



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 13, 2026 – 12:07 AM UTC

PDB ID : 4NM8 / pdb_00004nm8
Title : Crystal structure of broadly neutralizing antibody CR8043 bound to H3 influenza hemagglutinin
Authors : Lee, P.S.; Wilson, I.A.
Deposited on : 2013-11-14
Resolution : 4.00 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

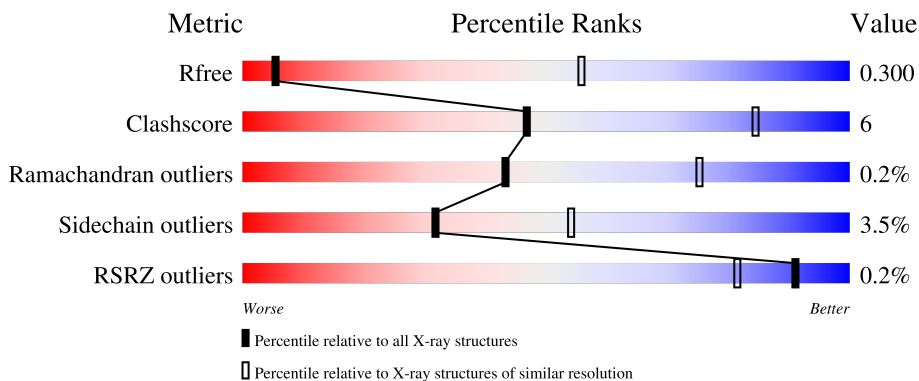
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.00 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	1082 (4.20-3.80)
Clashscore	190562	1129 (4.20-3.80)
Ramachandran outliers	187476	1064 (4.20-3.80)
Sidechain outliers	187428	1055 (4.20-3.80)
RSRZ outliers	180081	1082 (4.20-3.80)

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

Mol	Chain	Length	Quality of chain
1	A	323	 89% 9% .
1	C	323	 90% 8% .
1	E	323	 2% 85% 13% .
2	B	176	 85% 13% ..
2	D	176	 86% 10% ..

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Mol	Chain	Length	Quality of chain
2	F	176	85% 13% .
3	L	220	74% 21% ..
3	M	220	73% 23% ..
3	N	220	82% 15% ..
4	H	230	73% 18% . 7%
4	I	230	74% 16% . 8%
4	J	230	72% 19% . 7%
5	G	2	100% .
5	K	2	50% 50% .
5	O	2	50% 50% .
5	P	2	50% 50% .
5	Q	2	50% 50% .
5	R	2	50% 50% .

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 21672 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
			Total	C	N	O	S			
1	A	318	Total 2452	C 1537	N 431	O 471	S 13	0	0	0
1	C	318	Total 2452	C 1537	N 431	O 471	S 13	0	0	0
1	E	317	Total 2443	C 1531	N 429	O 470	S 13	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	7	ALA	-	expression tag	UNP Q91MA7
A	8	ASP	-	expression tag	UNP Q91MA7
A	9	PRO	-	expression tag	UNP Q91MA7
A	10	GLY	-	expression tag	UNP Q91MA7
C	7	ALA	-	expression tag	UNP Q91MA7
C	8	ASP	-	expression tag	UNP Q91MA7
C	9	PRO	-	expression tag	UNP Q91MA7
C	10	GLY	-	expression tag	UNP Q91MA7
E	7	ALA	-	expression tag	UNP Q91MA7
E	8	ASP	-	expression tag	UNP Q91MA7
E	9	PRO	-	expression tag	UNP Q91MA7
E	10	GLY	-	expression tag	UNP Q91MA7

- Molecule 2 is a protein called Hemagglutinin HA2 Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	172	Total 1391	C 863	N 243	O 279	S 6	0	0	0
2	D	171	Total 1382	C 858	N 241	O 277	S 6	0	0	0
2	F	171	Total 1382	C 858	N 241	O 277	S 6	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	123	GLY	ARG	conflict	UNP Q91MA7
D	123	GLY	ARG	conflict	UNP Q91MA7
F	123	GLY	ARG	conflict	UNP Q91MA7

- Molecule 3 is a protein called Antibody CR8043, Light Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	L	217	Total	C	N	O	S	0	0	0
			1685	1058	282	340	5			
3	M	217	Total	C	N	O	S	0	0	0
			1685	1058	282	340	5			
3	N	217	Total	C	N	O	S	0	0	0
			1685	1058	282	340	5			

- Molecule 4 is a protein called Antibody CR8043, Heavy Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	H	215	Total	C	N	O	S	0	0	0
			1621	1024	279	312	6			
4	I	211	Total	C	N	O	S	0	0	0
			1601	1012	275	308	6			
4	J	213	Total	C	N	O	S	0	0	0
			1613	1020	277	310	6			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	217	HIS	-	expression tag	UNP Q6N089
H	218	HIS	-	expression tag	UNP Q6N089
H	219	HIS	-	expression tag	UNP Q6N089
H	220	HIS	-	expression tag	UNP Q6N089
H	221	HIS	-	expression tag	UNP Q6N089
H	222	HIS	-	expression tag	UNP Q6N089
I	217	HIS	-	expression tag	UNP Q6N089
I	218	HIS	-	expression tag	UNP Q6N089
I	219	HIS	-	expression tag	UNP Q6N089
I	220	HIS	-	expression tag	UNP Q6N089
I	221	HIS	-	expression tag	UNP Q6N089
I	222	HIS	-	expression tag	UNP Q6N089
J	217	HIS	-	expression tag	UNP Q6N089
J	218	HIS	-	expression tag	UNP Q6N089

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Chain	Residue	Modelled	Actual	Comment	Reference
J	219	HIS	-	expression tag	UNP Q6N089
J	220	HIS	-	expression tag	UNP Q6N089
J	221	HIS	-	expression tag	UNP Q6N089
J	222	HIS	-	expression tag	UNP Q6N089

- 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
			Total	C	N	O			
5	G	2	28	16	2	10	0	0	0
5	K	2	28	16	2	10	0	0	0
5	O	2	28	16	2	10	0	0	0
5	P	2	28	16	2	10	0	0	0
5	Q	2	28	16	2	10	0	0	0
5	R	2	28	16	2	10	0	0	0

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).

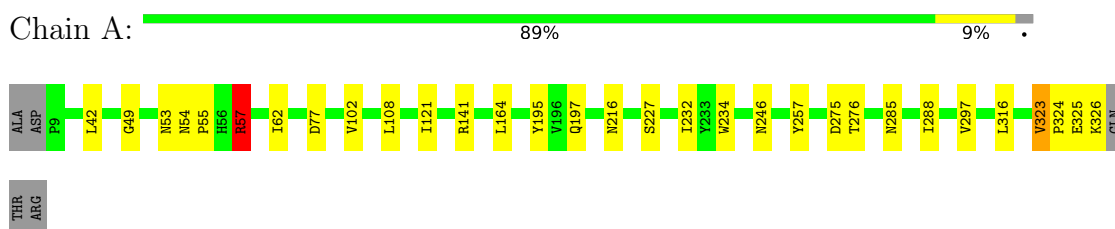


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
6	B	1	Total 14	8	1	5	0	0
6	C	1	Total 14	8	1	5	0	0
6	C	1	Total 14	8	1	5	0	0
6	D	1	Total 14	8	1	5	0	0
6	E	1	Total 14	8	1	5	0	0
6	E	1	Total 14	8	1	5	0	0
6	E	1	Total 14	8	1	5	0	0
6	F	1	Total 14	8	1	5	0	0

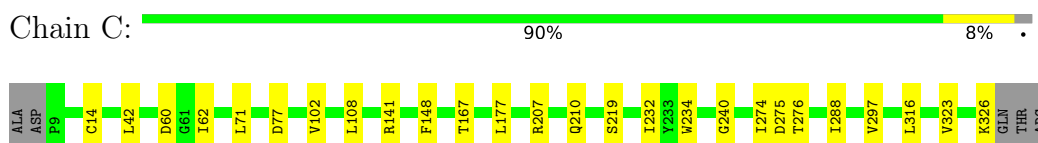
3 Residue-property plots [i](#)

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.

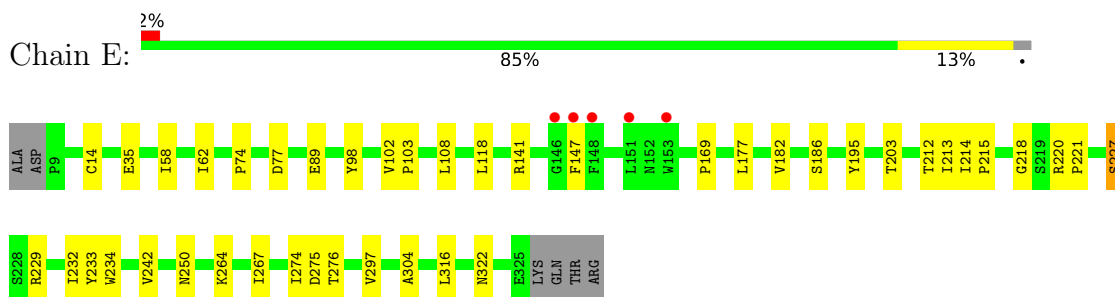
- Molecule 1: Hemagglutinin HA1 Chain



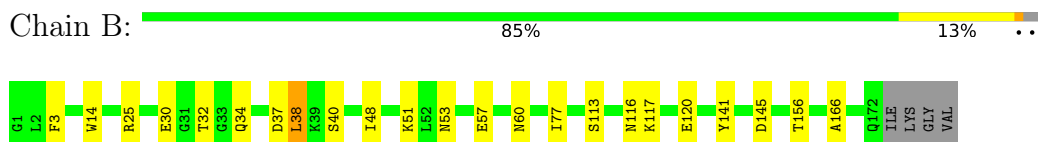
- Molecule 1: Hemagglutinin HA1 Chain



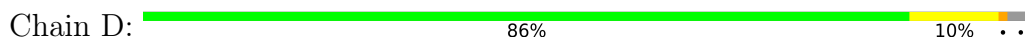
- Molecule 1: Hemagglutinin HA1 Chain



- Molecule 2: Hemagglutinin HA2 Chain

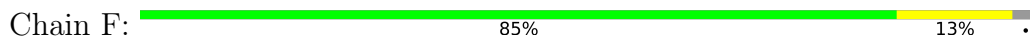


- Molecule 2: Hemagglutinin HA2 Chain





- Molecule 2: Hemagglutinin HA2 Chain



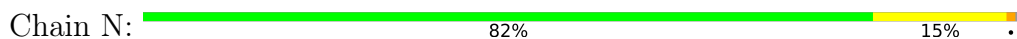
- Molecule 3: Antibody CR8043, Light Chain



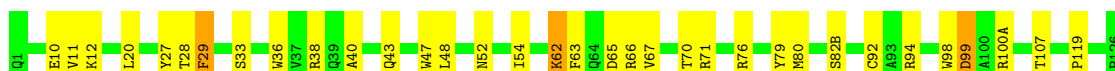
- Molecule 3: Antibody CR8043, Light Chain

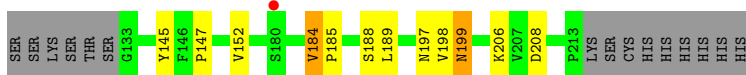


- Molecule 3: Antibody CR8043, Light Chain



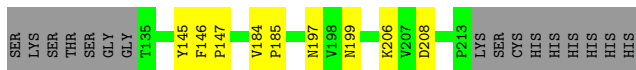
- Molecule 4: Antibody CR8043, Heavy Chain





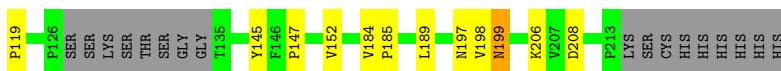
- Molecule 4: Antibody CR8043, Heavy Chain

Chain I: 74% 16% 8%



- Molecule 4: Antibody CR8043, Heavy Chain

Chain J: 72% 19% 7%



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

Chain G: 100%



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

Chain K: 50% 50%



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

Chain O: 50% 50%



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

Chain P:  50% 50%

MAG1
MAG2

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

Chain Q:  50% 50%

MAG1
MAG2

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

Chain R:  50% 50%

MAG1
MAG2

4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	241.49Å 142.35Å 170.72Å 90.00° 133.46° 90.00°	Depositor
Resolution (Å)	43.82 – 4.00 43.82 – 4.00	Depositor EDS
% Data completeness (in resolution range)	97.4 (43.82-4.00) 97.4 (43.82-4.00)	Depositor EDS
R_{merge}	0.20	Depositor
R_{sym}	0.20	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.03 (at 4.00Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.8.1_1168)	Depositor
R, R_{free}	0.240 , 0.292 (Not available) , 0.300	Depositor DCC
R_{free} test set	1733 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	127.3	Xtrriage
Anisotropy	0.188	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 73.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.000 for h+2*k,-h-l 0.005 for h,-k,-h-l 0.000 for -h-2*k,-k,l	Xtrriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	21672	wwPDB-VP
Average B, all atoms (Å ²)	68.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.25% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality i

5.1 Standard geometry i

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

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	0.46	0/2509	0.89	5/3418 (0.1%)
1	C	0.44	0/2509	0.88	0/3418
1	E	0.45	0/2500	0.90	3/3407 (0.1%)
2	B	0.49	0/1415	0.89	1/1902 (0.1%)
2	D	0.50	0/1406	0.87	2/1890 (0.1%)
2	F	0.47	0/1406	0.85	0/1890
3	L	0.40	0/1725	0.86	4/2347 (0.2%)
3	M	0.37	0/1725	0.86	2/2347 (0.1%)
3	N	0.38	0/1725	0.85	2/2347 (0.1%)
4	H	0.40	0/1662	0.86	2/2265 (0.1%)
4	I	0.42	0/1641	0.85	1/2236 (0.0%)
4	J	0.39	0/1654	0.85	2/2255 (0.1%)
All	All	0.43	0/21877	0.87	24/29722 (0.1%)

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

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

There are no bond length outliers.

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	L	47	LEU	N-CA-C	-6.82	104.60	113.12
3	L	188	LYS	N-CA-C	-6.79	106.88	114.62
3	M	47	LEU	N-CA-C	-6.52	104.97	113.12
3	N	47	LEU	N-CA-C	-6.50	105.00	113.12

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Mol	Chain	Res	Type	Atoms	Z	Observed(^o)	Ideal(^o)
3	N	188	LYS	N-CA-C	-6.47	107.24	114.62

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	57	ARG	Sidechain

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	2452	0	2404	15	0
1	C	2452	0	2403	15	0
1	E	2443	0	2390	26	0
2	B	1391	0	1306	19	0
2	D	1382	0	1298	23	0
2	F	1382	0	1298	21	0
3	L	1685	0	1627	22	0
3	M	1685	0	1627	23	0
3	N	1685	0	1627	20	0
4	H	1621	0	1588	29	0
4	I	1601	0	1570	30	0
4	J	1613	0	1582	31	0
5	G	28	0	25	0	0
5	K	28	0	25	1	0
5	O	28	0	25	1	0
5	P	28	0	25	1	0
5	Q	28	0	25	1	0
5	R	28	0	25	1	0
6	B	14	0	13	1	0
6	C	28	0	26	1	0
6	D	14	0	13	2	0
6	E	42	0	39	0	0
6	F	14	0	13	1	0
All	All	21672	0	20974	243	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

The worst 5 of 243 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)
4:I:11:VAL:HG21	4:I:147:PRO:HG3	1.45	0.95
4:H:11:VAL:HG21	4:H:147:PRO:HG3	1.49	0.94
3:N:108:ARG:NH1	3:N:109:THR:O	2.10	0.84
4:J:11:VAL:HG21	4:J:147:PRO:HG3	1.59	0.82
3:L:108:ARG:NH1	3:L:109:THR:O	2.14	0.80

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	316/323 (98%)	308 (98%)	7 (2%)	1 (0%)	36	70
1	C	316/323 (98%)	309 (98%)	6 (2%)	1 (0%)	36	70
1	E	315/323 (98%)	307 (98%)	7 (2%)	1 (0%)	36	70
2	B	170/176 (97%)	163 (96%)	7 (4%)	0	100	100
2	D	169/176 (96%)	162 (96%)	7 (4%)	0	100	100
2	F	169/176 (96%)	162 (96%)	7 (4%)	0	100	100
3	L	215/220 (98%)	209 (97%)	5 (2%)	1 (0%)	24	60
3	M	215/220 (98%)	210 (98%)	4 (2%)	1 (0%)	24	60
3	N	215/220 (98%)	210 (98%)	4 (2%)	1 (0%)	24	60
4	H	211/230 (92%)	207 (98%)	4 (2%)	0	100	100
4	I	207/230 (90%)	203 (98%)	4 (2%)	0	100	100
4	J	209/230 (91%)	204 (98%)	5 (2%)	0	100	100
All	All	2727/2847 (96%)	2654 (97%)	67 (2%)	6 (0%)	43	75

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	62	ILE
1	C	62	ILE
1	E	62	ILE
3	L	51	SER
3	M	51	SER

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	262/283 (93%)	259 (99%)	3 (1%)	65	74
1	C	266/283 (94%)	263 (99%)	3 (1%)	65	74
1	E	255/283 (90%)	255 (100%)	0	100	100
2	B	55/149 (37%)	55 (100%)	0	100	100
2	D	145/149 (97%)	144 (99%)	1 (1%)	76	79
2	F	145/149 (97%)	144 (99%)	1 (1%)	76	79
3	L	192/194 (99%)	173 (90%)	19 (10%)	7	27
3	M	192/194 (99%)	173 (90%)	19 (10%)	7	27
3	N	145/194 (75%)	138 (95%)	7 (5%)	23	46
4	H	178/193 (92%)	169 (95%)	9 (5%)	21	45
4	I	47/193 (24%)	44 (94%)	3 (6%)	16	40
4	J	150/193 (78%)	143 (95%)	7 (5%)	23	46
All	All	2032/2457 (83%)	1960 (96%)	72 (4%)	32	54

5 of 72 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	I	100(D)	SER
4	J	199	ASN
3	N	105	GLU
4	J	10	GLU

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Mol	Chain	Res	Type
3	L	152	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 34 such sidechains are listed below:

Mol	Chain	Res	Type
3	M	155	GLN
3	M	160	GLN
3	N	155	GLN
2	D	60	ASN
2	D	53	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

12 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	G	1	1,5	14,14,15	0.52	0	17,19,21	1.06	2 (11%)
5	NAG	G	2	5	14,14,15	0.61	0	17,19,21	1.12	3 (17%)
5	NAG	K	1	1,5	14,14,15	0.57	0	17,19,21	0.82	0
5	NAG	K	2	5	14,14,15	0.62	0	17,19,21	0.98	0
5	NAG	O	1	1,5	14,14,15	0.55	0	17,19,21	1.00	1 (5%)
5	NAG	O	2	5	14,14,15	0.59	0	17,19,21	0.84	0
5	NAG	P	1	1,5	14,14,15	0.60	0	17,19,21	0.85	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	P	2	5	14,14,15	0.54	0	17,19,21	0.75	0
5	NAG	Q	1	1,5	14,14,15	0.54	0	17,19,21	0.75	0
5	NAG	Q	2	5	14,14,15	0.57	0	17,19,21	0.86	0
5	NAG	R	1	1,5	14,14,15	0.56	0	17,19,21	0.72	0
5	NAG	R	2	5	14,14,15	0.52	0	17,19,21	0.78	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	G	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	G	2	5	-	2/6/23/26	0/1/1/1
5	NAG	K	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	K	2	5	-	0/6/23/26	0/1/1/1
5	NAG	O	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	O	2	5	-	0/6/23/26	0/1/1/1
5	NAG	P	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	P	2	5	-	0/6/23/26	0/1/1/1
5	NAG	Q	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	Q	2	5	-	0/6/23/26	0/1/1/1
5	NAG	R	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	R	2	5	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	O	1	NAG	C1-O5-C5	3.06	116.29	112.19
5	G	1	NAG	C2-N2-C7	-2.86	119.06	122.90
5	G	1	NAG	C1-O5-C5	2.55	115.60	112.19
5	G	2	NAG	O5-C1-C2	-2.09	108.06	111.29
5	G	2	NAG	O7-C7-N2	-2.07	118.32	121.98

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	R	1	NAG	C8-C7-N2-C2

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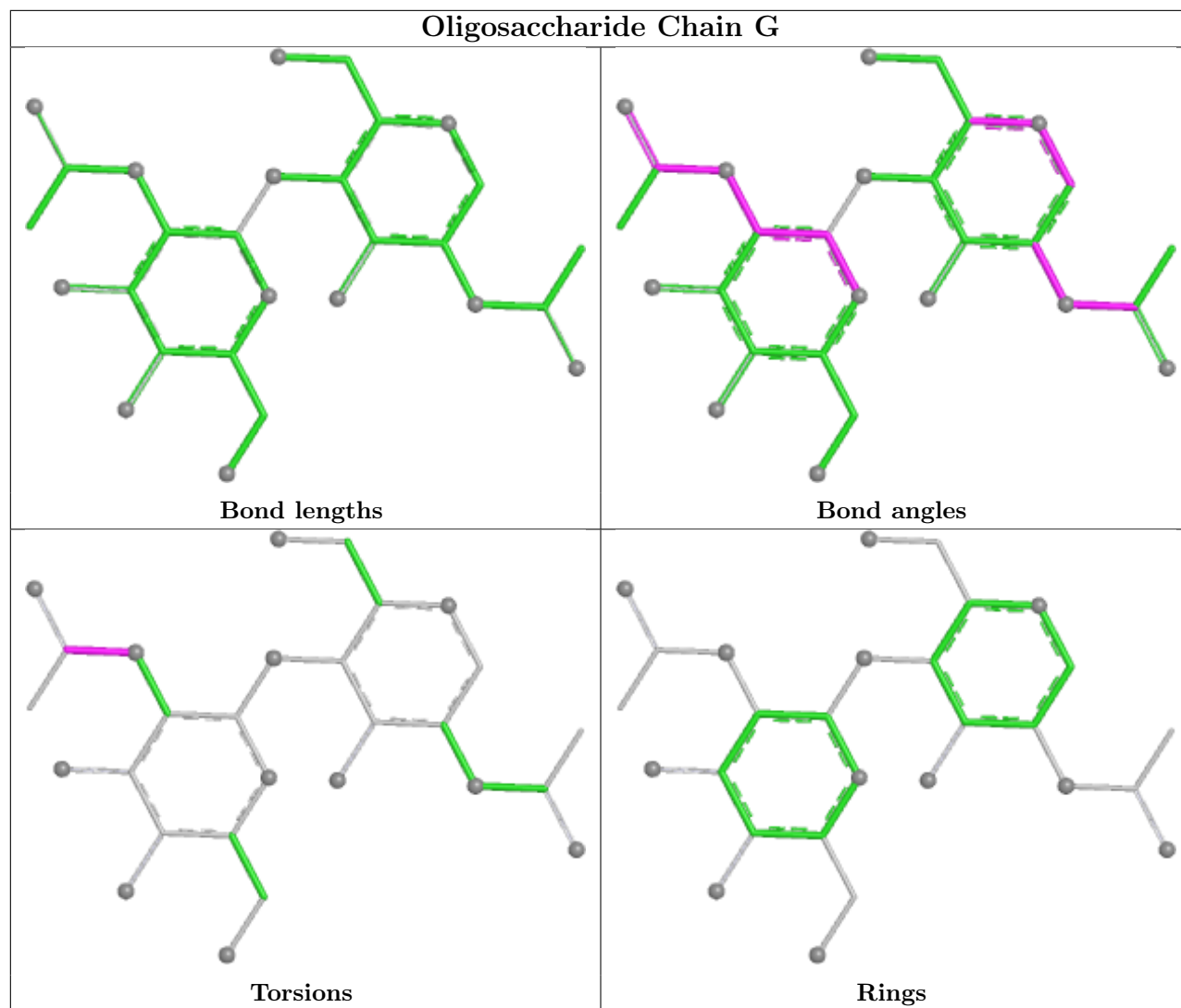
Mol	Chain	Res	Type	Atoms
5	Q	1	NAG	C8-C7-N2-C2
5	R	1	NAG	O7-C7-N2-C2
5	G	2	NAG	C8-C7-N2-C2
5	O	1	NAG	C8-C7-N2-C2

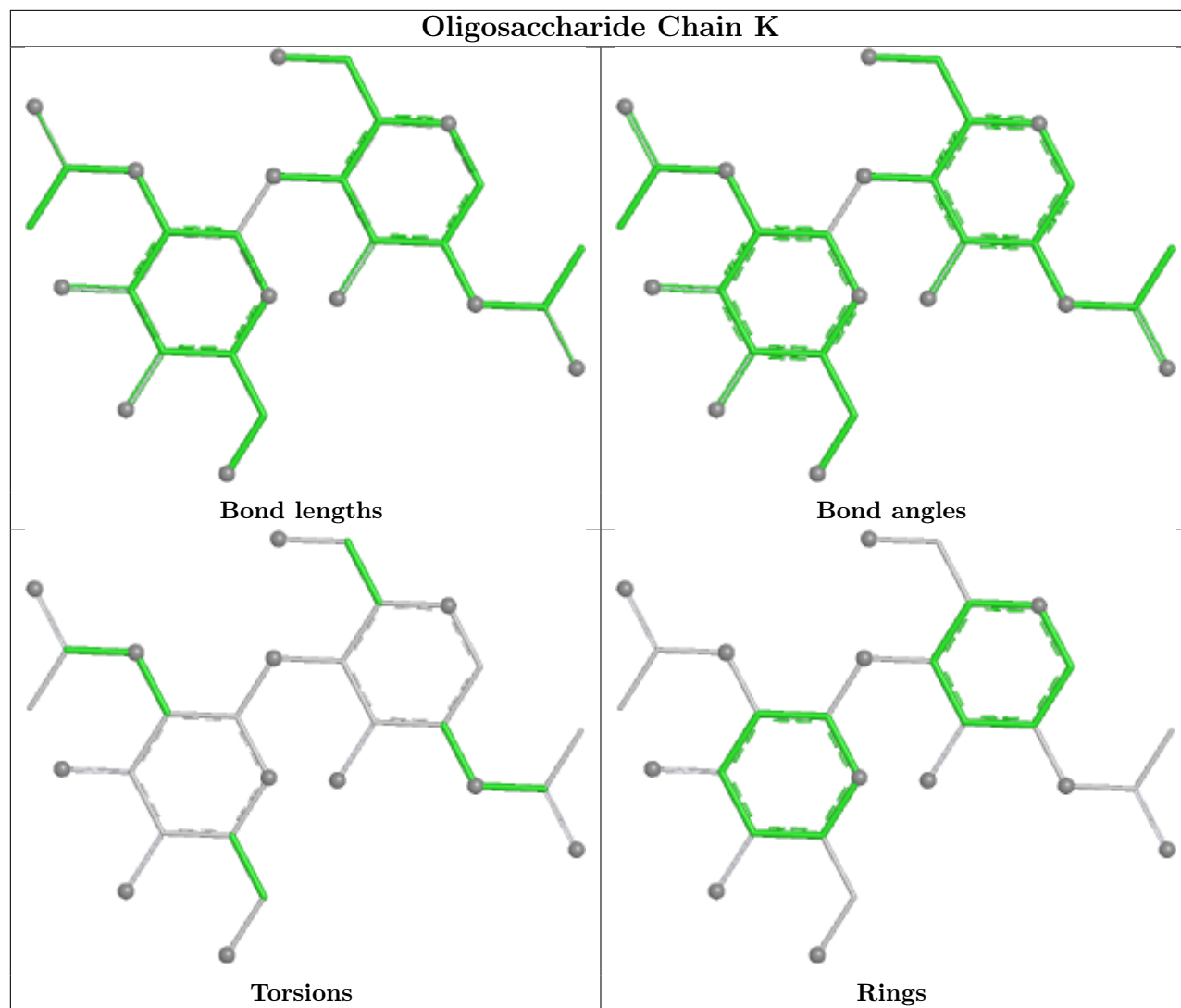
There are no ring outliers.

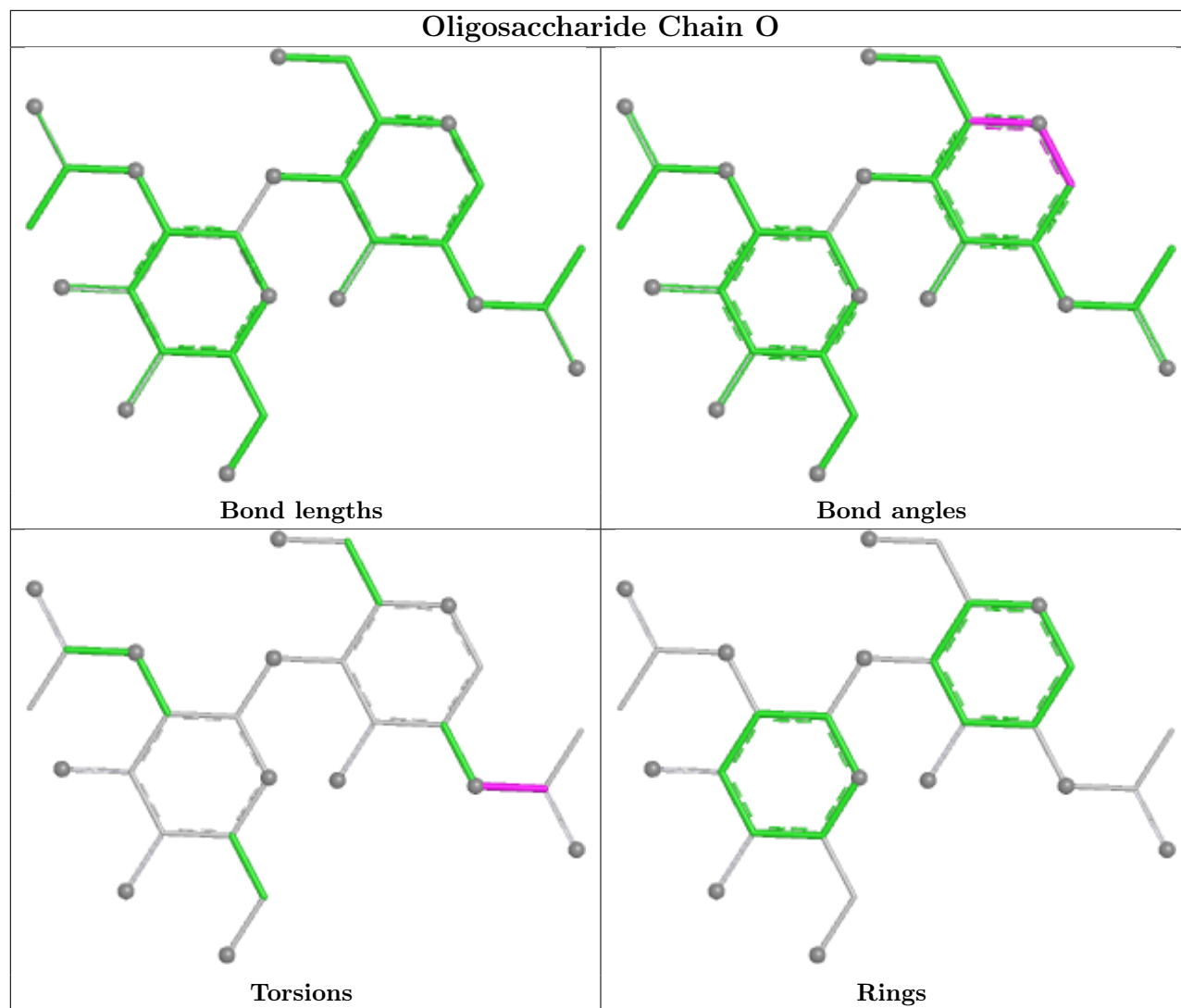
6 monomers are involved in 5 short contacts:

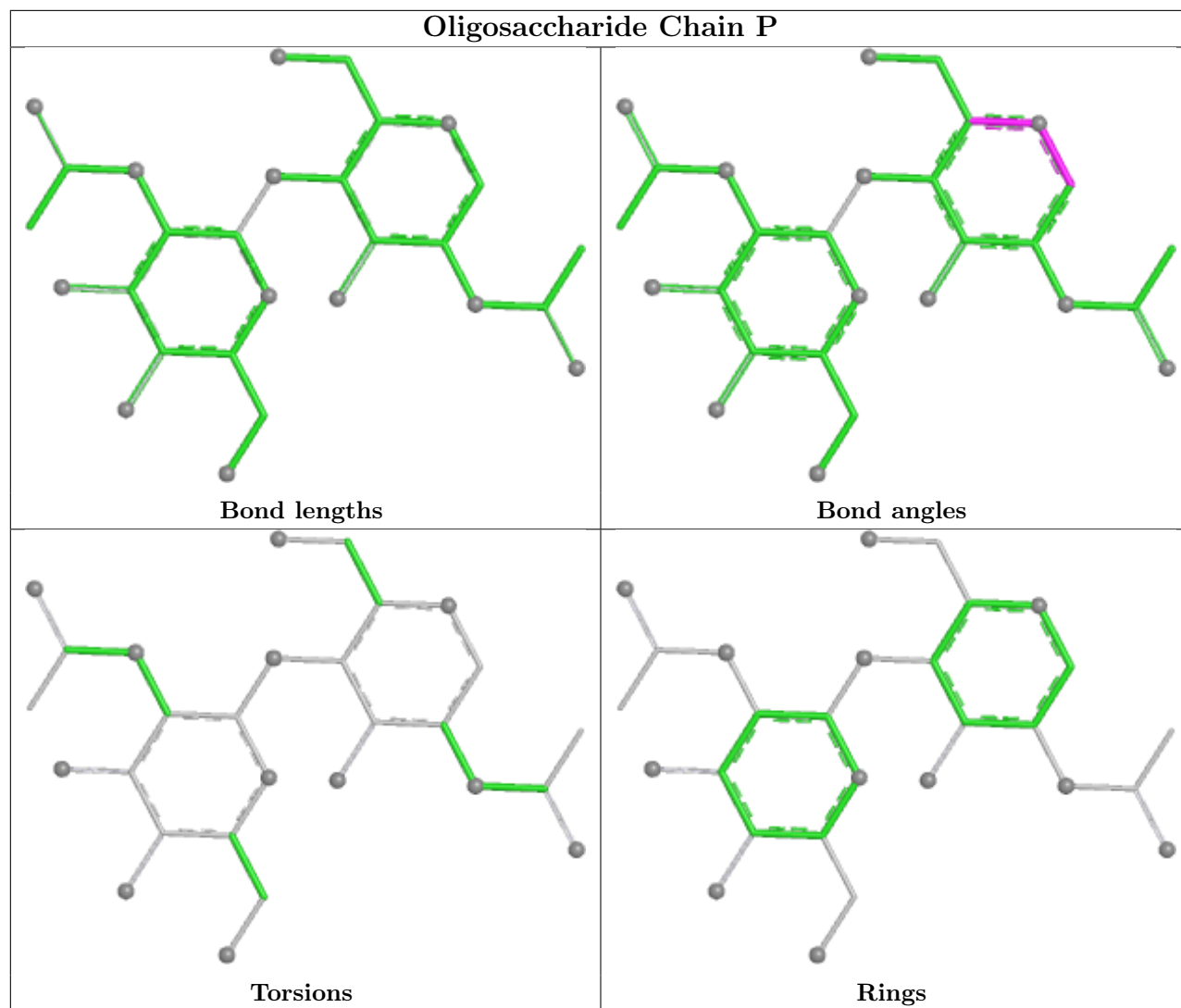
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	P	2	NAG	1	0
5	R	1	NAG	1	0
5	Q	1	NAG	1	0
5	O	1	NAG	1	0
5	P	1	NAG	1	0
5	K	1	NAG	1	0

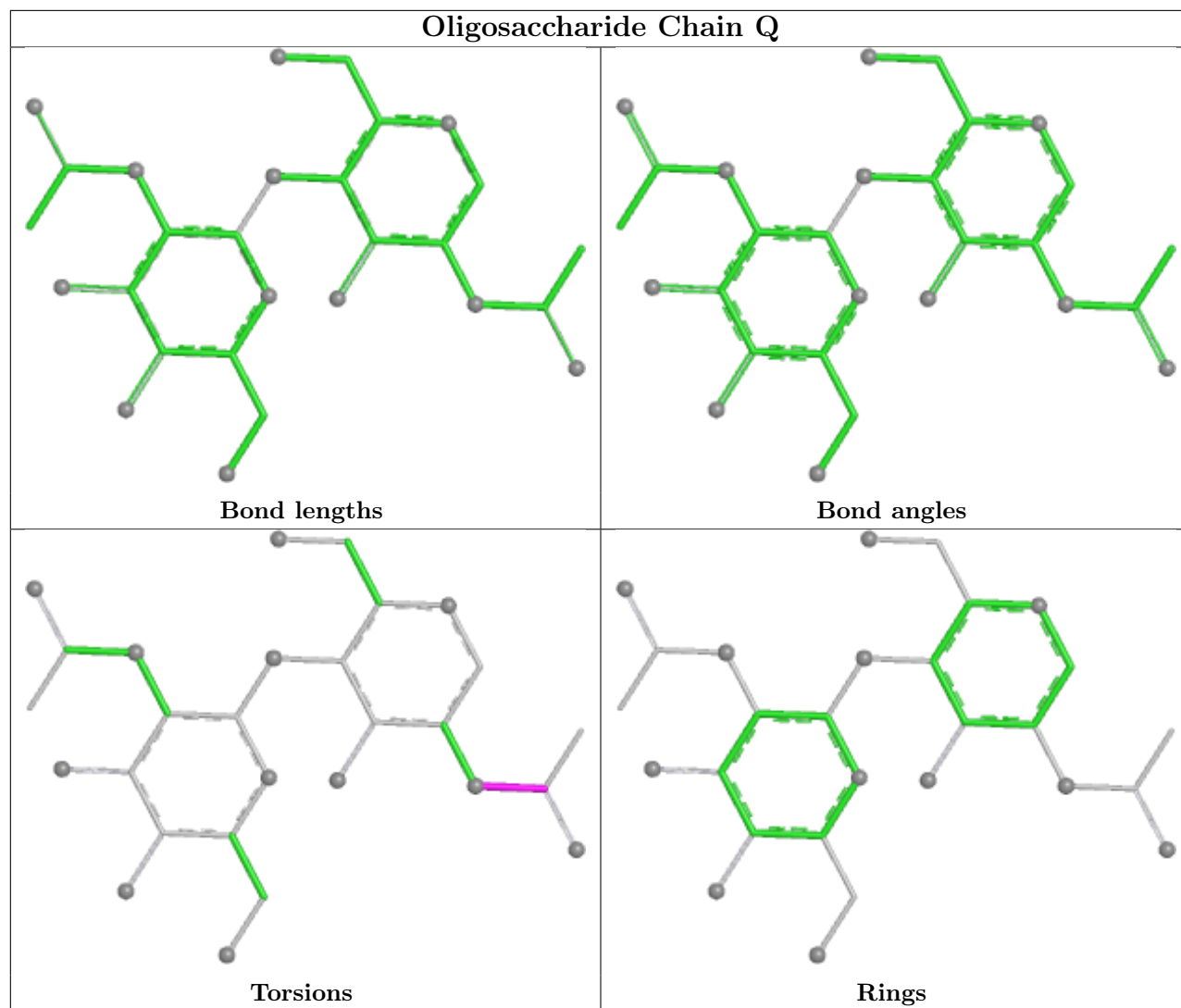
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

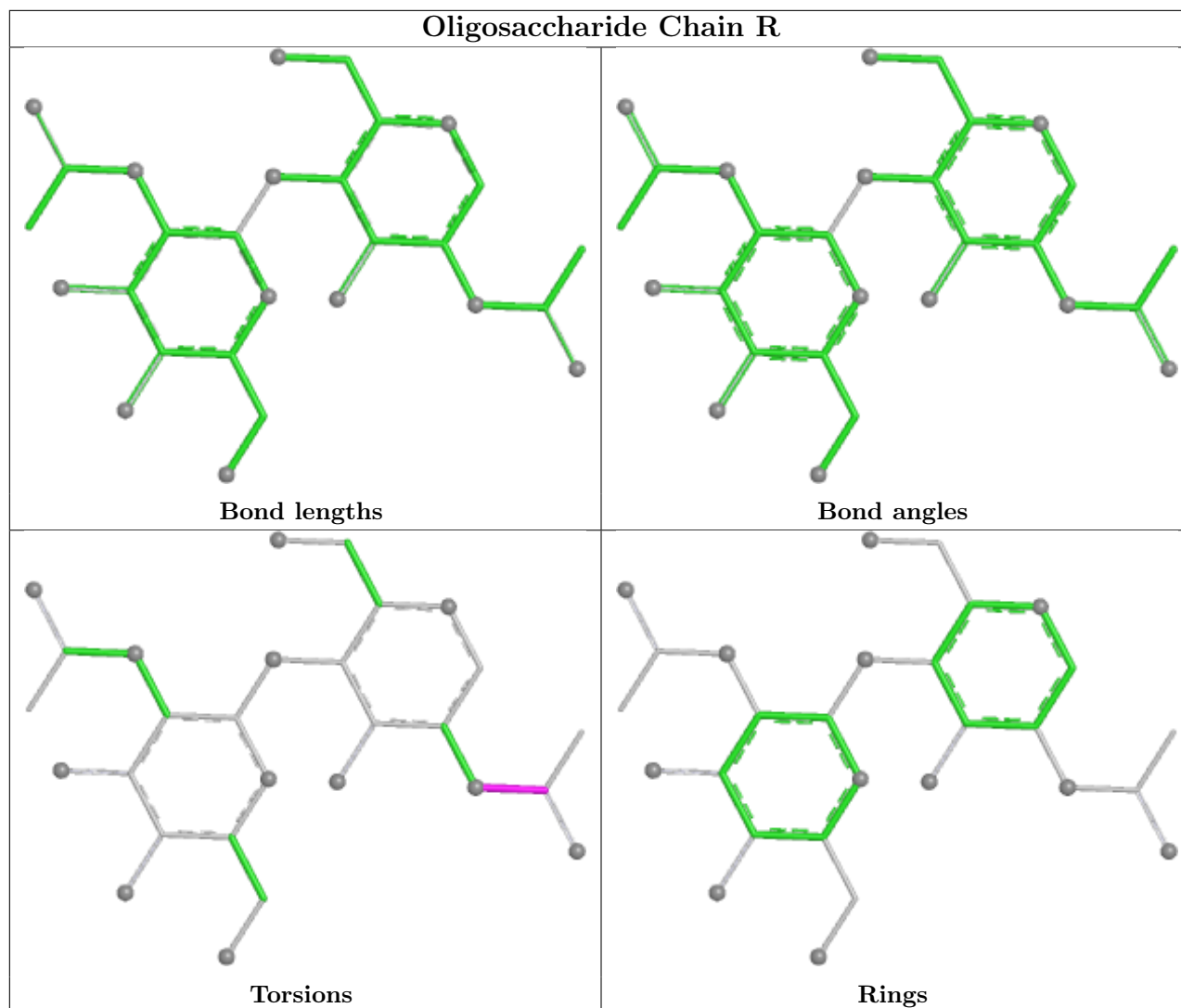












5.6 Ligand geometry [i](#)

8 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	$\# Z > 2$
6	NAG	F	201	2	14,14,15	0.56	0	17,19,21	1.52	3 (17%)
6	NAG	C	501	1	14,14,15	0.49	0	17,19,21	0.86	1 (5%)
6	NAG	E	503	1	14,14,15	0.49	0	17,19,21	1.00	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	NAG	D	201	2	14,14,15	0.56	0	17,19,21	1.53	3 (17%)
6	NAG	C	504	1	14,14,15	0.55	0	17,19,21	0.90	1 (5%)
6	NAG	E	501	1	14,14,15	0.47	0	17,19,21	1.07	1 (5%)
6	NAG	B	201	2	14,14,15	0.55	0	17,19,21	1.28	1 (5%)
6	NAG	E	502	1	14,14,15	0.51	0	17,19,21	1.25	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
6	NAG	F	201	2	-	2/6/23/26	0/1/1/1
6	NAG	C	501	1	-	0/6/23/26	0/1/1/1
6	NAG	E	503	1	-	0/6/23/26	0/1/1/1
6	NAG	D	201	2	-	2/6/23/26	0/1/1/1
6	NAG	C	504	1	-	0/6/23/26	0/1/1/1
6	NAG	E	501	1	-	0/6/23/26	0/1/1/1
6	NAG	B	201	2	-	2/6/23/26	0/1/1/1
6	NAG	E	502	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	E	502	NAG	C1-O5-C5	4.54	118.28	112.19
6	F	201	NAG	C1-O5-C5	4.49	118.20	112.19
6	B	201	NAG	C1-O5-C5	4.08	117.65	112.19
6	D	201	NAG	O5-C5-C6	3.63	114.72	107.66
6	E	501	NAG	C1-O5-C5	3.33	116.65	112.19

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	F	201	NAG	C8-C7-N2-C2
6	F	201	NAG	O7-C7-N2-C2
6	B	201	NAG	C8-C7-N2-C2
6	D	201	NAG	C8-C7-N2-C2
6	B	201	NAG	O7-C7-N2-C2

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	F	201	NAG	1	0
6	D	201	NAG	2	0
6	C	504	NAG	1	0
6	B	201	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	318/323 (98%)	-0.19	0 100 100	20, 55, 110, 160	0
1	C	318/323 (98%)	-0.28	0 100 100	18, 51, 106, 132	0
1	E	317/323 (98%)	-0.14	5 (1%) 70 52	19, 58, 136, 168	0
2	B	172/176 (97%)	-0.21	0 100 100	18, 34, 90, 135	0
2	D	171/176 (97%)	-0.25	0 100 100	18, 33, 88, 129	0
2	F	171/176 (97%)	-0.24	0 100 100	18, 36, 95, 161	0
3	L	217/220 (98%)	-0.23	0 100 100	20, 81, 162, 203	0
3	M	217/220 (98%)	-0.22	0 100 100	22, 79, 154, 177	0
3	N	217/220 (98%)	-0.19	0 100 100	22, 85, 165, 211	0
4	H	215/230 (93%)	-0.17	1 (0%) 87 73	22, 76, 162, 203	0
4	I	211/230 (91%)	-0.20	0 100 100	25, 68, 153, 188	0
4	J	213/230 (92%)	-0.13	0 100 100	24, 78, 175, 209	0
All	All	2757/2847 (96%)	-0.20	6 (0%) 91 81	18, 56, 150, 211	0

The worst 5 of 6 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	147	PHE	2.8
4	H	180	SER	2.7
1	E	151	LEU	2.7
1	E	153	TRP	2.4
1	E	146	GLY	2.3

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

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

6.3 Carbohydrates [i](#)

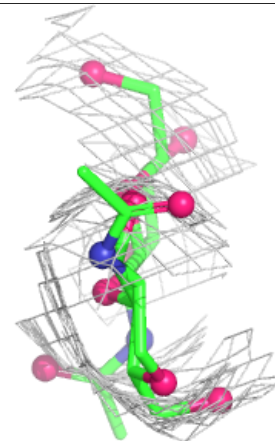
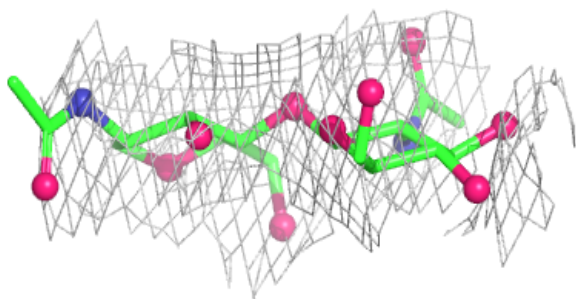
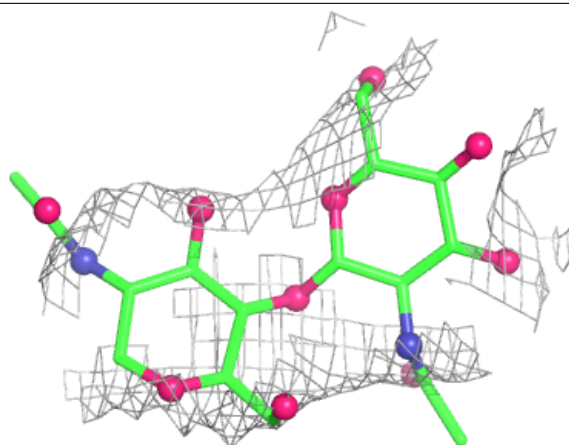
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	NAG	G	1	14/15	-	-	59,71,75,76	0
5	NAG	G	2	14/15	-	-	102,111,115,115	0
5	NAG	K	1	14/15	-	-	101,113,116,117	0
5	NAG	K	2	14/15	-	-	114,127,130,130	0
5	NAG	Q	2	14/15	0.19	0.14	89,95,101,101	0
5	NAG	R	2	14/15	0.22	0.14	101,107,112,112	0
5	NAG	O	2	14/15	0.32	0.13	90,96,101,101	0
5	NAG	P	1	14/15	0.67	0.13	80,92,97,99	0
5	NAG	P	2	14/15	0.68	0.17	119,131,133,134	0
5	NAG	R	1	14/15	0.82	0.10	49,59,64,65	0
5	NAG	Q	1	14/15	0.82	0.10	45,55,60,61	0
5	NAG	O	1	14/15	0.86	0.08	36,46,51,51	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.

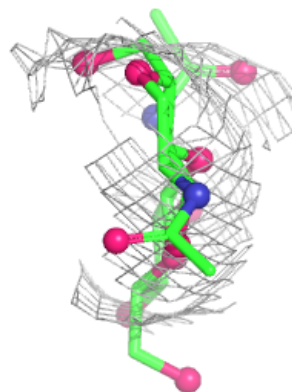
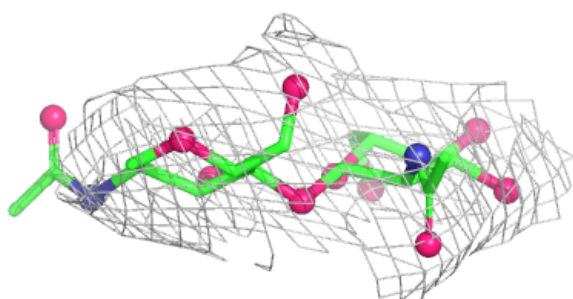
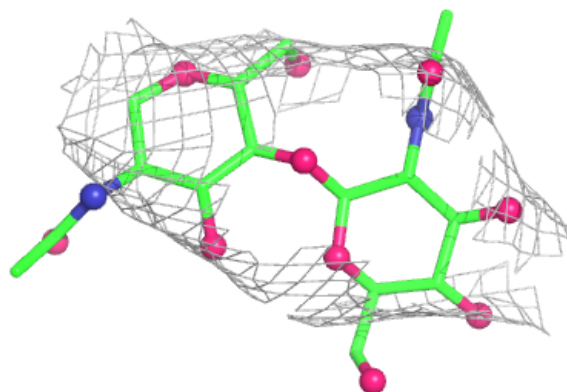
Electron density around Chain G:

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



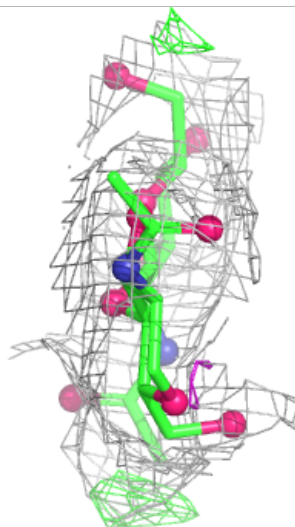
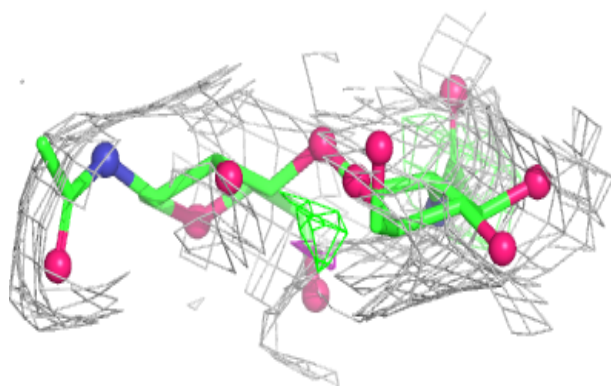
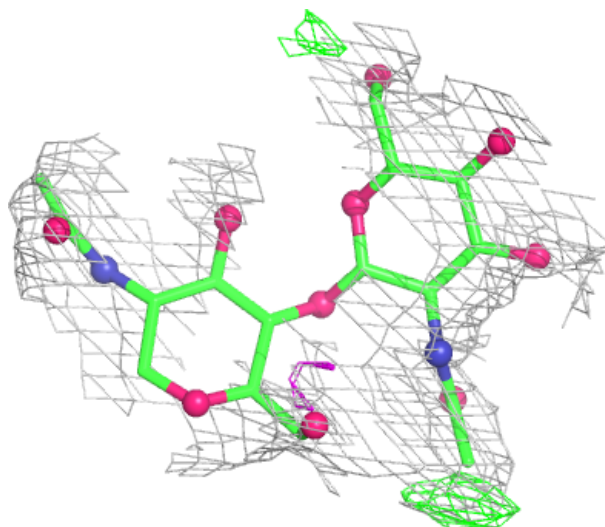
Electron density around Chain K:

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



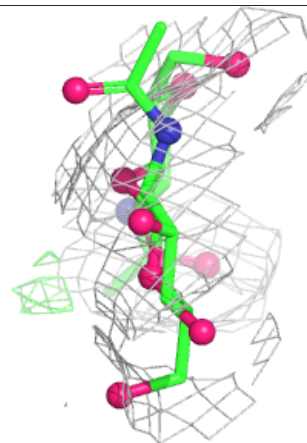
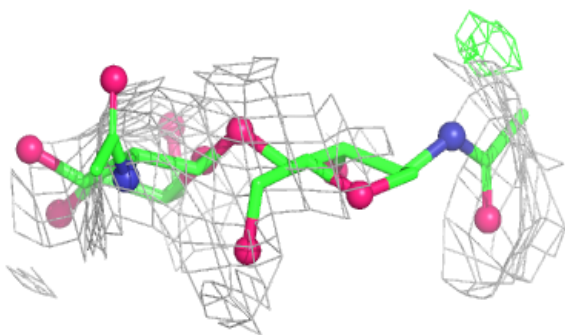
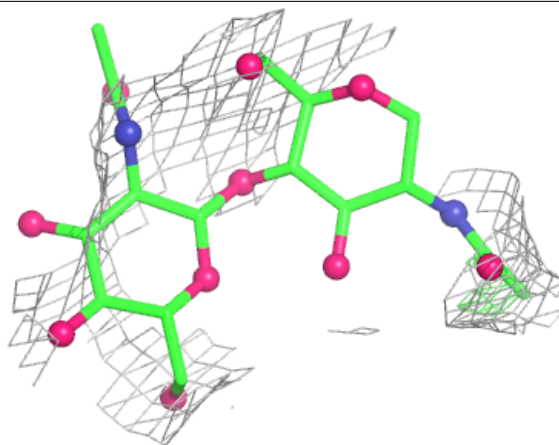
Electron density around Chain O:

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



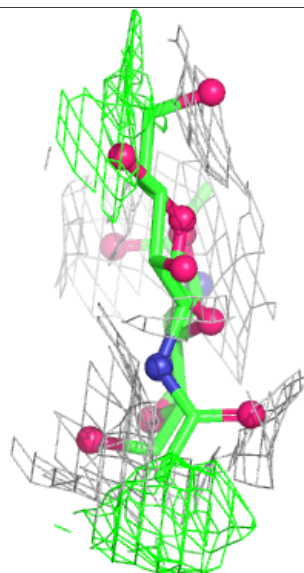
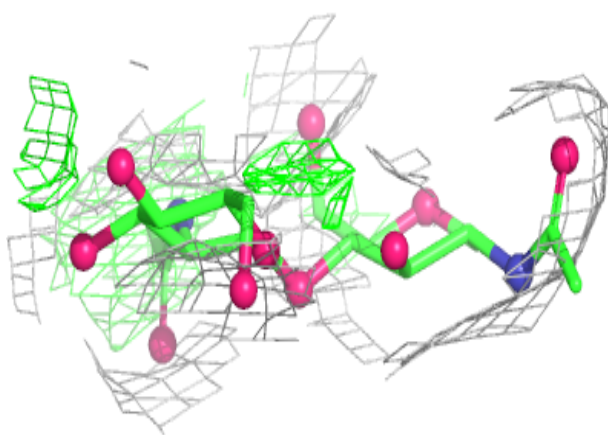
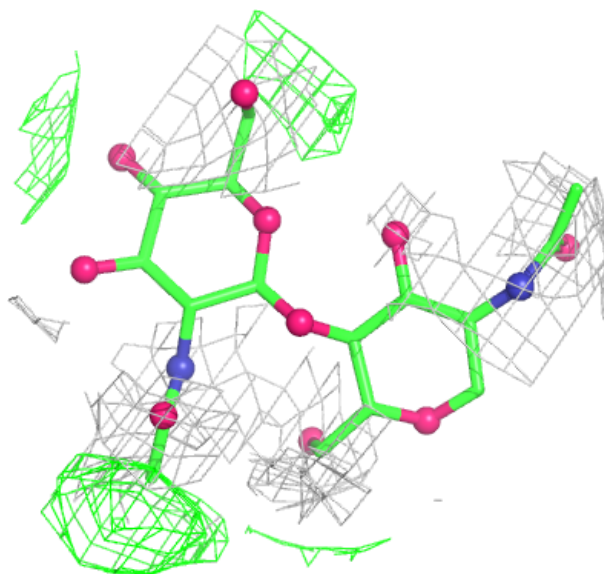
Electron density around Chain P:

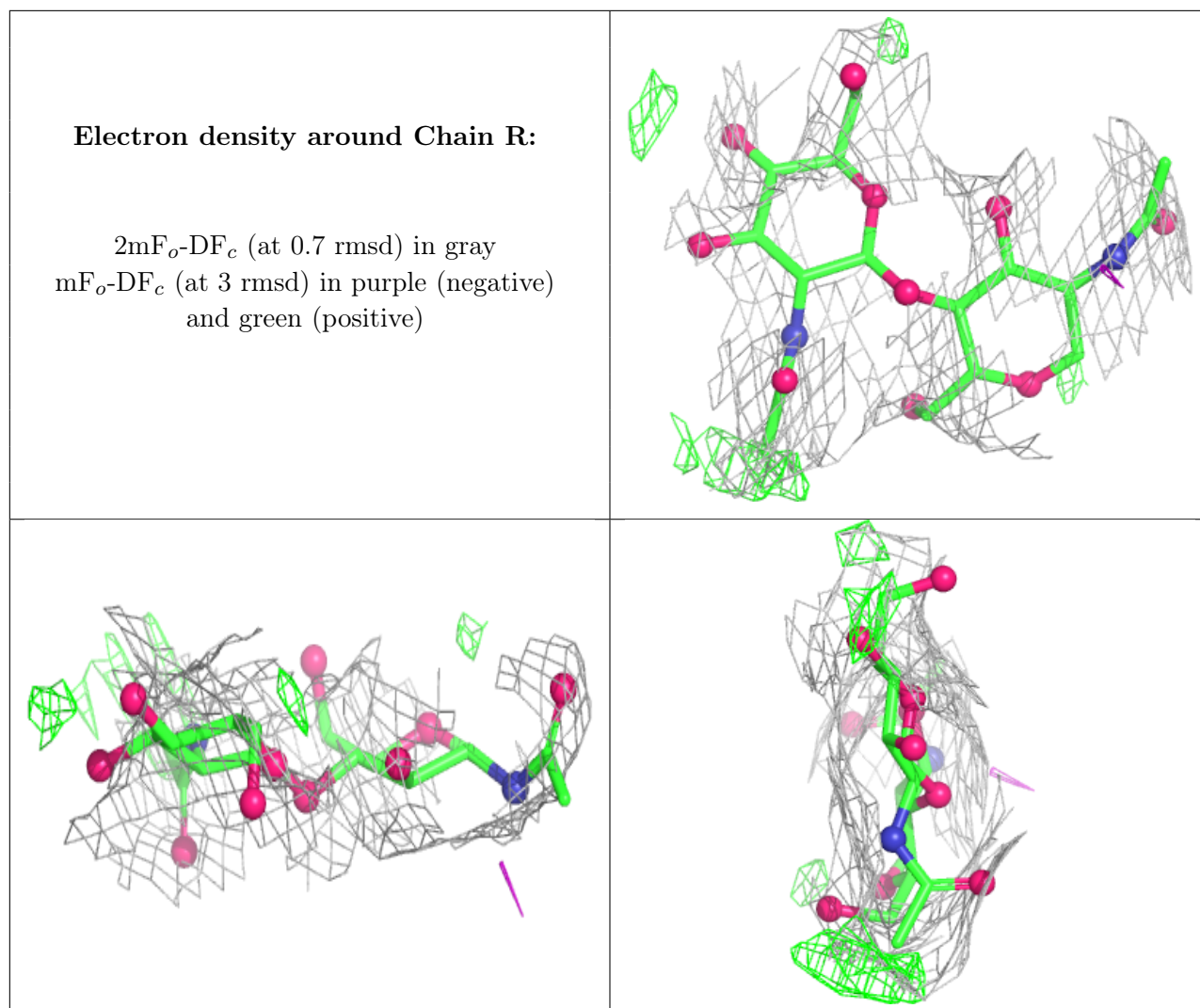
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



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)





6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
6	NAG	C	504	14/15	0.58	0.15	83,96,99,101	0
6	NAG	B	201	14/15	0.64	0.12	80,91,96,98	0
6	NAG	E	503	14/15	0.68	0.15	95,108,111,112	0
6	NAG	E	502	14/15	0.75	0.10	67,80,85,87	0
6	NAG	D	201	14/15	0.78	0.10	93,104,110,111	0
6	NAG	F	201	14/15	0.79	0.11	92,103,109,111	0
6	NAG	C	501	14/15	0.80	0.11	81,93,97,98	0
6	NAG	E	501	14/15	0.83	0.10	70,81,86,87	0

6.5 Other polymers [i](#)

There are no such residues in this entry.