



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 10, 2023 – 02:46 AM EDT

PDB ID : 7T66
Title : Co-crystal structure of Chaetomium glucosidase with compound UV-4
Authors : Karade, S.S.; Mariuzza, R.A.
Deposited on : 2021-12-13
Resolution : 2.19 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 : 2.35.1
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) : 2.35.1

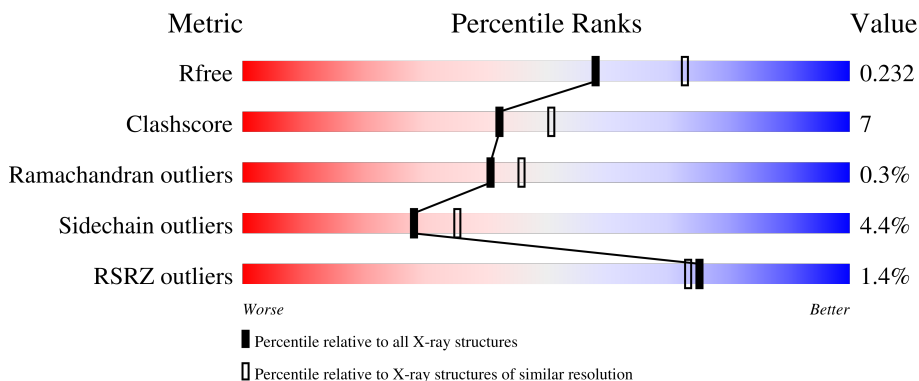
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.19 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	
1	B	819	

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
4	SO4	A	907	-	-	X	-

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 12895 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
			Total	C	N	O	S			
1	A	765	6096	3918	1029	1135	14	0	4	0
1	B	764	6078	3897	1020	1147	14	0	3	0

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

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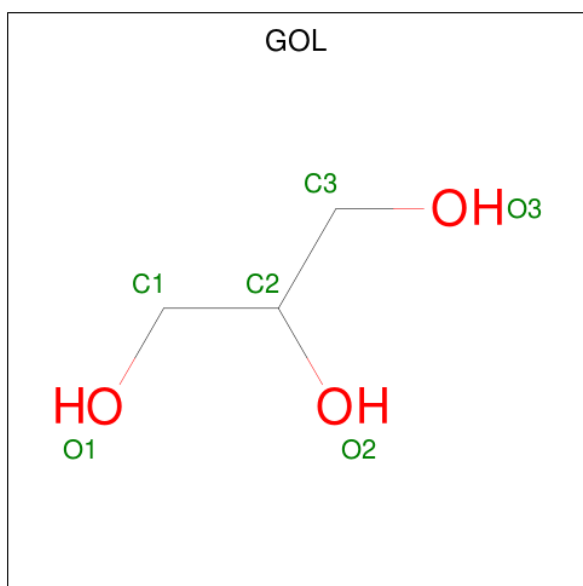
Chain	Residue	Modelled	Actual	Comment	Reference
A	24	CYS	-	expression tag	UNP G0SFD1
A	25	VAL	-	expression tag	UNP G0SFD1
A	26	ALA	-	expression tag	UNP G0SFD1
A	27	GLU	-	expression tag	UNP G0SFD1
A	28	THR	-	expression tag	UNP G0SFD1
A	29	GLY	-	expression tag	UNP G0SFD1
A	810	SER	-	expression tag	UNP 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

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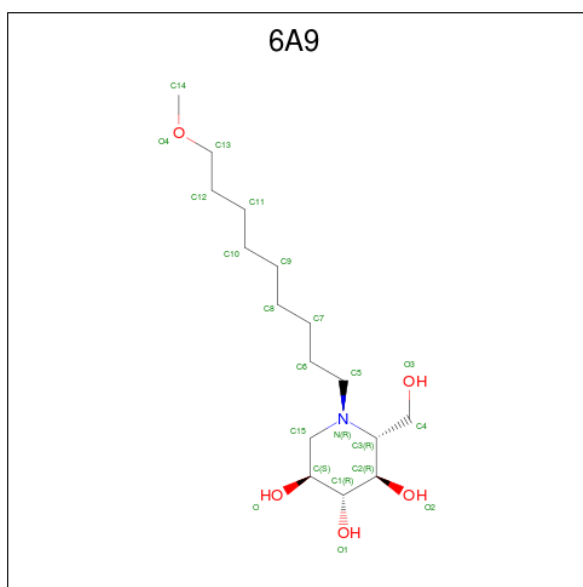
Chain	Residue	Modelled	Actual	Comment	Reference
B	27	GLU	-	expression tag	UNP G0SFD1
B	28	THR	-	expression tag	UNP G0SFD1
B	29	GLY	-	expression tag	UNP G0SFD1
B	810	SER	-	expression tag	UNP G0SFD1
B	811	GLY	-	expression tag	UNP G0SFD1
B	812	HIS	-	expression tag	UNP G0SFD1
B	813	HIS	-	expression tag	UNP 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 GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



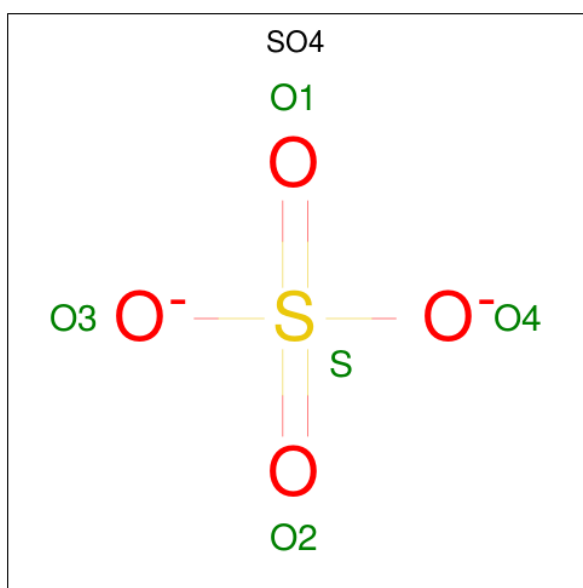
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is N-9'-methoxynonyl-1-deoxynojirimycin (three-letter code: 6A9) (formula: C₁₆H₃₃NO₅) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	22	16	1	5	0	0
3	B	1	22	16	1	5	0	0

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



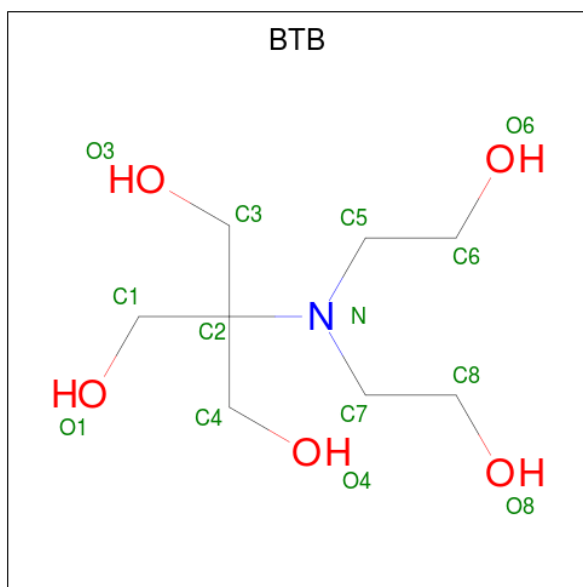
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0

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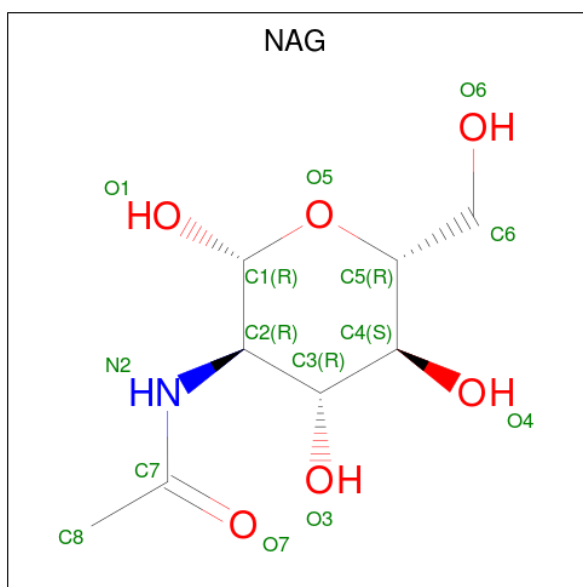
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	B	1	5	4	1	0	0
4	B	1	5	4	1	0	0
4	B	1	5	4	1	0	0
4	B	1	5	4	1	0	0

- Molecule 5 is 2-[BIS-(2-HYDROXY-ETHYL)-AMINO]-2-HYDROXYMETHYL-PROPAN E-1,3-DIOL (three-letter code: BTB) (formula: C₈H₁₉NO₅).



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

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



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

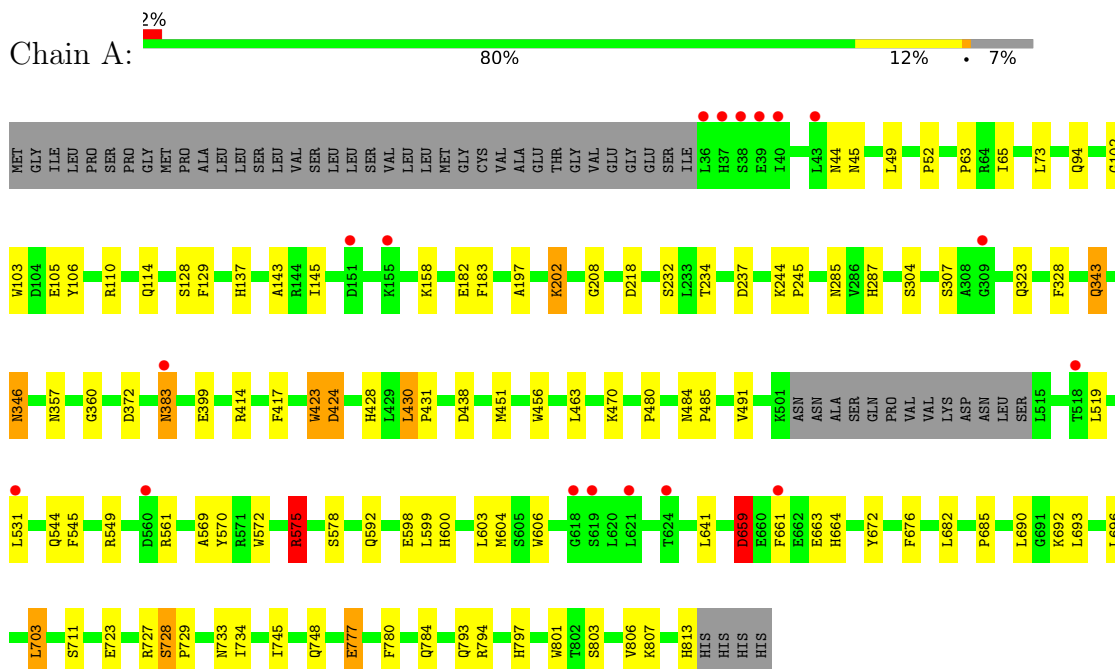
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	284	284	284	0	0
7	B	303	303	303	0	0

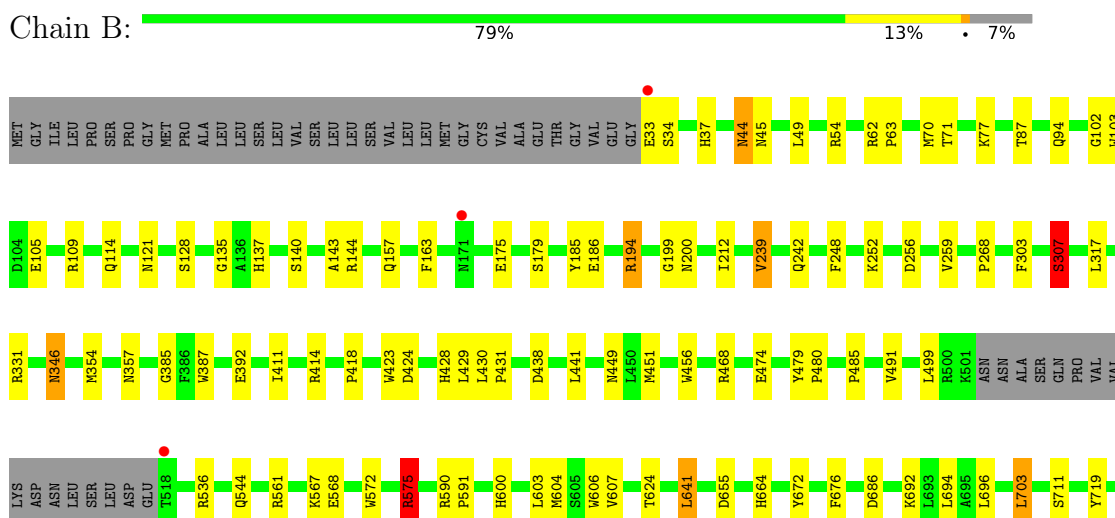
3 Residue-property plots i

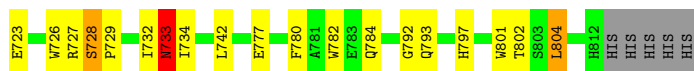
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: 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	135.59Å 178.40Å 180.04Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.78 – 2.19 46.74 – 2.19	Depositor EDS
% Data completeness (in resolution range)	99.7 (46.78-2.19) 99.8 (46.74-2.19)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.92 (at 2.20Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.187 , 0.231 0.187 , 0.232	Depositor DCC
R_{free} test set	5495 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	32.7	Xtrriage
Anisotropy	0.420	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 28.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.008 for -h,-l,-k	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	12895	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% 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: NAG, GOL, 6A9, SO4, BTB

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	0.53	1/6281 (0.0%)	0.70	3/8549 (0.0%)
1	B	0.56	1/6254 (0.0%)	0.71	4/8517 (0.0%)
All	All	0.54	2/12535 (0.0%)	0.71	7/17066 (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	A	0	1
1	B	0	2
All	All	0	3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	33	GLU	N-CA	8.98	1.64	1.46
1	A	723	GLU	CD-OE1	8.37	1.34	1.25

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	575	ARG	CB-CA-C	7.66	125.73	110.40
1	A	659	ASP	CB-CA-C	-6.39	97.61	110.40
1	B	536	ARG	CG-CD-NE	-6.26	98.65	111.80
1	A	777	GLU	CB-CA-C	5.53	121.46	110.40
1	B	733	ASN	N-CA-CB	-5.33	101.00	110.60
1	B	575	ARG	CB-CA-C	5.29	120.98	110.40
1	B	45	ASN	CB-CA-C	5.10	120.60	110.40

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	780	PHE	Peptide
1	B	732	ILE	Peptide
1	B	780	PHE	Peptide

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	6096	0	5784	75	0
1	B	6078	0	5705	91	0
2	A	6	0	8	1	0
2	B	6	0	8	0	0
3	A	22	0	0	1	0
3	B	22	0	0	0	0
4	A	30	0	0	3	0
4	B	20	0	0	0	0
5	B	14	0	19	0	0
6	B	14	0	13	0	0
7	A	284	0	0	1	0
7	B	303	0	0	11	0
All	All	12895	0	11537	165	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 (165) 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:37:HIS:HD2	7:B:1238:HOH:O	1.23	1.19
1:B:567:LYS:CB	7:B:1209:HOH:O	1.93	1.12
1:B:561:ARG:HE	1:B:664:HIS:HD2	1.08	0.99
1:B:572:TRP:H	1:B:600:HIS:HD2	1.11	0.98
1:A:572:TRP:H	1:A:600:HIS:HD2	1.18	0.88
1:A:659:ASP:HB3	1:A:661:PHE:H	1.39	0.87

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:561:ARG:HE	1:B:664:HIS:CD2	1.96	0.83
1:B:346:ASN:HD22	1:B:346:ASN:H	1.26	0.83
1:A:343:GLN:HE21	1:A:343:GLN:H	1.28	0.80
1:B:572:TRP:H	1:B:600:HIS:CD2	1.97	0.80
1:B:87:THR:HB	1:B:121:ASN:HD21	1.49	0.78
1:A:114:GLN:HE22	1:A:414:ARG:HH22	1.33	0.76
1:A:561:ARG:HE	1:A:664:HIS:HD2	1.31	0.76
1:B:346:ASN:HD22	1:B:346:ASN:N	1.86	0.74
1:A:659:ASP:HB2	1:A:663:GLU:H	1.52	0.72
1:A:234[B]:THR:HG22	7:B:1103:HOH:O	1.89	0.72
1:B:135:GLY:HA3	1:B:307:SER:HB3	1.71	0.71
1:A:685:PRO:HG3	1:A:748:GLN:HE22	1.57	0.69
1:B:114:GLN:NE2	1:B:414:ARG:HH12	1.91	0.68
1:B:239:VAL:HG22	1:B:242:GLN:OE1	1.94	0.67
1:B:733:ASN:ND2	1:B:801:TRP:CZ2	2.63	0.66
1:B:561:ARG:NE	1:B:664:HIS:HD2	1.88	0.66
1:B:451:MET:CE	1:B:544:GLN:HB2	2.26	0.66
1:B:728:SER:N	1:B:729:PRO:HD3	2.10	0.66
1:A:575:ARG:HH22	1:A:592:GLN:HE22	1.45	0.65
1:A:690:LEU:HD11	1:A:745:ILE:HD11	1.78	0.65
1:B:727:ARG:O	1:B:728:SER:HB3	1.96	0.64
1:A:208:GLY:HA2	2:A:901:GOL:H12	1.80	0.64
1:A:346:ASN:H	1:A:346:ASN:HD22	1.44	0.64
1:B:37:HIS:CD2	7:B:1238:HOH:O	2.12	0.64
1:A:572:TRP:H	1:A:600:HIS:CD2	2.09	0.63
1:B:62:ARG:HD2	1:B:70:MET:HE3	1.80	0.63
1:A:114:GLN:NE2	1:A:414:ARG:HH12	1.97	0.62
1:A:234[B]:THR:HG21	1:B:268:PRO:HG3	1.82	0.62
1:B:784:GLN:HE21	1:B:793:GLN:HE21	1.48	0.61
1:B:728:SER:H	1:B:729:PRO:CD	2.14	0.61
1:B:728:SER:N	1:B:729:PRO:CD	2.65	0.60
1:A:727:ARG:O	1:A:728:SER:HB3	2.02	0.60
1:B:114:GLN:HE22	1:B:414:ARG:HH22	1.48	0.60
1:A:561:ARG:HE	1:A:664:HIS:CD2	2.18	0.59
1:A:803:SER:O	1:A:806[A]:VAL:HG23	2.01	0.59
1:B:726:TRP:HH2	1:B:733:ASN:ND2	2.01	0.59
1:A:114:GLN:HE21	1:A:414:ARG:HH12	1.50	0.59
1:A:343:GLN:H	1:A:343:GLN:NE2	2.00	0.59
1:A:784:GLN:HE21	1:A:793:GLN:HE21	1.49	0.59
1:B:44:ASN:HD21	1:B:109:ARG:HH22	1.49	0.59
1:A:545:PHE:CZ	1:A:549:ARG:HD2	2.38	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:451:MET:HE2	1:B:544:GLN:HB2	1.85	0.58
1:B:784:GLN:NE2	1:B:793:GLN:HE21	2.01	0.58
1:A:244:LYS:HB3	1:A:245:PRO:HD3	1.84	0.57
1:B:604:MET:HG2	1:B:641:LEU:HD13	1.85	0.57
1:A:423:TRP:H	1:A:484:ASN:ND2	2.04	0.56
1:A:784:GLN:NE2	1:A:793:GLN:HE21	2.02	0.56
1:B:572:TRP:N	1:B:600:HIS:HD2	1.92	0.56
1:A:234[A]:THR:HG23	7:B:1103:HOH:O	2.04	0.56
1:B:137:HIS:CD2	1:B:307:SER:OG	2.59	0.56
1:B:128[A]:SER:O	1:B:143:ALA:HA	2.06	0.56
1:A:572:TRP:N	1:A:600:HIS:HD2	1.97	0.56
1:B:62:ARG:HD2	1:B:70:MET:CE	2.36	0.56
1:B:94:GLN:OE1	1:B:797:HIS:HE1	1.89	0.55
1:B:212:ILE:HD11	7:B:1170:HOH:O	2.07	0.54
1:B:194:ARG:HB2	1:B:200:ASN:HD22	1.72	0.54
1:A:234[B]:THR:CG2	7:B:1103:HOH:O	2.52	0.54
1:B:451:MET:HE1	1:B:544:GLN:HB2	1.91	0.53
1:B:456:TRP:CE2	1:B:480:PRO:HA	2.44	0.53
1:A:569:ALA:HA	1:A:604:MET:CE	2.38	0.53
1:B:54:ARG:NE	1:B:70:MET:HE1	2.24	0.53
1:B:801:TRP:O	1:B:804:LEU:HB2	2.09	0.53
1:A:423:TRP:H	1:A:484:ASN:HD22	1.56	0.52
1:B:248:PHE:O	1:B:252:LYS:HG3	2.09	0.52
1:B:346:ASN:H	1:B:346:ASN:ND2	2.01	0.52
1:B:385:GLY:HA2	1:B:387:TRP:CZ3	2.43	0.52
1:A:94:GLN:OE1	1:A:797:HIS:HE1	1.92	0.52
1:B:194:ARG:HA	1:B:199:GLY:O	2.10	0.52
1:A:456:TRP:CE2	1:A:480:PRO:HA	2.45	0.51
1:B:103:TRP:H	1:B:357:ASN:ND2	2.07	0.51
1:B:137:HIS:HD2	1:B:307:SER:OG	1.93	0.51
1:B:590:ARG:HB3	1:B:591:PRO:CD	2.41	0.51
1:B:696:LEU:HG	1:B:703:LEU:HD22	1.93	0.51
1:A:672:TYR:CE1	1:A:711:SER:HA	2.46	0.50
1:B:474:GLU:HB2	7:B:1304:HOH:O	2.10	0.50
1:B:590:ARG:HB3	1:B:591:PRO:HD2	1.93	0.50
1:A:690:LEU:HD11	1:A:745:ILE:CD1	2.40	0.50
1:A:202:LYS:HG2	1:A:304:SER:HB2	1.94	0.49
1:B:468:ARG:HD3	7:B:1166:HOH:O	2.12	0.49
1:A:110:ARG:NH2	1:A:323:GLN:HG3	2.28	0.49
1:A:383:ASN:HD22	1:A:383:ASN:N	2.08	0.49
1:A:696:LEU:HG	1:A:703:LEU:HD22	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:723:GLU:HB2	7:B:1158:HOH:O	2.11	0.49
1:B:194:ARG:HB2	1:B:200:ASN:ND2	2.27	0.49
1:A:106:TYR:CD2	1:A:360:GLY:HA2	2.47	0.48
1:B:385:GLY:HA2	1:B:387:TRP:CH2	2.48	0.48
1:A:65:ILE:HD13	1:A:197:ALA:HB1	1.95	0.48
1:B:782:TRP:CG	1:B:792:GLY:HA3	2.49	0.47
1:A:102:GLY:HA3	1:A:357:ASN:HD21	1.79	0.47
1:B:256:ASP:O	1:B:259:VAL:HG22	2.14	0.47
1:A:672:TYR:CG	1:A:734:ILE:HG21	2.50	0.47
1:B:140:SER:HB3	1:B:303:PHE:O	2.14	0.47
1:B:726:TRP:HH2	1:B:733:ASN:HD22	1.61	0.47
1:A:569:ALA:HA	1:A:604:MET:HE1	1.96	0.47
1:B:485:PRO:HB3	1:B:606:TRP:CE2	2.50	0.47
1:A:103:TRP:H	1:A:357:ASN:ND2	2.13	0.46
1:B:411:ILE:HD12	1:B:418:PRO:HA	1.97	0.46
1:A:659:ASP:HB3	1:A:661:PHE:N	2.19	0.46
1:A:578:SER:N	4:A:907:SO4:O1	2.38	0.46
1:A:428:HIS:O	1:A:431:PRO:HD2	2.15	0.46
1:B:604:MET:HG2	1:B:641:LEU:CD1	2.44	0.46
1:B:44:ASN:ND2	1:B:109:ARG:HH12	2.14	0.46
1:A:137:HIS:HD2	1:A:307:SER:OG	1.99	0.46
1:B:719:TYR:CE1	1:B:728:SER:HB2	2.51	0.46
1:B:568:GLU:HB3	1:B:604:MET:HE1	1.98	0.46
1:B:672:TYR:CE1	1:B:711:SER:HA	2.51	0.46
1:B:44:ASN:ND2	1:B:109:ARG:HH22	2.14	0.46
1:A:733:ASN:HB3	1:A:801:TRP:CG	2.50	0.45
1:B:428:HIS:O	1:B:431:PRO:HD2	2.16	0.45
1:B:672:TYR:CG	1:B:734:ILE:HG21	2.50	0.45
1:A:485:PRO:HB3	1:A:606:TRP:CE2	2.52	0.45
1:B:71:THR:HB	1:B:163:PHE:CZ	2.52	0.45
1:B:346:ASN:N	1:B:346:ASN:ND2	2.58	0.44
1:A:110:ARG:HH22	1:A:323:GLN:HE21	1.66	0.44
1:A:728:SER:N	1:A:729:PRO:CD	2.80	0.44
1:B:600:HIS:HA	1:B:655:ASP:OD1	2.17	0.44
1:A:570:TYR:HB3	1:A:603:LEU:HG	2.00	0.44
1:A:598:GLU:OE2	1:A:600:HIS:HE1	2.00	0.44
1:A:672:TYR:CZ	1:A:711:SER:HA	2.53	0.44
1:B:49:LEU:O	1:B:63:PRO:HA	2.18	0.43
1:A:73:LEU:HD22	1:A:145:ILE:HD12	1.99	0.43
1:B:103:TRP:H	1:B:357:ASN:HD21	1.66	0.43
1:A:575:ARG:HH22	1:A:592:GLN:NE2	2.14	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:77:LYS:H	1:B:121:ASN:ND2	2.16	0.43
1:B:801:TRP:HB2	1:B:804:LEU:HD22	2.00	0.43
1:B:733:ASN:HB3	1:B:734:ILE:H	1.41	0.43
1:A:128:SER:O	1:A:143:ALA:HA	2.19	0.43
1:B:429:LEU:HB2	1:B:491:VAL:HG21	2.00	0.42
1:B:727:ARG:O	1:B:728:SER:CB	2.64	0.42
1:A:424:ASP:OD1	3:A:902:6A9:O2	2.38	0.42
1:B:157:GLN:NE2	7:B:1104:HOH:O	2.46	0.42
1:A:49:LEU:O	1:A:63:PRO:HA	2.19	0.42
1:A:52:PRO:HD3	1:A:129:PHE:CE2	2.54	0.42
1:A:234[A]:THR:HG22	1:A:285:ASN:H	1.85	0.42
1:A:561:ARG:NE	1:A:664:HIS:HD2	2.09	0.42
1:B:354:MET:HE1	1:B:802:THR:HG22	2.01	0.42
1:B:479:TYR:HA	1:B:480:PRO:HD3	1.90	0.42
1:A:569:ALA:HB1	1:A:599:LEU:HD22	2.03	0.41
1:A:794:ARG:HD3	7:A:1074:HOH:O	2.20	0.41
1:B:784:GLN:HE21	1:B:793:GLN:HG3	1.84	0.41
1:A:372:ASP:HA	1:A:399:GLU:HA	2.02	0.41
1:B:114:GLN:HE21	1:B:414:ARG:HH12	1.62	0.41
1:B:430:LEU:HB2	1:B:431:PRO:HD3	2.02	0.41
1:A:430:LEU:HD13	1:A:491:VAL:HG22	2.02	0.41
1:B:102:GLY:HA3	1:B:357:ASN:HD21	1.85	0.41
1:A:813:HIS:HA	4:A:906:SO4:O2	2.20	0.41
1:A:105:GLU:HG2	1:A:328:PHE:CD1	2.56	0.41
1:A:182:GLU:HG3	1:A:183:PHE:CD2	2.56	0.41
1:B:179:SER:HB3	1:B:185:TYR:CD2	2.55	0.41
1:B:456:TRP:CD2	1:B:480:PRO:HA	2.55	0.41
1:B:603:LEU:O	1:B:607:VAL:HG23	2.20	0.41
1:A:578:SER:HB2	4:A:907:SO4:O1	2.21	0.41
1:B:575:ARG:HE	1:B:575:ARG:HB2	1.62	0.41
1:A:232:SER:OG	1:A:287:HIS:HD2	2.04	0.40
1:A:451:MET:CE	1:A:544:GLN:HB2	2.52	0.40
1:B:54:ARG:CZ	1:B:70:MET:HE1	2.50	0.40
1:A:456:TRP:CD2	1:A:480:PRO:HA	2.57	0.40
1:A:603:LEU:HD12	1:A:603:LEU:O	2.22	0.40
1:B:144:ARG:HB2	1:B:317:LEU:HD21	2.04	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	765/819 (93%)	740 (97%)	23 (3%)	2 (0%)	41	46
1	B	763/819 (93%)	746 (98%)	14 (2%)	3 (0%)	34	37
All	All	1528/1638 (93%)	1486 (97%)	37 (2%)	5 (0%)	41	46

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	728	SER
1	B	728	SER
1	B	733	ASN
1	A	659	ASP
1	B	307	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	633/707 (90%)	606 (96%)	27 (4%)	29	36
1	B	630/707 (89%)	602 (96%)	28 (4%)	28	35
All	All	1263/1414 (89%)	1208 (96%)	55 (4%)	28	35

All (55) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	44	ASN

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Mol	Chain	Res	Type
1	A	45	ASN
1	A	158	LYS
1	A	202	LYS
1	A	218	ASP
1	A	237	ASP
1	A	343	GLN
1	A	346	ASN
1	A	383	ASN
1	A	417	PHE
1	A	423	TRP
1	A	424	ASP
1	A	430	LEU
1	A	438	ASP
1	A	463	LEU
1	A	470	LYS
1	A	519	LEU
1	A	531	LEU
1	A	575	ARG
1	A	641	LEU
1	A	676	PHE
1	A	682	LEU
1	A	692	LYS
1	A	693	LEU
1	A	703	LEU
1	A	777	GLU
1	A	807	LYS
1	B	34	SER
1	B	44	ASN
1	B	105	GLU
1	B	175	GLU
1	B	186	GLU
1	B	194	ARG
1	B	239	VAL
1	B	307	SER
1	B	331	ARG
1	B	346	ASN
1	B	392	GLU
1	B	423	TRP
1	B	424	ASP
1	B	438	ASP
1	B	441	LEU
1	B	449	ASN

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Mol	Chain	Res	Type
1	B	499	LEU
1	B	575	ARG
1	B	624	THR
1	B	641	LEU
1	B	676	PHE
1	B	686	ASP
1	B	692	LYS
1	B	694	LEU
1	B	703	LEU
1	B	742	LEU
1	B	777	GLU
1	B	804	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (43) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	85	GLN
1	A	114	GLN
1	A	137	HIS
1	A	157	GLN
1	A	167	GLN
1	A	214	GLN
1	A	249	GLN
1	A	287	HIS
1	A	323	GLN
1	A	343	GLN
1	A	346	ASN
1	A	357	ASN
1	A	383	ASN
1	A	398	GLN
1	A	484	ASN
1	A	494	ASN
1	A	544	GLN
1	A	592	GLN
1	A	600	HIS
1	A	664	HIS
1	A	741	GLN
1	A	748	GLN
1	A	784	GLN
1	A	797	HIS
1	B	44	ASN
1	B	85	GLN

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Mol	Chain	Res	Type
1	B	114	GLN
1	B	121	ASN
1	B	137	HIS
1	B	157	GLN
1	B	167	GLN
1	B	200	ASN
1	B	214	GLN
1	B	287	HIS
1	B	346	ASN
1	B	357	ASN
1	B	476	GLN
1	B	484	ASN
1	B	600	HIS
1	B	664	HIS
1	B	733	ASN
1	B	784	GLN
1	B	797	HIS

5.3.3 RNA [i](#)

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

16 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
4	SO4	B	1005	-	4,4,4	0.17	0	6,6,6	0.10	0
4	SO4	B	1008	-	4,4,4	0.31	0	6,6,6	0.09	0
2	GOL	A	901	-	5,5,5	0.16	0	5,5,5	0.36	0
4	SO4	A	903	-	4,4,4	0.31	0	6,6,6	0.07	0
4	SO4	A	906	-	4,4,4	0.30	0	6,6,6	0.10	0
4	SO4	B	1006	-	4,4,4	0.60	0	6,6,6	0.21	0
6	NAG	B	1003	1	14,14,15	1.15	0	17,19,21	1.88	6 (35%)
4	SO4	B	1007	-	4,4,4	0.25	0	6,6,6	0.09	0
4	SO4	A	908	-	4,4,4	0.30	0	6,6,6	0.08	0
2	GOL	B	1002	-	5,5,5	0.35	0	5,5,5	0.65	0
4	SO4	A	905	-	4,4,4	0.42	0	6,6,6	0.24	0
5	BTB	B	1001	-	13,13,13	1.69	3 (23%)	7,16,16	0.72	0
4	SO4	A	907	-	4,4,4	0.36	0	6,6,6	0.06	0
3	6A9	B	1004	-	22,22,22	3.90	6 (27%)	25,27,27	1.71	3 (12%)
4	SO4	A	904	-	4,4,4	0.25	0	6,6,6	0.11	0
3	6A9	A	902	-	22,22,22	2.98	4 (18%)	25,27,27	1.16	2 (8%)

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
3	6A9	A	902	-	-	2/13/33/33	0/1/1/1
2	GOL	A	901	-	-	2/4/4/4	-
6	NAG	B	1003	1	-	2/6/23/26	0/1/1/1
2	GOL	B	1002	-	-	1/4/4/4	-
3	6A9	B	1004	-	-	9/13/33/33	0/1/1/1
5	BTB	B	1001	-	-	4/21/21/21	-

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1004	6A9	C5-N	-16.58	1.18	1.47
3	A	902	6A9	C5-N	-11.88	1.26	1.47
3	A	902	6A9	C-C1	-5.38	1.44	1.52
3	B	1004	6A9	C-C1	-5.36	1.44	1.52
5	B	1001	BTB	C3-C2	3.59	1.58	1.53
5	B	1001	BTB	C4-C2	3.01	1.57	1.53
5	B	1001	BTB	C1-C2	2.88	1.57	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	902	6A9	O1-C1	2.69	1.49	1.43
3	B	1004	6A9	C2-C3	2.64	1.59	1.53
3	B	1004	6A9	C1-C2	-2.55	1.45	1.52
3	B	1004	6A9	C15-C	-2.44	1.49	1.52
3	B	1004	6A9	O-C	2.21	1.48	1.43
3	A	902	6A9	O-C	2.04	1.47	1.43

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1004	6A9	C5-N-C3	-5.37	98.92	113.29
3	A	902	6A9	C4-C3-C2	-3.49	107.55	112.90
6	B	1003	NAG	C1-O5-C5	3.47	116.89	112.19
6	B	1003	NAG	C1-C2-N2	-3.20	105.03	110.49
3	B	1004	6A9	O1-C1-C2	-3.16	103.03	110.35
3	B	1004	6A9	O2-C2-C3	-2.96	104.50	109.77
6	B	1003	NAG	O5-C5-C6	2.73	111.48	107.20
6	B	1003	NAG	C3-C4-C5	-2.66	105.49	110.24
6	B	1003	NAG	C2-N2-C7	2.32	126.21	122.90
6	B	1003	NAG	O7-C7-N2	-2.05	118.19	121.95
3	A	902	6A9	C-C15-N	-2.03	106.93	110.54

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	1004	6A9	C6-C5-N-C3
3	B	1004	6A9	C12-C13-O4-C14
5	B	1001	BTB	C1-C2-C3-O3
5	B	1001	BTB	C4-C2-C3-O3
5	B	1001	BTB	N-C2-C3-O3
6	B	1003	NAG	C8-C7-N2-C2
6	B	1003	NAG	O7-C7-N2-C2
3	A	902	6A9	C7-C8-C9-C10
3	A	902	6A9	C6-C7-C8-C9
2	A	901	GOL	C1-C2-C3-O3
3	B	1004	6A9	C11-C12-C13-O4
5	B	1001	BTB	N-C7-C8-O8
3	B	1004	6A9	C11-C10-C9-C8
3	B	1004	6A9	C5-C6-C7-C8
3	B	1004	6A9	C7-C8-C9-C10
2	B	1002	GOL	O2-C2-C3-O3

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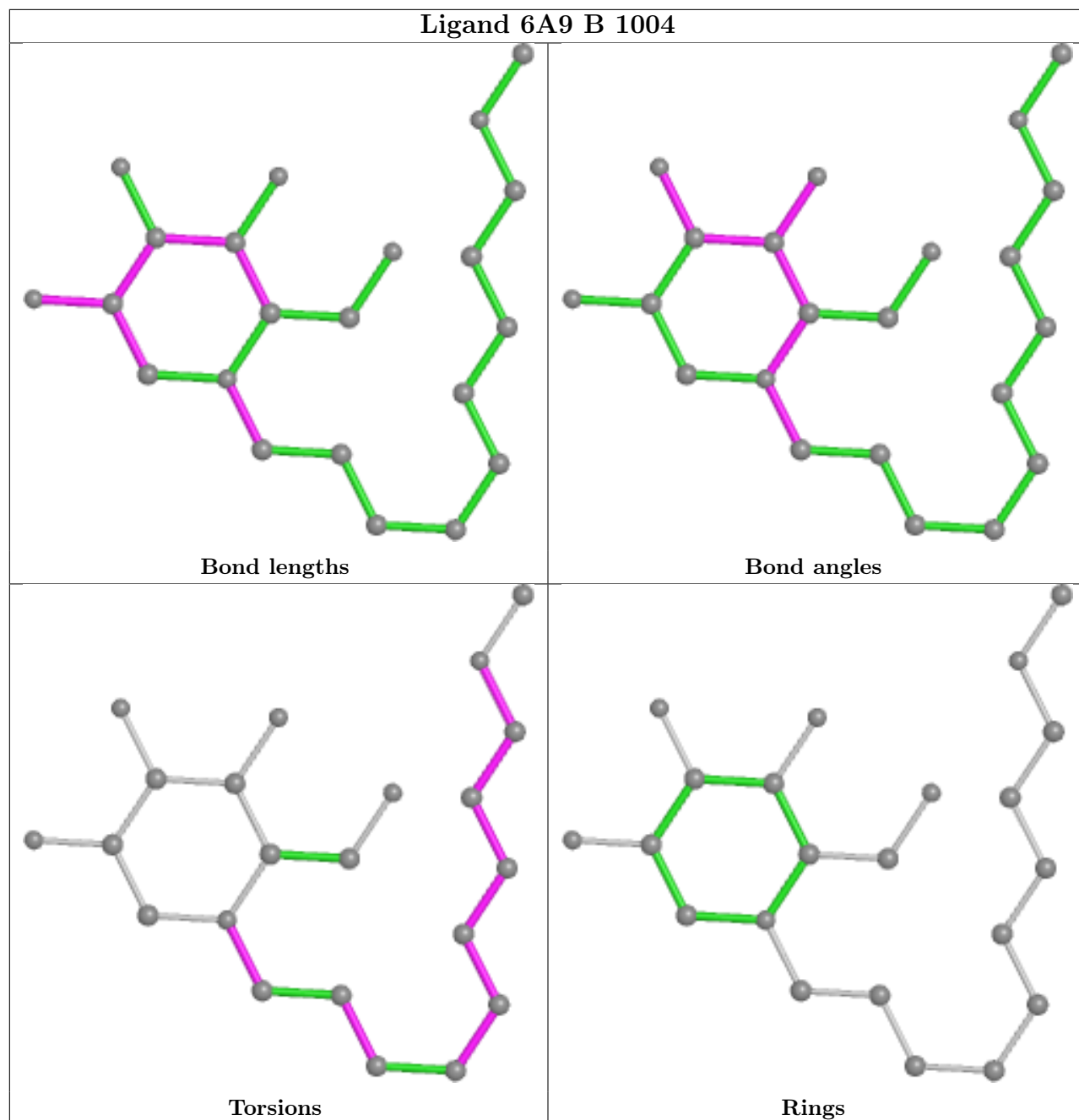
Mol	Chain	Res	Type	Atoms
3	B	1004	6A9	C10-C11-C12-C13
3	B	1004	6A9	C6-C5-N-C15
2	A	901	GOL	O2-C2-C3-O3
3	B	1004	6A9	C9-C10-C11-C12

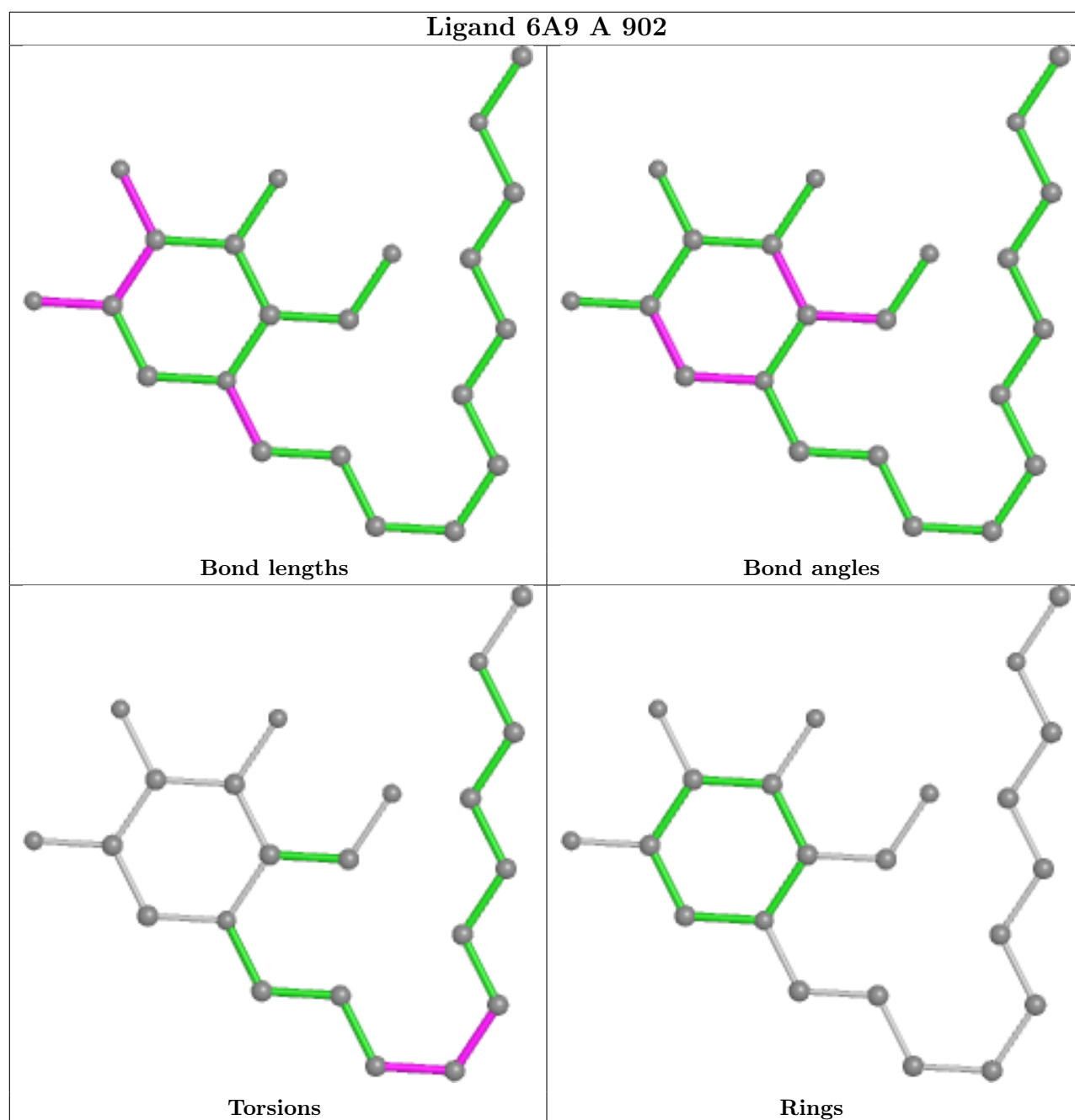
There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	901	GOL	1	0
4	A	906	SO4	1	0
4	A	907	SO4	2	0
3	A	902	6A9	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

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	765/819 (93%)	-0.13	18 (2%) 59 56	21, 33, 58, 108	0
1	B	764/819 (93%)	-0.27	3 (0%) 92 91	20, 32, 51, 82	0
All	All	1529/1638 (93%)	-0.20	21 (1%) 75 73	20, 32, 54, 108	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	37	HIS	6.3
1	A	36	LEU	5.8
1	A	518	THR	4.3
1	A	38	SER	3.4
1	A	40	ILE	3.1
1	A	43	LEU	3.0
1	B	33	GLU	2.8
1	B	171	ASN	2.8
1	A	151	ASP	2.7
1	A	39	GLU	2.7
1	A	619	SER	2.6
1	A	309	GLY	2.4
1	A	661	PHE	2.3
1	A	621	LEU	2.2
1	A	155	LYS	2.2
1	A	531	LEU	2.2
1	A	383	ASN	2.1
1	B	518	THR	2.1
1	A	618	GLY	2.0
1	A	624	THR	2.0
1	A	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 monosaccharides in this entry.

6.4 Ligands [i](#)

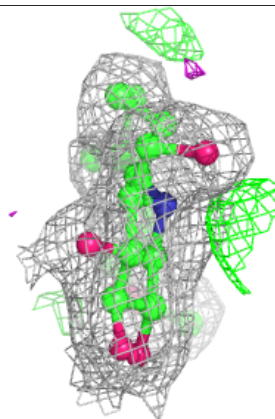
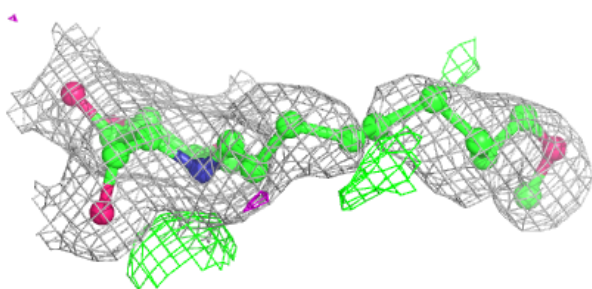
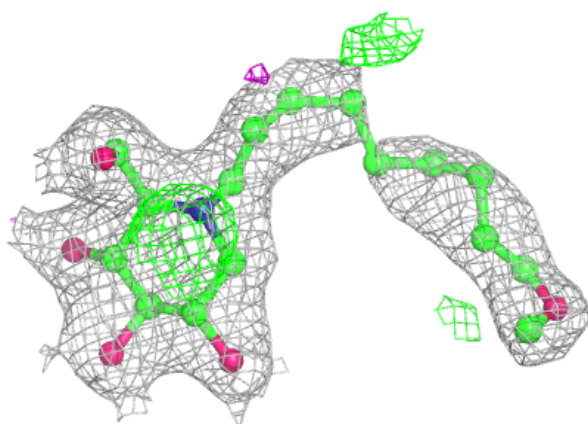
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	BTB	B	1001	14/14	0.81	0.18	46,64,69,69	0
4	SO4	A	908	5/5	0.84	0.29	97,105,108,119	0
6	NAG	B	1003	14/15	0.86	0.22	45,57,64,67	0
4	SO4	A	903	5/5	0.87	0.24	80,84,92,94	0
2	GOL	B	1002	6/6	0.89	0.13	29,38,43,44	0
2	GOL	A	901	6/6	0.92	0.14	42,51,64,67	0
4	SO4	A	907	5/5	0.93	0.16	81,82,87,92	0
4	SO4	A	904	5/5	0.93	0.16	57,59,71,80	0
4	SO4	A	906	5/5	0.95	0.18	72,81,91,95	0
3	6A9	B	1004	22/22	0.96	0.15	19,27,72,73	0
4	SO4	B	1005	5/5	0.96	0.20	39,55,59,59	0
4	SO4	B	1007	5/5	0.97	0.12	54,59,64,70	0
4	SO4	B	1008	5/5	0.98	0.13	43,47,56,59	0
4	SO4	A	905	5/5	0.98	0.14	34,35,37,39	0
3	6A9	A	902	22/22	0.98	0.16	19,23,74,79	0
4	SO4	B	1006	5/5	0.99	0.10	32,34,38,45	0

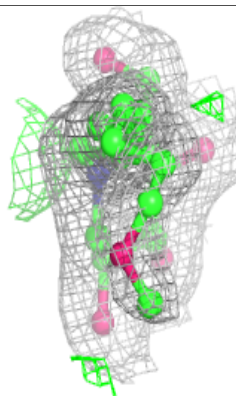
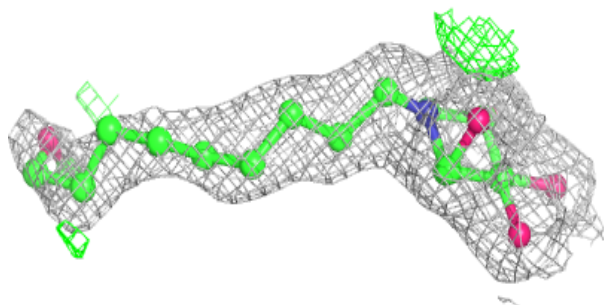
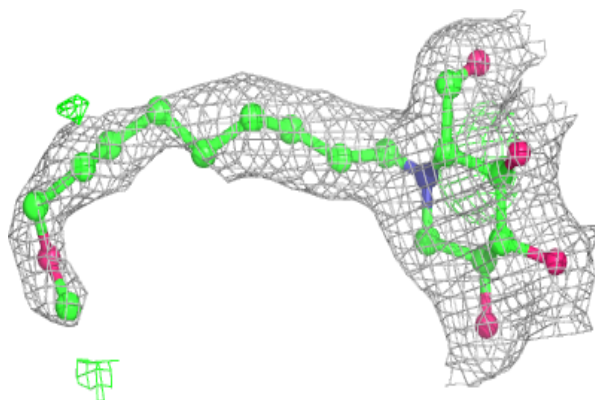
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 6A9 B 1004:

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

**Electron density around 6A9 A 902:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.