



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 22, 2020 – 04:25 AM BST

PDB ID : 5O7U  
Title : Crystal structure of the 7-Fluorotryptophan RSL lectin in complex with Lewis x tetrasaccharide  
Authors : Varrot, A.  
Deposited on : 2017-06-09  
Resolution : 1.15 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.13.1  
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) : 2.13.1

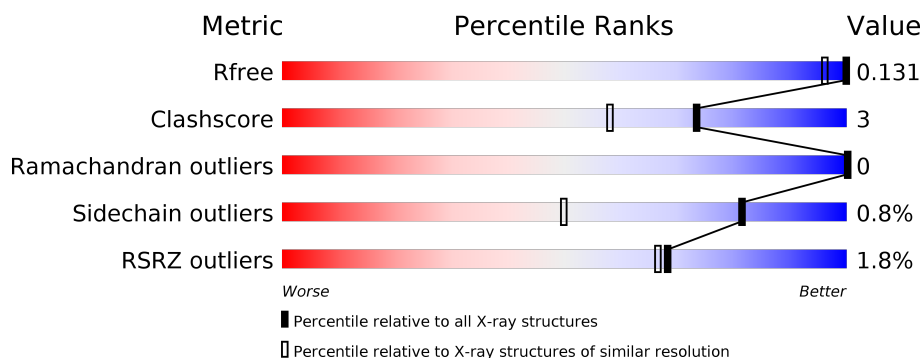
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.15 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	1492 (1.18-1.10)
Clashscore	141614	1537 (1.18-1.10)
Ramachandran outliers	138981	1483 (1.18-1.10)
Sidechain outliers	138945	1480 (1.18-1.10)
RSRZ outliers	127900	1464 (1.18-1.10)

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 on 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	90	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>90%</span> <span>9%</span> </div> </div>
1	B	90	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>89%</span> <span>9%</span> </div> </div>
2	C	3	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, green, yellow);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>33%</span> <span>67%</span> </div> </div>
3	D	4	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, green, yellow);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>50%</span> <span>50%</span> </div> </div>
4	E	2	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, green, orange);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>50%</span> <span>50%</span> </div> </div>
5	F	4	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, green, yellow);"></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>50%</span> <span>50%</span> </div> </div>

## 2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 1953 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.

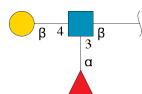
- Molecule 1 is a protein called Putative fucose-binding lectin protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	89	Total	C	F	N	O	S	0	3	0
			711	439	7	122	141	2			
1	B	89	Total	C	F	N	O	S	0	12	0
			776	478	8	134	154	2			

There are 14 discrepancies between the modelled and reference sequences:

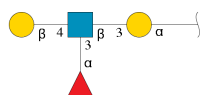
Chain	Residue	Modelled	Actual	Comment	Reference
A	10	F7W	TRP	conflict	UNP D8NA05
A	31	F7W	TRP	conflict	UNP D8NA05
A	36	F7W	TRP	conflict	UNP D8NA05
A	53	F7W	TRP	conflict	UNP D8NA05
A	74	F7W	TRP	conflict	UNP D8NA05
A	76	F7W	TRP	conflict	UNP D8NA05
A	81	F7W	TRP	conflict	UNP D8NA05
B	10	F7W	TRP	conflict	UNP D8NA05
B	31	F7W	TRP	conflict	UNP D8NA05
B	36	F7W	TRP	conflict	UNP D8NA05
B	53	F7W	TRP	conflict	UNP D8NA05
B	74	F7W	TRP	conflict	UNP D8NA05
B	76	F7W	TRP	conflict	UNP D8NA05
B	81	F7W	TRP	conflict	UNP D8NA05

- Molecule 2 is an oligosaccharide called alpha-L-fucopyranose-(1-3)-[beta-D-galactopyranose-(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
			36	20	1	15			

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



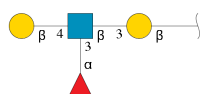
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	D	4	Total	C	N	O	0	3	0
			63	35	1	27			

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	E	2	Total	C	N	O	0	0	0
			25	14	1	10			

- Molecule 5 is an oligosaccharide called alpha-L-fucopyranose-(1-3)-[beta-D-galactopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose-(1-3)-beta-D-galactopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	F	4	Total	C	N	O	0	1	0
			50	28	1	21			

- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	1	Total	Mg	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Mg	0	0
			1	1		

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	B	1	Total	Ca	0	0
			1	1		

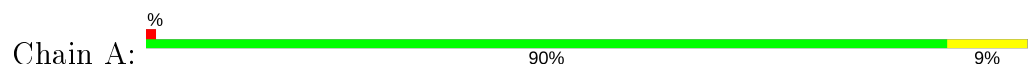
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	136	Total	O	0	7
			143	143		
8	B	143	Total	O	0	3
			146	146		

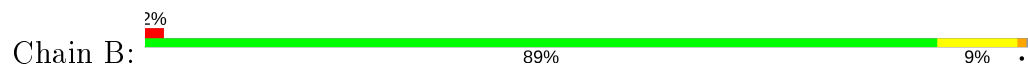
### 3 Residue-property plots [i](#)

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: Putative fucose-binding lectin protein



- Molecule 1: Putative fucose-binding lectin protein



- Molecule 2: alpha-L-fucopyranose-(1-3)-[beta-D-galactopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 3: alpha-L-fucopyranose-(1-3)-[beta-D-galactopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose-(1-3)-alpha-D-galactopyranose



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



- Molecule 5: alpha-L-fucopyranose-(1-3)-[beta-D-galactopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose-(1-3)-beta-D-galactopyranose

Chain F:



GAL1
MAG2
FUC3
GAL4

## 4 Data and refinement statistics

Property	Value	Source
Space group	F 2 3	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	129.15Å 129.15Å 129.15Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.29 – 1.15 32.29 – 1.15	Depositor EDS
% Data completeness (in resolution range)	99.9 (32.29-1.15) 99.9 (32.29-1.15)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.10 (at 1.15Å)	Xtriage
Refinement program	REFMAC 5.8.0158	Depositor
R, $R_{free}$	0.104 , 0.129 0.106 , 0.131	Depositor DCC
$R_{free}$ test set	3140 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	8.7	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 53.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.037 for k,h,-l	Xtriage
$F_o, F_c$ correlation	0.98	EDS
Total number of atoms	1953	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	12.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 48.38 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 8.6762e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: MG, NAG, GLA, CA, GAL, FUC, F7W

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	0.56	0/606	0.72	0/813
1	B	0.57	0/655	0.75	0/876
All	All	0.57	0/1261	0.74	0/1689

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	711	0	571	0	0
1	B	776	0	617	8	0
2	C	36	0	33	0	0
3	D	63	0	44	0	0
4	E	25	0	24	2	0
5	F	50	0	41	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
7	B	1	0	0	0	0
8	A	143	0	0	2	0
8	B	146	0	0	6	0
All	All	1953	0	1330	9	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 (9) 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)
8:A:256:HOH:O	1:B:76[A]:F7W:CZ3	2.00	1.07
1:B:4[B]:GLN:NE2	8:B:202:HOH:O	1.60	0.86
8:B:217:HOH:O	4:E:1:NAG:H83	1.73	0.85
8:A:256:HOH:O	1:B:76[A]:F7W:CH2	2.22	0.83
1:B:4[B]:GLN:HG2	8:B:202:HOH:O	1.76	0.82
1:B:4[B]:GLN:CG	8:B:202:HOH:O	2.28	0.75
1:B:76[A]:F7W:CH2	4:E:1:NAG:H62	2.39	0.53
1:B:79[A]:ASN:OD1	8:B:203:HOH:O	2.19	0.52
1:B:4[A]:GLN:OE1	8:B:204:HOH:O	2.20	0.49

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	82/90 (91%)	82 (100%)	0	0	100	100
1	B	91/90 (101%)	88 (97%)	3 (3%)	0	100	100
All	All	173/180 (96%)	170 (98%)	3 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	66/64 (103%)	65 (98%)	1 (2%)	65	27
1	B	71/64 (111%)	71 (100%)	0	100	100
All	All	137/128 (107%)	136 (99%)	1 (1%)	81	55

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	PRO

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

15 non-standard protein/DNA/RNA residues 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	$\# Z  > 2$
1	F7W	B	53	1	13,16,17	1.05	0	11,22,24	1.89	2 (18%)
1	F7W	B	76[A]	1	13,16,17	1.87	3 (23%)	11,22,24	4.90	7 (63%)
1	F7W	A	74	1	13,16,17	1.36	1 (7%)	11,22,24	2.89	4 (36%)
1	F7W	B	74	1	13,16,17	1.27	2 (15%)	11,22,24	2.75	3 (27%)
1	F7W	B	31	1	13,16,17	1.17	1 (7%)	11,22,24	1.68	1 (9%)
1	F7W	A	53	1	13,16,17	1.05	0	11,22,24	1.28	1 (9%)
1	F7W	A	36	1	13,16,17	0.90	0	11,22,24	2.03	2 (18%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
1	F7W	A	81	1	13,16,17	0.84	0	11,22,24	2.45	4 (36%)
1	F7W	B	10	1	13,16,17	1.06	0	11,22,24	2.00	3 (27%)
1	F7W	B	36	1	13,16,17	1.06	1 (7%)	11,22,24	2.33	4 (36%)
1	F7W	A	76	1	13,16,17	1.82	4 (30%)	11,22,24	3.46	6 (54%)
1	F7W	A	31	1	13,16,17	1.08	0	11,22,24	2.65	3 (27%)
1	F7W	A	10	1	13,16,17	0.98	0	11,22,24	1.73	4 (36%)
1	F7W	B	81	1	13,16,17	1.19	1 (7%)	11,22,24	2.17	4 (36%)
1	F7W	B	76[B]	1	13,16,17	1.97	2 (15%)	11,22,24	2.63	4 (36%)

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
1	F7W	B	53	1	-	0/4/6/8	0/2/2/2
1	F7W	B	76[A]	1	-	0/4/6/8	0/2/2/2
1	F7W	A	74	1	-	0/4/6/8	0/2/2/2
1	F7W	B	74	1	-	0/4/6/8	0/2/2/2
1	F7W	B	31	1	-	0/4/6/8	0/2/2/2
1	F7W	A	53	1	-	0/4/6/8	0/2/2/2
1	F7W	A	36	1	-	0/4/6/8	0/2/2/2
1	F7W	A	81	1	-	0/4/6/8	0/2/2/2
1	F7W	B	10	1	-	0/4/6/8	0/2/2/2
1	F7W	B	36	1	-	0/4/6/8	0/2/2/2
1	F7W	A	76	1	-	0/4/6/8	0/2/2/2
1	F7W	A	31	1	-	0/4/6/8	0/2/2/2
1	F7W	A	10	1	-	0/4/6/8	0/2/2/2
1	F7W	B	81	1	-	0/4/6/8	0/2/2/2
1	F7W	B	76[B]	1	-	0/4/6/8	0/2/2/2

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	76[B]	F7W	CZ2-CE2	5.72	1.47	1.41
1	B	76[A]	F7W	CZ2-CE2	4.38	1.46	1.41
1	A	76	F7W	CZ2-CE2	4.02	1.45	1.41
1	B	76[A]	F7W	CE3-CD2	-3.28	1.35	1.42
1	A	74	F7W	CH2-CZ2	3.03	1.39	1.36
1	B	81	F7W	CH2-CZ2	2.76	1.39	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	76[B]	F7W	CH2-CZ2	2.68	1.39	1.36
1	A	76	F7W	F1-CZ2	-2.62	1.31	1.36
1	A	76	F7W	CH2-CZ2	2.59	1.39	1.36
1	B	74	F7W	CZ2-CE2	2.57	1.44	1.41
1	B	76[A]	F7W	CD1-CG	2.31	1.43	1.37
1	A	76	F7W	CZ3-CE3	2.30	1.41	1.36
1	B	31	F7W	CZ2-CE2	2.11	1.43	1.41
1	B	74	F7W	CH2-CZ2	2.10	1.38	1.36
1	B	36	F7W	CZ2-CE2	2.01	1.43	1.41

All (52) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	76[A]	F7W	CH2-CZ2-CE2	-13.29	116.30	123.09
1	A	76	F7W	CH2-CZ2-CE2	-8.90	118.54	123.09
1	A	74	F7W	CH2-CZ2-CE2	-7.86	119.07	123.09
1	B	74	F7W	CH2-CZ2-CE2	-7.78	119.12	123.09
1	A	31	F7W	CH2-CZ2-CE2	-7.08	119.47	123.09
1	B	76[B]	F7W	CH2-CZ2-CE2	-6.43	119.80	123.09
1	B	36	F7W	CH2-CZ2-CE2	-5.76	120.14	123.09
1	A	81	F7W	CH2-CZ2-CE2	-5.69	120.18	123.09
1	B	81	F7W	CH2-CZ2-CE2	-5.68	120.19	123.09
1	B	10	F7W	CH2-CZ2-CE2	-5.32	120.37	123.09
1	A	36	F7W	CH2-CZ2-CE2	-5.22	120.42	123.09
1	A	76	F7W	F1-CZ2-CE2	4.90	119.38	117.40
1	B	53	F7W	CH2-CZ2-CE2	-4.77	120.65	123.09
1	B	31	F7W	CH2-CZ2-CE2	-4.45	120.82	123.09
1	B	76[A]	F7W	CB-CG-CD1	4.36	133.35	127.97
1	B	76[A]	F7W	CB-CG-CD2	-4.35	119.48	126.25
1	B	76[A]	F7W	CZ3-CH2-CZ2	3.98	123.54	118.66
1	B	76[A]	F7W	F1-CZ2-CH2	3.91	125.26	118.29
1	B	76[B]	F7W	F1-CZ2-CE2	3.79	118.93	117.40
1	A	81	F7W	CG-CB-CA	-3.78	108.68	114.53
1	A	31	F7W	F1-CZ2-CE2	3.64	118.87	117.40
1	A	10	F7W	CH2-CZ2-CE2	-3.54	121.28	123.09
1	A	74	F7W	CZ3-CH2-CZ2	3.27	122.66	118.66
1	A	74	F7W	F1-CZ2-CH2	2.94	123.53	118.29
1	B	74	F7W	F1-CZ2-CH2	2.65	123.01	118.29
1	B	76[A]	F7W	F1-CZ2-CE2	2.55	118.43	117.40
1	B	10	F7W	F1-CZ2-CH2	2.54	122.81	118.29
1	A	53	F7W	CH2-CZ2-CE2	-2.48	121.82	123.09
1	A	76	F7W	CZ3-CH2-CZ2	2.47	121.69	118.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	76[A]	F7W	CG-CB-CA	-2.34	110.91	114.53
1	B	53	F7W	F1-CZ2-CH2	2.34	122.46	118.29
1	A	10	F7W	F1-CZ2-CE2	-2.32	116.47	117.40
1	B	76[B]	F7W	CG-CB-CA	-2.32	110.94	114.53
1	A	76	F7W	CG-CB-CA	-2.32	110.94	114.53
1	A	36	F7W	CG-CB-CA	-2.31	110.95	114.53
1	B	74	F7W	CZ3-CH2-CZ2	2.30	121.49	118.66
1	A	81	F7W	F1-CZ2-CH2	2.27	122.34	118.29
1	A	74	F7W	CG-CB-CA	-2.27	111.02	114.53
1	A	10	F7W	F1-CZ2-CH2	2.21	122.23	118.29
1	B	36	F7W	CG-CB-CA	-2.20	111.12	114.53
1	B	76[B]	F7W	CZ3-CH2-CZ2	2.20	121.36	118.66
1	B	81	F7W	CG-CB-CA	-2.17	111.17	114.53
1	A	81	F7W	CB-CG-CD2	-2.17	122.87	126.25
1	A	76	F7W	CZ3-CE3-CD2	-2.16	117.89	120.89
1	A	10	F7W	CZ3-CE3-CD2	-2.16	117.90	120.89
1	B	81	F7W	F1-CZ2-CH2	2.14	122.10	118.29
1	A	76	F7W	F1-CZ2-CH2	2.12	122.08	118.29
1	B	36	F7W	CZ3-CH2-CZ2	2.08	121.21	118.66
1	B	10	F7W	CZ3-CH2-CZ2	2.07	121.20	118.66
1	A	31	F7W	CZ3-CH2-CZ2	2.05	121.18	118.66
1	B	36	F7W	F1-CZ2-CH2	2.05	121.94	118.29
1	B	81	F7W	CB-CA-C	-2.01	107.71	111.47

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	76[A]	F7W	3	0

## 5.5 Carbohydrates ⓘ

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	15,15,15	0.97	1 (6%)	21,21,21	2.07	6 (28%)
2	FUC	C	2	2	10,10,11	0.58	0	14,14,16	0.68	0
2	GAL	C	3	2	11,11,12	0.76	0	15,15,17	1.33	1 (6%)
3	GLA	D	1[A]	3	12,12,12	0.61	0	17,17,17	1.20	2 (11%)
3	GLA	D	1[B]	3	12,12,12	0.51	0	17,17,17	0.74	0
3	NAG	D	2[A]	3	14,14,15	0.87	0	17,19,21	0.96	1 (5%)
3	NAG	D	2[B]	3	14,14,15	0.87	0	17,19,21	0.97	1 (5%)
3	FUC	D	3	3	10,10,11	0.58	0	14,14,16	0.87	0
3	GAL	D	4[A]	-	11,11,12	0.67	0	15,15,17	0.75	0
3	GAL	D	4[B]	-	11,11,12	0.59	0	15,15,17	0.69	0
4	NAG	E	1	4	15,15,15	0.88	0	21,21,21	1.48	4 (19%)
4	FUC	E	2	4	10,10,11	0.68	0	14,14,16	0.90	0
5	GAL	F	1	5	12,12,12	0.45	0	17,17,17	0.89	0
5	NAG	F	2[A]	-	14,14,15	0.88	0	17,19,21	1.36	2 (11%)
5	NAG	F	2[B]	-	14,14,15	0.87	0	17,19,21	1.27	2 (11%)
5	FUC	F	3	5	10,10,11	0.60	0	14,14,16	0.87	0
5	GAL	F	4	5	11,11,12	1.12	1 (9%)	15,15,17	1.03	1 (6%)

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	-	1/6/26/26	0/1/1/1
2	FUC	C	2	2	-	-	0/1/1/1
2	GAL	C	3	2	-	0/2/19/22	0/1/1/1
3	GLA	D	1[A]	3	-	1/2/22/22	0/1/1/1
3	GLA	D	1[B]	3	-	0/2/22/22	0/1/1/1
3	NAG	D	2[A]	3	-	0/6/23/26	0/1/1/1
3	NAG	D	2[B]	3	-	0/6/23/26	0/1/1/1
3	FUC	D	3	3	-	-	0/1/1/1
3	GAL	D	4[A]	-	-	0/2/19/22	0/1/1/1
3	GAL	D	4[B]	-	-	1/2/19/22	0/1/1/1
4	NAG	E	1	4	-	0/6/26/26	0/1/1/1
4	FUC	E	2	4	-	-	0/1/1/1
5	GAL	F	1	5	-	1/2/22/22	0/1/1/1
5	NAG	F	2[A]	-	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	F	2[B]	-	-	2/6/23/26	0/1/1/1
5	FUC	F	3	5	-	-	0/1/1/1
5	GAL	F	4	5	-	0/2/19/22	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1	NAG	O5-C5	-2.34	1.38	1.44
5	F	4	GAL	O5-C1	2.18	1.47	1.43

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1	NAG	C1-C2-N2	-5.46	104.40	110.73
2	C	1	NAG	O5-C5-C6	-4.38	95.53	106.44
2	C	1	NAG	O3-C3-C2	3.50	116.73	109.66
2	C	1	NAG	O4-C4-C5	3.05	116.87	109.30
5	F	2[B]	NAG	O4-C4-C3	2.98	117.25	110.35
5	F	2[A]	NAG	O4-C4-C3	2.98	117.25	110.35
4	E	1	NAG	O3-C3-C4	-2.98	103.46	110.35
4	E	1	NAG	C4-C3-C2	2.87	114.55	110.34
5	F	2[A]	NAG	O5-C5-C6	2.85	111.67	107.20
4	E	1	NAG	C3-C4-C5	2.64	114.95	110.24
5	F	4	GAL	O2-C2-C3	-2.45	105.23	110.14
3	D	1[A]	GLA	O3-C3-C2	-2.41	104.77	110.35
5	F	2[B]	NAG	C3-C4-C5	2.36	114.44	110.24
2	C	3	GAL	O2-C2-C1	2.34	113.93	109.15
3	D	1[A]	GLA	O3-C3-C4	2.23	115.50	110.35
3	D	2[A]	NAG	O4-C4-C3	2.23	115.50	110.35
3	D	2[B]	NAG	O4-C4-C3	2.23	115.50	110.35
2	C	1	NAG	C3-C2-N2	2.23	114.82	110.62
4	E	1	NAG	C1-O5-C5	2.10	117.62	113.66
2	C	1	NAG	O1-C1-O5	-2.01	104.35	110.38

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	F	2[B]	NAG	O5-C5-C6-O6
2	C	1	NAG	O5-C5-C6-O6
5	F	1	GAL	O5-C5-C6-O6

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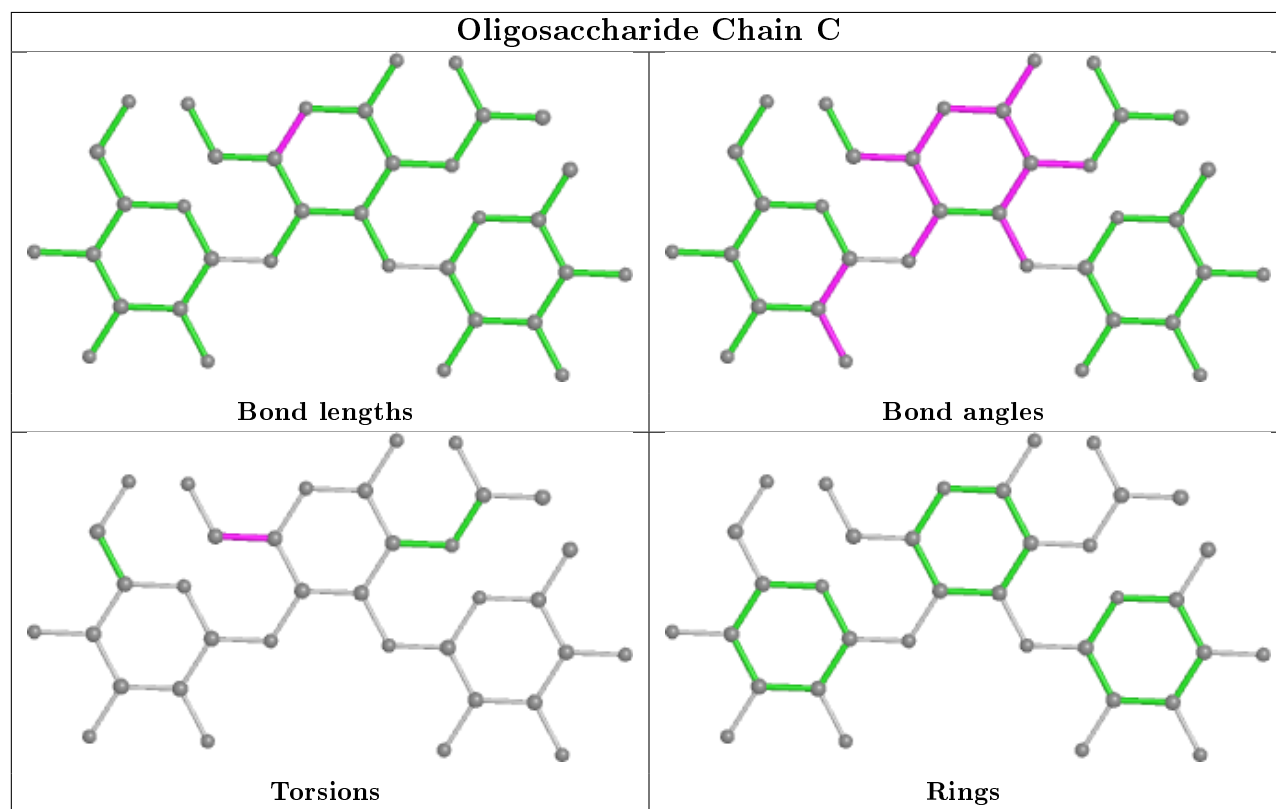
Mol	Chain	Res	Type	Atoms
3	D	4[B]	GAL	O5-C5-C6-O6
5	F	2[B]	NAG	C4-C5-C6-O6
5	F	2[A]	NAG	C4-C5-C6-O6
3	D	1[A]	GLA	O5-C5-C6-O6
5	F	2[A]	NAG	O5-C5-C6-O6

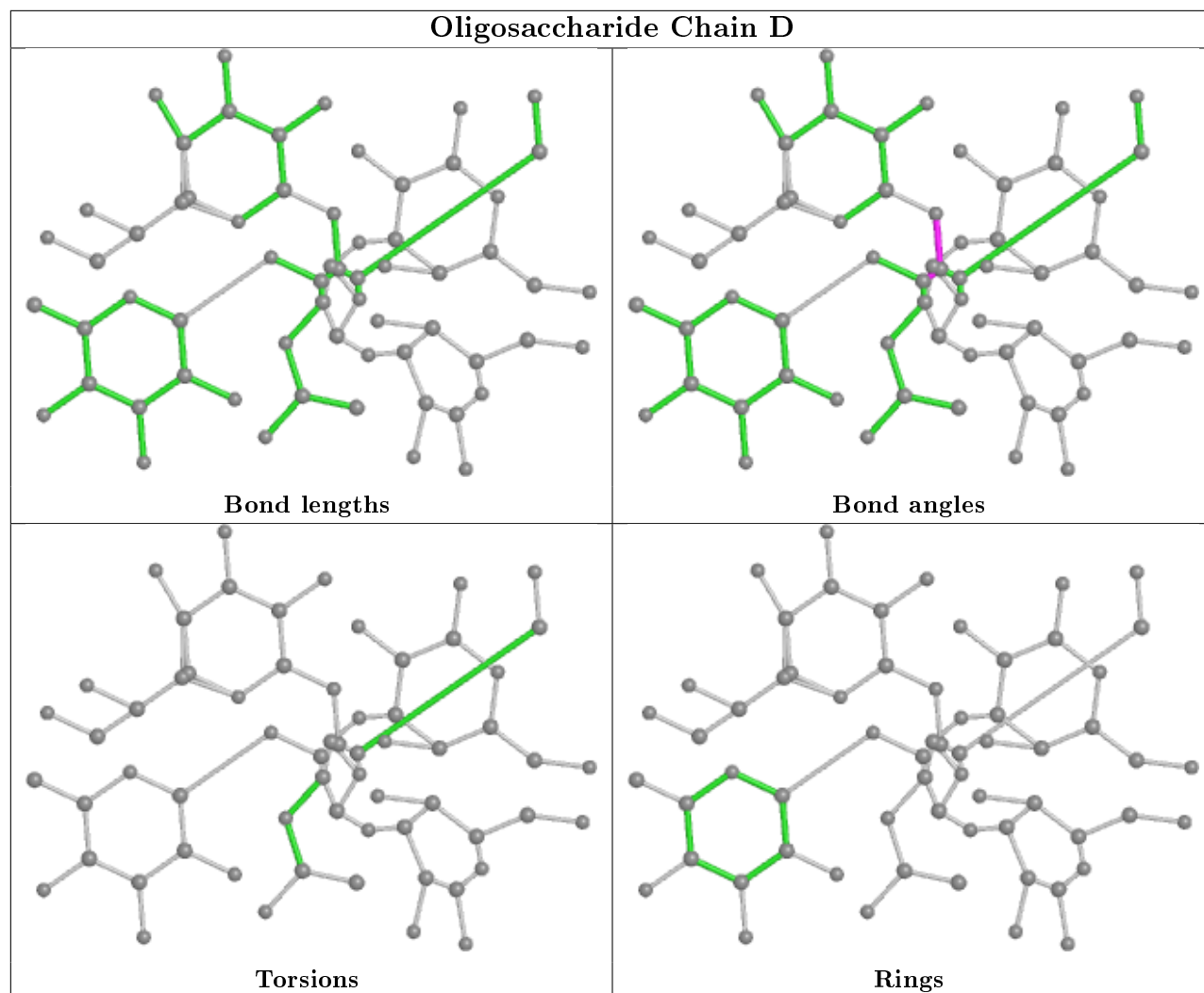
There are no ring outliers.

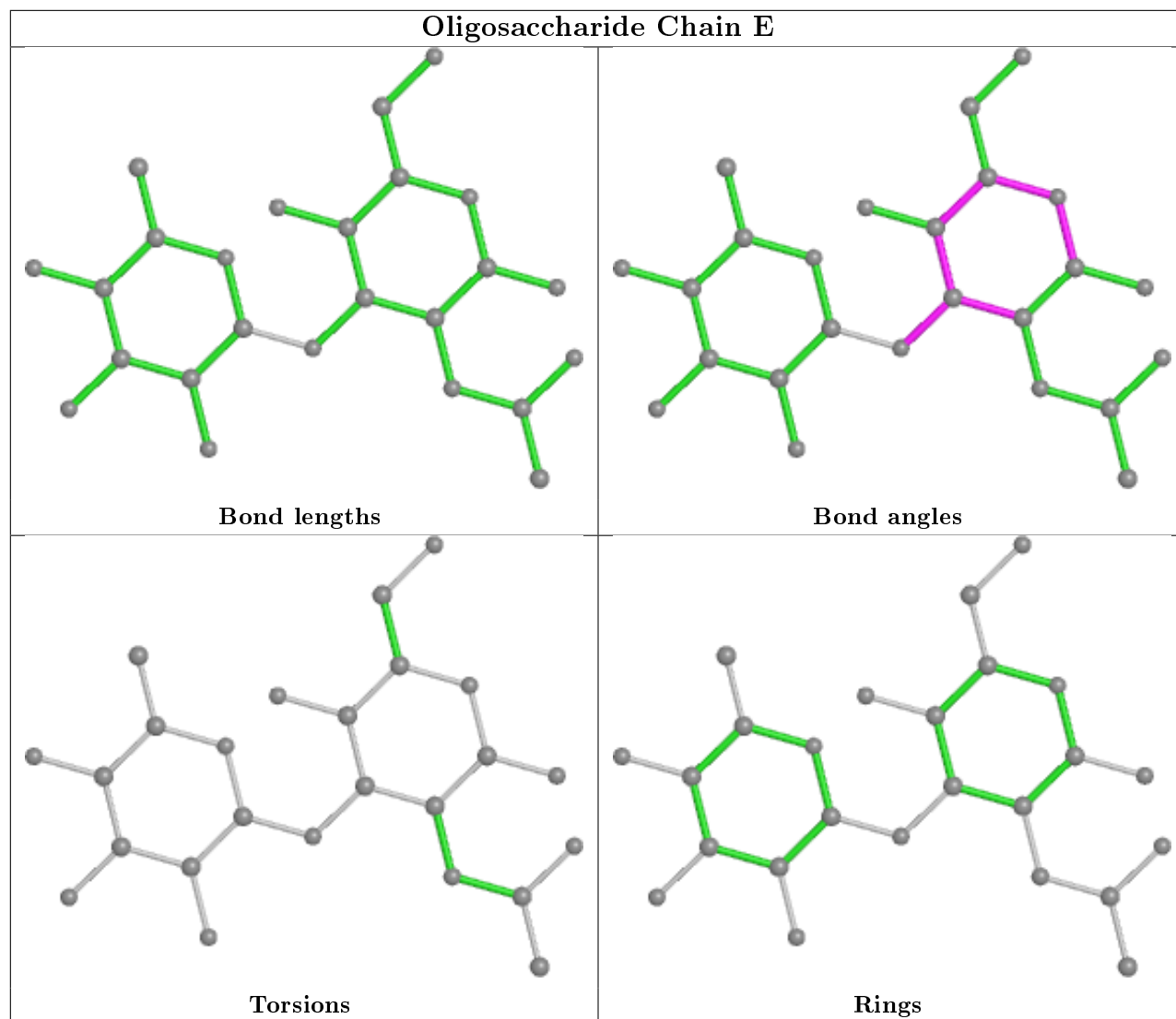
1 monomer is involved in 2 short contacts:

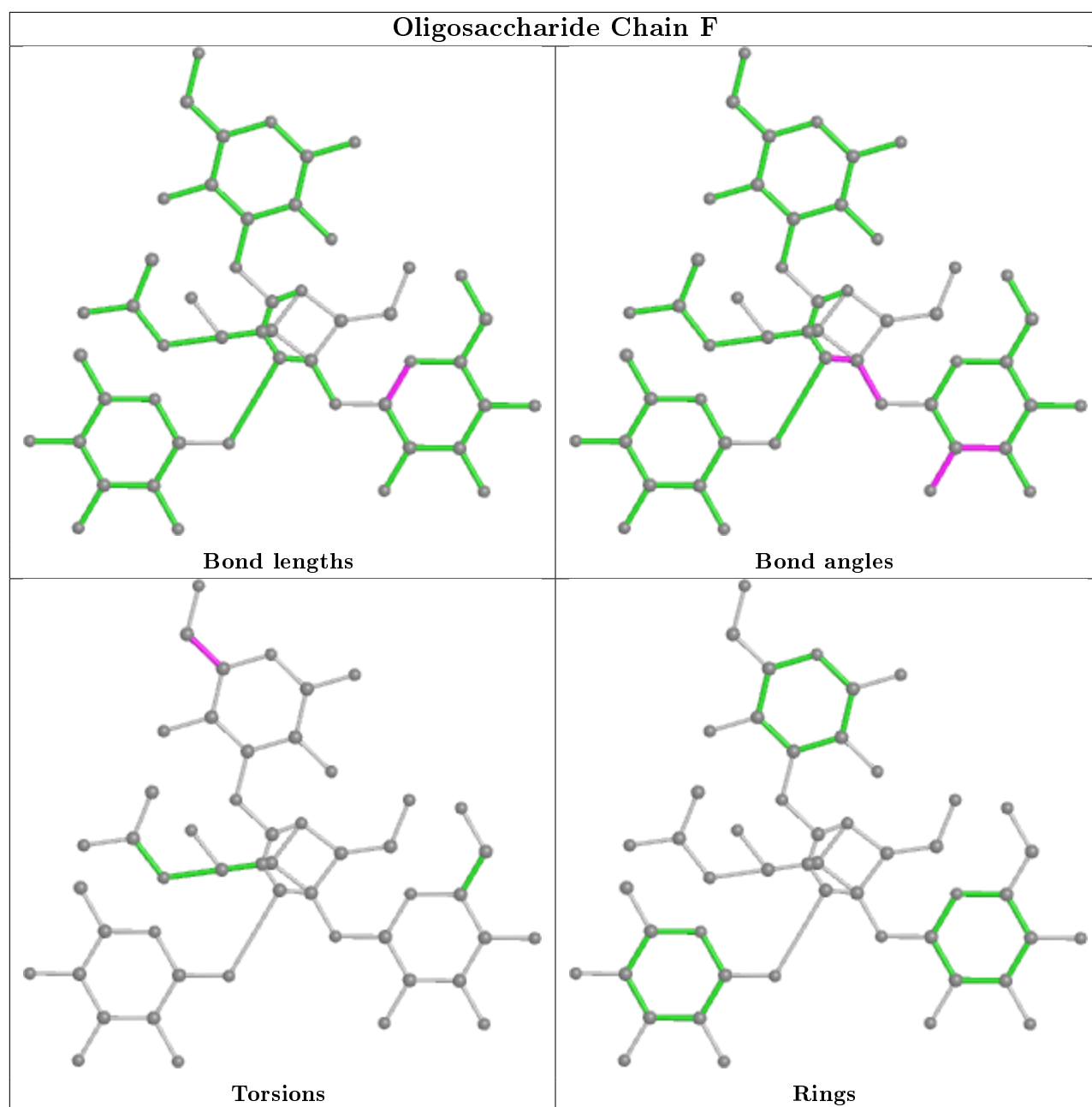
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	1	NAG	2	0

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









## 5.6 Ligand geometry [i](#)

Of 3 ligands modelled in this entry, 3 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers

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, 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	82/90 (91%)	-0.14	1 (1%) 79 77	6, 9, 16, 20	1 (1%)
1	B	82/90 (91%)	0.01	2 (2%) 59 57	6, 10, 16, 21	0
All	All	164/180 (91%)	-0.07	3 (1%) 68 66	6, 9, 17, 21	1 (0%)

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2	SER	4.4
1	A	23[A]	ASN	3.0
1	B	12	THR	2.2

### 6.2 Non-standard residues in protein, DNA, RNA chains [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
1	F7W	B	76[A]	15/16	0.97	0.09	6,11,14,15	15
1	F7W	B	76[B]	15/16	0.97	0.09	7,8,9,14	15
1	F7W	B	10	15/16	0.98	0.05	7,8,9,10	0
1	F7W	A	76	15/16	0.98	0.06	7,9,13,17	0
1	F7W	A	10	15/16	0.98	0.05	6,7,8,9	0
1	F7W	A	74	15/16	0.98	0.06	6,7,14,15	0
1	F7W	A	36	15/16	0.99	0.06	6,6,6,7	0
1	F7W	A	81	15/16	0.99	0.05	7,8,9,9	0
1	F7W	B	53	15/16	0.99	0.05	6,8,8,10	0
1	F7W	B	36	15/16	0.99	0.05	6,6,6,7	0
1	F7W	B	74	15/16	0.99	0.05	6,7,11,11	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
1	F7W	A	31	15/16	0.99	0.04	6,7,7,9	0
1	F7W	B	31	15/16	0.99	0.05	6,8,10,12	0
1	F7W	B	81	15/16	0.99	0.05	7,7,8,9	0
1	F7W	A	53	15/16	0.99	0.05	6,7,8,8	0

### 6.3 Carbohydrates

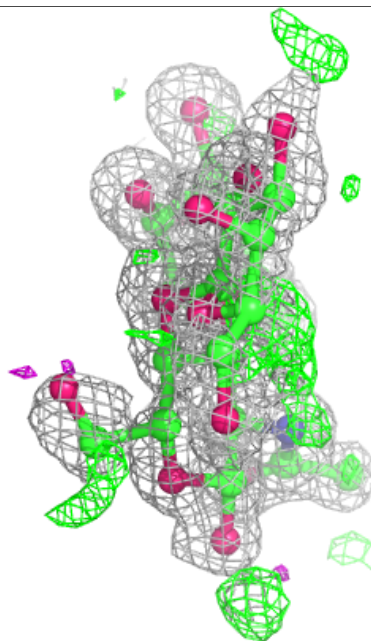
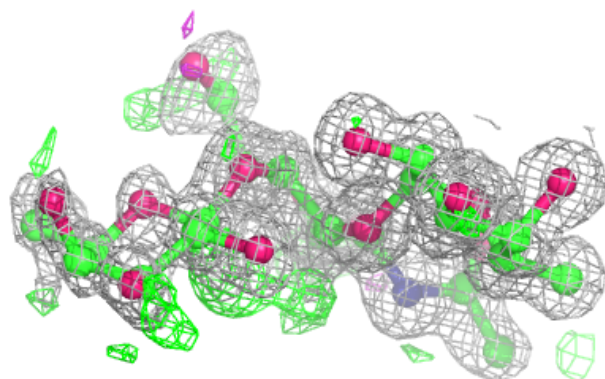
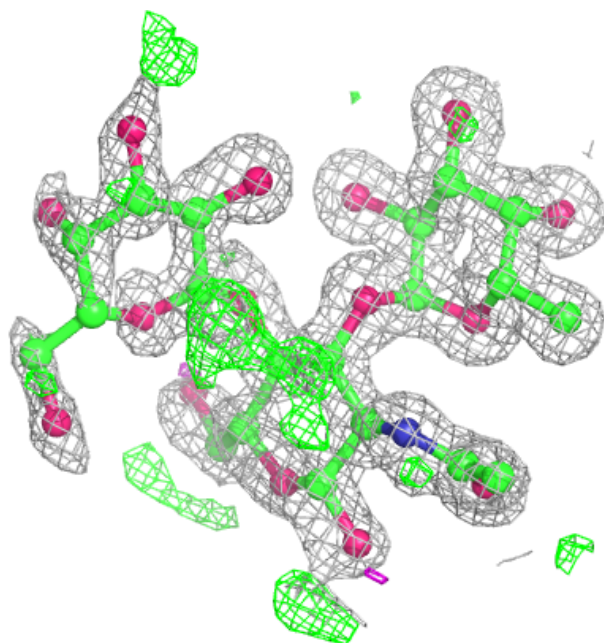
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
2	GAL	C	3	11/12	0.81	0.14	16,22,27,30	11
4	NAG	E	1	15/15	0.87	0.16	12,21,25,27	1
5	GAL	F	1	12/12	0.90	0.13	12,15,21,27	12
3	GLA	D	1[A]	12/12	0.94	0.14	10,18,23,24	12
3	GLA	D	1[B]	12/12	0.94	0.14	11,19,23,25	12
2	NAG	C	1	15/15	0.95	0.09	9,15,22,27	13
5	NAG	F	2[B]	14/15	0.96	0.12	7,11,12,16	3
5	NAG	F	2[A]	14/15	0.96	0.12	7,11,14,16	3
5	GAL	F	4	11/12	0.96	0.11	9,12,14,15	0
3	NAG	D	2[A]	14/15	0.98	0.05	7,9,12,13	1
3	GAL	D	4[B]	11/12	0.98	0.09	9,9,12,14	3
3	NAG	D	2[B]	14/15	0.98	0.05	7,9,12,13	1
3	GAL	D	4[A]	11/12	0.98	0.09	9,9,12,14	3
3	FUC	D	3	10/11	0.99	0.05	6,6,7,7	0
5	FUC	F	3	10/11	0.99	0.06	7,7,7,8	0
4	FUC	E	2	10/11	0.99	0.05	9,9,10,11	0
2	FUC	C	2	10/11	0.99	0.06	8,8,9,9	0

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

**Electron density around Chain C:**

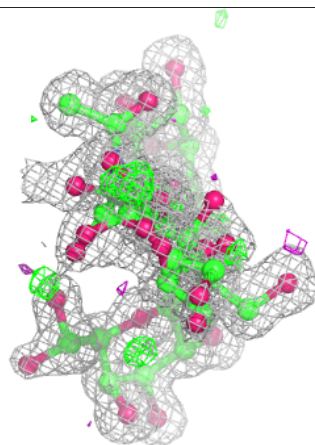
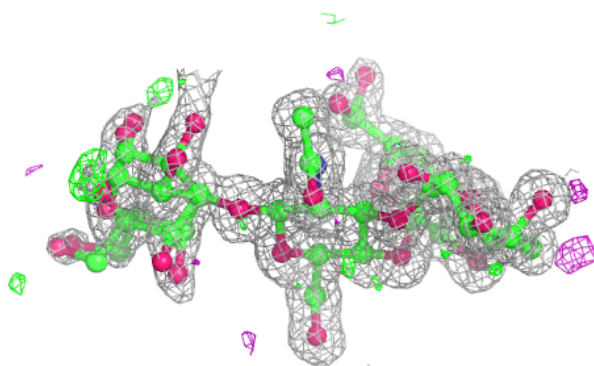
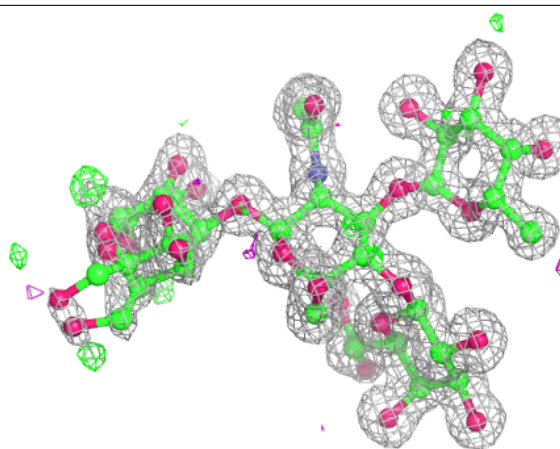
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





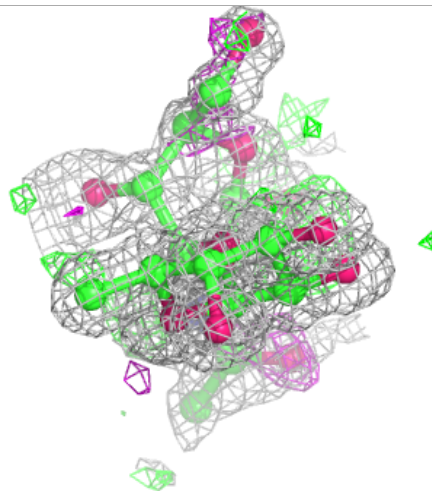
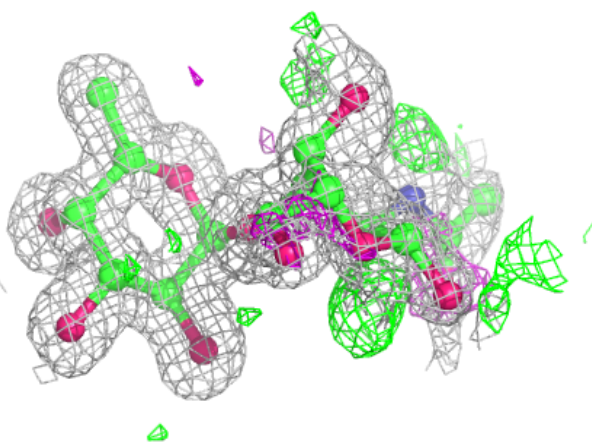
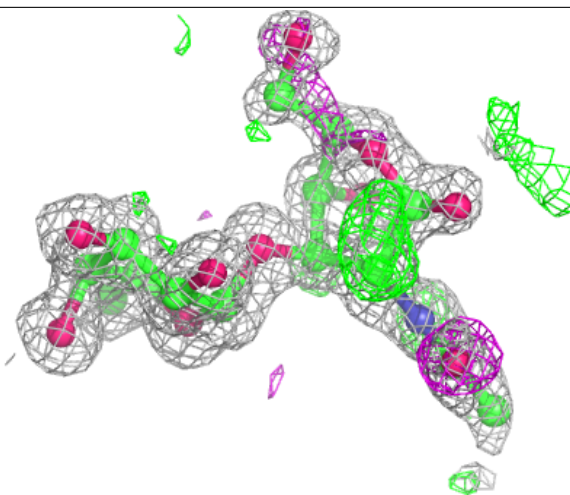
**Electron density around Chain D:**

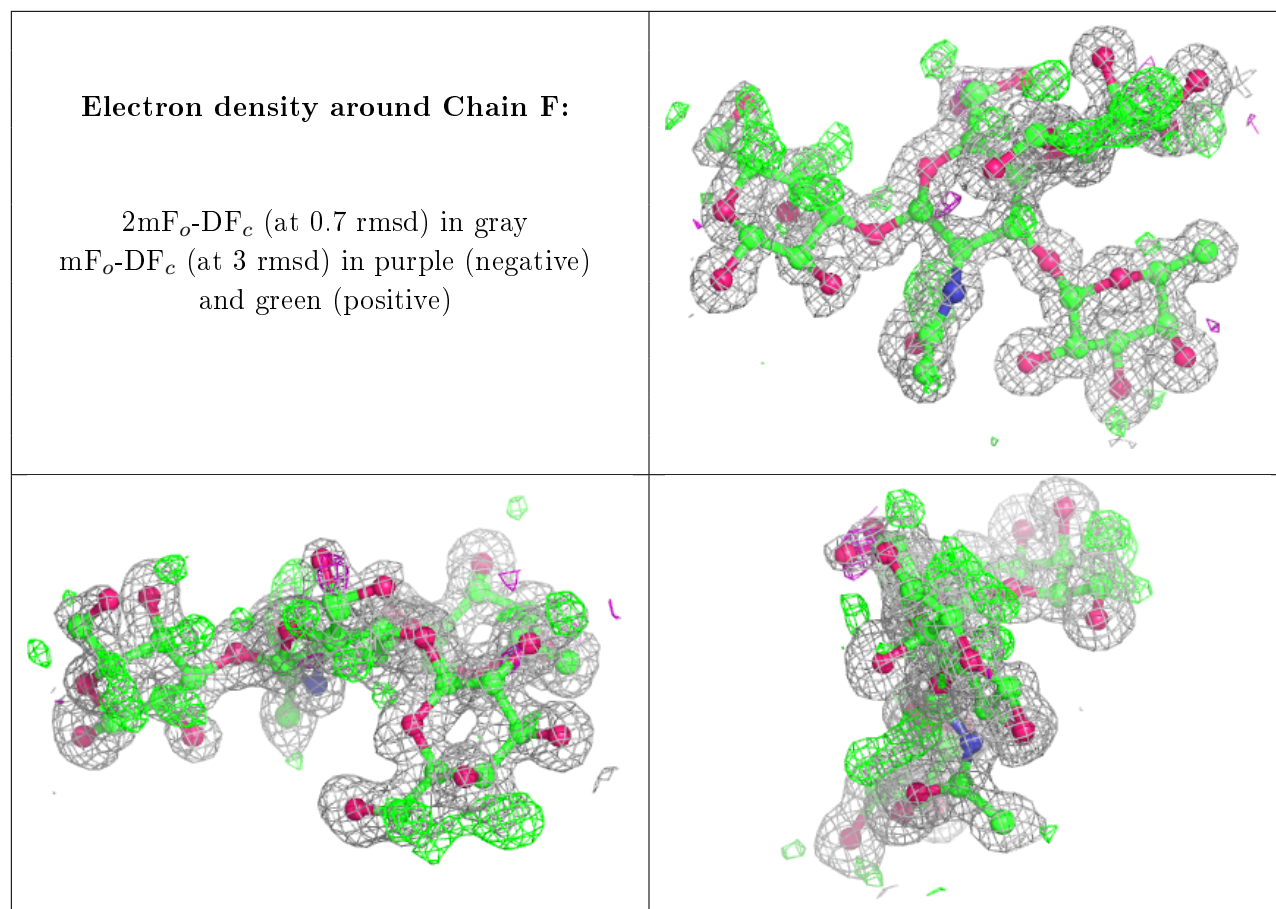
$2mF_o - DF_c$  (at 0.7 rmsd) in gray  
 $mF_o - DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around Chain E:**

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





## 6.4 Ligands ⓘ

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
6	MG	B	102	1/1	0.99	0.24	18,18,18,18	0
6	MG	A	101	1/1	1.00	0.27	17,17,17,17	0
7	CA	B	101	1/1	1.00	0.03	7,7,7,7	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.