Full wwPDB X-ray Structure Validation Report (i)

Oct 31, 2023 – 08:07 PM JST

PDB ID	:	5GZK
Title	:	Endo-beta-1,2-glucanase from Chitinophaga pinensis - sophorotriose and glucose complex
Authors	:	Abe, K.; Nakajima, M.; Arakawa, T.; Fushinobu, S.; Taguchi, H.
Deposited on	:	2016-09-28
Resolution	:	1.70 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:

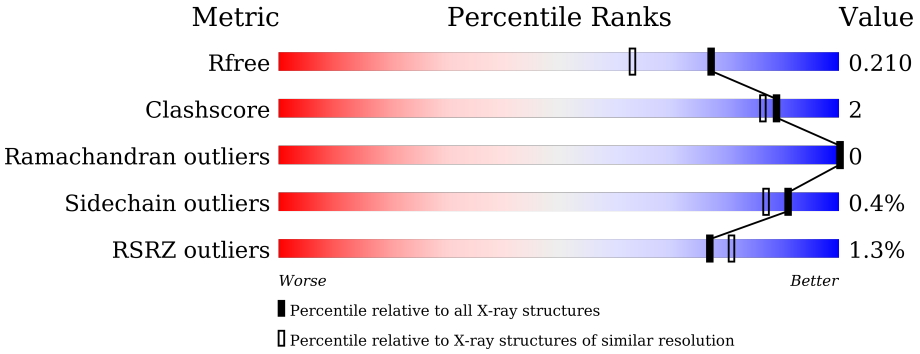
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 1.70 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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	461	.% 85% 6% 9%
1	B	461	.% 85% 5% 9%
2	C	3	100%
2	D	3	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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	CL	B	503	-	-	X	-

2 Entry composition (i)

There are 10 unique types of molecules in this entry. The entry contains 7577 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 Uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	418	3385	2188	564	616	17	0	0	0
1	B	418	3385	2188	564	616	17	0	0	0

There are 40 discrepancies between the modelled and reference sequences:

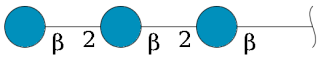
Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP C7PIC2
A	-18	GLY	-	expression tag	UNP C7PIC2
A	-17	SER	-	expression tag	UNP C7PIC2
A	-16	SER	-	expression tag	UNP C7PIC2
A	-15	HIS	-	expression tag	UNP C7PIC2
A	-14	HIS	-	expression tag	UNP C7PIC2
A	-13	HIS	-	expression tag	UNP C7PIC2
A	-12	HIS	-	expression tag	UNP C7PIC2
A	-11	HIS	-	expression tag	UNP C7PIC2
A	-10	HIS	-	expression tag	UNP C7PIC2
A	-9	SER	-	expression tag	UNP C7PIC2
A	-8	SER	-	expression tag	UNP C7PIC2
A	-7	GLY	-	expression tag	UNP C7PIC2
A	-6	LEU	-	expression tag	UNP C7PIC2
A	-5	VAL	-	expression tag	UNP C7PIC2
A	-4	PRO	-	expression tag	UNP C7PIC2
A	-3	ARG	-	expression tag	UNP C7PIC2
A	-2	GLY	-	expression tag	UNP C7PIC2
A	-1	SER	-	expression tag	UNP C7PIC2
A	0	HIS	-	expression tag	UNP C7PIC2
B	-19	MET	-	initiating methionine	UNP C7PIC2
B	-18	GLY	-	expression tag	UNP C7PIC2
B	-17	SER	-	expression tag	UNP C7PIC2
B	-16	SER	-	expression tag	UNP C7PIC2
B	-15	HIS	-	expression tag	UNP C7PIC2

Continued on next page...

Continued from previous page...

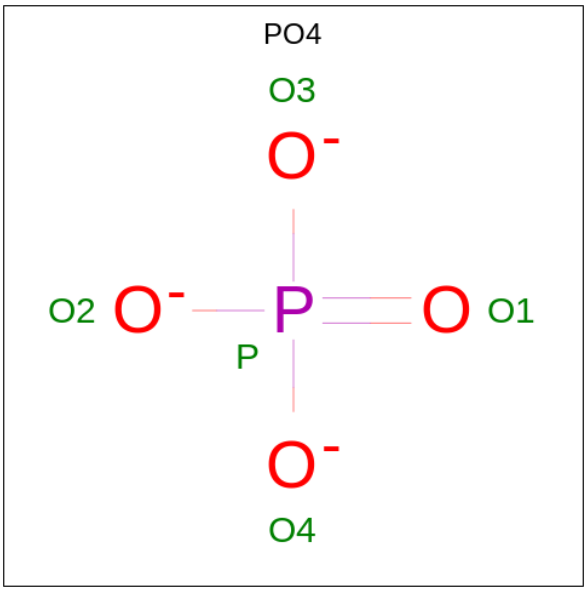
Chain	Residue	Modelled	Actual	Comment	Reference
B	-14	HIS	-	expression tag	UNP C7PIC2
B	-13	HIS	-	expression tag	UNP C7PIC2
B	-12	HIS	-	expression tag	UNP C7PIC2
B	-11	HIS	-	expression tag	UNP C7PIC2
B	-10	HIS	-	expression tag	UNP C7PIC2
B	-9	SER	-	expression tag	UNP C7PIC2
B	-8	SER	-	expression tag	UNP C7PIC2
B	-7	GLY	-	expression tag	UNP C7PIC2
B	-6	LEU	-	expression tag	UNP C7PIC2
B	-5	VAL	-	expression tag	UNP C7PIC2
B	-4	PRO	-	expression tag	UNP C7PIC2
B	-3	ARG	-	expression tag	UNP C7PIC2
B	-2	GLY	-	expression tag	UNP C7PIC2
B	-1	SER	-	expression tag	UNP C7PIC2
B	0	HIS	-	expression tag	UNP C7PIC2

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



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
2	C	3	34	18	16	0	0	0
			Total	C	O			
2	D	3	34	18	16	0	0	0

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).

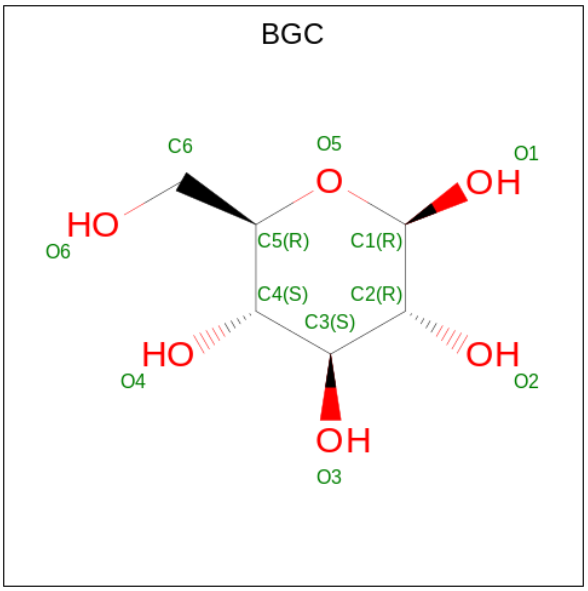


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O P 5 4 1	0	0
3	B	1	Total O P 5 4 1	0	0

- Molecule 4 is POTASSIUM ION (three-letter code: K) (formula: K).

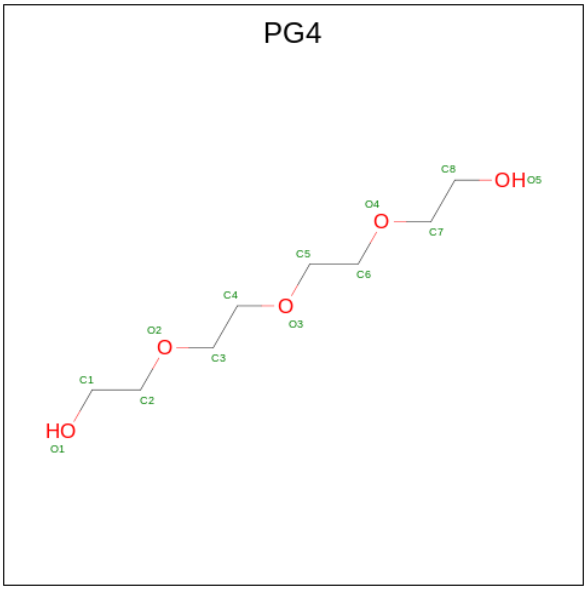
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total K 1 1	0	0
4	B	1	Total K 1 1	0	0

- Molecule 5 is beta-D-glucopyranose (three-letter code: BGC) (formula: $C_6H_{12}O_6$).



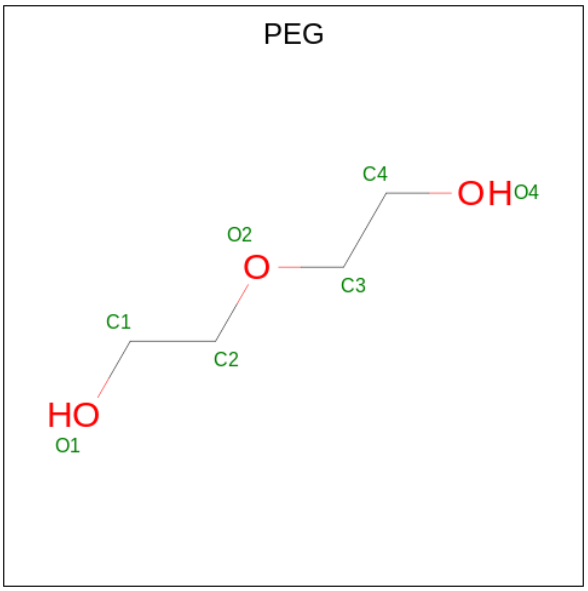
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
5	A	1	12	6	6	0	0
			Total	C	O		
5	B	1	12	6	6	0	0

- Molecule 6 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: $C_8H_{18}O_5$).



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

- Molecule 7 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).

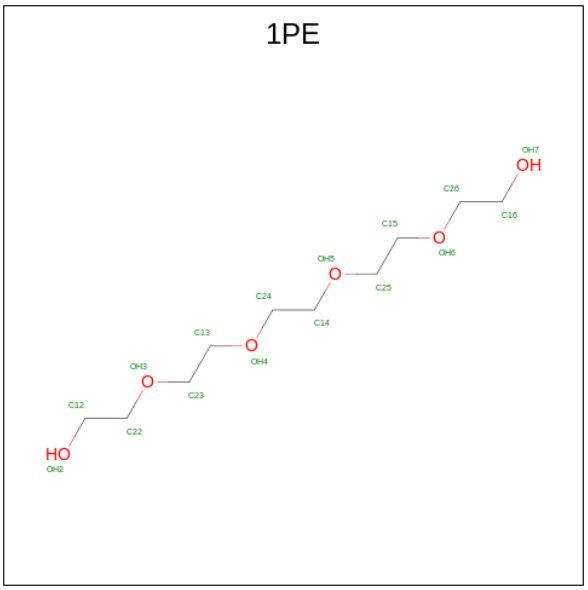


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total C O 7 4 3	0	0

- Molecule 8 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total Cl 1 1	0	0

- Molecule 9 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: $C_{10}H_{22}O_6$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
9	B	1	16	10	6	0	0

- Molecule 10 is water.

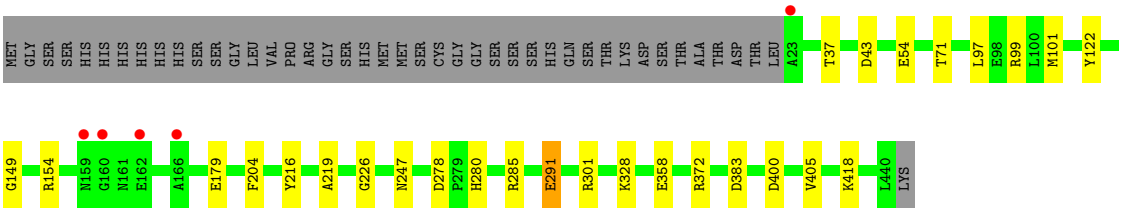
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
10	A	334	334	334	0	0
			Total	O		
10	B	332	332	332	0	0

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.

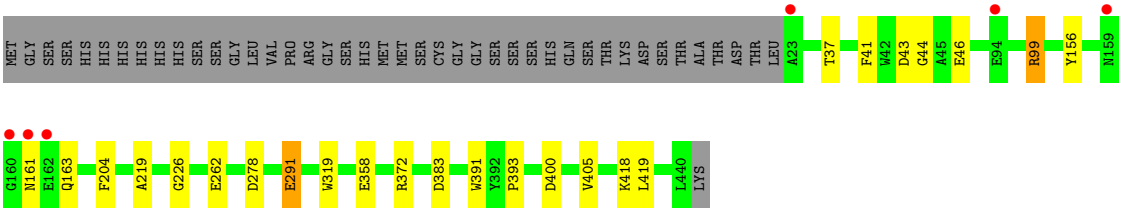
• Molecule 1: Uncharacterized protein

Chain A:



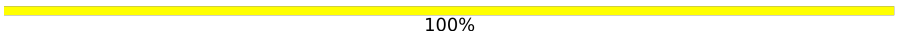
• Molecule 1: Uncharacterized protein

Chain B:



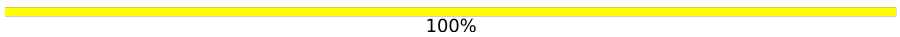
• Molecule 2: beta-D-glucopyranose-(1-2)-beta-D-glucopyranose-(1-2)-beta-D-glucopyranose

Chain C:



• Molecule 2: beta-D-glucopyranose-(1-2)-beta-D-glucopyranose-(1-2)-beta-D-glucopyranose

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	126.11Å 117.40Å 75.55Å 90.00° 92.56° 90.00°	Depositor
Resolution (Å)	49.46 – 1.70 37.82 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.9 (49.46-1.70) 99.9 (37.82-1.70)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.48 (at 1.70Å)	Xtriage
Refinement program	REFMAC 5.8.0107	Depositor
R, R_{free}	0.166 , 0.199 0.181 , 0.210	Depositor DCC
R_{free} test set	5990 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å^2)	14.3	Xtriage
Anisotropy	0.037	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 47.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.083 for -h,-k,l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	7577	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.72% 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: 1PE, PG4, PO4, CL, K, PEG, BGC

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	1.26	8/3499 (0.2%)	1.11	10/4753 (0.2%)
1	B	1.27	9/3499 (0.3%)	1.10	5/4753 (0.1%)
All	All	1.27	17/6998 (0.2%)	1.10	15/9506 (0.2%)

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	358	GLU	CG-CD	9.08	1.65	1.51
1	B	358	GLU	CG-CD	8.32	1.64	1.51
1	A	358	GLU	CD-OE2	6.73	1.33	1.25
1	A	291	GLU	CD-OE1	6.61	1.32	1.25
1	B	262	GLU	CD-OE1	5.98	1.32	1.25
1	A	149	GLY	N-CA	-5.98	1.37	1.46
1	A	216	TYR	CG-CD1	5.84	1.46	1.39
1	B	156	TYR	CE2-CZ	-5.76	1.31	1.38
1	B	44	GLY	N-CA	5.72	1.54	1.46
1	A	291	GLU	CD-OE2	5.49	1.31	1.25
1	B	46	GLU	CD-OE2	5.32	1.31	1.25
1	B	358	GLU	CD-OE2	5.26	1.31	1.25
1	B	291	GLU	CD-OE2	5.23	1.31	1.25
1	A	122	TYR	CE2-CZ	5.07	1.45	1.38
1	A	179	GLU	CG-CD	-5.07	1.44	1.51
1	B	319	TRP	CB-CG	-5.02	1.41	1.50
1	B	419	LEU	N-CA	-5.01	1.36	1.46

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	278	ASP	CB-CG-OD1	9.07	126.47	118.30
1	A	43	ASP	CB-CG-OD1	-7.80	111.28	118.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	285	ARG	NE-CZ-NH1	7.24	123.92	120.30
1	A	43	ASP	CB-CG-OD2	7.05	124.65	118.30
1	A	301	ARG	NE-CZ-NH1	6.87	123.73	120.30
1	A	301	ARG	NE-CZ-NH2	-6.74	116.93	120.30
1	A	278	ASP	CB-CG-OD2	6.24	123.91	118.30
1	A	372	ARG	NE-CZ-NH1	6.21	123.40	120.30
1	B	43	ASP	CB-CG-OD1	-5.96	112.94	118.30
1	A	54	GLU	OE1-CD-OE2	-5.90	116.22	123.30
1	A	154	ARG	NE-CZ-NH2	-5.67	117.46	120.30
1	B	372	ARG	NE-CZ-NH1	5.46	123.03	120.30
1	A	99	ARG	NE-CZ-NH1	5.32	122.96	120.30
1	B	43	ASP	CB-CG-OD2	5.27	123.04	118.30
1	B	99	ARG	NE-CZ-NH1	5.21	122.90	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	3385	0	3193	14	0
1	B	3385	0	3193	11	0
2	C	34	0	30	0	0
2	D	34	0	29	0	0
3	A	5	0	0	1	0
3	B	5	0	0	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	12	0	12	0	0
5	B	12	0	12	1	0
6	A	13	0	18	5	0
7	A	7	0	10	0	0
8	B	1	0	0	3	0
9	B	16	0	22	2	0
10	A	334	0	0	2	1
10	B	332	0	0	2	2

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	7577	0	6519	26	3

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 (26) 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)
5:B:504:BGC:H3	10:B:834:HOH:O	1.66	0.93
1:A:418:LYS:HZ3	6:A:504:PG4:H22	1.57	0.70
1:A:418:LYS:NZ	6:A:504:PG4:H22	2.07	0.70
1:A:291:GLU:OE2	3:A:501:PO4:O4	2.17	0.62
1:B:291:GLU:OE2	3:B:501:PO4:O4	2.20	0.60
1:A:418:LYS:CE	6:A:504:PG4:H22	2.32	0.60
1:B:418:LYS:HD3	9:B:505:1PE:H131	1.84	0.59
1:A:97:LEU:HG	1:A:101:MET:CE	2.35	0.57
1:B:418:LYS:CD	9:B:505:1PE:H131	2.35	0.57
1:B:99:ARG:HD2	8:B:503:CL:CL	2.43	0.56
1:A:418:LYS:HZ3	6:A:504:PG4:C2	2.20	0.55
1:B:99:ARG:NH1	8:B:503:CL:CL	2.61	0.52
1:A:247:ASN:HB3	10:A:764:HOH:O	2.10	0.51
1:A:328:LYS:HD3	10:A:754:HOH:O	2.10	0.51
1:A:97:LEU:HG	1:A:101:MET:HE2	1.92	0.51
1:B:383:ASP:OD1	1:B:400:ASP:OD2	2.31	0.48
1:A:219:ALA:O	1:A:226:GLY:HA2	2.15	0.47
1:A:418:LYS:CD	6:A:504:PG4:H22	2.46	0.46
1:A:383:ASP:OD1	1:A:400:ASP:OD2	2.34	0.45
1:A:280:HIS:HE1	10:B:893:HOH:O	1.99	0.43
1:B:37:THR:HG22	1:B:405:VAL:HG23	1.99	0.43
1:B:161:ASN:OD1	1:B:163:GLN:N	2.51	0.43
1:B:219:ALA:O	1:B:226:GLY:HA2	2.19	0.43
1:A:37:THR:HG22	1:A:405:VAL:HG23	2.01	0.43
1:B:391:TRP:CZ2	1:B:393:PRO:HG3	2.55	0.41
1:B:41:PHE:O	8:B:503:CL:CL	2.76	0.41

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:B:903:HOH:O	10:B:903:HOH:O[2_655]	1.03	1.17

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:A:891:HOH:O	10:A:891:HOH:O[2_555]	1.14	1.06
10:B:875:HOH:O	10:B:875:HOH:O[2_655]	1.14	1.06

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	416/461 (90%)	399 (96%)	17 (4%)	0	100	100
1	B	416/461 (90%)	402 (97%)	14 (3%)	0	100	100
All	All	832/922 (90%)	801 (96%)	31 (4%)	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	348/385 (90%)	346 (99%)	2 (1%)	86	80
1	B	348/385 (90%)	347 (100%)	1 (0%)	92	89
All	All	696/770 (90%)	693 (100%)	3 (0%)	91	87

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	71	THR

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	204	PHE
1	B	204	PHE

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	251	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)

6 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	BGC	C	1	2	12,12,12	0.79	0	17,17,17	1.66	5 (29%)
2	BGC	C	2	2	11,11,12	1.79	4 (36%)	15,15,17	2.05	5 (33%)
2	BGC	C	3	2	11,11,12	1.18	0	15,15,17	1.18	2 (13%)
2	BGC	D	1	2	12,12,12	0.95	0	17,17,17	1.09	1 (5%)
2	BGC	D	2	2	11,11,12	1.84	3 (27%)	15,15,17	2.32	5 (33%)
2	BGC	D	3	2	11,11,12	1.91	4 (36%)	15,15,17	1.41	2 (13%)

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	BGC	C	1	2	-	2/2/22/22	0/1/1/1
2	BGC	C	2	2	-	0/2/19/22	0/1/1/1
2	BGC	C	3	2	-	0/2/19/22	0/1/1/1
2	BGC	D	1	2	-	0/2/22/22	0/1/1/1
2	BGC	D	2	2	-	0/2/19/22	0/1/1/1
2	BGC	D	3	2	-	0/2/19/22	0/1/1/1

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	2	BGC	O4-C4	-3.66	1.34	1.43
2	C	2	BGC	C4-C5	3.42	1.60	1.53
2	D	2	BGC	O3-C3	3.11	1.50	1.43
2	D	3	BGC	C2-C3	3.04	1.57	1.52
2	D	3	BGC	C4-C5	2.65	1.58	1.53
2	C	2	BGC	O6-C6	2.59	1.53	1.42
2	C	2	BGC	O3-C3	2.49	1.48	1.43
2	D	2	BGC	O6-C6	2.37	1.52	1.42
2	D	3	BGC	O5-C5	2.23	1.48	1.43
2	D	3	BGC	O5-C1	2.08	1.47	1.43
2	C	2	BGC	C4-C3	2.02	1.57	1.52

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	2	BGC	C2-C3-C4	-4.66	102.83	110.89
2	C	2	BGC	C1-O5-C5	4.47	118.24	112.19
2	C	2	BGC	O3-C3-C4	4.03	119.66	110.35
2	C	1	BGC	C1-O5-C5	3.64	120.53	113.66
2	D	2	BGC	O3-C3-C4	3.56	118.59	110.35
2	D	2	BGC	O4-C4-C3	-3.45	102.38	110.35
2	D	2	BGC	C1-O5-C5	3.42	116.82	112.19
2	D	2	BGC	C3-C4-C5	3.41	116.31	110.24
2	C	2	BGC	O4-C4-C3	-3.18	103.00	110.35
2	D	1	BGC	C1-C2-C3	-2.85	104.39	110.31
2	C	1	BGC	C4-C3-C2	-2.76	106.01	110.82
2	D	3	BGC	O2-C2-C1	2.75	114.78	109.15
2	C	1	BGC	O5-C5-C4	2.65	114.51	109.69
2	D	3	BGC	O3-C3-C2	-2.57	105.06	109.99
2	C	3	BGC	C1-O5-C5	-2.40	108.94	112.19

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	3	BGC	O2-C2-C1	2.25	113.76	109.15
2	C	1	BGC	C3-C4-C5	-2.22	106.28	110.24
2	C	2	BGC	C6-C5-C4	2.18	118.12	113.00
2	C	1	BGC	O2-C2-C3	-2.16	105.36	110.35
2	C	2	BGC	C2-C3-C4	-2.05	107.34	110.89

There are no chirality outliers.

All (2) torsion outliers are listed below:

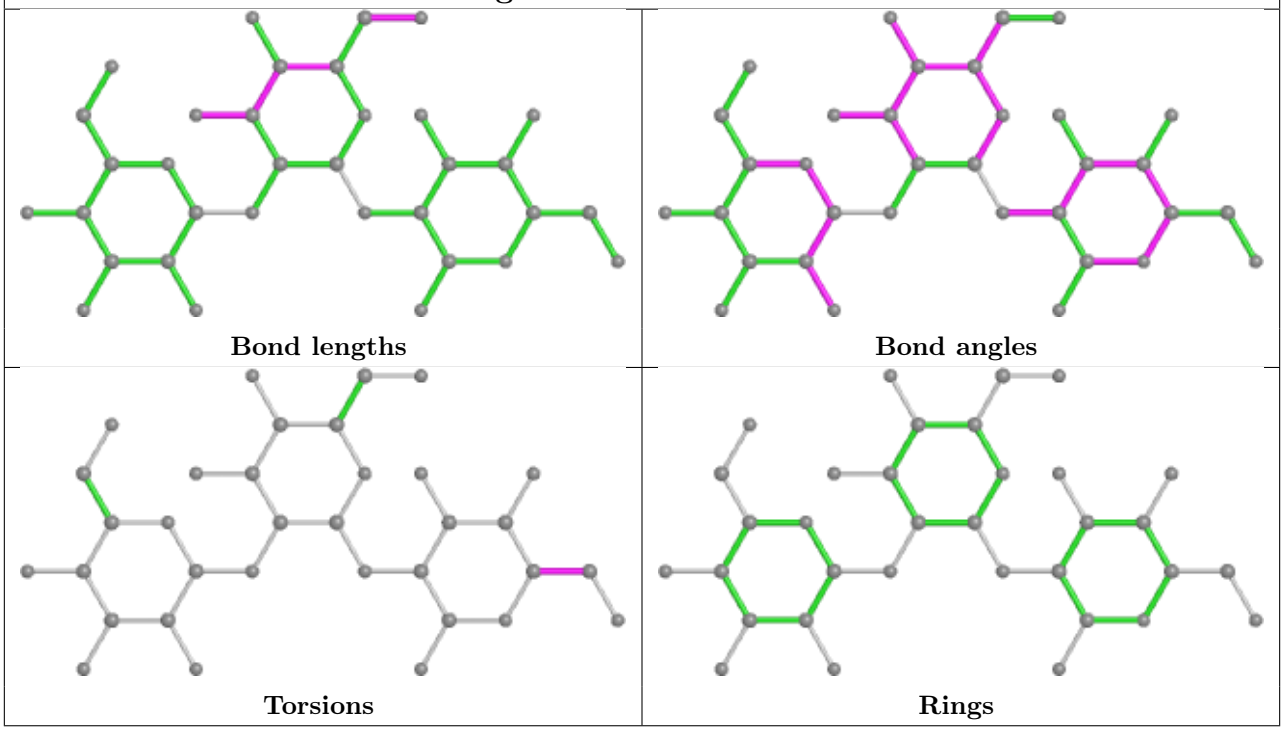
Mol	Chain	Res	Type	Atoms
2	C	1	BGC	O5-C5-C6-O6
2	C	1	BGC	C4-C5-C6-O6

There are no ring outliers.

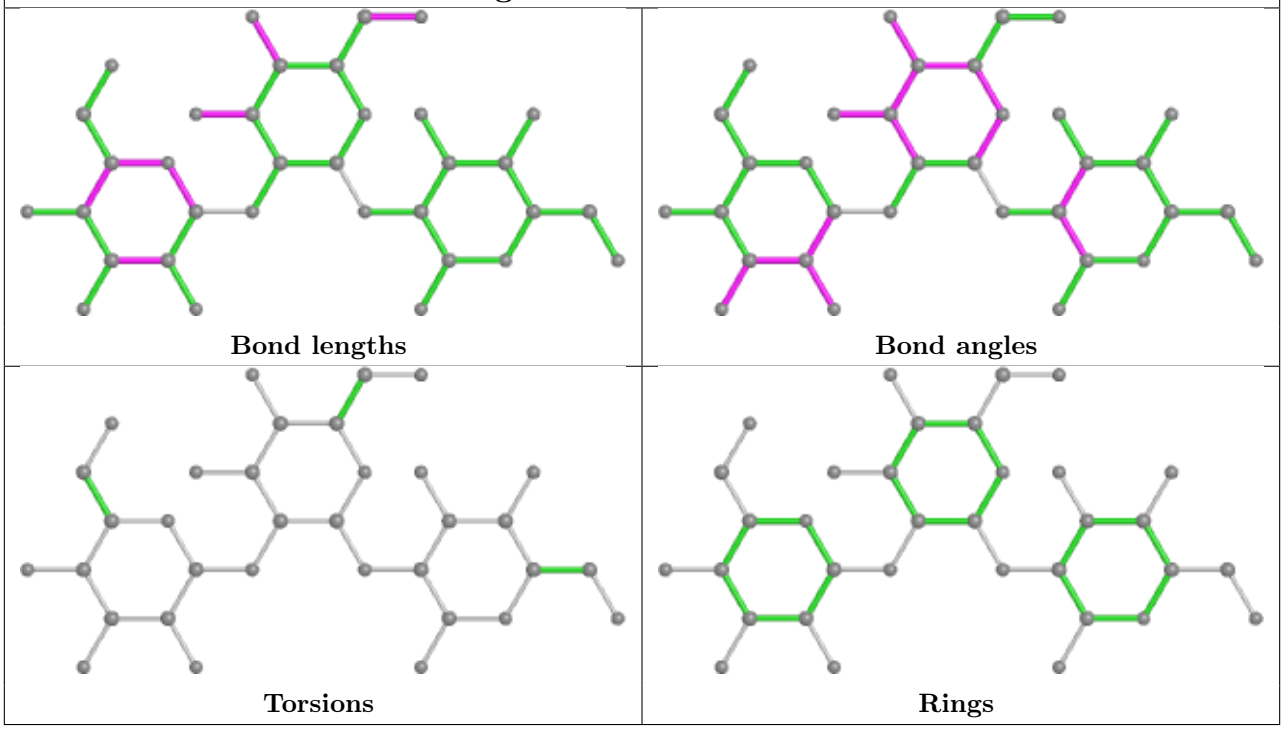
No monomer is involved in short contacts.

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)

Of 10 ligands modelled in this entry, 3 are monoatomic - leaving 7 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	$\#\|Z\| > 2$
6	PG4	A	504	-	12,12,12	0.88	0	11,11,11	1.45	1 (9%)
5	BGC	B	504	-	12,12,12	1.05	0	17,17,17	0.99	1 (5%)
7	PEG	A	505	-	6,6,6	0.81	0	5,5,5	1.22	1 (20%)
9	1PE	B	505	-	15,15,15	0.70	0	14,14,14	1.08	1 (7%)
3	PO4	A	501	-	4,4,4	1.39	1 (25%)	6,6,6	1.21	0
3	PO4	B	501	-	4,4,4	1.49	1 (25%)	6,6,6	0.95	0
5	BGC	A	503	-	12,12,12	1.08	0	17,17,17	1.62	3 (17%)

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
6	PG4	A	504	-	-	3/10/10/10	-
5	BGC	B	504	-	-	0/2/22/22	0/1/1/1
7	PEG	A	505	-	-	1/4/4/4	-
9	1PE	B	505	-	-	4/13/13/13	-
5	BGC	A	503	-	-	0/2/22/22	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	501	PO4	P-O3	2.60	1.62	1.54
3	A	501	PO4	P-O2	2.06	1.60	1.54

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	A	504	PG4	O2-C2-C1	3.82	126.83	110.07
5	A	503	BGC	C3-C4-C5	3.45	116.39	110.24
5	B	504	BGC	C4-C3-C2	2.98	116.03	110.82
5	A	503	BGC	C1-O5-C5	-2.54	108.88	113.66
7	A	505	PEG	O2-C3-C4	2.36	120.45	110.07
9	B	505	1PE	OH3-C22-C12	2.09	119.25	110.07
5	A	503	BGC	O1-C1-C2	-2.02	103.35	109.03

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	504	PG4	O1-C1-C2-O2
9	B	505	1PE	OH6-C15-C25-OH5
6	A	504	PG4	O3-C5-C6-O4
6	A	504	PG4	O4-C7-C8-O5
7	A	505	PEG	O2-C3-C4-O4
9	B	505	1PE	OH2-C12-C22-OH3
9	B	505	1PE	OH4-C13-C23-OH3
9	B	505	1PE	C23-C13-OH4-C24

There are no ring outliers.

5 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	504	PG4	5	0
5	B	504	BGC	1	0
9	B	505	1PE	2	0
3	A	501	PO4	1	0
3	B	501	PO4	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	418/461 (90%)	-0.07	5 (1%)	79	82	9, 16, 28, 50	0
1	B	418/461 (90%)	-0.08	6 (1%)	75	79	9, 17, 31, 57	0
All	All	836/922 (90%)	-0.08	11 (1%)	77	81	9, 17, 30, 57	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	159	ASN	3.4
1	A	159	ASN	3.1
1	B	160	GLY	3.0
1	B	162	GLU	2.9
1	A	162	GLU	2.8
1	A	23	ALA	2.7
1	A	160	GLY	2.4
1	A	166	ALA	2.3
1	B	23	ALA	2.2
1	B	94	GLU	2.1
1	B	161	ASN	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)

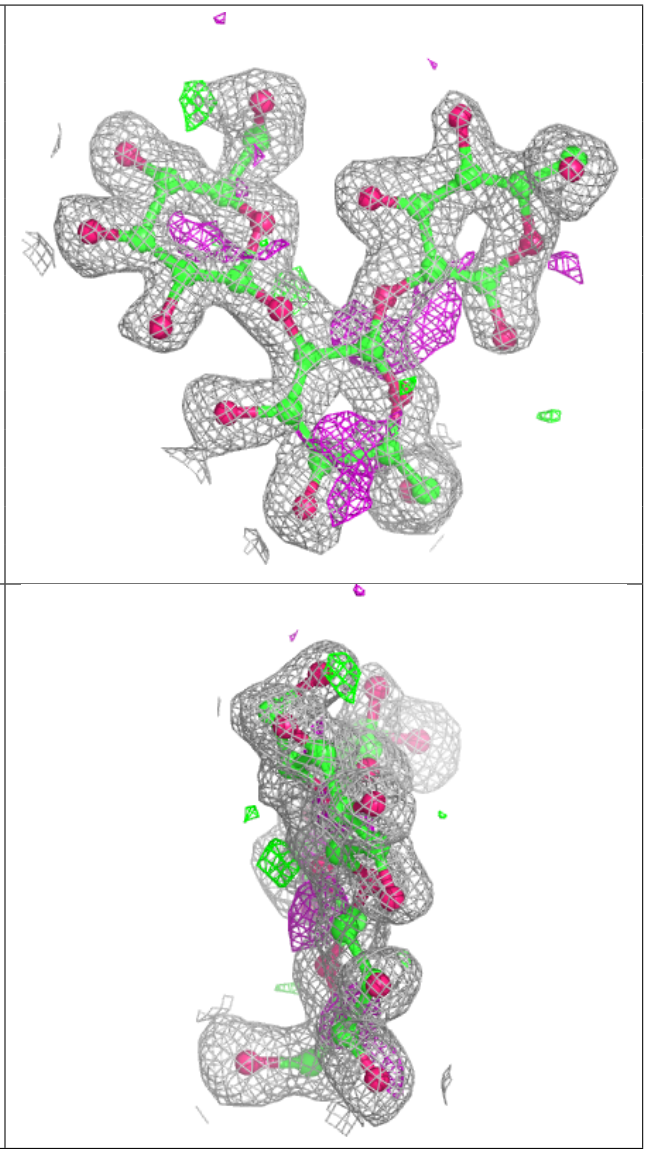
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	BGC	D	3	11/12	0.83	0.19	22,26,31,32	0
2	BGC	C	1	12/12	0.84	0.18	27,38,41,45	0
2	BGC	C	3	11/12	0.86	0.16	23,28,31,34	0
2	BGC	D	1	12/12	0.90	0.16	23,30,34,34	0
2	BGC	D	2	11/12	0.91	0.15	15,25,28,29	0
2	BGC	C	2	11/12	0.91	0.15	17,25,26,28	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.

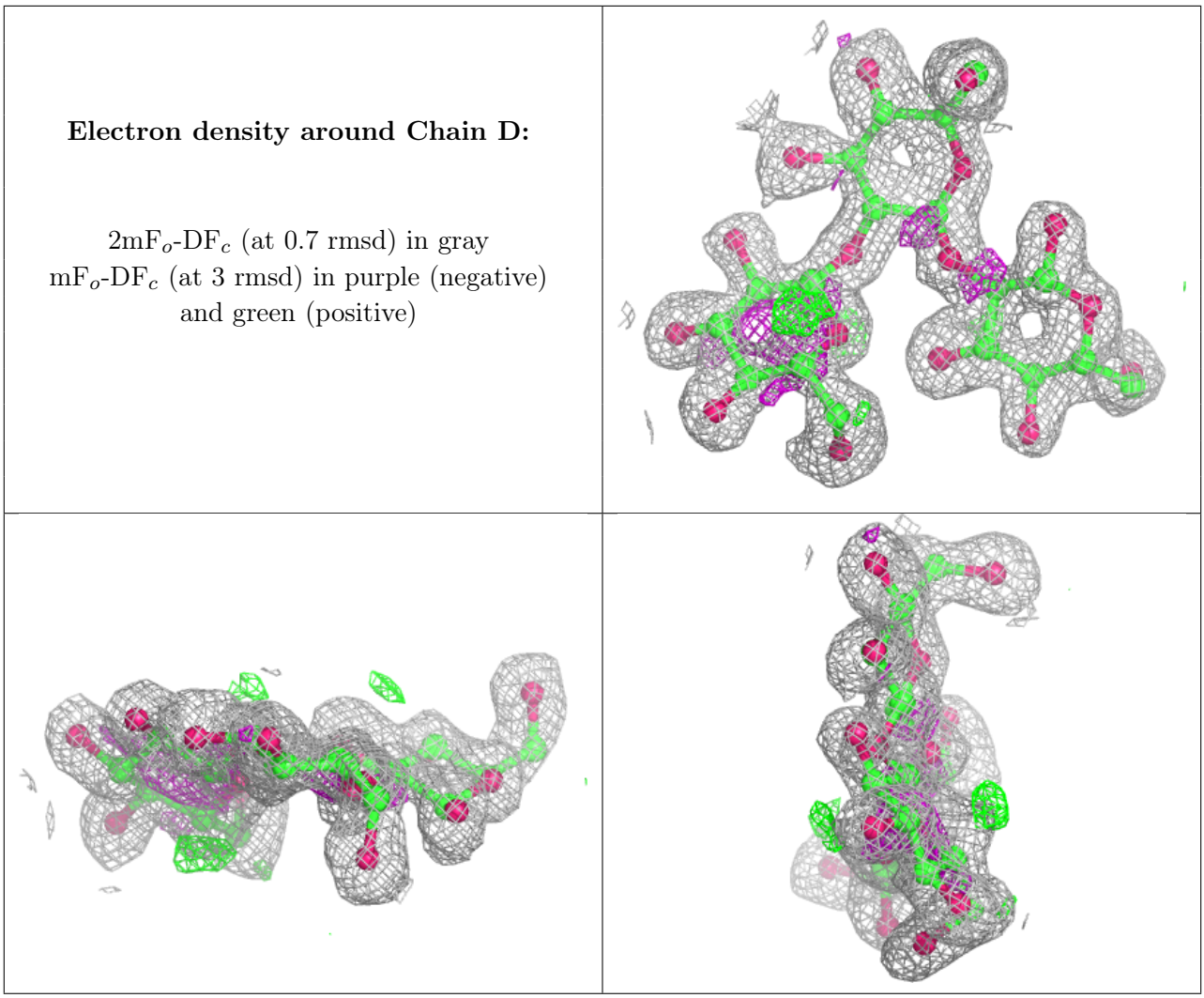
Electron density around Chain C:

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
9	1PE	B	505	16/16	0.80	0.17	31,35,42,47	0
6	PG4	A	504	13/13	0.82	0.16	30,32,39,40	0
5	BGC	B	504	12/12	0.82	0.18	32,46,51,51	0
5	BGC	A	503	12/12	0.83	0.17	28,40,46,48	0
7	PEG	A	505	7/7	0.88	0.10	32,33,36,41	0
8	CL	B	503	1/1	0.90	0.12	43,43,43,43	0
3	PO4	A	501	5/5	0.96	0.16	23,29,33,33	0
3	PO4	B	501	5/5	0.97	0.14	22,26,30,31	0
4	K	A	502	1/1	0.98	0.24	46,46,46,46	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	K	B	502	1/1	0.98	0.25	42,42,42,42	0

6.5 Other polymers (i)

There are no such residues in this entry.