



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2024 – 12:15 PM JST

PDB ID : 8HW3  
Title : Limosilactobacillus reuteri N1 GtfB-acarbose  
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Deposited on : 2022-12-28  
Resolution : 2.66 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 : 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

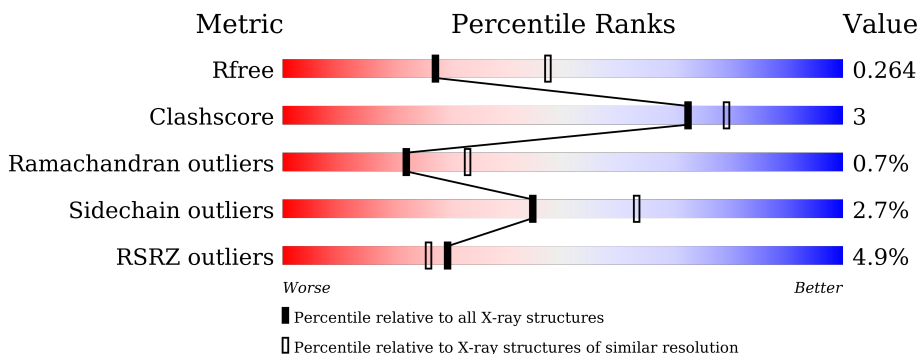
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.66 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	1332 (2.68-2.64)
Clashscore	141614	1374 (2.68-2.64)
Ramachandran outliers	138981	1349 (2.68-2.64)
Sidechain outliers	138945	1349 (2.68-2.64)
RSRZ outliers	127900	1318 (2.68-2.64)

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	833	
1	B	833	
2	C	3	
2	D	3	
2	E	3	
2	F	3	

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:

<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Chirality</b>	<b>Geometry</b>	<b>Clashes</b>	<b>Electron density</b>
2	AC1	E	3	-	-	-	X
2	AC1	F	3	-	-	-	X

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 13223 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 dextransucrase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	827	6457	4025	1095	1315	22	0	0	0
1	B	827	6457	4025	1095	1315	22	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	25	MET	-	initiating methionine	UNP A0A848PDI7
B	25	MET	-	initiating methionine	UNP A0A848PDI7

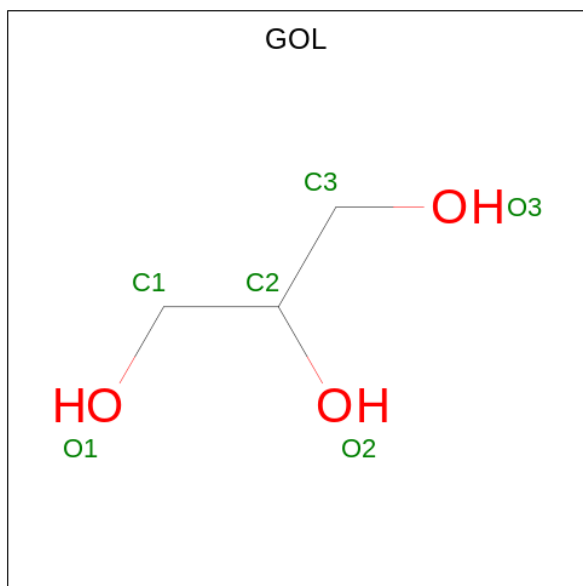
- Molecule 2 is an oligosaccharide called 4,6-dideoxy-4- $\{[(1S,4R,5S,6S)-4,5,6\text{-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}\}$ - $\alpha$ -D-glucopyranose-(1-4)- $\alpha$ -D-glucopyranose-(1-4)- $\beta$ -D-glucopyranose.

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

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Na	0	0
			1	1		
3	B	1	Total	Na	0	0
			1	1		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



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

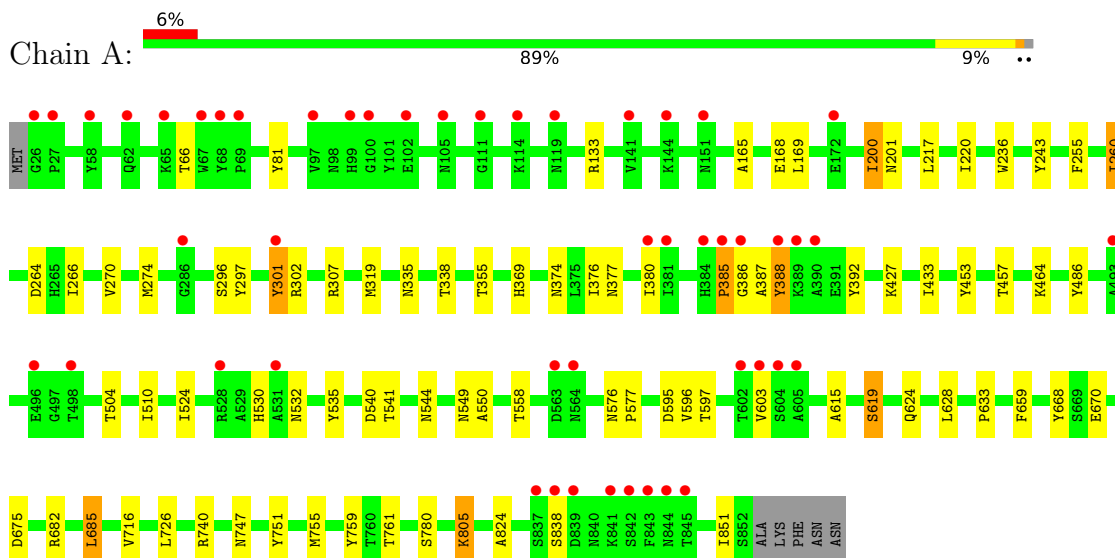
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	68	Total O 68 68	0	0
5	B	57	Total O 57 57	0	0

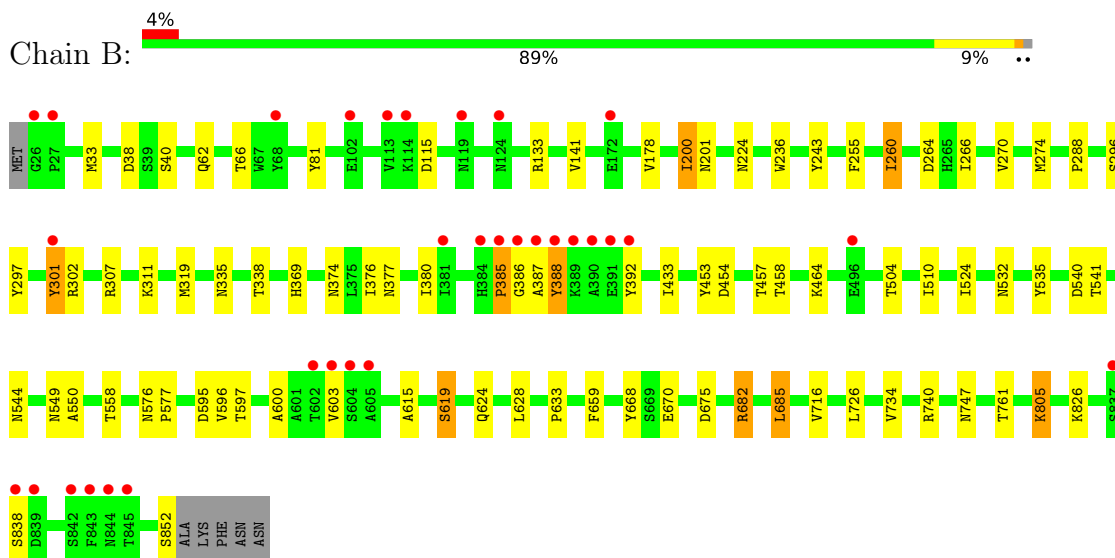
### 3 Residue-property plots [i](#)

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.

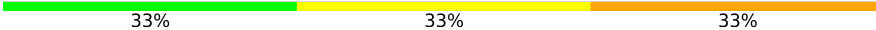
- Molecule 1: dextranucrase



- Molecule 1: dextranucrase




- Molecule 2: 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)-beta-D-glucopyranose

Chain C:  33% 33% 33%

BGC1  
GLC2  
AC13

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

Chain D:  67% 33%

BGC1  
GLC2  
AC13

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

Chain E:  100%

BGC1  
GLC2  
AC13

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

Chain F:  33% 67%

BGC1  
GLC2  
AC13

## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	204.77Å 100.62Å 106.67Å 90.00° 108.17° 90.00°	Depositor
Resolution (Å)	47.11 – 2.66 47.07 – 2.66	Depositor EDS
% Data completeness (in resolution range)	99.0 (47.11-2.66) 99.0 (47.07-2.66)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.02 (at 2.65Å)	Xtrriage
Refinement program	REFMAC 5	Depositor
R, $R_{free}$	0.212 , 0.262 0.219 , 0.264	Depositor DCC
$R_{free}$ test set	2965 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.4	Xtrriage
Anisotropy	0.056	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 41.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	13223	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.64% 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: AC1, BGC, GOL, GLC, NA

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	0.48	0/6597	0.65	0/8984
1	B	0.48	0/6597	0.65	1/8984 (0.0%)
All	All	0.48	0/13194	0.65	1/17968 (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	682	ARG	NE-CZ-NH1	5.77	123.19	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	6457	0	6094	43	0
1	B	6457	0	6094	45	0
2	C	44	0	30	3	0
2	D	44	0	30	2	0
2	E	44	0	30	3	0
2	F	44	0	30	3	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	6	0	8	0	0
5	A	68	0	0	0	0
5	B	57	0	0	1	0
All	All	13223	0	12316	87	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 (87) 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:633:PRO:O	2:C:3:AC1:O2	1.97	0.83
1:A:851:ILE:O	1:A:851:ILE:HG22	1.83	0.78
2:C:3:AC1:HCB1	2:C:3:AC1:C6	2.14	0.77
1:B:224:ASN:ND2	5:B:1001:HOH:O	2.22	0.73
1:B:264:ASP:OD2	2:F:1:BGC:H1	1.89	0.71
1:A:595:ASP:OD1	1:A:597:THR:HG23	1.90	0.71
1:B:595:ASP:OD1	1:B:597:THR:HG23	1.90	0.70
2:D:3:AC1:HCB1	2:D:3:AC1:C6	2.30	0.61
1:B:81:TYR:CZ	1:B:133:ARG:HD3	2.38	0.59
1:B:307:ARG:HG2	1:B:311:LYS:HE3	1.86	0.58
2:F:1:BGC:H5	2:F:2:GLC:O2	2.04	0.58
1:A:81:TYR:CZ	1:A:133:ARG:HD3	2.38	0.58
1:A:851:ILE:O	1:A:851:ILE:CG2	2.52	0.57
1:A:628:LEU:HD22	1:A:675:ASP:OD2	2.05	0.56
1:B:628:LEU:HD22	1:B:675:ASP:OD2	2.04	0.56
1:A:335:ASN:ND2	1:B:302:ARG:HH22	2.04	0.55
1:A:236:TRP:CZ2	1:A:682:ARG:HG2	2.42	0.55
1:B:236:TRP:CZ2	1:B:682:ARG:HG2	2.42	0.54
1:B:38:ASP:OD1	1:B:40:SER:OG	2.17	0.54
1:B:81:TYR:CE2	1:B:133:ARG:HD3	2.43	0.54
1:A:200:ILE:HG22	1:A:201:ASN:N	2.24	0.53
1:A:374:ASN:O	1:A:377:ASN:O	2.27	0.53
1:B:633:PRO:HG2	2:D:3:AC1:O2	2.09	0.52
1:A:376:ILE:O	1:A:380:ILE:HG12	2.10	0.52
1:B:200:ILE:HG22	1:B:201:ASN:N	2.24	0.52
1:B:374:ASN:O	1:B:377:ASN:O	2.27	0.52
1:B:243:TYR:CE1	1:B:685:LEU:HD22	2.45	0.52
1:B:376:ILE:O	1:B:380:ILE:HG12	2.09	0.52
1:A:264:ASP:OD2	2:E:1:BGC:H1	2.09	0.52
2:C:3:AC1:C6	2:C:3:AC1:C1B	2.85	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:81:TYR:CE2	1:A:133:ARG:HD3	2.44	0.51
1:A:243:TYR:CE1	1:A:685:LEU:HD22	2.46	0.51
1:A:549:ASN:O	1:A:550:ALA:HB3	2.11	0.50
1:A:302:ARG:HH22	1:B:335:ASN:ND2	2.09	0.50
1:A:266:ILE:HD12	1:A:270:VAL:HG21	1.94	0.50
1:A:335:ASN:HD21	1:B:302:ARG:HH22	1.60	0.49
1:A:217:LEU:HD13	2:E:3:AC1:C6	2.42	0.49
1:B:62:GLN:HE22	1:B:141:VAL:HG21	1.77	0.49
1:A:385:PRO:O	1:A:387:ALA:N	2.46	0.49
1:B:549:ASN:O	1:B:550:ALA:HB3	2.13	0.49
1:B:464:LYS:O	1:B:596:VAL:HG22	2.14	0.48
1:B:385:PRO:O	1:B:387:ALA:N	2.46	0.48
1:A:464:LYS:O	1:A:596:VAL:HG22	2.13	0.47
1:B:302:ARG:HG3	2:F:1:BGC:O1	2.14	0.47
1:A:302:ARG:HH22	1:B:335:ASN:HD21	1.63	0.47
1:B:33:MET:HB2	1:B:852:SER:HB2	1.97	0.47
1:B:301:TYR:HA	1:B:319:MET:O	2.15	0.46
1:B:433:ILE:HD12	1:B:433:ILE:N	2.30	0.46
2:E:1:BGC:H5	2:E:2:GLC:O2	2.15	0.46
1:A:338:THR:HG21	1:B:307:ARG:NH2	2.30	0.46
1:B:266:ILE:HD12	1:B:270:VAL:HG21	1.96	0.46
1:B:540:ASP:OD1	1:B:541:THR:N	2.48	0.46
1:A:307:ARG:NH2	1:B:338:THR:HG21	2.31	0.46
1:A:433:ILE:HD12	1:A:433:ILE:N	2.31	0.46
1:A:540:ASP:OD1	1:A:541:THR:N	2.47	0.45
1:B:535:TYR:O	1:B:558:THR:HA	2.16	0.45
1:A:301:TYR:HA	1:A:319:MET:O	2.17	0.45
1:A:755:MET:HG2	1:A:824:ALA:HB2	1.99	0.45
1:A:761:THR:HG23	1:A:805:LYS:HD2	1.99	0.45
1:A:255:PHE:CD1	1:A:716:VAL:HB	2.52	0.44
1:A:535:TYR:O	1:A:558:THR:HA	2.18	0.44
1:B:260:ILE:CD1	1:B:274:MET:SD	3.06	0.44
1:B:369:HIS:CD2	1:B:624:GLN:HE22	2.36	0.44
1:B:761:THR:HG23	1:B:805:LYS:HD2	2.00	0.44
1:B:255:PHE:CD1	1:B:716:VAL:HB	2.53	0.43
1:A:169:LEU:HD12	1:A:751:TYR:CD2	2.54	0.42
1:A:369:HIS:CD2	1:A:624:GLN:HE22	2.38	0.42
1:B:510:ILE:HD11	1:B:524:ILE:CD1	2.49	0.42
1:B:668:TYR:CZ	1:B:670:GLU:HB2	2.55	0.42
1:A:576:ASN:HB2	1:A:577:PRO:CD	2.50	0.42
1:B:453:TYR:CZ	1:B:457:THR:HG21	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:576:ASN:HB2	1:B:577:PRO:CD	2.49	0.42
1:A:260:ILE:CD1	1:A:274:MET:SD	3.08	0.42
1:B:288:PRO:HB2	1:B:600:ALA:HB1	2.02	0.42
1:A:668:TYR:CZ	1:A:670:GLU:HB2	2.55	0.42
1:B:454:ASP:O	1:B:458:THR:OG1	2.31	0.42
1:A:510:ILE:HD11	1:A:524:ILE:CD1	2.50	0.41
1:A:615:ALA:O	1:A:619:SER:OG	2.38	0.41
1:A:453:TYR:CZ	1:A:457:THR:HG21	2.55	0.41
1:B:615:ALA:O	1:B:619:SER:OG	2.38	0.41
1:A:486:TYR:O	1:A:530:HIS:HE1	2.03	0.41
1:A:165:ALA:O	1:A:168:GLU:HG2	2.21	0.41
1:B:260:ILE:HD11	1:B:274:MET:SD	2.61	0.41
1:B:200:ILE:HG22	1:B:201:ASN:H	1.86	0.41
1:A:220:ILE:HD11	1:A:759:TYR:O	2.22	0.40
1:A:355:THR:O	1:A:427:LYS:NZ	2.51	0.40
1:B:178:VAL:HB	1:B:734:VAL:HB	2.03	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	825/833 (99%)	772 (94%)	47 (6%)	6 (1%)	22	33
1	B	825/833 (99%)	770 (93%)	49 (6%)	6 (1%)	22	33
All	All	1650/1666 (99%)	1542 (94%)	96 (6%)	12 (1%)	22	33

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	386	GLY
1	B	386	GLY

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Mol	Chain	Res	Type
1	A	388	TYR
1	A	200	ILE
1	A	747	ASN
1	B	200	ILE
1	B	388	TYR
1	B	747	ASN
1	A	838	SER
1	A	385	PRO
1	B	385	PRO
1	B	838	SER

### 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	695/700 (99%)	677 (97%)	18 (3%)	46	64
1	B	695/700 (99%)	676 (97%)	19 (3%)	44	63
All	All	1390/1400 (99%)	1353 (97%)	37 (3%)	44	63

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	66	THR
1	A	260	ILE
1	A	296	SER
1	A	297	TYR
1	A	301	TYR
1	A	388	TYR
1	A	392	TYR
1	A	504	THR
1	A	532	ASN
1	A	544	ASN
1	A	603	VAL
1	A	619	SER
1	A	659	PHE

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Mol	Chain	Res	Type
1	A	685	LEU
1	A	726	LEU
1	A	740	ARG
1	A	780	SER
1	A	805	LYS
1	B	66	THR
1	B	115	ASP
1	B	260	ILE
1	B	296	SER
1	B	297	TYR
1	B	301	TYR
1	B	388	TYR
1	B	392	TYR
1	B	504	THR
1	B	532	ASN
1	B	544	ASN
1	B	603	VAL
1	B	619	SER
1	B	659	PHE
1	B	685	LEU
1	B	726	LEU
1	B	740	ARG
1	B	805	LYS
1	B	826	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	62	GLN
1	A	99	HIS
1	A	335	ASN
1	A	413	GLN
1	A	419	GLN
1	A	530	HIS
1	A	624	GLN
1	A	638	ASN
1	A	767	GLN
1	B	46	ASN
1	B	62	GLN
1	B	99	HIS
1	B	334	ASN
1	B	335	ASN

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Mol	Chain	Res	Type
1	B	413	GLN
1	B	419	GLN
1	B	530	HIS
1	B	624	GLN
1	B	638	ASN
1	B	767	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

12 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	BGC	C	1	2	12,12,12	0.51	0	17,17,17	1.06	0
2	GLC	C	2	2	11,11,12	0.46	0	15,15,17	2.67	8 (53%)
2	AC1	C	3	2	21,22,23	0.21	0	22,32,34	1.16	3 (13%)
2	BGC	D	1	2	12,12,12	0.61	0	17,17,17	1.17	1 (5%)
2	GLC	D	2	2	11,11,12	0.45	0	15,15,17	2.91	5 (33%)
2	AC1	D	3	2	21,22,23	0.27	0	22,32,34	1.08	2 (9%)
2	BGC	E	1	2	12,12,12	0.65	0	17,17,17	1.65	4 (23%)
2	GLC	E	2	2	11,11,12	0.64	0	15,15,17	1.42	3 (20%)
2	AC1	E	3	2	21,22,23	0.46	0	22,32,34	1.56	4 (18%)
2	BGC	F	1	2	12,12,12	0.50	0	17,17,17	1.57	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	GLC	F	2	2	11,11,12	0.73	0	15,15,17	1.54	4 (26%)
2	AC1	F	3	2	21,22,23	0.37	0	22,32,34	0.96	2 (9%)

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	GLC	C	2	2	-	0/2/19/22	0/1/1/1
2	AC1	C	3	2	-	2/6/43/46	0/2/2/2
2	BGC	D	1	2	-	2/2/22/22	0/1/1/1
2	GLC	D	2	2	-	0/2/19/22	0/1/1/1
2	AC1	D	3	2	-	3/6/43/46	0/2/2/2
2	BGC	E	1	2	-	2/2/22/22	0/1/1/1
2	GLC	E	2	2	-	0/2/19/22	0/1/1/1
2	AC1	E	3	2	-	3/6/43/46	0/2/2/2
2	BGC	F	1	2	-	2/2/22/22	0/1/1/1
2	GLC	F	2	2	-	0/2/19/22	0/1/1/1
2	AC1	F	3	2	-	2/6/43/46	0/2/2/2

There are no bond length outliers.

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	2	GLC	C1-C2-C3	6.87	118.11	109.67
2	D	2	GLC	C3-C4-C5	-6.61	98.46	110.24
2	C	2	GLC	C1-C2-C3	5.32	116.21	109.67
2	C	2	GLC	C3-C4-C5	-4.98	101.35	110.24
2	E	3	AC1	C1-C2-C3	4.30	114.95	109.67
2	E	3	AC1	C2-C3-C4	3.84	114.01	110.63
2	F	1	BGC	O5-C5-C4	-3.55	103.25	109.69
2	E	1	BGC	O5-C5-C4	-3.51	103.31	109.69
2	C	2	GLC	O5-C1-C2	3.43	116.07	110.77
2	E	2	GLC	C1-O5-C5	3.35	116.73	112.19
2	F	2	GLC	C1-O5-C5	3.20	116.53	112.19
2	C	2	GLC	C1-O5-C5	3.20	116.52	112.19
2	C	3	AC1	C7B-C1B-N4A	-3.16	105.94	110.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	3	AC1	C2-C3-C4	-2.83	108.13	110.63
2	C	2	GLC	O4-C4-C5	2.80	116.26	109.30
2	F	1	BGC	C6-C5-C4	2.79	119.54	113.00
2	F	3	AC1	O2B-C2B-C1B	2.79	114.71	109.12
2	E	2	GLC	O4-C4-C5	2.72	116.05	109.30
2	D	2	GLC	O2-C2-C3	-2.70	104.73	110.14
2	E	1	BGC	O5-C1-C2	2.56	114.86	110.28
2	C	2	GLC	C2-C3-C4	-2.53	106.52	110.89
2	D	2	GLC	O4-C4-C5	2.51	115.53	109.30
2	E	2	GLC	C2-C3-C4	-2.45	106.66	110.89
2	F	2	GLC	O5-C1-C2	2.43	114.52	110.77
2	E	1	BGC	O4-C4-C5	2.40	115.26	109.30
2	C	2	GLC	O2-C2-C3	-2.32	105.49	110.14
2	E	1	BGC	C6-C5-C4	2.32	118.43	113.00
2	F	2	GLC	O4-C4-C5	2.29	114.98	109.30
2	D	1	BGC	O5-C1-C2	-2.23	106.31	110.28
2	E	3	AC1	O2B-C2B-C1B	2.22	113.57	109.12
2	F	2	GLC	O2-C2-C1	2.22	113.69	109.15
2	F	3	AC1	C1-C2-C3	2.21	112.39	109.67
2	D	2	GLC	O5-C5-C4	-2.21	105.45	110.83
2	C	2	GLC	O5-C5-C4	-2.16	105.57	110.83
2	C	3	AC1	O5-C1-C2	2.15	114.09	110.77
2	E	3	AC1	C1-O5-C5	2.15	117.65	112.78
2	D	3	AC1	C2B-C3B-C4A	2.02	113.38	110.18
2	C	3	AC1	C1-O5-C5	2.00	117.31	112.78

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	3	AC1	C5-C4-N4A-C1B
2	D	3	AC1	C5-C4-N4A-C1B
2	D	3	AC1	C4A-C5B-C6B-O6B
2	D	3	AC1	C7B-C5B-C6B-O6B
2	E	3	AC1	C7B-C1B-N4A-C4
2	E	3	AC1	C4A-C5B-C6B-O6B
2	E	3	AC1	C7B-C5B-C6B-O6B
2	F	3	AC1	C7B-C1B-N4A-C4
2	E	1	BGC	C4-C5-C6-O6
2	F	1	BGC	C4-C5-C6-O6
2	F	1	BGC	O5-C5-C6-O6
2	E	1	BGC	O5-C5-C6-O6

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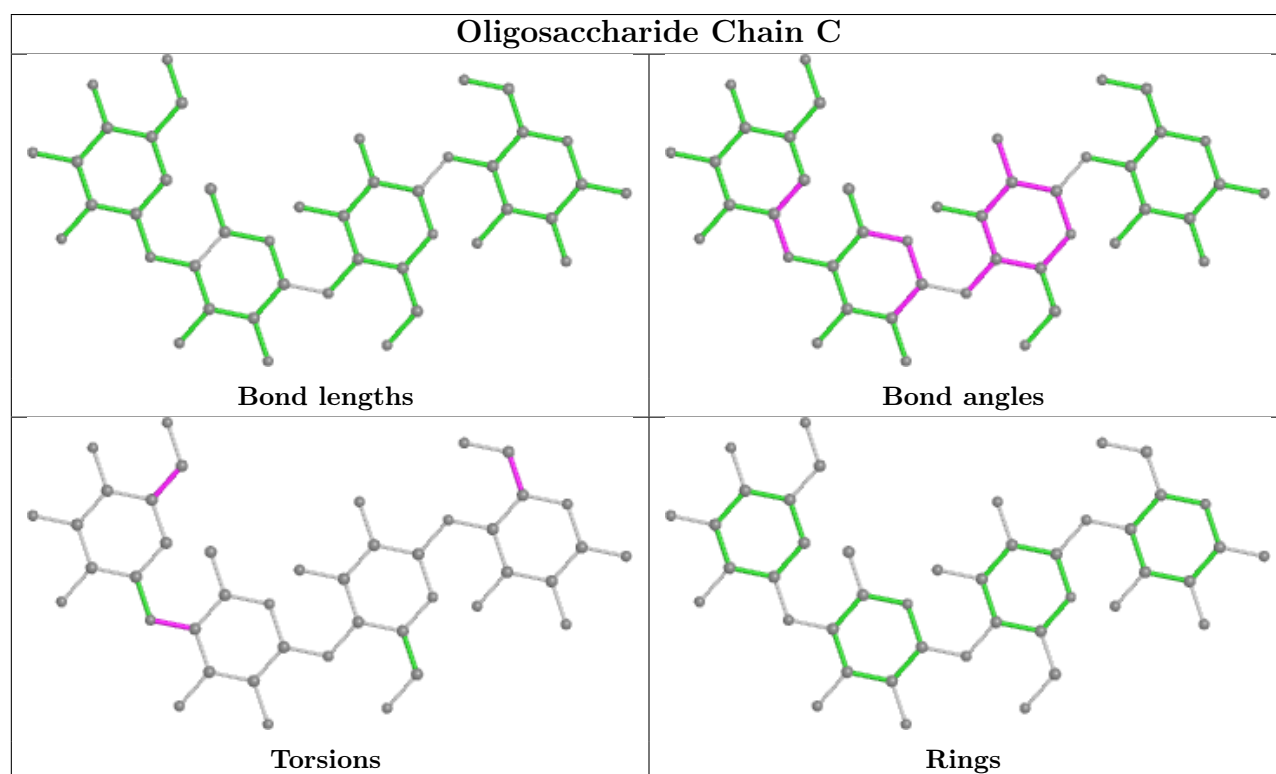
Mol	Chain	Res	Type	Atoms
2	C	1	BGC	O5-C5-C6-O6
2	C	1	BGC	C4-C5-C6-O6
2	D	1	BGC	C4-C5-C6-O6
2	D	1	BGC	O5-C5-C6-O6
2	C	3	AC1	C7B-C5B-C6B-O6B
2	F	3	AC1	C7B-C5B-C6B-O6B

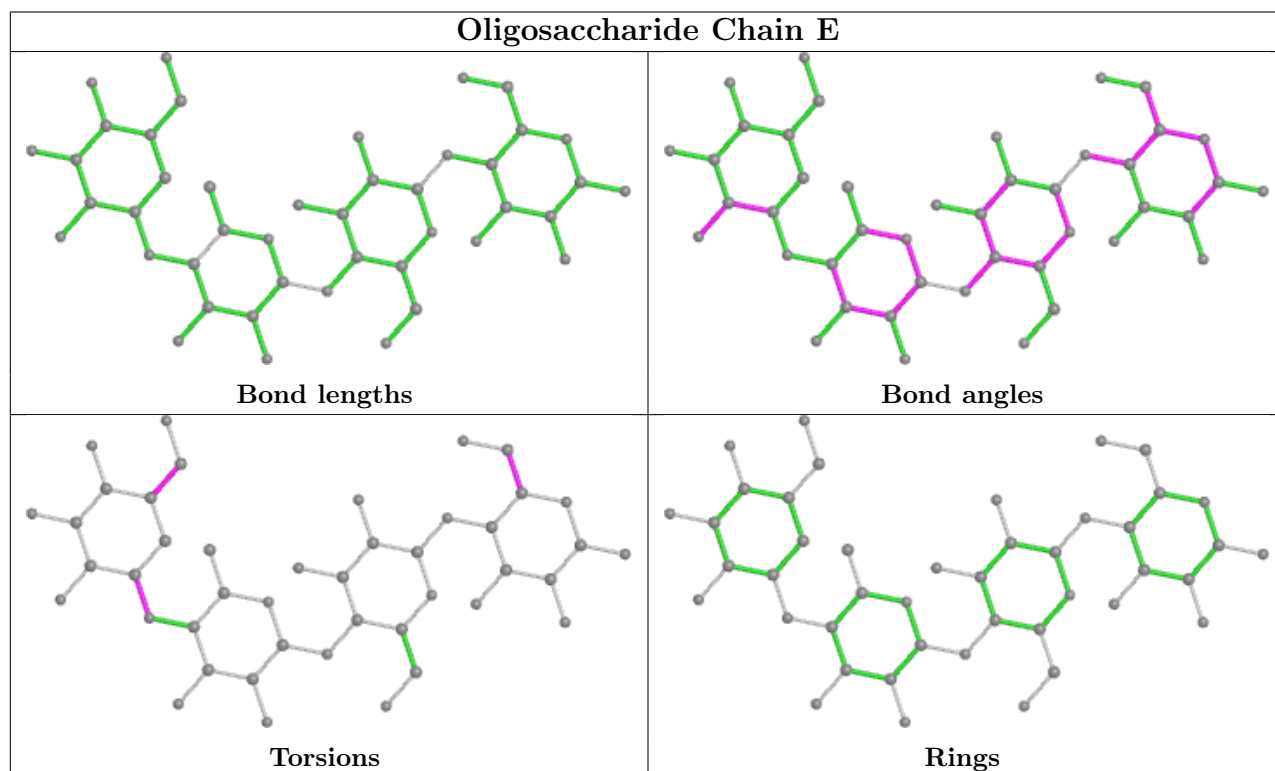
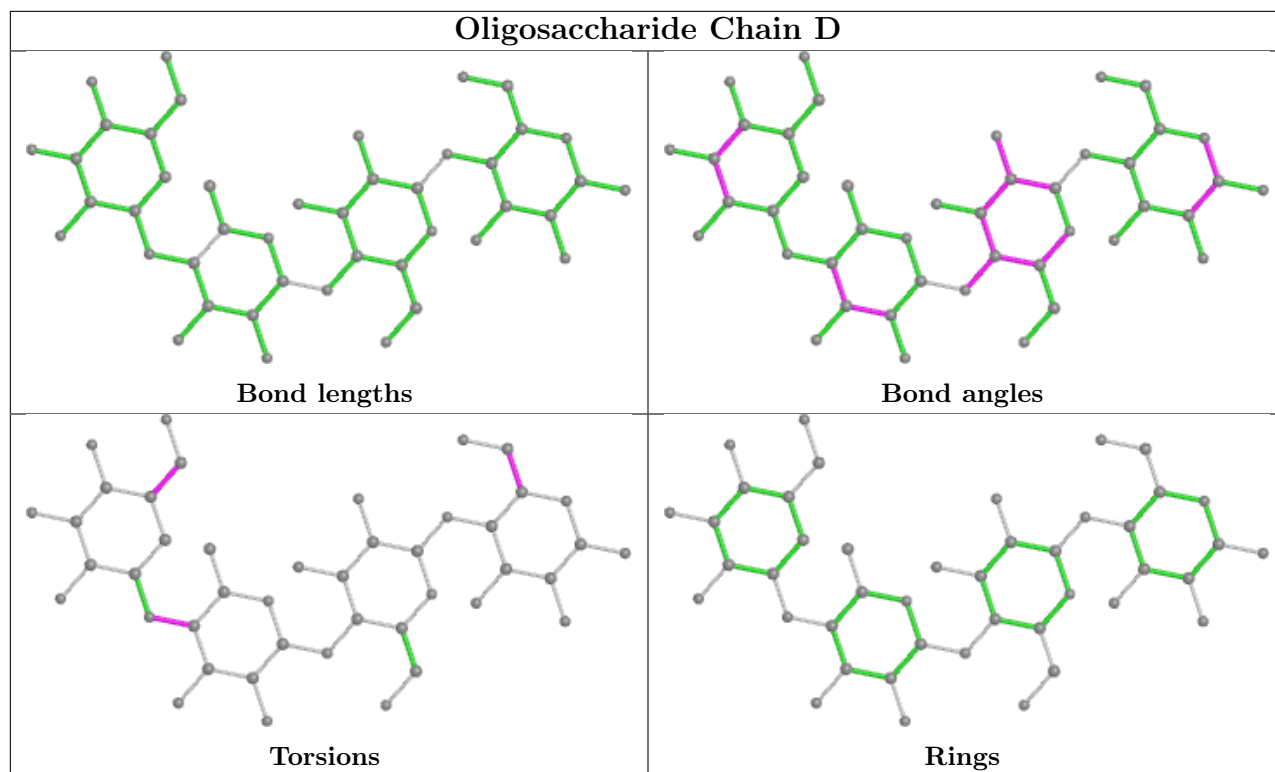
There are no ring outliers.

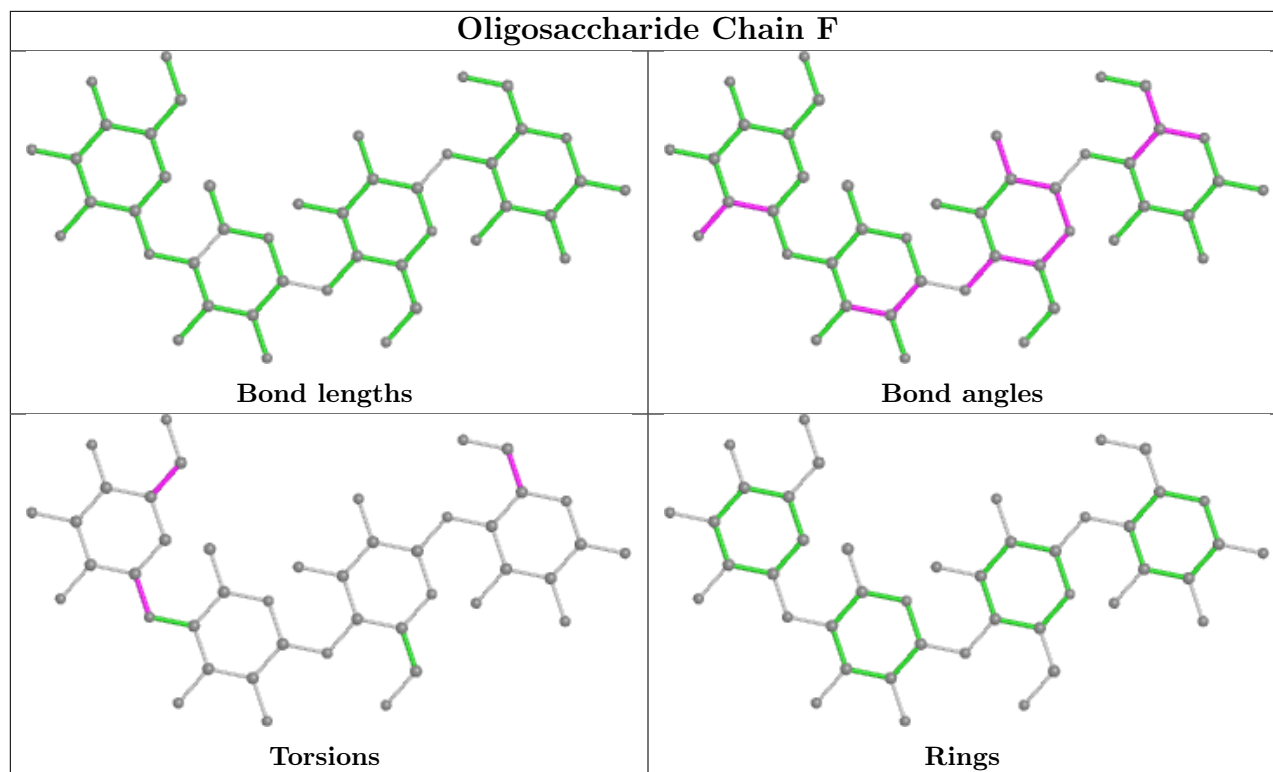
7 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	F	2	GLC	1	0
2	C	3	AC1	3	0
2	E	3	AC1	1	0
2	F	1	BGC	3	0
2	E	2	GLC	1	0
2	E	1	BGC	2	0
2	D	3	AC1	2	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 3 ligands modelled in this entry, 2 are monoatomic - leaving 1 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
4	GOL	B	901	-	5,5,5	0.47	0	5,5,5	0.48	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
4	GOL	B	901	-	-	0/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers

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, 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	827/833 (99%)	0.15	49 (5%) 22 19	17, 29, 72, 110	0
1	B	827/833 (99%)	0.12	32 (3%) 39 35	16, 29, 68, 118	0
All	All	1654/1666 (99%)	0.13	81 (4%) 29 26	16, 29, 71, 118	0

All (81) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	26	GLY	12.6
1	B	838	SER	9.4
1	B	842	SER	8.4
1	B	26	GLY	7.5
1	B	839	ASP	7.0
1	B	388	TYR	6.9
1	B	603	VAL	6.4
1	A	388	TYR	6.0
1	B	385	PRO	6.0
1	A	385	PRO	5.5
1	A	603	VAL	5.1
1	A	838	SER	4.9
1	A	390	ALA	4.8
1	A	842	SER	4.6
1	B	390	ALA	4.6
1	B	392	TYR	4.1
1	B	124	ASN	4.1
1	A	141	VAL	4.0
1	A	839	ASP	3.9
1	A	605	ALA	3.9
1	A	68	TYR	3.9
1	B	605	ALA	3.7
1	A	528	ARG	3.5
1	B	119	ASN	3.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	68	TYR	3.3
1	B	27	PRO	3.3
1	A	498	THR	3.3
1	A	381	ILE	3.3
1	B	844	ASN	3.2
1	B	172	GLU	3.2
1	A	841	LYS	3.2
1	A	496	GLU	3.1
1	A	27	PRO	3.1
1	B	386	GLY	3.0
1	B	837	SER	3.0
1	A	531	ALA	3.0
1	A	389	LYS	3.0
1	A	604	SER	2.9
1	A	563	ASP	2.8
1	A	105	ASN	2.8
1	B	381	ILE	2.8
1	B	384	HIS	2.7
1	A	301	TYR	2.7
1	B	843	PHE	2.7
1	A	69	PRO	2.7
1	A	384	HIS	2.6
1	A	144	LYS	2.6
1	A	151	ASN	2.6
1	A	99	HIS	2.5
1	A	493	ALA	2.5
1	A	843	PHE	2.5
1	B	387	ALA	2.5
1	A	172	GLU	2.4
1	B	845	THR	2.4
1	A	62	GLN	2.3
1	B	391	GLU	2.3
1	A	386	GLY	2.3
1	B	389	LYS	2.3
1	A	65	LYS	2.3
1	A	100	GLY	2.2
1	B	114	LYS	2.2
1	A	58	TYR	2.2
1	A	111	GLY	2.2
1	B	301	TYR	2.2
1	A	837	SER	2.2
1	A	564	ASN	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	97	VAL	2.1
1	A	844	ASN	2.1
1	A	102	GLU	2.1
1	B	496	GLU	2.1
1	A	119	ASN	2.1
1	A	845	THR	2.1
1	A	286	GLY	2.1
1	A	67	TRP	2.1
1	B	604	SER	2.1
1	B	602	THR	2.0
1	B	113	VAL	2.0
1	A	380	ILE	2.0
1	A	114	LYS	2.0
1	A	602	THR	2.0
1	B	102	GLU	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.

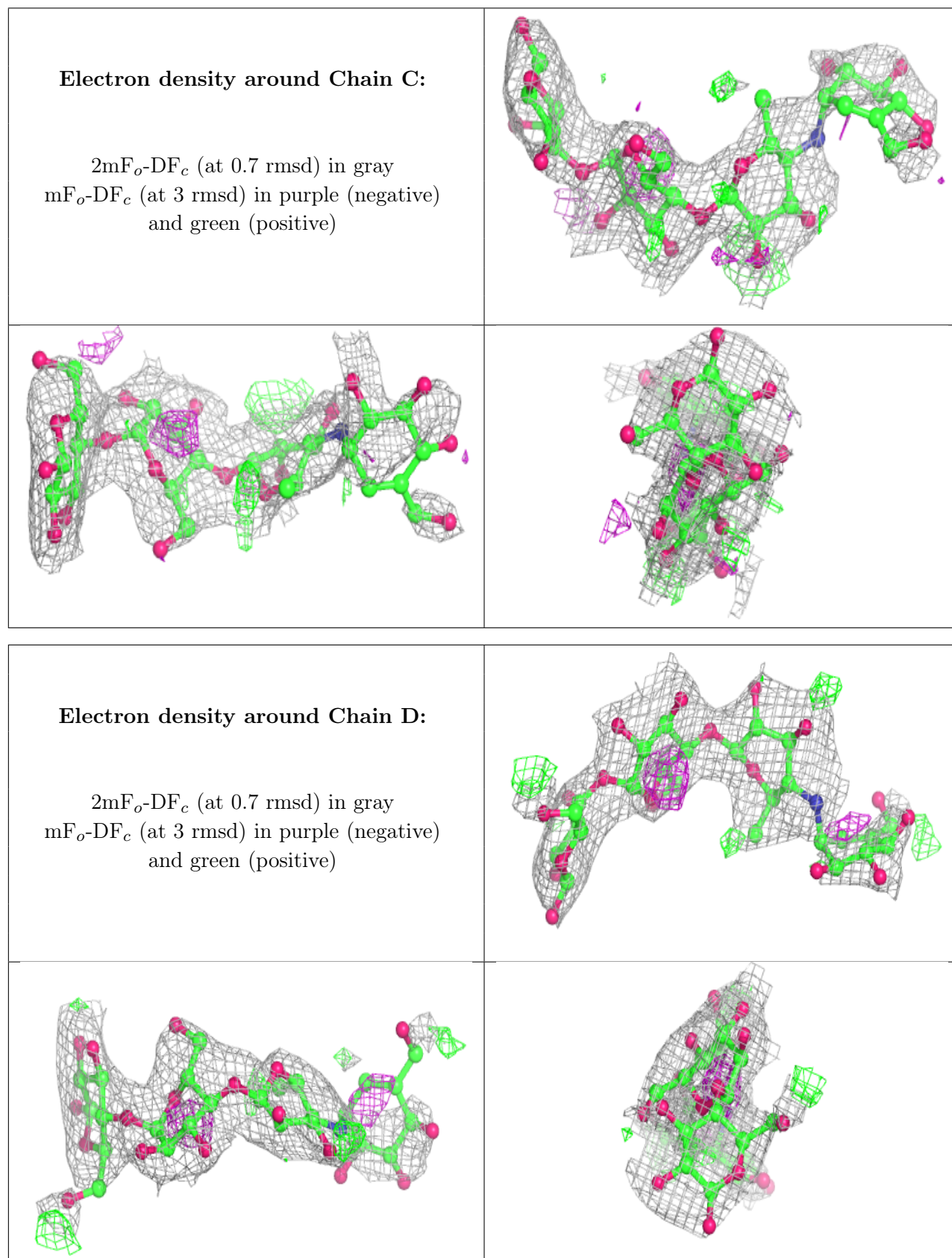
## 6.3 Carbohydrates [i](#)

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(Å <sup>2</sup> )	Q<0.9
2	AC1	F	3	21/22	0.46	0.49	82,104,118,123	0
2	AC1	E	3	21/22	0.55	0.49	82,106,114,116	0
2	AC1	C	3	21/22	0.67	0.35	64,77,89,90	0
2	GLC	F	2	11/12	0.70	0.35	67,80,83,88	0
2	AC1	D	3	21/22	0.70	0.35	59,68,78,81	0
2	BGC	E	1	12/12	0.74	0.31	54,70,75,81	0
2	BGC	F	1	12/12	0.76	0.28	54,72,74,81	0
2	GLC	C	2	11/12	0.82	0.26	46,48,51,57	0
2	GLC	E	2	11/12	0.82	0.26	78,86,88,88	0
2	GLC	D	2	11/12	0.84	0.26	42,48,50,53	0
2	BGC	D	1	12/12	0.86	0.25	49,53,56,56	0
2	BGC	C	1	12/12	0.90	0.26	46,49,53,53	0

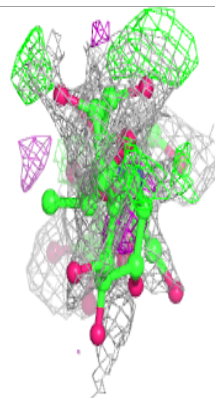
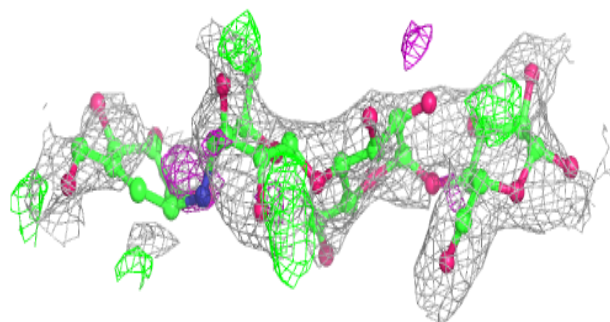
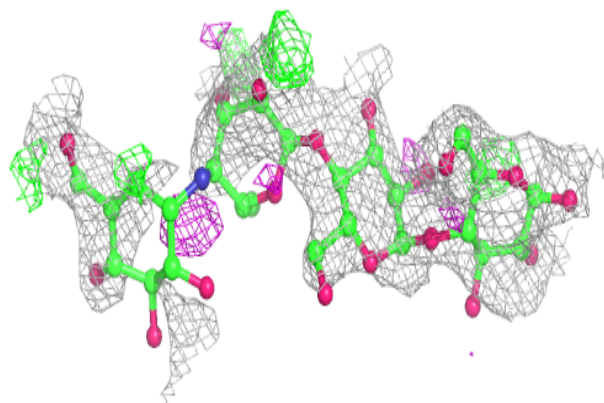


The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

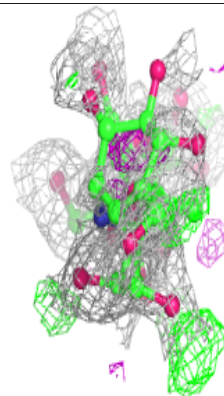
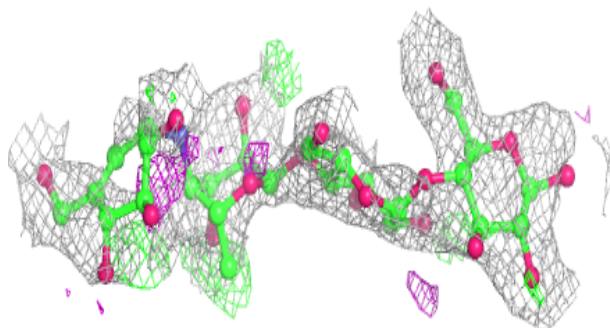
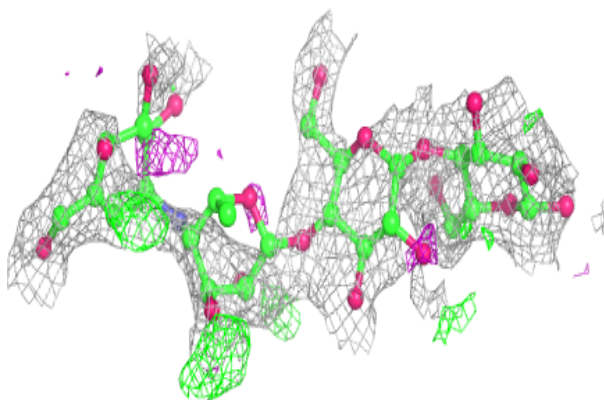


**Electron density around Chain E:**

$2mF_o-DF_c$  (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)



## 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
3	NA	B	902	1/1	0.93	0.09	20,20,20,20	0
3	NA	A	901	1/1	0.94	0.10	19,19,19,19	0
4	GOL	B	901	6/6	0.96	0.18	29,30,31,31	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.