



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 09:46 PM GMT

PDB ID : 4W8B
Title : Crystal structure of XEG5B, a GH5 xyloglucan-specific beta-1,4-glucanase from ruminal metagenomic library, in complex with XXLG
Authors : Santos, C.R.; Cordeiro, R.L.; Wong, D.W.S.; Murakami, M.T.
Deposited on : 2014-08-22
Resolution : 1.15 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
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) : trunk26865

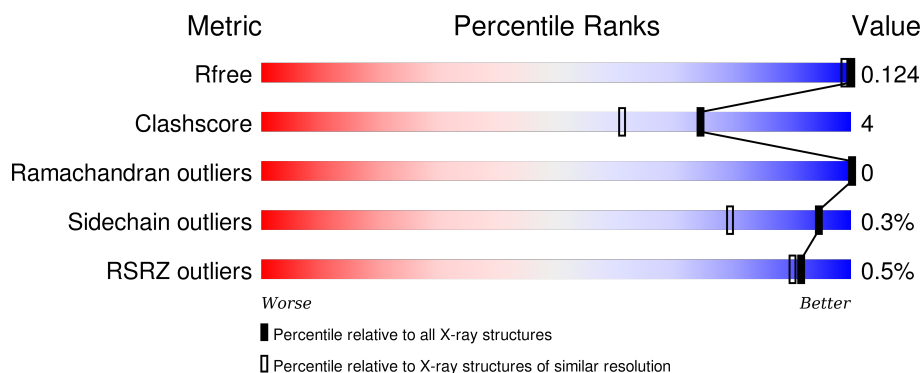
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.15 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}	91344	1495 (1.20-1.08)
Clashscore	102246	1593 (1.20-1.08)
Ramachandran outliers	100387	1521 (1.20-1.08)
Sidechain outliers	100360	1518 (1.20-1.08)
RSRZ outliers	91569	1498 (1.20-1.08)

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 ≥ 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	386	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> % 91% 8% </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	GLC	A	601[A]	-	-	-	X

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GLC	A	601[B]	-	-	-	X
2	GAL	A	608	-	-	-	X
3	SO4	A	611	-	-	-	X
4	GOL	A	613	-	-	-	X
5	XYS	A	618	-	-	-	X

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 3886 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 Exo-xyloglucanase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	386	Total	C	N	O	S	0	8	0
			3044	1914	517	602	11			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	517	LEU	-	expression tag	UNP D2XML9
A	518	GLU	-	expression tag	UNP D2XML9
A	519	HIS	-	expression tag	UNP D2XML9
A	520	HIS	-	expression tag	UNP D2XML9
A	521	HIS	-	expression tag	UNP D2XML9
A	522	HIS	-	expression tag	UNP D2XML9
A	523	HIS	-	expression tag	UNP D2XML9
A	524	HIS	-	expression tag	UNP D2XML9

- Molecule 2 is a polymer of unknown type called SUGAR (8-MER).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	8	Total	C	O	0	1
			85	46	39		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

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

- Molecule 5 is a polymer of unknown type called SUGAR (5-MER).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	5	Total	C	O	0	0
			52	28	24		

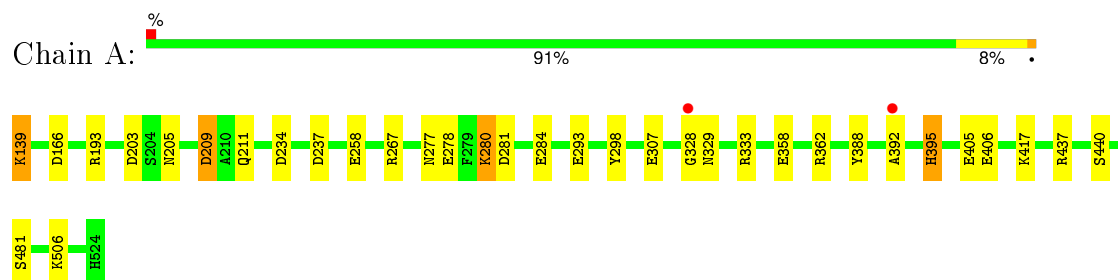
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	678	Total	O	0	0
			678	678		

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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: Exo-xyloglucanase



4 Data and refinement statistics

Property	Value	Source
Space group	P 61	Depositor
Cell constants a, b, c, α , β , γ	120.63 Å 120.63 Å 59.00 Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	39.49 – 1.15 39.49 – 1.15	Depositor EDS
% Data completeness (in resolution range)	95.7 (39.49-1.15) 95.7 (39.49-1.15)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.74 (at 1.15 Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.103 , 0.122 0.107 , 0.124	Depositor DCC
R_{free} test set	8301 reflections (5.27%)	DCC
Wilson B-factor (Å ²)	7.0	Xtriage
Anisotropy	0.296	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 49.5	EDS
Estimated twinning fraction	0.029 for h,-h-k,-l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	1 of 165781 reflections (0.001%)	Xtriage
F_o, F_c correlation	0.98	EDS
Total number of atoms	3886	wwPDB-VP
Average B, all atoms (Å ²)	11.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.57% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, BGC, GLC, GAL, XYS, SO4

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	1.17	15/3158 (0.5%)	1.07	22/4296 (0.5%)

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	307	GLU	CD-OE2	9.99	1.36	1.25
1	A	406	GLU	CB-CG	-9.85	1.33	1.52
1	A	258	GLU	CB-CG	-8.98	1.35	1.52
1	A	481	SER	CB-OG	8.44	1.53	1.42
1	A	358	GLU	CD-OE1	8.02	1.34	1.25
1	A	440	SER	CB-OG	-8.00	1.31	1.42
1	A	333	ARG	CA-CB	7.90	1.71	1.53
1	A	298	TYR	CE1-CZ	-7.85	1.28	1.38
1	A	284	GLU	CG-CD	-7.56	1.40	1.51
1	A	392	ALA	N-CA	7.00	1.60	1.46
1	A	328	GLY	N-CA	6.26	1.55	1.46
1	A	280	LYS	CD-CE	6.07	1.66	1.51
1	A	139	LYS	CA-CB	-5.71	1.41	1.53
1	A	281	ASP	CA-CB	-5.41	1.42	1.53
1	A	284	GLU	CB-CG	5.36	1.62	1.52

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	166	ASP	CB-CG-OD1	10.65	127.89	118.30
1	A	209[A]	ASP	CB-CG-OD2	-9.07	110.14	118.30
1	A	209[B]	ASP	CB-CG-OD2	-9.07	110.14	118.30
1	A	209[A]	ASP	CB-CG-OD1	6.96	124.57	118.30
1	A	209[B]	ASP	CB-CG-OD1	6.96	124.57	118.30
1	A	281	ASP	CB-CG-OD1	6.85	124.47	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	280	LYS	CD-CE-NZ	6.58	126.83	111.70
1	A	362	ARG	NE-CZ-NH1	6.46	123.53	120.30
1	A	193	ARG	NE-CZ-NH2	-6.28	117.16	120.30
1	A	388	TYR	CB-CG-CD1	6.20	124.72	121.00
1	A	258	GLU	CG-CD-OE2	-6.17	105.97	118.30
1	A	298	TYR	CD1-CE1-CZ	-6.16	114.25	119.80
1	A	267	ARG	NE-CZ-NH2	-5.85	117.38	120.30
1	A	406	GLU	CA-CB-CG	5.78	126.11	113.40
1	A	437	ARG	NE-CZ-NH2	5.74	123.17	120.30
1	A	278	GLU	OE1-CD-OE2	-5.61	116.57	123.30
1	A	280	LYS	CG-CD-CE	5.47	128.32	111.90
1	A	203	ASP	CB-CG-OD1	5.42	123.18	118.30
1	A	298	TYR	CB-CG-CD2	5.32	124.19	121.00
1	A	193	ARG	NE-CZ-NH1	5.32	122.96	120.30
1	A	234	ASP	CB-CG-OD1	-5.25	113.58	118.30
1	A	237	ASP	CB-CG-OD2	-5.25	113.58	118.30

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	3044	0	2839	19	0
2	A	85	0	65	0	0
3	A	15	0	0	1	0
4	A	12	0	15	0	0
5	A	52	0	43	5	0
6	A	678	0	0	19	0
All	All	3886	0	2962	25	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 4.

All (25) 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:506[B]:LYS:HG2	6:A:1219:HOH:O	1.54	1.07
1:A:209[B]:ASP:OD2	6:A:701:HOH:O	1.76	1.00
5:A:616:BGC:H6C1	6:A:1264:HOH:O	1.73	0.88
1:A:506[B]:LYS:CD	6:A:1219:HOH:O	2.22	0.87
1:A:506[B]:LYS:HE2	6:A:1163:HOH:O	1.82	0.79
1:A:277:ASN:HD22	1:A:280:LYS:HE2	1.52	0.72
1:A:395:HIS:HE1	1:A:405:GLU:OE2	1.72	0.71
1:A:211:GLN:NE2	6:A:705:HOH:O	2.26	0.67
1:A:395:HIS:HD2	6:A:898:HOH:O	1.79	0.65
5:A:616:BGC:C5	6:A:1264:HOH:O	2.46	0.62
1:A:205:ASN:ND2	6:A:702:HOH:O	2.18	0.59
1:A:506[B]:LYS:CE	6:A:1163:HOH:O	2.47	0.57
1:A:506[B]:LYS:HD3	6:A:1219:HOH:O	1.93	0.57
5:A:618:XYO:O2	6:A:1374:HOH:O	1.99	0.56
5:A:616:BGC:C6	6:A:1264:HOH:O	2.39	0.56
5:A:616:BGC:H5	6:A:1264:HOH:O	2.10	0.50
1:A:506[B]:LYS:CG	6:A:1219:HOH:O	2.18	0.50
1:A:506[B]:LYS:NZ	6:A:1163:HOH:O	2.44	0.49
1:A:277:ASN:ND2	1:A:280:LYS:HE2	2.26	0.47
1:A:139:LYS:HE2	6:A:1226:HOH:O	2.15	0.47
1:A:417[B]:LYS:HE3	6:A:707:HOH:O	2.14	0.46
3:A:611:SO4:O4	6:A:703:HOH:O	2.21	0.44
1:A:280:LYS:O	1:A:329:ASN:HB2	2.18	0.44
1:A:277:ASN:HD22	1:A:280:LYS:CE	2.26	0.42

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	393/386 (102%)	380 (97%)	13 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	324/315 (103%)	323 (100%)	1 (0%)	94	79

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	395	HIS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	142	GLN
1	A	277	ASN
1	A	395	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](#)

14 carbohydrates 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	GLC	A	601[A]	-	12,12,12	2.04	2 (16%)	17,17,17	1.66	4 (23%)
2	GLC	A	601[B]	-	12,12,12	1.09	1 (8%)	17,17,17	2.46	6 (35%)
2	BGC	A	602	2	11,11,12	2.12	4 (36%)	14,15,17	1.47	4 (28%)
2	BGC	A	603	2	11,11,12	1.78	3 (27%)	14,15,17	3.06	5 (35%)
2	BGC	A	604	2	11,11,12	1.28	1 (9%)	14,15,17	1.39	3 (21%)
2	XYS	A	605	2	9,9,10	1.56	1 (11%)	12,12,14	2.58	5 (41%)
2	XYS	A	606	2	9,9,10	1.70	2 (22%)	12,12,14	3.47	7 (58%)
2	XYS	A	607	2	9,9,10	1.32	1 (11%)	12,12,14	1.32	1 (8%)
2	GAL	A	608	2	11,11,12	1.48	2 (18%)	14,15,17	2.03	3 (21%)
5	BGC	A	614	5	12,12,12	1.43	3 (25%)	17,17,17	1.64	5 (29%)
5	BGC	A	615	5	11,11,12	1.02	0	14,15,17	1.25	2 (14%)
5	BGC	A	616	5	11,11,12	1.19	0	14,15,17	1.45	2 (14%)
5	XYS	A	617	5	9,9,10	1.73	1 (11%)	12,12,14	1.79	3 (25%)
5	XYS	A	618	5	9,9,10	2.18	5 (55%)	12,12,14	2.52	6 (50%)

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	GLC	A	601[A]	-	-	0/2/22/22	0/1/1/1
2	GLC	A	601[B]	-	-	0/2/22/22	0/1/1/1
2	BGC	A	602	2	-	0/2/19/22	0/1/1/1
2	BGC	A	603	2	-	0/2/19/22	0/1/1/1
2	BGC	A	604	2	-	0/2/19/22	0/1/1/1
2	XYS	A	605	2	-	0/0/14/17	0/1/1/1
2	XYS	A	606	2	-	0/0/14/17	0/1/1/1
2	XYS	A	607	2	-	0/0/14/17	0/1/1/1
2	GAL	A	608	2	-	0/2/19/22	0/1/1/1
5	BGC	A	614	5	-	0/2/22/22	0/1/1/1
5	BGC	A	615	5	-	0/2/19/22	0/1/1/1
5	BGC	A	616	5	-	0/2/19/22	0/1/1/1
5	XYS	A	617	5	-	0/0/14/17	0/1/1/1
5	XYS	A	618	5	-	0/0/14/17	0/1/1/1

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	618	XYS	O3-C3	-3.56	1.34	1.43
2	A	606	XYS	C4-C3	-3.08	1.48	1.52
2	A	601[A]	GLC	C4-C5	-2.51	1.47	1.53
2	A	601[B]	GLC	C4-C5	-2.51	1.47	1.53
2	A	607	XYS	C4-C3	-2.41	1.49	1.52
2	A	603	BGC	O2-C2	-2.37	1.38	1.43
2	A	602	BGC	O5-C5	-2.33	1.38	1.43
5	A	618	XYS	C2-C3	-2.31	1.49	1.52
2	A	602	BGC	O4-C4	-2.29	1.37	1.43
2	A	603	BGC	C4-C5	-2.16	1.48	1.53
2	A	608	GAL	C6-C5	2.00	1.59	1.51
5	A	614	BGC	O5-C1	2.03	1.46	1.43
5	A	614	BGC	C1-C2	2.22	1.57	1.52
5	A	618	XYS	O5-C5	2.30	1.47	1.42
5	A	618	XYS	C4-C3	2.64	1.56	1.52
5	A	618	XYS	O2-C2	2.65	1.49	1.43
5	A	614	BGC	C4-C5	2.73	1.58	1.53
2	A	602	BGC	C4-C5	3.09	1.59	1.53
2	A	606	XYS	C2-C3	3.09	1.56	1.52
2	A	605	XYS	C2-C3	3.29	1.57	1.52
2	A	604	BGC	O5-C1	3.31	1.49	1.43
2	A	608	GAL	O5-C1	3.38	1.49	1.43
5	A	617	XYS	C4-C3	3.48	1.57	1.52
2	A	603	BGC	O5-C1	4.04	1.50	1.43
2	A	602	BGC	O2-C2	4.42	1.53	1.43
2	A	601[A]	GLC	C6-C5	6.01	1.73	1.51

All (56) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	603	BGC	O5-C1-C2	-7.39	98.87	110.86
2	A	606	XYS	O3-C3-C4	-6.43	98.38	110.00
2	A	605	XYS	C4-C3-C2	-6.01	105.30	111.24
2	A	606	XYS	C5-O5-C1	-4.96	103.57	111.57
2	A	606	XYS	C5-C4-C3	-4.95	103.69	109.54
2	A	606	XYS	C1-C2-C3	-4.72	103.96	109.54
5	A	617	XYS	C4-C3-C2	-3.82	107.46	111.24
2	A	606	XYS	O5-C5-C4	-3.44	103.87	110.31
2	A	604	BGC	O5-C1-C2	-3.23	105.62	110.86
2	A	603	BGC	O2-C2-C1	-3.20	102.78	109.21
2	A	605	XYS	O4-C4-C3	-2.83	104.42	110.12
2	A	608	GAL	C2-C3-C4	-2.83	106.24	111.04
2	A	602	BGC	C3-C4-C5	-2.81	105.31	110.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	608	GAL	O2-C2-C1	-2.73	103.73	109.21
5	A	618	XYS	C4-C3-C2	-2.70	108.57	111.24
5	A	615	BGC	C1-C2-C3	-2.53	106.55	109.54
2	A	602	BGC	O3-C3-C4	-2.52	104.66	110.34
5	A	616	BGC	O4-C4-C3	-2.47	104.77	110.34
2	A	606	XYS	O5-C1-C2	-2.47	105.69	110.31
5	A	614	BGC	O1-C1-O5	-2.36	103.80	110.25
2	A	604	BGC	O2-C2-C3	-2.33	105.42	110.12
5	A	614	BGC	O2-C2-C3	-2.28	105.21	110.34
5	A	615	BGC	O6-C6-C5	-2.22	104.00	111.33
2	A	604	BGC	O5-C5-C6	-2.21	102.57	107.35
2	A	602	BGC	O5-C1-C2	-2.18	107.31	110.86
2	A	607	XYS	O5-C1-C2	-2.10	106.38	110.31
2	A	602	BGC	C1-C2-C3	-2.03	107.14	109.54
5	A	617	XYS	C5-C4-C3	2.11	112.04	109.54
5	A	614	BGC	C3-C4-C5	2.14	113.92	110.20
2	A	601[A]	GLC	C1-C2-C3	2.22	113.73	110.43
2	A	601[B]	GLC	C1-C2-C3	2.22	113.73	110.43
2	A	601[B]	GLC	O6-C6-C5	2.25	118.78	111.33
5	A	614	BGC	O5-C5-C4	2.27	113.95	109.68
2	A	603	BGC	C1-C2-C3	2.34	112.31	109.54
2	A	601[A]	GLC	C3-C4-C5	2.47	114.50	110.20
2	A	601[B]	GLC	C3-C4-C5	2.47	114.50	110.20
5	A	617	XYS	O4-C4-C3	2.50	115.15	110.12
2	A	605	XYS	C5-O5-C1	2.51	115.61	111.57
2	A	603	BGC	O2-C2-C3	2.72	115.60	110.12
5	A	618	XYS	O4-C4-C3	2.74	115.62	110.12
2	A	601[A]	GLC	O1-C1-C2	2.74	116.55	109.21
2	A	601[B]	GLC	O1-C1-C2	2.74	116.55	109.21
2	A	606	XYS	O4-C4-C5	2.78	114.78	109.21
2	A	605	XYS	O2-C2-C1	2.79	114.80	109.21
2	A	601[A]	GLC	O6-C6-C5	2.83	120.67	111.33
5	A	614	BGC	O2-C2-C1	2.91	116.23	109.82
5	A	618	XYS	O3-C3-C4	2.92	115.28	110.00
5	A	618	XYS	C1-C2-C3	3.32	113.47	109.54
5	A	616	BGC	C1-C2-C3	3.38	113.54	109.54
2	A	601[B]	GLC	O5-C5-C6	3.66	115.60	106.36
5	A	618	XYS	C5-O5-C1	4.16	118.28	111.57
2	A	605	XYS	C5-C4-C3	4.17	114.47	109.54
5	A	618	XYS	C5-C4-C3	4.58	114.96	109.54
2	A	608	GAL	O6-C6-C5	5.63	129.93	111.33
2	A	603	BGC	C1-O5-C5	6.62	120.65	112.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	601[B]	GLC	C6-C5-C4	7.21	130.80	113.02

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	616	BGC	4	0
5	A	618	XYS	1	0

5.6 Ligand geometry

5 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	SO4	A	609	-	4,4,4	1.46	1 (25%)	6,6,6	1.97	1 (16%)
3	SO4	A	610	-	4,4,4	0.79	0	6,6,6	0.14	0
3	SO4	A	611	-	4,4,4	4.17	3 (75%)	6,6,6	1.23	0
4	GOL	A	612	-	5,5,5	1.25	0	5,5,5	1.72	2 (40%)
4	GOL	A	613	-	5,5,5	1.35	1 (20%)	5,5,5	0.92	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
3	SO4	A	609	-	-	0/0/0/0	0/0/0/0
3	SO4	A	610	-	-	0/0/0/0	0/0/0/0
3	SO4	A	611	-	-	0/0/0/0	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	A	612	-	-	0/4/4/4	0/0/0/0
4	GOL	A	613	-	-	0/4/4/4	0/0/0/0

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	611	SO4	O2-S	-5.97	1.26	1.47
3	A	609	SO4	O4-S	-2.48	1.38	1.47
4	A	613	GOL	O3-C3	2.13	1.51	1.42
3	A	611	SO4	O4-S	3.57	1.60	1.47
3	A	611	SO4	O3-S	4.22	1.62	1.47

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	609	SO4	O4-S-O3	-4.39	91.15	108.98
4	A	612	GOL	C3-C2-C1	-2.90	99.75	111.12
4	A	612	GOL	O2-C2-C3	2.18	118.66	108.65

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	611	SO4	1	0

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	386/386 (100%)	-0.00	2 (0%) 91 90	4, 7, 15, 39	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	328	GLY	2.9
1	A	392	ALA	2.5

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](#)

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, 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	LLDF	B-factors(Å ²)	Q<0.9
5	XYS	A	618	9/10	0.95	0.16	6.33	12,15,16,18	9
2	GLC	A	601[B]	12/12	0.98	0.09	4.96	6,8,10,13	2
2	GLC	A	601[A]	12/12	0.98	0.09	4.96	6,8,12,13	2
2	GAL	A	608	11/12	0.92	0.13	4.17	15,16,27,36	0
2	XYS	A	605	9/10	0.95	0.09	1.21	13,13,16,19	9
2	BGC	A	604	11/12	0.97	0.08	0.60	11,13,16,16	0
2	XYS	A	607	9/10	0.99	0.06	-1.34	6,8,9,10	0
2	BGC	A	602	11/12	0.97	0.07	-	9,11,12,14	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
5	BGC	A	614	12/12	0.78	0.30	-	21,27,36,37	12
2	BGC	A	603	11/12	0.97	0.07	-	10,12,18,22	0
2	XYS	A	606	9/10	0.87	0.14	-	15,19,32,34	9
5	BGC	A	615	11/12	0.90	0.29	-	18,19,25,27	11
5	BGC	A	616	11/12	0.89	0.33	-	18,19,23,26	11
5	XYS	A	617	9/10	0.81	0.38	-	24,30,37,37	9

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, 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	LLDF	B-factors(\AA^2)	Q<0.9
3	SO4	A	611	5/5	0.98	0.14	14.21	9,11,17,18	5
4	GOL	A	613	6/6	0.97	0.14	7.56	12,20,25,30	0
4	GOL	A	612	6/6	0.97	0.12	1.39	10,21,31,44	0
3	SO4	A	610	5/5	0.99	0.07	-0.50	9,9,10,12	0
3	SO4	A	609	5/5	0.99	0.05	-1.32	8,9,12,16	0

6.5 Other polymers [i](#)

There are no such residues in this entry.