



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jul 18, 2022 – 04:17 pm BST

PDB ID : 7NOZ  
Title : Structure of the nanobody stablized properdin bound alternative pathway pro-convertase C3b:FB:FP  
Authors : Lorenzen, J.; Pedersen, D.V.; Andersen, G.R.  
Deposited on : 2021-02-26  
Resolution : 3.90 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)

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 : 1.8.4, CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.29  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0267  
CCP4 : 7.1.010 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.29

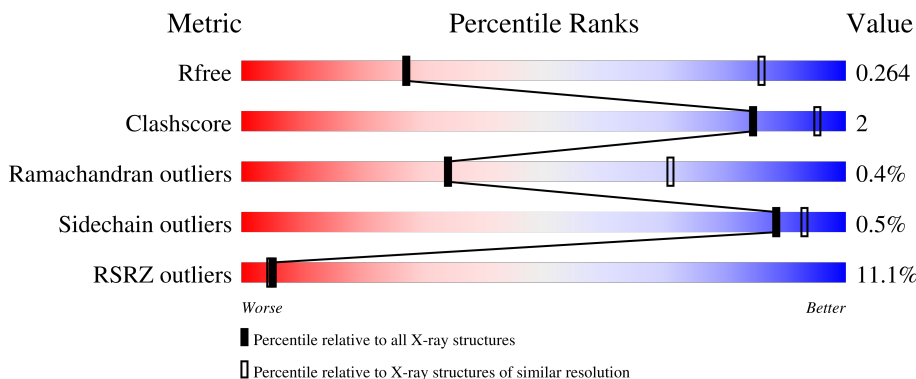
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.90 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	1002 (4.14-3.66)
Clashscore	141614	1004 (4.12-3.68)
Ramachandran outliers	138981	1021 (4.14-3.66)
Sidechain outliers	138945	1014 (4.14-3.66)
RSRZ outliers	127900	1275 (4.20-3.60)

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	645	 8% 93% 6%
2	B	912	 13% 91% 9%
3	C	163	 19% 92% 8%
4	D	207	 15% 88% 11%
5	F	731	 4% 91% 6%

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Mol	Chain	Length	Quality of chain
6	R	124	
7	E	3	
7	G	3	
7	L	3	
8	H	2	
8	I	2	
8	J	2	
9	K	4	
9	M	4	

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
10	MAN	C	203	-	-	-	X
8	BGC	H	2	-	-	-	X
8	BGC	I	2	-	-	-	X

## 2 Entry composition

There are 13 unique types of molecules in this entry. The entry contains 21994 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 Complement C3 beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	642	5007	3187	848	957	15	0	0	0

- Molecule 2 is a protein called Complement C3 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	906	7236	4584	1215	1399	38	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1013	GLU	GLN	conflict	UNP P01024

- Molecule 3 is a protein called Properdin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	163	1228	746	227	234	21	0	0	0

- Molecule 4 is a protein called Properdin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	207	1594	987	303	282	22	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	255	GLY	PRO	conflict	UNP P27918

- Molecule 5 is a protein called Complement factor B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	F	712	5615	3529	978	1075	33	0	0	0

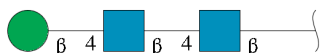
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	279	GLY	ASP	engineered mutation	UNP P00751
F	765	ALA	-	expression tag	UNP P00751

- Molecule 6 is a protein called hFPNb1 nanobody.

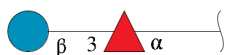
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
6	R	124	951	588	172	187	4	0	0	0

- Molecule 7 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			
7	E	3	39	22	2	15	0	0	0
7	G	3	39	22	2	15	0	0	0
7	L	3	39	22	2	15	0	0	0

- Molecule 8 is an oligosaccharide called beta-D-glucopyranose-(1-3)-alpha-L-fucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
8	H	2	21	12	9	0	0	0
8	I	2	21	12	9	0	0	0

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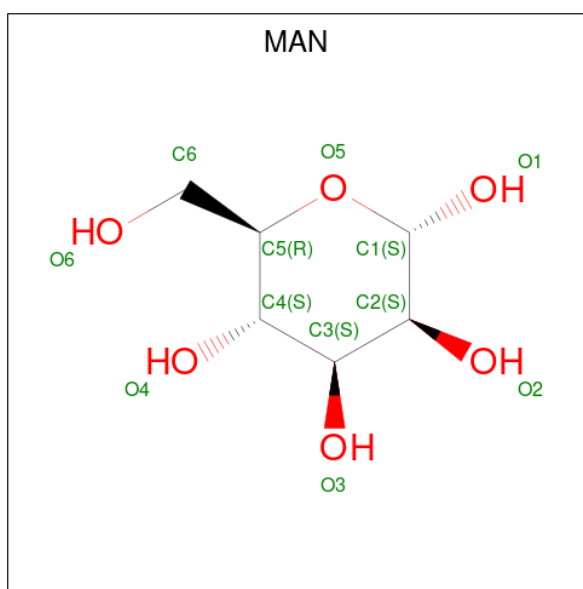
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
8	J	2	Total	C	O	0	0	0
			21	12	9			

- Molecule 9 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-beta-D-mannopyranos e-(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
9	K	4	Total	C	N	O	0	0	0
			50	28	2	20			
9	M	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 10 is alpha-D-mannopyranose (three-letter code: MAN) (formula: C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>).



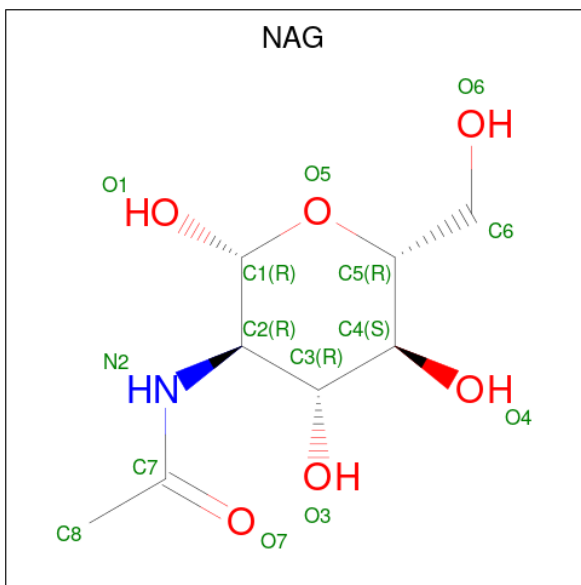
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	C	1	Total	C	O	0	0
			11	6	5		
10	C	1	Total	C	O	0	0
			11	6	5		
10	C	1	Total	C	O	0	0
			11	6	5		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	D	1	Total	C	O	0	0
			11	6	5		
10	D	1	Total	C	O	0	0
			11	6	5		
10	D	1	Total	C	O	0	0
			11	6	5		

- Molecule 11 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
11	F	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 12 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	F	1	Total	Mg	0	0
			1	1		

- Molecule 13 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
13	B	1	Total	O	0	0
			1	1		

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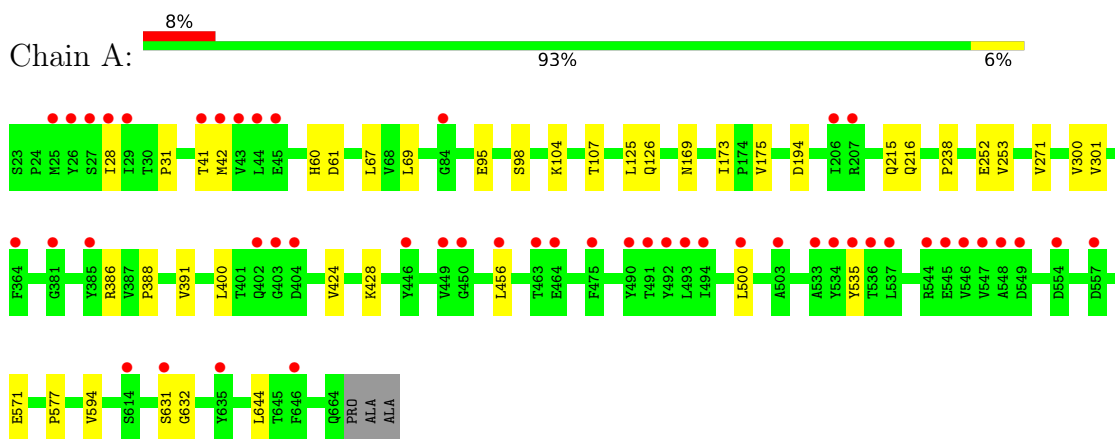
<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
13	F	1	Total	O	0	0
			1	1		



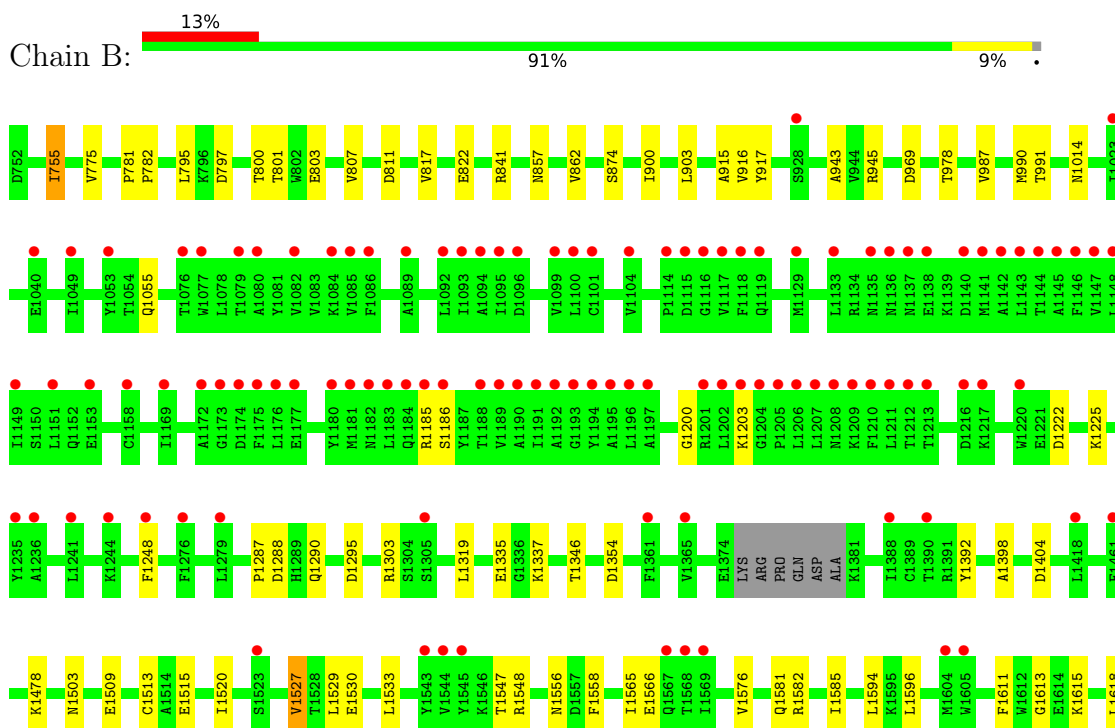
### 3 Residue-property plots [i](#)

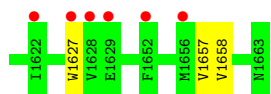
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Complement C3 beta chain

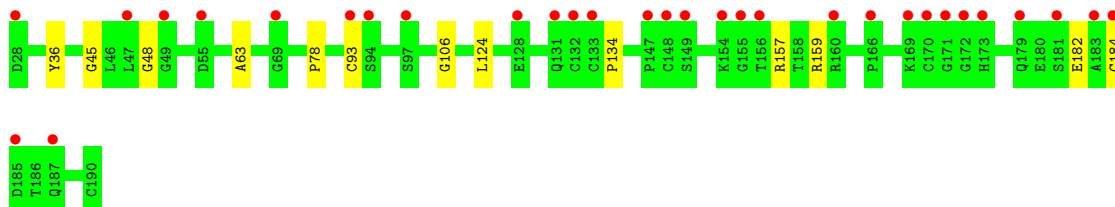
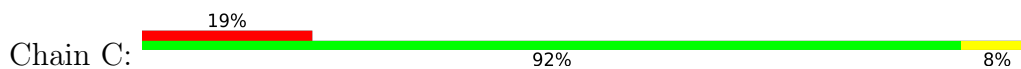


- Molecule 2: Complement C3 alpha chain

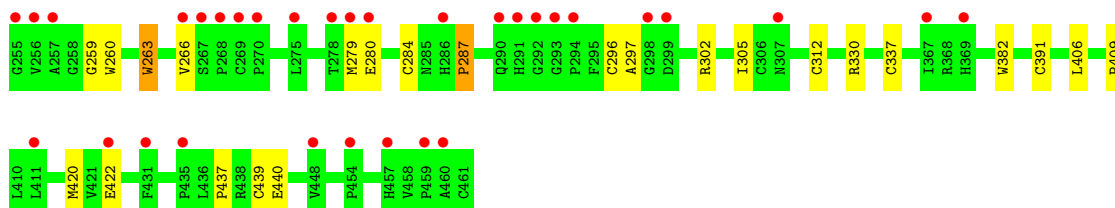
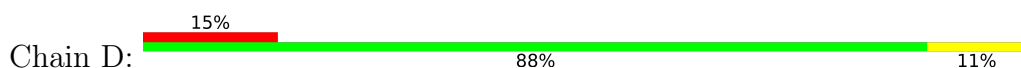




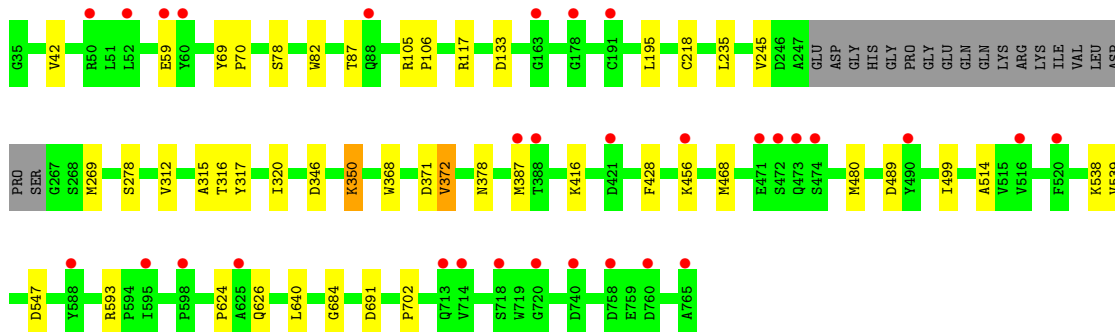
- Molecule 3: Properdin



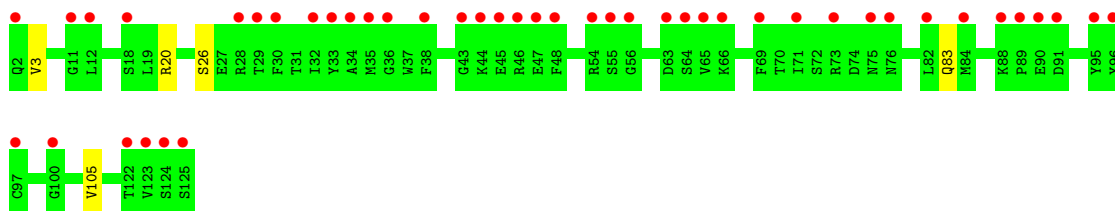
- Molecule 4: Properdin



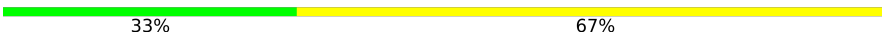
- Molecule 5: Complement factor B



- Molecule 6: hFPNb1 nanobody

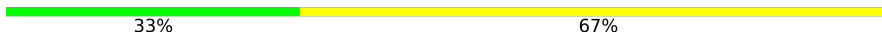


- Molecule 7: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E:  33% 67%

MAG1  
MAG2  
BMA3

- Molecule 7: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:  33% 67%

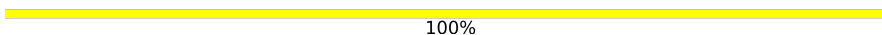
MAG1  
MAG2  
BMA3

- Molecule 7: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain L:  33% 67%

MAG1  
MAG2  
BMA3

- Molecule 8: beta-D-glucopyranose-(1-3)-alpha-L-fucopyranose

Chain H:  100%

FUC1  
BGC2

- Molecule 8: beta-D-glucopyranose-(1-3)-alpha-L-fucopyranose

Chain I:  100%

FUC1  
BGC2

- Molecule 8: beta-D-glucopyranose-(1-3)-alpha-L-fucopyranose

Chain J:  100%

FUC1  
BGC2

- Molecule 9: alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain K:  50% 50%

MAG1  
MAG2  
BMA3  
MAN4

- Molecule 9: alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain M:  25% 75%

MAG1  
MAG2  
BMA3  
MAN4

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	148.69Å 179.46Å 192.60Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.59 – 3.90 49.26 – 3.90	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.59-3.90) 100.0 (49.26-3.90)	Depositor EDS
$R_{merge}$	0.19	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.58 (at 3.88Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, $R_{free}$	0.249 , 0.265 0.249 , 0.264	Depositor DCC
$R_{free}$ test set	45798 reflections (96.11%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	196.3	Xtriage
Anisotropy	0.323	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	(Not available) , (Not available)	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.43$ , $\langle L^2 \rangle = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	21994	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	288.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.73% 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

### 5.1 Standard geometry

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

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	0.26	0/5108	0.55	0/6940
2	B	0.27	0/7380	0.55	0/9992
3	C	0.29	0/1261	0.62	0/1710
4	D	0.26	0/1647	0.61	0/2244
5	F	0.26	0/5742	0.54	0/7773
6	R	0.26	0/967	0.54	0/1305
All	All	0.27	0/22105	0.56	0/29964

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
3	C	0	1
4	D	0	1
5	F	0	2
All	All	0	4

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	159	ARG	Sidechain
4	D	263	TRP	Peptide
5	F	372	VAL	Peptide
5	F	69	TYR	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	5007	0	5064	22	0
2	B	7236	0	7153	47	0
3	C	1228	0	1122	5	0
4	D	1594	0	1508	12	0
5	F	5615	0	5468	25	0
6	R	951	0	923	3	0
7	E	39	0	34	0	0
7	G	39	0	34	0	0
7	L	39	0	34	0	0
8	H	21	0	19	0	0
8	I	21	0	19	0	0
8	J	21	0	19	0	0
9	K	50	0	43	0	0
9	M	50	0	43	0	0
10	C	33	0	30	0	0
10	D	33	0	30	0	0
11	F	14	0	13	0	0
12	F	1	0	0	0	0
13	B	1	0	0	0	0
13	F	1	0	0	1	0
All	All	21994	0	21556	102	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 2.

The worst 5 of 102 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)
2:B:1503:ASN:N	2:B:1515:GLU:OE2	2.17	0.72
2:B:862:VAL:HG22	2:B:916:VAL:HG12	1.81	0.63
1:A:386:ARG:HG3	1:A:400:LEU:HD21	1.83	0.61
1:A:125:LEU:HB2	1:A:215:GLN:HE22	1.69	0.58
2:B:1404:ASP:HB3	2:B:1478:LYS:HB3	1.86	0.58

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	640/645 (99%)	614 (96%)	25 (4%)	1 (0%)	47	79
2	B	902/912 (99%)	849 (94%)	47 (5%)	6 (1%)	22	60
3	C	161/163 (99%)	147 (91%)	12 (8%)	2 (1%)	13	49
4	D	205/207 (99%)	195 (95%)	9 (4%)	1 (0%)	29	67
5	F	708/731 (97%)	674 (95%)	32 (4%)	2 (0%)	41	75
6	R	122/124 (98%)	118 (97%)	4 (3%)	0	100	100
All	All	2738/2782 (98%)	2597 (95%)	129 (5%)	12 (0%)	34	71

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	755	ILE
2	B	1527	VAL
3	C	134	PRO
2	B	1615	LYS
4	D	287	PRO

### 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	566/567 (100%)	565 (100%)	1 (0%)	93	96
2	B	802/807 (99%)	801 (100%)	1 (0%)	93	97
3	C	134/134 (100%)	132 (98%)	2 (2%)	65	80

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	D	175/176 (99%)	169 (97%)	6 (3%)	37	62
5	F	619/635 (98%)	617 (100%)	2 (0%)	92	95
6	R	100/100 (100%)	100 (100%)	0	100	100
All	All	2396/2419 (99%)	2384 (100%)	12 (0%)	88	93

5 of 12 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	D	337	CYS
4	D	406	LEU
5	F	378	ASN
4	D	439	CYS
3	C	184	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	398	GLN
2	B	989	GLN
5	F	347	HIS
5	F	618	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

23 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
7	NAG	E	1	7,1	14,14,15	0.45	0	17,19,21	0.47	0
7	NAG	E	2	7	14,14,15	0.47	0	17,19,21	1.36	3 (17%)
7	BMA	E	3	7	11,11,12	0.96	1 (9%)	15,15,17	1.39	1 (6%)
7	NAG	G	1	2,7	14,14,15	0.75	1 (7%)	17,19,21	0.82	1 (5%)
7	NAG	G	2	7	14,14,15	0.39	0	17,19,21	0.73	1 (5%)
7	BMA	G	3	7	11,11,12	0.85	0	15,15,17	0.85	0
8	FUC	H	1	3,8	10,10,11	0.80	0	14,14,16	0.92	1 (7%)
8	BGC	H	2	8	11,11,12	1.76	3 (27%)	15,15,17	0.99	0
8	FUC	I	1	3,8	10,10,11	1.17	1 (10%)	14,14,16	1.02	0
8	BGC	I	2	8	11,11,12	1.69	1 (9%)	15,15,17	2.09	3 (20%)
8	FUC	J	1	4,8	10,10,11	0.94	0	14,14,16	0.97	1 (7%)
8	BGC	J	2	8	11,11,12	1.78	3 (27%)	15,15,17	1.19	1 (6%)
9	NAG	K	1	4,9	14,14,15	0.39	0	17,19,21	0.71	0
9	NAG	K	2	9	14,14,15	1.09	1 (7%)	17,19,21	2.21	3 (17%)
9	BMA	K	3	9	11,11,12	0.92	0	15,15,17	0.74	0
9	MAN	K	4	9	11,11,12	0.86	1 (9%)	15,15,17	1.51	2 (13%)
7	NAG	L	1	5,7	14,14,15	0.42	0	17,19,21	0.51	0
7	NAG	L	2	7	14,14,15	0.74	1 (7%)	17,19,21	0.74	1 (5%)
7	BMA	L	3	7	11,11,12	0.85	0	15,15,17	0.96	1 (6%)
9	NAG	M	1	5,9	14,14,15	0.65	1 (7%)	17,19,21	0.96	1 (5%)
9	NAG	M	2	9	14,14,15	0.35	0	17,19,21	0.51	0
9	BMA	M	3	9	11,11,12	0.85	0	15,15,17	1.04	1 (6%)
9	MAN	M	4	9	11,11,12	0.95	1 (9%)	15,15,17	1.53	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
7	NAG	E	1	7,1	-	0/6/23/26	0/1/1/1
7	NAG	E	2	7	-	1/6/23/26	0/1/1/1
7	BMA	E	3	7	-	1/2/19/22	0/1/1/1
7	NAG	G	1	2,7	-	2/6/23/26	0/1/1/1
7	NAG	G	2	7	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	BMA	G	3	7	-	1/2/19/22	0/1/1/1
8	FUC	H	1	3,8	-	-	0/1/1/1
8	BGC	H	2	8	-	2/2/19/22	0/1/1/1
8	FUC	I	1	3,8	-	-	0/1/1/1
8	BGC	I	2	8	-	2/2/19/22	0/1/1/1
8	FUC	J	1	4,8	-	-	0/1/1/1
8	BGC	J	2	8	-	2/2/19/22	0/1/1/1
9	NAG	K	1	4,9	-	0/6/23/26	0/1/1/1
9	NAG	K	2	9	-	3/6/23/26	0/1/1/1
9	BMA	K	3	9	-	0/2/19/22	0/1/1/1
9	MAN	K	4	9	-	2/2/19/22	0/1/1/1
7	NAG	L	1	5,7	-	0/6/23/26	0/1/1/1
7	NAG	L	2	7	-	2/6/23/26	0/1/1/1
7	BMA	L	3	7	-	1/2/19/22	0/1/1/1
9	NAG	M	1	5,9	-	0/6/23/26	0/1/1/1
9	NAG	M	2	9	-	0/6/23/26	0/1/1/1
9	BMA	M	3	9	-	0/2/19/22	0/1/1/1
9	MAN	M	4	9	-	1/2/19/22	0/1/1/1

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	I	2	BGC	O5-C1	4.72	1.51	1.43
8	J	2	BGC	O5-C1	4.71	1.51	1.43
8	H	2	BGC	O5-C1	4.62	1.51	1.43
9	K	2	NAG	C1-C2	3.40	1.57	1.52
8	I	1	FUC	C2-C3	2.53	1.56	1.52

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	K	2	NAG	C2-N2-C7	7.72	133.90	122.90
8	I	2	BGC	C1-C2-C3	5.44	116.35	109.67
9	M	4	MAN	C1-O5-C5	4.93	118.87	112.19
9	K	4	MAN	C1-O5-C5	4.88	118.80	112.19
7	E	3	BMA	C1-O5-C5	4.23	117.92	112.19

There are no chirality outliers.

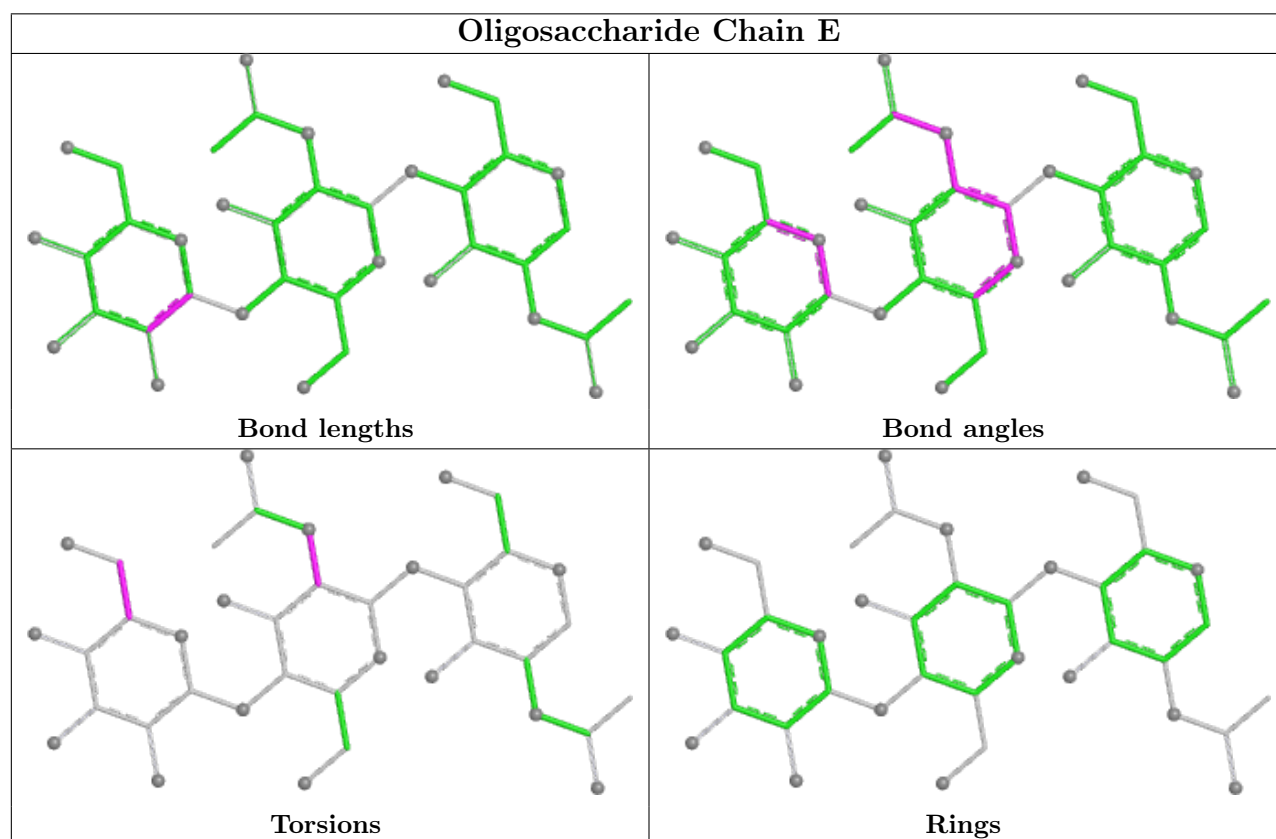
5 of 22 torsion outliers are listed below:

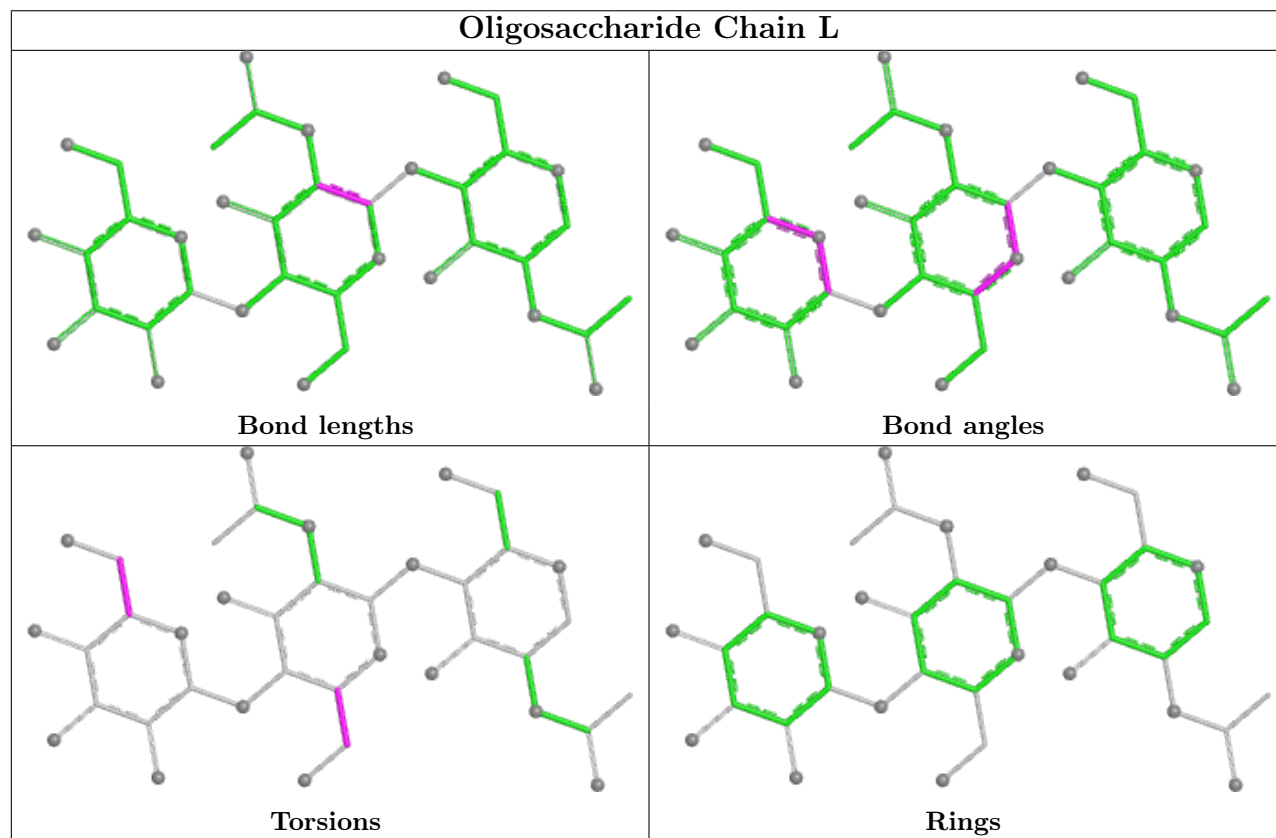
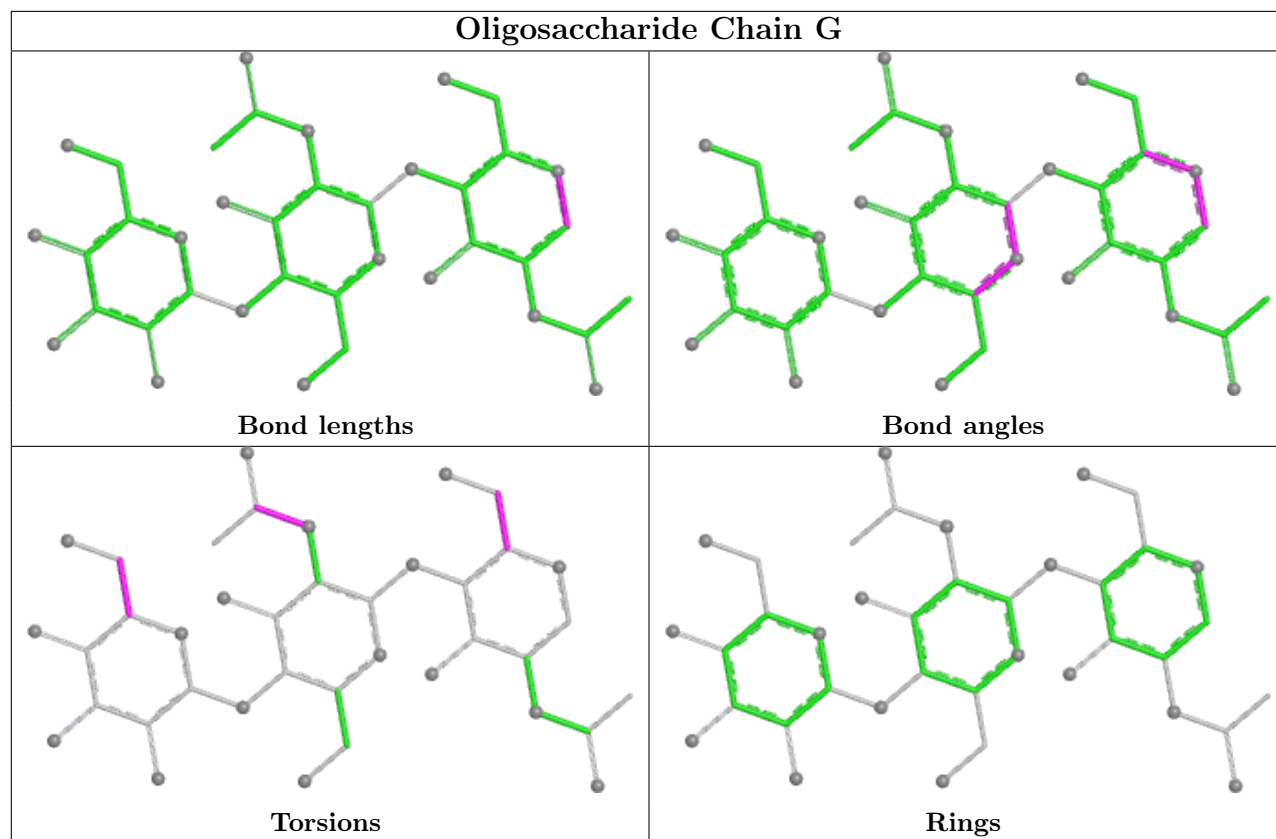
Mol	Chain	Res	Type	Atoms
7	G	1	NAG	O5-C5-C6-O6
8	H	2	BGC	O5-C5-C6-O6
7	L	2	NAG	O5-C5-C6-O6
7	G	1	NAG	C4-C5-C6-O6
7	L	2	NAG	C4-C5-C6-O6

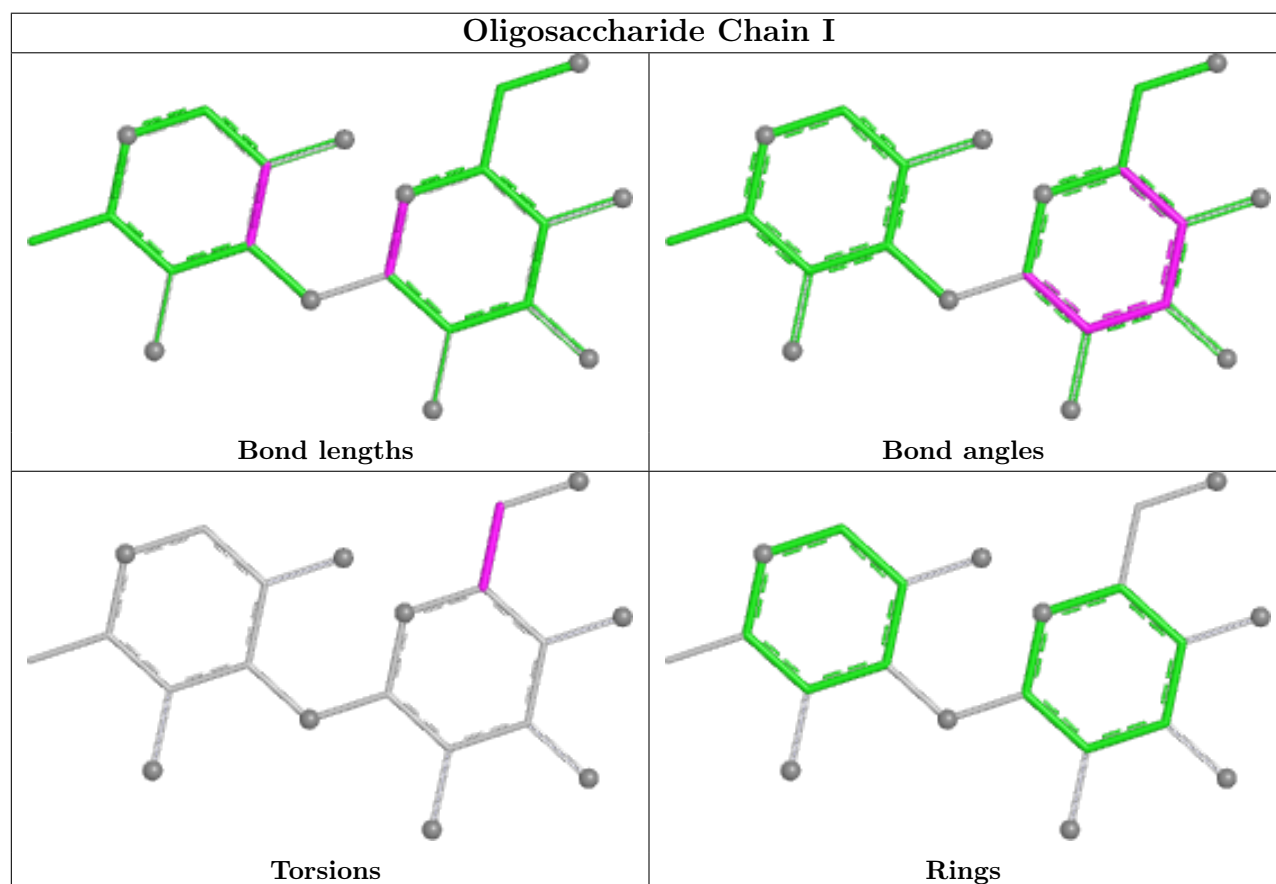
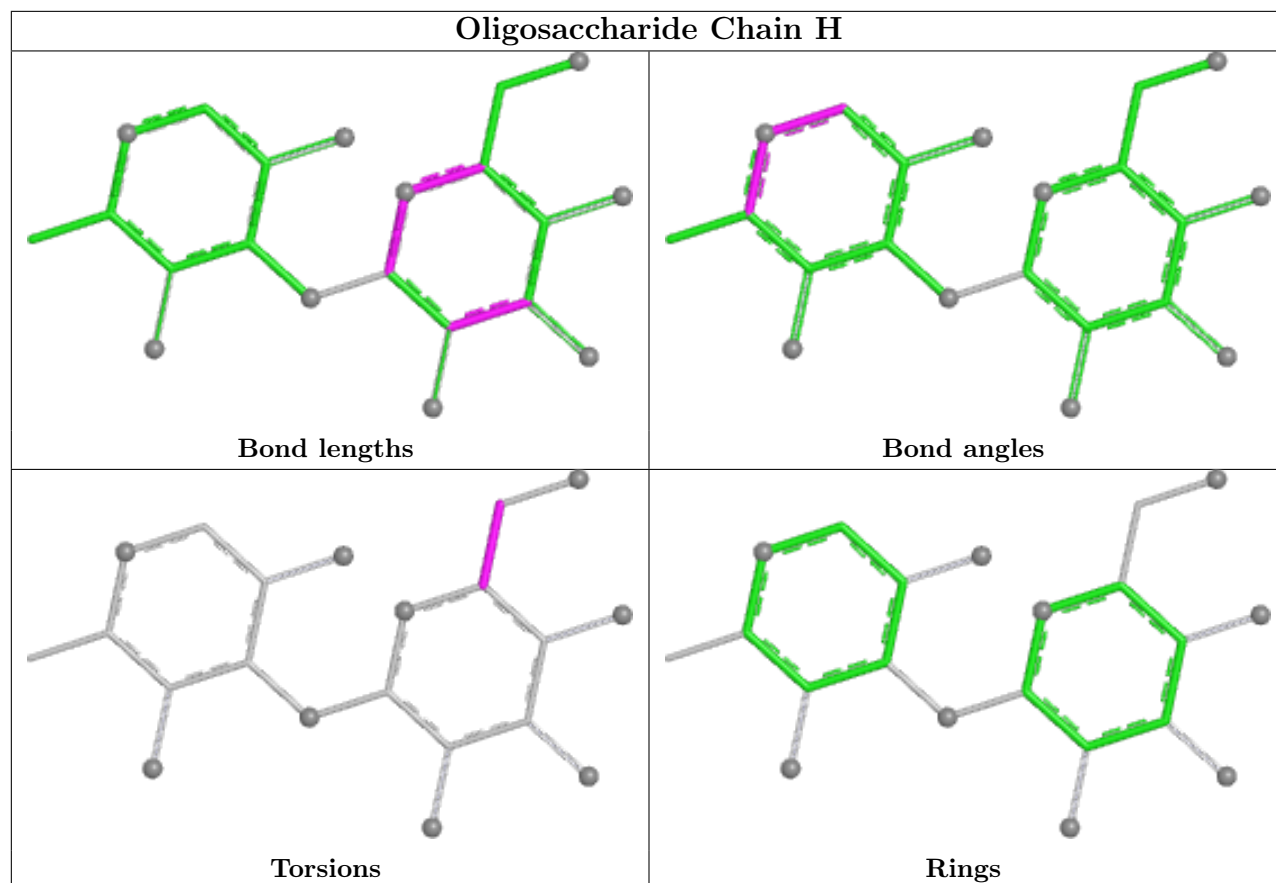
There are no ring outliers.

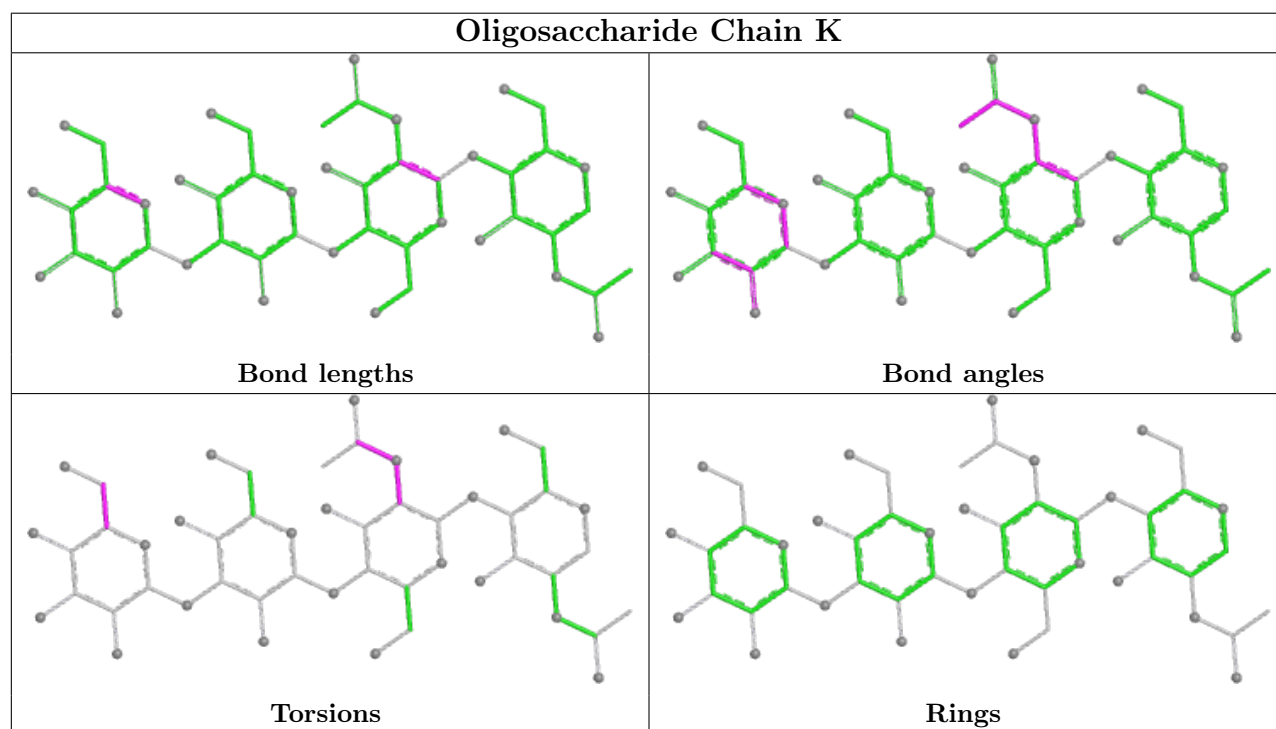
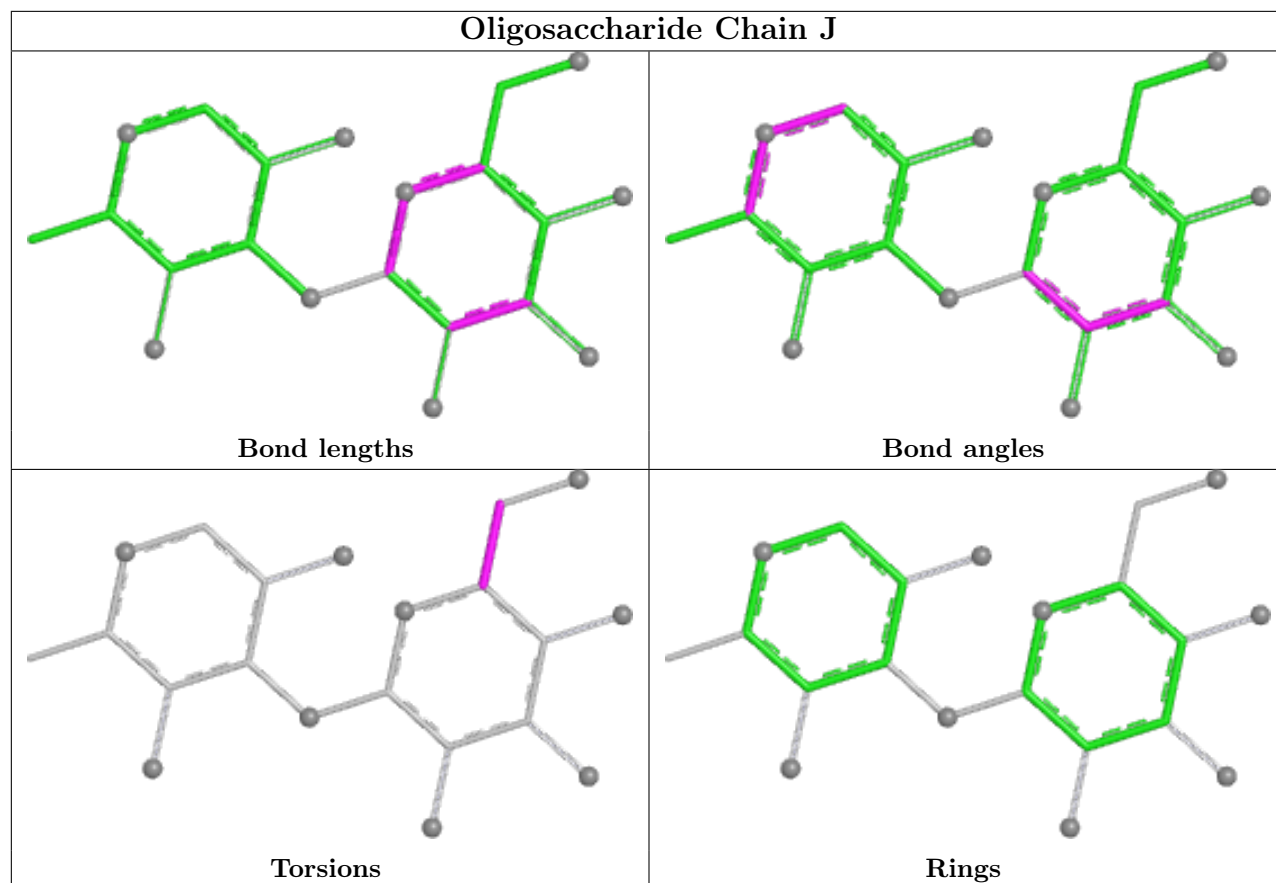
No monomer is involved in short contacts.

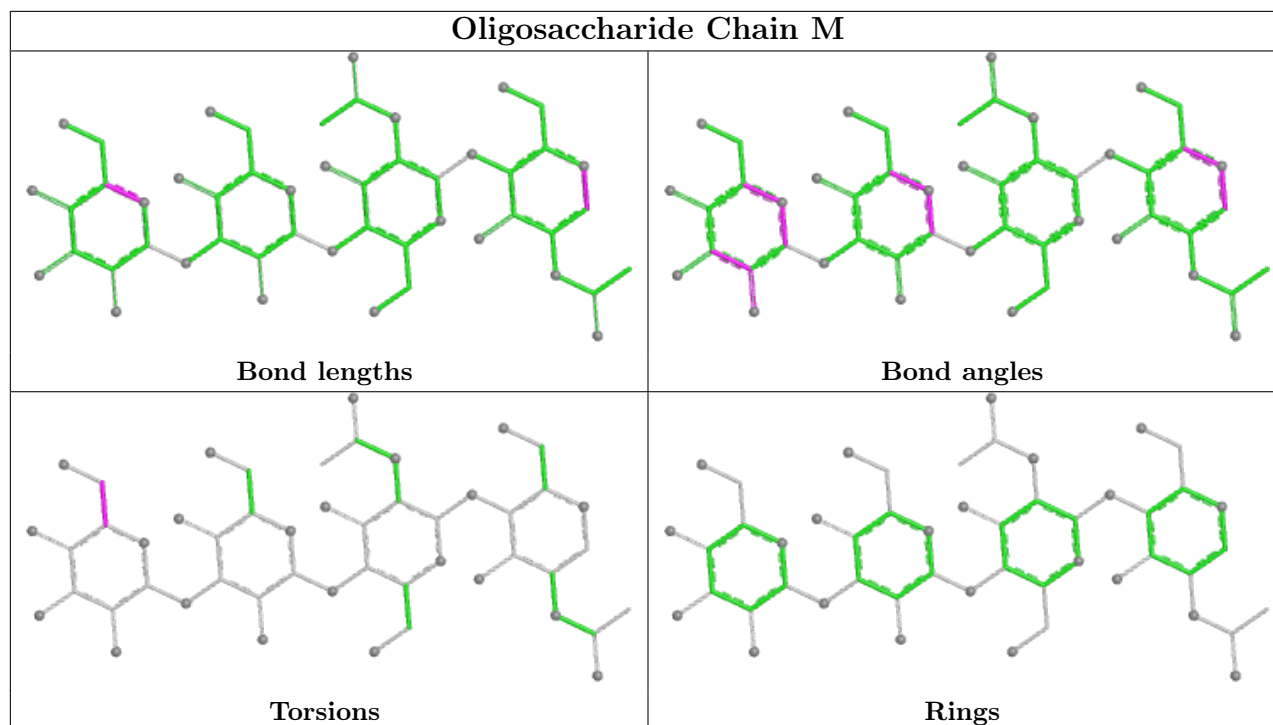
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.











## 5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 1 is monoatomic - leaving 7 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	$\# Z  > 2$
10	MAN	C	201	3	11,11,12	1.14	0	15,15,17	1.31	2 (13%)
10	MAN	C	203	3	11,11,12	1.04	0	15,15,17	1.55	2 (13%)
10	MAN	D	502	4	11,11,12	1.03	0	15,15,17	1.51	2 (13%)
10	MAN	D	501	4	11,11,12	1.07	0	15,15,17	1.55	2 (13%)
10	MAN	C	202	3	11,11,12	1.15	0	15,15,17	1.32	2 (13%)
10	MAN	D	503	4	11,11,12	1.28	2 (18%)	15,15,17	1.73	3 (20%)
11	NAG	F	801	5	14,14,15	0.50	0	17,19,21	0.99	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
10	MAN	C	201	3	-	2/2/19/22	0/1/1/1
10	MAN	C	203	3	-	0/2/19/22	0/1/1/1
10	MAN	D	502	4	-	1/2/19/22	0/1/1/1
10	MAN	D	501	4	-	0/2/19/22	0/1/1/1
10	MAN	C	202	3	-	0/2/19/22	0/1/1/1
10	MAN	D	503	4	-	2/2/19/22	0/1/1/1
11	NAG	F	801	5	-	3/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	D	503	MAN	C4-C5	2.58	1.58	1.53
10	D	503	MAN	O5-C5	2.33	1.48	1.43

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	D	503	MAN	C1-O5-C5	4.76	118.64	112.19
10	D	502	MAN	C1-O5-C5	4.07	117.71	112.19
10	D	501	MAN	C1-O5-C5	3.96	117.56	112.19
10	C	203	MAN	C1-O5-C5	3.79	117.33	112.19
11	F	801	NAG	C2-N2-C7	3.02	127.20	122.90

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
11	F	801	NAG	C4-C5-C6-O6
11	F	801	NAG	O5-C5-C6-O6
10	C	201	MAN	C4-C5-C6-O6
10	D	503	MAN	C4-C5-C6-O6
10	C	201	MAN	O5-C5-C6-O6

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 [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	642/645 (99%)	0.25	50 (7%) 13 10	164, 224, 308, 343	0
2	B	906/912 (99%)	0.59	117 (12%) 3 3	161, 255, 453, 489	0
3	C	163/163 (100%)	0.70	31 (19%) 1 1	347, 395, 626, 674	0
4	D	207/207 (100%)	0.46	32 (15%) 2 2	279, 352, 493, 532	0
5	F	712/731 (97%)	0.15	31 (4%) 34 28	190, 233, 342, 367	0
6	R	124/124 (100%)	1.76	45 (36%) 0 0	383, 465, 510, 524	0
All	All	2754/2782 (98%)	0.45	306 (11%) 5 5	161, 256, 475, 674	0

The worst 5 of 306 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	1205	PRO	16.9
2	B	1206	LEU	16.5
2	B	1183	LEU	15.2
2	B	1095	ILE	14.6
2	B	1144	THR	14.0

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

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

### 6.3 Carbohydrates [i](#)

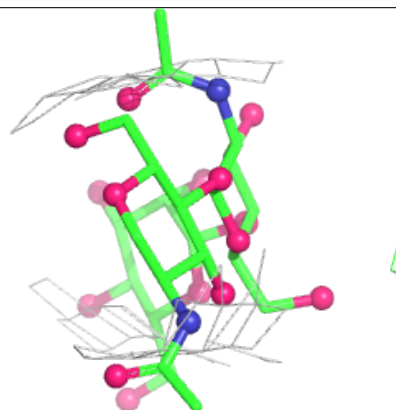
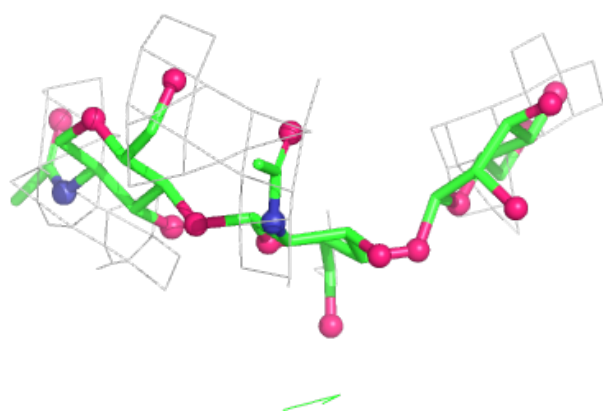
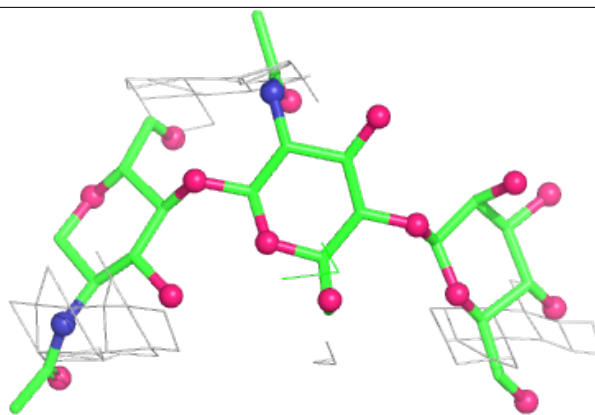
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
8	BGC	H	2	11/12	0.04	0.82	726,765,818,828	0
8	BGC	I	2	11/12	0.65	0.40	445,466,477,478	0
9	MAN	K	4	11/12	0.68	0.13	326,339,345,350	0
7	NAG	E	2	14/15	0.70	0.22	267,269,271,271	0
9	BMA	M	3	11/12	0.72	0.24	296,296,296,296	0
9	NAG	M	2	14/15	0.73	0.23	296,296,296,296	0
7	BMA	L	3	11/12	0.74	0.15	344,349,373,383	0
8	FUC	H	1	10/11	0.76	0.36	635,694,745,767	0
8	FUC	I	1	10/11	0.77	0.39	466,472,482,491	0
7	BMA	E	3	11/12	0.78	0.25	270,271,272,273	0
7	NAG	L	2	14/15	0.78	0.19	313,322,336,345	0
9	MAN	M	4	11/12	0.79	0.23	296,296,296,296	0
9	BMA	K	3	11/12	0.80	0.15	326,332,339,340	0
9	NAG	K	2	14/15	0.83	0.14	301,312,321,322	0
7	NAG	G	1	14/15	0.84	0.16	247,265,283,287	0
7	BMA	G	3	11/12	0.84	0.17	334,351,381,382	0
9	NAG	K	1	14/15	0.84	0.22	292,296,303,305	0
7	NAG	E	1	14/15	0.85	0.24	265,266,268,268	0
8	BGC	J	2	11/12	0.85	0.31	302,319,344,348	0
7	NAG	G	2	14/15	0.85	0.16	293,317,341,341	0
9	NAG	M	1	14/15	0.86	0.09	296,296,296,296	0
8	FUC	J	1	10/11	0.92	0.12	310,320,332,340	0
7	NAG	L	1	14/15	0.92	0.13	277,287,300,302	0

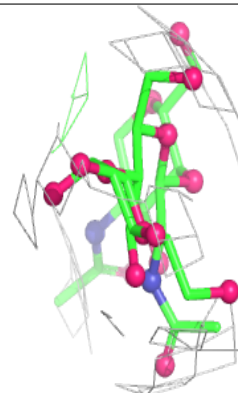
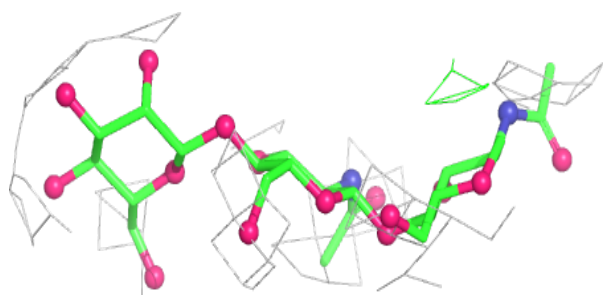
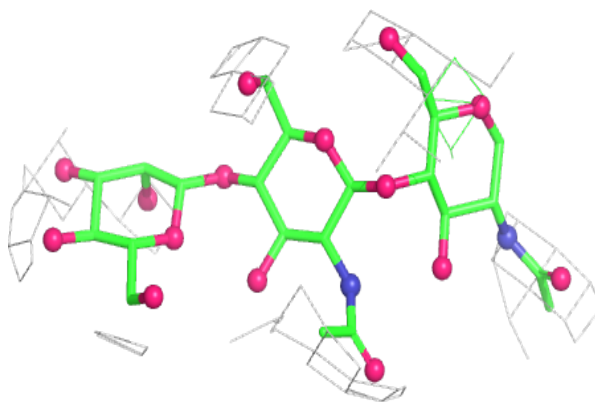
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

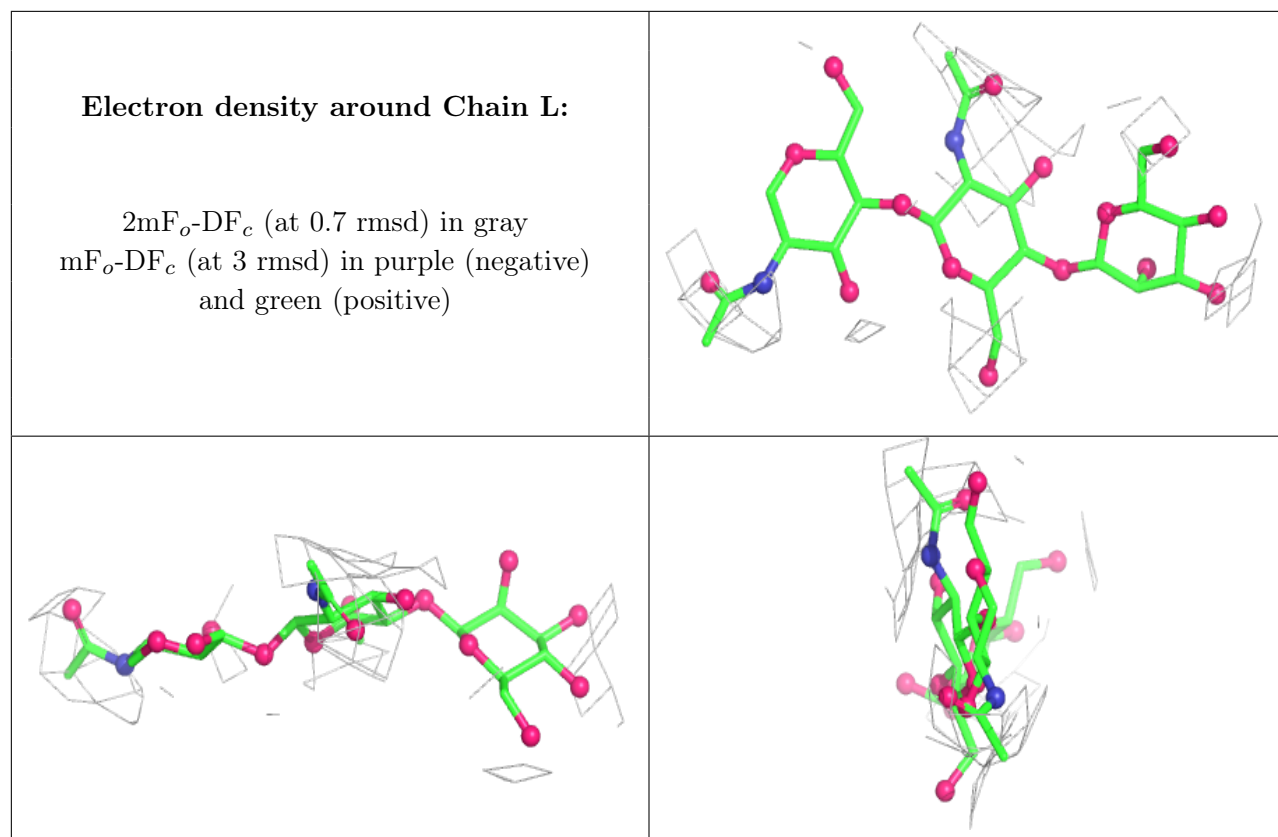
**Electron density around Chain E:**

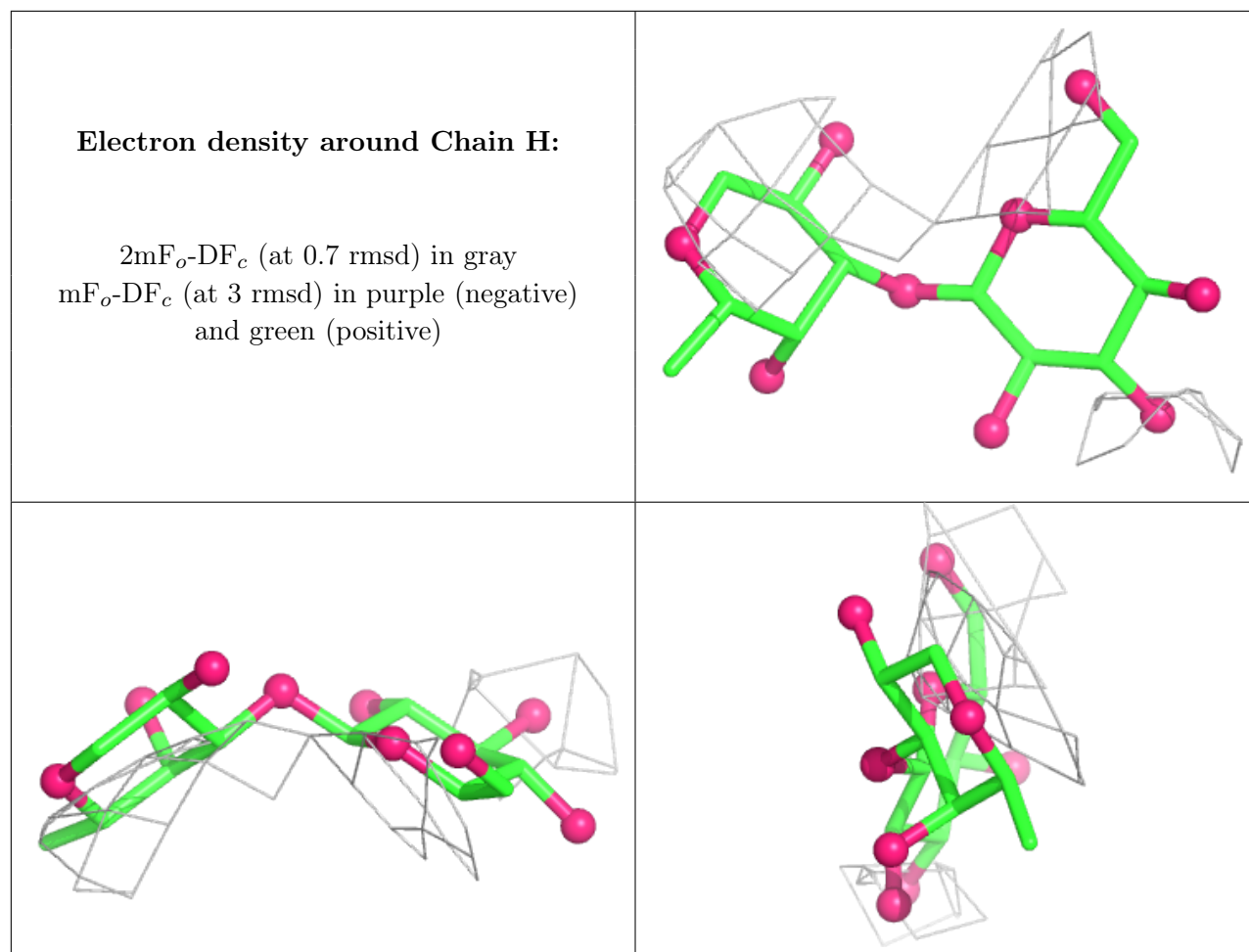
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

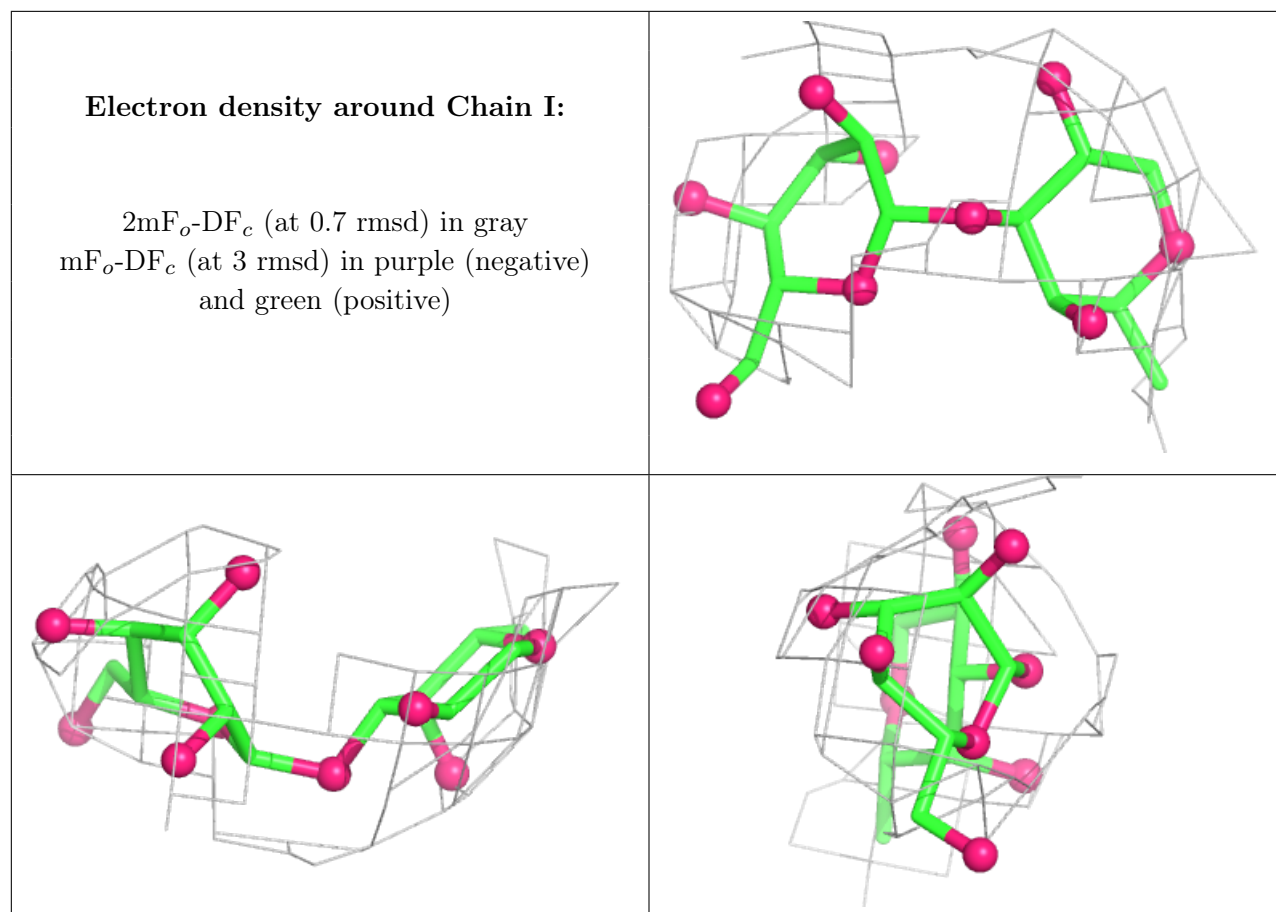
**Electron density around Chain G:**

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





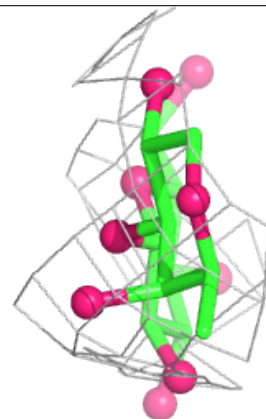
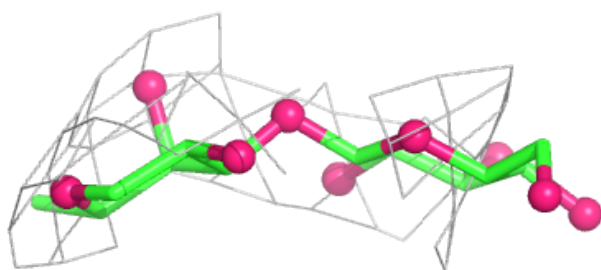
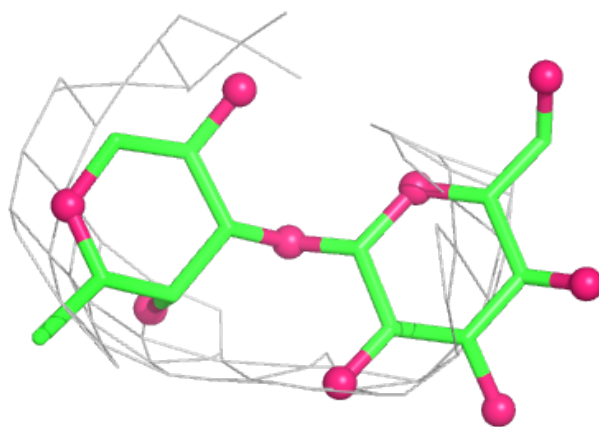




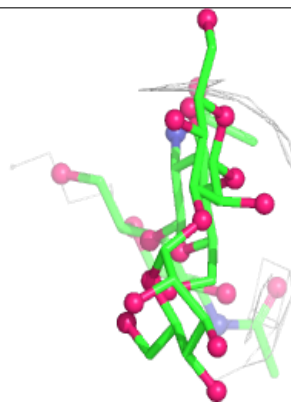
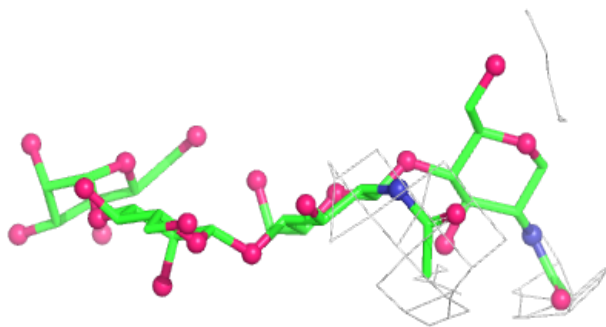
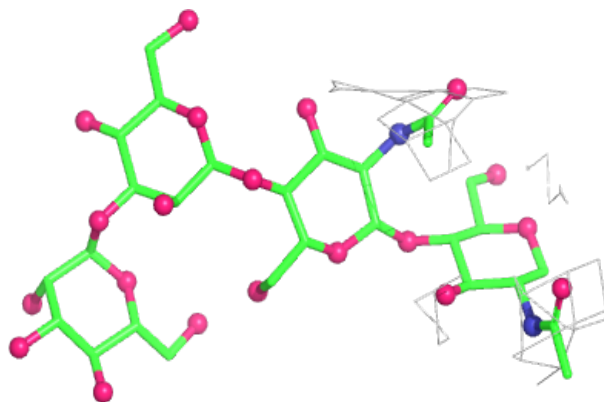


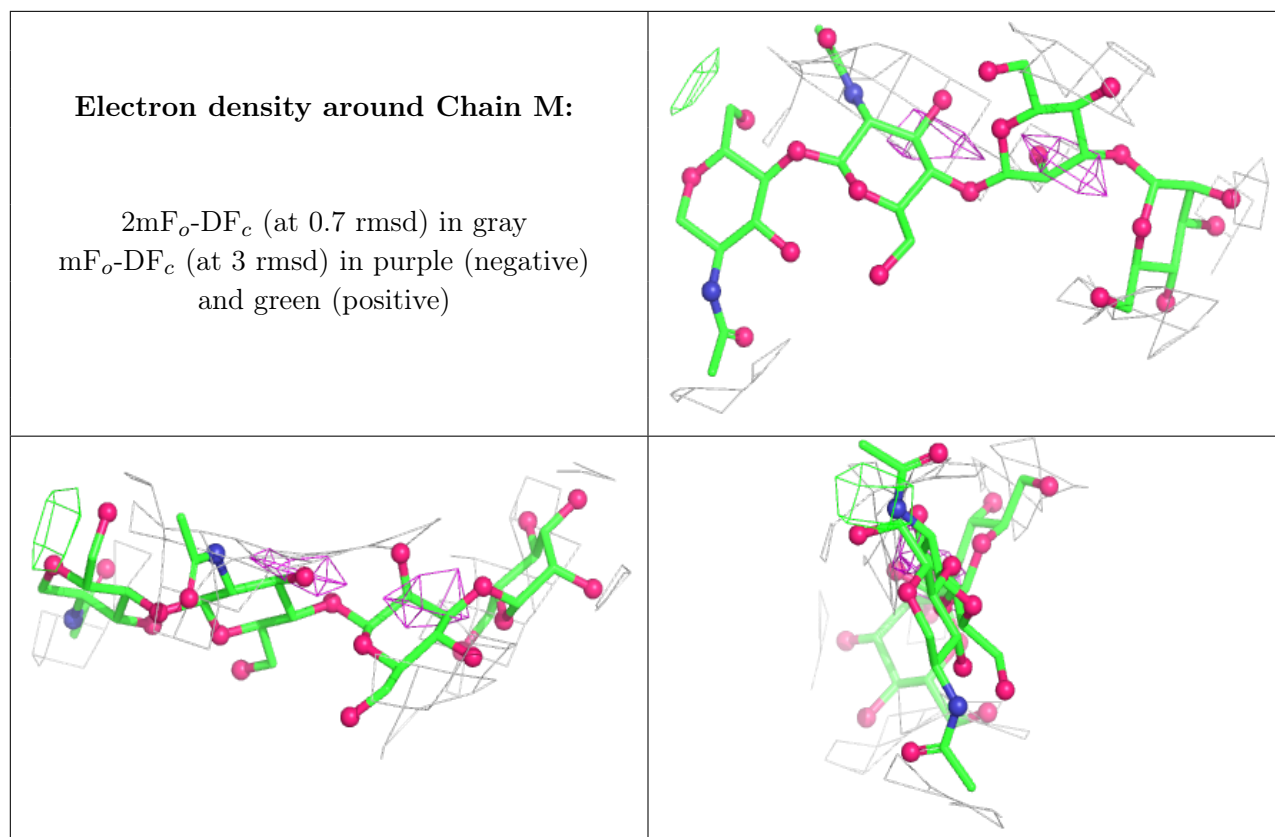
**Electron density around Chain J:**

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

**Electron density around Chain K:**

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





## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
10	MAN	C	203	11/12	0.68	0.50	435,439,457,459	0
12	MG	F	802	1/1	0.80	0.18	226,226,226,226	0
11	NAG	F	801	14/15	0.85	0.21	266,286,294,301	0
10	MAN	D	503	11/12	0.85	0.11	309,315,322,324	0
10	MAN	C	201	11/12	0.86	0.19	296,304,319,322	0
10	MAN	C	202	11/12	0.91	0.38	367,378,392,392	0
10	MAN	D	502	11/12	0.97	0.24	242,250,255,257	0
10	MAN	D	501	11/12	0.97	0.11	243,253,260,262	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.