



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 17, 2022 – 03:27 PM EDT

PDB ID : 3WN4
Title : Crystal structure of human TLR8 in complex with DS-877
Authors : Tanji, H.; Ohto, U.; Shimizu, T.
Deposited on : 2013-12-02
Resolution : 1.81 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.29
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) : 2.29

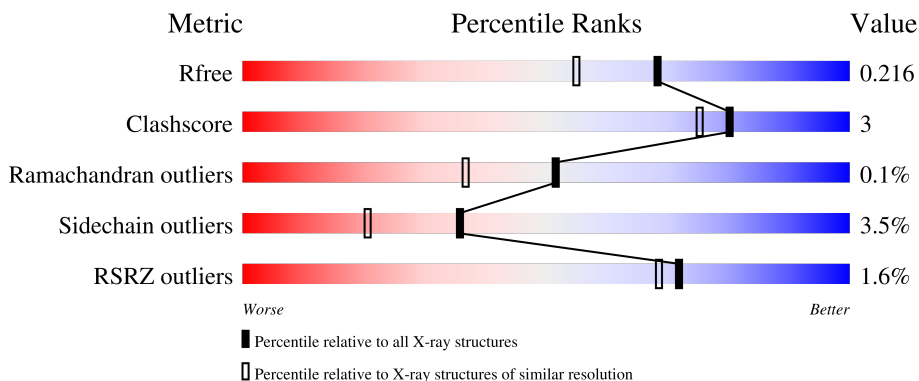
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.81 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	7484 (1.84-1.80)
Clashscore	141614	8401 (1.84-1.80)
Ramachandran outliers	138981	8290 (1.84-1.80)
Sidechain outliers	138945	8290 (1.84-1.80)
RSRZ outliers	127900	7371 (1.84-1.80)

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	811	 83% 8% 8%
2	B	5	 100%
3	C	3	 100%
3	D	3	 100%

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 6768 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 Toll-like receptor 8.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	747	6013	3846	1020	1128	19	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	ARG	-	expression tag	UNP Q9NR97
A	24	SER	-	expression tag	UNP Q9NR97
A	25	PRO	-	expression tag	UNP Q9NR97
A	26	TRP	-	expression tag	UNP Q9NR97
A	828	GLU	-	expression tag	UNP Q9NR97
A	829	PHE	-	expression tag	UNP Q9NR97
A	830	LEU	-	expression tag	UNP Q9NR97
A	831	VAL	-	expression tag	UNP Q9NR97
A	832	PRO	-	expression tag	UNP Q9NR97
A	833	ARG	-	expression tag	UNP Q9NR97

- Molecule 2 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(2-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	5	61	34	2	25	0	0	0

- Molecule 3 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

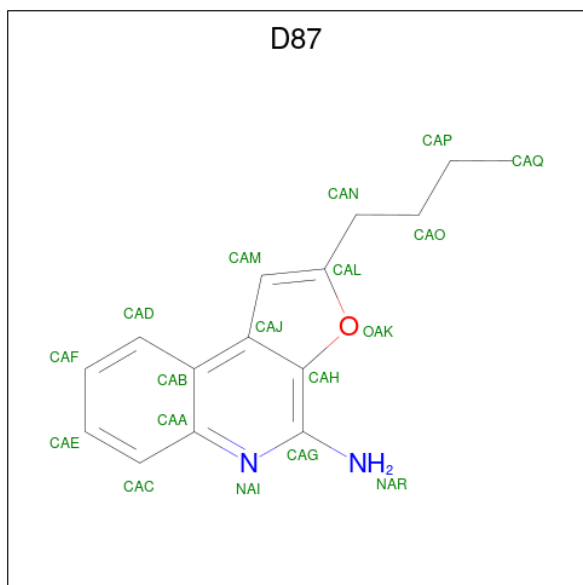
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	3	39	22	2	15	0	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	D	3	39	22	2	15	0	0	0

- Molecule 4 is 2-butylfuro[2,3-c]quinolin-4-amine (three-letter code: D87) (formula: $C_{15}H_{16}N_2O$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	A	1	18	15	2	1	0	0

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

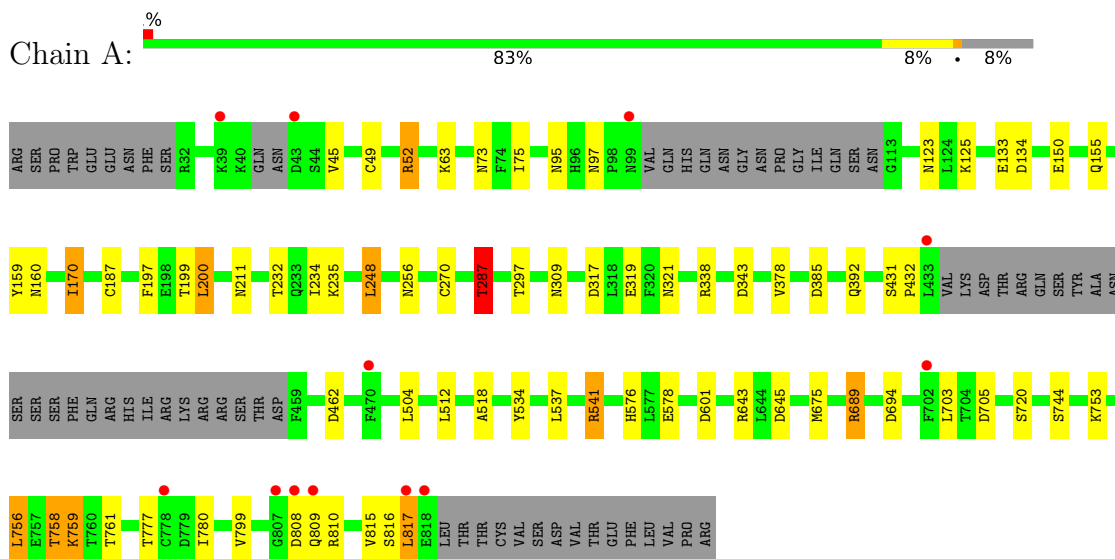
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	472	Total	O	0	0
			472	472		

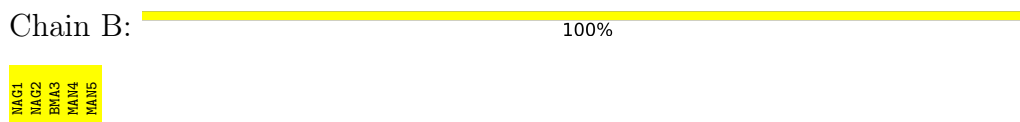
3 Residue-property plots [i](#)

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: Toll-like receptor 8



- Molecule 2: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(2-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



MAG1
MAG2
BMA3

4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	138.36Å 103.53Å 70.72Å 90.00° 106.74° 90.00°	Depositor
Resolution (Å)	27.19 – 1.81 27.19 – 1.81	Depositor EDS
% Data completeness (in resolution range)	96.5 (27.19-1.81) 96.5 (27.19-1.81)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.34 (at 1.80Å)	Xtrriage
Refinement program	REFMAC 5.8.0049	Depositor
R, R_{free}	0.168 , 0.208 0.178 , 0.216	Depositor DCC
R_{free} test set	4237 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	24.2	Xtrriage
Anisotropy	0.080	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 49.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6768	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.33% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, MAN, BMA, D87

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	0.94	1/6136 (0.0%)	0.98	16/8320 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	287	THR	CB-CG2	-7.22	1.28	1.52

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	675	MET	CG-SD-CE	-8.30	86.92	100.20
1	A	689	ARG	NE-CZ-NH2	6.95	123.77	120.30
1	A	705	ASP	CB-CG-OD1	6.60	124.24	118.30
1	A	601	ASP	CB-CG-OD1	6.30	123.97	118.30
1	A	52	ARG	CG-CD-NE	-6.27	98.63	111.80
1	A	338	ARG	NE-CZ-NH1	6.20	123.40	120.30
1	A	343	ASP	CB-CG-OD2	-6.02	112.89	118.30
1	A	462	ASP	CB-CG-OD1	5.96	123.66	118.30
1	A	541	ARG	NE-CZ-NH2	-5.94	117.33	120.30
1	A	287	THR	N-CA-CB	-5.76	99.36	110.30
1	A	694	ASP	CB-CG-OD2	-5.54	113.31	118.30
1	A	643	ARG	NE-CZ-NH2	-5.50	117.55	120.30
1	A	462	ASP	CB-CG-OD2	-5.48	113.36	118.30
1	A	694	ASP	CB-CG-OD1	5.42	123.18	118.30
1	A	645	ASP	CB-CG-OD1	5.33	123.10	118.30
1	A	248	LEU	CB-CG-CD2	5.32	120.05	111.00

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	6013	0	5996	31	0
2	B	61	0	52	0	0
3	C	39	0	34	0	0
3	D	39	0	34	0	0
4	A	18	0	16	0	0
5	A	126	0	117	5	0
6	A	472	0	0	2	0
All	All	6768	0	6249	34	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 (34) 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:758:THR:HG22	1:A:759:LYS:H	1.47	0.80
1:A:297:THR:H	1:A:321:ASN:HD21	1.38	0.71
1:A:816:SER:O	1:A:817:LEU:HD23	1.92	0.69
5:A:904:NAG:C8	6:A:1283:HOH:O	2.47	0.62
1:A:63:LYS:HE2	5:A:902:NAG:O3	2.01	0.60
1:A:235:LYS:HD3	1:A:270:CYS:SG	2.43	0.58
1:A:73:ASN:HB2	1:A:97:ASN:HD21	1.70	0.56
1:A:211:ASN:O	1:A:232:THR:HA	2.08	0.53
1:A:758:THR:HG22	1:A:759:LYS:N	2.21	0.53
1:A:95:ASN:ND2	1:A:133:GLU:H	2.08	0.52
1:A:392:GLN:HG2	5:A:911:NAG:O6	2.09	0.51
1:A:52:ARG:HG2	1:A:799:VAL:HG21	1.93	0.50
1:A:576:HIS:HB3	1:A:578:GLU:OE1	2.12	0.49
1:A:431:SER:HB2	1:A:432:PRO:CD	2.43	0.49
1:A:753:LYS:HA	1:A:756:LEU:HD22	1.96	0.48
5:A:904:NAG:O3	5:A:904:NAG:H82	2.15	0.47
1:A:512:LEU:HB2	1:A:537:LEU:HD23	1.97	0.47
1:A:234:ILE:O	1:A:256:ASN:HB3	2.15	0.45
1:A:317:ASP:OD1	1:A:319:GLU:OE1	2.34	0.45
1:A:134:ASP:HA	1:A:155:GLN:O	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:720:SER:HA	1:A:744:SER:O	2.17	0.45
1:A:170:ILE:H	1:A:170:ILE:HD13	1.81	0.45
1:A:197:PHE:HA	1:A:200:LEU:HD22	2.01	0.43
1:A:758:THR:CG2	1:A:759:LYS:N	2.79	0.43
1:A:809:GLN:OE1	1:A:817:LEU:HD22	2.18	0.43
1:A:518:ALA:HA	1:A:541:ARG:O	2.19	0.42
5:A:904:NAG:H81	6:A:1283:HOH:O	2.16	0.42
1:A:159:TYR:CE1	1:A:187:CYS:HB2	2.54	0.42
1:A:777:THR:O	1:A:780:ILE:HG22	2.20	0.42
1:A:287:THR:HA	1:A:309:ASN:O	2.20	0.41
1:A:75:ILE:H	1:A:97:ASN:HD22	1.69	0.41
1:A:297:THR:H	1:A:321:ASN:ND2	2.12	0.41
1:A:816:SER:O	1:A:817:LEU:CD2	2.65	0.41
1:A:758:THR:CG2	1:A:759:LYS:H	2.22	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	739/811 (91%)	700 (95%)	38 (5%)	1 (0%)	51 37

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	378	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	693/755 (92%)	669 (96%)	24 (4%)	36 20

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	45	VAL
1	A	49	CYS
1	A	123	ASN
1	A	125	LYS
1	A	150	GLU
1	A	160	ASN
1	A	170	ILE
1	A	199	THR
1	A	200	LEU
1	A	248	LEU
1	A	287	THR
1	A	385	ASP
1	A	504	LEU
1	A	534	TYR
1	A	689	ARG
1	A	703	LEU
1	A	756	LEU
1	A	758	THR
1	A	759	LYS
1	A	761	THR
1	A	808	ASP
1	A	810	ARG
1	A	815	VAL
1	A	817	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	84	GLN
1	A	95	ASN
1	A	97	ASN
1	A	135	ASN
1	A	202	ASN

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Mol	Chain	Res	Type
1	A	288	GLN
1	A	321	ASN
1	A	355	GLN
1	A	415	GLN
1	A	653	HIS
1	A	661	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](#)

11 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	1,2	14,14,15	0.90	0	17,19,21	1.38	3 (17%)
2	NAG	B	2	2	14,14,15	0.99	1 (7%)	17,19,21	1.59	5 (29%)
2	BMA	B	3	2	11,11,12	0.64	0	15,15,17	1.22	2 (13%)
2	MAN	B	4	2	11,11,12	0.96	0	15,15,17	1.86	4 (26%)
2	MAN	B	5	2	11,11,12	0.73	0	13,15,17	1.66	2 (15%)
3	NAG	C	1	1,3	14,14,15	1.07	1 (7%)	17,19,21	1.66	5 (29%)
3	NAG	C	2	3	14,14,15	1.20	1 (7%)	17,19,21	1.44	2 (11%)
3	BMA	C	3	3	11,11,12	0.56	0	15,15,17	2.24	7 (46%)
3	NAG	D	1	1,3	14,14,15	1.29	1 (7%)	17,19,21	1.59	4 (23%)
3	NAG	D	2	3	14,14,15	0.93	1 (7%)	17,19,21	1.70	4 (23%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	BMA	D	3	3	11,11,12	0.80	0	15,15,17	1.34	2 (13%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	B	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	B	2	2	-	0/6/23/26	0/1/1/1
2	BMA	B	3	2	-	0/2/19/22	0/1/1/1
2	MAN	B	4	2	-	0/2/19/22	0/1/1/1
2	MAN	B	5	2	-	2/2/18/22	0/1/1/1
3	NAG	C	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	C	2	3	-	0/6/23/26	0/1/1/1
3	BMA	C	3	3	-	2/2/19/22	0/1/1/1
3	NAG	D	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	D	2	3	-	0/6/23/26	0/1/1/1
3	BMA	D	3	3	-	0/2/19/22	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	2	NAG	O5-C1	-3.68	1.37	1.43
3	D	1	NAG	O5-C1	3.12	1.48	1.43
3	C	1	NAG	C3-C2	2.61	1.58	1.52
3	D	2	NAG	C1-C2	2.43	1.56	1.52
2	B	2	NAG	O5-C1	-2.42	1.39	1.43

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	4	MAN	O3-C3-C2	4.35	118.32	109.99
2	B	5	MAN	C2-C3-C4	-4.30	104.44	110.69
3	C	3	BMA	C3-C4-C5	4.26	117.83	110.24
3	C	3	BMA	C1-O5-C5	3.94	117.52	112.19
3	C	2	NAG	C3-C4-C5	-3.86	103.35	110.24
3	D	1	NAG	O4-C4-C3	-3.82	101.53	110.35
3	C	1	NAG	C4-C3-C2	-3.06	106.53	111.02
3	D	2	NAG	O7-C7-N2	2.87	127.23	121.95
3	D	2	NAG	O4-C4-C3	-2.87	103.72	110.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	3	BMA	O5-C5-C4	2.85	117.76	110.83
2	B	4	MAN	O2-C2-C3	2.82	115.79	110.14
3	D	2	NAG	C1-O5-C5	-2.78	108.43	112.19
2	B	1	NAG	O4-C4-C5	-2.77	102.41	109.30
2	B	4	MAN	C1-O5-C5	2.68	115.83	112.19
2	B	2	NAG	O5-C1-C2	-2.67	107.07	111.29
3	C	1	NAG	O3-C3-C4	2.60	116.36	110.35
3	D	2	NAG	C4-C3-C2	-2.56	107.26	111.02
3	C	3	BMA	C1-C2-C3	2.55	112.80	109.67
3	C	3	BMA	O5-C1-C2	2.54	114.70	110.77
3	C	2	NAG	C8-C7-N2	2.54	120.40	116.10
3	D	1	NAG	C4-C3-C2	-2.53	107.31	111.02
2	B	3	BMA	C1-C2-C3	2.50	112.73	109.67
2	B	5	MAN	C1-C2-C3	-2.49	105.18	110.91
2	B	4	MAN	C6-C5-C4	-2.46	107.24	113.00
3	C	3	BMA	O4-C4-C3	-2.42	104.75	110.35
2	B	1	NAG	O5-C1-C2	-2.40	107.49	111.29
3	C	1	NAG	O4-C4-C3	2.36	115.81	110.35
2	B	2	NAG	O4-C4-C3	-2.31	105.01	110.35
2	B	2	NAG	C1-C2-N2	2.31	114.43	110.49
2	B	3	BMA	C1-O5-C5	-2.27	109.12	112.19
3	D	3	BMA	O5-C5-C6	2.26	110.74	107.20
2	B	2	NAG	C3-C4-C5	-2.24	106.24	110.24
3	C	3	BMA	C6-C5-C4	-2.21	107.83	113.00
2	B	2	NAG	C1-O5-C5	-2.12	109.32	112.19
3	D	1	NAG	O5-C1-C2	2.12	114.63	111.29
3	C	1	NAG	O7-C7-N2	2.09	125.80	121.95
2	B	1	NAG	C8-C7-N2	-2.07	112.59	116.10
3	C	1	NAG	O7-C7-C8	-2.06	118.23	122.06
3	D	3	BMA	O5-C5-C4	-2.06	105.81	110.83
3	D	1	NAG	O4-C4-C5	2.03	114.34	109.30

There are no chirality outliers.

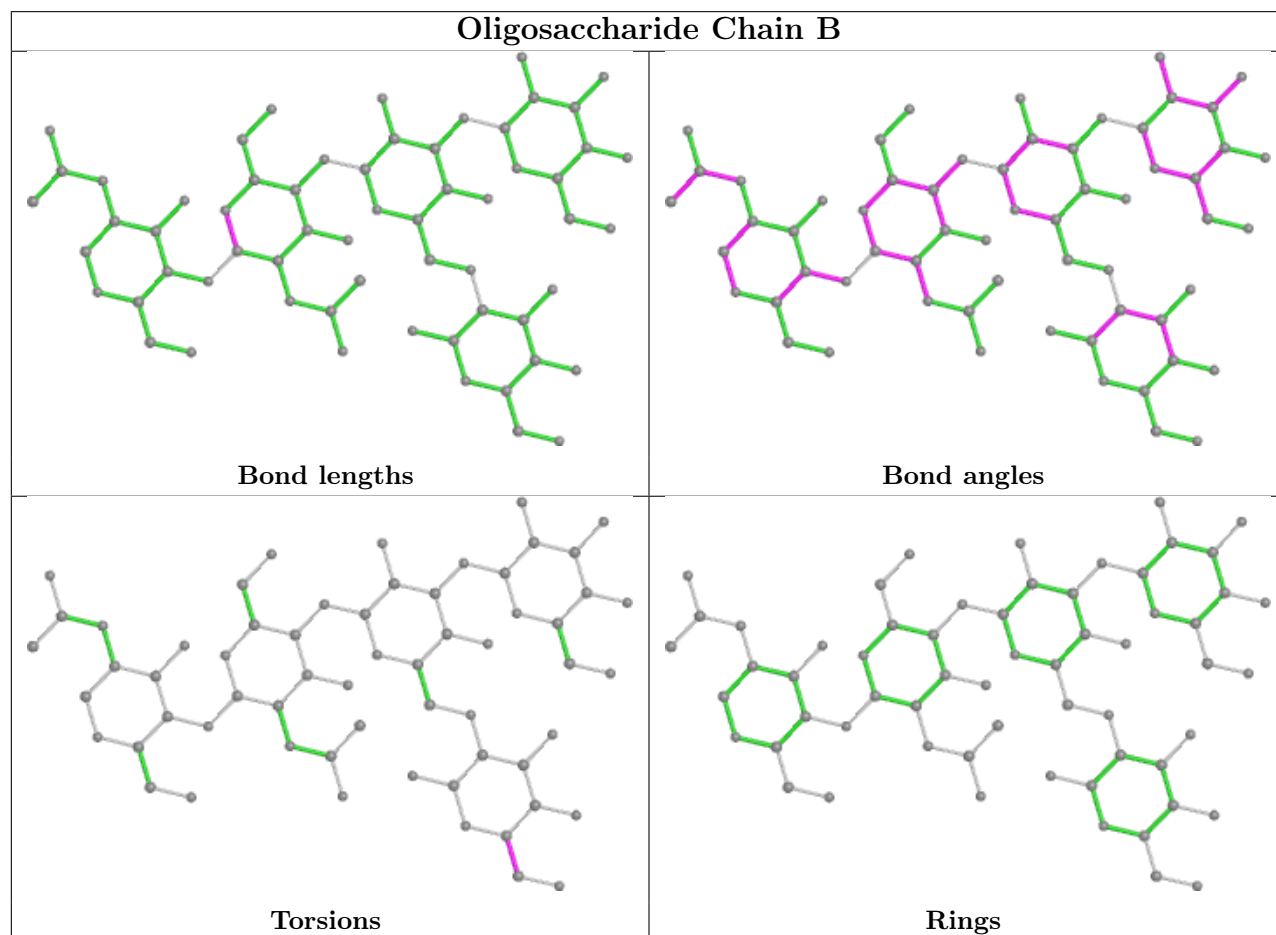
All (4) torsion outliers are listed below:

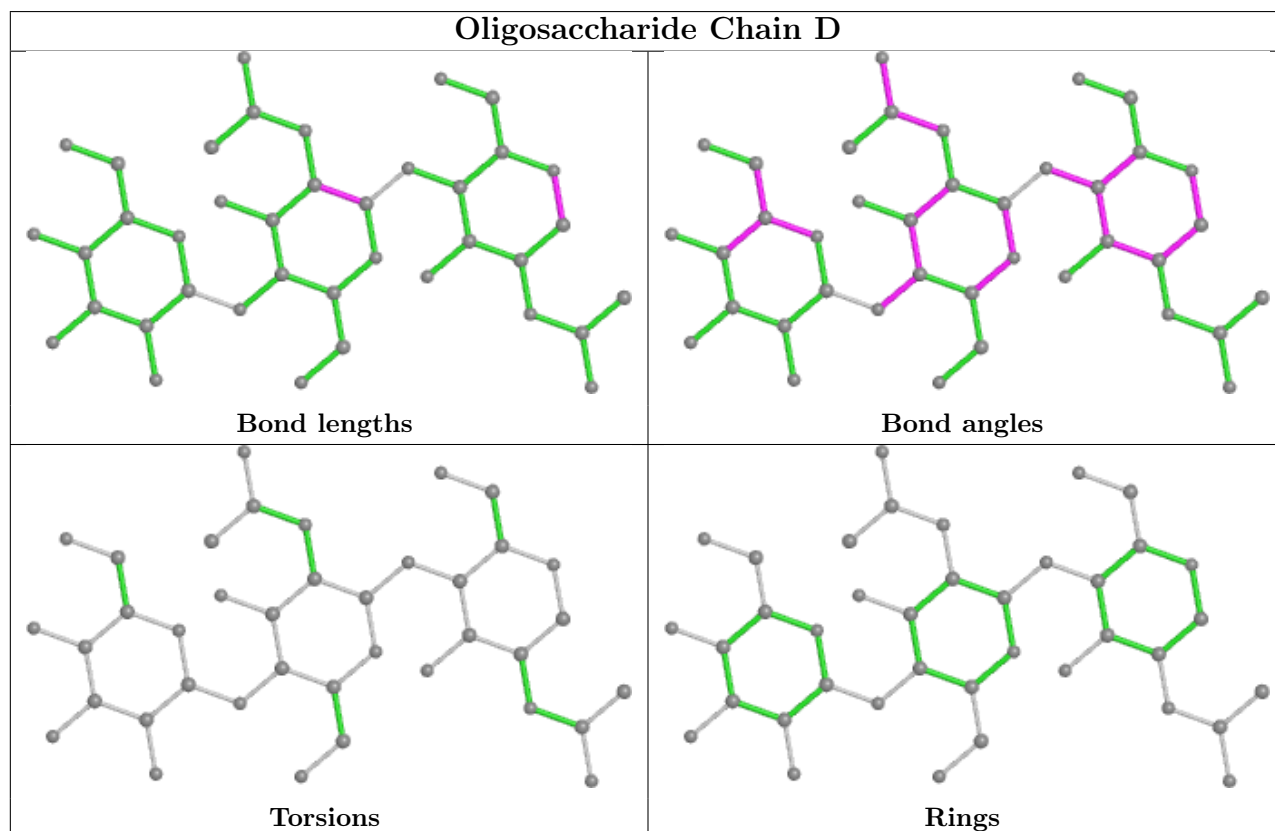
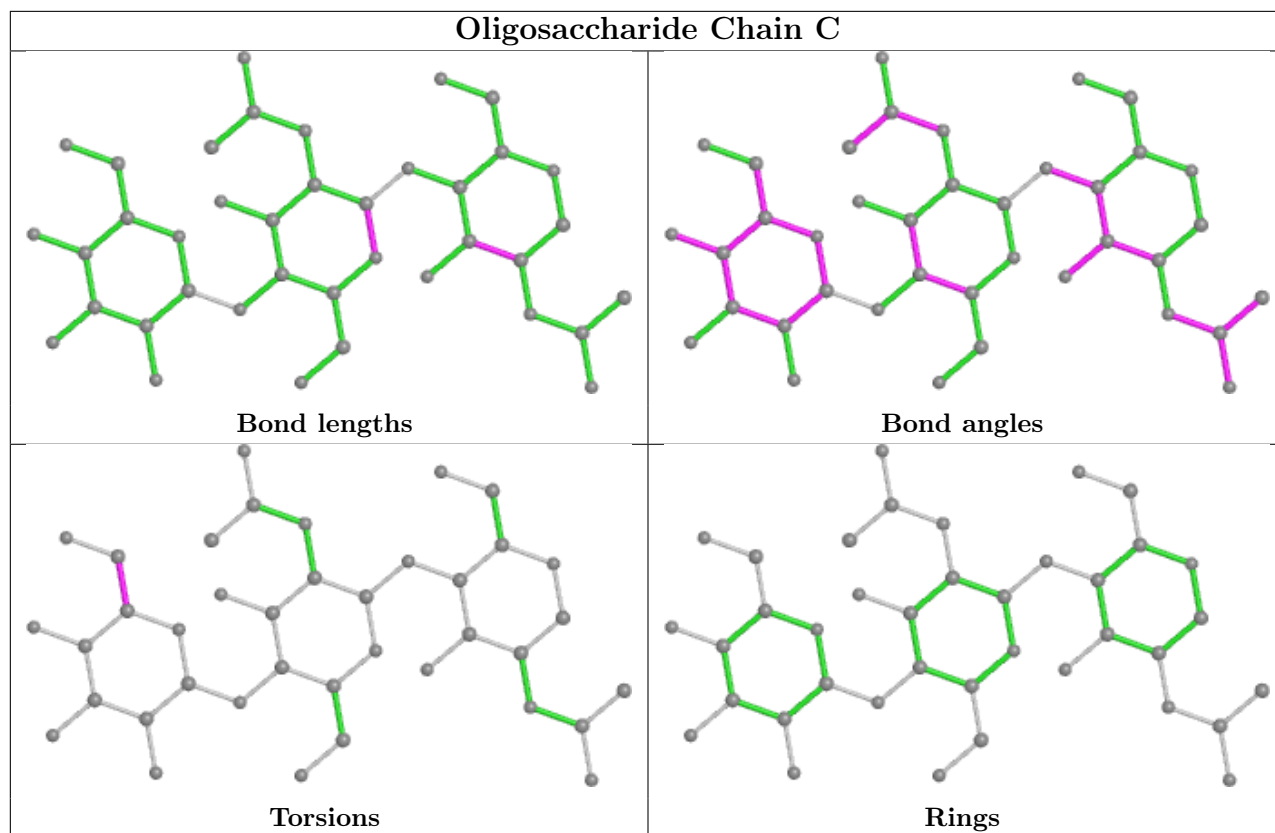
Mol	Chain	Res	Type	Atoms
2	B	5	MAN	O5-C5-C6-O6
3	C	3	BMA	C4-C5-C6-O6
3	C	3	BMA	O5-C5-C6-O6
2	B	5	MAN	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.





5.6 Ligand geometry

10 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	NAG	A	911	1	14,14,15	0.44	0	17,19,21	1.73	4 (23%)
4	D87	A	901	-	15,20,20	1.34	1 (6%)	20,28,28	1.63	6 (30%)
5	NAG	A	904	1	14,14,15	0.61	0	17,19,21	2.75	10 (58%)
5	NAG	A	915	1	14,14,15	1.18	1 (7%)	17,19,21	2.51	7 (41%)
5	NAG	A	910	1	14,14,15	0.86	0	17,19,21	1.02	1 (5%)
5	NAG	A	916	1	14,14,15	0.72	0	17,19,21	1.91	3 (17%)
5	NAG	A	921	1	14,14,15	1.10	1 (7%)	17,19,21	2.62	8 (47%)
5	NAG	A	920	1	14,14,15	1.02	1 (7%)	17,19,21	2.30	7 (41%)
5	NAG	A	902	1	14,14,15	0.85	0	17,19,21	1.46	3 (17%)
5	NAG	A	903	1	14,14,15	0.80	0	17,19,21	1.00	1 (5%)

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
5	NAG	A	911	1	-	0/6/23/26	0/1/1/1
4	D87	A	901	-	-	2/3/4/4	0/3/3/3
5	NAG	A	904	1	-	5/6/23/26	0/1/1/1
5	NAG	A	915	1	-	2/6/23/26	0/1/1/1
5	NAG	A	910	1	-	0/6/23/26	0/1/1/1
5	NAG	A	916	1	-	0/6/23/26	0/1/1/1
5	NAG	A	921	1	-	0/6/23/26	0/1/1/1
5	NAG	A	920	1	-	0/6/23/26	0/1/1/1
5	NAG	A	902	1	-	0/6/23/26	0/1/1/1
5	NAG	A	903	1	-	0/6/23/26	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	901	D87	CAJ-CAH	-3.89	1.35	1.43
5	A	915	NAG	O5-C1	-2.97	1.39	1.43
5	A	920	NAG	O5-C1	-2.49	1.39	1.43
5	A	921	NAG	O7-C7	2.42	1.28	1.23

All (50) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	915	NAG	C1-C2-N2	-7.50	97.68	110.49
5	A	921	NAG	C1-O5-C5	5.62	119.80	112.19
5	A	916	NAG	C1-O5-C5	5.39	119.50	112.19
5	A	920	NAG	C1-O5-C5	4.79	118.68	112.19
5	A	921	NAG	O5-C1-C2	-4.63	103.97	111.29
5	A	921	NAG	C2-N2-C7	-4.57	116.40	122.90
5	A	904	NAG	O5-C1-C2	-4.46	104.24	111.29
5	A	904	NAG	O5-C5-C6	4.45	114.18	107.20
5	A	904	NAG	C1-C2-N2	-4.26	103.22	110.49
5	A	920	NAG	O7-C7-C8	-4.12	114.40	122.06
5	A	911	NAG	C1-C2-N2	-4.10	103.48	110.49
5	A	904	NAG	C8-C7-N2	3.98	122.83	116.10
5	A	904	NAG	C1-O5-C5	3.92	117.50	112.19
5	A	911	NAG	O5-C1-C2	3.48	116.78	111.29
5	A	904	NAG	C2-N2-C7	3.42	127.78	122.90
5	A	915	NAG	O7-C7-N2	-3.37	115.76	121.95
5	A	920	NAG	C2-N2-C7	3.33	127.64	122.90
5	A	920	NAG	O5-C5-C6	3.23	112.27	107.20
4	A	901	D87	CAB-CAA-NAI	-3.04	120.08	123.01
4	A	901	D87	CAM-CAJ-CAH	-3.02	105.85	109.66
5	A	921	NAG	C3-C4-C5	3.01	115.61	110.24
5	A	921	NAG	O3-C3-C4	-3.00	103.42	110.35
5	A	916	NAG	C6-C5-C4	-2.83	106.37	113.00
5	A	915	NAG	O6-C6-C5	-2.68	102.10	111.29
5	A	915	NAG	O5-C5-C4	-2.66	104.36	110.83
4	A	901	D87	CAC-CAA-CAB	2.65	123.70	120.05
5	A	920	NAG	C8-C7-N2	2.61	120.52	116.10
5	A	902	NAG	C1-O5-C5	2.58	115.68	112.19
5	A	921	NAG	O5-C5-C4	2.52	116.97	110.83
5	A	910	NAG	C1-C2-N2	-2.52	106.19	110.49
5	A	911	NAG	O4-C4-C3	-2.42	104.77	110.35
5	A	902	NAG	C1-C2-N2	-2.37	106.44	110.49
5	A	916	NAG	C1-C2-N2	2.29	114.39	110.49
4	A	901	D87	CAE-CAC-CAA	-2.28	116.80	120.08
5	A	904	NAG	O3-C3-C2	2.27	114.17	109.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	903	NAG	O4-C4-C3	-2.26	105.12	110.35
5	A	904	NAG	O4-C4-C3	-2.23	105.19	110.35
4	A	901	D87	CAO-CAN-CAL	-2.22	106.17	113.10
5	A	911	NAG	C1-O5-C5	2.21	115.19	112.19
5	A	902	NAG	O7-C7-C8	-2.20	117.97	122.06
5	A	920	NAG	C3-C4-C5	2.20	114.17	110.24
5	A	921	NAG	O3-C3-C2	-2.20	104.91	109.47
5	A	921	NAG	C4-C3-C2	-2.15	107.87	111.02
5	A	904	NAG	O3-C3-C4	-2.14	105.40	110.35
5	A	920	NAG	O4-C4-C3	-2.07	105.56	110.35
4	A	901	D87	CAP-CAO-CAN	-2.07	104.22	113.98
5	A	915	NAG	C3-C4-C5	-2.07	106.55	110.24
5	A	904	NAG	O7-C7-C8	-2.06	118.23	122.06
5	A	915	NAG	C8-C7-N2	2.05	119.57	116.10
5	A	915	NAG	C4-C3-C2	-2.01	108.08	111.02

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	904	NAG	C8-C7-N2-C2
5	A	904	NAG	O7-C7-N2-C2
5	A	915	NAG	C8-C7-N2-C2
5	A	915	NAG	O7-C7-N2-C2
5	A	904	NAG	C4-C5-C6-O6
5	A	904	NAG	O5-C5-C6-O6
5	A	904	NAG	C1-C2-N2-C7
4	A	901	D87	CAN-CAO-CAP-CAQ
4	A	901	D87	CAM-CAL-CAN-CAO

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	911	NAG	1	0
5	A	904	NAG	3	0
5	A	902	NAG	1	0

5.7 Other polymers [i](#)

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	747/811 (92%)	-0.28	12 (1%) 72 68	17, 26, 47, 83	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	817	LEU	4.2
1	A	808	ASP	3.6
1	A	43	ASP	3.5
1	A	818	GLU	3.3
1	A	470	PHE	3.3
1	A	99	ASN	2.7
1	A	778	CYS	2.5
1	A	39	LYS	2.5
1	A	807	GLY	2.4
1	A	809	GLN	2.3
1	A	702	PHE	2.2
1	A	433	LEU	2.0

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

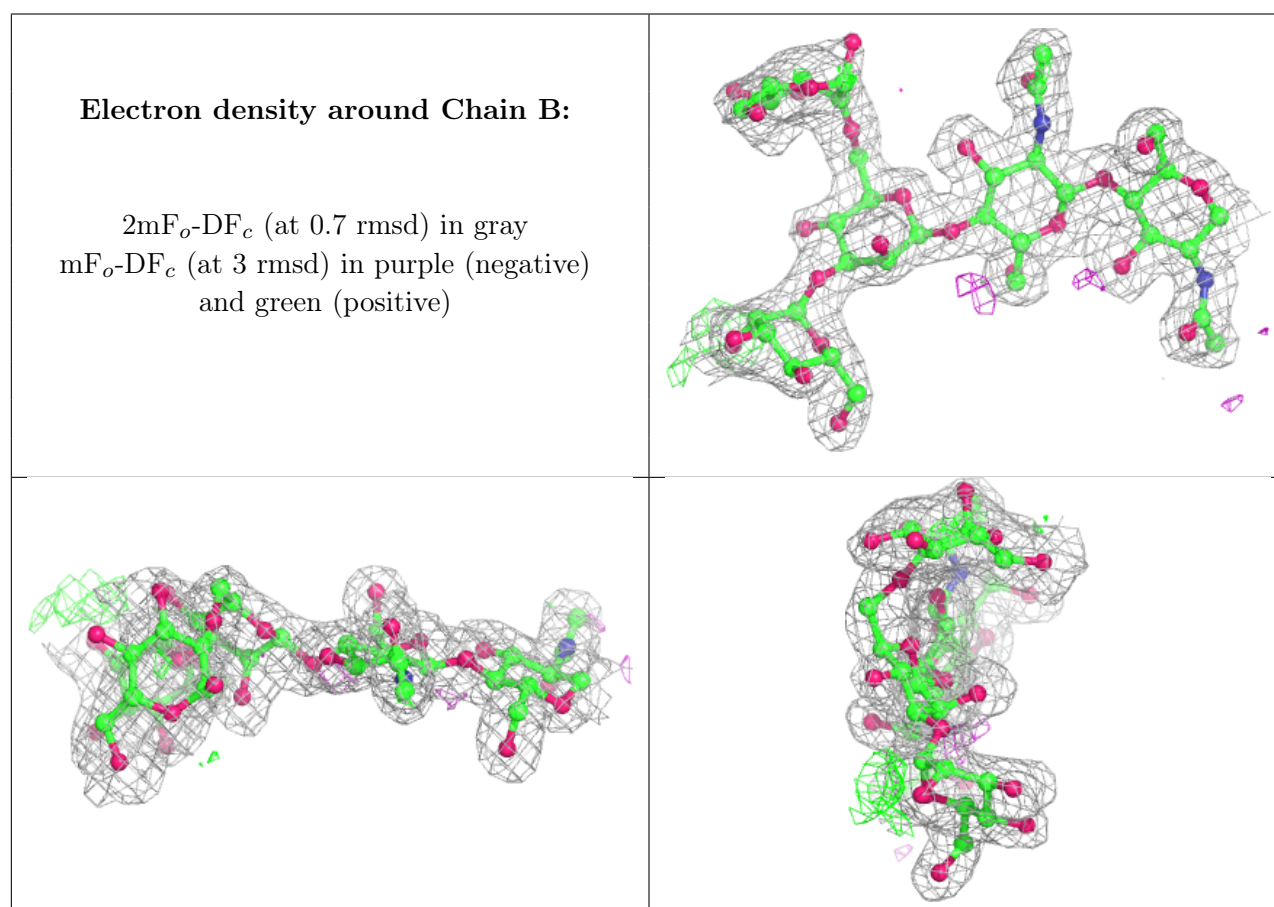
There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

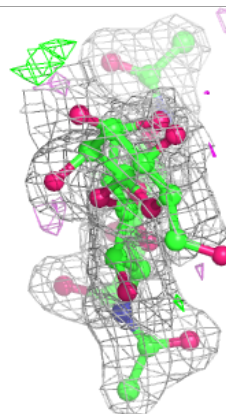
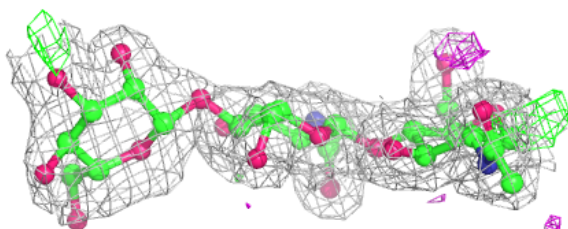
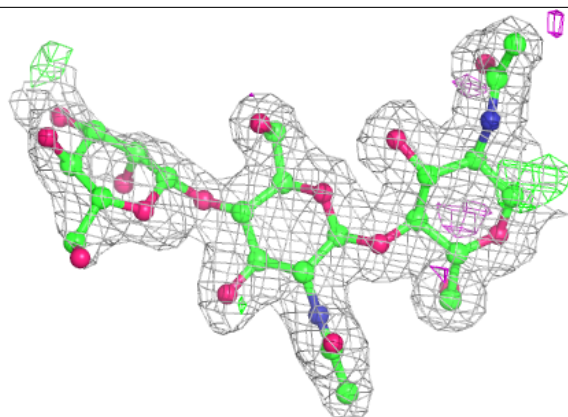
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	BMA	C	3	11/12	0.84	0.31	51,63,68,71	0
2	MAN	B	4	11/12	0.87	0.21	32,41,46,47	0
2	MAN	B	5	11/12	0.88	0.27	59,63,68,80	0
3	BMA	D	3	11/12	0.91	0.19	31,41,46,48	0
3	NAG	C	2	14/15	0.93	0.13	24,33,40,51	0
3	NAG	D	2	14/15	0.95	0.09	19,23,27,34	0
2	BMA	B	3	11/12	0.96	0.18	30,36,44,50	0
3	NAG	D	1	14/15	0.96	0.06	17,19,21,21	0
3	NAG	C	1	14/15	0.97	0.06	18,21,26,27	0
2	NAG	B	2	14/15	0.97	0.09	19,21,28,30	0
2	NAG	B	1	14/15	0.98	0.06	16,18,19,22	0

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

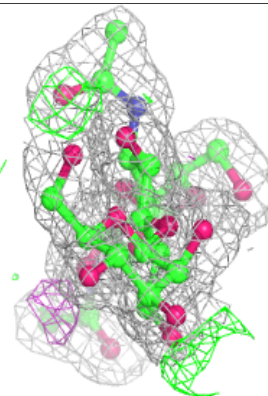
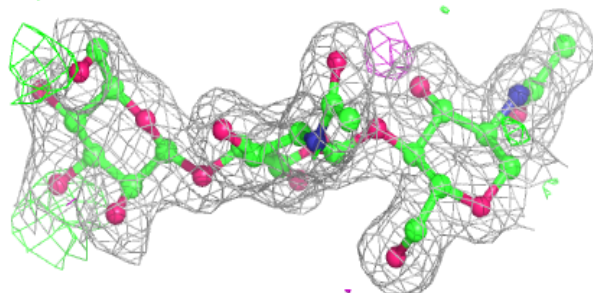
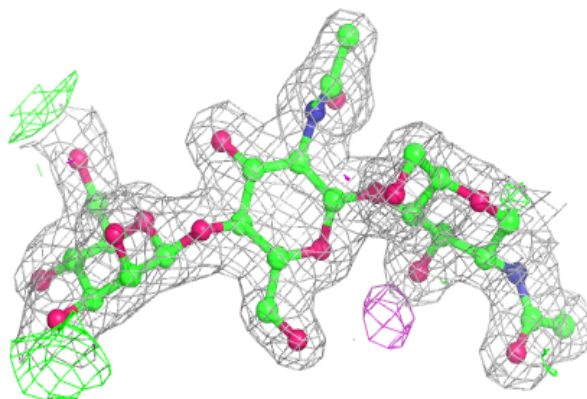


Electron density around Chain C:

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

**Electron density around Chain D:**

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



6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	NAG	A	904	14/15	0.81	0.22	32,49,53,53	0
5	NAG	A	921	14/15	0.85	0.19	36,46,53,60	0
5	NAG	A	911	14/15	0.87	0.27	59,64,72,75	0
5	NAG	A	916	14/15	0.91	0.23	36,43,48,50	0
5	NAG	A	915	14/15	0.92	0.17	30,41,53,58	0
5	NAG	A	903	14/15	0.93	0.18	38,45,57,62	0
5	NAG	A	920	14/15	0.95	0.08	21,29,33,37	0
5	NAG	A	910	14/15	0.95	0.13	27,31,35,37	0
5	NAG	A	902	14/15	0.96	0.06	26,27,30,31	0
4	D87	A	901	18/18	0.98	0.06	16,19,30,33	0

6.5 Other polymers [i](#)

There are no such residues in this entry.