



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 14, 2026 – 07:41 PM UTC

PDB ID : 6WJ1 / pdb_00006wj1
Title : Crystal structure of Fab 54-4H03 bound to H1 influenza hemagglutinin
Authors : Wu, N.C.; Wilson, I.A.
Deposited on : 2020-04-11
Resolution : 3.50 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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

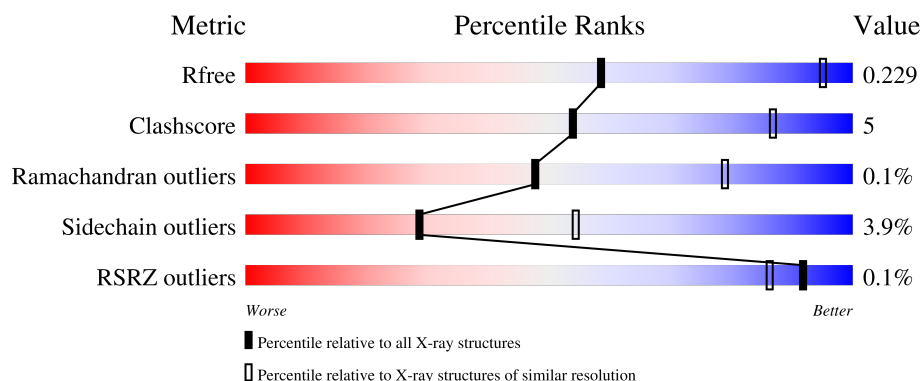
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.50 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.



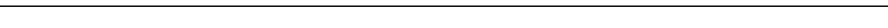
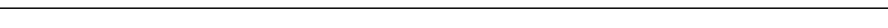
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1085 (3.54-3.46)
Clashscore	190562	1140 (3.54-3.46)
Ramachandran outliers	187476	1113 (3.54-3.46)
Sidechain outliers	187428	1114 (3.54-3.46)
RSRZ outliers	180081	1084 (3.54-3.46)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	330	
1	C	330	
1	E	330	
2	B	175	
2	D	175	

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Mol	Chain	Length	Quality of chain
2	F	175	 87% 10% .
3	G	230	 83% 14% ..
3	H	230	 78% 20% ..
3	J	230	 74% 22% . .
4	I	216	 84% 15%
4	K	216	 84% 14% .
4	L	216	 84% 13% .
5	M	2	 100%
5	O	2	 100%
5	T	2	 100%
6	N	5	 60% 40%
7	P	4	 25% 75%
8	Q	2	 100%
9	R	4	 50% 50%
10	S	3	 100%

2 Entry composition

There are 11 unique types of molecules in this entry. The entry contains 22401 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 Hemagglutinin HA1 chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	324	Total	C	N	O	S	0	0	0
			2529	1599	436	483	11			
1	C	324	Total	C	N	O	S	0	0	0
			2530	1601	436	482	11			
1	E	326	Total	C	N	O	S	0	0	0
			2544	1608	438	487	11			

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	8	ASP	-	expression tag	UNP A0A3S7XTA4
A	9	PRO	-	expression tag	UNP A0A3S7XTA4
A	10	GLY	-	expression tag	UNP A0A3S7XTA4
C	8	ASP	-	expression tag	UNP A0A3S7XTA4
C	9	PRO	-	expression tag	UNP A0A3S7XTA4
C	10	GLY	-	expression tag	UNP A0A3S7XTA4
E	8	ASP	-	expression tag	UNP A0A3S7XTA4
E	9	PRO	-	expression tag	UNP A0A3S7XTA4
E	10	GLY	-	expression tag	UNP A0A3S7XTA4

- Molecule 2 is a protein called Hemagglutinin HA2 chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	175	Total	C	N	O	S	0	0	0
			1406	881	238	281	6			
2	D	171	Total	C	N	O	S	0	0	0
			1375	863	234	272	6			
2	F	171	Total	C	N	O	S	0	0	0
			1375	863	234	272	6			

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	47	GLY	GLU	conflict	UNP A0A3S5H8L7
B	77	ILE	VAL	conflict	UNP A0A3S5H8L7
B	175	SER	GLY	conflict	UNP A0A3S5H8L7
D	47	GLY	GLU	conflict	UNP A0A3S5H8L7
D	77	ILE	VAL	conflict	UNP A0A3S5H8L7
D	175	SER	GLY	conflict	UNP A0A3S5H8L7
F	47	GLY	GLU	conflict	UNP A0A3S5H8L7
F	77	ILE	VAL	conflict	UNP A0A3S5H8L7
F	175	SER	GLY	conflict	UNP A0A3S5H8L7

- Molecule 3 is a protein called Fab 54-4H03 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	228	Total	C	N	O	S	0	1	0
			1746	1106	296	339	5			
3	J	228	Total	C	N	O	S	0	1	0
			1746	1106	296	339	5			
3	G	228	Total	C	N	O	S	0	1	0
			1746	1106	296	339	5			

- Molecule 4 is a protein called Fab 54-4H03 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	L	215	Total	C	N	O	S	0	0	0
			1652	1033	275	339	5			
4	K	215	Total	C	N	O	S	0	0	0
			1652	1033	275	339	5			
4	I	215	Total	C	N	O	S	0	0	0
			1652	1033	275	339	5			

- Molecule 5 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



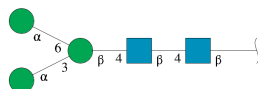
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	M	2	Total	C	N	O	0	0	0
			28	16	2	10			
5	O	2	Total	C	N	O	0	0	0
			28	16	2	10			

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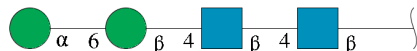
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	T	2	Total	C	N	O	0	0	0
			28	16	2	10			

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



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

- Molecule 7 is an oligosaccharide called alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



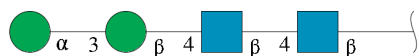
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
7	P	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 8 is an oligosaccharide called alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose.



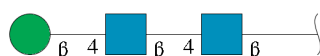
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
8	Q	2	Total	C	N	O	0	0	0
			24	14	1	9			

- Molecule 9 is an oligosaccharide called 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.



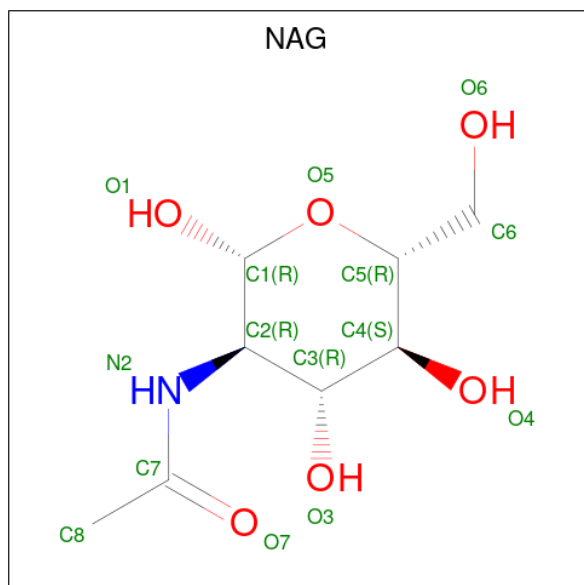
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
9	R	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 10 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
10	S	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 11 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

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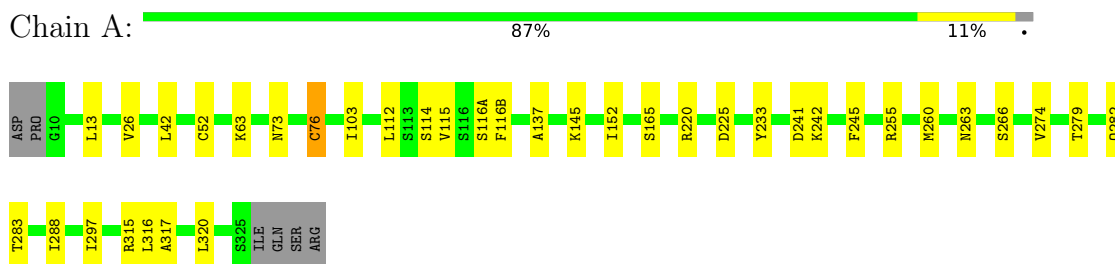
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
11	C	1	Total	C	N	O	0	0
			14	8	1	5		
11	C	1	Total	C	N	O	0	0
			14	8	1	5		
11	C	1	Total	C	N	O	0	0
			14	8	1	5		
11	E	1	Total	C	N	O	0	0
			14	8	1	5		
11	E	1	Total	C	N	O	0	0
			14	8	1	5		
11	E	1	Total	C	N	O	0	0
			14	8	1	5		
11	B	1	Total	C	N	O	0	0
			14	8	1	5		
11	D	1	Total	C	N	O	0	0
			14	8	1	5		

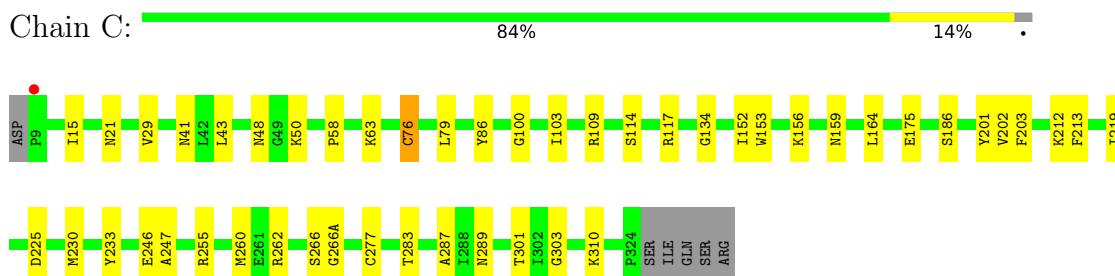
3 Residue-property plots

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.

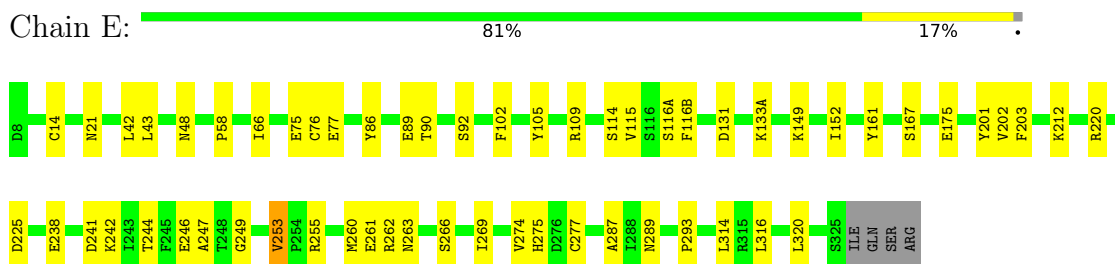
- Molecule 1: Hemagglutinin HA1 chain



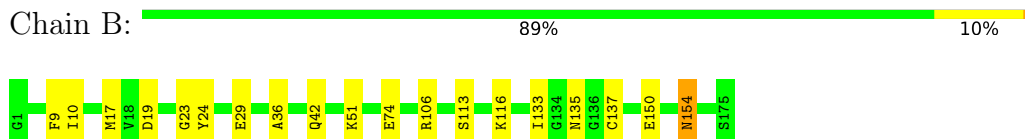
- Molecule 1: Hemagglutinin HA1 chain



- Molecule 1: Hemagglutinin HA1 chain



- Molecule 2: Hemagglutinin HA2 chain



- Molecule 2: Hemagglutinin HA2 chain

Chain D:  89% 9% ..



- Molecule 2: Hemagglutinin HA2 chain

Chain F:  87% 10% .



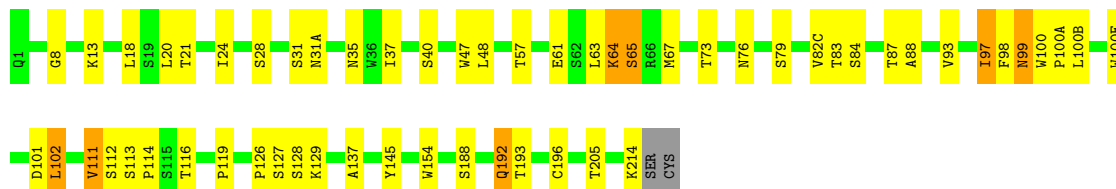
- Molecule 3: Fab 54-4H03 heavy chain

Chain H:  78% 20% ..



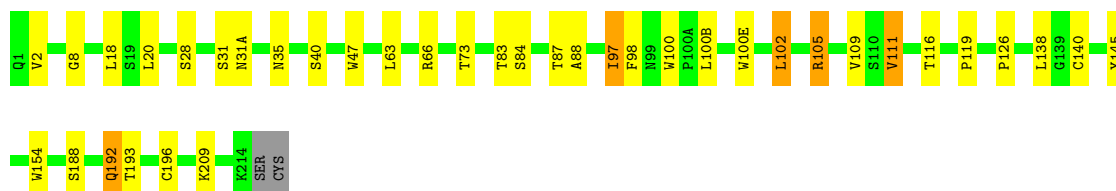
- Molecule 3: Fab 54-4H03 heavy chain

Chain J:  74% 22% ..



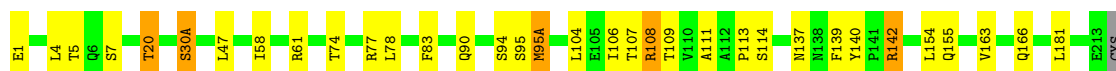
- Molecule 3: Fab 54-4H03 heavy chain

Chain G:  83% 14% ..



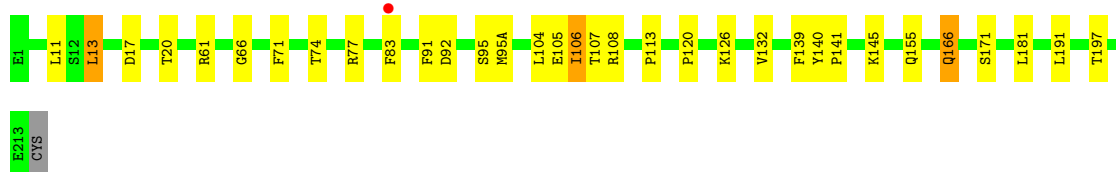
- Molecule 4: Fab 54-4H03 light chain

Chain L:  84% 13% .



- Molecule 4: Fab 54-4H03 light chain

Chain K: 84% 14%



- Molecule 4: Fab 54-4H03 light chain

Chain I: 84% 15%



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain M: 100%



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain O: 100%



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain T: 100%



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

Chain N: 60% 40%



- Molecule 7: alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain P:



- Molecule 8: alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain Q:



- 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 R:



- Molecule 10: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain S:



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	231.54Å 259.21Å 165.11Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.22 – 3.50 47.22 – 3.50	Depositor EDS
% Data completeness (in resolution range)	99.6 (47.22-3.50) 99.6 (47.22-3.50)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.54 (at 3.48Å)	Xtriage
Refinement program	PHENIX 1.16_3549	Depositor
R, R_{free}	0.179 , 0.232 0.179 , 0.229	Depositor DCC
R_{free} test set	3153 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	99.2	Xtriage
Anisotropy	0.550	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 78.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.27$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	22401	wwPDB-VP
Average B, all atoms (Å ²)	124.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.02% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

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

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	0.11	0/2593	0.28	0/3524
1	C	0.11	0/2595	0.29	0/3527
1	E	0.11	0/2609	0.29	0/3547
2	B	0.10	0/1434	0.28	0/1932
2	D	0.12	0/1403	0.29	0/1890
2	F	0.12	0/1403	0.29	0/1890
3	G	0.13	0/1794	0.35	0/2450
3	H	0.14	0/1794	0.37	0/2450
3	J	0.15	0/1794	0.38	0/2450
4	I	0.10	0/1687	0.31	0/2292
4	K	0.13	0/1687	0.35	0/2292
4	L	0.14	0/1687	0.36	0/2292
All	All	0.12	0/22480	0.32	0/30536

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
4	I	0	1
4	K	0	1
4	L	0	1
All	All	0	3

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	I	95	SER	Peptide
4	K	95	SER	Peptide
4	L	95(A)	MET	Peptide

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2529	0	2474	19	0
1	C	2530	0	2475	27	0
1	E	2544	0	2485	33	0
2	B	1406	0	1325	12	0
2	D	1375	0	1299	14	0
2	F	1375	0	1299	10	0
3	G	1746	0	1714	21	0
3	H	1746	0	1714	26	0
3	J	1746	0	1714	34	0
4	I	1652	0	1595	14	0
4	K	1652	0	1595	15	0
4	L	1652	0	1595	14	0
5	M	28	0	25	0	0
5	O	28	0	25	0	0
5	T	28	0	25	0	0
6	N	61	0	52	0	0
7	P	50	0	41	1	0
8	Q	24	0	22	0	0
9	R	50	0	43	1	0
10	S	39	0	34	0	0
11	A	28	0	26	0	0
11	B	14	0	13	0	0
11	C	42	0	39	1	0
11	D	14	0	13	0	0
11	E	42	0	39	0	0
All	All	22401	0	21681	217	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 5.

The worst 5 of 217 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)
3:H:100:TRP:HA	3:H:100(B):LEU:H	1.47	0.79
4:I:107:THR:HG22	4:I:171:SER:HB3	1.72	0.72
3:G:119:PRO:HB3	3:G:145:TYR:HB3	1.72	0.71
1:C:310:LYS:HG2	2:D:89:LEU:HD11	1.73	0.70
3:J:63:LEU:HD12	3:J:67:MET:HE2	1.74	0.69

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	322/330 (98%)	317 (98%)	5 (2%)	0	100	100
1	C	322/330 (98%)	318 (99%)	4 (1%)	0	100	100
1	E	324/330 (98%)	316 (98%)	8 (2%)	0	100	100
2	B	173/175 (99%)	165 (95%)	8 (5%)	0	100	100
2	D	169/175 (97%)	164 (97%)	5 (3%)	0	100	100
2	F	169/175 (97%)	167 (99%)	2 (1%)	0	100	100
3	G	227/230 (99%)	215 (95%)	12 (5%)	0	100	100
3	H	227/230 (99%)	215 (95%)	10 (4%)	2 (1%)	14	47
3	J	227/230 (99%)	205 (90%)	21 (9%)	1 (0%)	30	62
4	I	213/216 (99%)	202 (95%)	11 (5%)	0	100	100
4	K	213/216 (99%)	201 (94%)	12 (6%)	0	100	100
4	L	213/216 (99%)	203 (95%)	9 (4%)	1 (0%)	24	57
All	All	2799/2853 (98%)	2688 (96%)	107 (4%)	4 (0%)	48	79

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	H	100(A)	PRO
4	L	95(A)	MET
3	H	53	SER
3	J	64	LYS

5.3.2 Protein sidechains ⓘ

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	284/290 (98%)	279 (98%)	5 (2%)	51	69
1	C	284/290 (98%)	277 (98%)	7 (2%)	42	63
1	E	286/290 (99%)	277 (97%)	9 (3%)	35	59
2	B	150/150 (100%)	146 (97%)	4 (3%)	39	62
2	D	146/150 (97%)	144 (99%)	2 (1%)	59	71
2	F	146/150 (97%)	141 (97%)	5 (3%)	32	57
3	G	202/203 (100%)	192 (95%)	10 (5%)	22	48
3	H	202/203 (100%)	189 (94%)	13 (6%)	16	42
3	J	202/203 (100%)	190 (94%)	12 (6%)	18	44
4	I	187/188 (100%)	179 (96%)	8 (4%)	26	51
4	K	187/188 (100%)	178 (95%)	9 (5%)	23	49
4	L	187/188 (100%)	175 (94%)	12 (6%)	16	42
All	All	2463/2493 (99%)	2367 (96%)	96 (4%)	28	54

5 of 96 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	J	13	LYS
4	K	106	ILE
3	J	65	SER
3	J	111	VAL
4	K	166	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 19

such sidechains are listed below:

Mol	Chain	Res	Type
4	L	155	GLN
3	G	6	GLN
4	I	155	GLN
4	K	155	GLN
2	D	129	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

24 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	$\# Z > 2$
5	NAG	M	1	1,5	14,14,15	0.28	0	17,19,21	0.38	0
5	NAG	M	2	5	14,14,15	0.25	0	17,19,21	0.56	0
6	NAG	N	1	1,6	14,14,15	0.24	0	17,19,21	0.54	0
6	NAG	N	2	6	14,14,15	0.18	0	17,19,21	0.45	0
6	BMA	N	3	6	11,11,12	0.63	0	15,15,17	0.73	0
6	MAN	N	4	6	11,11,12	0.74	0	15,15,17	1.01	2 (13%)
6	MAN	N	5	6	11,11,12	0.74	0	15,15,17	1.04	1 (6%)
5	NAG	O	1	1,5	14,14,15	0.20	0	17,19,21	0.59	0
5	NAG	O	2	5	14,14,15	0.27	0	17,19,21	0.42	0
7	NAG	P	1	1,7	14,14,15	0.33	0	17,19,21	0.52	0
7	NAG	P	2	7	14,14,15	0.24	0	17,19,21	0.43	0
7	BMA	P	3	7	11,11,12	0.61	0	15,15,17	0.74	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	MAN	P	4	7	11,11,12	0.67	0	15,15,17	0.99	2 (13%)
8	NAG	Q	1	1,8	14,14,15	0.36	0	17,19,21	0.42	0
8	FUC	Q	2	8	10,10,11	0.80	0	14,14,16	0.73	0
9	NAG	R	1	1,9	14,14,15	0.23	0	17,19,21	0.56	0
9	NAG	R	2	9	14,14,15	0.24	0	17,19,21	0.42	0
9	BMA	R	3	9	11,11,12	0.65	0	15,15,17	0.69	0
9	MAN	R	4	9	11,11,12	0.88	1 (9%)	15,15,17	1.32	2 (13%)
10	NAG	S	1	1,10	14,14,15	0.42	0	17,19,21	0.54	0
10	NAG	S	2	10	14,14,15	0.30	0	17,19,21	0.40	0
10	BMA	S	3	10	11,11,12	0.62	0	15,15,17	0.80	0
5	NAG	T	1	5,2	14,14,15	0.35	0	17,19,21	0.46	0
5	NAG	T	2	5	14,14,15	0.31	0	17,19,21	0.61	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
5	NAG	M	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	M	2	5	-	3/6/23/26	0/1/1/1
6	NAG	N	1	1,6	-	2/6/23/26	0/1/1/1
6	NAG	N	2	6	-	2/6/23/26	0/1/1/1
6	BMA	N	3	6	-	0/2/19/22	0/1/1/1
6	MAN	N	4	6	-	2/2/19/22	0/1/1/1
6	MAN	N	5	6	-	2/2/19/22	0/1/1/1
5	NAG	O	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	O	2	5	-	2/6/23/26	0/1/1/1
7	NAG	P	1	1,7	-	2/6/23/26	0/1/1/1
7	NAG	P	2	7	-	2/6/23/26	0/1/1/1
7	BMA	P	3	7	-	0/2/19/22	0/1/1/1
7	MAN	P	4	7	-	0/2/19/22	0/1/1/1
8	NAG	Q	1	1,8	-	0/6/23/26	0/1/1/1
8	FUC	Q	2	8	-	-	0/1/1/1
9	NAG	R	1	1,9	-	2/6/23/26	0/1/1/1
9	NAG	R	2	9	-	2/6/23/26	0/1/1/1
9	BMA	R	3	9	-	0/2/19/22	0/1/1/1
9	MAN	R	4	9	-	0/2/19/22	1/1/1/1
10	NAG	S	1	1,10	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	NAG	S	2	10	-	2/6/23/26	0/1/1/1
10	BMA	S	3	10	-	0/2/19/22	0/1/1/1
5	NAG	T	1	5,2	-	2/6/23/26	0/1/1/1
5	NAG	T	2	5	-	2/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	R	4	MAN	O5-C5	2.01	1.47	1.43

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	R	4	MAN	C1-O5-C5	4.00	117.55	112.19
7	P	4	MAN	C1-O5-C5	2.50	115.53	112.19
6	N	5	MAN	C1-O5-C5	2.32	115.30	112.19
7	P	4	MAN	O2-C2-C3	-2.25	105.50	110.15
6	N	4	MAN	C1-O5-C5	2.16	115.08	112.19

There are no chirality outliers.

5 of 33 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	P	2	NAG	O5-C5-C6-O6
7	P	2	NAG	C4-C5-C6-O6
9	R	2	NAG	O5-C5-C6-O6
6	N	2	NAG	O5-C5-C6-O6
6	N	4	MAN	O5-C5-C6-O6

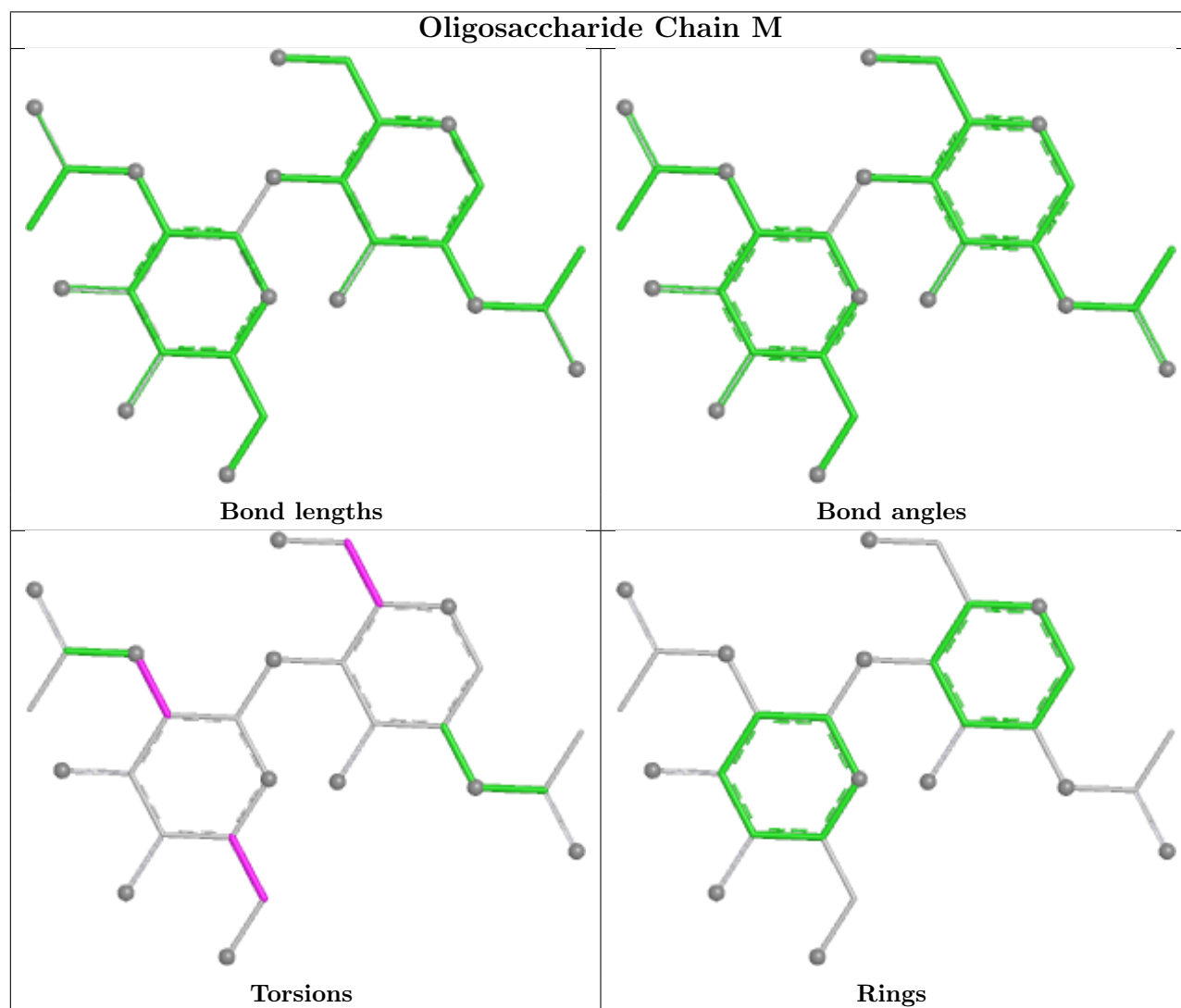
All (1) ring outliers are listed below:

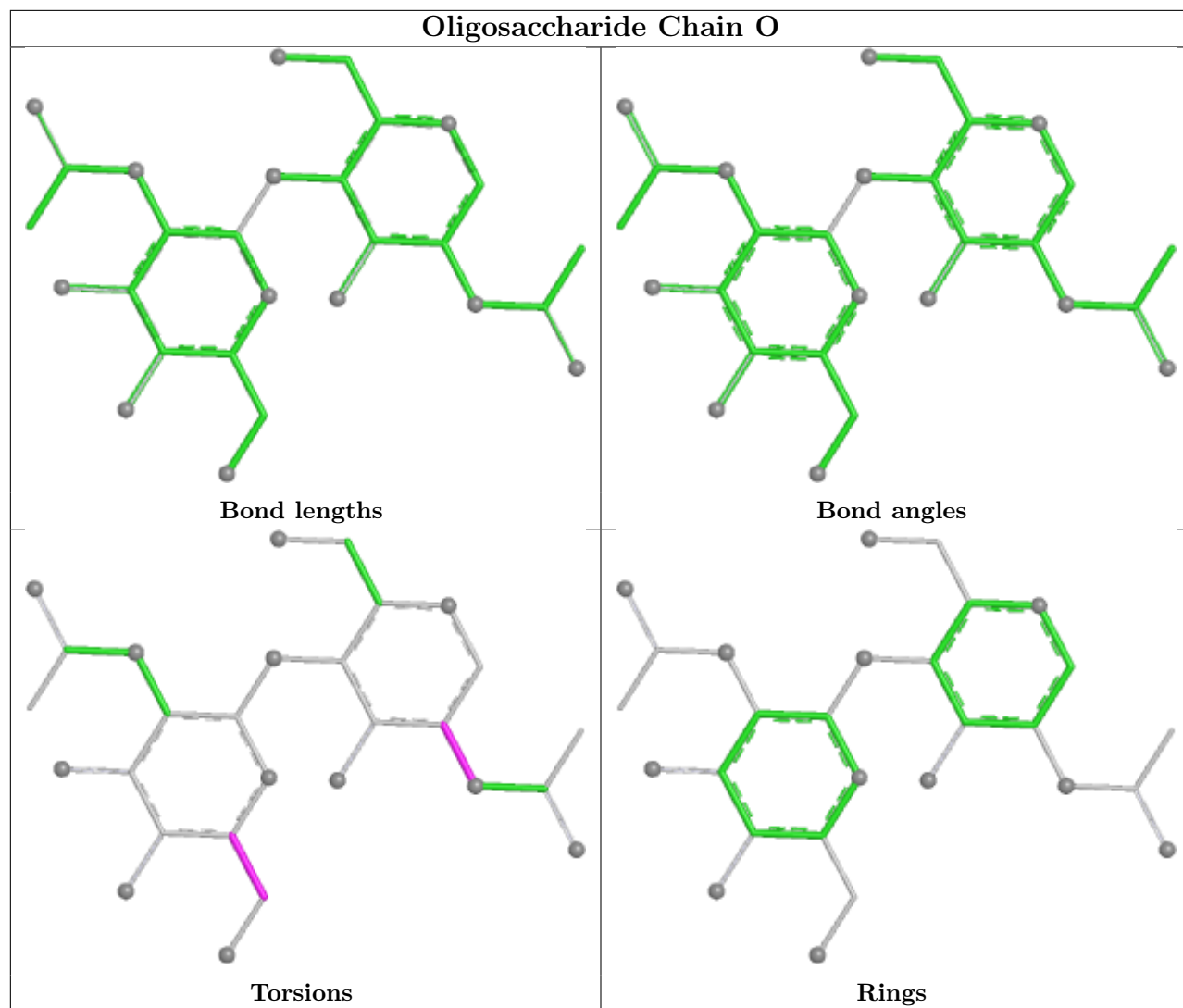
Mol	Chain	Res	Type	Atoms
9	R	4	MAN	C1-C2-C3-C4-C5-O5

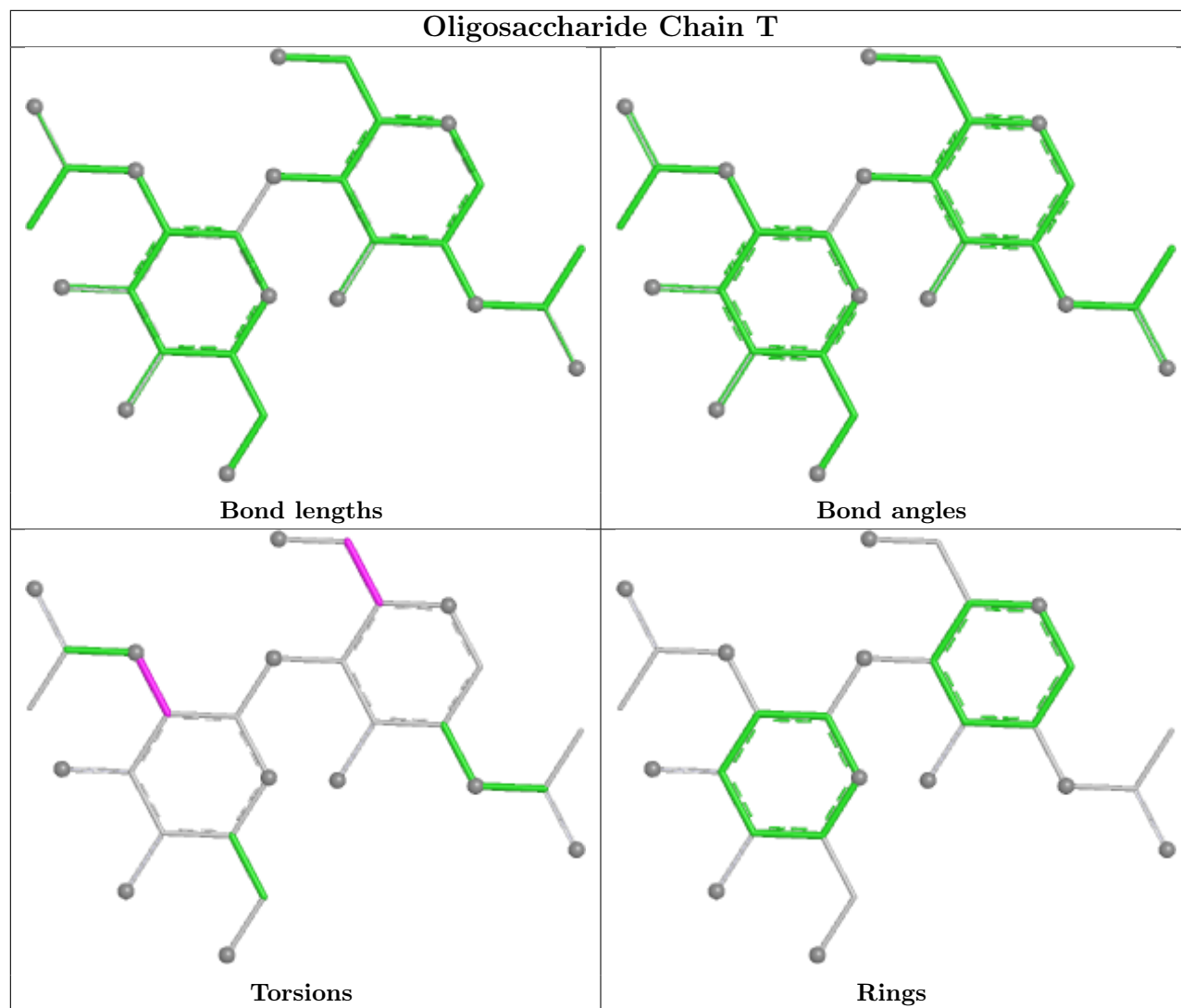
3 monomers are involved in 2 short contacts:

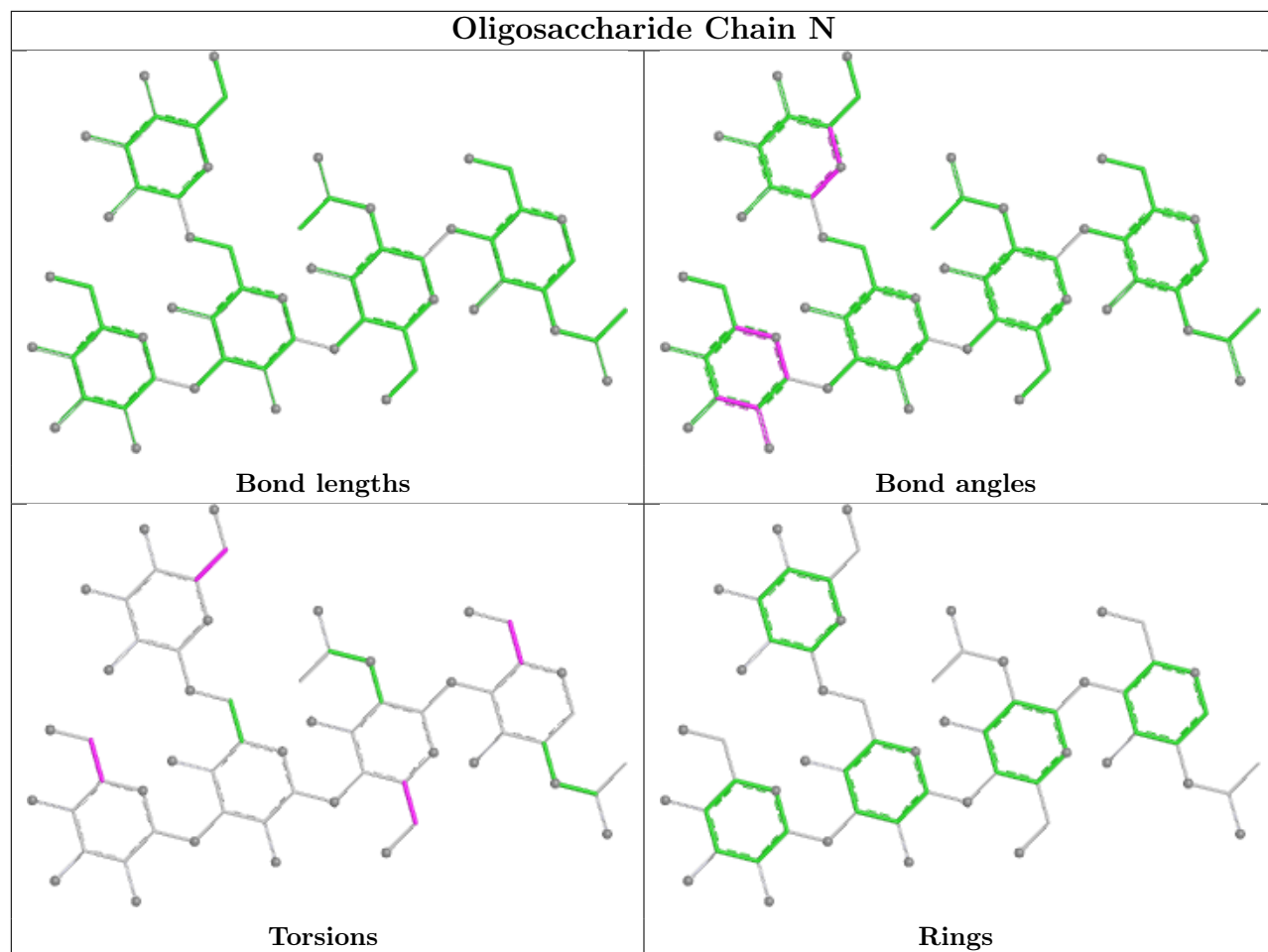
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	P	2	NAG	1	0
7	P	3	BMA	1	0
9	R	1	NAG	1	0

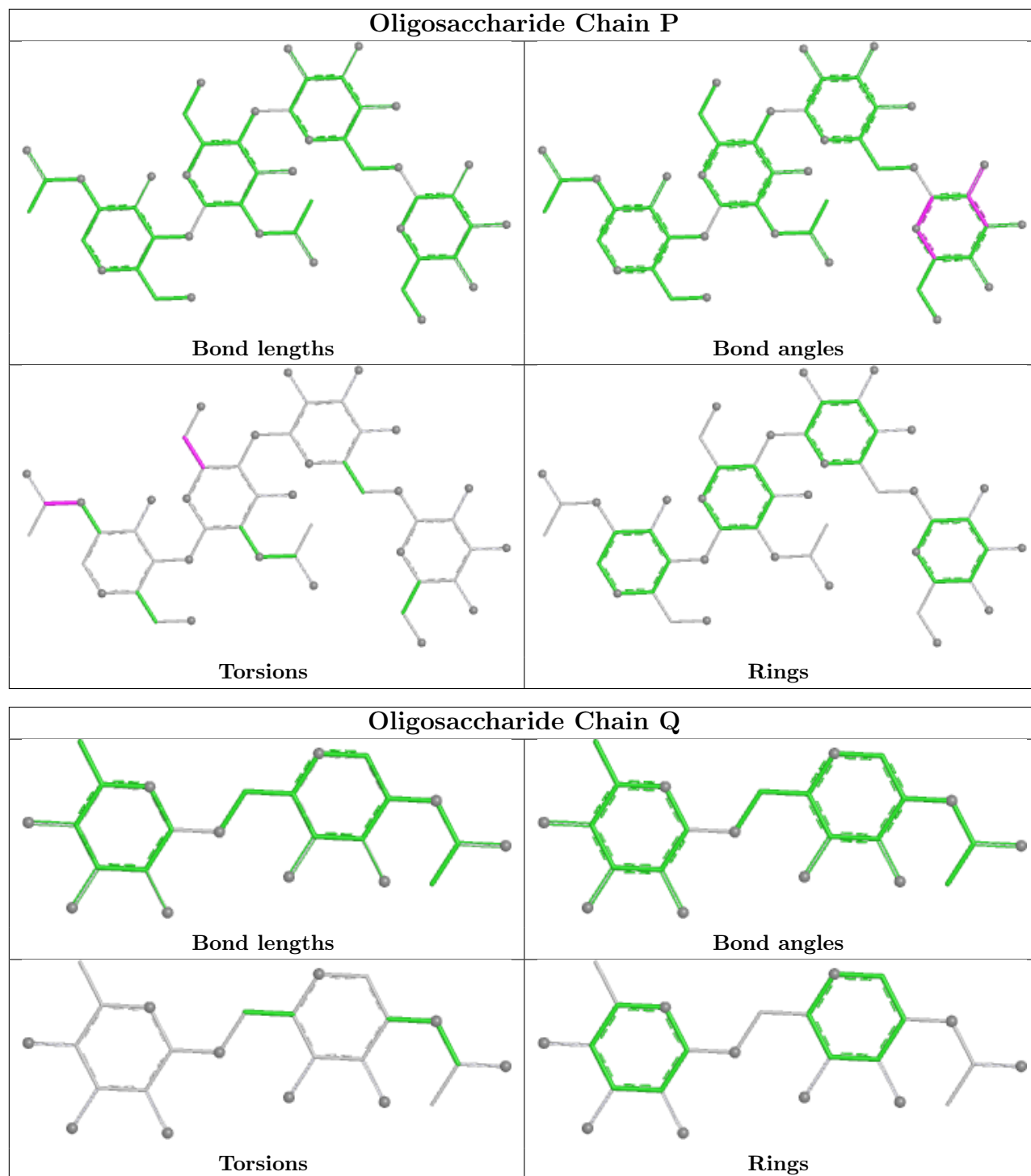
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

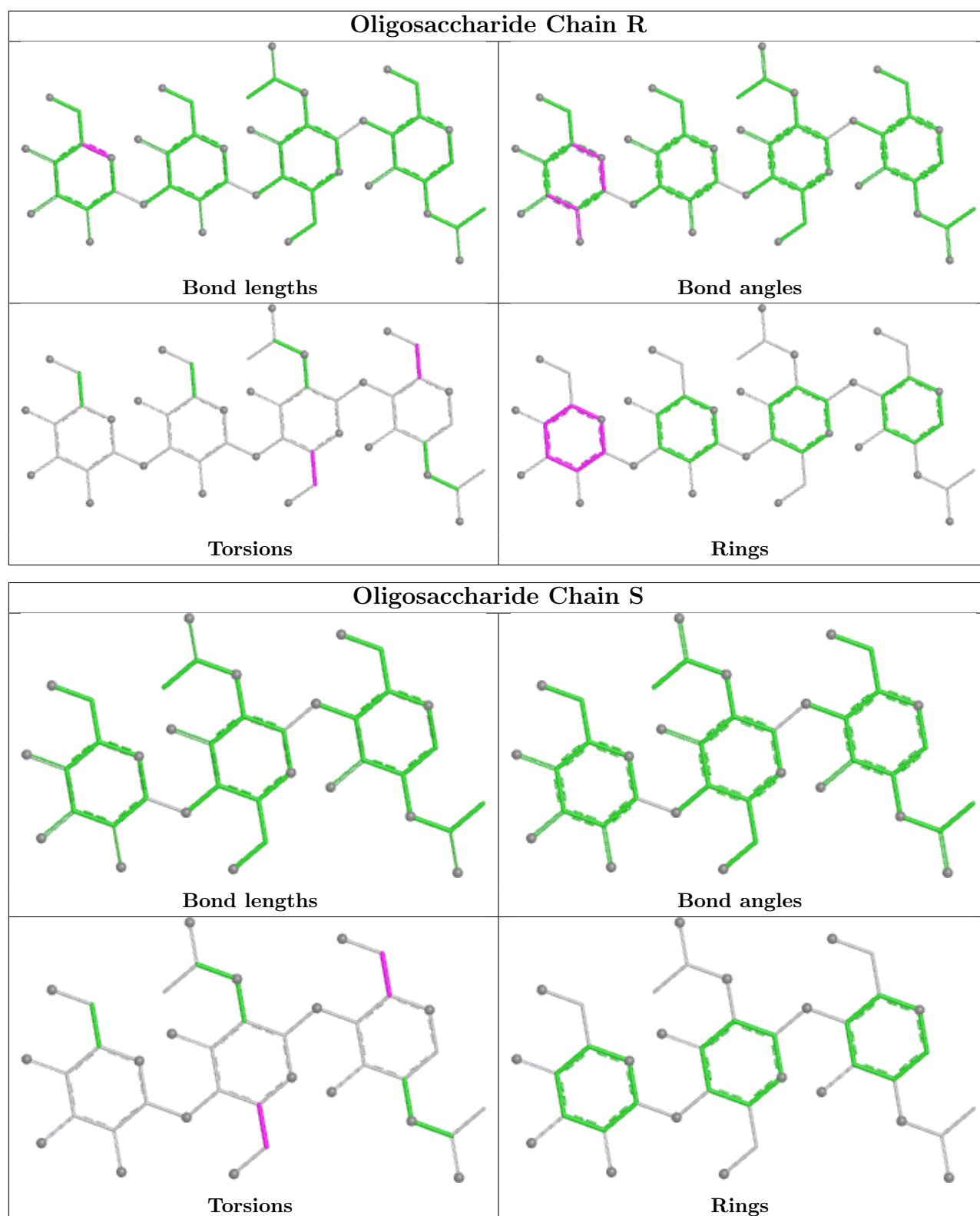












5.6 Ligand geometry [i](#)

10 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
11	NAG	D	201	2	14,14,15	0.33	0	17,19,21	0.62	0
11	NAG	A	411	1	14,14,15	0.39	0	17,19,21	0.45	0
11	NAG	E	409	1	14,14,15	0.40	0	17,19,21	0.57	0
11	NAG	E	410	1	14,14,15	0.47	0	17,19,21	0.44	0
11	NAG	A	410	1	14,14,15	0.42	0	17,19,21	0.54	0
11	NAG	E	401	1	14,14,15	0.36	0	17,19,21	0.41	0
11	NAG	C	401	1	14,14,15	0.65	1 (7%)	17,19,21	0.64	0
11	NAG	B	201	2	14,14,15	0.33	0	17,19,21	0.57	0
11	NAG	C	409	1	14,14,15	0.39	0	17,19,21	0.60	0
11	NAG	C	408	1	14,14,15	0.42	0	17,19,21	0.55	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
11	NAG	D	201	2	-	3/6/23/26	0/1/1/1
11	NAG	A	411	1	-	2/6/23/26	0/1/1/1
11	NAG	E	409	1	-	1/6/23/26	0/1/1/1
11	NAG	E	410	1	-	0/6/23/26	0/1/1/1
11	NAG	A	410	1	-	1/6/23/26	0/1/1/1
11	NAG	E	401	1	-	2/6/23/26	0/1/1/1
11	NAG	C	401	1	-	3/6/23/26	0/1/1/1
11	NAG	B	201	2	-	2/6/23/26	0/1/1/1
11	NAG	C	409	1	-	2/6/23/26	0/1/1/1
11	NAG	C	408	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)
11	C	401	NAG	C1-C2	2.19	1.55	1.52

There are no bond angle outliers.

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
11	C	409	NAG	O5-C5-C6-O6
11	C	401	NAG	O5-C5-C6-O6
11	E	401	NAG	O5-C5-C6-O6
11	A	410	NAG	O5-C5-C6-O6
11	E	409	NAG	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
11	C	401	NAG	1	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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	324/330 (98%)	-0.62	0 100 100	77, 124, 180, 202	0
1	C	324/330 (98%)	-0.62	1 (0%) 90 76	69, 113, 159, 232	0
1	E	326/330 (98%)	-0.60	0 100 100	60, 132, 188, 217	0
2	B	175/175 (100%)	-0.64	0 100 100	62, 106, 170, 211	0
2	D	171/175 (97%)	-0.64	0 100 100	52, 93, 148, 185	0
2	F	171/175 (97%)	-0.64	0 100 100	60, 93, 145, 179	0
3	G	228/230 (99%)	-0.26	0 100 100	114, 202, 279, 386	1 (0%)
3	H	228/230 (99%)	-0.62	0 100 100	51, 98, 165, 255	1 (0%)
3	J	228/230 (99%)	-0.57	0 100 100	52, 103, 185, 254	1 (0%)
4	I	215/216 (99%)	-0.42	0 100 100	108, 195, 263, 299	0
4	K	215/216 (99%)	-0.75	1 (0%) 87 68	55, 89, 132, 179	0
4	L	215/216 (99%)	-0.71	0 100 100	55, 78, 120, 160	0
All	All	2820/2853 (98%)	-0.59	2 (0%) 92 86	51, 114, 228, 386	3 (0%)

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	K	83	PHE	2.7
1	C	9	PRO	2.5

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

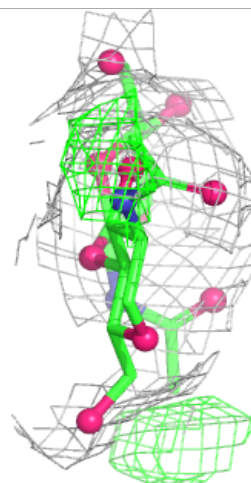
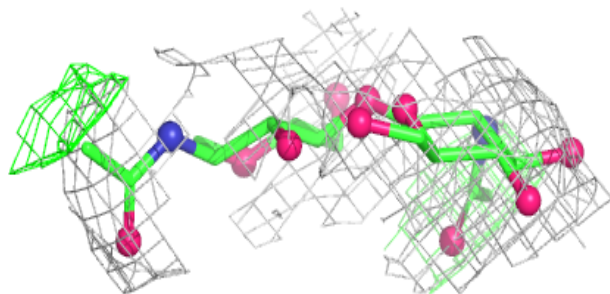
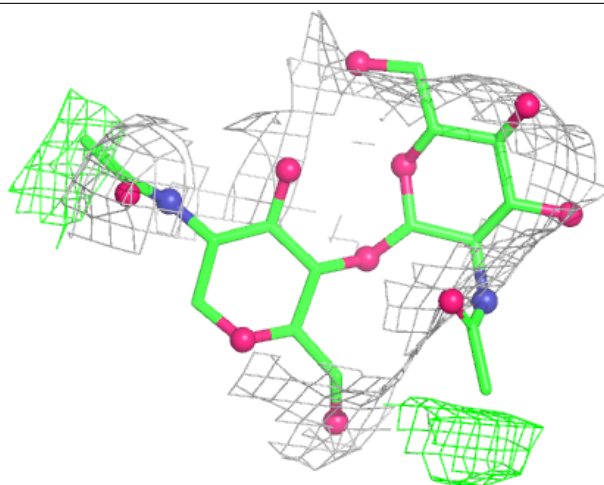
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	NAG	T	2	14/15	0.21	0.12	140,177,191,196	0
6	MAN	N	5	11/12	0.38	0.09	207,218,220,222	0
7	BMA	P	3	11/12	0.38	0.10	156,166,172,176	0
5	NAG	M	2	14/15	0.44	0.09	175,195,216,219	0
5	NAG	O	2	14/15	0.47	0.09	171,200,203,204	0
6	BMA	N	3	11/12	0.52	0.08	171,189,206,215	0
6	MAN	N	4	11/12	0.53	0.08	180,186,188,189	0
5	NAG	T	1	14/15	0.55	0.13	129,163,171,180	0
7	MAN	P	4	11/12	0.55	0.09	172,179,190,190	0
9	MAN	R	4	11/12	0.61	0.06	195,199,205,207	0
9	BMA	R	3	11/12	0.62	0.07	185,193,199,204	0
10	BMA	S	3	11/12	0.63	0.08	204,216,221,222	0
10	NAG	S	2	14/15	0.67	0.09	181,197,213,221	0
8	FUC	Q	2	10/11	0.70	0.10	186,198,201,203	0
10	NAG	S	1	14/15	0.70	0.07	128,144,168,182	0
5	NAG	O	1	14/15	0.72	0.07	156,174,189,202	0
5	NAG	M	1	14/15	0.74	0.10	139,160,173,187	0
9	NAG	R	2	14/15	0.80	0.09	153,171,181,187	0
6	NAG	N	2	14/15	0.80	0.08	163,164,168,175	0
8	NAG	Q	1	14/15	0.86	0.07	143,162,179,185	0
9	NAG	R	1	14/15	0.88	0.06	106,120,132,141	0
6	NAG	N	1	14/15	0.89	0.07	141,158,165,171	0
7	NAG	P	2	14/15	0.91	0.06	112,121,133,141	0
7	NAG	P	1	14/15	0.95	0.06	69,88,106,110	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.

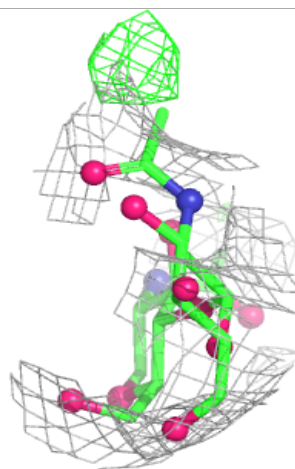
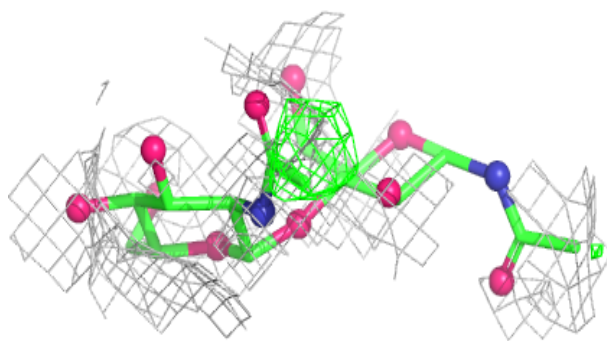
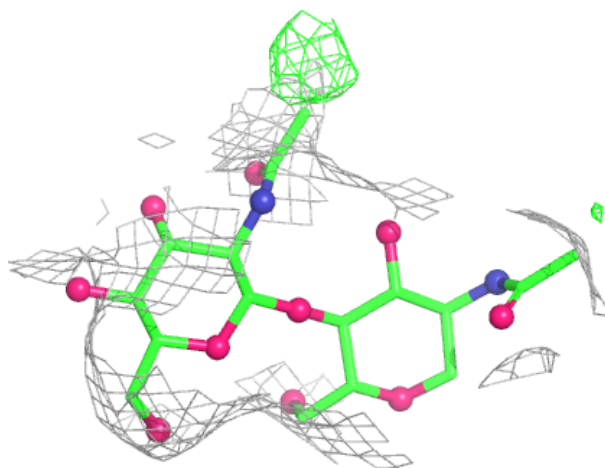
Electron density around Chain M:

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



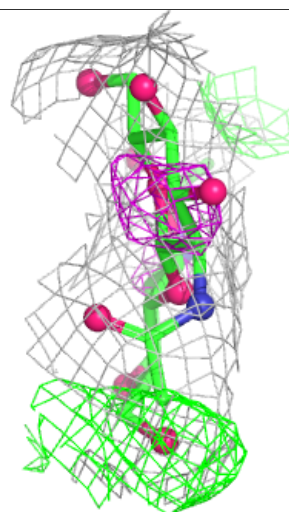
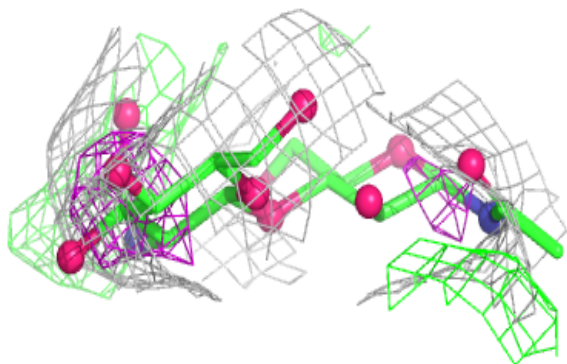
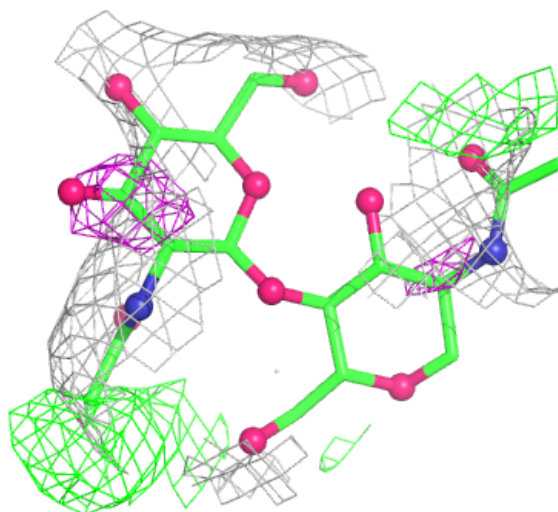
Electron density around Chain O:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



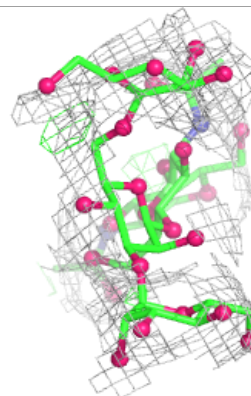
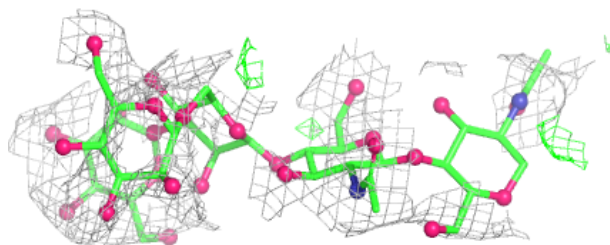
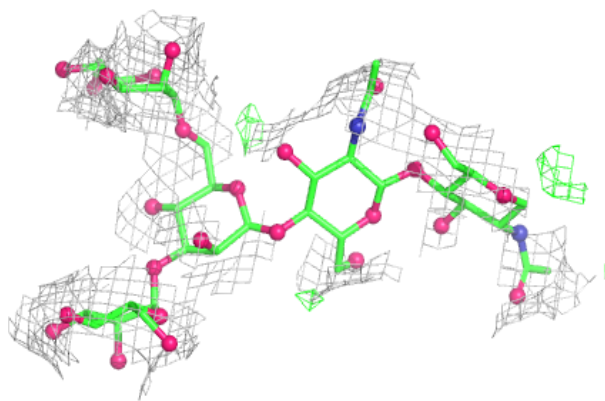
Electron density around Chain T:

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

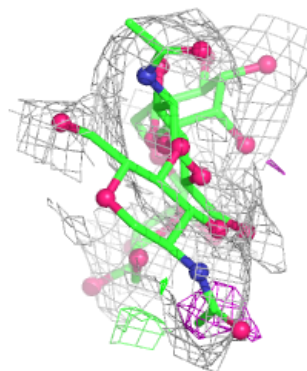
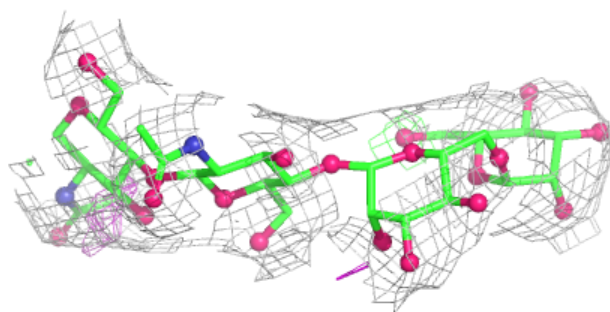
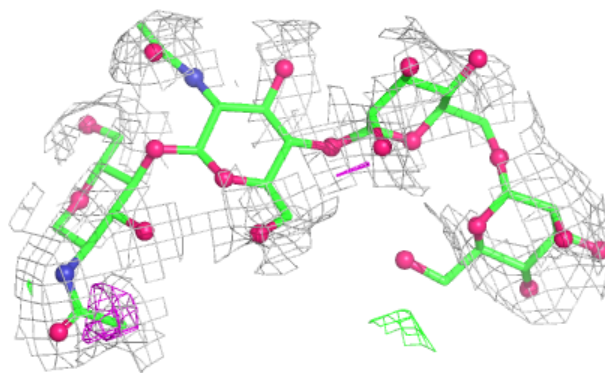


Electron density around Chain N:

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

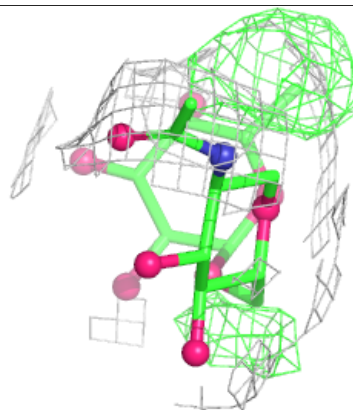
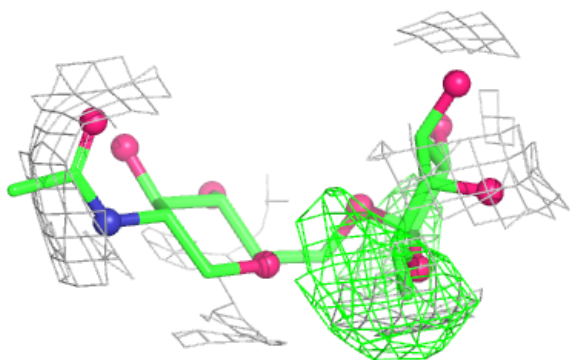
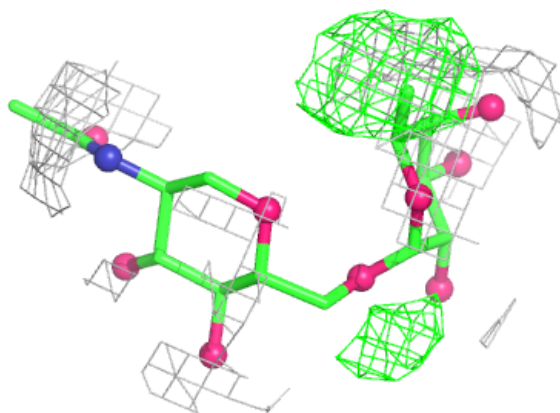
**Electron density around Chain P:**

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

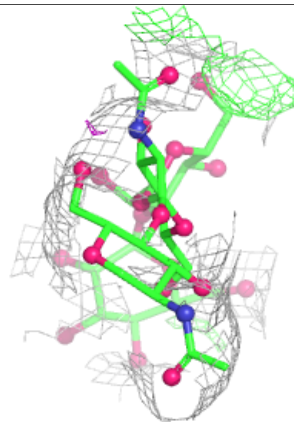
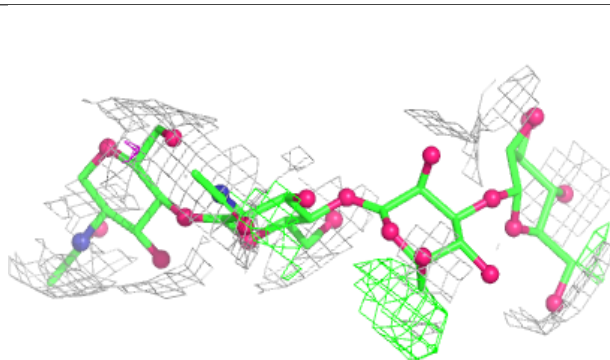
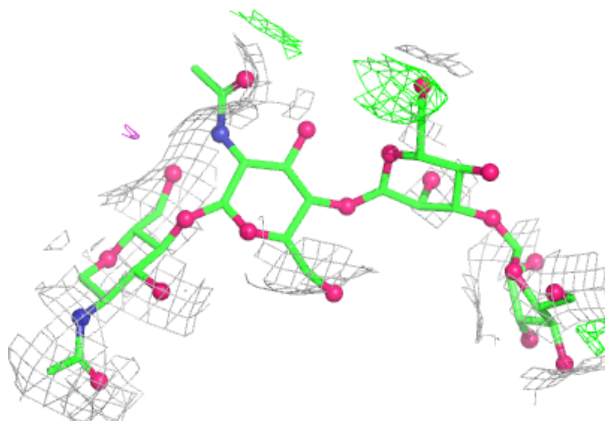


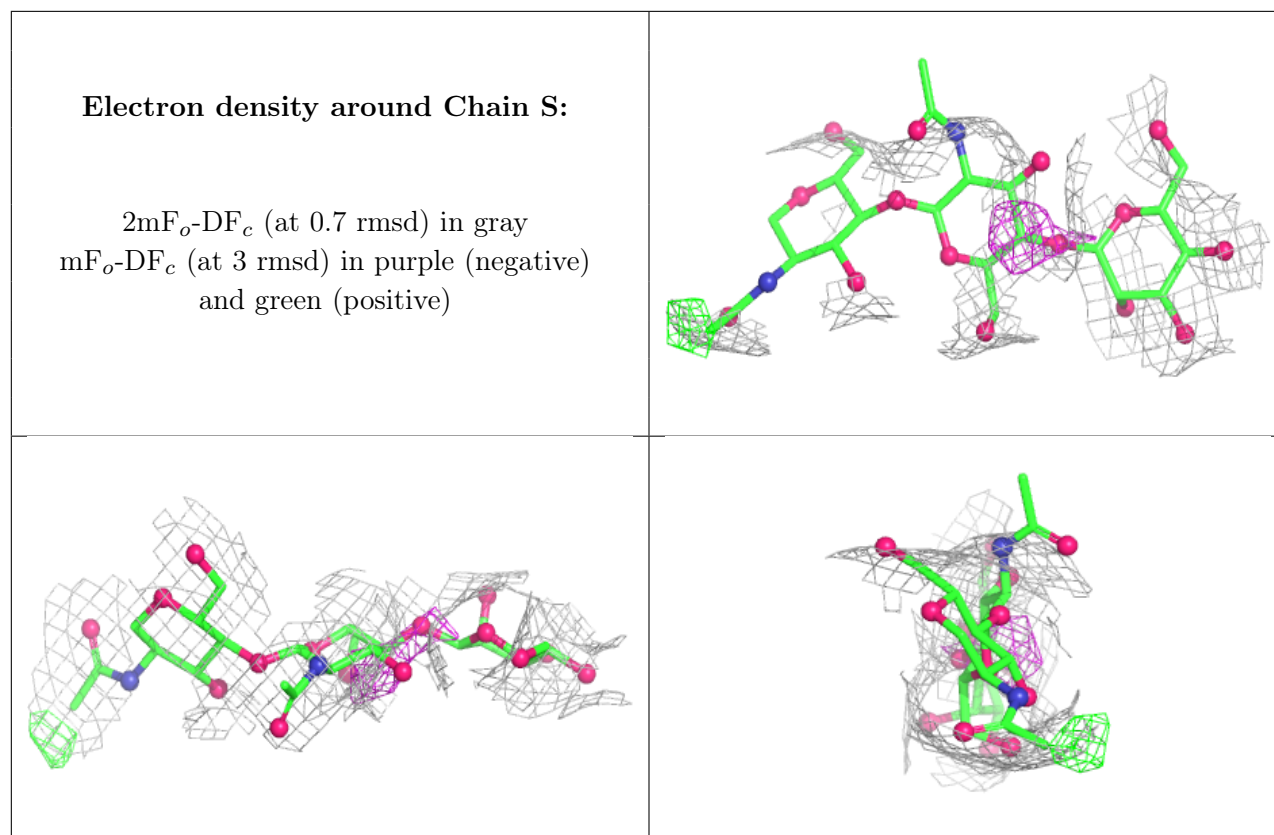
Electron density around Chain Q:

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

**Electron density around Chain R:**

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





6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
11	NAG	B	201	14/15	0.45	0.13	142,158,178,184	0
11	NAG	E	410	14/15	0.47	0.11	137,153,161,162	0
11	NAG	E	401	14/15	0.63	0.09	132,157,167,171	0
11	NAG	A	411	14/15	0.65	0.11	130,143,152,152	0
11	NAG	D	201	14/15	0.65	0.09	115,138,144,145	0
11	NAG	A	410	14/15	0.66	0.10	174,182,199,202	0
11	NAG	C	408	14/15	0.66	0.08	119,135,141,142	0
11	NAG	C	409	14/15	0.70	0.09	148,156,170,173	0
11	NAG	E	409	14/15	0.79	0.08	160,173,182,182	0
11	NAG	C	401	14/15	0.82	0.09	145,168,170,172	0

6.5 Other polymers [i](#)

There are no such residues in this entry.