817	HIS	-	expression tag	UNP G0SFD1

- Molecule 2 is (1S,2S,3R,4S,5S)-5-(butylamino)-1-(hydroxymethyl)cyclohexane-1,2,3,4-tetrol (CCD ID: VND) (formula: $C_{11}H_{23}NO_5$) (labeled as "Ligand of Interest" by depositor).



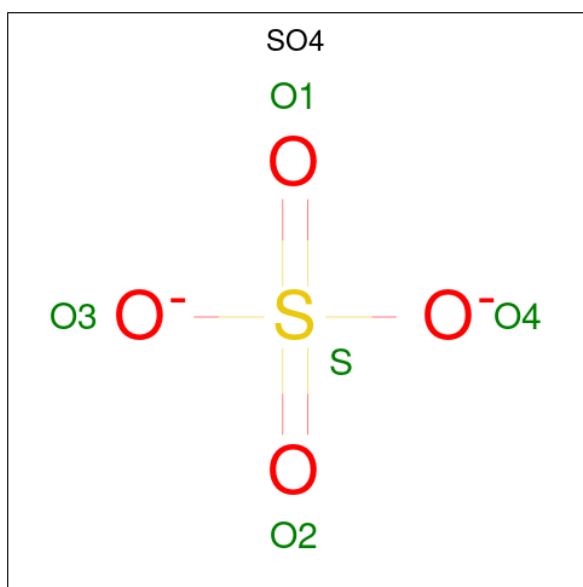
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			17	11	1	5		
2	B	1	Total	C	N	O	0	0
			17	11	1	5		

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



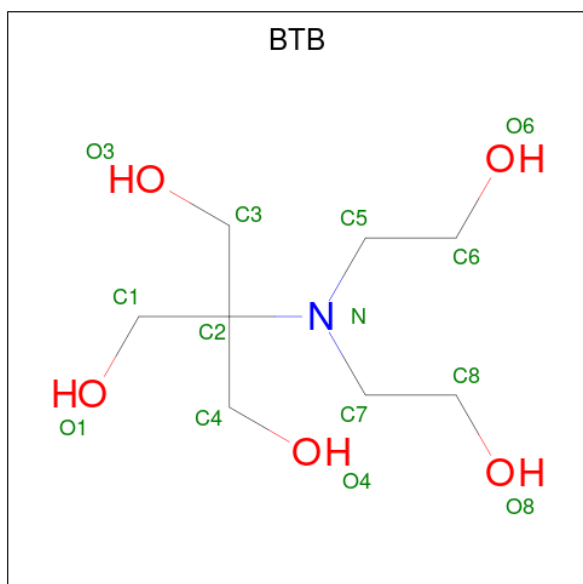
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is 2-[BIS-(2-HYDROXY-ETHYL)-AMINO]-2-HYDROXYMETHYL-PROPAN E-1,3-DIOL (CCD ID: BTB) (formula: $C_8H_{19}NO_5$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	N	O	0	0
			14	8	1	5		

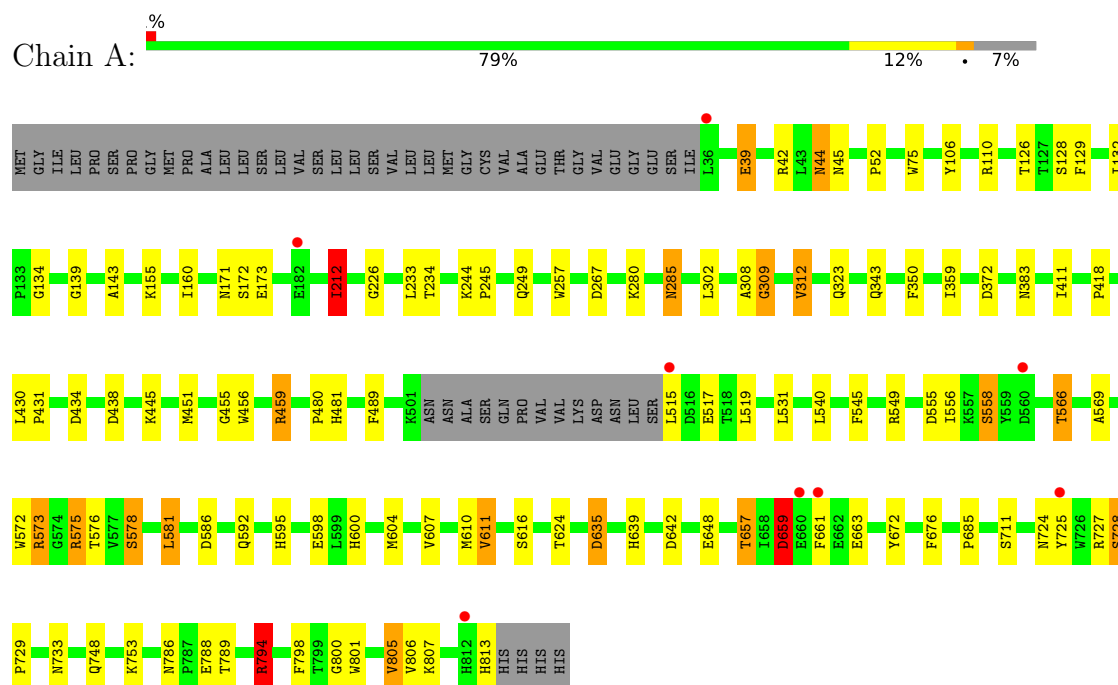
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	164	Total	O	0	0
			164	164		
6	B	171	Total	O	0	0
			171	171		

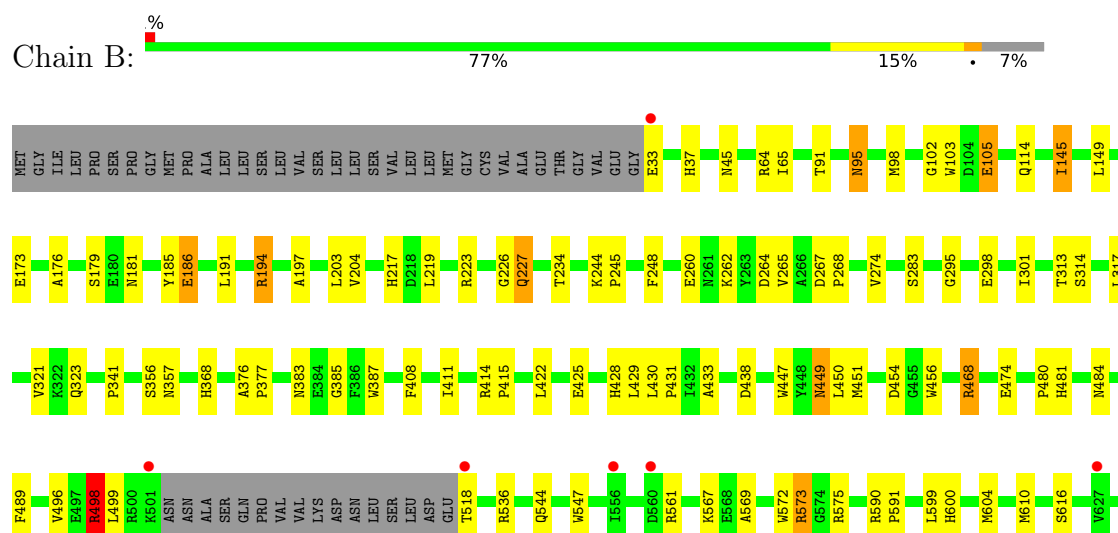
3 Residue-property plots [i](#)

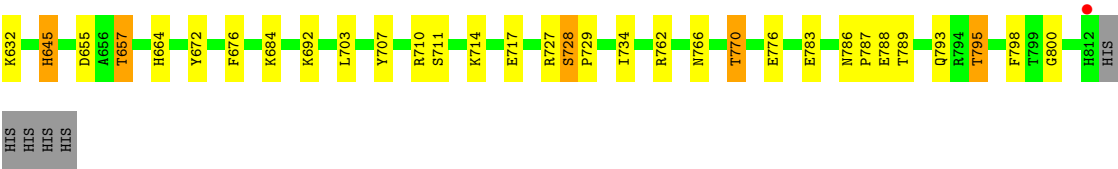
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Chaetomium alpha glucosidase



• Molecule 1: Chaetomium alpha glucosidase





4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	135.60Å 178.53Å 180.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.83 – 2.30 46.83 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.7 (46.83-2.30) 99.7 (46.83-2.30)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.64 (at 2.32Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.183 , 0.232 0.183 , 0.232	Depositor DCC
R_{free} test set	4884 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	39.2	Xtriage
Anisotropy	0.497	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 29.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.014 for -h,-l,-k	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	12614	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.88% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: VND, SO4, BTB, GOL

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	0.63	1/6259 (0.0%)	1.17	14/8523 (0.2%)
1	B	0.65	2/6247 (0.0%)	1.19	18/8503 (0.2%)
All	All	0.64	3/12506 (0.0%)	1.18	32/17026 (0.2%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	595	HIS	CE1-NE2	5.62	1.38	1.32
1	B	37	HIS	CE1-NE2	5.43	1.38	1.32
1	B	645	HIS	CE1-NE2	5.41	1.38	1.32

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	45	ASN	CB-CA-C	9.49	125.78	110.88
1	A	575	ARG	CB-CA-C	8.41	123.74	109.53
1	A	794	ARG	CG-CD-NE	-7.39	95.75	112.00
1	A	659	ASP	CB-CA-C	-7.29	95.91	110.42
1	B	248	PHE	CA-CB-CG	-7.01	106.79	113.80
1	A	794	ARG	CB-CG-CD	6.65	126.59	111.30
1	B	468	ARG	CG-CD-NE	-6.57	97.56	112.00
1	B	657	THR	CB-CA-C	-6.44	97.59	111.11
1	A	642	ASP	CB-CA-C	6.35	120.80	110.95
1	B	684	LYS	CB-CA-C	6.32	119.34	109.42
1	A	573	ARG	CG-CD-NE	-6.21	98.35	112.00
1	A	212	ILE	CB-CA-C	5.96	117.71	110.85
1	A	459	ARG	CG-CD-NE	-5.93	98.96	112.00
1	B	449	ASN	CA-CB-CG	-5.85	106.75	112.60
1	B	264	ASP	CA-CB-CG	5.80	118.40	112.60
1	B	260	GLU	CB-CG-CD	5.79	122.44	112.60

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	806	VAL	N-CA-CB	5.77	119.24	110.58
1	B	368	HIS	CA-C-N	-5.67	113.29	122.82
1	B	368	HIS	C-N-CA	-5.67	113.29	122.82
1	B	575	ARG	CB-CA-C	5.62	120.95	109.76
1	B	186	GLU	CB-CG-CD	5.61	122.14	112.60
1	A	173	GLU	CB-CG-CD	5.57	122.07	112.60
1	B	45	ASN	CA-CB-CG	5.56	118.16	112.60
1	B	498	ARG	CG-CD-NE	-5.52	99.86	112.00
1	A	383	ASN	CB-CA-C	-5.44	99.92	109.71
1	B	776	GLU	CB-CG-CD	5.44	121.84	112.60
1	B	573	ARG	CG-CD-NE	-5.36	100.20	112.00
1	A	285	ASN	CB-CA-C	5.30	118.95	110.09
1	B	518	THR	CB-CA-C	5.29	120.75	109.10
1	A	576	THR	CA-CB-OG1	-5.18	101.83	109.60
1	A	267	ASP	CA-CB-CG	5.14	117.74	112.60
1	B	573	ARG	CB-CG-CD	5.07	122.96	111.30

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	6077	0	5747	75	0
1	B	6071	0	5732	98	0
2	A	17	0	0	1	0
2	B	17	0	0	0	0
3	A	12	0	16	2	0
3	B	6	0	8	4	0
4	A	40	0	0	2	0
4	B	25	0	0	2	0
5	B	14	0	19	1	0
6	A	164	0	0	5	0
6	B	171	0	0	3	0
All	All	12614	0	11522	168	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 7.

All (168) 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:314:SER:H	3:B:903:GOL:H31	1.11	1.14
1:A:657:THR:HG21	6:A:1094:HOH:O	1.52	1.10
1:B:451:MET:HE1	1:B:544:GLN:HB2	1.44	0.96
1:B:561:ARG:HE	1:B:664:HIS:HD2	0.95	0.93
1:B:451:MET:CE	1:B:544:GLN:HB2	1.98	0.92
1:A:481:HIS:HE1	6:A:1110:HOH:O	1.52	0.90
1:A:451:MET:HE1	1:A:540:LEU:HB3	1.53	0.88
1:B:561:ARG:HE	1:B:664:HIS:CD2	1.87	0.87
1:B:572:TRP:H	1:B:600:HIS:HD2	1.22	0.87
1:B:766:ASN:O	1:B:770:THR:HG23	1.72	0.87
1:A:132:ILE:HD13	1:A:312:VAL:HG21	1.63	0.81
1:B:314:SER:N	3:B:903:GOL:H31	1.94	0.80
1:B:217:HIS:HE1	1:B:267:ASP:O	1.65	0.80
1:B:561:ARG:NE	1:B:664:HIS:HD2	1.79	0.79
1:A:659:ASP:HB3	1:A:661:PHE:H	1.49	0.77
1:A:451:MET:CE	1:A:540:LEU:HB3	2.14	0.77
1:A:451:MET:HE3	1:A:540:LEU:HD22	1.68	0.76
1:B:572:TRP:H	1:B:600:HIS:CD2	2.03	0.76
1:A:110:ARG:HH21	1:A:323:GLN:HG3	1.51	0.74
1:A:572:TRP:H	1:A:600:HIS:HD2	1.38	0.72
1:B:481:HIS:HD2	6:B:1164:HOH:O	1.73	0.71
1:B:149:LEU:HD11	1:B:295:GLY:HA2	1.72	0.71
1:B:114:GLN:NE2	1:B:414:ARG:HH12	1.89	0.70
1:A:578:SER:OG	6:A:1001:HOH:O	2.08	0.70
1:B:783:GLU:OE1	1:B:795:THR:HG23	1.92	0.69
1:B:786:ASN:ND2	1:B:788:GLU:H	1.90	0.68
1:A:569:ALA:HA	1:A:604:MET:CE	2.26	0.65
1:A:604:MET:HE3	6:A:1101:HOH:O	1.97	0.64
1:B:114:GLN:HE22	1:B:414:ARG:HH22	1.46	0.64
1:A:685:PRO:CG	1:A:748:GLN:HE22	2.11	0.64
1:A:233:LEU:HD22	1:B:265:VAL:HG23	1.80	0.64
1:A:249:GLN:HE21	1:B:262:LYS:NZ	1.97	0.62
1:B:481:HIS:CD2	6:B:1164:HOH:O	2.48	0.62
1:A:813:HIS:HA	4:A:909:SO4:O2	1.99	0.62
1:B:217:HIS:HD2	1:B:219:LEU:H	1.48	0.62
1:A:728:SER:N	1:A:729:PRO:CD	2.63	0.61
1:A:685:PRO:HG2	1:A:748:GLN:HE22	1.67	0.60

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:728:SER:N	1:B:729:PRO:CD	2.64	0.60
1:B:786:ASN:HD22	1:B:789:THR:H	1.47	0.60
1:A:451:MET:HE1	1:A:540:LEU:CB	2.29	0.59
1:A:728:SER:H	1:A:729:PRO:CD	2.14	0.59
1:A:569:ALA:HA	1:A:604:MET:HE1	1.84	0.59
1:B:223:ARG:HH11	1:B:223:ARG:HG3	1.67	0.59
1:A:171:ASN:N	3:A:902:GOL:O3	2.30	0.58
1:B:226:GLY:H	1:B:227:GLN:NE2	2.02	0.58
1:A:786:ASN:ND2	1:A:788:GLU:H	2.01	0.58
1:B:728:SER:N	1:B:729:PRO:HD3	2.19	0.56
1:B:450:LEU:HB3	4:B:908:SO4:O4	2.04	0.56
1:B:451:MET:HE2	1:B:544:GLN:HB2	1.82	0.56
1:B:194:ARG:CG	1:B:194:ARG:HH11	2.19	0.56
1:A:249:GLN:HE21	1:B:262:LYS:HZ3	1.52	0.56
1:A:456:TRP:CE2	1:A:480:PRO:HA	2.41	0.56
1:A:598:GLU:OE2	1:A:600:HIS:HE1	1.89	0.56
1:A:257:TRP:CZ2	4:A:910:SO4:O4	2.58	0.55
1:B:672:TYR:CG	1:B:734:ILE:HG21	2.41	0.55
1:B:569:ALA:HB1	1:B:599:LEU:HD22	1.89	0.55
1:B:203:LEU:HD11	1:B:301:ILE:HG23	1.89	0.55
1:B:223:ARG:HG3	1:B:223:ARG:NH1	2.21	0.54
1:B:728:SER:H	1:B:729:PRO:CD	2.21	0.54
1:B:149:LEU:CD1	1:B:295:GLY:HA2	2.36	0.54
1:B:385:GLY:HA2	1:B:387:TRP:CZ3	2.43	0.54
1:B:317:LEU:O	1:B:321:VAL:HG23	2.07	0.54
1:B:422:LEU:HB3	1:B:484:ASN:HD22	1.73	0.54
1:B:786:ASN:HD22	1:B:788:GLU:H	1.53	0.53
1:A:728:SER:N	1:A:729:PRO:HD3	2.23	0.53
1:A:727:ARG:O	1:A:728:SER:HB3	2.09	0.53
1:A:659:ASP:HB2	1:A:663:GLU:H	1.74	0.53
1:B:103:TRP:H	1:B:357:ASN:ND2	2.05	0.53
1:B:489:PHE:CE1	1:B:610:MET:HE3	2.43	0.53
2:A:901:VND:O1	2:A:901:VND:N1	2.42	0.53
1:B:179:SER:HB3	1:B:185:TYR:CE2	2.44	0.53
1:A:39:GLU:HA	1:A:39:GLU:OE2	2.10	0.52
1:A:648:GLU:HA	1:A:648:GLU:OE2	2.10	0.52
1:A:132:ILE:HD13	1:A:312:VAL:CG2	2.37	0.52
1:A:786:ASN:HD22	1:A:789:THR:H	1.57	0.52
1:A:411:ILE:HD12	1:A:418:PRO:HA	1.92	0.52
1:B:727:ARG:O	1:B:728:SER:HB3	2.10	0.52
1:A:659:ASP:HB3	1:A:661:PHE:N	2.23	0.51

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:600:HIS:HA	1:B:655:ASP:OD1	2.10	0.51
1:A:481:HIS:H	1:A:481:HIS:CD2	2.29	0.51
1:B:433:ALA:O	1:B:498:ARG:NH2	2.43	0.50
1:A:459:ARG:NH1	1:A:581:LEU:HD12	2.27	0.50
1:B:64:ARG:HD3	1:B:408:PHE:CE1	2.47	0.50
1:A:672:TYR:CZ	1:A:711:SER:HA	2.46	0.50
1:A:249:GLN:NE2	1:B:262:LYS:NZ	2.59	0.50
1:B:95:ASN:HD22	1:B:95:ASN:C	2.20	0.50
1:B:181:ASN:ND2	1:B:186:GLU:HG3	2.27	0.50
1:B:226:GLY:H	1:B:227:GLN:HE22	1.60	0.50
1:B:707:TYR:HA	1:B:770:THR:HG21	1.94	0.50
1:A:786:ASN:HD22	1:A:788:GLU:H	1.60	0.49
1:B:766:ASN:O	1:B:770:THR:CG2	2.54	0.49
1:B:179:SER:HB3	1:B:185:TYR:CD2	2.47	0.49
1:A:110:ARG:NH2	1:A:323:GLN:HG3	2.25	0.49
1:B:194:ARG:HG3	1:B:194:ARG:NH1	2.27	0.49
1:B:203:LEU:HD11	1:B:301:ILE:CG2	2.43	0.48
1:B:102:GLY:HA3	1:B:357:ASN:HD21	1.79	0.48
1:B:203:LEU:HD12	1:B:204:VAL:N	2.29	0.48
1:B:217:HIS:CD2	1:B:219:LEU:H	2.31	0.48
1:A:308:ALA:O	1:A:309:GLY:O	2.32	0.48
1:B:217:HIS:CE1	1:B:267:ASP:O	2.55	0.48
1:B:456:TRP:CE2	1:B:480:PRO:HA	2.49	0.47
1:A:489:PHE:CE1	1:A:610:MET:HE3	2.49	0.47
1:B:33:GLU:N	1:B:536:ARG:HH12	2.13	0.47
1:B:314:SER:H	3:B:903:GOL:C3	2.02	0.47
1:B:425:GLU:HG2	1:B:447:TRP:NE1	2.30	0.47
1:A:481:HIS:CE1	6:A:1110:HOH:O	2.41	0.46
1:A:430:LEU:HB2	1:A:431:PRO:HD3	1.98	0.46
1:B:145:ILE:O	1:B:298:GLU:HA	2.16	0.46
1:A:52:PRO:HD3	1:A:129:PHE:CE1	2.50	0.46
1:B:590:ARG:HB3	1:B:591:PRO:HD2	1.96	0.46
1:A:672:TYR:CE1	1:A:711:SER:HA	2.51	0.46
1:A:249:GLN:NE2	1:B:262:LYS:HZ1	2.14	0.46
1:A:434:ASP:OD2	1:A:807:LYS:HD3	2.16	0.46
1:A:519:LEU:HD23	1:A:519:LEU:HA	1.74	0.46
1:B:428:HIS:O	1:B:431:PRO:HD2	2.15	0.46
1:B:710:ARG:HG2	1:B:787:PRO:HB3	1.99	0.45
1:B:376:ALA:HA	1:B:377:PRO:HD2	1.81	0.45
1:A:244:LYS:HB3	1:A:245:PRO:HD3	1.99	0.45
1:A:555:ASP:OD1	1:A:558:SER:HB3	2.17	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:733:ASN:HB3	1:A:801:TRP:CG	2.51	0.45
1:A:598:GLU:OE2	1:A:600:HIS:CE1	2.69	0.44
1:B:499:LEU:HD23	1:B:499:LEU:HA	1.79	0.44
1:B:590:ARG:HB3	1:B:591:PRO:CD	2.48	0.44
1:B:727:ARG:O	1:B:728:SER:CB	2.65	0.44
1:B:672:TYR:CD2	1:B:734:ILE:HG21	2.53	0.44
1:B:194:ARG:HH11	1:B:194:ARG:HG3	1.82	0.44
1:B:672:TYR:CE1	1:B:711:SER:HA	2.52	0.44
1:B:105:GLU:HA	1:B:356:SER:OG	2.18	0.44
1:A:44:ASN:ND2	1:A:519:LEU:HD22	2.32	0.43
1:B:65:ILE:HD13	1:B:197:ALA:HB1	2.00	0.43
1:A:350:PHE:CZ	1:A:805[A]:VAL:HG11	2.54	0.43
1:B:103:TRP:H	1:B:357:ASN:HD21	1.67	0.43
1:A:545:PHE:CZ	1:A:549:ARG:HD2	2.54	0.43
1:B:798:PHE:C	1:B:800:GLY:HA3	2.44	0.43
1:A:451:MET:SD	1:A:455:GLY:HA2	2.59	0.43
1:B:176:ALA:HB2	1:B:191:LEU:CD2	2.49	0.42
1:B:234:THR:O	5:B:902:BTB:H51	2.18	0.42
1:A:635:ASP:O	1:A:639:HIS:HD2	2.01	0.42
1:A:106:TYR:HD2	1:A:359:ILE:HG23	1.85	0.42
1:A:128:SER:O	1:A:143:ALA:HA	2.20	0.42
1:B:194:ARG:CG	1:B:194:ARG:NH1	2.78	0.42
1:B:729:PRO:HA	1:B:787:PRO:HD3	2.01	0.42
1:A:302:LEU:HB3	1:A:312:VAL:HG12	2.02	0.42
1:A:234[B]:THR:HA	1:A:285:ASN:OD1	2.20	0.42
1:B:762:ARG:HD2	4:B:905:SO4:O3	2.19	0.42
1:B:567:LYS:NZ	6:B:1003:HOH:O	2.53	0.42
1:B:604:MET:HE2	1:B:645:HIS:CD2	2.54	0.42
1:A:724:ASN:O	1:A:794:ARG:NH1	2.53	0.42
1:B:430:LEU:HB2	1:B:431:PRO:HD3	2.02	0.42
1:A:372:ASP:C	1:A:372:ASP:OD1	2.62	0.41
1:B:176:ALA:HA	1:B:191:LEU:HD23	2.03	0.41
1:A:798:PHE:C	1:A:800:GLY:HA3	2.44	0.41
1:B:385:GLY:HA2	1:B:387:TRP:CH2	2.56	0.41
1:A:75:TRP:HA	1:A:160:ILE:O	2.21	0.41
1:A:607:VAL:O	1:A:611:VAL:HG22	2.21	0.41
1:B:244:LYS:N	1:B:245:PRO:CD	2.84	0.41
1:A:212:ILE:HD11	1:A:226:GLY:C	2.45	0.41
1:A:575:ARG:HH22	1:A:592:GLN:NE2	2.18	0.41
1:B:429:LEU:HD23	1:B:429:LEU:HA	1.87	0.41
1:A:234[B]:THR:HG21	1:B:268:PRO:HG3	2.02	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:556:ILE:HD12	1:A:566:THR:O	2.21	0.41
1:B:114:GLN:HE21	1:B:414:ARG:HH12	1.64	0.41
1:B:313:THR:HB	3:B:903:GOL:H12	2.03	0.41
1:B:414:ARG:N	1:B:415:PRO:HD2	2.36	0.41
1:A:134:GLY:O	1:A:139:GLY:HA2	2.20	0.41
1:B:411:ILE:O	1:B:411:ILE:HG13	2.22	0.40
1:A:171:ASN:H	3:A:902:GOL:C3	2.30	0.40
1:B:454:ASP:O	1:B:547:TRP:HB2	2.20	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	763/819 (93%)	740 (97%)	19 (2%)	4 (0%)	24	31
1	B	760/819 (93%)	736 (97%)	23 (3%)	1 (0%)	48	60
All	All	1523/1638 (93%)	1476 (97%)	42 (3%)	5 (0%)	36	46

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	309	GLY
1	A	728	SER
1	B	728	SER
1	A	794	ARG
1	A	659	ASP

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	629/707 (89%)	597 (95%)	32 (5%)	21	32
1	B	630/707 (89%)	599 (95%)	31 (5%)	22	34
All	All	1259/1414 (89%)	1196 (95%)	63 (5%)	22	33

All (63) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	GLU
1	A	42	ARG
1	A	44	ASN
1	A	45	ASN
1	A	126	THR
1	A	155	LYS
1	A	172	SER
1	A	212	ILE
1	A	280	LYS
1	A	312	VAL
1	A	343	GLN
1	A	438	ASP
1	A	445	LYS
1	A	515	LEU
1	A	517	GLU
1	A	531	LEU
1	A	558	SER
1	A	566	THR
1	A	573	ARG
1	A	578	SER
1	A	581	LEU
1	A	586	ASP
1	A	611	VAL
1	A	616	SER
1	A	624	THR
1	A	635	ASP
1	A	657	THR

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	676	PHE
1	A	725	TYR
1	A	753	LYS
1	A	805[A]	VAL
1	A	805[B]	VAL
1	B	91	THR
1	B	95	ASN
1	B	98	MET
1	B	105	GLU
1	B	145	ILE
1	B	173	GLU
1	B	194	ARG
1	B	227	GLN
1	B	274	VAL
1	B	283	SER
1	B	323	GLN
1	B	341	PRO
1	B	383	ASN
1	B	438	ASP
1	B	449	ASN
1	B	468	ARG
1	B	474	GLU
1	B	496	VAL
1	B	498	ARG
1	B	573	ARG
1	B	616	SER
1	B	632	LYS
1	B	657	THR
1	B	676	PHE
1	B	692	LYS
1	B	703	LEU
1	B	714	LYS
1	B	717	GLU
1	B	770	THR
1	B	793	GLN
1	B	795	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (42) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	120	GLN
1	A	157	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	167	GLN
1	A	231	GLN
1	A	242	GLN
1	A	249	GLN
1	A	273	GLN
1	A	397	HIS
1	A	398	GLN
1	A	461	GLN
1	A	478	GLN
1	A	481	HIS
1	A	484	ASN
1	A	592	GLN
1	A	600	HIS
1	A	639	HIS
1	A	741	GLN
1	A	748	GLN
1	A	786	ASN
1	A	793	GLN
1	B	85	GLN
1	B	95	ASN
1	B	114	GLN
1	B	120	GLN
1	B	137	HIS
1	B	167	GLN
1	B	181	ASN
1	B	217	HIS
1	B	227	GLN
1	B	250	GLN
1	B	323	GLN
1	B	357	ASN
1	B	368	HIS
1	B	398	GLN
1	B	461	GLN
1	B	481	HIS
1	B	484	ASN
1	B	600	HIS
1	B	664	HIS
1	B	748	GLN
1	B	786	ASN
1	B	793	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

19 ligands 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	$\# Z > 2$
3	GOL	B	903	-	5,5,5	0.08	0	5,5,5	0.30	0
4	SO4	B	905	-	4,4,4	0.31	0	6,6,6	0.14	0
3	GOL	A	902	-	5,5,5	0.15	0	5,5,5	0.42	0
4	SO4	A	905	-	4,4,4	0.26	0	6,6,6	0.21	0
3	GOL	A	903	-	5,5,5	0.15	0	5,5,5	0.43	0
4	SO4	B	906	-	4,4,4	0.21	0	6,6,6	0.08	0
4	SO4	B	907	-	4,4,4	0.26	0	6,6,6	0.17	0
4	SO4	A	906	-	4,4,4	0.30	0	6,6,6	0.12	0
4	SO4	A	907	-	4,4,4	0.37	0	6,6,6	0.20	0
5	BTB	B	902	-	13,13,13	1.41	2 (15%)	7,16,16	1.27	1 (14%)
4	SO4	A	904	-	4,4,4	0.29	0	6,6,6	0.12	0
4	SO4	B	904	-	4,4,4	0.45	0	6,6,6	0.35	0
4	SO4	A	909	-	4,4,4	0.30	0	6,6,6	0.11	0
2	VND	B	901	-	17,17,17	1.10	1 (5%)	21,24,24	0.96	0
2	VND	A	901	-	17,17,17	1.08	2 (11%)	21,24,24	2.71	7 (33%)
4	SO4	B	908	-	4,4,4	0.34	0	6,6,6	0.19	0
4	SO4	A	910	-	4,4,4	0.32	0	6,6,6	0.13	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	A	911	-	4,4,4	0.26	0	6,6,6	0.18	0
4	SO4	A	908	-	4,4,4	0.31	0	6,6,6	0.22	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	VND	A	901	-	-	2/8/31/31	0/1/1/1
3	GOL	A	903	-	-	2/4/4/4	-
5	BTB	B	902	-	-	7/21/21/21	-
3	GOL	B	903	-	-	2/4/4/4	-
2	VND	B	901	-	-	1/8/31/31	0/1/1/1
3	GOL	A	902	-	-	1/4/4/4	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	902	BTB	C2-N	3.15	1.54	1.48
2	A	901	VND	O1-C6	-2.69	1.40	1.44
2	B	901	VND	O1-C6	-2.58	1.40	1.44
5	B	902	BTB	C7-N	2.43	1.51	1.48
2	A	901	VND	C3-C2	2.05	1.56	1.52

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	901	VND	O1-C6-C7	8.16	119.10	108.25
2	A	901	VND	C1-C6-C7	-4.81	104.07	110.13
2	A	901	VND	O1-C6-C5	-4.69	98.10	108.40
2	A	901	VND	O4-C4-C5	3.63	117.34	109.77
2	A	901	VND	O2-C7-C6	-2.32	103.69	111.92
5	B	902	BTB	O3-C3-C2	2.12	116.39	111.40
2	A	901	VND	O5-C3-C4	-2.09	105.44	110.38
2	A	901	VND	C1-C2-N1	-2.01	107.60	112.03

There are no chirality outliers.

All (15) torsion outliers are listed below:

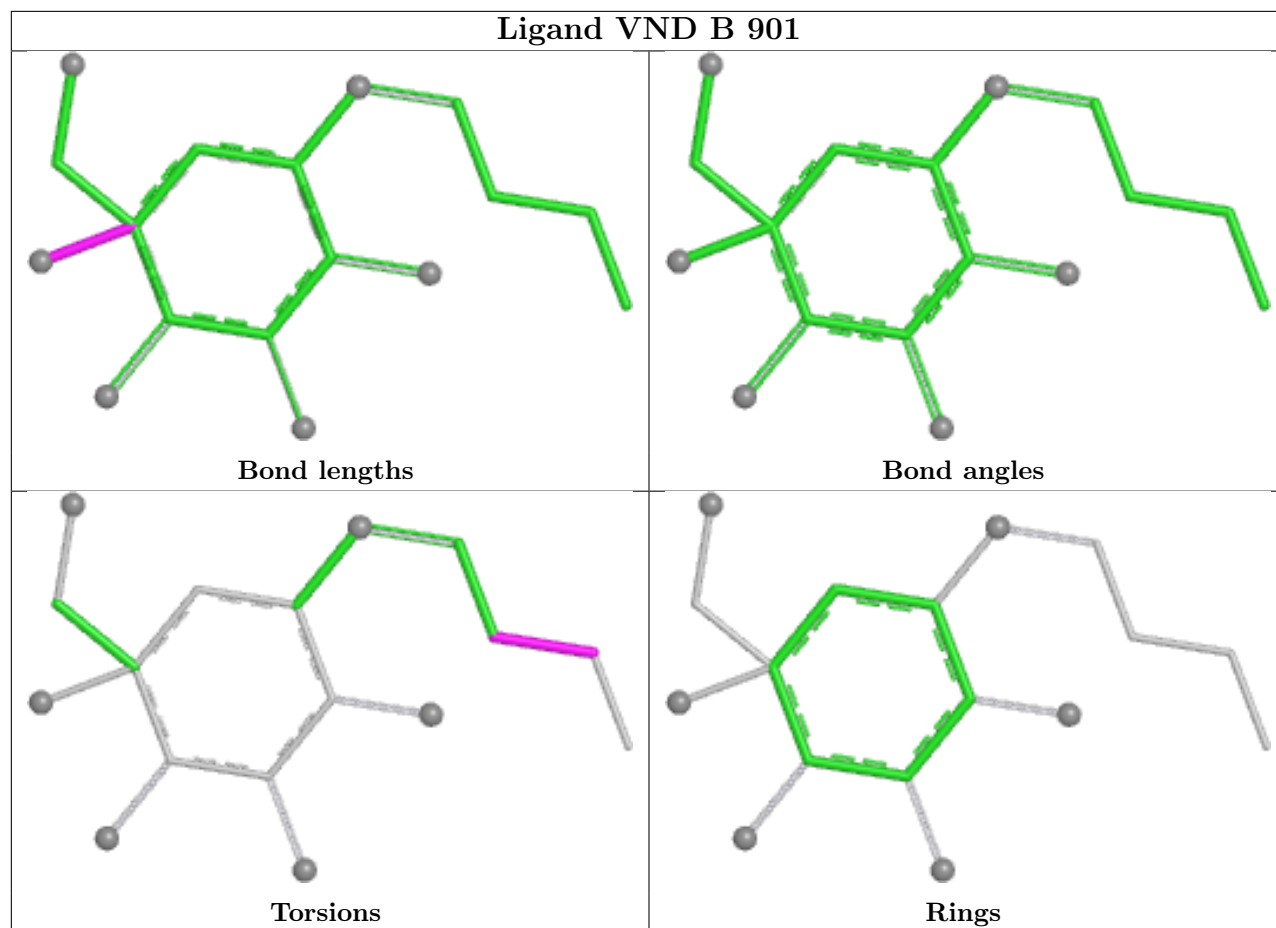
Mol	Chain	Res	Type	Atoms
3	A	903	GOL	C1-C2-C3-O3
3	B	903	GOL	C1-C2-C3-O3
5	B	902	BTB	C1-C2-C3-O3
5	B	902	BTB	C4-C2-C3-O3
5	B	902	BTB	N-C2-C3-O3
2	A	901	VND	N1-C8-C9-C10
3	A	903	GOL	O2-C2-C3-O3
3	B	903	GOL	O2-C2-C3-O3
2	B	901	VND	C11-C10-C9-C8
3	A	902	GOL	C1-C2-C3-O3
5	B	902	BTB	C6-C5-N-C2
5	B	902	BTB	C3-C2-N-C7
5	B	902	BTB	C4-C2-N-C7
2	A	901	VND	C11-C10-C9-C8
5	B	902	BTB	C1-C2-N-C7

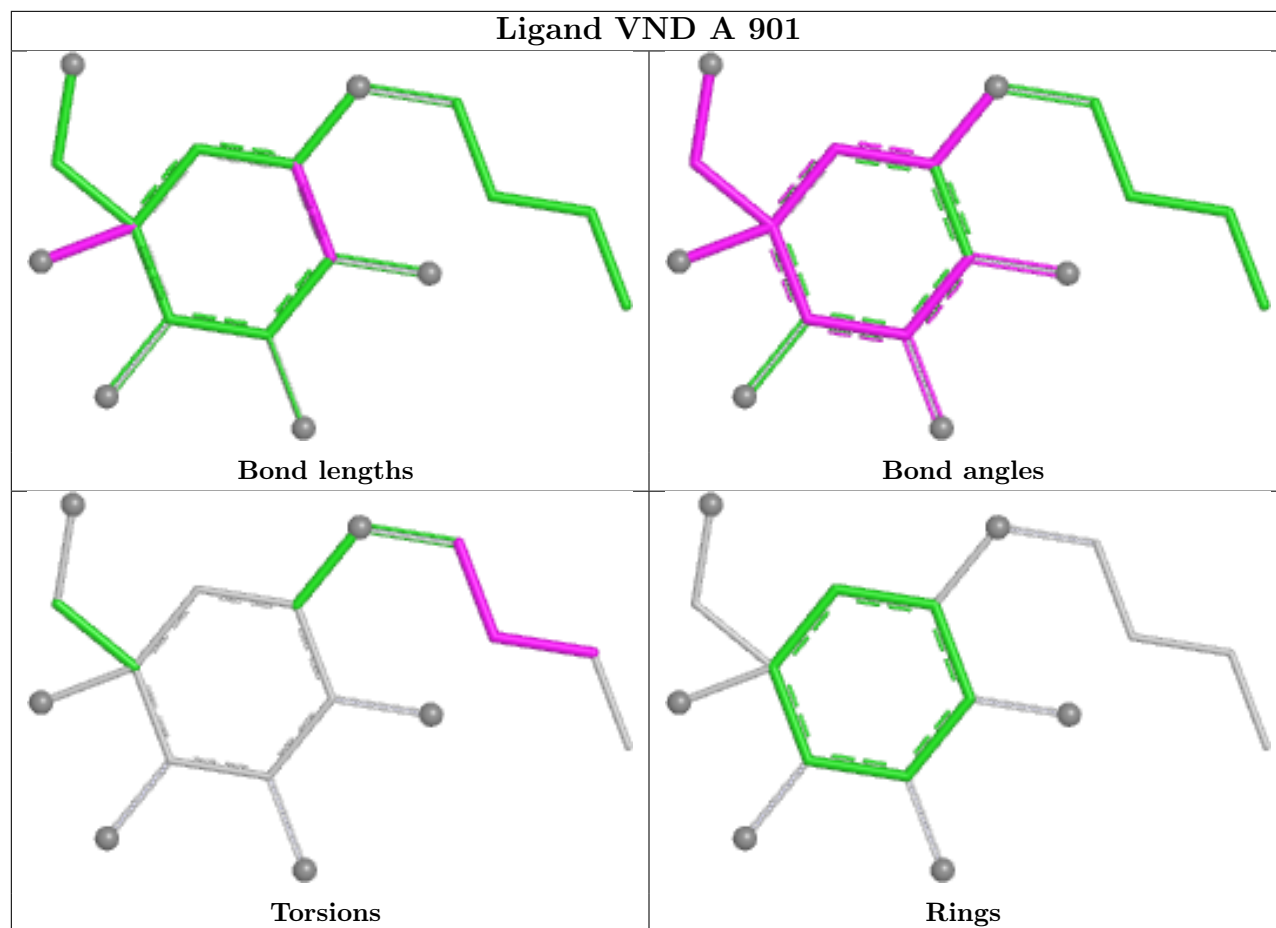
There are no ring outliers.

8 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	903	GOL	4	0
4	B	905	SO4	1	0
3	A	902	GOL	2	0
5	B	902	BTB	1	0
4	A	909	SO4	1	0
2	A	901	VND	1	0
4	B	908	SO4	1	0
4	A	910	SO4	1	0

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 [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	765/819 (93%)	-0.32	8 (1%) 79 80	20, 39, 67, 91	2 (0%)
1	B	764/819 (93%)	-0.32	7 (0%) 81 82	22, 40, 67, 88	0
All	All	1529/1638 (93%)	-0.32	15 (0%) 79 80	20, 39, 67, 91	2 (0%)

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	515	LEU	4.0
1	B	812	HIS	3.8
1	B	33	GLU	3.8
1	B	556	ILE	3.3
1	B	518	THR	3.3
1	A	660	GLU	2.7
1	A	661	PHE	2.7
1	A	560	ASP	2.6
1	A	812	HIS	2.2
1	A	36	LEU	2.2
1	A	725	TYR	2.2
1	B	627	VAL	2.1
1	B	501	LYS	2.1
1	A	182	GLU	2.1
1	B	560	ASP	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

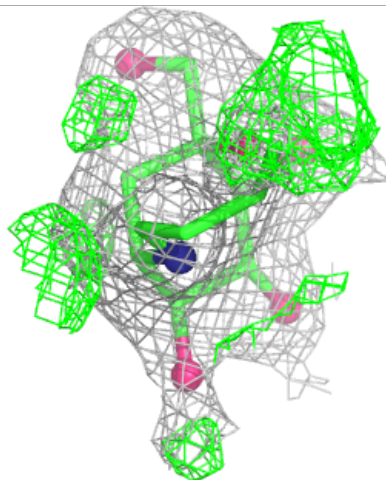
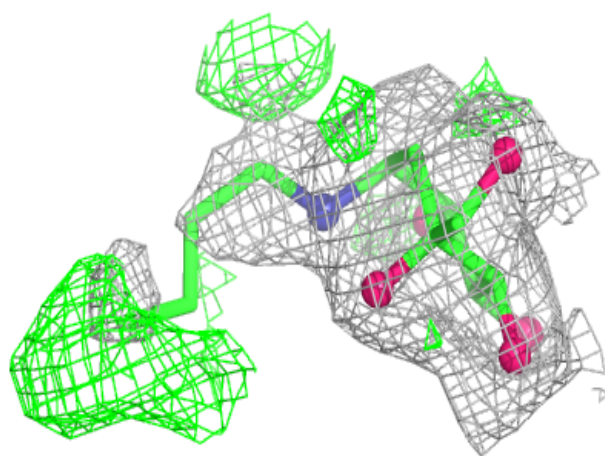
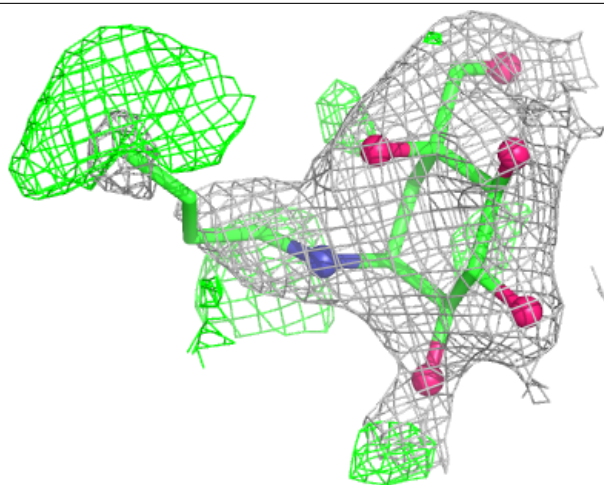
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

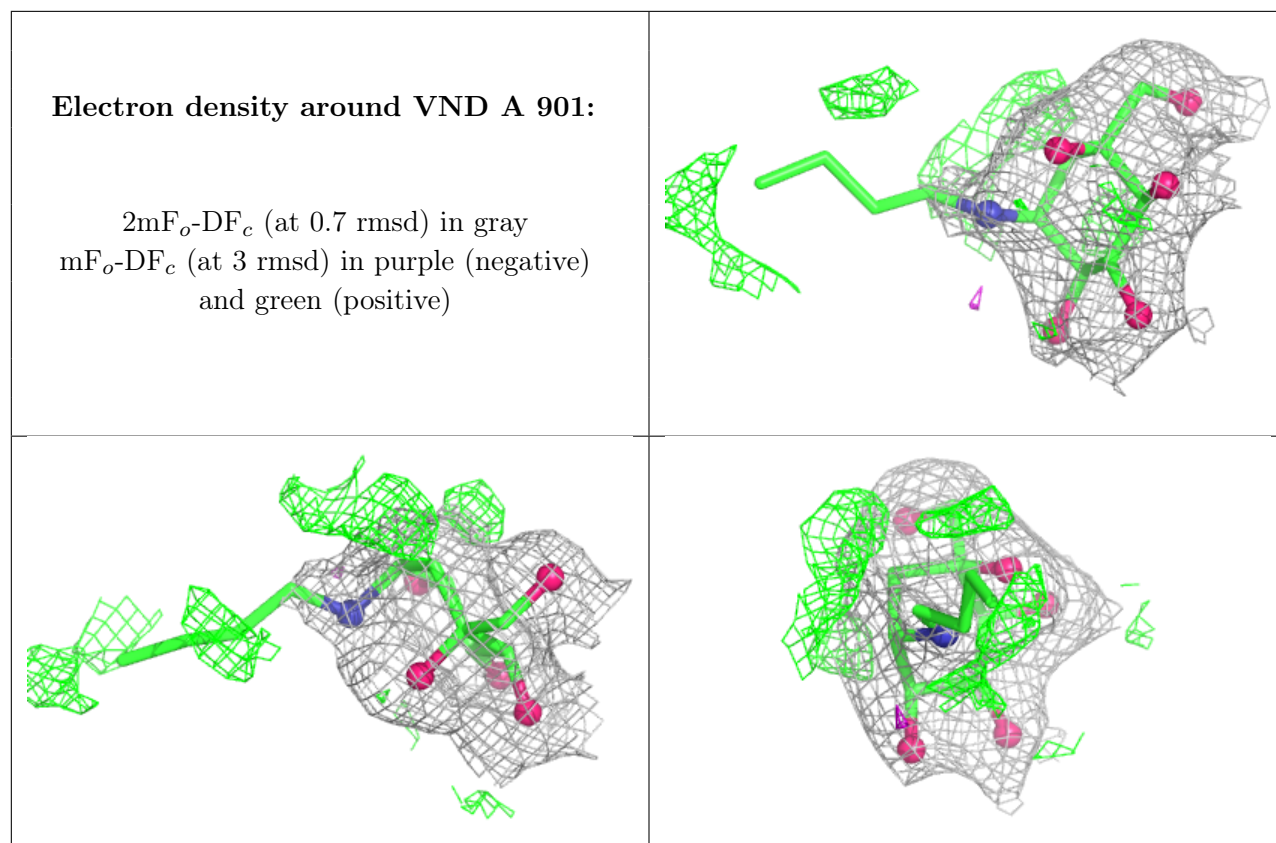
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	SO4	B	907	5/5	0.62	0.13	94,99,116,117	0
4	SO4	A	906	5/5	0.74	0.09	89,109,111,113	0
4	SO4	A	911	5/5	0.76	0.11	78,86,99,101	0
4	SO4	A	904	5/5	0.79	0.09	99,100,103,108	0
3	GOL	B	903	6/6	0.81	0.13	58,62,69,76	0
3	GOL	A	903	6/6	0.83	0.17	72,74,81,83	0
4	SO4	A	909	5/5	0.83	0.11	102,103,120,126	0
4	SO4	A	910	5/5	0.84	0.13	99,115,123,135	0
5	BTB	B	902	14/14	0.84	0.14	54,67,84,94	0
2	VND	B	901	17/17	0.86	0.20	41,58,102,113	0
2	VND	A	901	17/17	0.89	0.18	35,49,107,108	0
3	GOL	A	902	6/6	0.91	0.11	63,67,71,76	0
4	SO4	A	905	5/5	0.92	0.12	55,57,65,81	0
4	SO4	B	906	5/5	0.92	0.13	51,64,72,72	0
4	SO4	B	908	5/5	0.95	0.12	55,69,82,97	0
4	SO4	A	908	5/5	0.96	0.17	57,59,69,76	0
4	SO4	B	905	5/5	0.97	0.08	58,60,66,70	0
4	SO4	B	904	5/5	0.98	0.07	38,39,50,55	0
4	SO4	A	907	5/5	0.99	0.04	36,37,39,42	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.

Electron density around VND B 901:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





6.5 Other polymers ⓘ

There are no such residues in this entry.