



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 25, 2023 – 06:19 PM EDT

PDB ID : 6BS6
Title : SusG with mixed linkage amylosaccharide
Authors : Koropatkin, N.M.; Cockburn, D.W.
Deposited on : 2017-12-01
Resolution : 2.17 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)
Xtrriage (Phenix) : 1.13
EDS : 2.35.1
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

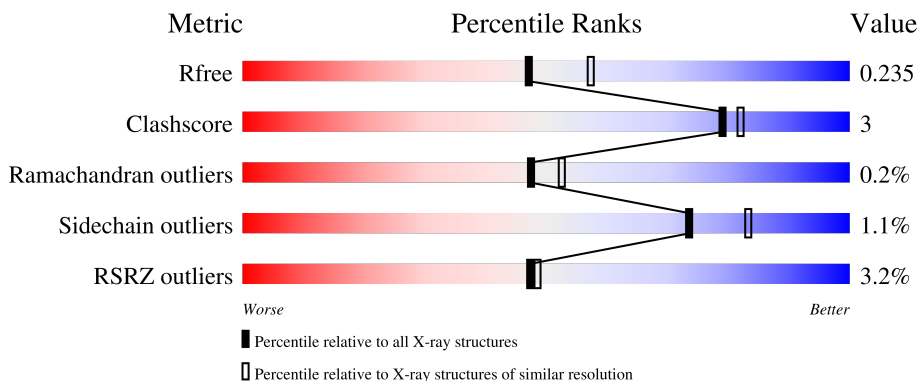
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.17 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.




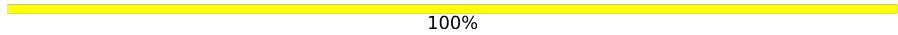
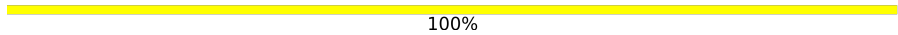
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	6864 (2.20-2.16)
Clashscore	141614	7689 (2.20-2.16)
Ramachandran outliers	138981	7564 (2.20-2.16)
Sidechain outliers	138945	7564 (2.20-2.16)
RSRZ outliers	127900	6738 (2.20-2.16)

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	670	 90% 7%
1	B	670	 90% 7%
2	C	4	 100%
2	H	4	 50% 50%
3	D	8	 100%

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Mol	Chain	Length	Quality of chain
4	E	6	 50% 50%
5	F	3	 100%
6	G	7	 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
7	CA	A	720	-	-	-	X

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 11397 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 Alpha-amylase SusG.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	648	Total	C	N	O	S	0	0	0
			5164	3286	836	1026	16			
1	B	649	Total	C	N	O	S	0	0	0
			5169	3288	836	1029	16			

There are 4 discrepancies between the modelled and reference sequences:

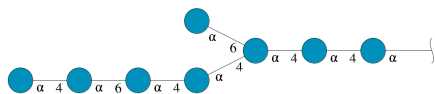
Chain	Residue	Modelled	Actual	Comment	Reference
A	23	GLY	-	expression tag	UNP Q8A1G3
A	498	ASN	ASP	engineered mutation	UNP Q8A1G3
B	23	GLY	-	expression tag	UNP Q8A1G3
B	498	ASN	ASP	engineered mutation	UNP Q8A1G3

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



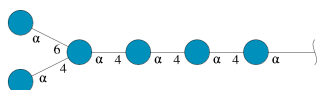
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
2	C	4	Total	C	O	0	0	0
			45	24	21			
2	H	4	Total	C	O	0	0	0
			45	24	21			

- Molecule 3 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-6)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-[alpha-D-glucopyranose-(1-6)]alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



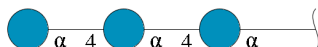
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	D	8	Total	C	O	0	0	0
			89	48	41			

- Molecule 4 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-[alpha-D-glucopyranose-(1-6)]alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



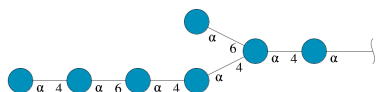
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
4	E	6	Total	C	O	0	0	0
			67	36	31			

- Molecule 5 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
5	F	3	Total	C	O	0	0	0
			34	18	16			

- Molecule 6 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-6)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-[alpha-D-glucopyranose-(1-6)]alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.

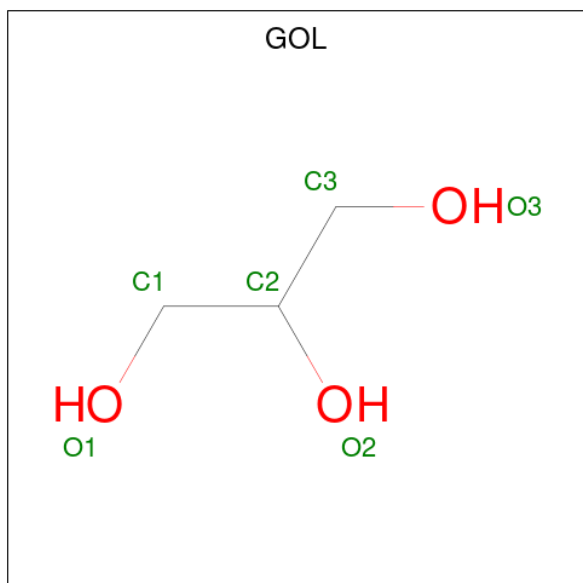


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
6	G	7	Total	C	O	0	0	0
			78	42	36			

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	2	Total	Ca	0	0
			2	2		
7	B	2	Total	Ca	0	0
			2	2		

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 9 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



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

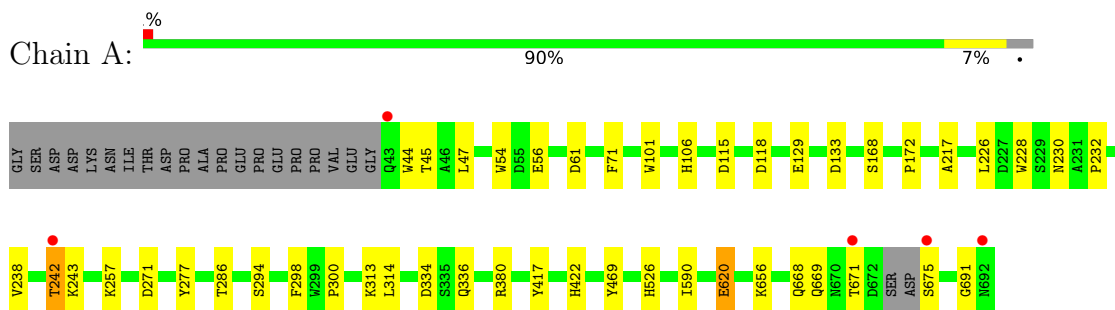
- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	467	Total O 467 467	0	0
10	B	225	Total O 225 225	0	0

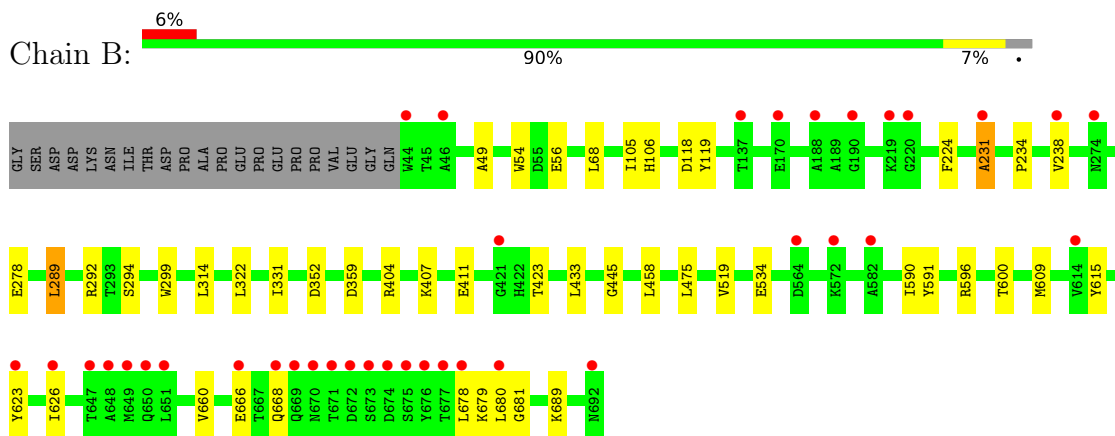
3 Residue-property plots [i](#)

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.

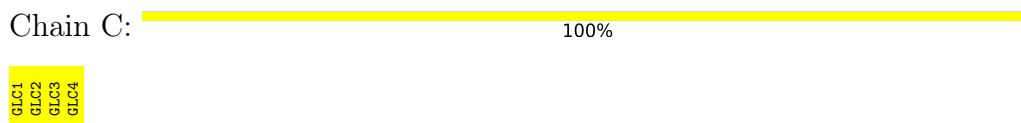
- Molecule 1: Alpha-amylase SusG



- Molecule 1: Alpha-amylase SusG



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

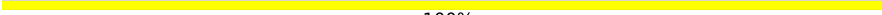


- Molecule 2: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose



GLC1
GLC2
GLC3
GLC4

- Molecule 3: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-6)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-[alpha-D-glucopyranose-(1-6)]alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain D:  100%

GLC1
GLC2
GLC3
GLC4
GLC5
GLC6
GLC7
GLC8

- Molecule 4: alpha-D-glucopyranose-(1-4)-[alpha-D-glucopyranose-(1-6)]alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain E:  50% 50%

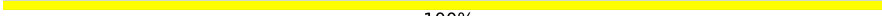
GLC1
GLC2
GLC3
GLC4
GLC5
GLC6

- Molecule 5: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain F:  100%

GLC1
GLC2
GLC3

- Molecule 6: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-6)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-[alpha-D-glucopyranose-(1-6)]alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain G:  100%

GLC1
GLC2
GLC3
GLC4
GLC5
GLC6
GLC7

4 Data and refinement statistics i

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	127.44Å 127.44Å 129.41Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.40 – 2.17 45.06 – 2.17	Depositor EDS
% Data completeness (in resolution range)	97.1 (45.40-2.17) 82.3 (45.06-2.17)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.89 (at 2.18Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.194 , 0.232 0.201 , 0.235	Depositor DCC
R_{free} test set	1977 reflections (1.82%)	wwPDB-VP
Wilson B-factor (Å ²)	29.8	Xtriage
Anisotropy	0.654	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 39.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.015 for -h,-l,-k 0.005 for -h,l,k 0.005 for l,-k,h 0.014 for -l,-k,-h 0.029 for h,-k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11397	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.63% 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: GLC, CA, GOL, ACT

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	0.39	0/5302	0.51	0/7204
1	B	0.32	0/5308	0.49	1/7214 (0.0%)
All	All	0.36	0/10610	0.50	1/14418 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	231	ALA	C-N-CD	8.82	146.92	128.40

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	5164	0	4870	24	0
1	B	5169	0	4872	30	0
2	C	45	0	39	0	0
2	H	45	0	39	1	0
3	D	89	0	75	0	0
4	E	67	0	57	2	0
5	F	34	0	30	0	0
6	G	78	0	66	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	2	0	0	0	0
7	B	2	0	0	0	0
8	A	6	0	8	1	0
9	A	4	0	3	0	0
10	A	467	0	0	2	0
10	B	225	0	0	2	0
All	All	11397	0	10059	57	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 3.

All (57) 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:238:VAL:HG21	1:B:314:LEU:HD21	1.64	0.79
1:A:242:THR:O	1:A:243:LYS:HD3	1.93	0.69
2:H:1:GLC:H62	2:H:2:GLC:H5	1.77	0.67
1:B:615:TYR:HB3	1:B:626:ILE:HD13	1.76	0.67
1:B:359:ASP:OD1	1:B:404:ARG:NH2	2.27	0.67
1:B:596:ARG:O	1:B:600:THR:HG23	1.95	0.67
1:A:271:ASP:OD2	10:A:801:HOH:O	2.13	0.66
1:B:54:TRP:CD1	1:B:600:THR:HG22	2.32	0.64
4:E:2:GLC:H61	4:E:3:GLC:H5	1.79	0.64
1:B:666:GLU:HB3	1:B:681:GLY:HA3	1.81	0.63
1:A:61:ASP:OD2	1:A:526:HIS:ND1	2.27	0.62
1:B:292:ARG:HD3	1:B:299:TRP:CZ3	2.40	0.56
1:B:678:LEU:HD21	1:B:680:LEU:HG	1.90	0.54
1:B:689:LYS:NZ	10:B:806:HOH:O	2.40	0.52
1:B:68:LEU:HD11	1:B:105:ILE:HG22	1.92	0.51
1:A:172:PRO:HB2	8:A:721:GOL:H32	1.92	0.51
1:A:217:ALA:HB2	1:A:286:THR:HG22	1.93	0.50
1:A:226:LEU:HB2	1:A:277:TYR:HB2	1.94	0.50
1:B:626:ILE:O	1:B:626:ILE:HD12	2.13	0.49
1:A:47:LEU:HD21	1:A:669:GLN:HB3	1.94	0.49
1:A:238:VAL:HG21	1:A:314:LEU:HD21	1.93	0.48
1:A:469:TYR:OH	1:A:620:GLU:HG3	2.13	0.48
1:A:44:TRP:HB3	1:A:668:GLN:OE1	2.14	0.47
1:A:656:LYS:HZ2	1:A:691:GLY:HA3	1.80	0.46
1:B:49:ALA:HA	1:B:660:VAL:HG12	1.98	0.46
1:B:458:LEU:HD13	1:B:519:VAL:HG11	1.96	0.46
1:B:234:PRO:HG2	1:B:322:LEU:HB2	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:230:ASN:OD1	1:A:232:PRO:HD2	2.14	0.46
1:B:106:HIS:ND1	1:B:119:TYR:HA	2.31	0.46
1:B:54:TRP:CE2	1:B:56:GLU:HA	2.52	0.45
1:A:313:LYS:HE2	1:A:336:GLN:O	2.17	0.45
1:A:71:PHE:HB3	10:A:1023:HOH:O	2.16	0.45
1:A:228:TRP:CE2	1:A:257:LYS:HE3	2.52	0.45
1:B:407:LYS:HB2	1:B:445:GLY:HA2	1.98	0.44
1:B:668:GLN:NE2	1:B:679:LYS:HD3	2.32	0.44
4:E:1:GLC:H62	4:E:2:GLC:H5	1.98	0.44
1:A:129:GLU:OE1	1:A:380:ARG:NH2	2.46	0.44
1:A:242:THR:OG1	1:A:243:LYS:N	2.48	0.44
1:B:407:LYS:NZ	1:B:411:GLU:OE2	2.36	0.43
1:B:590:ILE:HD13	1:B:590:ILE:HA	1.84	0.43
1:B:623:TYR:HB3	1:B:626:ILE:HG12	2.01	0.43
1:B:224:PHE:O	1:B:278:GLU:HA	2.19	0.43
1:B:292:ARG:HD2	10:B:870:HOH:O	2.19	0.42
1:B:623:TYR:HB3	1:B:626:ILE:CG1	2.50	0.42
1:A:106:HIS:HB3	1:A:118:ASP:O	2.20	0.42
1:B:106:HIS:CD2	1:B:106:HIS:N	2.88	0.42
1:A:298:PHE:O	1:A:300:PRO:HD3	2.20	0.42
1:A:133:ASP:OD1	1:A:380:ARG:HD2	2.19	0.41
1:B:534:GLU:HA	1:B:591:TYR:CE1	2.55	0.41
1:A:54:TRP:CE2	1:A:56:GLU:HA	2.55	0.41
1:B:106:HIS:HB3	1:B:118:ASP:O	2.20	0.41
1:B:289:LEU:HG	1:B:331:ILE:HB	2.01	0.41
1:B:292:ARG:HD3	1:B:299:TRP:CH2	2.56	0.41
1:A:313:LYS:HD3	1:A:334:ASP:HA	2.02	0.40
1:A:417:TYR:CE1	1:A:422:HIS:ND1	2.89	0.40
1:B:475:LEU:HG	1:B:609:MET:HE2	2.02	0.40
1:A:671:THR:HA	1:A:675:SER:O	2.22	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	644/670 (96%)	627 (97%)	16 (2%)	1 (0%)	47	52
1	B	647/670 (97%)	621 (96%)	25 (4%)	1 (0%)	47	52
All	All	1291/1340 (96%)	1248 (97%)	41 (3%)	2 (0%)	47	52

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	242	THR
1	B	231	ALA

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	549/568 (97%)	542 (99%)	7 (1%)	69	79
1	B	550/568 (97%)	545 (99%)	5 (1%)	78	87
All	All	1099/1136 (97%)	1087 (99%)	12 (1%)	73	83

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	45	THR
1	A	101	TRP
1	A	115	ASP
1	A	168	SER
1	A	294	SER
1	A	590	ILE
1	A	620	GLU
1	B	289	LEU
1	B	294	SER
1	B	352	ASP
1	B	423	THR

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Mol	Chain	Res	Type
1	B	433	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	668	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](#)

32 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	12,12,12	1.21	1 (8%)	17,17,17	0.91	0
2	GLC	C	2	2	11,11,12	1.53	2 (18%)	15,15,17	0.79	0
2	GLC	C	3	2	11,11,12	1.57	2 (18%)	15,15,17	0.85	0
2	GLC	C	4	2	11,11,12	1.73	3 (27%)	15,15,17	0.85	0
3	GLC	D	1	3	12,12,12	1.33	1 (8%)	17,17,17	1.11	1 (5%)
3	GLC	D	2	3	11,11,12	1.62	3 (27%)	15,15,17	0.73	0
3	GLC	D	3	3	11,11,12	1.47	2 (18%)	15,15,17	1.14	2 (13%)
3	GLC	D	4	3	11,11,12	1.48	2 (18%)	15,15,17	1.27	2 (13%)
3	GLC	D	5	3	11,11,12	1.62	2 (18%)	15,15,17	0.72	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	GLC	D	6	3	11,11,12	1.40	2 (18%)	15,15,17	0.90	1 (6%)
3	GLC	D	7	3	11,11,12	1.61	3 (27%)	15,15,17	0.80	1 (6%)
3	GLC	D	8	3	11,11,12	1.82	2 (18%)	15,15,17	0.62	0
4	GLC	E	1	4	12,12,12	1.25	1 (8%)	17,17,17	1.15	2 (11%)
4	GLC	E	2	4	11,11,12	1.63	2 (18%)	15,15,17	0.56	0
4	GLC	E	3	4	11,11,12	1.56	2 (18%)	15,15,17	0.69	0
4	GLC	E	4	4	11,11,12	1.62	2 (18%)	15,15,17	0.96	0
4	GLC	E	5	4	11,11,12	1.72	3 (27%)	15,15,17	0.85	0
4	GLC	E	6	4	11,11,12	1.78	3 (27%)	15,15,17	0.84	0
5	GLC	F	1	5	12,12,12	1.21	2 (16%)	17,17,17	0.87	0
5	GLC	F	2	5	11,11,12	1.60	2 (18%)	15,15,17	0.69	0
5	GLC	F	3	5	11,11,12	1.68	3 (27%)	15,15,17	1.12	1 (6%)
6	GLC	G	1	6	12,12,12	1.15	1 (8%)	17,17,17	0.68	0
6	GLC	G	2	6	11,11,12	1.59	2 (18%)	15,15,17	0.96	1 (6%)
6	GLC	G	3	6	11,11,12	1.79	3 (27%)	15,15,17	0.96	0
6	GLC	G	4	6	11,11,12	1.65	2 (18%)	15,15,17	1.00	1 (6%)
6	GLC	G	5	6	11,11,12	1.67	2 (18%)	15,15,17	0.61	0
6	GLC	G	6	6	11,11,12	1.72	3 (27%)	15,15,17	0.71	0
6	GLC	G	7	6	11,11,12	1.57	2 (18%)	15,15,17	1.11	0
2	GLC	H	1	2	12,12,12	1.16	1 (8%)	17,17,17	0.82	0
2	GLC	H	2	2	11,11,12	1.59	2 (18%)	15,15,17	0.53	0
2	GLC	H	3	2	11,11,12	1.75	2 (18%)	15,15,17	0.76	0
2	GLC	H	4	2	11,11,12	1.68	3 (27%)	15,15,17	0.76	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	GLC	C	1	2	-	0/2/22/22	0/1/1/1
2	GLC	C	2	2	-	0/2/19/22	0/1/1/1
2	GLC	C	3	2	-	1/2/19/22	0/1/1/1
2	GLC	C	4	2	-	1/2/19/22	0/1/1/1
3	GLC	D	1	3	-	2/2/22/22	0/1/1/1
3	GLC	D	2	3	-	1/2/19/22	0/1/1/1
3	GLC	D	3	3	-	0/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GLC	D	4	3	-	0/2/19/22	0/1/1/1
3	GLC	D	5	3	-	0/2/19/22	0/1/1/1
3	GLC	D	6	3	-	0/2/19/22	0/1/1/1
3	GLC	D	7	3	-	2/2/19/22	0/1/1/1
3	GLC	D	8	3	-	2/2/19/22	0/1/1/1
4	GLC	E	1	4	-	0/2/22/22	0/1/1/1
4	GLC	E	2	4	-	0/2/19/22	0/1/1/1
4	GLC	E	3	4	-	0/2/19/22	0/1/1/1
4	GLC	E	4	4	-	2/2/19/22	0/1/1/1
4	GLC	E	5	4	-	0/2/19/22	0/1/1/1
4	GLC	E	6	4	-	0/2/19/22	0/1/1/1
5	GLC	F	1	5	-	0/2/22/22	0/1/1/1
5	GLC	F	2	5	-	0/2/19/22	0/1/1/1
5	GLC	F	3	5	-	1/2/19/22	0/1/1/1
6	GLC	G	1	6	-	1/2/22/22	0/1/1/1
6	GLC	G	2	6	-	1/2/19/22	0/1/1/1
6	GLC	G	3	6	-	0/2/19/22	0/1/1/1
6	GLC	G	4	6	-	0/2/19/22	0/1/1/1
6	GLC	G	5	6	-	0/2/19/22	0/1/1/1
6	GLC	G	6	6	-	2/2/19/22	0/1/1/1
6	GLC	G	7	6	-	1/2/19/22	0/1/1/1
2	GLC	H	1	2	-	0/2/22/22	0/1/1/1
2	GLC	H	2	2	-	2/2/19/22	0/1/1/1
2	GLC	H	3	2	-	0/2/19/22	0/1/1/1
2	GLC	H	4	2	-	2/2/19/22	0/1/1/1

All (68) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	6	GLC	O5-C1	4.27	1.50	1.43
3	D	8	GLC	O5-C1	4.15	1.50	1.43
2	H	3	GLC	O5-C1	4.14	1.50	1.43
6	G	5	GLC	O5-C1	4.09	1.50	1.43
2	C	4	GLC	O5-C1	4.03	1.50	1.43
4	E	2	GLC	O5-C1	4.00	1.50	1.43
6	G	3	GLC	O5-C1	3.99	1.50	1.43
4	E	5	GLC	O5-C1	3.95	1.50	1.43
6	G	6	GLC	O5-C1	3.95	1.50	1.43
2	H	4	GLC	O5-C1	3.94	1.50	1.43
5	F	3	GLC	O5-C1	3.90	1.49	1.43
6	G	4	GLC	O5-C1	3.88	1.49	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	G	2	GLC	O5-C1	3.86	1.49	1.43
2	C	2	GLC	O5-C1	3.71	1.49	1.43
6	G	7	GLC	O5-C1	3.69	1.49	1.43
2	H	2	GLC	O5-C1	3.67	1.49	1.43
3	D	3	GLC	O5-C1	3.67	1.49	1.43
3	D	7	GLC	O5-C1	3.63	1.49	1.43
2	C	3	GLC	O5-C1	3.63	1.49	1.43
5	F	2	GLC	O5-C1	3.62	1.49	1.43
3	D	2	GLC	O5-C1	3.61	1.49	1.43
3	D	5	GLC	O5-C1	3.53	1.49	1.43
4	E	4	GLC	O5-C1	3.50	1.49	1.43
3	D	8	GLC	C2-C3	-3.42	1.47	1.52
3	D	1	GLC	O5-C1	3.39	1.51	1.42
4	E	3	GLC	O5-C1	3.38	1.49	1.43
3	D	4	GLC	O5-C1	3.28	1.48	1.43
6	G	3	GLC	C2-C3	-3.21	1.47	1.52
2	H	3	GLC	C2-C3	-3.05	1.48	1.52
4	E	1	GLC	O5-C1	3.03	1.50	1.42
5	F	2	GLC	C2-C3	-3.01	1.48	1.52
2	C	4	GLC	C2-C3	-3.01	1.48	1.52
3	D	5	GLC	C2-C3	-2.99	1.48	1.52
2	C	1	GLC	O5-C1	2.99	1.50	1.42
4	E	3	GLC	C2-C3	-2.95	1.48	1.52
6	G	6	GLC	C2-C3	-2.95	1.48	1.52
2	C	3	GLC	C2-C3	-2.94	1.48	1.52
3	D	6	GLC	O5-C1	2.90	1.48	1.43
4	E	4	GLC	C2-C3	-2.87	1.48	1.52
2	H	1	GLC	O5-C1	2.86	1.50	1.42
5	F	3	GLC	C2-C3	-2.86	1.48	1.52
4	E	5	GLC	C2-C3	-2.85	1.48	1.52
6	G	1	GLC	O5-C1	2.78	1.49	1.42
5	F	1	GLC	O5-C1	2.76	1.49	1.42
4	E	6	GLC	C2-C3	-2.72	1.48	1.52
2	H	4	GLC	C2-C3	-2.70	1.48	1.52
2	H	2	GLC	C2-C3	-2.70	1.48	1.52
6	G	2	GLC	C2-C3	-2.63	1.48	1.52
3	D	2	GLC	C2-C3	-2.62	1.48	1.52
3	D	6	GLC	C2-C3	-2.59	1.48	1.52
6	G	4	GLC	C2-C3	-2.56	1.48	1.52
6	G	5	GLC	C2-C3	-2.54	1.48	1.52
4	E	2	GLC	C2-C3	-2.43	1.48	1.52
3	D	7	GLC	C2-C3	-2.38	1.49	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	G	7	GLC	C2-C3	-2.37	1.49	1.52
2	C	2	GLC	C2-C3	-2.31	1.49	1.52
4	E	6	GLC	O5-C5	2.28	1.48	1.43
3	D	3	GLC	C2-C3	-2.25	1.49	1.52
3	D	7	GLC	O5-C5	2.24	1.48	1.43
3	D	4	GLC	C2-C3	-2.19	1.49	1.52
6	G	3	GLC	O5-C5	2.18	1.47	1.43
4	E	5	GLC	O5-C5	2.15	1.47	1.43
5	F	1	GLC	C3-C2	-2.15	1.46	1.52
2	C	4	GLC	O5-C5	2.10	1.47	1.43
3	D	2	GLC	O5-C5	2.09	1.47	1.43
2	H	4	GLC	O5-C5	2.08	1.47	1.43
6	G	6	GLC	O5-C5	2.02	1.47	1.43
5	F	3	GLC	O5-C5	2.01	1.47	1.43

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	3	GLC	C1-C2-C3	3.16	113.55	109.67
4	E	1	GLC	O5-C5-C4	2.71	114.62	109.69
3	D	4	GLC	O2-C2-C3	2.62	115.40	110.14
5	F	3	GLC	C3-C4-C5	2.60	114.87	110.24
3	D	6	GLC	O2-C2-C1	-2.57	103.89	109.15
6	G	2	GLC	C1-C2-C3	2.49	112.72	109.67
3	D	1	GLC	O5-C1-C2	2.31	114.41	110.28
3	D	4	GLC	C3-C4-C5	2.28	114.31	110.24
3	D	7	GLC	C6-C5-C4	-2.10	108.08	113.00
6	G	4	GLC	C6-C5-C4	-2.09	108.11	113.00
4	E	1	GLC	C6-C5-C4	-2.09	108.12	113.00
3	D	3	GLC	O3-C3-C2	-2.04	106.09	109.99

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	G	6	GLC	O5-C5-C6-O6
3	D	1	GLC	O5-C5-C6-O6
6	G	6	GLC	C4-C5-C6-O6
3	D	7	GLC	O5-C5-C6-O6
3	D	7	GLC	C4-C5-C6-O6
3	D	8	GLC	O5-C5-C6-O6
2	H	4	GLC	C4-C5-C6-O6

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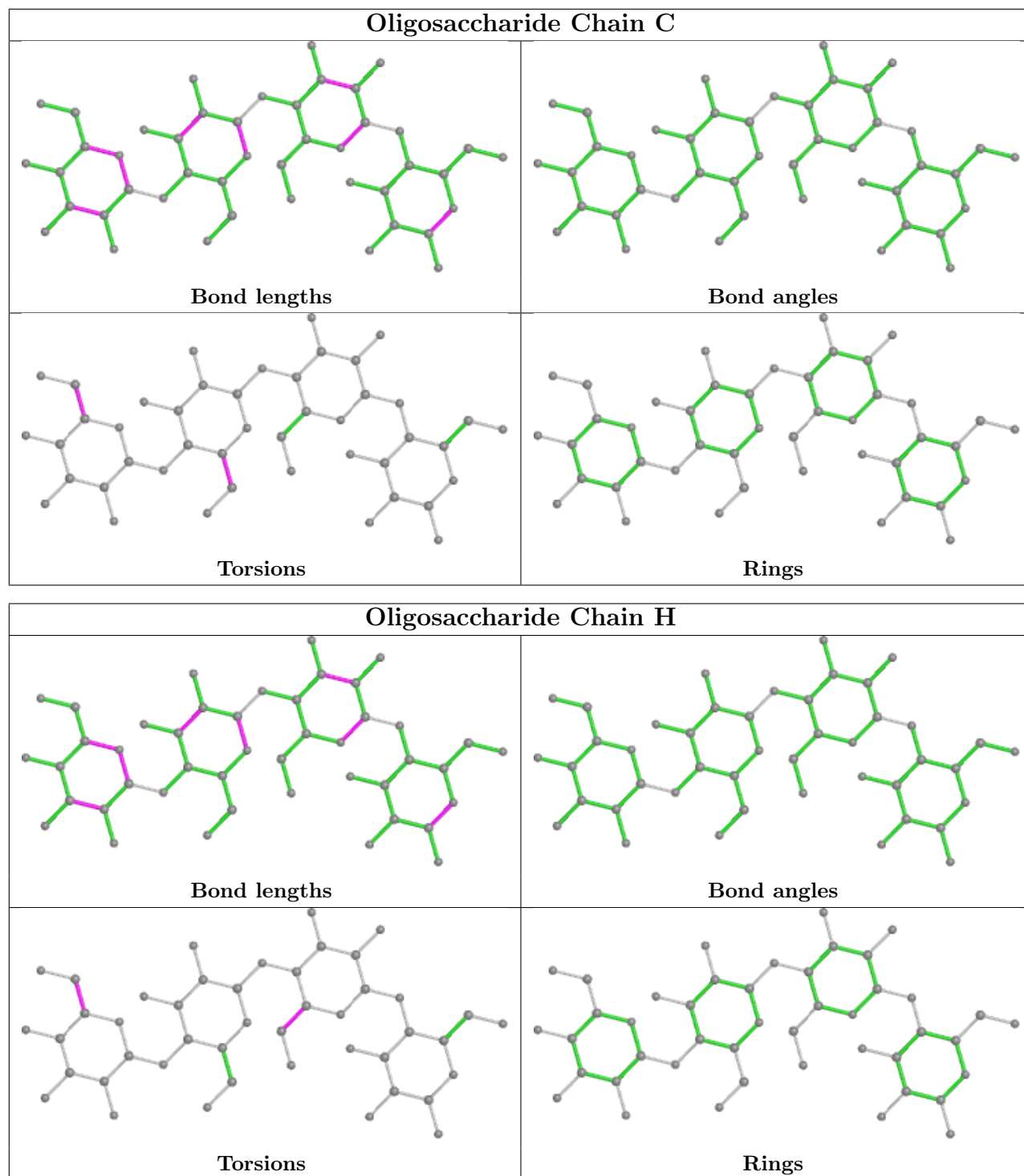
Mol	Chain	Res	Type	Atoms
3	D	8	GLC	C4-C5-C6-O6
3	D	1	GLC	C4-C5-C6-O6
2	H	2	GLC	C4-C5-C6-O6
2	H	4	GLC	O5-C5-C6-O6
5	F	3	GLC	O5-C5-C6-O6
2	C	3	GLC	O5-C5-C6-O6
4	E	4	GLC	C4-C5-C6-O6
6	G	1	GLC	C4-C5-C6-O6
2	H	2	GLC	O5-C5-C6-O6
6	G	7	GLC	O5-C5-C6-O6
3	D	2	GLC	C4-C5-C6-O6
6	G	2	GLC	C4-C5-C6-O6
4	E	4	GLC	O5-C5-C6-O6
2	C	4	GLC	C4-C5-C6-O6

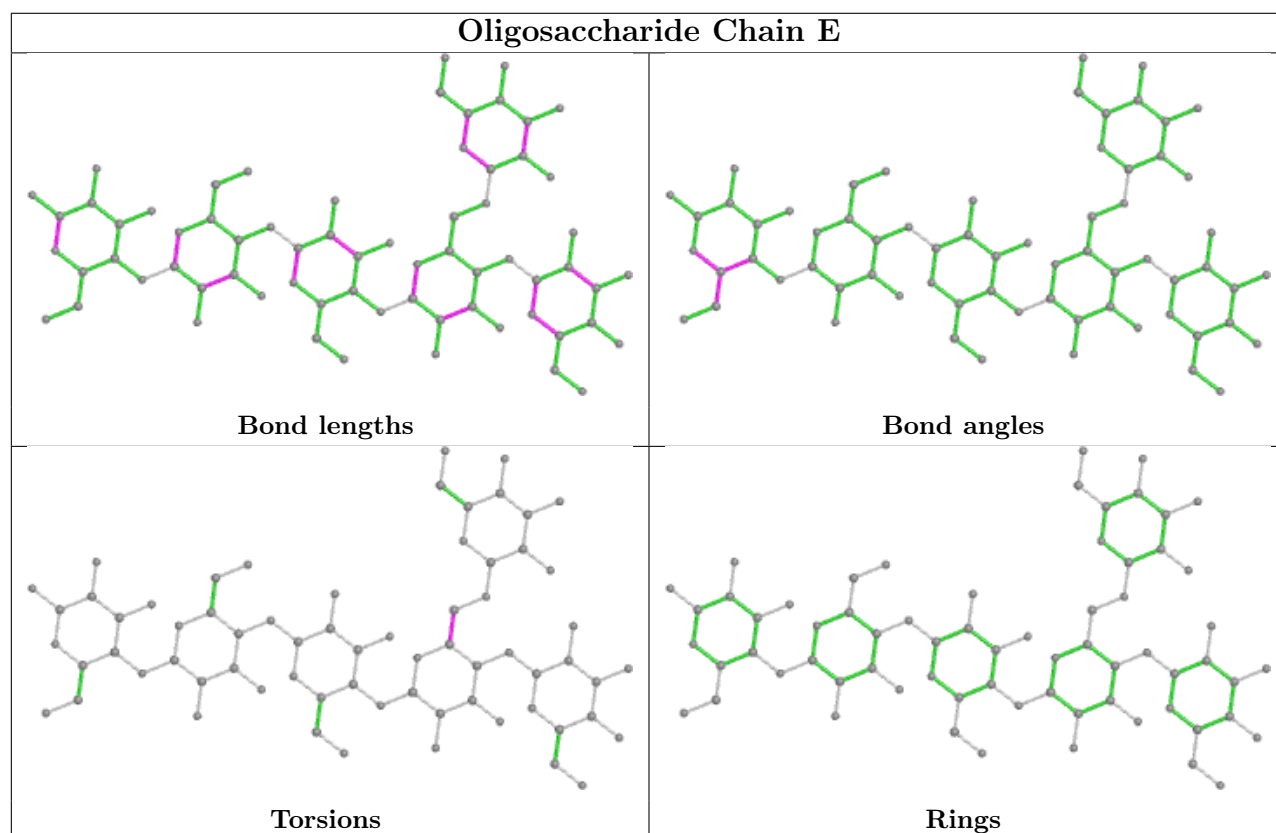
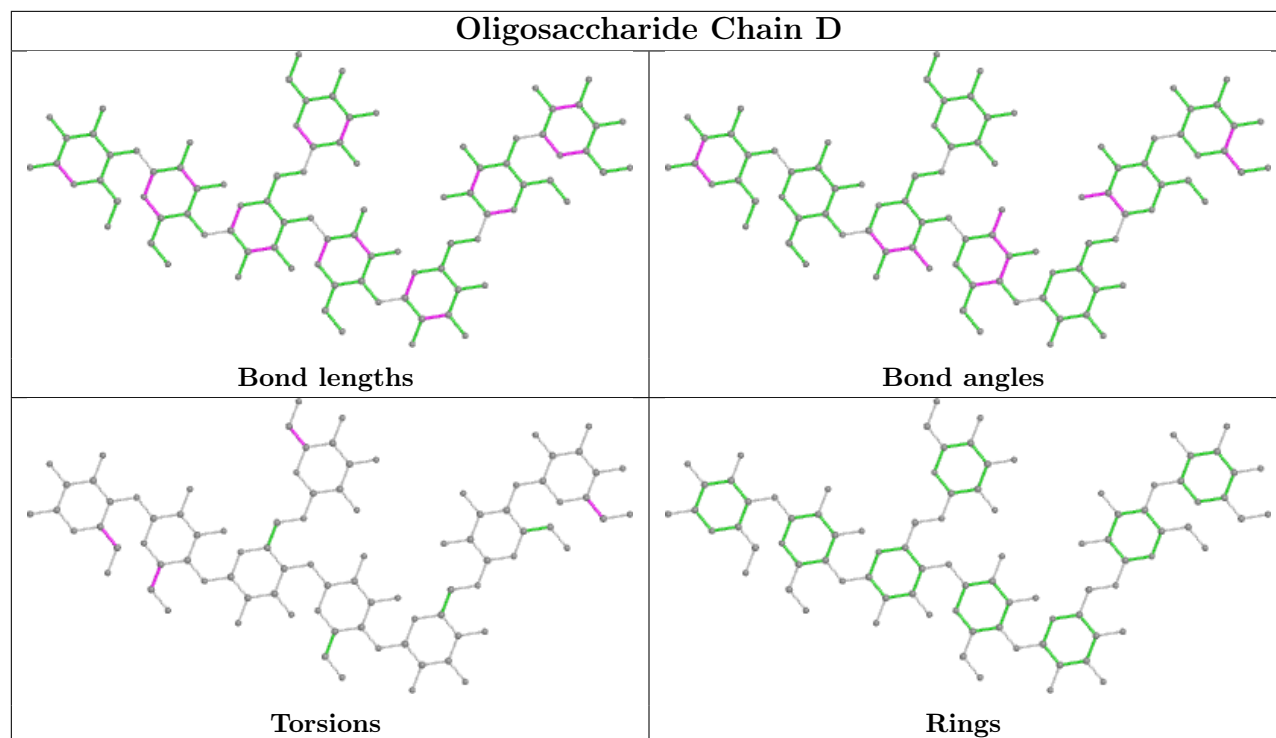
There are no ring outliers.

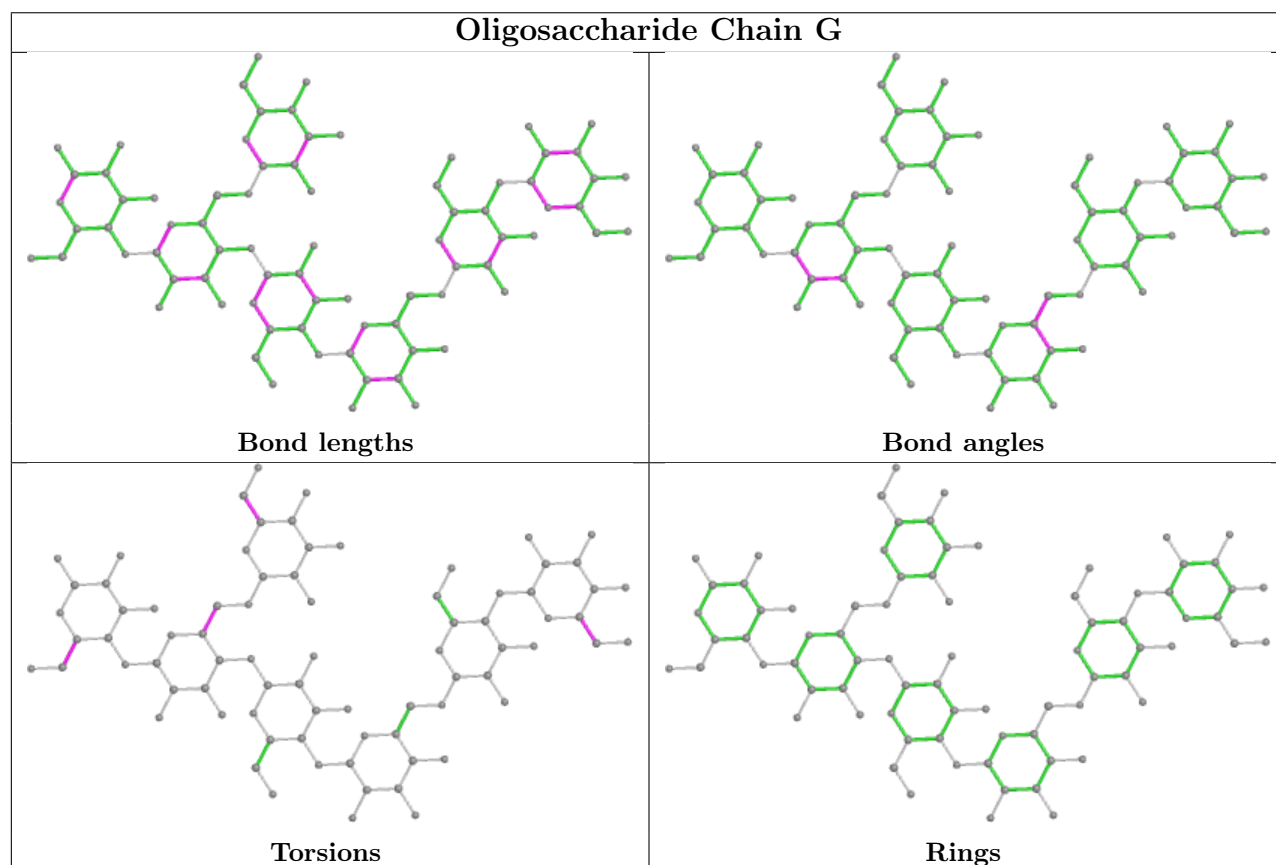
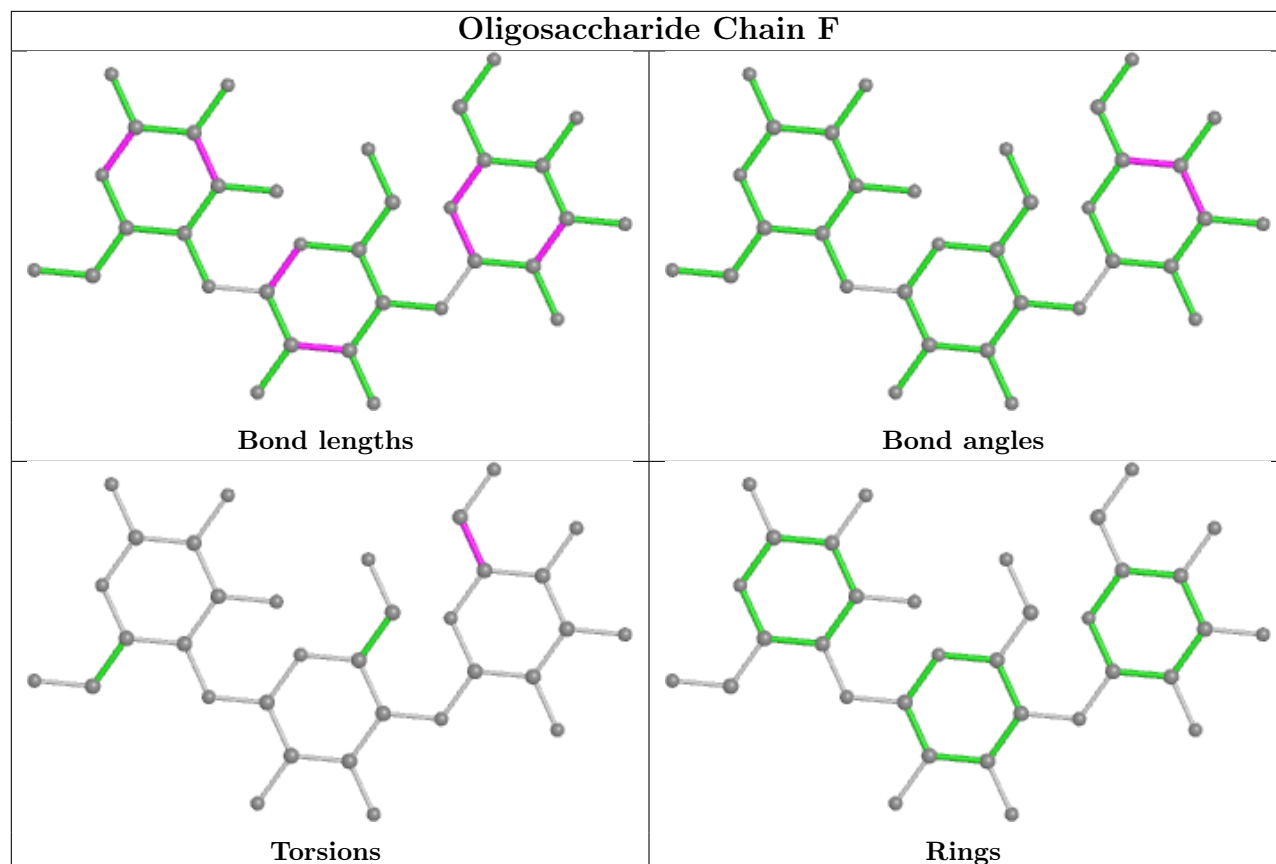
5 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	H	1	GLC	1	0
4	E	3	GLC	1	0
4	E	1	GLC	1	0
4	E	2	GLC	2	0
2	H	2	GLC	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 oligosaccharide.







5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 4 are monoatomic - leaving 2 for Mogul analysis.

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
8	GOL	A	721	-	5,5,5	0.32	0	5,5,5	0.61	0
9	ACT	A	722	-	3,3,3	0.80	0	3,3,3	0.90	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
8	GOL	A	721	-	-	1/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	A	721	GOL	O1-C1-C2-O2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	721	GOL	1	0

5.7 Other polymers [i](#)

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, 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	648/670 (96%)	-0.24	5 (0%) 86 86	20, 33, 57, 80	0
1	B	649/670 (96%)	0.16	37 (5%) 23 25	29, 51, 75, 98	0
All	All	1297/1340 (96%)	-0.04	42 (3%) 47 48	20, 42, 70, 98	0

All (42) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	647	THR	4.8
1	B	46	ALA	4.4
1	B	675	SER	4.2
1	B	44	TRP	4.2
1	B	674	ASP	4.1
1	B	676	TYR	4.1
1	B	671	THR	3.8
1	B	692	ASN	3.8
1	B	673	SER	3.6
1	B	650	GLN	3.5
1	A	692	ASN	3.5
1	B	572	LYS	3.5
1	B	623	TYR	3.2
1	B	582	ALA	3.1
1	B	614	VAL	3.1
1	B	648	ALA	3.1
1	B	677	THR	2.9
1	A	43	GLN	2.9
1	B	231	ALA	2.8
1	A	675	SER	2.8
1	A	242	THR	2.8
1	B	672	ASP	2.7
1	B	680	LEU	2.7
1	B	668	GLN	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	678	LEU	2.6
1	B	651	LEU	2.6
1	B	220	GLY	2.5
1	B	190	GLY	2.5
1	B	188	ALA	2.4
1	B	666	GLU	2.3
1	A	671	THR	2.3
1	B	421	GLY	2.3
1	B	670	ASN	2.3
1	B	137	THR	2.2
1	B	274	ASN	2.2
1	B	238	VAL	2.2
1	B	669	GLN	2.1
1	B	626	ILE	2.1
1	B	564	ASP	2.1
1	B	649	MET	2.1
1	B	170	GLU	2.0
1	B	219	LYS	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
3	GLC	D	1	12/12	0.71	0.20	52,64,71,74	0
4	GLC	E	1	12/12	0.80	0.25	60,66,78,79	0
2	GLC	H	4	11/12	0.83	0.28	74,75,82,86	0
2	GLC	H	1	12/12	0.84	0.24	72,84,86,89	0
3	GLC	D	7	11/12	0.86	0.17	52,56,60,68	0
2	GLC	C	4	11/12	0.86	0.15	45,59,67,74	0
4	GLC	E	6	11/12	0.86	0.30	67,74,77,77	0
2	GLC	H	3	11/12	0.88	0.15	50,63,67,71	0
2	GLC	C	1	12/12	0.88	0.18	41,59,71,74	0
5	GLC	F	3	11/12	0.88	0.20	58,66,74,80	0

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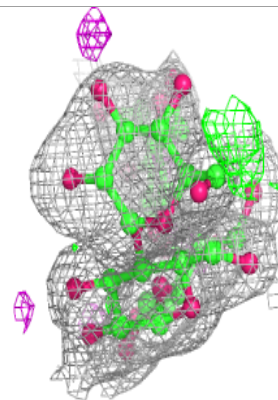
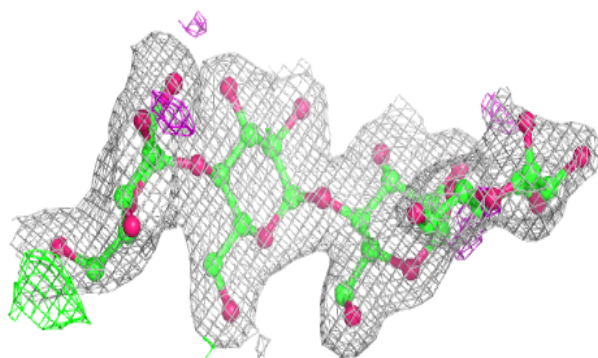
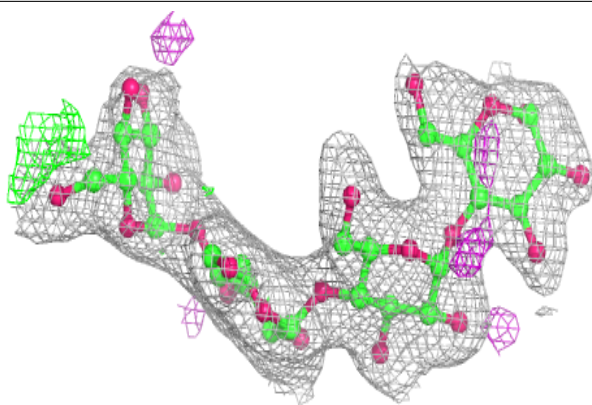
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	GLC	E	2	11/12	0.90	0.15	46,62,69,69	0
2	GLC	H	2	11/12	0.91	0.13	61,63,67,68	0
4	GLC	E	5	11/12	0.91	0.14	56,61,74,79	0
4	GLC	E	4	11/12	0.92	0.08	31,34,43,52	0
6	GLC	G	1	12/12	0.93	0.10	40,56,63,68	0
6	GLC	G	4	11/12	0.93	0.15	34,43,48,50	0
6	GLC	G	6	11/12	0.93	0.11	59,66,72,78	0
6	GLC	G	7	11/12	0.93	0.12	46,57,65,70	0
6	GLC	G	5	11/12	0.94	0.10	44,48,58,62	0
3	GLC	D	6	11/12	0.94	0.12	24,29,36,37	0
2	GLC	C	2	11/12	0.94	0.09	35,40,47,53	0
6	GLC	G	2	11/12	0.95	0.09	37,44,48,48	0
6	GLC	G	3	11/12	0.95	0.16	33,38,43,46	0
5	GLC	F	2	11/12	0.95	0.08	36,39,42,44	0
5	GLC	F	1	12/12	0.96	0.09	37,38,49,50	0
4	GLC	E	3	11/12	0.96	0.09	24,34,40,47	0
3	GLC	D	8	11/12	0.96	0.11	35,47,56,60	0
3	GLC	D	2	11/12	0.96	0.09	29,36,55,57	0
3	GLC	D	5	11/12	0.96	0.14	23,26,31,35	0
3	GLC	D	4	11/12	0.97	0.14	17,24,27,28	0
2	GLC	C	3	11/12	0.97	0.08	31,35,42,45	0
3	GLC	D	3	11/12	0.97	0.14	21,26,30,33	0

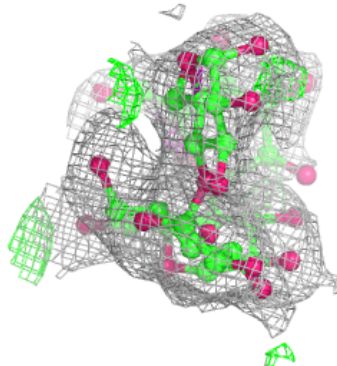
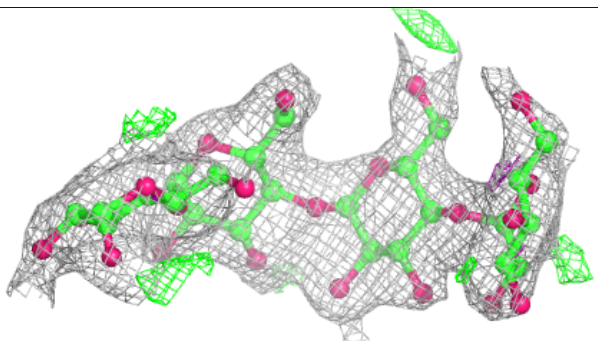
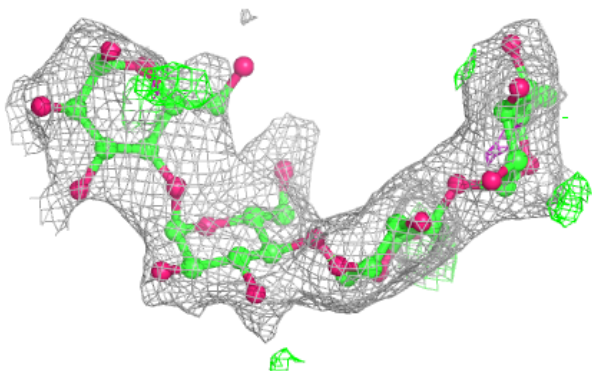
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

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)

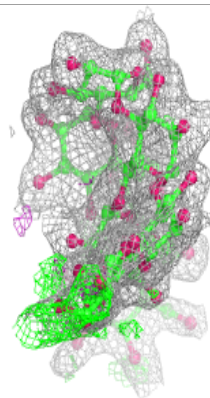
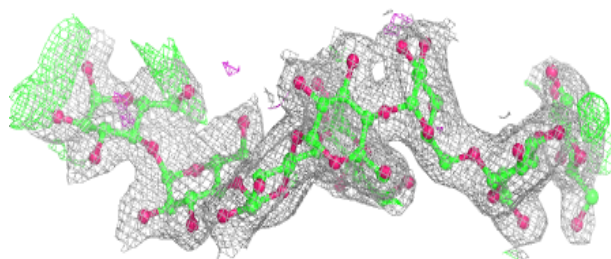
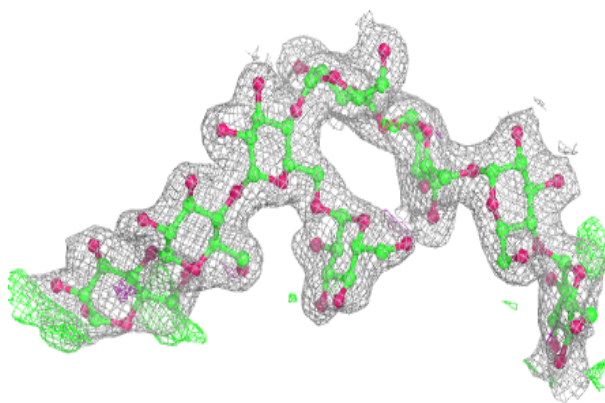
**Electron density around Chain H:**

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



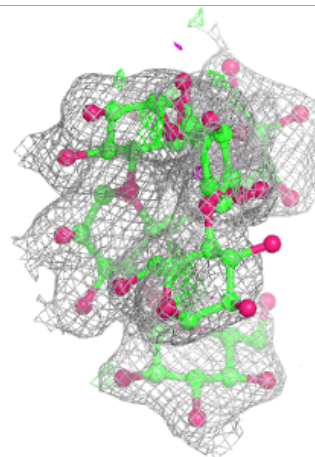
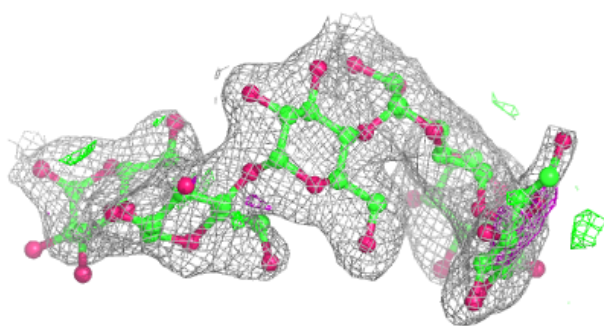
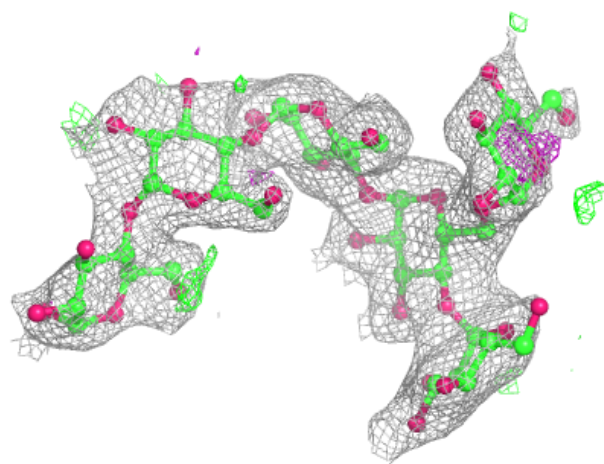
Electron density around Chain D:

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



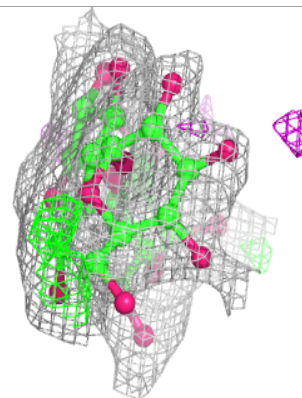
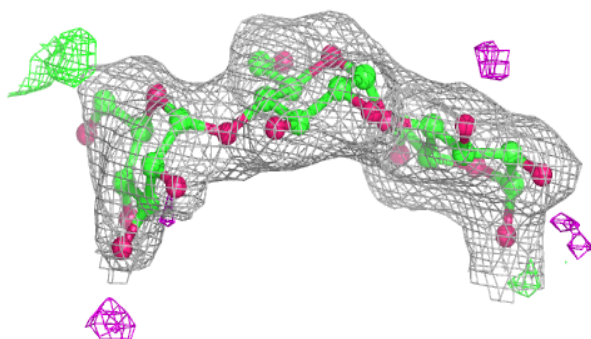
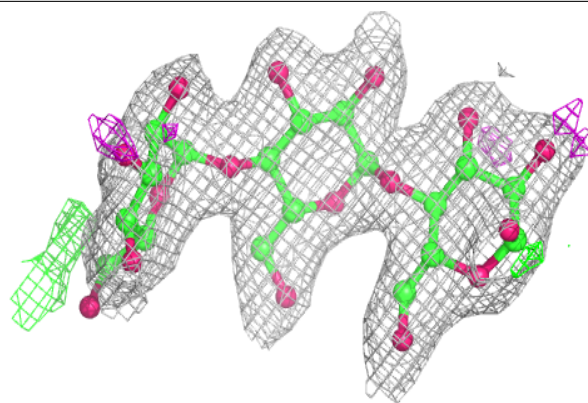
Electron density around Chain E:

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

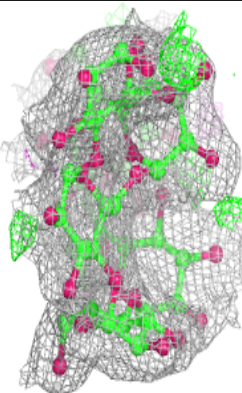
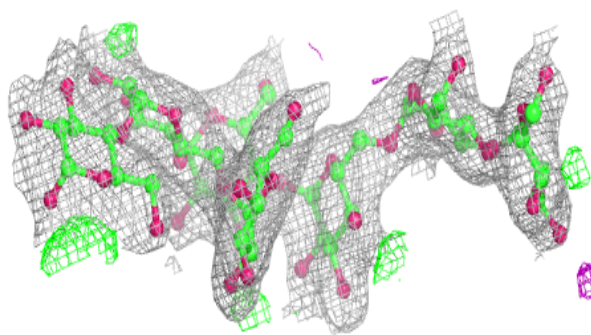
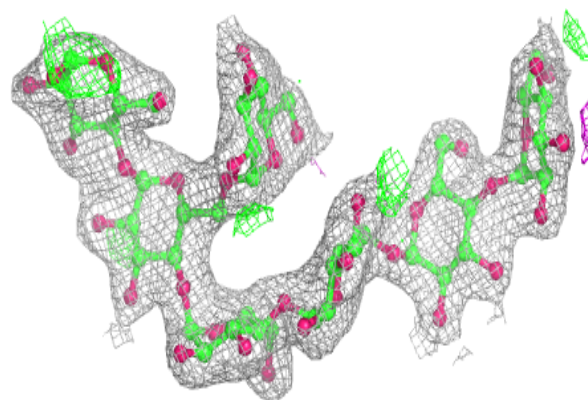


Electron density around Chain F:

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

**Electron density around Chain G:**

$2mF_o-DF_c$ (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
7	CA	A	720	1/1	0.80	0.41	89,89,89,89	0
8	GOL	A	721	6/6	0.81	0.19	49,53,63,63	0
7	CA	B	716	1/1	0.86	0.11	77,77,77,77	0
9	ACT	A	722	4/4	0.90	0.13	50,56,59,64	0
7	CA	B	715	1/1	0.98	0.14	41,41,41,41	0
7	CA	A	719	1/1	0.99	0.13	24,24,24,24	0

6.5 Other polymers [i](#)

There are no such residues in this entry.