



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 04:41 PM EDT

PDB ID : 1DBN  
Title : MAACKIA AMURENSIS LEUKOAGGLUTININ (LECTIN) WITH SIALYL-LACTOSE  
Authors : Imberty, A.; Gautier, C.; Lescar, J.; Loris, R.  
Deposited on : 1999-11-03  
Resolution : 2.75 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 : 2.36.2  
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) : 2.36.2

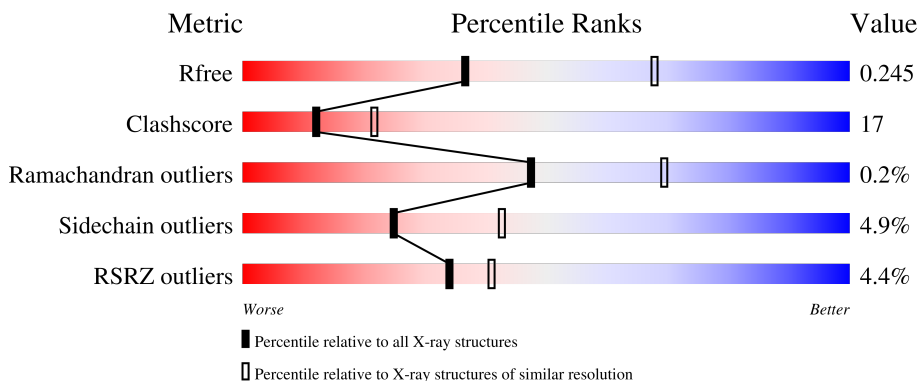
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.75 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	1235 (2.78-2.74)
Clashscore	141614	1277 (2.78-2.74)
Ramachandran outliers	138981	1257 (2.78-2.74)
Sidechain outliers	138945	1257 (2.78-2.74)
RSRZ outliers	127900	1207 (2.78-2.74)

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	239	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 68%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 30%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 10px;">3%      68%      30%      •</p>
1	B	239	<div style="display: flex; align-items: center;"> <div style="width: 5%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 66%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 32%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 10px;">5%      66%      32%      •</p>
2	C	3	<div style="display: flex; align-items: center;"> <div style="width: 33%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 67%; height: 10px; background-color: yellow; margin-right: 5px;"></div> </div> <p style="margin-left: 10px;">33%      67%</p>
2	D	3	<div style="display: flex; align-items: center;"> <div style="width: 100%; height: 10px; background-color: yellow; margin-right: 5px;"></div> </div> <p style="margin-left: 10px;">100%</p>

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
3	NAG	A	811	-	-	-	X

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 3874 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.

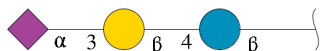
- Molecule 1 is a protein called PROTEIN (LEUKOAGGLUTININ).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
1	A	239	1842	1182	293	367	0	0	0
1	B	239	1842	1182	293	367	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	60	GLY	ASP	SEE REMARK 999	PIR JC5444
A	128	PHE	LEU	SEE REMARK 999	PIR JC5444
B	60	GLY	ASP	SEE REMARK 999	PIR JC5444
B	128	PHE	LEU	SEE REMARK 999	PIR JC5444

- Molecule 2 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	3	43	23	1	19	0	0	0
2	D	3	43	23	1	19	0	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



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

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

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

- Molecule 5 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Mn	0	0
			1	1		
5	B	1	Total	Mn	0	0
			1	1		

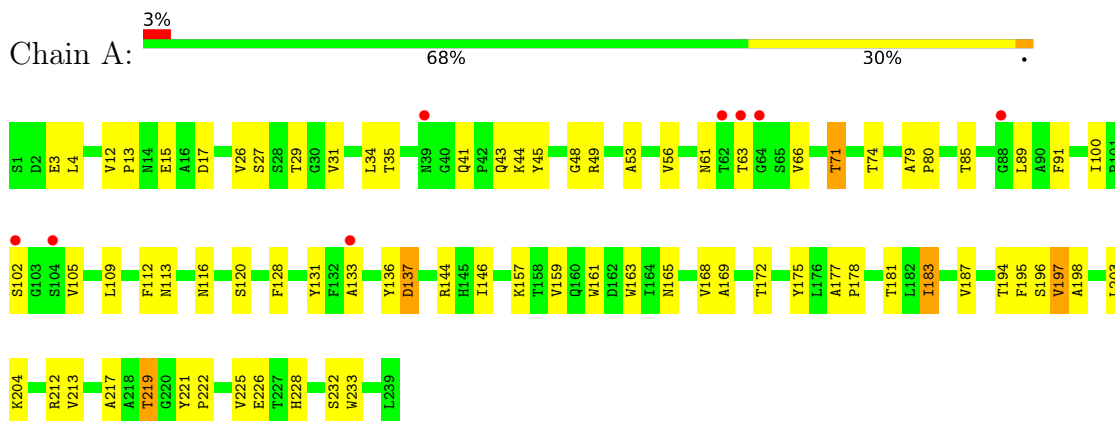
- Molecule 6 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
6	A	16	Total 16	O 16	0	0
6	B	14	Total 14	O 14	0	0

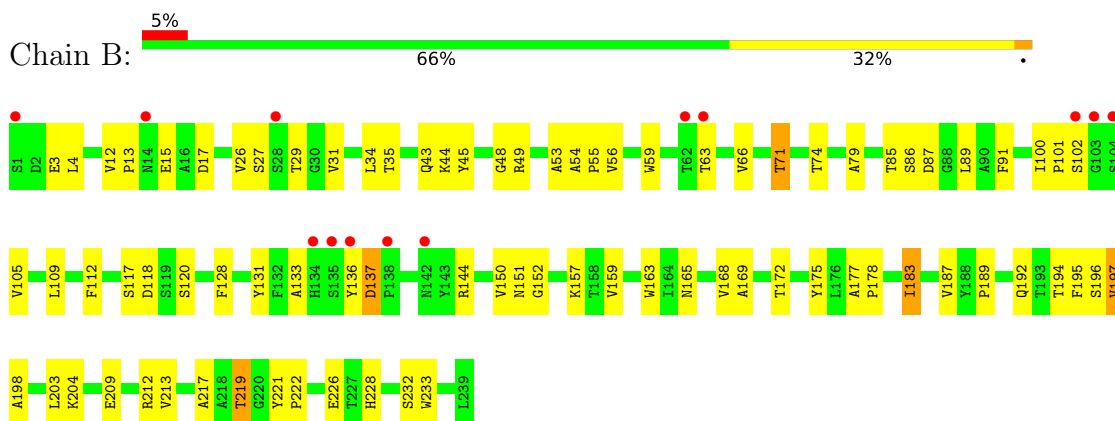
### 3 Residue-property plots [i](#)

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: PROTEIN (LEUKOAGGLUTININ)




- Molecule 1: PROTEIN (LEUKOAGGLUTININ)



- Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-beta-D-glucopyranose



- Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain D:  100%

8GG1  
GAL2  
SIA3



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	80.74Å 88.45Å 84.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.75 29.82 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.9 (30.00-2.75) 99.9 (29.82-2.70)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.05 (at 2.68Å)	Xtrriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.221 , 0.253 0.213 , 0.245	Depositor DCC
$R_{free}$ test set	1349 reflections (7.86%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	52.0	Xtrriage
Anisotropy	0.518	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 51.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.018 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	3874	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	47.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.49% 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: BGC, NAG, CA, SIA, GAL, MN

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	0.42	0/1894	0.66	0/2599
1	B	0.42	0/1894	0.66	0/2599
All	All	0.42	0/3788	0.66	0/5198

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 [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	1842	0	1755	65	0
1	B	1842	0	1756	70	0
2	C	43	0	37	4	0
2	D	43	0	37	6	0
3	A	42	0	39	5	0
3	B	28	0	26	3	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	16	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	14	0	0	3	0
All	All	3874	0	3650	128	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 17.

All (128) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:49:ARG:HD3	1:B:100:ILE:HG12	1.35	1.09
1:A:49:ARG:HD3	1:A:100:ILE:HG12	1.36	1.04
1:A:194:THR:HG21	1:B:196:SER:HB2	1.58	0.85
1:A:43:GLN:O	1:A:219:THR:HG21	1.75	0.85
1:A:196:SER:HB2	1:B:194:THR:HG21	1.58	0.85
1:B:43:GLN:O	1:B:219:THR:HG21	1.75	0.85
1:A:71:THR:HG21	1:A:233:TRP:HE1	1.50	0.76
1:B:71:THR:HG21	1:B:233:TRP:HE1	1.51	0.76
1:A:183:ILE:HD12	1:B:187:VAL:HG21	1.69	0.74
1:A:105:VAL:HG23	1:A:112:PHE:O	1.88	0.72
1:A:45:TYR:N	1:A:219:THR:HG22	2.05	0.72
1:B:45:TYR:N	1:B:219:THR:HG22	2.05	0.71
1:A:27:SER:OG	1:A:29:THR:HG22	1.90	0.71
1:B:105:VAL:HG23	1:B:112:PHE:O	1.90	0.70
1:B:27:SER:OG	1:B:29:THR:HG22	1.90	0.70
1:A:187:VAL:HG21	1:B:183:ILE:HD12	1.72	0.69
1:A:194:THR:HG21	1:B:196:SER:CB	2.30	0.62
3:A:821:NAG:H83	1:B:168:VAL:HG12	1.80	0.61
1:A:34:LEU:HD23	1:A:228:HIS:O	2.00	0.61
1:B:71:THR:CG2	1:B:233:TRP:HE1	2.14	0.61
1:B:221:TYR:CD1	1:B:222:PRO:HD2	2.37	0.60
1:A:71:THR:CG2	1:A:233:TRP:HE1	2.15	0.59
1:A:221:TYR:CD1	1:A:222:PRO:HD2	2.37	0.59
1:B:34:LEU:HD23	1:B:228:HIS:O	2.03	0.58
1:A:61:ASN:ND2	3:A:801:NAG:O7	2.37	0.58
1:A:196:SER:CB	1:B:194:THR:HG21	2.32	0.57
1:A:89:LEU:HD23	1:A:128:PHE:HB2	1.86	0.57
1:B:89:LEU:HD23	1:B:128:PHE:HB2	1.87	0.56
3:A:821:NAG:H81	1:B:189:PRO:HD2	1.88	0.56
1:B:4:LEU:HD23	1:B:56:VAL:HG22	1.89	0.54
1:A:4:LEU:HD23	1:A:56:VAL:HG22	1.89	0.54
1:B:157:LYS:HD3	1:B:198:ALA:O	2.07	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:157:LYS:HD3	1:A:198:ALA:O	2.08	0.54
1:B:177:ALA:HB3	1:B:178:PRO:HD3	1.90	0.54
1:B:49:ARG:CD	1:B:100:ILE:HG12	2.24	0.54
2:D:3:SIA:H6	2:D:3:SIA:O1A	2.08	0.53
1:A:183:ILE:HD12	1:B:187:VAL:CG2	2.38	0.53
1:B:89:LEU:HD23	1:B:89:LEU:H	1.73	0.53
2:C:3:SIA:H6	2:C:3:SIA:O1A	2.07	0.53
1:A:49:ARG:CD	1:A:100:ILE:HG12	2.25	0.52
1:B:144:ARG:HG2	1:B:144:ARG:HH11	1.74	0.52
1:A:89:LEU:HD23	1:A:89:LEU:H	1.74	0.52
1:A:109:LEU:N	1:A:109:LEU:HD23	2.24	0.52
1:A:144:ARG:HG2	1:A:144:ARG:HH11	1.75	0.52
1:B:15:GLU:HG2	1:B:17:ASP:OD1	2.09	0.52
1:B:109:LEU:HD23	1:B:109:LEU:N	2.24	0.52
1:A:15:GLU:HG2	1:A:17:ASP:OD1	2.11	0.51
1:B:137:ASP:OD2	2:D:2:GAL:H61	2.11	0.51
1:B:59:TRP:O	1:B:209:GLU:HG3	2.11	0.51
1:A:172:THR:HG21	6:B:936:HOH:O	2.11	0.50
1:A:105:VAL:O	1:A:105:VAL:HG22	2.12	0.50
1:A:66:VAL:HG21	1:A:204:LYS:HD2	1.94	0.50
1:B:74:THR:HA	1:B:169:ALA:O	2.12	0.50
1:A:131:TYR:CE1	2:C:2:GAL:H62	2.47	0.50
1:A:35:THR:OG1	1:A:228:HIS:HD2	1.95	0.49
1:B:29:THR:HG23	1:B:31:VAL:HG13	1.94	0.49
1:A:29:THR:HG23	1:A:31:VAL:HG13	1.95	0.49
1:A:27:SER:OG	1:A:29:THR:CG2	2.58	0.49
1:B:136:TYR:CZ	2:D:1:BGC:H6C1	2.48	0.49
1:B:66:VAL:HG21	1:B:204:LYS:HD2	1.95	0.49
1:A:175:TYR:CZ	1:A:203:LEU:HG	2.48	0.49
1:B:105:VAL:HG22	1:B:105:VAL:O	2.12	0.49
1:B:221:TYR:CG	1:B:222:PRO:HD2	2.48	0.48
1:A:181:THR:HG23	1:B:192:GLN:HE22	1.78	0.48
1:B:12:VAL:HG13	1:B:13:PRO:HD2	1.95	0.48
1:B:27:SER:OG	1:B:29:THR:CG2	2.59	0.48
1:B:175:TYR:CZ	1:B:203:LEU:HG	2.48	0.48
1:A:159:VAL:CG1	1:A:197:VAL:HG22	2.43	0.48
1:A:177:ALA:HB3	1:A:178:PRO:HD3	1.94	0.48
1:A:221:TYR:CG	1:A:222:PRO:HD2	2.49	0.48
1:A:74:THR:HA	1:A:169:ALA:O	2.14	0.47
1:A:159:VAL:HG11	1:A:197:VAL:HG22	1.96	0.47
1:B:101:PRO:HA	3:B:911:NAG:H82	1.95	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:118:ASP:OD1	1:B:120:SER:HB2	2.13	0.47
1:B:226:GLU:OE2	1:B:228:HIS:HE1	1.97	0.47
1:A:61:ASN:ND2	3:A:801:NAG:C7	2.76	0.47
1:A:194:THR:HG22	1:A:195:PHE:N	2.30	0.47
1:B:159:VAL:CG1	1:B:197:VAL:HG22	2.45	0.47
1:B:35:THR:OG1	1:B:228:HIS:HD2	1.98	0.47
1:B:194:THR:HG22	1:B:195:PHE:N	2.29	0.47
1:A:102:SER:O	1:A:113:ASN:OD1	2.33	0.47
1:A:131:TYR:CZ	1:A:133:ALA:HB3	2.50	0.47
1:B:163:TRP:CZ2	1:B:165:ASN:HA	2.50	0.47
1:B:131:TYR:CZ	1:B:133:ALA:HB3	2.50	0.46
1:A:226:GLU:OE2	1:A:228:HIS:HE1	1.98	0.46
1:B:91:PHE:CZ	1:B:213:VAL:CG2	2.99	0.46
1:B:152:GLY:HA2	6:B:937:HOH:O	2.15	0.46
1:A:163:TRP:CZ2	1:A:165:ASN:HA	2.50	0.46
1:A:53:ALA:O	1:A:212:ARG:NH1	2.50	0.45
1:A:91:PHE:CZ	1:A:213:VAL:CG2	3.00	0.45
1:A:12:VAL:HG13	1:A:13:PRO:HD2	1.97	0.45
1:B:159:VAL:HG11	1:B:197:VAL:HG22	1.98	0.45
1:A:137:ASP:OD2	2:C:2:GAL:H61	2.17	0.45
1:B:53:ALA:O	1:B:212:ARG:NH1	2.50	0.45
1:B:109:LEU:HD23	1:B:109:LEU:H	1.82	0.45
1:B:136:TYR:OH	2:D:1:BGC:H6C1	2.17	0.45
1:A:113:ASN:CG	3:A:811:NAG:N2	2.71	0.44
1:B:44:LYS:HA	1:B:219:THR:CG2	2.48	0.44
1:B:85:THR:HB	1:B:226:GLU:OE1	2.18	0.44
1:B:49:ARG:HD3	1:B:100:ILE:CG1	2.25	0.43
1:B:71:THR:O	1:B:172:THR:HA	2.18	0.43
1:A:71:THR:O	1:A:172:THR:HA	2.18	0.43
1:A:44:LYS:HA	1:A:219:THR:CG2	2.49	0.43
1:A:109:LEU:HD23	1:A:109:LEU:H	1.82	0.43
1:A:48:GLY:O	1:A:49:ARG:HG3	2.18	0.43
1:A:159:VAL:HB	1:A:197:VAL:HG13	2.00	0.43
1:B:136:TYR:HB3	2:D:2:GAL:H61	2.00	0.43
1:A:168:VAL:HG12	3:B:921:NAG:H83	1.99	0.42
1:B:48:GLY:O	1:B:49:ARG:HG3	2.19	0.42
1:A:187:VAL:CG2	1:B:183:ILE:HD12	2.44	0.42
1:B:86:SER:HA	1:B:87:ASP:HA	1.76	0.42
1:B:87:ASP:OD1	2:D:2:GAL:O6	2.38	0.42
1:B:102:SER:H	3:B:911:NAG:HN2	1.67	0.42
1:B:79:ALA:HB2	1:B:226:GLU:HB3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:79:ALA:HB2	1:A:226:GLU:HB3	2.02	0.41
1:A:45:TYR:HA	1:A:219:THR:O	2.21	0.41
1:A:85:THR:HB	1:A:226:GLU:OE1	2.20	0.41
1:B:34:LEU:HB3	1:B:217:ALA:HB3	2.02	0.41
1:B:159:VAL:HB	1:B:197:VAL:HG13	2.01	0.41
1:A:34:LEU:HB3	1:A:217:ALA:HB3	2.03	0.41
1:A:71:THR:CG2	1:A:233:TRP:NE1	2.84	0.41
1:A:136:TYR:HB3	2:C:2:GAL:H61	2.03	0.40
1:B:212:ARG:HG2	6:B:929:HOH:O	2.21	0.40
1:A:146:ILE:HG13	1:A:161:TRP:HB2	2.04	0.40
1:B:117:SER:HA	1:B:151:ASN:O	2.21	0.40
1:A:80:PRO:HD2	1:A:225:VAL:O	2.22	0.40
1:B:54:ALA:HA	1:B:55:PRO:HD3	1.92	0.40
1:B:150:VAL:O	1:B:151:ASN:HB2	2.21	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	237/239 (99%)	224 (94%)	12 (5%)	1 (0%)	34	53
1	B	237/239 (99%)	225 (95%)	12 (5%)	0	100	100
All	All	474/478 (99%)	449 (95%)	24 (5%)	1 (0%)	47	69

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	116	ASN

### 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	205/205 (100%)	194 (95%)	11 (5%)	22	38
1	B	205/205 (100%)	196 (96%)	9 (4%)	28	47
All	All	410/410 (100%)	390 (95%)	20 (5%)	25	43

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	GLU
1	A	26	VAL
1	A	41	GLN
1	A	63	THR
1	A	71	THR
1	A	120	SER
1	A	137	ASP
1	A	183	ILE
1	A	197	VAL
1	A	219	THR
1	A	232	SER
1	B	3	GLU
1	B	26	VAL
1	B	63	THR
1	B	71	THR
1	B	137	ASP
1	B	183	ILE
1	B	197	VAL
1	B	219	THR
1	B	232	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	14	ASN
1	A	33	GLN

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Mol	Chain	Res	Type
1	A	43	GLN
1	A	116	ASN
1	A	192	GLN
1	A	228	HIS
1	B	14	ASN
1	B	33	GLN
1	B	43	GLN
1	B	116	ASN
1	B	192	GLN
1	B	228	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	0.39	0	17,17,17	0.35	0
2	GAL	C	2	2	11,11,12	0.43	0	15,15,17	0.63	0
2	SIA	C	3	2	20,20,21	0.77	0	24,28,31	0.85	0
2	BGC	D	1	2	12,12,12	0.35	0	17,17,17	0.39	0
2	GAL	D	2	2	11,11,12	0.48	0	15,15,17	0.61	0
2	SIA	D	3	2	20,20,21	0.78	0	24,28,31	0.87	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral



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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	BGC	C	1	2	-	0/2/22/22	0/1/1/1
2	GAL	C	2	2	-	2/2/19/22	0/1/1/1
2	SIA	C	3	2	-	5/18/34/38	0/1/1/1
2	BGC	D	1	2	-	0/2/22/22	0/1/1/1
2	GAL	D	2	2	-	2/2/19/22	0/1/1/1
2	SIA	D	3	2	-	5/18/34/38	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (14) torsion outliers are listed below:

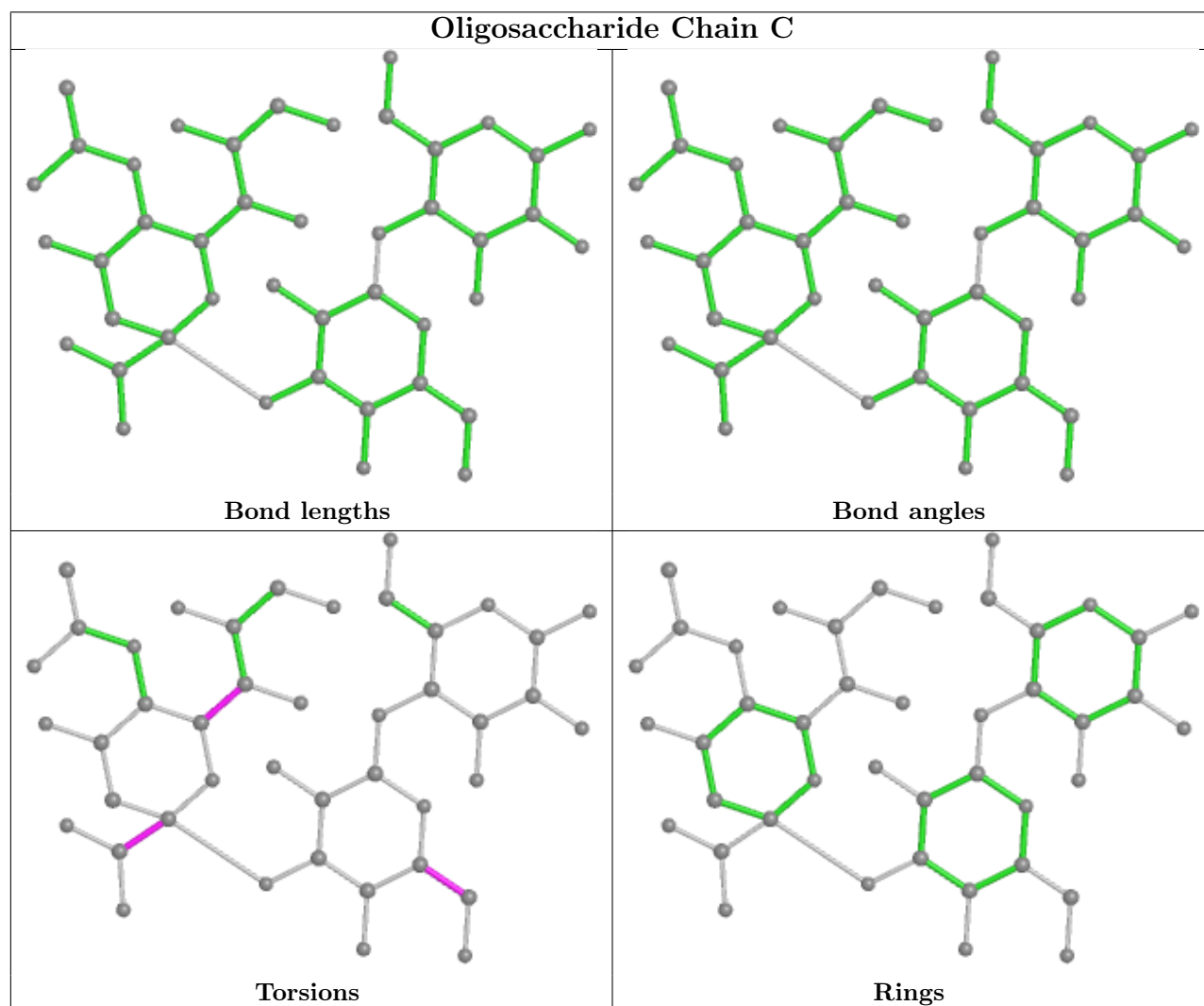
Mol	Chain	Res	Type	Atoms
2	C	3	SIA	C5-C6-C7-C8
2	C	3	SIA	C5-C6-C7-O7
2	C	3	SIA	O6-C6-C7-C8
2	C	3	SIA	O6-C6-C7-O7
2	D	3	SIA	C5-C6-C7-C8
2	D	3	SIA	C5-C6-C7-O7
2	D	3	SIA	O6-C6-C7-C8
2	D	3	SIA	O6-C6-C7-O7
2	D	2	GAL	C4-C5-C6-O6
2	C	2	GAL	C4-C5-C6-O6
2	C	2	GAL	O5-C5-C6-O6
2	D	2	GAL	O5-C5-C6-O6
2	C	3	SIA	O1A-C1-C2-C3
2	D	3	SIA	O1A-C1-C2-C3

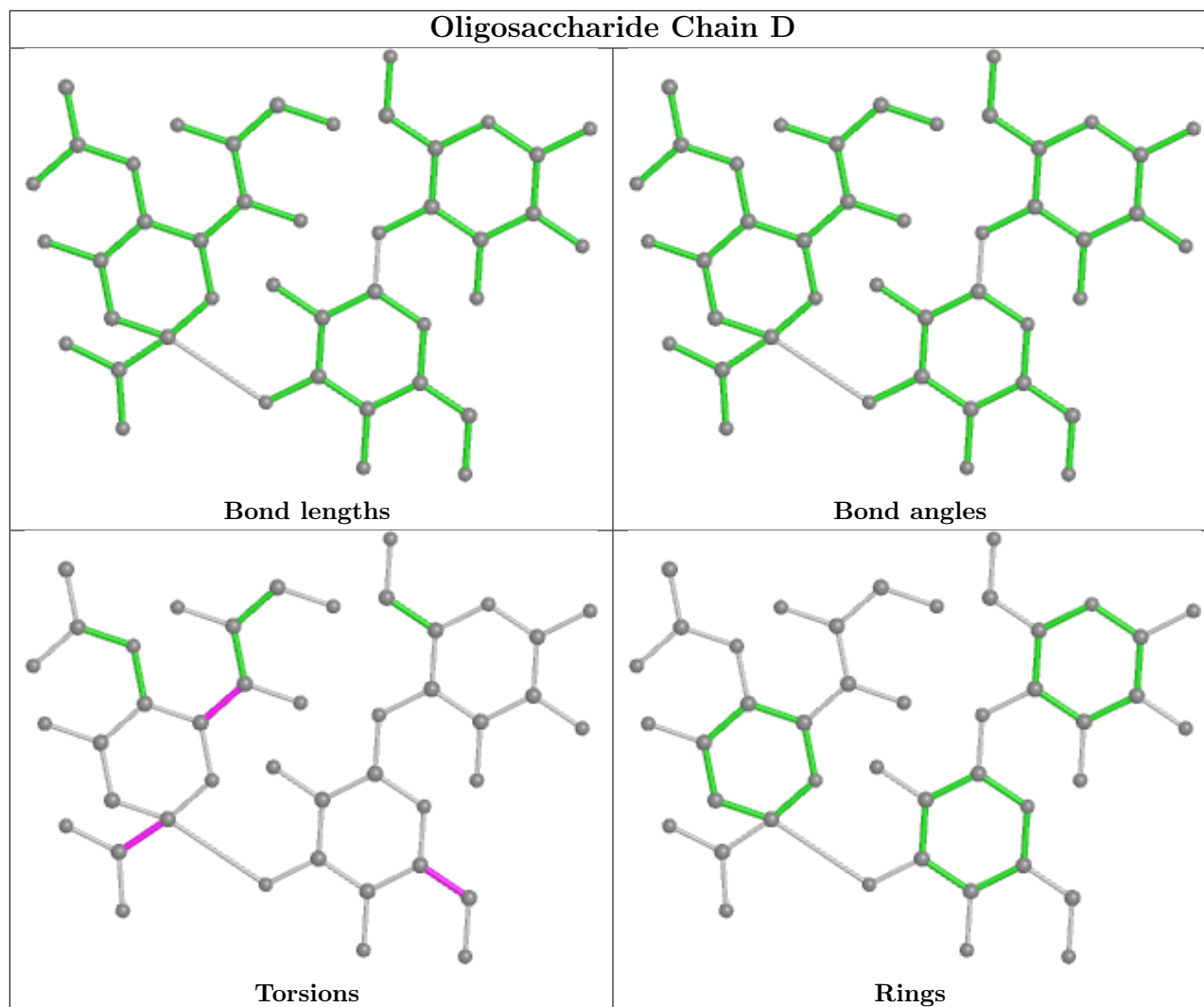
There are no ring outliers.

5 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	2	GAL	3	0
2	D	1	BGC	2	0
2	C	2	GAL	3	0
2	C	3	SIA	1	0
2	D	3	SIA	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 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 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	$\# Z  > 2$
3	NAG	A	801	1	14,14,15	0.65	0	17,19,21	1.00	1 (5%)
3	NAG	B	921	1	14,14,15	0.63	0	17,19,21	0.90	0
3	NAG	A	811	1	14,14,15	0.68	0	17,19,21	0.66	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	A	821	1	14,14,15	0.52	0	17,19,21	0.77	0
3	NAG	B	911	1	14,14,15	0.66	0	17,19,21	0.64	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
3	NAG	A	801	1	-	2/6/23/26	0/1/1/1
3	NAG	B	921	1	-	2/6/23/26	0/1/1/1
3	NAG	A	811	1	-	2/6/23/26	0/1/1/1
3	NAG	A	821	1	-	0/6/23/26	0/1/1/1
3	NAG	B	911	1	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
3	A	801	NAG	C4-C3-C2	-2.67	107.11	111.02

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	801	NAG	O5-C5-C6-O6
3	A	811	NAG	O5-C5-C6-O6
3	A	801	NAG	C4-C5-C6-O6
3	A	811	NAG	C4-C5-C6-O6
3	B	921	NAG	O5-C5-C6-O6
3	B	921	NAG	C4-C5-C6-O6
3	B	911	NAG	C1-C2-N2-C7

There are no ring outliers.

5 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	801	NAG	2	0
3	B	921	NAG	1	0
3	A	811	NAG	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	821	NAG	2	0
3	B	911	NAG	2	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

### 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	239/239 (100%)	-0.04	8 (3%) 46 54	25, 41, 66, 84	0
1	B	239/239 (100%)	0.07	13 (5%) 25 31	29, 46, 70, 87	0
All	All	478/478 (100%)	0.01	21 (4%) 34 41	25, 44, 69, 87	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	62	THR	5.6
1	B	142	ASN	4.3
1	A	64	GLY	4.2
1	B	135	SER	4.1
1	B	134	HIS	3.7
1	B	138	PRO	3.4
1	B	136	TYR	3.4
1	B	63	THR	3.3
1	A	62	THR	3.2
1	B	103	GLY	2.7
1	B	28	SER	2.7
1	B	102	SER	2.6
1	B	14	ASN	2.6
1	B	104	SER	2.4
1	A	63	THR	2.4
1	A	102	SER	2.3
1	B	1	SER	2.2
1	A	39	ASN	2.2
1	A	104	SER	2.1
1	A	133	ALA	2.1
1	A	88	GLY	2.1

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

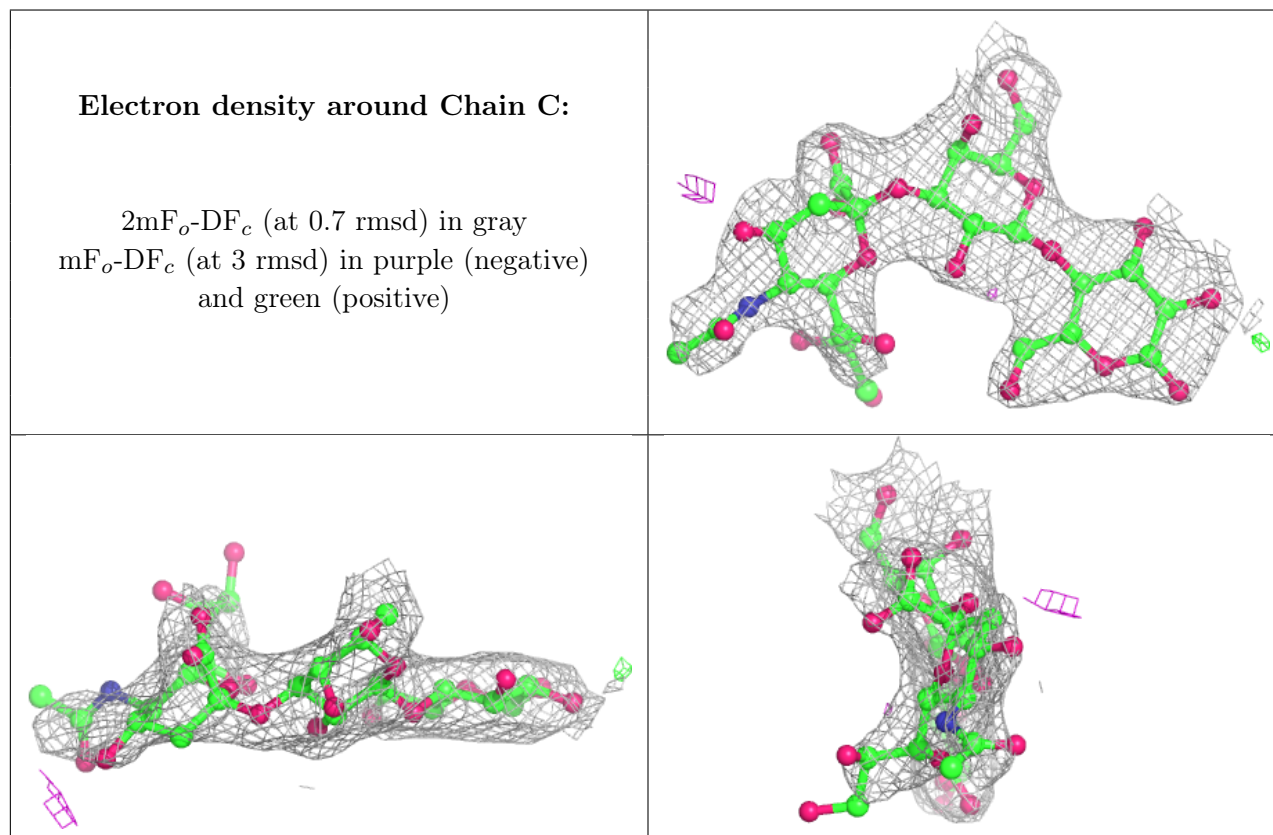
There are no non-standard protein/DNA/RNA residues in this entry.

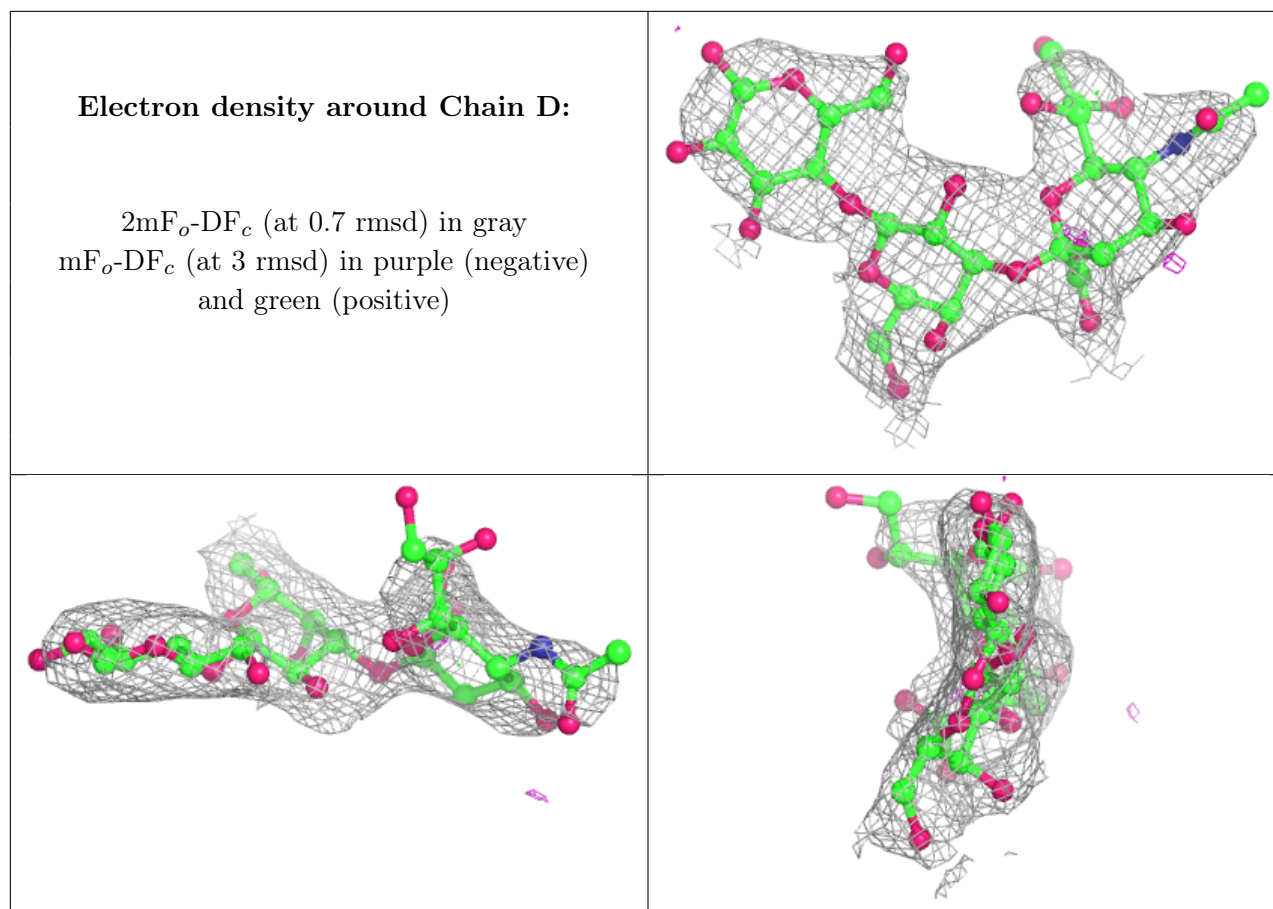
## 6.3 Carbohydrates [i](#)

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	SIA	C	3	20/21	0.82	0.46	79,87,97,99	0
2	SIA	D	3	20/21	0.82	0.51	73,88,98,99	0
2	GAL	D	2	11/12	0.87	0.19	66,69,73,81	0
2	GAL	C	2	11/12	0.89	0.17	54,64,67,74	0
2	BGC	D	1	12/12	0.94	0.44	66,70,73,74	0
2	BGC	C	1	12/12	0.95	0.23	59,62,65,68	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.





## 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	NAG	A	811	14/15	0.79	0.40	78,81,89,91	0
3	NAG	B	911	14/15	0.80	0.32	77,79,89,94	0
3	NAG	A	801	14/15	0.82	0.20	54,59,66,67	0
3	NAG	A	821	14/15	0.86	0.29	60,72,76,77	0
3	NAG	B	921	14/15	0.90	0.22	39,44,47,48	0
4	CA	A	301	1/1	0.96	0.14	43,43,43,43	0
4	CA	B	303	1/1	0.98	0.06	53,53,53,53	0
5	MN	A	302	1/1	0.99	0.22	49,49,49,49	0
5	MN	B	304	1/1	0.99	0.15	44,44,44,44	0



## 6.5 Other polymers [i](#)

There are no such residues in this entry.