



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 23, 2024 – 10:59 AM EDT

PDB ID : 3W37  
Title : Sugar beet alpha-glucosidase with acarbose  
Authors : Tagami, T.; Yamashita, K.; Okuyama, M.; Mori, H.; Yao, M.; Kimura, A.  
Deposited on : 2012-12-13  
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](mailto: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>.

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

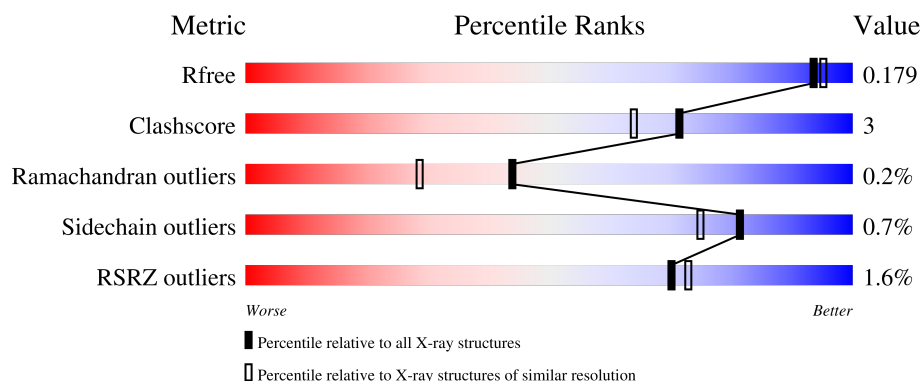
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 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))
$R_{free}$	164625	5161 (1.70-1.70)
Clashscore	180529	5671 (1.70-1.70)
Ramachandran outliers	177936	5594 (1.70-1.70)
Sidechain outliers	177891	5594 (1.70-1.70)
RSRZ outliers	164620	5159 (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  $\geq 3$ , 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	913	<div> <div style="width: 100%; height: 10px; background-color: red;"></div> <div style="display: flex; justify-content: space-between; align-items: center;"> <span>%</span> <div style="width: 85%; height: 10px; background-color: green;"></div> <div style="width: 5%; height: 10px; background-color: yellow;"></div> <div style="width: 10%; height: 10px; background-color: grey;"></div> </div> </div>
2	B	2	<div> <div style="width: 100%; height: 10px; background-color: yellow;"></div> <div style="text-align: center;">100%</div> </div>
3	C	3	<div> <div style="width: 67%; height: 10px; background-color: yellow;"></div> <div style="width: 33%; height: 10px; background-color: orange;"></div> <div style="display: flex; justify-content: space-between; align-items: center;"> <span>67%</span> <span>33%</span> </div> </div>
4	D	3	<div> <div style="width: 100%; height: 10px; background-color: orange;"></div> <div style="text-align: center;">100%</div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	ACY	A	1009	-	-	X	-
5	ACY	A	1013	-	-	X	-

## 2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 7682 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-glucosidase.

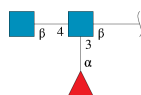
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	826	Total	C	N	O	S	0	26	0
			6784	4350	1148	1252	34			

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 is an oligosaccharide called alpha-L-fucopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose.

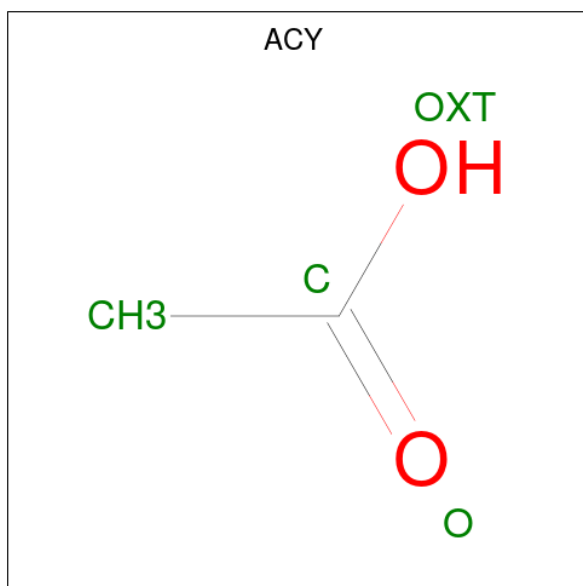


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	3	Total	C	N	O	0	0	0
			38	22	2	14			

- Molecule 4 is an oligosaccharide called 4,6-dideoxy-4-[(1S,4R,5S,6S)-4,5,6-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	D	3	Total	C	N	O	0	0	0
			44	25	1	18			

- Molecule 5 is ACETIC ACID (three-letter code: ACY) (formula:  $C_2H_4O_2$ ).



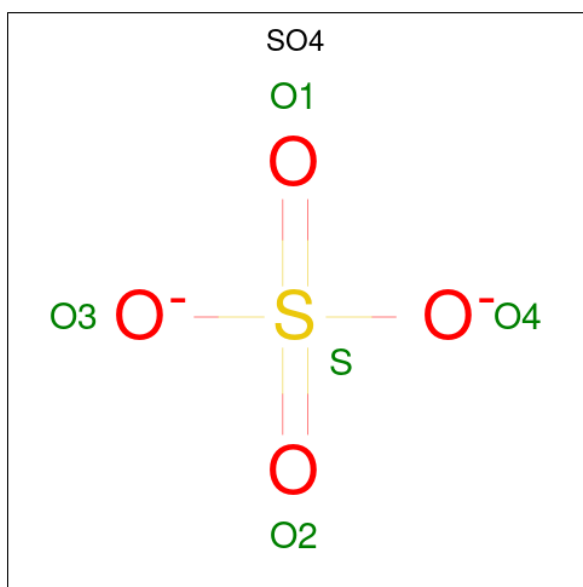
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



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

- Molecule 7 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

- Molecule 8 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



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

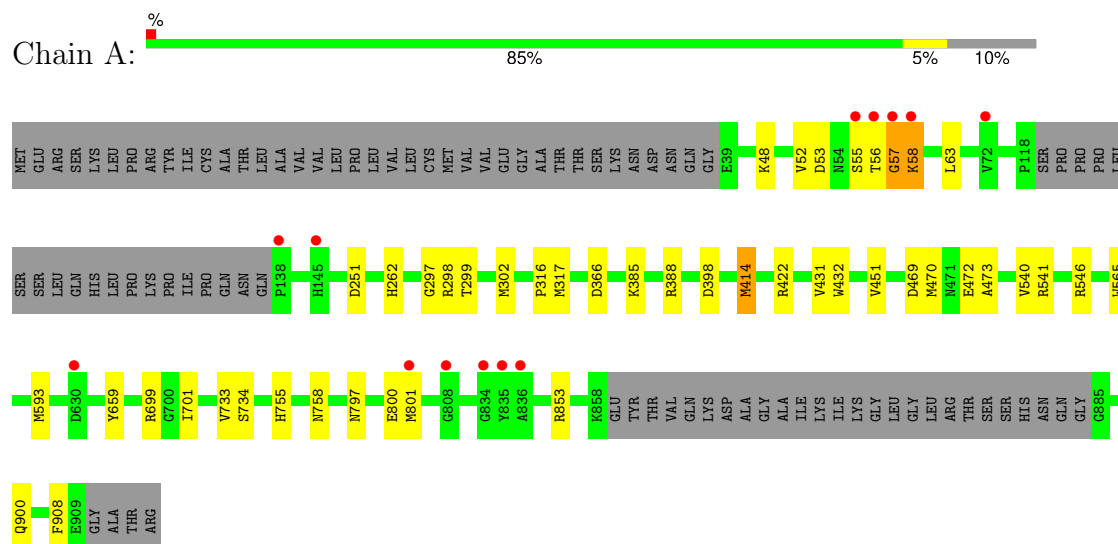
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	739	Total	O	0	0
			739	739		

### 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.

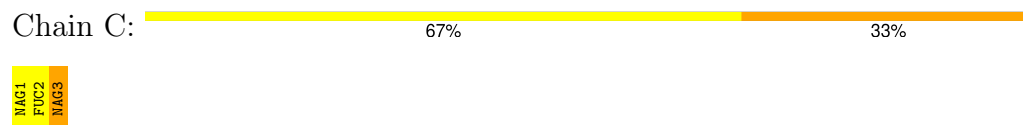
- Molecule 1: Alpha-glucosidase



- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 3: alpha-L-fucopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 4: 4,6-dideoxy-4-{[(1S,4R,5S,6S)-4,5,6-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose





GLC1  
GLC2  
AC13

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.36Å 98.20Å 108.75Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.53 – 1.70 39.53 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.9 (39.53-1.70) 99.9 (39.53-1.70)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.00 (at 1.70Å)	Xtriage
Refinement program	PHENIX 1.7.2 _860	Depositor
R, $R_{free}$	0.154 , 0.182 0.151 , 0.179	Depositor DCC
$R_{free}$ test set	2087 reflections (2.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	17.0	Xtriage
Anisotropy	0.078	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 41.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	7682	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.57% of the height of the origin peak. No significant pseudotranslation is detected.*

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

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

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GLC, AC1, GOL, SO4, NAG, FUC, ACY

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	0.65	0/6976	0.76	2/9496 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	366	ASP	CB-CG-OD2	6.11	123.80	118.30
1	A	422	ARG	NE-CZ-NH2	-5.67	117.46	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	6784	0	6573	40	0
2	B	28	0	25	0	0
3	C	38	0	34	1	0
4	D	44	0	30	2	0
5	A	12	0	9	7	0
6	A	18	0	24	2	0
7	A	5	0	0	0	0
8	A	14	0	13	0	0
9	A	739	0	0	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	7682	0	6708	44	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 (44) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:699[A]:ARG:HH21	1:A:758:ASN:HD22	1.25	0.84
1:A:755:HIS:ND1	5:A:1009:ACY:H1	1.94	0.82
4:D:1:GLC:H62	4:D:2:GLC:H5	1.71	0.73
1:A:299:THR:H	1:A:302[B]:MET:HE2	1.56	0.71
1:A:699[A]:ARG:HE	1:A:758:ASN:HD21	1.37	0.71
1:A:58:LYS:NZ	9:A:1700:HOH:O	2.24	0.66
1:A:733:VAL:HA	5:A:1013:ACY:H3	1.79	0.65
1:A:432:TRP:NE1	1:A:470[B]:MET:SD	2.71	0.64
6:A:1011:GOL:O3	6:A:1011:GOL:O1	2.17	0.63
1:A:699[A]:ARG:HH21	1:A:758:ASN:ND2	1.96	0.63
1:A:699[A]:ARG:HE	1:A:758:ASN:ND2	1.97	0.61
1:A:734:SER:H	5:A:1013:ACY:CH3	2.12	0.61
1:A:298:ARG:H	1:A:302[B]:MET:HE3	1.71	0.55
1:A:734:SER:H	5:A:1013:ACY:H1	1.72	0.53
1:A:472:GLU:N	1:A:473:ALA:HA	2.23	0.53
1:A:699[B]:ARG:CZ	5:A:1009:ACY:O	2.56	0.53
1:A:699[A]:ARG:NH2	1:A:758:ASN:HD22	2.02	0.52
1:A:48:LYS:HD3	1:A:63:LEU:HD23	1.92	0.52
1:A:398:ASP:OD1	1:A:470[B]:MET:HG3	2.10	0.51
1:A:55:SER:O	1:A:56:THR:OG1	2.24	0.51
1:A:298:ARG:NH1	9:A:1794:HOH:O	2.44	0.50
1:A:758:ASN:OD1	5:A:1009:ACY:H3	2.11	0.50
1:A:316:PRO:HB2	1:A:546:ARG:HD3	1.95	0.48
1:A:900:GLN:HG3	9:A:1627:HOH:O	2.14	0.47
1:A:734:SER:H	5:A:1013:ACY:H3	1.79	0.46
1:A:797:ASN:OD1	1:A:800:GLU:HG2	2.15	0.46
1:A:56:THR:HG22	1:A:57:GLY:O	2.15	0.46
1:A:317:MET:HG3	1:A:593[B]:MET:CE	2.47	0.45
1:A:540:VAL:HG22	1:A:801[A]:MET:HE1	2.00	0.44
1:A:593[B]:MET:HB2	1:A:593[B]:MET:HE2	1.78	0.43
1:A:414[A]:MET:HE2	9:A:1601:HOH:O	2.17	0.43
6:A:1008:GOL:H12	9:A:1412:HOH:O	2.17	0.43
1:A:659:TYR:CE2	1:A:701:ILE:HD12	2.53	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:385:LYS:HE3	1:A:385:LYS:HB3	1.58	0.42
1:A:469:ASP:OD2	4:D:3:AC1:HCB2	2.20	0.42
1:A:52:VAL:HG11	1:A:58:LYS:HE2	2.01	0.42
1:A:451:VAL:HG13	9:A:1675:HOH:O	2.19	0.41
9:A:1679:HOH:O	3:C:3:NAG:H5	2.20	0.41
1:A:541:ARG:NH1	9:A:1424:HOH:O	2.50	0.41
1:A:251:ASP:HB3	1:A:262:HIS:CE1	2.56	0.41
1:A:297:GLY:HA3	1:A:298:ARG:HA	1.91	0.41
1:A:540:VAL:HG13	1:A:801[A]:MET:HE3	2.02	0.41
1:A:699[B]:ARG:HH21	1:A:758:ASN:HD21	1.69	0.41
1:A:853:ARG:HG3	1:A:908:PHE:CD1	2.55	0.41

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	846/913 (93%)	823 (97%)	21 (2%)	2 (0%)	44 29

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	57	GLY
1	A	431	VAL

### 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	740/788 (94%)	734 (99%)	6 (1%)	79	71

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	53	ASP
1	A	58	LYS
1	A	388	ARG
1	A	414[A]	MET
1	A	414[B]	MET
1	A	565	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	758	ASN
1	A	778	HIS

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates ⓘ

8 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	NAG	B	1	2,1	14,14,15	0.67	1 (7%)	17,19,21	1.05	1 (5%)
2	NAG	B	2	2	14,14,15	0.58	0	17,19,21	0.96	1 (5%)
3	NAG	C	1	1,3	14,14,15	0.62	0	17,19,21	1.81	5 (29%)
3	FUC	C	2	3	10,10,11	1.52	2 (20%)	14,14,16	0.89	0
3	NAG	C	3	3	14,14,15	0.70	0	17,19,21	1.54	3 (17%)
4	GLC	D	1	4	12,12,12	0.60	0	17,17,17	1.27	1 (5%)
4	GLC	D	2	4	11,11,12	0.46	0	15,15,17	1.50	3 (20%)
4	AC1	D	3	4	21,22,23	1.04	2 (9%)	22,32,34	1.35	4 (18%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	B	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	B	2	2	-	0/6/23/26	0/1/1/1
3	NAG	C	1	1,3	-	0/6/23/26	0/1/1/1
3	FUC	C	2	3	-	-	0/1/1/1
3	NAG	C	3	3	-	2/6/23/26	0/1/1/1
4	GLC	D	1	4	-	0/2/22/22	0/1/1/1
4	GLC	D	2	4	-	0/2/19/22	0/1/1/1
4	AC1	D	3	4	-	2/6/43/46	0/2/2/2

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	3	AC1	C4A-C5B	-2.40	1.49	1.51
3	C	2	FUC	C6-C5	2.16	1.56	1.51
3	C	2	FUC	O4-C4	2.14	1.48	1.43
4	D	3	AC1	C7B-C5B	2.04	1.35	1.32
2	B	1	NAG	C1-C2	2.03	1.55	1.52

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1	NAG	O4-C4-C3	-3.66	101.74	110.38
4	D	2	GLC	C1-O5-C5	3.46	116.82	112.19
3	C	1	NAG	C2-N2-C7	-3.31	118.47	122.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1	NAG	O3-C3-C4	-3.17	102.90	110.38
4	D	3	AC1	O3-C3-C2	-3.16	103.60	110.05
4	D	1	GLC	C6-C5-C4	-3.09	105.43	113.02
4	D	2	GLC	O3-C3-C2	-2.99	103.95	110.05
3	C	1	NAG	O3-C3-C2	2.88	115.38	109.40
3	C	3	NAG	O4-C4-C5	2.70	115.97	109.32
3	C	1	NAG	O4-C4-C5	2.52	115.54	109.32
4	D	3	AC1	O3B-C3B-C4A	-2.50	104.68	109.64
2	B	1	NAG	C1-C2-N2	2.33	114.10	110.43
3	C	3	NAG	C1-O5-C5	-2.32	109.07	112.19
4	D	3	AC1	C6-C5-C4	-2.24	109.46	113.57
4	D	3	AC1	O6B-C6B-C5B	-2.21	105.79	112.74
2	B	2	NAG	C1-O5-C5	2.19	115.12	112.19
3	C	3	NAG	C6-C5-C4	2.03	118.01	113.02
4	D	2	GLC	C3-C4-C5	-2.00	106.60	110.23

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	3	NAG	C4-C5-C6-O6
4	D	3	AC1	C7B-C1B-N4A-C4
2	B	1	NAG	C8-C7-N2-C2
2	B	1	NAG	O7-C7-N2-C2
4	D	3	AC1	C7B-C5B-C6B-O6B
3	C	3	NAG	O5-C5-C6-O6

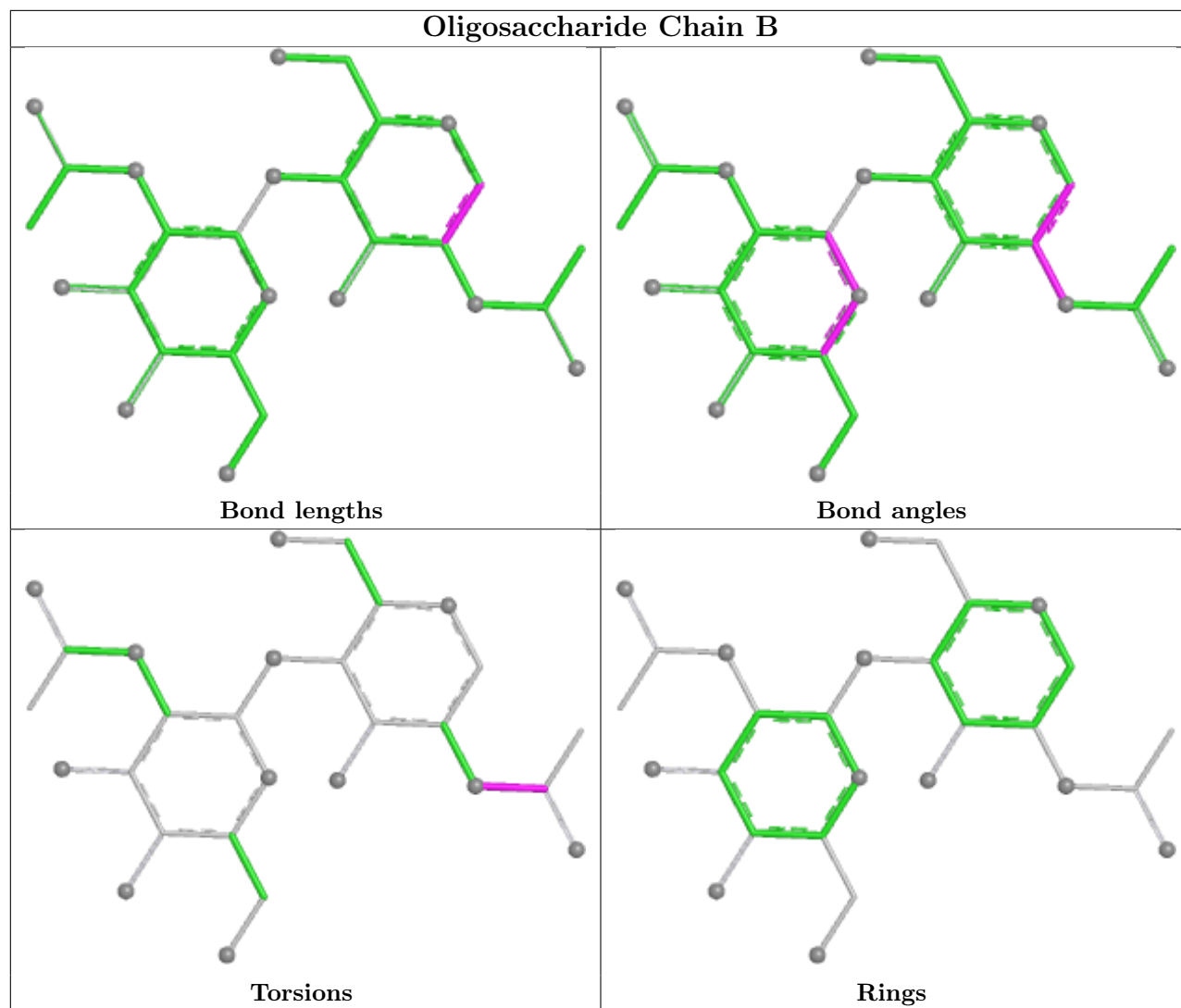
There are no ring outliers.

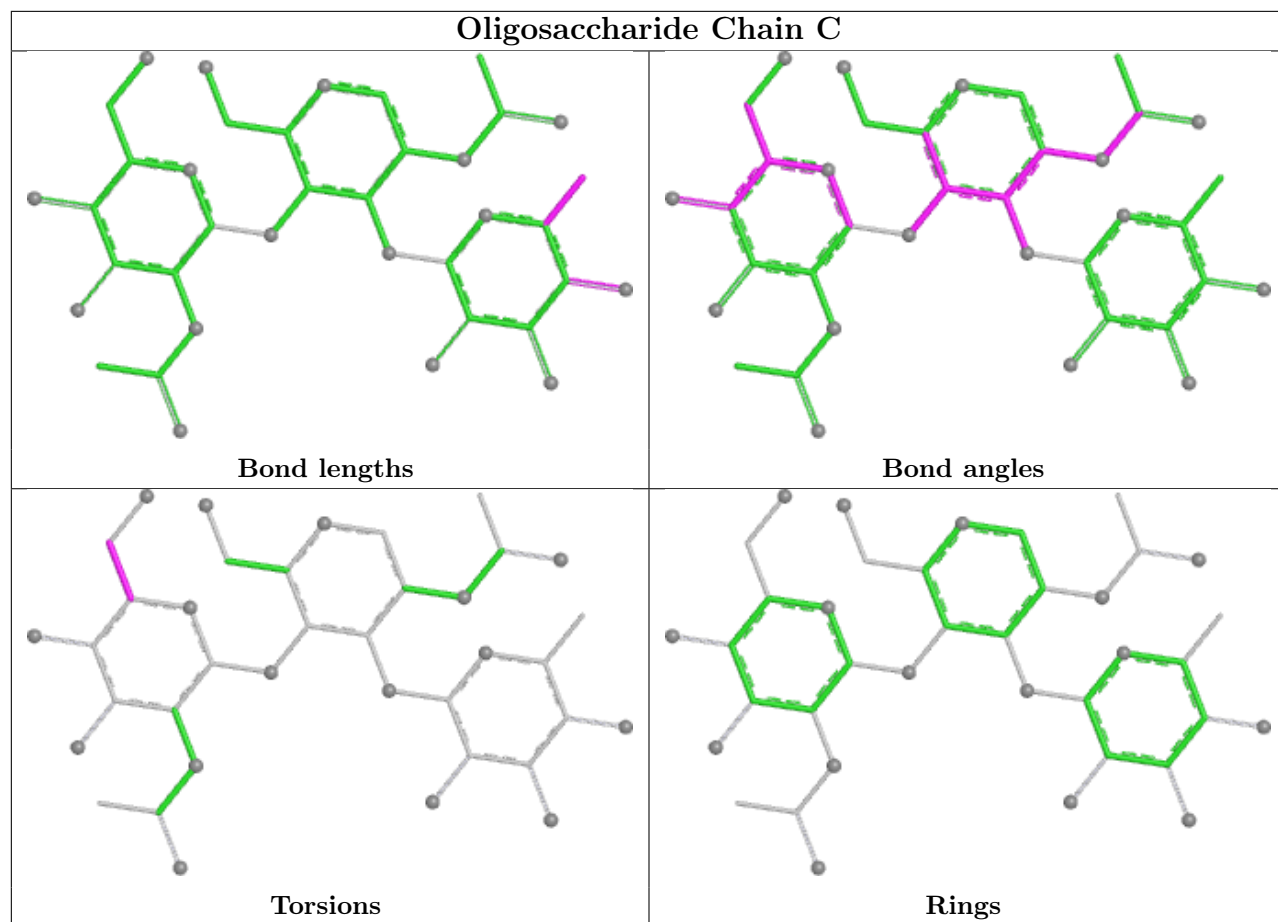
4 monomers are involved in 3 short contacts:

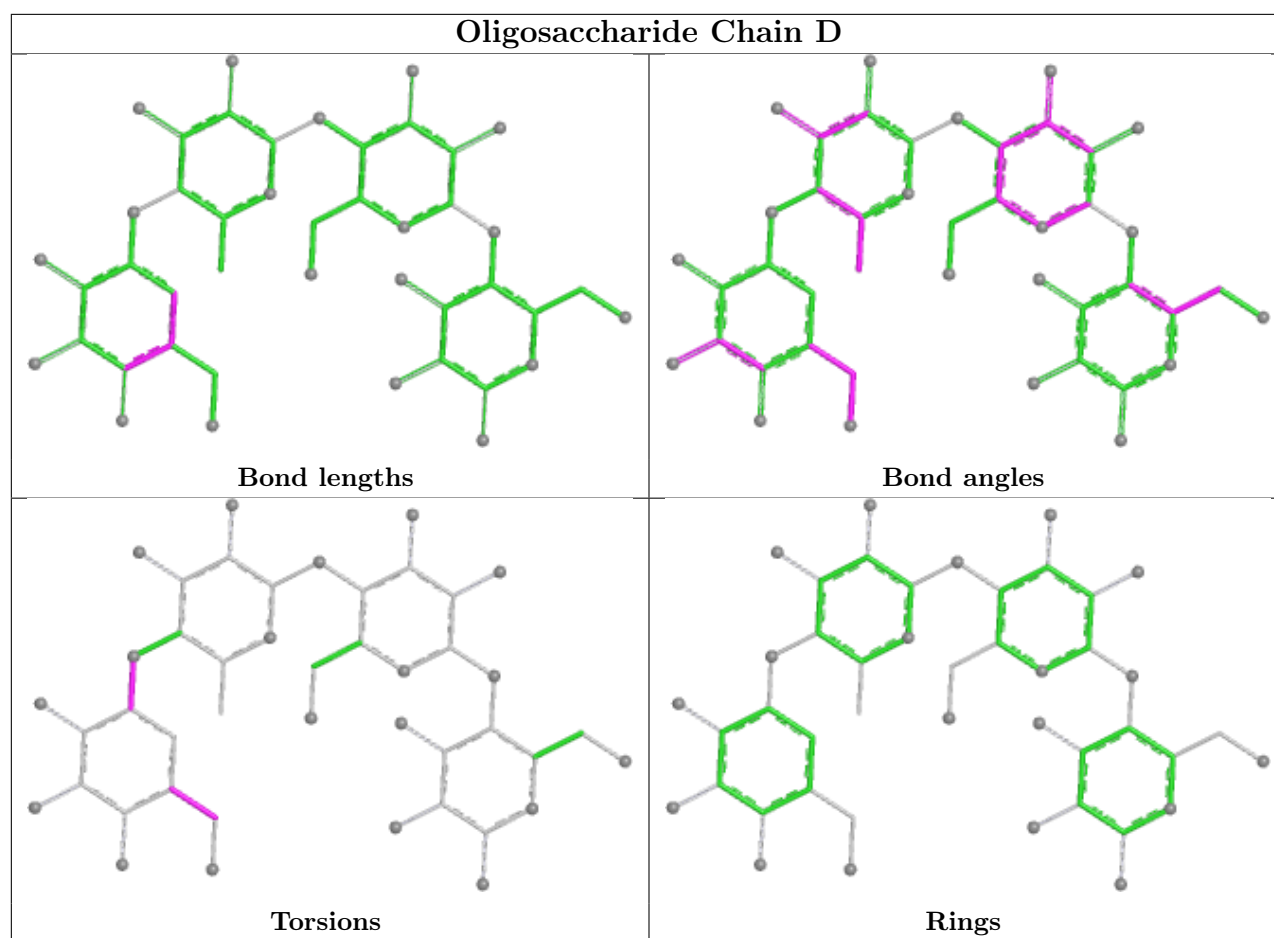
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	3	NAG	1	0
4	D	1	GLC	1	0
4	D	3	AC1	1	0
4	D	2	GLC	1	0

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](#)

8 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
5	ACY	A	1013	-	3,3,3	0.82	0	3,3,3	0.90	0
6	GOL	A	1011	-	5,5,5	0.51	0	5,5,5	0.75	0
8	NAG	A	1012	1	14,14,15	0.54	0	17,19,21	1.81	4 (23%)
6	GOL	A	1008	-	5,5,5	0.31	0	5,5,5	0.66	0
6	GOL	A	1014	-	5,5,5	0.31	0	5,5,5	0.97	0
5	ACY	A	1009	-	3,3,3	0.72	0	3,3,3	1.50	1 (33%)
7	SO4	A	1010	-	4,4,4	0.33	0	6,6,6	0.27	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	ACY	A	1007	-	3,3,3	0.83	0	3,3,3	0.70	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
6	GOL	A	1011	-	-	4/4/4/4	-
6	GOL	A	1014	-	-	2/4/4/4	-
8	NAG	A	1012	1	-	3/6/23/26	0/1/1/1
6	GOL	A	1008	-	-	0/4/4/4	-

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	A	1012	NAG	C1-O5-C5	4.70	118.49	112.19
8	A	1012	NAG	C1-C2-N2	3.21	115.48	110.43
8	A	1012	NAG	C4-C3-C2	-2.99	106.64	111.02
8	A	1012	NAG	O5-C1-C2	-2.47	107.47	111.29
5	A	1009	ACY	O-C-CH3	-2.06	114.09	122.53

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	1011	GOL	O1-C1-C2-O2
6	A	1011	GOL	O1-C1-C2-C3
6	A	1011	GOL	C1-C2-C3-O3
6	A	1014	GOL	O1-C1-C2-C3
8	A	1012	NAG	C1-C2-N2-C7
8	A	1012	NAG	C8-C7-N2-C2
8	A	1012	NAG	O7-C7-N2-C2
6	A	1011	GOL	O2-C2-C3-O3
6	A	1014	GOL	O1-C1-C2-O2

There are no ring outliers.

4 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1013	ACY	4	0
6	A	1011	GOL	1	0
6	A	1008	GOL	1	0
5	A	1009	ACY	3	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, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	826/913 (90%)	-0.51	13 (1%) 70 73	5, 17, 41, 82	26 (3%)

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	57	GLY	3.7
1	A	138	PRO	3.2
1	A	630	ASP	3.1
1	A	56	THR	3.0
1	A	55	SER	2.6
1	A	836	ALA	2.6
1	A	808	GLY	2.6
1	A	58	LYS	2.4
1	A	835	TYR	2.3
1	A	834	GLY	2.2
1	A	72[A]	VAL	2.1
1	A	145	HIS	2.0
1	A	801[A]	MET	2.0

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

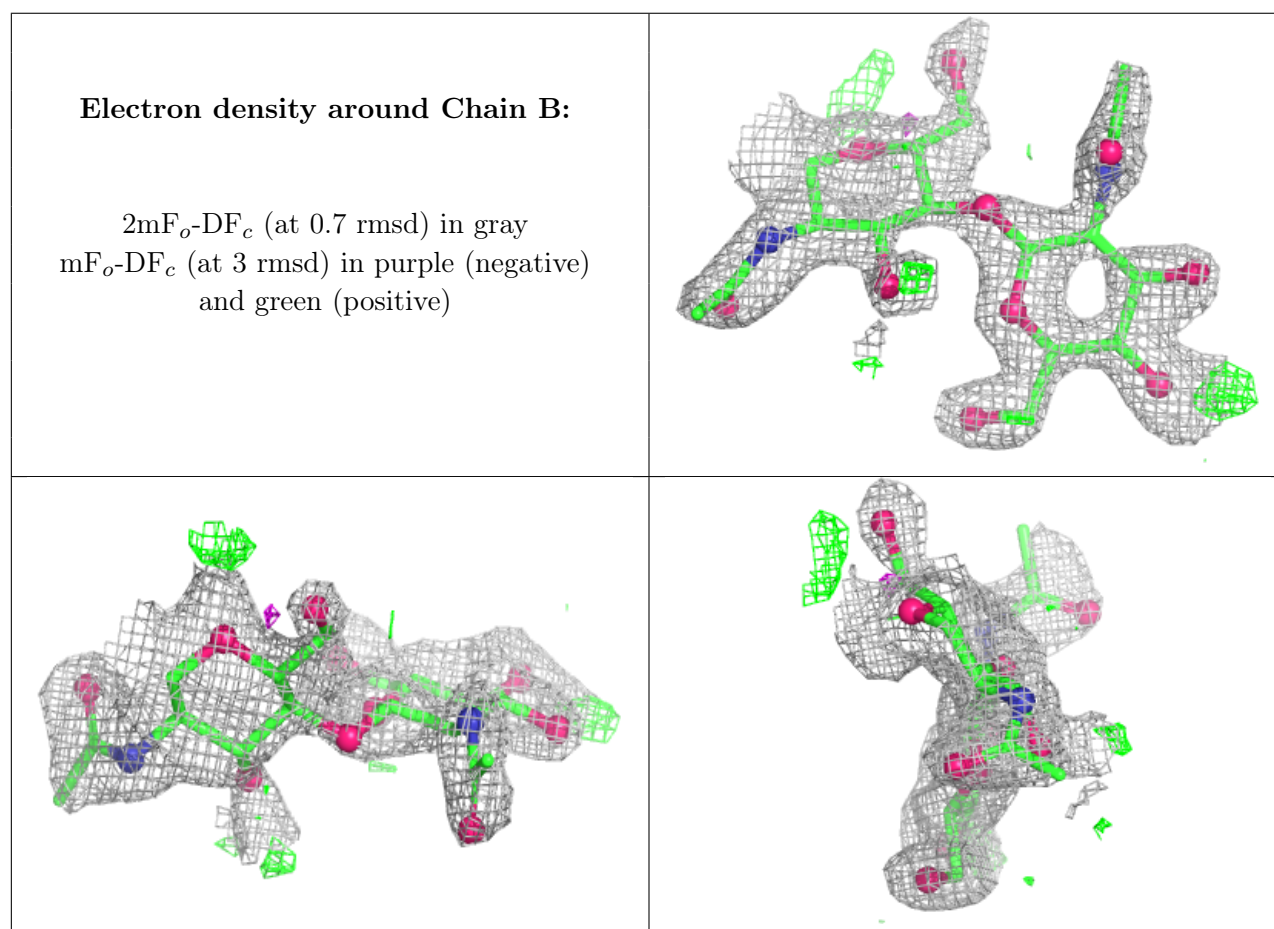
There are no non-standard protein/DNA/RNA residues in this entry.

### 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, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

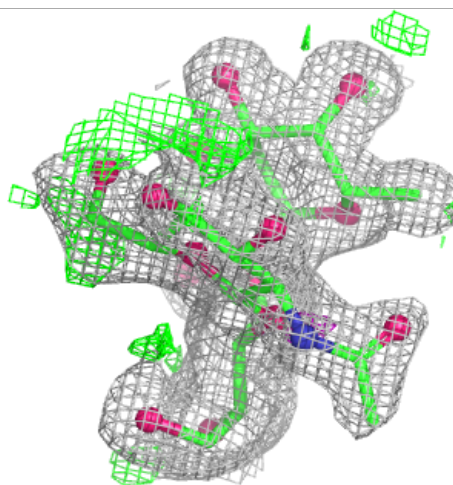
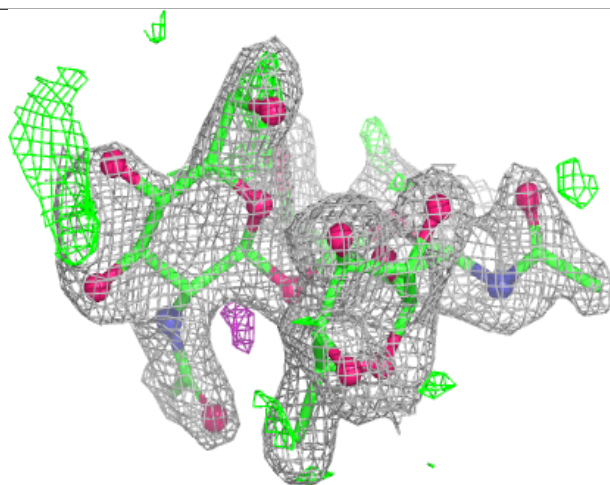
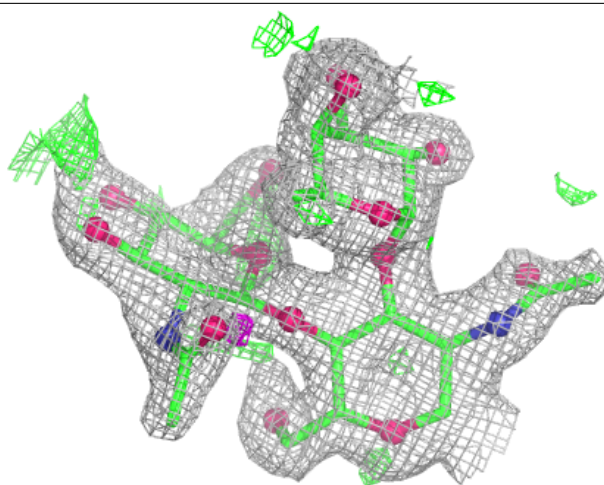
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NAG	B	1	14/15	0.60	0.15	51,64,68,69	0
2	NAG	B	2	14/15	0.68	0.15	54,62,67,67	0
3	NAG	C	3	14/15	0.71	0.15	46,52,58,58	0
3	NAG	C	1	14/15	0.87	0.10	27,38,46,47	0
3	FUC	C	2	10/11	0.88	0.10	28,34,38,38	0
4	GLC	D	1	12/12	0.90	0.10	22,35,41,45	0
4	GLC	D	2	11/12	0.95	0.06	17,20,24,25	0
4	AC1	D	3	21/22	0.96	0.06	13,18,23,23	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.

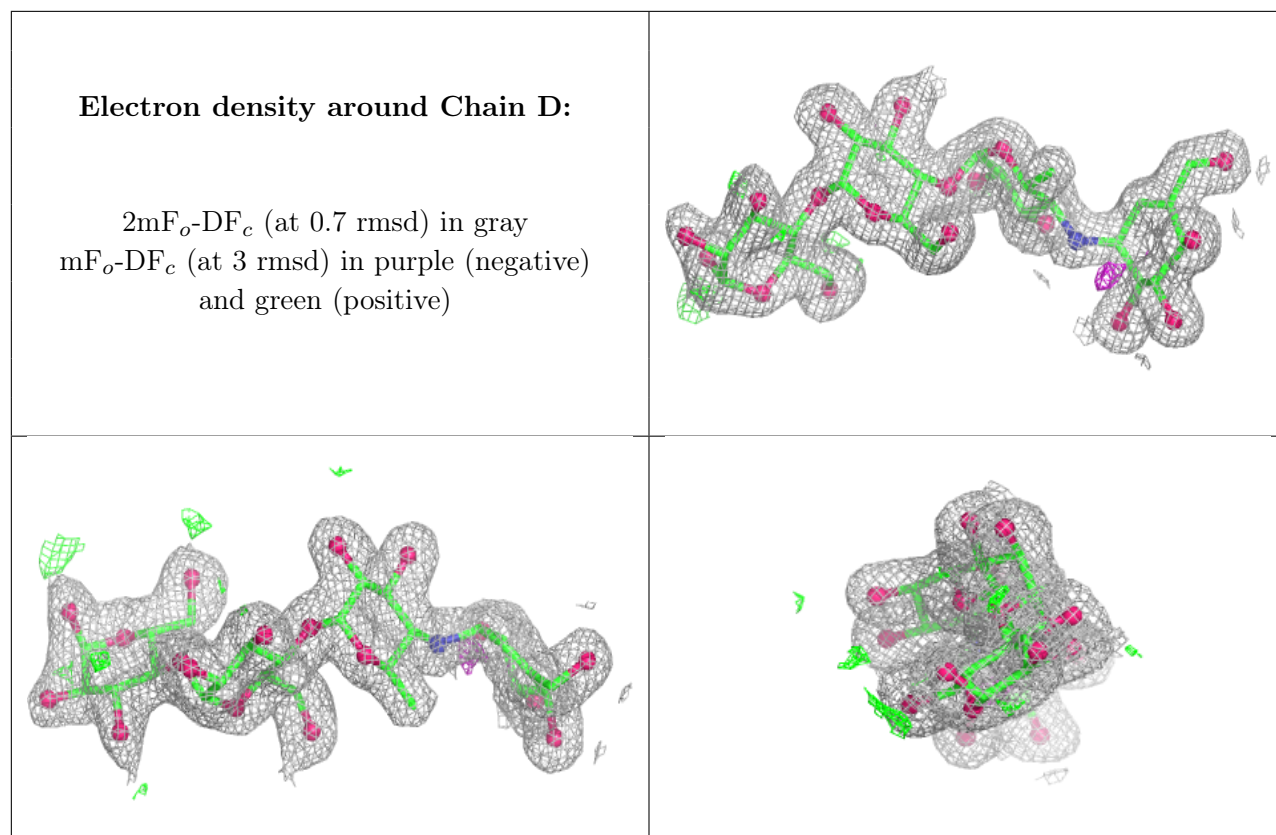


**Electron density around Chain C:**

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







## 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, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
8	NAG	A	1012	14/15	0.64	0.17	53,67,73,73	0
6	GOL	A	1011	6/6	0.72	0.15	30,47,50,54	0
5	ACY	A	1007	4/4	0.77	0.17	30,42,48,50	0
5	ACY	A	1013	4/4	0.84	0.12	19,44,50,53	0
7	SO4	A	1010	5/5	0.87	0.11	45,48,49,54	0
6	GOL	A	1014	6/6	0.89	0.11	24,41,54,62	0
6	GOL	A	1008	6/6	0.90	0.10	22,43,49,54	0
5	ACY	A	1009	4/4	0.91	0.16	12,33,39,50	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.