



wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 5, 2024 – 01:34 am GMT

PDB ID : 4UO1
Title : Structure of the A_Equine_Richmond_07 H3 haemagglutinin in complex with 3SLN
Authors : Vachieri, S.G.; Collins, P.J.; Haire, L.F.; Ogradowicz, R.W.; Martin, S.R.; Walker, P.A.; Xiong, X.; Gamblin, S.J.; Skehel, J.J.
Deposited on : 2014-05-31
Resolution : 3.00 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

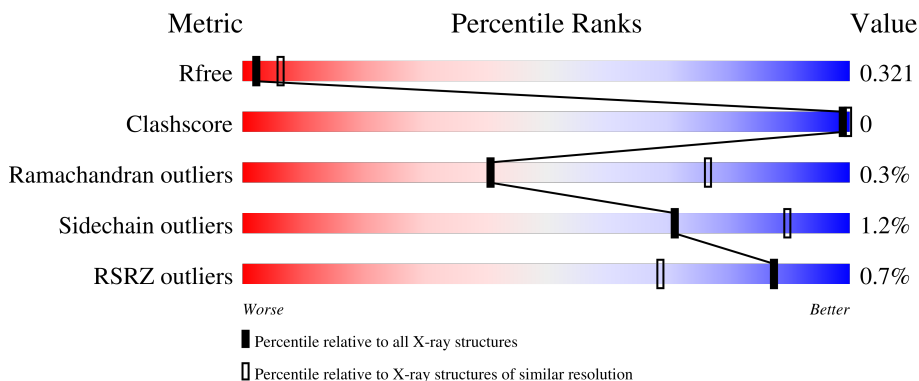
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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}	130704	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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	329	96%
1	C	329	95%
1	E	329	95%
2	B	172	99%
2	D	172	99%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	172	98%
3	G	2	50%
3	I	2	100%
3	N	2	50%
3	S	2	100%
4	H	5	20%
4	O	5	40%
4	Q	5	20%
5	J	4	50%
6	K	3	67%
7	L	2	50%
8	M	2	50%
9	P	3	100%
9	T	3	33%
10	R	3	100%
10	U	3	33%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
10	NAG	R	2	X	-	-	-
10	FUC	R	3	X	-	-	-
10	FUC	U	3	X	-	-	-
11	NAG	D	202	-	-	-	X
11	NAG	E	621	-	-	-	X
3	NAG	G	2	-	-	-	X
4	MAN	O	4	X	-	-	-
4	MAN	Q	5	X	-	-	-
5	FUC	J	4	X	-	-	-
6	NAG	K	2	-	-	-	X

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	FUC	M	2	X	-	-	-

2 Entry composition [i](#)

There are 13 unique types of molecules in this entry. The entry contains 12524 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	325	Total 2535	C 1584	N 449	O 487	S 15	0	0	0
1	C	320	Total 2492	C 1557	N 441	O 479	S 15	0	0	0
1	E	325	Total 2526	C 1578	N 447	O 486	S 15	0	0	0

- Molecule 2 is a protein called HEMAGGLUTININ.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	172	Total 1399	C 873	N 242	O 278	S 6	0	0	0
2	D	171	Total 1384	C 863	N 239	O 276	S 6	0	0	0
2	F	172	Total 1403	C 874	N 245	O 278	S 6	0	0	0

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



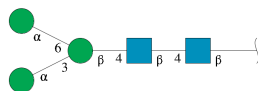
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	G	2	Total 28	C 16	N 2	O 10	0	0	0
3	I	2	Total 28	C 16	N 2	O 10	0	0	0
3	N	2	Total 28	C 16	N 2	O 10	0	0	0

Continued on next page...

Continued from previous page...

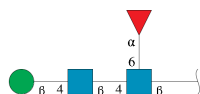
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	S	2	28	16	2	10	0	0	0

- Molecule 4 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.



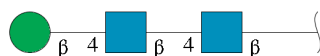
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	H	5	61	34	2	25	0	0	0
4	O	5	61	34	2	25	0	0	0
4	Q	5	61	34	2	25	0	0	0

- Molecule 5 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.



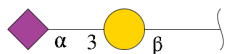
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
5	J	4	49	28	2	19	0	0	0

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
6	K	3	39	22	2	15	0	0	0

- Molecule 7 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose.



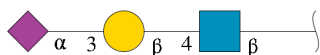
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
7	L	2	31	17	1	13	0	0	0

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



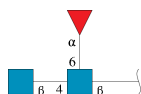
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
8	M	2	24	14	1	9	0	0	0

- Molecule 9 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



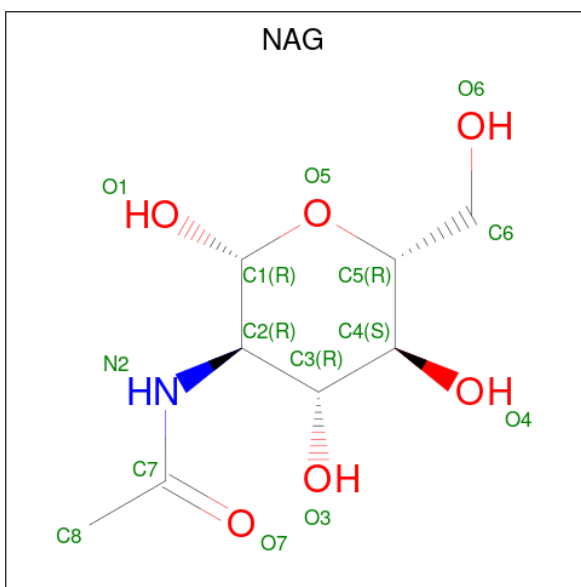
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
9	P	3	46	25	2	19	0	0	0
9	T	3	46	25	2	19	0	0	0

- Molecule 10 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.



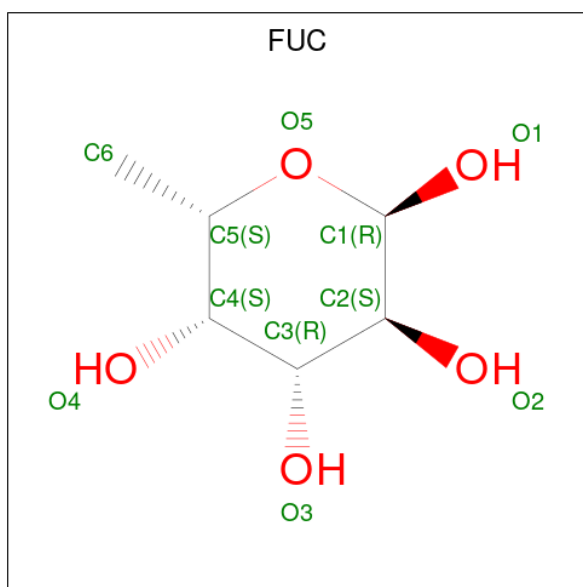
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
10	R	3	Total	C	N	O	0	0	0
			38	22	2	14			
10	U	3	Total	C	N	O	0	0	0
			38	22	2	14			

- Molecule 11 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



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

- Molecule 12 is alpha-L-fucopyranose (three-letter code: FUC) (formula: C₆H₁₂O₅).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	D	1	Total	C O	0	0
			10	6 4		

- Molecule 13 is water.

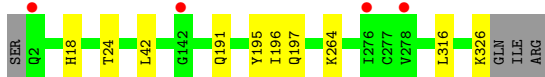
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
13	A	20	Total	O	0	0
			20	20		
13	B	5	Total	O	0	0
			5	5		
13	C	17	Total	O	0	0
			17	17		
13	D	9	Total	O	0	0
			9	9		
13	E	12	Total	O	0	0
			12	12		
13	F	8	Total	O	0	0
			8	8		

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

Chain A:  96%



- Molecule 1: HEMAGGLUTININ

Chain C:  95%



- Molecule 1: HEMAGGLUTININ

Chain E:  95%



- Molecule 2: HEMAGGLUTININ

Chain B:  99%



- Molecule 2: HEMAGGLUTININ

Chain D:  99%



- Molecule 2: HEMAGGLUTININ

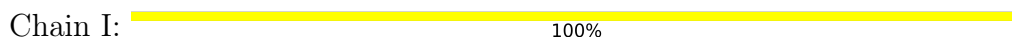
Chain F:  98%



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



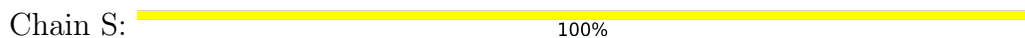
- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



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



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



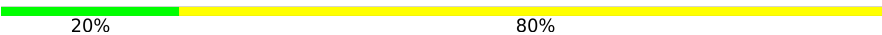
- Molecule 4: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 4: 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



- Molecule 4: 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 Q:  20% 80%



- Molecule 5: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain J:  50% 50%



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

Chain K:  67% 33%



- Molecule 7: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose

Chain L:  50% 50%



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

Chain M:  50% 50%



- Molecule 9: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain P:  100%



- Molecule 9: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain T:  33% 67%

MAG1
GAL2
SIA3

- Molecule 10: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain R:  100%

MAG1
MAG2
FUC3

- Molecule 10: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain U:  33% 67%

MAG1
MAG2
FUC3

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	78.81Å 129.94Å 194.12Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	107.98 – 3.00 46.67 – 3.00	Depositor EDS
% Data completeness (in resolution range)	95.8 (107.98-3.00) 95.9 (46.67-3.00)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.10 (at 3.01Å)	Xtrriage
Refinement program	REFMAC 5.8.0069	Depositor
R, R_{free}	0.275 , 0.327 0.272 , 0.321	Depositor DCC
R_{free} test set	1958 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	59.3	Xtrriage
Anisotropy	0.951	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 23.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.27$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	12524	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.52% 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: FUC, NAG, MAN, GAL, SIA, BMA

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	0.25	0/2589	0.44	0/3514
1	C	0.25	0/2543	0.43	0/3449
1	E	0.26	0/2580	0.44	0/3504
2	B	0.27	0/1424	0.42	0/1915
2	D	0.26	0/1409	0.42	0/1897
2	F	0.26	0/1428	0.42	0/1920
All	All	0.26	0/11973	0.43	0/16199

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	2535	0	2484	2	0
1	C	2492	0	2435	2	0
1	E	2526	0	2469	3	0
2	B	1399	0	1317	0	0
2	D	1384	0	1294	0	0
2	F	1403	0	1324	2	0
3	G	28	0	25	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	I	28	0	25	0	0
3	N	28	0	25	0	0
3	S	28	0	25	0	0
4	H	61	0	52	0	0
4	O	61	0	52	0	0
4	Q	61	0	52	0	0
5	J	49	0	43	0	0
6	K	39	0	34	0	0
7	L	31	0	26	0	0
8	M	24	0	22	0	0
9	P	46	0	40	0	0
9	T	46	0	40	0	0
10	R	38	0	34	0	0
10	U	38	0	34	1	0
11	A	14	0	13	0	0
11	C	28	0	26	0	0
11	D	28	0	26	0	0
11	E	28	0	26	0	0
12	D	10	0	10	0	0
13	A	20	0	0	0	0
13	B	5	0	0	0	0
13	C	17	0	0	0	0
13	D	9	0	0	0	0
13	E	12	0	0	0	0
13	F	8	0	0	0	0
All	All	12524	0	11953	10	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 0.

The worst 5 of 10 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:283:THR:HG22	1:E:301:THR:HG22	1.88	0.55
2:F:158:ASP:O	2:F:161:ILE:HG22	2.12	0.49
1:C:34:ILE:HD11	1:C:321:ARG:HD2	1.95	0.48
1:A:42:LEU:HD11	1:A:316:LEU:HB2	1.94	0.48
1:C:42:LEU:HD11	1:C:316:LEU:HB2	1.95	0.48

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	323/329 (98%)	303 (94%)	19 (6%)	1 (0%)	41	76
1	C	317/329 (96%)	302 (95%)	14 (4%)	1 (0%)	41	76
1	E	323/329 (98%)	307 (95%)	15 (5%)	1 (0%)	41	76
2	B	170/172 (99%)	162 (95%)	8 (5%)	0	100	100
2	D	169/172 (98%)	158 (94%)	11 (6%)	0	100	100
2	F	170/172 (99%)	157 (92%)	12 (7%)	1 (1%)	25	64
All	All	1472/1503 (98%)	1389 (94%)	79 (5%)	4 (0%)	41	76

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	62	ARG
2	F	58	ARG
1	E	3	ASN
1	A	196	ILE

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	288/292 (99%)	283 (98%)	5 (2%)	60	85
1	C	281/292 (96%)	278 (99%)	3 (1%)	73	90
1	E	286/292 (98%)	282 (99%)	4 (1%)	67	88

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	145/146 (99%)	144 (99%)	1 (1%)	84	94
2	D	143/146 (98%)	143 (100%)	0	100	100
2	F	146/146 (100%)	144 (99%)	2 (1%)	67	88
All	All	1289/1314 (98%)	1274 (99%)	15 (1%)	71	90

5 of 15 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	135	ARG
2	F	58	ARG
1	C	197	GLN
2	F	59	THR
1	E	159	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	197	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

46 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
3	NAG	G	1	3,1	14,14,15	0.73	0	17,19,21	1.22	2 (11%)
3	NAG	G	2	3	14,14,15	0.51	0	17,19,21	0.76	0
4	NAG	H	1	1,4	14,14,15	0.52	0	17,19,21	0.97	1 (5%)
4	NAG	H	2	4	14,14,15	0.50	0	17,19,21	0.70	0
4	BMA	H	3	4	11,11,12	0.49	0	15,15,17	1.61	2 (13%)
4	MAN	H	4	4	11,11,12	0.59	0	15,15,17	1.03	1 (6%)
4	MAN	H	5	4	11,11,12	0.57	0	15,15,17	2.35	3 (20%)
3	NAG	I	1	3,1	14,14,15	0.40	0	17,19,21	1.41	3 (17%)
3	NAG	I	2	3	14,14,15	0.55	0	17,19,21	1.08	2 (11%)
5	NAG	J	1	5,1	14,14,15	0.54	0	17,19,21	0.93	0
5	NAG	J	2	5	14,14,15	0.49	0	17,19,21	1.19	2 (11%)
5	BMA	J	3	5	11,11,12	0.41	0	15,15,17	1.87	3 (20%)
5	FUC	J	4	5	10,10,11	0.64	0	14,14,16	0.53	0
6	NAG	K	1	6,1	14,14,15	0.54	0	17,19,21	0.74	0
6	NAG	K	2	6	14,14,15	0.66	0	17,19,21	1.38	1 (5%)
6	BMA	K	3	6	11,11,12	0.29	0	15,15,17	0.67	0
7	GAL	L	1	7	11,11,12	0.62	0	15,15,17	0.72	0
7	SIA	L	2	7	20,20,21	0.59	0	24,28,31	1.11	2 (8%)
8	NAG	M	1	8,2	14,14,15	0.56	0	17,19,21	0.94	1 (5%)
8	FUC	M	2	8	10,10,11	0.63	0	14,14,16	0.81	0
3	NAG	N	1	3,1	14,14,15	0.50	0	17,19,21	1.04	1 (5%)
3	NAG	N	2	3	14,14,15	0.51	0	17,19,21	0.69	0
4	NAG	O	1	1,4	14,14,15	0.50	0	17,19,21	0.73	0
4	NAG	O	2	4	14,14,15	0.52	0	17,19,21	0.71	0
4	BMA	O	3	4	11,11,12	0.54	0	15,15,17	1.41	3 (20%)
4	MAN	O	4	4	11,11,12	0.54	0	15,15,17	2.46	3 (20%)
4	MAN	O	5	4	11,11,12	0.53	0	15,15,17	1.07	1 (6%)
9	NAG	P	1	9	15,15,15	0.48	0	21,21,21	1.01	2 (9%)
9	GAL	P	2	9	11,11,12	0.66	0	15,15,17	1.06	1 (6%)
9	SIA	P	3	9	20,20,21	0.57	0	24,28,31	1.18	3 (12%)
4	NAG	Q	1	1,4	14,14,15	0.51	0	17,19,21	0.96	1 (5%)
4	NAG	Q	2	4	14,14,15	0.54	0	17,19,21	0.64	0
4	BMA	Q	3	4	11,11,12	0.45	0	15,15,17	1.07	1 (6%)
4	MAN	Q	4	4	11,11,12	0.62	0	15,15,17	1.40	2 (13%)
4	MAN	Q	5	4	11,11,12	0.51	0	15,15,17	1.88	2 (13%)
10	NAG	R	1	1,10	14,14,15	0.55	0	17,19,21	0.90	1 (5%)
10	NAG	R	2	10	14,14,15	0.73	0	17,19,21	1.79	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
10	FUC	R	3	10	10,10,11	0.58	0	14,14,16	1.11	2 (14%)
3	NAG	S	1	3,1	14,14,15	0.60	0	17,19,21	0.87	1 (5%)
3	NAG	S	2	3	14,14,15	0.64	0	17,19,21	1.12	1 (5%)
9	NAG	T	1	9	15,15,15	0.42	0	21,21,21	0.71	0
9	GAL	T	2	9	11,11,12	0.59	0	15,15,17	0.88	1 (6%)
9	SIA	T	3	9	20,20,21	0.59	0	24,28,31	1.34	4 (16%)
10	NAG	U	1	10,2	14,14,15	0.49	0	17,19,21	1.23	2 (11%)
10	NAG	U	2	10	14,14,15	0.57	0	17,19,21	1.66	2 (11%)
10	FUC	U	3	10	10,10,11	0.65	0	14,14,16	1.00	1 (7%)

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
3	NAG	G	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	G	2	3	-	2/6/23/26	0/1/1/1
4	NAG	H	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	H	2	4	-	0/6/23/26	0/1/1/1
4	BMA	H	3	4	-	2/2/19/22	0/1/1/1
4	MAN	H	4	4	-	2/2/19/22	0/1/1/1
4	MAN	H	5	4	-	0/2/19/22	0/1/1/1
3	NAG	I	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	I	2	3	-	1/6/23/26	0/1/1/1
5	NAG	J	1	5,1	-	2/6/23/26	0/1/1/1
5	NAG	J	2	5	-	0/6/23/26	0/1/1/1
5	BMA	J	3	5	-	2/2/19/22	0/1/1/1
5	FUC	J	4	5	1/1/4/5	-	0/1/1/1
6	NAG	K	1	6,1	-	2/6/23/26	0/1/1/1
6	NAG	K	2	6	-	0/6/23/26	0/1/1/1
6	BMA	K	3	6	-	0/2/19/22	0/1/1/1
7	GAL	L	1	7	-	1/2/19/22	0/1/1/1
7	SIA	L	2	7	-	1/18/34/38	0/1/1/1
8	NAG	M	1	8,2	-	2/6/23/26	0/1/1/1
8	FUC	M	2	8	1/1/4/5	-	0/1/1/1
3	NAG	N	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	N	2	3	-	2/6/23/26	0/1/1/1
4	NAG	O	1	1,4	-	1/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	O	2	4	-	0/6/23/26	0/1/1/1
4	BMA	O	3	4	-	2/2/19/22	0/1/1/1
4	MAN	O	4	4	1/1/4/5	0/2/19/22	0/1/1/1
4	MAN	O	5	4	-	2/2/19/22	1/1/1/1
9	NAG	P	1	9	-	0/6/26/26	0/1/1/1
9	GAL	P	2	9	-	2/2/19/22	0/1/1/1
9	SIA	P	3	9	-	1/18/34/38	0/1/1/1
4	NAG	Q	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	Q	2	4	-	0/6/23/26	0/1/1/1
4	BMA	Q	3	4	-	2/2/19/22	0/1/1/1
4	MAN	Q	4	4	-	2/2/19/22	0/1/1/1
4	MAN	Q	5	4	1/1/4/5	2/2/19/22	0/1/1/1
10	NAG	R	1	1,10	-	2/6/23/26	0/1/1/1
10	NAG	R	2	10	1/1/5/7	2/6/23/26	0/1/1/1
10	FUC	R	3	10	1/1/4/5	-	0/1/1/1
3	NAG	S	1	3,1	-	1/6/23/26	0/1/1/1
3	NAG	S	2	3	-	0/6/23/26	0/1/1/1
9	NAG	T	1	9	-	2/6/26/26	0/1/1/1
9	GAL	T	2	9	-	2/2/19/22	0/1/1/1
9	SIA	T	3	9	-	0/18/34/38	0/1/1/1
10	NAG	U	1	10,2	-	2/6/23/26	0/1/1/1
10	NAG	U	2	10	-	2/6/23/26	0/1/1/1
10	FUC	U	3	10	1/1/4/5	-	0/1/1/1

There are no bond length outliers.

The worst 5 of 60 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	O	4	MAN	O5-C1-C2	7.67	122.62	110.77
4	H	5	MAN	C1-O5-C5	7.03	121.72	112.19
10	R	2	NAG	O5-C1-C2	5.72	120.32	111.29
4	Q	5	MAN	O5-C1-C2	5.64	119.47	110.77
5	J	3	BMA	C1-O5-C5	4.95	118.89	112.19

5 of 7 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	O	4	MAN	C1
4	Q	5	MAN	C1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atom
5	J	4	FUC	C1
8	M	2	FUC	C1
10	R	2	NAG	C1

5 of 48 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	I	2	NAG	C3-C2-N2-C7
10	U	2	NAG	C1-C2-N2-C7
9	T	2	GAL	C4-C5-C6-O6
6	K	1	NAG	O5-C5-C6-O6
10	R	1	NAG	O5-C5-C6-O6

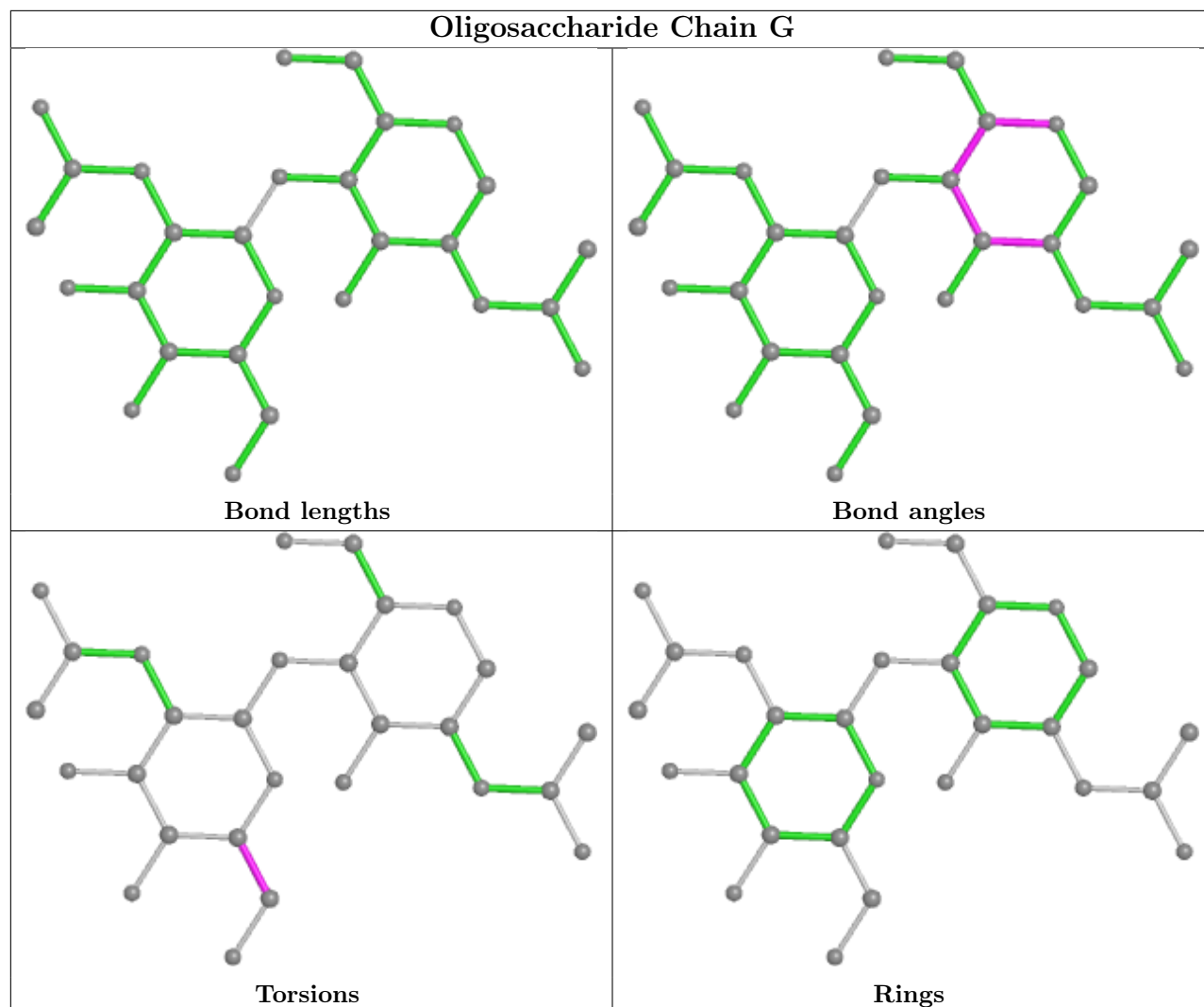
All (1) ring outliers are listed below:

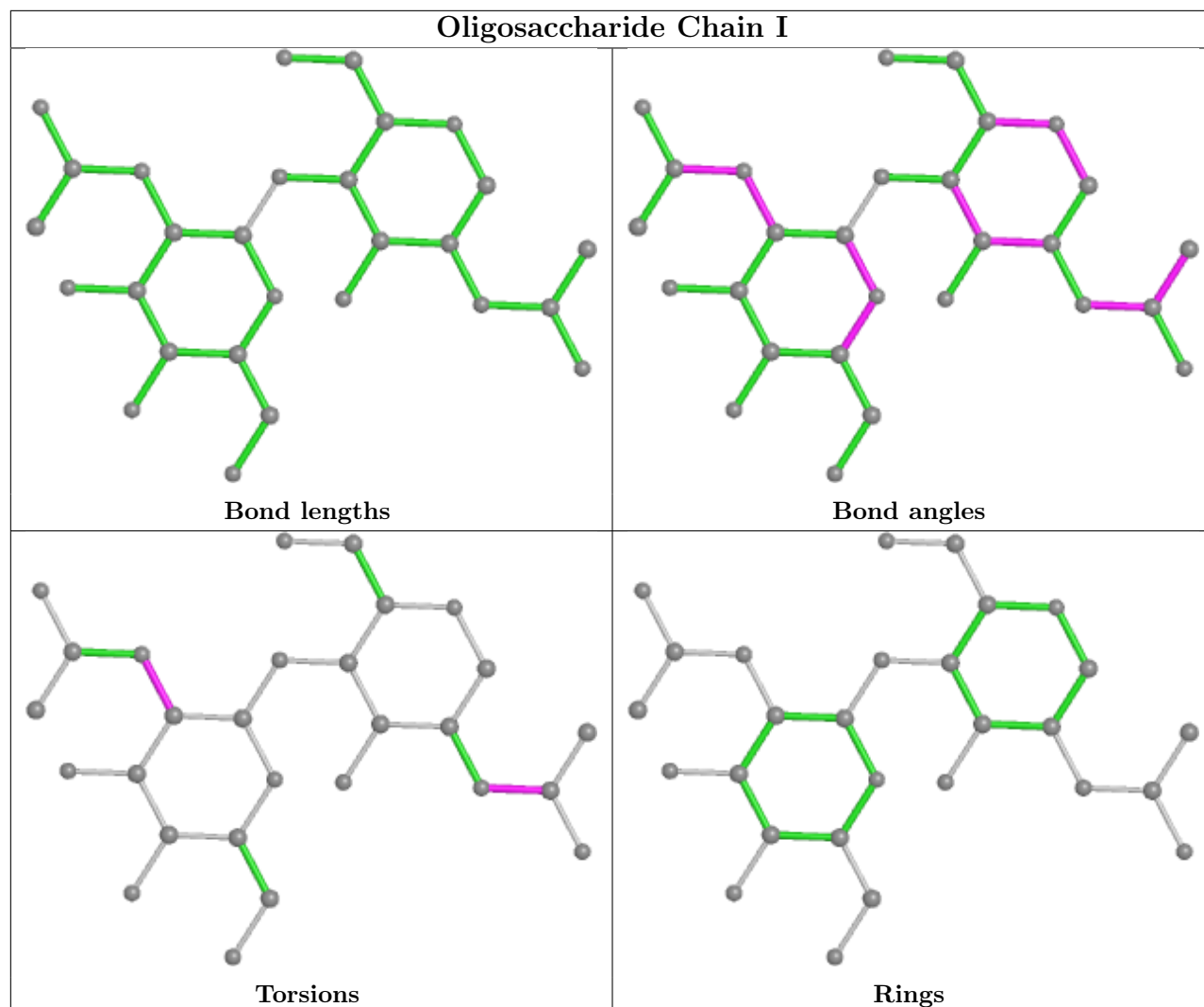
Mol	Chain	Res	Type	Atoms
4	O	5	MAN	C1-C2-C3-C4-C5-O5

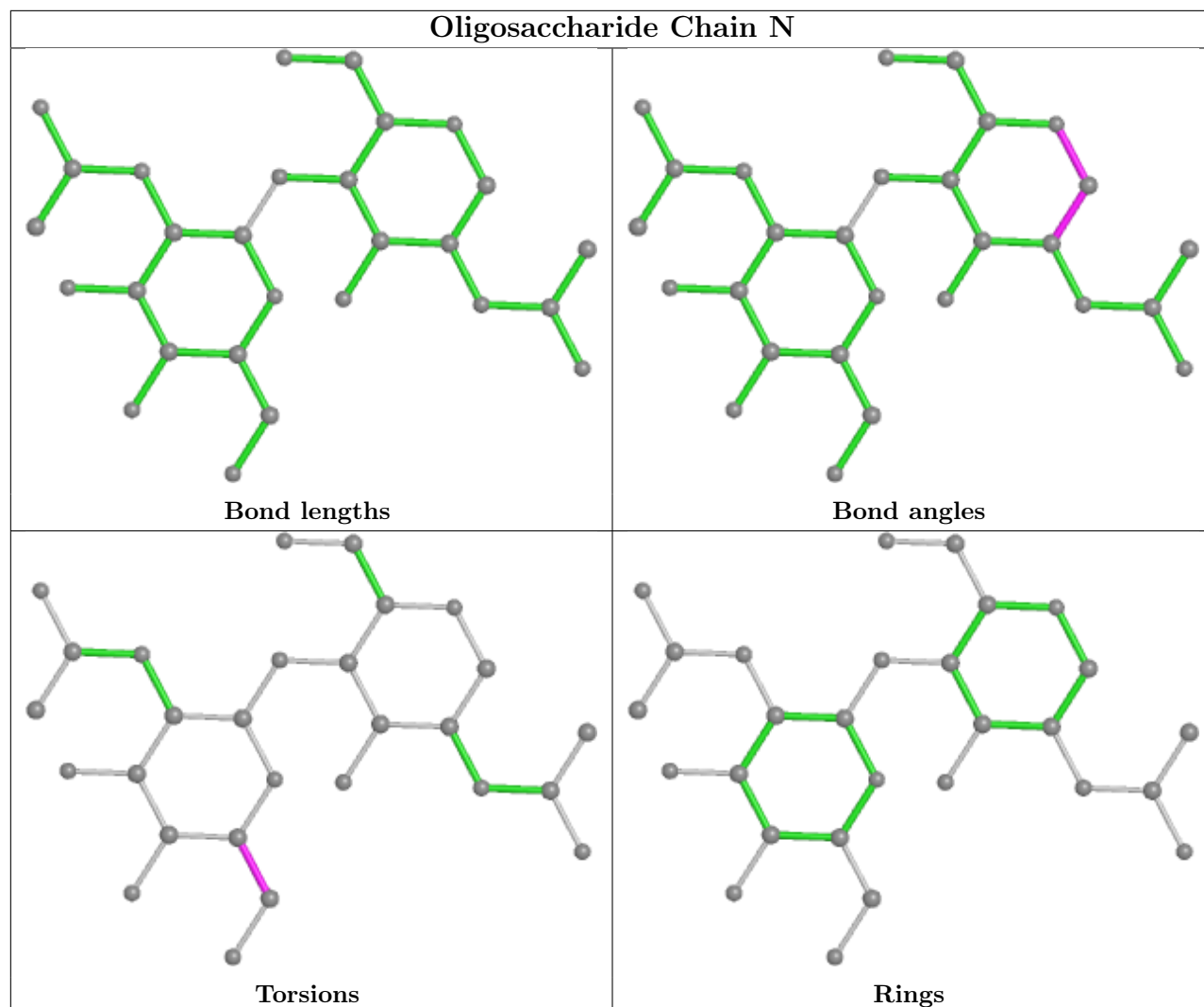
2 monomers are involved in 1 short contact:

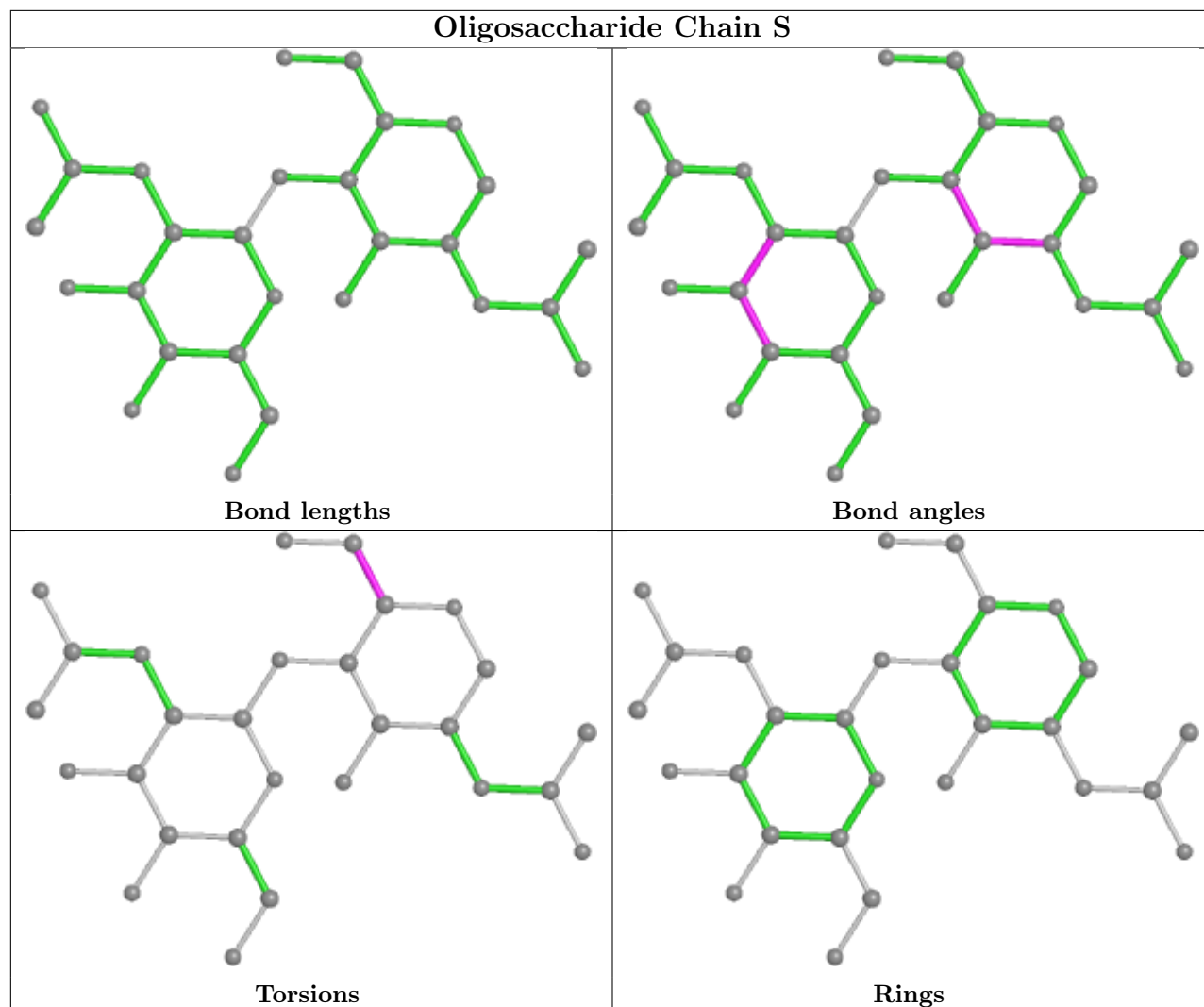
Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	U	2	NAG	1	0
10	U	1	NAG	1	0

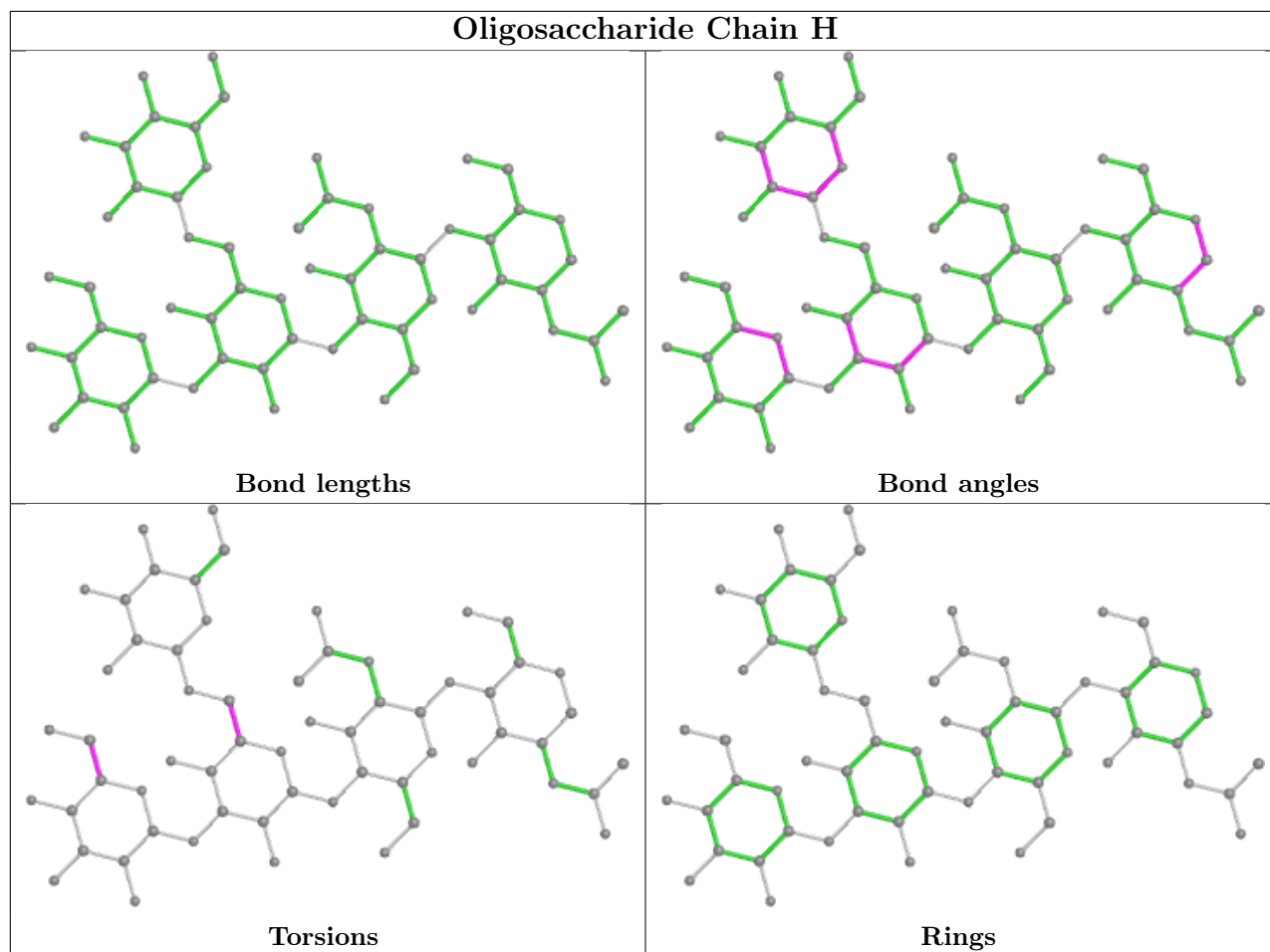
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

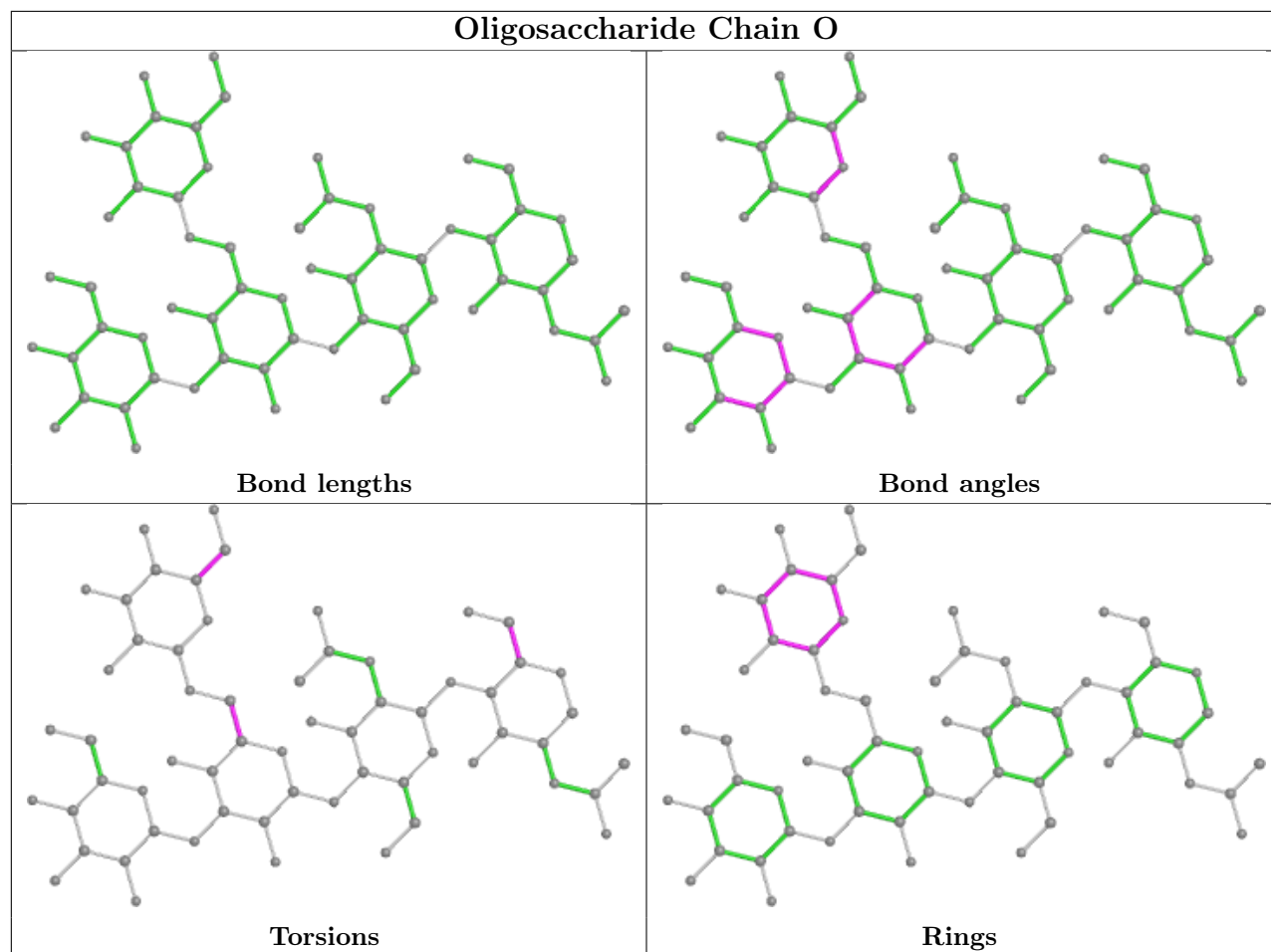


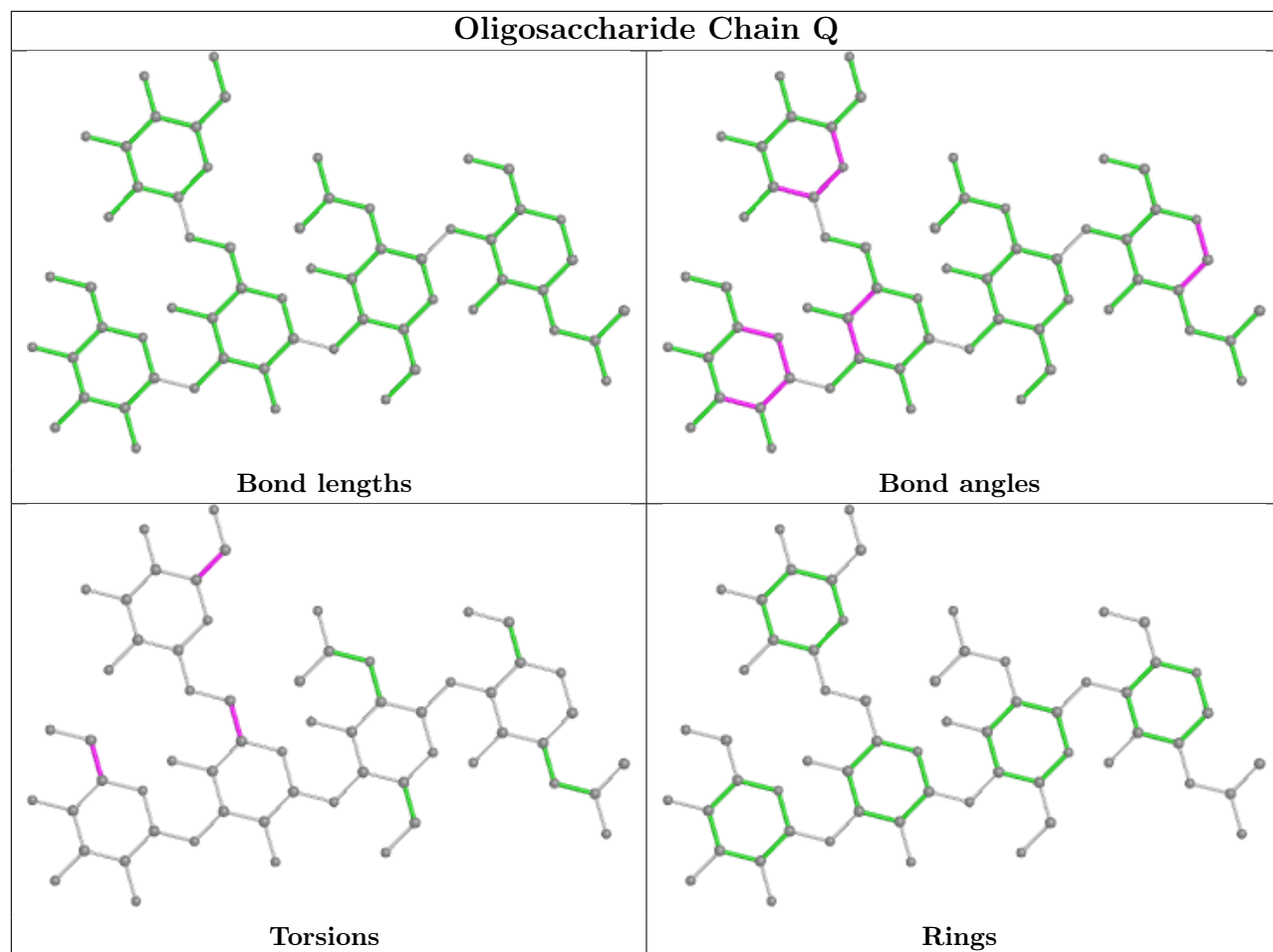


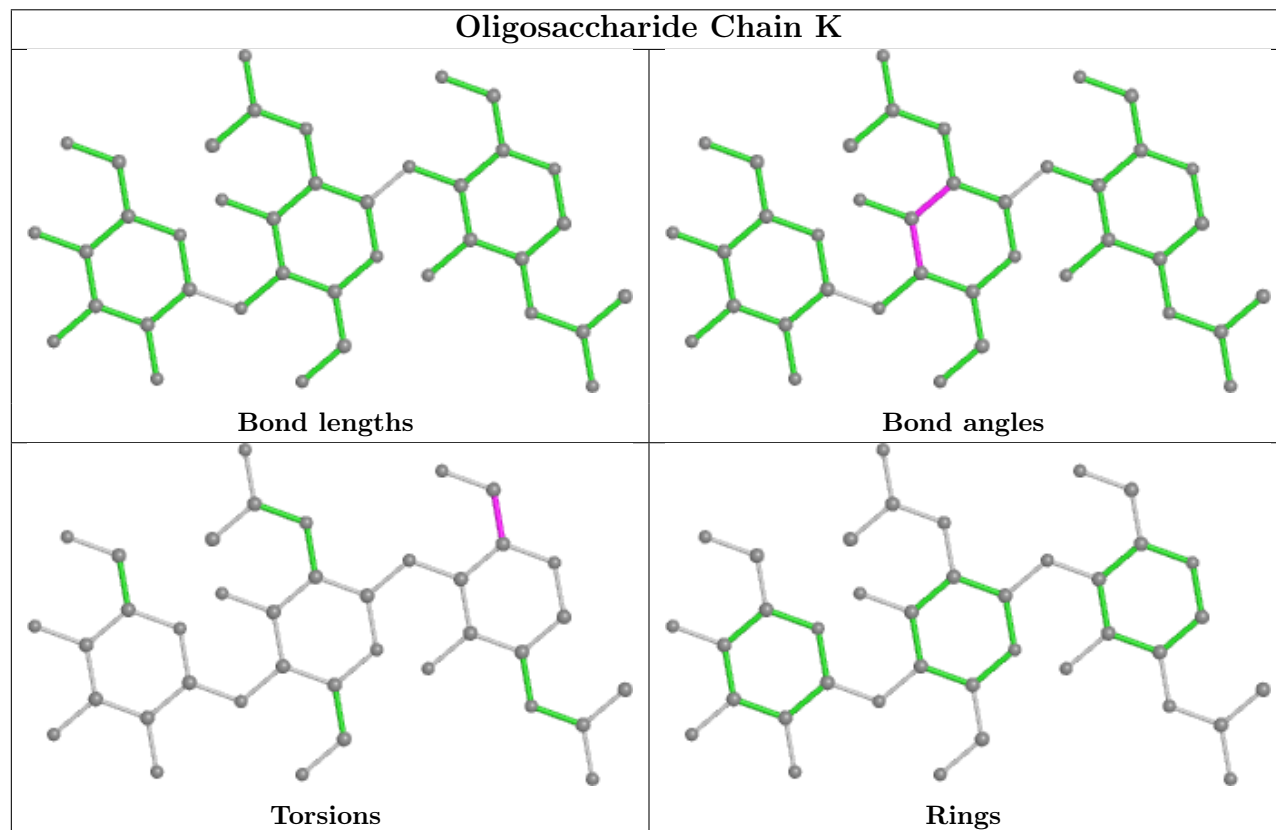
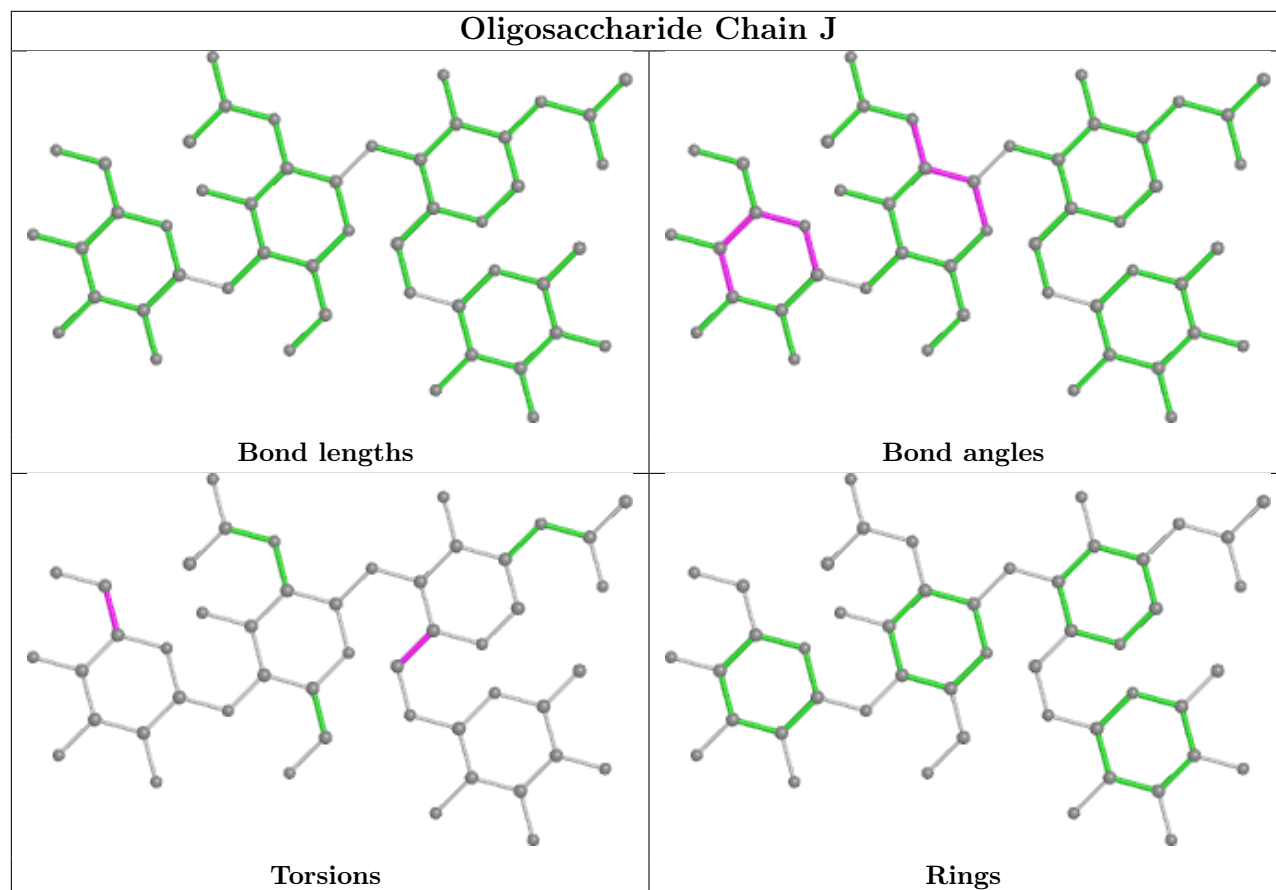


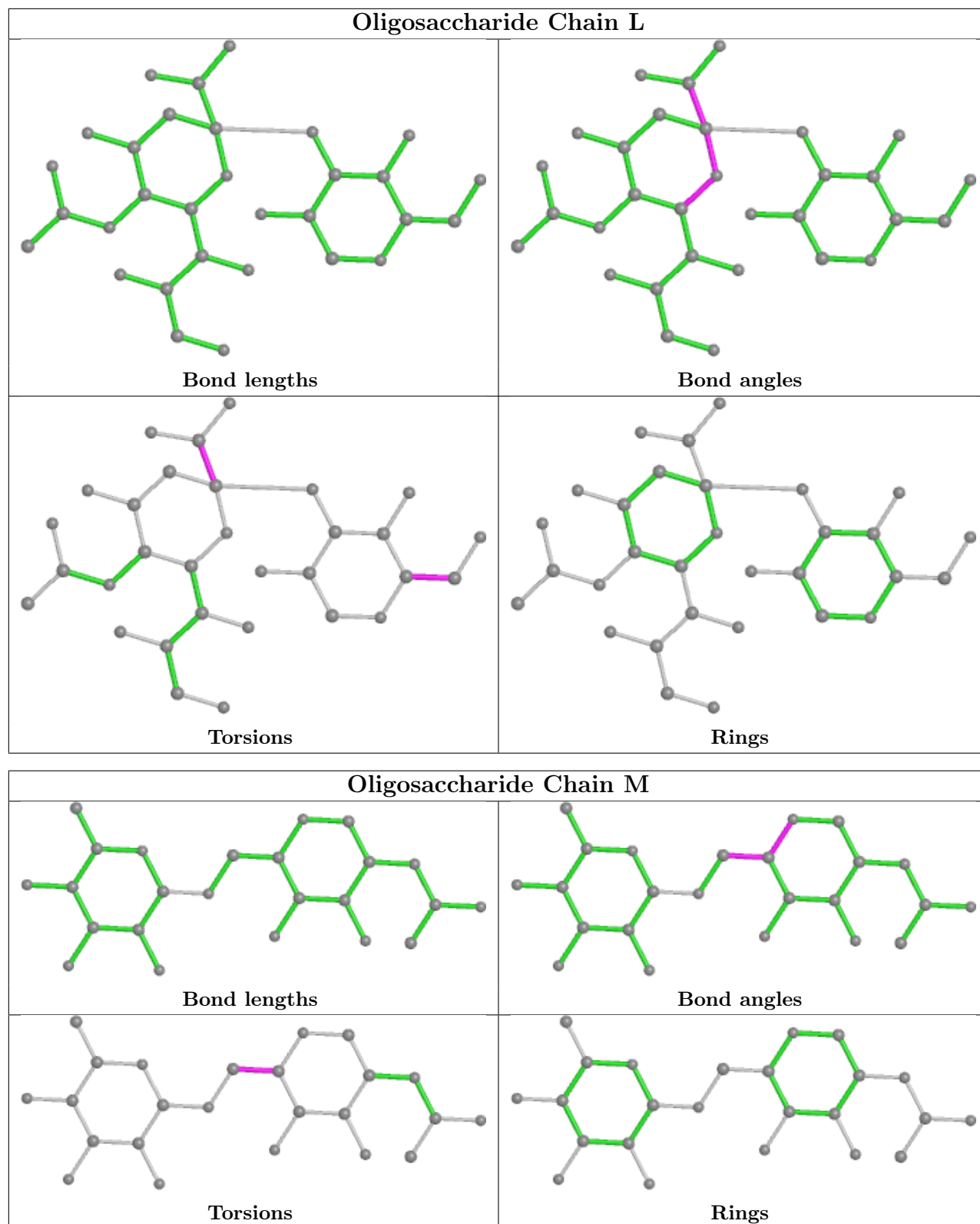


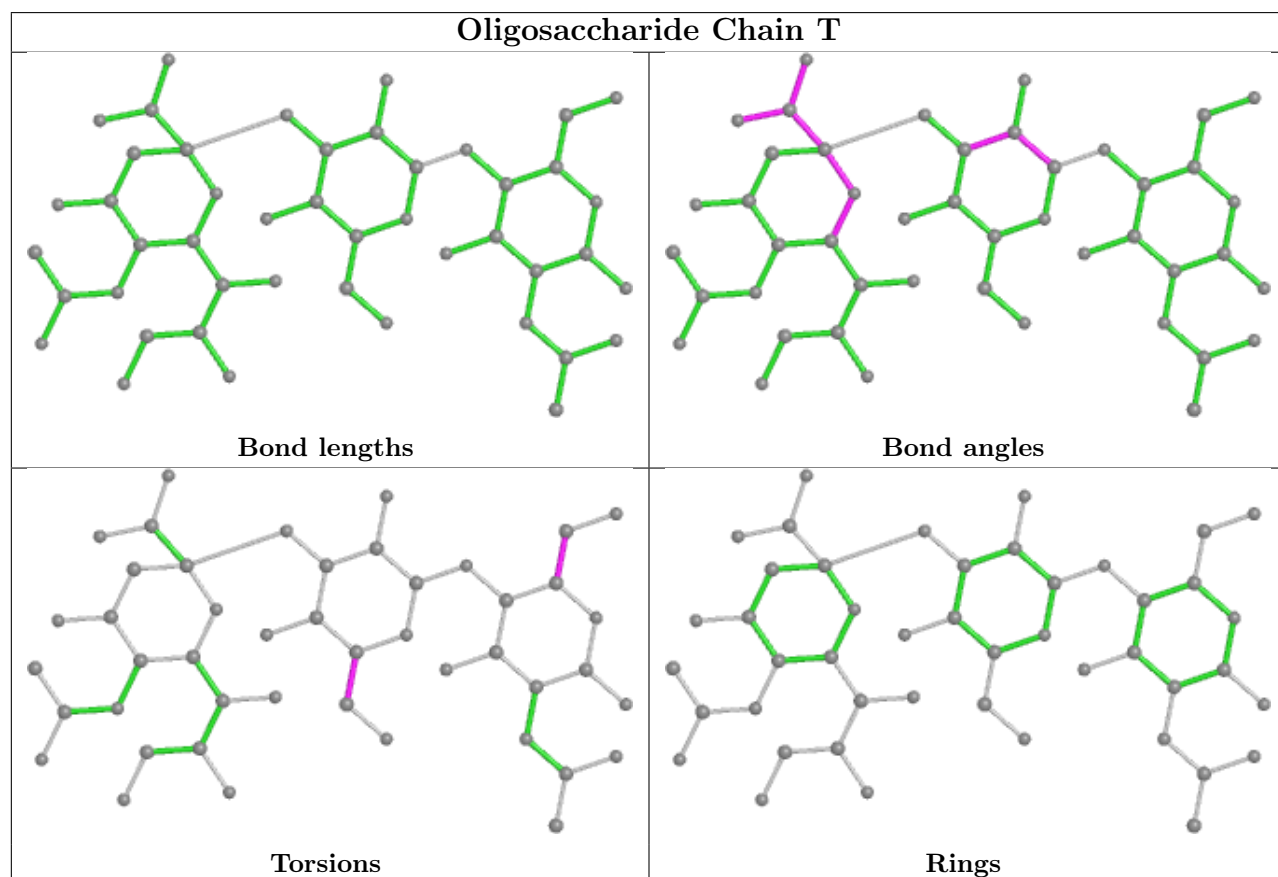
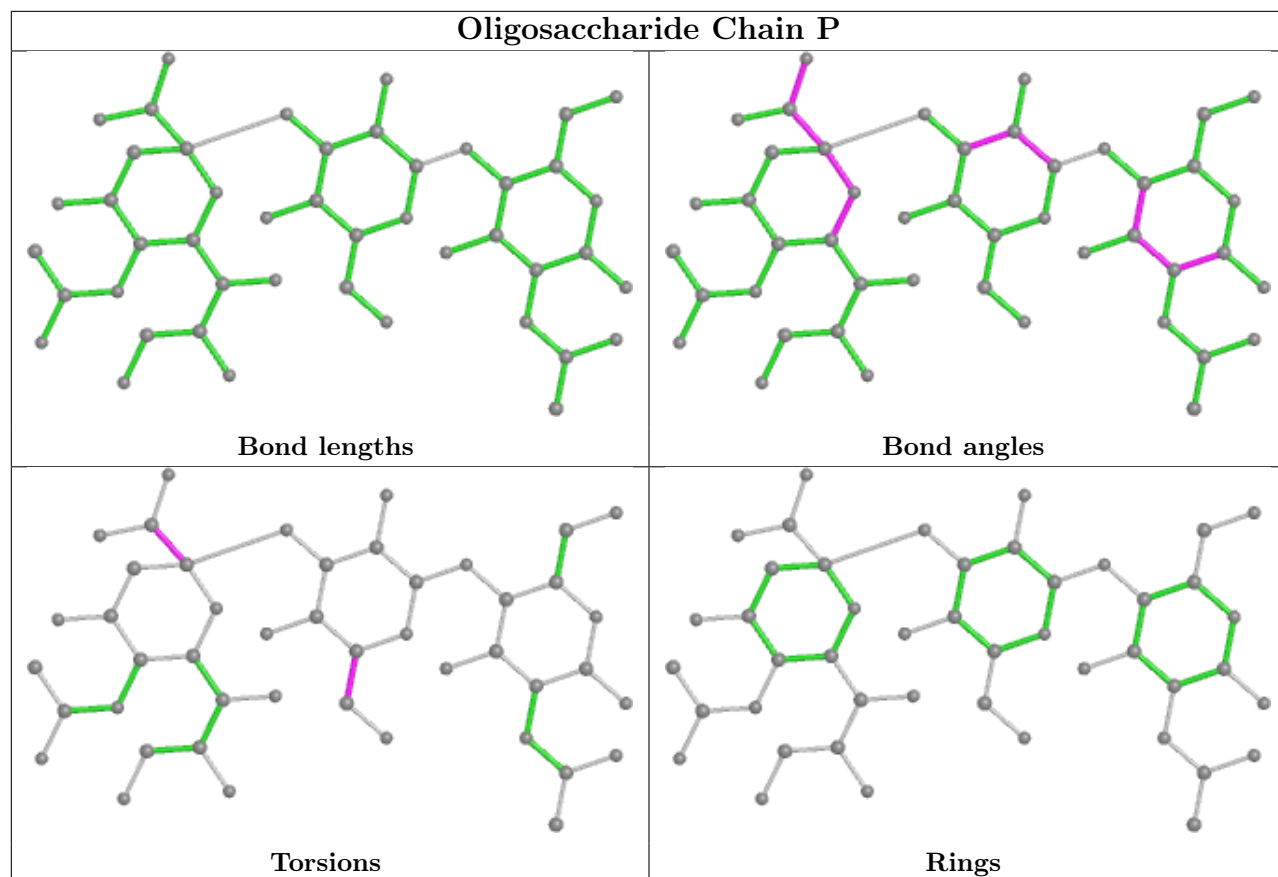


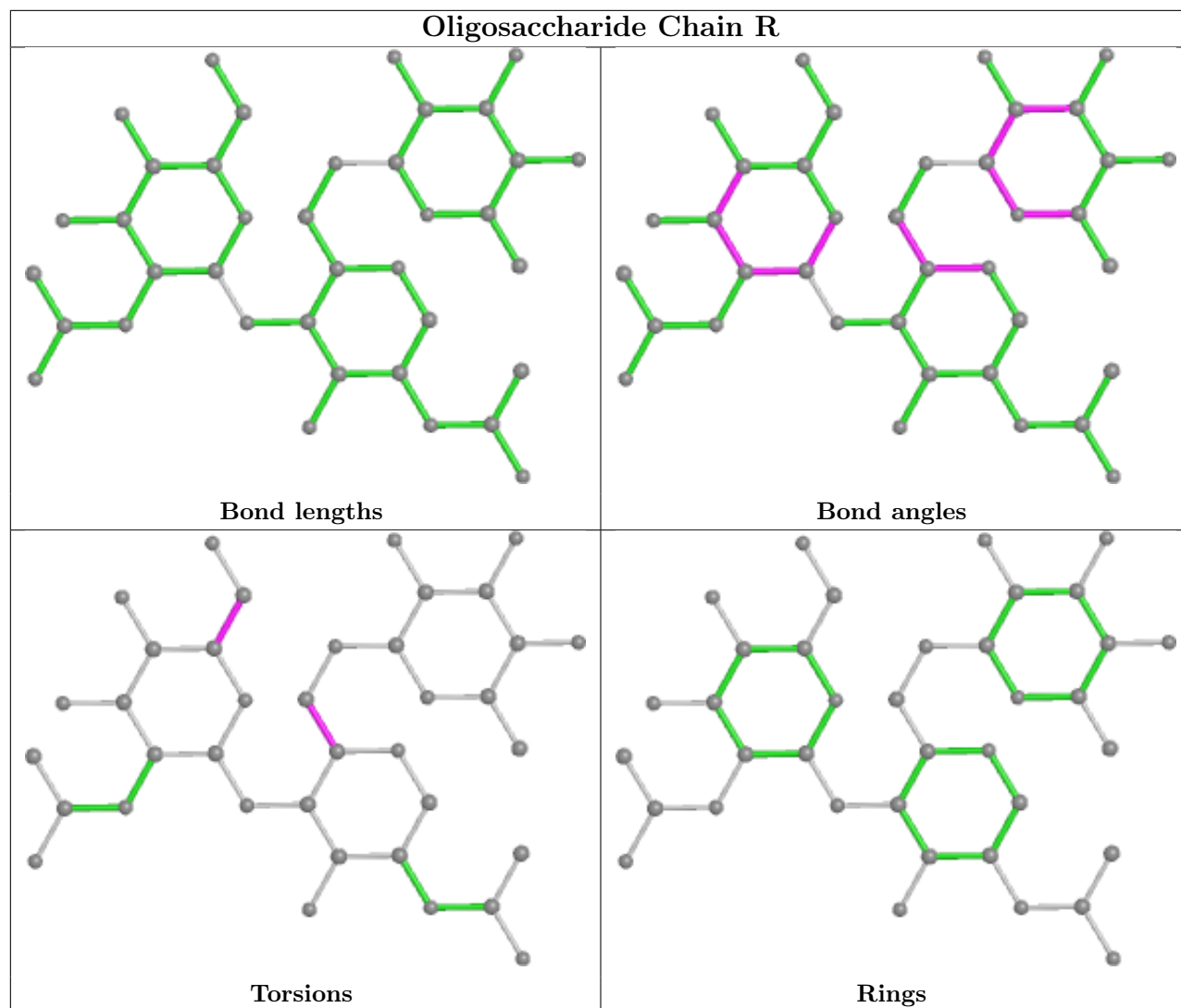


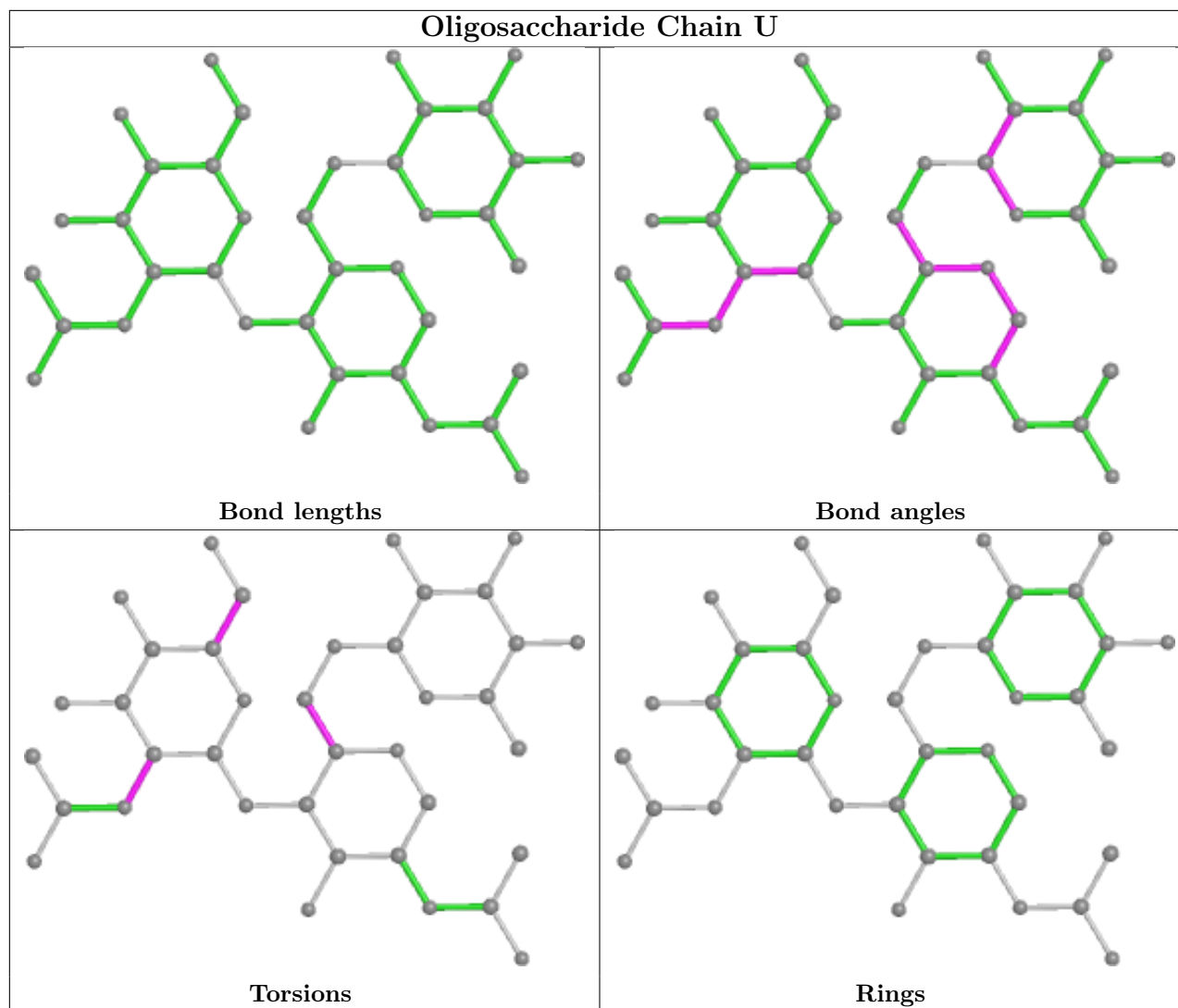












5.6 Ligand geometry [i](#)

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	$\# Z > 2$
11	NAG	C	632	-	14,14,15	0.60	0	17,19,21	1.00	1 (5%)
11	NAG	A	411	1	14,14,15	0.54	0	17,19,21	0.87	0
11	NAG	E	441	1	14,14,15	0.52	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
12	FUC	D	200	-	10,10,11	0.69	0	14,14,16	0.73	0
11	NAG	D	202	-	14,14,15	0.54	0	17,19,21	0.67	0
11	NAG	C	631	-	14,14,15	0.62	0	17,19,21	1.62	3 (17%)
11	NAG	D	201	2	14,14,15	0.65	0	17,19,21	1.18	2 (11%)
11	NAG	E	621	1	14,14,15	0.68	0	17,19,21	1.34	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
11	NAG	C	632	-	-	0/6/23/26	0/1/1/1
11	NAG	A	411	1	-	1/6/23/26	0/1/1/1
11	NAG	E	441	1	-	2/6/23/26	0/1/1/1
12	FUC	D	200	-	-	-	0/1/1/1
11	NAG	D	202	-	-	2/6/23/26	0/1/1/1
11	NAG	C	631	-	-	0/6/23/26	0/1/1/1
11	NAG	D	201	2	-	2/6/23/26	0/1/1/1
11	NAG	E	621	1	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	E	621	NAG	C4-C3-C2	4.20	117.17	111.02
11	C	631	NAG	C3-C4-C5	4.13	117.61	110.24
11	C	631	NAG	O5-C1-C2	-3.49	105.78	111.29
11	D	201	NAG	C4-C3-C2	3.35	115.93	111.02
11	E	441	NAG	C8-C7-N2	2.25	119.91	116.10

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
11	D	201	NAG	C4-C5-C6-O6
11	D	202	NAG	O5-C5-C6-O6
11	D	202	NAG	C4-C5-C6-O6
11	D	201	NAG	O5-C5-C6-O6
11	E	441	NAG	C8-C7-N2-C2

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, 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	325/329 (98%)	-0.02	4 (1%) 79 54	60, 80, 107, 123	0
1	C	320/329 (97%)	-0.12	0 100 100	63, 78, 95, 106	0
1	E	325/329 (98%)	0.18	5 (1%) 73 46	67, 97, 118, 146	0
2	B	172/172 (100%)	-0.10	1 (0%) 89 72	55, 74, 90, 107	0
2	D	171/172 (99%)	-0.10	0 100 100	55, 74, 88, 93	0
2	F	172/172 (100%)	-0.09	0 100 100	58, 73, 91, 99	0
All	All	1485/1503 (98%)	-0.03	10 (0%) 87 69	55, 79, 110, 146	0

The worst 5 of 10 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	278	VAL	3.4
1	A	2	GLN	2.9
1	A	142	GLY	2.5
1	E	96	ASN	2.5
2	B	57	GLU	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 [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.

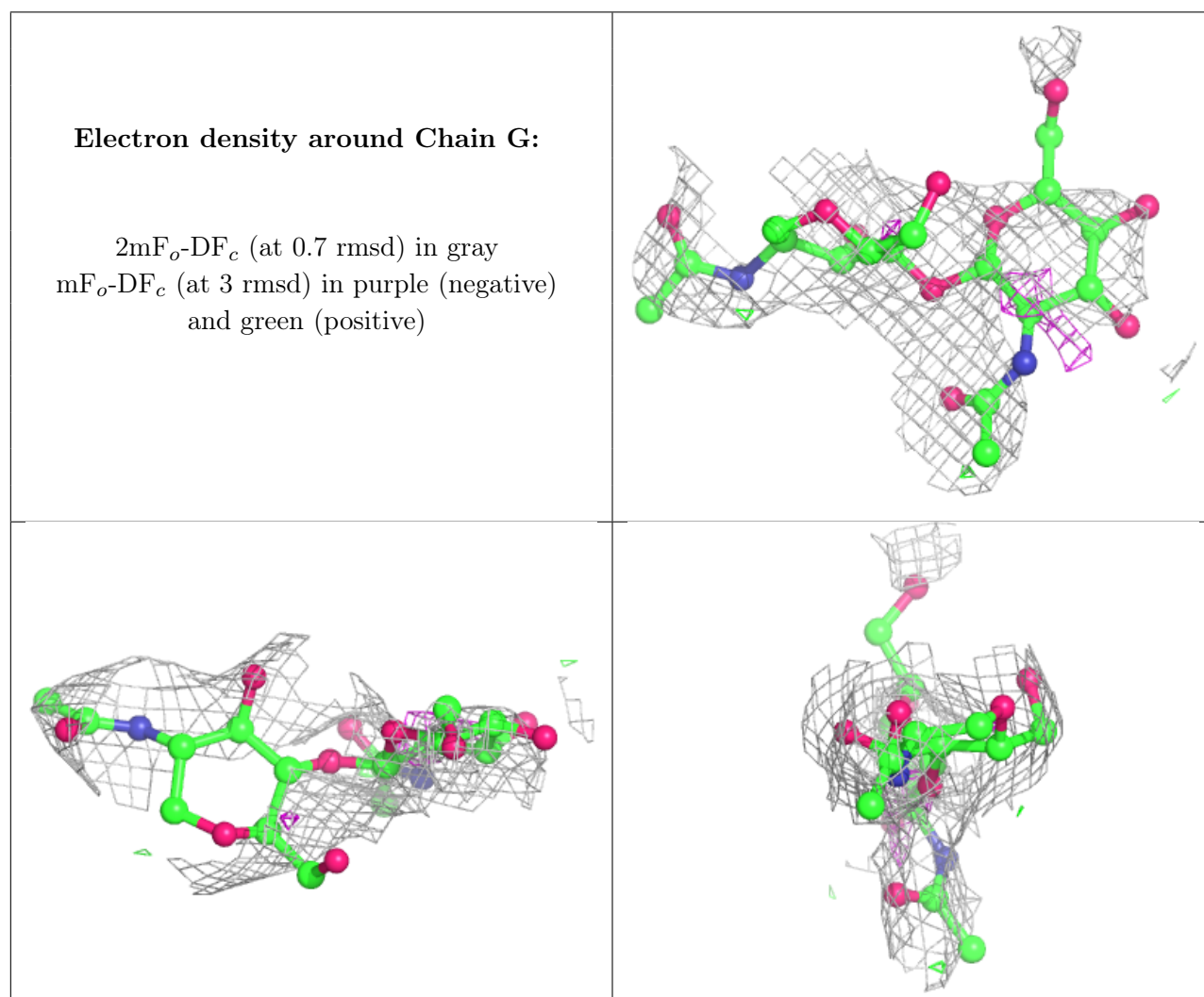
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	NAG	G	2	14/15	0.51	0.55	127,130,136,138	0
10	NAG	R	2	14/15	0.56	0.36	121,123,130,130	0
4	MAN	H	5	11/12	0.60	0.27	143,146,158,159	0
3	NAG	N	1	14/15	0.63	0.27	101,106,110,114	0
3	NAG	I	2	14/15	0.64	0.28	91,97,101,103	0
3	NAG	N	2	14/15	0.66	0.37	117,120,126,128	0
4	MAN	H	4	11/12	0.73	0.37	144,153,163,167	0
10	NAG	U	2	14/15	0.73	0.29	100,111,118,121	0
6	NAG	K	2	14/15	0.74	0.42	98,105,109,109	0
9	NAG	T	1	15/15	0.74	0.30	138,143,150,151	0
6	BMA	K	3	11/12	0.75	0.30	105,111,115,119	0
4	BMA	H	3	11/12	0.75	0.24	134,139,147,148	0
4	MAN	Q	5	11/12	0.76	0.24	126,130,132,133	0
4	MAN	O	5	11/12	0.76	0.19	108,110,112,115	0
4	BMA	Q	3	11/12	0.76	0.14	119,122,124,128	0
10	FUC	R	3	10/11	0.77	0.27	114,117,120,122	0
10	NAG	R	1	14/15	0.79	0.27	107,111,115,118	0
4	MAN	Q	4	11/12	0.79	0.25	128,132,134,136	0
9	NAG	P	1	15/15	0.80	0.35	104,110,115,117	0
4	NAG	H	2	14/15	0.82	0.29	115,119,126,131	0
4	MAN	O	4	11/12	0.82	0.21	104,111,118,120	0
10	FUC	U	3	10/11	0.82	0.29	99,102,106,108	0
3	NAG	G	1	14/15	0.83	0.32	114,118,124,125	0
5	BMA	J	3	11/12	0.84	0.20	124,130,135,135	0
3	NAG	S	2	14/15	0.84	0.20	99,101,104,107	0
8	NAG	M	1	14/15	0.85	0.25	96,101,104,107	0
8	FUC	M	2	10/11	0.87	0.37	101,103,107,110	0
4	BMA	O	3	11/12	0.88	0.17	101,105,110,111	0
7	SIA	L	2	20/21	0.88	0.19	72,77,83,85	0
3	NAG	S	1	14/15	0.88	0.14	89,94,98,98	0
9	GAL	T	2	11/12	0.88	0.25	127,129,135,135	0
9	SIA	T	3	20/21	0.88	0.25	119,125,131,131	0
6	NAG	K	1	14/15	0.89	0.29	90,93,98,99	0
4	NAG	O	1	14/15	0.89	0.25	80,82,86,87	0
5	NAG	J	1	14/15	0.89	0.20	97,101,107,109	0
10	NAG	U	1	14/15	0.89	0.17	95,101,104,107	0
3	NAG	I	1	14/15	0.89	0.20	85,89,92,93	0
5	FUC	J	4	10/11	0.89	0.31	109,111,114,114	0
5	NAG	J	2	14/15	0.90	0.22	112,115,120,121	0
7	GAL	L	1	11/12	0.90	0.14	81,82,85,85	0
9	SIA	P	3	20/21	0.90	0.19	83,86,93,95	0
4	NAG	H	1	14/15	0.91	0.18	103,106,111,113	0
9	GAL	P	2	11/12	0.91	0.12	95,96,100,101	0

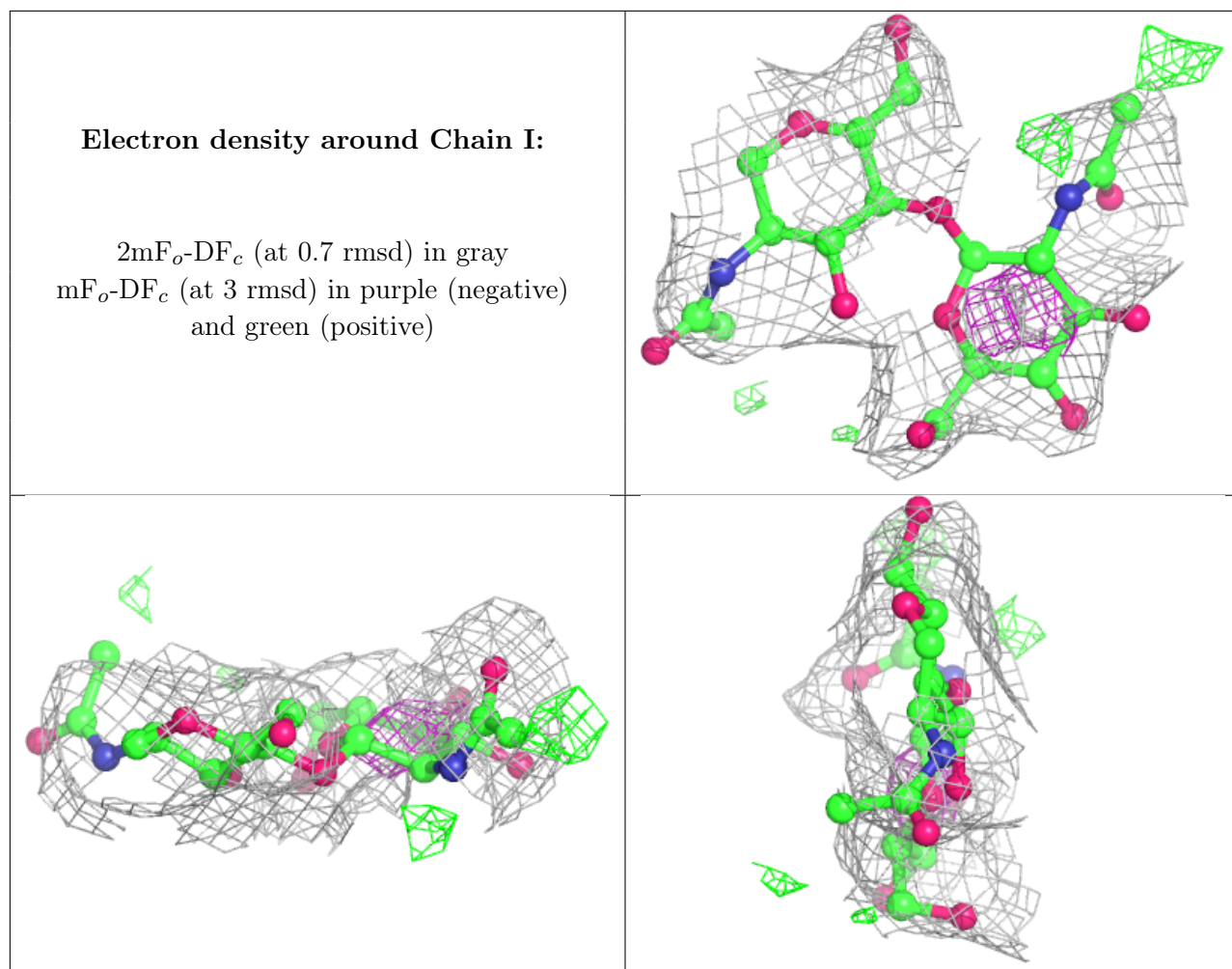
Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	NAG	Q	2	14/15	0.91	0.20	103,109,114,117	0
4	NAG	O	2	14/15	0.93	0.30	89,91,96,98	0
4	NAG	Q	1	14/15	0.94	0.17	100,103,105,107	0

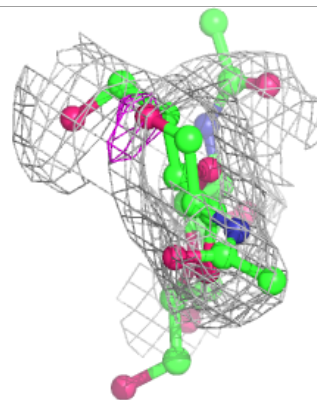
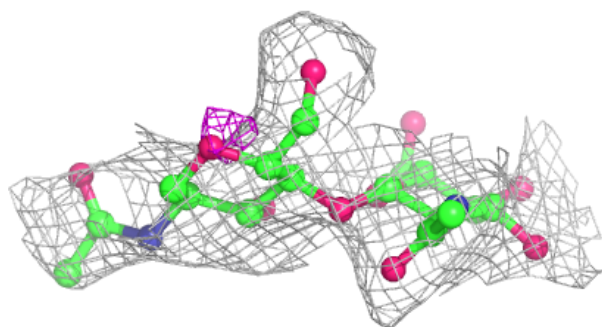
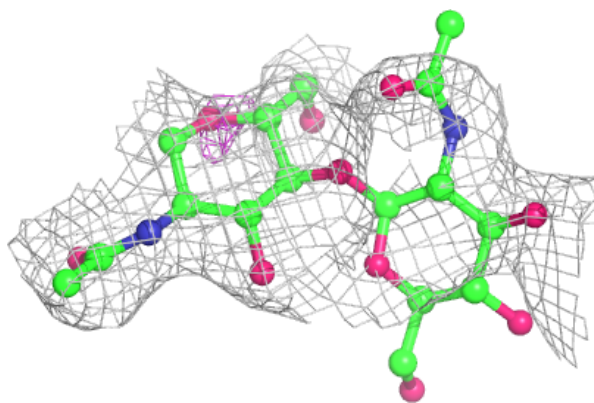
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



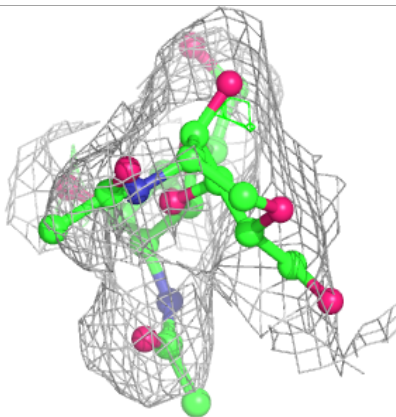
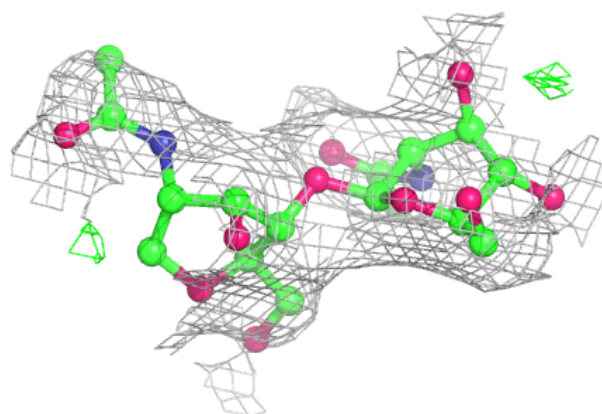
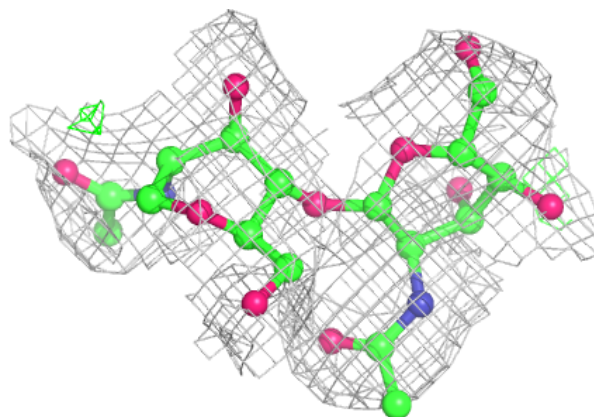


Electron density around Chain N:

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

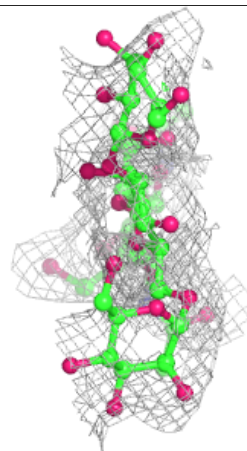
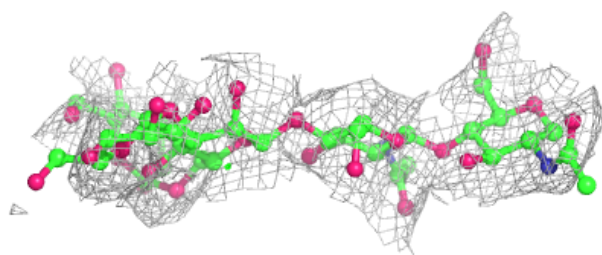
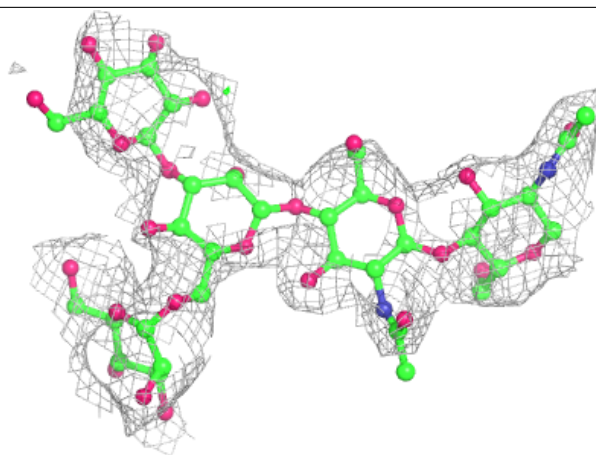
**Electron density around Chain S:**

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



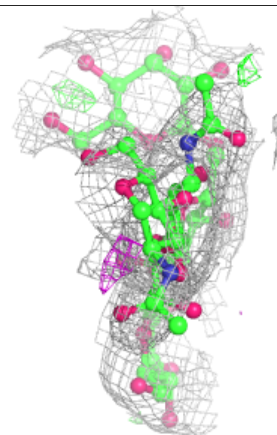
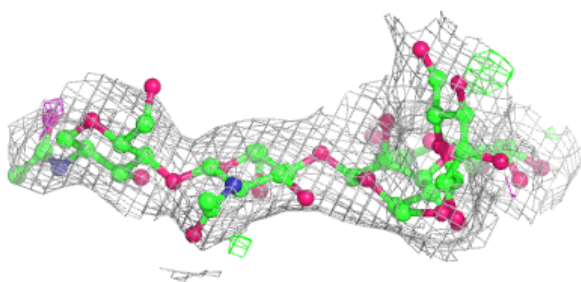
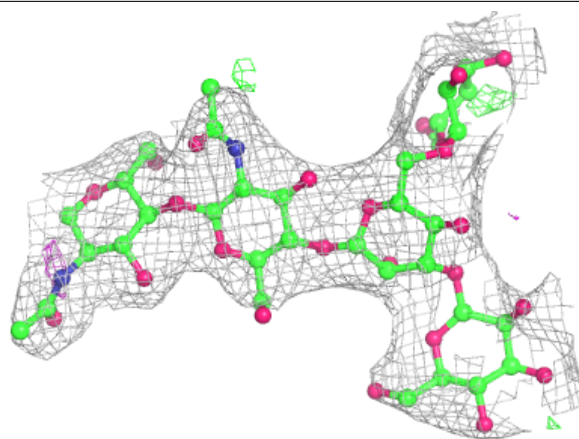
Electron density around Chain H:

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



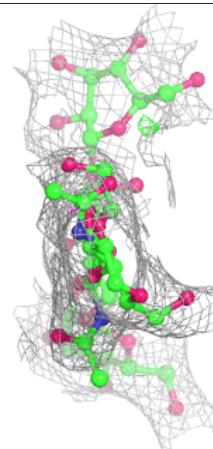
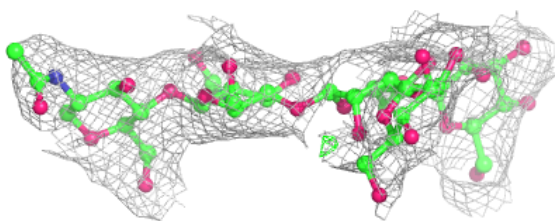
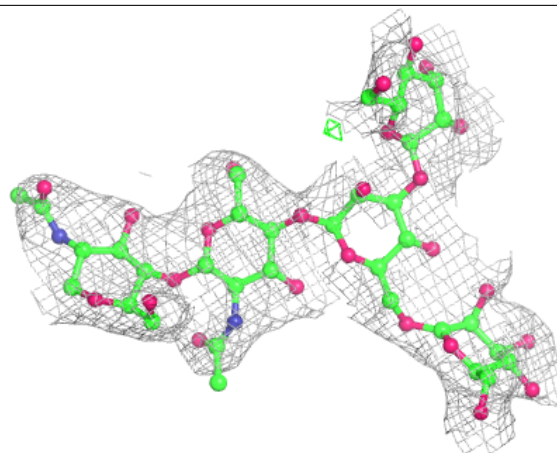
Electron density around Chain O:

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



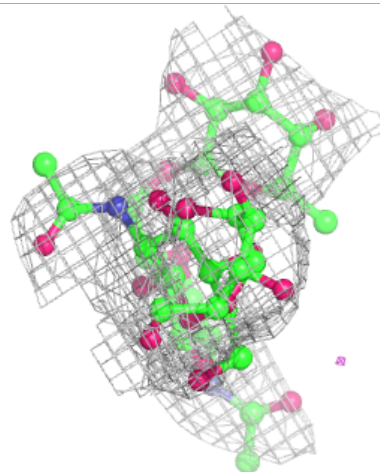
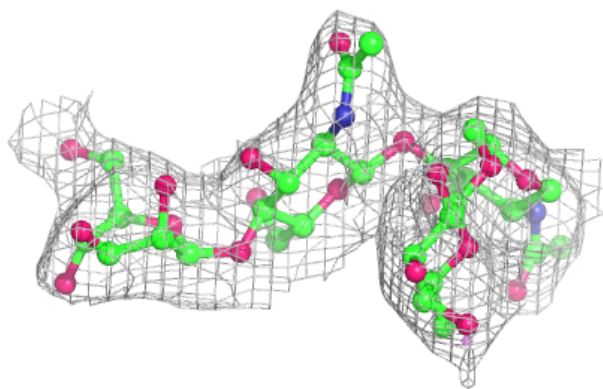
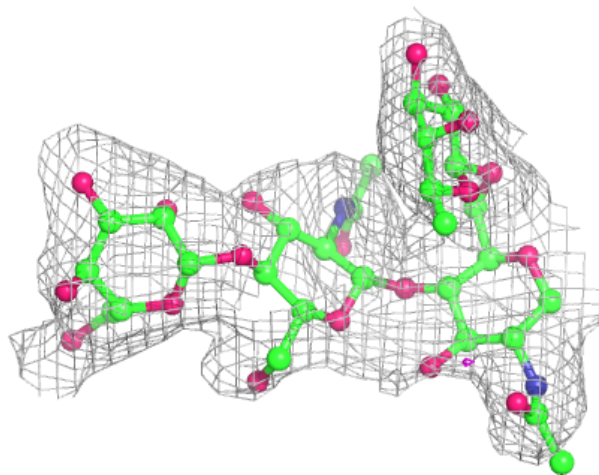
Electron density around Chain Q:

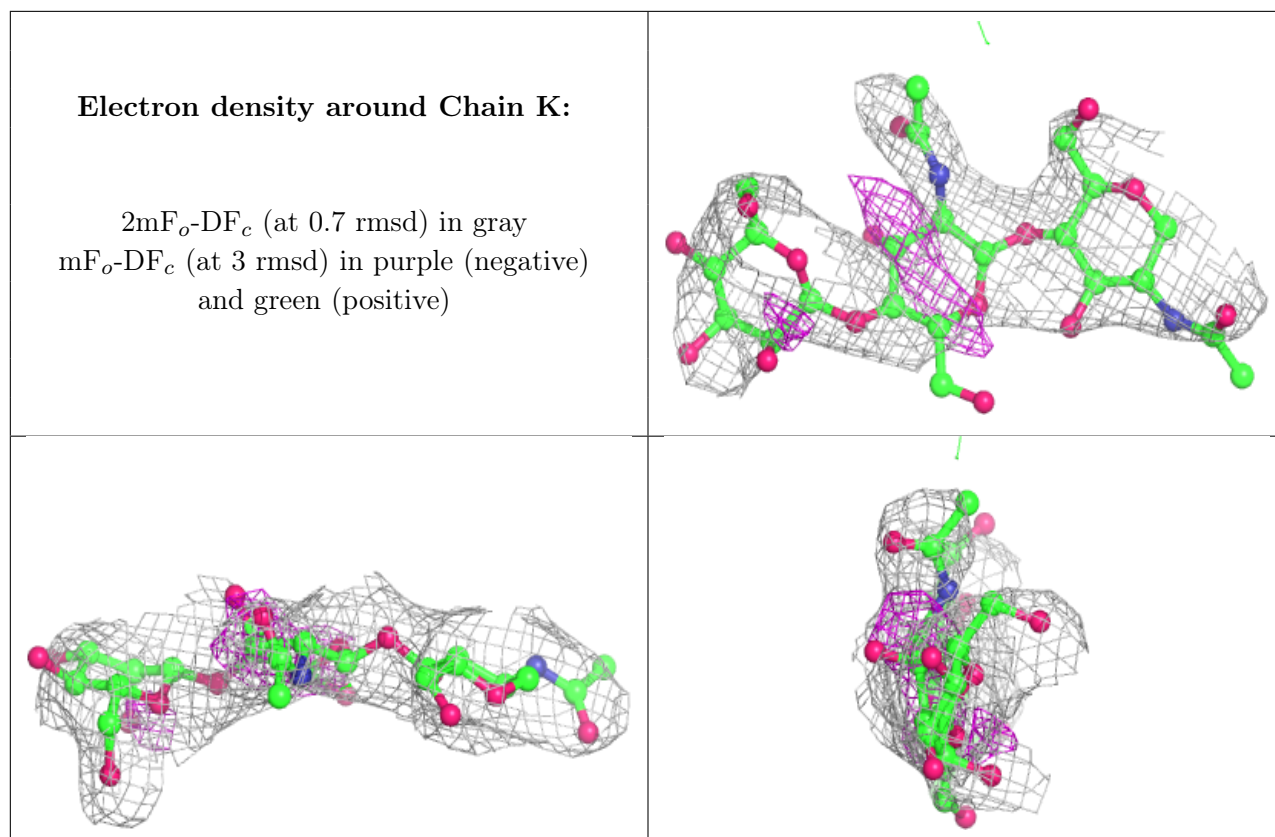
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain J:

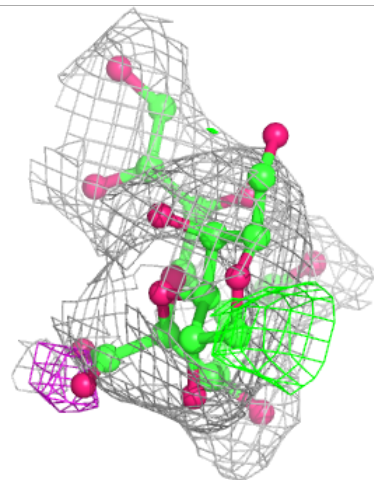
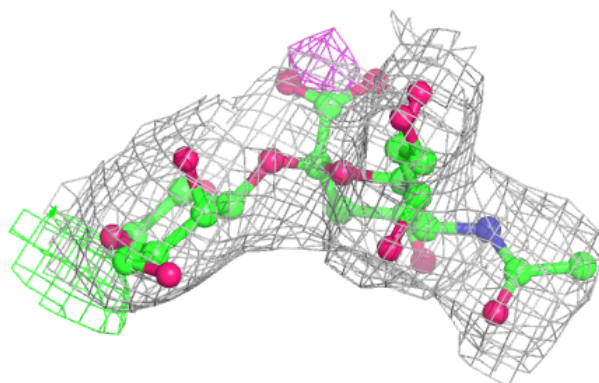
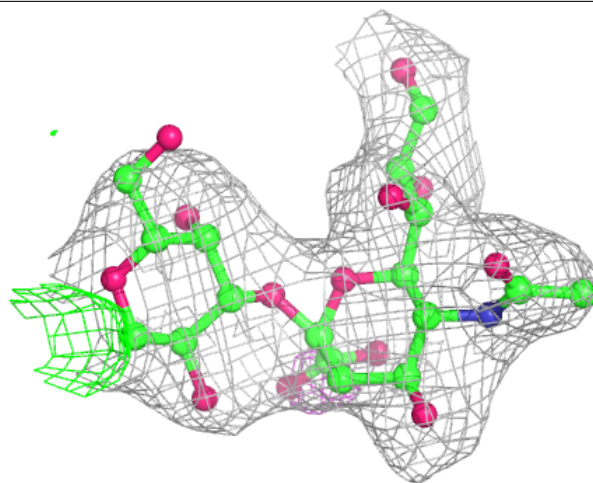
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





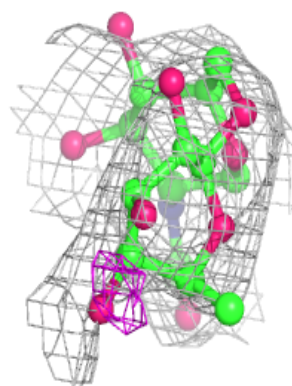
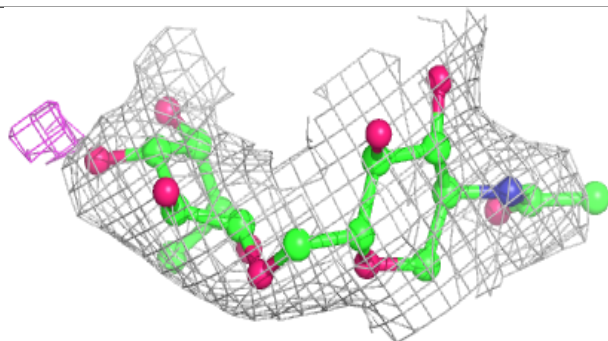
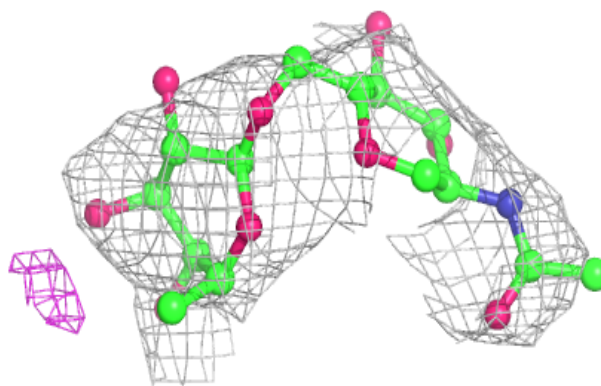
Electron density around Chain L:

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

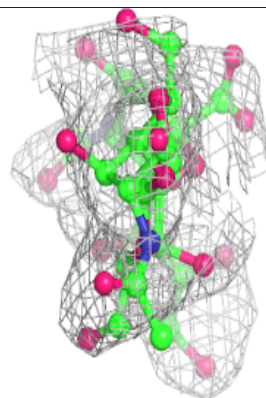
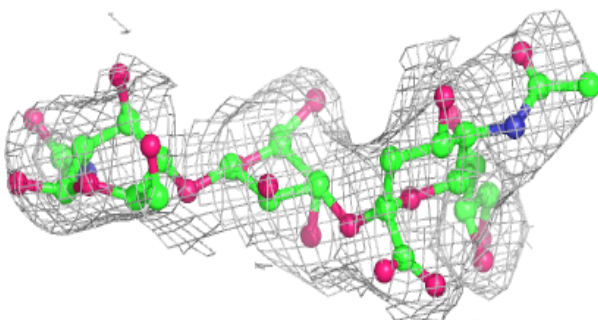
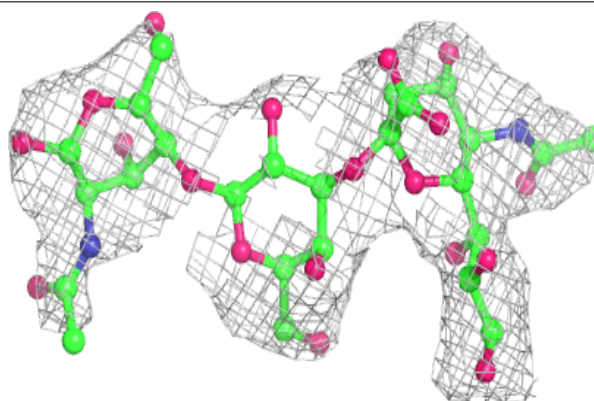


Electron density around Chain M:

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

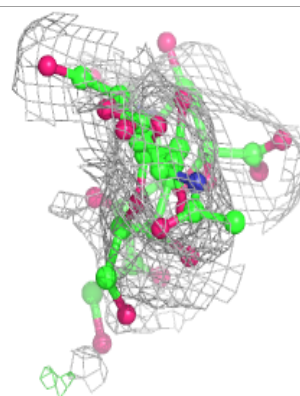
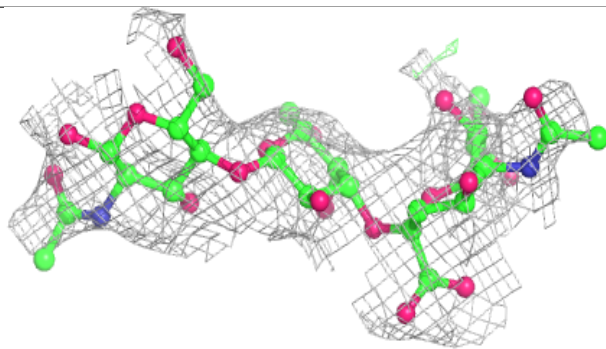
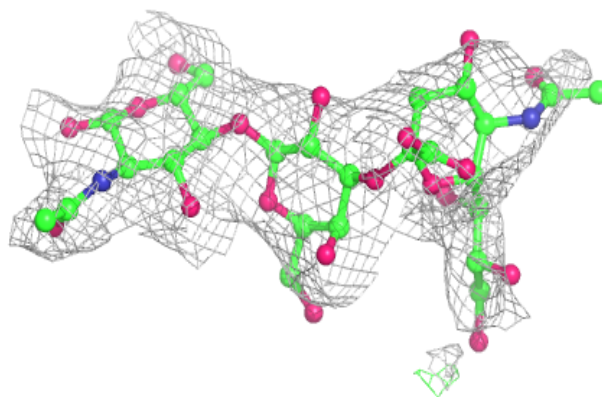
**Electron density around Chain P:**

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



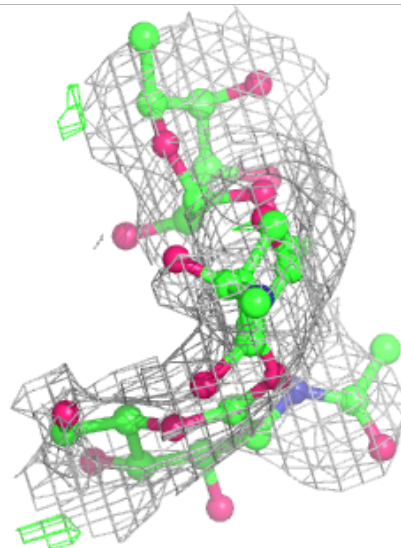
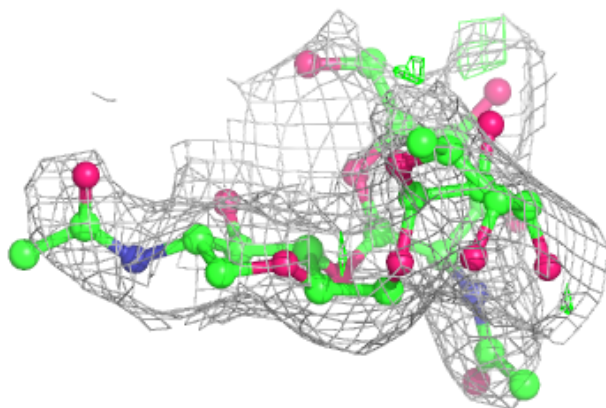
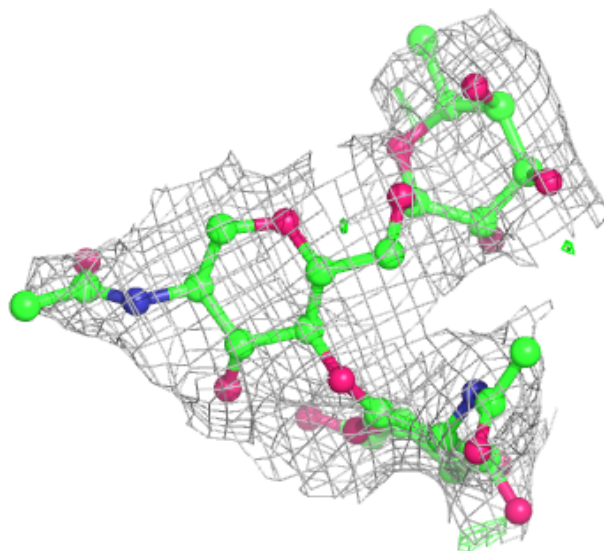
Electron density around Chain T:

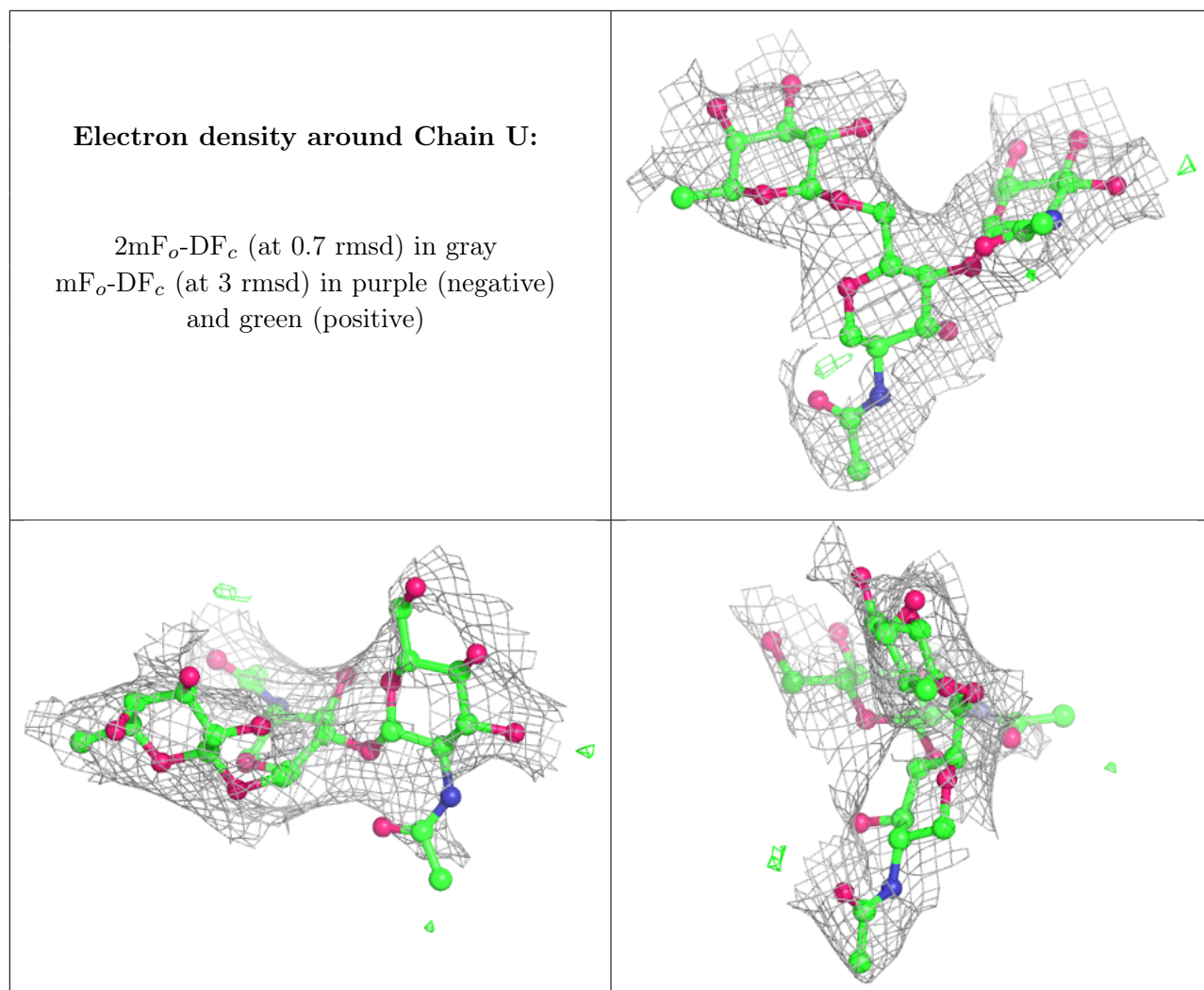
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain 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(Å ²)	Q<0.9
11	NAG	D	202	14/15	0.63	0.56	116,124,129,130	0
11	NAG	E	621	14/15	0.65	0.45	98,101,108,109	0
12	FUC	D	200	10/11	0.74	0.28	117,122,124,127	0
11	NAG	C	631	14/15	0.82	0.23	81,85,87,87	0
11	NAG	C	632	14/15	0.83	0.24	96,102,103,104	0
11	NAG	D	201	14/15	0.84	0.30	93,98,100,102	0
11	NAG	A	411	14/15	0.87	0.32	118,122,124,128	0
11	NAG	E	441	14/15	0.87	0.26	91,95,97,98	0

6.5 Other polymers

There are no such residues in this entry.