



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 05:40 PM UTC

PDB ID : 8HW3 / pdb_00008hw3
Title : Limosilactobacillus reuteri N1 GtfB-acarbose
Authors : Dong, J.J.; Bai, Y.X.
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

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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

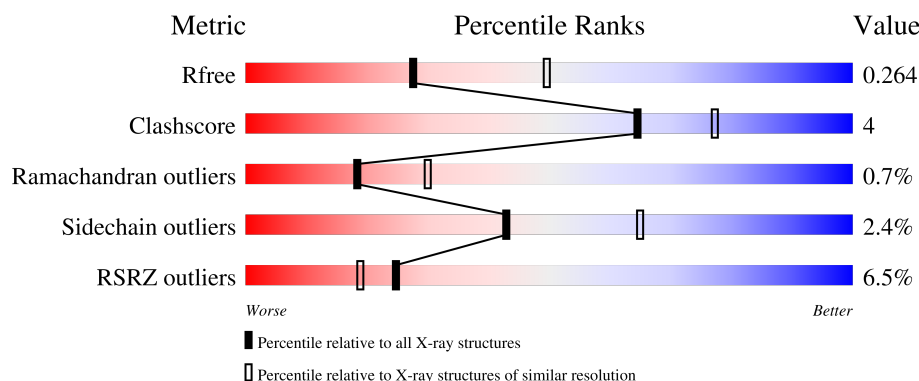
1 Overall quality at a glance

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}	180053	1110 (2.66-2.66)
Clashscore	190562	1141 (2.66-2.66)
Ramachandran outliers	187476	1126 (2.66-2.66)
Sidechain outliers	187428	1126 (2.66-2.66)
RSRZ outliers	180081	1110 (2.66-2.66)

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	833	7% 88% 10% ..
1	B	833	6% 88% 10% ..
2	C	3	33% 33% 33%
2	D	3	67% 33%
2	E	3	100%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	3	 33% 67%

2 Entry composition

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
1	A	827	Total	C	N	O	S	0	0	0
			6457	4025	1095	1315	22			
1	B	827	Total	C	N	O	S	0	0	0
			6457	4025	1095	1315	22			

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-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
2	C	3	Total	C	N	O	0	0	0
			44	25	1	18			
2	D	3	Total	C	N	O	0	0	0
			44	25	1	18			
2	E	3	Total	C	N	O	0	0	0
			44	25	1	18			
2	F	3	Total	C	N	O	0	0	0
			44	25	1	18			

- Molecule 3 is SODIUM ION (CCD ID: 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 (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

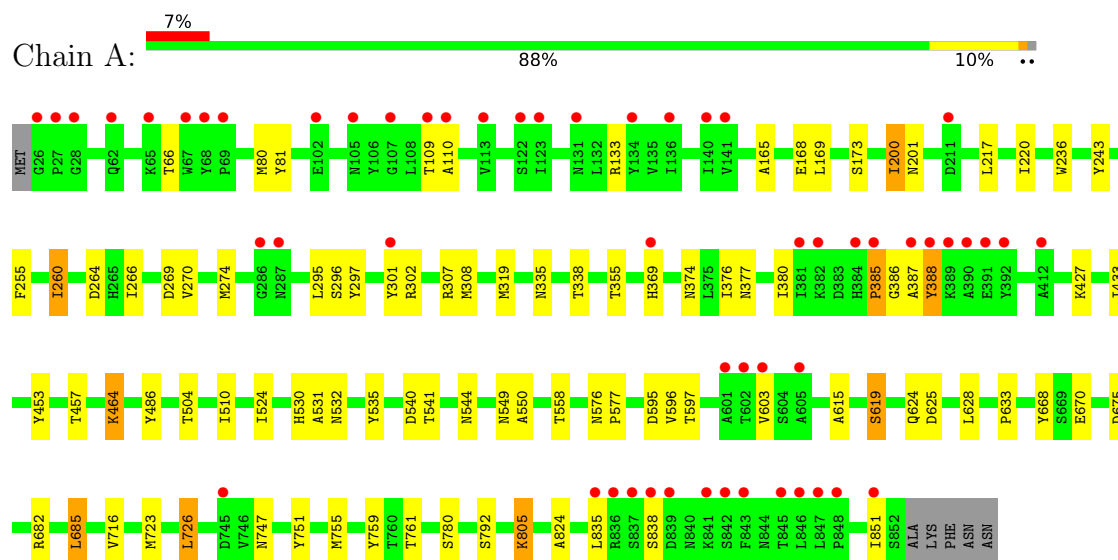
- Molecule 5 is water.

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

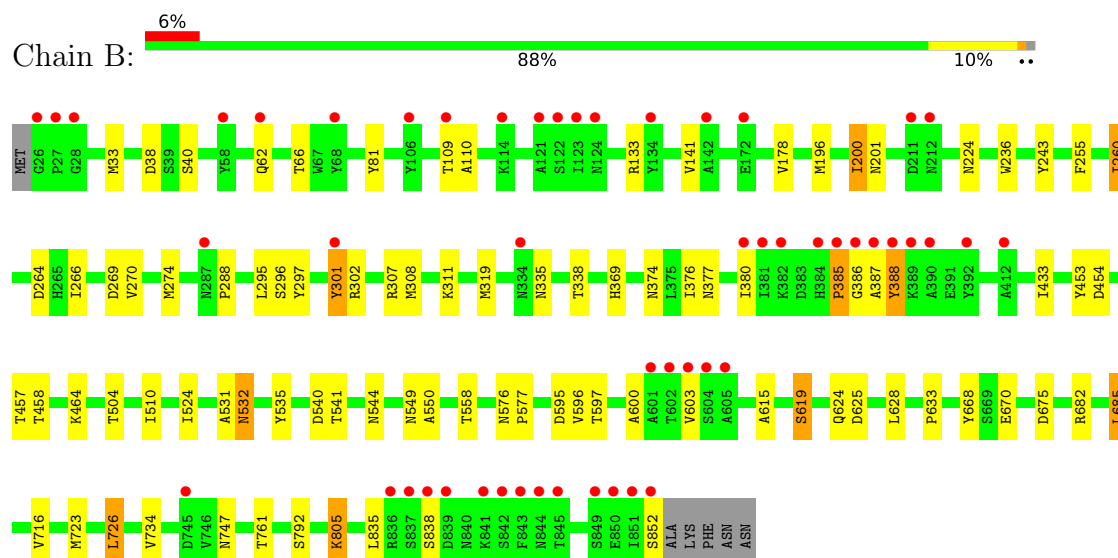
3 Residue-property plots

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.

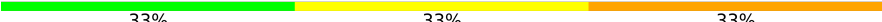
• Molecule 1: dextranucrase



• 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- $\{[(1S,4R,5S,6S)-4,5,6\text{-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}\}$ - α -D-glucopyranose-(1-4)- α -D-glucopyranose-(1-4)- β -D-glucopyranose

Chain D:  67% 33%

BGC1
GLC2
AC13

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

Chain E:  100%

BGC1
GLC2
AC13

- Molecule 2: 4,6-dideoxy-4- $\{[(1S,4R,5S,6S)-4,5,6\text{-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}\}$ - α -D-glucopyranose-(1-4)- α -D-glucopyranose-(1-4)- β -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, α , β , γ	204.77Å 100.62Å 106.67Å 90.00° 108.17° 90.00°	Depositor
Resolution (Å)	47.11 – 2.66 47.11 – 2.66	Depositor EDS
% Data completeness (in resolution range)	99.0 (47.11-2.66) 99.0 (47.11-2.66)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.02 (at 2.65Å)	Xtriage
Refinement program	REFMAC 5	Depositor
R, R_{free}	0.212 , 0.262 0.219 , 0.264	Depositor DCC
R_{free} test set	2965 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	29.4	Xtriage
Anisotropy	0.056	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 39.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	13223	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage'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.*

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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: AC1, GOL, NA, BGC, GLC

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.67	0/6597	0.83	0/8984
1	B	0.66	0/6597	0.83	0/8984
All	All	0.67	0/13194	0.83	0/17968

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	50	0
1	B	6457	0	6094	51	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
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	100	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 4.

All (100) 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:200:ILE:HA	1:A:308:MET:HE2	1.62	0.82
1:B:200:ILE:HA	1:B:308:MET:HE2	1.62	0.82
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
1:A:723:MET:HE2	1:A:726:LEU:HD11	1.79	0.64
1:B:723:MET:HE2	1:B:726:LEU:HD11	1.81	0.62
2:D:3:AC1:HCB1	2:D:3:AC1:C6	2.30	0.61
1:B:38:ASP:OD1	1:B:40:SER:OG	2.17	0.60
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: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
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

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:269:ASP:OD2	1:A:792:SER:OG	2.33	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:625:ASP:OD1	1:A:625:ASP:C	2.62	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
1:B:576:ASN:HB2	1:B:577:PRO:CD	2.49	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:260:ILE:CD1	1:A:274:MET:SD	3.08	0.42
1:B:269:ASP:OD2	1:B:792:SER:OG	2.36	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:109:THR:O	1:B:110:ALA:C	2.62	0.42
1:A:615:ALA:O	1:A:619:SER:OG	2.38	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:B:531:ALA:O	1:B:532:ASN:C	2.63	0.41
1:A:453:TYR:CZ	1:A:457:THR:HG21	2.55	0.41
1:B:625:ASP:OD1	1:B:625:ASP:C	2.63	0.41
1:B:615:ALA:O	1:B:619:SER:OG	2.38	0.41
1:A:109:THR:O	1:A:110:ALA:C	2.62	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:80:MET:HE3	1:A:133:ARG:HG3	2.03	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:A:531:ALA:O	1:A:532:ASN:C	2.63	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%)	18	30
1	B	825/833 (99%)	770 (93%)	49 (6%)	6 (1%)	18	30
All	All	1650/1666 (99%)	1542 (94%)	96 (6%)	12 (1%)	18	30

All (12) Ramachandran outliers are listed below:

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

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%)	678 (98%)	17 (2%)	43	65
1	B	695/700 (99%)	678 (98%)	17 (2%)	43	65
All	All	1390/1400 (99%)	1356 (98%)	34 (2%)	43	65

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	66	THR
1	A	173	SER
1	A	260	ILE
1	A	295	LEU
1	A	296	SER
1	A	297	TYR
1	A	388	TYR
1	A	464	LYS
1	A	504	THR
1	A	544	ASN
1	A	603	VAL

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	619	SER
1	A	685	LEU
1	A	726	LEU
1	A	780	SER
1	A	805	LYS
1	A	835	LEU
1	B	66	THR
1	B	196	MET
1	B	260	ILE
1	B	295	LEU
1	B	296	SER
1	B	297	TYR
1	B	301	TYR
1	B	388	TYR
1	B	504	THR
1	B	532	ASN
1	B	544	ASN
1	B	603	VAL
1	B	619	SER
1	B	685	LEU
1	B	726	LEU
1	B	805	LYS
1	B	835	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (36) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	62	GLN
1	A	98	ASN
1	A	289	GLN
1	A	335	ASN
1	A	341	ASN
1	A	371	GLN
1	A	384	HIS
1	A	395	GLN
1	A	413	GLN
1	A	419	GLN
1	A	432	GLN
1	A	479	ASN
1	A	530	HIS
1	A	532	ASN
1	A	624	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	638	ASN
1	A	653	ASN
1	A	674	ASN
1	A	690	ASN
1	B	62	GLN
1	B	98	ASN
1	B	289	GLN
1	B	335	ASN
1	B	371	GLN
1	B	384	HIS
1	B	395	GLN
1	B	410	GLN
1	B	413	GLN
1	B	419	GLN
1	B	432	GLN
1	B	530	HIS
1	B	532	ASN
1	B	624	GLN
1	B	638	ASN
1	B	674	ASN
1	B	690	ASN

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	1.05	0
2	GLC	C	2	2	11,11,12	0.45	0	15,15,17	2.46	8 (53%)
2	AC1	C	3	2	21,22,23	0.19	0	22,32,34	1.14	2 (9%)
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	0.44	0	15,15,17	2.69	5 (33%)
2	AC1	D	3	2	21,22,23	0.26	0	22,32,34	0.95	1 (4%)
2	BGC	E	1	2	12,12,12	0.65	0	17,17,17	1.64	4 (23%)
2	GLC	E	2	2	11,11,12	0.63	0	15,15,17	1.39	3 (20%)
2	AC1	E	3	2	21,22,23	0.43	0	22,32,34	1.24	2 (9%)
2	BGC	F	1	2	12,12,12	0.51	0	17,17,17	1.55	2 (11%)
2	GLC	F	2	2	11,11,12	0.72	0	15,15,17	1.40	2 (13%)
2	AC1	F	3	2	21,22,23	0.34	0	22,32,34	0.91	1 (4%)

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 (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	2	GLC	C3-C4-C5	-6.50	98.46	110.23

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	2	GLC	C1-C2-C3	5.81	118.11	109.64
2	C	2	GLC	C3-C4-C5	-4.90	101.35	110.23
2	C	2	GLC	C1-C2-C3	4.51	116.21	109.64
2	E	3	AC1	C1-C2-C3	3.64	114.95	109.64
2	F	1	BGC	O5-C5-C4	-3.58	103.25	109.70
2	E	1	BGC	O5-C5-C4	-3.54	103.31	109.70
2	E	2	GLC	C1-O5-C5	3.39	116.73	112.19
2	F	2	GLC	C1-O5-C5	3.24	116.53	112.19
2	C	2	GLC	C1-O5-C5	3.24	116.52	112.19
2	C	3	AC1	C7B-C1B-N4A	-3.22	105.94	110.68
2	F	3	AC1	O2B-C2B-C1B	2.86	114.71	109.08
2	C	2	GLC	O4-C4-C5	2.82	116.26	109.32
2	E	2	GLC	O4-C4-C5	2.73	116.05	109.32
2	F	1	BGC	C6-C5-C4	2.66	119.54	113.02
2	D	2	GLC	O2-C2-C3	-2.62	104.73	110.15
2	E	1	BGC	O5-C1-C2	2.59	114.86	110.30
2	D	2	GLC	O4-C4-C5	2.52	115.53	109.32
2	C	2	GLC	C2-C3-C4	-2.47	106.52	110.86
2	E	1	BGC	O4-C4-C5	2.41	115.26	109.32
2	E	2	GLC	C2-C3-C4	-2.39	106.66	110.86
2	F	2	GLC	O4-C4-C5	2.30	114.98	109.32
2	E	3	AC1	O2B-C2B-C1B	2.28	113.57	109.08
2	D	1	BGC	O5-C1-C2	-2.27	106.31	110.30
2	C	2	GLC	O2-C2-C3	-2.25	105.49	110.15
2	C	2	GLC	O5-C1-C2	2.21	116.07	110.79
2	D	2	GLC	O5-C5-C4	-2.21	105.45	110.83
2	E	1	BGC	C6-C5-C4	2.20	118.43	113.02
2	C	2	GLC	O5-C5-C4	-2.16	105.57	110.83
2	C	3	AC1	C6-C5-C4	2.02	117.27	113.57
2	D	3	AC1	C2B-C3B-C4A	2.00	113.38	110.22

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	C4A-C5B-C6B-O6B
2	E	3	AC1	C7B-C5B-C6B-O6B
2	E	1	BGC	C4-C5-C6-O6

Continued on next page...

Continued from previous page...

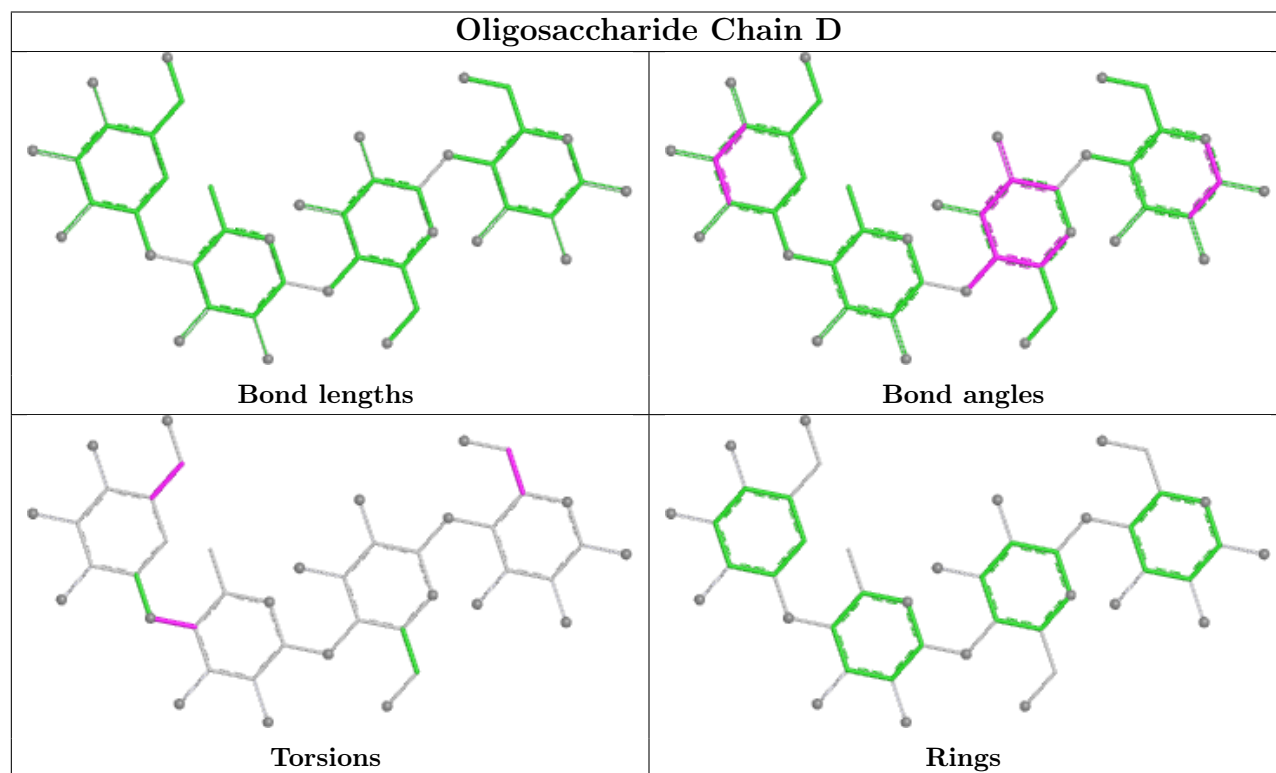
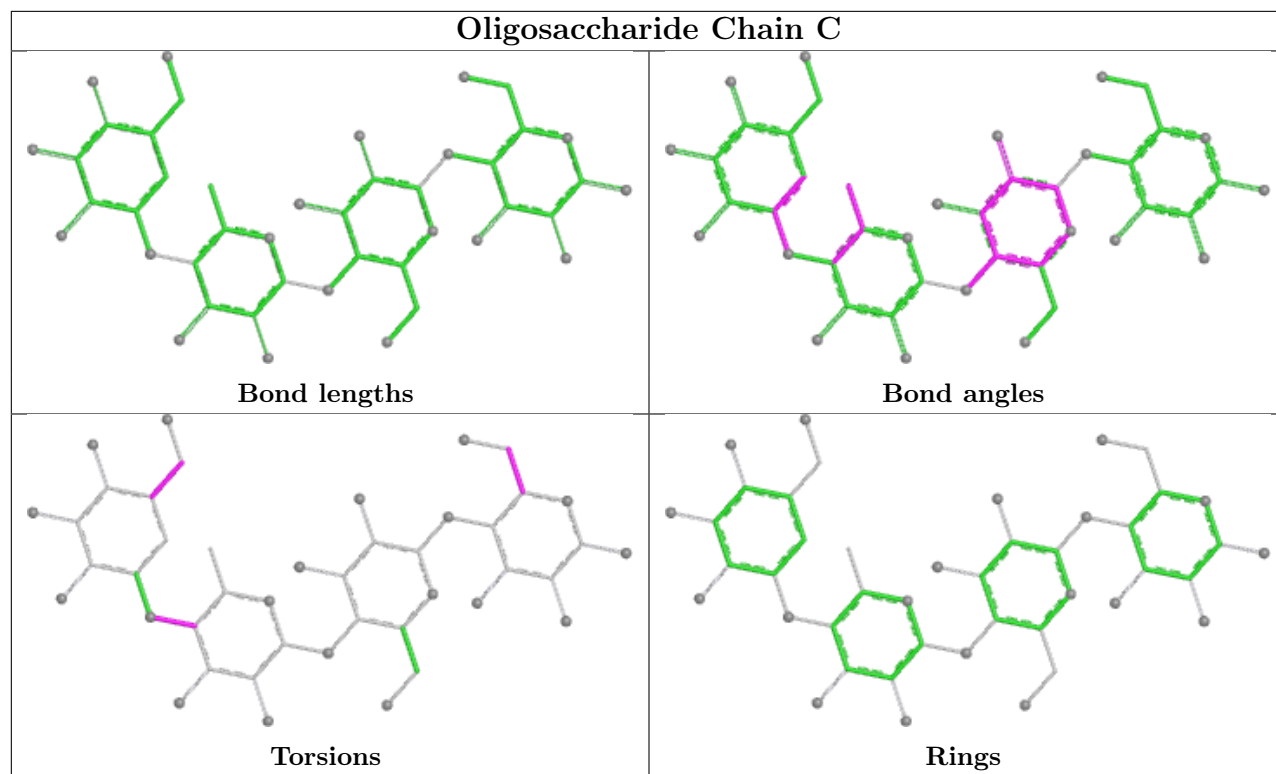
Mol	Chain	Res	Type	Atoms
2	F	1	BGC	C4-C5-C6-O6
2	F	1	BGC	O5-C5-C6-O6
2	E	1	BGC	O5-C5-C6-O6
2	D	1	BGC	C4-C5-C6-O6
2	C	1	BGC	C4-C5-C6-O6
2	C	1	BGC	O5-C5-C6-O6
2	D	1	BGC	O5-C5-C6-O6
2	E	3	AC1	C7B-C1B-N4A-C4
2	F	3	AC1	C7B-C1B-N4A-C4
2	F	3	AC1	C7B-C5B-C6B-O6B
2	C	3	AC1	C7B-C5B-C6B-O6B

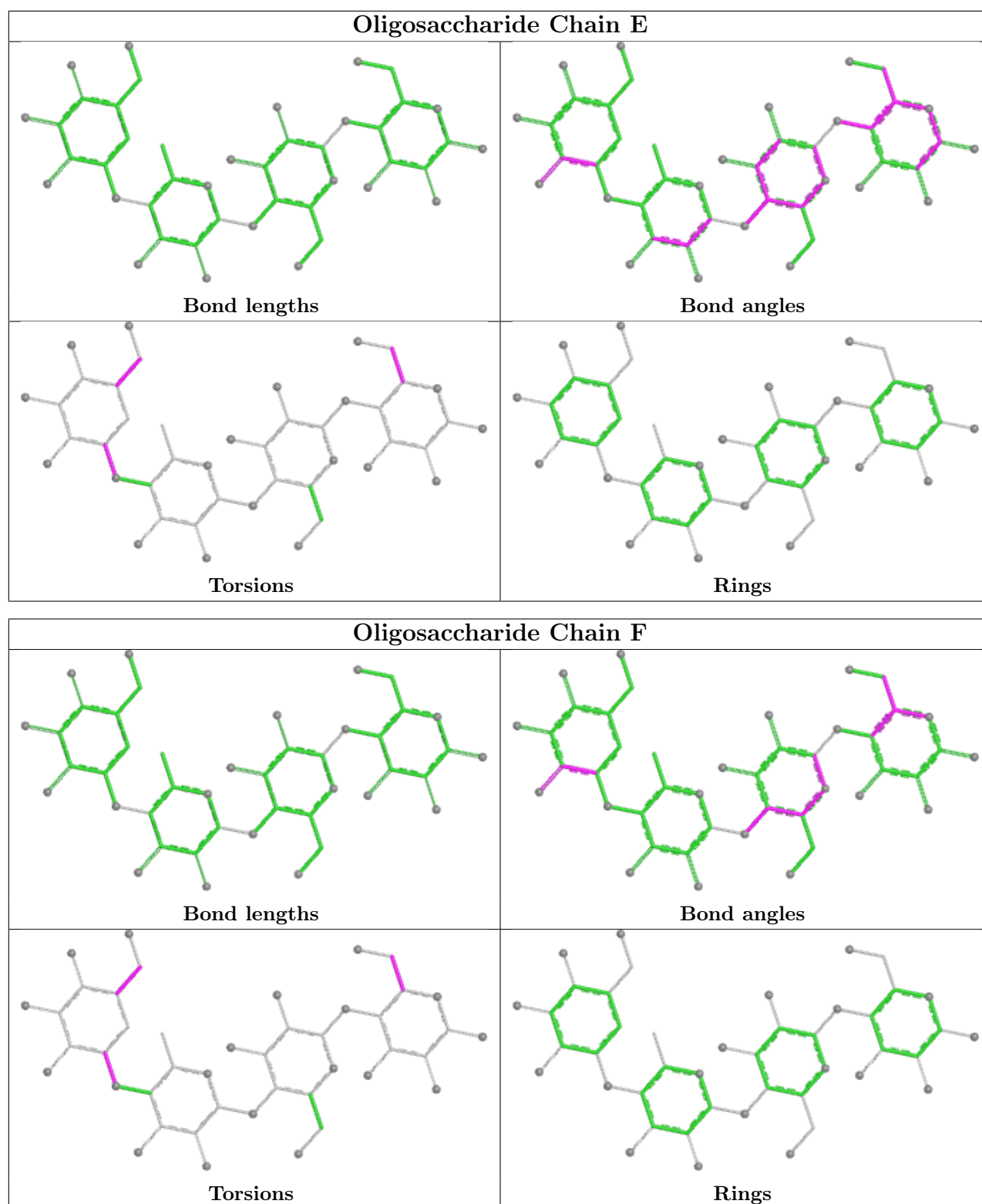
There are no ring outliers.

7 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	3	AC1	2	0
2	E	3	AC1	1	0
2	E	2	GLC	1	0
2	C	3	AC1	3	0
2	F	1	BGC	3	0
2	E	1	BGC	2	0
2	F	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 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	0.49	0	5,5,5	0.51	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 [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

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	827/833 (99%)	0.24	55 (6%) 24 18	17, 29, 72, 110	0
1	B	827/833 (99%)	0.26	52 (6%) 26 19	16, 29, 68, 118	0
All	All	1654/1666 (99%)	0.25	107 (6%) 25 19	16, 29, 71, 118	0

All (107) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	603	VAL	8.3
1	A	603	VAL	5.2
1	A	390	ALA	5.0
1	A	26	GLY	5.0
1	A	385	PRO	5.0
1	B	839	ASP	5.0
1	B	605	ALA	4.7
1	A	605	ALA	4.6
1	A	301	TYR	4.5
1	B	385	PRO	4.0
1	B	301	TYR	4.0
1	B	842	SER	3.9
1	B	388	TYR	3.8
1	B	68	TYR	3.8
1	B	838	SER	3.8
1	A	601	ALA	3.8
1	A	69	PRO	3.8
1	A	839	ASP	3.7
1	A	842	SER	3.7
1	B	387	ALA	3.6
1	B	123	ILE	3.6
1	B	843	PHE	3.6
1	A	843	PHE	3.5
1	A	387	ALA	3.4

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	287	ASN	3.3
1	B	392	TYR	3.3
1	A	388	TYR	3.3
1	A	392	TYR	3.3
1	A	109	THR	3.3
1	B	601	ALA	3.3
1	B	852	SER	3.2
1	B	26	GLY	3.2
1	A	27	PRO	3.2
1	B	28	GLY	3.2
1	A	838	SER	3.1
1	A	841	LYS	3.1
1	A	62	GLN	3.1
1	B	602	THR	3.1
1	B	412	ALA	3.0
1	B	382	LYS	3.0
1	A	384	HIS	3.0
1	B	384	HIS	3.0
1	B	851	ILE	3.0
1	A	837	SER	2.9
1	A	287	ASN	2.9
1	A	68	TYR	2.9
1	A	848	PRO	2.9
1	B	211	ASP	2.9
1	A	382	LYS	2.9
1	A	105	ASN	2.8
1	A	123	ILE	2.8
1	B	837	SER	2.8
1	A	286	GLY	2.8
1	B	122	SER	2.8
1	A	102	GLU	2.8
1	B	390	ALA	2.7
1	B	134	TYR	2.7
1	B	841	LYS	2.7
1	A	122	SER	2.7
1	B	850	GLU	2.7
1	A	141	VAL	2.7
1	A	65	LYS	2.6
1	B	381	ILE	2.6
1	B	745	ASP	2.5
1	A	845	THR	2.5
1	B	604	SER	2.5

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	124	ASN	2.4
1	A	835	LEU	2.4
1	B	172	GLU	2.4
1	B	849	SER	2.4
1	A	391	GLU	2.3
1	A	389	LYS	2.3
1	A	836	ARG	2.3
1	B	121	ALA	2.3
1	B	114	LYS	2.3
1	A	28	GLY	2.3
1	A	369	HIS	2.3
1	B	58	TYR	2.3
1	A	745	ASP	2.3
1	A	67	TRP	2.2
1	A	381	ILE	2.2
1	B	845	THR	2.2
1	B	334	ASN	2.2
1	A	107	GLY	2.2
1	A	846	LEU	2.2
1	A	140	ILE	2.2
1	A	110	ALA	2.2
1	B	142	ALA	2.2
1	B	389	LYS	2.2
1	B	386	GLY	2.2
1	B	212	ASN	2.1
1	A	847	LEU	2.1
1	A	211	ASP	2.1
1	B	380	ILE	2.1
1	A	412	ALA	2.1
1	B	109	THR	2.1
1	B	62	GLN	2.1
1	A	136	ILE	2.1
1	B	844	ASN	2.1
1	A	851	ILE	2.1
1	B	836	ARG	2.1
1	A	134	TYR	2.1
1	B	106	TYR	2.1
1	A	113	VAL	2.0
1	A	602	THR	2.0
1	B	27	PRO	2.0
1	A	131	ASN	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

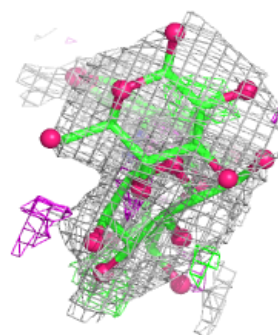
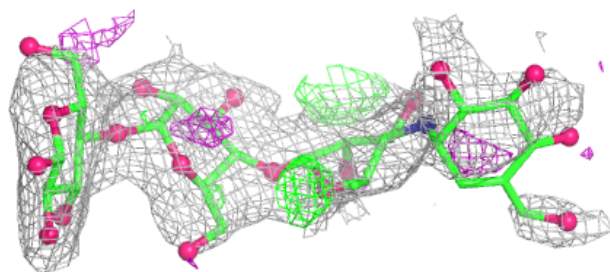
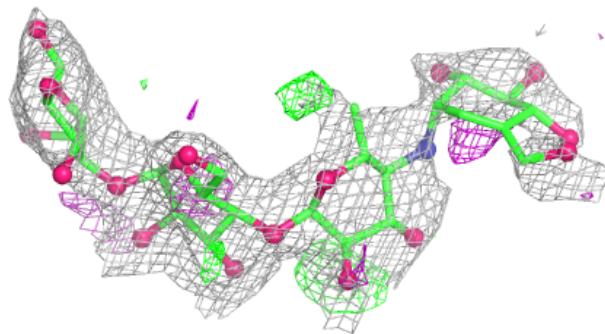
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	AC1	C	3	21/22	0.49	0.24	64,77,89,90	0
2	AC1	D	3	21/22	0.49	0.23	59,68,78,81	0
2	AC1	E	3	21/22	0.64	0.31	82,106,114,116	0
2	AC1	F	3	21/22	0.67	0.33	82,104,118,123	0
2	BGC	E	1	12/12	0.73	0.20	54,70,75,81	0
2	BGC	F	1	12/12	0.75	0.20	54,72,74,81	0
2	GLC	F	2	11/12	0.78	0.20	67,80,83,88	0
2	GLC	C	2	11/12	0.80	0.17	46,48,51,57	0
2	GLC	D	2	11/12	0.81	0.17	42,48,50,53	0
2	GLC	E	2	11/12	0.81	0.17	78,86,88,88	0
2	BGC	D	1	12/12	0.85	0.12	49,53,56,56	0
2	BGC	C	1	12/12	0.89	0.13	46,49,53,53	0

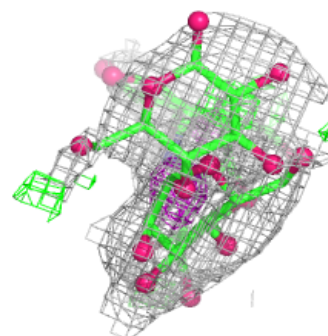
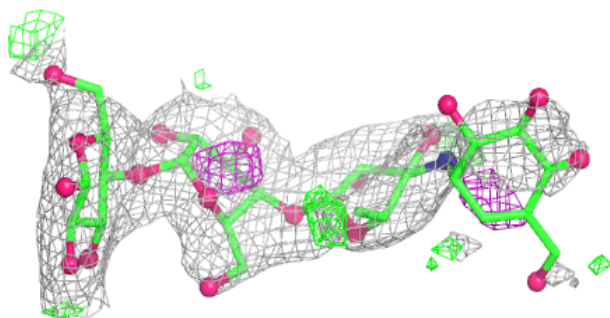
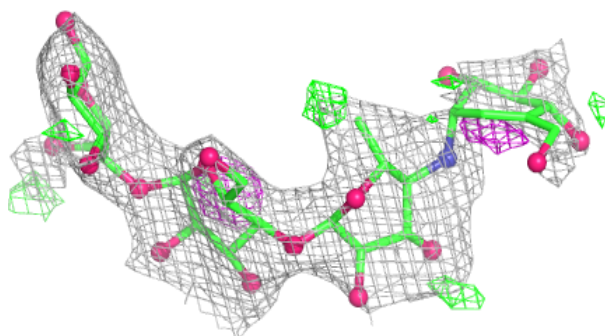
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain C:

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

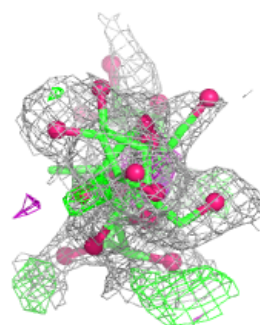
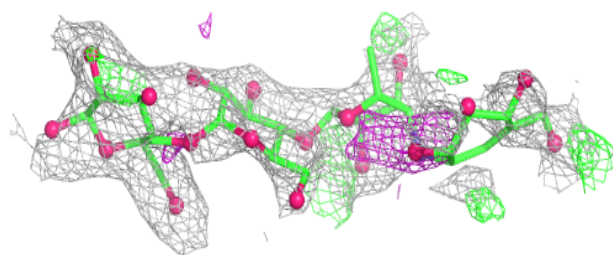
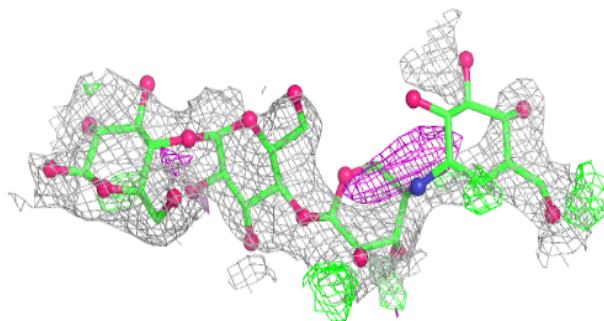
**Electron density around Chain D:**

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

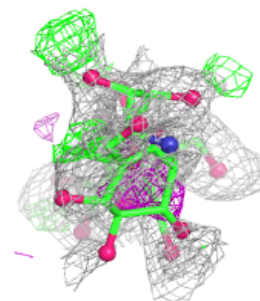
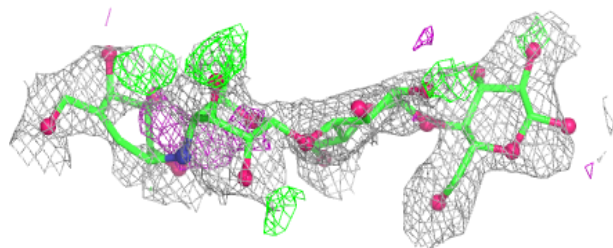
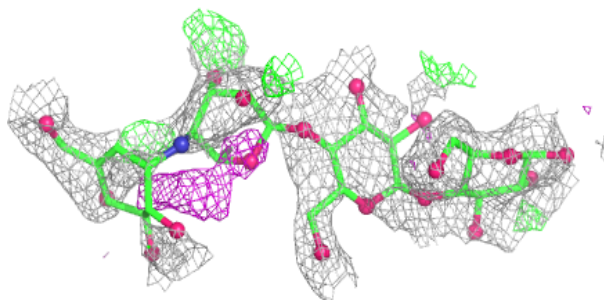


Electron density around Chain E:

$2mF_o-DF_c$ (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, 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
4	GOL	B	901	6/6	0.92	0.11	29,30,31,31	0
3	NA	B	902	1/1	0.98	0.05	20,20,20,20	0
3	NA	A	901	1/1	0.99	0.03	19,19,19,19	0

6.5 Other polymers [i](#)

There are no such residues in this entry.