



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 13, 2017 – 06:37 pm GMT

PDB ID : 3WLS  
Title : Crystal Structure Analysis of Plant Exohydrolase  
Authors : Streltsov, V.A.; Luang, S.; Hrmova, M.  
Deposited on : 2013-11-12  
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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : 1.9-1692  
EDS : trunk28620  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : recalc28949

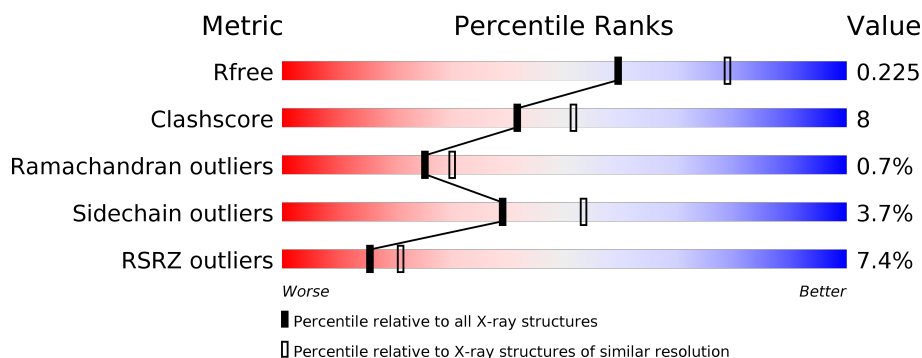
# 1 Overall quality at a glance

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))
$R_{free}$	100719	4130 (2.30-2.30)
Clashscore	112137	4751 (2.30-2.30)
Ramachandran outliers	110173	4705 (2.30-2.30)
Sidechain outliers	110143	4704 (2.30-2.30)
RSRZ outliers	101464	4156 (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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	609	<div> <div>7%</div> <div>84%</div> <div>13%</div> <div>.</div> </div>

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
2	NAG	A	701	X	-	-	-
2	NAG	A	702	-	-	-	X

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NAG	A	703	X	-	-	-
5	GOL	A	706	-	-	X	-
5	GOL	A	709	-	-	X	-
5	GOL	A	710	-	-	X	-
5	GOL	A	712	-	-	-	X
5	GOL	A	713	-	-	-	X

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 5070 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.

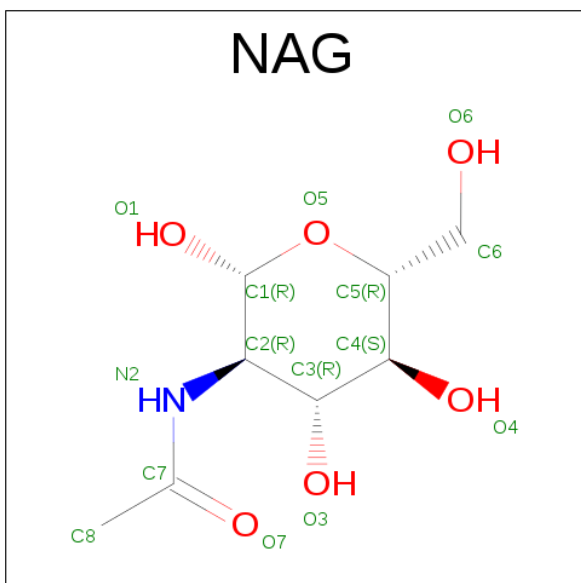
- Molecule 1 is a protein called Beta-D-glucan exohydrolase isoenzyme ExoI.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	606	4598	2908	799	865	26	0	3	0

There are 7 discrepancies between the modelled and reference sequences:

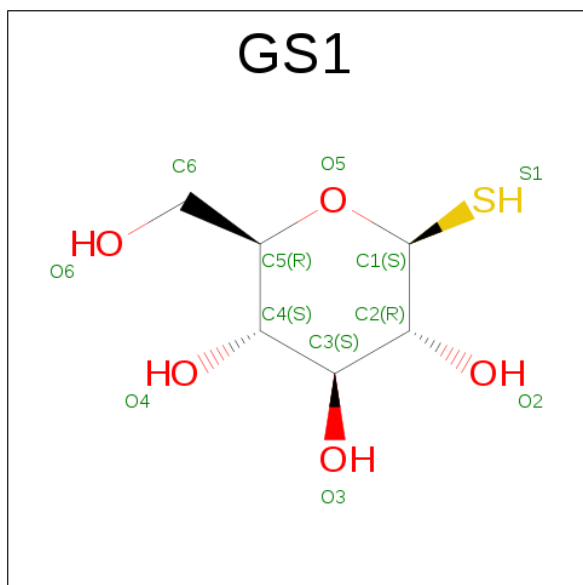
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	HIS	-	EXPRESSION TAG	UNP Q9XEI3
A	-2	HIS	-	EXPRESSION TAG	UNP Q9XEI3
A	-1	ALA	-	EXPRESSION TAG	UNP Q9XEI3
A	0	ALA	-	EXPRESSION TAG	UNP Q9XEI3
A	158	ALA	ARG	ENGINEERED MUTATION	UNP Q9XEI3
A	161	ALA	GLU	ENGINEERED MUTATION	UNP Q9XEI3
A	320	LYS	ASN	SEE REMARK 999	UNP Q9XEI3

- Molecule 2 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



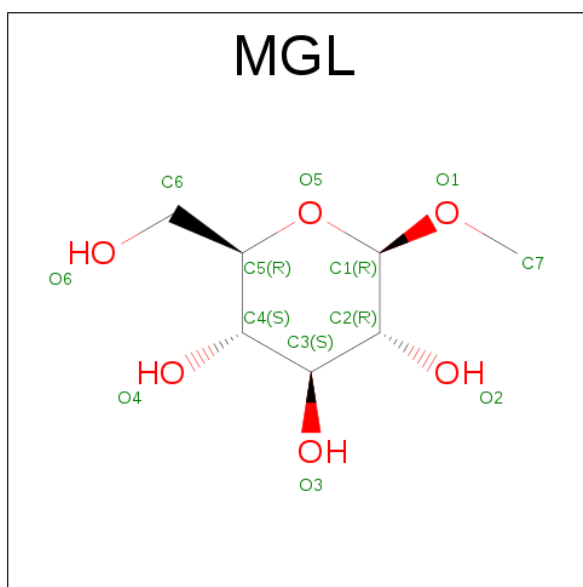
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is SUGAR (1-THIO-BETA-D-GLUCOPYRANOSE) (three-letter code: GS1) (formula:  $C_6H_{12}O_5S$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	O	S	0	0
			12	6	5	1		

- Molecule 4 is SUGAR (O1-METHYL-GLUCOSE) (three-letter code: MGL) (formula:  $C_7H_{14}O_6$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	1
			13	8	5		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



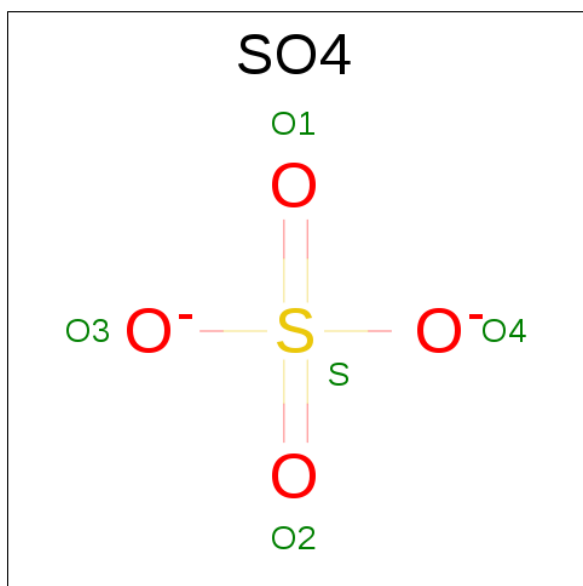
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		

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

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

- Molecule 7 is water.

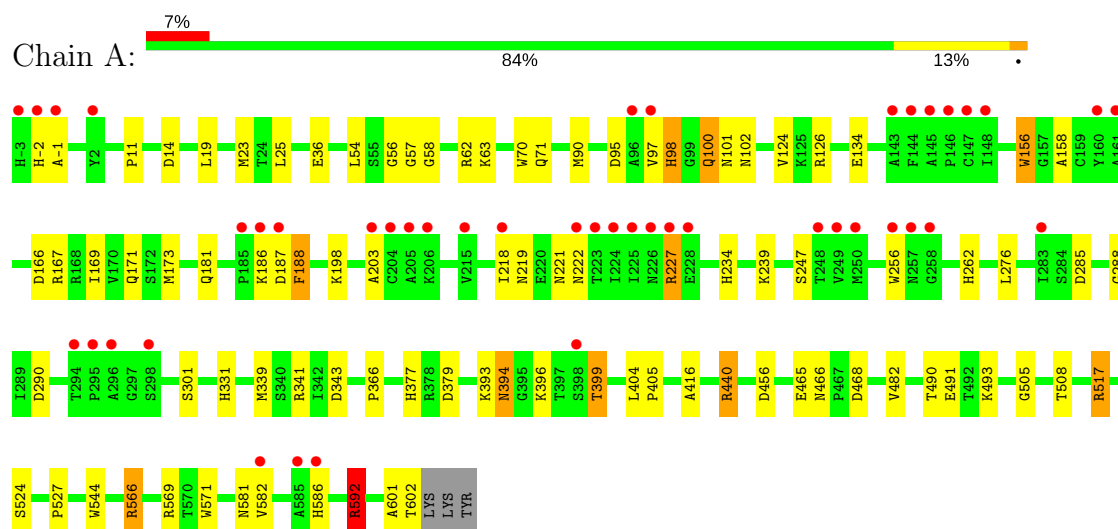
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	330	Total 330	O 330	0	0



### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: Beta-D-glucan exohydrolase isoenzyme ExoI



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	101.72Å 101.72Å 183.45Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.10 – 2.30 39.10 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.3 (39.10-2.30) 99.4 (39.10-2.30)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.35 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.168 , 0.224 0.170 , 0.225	Depositor DCC
$R_{free}$ test set	2175 reflections (5.29%)	DCC
Wilson B-factor (Å <sup>2</sup> )	37.2	Xtriage
Anisotropy	0.376	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 41.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	5070	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.29% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: GS1, GOL, SO4, NAG, MGL

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	1.00	4/4715 (0.1%)	1.00	16/6406 (0.2%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	156	TRP	CD2-CE2	7.52	1.50	1.41
1	A	70	TRP	CD2-CE2	7.50	1.50	1.41
1	A	571	TRP	CD2-CE2	5.55	1.48	1.41
1	A	256	TRP	CD2-CE2	5.21	1.47	1.41

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	95	ASP	CB-CG-OD1	-8.58	110.58	118.30
1	A	456	ASP	CB-CG-OD1	8.56	126.01	118.30
1	A	62	ARG	NE-CZ-NH2	-7.74	116.43	120.30
1	A	517	ARG	NE-CZ-NH1	7.44	124.02	120.30
1	A	592	ARG	NE-CZ-NH2	7.02	123.81	120.30
1	A	343	ASP	CB-CG-OD1	6.99	124.59	118.30
1	A	95	ASP	CB-CG-OD2	6.63	124.27	118.30
1	A	456	ASP	CB-CG-OD2	-6.55	112.40	118.30
1	A	566	ARG	NE-CZ-NH1	6.01	123.31	120.30
1	A	379	ASP	CB-CG-OD1	5.85	123.56	118.30
1	A	468	ASP	CB-CG-OD1	5.83	123.55	118.30
1	A	188	PHE	N-CA-C	5.82	126.71	111.00
1	A	62	ARG	NE-CZ-NH1	5.73	123.16	120.30
1	A	166	ASP	CB-CG-OD1	5.50	123.25	118.30
1	A	126	ARG	NE-CZ-NH1	5.44	123.02	120.30
1	A	198	LYS	CD-CE-NZ	-5.20	99.73	111.70

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	4598	0	4569	72	0
2	A	42	0	39	1	0
3	A	12	0	11	1	0
4	A	13	0	6	5	0
5	A	60	0	80	18	0
6	A	15	0	0	1	0
7	A	330	0	0	7	0
All	All	5070	0	4705	76	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 8.

All (76) 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:377:HIS:HE1	5:A:709:GOL:H12	1.09	1.09
1:A:57:GLY:H	4:A:705[B]:MGL:H71	1.19	1.06
1:A:377:HIS:HE1	5:A:709:GOL:C1	1.70	1.04
1:A:377:HIS:CE1	5:A:709:GOL:H12	1.96	0.99
1:A:440[B]:ARG:NH2	7:A:812:HOH:O	2.00	0.92
1:A:156:TRP:HE1	1:A:219:ASN:HD22	1.21	0.89
1:A:222:ASN:HB2	2:A:702:NAG:H82	1.54	0.87
1:A:377:HIS:CE1	5:A:709:GOL:C1	2.55	0.87
1:A:394:ASN:HD21	1:A:404:LEU:H	1.21	0.87
1:A:167:ARG:HH21	1:A:171:GLN:HE22	1.29	0.80
1:A:399:THR:HG22	7:A:832:HOH:O	1.84	0.77
1:A:57:GLY:H	4:A:705[B]:MGL:C7	1.97	0.77
1:A:97:VAL:H	1:A:101:ASN:HD21	1.33	0.76
1:A:466[A]:ASN:ND2	1:A:508:THR:OG1	2.20	0.74
1:A:100:GLN:HA	1:A:100:GLN:HE21	1.53	0.73
1:A:181:GLN:HE21	1:A:203:ALA:H	1.35	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:57:GLY:N	4:A:705[B]:MGL:H71	2.00	0.71
1:A:156:TRP:HE1	1:A:219:ASN:ND2	1.90	0.70
1:A:490:THR:HG22	1:A:491:GLU:HG3	1.73	0.70
1:A:57:GLY:N	4:A:705[A]:MGL:H71	2.09	0.68
1:A:262:HIS:HE1	1:A:285:ASP:H	1.42	0.67
1:A:134:GLU:OE2	1:A:377:HIS:HD2	1.78	0.66
1:A:167:ARG:NH2	1:A:171:GLN:HE22	1.92	0.66
1:A:566:ARG:HH22	5:A:706:GOL:H11	1.61	0.65
1:A:97:VAL:H	1:A:101:ASN:ND2	1.96	0.64
1:A:399:THR:CG2	7:A:832:HOH:O	2.44	0.64
1:A:566:ARG:HH21	5:A:706:GOL:H32	1.62	0.63
1:A:167:ARG:HH21	1:A:171:GLN:NE2	1.97	0.62
1:A:234:HIS:HE1	7:A:851:HOH:O	1.82	0.61
1:A:377:HIS:CE1	5:A:709:GOL:H11	2.35	0.60
1:A:601:ALA:N	6:A:718:SO4:O4	2.27	0.58
1:A:100:GLN:CA	1:A:100:GLN:HE21	2.17	0.57
1:A:566:ARG:NH2	5:A:706:GOL:H11	2.19	0.57
1:A:262:HIS:CE1	1:A:285:ASP:H	2.23	0.56
1:A:465:GLU:HG2	1:A:466[B]:ASN:ND2	2.24	0.53
1:A:181:GLN:NE2	1:A:203:ALA:H	2.05	0.53
1:A:301:SER:O	1:A:331:HIS:HE1	1.92	0.52
1:A:285:ASP:OD1	3:A:704:GS1:H1	2.09	0.52
1:A:566:ARG:NH2	5:A:706:GOL:H2	2.24	0.52
1:A:566:ARG:HH21	5:A:706:GOL:C2	2.22	0.52
1:A:134:GLU:OE2	1:A:377:HIS:CD2	2.60	0.52
1:A:566:ARG:HH21	5:A:706:GOL:C3	2.23	0.52
5:A:710:GOL:H12	7:A:827:HOH:O	2.11	0.51
1:A:56:GLY:C	4:A:705[A]:MGL:H71	2.32	0.50
1:A:524:SER:O	1:A:544:TRP:HA	2.12	0.49
1:A:566:ARG:NH2	5:A:706:GOL:C1	2.77	0.48
1:A:566:ARG:NH2	5:A:706:GOL:C2	2.77	0.47
1:A:234:HIS:CE1	7:A:851:HOH:O	2.63	0.47
1:A:58:GLY:H	1:A:102:ASN:ND2	2.12	0.47
1:A:124:VAL:HG21	1:A:173:MET:SD	2.56	0.46
1:A:156:TRP:CE2	1:A:158:ALA:HB3	2.51	0.45
1:A:11:PRO:HG2	1:A:14:ASP:OD2	2.17	0.45
1:A:25:LEU:HD13	1:A:339:MET:HE1	1.98	0.44
1:A:169:ILE:O	1:A:173:MET:HG2	2.18	0.44
1:A:393:LYS:HE2	1:A:396:LYS:HA	1.99	0.44
1:A:100:GLN:HA	1:A:100:GLN:NE2	2.29	0.44
1:A:405:PRO:HG2	1:A:602:THR:HG23	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:416:ALA:O	1:A:482:VAL:HA	2.17	0.43
1:A:394:ASN:HD21	1:A:404:LEU:N	2.02	0.43
1:A:19:LEU:O	1:A:23:MET:HG3	2.19	0.43
1:A:234:HIS:HD2	7:A:1112:HOH:O	2.02	0.42
1:A:592:ARG:HH21	1:A:592:ARG:HG2	1.85	0.42
1:A:262:HIS:CE1	1:A:288:GLY:HA3	2.54	0.42
1:A:181:GLN:HE22	1:A:247:SER:H	1.69	0.41
1:A:566:ARG:HH21	5:A:706:GOL:H2	1.85	0.41
1:A:98:HIS:H	1:A:101:ASN:HD22	1.69	0.41
1:A:527:PRO:HD3	1:A:569:ARG:HD3	2.03	0.41
1:A:239:LYS:HD3	1:A:276:LEU:HD22	2.03	0.41
1:A:581:ASN:O	1:A:582:VAL:C	2.60	0.40
1:A:71:GLN:HE22	1:A:366:PRO:HA	1.85	0.40
1:A:218:ILE:O	1:A:221:ASN:HB2	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	607/609 (100%)	584 (96%)	19 (3%)	4 (1%)	25	30

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	-2	HIS
1	A	188	PHE
1	A	-1	ALA
1	A	505	GLY

### 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	488/488 (100%)	468 (96%)	20 (4%)	35 48

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	36	GLU
1	A	54	LEU
1	A	63	LYS
1	A	90	MET
1	A	98	HIS
1	A	100	GLN
1	A	186	LYS
1	A	187	ASP
1	A	227[A]	ARG
1	A	227[B]	ARG
1	A	290	ASP
1	A	341	ARG
1	A	394	ASN
1	A	399	THR
1	A	440[A]	ARG
1	A	440[B]	ARG
1	A	493	LYS
1	A	517	ARG
1	A	586	HIS
1	A	592	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	-3	HIS
1	A	71	GLN
1	A	100	GLN
1	A	101	ASN
1	A	102	ASN

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Mol	Chain	Res	Type
1	A	112	ASN
1	A	171	GLN
1	A	181	GLN
1	A	199	ASN
1	A	219	ASN
1	A	234	HIS
1	A	262	HIS
1	A	331	HIS
1	A	377	HIS
1	A	394	ASN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

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$
2	NAG	A	701	1	14,14,15	1.27	1 (7%)	15,19,21	2.16	4 (26%)
2	NAG	A	702	1	14,14,15	0.71	1 (7%)	15,19,21	1.72	2 (13%)
2	NAG	A	703	1	14,14,15	1.00	1 (7%)	15,19,21	2.55	8 (53%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	GS1	A	704	4	11,12,12	0.76	0	15,17,17	1.93	7 (46%)
4	MGL	A	705[A]	-	12,12,13	1.27	2 (16%)	17,17,18	5.58	12 (70%)
4	MGL	A	705[B]	-	12,12,13	1.34	2 (16%)	17,17,18	5.44	11 (64%)
5	GOL	A	706	-	5,5,5	0.59	0	5,5,5	0.69	0
5	GOL	A	707	-	5,5,5	0.57	0	5,5,5	1.06	0
5	GOL	A	708	-	5,5,5	0.64	0	5,5,5	0.78	0
5	GOL	A	709	-	5,5,5	0.15	0	5,5,5	0.73	0
5	GOL	A	710	-	5,5,5	0.47	0	5,5,5	1.34	1 (20%)
5	GOL	A	711	-	5,5,5	0.97	0	5,5,5	1.20	0
5	GOL	A	712	-	5,5,5	0.56	0	5,5,5	0.71	0
5	GOL	A	713	-	5,5,5	0.52	0	5,5,5	1.33	1 (20%)
5	GOL	A	714	-	5,5,5	0.32	0	5,5,5	0.38	0
5	GOL	A	715	-	5,5,5	0.48	0	5,5,5	0.74	0
6	SO4	A	716	-	4,4,4	0.64	0	6,6,6	0.92	0
6	SO4	A	717	-	4,4,4	0.60	0	6,6,6	0.72	0
6	SO4	A	718	-	4,4,4	0.46	0	6,6,6	0.51	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	NAG	A	701	1	1/1/5/7	0/6/23/26	0/1/1/1
2	NAG	A	702	1	-	0/6/23/26	0/1/1/1
2	NAG	A	703	1	1/1/5/7	0/6/23/26	0/1/1/1
3	GS1	A	704	4	-	0/2/22/22	0/1/1/1
4	MGL	A	705[A]	-	-	0/2/22/24	0/1/1/1
4	MGL	A	705[B]	-	-	0/2/22/24	0/1/1/1
5	GOL	A	706	-	-	0/4/4/4	0/0/0/0
5	GOL	A	707	-	-	0/4/4/4	0/0/0/0
5	GOL	A	708	-	-	0/4/4/4	0/0/0/0
5	GOL	A	709	-	-	0/4/4/4	0/0/0/0
5	GOL	A	710	-	-	0/4/4/4	0/0/0/0
5	GOL	A	711	-	-	0/4/4/4	0/0/0/0
5	GOL	A	712	-	-	0/4/4/4	0/0/0/0
5	GOL	A	713	-	-	0/4/4/4	0/0/0/0
5	GOL	A	714	-	-	0/4/4/4	0/0/0/0
5	GOL	A	715	-	-	0/4/4/4	0/0/0/0
6	SO4	A	716	-	-	0/0/0/0	0/0/0/0
6	SO4	A	717	-	-	0/0/0/0	0/0/0/0
6	SO4	A	718	-	-	0/0/0/0	0/0/0/0

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	705[A]	MGL	C3-C2	-2.04	1.47	1.52
4	A	705[B]	MGL	C3-C2	-2.04	1.47	1.52
4	A	705[A]	MGL	O2-C2	-2.04	1.38	1.43
4	A	705[B]	MGL	O2-C2	-2.04	1.38	1.43
2	A	703	NAG	C4-C3	2.04	1.57	1.52
2	A	702	NAG	C1-C2	2.23	1.55	1.52
2	A	701	NAG	C1-C2	3.88	1.57	1.52

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	705[A]	MGL	O5-C1-O1	-11.11	84.87	110.92
4	A	705[B]	MGL	O5-C1-O1	-11.11	84.87	110.92
4	A	705[A]	MGL	O4-C4-C3	-9.08	90.61	110.36
4	A	705[B]	MGL	O4-C4-C3	-9.08	90.61	110.36
4	A	705[A]	MGL	C1-C2-C3	-6.20	98.46	109.98
4	A	705[B]	MGL	C1-C2-C3	-6.20	98.46	109.98
4	A	705[A]	MGL	C7-O1-C1	-5.17	105.21	113.29
4	A	705[A]	MGL	O5-C5-C6	-4.29	97.61	106.69
4	A	705[B]	MGL	O5-C5-C6	-4.29	97.61	106.69
2	A	703	NAG	O3-C3-C2	-2.96	103.05	109.39
2	A	703	NAG	O7-C7-N2	-2.96	116.23	121.92
2	A	701	NAG	C3-C4-C5	-2.90	105.10	110.22
2	A	703	NAG	O7-C7-C8	-2.84	116.89	122.06
4	A	705[A]	MGL	O3-C3-C4	-2.82	104.22	110.36
4	A	705[B]	MGL	O3-C3-C4	-2.82	104.22	110.36
4	A	705[A]	MGL	O2-C2-C3	-2.63	104.62	110.36
4	A	705[B]	MGL	O2-C2-C3	-2.63	104.62	110.36
2	A	701	NAG	C4-C3-C2	-2.44	107.44	111.02
3	A	704	GS1	C1-C2-C3	-2.37	105.61	110.69
3	A	704	GS1	C3-C4-C5	-2.34	106.09	110.22
5	A	713	GOL	O1-C1-C2	-2.25	98.75	110.07
3	A	704	GS1	O6-C6-C5	-2.17	104.05	111.34
2	A	703	NAG	O4-C4-C5	-2.11	103.97	109.28
5	A	710	GOL	O3-C3-C2	-2.09	99.55	110.07
3	A	704	GS1	O2-C2-C1	-2.06	106.17	110.27
2	A	702	NAG	C4-C3-C2	-2.02	108.06	111.02
2	A	703	NAG	C2-N2-C7	2.08	125.98	122.94
4	A	705[A]	MGL	C1-O5-C5	2.29	117.72	113.67
4	A	705[B]	MGL	C1-O5-C5	2.29	117.72	113.67
3	A	704	GS1	O2-C2-C3	2.32	115.41	110.36
3	A	704	GS1	C6-C5-C4	2.34	118.48	113.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	703	NAG	O3-C3-C4	2.39	115.55	110.36
4	A	705[A]	MGL	O5-C5-C4	2.90	114.40	109.62
4	A	705[B]	MGL	O5-C5-C4	2.90	114.40	109.62
2	A	703	NAG	C3-C4-C5	3.26	115.96	110.22
2	A	702	NAG	C1-O5-C5	4.36	118.17	112.17
3	A	704	GS1	O5-C1-C2	4.43	116.34	110.28
4	A	705[A]	MGL	O4-C4-C5	4.52	119.81	109.74
4	A	705[B]	MGL	O4-C4-C5	4.52	119.81	109.74
2	A	701	NAG	C1-O5-C5	4.82	118.81	112.17
2	A	701	NAG	O5-C1-C2	4.84	118.21	111.47
2	A	703	NAG	C8-C7-N2	5.97	126.88	116.11
4	A	705[A]	MGL	C6-C5-C4	7.52	126.47	113.07
4	A	705[B]	MGL	C6-C5-C4	7.52	126.47	113.07
4	A	705[A]	MGL	O1-C1-C2	11.48	121.79	108.14
4	A	705[B]	MGL	O1-C1-C2	11.48	121.79	108.14

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	703	NAG	C1
2	A	701	NAG	C1

There are no torsion outliers.

There are no ring outliers.

8 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	702	NAG	1	0
3	A	704	GS1	1	0
4	A	705[A]	MGL	2	0
4	A	705[B]	MGL	3	0
5	A	706	GOL	9	0
5	A	709	GOL	5	0
5	A	710	GOL	4	0
6	A	718	SO4	1	0

## 5.7 Other polymers ⓘ

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	606/609 (99%)	-0.12	45 (7%) 15 21	28, 37, 62, 120	0

All (45) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	-2	HIS	6.4
1	A	586	HIS	5.3
1	A	-3	HIS	5.0
1	A	585	ALA	4.0
1	A	582	VAL	3.8
1	A	187	ASP	3.7
1	A	249	VAL	3.5
1	A	224	ILE	3.3
1	A	294	THR	3.3
1	A	295	PRO	3.2
1	A	186	LYS	3.1
1	A	258	GLY	3.0
1	A	226	ASN	3.0
1	A	204	CYS	2.9
1	A	146	PRO	2.9
1	A	147	CYS	2.9
1	A	97	VAL	2.9
1	A	185	PRO	2.9
1	A	257	ASN	2.9
1	A	228	GLU	2.9
1	A	-1	ALA	2.8
1	A	250	MET	2.7
1	A	143	ALA	2.7
1	A	148	ILE	2.6
1	A	283	ILE	2.6
1	A	398	SER	2.6
1	A	298	SER	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	223	THR	2.5
1	A	215	VAL	2.4
1	A	256	TRP	2.4
1	A	144	PHE	2.4
1	A	161	ALA	2.4
1	A	248	THR	2.4
1	A	225	ILE	2.4
1	A	145	ALA	2.4
1	A	2	TYR	2.3
1	A	205	ALA	2.3
1	A	222	ASN	2.3
1	A	206	LYS	2.3
1	A	96	ALA	2.2
1	A	218	ILE	2.1
1	A	227[A]	ARG	2.1
1	A	160	TYR	2.1
1	A	203	ALA	2.1
1	A	296	ALA	2.1

## 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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
5	GOL	A	712	6/6	0.83	0.23	13.64	58,65,73,75	0
5	GOL	A	713	6/6	0.82	0.23	9.02	54,68,80,90	0
2	NAG	A	702	14/15	0.82	0.44	3.83	77,88,105,129	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
5	GOL	A	711	6/6	0.88	0.15	0.53	56,60,64,70	0
4	MGL	A	705[A]	12/13	0.89	0.13	0.36	41,55,60,75	1
4	MGL	A	705[B]	12/13	0.89	0.13	0.36	29,55,60,75	1
3	GS1	A	704	12/12	0.96	0.14	-0.21	34,45,51,60	0
5	GOL	A	708	6/6	0.75	0.16	-	64,71,76,83	0
5	GOL	A	714	6/6	0.88	0.17	-	54,68,83,83	0
6	SO4	A	718	5/5	0.92	0.34	-	92,100,125,127	0
5	GOL	A	706	6/6	0.78	0.20	-	60,65,72,87	0
2	NAG	A	703	14/15	0.75	0.33	-	79,89,111,113	0
6	SO4	A	717	5/5	0.84	0.35	-	92,94,110,110	0
2	NAG	A	701	14/15	0.64	0.36	-	72,89,113,116	0
5	GOL	A	709	6/6	0.92	0.22	-	50,64,75,85	0
6	SO4	A	716	5/5	0.97	0.17	-	56,60,69,71	0
5	GOL	A	707	6/6	0.85	0.34	-	49,60,63,67	0
5	GOL	A	715	6/6	0.76	0.30	-	74,86,92,99	0
5	GOL	A	710	6/6	0.90	0.30	-	61,67,69,80	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.