



# wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 9, 2024 – 09:37 PM EST

PDB ID : 3W3G  
Title : Crystal structure of human TLR8 (unliganded form)  
Authors : Tanji, H.; Ohto, U.; Shimizu, T.  
Deposited on : 2012-12-21  
Resolution : 2.30 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

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<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

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

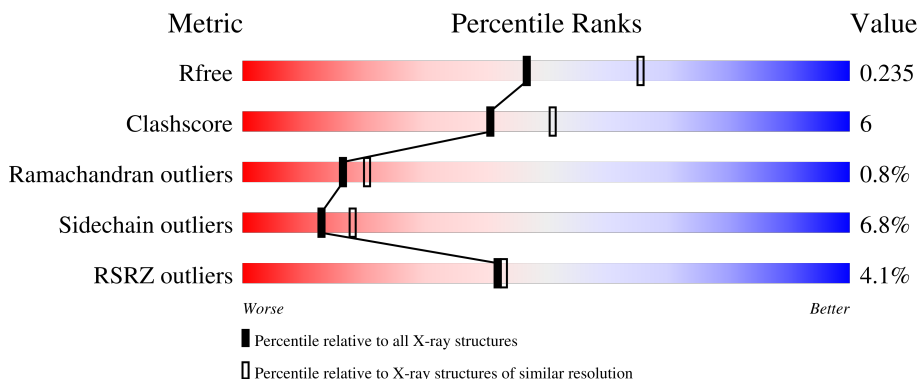
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.30 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



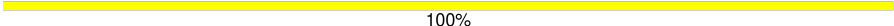
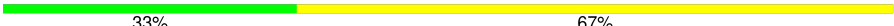
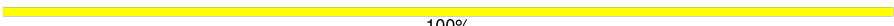
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	5963 (2.30-2.30)
Clashscore	180529	6698 (2.30-2.30)
Ramachandran outliers	177936	6640 (2.30-2.30)
Sidechain outliers	177891	6640 (2.30-2.30)
RSRZ outliers	164620	5963 (2.30-2.30)

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	811	 3% 77% 13% 7%
1	B	811	 5% 73% 15% 8%
2	C	3	 33% 67%
2	D	3	 100%
2	E	3	 100%

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Mol	Chain	Length	Quality of chain
2	G	3	 100%
2	H	3	 33% 67%
3	F	2	 100%

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 12865 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	752	6055	3873	1029	1134	19	0	0	0
1	B	743	5985	3828	1019	1119	19	0	0	0

There are 20 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
B	23	ARG	-	expression tag	UNP Q9NR97
B	24	SER	-	expression tag	UNP Q9NR97
B	25	PRO	-	expression tag	UNP Q9NR97
B	26	TRP	-	expression tag	UNP Q9NR97
B	828	GLU	-	expression tag	UNP Q9NR97
B	829	PHE	-	expression tag	UNP Q9NR97
B	830	LEU	-	expression tag	UNP Q9NR97
B	831	VAL	-	expression tag	UNP Q9NR97
B	832	PRO	-	expression tag	UNP Q9NR97
B	833	ARG	-	expression tag	UNP Q9NR97

- Molecule 2 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
2	C	3	Total	C	N	O	0	0	0
			39	22	2	15			
2	D	3	Total	C	N	O	0	0	0
			39	22	2	15			
2	E	3	Total	C	N	O	0	0	0
			39	22	2	15			
2	G	3	Total	C	N	O	0	0	0
			39	22	2	15			
2	H	3	Total	C	N	O	0	0	0
			39	22	2	15			

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



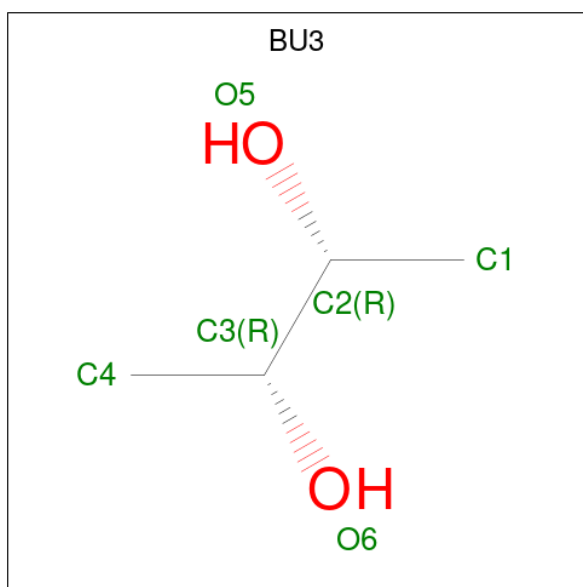
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	F	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



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

- Molecule 5 is (R,R)-2,3-BUTANEDIOL (three-letter code: BU3) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	C O	0	0
			6	4 2		

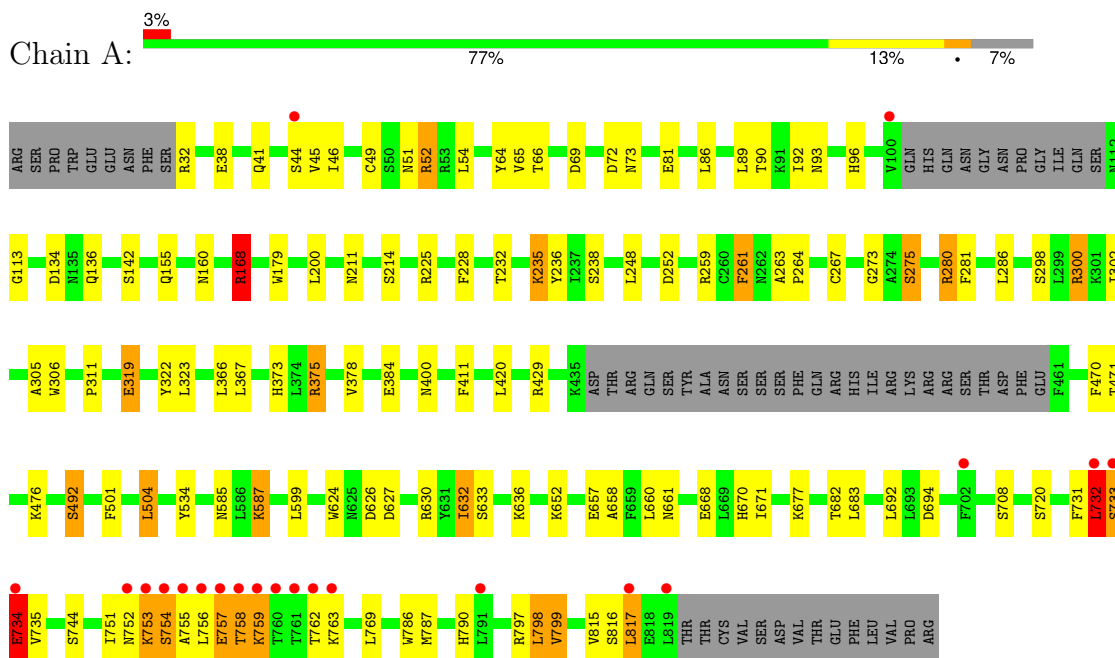
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	299	Total	O	0	0
			299	299		
6	B	157	Total	O	0	0
			157	157		

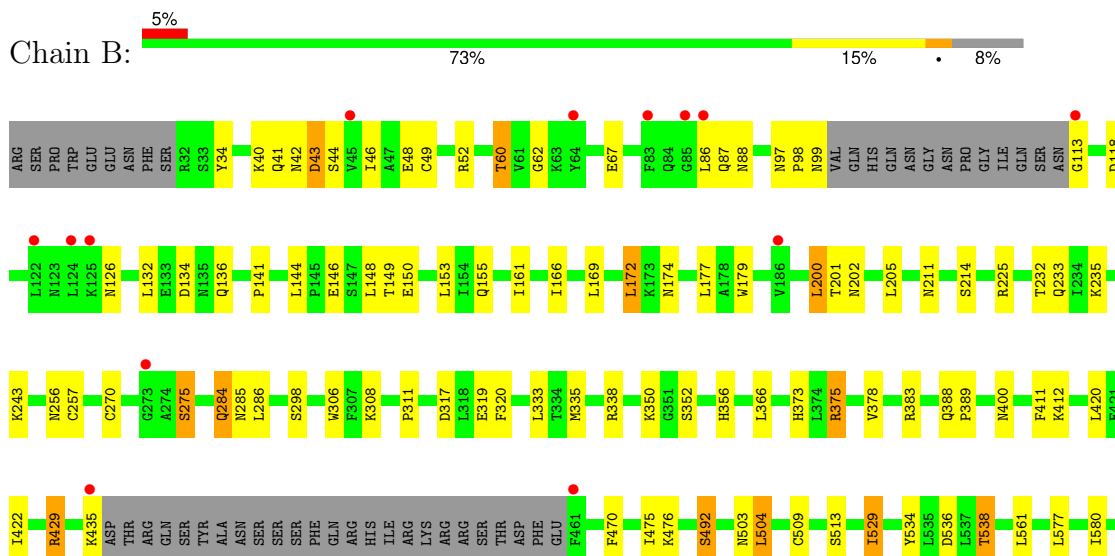
### 3 Residue-property plots [i](#)

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.

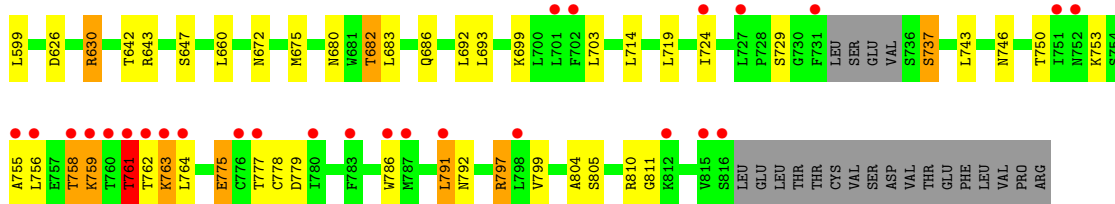
- Molecule 1: Toll-like receptor 8



- Molecule 1: Toll-like receptor 8







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

Chain C: 33% 67%

MAG1  
MAG2  
BM3

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

Chain D: 100%

MAG1  
MAG2  
BM3

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

Chain E: 100%

MAG1  
MAG2  
BM3

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

Chain G: 100%

MAG1  
MAG2  
BM3

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

Chain H: 33% 67%

MAG1  
MAG2  
BM3

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

Chain F: 100%

MAG1  
MAG2

## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	137.53Å 101.97Å 141.34Å 90.00° 104.75° 90.00°	Depositor
Resolution (Å)	34.38 – 2.30 34.38 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.6 (34.38-2.30) 99.7 (34.38-2.30)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.14	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.03 (at 2.29Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.182 , 0.236 0.181 , 0.235	Depositor DCC
$R_{free}$ test set	4190 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.1	Xtrriage
Anisotropy	0.071	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 39.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	12865	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.93% 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: BMA, NAG, BU3

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	0.71	3/6179 (0.0%)	0.80	6/8380 (0.1%)
1	B	0.61	3/6108 (0.0%)	0.72	4/8281 (0.0%)
All	All	0.66	6/12287 (0.0%)	0.76	10/16661 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	179	TRP	CD2-CE2	5.42	1.47	1.41
1	A	624	TRP	CD2-CE2	5.42	1.47	1.41
1	A	786	TRP	CD2-CE2	5.25	1.47	1.41
1	B	306	TRP	CD2-CE2	5.24	1.47	1.41
1	A	306	TRP	CD2-CE2	5.20	1.47	1.41

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	791	LEU	CA-CB-CG	7.00	131.41	115.30
1	B	375	ARG	NE-CZ-NH2	-6.68	116.96	120.30
1	A	375	ARG	NE-CZ-NH2	-6.57	117.01	120.30
1	A	259	ARG	NE-CZ-NH2	-5.71	117.44	120.30
1	A	300	ARG	NE-CZ-NH2	-5.33	117.63	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	734	GLU	Peptide

## 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	6055	0	6054	72	0
1	B	5985	0	5981	86	0
2	C	39	0	34	0	0
2	D	39	0	34	0	0
2	E	39	0	34	0	0
2	G	39	0	34	0	0
2	H	39	0	34	0	0
3	F	28	0	25	0	0
4	A	84	0	78	0	0
4	B	56	0	52	1	0
5	A	6	0	10	2	0
6	A	299	0	0	13	0
6	B	157	0	0	7	0
All	All	12865	0	12370	158	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 6.

The worst 5 of 158 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:708:SER:HB3	1:A:734:GLU:O	1.45	1.11
1:B:172:LEU:HD21	1:B:200:LEU:HG	1.25	1.11
1:B:630:ARG:HH11	1:B:630:ARG:HG3	1.26	0.99
1:A:375:ARG:HD2	6:A:1191:HOH:O	1.74	0.87
1:B:536:ASP:OD1	1:B:538:THR:HB	1.75	0.85

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	746/811 (92%)	691 (93%)	49 (7%)	6 (1%)	16	20
1	B	735/811 (91%)	677 (92%)	52 (7%)	6 (1%)	16	20
All	All	1481/1622 (91%)	1368 (92%)	101 (7%)	12 (1%)	16	20

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	733	SER
1	A	273	GLY
1	A	732	LEU
1	A	754	SER
1	B	42	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	699/755 (93%)	654 (94%)	45 (6%)	14	20
1	B	690/755 (91%)	641 (93%)	49 (7%)	12	17
All	All	1389/1510 (92%)	1295 (93%)	94 (7%)	13	18

5 of 94 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	225	ARG

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Mol	Chain	Res	Type
1	B	509	CYS
1	B	275	SER
1	B	429	ARG
1	B	561	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	233	GLN
1	B	285	ASN
1	B	792	ASN
1	A	604	ASN
1	A	752	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](#)

17 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	C	1	2,1	14,14,15	0.92	1 (7%)	17,19,21	1.57	2 (11%)
2	NAG	C	2	2	14,14,15	0.84	0	17,19,21	1.82	5 (29%)
2	BMA	C	3	2	11,11,12	0.26	0	15,15,17	0.52	0
2	NAG	D	1	2,1	14,14,15	1.03	1 (7%)	17,19,21	1.37	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	NAG	D	2	2	14,14,15	0.77	0	17,19,21	2.44	6 (35%)
2	BMA	D	3	2	11,11,12	0.45	0	15,15,17	1.23	2 (13%)
2	NAG	E	1	2,1	14,14,15	0.60	0	17,19,21	1.65	6 (35%)
2	NAG	E	2	2	14,14,15	1.03	1 (7%)	17,19,21	2.12	6 (35%)
2	BMA	E	3	2	11,11,12	0.77	0	15,15,17	1.58	3 (20%)
3	NAG	F	1	3,1	14,14,15	0.74	0	17,19,21	1.85	6 (35%)
3	NAG	F	2	3	14,14,15	0.50	0	17,19,21	1.11	1 (5%)
2	NAG	G	1	2,1	14,14,15	0.59	0	17,19,21	1.43	3 (17%)
2	NAG	G	2	2	14,14,15	0.65	0	17,19,21	1.95	3 (17%)
2	BMA	G	3	2	11,11,12	0.56	0	15,15,17	0.98	1 (6%)
2	NAG	H	1	2,1	14,14,15	0.82	0	17,19,21	1.72	5 (29%)
2	NAG	H	2	2	14,14,15	0.80	0	17,19,21	1.92	2 (11%)
2	BMA	H	3	2	11,11,12	0.25	0	15,15,17	0.52	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	NAG	C	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	2/6/23/26	0/1/1/1
2	BMA	C	3	2	-	2/2/19/22	0/1/1/1
2	NAG	D	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
2	BMA	D	3	2	-	0/2/19/22	0/1/1/1
2	NAG	E	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	2/6/23/26	0/1/1/1
2	BMA	E	3	2	-	0/2/19/22	0/1/1/1
3	NAG	F	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	F	2	3	-	2/6/23/26	0/1/1/1
2	NAG	G	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	G	2	2	-	2/6/23/26	0/1/1/1
2	BMA	G	3	2	-	1/2/19/22	0/1/1/1
2	NAG	H	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	H	2	2	-	1/6/23/26	0/1/1/1
2	BMA	H	3	2	-	2/2/19/22	0/1/1/1



All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	2	NAG	O5-C1	-2.35	1.39	1.43
2	D	1	NAG	O5-C1	-2.27	1.39	1.43
2	C	1	NAG	C2-N2	-2.02	1.42	1.46

The worst 5 of 53 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	2	NAG	C1-O5-C5	6.91	121.44	112.19
2	G	2	NAG	C1-O5-C5	5.67	119.79	112.19
2	H	2	NAG	C1-O5-C5	5.67	119.79	112.19
2	E	2	NAG	O6-C6-C5	-4.55	95.84	111.33
2	G	1	NAG	C1-C2-N2	-4.34	103.60	110.43

There are no chirality outliers.

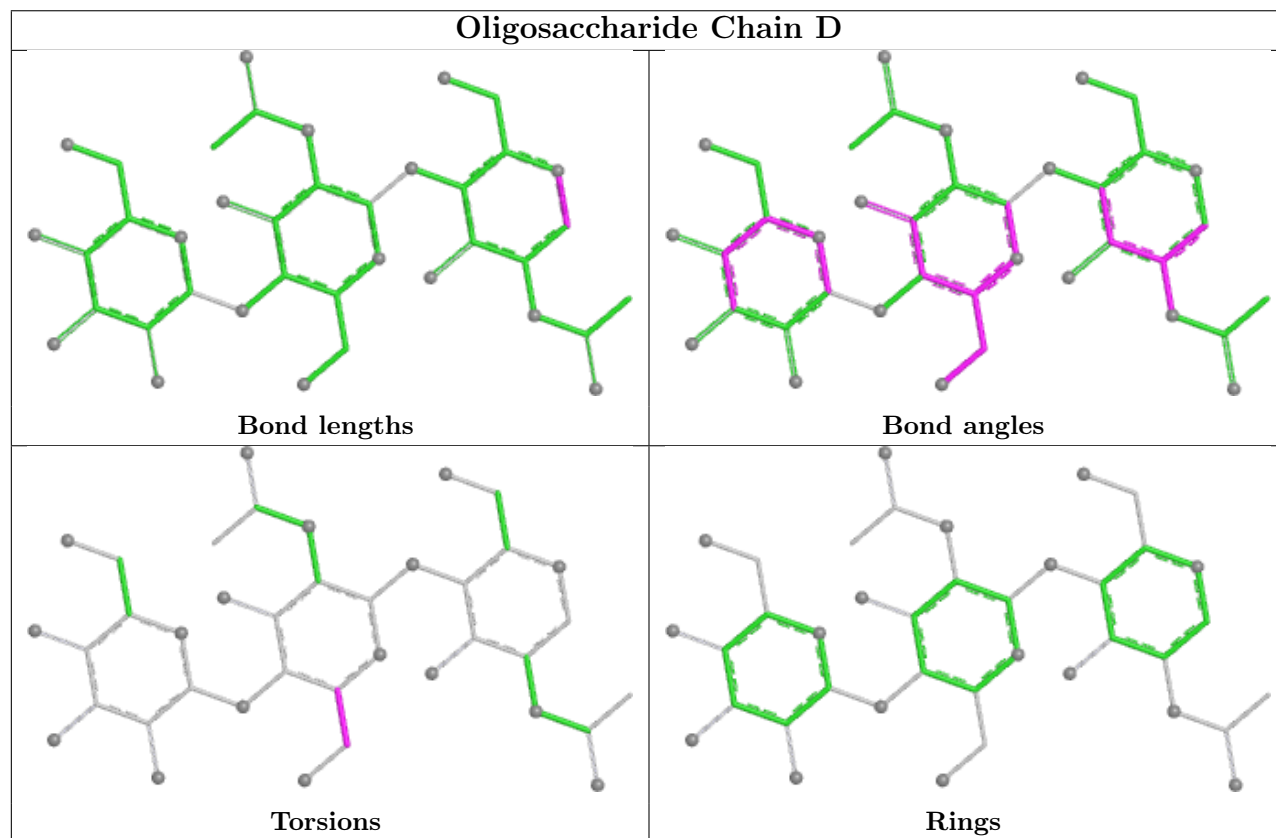
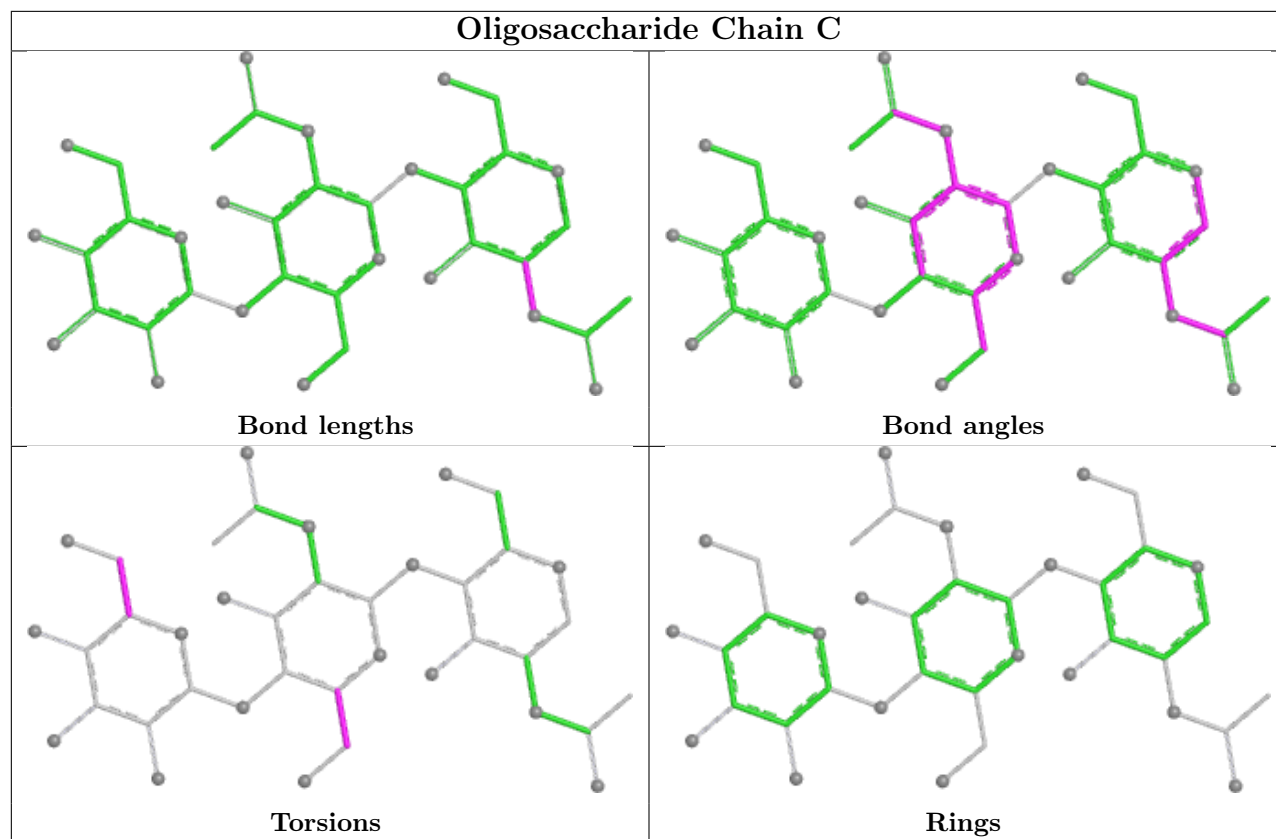
5 of 16 torsion outliers are listed below:

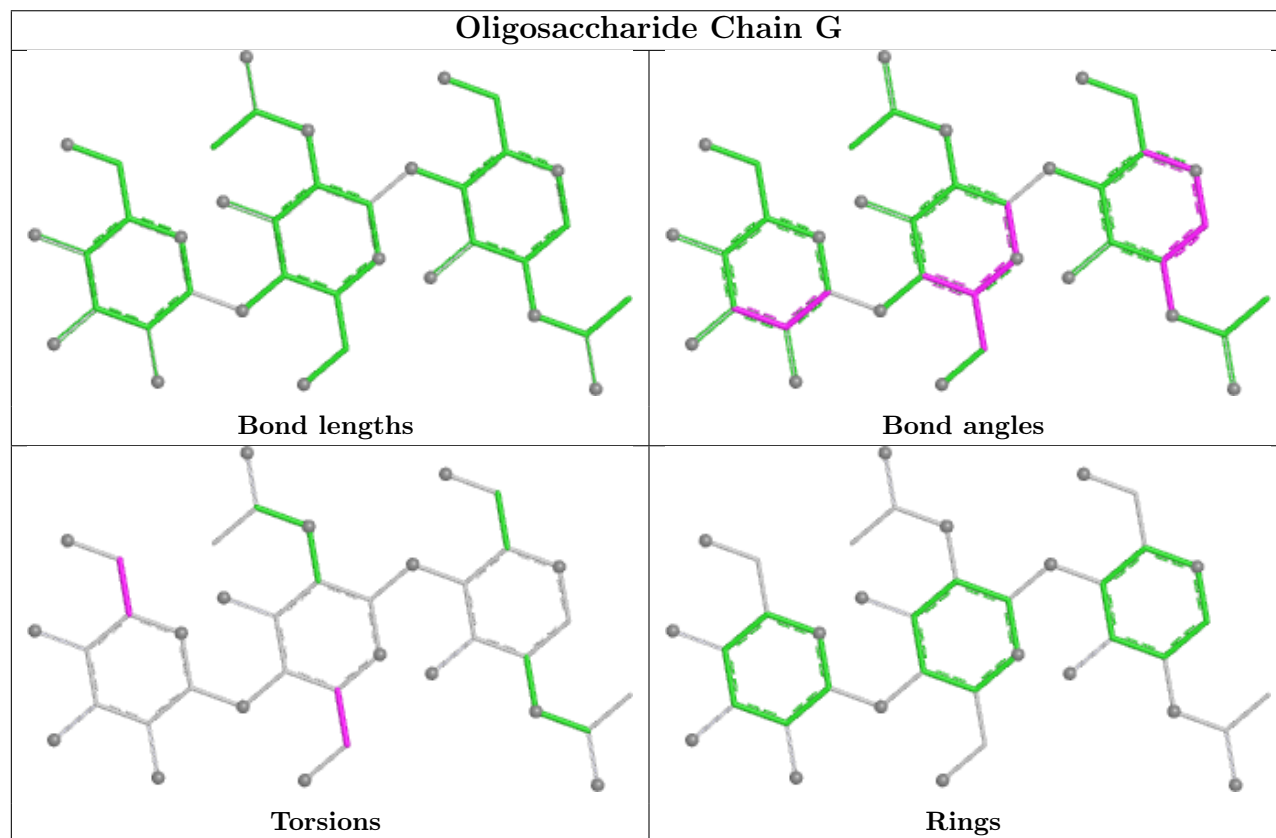
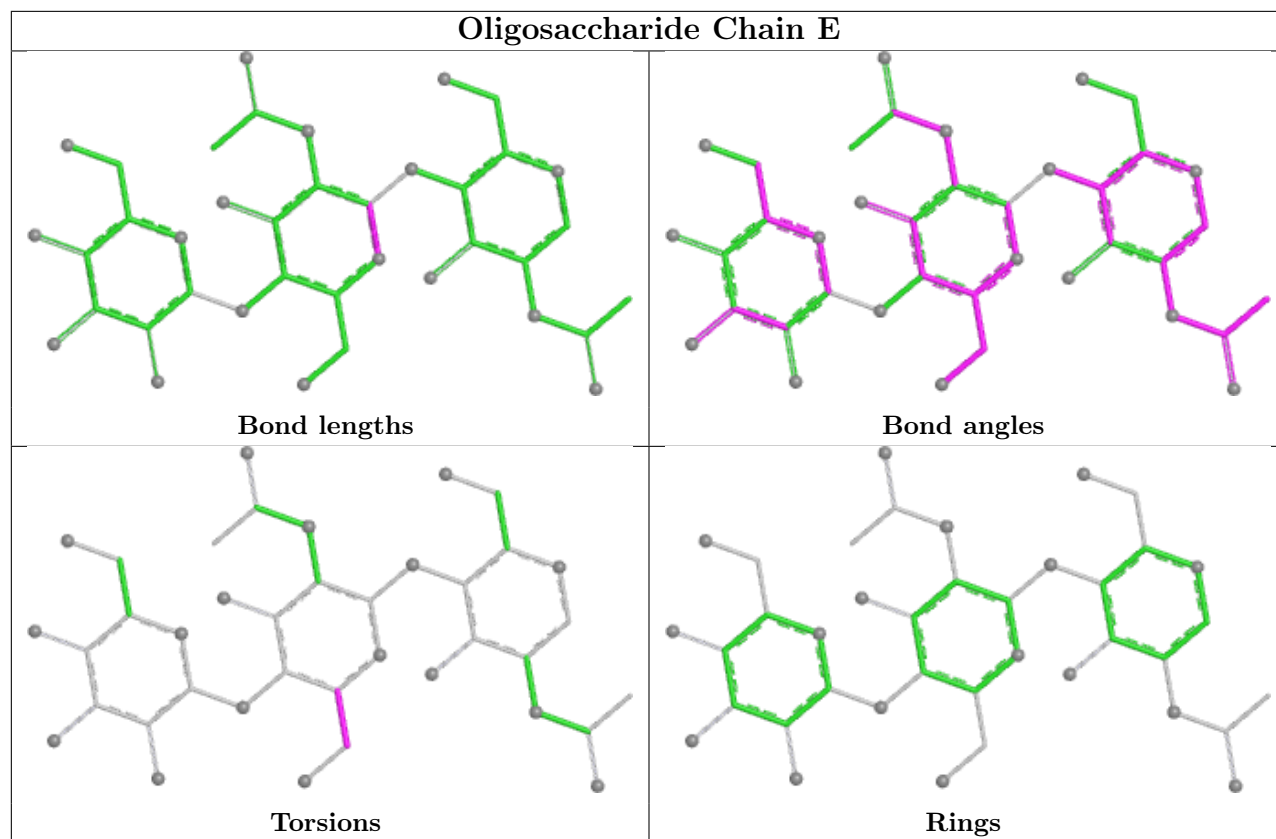
Mol	Chain	Res	Type	Atoms
2	H	3	BMA	O5-C5-C6-O6
2	D	2	NAG	C4-C5-C6-O6
2	D	2	NAG	O5-C5-C6-O6
2	H	3	BMA	C4-C5-C6-O6
2	G	2	NAG	C4-C5-C6-O6

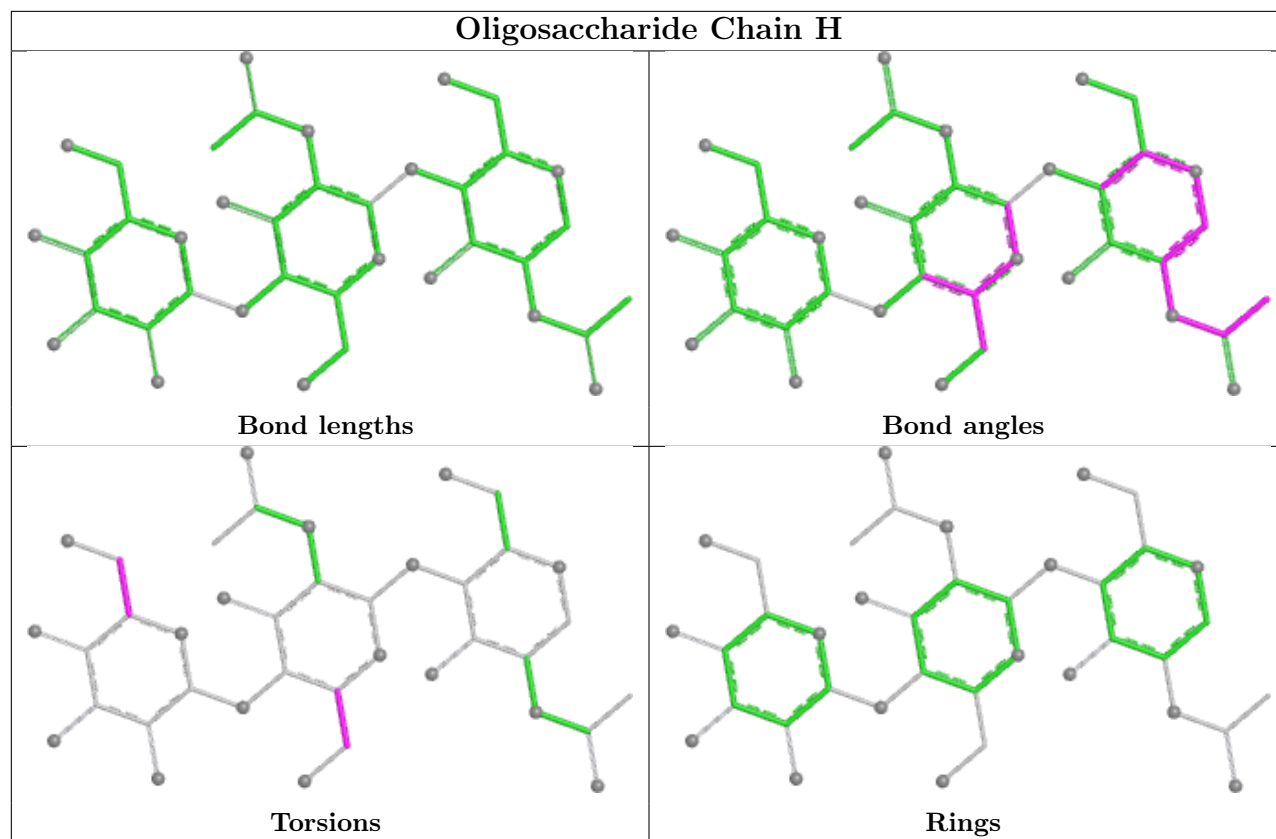
There are no ring outliers.

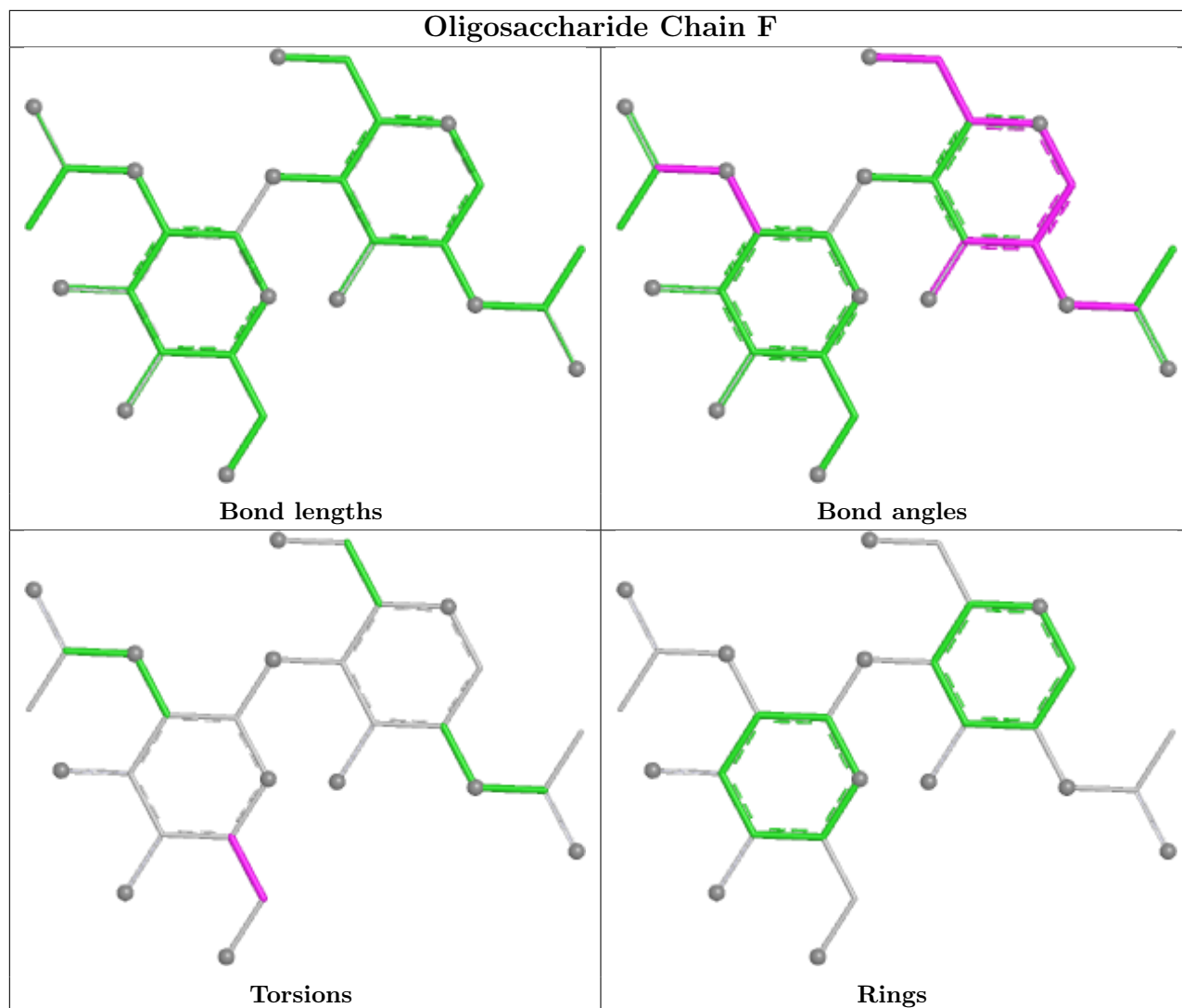
No monomer is involved in short contacts.

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 [i](#)

11 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	$\# Z  > 2$
4	NAG	B	1007	1	14,14,15	0.75	0	17,19,21	1.04	0
4	NAG	B	1012	1	14,14,15	0.58	0	17,19,21	0.78	0
4	NAG	A	1013	1	14,14,15	0.86	1 (7%)	17,19,21	1.97	5 (29%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	NAG	A	1004	1	14,14,15	0.71	0	17,19,21	1.17	1 (5%)
4	NAG	B	1011	1	14,14,15	0.47	0	17,19,21	1.55	2 (11%)
4	NAG	A	1008	1	14,14,15	0.78	0	17,19,21	1.27	2 (11%)
4	NAG	A	1015	1	14,14,15	0.62	0	17,19,21	1.08	1 (5%)
4	NAG	B	1003	1	14,14,15	0.54	0	17,19,21	1.17	1 (5%)
4	NAG	A	1012	1	14,14,15	0.53	0	17,19,21	1.17	2 (11%)
5	BU3	A	1016	-	4,5,5	0.49	0	6,6,6	0.80	0
4	NAG	A	1014	1	14,14,15	0.66	0	17,19,21	1.20	2 (11%)

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	NAG	B	1007	1	-	0/6/23/26	0/1/1/1
4	NAG	B	1012	1	-	0/6/23/26	0/1/1/1
4	NAG	A	1013	1	-	0/6/23/26	0/1/1/1
4	NAG	A	1004	1	-	2/6/23/26	0/1/1/1
4	NAG	B	1011	1	-	0/6/23/26	0/1/1/1
4	NAG	A	1008	1	-	0/6/23/26	0/1/1/1
4	NAG	A	1015	1	-	1/6/23/26	0/1/1/1
4	NAG	B	1003	1	-	4/6/23/26	0/1/1/1
4	NAG	A	1012	1	-	2/6/23/26	0/1/1/1
5	BU3	A	1016	-	-	4/4/4/4	-
4	NAG	A	1014	1	-	0/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1013	NAG	O3-C3	-2.18	1.37	1.43

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1013	NAG	C1-O5-C5	5.23	119.19	112.19
4	B	1011	NAG	C1-O5-C5	4.96	118.83	112.19
4	A	1015	NAG	C1-O5-C5	3.83	117.31	112.19
4	A	1014	NAG	O5-C5-C6	3.30	114.08	107.66
4	A	1013	NAG	C1-C2-N2	-3.14	105.49	110.43

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1016	BU3	O5-C2-C3-O6
5	A	1016	BU3	C1-C2-C3-O6
5	A	1016	BU3	O5-C2-C3-C4
4	B	1003	NAG	O5-C5-C6-O6
4	B	1003	NAG	C4-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1011	NAG	1	0
5	A	1016	BU3	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 [i](#)

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	752/811 (92%)	-0.39	21 (2%) 55 56	14, 27, 61, 139	0
1	B	743/811 (91%)	0.12	40 (5%) 32 34	17, 44, 102, 137	0
All	All	1495/1622 (92%)	-0.14	61 (4%) 42 43	14, 33, 92, 139	0

The worst 5 of 61 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	819	LEU	5.6
1	A	761	THR	5.6
1	A	100	VAL	4.6
1	A	762	THR	4.6
1	B	783	PHE	4.6

### 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	BMA	H	3	11/12	0.61	0.16	42,51,55,57	0
2	BMA	C	3	11/12	0.62	0.16	45,57,64,68	0
2	BMA	G	3	11/12	0.66	0.13	66,70,75,80	0
2	BMA	D	3	11/12	0.75	0.13	51,60,64,69	0
2	BMA	E	3	11/12	0.87	0.08	31,37,40,47	0

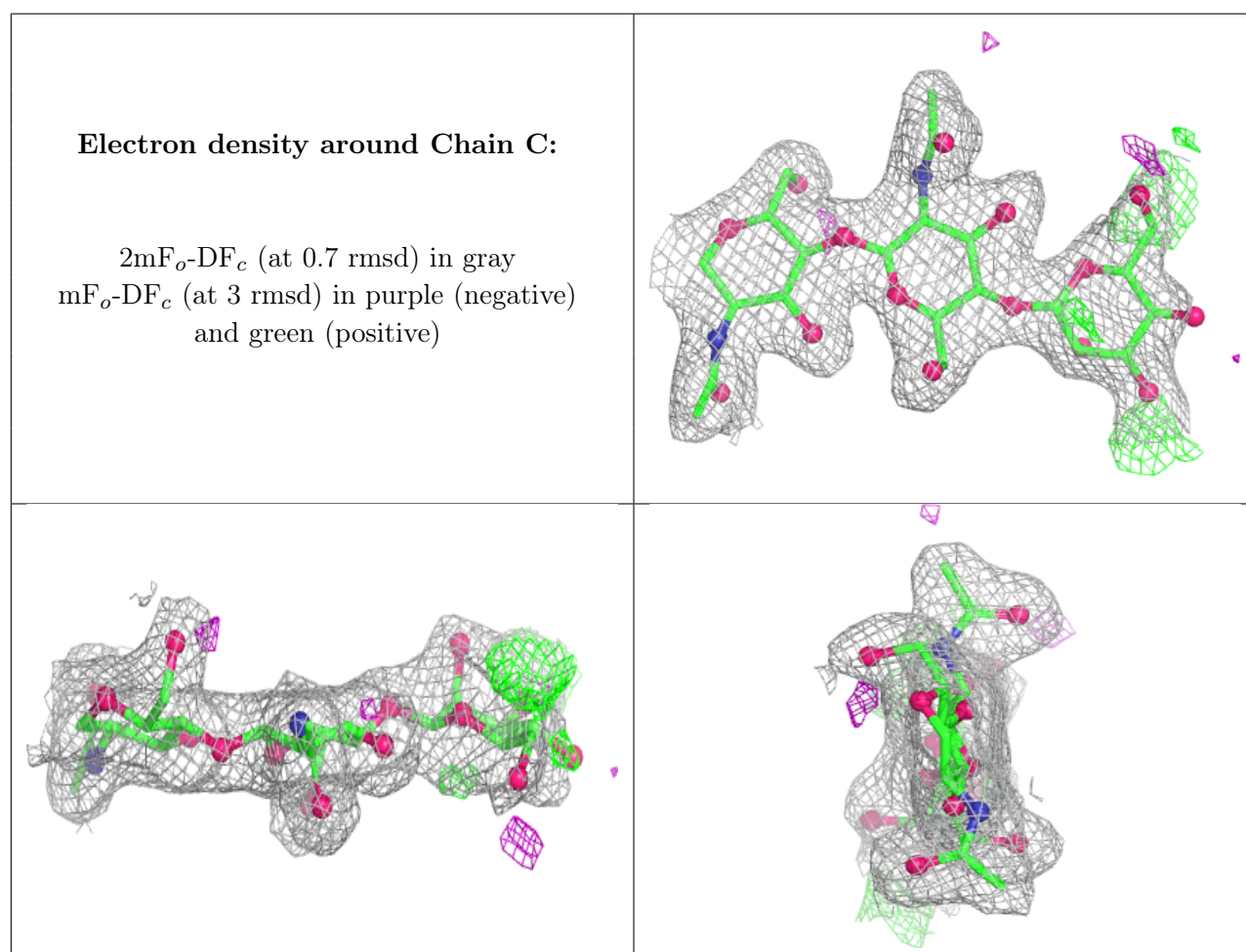
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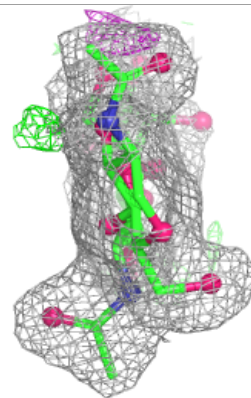
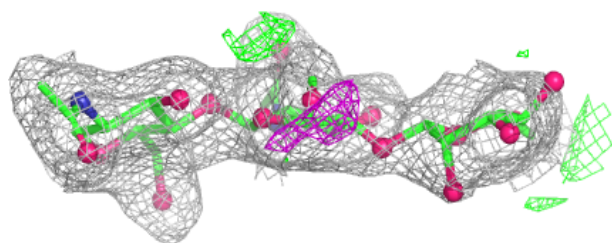
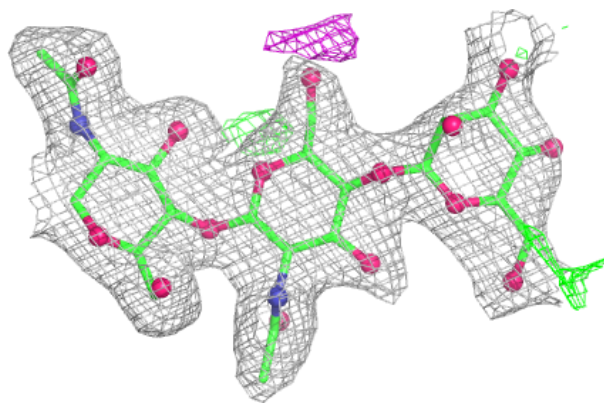
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NAG	D	2	14/15	0.89	0.08	31,36,45,52	0
2	NAG	G	2	14/15	0.91	0.10	35,44,63,63	0
3	NAG	F	2	14/15	0.93	0.07	34,37,48,49	0
2	NAG	E	2	14/15	0.95	0.06	21,23,27,29	0
3	NAG	F	1	14/15	0.95	0.06	26,30,34,39	0
2	NAG	H	2	14/15	0.95	0.06	27,29,35,42	0
2	NAG	H	1	14/15	0.97	0.05	19,22,23,25	0
2	NAG	C	1	14/15	0.97	0.05	14,16,18,19	0
2	NAG	G	1	14/15	0.97	0.05	22,24,26,30	0
2	NAG	E	1	14/15	0.97	0.06	15,18,19,22	0
2	NAG	C	2	14/15	0.97	0.05	16,20,28,35	0
2	NAG	D	1	14/15	0.98	0.04	17,21,24,26	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.

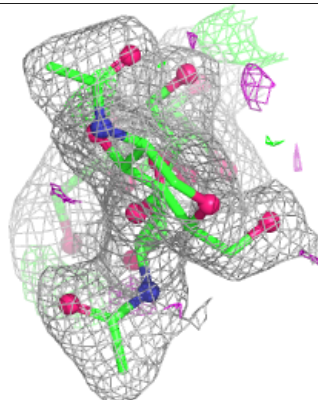
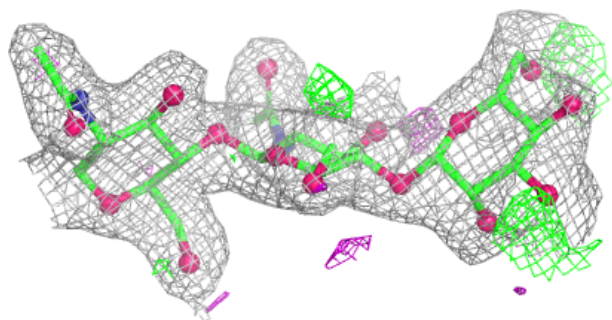
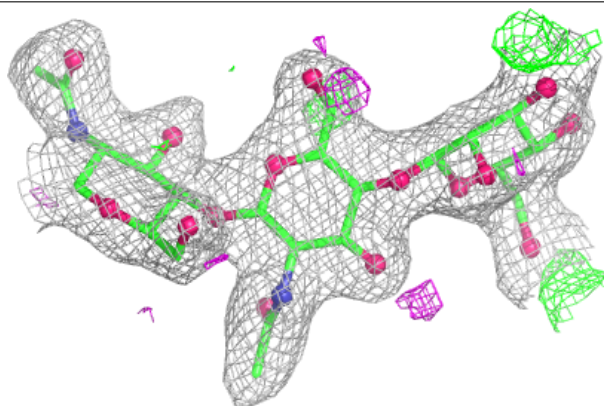


**Electron density around Chain D:**

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

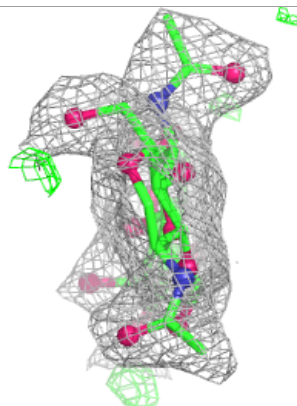
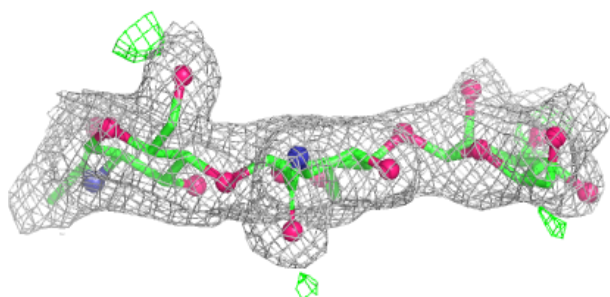
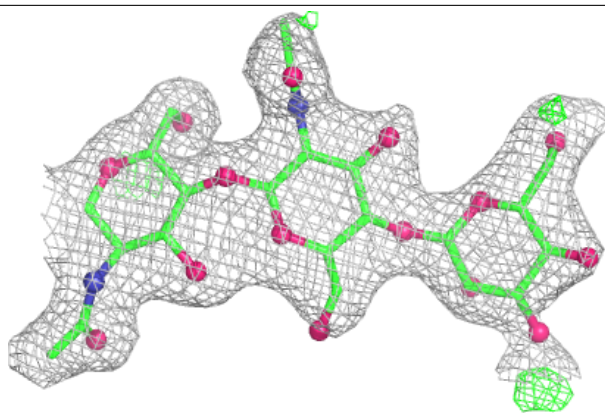
**Electron density around Chain E:**

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

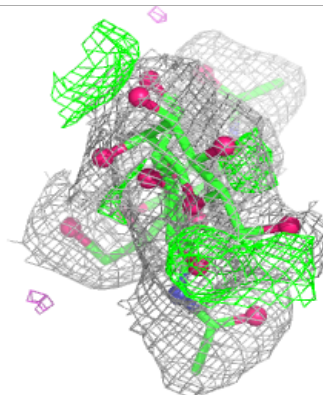
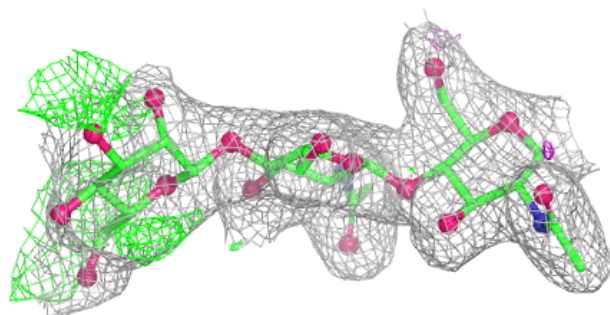
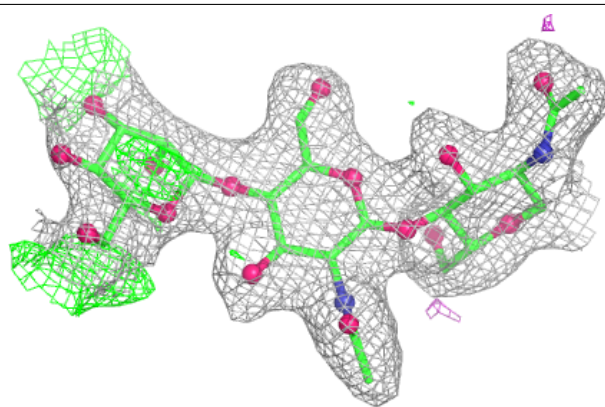


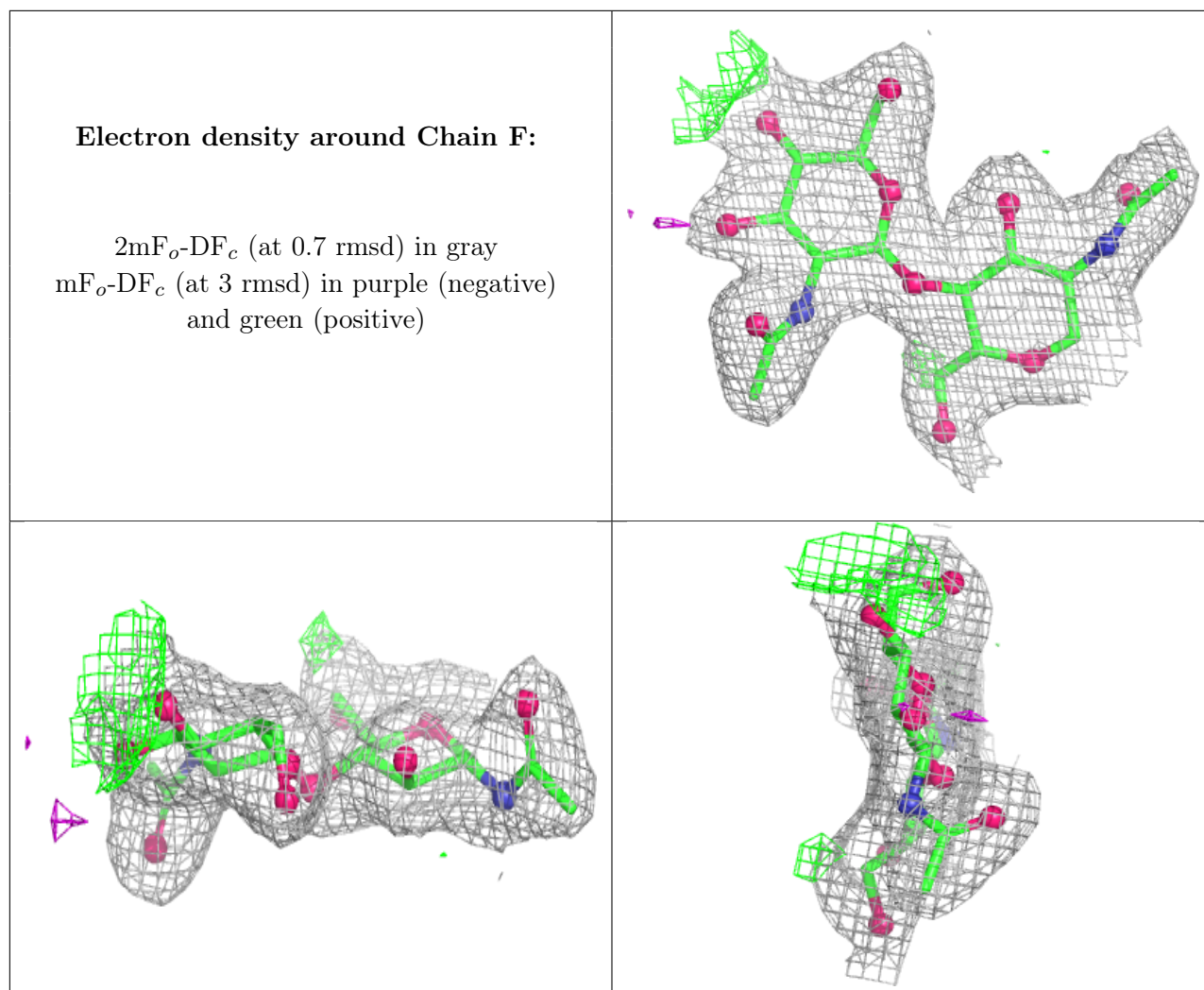
**Electron density around Chain G:**

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

**Electron density around Chain H:**

$2mF_o-DF_c$  (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( $\text{\AA}^2$ )	Q < 0.9
4	NAG	B	1003	14/15	0.72	0.13	59,69,73,76	0
4	NAG	A	1015	14/15	0.80	0.14	55,64,69,70	0
4	NAG	A	1004	14/15	0.82	0.11	37,44,49,50	0
4	NAG	B	1012	14/15	0.86	0.09	57,61,64,66	0
5	BU3	A	1016	6/6	0.86	0.21	49,55,58,69	0
4	NAG	B	1007	14/15	0.87	0.11	51,63,70,71	0
4	NAG	A	1008	14/15	0.89	0.10	40,47,55,56	0
4	NAG	B	1011	14/15	0.89	0.10	59,67,75,76	0
4	NAG	A	1014	14/15	0.91	0.08	42,50,56,57	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	NAG	A	1012	14/15	0.92	0.08	44,47,49,49	0
4	NAG	A	1013	14/15	0.96	0.06	17,20,24,26	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.