



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 03:03 AM UTC

PDB ID : 2Q7N / pdb_00002q7n
Title : Crystal structure of Leukemia inhibitory factor in complex with LIF receptor (domains 1-5)
Authors : Huyton, T.; Zhang, J.G.; Nicola, N.A.; Garrett, T.P.J.
Deposited on : 2007-06-07
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

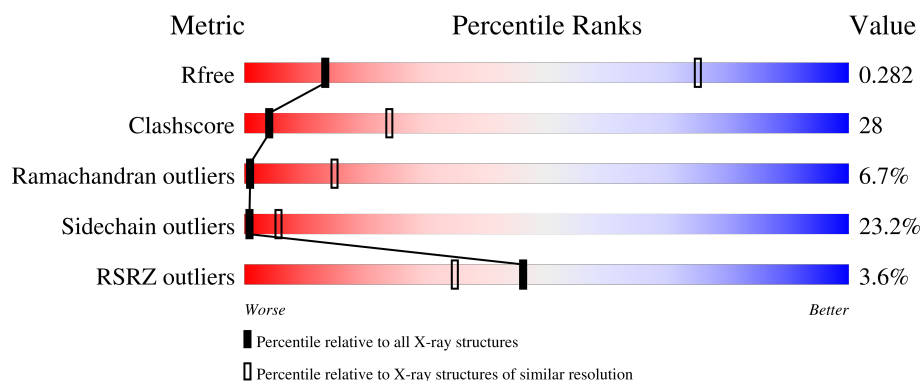
1 Overall quality at a glance

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.



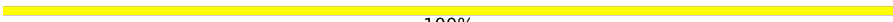
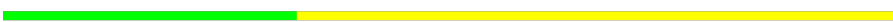
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1082 (4.20-3.80)
Clashscore	190562	1129 (4.20-3.80)
Ramachandran outliers	187476	1064 (4.20-3.80)
Sidechain outliers	187428	1055 (4.20-3.80)
RSRZ outliers	180081	1082 (4.20-3.80)

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	488	7% 39% 44% 14% ..
1	C	488	2% 42% 41% 14% ..
2	B	180	% 43% 41% 13% .
2	D	180	41% 45% 12% .
3	E	3	100%

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Mol	Chain	Length	Quality of chain
3	H	3	 100%
3	I	3	 100%
3	N	3	 33% 67%
3	O	3	 33% 67%
4	F	2	 50% 50%
4	G	2	 100%
4	L	2	 50% 50%
4	M	2	 50% 50%
4	P	2	 100%
4	Q	2	 100%
4	S	2	 50% 50%
5	J	4	 100%
6	K	4	 50% 50%
7	R	5	 20% 80%

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
3	NAG	I	2	-	-	-	X
3	NAG	O	1	X	-	-	-
4	NAG	M	2	-	-	-	X
5	MAN	J	3	X	-	-	-
6	MAN	K	3	X	-	-	-
7	MAN	R	3	X	-	-	-

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 10839 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 Leukemia inhibitory factor receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	480	Total	C	N	O	S	0	0	0
			3739	2369	642	711	17			
1	C	480	Total	C	N	O	S	0	0	0
			3739	2369	642	711	17			

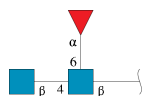
There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	ASP	-	cloning artifact	UNP P42703
A	0	TYR	-	cloning artifact	UNP P42703
A	1	LYS	-	cloning artifact	UNP P42703
A	2	ASP	-	cloning artifact	UNP P42703
A	3	ASP	-	cloning artifact	UNP P42703
A	4	ASP	-	cloning artifact	UNP P42703
A	5	ASP	-	cloning artifact	UNP P42703
A	6	LYS	-	cloning artifact	UNP P42703
C	-1	ASP	-	cloning artifact	UNP P42703
C	0	TYR	-	cloning artifact	UNP P42703
C	1	LYS	-	cloning artifact	UNP P42703
C	2	ASP	-	cloning artifact	UNP P42703
C	3	ASP	-	cloning artifact	UNP P42703
C	4	ASP	-	cloning artifact	UNP P42703
C	5	ASP	-	cloning artifact	UNP P42703
C	6	LYS	-	cloning artifact	UNP P42703

- Molecule 2 is a protein called Leukemia inhibitory factor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	180	Total	C	N	O	S	0	0	0
			1387	884	245	251	7			
2	D	180	Total	C	N	O	S	0	0	0
			1387	884	245	251	7			

- Molecule 3 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
3	E	3	Total	C	N	O	0	0	0
			38	22	2	14			
3	H	3	Total	C	N	O	0	0	0
			38	22	2	14			
3	I	3	Total	C	N	O	0	0	0
			38	22	2	14			
3	N	3	Total	C	N	O	0	0	0
			38	22	2	14			
3	O	3	Total	C	N	O	0	0	0
			38	22	2	14			

- Molecule 4 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
4	F	2	Total	C	N	O	0	0	0
			28	16	2	10			
4	G	2	Total	C	N	O	0	0	0
			28	16	2	10			
4	L	2	Total	C	N	O	0	0	0
			28	16	2	10			
4	M	2	Total	C	N	O	0	0	0
			28	16	2	10			
4	P	2	Total	C	N	O	0	0	0
			28	16	2	10			
4	Q	2	Total	C	N	O	0	0	0
			28	16	2	10			
4	S	2	Total	C	N	O	0	0	0
			28	16	2	10			

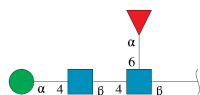
- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

copyranose.



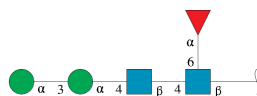
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	J	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 6 is an oligosaccharide called alpha-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.



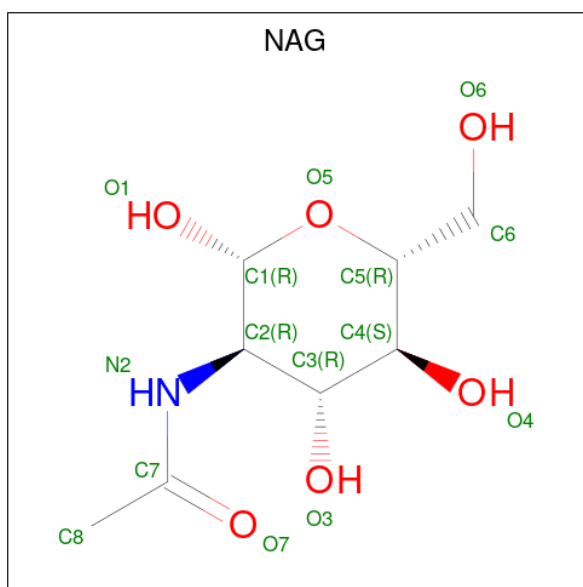
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
6	K	4	Total	C	N	O	0	0	0
			49	28	2	19			

- Molecule 7 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-alpha-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.

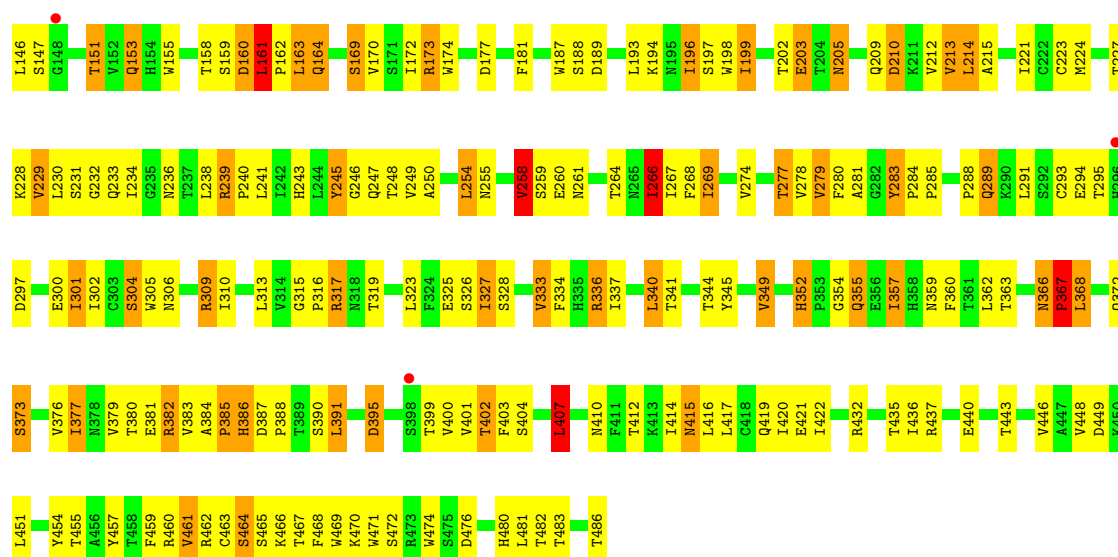


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
7	R	5	Total	C	N	O	0	0	0
			60	34	2	24			

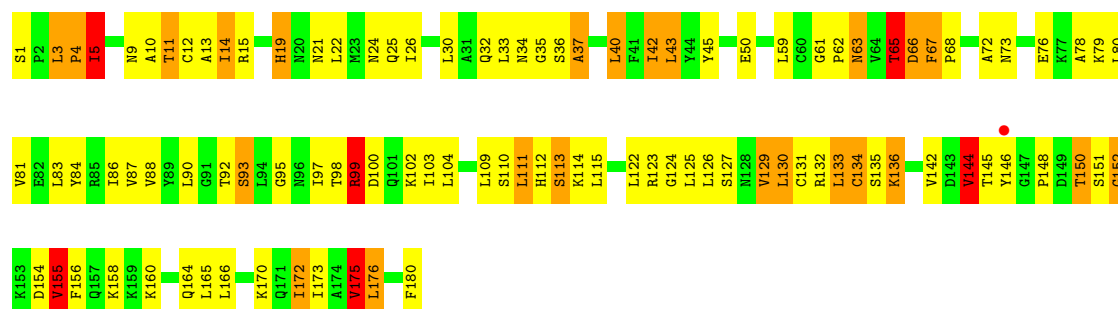
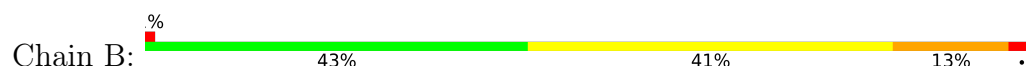
- Molecule 8 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



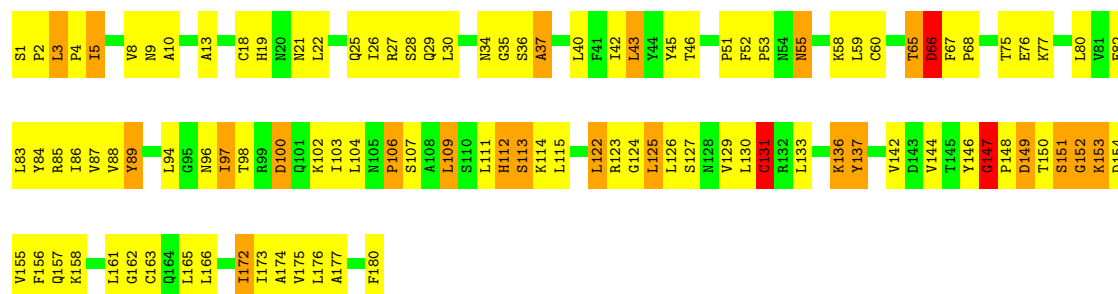
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total	C	N	O	0	0
			14	8	1	5		
8	C	1	Total	C	N	O	0	0
			14	8	1	5		
8	C	1	Total	C	N	O	0	0
			14	8	1	5		



• Molecule 2: Leukemia inhibitory factor



• Molecule 2: Leukemia inhibitory factor



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



MAG1
MAG2
FUC3

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

Chain H:  100%

MAG1
MAG2
FUC3

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

Chain I:  100%

MAG1
MAG2
FUC3

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

Chain N:  33% 67%

MAG1
MAG2
FUC3

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

Chain O:  33% 67%

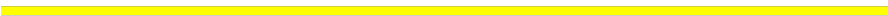
MAG1
MAG2
FUC3

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

Chain F:  50% 50%

MAG1
MAG2

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

Chain G:  100%

MAG1
MAG2

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

Chain L:  50% 50%

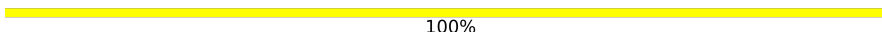

MAG1
MAG2

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

Chain M:  50% 50%

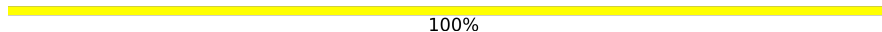

MAG1
MAG2

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

Chain P:  100%


MAG1
MAG2

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

Chain Q:  100%

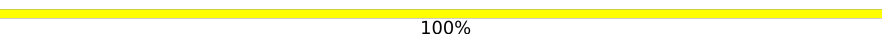

MAG1
MAG2

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

Chain S:  50% 50%


MAG1
MAG2

- Molecule 5: alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain J:  100%


MAG1
MAG2
MAN3
MAN4

- Molecule 6: alpha-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 K:  50% 50%

MAG1
MAG2
MAN3
FUC4

- Molecule 7: alpha-D-mannopyranose-(1-3)-alpha-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 R:  20% 80%

MAG1
MAG2
MAN3
MAN4
FUC5

4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	193.48Å 240.13Å 202.63Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 4.00 20.00 – 4.01	Depositor EDS
% Data completeness (in resolution range)	93.6 (20.00-4.00) 92.7 (20.00-4.01)	Depositor EDS
R_{merge}	0.23	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.84 (at 4.07Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.237 , 0.287 0.232 , 0.282	Depositor DCC
R_{free} test set	1852 reflections (4.67%)	wwPDB-VP
Wilson B-factor (Å ²)	119.0	Xtriage
Anisotropy	0.286	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.19 , 85.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	10839	wwPDB-VP
Average B, all atoms (Å ²)	102.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.76% 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, MAN, 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	0.95	5/3842 (0.1%)	1.18	25/5267 (0.5%)
1	C	0.88	4/3842 (0.1%)	1.18	24/5267 (0.5%)
2	B	0.90	1/1416 (0.1%)	1.15	8/1923 (0.4%)
2	D	0.94	2/1416 (0.1%)	1.14	6/1923 (0.3%)
All	All	0.92	12/10516 (0.1%)	1.17	63/14380 (0.4%)

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	2
1	C	0	2
All	All	0	4

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	28	VAL	CA-CB	8.94	1.66	1.54
1	C	28	VAL	CA-CB	8.69	1.63	1.54
2	D	150	THR	CA-CB	7.04	1.65	1.53
1	A	78	THR	CA-CB	6.23	1.60	1.53
2	B	150	THR	CA-CB	6.19	1.63	1.53

The worst 5 of 63 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	116	LEU	CA-C-N	9.98	130.06	119.78
1	C	116	LEU	C-N-CA	9.98	130.06	119.78

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	18	CYS	N-CA-C	8.13	121.52	109.24
1	C	55	ILE	CB-CA-C	-8.03	102.02	110.53
1	A	46	HIS	CA-C-N	7.99	128.14	120.31

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	239	ARG	Peptide
1	A	384	ALA	Peptide
1	C	28	VAL	Peptide
1	C	40	ASP	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	3739	0	3568	216	0
1	C	3739	0	3568	214	0
2	B	1387	0	1417	83	0
2	D	1387	0	1417	87	0
3	E	38	0	34	0	0
3	H	38	0	34	0	0
3	I	38	0	34	0	0
3	N	38	0	34	0	0
3	O	38	0	34	0	0
4	F	28	0	25	1	0
4	G	28	0	25	0	0
4	L	28	0	25	0	0
4	M	28	0	25	0	0
4	P	28	0	25	0	0
4	Q	28	0	25	0	0
4	S	28	0	25	1	0
5	J	50	0	43	0	0
6	K	49	0	43	0	0
7	R	60	0	52	0	0
8	A	14	0	13	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	C	28	0	26	0	0
All	All	10839	0	10492	586	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 28.

The worst 5 of 586 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:A:310:ILE:HD12	1:A:310:ILE:H	1.00	1.13
1:C:285:PRO:HD3	1:C:366:ASN:HB2	1.40	1.02
2:B:34:ASN:HD22	2:B:173:ILE:HG23	1.25	1.01
2:B:15:ARG:HD2	2:B:130:LEU:HD21	1.40	1.01
1:A:337:ILE:HD12	1:A:337:ILE:H	1.22	1.00

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	478/488 (98%)	374 (78%)	74 (16%)	30 (6%)	1	15
1	C	478/488 (98%)	383 (80%)	70 (15%)	25 (5%)	1	18
2	B	178/180 (99%)	125 (70%)	38 (21%)	15 (8%)	0	11
2	D	178/180 (99%)	115 (65%)	45 (25%)	18 (10%)	0	8
All	All	1312/1336 (98%)	997 (76%)	227 (17%)	88 (7%)	1	15

5 of 88 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	28	VAL

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Mol	Chain	Res	Type
1	A	30	PRO
1	A	71	ASN
1	A	73	PHE
1	A	118	HIS

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	419/443 (95%)	320 (76%)	99 (24%)	1	5
1	C	419/443 (95%)	315 (75%)	104 (25%)	1	4
2	B	154/154 (100%)	119 (77%)	35 (23%)	1	6
2	D	154/154 (100%)	126 (82%)	28 (18%)	2	12
All	All	1146/1194 (96%)	880 (77%)	266 (23%)	1	5

5 of 266 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	436	ILE
2	D	3	LEU
2	D	144	VAL
1	A	476	ASP
1	A	454	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 38 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	335	HIS
2	D	71	HIS
1	C	366	ASN
2	D	32	GLN
2	D	128	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 ⓘ

42 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	E	1	1,3	14,14,15	0.61	0	17,19,21	1.07	1 (5%)
3	NAG	E	2	3	14,14,15	0.59	0	17,19,21	0.99	1 (5%)
3	FUC	E	3	3	10,10,11	0.71	0	14,14,16	1.68	3 (21%)
4	NAG	F	1	1,4	14,14,15	0.60	0	17,19,21	1.02	1 (5%)
4	NAG	F	2	4	14,14,15	0.63	0	17,19,21	1.35	3 (17%)
4	NAG	G	1	1,4	14,14,15	0.55	0	17,19,21	1.27	1 (5%)
4	NAG	G	2	4	14,14,15	0.75	0	17,19,21	1.29	2 (11%)
3	NAG	H	1	1,3	14,14,15	0.48	0	17,19,21	0.92	1 (5%)
3	NAG	H	2	3	14,14,15	0.59	0	17,19,21	1.11	1 (5%)
3	FUC	H	3	3	10,10,11	0.70	0	14,14,16	1.04	2 (14%)
3	NAG	I	1	1,3	14,14,15	0.62	0	17,19,21	1.17	2 (11%)
3	NAG	I	2	3	14,14,15	0.55	0	17,19,21	0.83	1 (5%)
3	FUC	I	3	3	10,10,11	0.82	0	14,14,16	0.96	1 (7%)
5	NAG	J	1	1,5	14,14,15	0.70	0	17,19,21	1.34	3 (17%)
5	NAG	J	2	5	14,14,15	0.60	0	17,19,21	1.10	2 (11%)
5	MAN	J	3	5	11,11,12	0.60	0	15,15,17	1.74	4 (26%)
5	MAN	J	4	5	11,11,12	0.55	0	15,15,17	0.86	1 (6%)
6	NAG	K	1	6,1	14,14,15	0.75	0	17,19,21	1.00	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	NAG	K	2	6	14,14,15	0.53	0	17,19,21	0.82	0
6	MAN	K	3	6	11,11,12	0.70	0	15,15,17	1.24	2 (13%)
6	FUC	K	4	6	10,10,11	0.80	0	14,14,16	1.34	2 (14%)
4	NAG	L	1	1,4	14,14,15	0.56	0	17,19,21	1.42	3 (17%)
4	NAG	L	2	4	14,14,15	0.47	0	17,19,21	1.00	0
4	NAG	M	1	1,4	14,14,15	0.55	0	17,19,21	1.86	3 (17%)
4	NAG	M	2	4	14,14,15	0.50	0	17,19,21	0.82	0
3	NAG	N	1	1,3	14,14,15	0.52	0	17,19,21	0.92	1 (5%)
3	NAG	N	2	3	14,14,15	0.59	0	17,19,21	0.78	0
3	FUC	N	3	3	10,10,11	0.72	0	14,14,16	1.42	3 (21%)
3	NAG	O	1	1,3	14,14,15	0.60	0	17,19,21	1.04	1 (5%)
3	NAG	O	2	3	14,14,15	0.63	0	17,19,21	0.89	1 (5%)
3	FUC	O	3	3	10,10,11	0.77	0	14,14,16	1.03	0
4	NAG	P	1	1,4	14,14,15	0.51	0	17,19,21	1.31	3 (17%)
4	NAG	P	2	4	14,14,15	0.65	0	17,19,21	1.30	2 (11%)
4	NAG	Q	1	1,4	14,14,15	0.50	0	17,19,21	1.83	3 (17%)
4	NAG	Q	2	4	14,14,15	0.88	1 (7%)	17,19,21	1.86	3 (17%)
7	NAG	R	1	1,7	14,14,15	0.81	0	17,19,21	1.65	5 (29%)
7	NAG	R	2	7	14,14,15	0.67	0	17,19,21	1.09	2 (11%)
7	MAN	R	3	7	11,11,12	0.89	0	15,15,17	1.99	6 (40%)
7	MAN	R	4	7	11,11,12	0.49	0	15,15,17	2.29	3 (20%)
7	FUC	R	5	7	10,10,11	0.68	0	14,14,16	0.79	0
4	NAG	S	1	1,4	14,14,15	0.45	0	17,19,21	1.65	4 (23%)
4	NAG	S	2	4	14,14,15	0.51	0	17,19,21	1.30	2 (11%)

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	E	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	E	2	3	-	0/6/23/26	0/1/1/1
3	FUC	E	3	3	-	-	0/1/1/1
4	NAG	F	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	F	2	4	-	2/6/23/26	0/1/1/1
4	NAG	G	1	1,4	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	G	2	4	-	4/6/23/26	0/1/1/1
3	NAG	H	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	H	2	3	-	3/6/23/26	0/1/1/1
3	FUC	H	3	3	-	-	0/1/1/1
3	NAG	I	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	I	2	3	-	2/6/23/26	0/1/1/1
3	FUC	I	3	3	-	-	0/1/1/1
5	NAG	J	1	1,5	-	3/6/23/26	0/1/1/1
5	NAG	J	2	5	-	4/6/23/26	0/1/1/1
5	MAN	J	3	5	1/1/4/5	2/2/19/22	0/1/1/1
5	MAN	J	4	5	-	1/2/19/22	0/1/1/1
6	NAG	K	1	6,1	-	3/6/23/26	0/1/1/1
6	NAG	K	2	6	-	0/6/23/26	0/1/1/1
6	MAN	K	3	6	1/1/4/5	0/2/19/22	0/1/1/1
6	FUC	K	4	6	-	-	0/1/1/1
4	NAG	L	1	1,4	-	3/6/23/26	0/1/1/1
4	NAG	L	2	4	-	5/6/23/26	0/1/1/1
4	NAG	M	1	1,4	-	4/6/23/26	0/1/1/1
4	NAG	M	2	4	-	2/6/23/26	0/1/1/1
3	NAG	N	1	1,3	-	4/6/23/26	0/1/1/1
3	NAG	N	2	3	-	2/6/23/26	0/1/1/1
3	FUC	N	3	3	-	-	0/1/1/1
3	NAG	O	1	1,3	1/1/5/7	2/6/23/26	0/1/1/1
3	NAG	O	2	3	-	2/6/23/26	0/1/1/1
3	FUC	O	3	3	-	-	0/1/1/1
4	NAG	P	1	1,4	-	4/6/23/26	0/1/1/1
4	NAG	P	2	4	-	3/6/23/26	0/1/1/1
4	NAG	Q	1	1,4	-	3/6/23/26	0/1/1/1
4	NAG	Q	2	4	-	4/6/23/26	0/1/1/1
7	NAG	R	1	1,7	-	4/6/23/26	0/1/1/1
7	NAG	R	2	7	-	3/6/23/26	0/1/1/1
7	MAN	R	3	7	1/1/4/5	1/2/19/22	0/1/1/1
7	MAN	R	4	7	-	0/2/19/22	0/1/1/1
7	FUC	R	5	7	-	-	0/1/1/1
4	NAG	S	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	S	2	4	-	5/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	Q	2	NAG	C1-C2	2.67	1.56	1.52

The worst 5 of 79 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	R	4	MAN	C1-O5-C5	7.25	121.91	112.19
4	Q	2	NAG	C1-O5-C5	5.52	119.58	112.19
4	M	1	NAG	C4-C3-C2	-4.52	104.39	111.02
5	J	3	MAN	C3-C4-C5	4.31	118.04	110.23
4	Q	1	NAG	C1-O5-C5	4.10	117.68	112.19

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	O	1	NAG	C1
5	J	3	MAN	C1
6	K	3	MAN	C1
7	R	3	MAN	C1

5 of 85 torsion outliers are listed below:

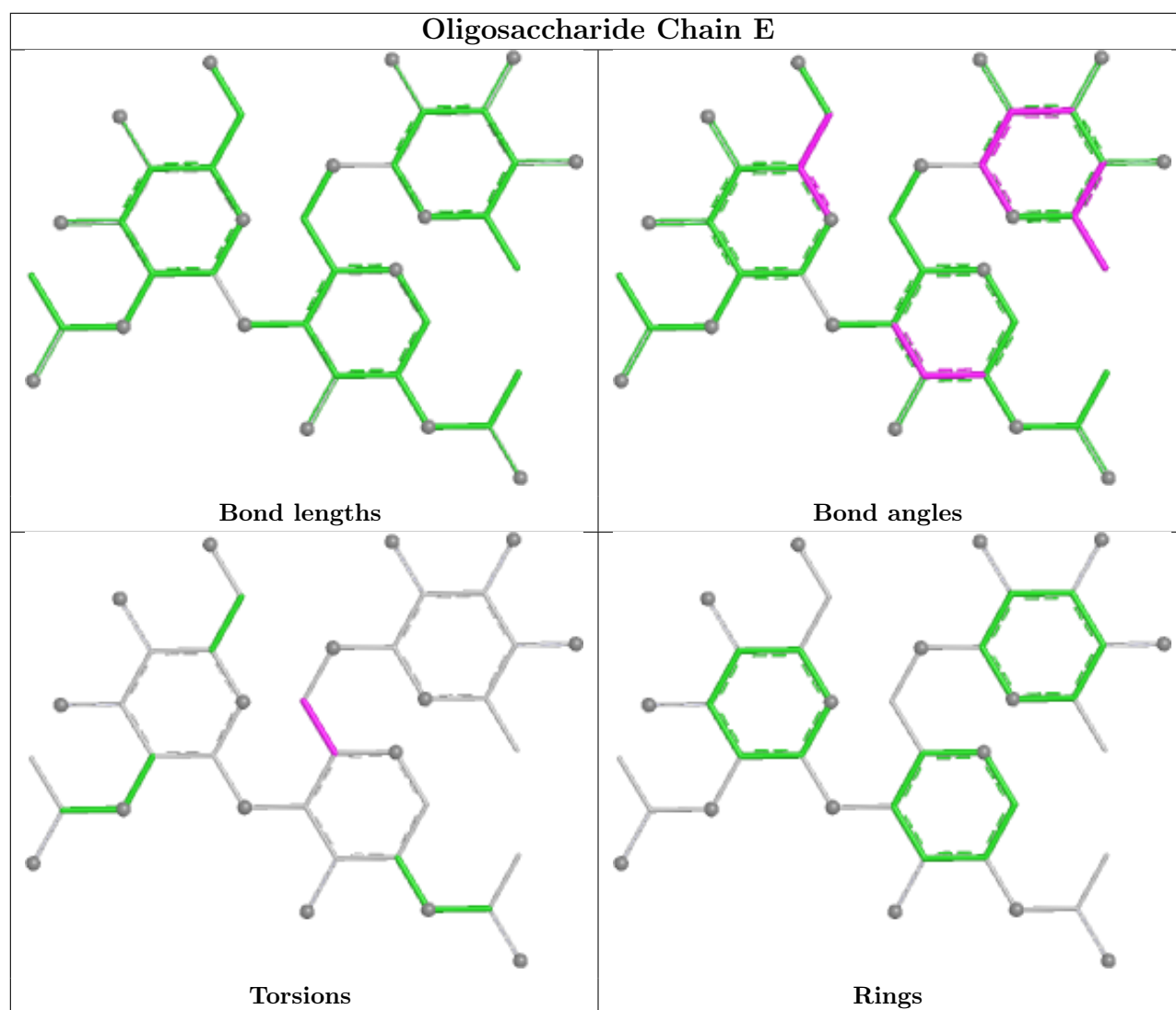
Mol	Chain	Res	Type	Atoms
3	H	1	NAG	C8-C7-N2-C2
3	H	1	NAG	O7-C7-N2-C2
3	I	2	NAG	C8-C7-N2-C2
3	I	2	NAG	O7-C7-N2-C2
3	N	1	NAG	C8-C7-N2-C2

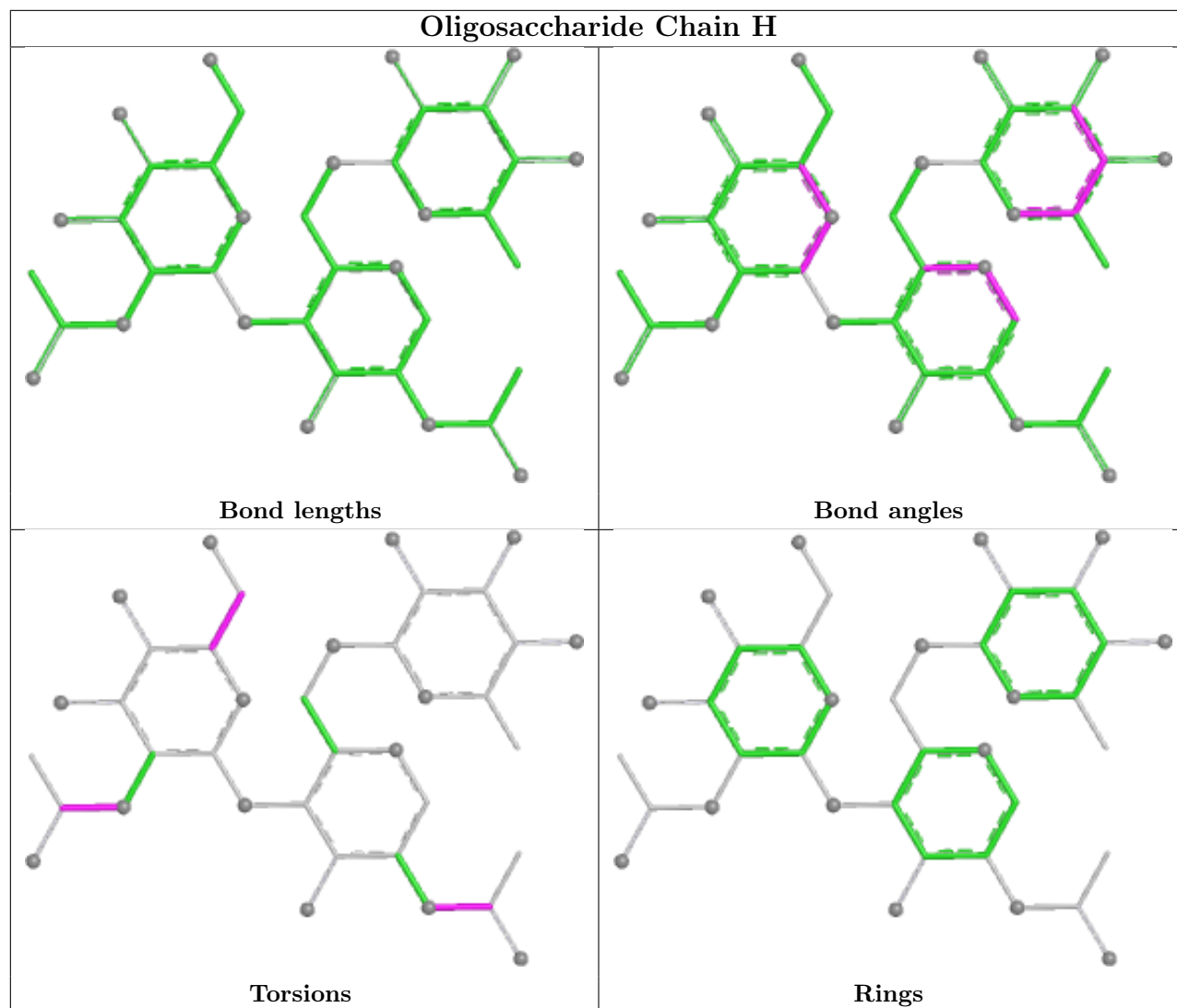
There are no ring outliers.

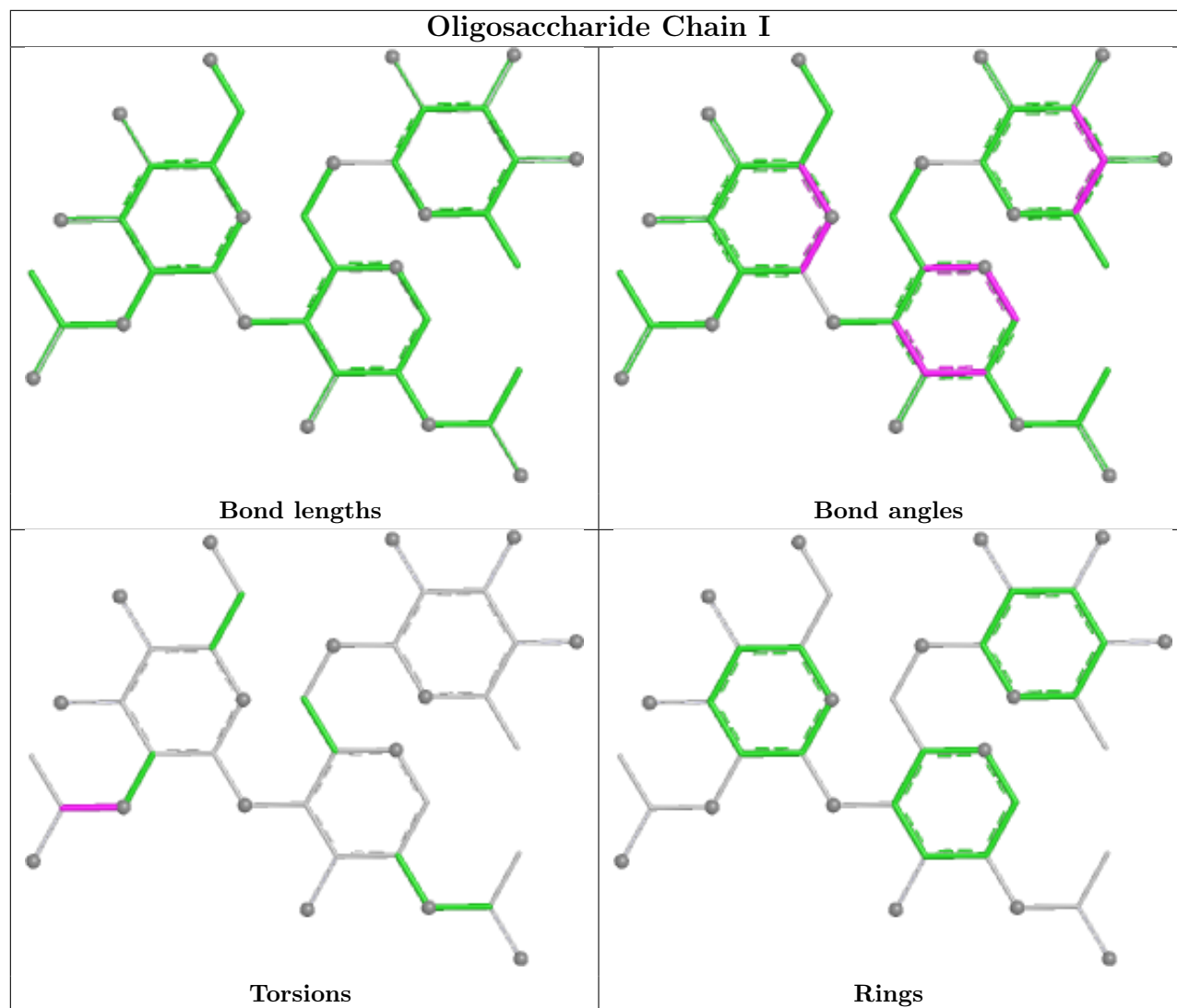
2 monomers are involved in 2 short contacts:

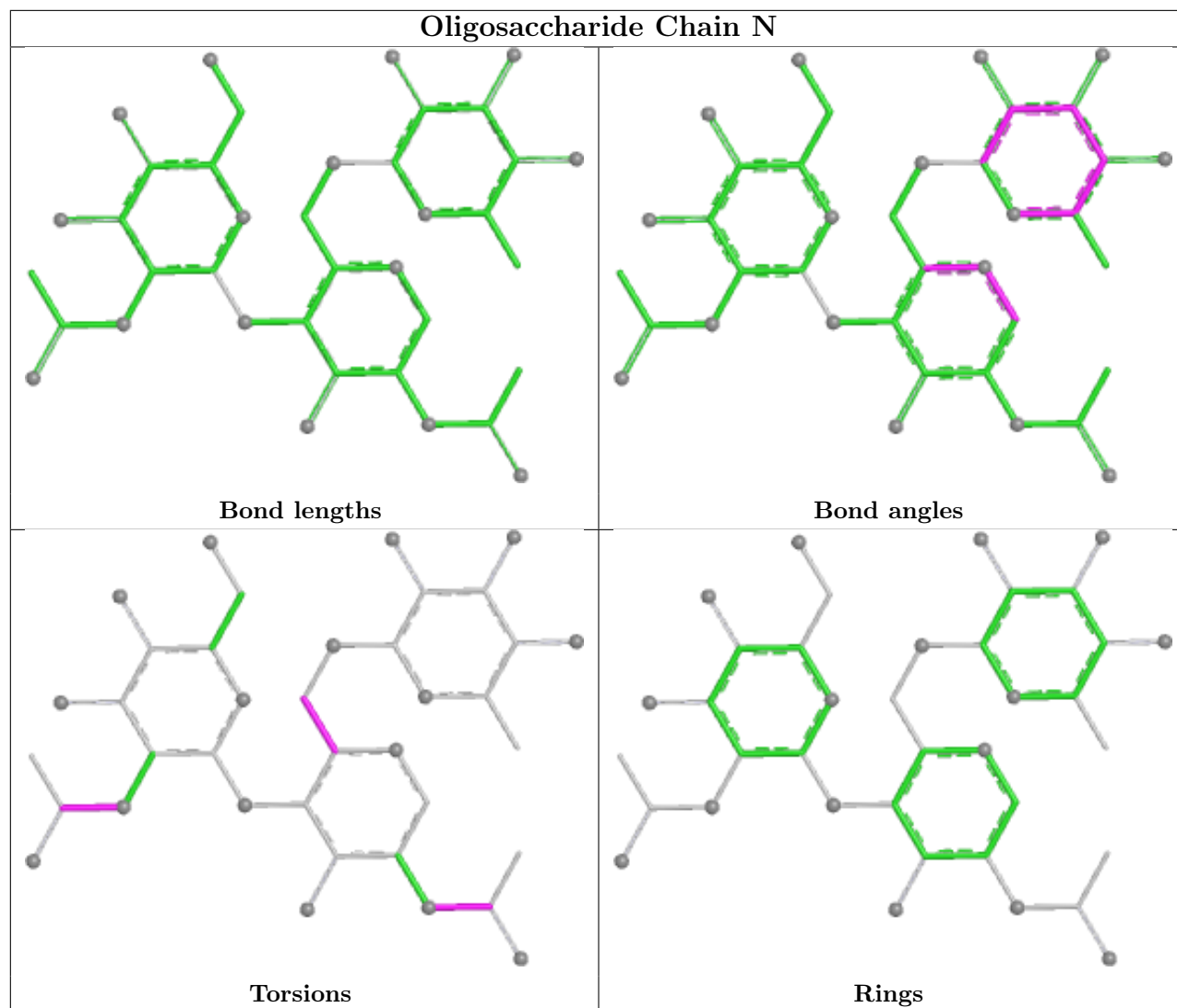
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	F	1	NAG	1	0
4	S	1	NAG	1	0

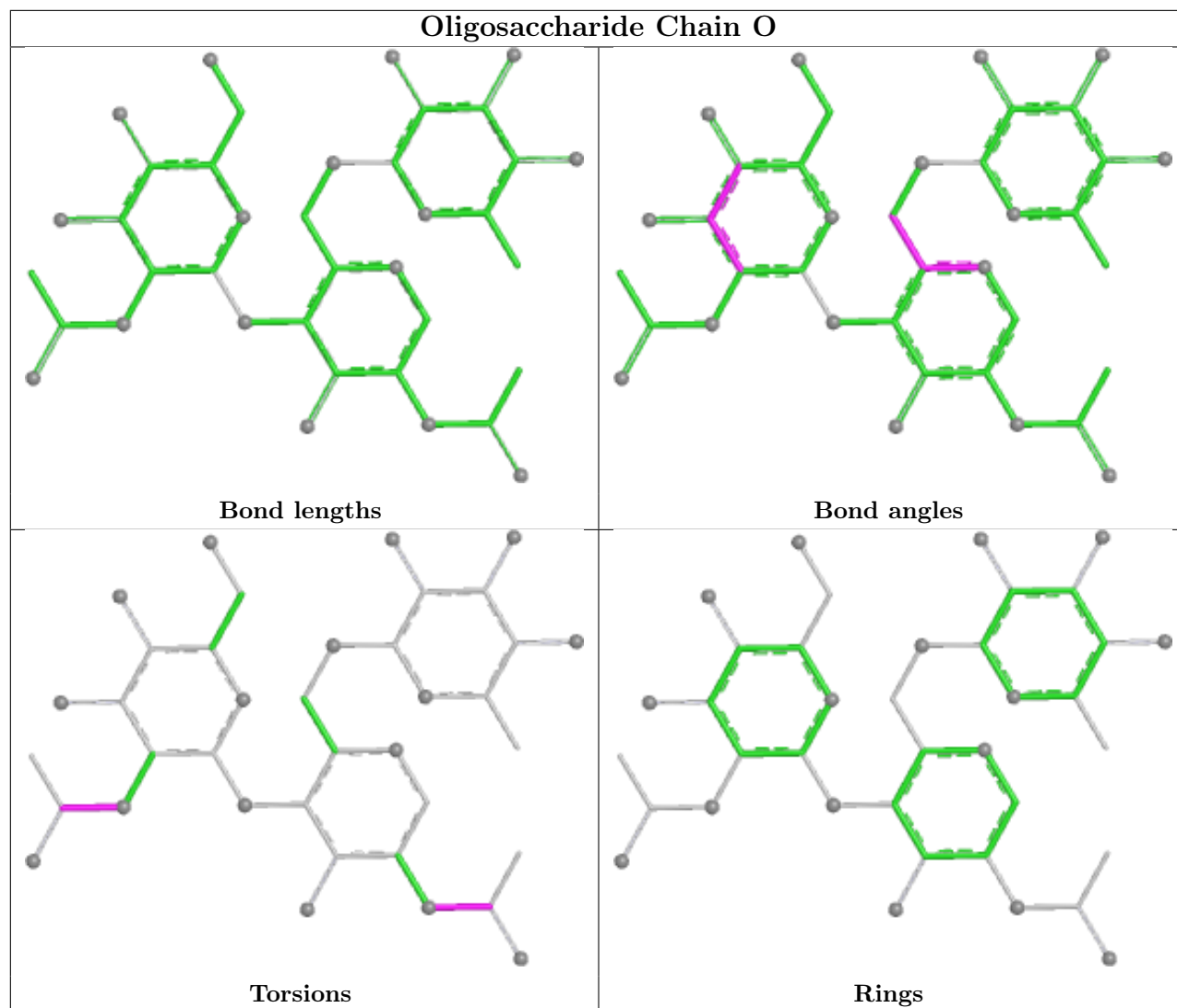
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

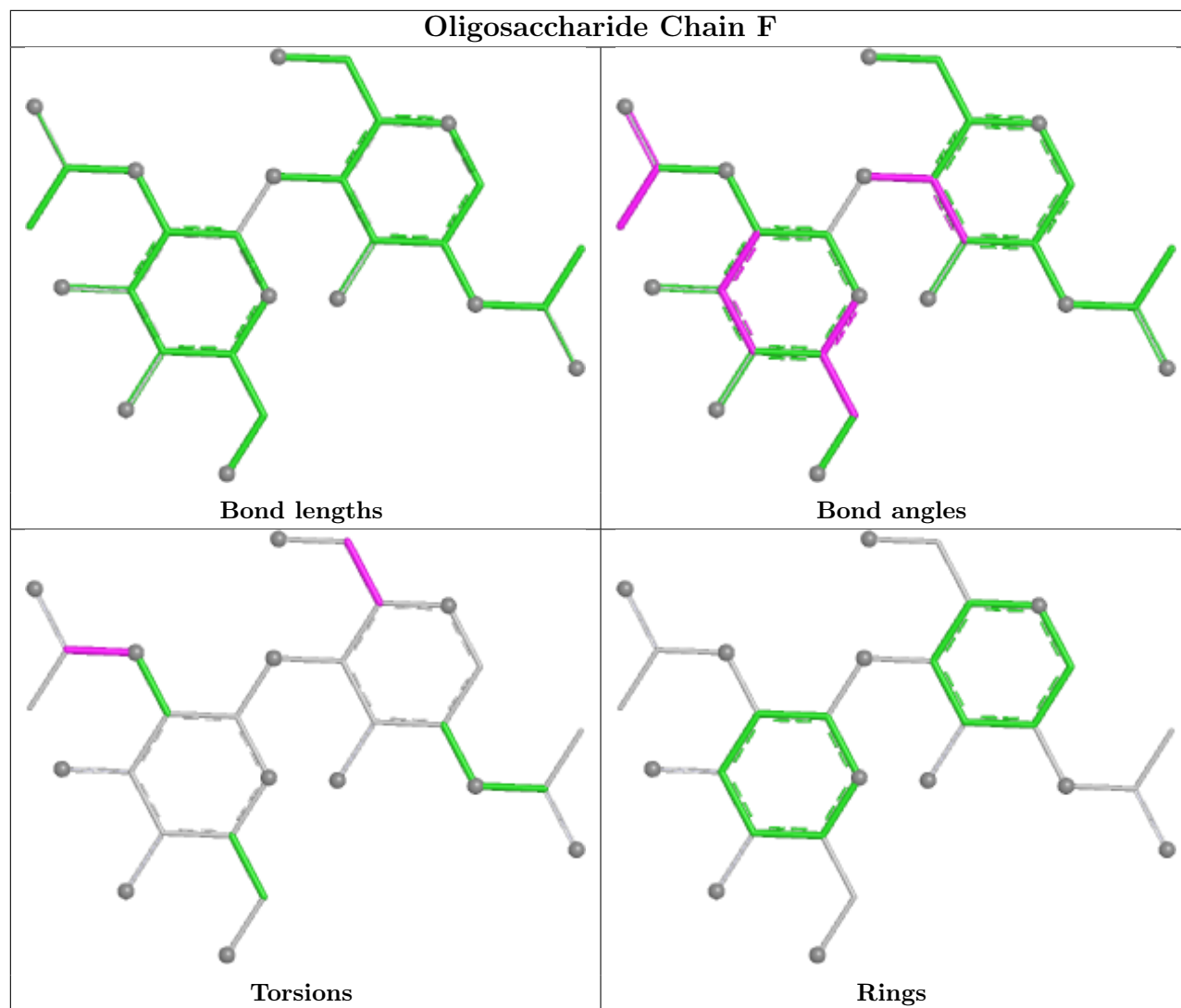


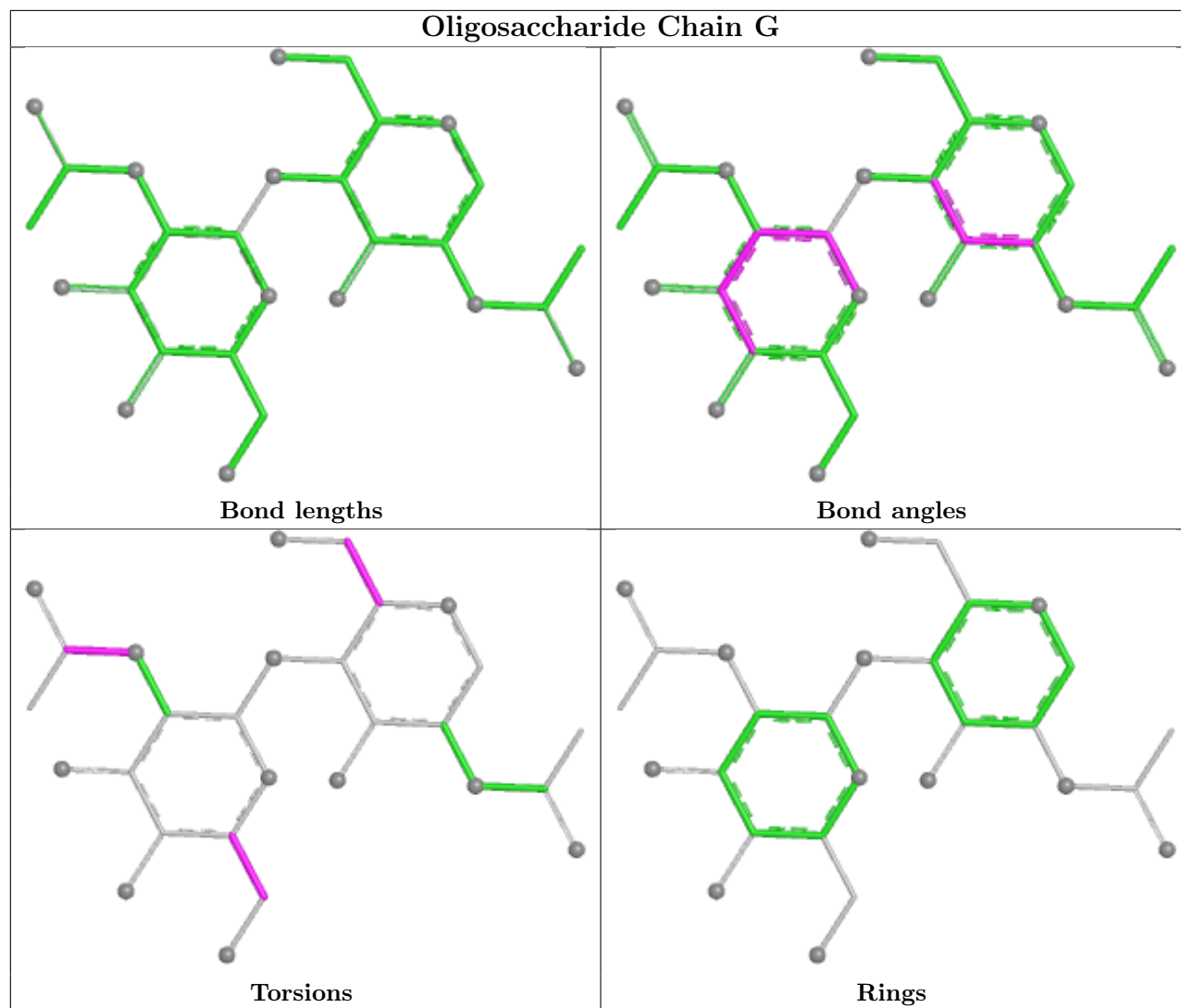


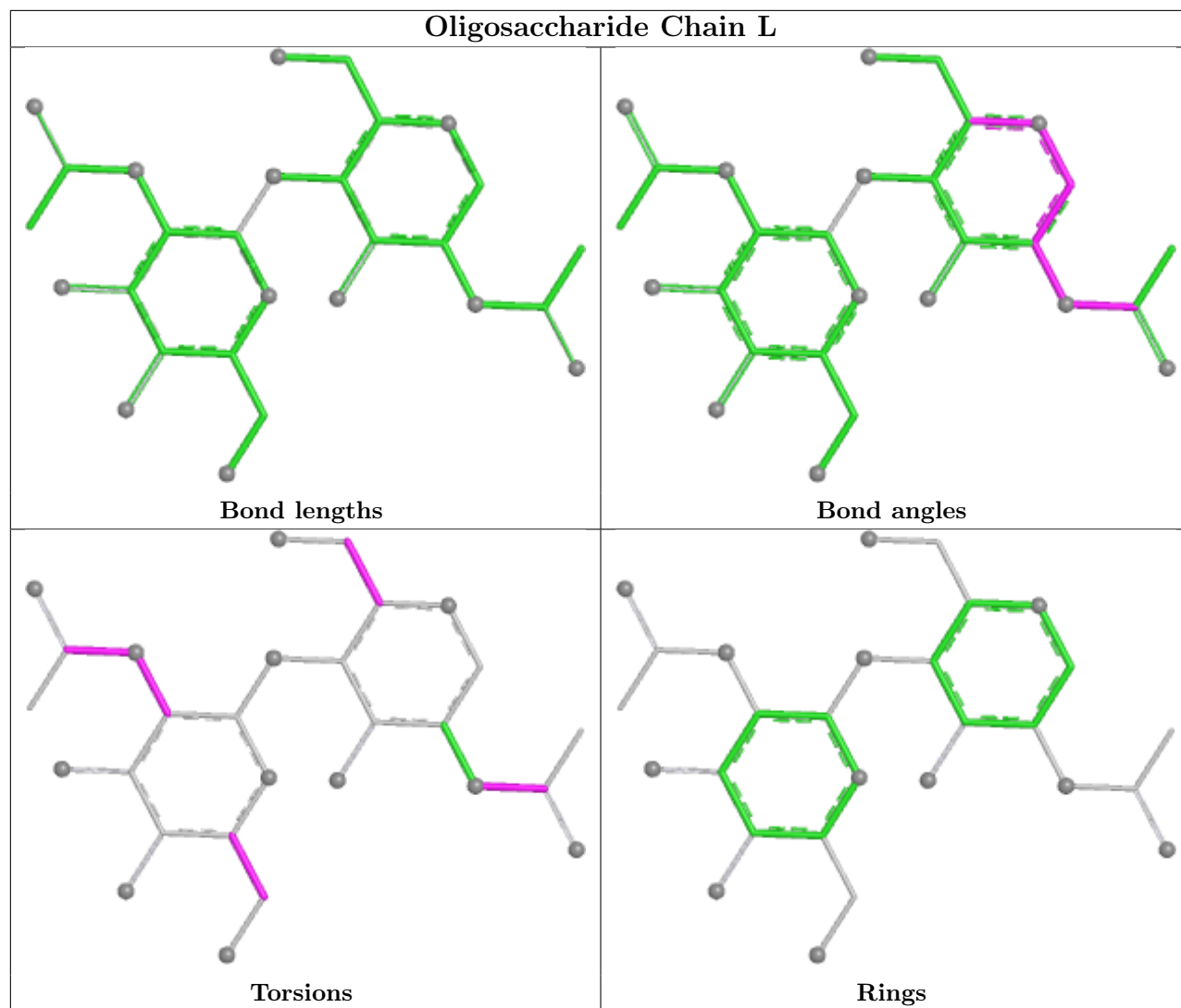


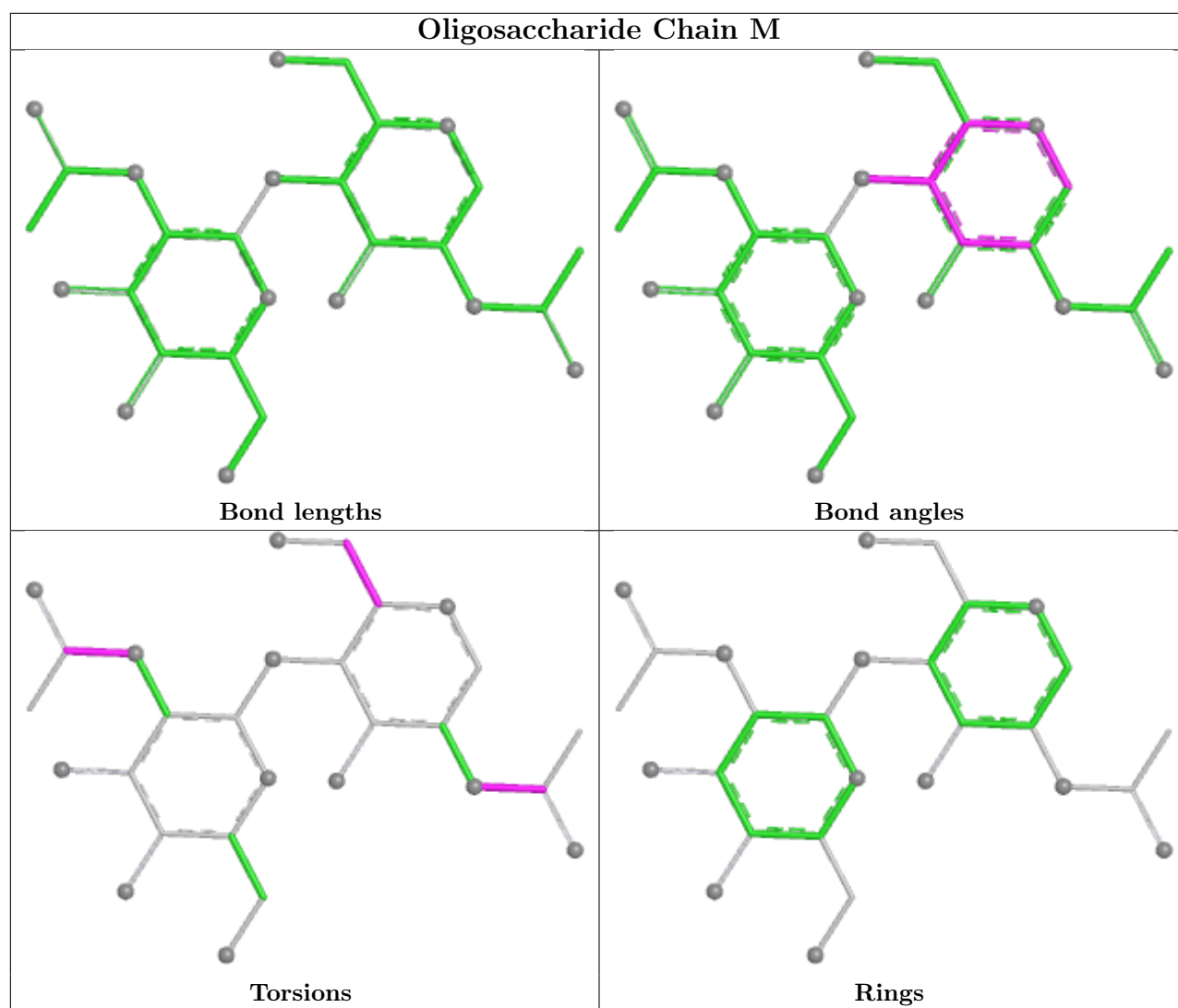


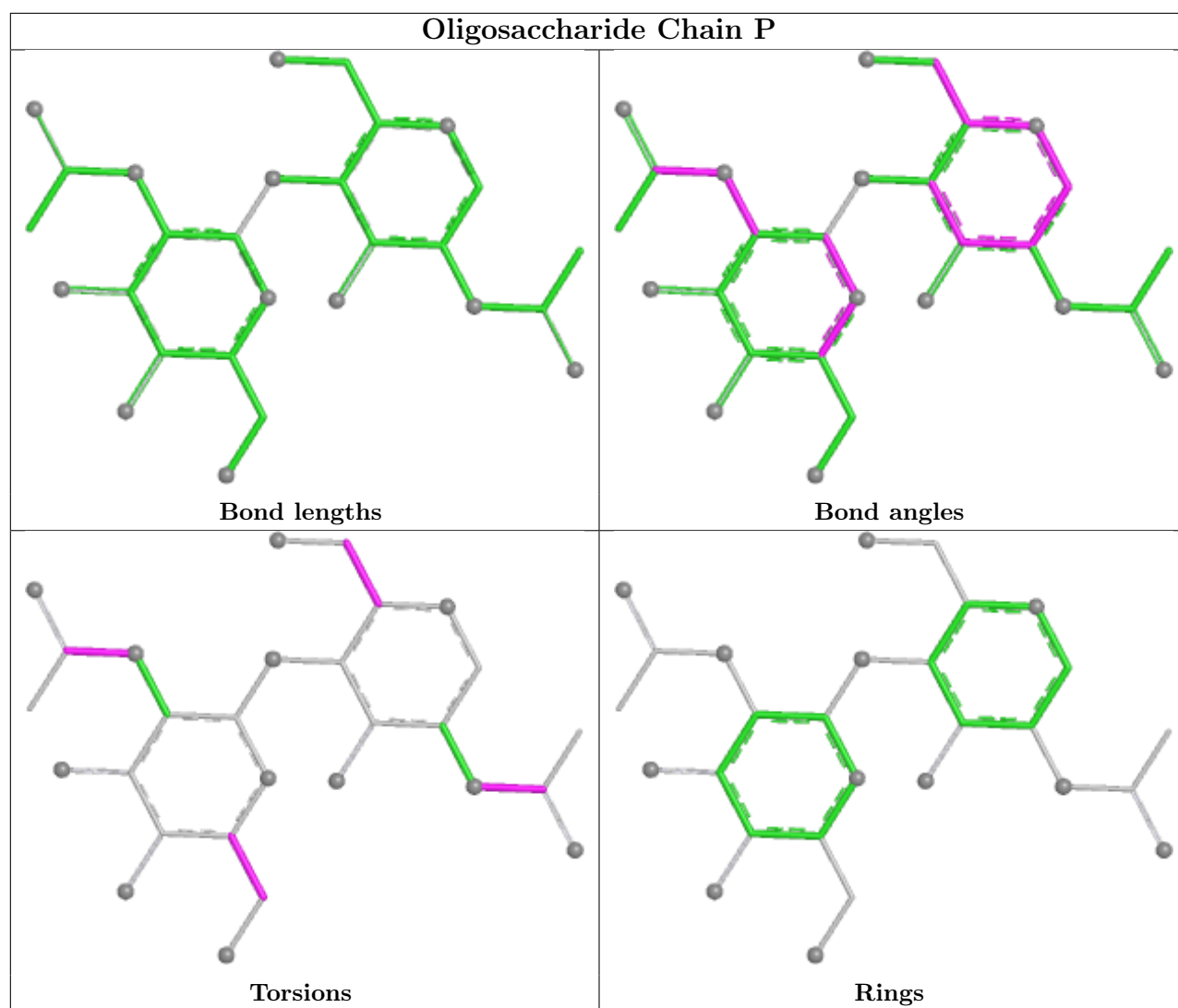


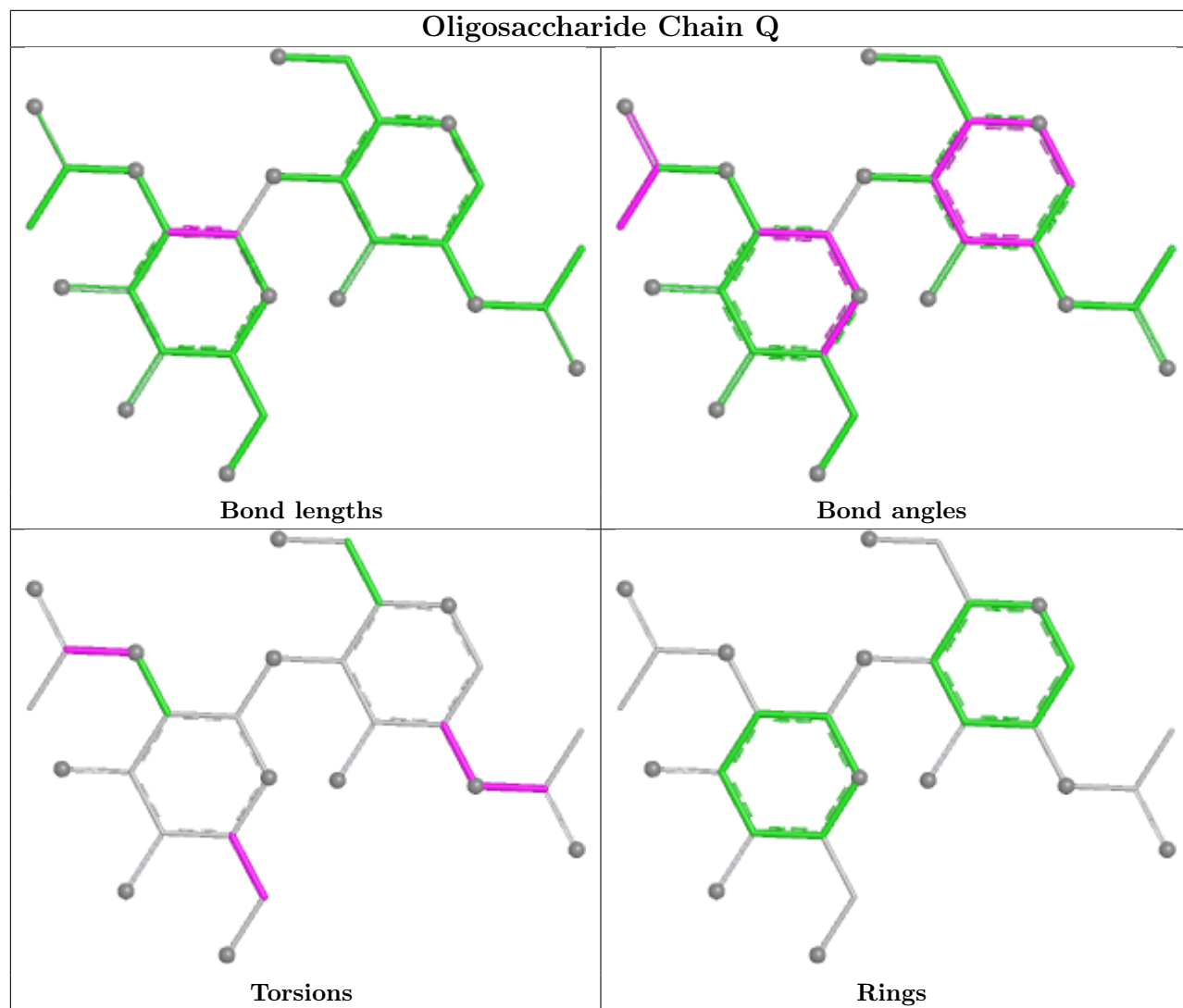


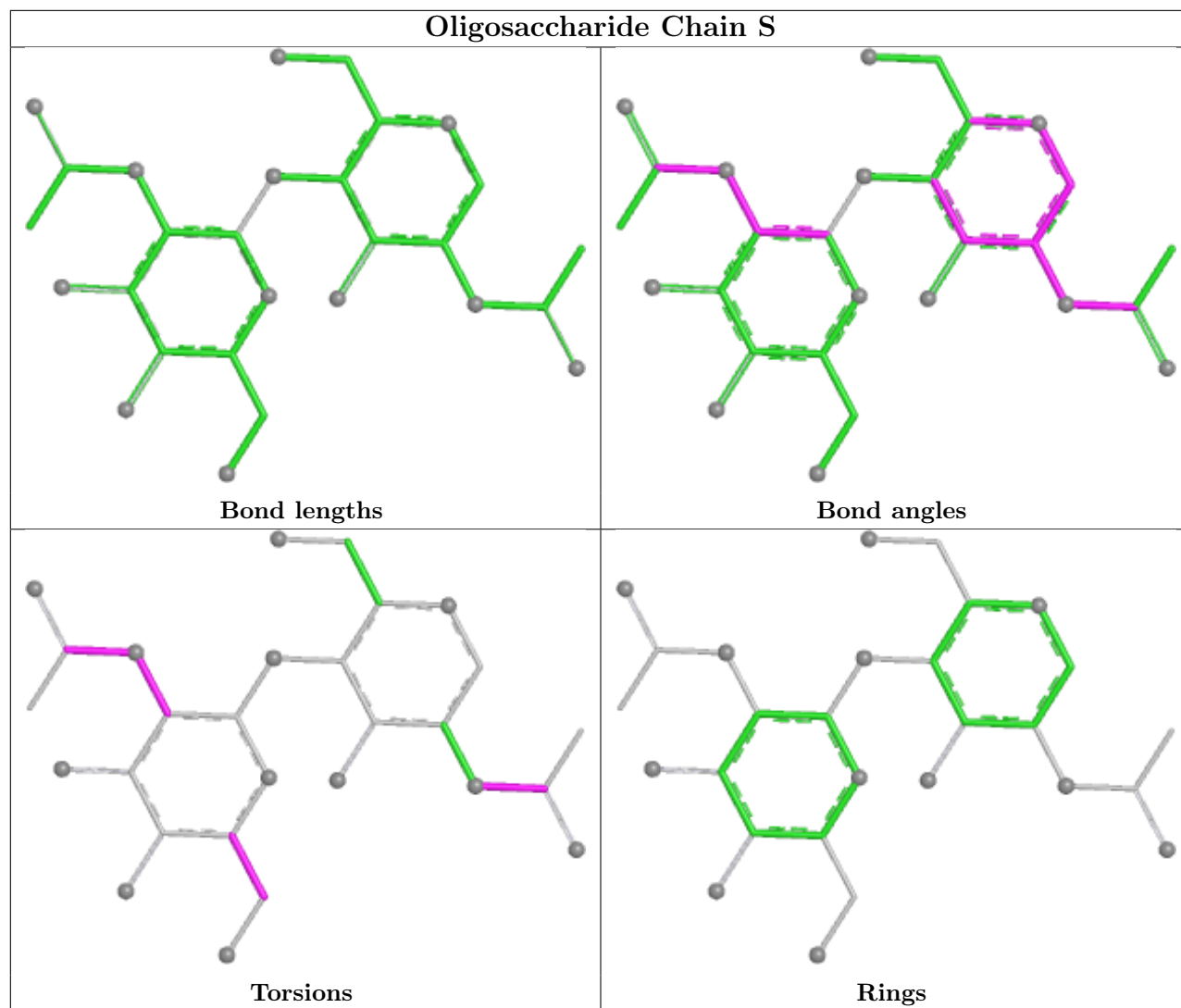


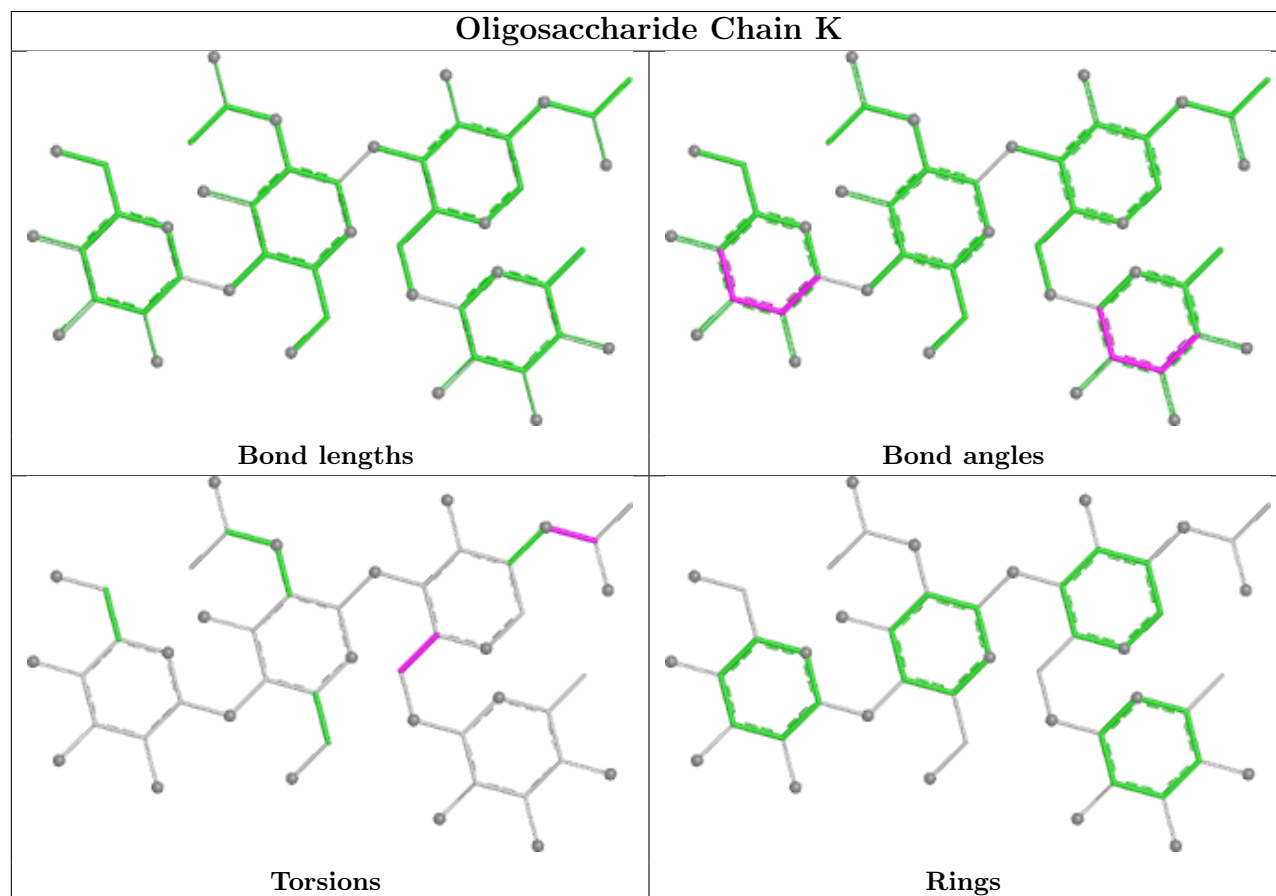
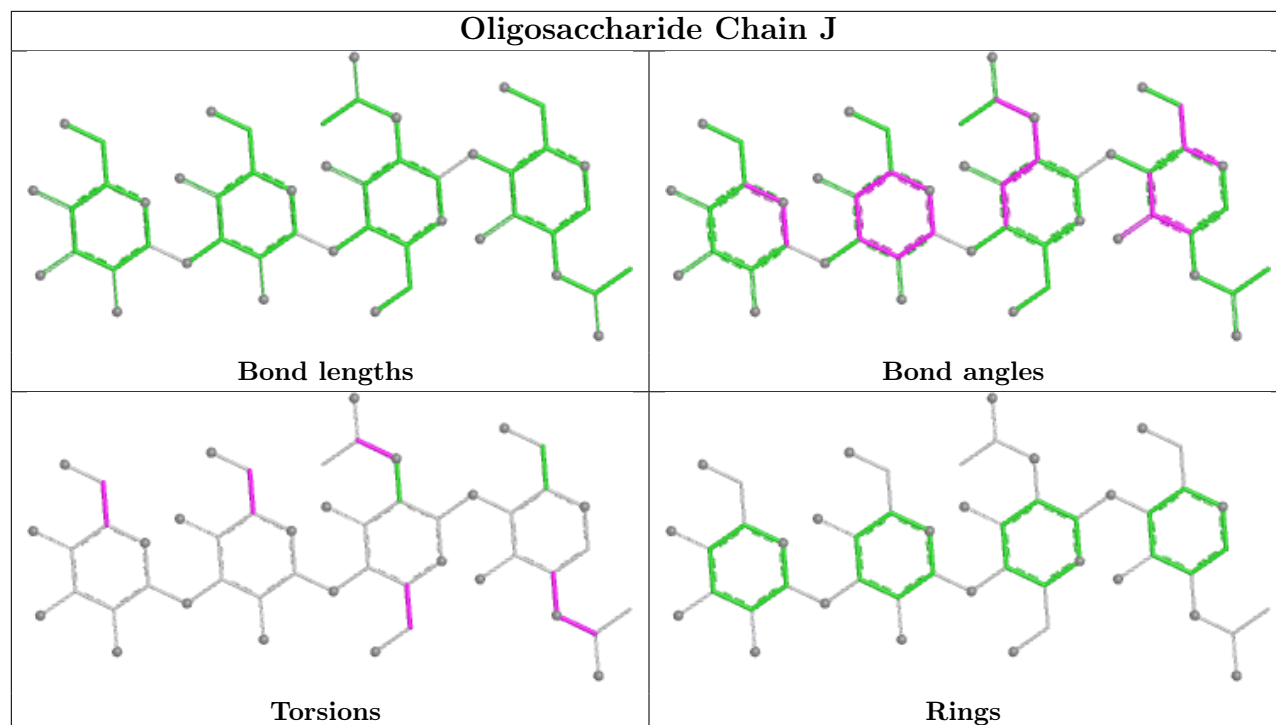


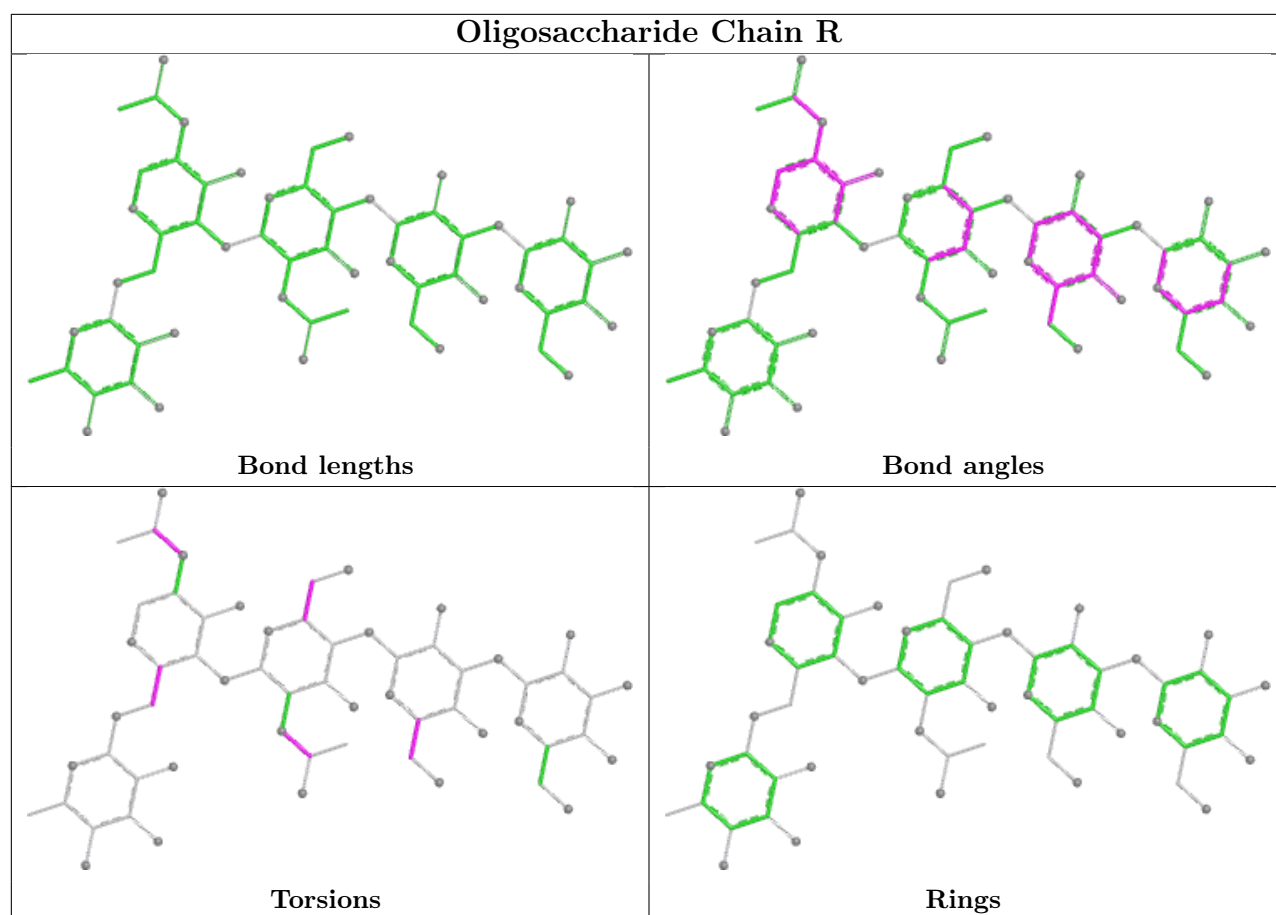












5.6 Ligand geometry [i](#)

3 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	$\# Z > 2$
8	NAG	A	601	1	14,14,15	0.50	0	17,19,21	1.33	3 (17%)
8	NAG	C	502	1	14,14,15	0.47	0	17,19,21	1.37	1 (5%)
8	NAG	C	501	1	14,14,15	0.48	0	17,19,21	0.84	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
8	NAG	A	601	1	-	6/6/23/26	0/1/1/1
8	NAG	C	502	1	-	3/6/23/26	0/1/1/1
8	NAG	C	501	1	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	C	502	NAG	C1-O5-C5	4.20	117.81	112.19
8	A	601	NAG	O5-C1-C2	-3.02	106.62	111.29
8	C	501	NAG	C1-O5-C5	2.49	115.52	112.19
8	A	601	NAG	C4-C3-C2	2.44	114.59	111.02
8	A	601	NAG	C1-O5-C5	2.17	115.09	112.19

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	C	502	NAG	C8-C7-N2-C2
8	C	502	NAG	O7-C7-N2-C2
8	A	601	NAG	C8-C7-N2-C2
8	A	601	NAG	O5-C5-C6-O6
8	A	601	NAG	O7-C7-N2-C2

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	480/488 (98%)	0.53	36 (7%) 20 20	78, 100, 119, 144	0
1	C	480/488 (98%)	0.24	10 (2%) 63 47	80, 100, 119, 141	0
2	B	180/180 (100%)	-0.01	1 (0%) 85 71	83, 100, 122, 138	0
2	D	180/180 (100%)	-0.14	0 100 100	85, 101, 122, 137	0
All	All	1320/1336 (98%)	0.26	47 (3%) 46 35	78, 100, 120, 144	0

The worst 5 of 47 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	98	ALA	5.3
1	A	104	SER	4.8
1	A	43	HIS	4.1
1	A	28	VAL	3.9
1	A	101	PHE	3.6

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	I	2	14/15	0.55	0.64	114,114,115,115	14
3	FUC	O	3	10/11	0.57	0.27	135,136,137,137	10

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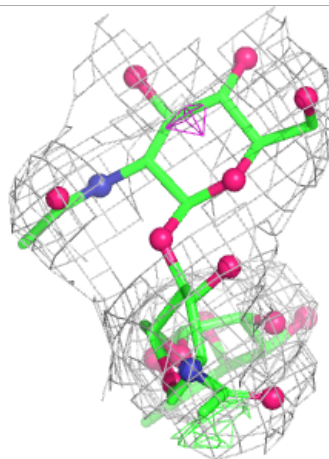
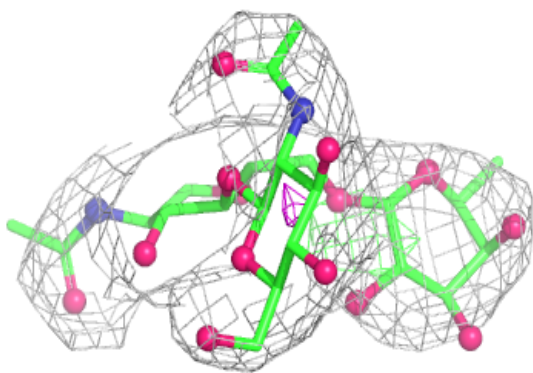
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	NAG	P	1	14/15	0.59	0.25	101,102,105,108	14
7	MAN	R	4	11/12	0.59	0.19	67,68,69,69	11
5	MAN	J	4	11/12	0.61	0.17	105,105,106,106	11
4	NAG	P	2	14/15	0.61	0.28	110,112,113,113	14
4	NAG	F	2	14/15	0.63	0.20	87,89,90,90	14
5	MAN	J	3	11/12	0.63	0.16	100,101,102,104	11
4	NAG	Q	2	14/15	0.64	0.22	105,107,108,109	14
3	NAG	O	2	14/15	0.72	0.34	128,129,129,130	14
4	NAG	M	2	14/15	0.72	0.71	109,109,109,109	14
7	FUC	R	5	10/11	0.73	0.20	83,84,84,84	10
3	NAG	N	2	14/15	0.76	0.18	103,105,105,105	14
3	FUC	N	3	10/11	0.77	0.17	102,103,103,103	10
3	NAG	E	2	14/15	0.77	0.16	75,76,76,76	14
3	NAG	H	2	14/15	0.78	0.21	105,107,108,109	14
3	FUC	H	3	10/11	0.79	0.21	100,101,101,101	10
3	NAG	N	1	14/15	0.80	0.15	96,98,102,102	14
4	NAG	S	2	14/15	0.81	0.19	96,96,97,97	14
7	MAN	R	3	11/12	0.81	0.14	68,69,70,71	11
3	NAG	H	1	14/15	0.82	0.14	96,98,100,102	14
4	NAG	G	1	14/15	0.82	0.12	92,94,96,98	14
4	NAG	F	1	14/15	0.83	0.14	90,91,93,95	14
4	NAG	Q	1	14/15	0.84	0.14	102,102,104,105	14
4	NAG	M	1	14/15	0.84	0.20	103,107,108,108	14
3	NAG	O	1	14/15	0.86	0.14	123,126,130,133	14
5	NAG	J	1	14/15	0.86	0.17	81,88,90,90	14
5	NAG	J	2	14/15	0.86	0.17	92,93,95,98	14
3	NAG	E	1	14/15	0.86	0.12	71,74,76,77	14
7	NAG	R	2	14/15	0.87	0.20	73,78,80,81	14
6	MAN	K	3	11/12	0.87	0.27	63,64,64,64	11
3	FUC	I	3	10/11	0.89	0.23	104,105,106,106	10
3	FUC	E	3	10/11	0.89	0.18	68,69,69,70	10
6	NAG	K	2	14/15	0.89	0.17	59,60,62,63	14
4	NAG	L	2	14/15	0.89	0.32	87,87,87,87	14
4	NAG	S	1	14/15	0.91	0.12	92,93,94,95	14
4	NAG	L	1	14/15	0.91	0.17	85,88,88,89	14
3	NAG	I	1	14/15	0.91	0.15	107,112,112,113	14
6	FUC	K	4	10/11	0.92	0.11	57,59,59,59	10
6	NAG	K	1	14/15	0.93	0.15	56,60,62,64	14
4	NAG	G	2	14/15	0.94	0.18	100,101,103,103	14
7	NAG	R	1	14/15	0.94	0.12	80,81,83,83	14

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

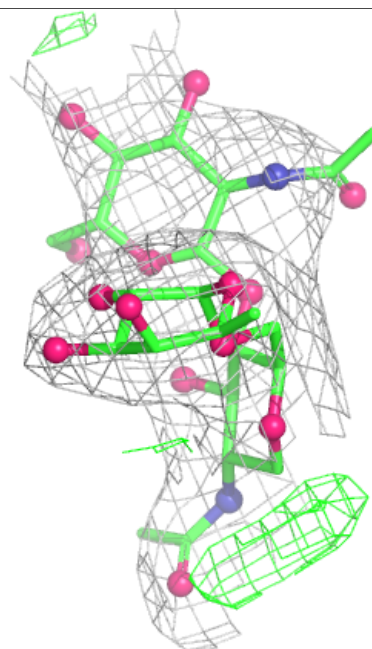
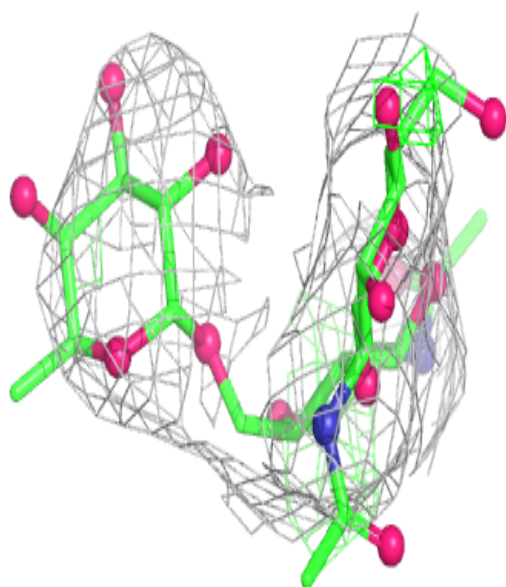
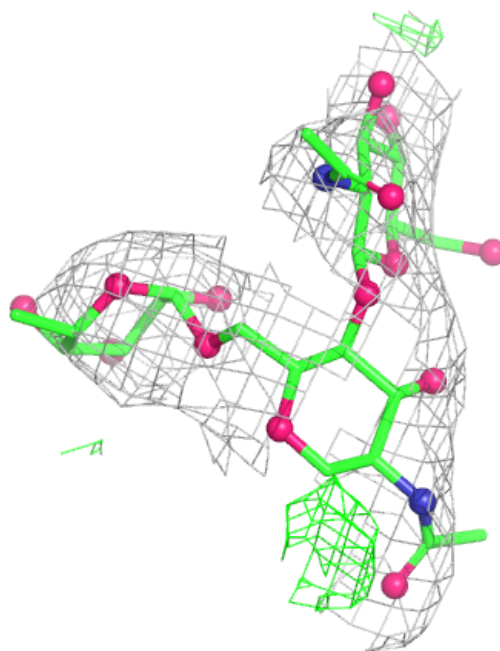
Electron density around Chain E:

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



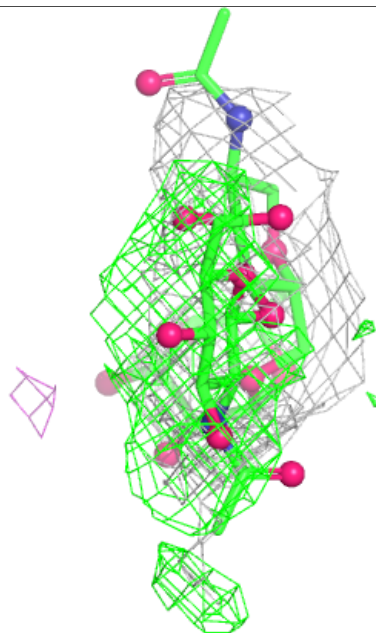
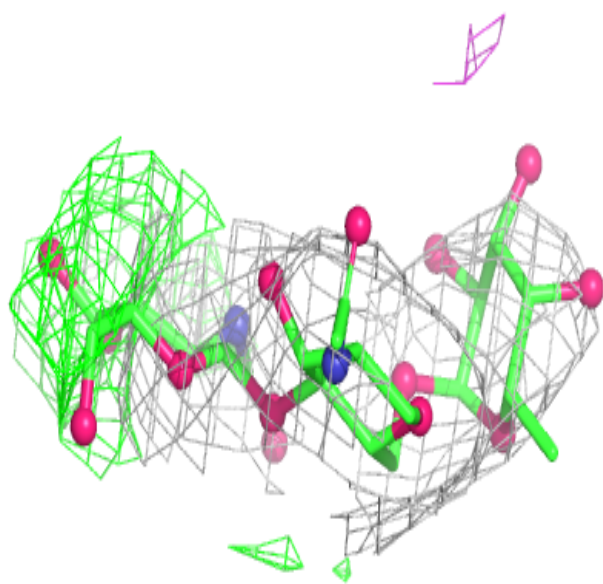
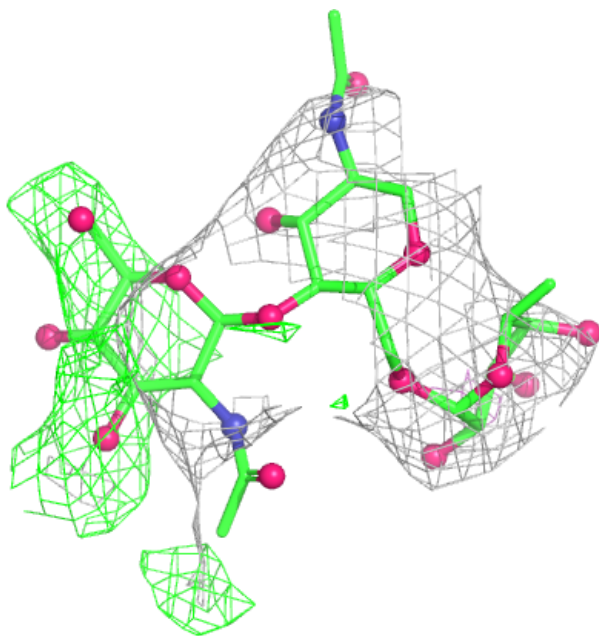
Electron density around Chain H:

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



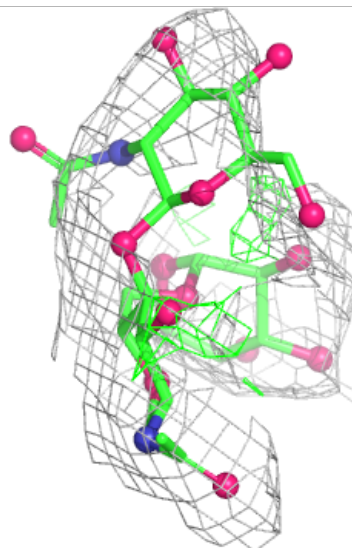
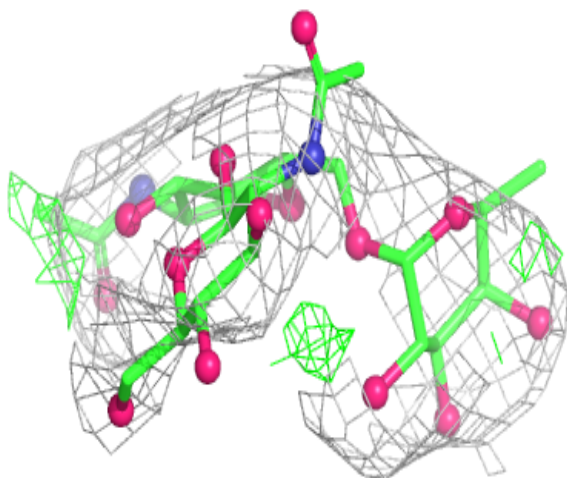
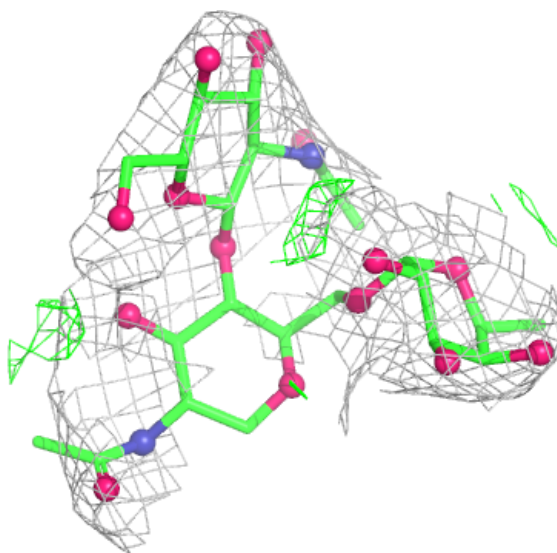
Electron density around Chain I:

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



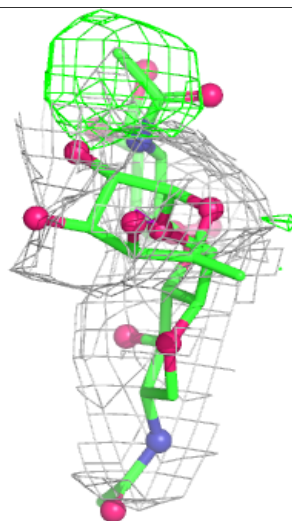
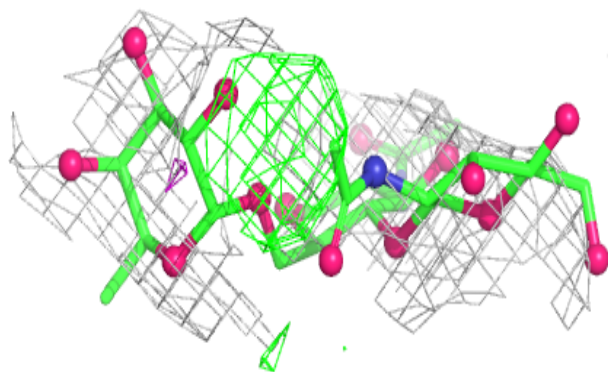
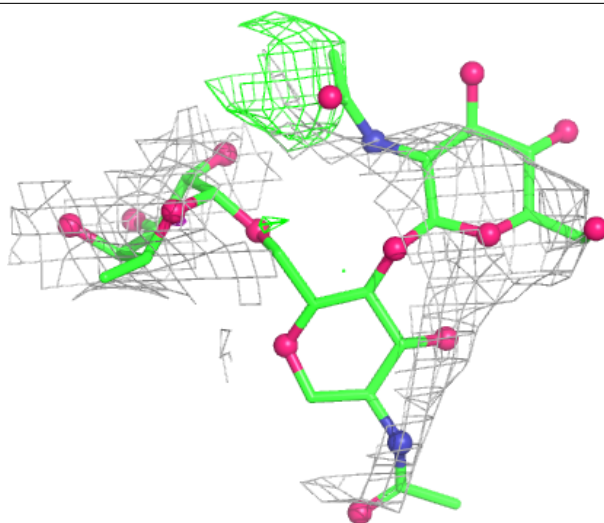
Electron density around Chain N:

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



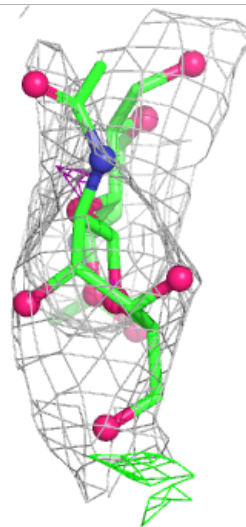
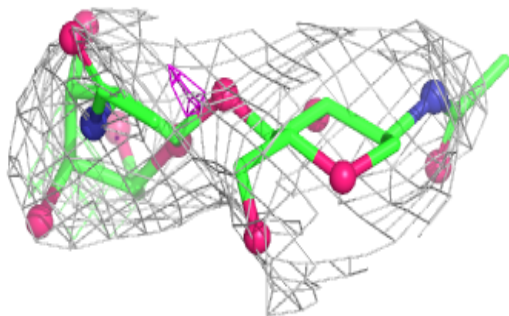
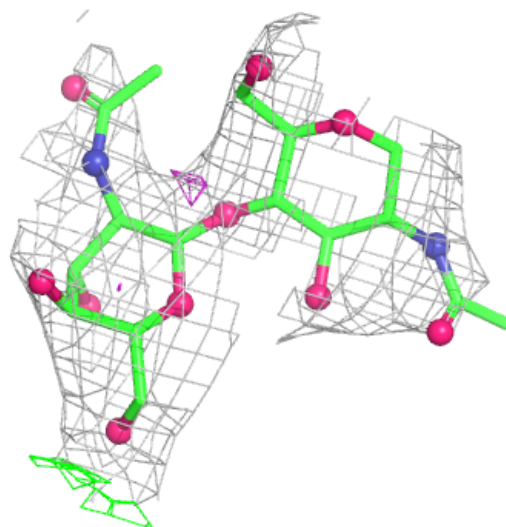
Electron density around Chain O:

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



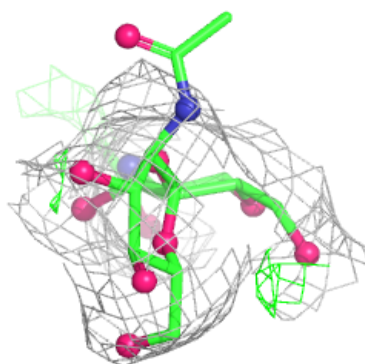
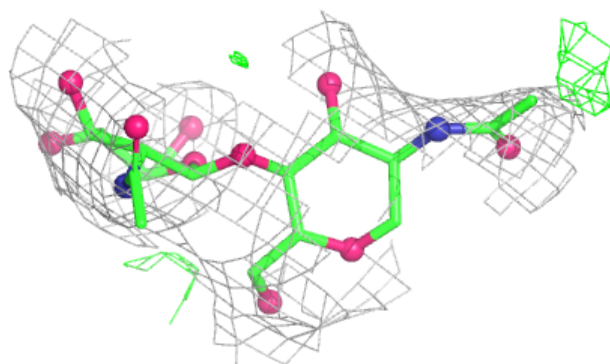
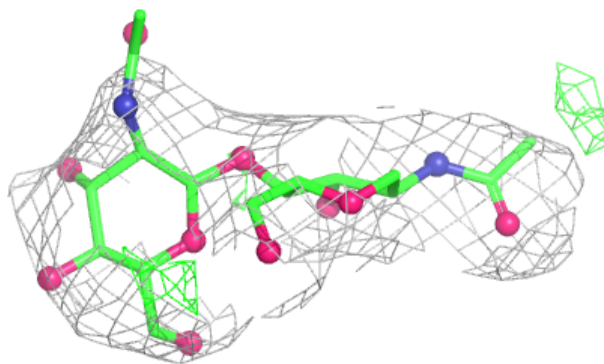
Electron density around Chain F:

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

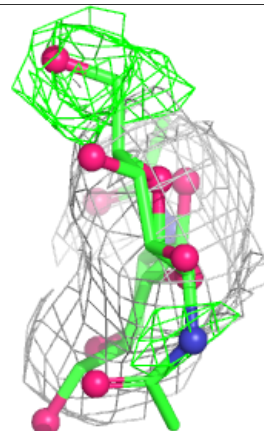
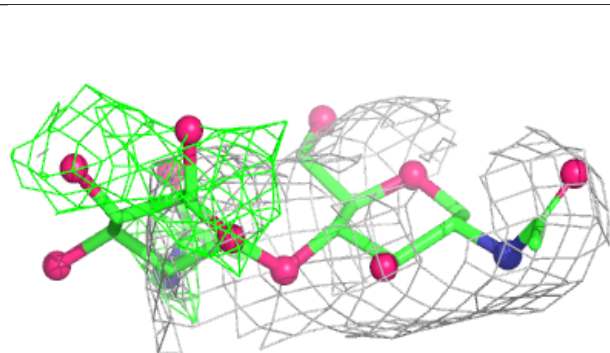
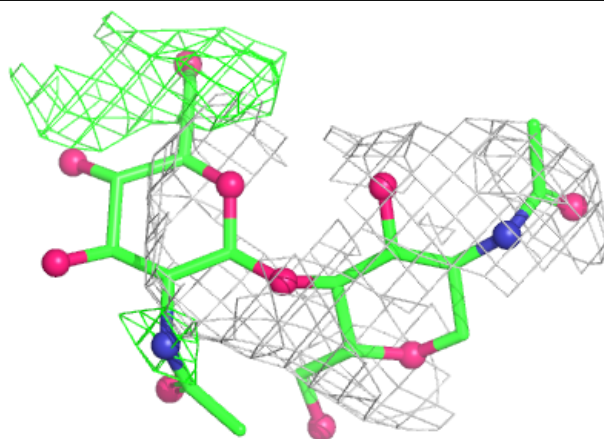


Electron density around Chain G:

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

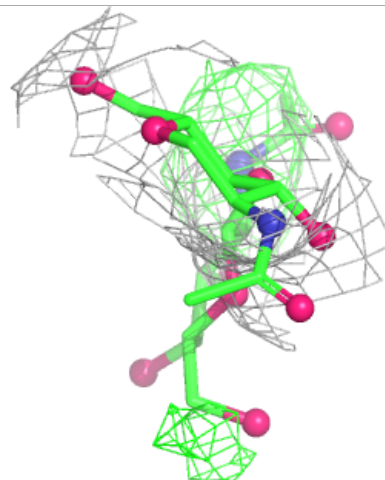
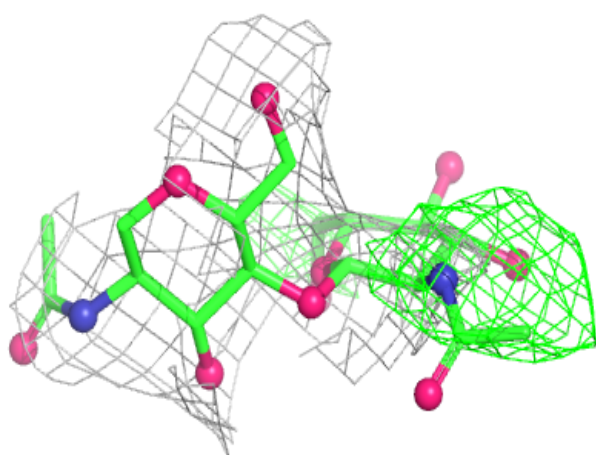
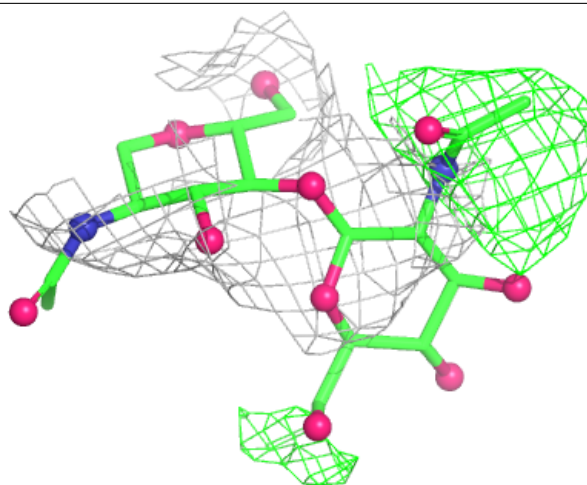
**Electron density around Chain L:**

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



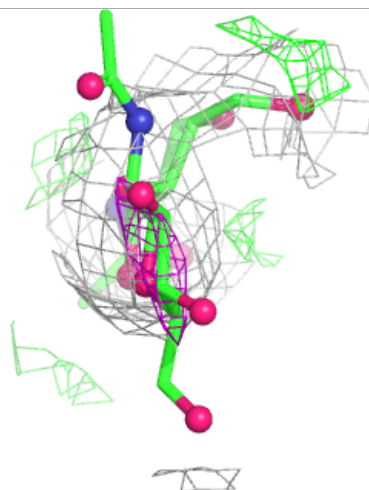
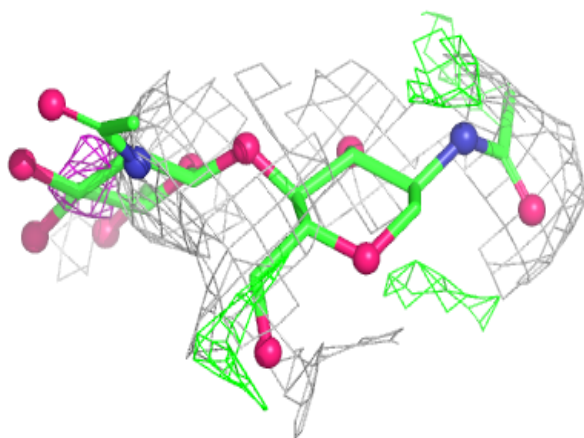
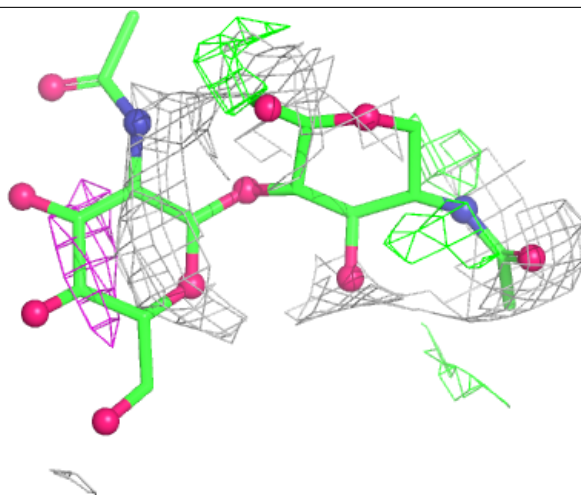
Electron density around Chain M:

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



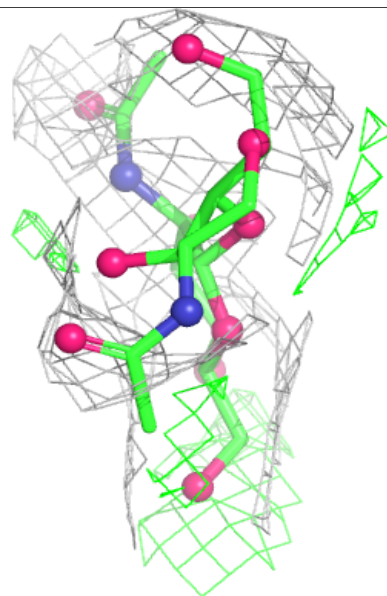
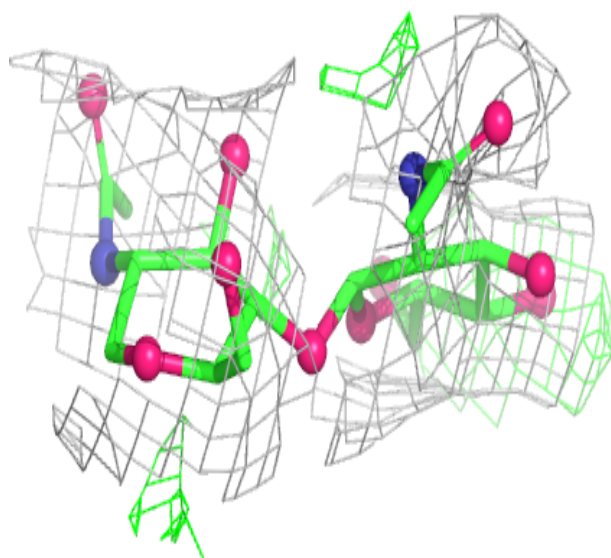
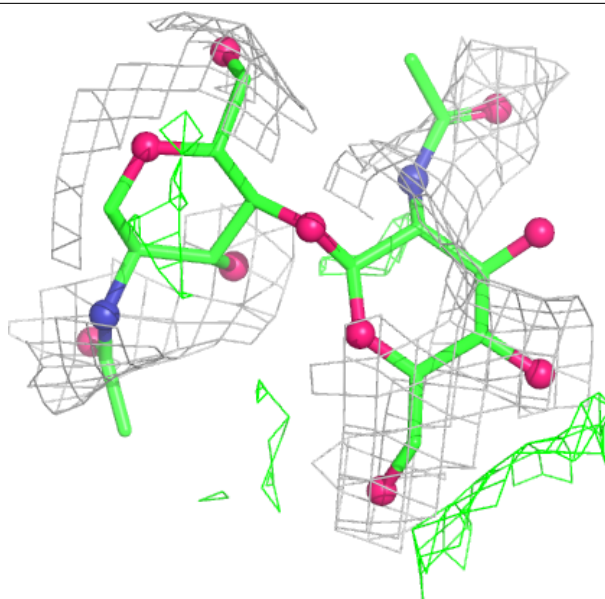
Electron density around Chain P:

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



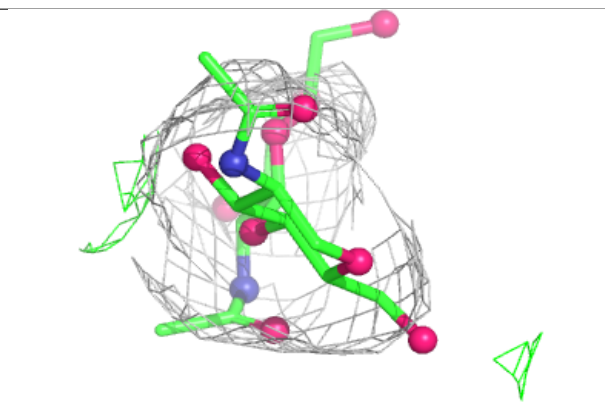
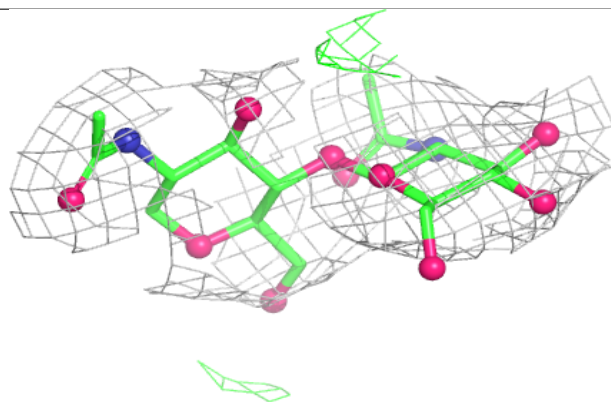
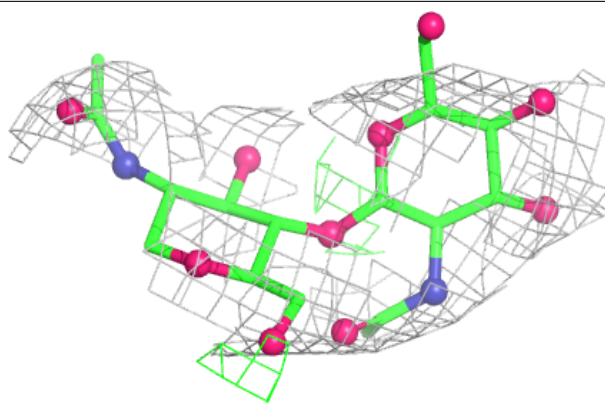
Electron density around Chain Q:

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

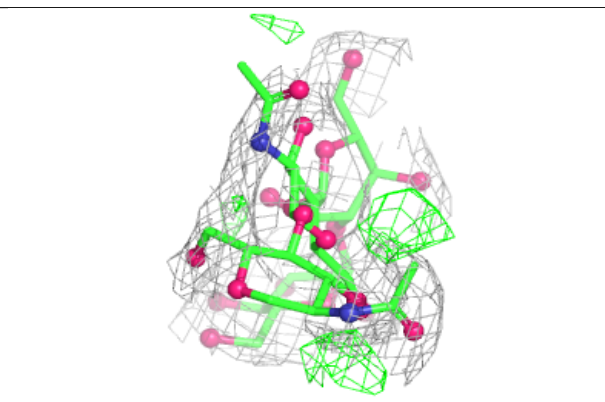
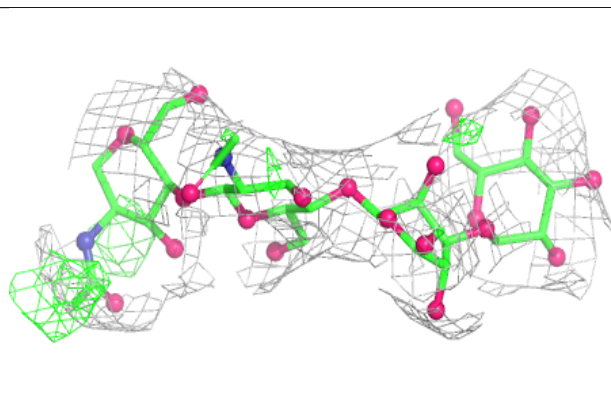
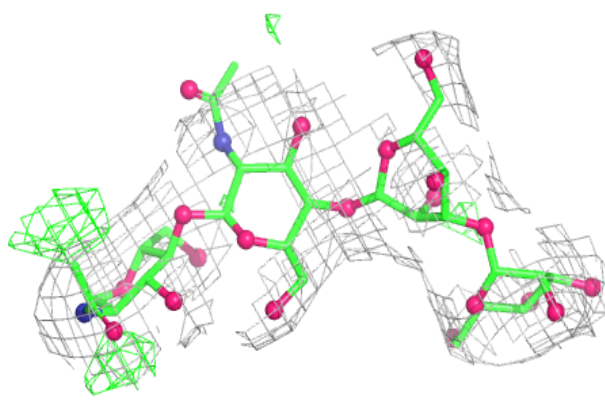


Electron density around Chain S:

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

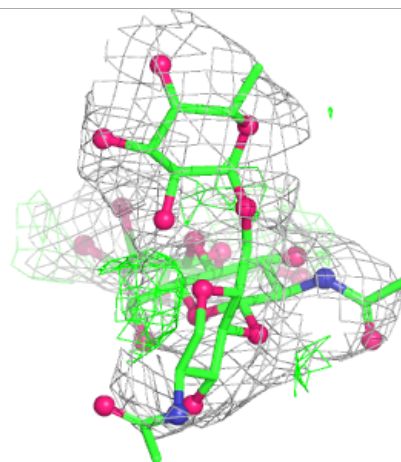
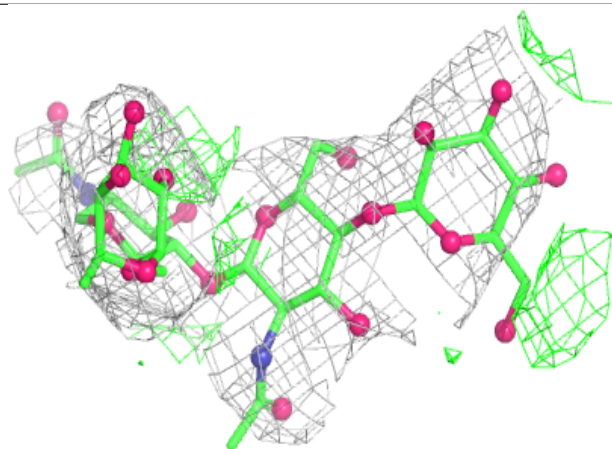
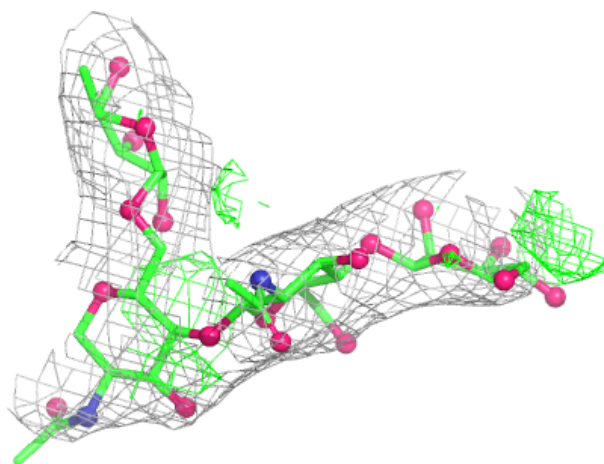
**Electron density around Chain J:**

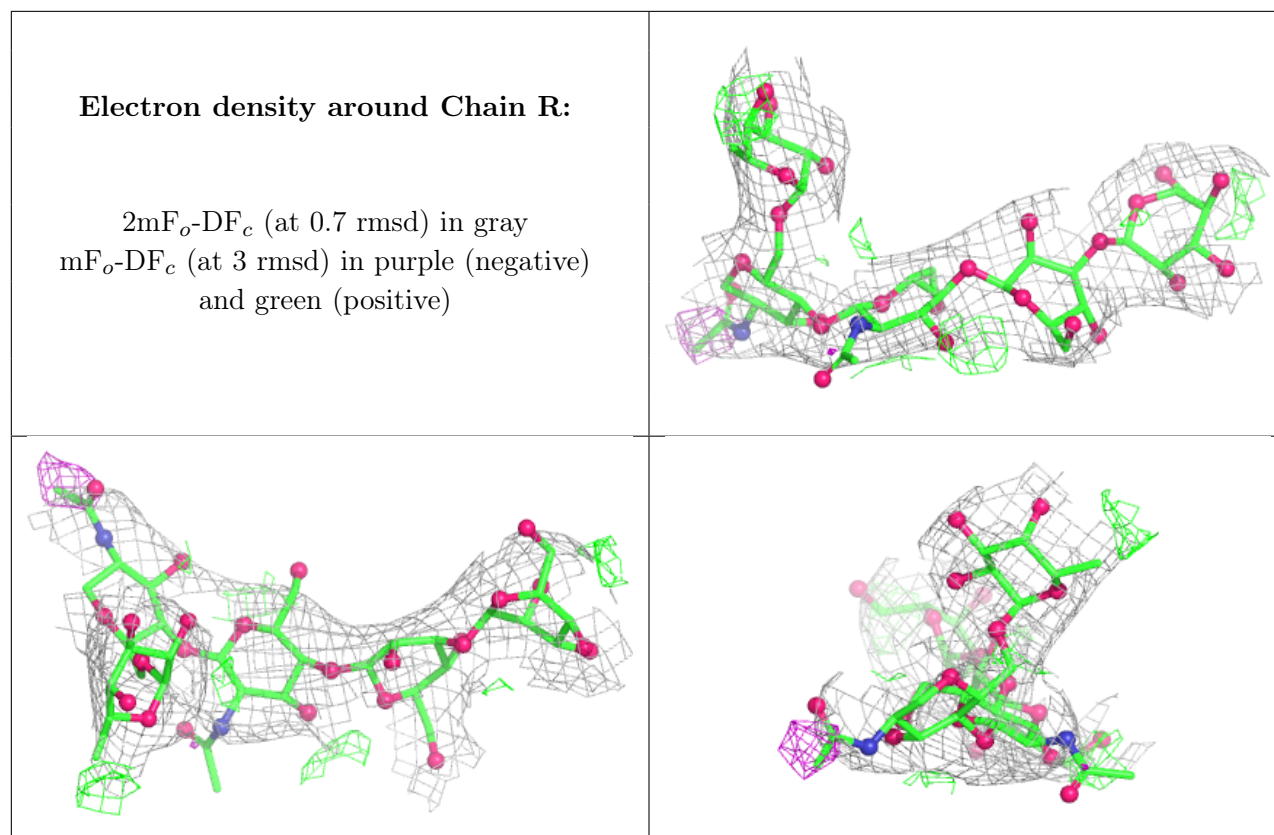
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain K:

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





6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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
8	NAG	C	502	14/15	0.59	0.26	94,97,99,99	14
8	NAG	A	601	14/15	0.81	0.21	77,86,87,88	14
8	NAG	C	501	14/15	0.82	0.18	89,92,93,94	14

6.5 Other polymers [i](#)

There are no such residues in this entry.