Full wwPDB X-ray Structure Validation Report (i)

Apr 21, 2024 – 06:04 am BST

PDB ID	:	3ZST
Title	:	GlgE isoform 1 from Streptomyces coelicolor with alpha-cyclodextrin bound
Authors	:	Syson, K.; Stevenson, C.E.M.; Rejzek, M.; Fairhurst, S.A.; Nair, A.; Bruton, C.J.; Field, R.A.; Chater, K.F.; Lawson, D.M.; Bornemann, S.
Deposited on	:	2011-06-30
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 (i) 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 (i)) were used in the production of this report:

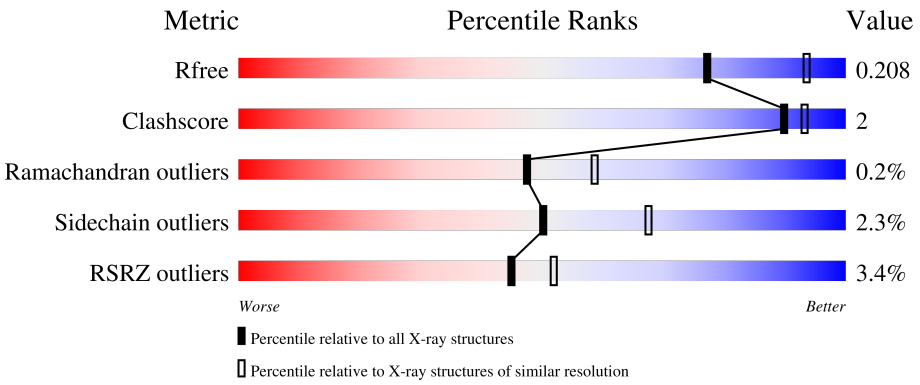
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance (i)

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}	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (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 <=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	695	% 89% • 7%
1	B	695	6% 87% 5% • 7%
2	C	6	100%
2	D	6	100%

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	D	2	-	-	-	X
2	GLC	D	3	-	-	-	X

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 11175 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 PUTATIVE GLUCANOHYDROLASE PEP1A GLGE ISOFORM 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	649	5157	3260	937	950	10	0	5	0
1	B	649	5151	3257	936	948	10	0	5	0

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP Q9L1K2
A	-18	GLY	-	expression tag	UNP Q9L1K2
A	-17	SER	-	expression tag	UNP Q9L1K2
A	-16	SER	-	expression tag	UNP Q9L1K2
A	-15	HIS	-	expression tag	UNP Q9L1K2
A	-14	HIS	-	expression tag	UNP Q9L1K2
A	-13	HIS	-	expression tag	UNP Q9L1K2
A	-12	HIS	-	expression tag	UNP Q9L1K2
A	-11	HIS	-	expression tag	UNP Q9L1K2
A	-10	HIS	-	expression tag	UNP Q9L1K2
A	-9	SER	-	expression tag	UNP Q9L1K2
A	-8	SER	-	expression tag	UNP Q9L1K2
A	-7	GLY	-	expression tag	UNP Q9L1K2
A	-6	LEU	-	expression tag	UNP Q9L1K2
A	-5	VAL	-	expression tag	UNP Q9L1K2
A	-4	PRO	-	expression tag	UNP Q9L1K2
A	-3	ARG	-	expression tag	UNP Q9L1K2
A	-2	GLY	-	expression tag	UNP Q9L1K2
A	-1	SER	-	expression tag	UNP Q9L1K2
A	0	HIS	-	expression tag	UNP Q9L1K2
B	-19	MET	-	expression tag	UNP Q9L1K2
B	-18	GLY	-	expression tag	UNP Q9L1K2
B	-17	SER	-	expression tag	UNP Q9L1K2
B	-16	SER	-	expression tag	UNP Q9L1K2

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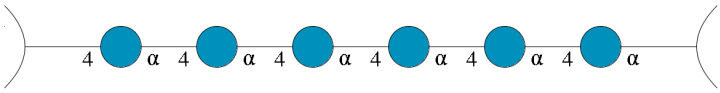
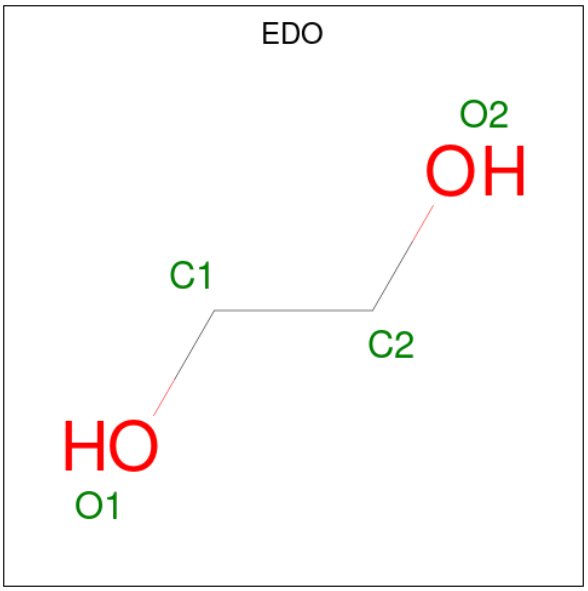
Chain	Residue	Modelled	Actual	Comment	Reference
B	-15	HIS	-	expression tag	UNP Q9L1K2
B	-14	HIS	-	expression tag	UNP Q9L1K2
B	-13	HIS	-	expression tag	UNP Q9L1K2
B	-12	HIS	-	expression tag	UNP Q9L1K2
B	-11	HIS	-	expression tag	UNP Q9L1K2
B	-10	HIS	-	expression tag	UNP Q9L1K2
B	-9	SER	-	expression tag	UNP Q9L1K2
B	-8	SER	-	expression tag	UNP Q9L1K2
B	-7	GLY	-	expression tag	UNP Q9L1K2
B	-6	LEU	-	expression tag	UNP Q9L1K2
B	-5	VAL	-	expression tag	UNP Q9L1K2
B	-4	PRO	-	expression tag	UNP Q9L1K2
B	-3	ARG	-	expression tag	UNP Q9L1K2
B	-2	GLY	-	expression tag	UNP Q9L1K2
B	-1	SER	-	expression tag	UNP Q9L1K2
B	0	HIS	-	expression tag	UNP Q9L1K2

- Molecule 2 is an oligosaccharide called Cyclohexakis-(1-4)-(alpha-D-glucopyranose).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
2	C	6	66	36	30	0	0	0
			Total	C	O			
2	D	6	66	36	30	0	0	0

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	4	2	2	0	0

- Molecule 4 is water.

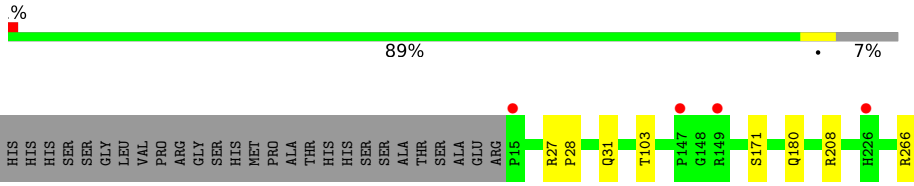
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	488	488	488	0	0
			Total	O		
4	B	243	243	243	0	0

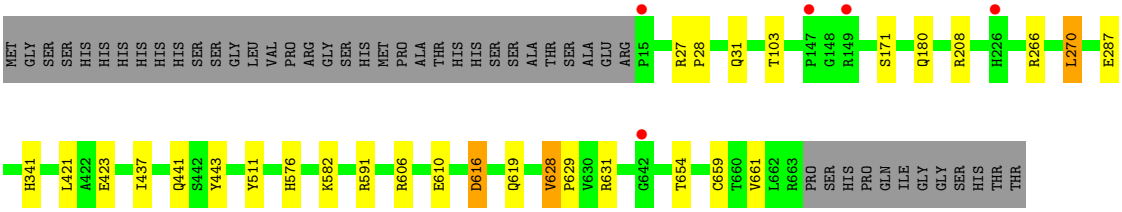
3 Residue-property plots (i)

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: PUTATIVE GLUCANOHYDROLASE PEP1A GLGE ISOFORM 1

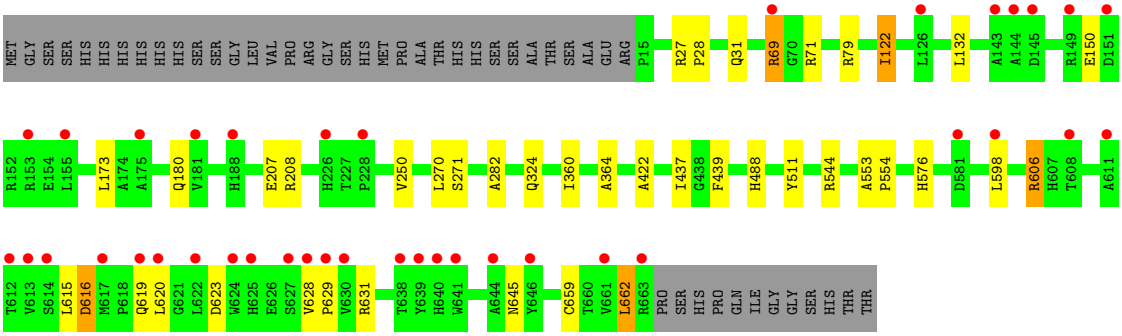
Chain A:





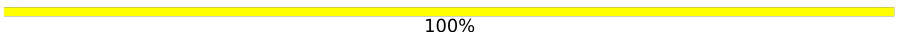
• Molecule 1: PUTATIVE GLUCANOHYDROLASE PEP1A GLGE ISOFORM 1

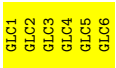
Chain B:



• Molecule 2: Cyclohexakis-(1-4)-(alpha-D-glucopyranose)

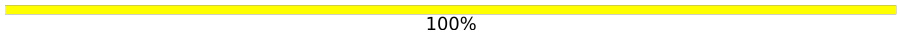
Chain C:

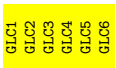




• Molecule 2: Cyclohexakis-(1-4)-(alpha-D-glucopyranose)

Chain D:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α, β, γ	113.24Å 113.24Å 314.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	106.54 – 2.30 56.10 – 2.30	Depositor EDS
% Data completeness (in resolution range)	93.4 (106.54-2.30) 93.4 (56.10-2.30)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	7.16 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.6.0101	Depositor
R, R_{free}	0.173 , 0.201 0.180 , 0.208	Depositor DCC
R_{free} test set	4305 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	27.2	Xtriage
Anisotropy	0.445	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 31.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.45$, $< L^2 > = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	11175	wwPDB-VP
Average B, all atoms (Å^2)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.92% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: EDO, GLC

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	0.80	1/5324 (0.0%)	0.78	4/7280 (0.1%)
1	B	0.71	0/5319	0.73	1/7275 (0.0%)
All	All	0.75	1/10643 (0.0%)	0.76	5/14555 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	287	GLU	CD-OE1	5.36	1.31	1.25

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	208	ARG	NE-CZ-NH1	6.63	123.61	120.30
1	B	208	ARG	NE-CZ-NH1	5.74	123.17	120.30
1	A	606	ARG	NE-CZ-NH1	5.54	123.07	120.30
1	A	266[A]	ARG	NE-CZ-NH2	-5.10	117.75	120.30
1	A	266[B]	ARG	NE-CZ-NH2	-5.10	117.75	120.30

There are no chirality outliers.

There are no planarity outliers.

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	5157	0	5002	13	0
1	B	5151	0	4990	24	0
2	C	66	0	54	0	0
2	D	66	0	54	0	0
3	A	4	0	6	0	0
4	A	488	0	0	3	0
4	B	243	0	0	1	0
All	All	11175	0	10106	37	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 2.

All (37) 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:615:LEU:HD23	1:B:620:LEU:HD11	1.52	0.90
1:B:628:VAL:HG13	1:B:629:PRO:HD2	1.63	0.78
1:B:282:ALA:HA	1:B:360:ILE:HD13	1.69	0.73
1:B:122:ILE:CD1	1:B:132:LEU:HD21	2.19	0.72
1:A:628:VAL:HG13	1:A:629:PRO:HD2	1.77	0.66
1:B:122:ILE:HD11	1:B:132:LEU:HD21	1.78	0.65
1:B:122:ILE:HD11	1:B:132:LEU:CD2	2.35	0.56
1:B:364:ALA:HB1	4:B:2175:HOH:O	2.07	0.54
1:A:103:THR:HG21	4:A:2119:HOH:O	2.07	0.54
1:B:615:LEU:HD23	1:B:620:LEU:CD1	2.33	0.52
1:B:615:LEU:HD13	1:B:645:ASN:ND2	2.26	0.51
1:A:576:HIS:CG	1:A:619:GLN:HG2	2.48	0.49
1:B:576:HIS:CG	1:B:619:GLN:HG2	2.47	0.49
1:B:282:ALA:HA	1:B:360:ILE:CD1	2.40	0.48
1:B:437:ILE:C	1:B:437:ILE:HD12	2.34	0.48
1:A:27:ARG:HB3	1:A:28:PRO:HA	1.97	0.47
1:B:324:GLN:NE2	1:B:360:ILE:HD12	2.31	0.46
1:B:488:HIS:HB3	1:B:606[B]:ARG:HH21	1.81	0.45
1:A:591:ARG:HD3	4:A:2459:HOH:O	2.15	0.45
1:B:422:ALA:HB2	1:B:439:PHE:CD1	2.52	0.45
1:B:553:ALA:HB3	1:B:554:PRO:HD3	1.98	0.44
1:A:437:ILE:HD12	1:A:437:ILE:C	2.38	0.44
1:B:27:ARG:HB3	1:B:28:PRO:HA	1.99	0.44
1:B:662:LEU:HD12	1:B:662:LEU:H	1.83	0.43
1:B:250:VAL:O	1:B:250:VAL:HG12	2.17	0.43
1:A:423:GLU:HA	1:A:443:TYR:CD1	2.54	0.42
1:A:270:LEU:HD12	1:A:270:LEU:HA	1.80	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:341:HIS:HE1	4:A:2301:HOH:O	2.02	0.42
1:A:582:LYS:HG3	1:A:610:GLU:O	2.20	0.41
1:A:421:LEU:HD13	1:A:441:GLN:HB3	2.01	0.41
1:B:615:LEU:N	1:B:615:LEU:HD12	2.36	0.41
1:B:628:VAL:HG13	1:B:629:PRO:CD	2.43	0.41
1:B:122:ILE:HD12	1:B:173:LEU:HB2	2.03	0.41
1:A:628:VAL:CG1	1:A:661:VAL:HG13	2.51	0.41
1:A:631:ARG:O	1:A:659:CYS:HA	2.21	0.40
1:B:631:ARG:O	1:B:659:CYS:HA	2.22	0.40
1:B:69:ARG:HE	1:B:69:ARG:HB2	1.74	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	652/695 (94%)	640 (98%)	11 (2%)	1 (0%)	47	58
1	B	652/695 (94%)	641 (98%)	10 (2%)	1 (0%)	47	58
All	All	1304/1390 (94%)	1281 (98%)	21 (2%)	2 (0%)	47	58

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	616	ASP
1	A	616	ASP

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	539/575 (94%)	531 (98%)	8 (2%)	65	79
1	B	538/575 (94%)	520 (97%)	18 (3%)	38	53
All	All	1077/1150 (94%)	1051 (98%)	26 (2%)	50	66

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	GLN
1	A	171	SER
1	A	180	GLN
1	A	270	LEU
1	A	511	TYR
1	A	616	ASP
1	A	628	VAL
1	A	654	THR
1	B	31	GLN
1	B	69	ARG
1	B	71	ARG
1	B	79	ARG
1	B	122	ILE
1	B	150	GLU
1	B	180	GLN
1	B	207	GLU
1	B	270	LEU
1	B	271	SER
1	B	511	TYR
1	B	544	ARG
1	B	598	LEU
1	B	606[A]	ARG
1	B	606[B]	ARG
1	B	616	ASP
1	B	623	ASP
1	B	662	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	262	HIS

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Mol	Chain	Res	Type
1	A	397	HIS
1	A	436	GLN
1	B	262	HIS
1	B	397	HIS
1	B	436	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

12 monosaccharides 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	C	1	2	11,11,12	1.07	1 (9%)	15,15,17	1.90	4 (26%)
2	GLC	C	2	2	11,11,12	1.81	3 (27%)	15,15,17	2.28	6 (40%)
2	GLC	C	3	2	11,11,12	1.35	1 (9%)	15,15,17	1.74	5 (33%)
2	GLC	C	4	2	11,11,12	1.41	1 (9%)	15,15,17	1.94	3 (20%)
2	GLC	C	5	2	11,11,12	1.00	0	15,15,17	2.12	3 (20%)
2	GLC	C	6	2	11,11,12	1.79	4 (36%)	15,15,17	2.06	5 (33%)
2	GLC	D	1	2	11,11,12	1.44	3 (27%)	15,15,17	1.48	1 (6%)
2	GLC	D	2	2	11,11,12	1.83	3 (27%)	15,15,17	1.86	4 (26%)
2	GLC	D	3	2	11,11,12	1.29	1 (9%)	15,15,17	2.02	4 (26%)
2	GLC	D	4	2	11,11,12	1.79	3 (27%)	15,15,17	1.25	2 (13%)
2	GLC	D	5	2	11,11,12	1.46	3 (27%)	15,15,17	1.79	5 (33%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	GLC	D	6	2	11,11,12	1.77	2 (18%)	15,15,17	2.10	5 (33%)

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	C	1	2	-	2/2/19/22	0/1/1/1
2	GLC	C	2	2	-	2/2/19/22	0/1/1/1
2	GLC	C	3	2	-	2/2/19/22	0/1/1/1
2	GLC	C	4	2	-	2/2/19/22	0/1/1/1
2	GLC	C	5	2	-	1/2/19/22	0/1/1/1
2	GLC	C	6	2	-	0/2/19/22	0/1/1/1
2	GLC	D	1	2	-	2/2/19/22	0/1/1/1
2	GLC	D	2	2	-	0/2/19/22	0/1/1/1
2	GLC	D	3	2	-	2/2/19/22	0/1/1/1
2	GLC	D	4	2	-	2/2/19/22	0/1/1/1
2	GLC	D	5	2	-	0/2/19/22	0/1/1/1
2	GLC	D	6	2	-	2/2/19/22	0/1/1/1

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	6	GLC	O5-C1	4.66	1.51	1.43
2	C	2	GLC	O5-C1	3.91	1.50	1.43
2	D	2	GLC	O5-C1	3.65	1.49	1.43
2	D	2	GLC	O5-C5	3.44	1.50	1.43
2	D	4	GLC	C4-C5	3.33	1.60	1.53
2	C	6	GLC	O5-C1	2.95	1.48	1.43
2	C	4	GLC	O5-C5	2.68	1.48	1.43
2	C	6	GLC	O5-C5	2.65	1.48	1.43
2	C	6	GLC	C4-C5	2.65	1.58	1.53
2	C	1	GLC	O4-C4	2.61	1.49	1.43
2	D	5	GLC	C2-C3	2.58	1.56	1.52
2	D	1	GLC	O5-C5	2.51	1.48	1.43
2	C	2	GLC	O2-C2	2.44	1.48	1.43
2	D	1	GLC	O4-C4	2.37	1.48	1.43
2	D	4	GLC	O5-C5	2.34	1.48	1.43
2	D	5	GLC	O4-C4	2.24	1.48	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	2	GLC	C2-C3	-2.22	1.49	1.52
2	D	4	GLC	O5-C1	2.20	1.47	1.43
2	C	3	GLC	C4-C5	2.20	1.57	1.53
2	D	3	GLC	O5-C5	2.19	1.47	1.43
2	D	5	GLC	O5-C1	2.16	1.47	1.43
2	D	2	GLC	C4-C5	2.14	1.57	1.53
2	C	6	GLC	C1-C2	2.12	1.57	1.52
2	D	6	GLC	O5-C5	2.10	1.47	1.43
2	D	1	GLC	C4-C5	2.10	1.57	1.53

All (47) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	5	GLC	O4-C4-C3	-6.15	96.14	110.35
2	D	3	GLC	O5-C5-C6	4.99	115.03	107.20
2	D	2	GLC	C1-O5-C5	4.72	118.59	112.19
2	C	4	GLC	C1-O5-C5	4.57	118.39	112.19
2	C	1	GLC	C6-C5-C4	-4.16	103.26	113.00
2	C	6	GLC	C3-C4-C5	4.06	117.49	110.24
2	D	6	GLC	C1-O5-C5	3.97	117.57	112.19
2	D	6	GLC	C3-C4-C5	3.92	117.23	110.24
2	C	1	GLC	O5-C1-C2	-3.89	104.77	110.77
2	C	6	GLC	O5-C5-C6	3.88	113.28	107.20
2	C	2	GLC	O5-C1-C2	3.77	116.59	110.77
2	C	2	GLC	C1-C2-C3	-3.66	105.17	109.67
2	C	2	GLC	C1-O5-C5	3.57	117.03	112.19
2	C	3	GLC	C3-C4-C5	3.56	116.58	110.24
2	C	4	GLC	O5-C5-C4	3.50	119.35	110.83
2	C	2	GLC	O4-C4-C3	-3.41	102.47	110.35
2	D	3	GLC	O4-C4-C3	-3.36	102.58	110.35
2	D	3	GLC	C1-O5-C5	-3.25	107.78	112.19
2	C	5	GLC	C1-O5-C5	3.21	116.54	112.19
2	C	3	GLC	O5-C1-C2	3.19	115.69	110.77
2	D	6	GLC	O4-C4-C3	-3.14	103.09	110.35
2	C	2	GLC	C3-C4-C5	3.13	115.83	110.24
2	C	5	GLC	C3-C4-C5	3.12	115.81	110.24
2	C	6	GLC	O4-C4-C3	-3.12	103.14	110.35
2	D	5	GLC	O5-C5-C6	3.08	112.04	107.20
2	D	2	GLC	O5-C5-C4	3.02	118.18	110.83
2	D	6	GLC	O5-C5-C6	3.01	111.93	107.20
2	C	3	GLC	O4-C4-C3	-3.00	103.41	110.35
2	C	6	GLC	O5-C1-C2	3.00	115.40	110.77

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	2	GLC	C2-C3-C4	2.95	116.00	110.89
2	D	5	GLC	O5-C1-C2	-2.90	106.30	110.77
2	C	4	GLC	C6-C5-C4	-2.84	106.35	113.00
2	C	1	GLC	O5-C5-C4	-2.81	104.00	110.83
2	D	4	GLC	C3-C4-C5	2.78	115.20	110.24
2	D	6	GLC	O5-C1-C2	2.70	114.93	110.77
2	D	4	GLC	O5-C5-C6	2.68	111.40	107.20
2	C	1	GLC	C3-C4-C5	2.53	114.75	110.24
2	D	5	GLC	O5-C5-C4	-2.53	104.67	110.83
2	C	6	GLC	C1-C2-C3	2.53	112.77	109.67
2	D	2	GLC	O5-C1-C2	-2.49	106.92	110.77
2	D	5	GLC	C3-C4-C5	2.41	114.54	110.24
2	D	2	GLC	C1-C2-C3	-2.35	106.78	109.67
2	D	1	GLC	C1-C2-C3	2.34	112.54	109.67
2	C	3	GLC	O5-C5-C4	2.29	116.39	110.83
2	D	5	GLC	O3-C3-C4	-2.16	105.35	110.35
2	C	3	GLC	O5-C5-C6	-2.12	103.87	107.20
2	D	3	GLC	C1-C2-C3	2.05	112.18	109.67

There are no chirality outliers.

All (17) torsion outliers are listed below:

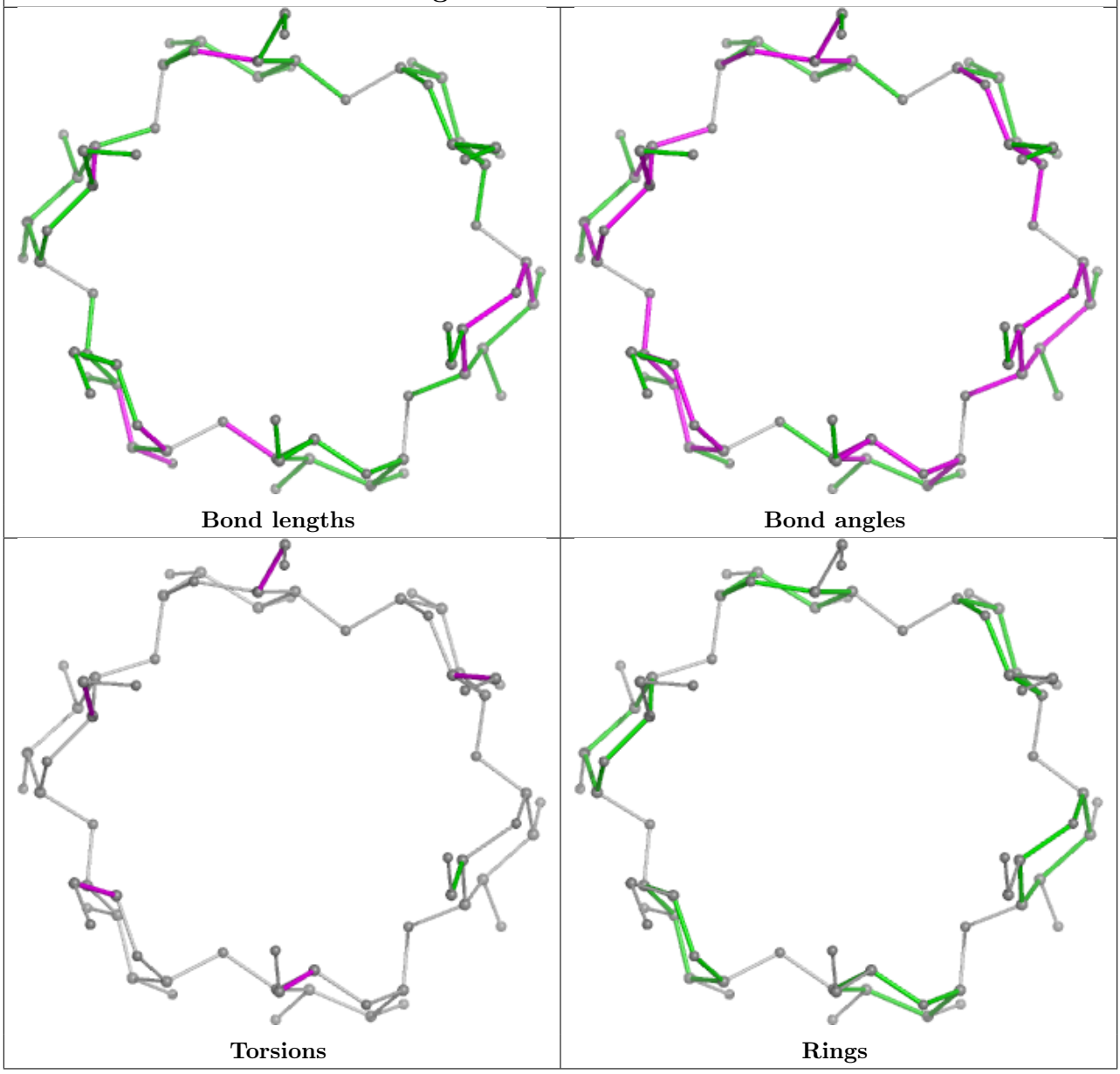
Mol	Chain	Res	Type	Atoms
2	C	3	GLC	O5-C5-C6-O6
2	D	1	GLC	O5-C5-C6-O6
2	C	1	GLC	O5-C5-C6-O6
2	D	6	GLC	O5-C5-C6-O6
2	D	1	GLC	C4-C5-C6-O6
2	D	4	GLC	C4-C5-C6-O6
2	D	6	GLC	C4-C5-C6-O6
2	C	1	GLC	C4-C5-C6-O6
2	C	2	GLC	O5-C5-C6-O6
2	C	3	GLC	C4-C5-C6-O6
2	C	4	GLC	C4-C5-C6-O6
2	D	4	GLC	O5-C5-C6-O6
2	C	2	GLC	C4-C5-C6-O6
2	D	3	GLC	C4-C5-C6-O6
2	D	3	GLC	O5-C5-C6-O6
2	C	5	GLC	C4-C5-C6-O6
2	C	4	GLC	O5-C5-C6-O6

There are no ring outliers.

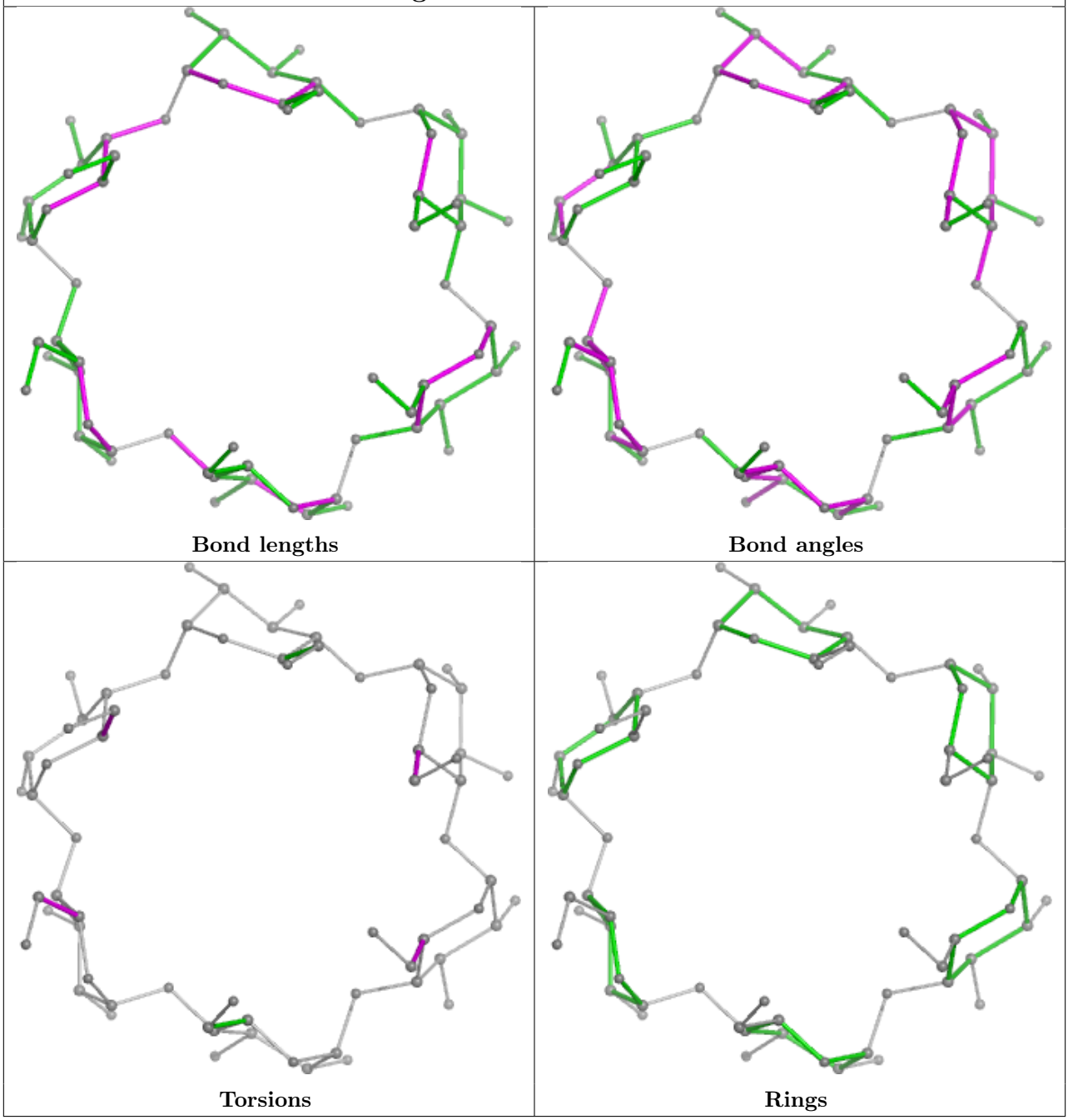
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

Oligosaccharide Chain C



Oligosaccharide Chain D



5.6 Ligand geometry (i)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection.

RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	EDO	A	750	-	3,3,3	0.81	0	2,2,2	0.18	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	EDO	A	750	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	649/695 (93%)	-0.21	5 (0%)	86	89	26, 36, 64, 103	0
1	B	649/695 (93%)	0.17	39 (6%)	21	28	36, 53, 86, 121	0
All	All	1298/1390 (93%)	-0.02	44 (3%)	45	52	26, 46, 78, 121	0

All (44) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	144	ALA	6.2
1	B	641	TRP	6.1
1	B	640	HIS	4.5
1	B	625	HIS	4.4
1	B	145	ASP	4.3
1	B	644	ALA	4.2
1	B	622	LEU	4.0
1	B	628	VAL	4.0
1	B	639	TYR	3.9
1	B	661	VAL	3.9
1	B	627	SER	3.8
1	B	181	VAL	3.5
1	B	598	LEU	3.4
1	B	613	VAL	3.3
1	B	630	VAL	3.0
1	B	69	ARG	2.9
1	B	614	SER	2.9
1	A	642	GLY	2.8
1	B	638	THR	2.8
1	B	612	THR	2.7
1	B	151	ASP	2.6
1	B	629	PRO	2.6
1	B	153	ARG	2.6
1	B	149	ARG	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	126	LEU	2.5
1	B	620	LEU	2.5
1	B	617	MET	2.5
1	B	226	HIS	2.5
1	B	624	TRP	2.5
1	B	581	ASP	2.4
1	B	619	GLN	2.4
1	B	646	TYR	2.4
1	A	15	PRO	2.4
1	B	611	ALA	2.3
1	B	663	ARG	2.3
1	B	175	ALA	2.2
1	A	149	ARG	2.2
1	B	155	LEU	2.2
1	A	226	HIS	2.2
1	B	228	PRO	2.1
1	B	608	THR	2.1
1	A	147	PRO	2.0
1	B	188	HIS	2.0
1	B	143	ALA	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)

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
2	GLC	D	3	11/12	0.76	0.41	82,97,100,106	0
2	GLC	D	2	11/12	0.77	0.45	99,106,114,118	0
2	GLC	D	4	11/12	0.79	0.27	74,78,81,87	0
2	GLC	D	5	11/12	0.80	0.26	62,65,73,74	0
2	GLC	D	6	11/12	0.82	0.24	60,67,74,83	0
2	GLC	D	1	11/12	0.83	0.31	77,87,94,102	0
2	GLC	C	2	11/12	0.85	0.15	46,51,59,64	0
2	GLC	C	3	11/12	0.86	0.17	66,73,81,88	0

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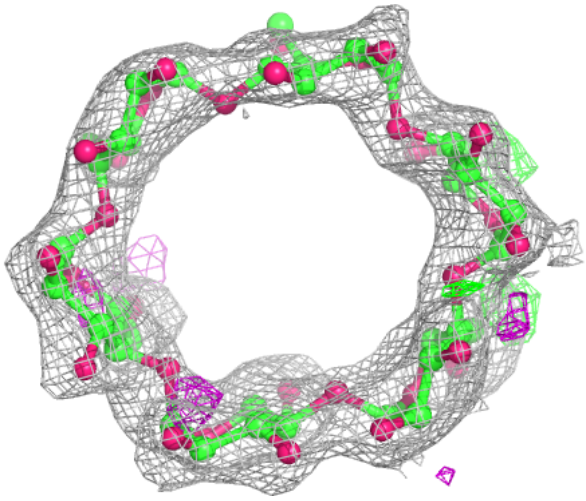
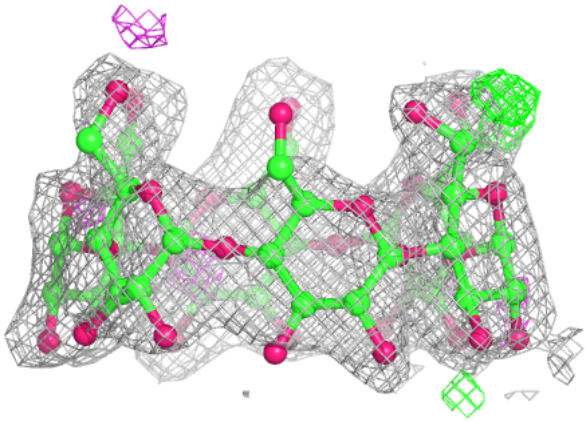
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	GLC	C	1	11/12	0.87	0.16	50,53,59,61	0
2	GLC	C	6	11/12	0.87	0.15	55,66,70,70	0
2	GLC	C	4	11/12	0.89	0.27	86,99,102,102	0
2	GLC	C	5	11/12	0.92	0.21	75,82,90,92	0

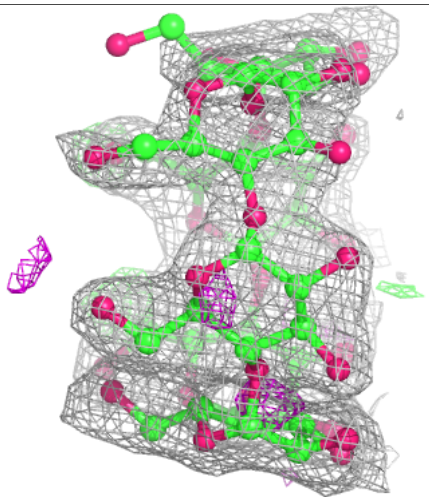
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain C:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)

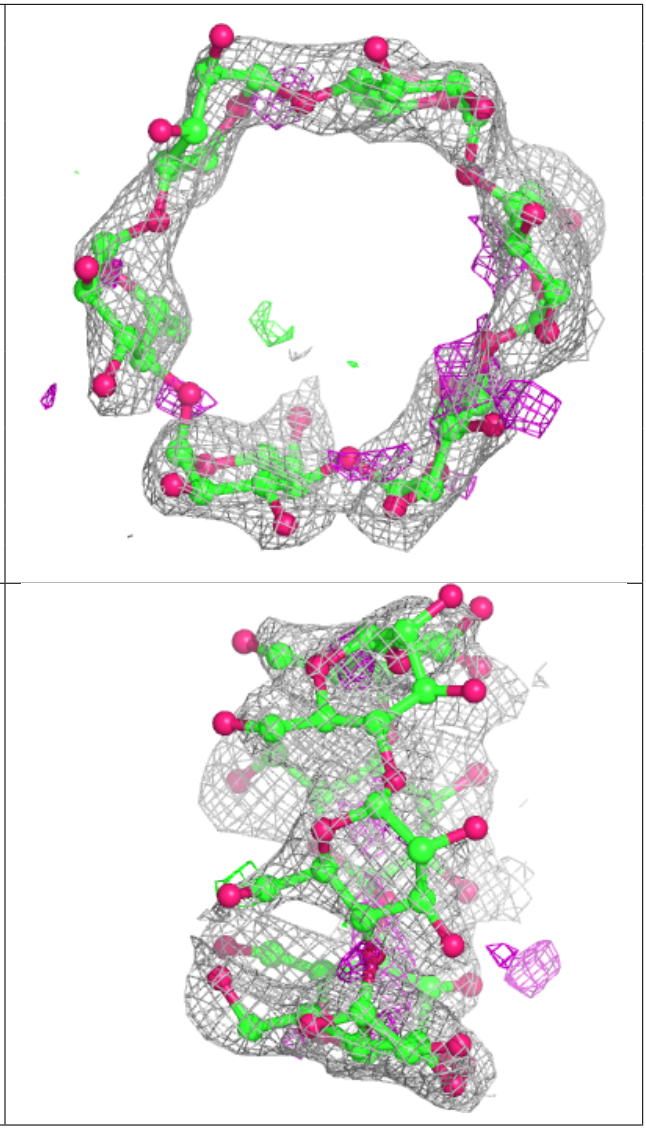






Electron density around Chain D:

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



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(Å^2)	Q<0.9
3	EDO	A	750	4/4	0.91	0.15	42,46,52,58	0

6.5 Other polymers (i)

There are no such residues in this entry.