



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 7, 2024 – 06:05 am GMT

PDB ID : 6FHW
Title : Structure of Hormoconis resinae Glucoamylase
Authors : Roth, C.; Moroz, O.V.; Ariza, A.; Friis, E.P.; Davies, G.J.; Wilson, K.S.
Deposited on : 2018-01-15
Resolution : 3.60 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

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

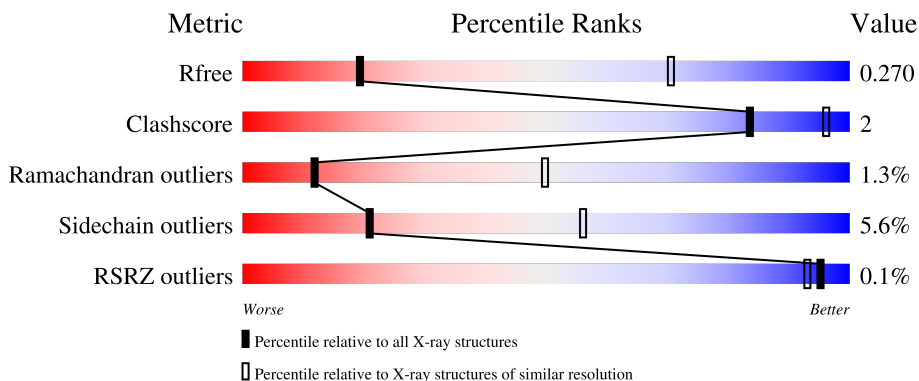
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.60 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.




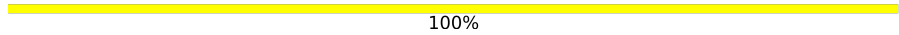


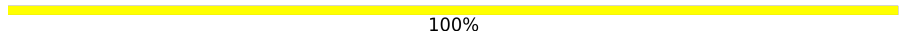
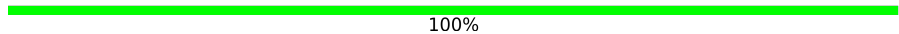
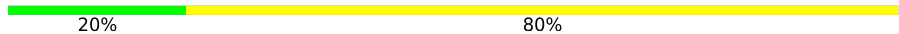

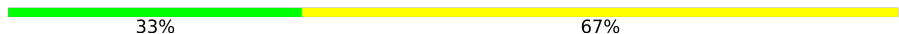
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1257 (3.70-3.50)
Clashscore	141614	1353 (3.70-3.50)
Ramachandran outliers	138981	1307 (3.70-3.50)
Sidechain outliers	138945	1307 (3.70-3.50)
RSRZ outliers	127900	1161 (3.70-3.50)

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	616	
1	B	616	
2	C	2	
2	D	2	
2	E	2	

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Mol	Chain	Length	Quality of chain
2	G	2	 50% 50%
2	H	2	 100%
2	I	2	 50% 50%
2	J	2	 50% 50%
2	K	2	 100%
2	L	2	 100%
3	F	5	 20% 80%
4	M	3	 67% 33%
4	N	3	 33% 67%

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
2	NAG	K	2	-	-	-	X
3	MAN	F	5	-	-	-	X

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 9385 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 Glucoamylase P.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	586	4474	2838	740	879	17	0	0	0
1	B	587	4482	2842	742	881	17	0	0	0

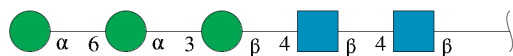
- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	2	28	16	2	10	0	0	0
2	D	2	28	16	2	10	0	0	0
2	E	2	28	16	2	10	0	0	0
2	G	2	28	16	2	10	0	0	0
2	H	2	28	16	2	10	0	0	0
2	I	2	28	16	2	10	0	0	0
2	J	2	28	16	2	10	0	0	0
2	K	2	28	16	2	10	0	0	0
2	L	2	28	16	2	10	0	0	0

- Molecule 3 is an oligosaccharide called alpha-D-mannopyranose-(1-6)-alpha-D-mannopyran

ose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

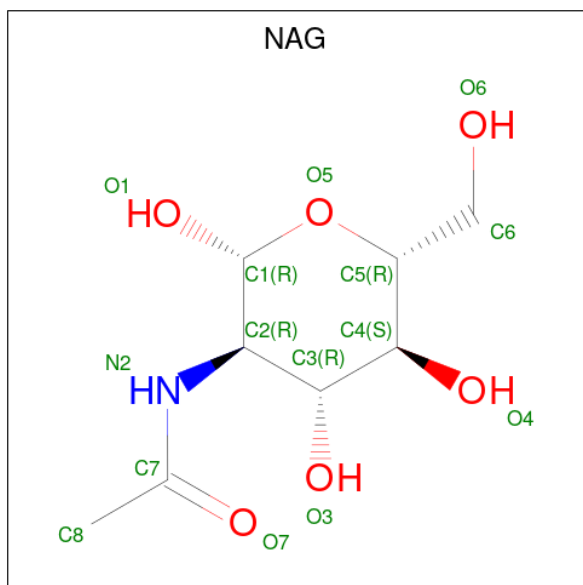


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	F	5	61	34	2	25	0	0	0

- Molecule 4 is an oligosaccharide called 4,6-dideoxy-4-[[[(1S,4R,5S,6S)-4,5,6-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino]-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	M	3	44	25	1	18	0	0	0
4	N	3	44	25	1	18	0	0	0

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



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

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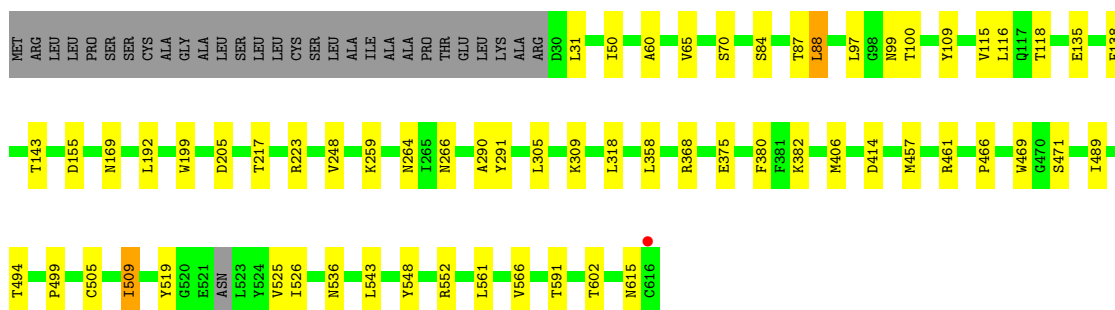
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	14	8	1	5	0	0

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.

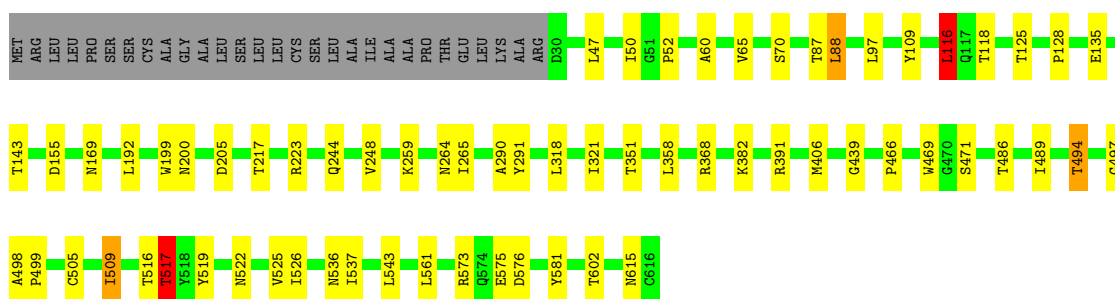
- Molecule 1: Glucoamylase P

Chain A:  85% 10% 5%



- Molecule 1: Glucoamylase P

Chain B:  84% 10% 5%



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

Chain C:  100%

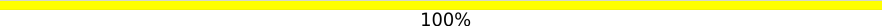


- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucofuranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucofuranose

Chain D:  50% 50%

MAG1
MAG2

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

Chain E:  100%

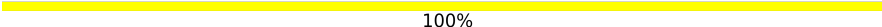
MAG1
MAG2

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

Chain G:  50% 50%

MAG1
MAG2

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

Chain H:  100%

MAG1
MAG2

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

Chain I:  50% 50%

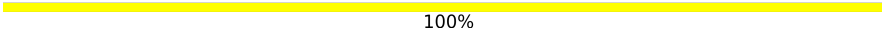
MAG1
MAG2

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

Chain J:  50% 50%

MAG1
MAG2

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

Chain K:  100%


MAG1
MAG2

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

Chain L:  100%

GLC1
GLC2

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

Chain F:  20% 80%

GLC1
GLC2
BMA3
MAN4
MAN5

- Molecule 4: 4,6-dideoxy-4-[(1S,4R,5S,6S)-4,5,6-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain M:  67% 33%

GLC1
GLC2
AC13

- Molecule 4: 4,6-dideoxy-4-[(1S,4R,5S,6S)-4,5,6-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain N:  33% 67%

GLC1
GLC2
AC13

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	137.97Å 149.83Å 192.35Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	59.58 – 3.60 59.58 – 3.60	Depositor EDS
% Data completeness (in resolution range)	79.1 (59.58-3.60) 79.1 (59.58-3.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.52 (at 3.57Å)	Xtrriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.264 , 0.273 0.265 , 0.270	Depositor DCC
R_{free} test set	1887 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å ²)	54.0	Xtrriage
Anisotropy	0.056	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 9.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.82	EDS
Total number of atoms	9385	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.16% 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: MAN, GLC, NAG, AC1, 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	0.38	0/4592	0.56	0/6284
1	B	0.38	0/4601	0.57	1/6298 (0.0%)
All	All	0.38	0/9193	0.57	1/12582 (0.0%)

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	B	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	116	LEU	CA-CB-CG	6.51	130.28	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	575	GLU	Peptide

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	4474	0	4241	18	0
1	B	4482	0	4250	24	0
2	C	28	0	25	0	0
2	D	28	0	25	0	0
2	E	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	0	0
2	I	28	0	25	1	0
2	J	28	0	25	1	0
2	K	28	0	25	0	0
2	L	28	0	25	0	0
3	F	61	0	52	0	0
4	M	44	0	30	0	0
4	N	44	0	30	0	0
5	A	28	0	26	0	0
All	All	9385	0	8854	43	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 2.

All (43) 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:115:VAL:O	1:A:118:THR:HG22	1.91	0.70
1:B:52:PRO:HA	1:B:60:ALA:HB1	1.79	0.65
1:A:65:VAL:HG11	1:A:87:THR:HG21	1.78	0.65
1:B:65:VAL:HG11	1:B:87:THR:HG21	1.78	0.64
1:B:88:LEU:HD22	1:B:109:TYR:CD1	2.35	0.61
1:A:88:LEU:HD22	1:A:109:TYR:CD1	2.35	0.61
1:B:517:THR:HG21	1:B:573:ARG:CZ	2.34	0.58
1:A:116:LEU:HD11	1:A:138:PHE:CD1	2.40	0.57
1:A:116:LEU:HD11	1:A:138:PHE:CG	2.39	0.57
1:B:118:THR:HG21	1:B:499:PRO:HD2	1.90	0.54
1:B:125:THR:HG23	1:B:128:PRO:HD2	1.94	0.50
1:B:537:ILE:HG21	1:B:581:TYR:CD2	2.47	0.50
1:B:498:ALA:HB1	1:B:499:PRO:HD2	1.93	0.49
1:A:414:ASP:OD1	1:A:461:ARG:NH2	2.46	0.49
2:J:1:NAG:H82	2:J:1:NAG:O3	2.13	0.49
1:B:88:LEU:HD22	1:B:109:TYR:CG	2.48	0.48
1:A:88:LEU:HD22	1:A:109:TYR:CG	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:305:LEU:HD12	1:A:380:PHE:CE2	2.49	0.46
1:A:199:TRP:CD2	1:A:248:VAL:HG22	2.52	0.45
1:A:205:ASP:HB3	1:A:264:ASN:HD21	1.81	0.45
1:B:205:ASP:HB3	1:B:264:ASN:HD21	1.81	0.45
1:B:200:ASN:HD22	2:I:1:NAG:H83	1.82	0.45
1:B:516:THR:O	1:B:517:THR:HG23	2.17	0.45
1:B:199:TRP:CD2	1:B:248:VAL:HG22	2.52	0.44
1:B:498:ALA:HB1	1:B:499:PRO:CD	2.47	0.44
1:B:50:ILE:HG12	1:B:65:VAL:HG13	2.00	0.44
1:A:155:ASP:HB3	1:A:217:THR:HG23	2.00	0.43
1:B:244:GLN:NE2	1:B:486:THR:HG23	2.32	0.43
1:A:290:ALA:HB2	1:A:471:SER:OG	2.18	0.43
1:B:116:LEU:C	1:B:116:LEU:HD12	2.37	0.43
1:A:509:ILE:HG21	1:A:561:LEU:HD11	2.00	0.43
1:B:155:ASP:HB3	1:B:217:THR:HG23	2.00	0.43
1:A:566:VAL:HG12	1:A:591:THR:HB	2.01	0.43
1:B:290:ALA:HB2	1:B:471:SER:OG	2.18	0.43
1:A:50:ILE:HG12	1:A:65:VAL:HG13	2.00	0.43
1:B:509:ILE:HG21	1:B:561:LEU:HD11	2.00	0.43
1:A:525:VAL:HG12	1:A:543:LEU:HD11	2.01	0.42
1:A:519:TYR:HA	1:A:548:TYR:CD1	2.55	0.42
1:B:525:VAL:HG12	1:B:543:LEU:HD11	2.01	0.42
1:B:494:THR:H	1:B:498:ALA:HB3	1.84	0.41
1:A:223:ARG:HG3	1:A:469:TRP:CD2	2.56	0.41
1:B:321:ILE:HD11	1:B:439:GLY:HA2	2.03	0.41
1:B:223:ARG:HG3	1:B:469:TRP:CD2	2.56	0.40

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	582/616 (94%)	531 (91%)	45 (8%)	6 (1%)	15	55
1	B	585/616 (95%)	531 (91%)	45 (8%)	9 (2%)	10	47
All	All	1167/1232 (95%)	1062 (91%)	90 (8%)	15 (1%)	12	50

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	519	TYR
1	A	60	ALA
1	A	70	SER
1	A	499	PRO
1	B	70	SER
1	A	466	PRO
1	B	466	PRO
1	B	522	ASN
1	B	497	GLY
1	B	517	THR
1	B	576	ASP
1	A	494	THR
1	B	494	THR
1	B	505	CYS
1	A	505	CYS

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	472/495 (95%)	444 (94%)	28 (6%)	19	55
1	B	473/495 (96%)	448 (95%)	25 (5%)	22	58
All	All	945/990 (96%)	892 (94%)	53 (6%)	21	56

All (53) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	LEU

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Mol	Chain	Res	Type
1	A	84	SER
1	A	88	LEU
1	A	97	LEU
1	A	99	ASN
1	A	100	THR
1	A	135	GLU
1	A	143	THR
1	A	169	ASN
1	A	192	LEU
1	A	259	LYS
1	A	266	ASN
1	A	291	TYR
1	A	309	LYS
1	A	318	LEU
1	A	358	LEU
1	A	368	ARG
1	A	375	GLU
1	A	382	LYS
1	A	406	MET
1	A	457	MET
1	A	489	ILE
1	A	509	ILE
1	A	526	ILE
1	A	536	ASN
1	A	552	ARG
1	A	602	THR
1	A	615	ASN
1	B	47	LEU
1	B	88	LEU
1	B	97	LEU
1	B	116	LEU
1	B	135	GLU
1	B	143	THR
1	B	169	ASN
1	B	192	LEU
1	B	259	LYS
1	B	265	ILE
1	B	291	TYR
1	B	318	LEU
1	B	351	THR
1	B	358	LEU
1	B	368	ARG

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Mol	Chain	Res	Type
1	B	382	LYS
1	B	391	ARG
1	B	406	MET
1	B	489	ILE
1	B	509	ILE
1	B	517	THR
1	B	526	ILE
1	B	536	ASN
1	B	602	THR
1	B	615	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	48	ASN
1	A	49	ASN
1	A	108	GLN
1	A	169	ASN
1	A	174	ASN
1	A	190	ASN
1	A	253	GLN
1	A	264	ASN
1	A	303	GLN
1	A	307	ASN
1	A	364	GLN
1	A	433	GLN
1	A	536	ASN
1	A	562	ASN
1	A	574	GLN
1	B	48	ASN
1	B	49	ASN
1	B	169	ASN
1	B	174	ASN
1	B	190	ASN
1	B	264	ASN
1	B	364	GLN
1	B	433	GLN
1	B	536	ASN
1	B	562	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](#)

29 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	C	1	2,1	14,14,15	0.36	0	17,19,21	0.57	0
2	NAG	C	2	2	14,14,15	0.38	0	17,19,21	0.89	0
2	NAG	D	1	2,1	14,14,15	0.30	0	17,19,21	1.15	2 (11%)
2	NAG	D	2	2	14,14,15	0.31	0	17,19,21	0.65	0
2	NAG	E	1	2,1	14,14,15	0.38	0	17,19,21	0.97	1 (5%)
2	NAG	E	2	2	14,14,15	0.37	0	17,19,21	1.22	2 (11%)
3	NAG	F	1	1,3	14,14,15	0.33	0	17,19,21	1.23	2 (11%)
3	NAG	F	2	3	14,14,15	0.32	0	17,19,21	0.67	0
3	BMA	F	3	3	11,11,12	0.44	0	15,15,17	1.15	2 (13%)
3	MAN	F	4	3	11,11,12	0.34	0	15,15,17	0.72	1 (6%)
3	MAN	F	5	3	11,11,12	0.52	0	15,15,17	2.12	3 (20%)
2	NAG	G	1	2,1	14,14,15	0.26	0	17,19,21	0.97	2 (11%)
2	NAG	G	2	2	14,14,15	0.27	0	17,19,21	0.64	0
2	NAG	H	1	2,1	14,14,15	0.38	0	17,19,21	0.84	1 (5%)
2	NAG	H	2	2	14,14,15	0.38	0	17,19,21	1.25	2 (11%)
2	NAG	I	1	2,1	14,14,15	0.39	0	17,19,21	1.44	3 (17%)
2	NAG	I	2	2	14,14,15	0.27	0	17,19,21	0.71	0
2	NAG	J	1	2,1	14,14,15	0.46	0	17,19,21	1.76	2 (11%)
2	NAG	J	2	2	14,14,15	0.31	0	17,19,21	0.85	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	K	1	2,1	14,14,15	0.35	0	17,19,21	1.24	1 (5%)
2	NAG	K	2	2	14,14,15	0.32	0	17,19,21	1.69	2 (11%)
2	NAG	L	1	2,1	14,14,15	0.39	0	17,19,21	0.75	0
2	NAG	L	2	2	14,14,15	0.31	0	17,19,21	0.73	0
4	GLC	M	1	4	12,12,12	0.57	0	17,17,17	0.69	0
4	GLC	M	2	4	11,11,12	0.33	0	15,15,17	1.51	2 (13%)
4	AC1	M	3	4	21,22,23	0.53	0	22,32,34	0.82	0
4	GLC	N	1	4	12,12,12	0.52	0	17,17,17	0.59	0
4	GLC	N	2	4	11,11,12	0.32	0	15,15,17	1.15	2 (13%)
4	AC1	N	3	4	21,22,23	0.63	0	22,32,34	0.83	1 (4%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	C	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	1/6/23/26	0/1/1/1
2	NAG	D	1	2,1	-	3/6/23/26	0/1/1/1
2	NAG	D	2	2	-	1/6/23/26	0/1/1/1
2	NAG	E	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	1/6/23/26	0/1/1/1
3	NAG	F	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	F	2	3	-	0/6/23/26	0/1/1/1
3	BMA	F	3	3	-	0/2/19/22	0/1/1/1
3	MAN	F	4	3	-	0/2/19/22	0/1/1/1
3	MAN	F	5	3	-	0/2/19/22	0/1/1/1
2	NAG	G	1	2,1	-	1/6/23/26	0/1/1/1
2	NAG	G	2	2	-	2/6/23/26	0/1/1/1
2	NAG	H	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	H	2	2	-	3/6/23/26	0/1/1/1
2	NAG	I	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	I	2	2	-	1/6/23/26	0/1/1/1
2	NAG	J	1	2,1	-	5/6/23/26	0/1/1/1
2	NAG	J	2	2	-	0/6/23/26	0/1/1/1
2	NAG	K	1	2,1	-	4/6/23/26	0/1/1/1
2	NAG	K	2	2	-	4/6/23/26	0/1/1/1
2	NAG	L	1	2,1	-	1/6/23/26	0/1/1/1
2	NAG	L	2	2	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GLC	M	1	4	-	0/2/22/22	0/1/1/1
4	GLC	M	2	4	-	0/2/19/22	0/1/1/1
4	AC1	M	3	4	-	4/6/43/46	0/2/2/2
4	GLC	N	1	4	-	2/2/22/22	0/1/1/1
4	GLC	N	2	4	-	0/2/19/22	0/1/1/1
4	AC1	N	3	4	-	5/6/43/46	0/2/2/2

There are no bond length outliers.

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	5	MAN	C1-O5-C5	5.67	119.87	112.19
2	K	2	NAG	C2-N2-C7	4.97	129.97	122.90
3	F	5	MAN	C1-C2-C3	4.64	115.37	109.67
2	J	1	NAG	C2-N2-C7	4.37	129.12	122.90
4	M	2	GLC	C1-C2-C3	4.17	114.79	109.67
2	J	1	NAG	C8-C7-N2	3.86	122.64	116.10
2	I	1	NAG	C8-C7-N2	3.49	122.02	116.10
2	K	2	NAG	C8-C7-N2	3.27	121.63	116.10
2	K	1	NAG	C1-C2-N2	3.14	115.86	110.49
2	I	1	NAG	C2-N2-C7	3.14	127.38	122.90
3	F	3	BMA	C1-C2-C3	3.07	113.44	109.67
3	F	1	NAG	O5-C1-C2	-2.88	106.75	111.29
2	H	2	NAG	C1-O5-C5	2.81	116.00	112.19
2	E	1	NAG	O5-C1-C2	-2.61	107.17	111.29
2	D	1	NAG	C8-C7-N2	2.59	120.49	116.10
3	F	5	MAN	O5-C1-C2	2.42	114.50	110.77
4	N	2	GLC	C1-C2-C3	2.36	112.57	109.67
3	F	4	MAN	C1-O5-C5	2.34	115.36	112.19
2	H	1	NAG	C1-C2-N2	2.33	114.47	110.49
2	H	2	NAG	C2-N2-C7	2.32	126.21	122.90
2	D	1	NAG	C2-N2-C7	2.32	126.20	122.90
3	F	1	NAG	C1-C2-N2	2.31	114.44	110.49
2	E	2	NAG	C2-N2-C7	2.27	126.14	122.90
2	E	2	NAG	O5-C1-C2	-2.26	107.72	111.29
3	F	3	BMA	C1-O5-C5	2.25	115.24	112.19
4	N	2	GLC	C1-O5-C5	2.19	115.16	112.19
4	M	2	GLC	C2-C3-C4	2.12	114.57	110.89
2	G	1	NAG	C1-O5-C5	2.12	115.06	112.19
2	G	1	NAG	O5-C1-C2	-2.10	107.97	111.29
2	I	1	NAG	O7-C7-C8	-2.10	118.16	122.06

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	N	3	AC1	C1-C2-C3	2.05	112.18	109.67

There are no chirality outliers.

All (42) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	M	3	AC1	C3-C4-N4A-C1B
4	M	3	AC1	C5-C4-N4A-C1B
4	M	3	AC1	C4A-C5B-C6B-O6B
4	M	3	AC1	C7B-C5B-C6B-O6B
4	N	3	AC1	C5-C4-N4A-C1B
2	G	2	NAG	O5-C5-C6-O6
2	J	1	NAG	O5-C5-C6-O6
2	D	1	NAG	C8-C7-N2-C2
2	D	1	NAG	O7-C7-N2-C2
2	I	1	NAG	C8-C7-N2-C2
2	I	1	NAG	O7-C7-N2-C2
2	J	1	NAG	C8-C7-N2-C2
2	J	1	NAG	O7-C7-N2-C2
2	K	2	NAG	C8-C7-N2-C2
2	K	2	NAG	O7-C7-N2-C2
4	N	1	GLC	O5-C5-C6-O6
2	H	2	NAG	O5-C5-C6-O6
2	G	2	NAG	C4-C5-C6-O6
2	D	1	NAG	O5-C5-C6-O6
2	L	1	NAG	O5-C5-C6-O6
4	N	1	GLC	C4-C5-C6-O6
3	F	1	NAG	O5-C5-C6-O6
2	J	1	NAG	C4-C5-C6-O6
2	G	1	NAG	O5-C5-C6-O6
2	I	2	NAG	O5-C5-C6-O6
2	D	2	NAG	O5-C5-C6-O6
2	K	2	NAG	O5-C5-C6-O6
2	C	2	NAG	O5-C5-C6-O6
4	N	3	AC1	C7B-C5B-C6B-O6B
2	K	1	NAG	C4-C5-C6-O6
2	J	1	NAG	C1-C2-N2-C7
2	K	1	NAG	C3-C2-N2-C7
2	K	2	NAG	C3-C2-N2-C7
4	N	3	AC1	C2B-C1B-N4A-C4
2	H	2	NAG	C4-C5-C6-O6
4	N	3	AC1	C3-C4-N4A-C1B

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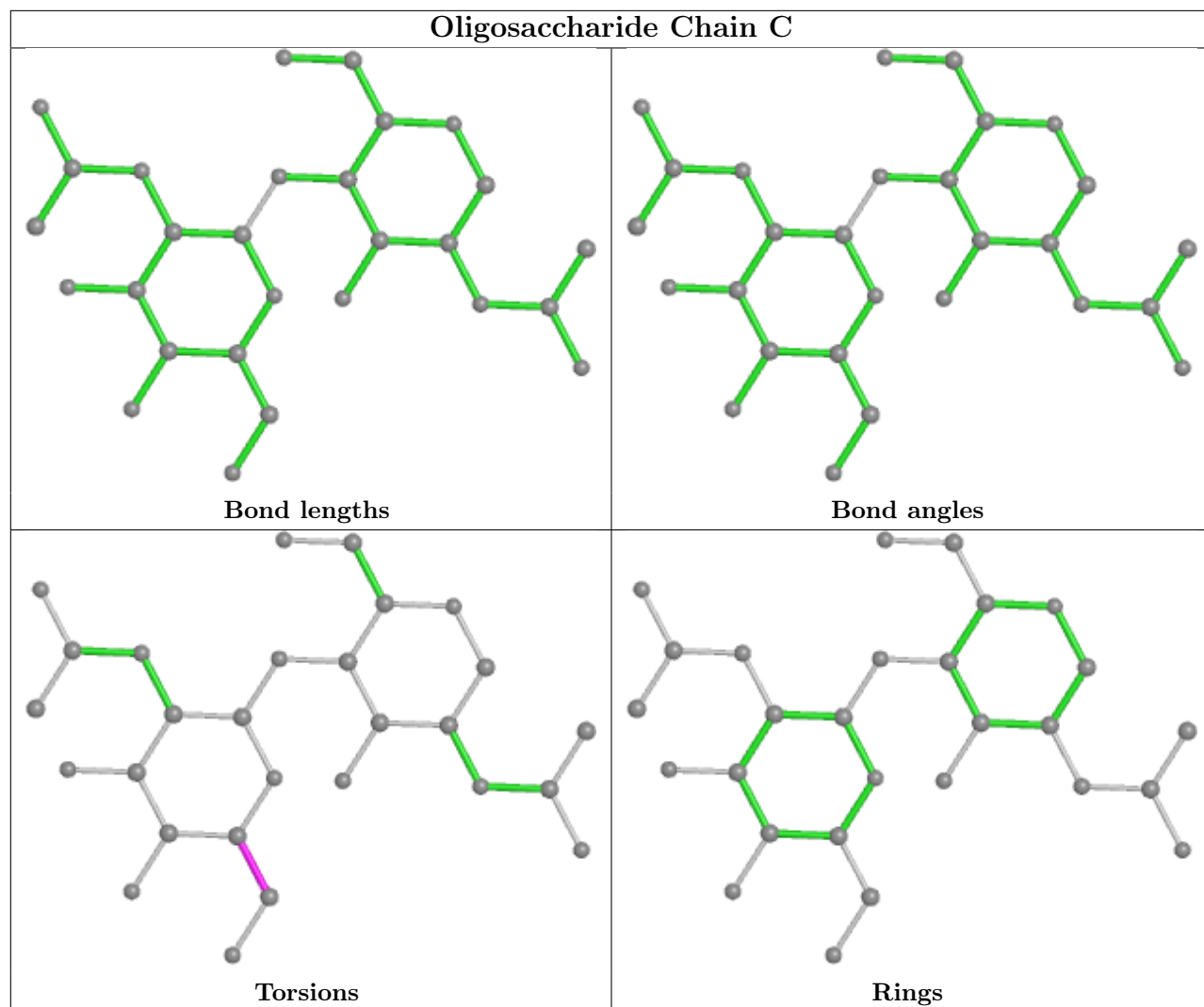
Mol	Chain	Res	Type	Atoms
2	K	1	NAG	O5-C5-C6-O6
4	N	3	AC1	C4A-C5B-C6B-O6B
3	F	1	NAG	C4-C5-C6-O6
2	K	1	NAG	C1-C2-N2-C7
2	E	2	NAG	C3-C2-N2-C7
2	H	2	NAG	C3-C2-N2-C7

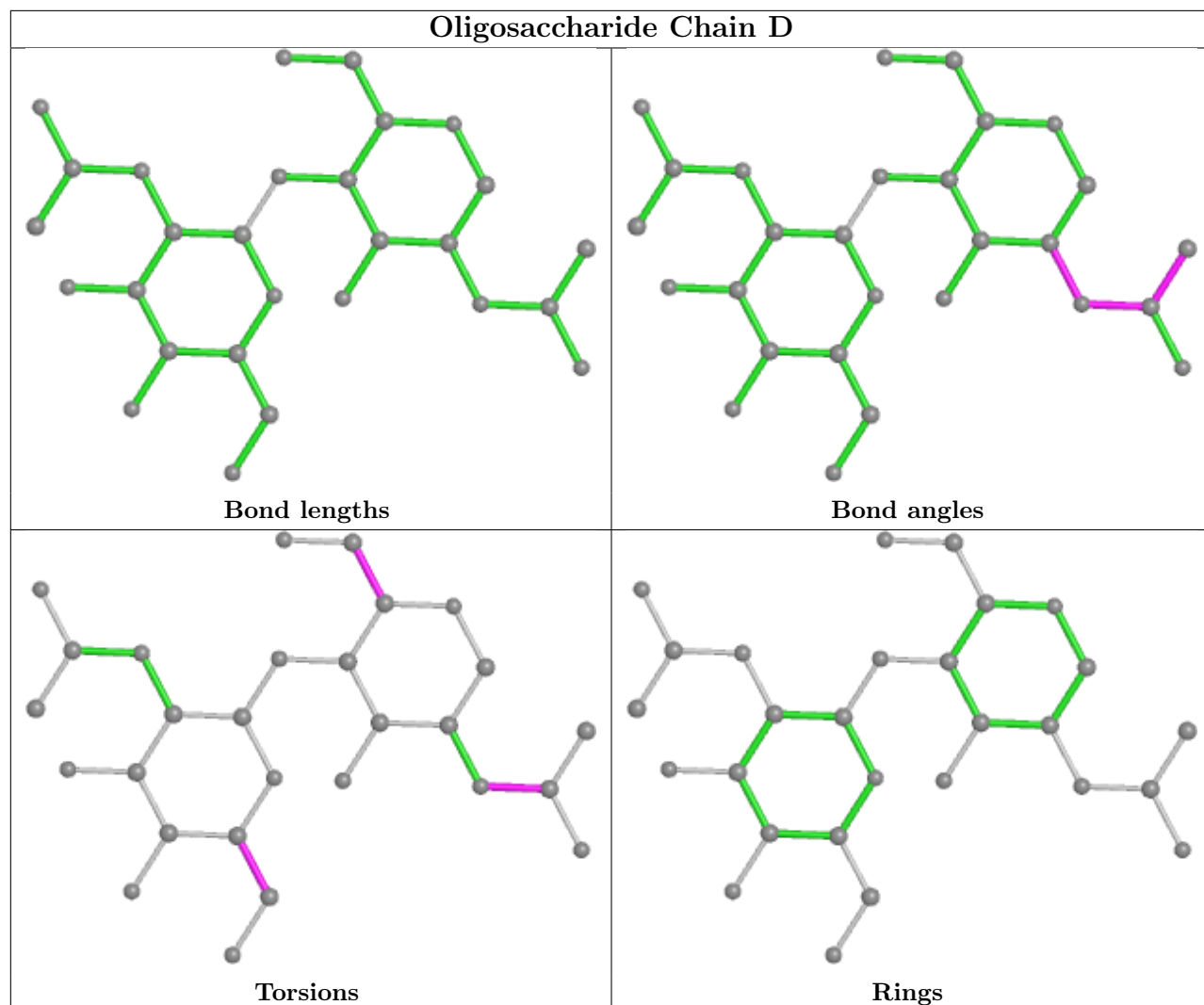
There are no ring outliers.

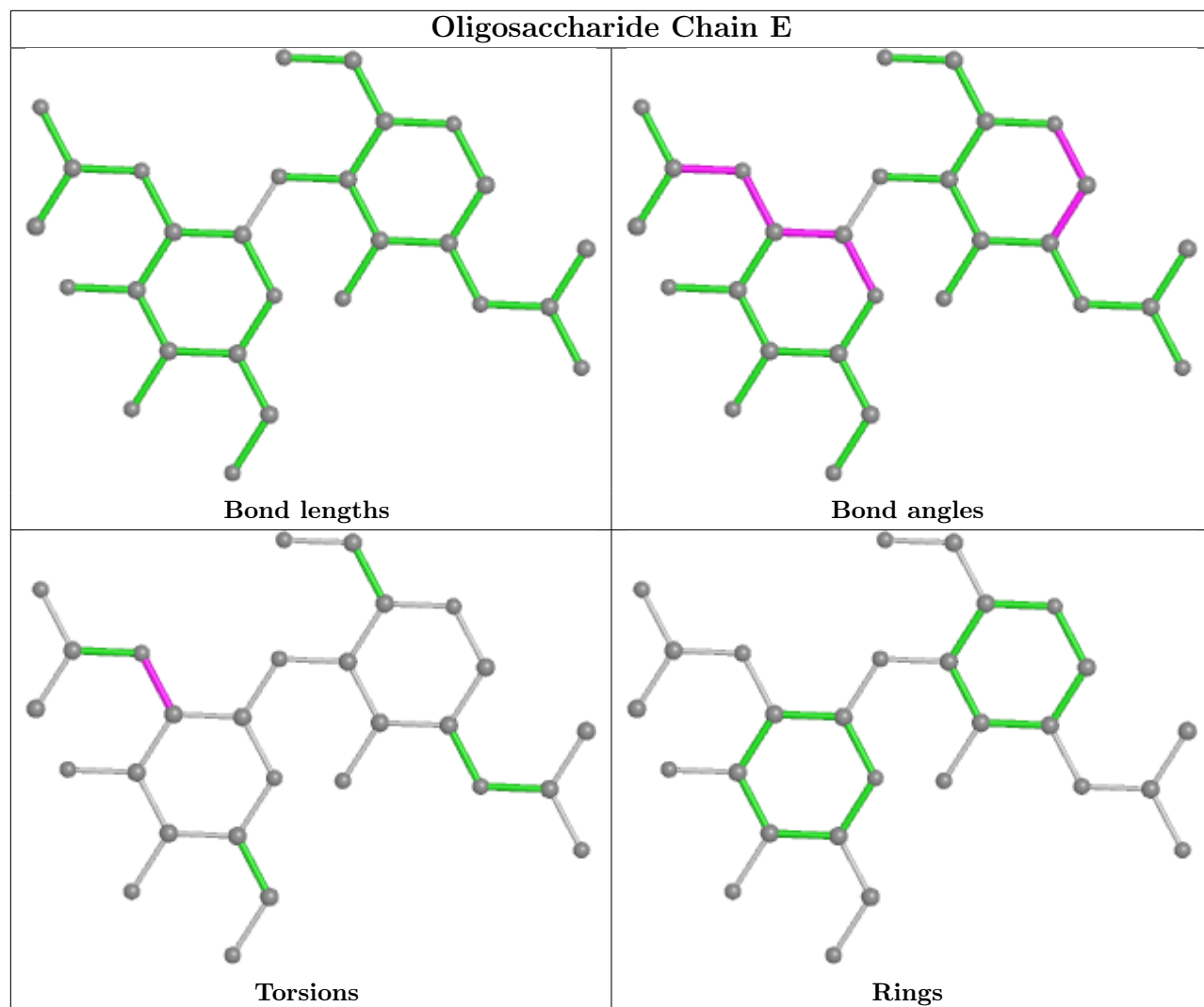
2 monomers are involved in 2 short contacts:

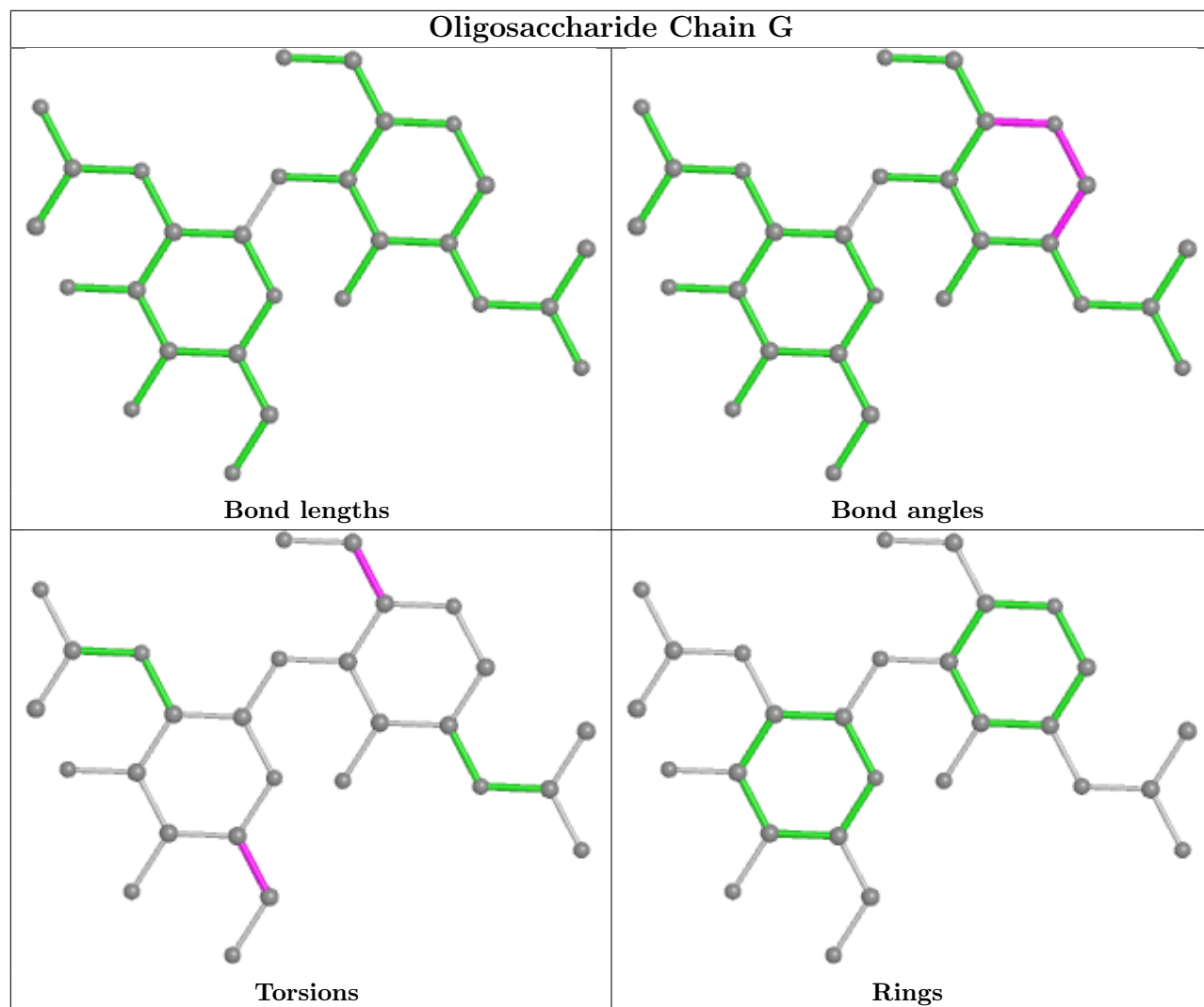
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	J	1	NAG	1	0
2	I	1	NAG	1	0

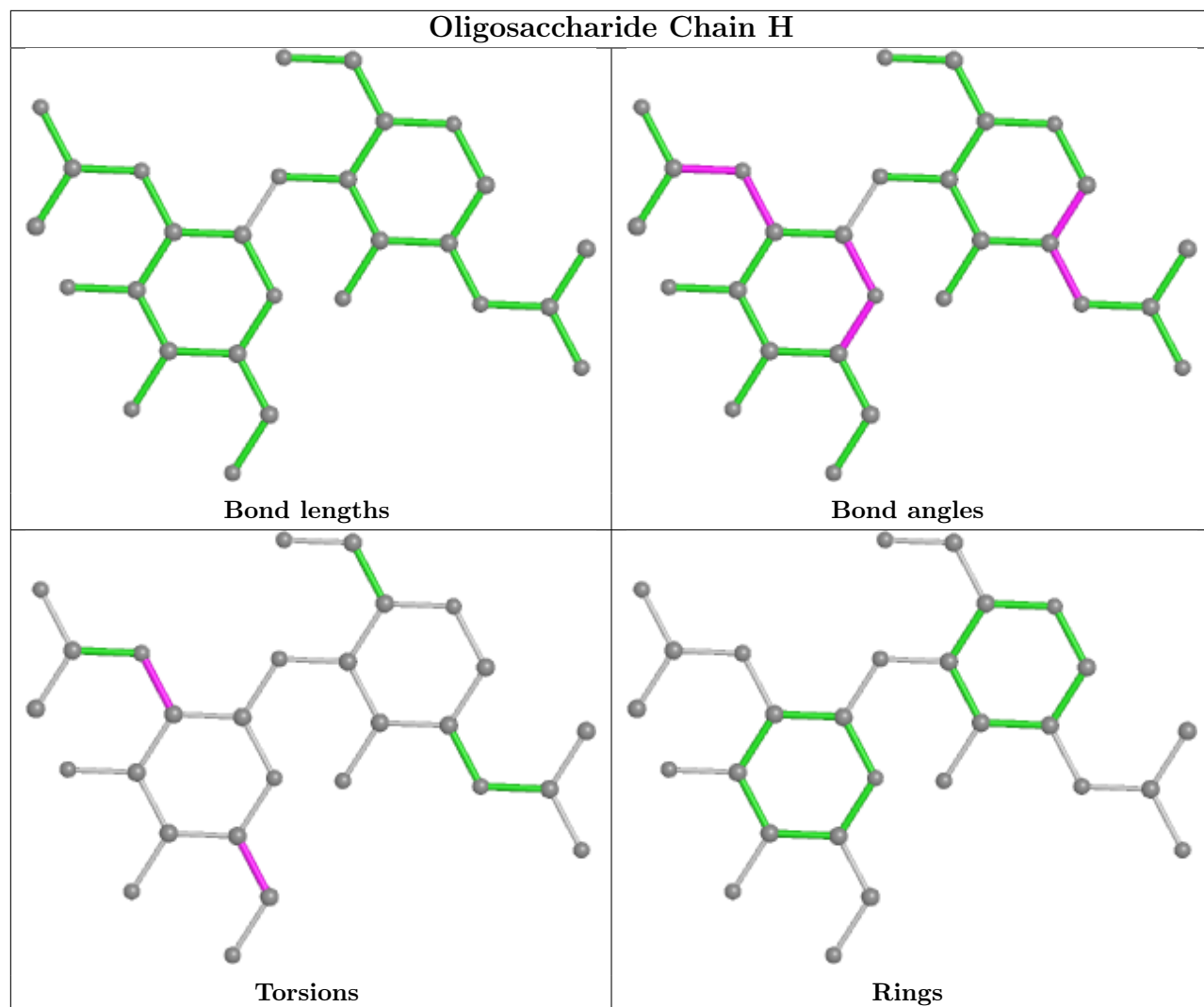
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

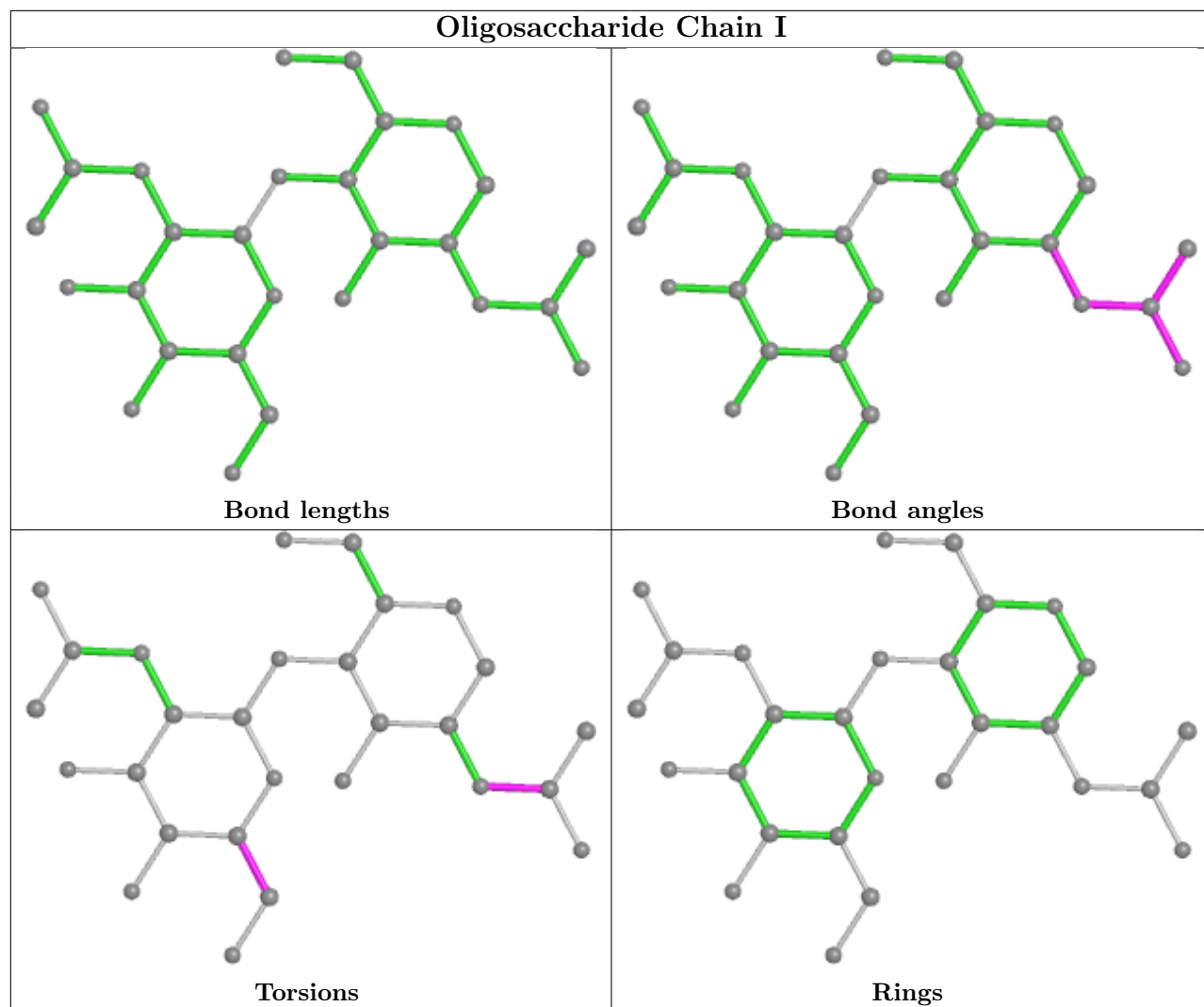


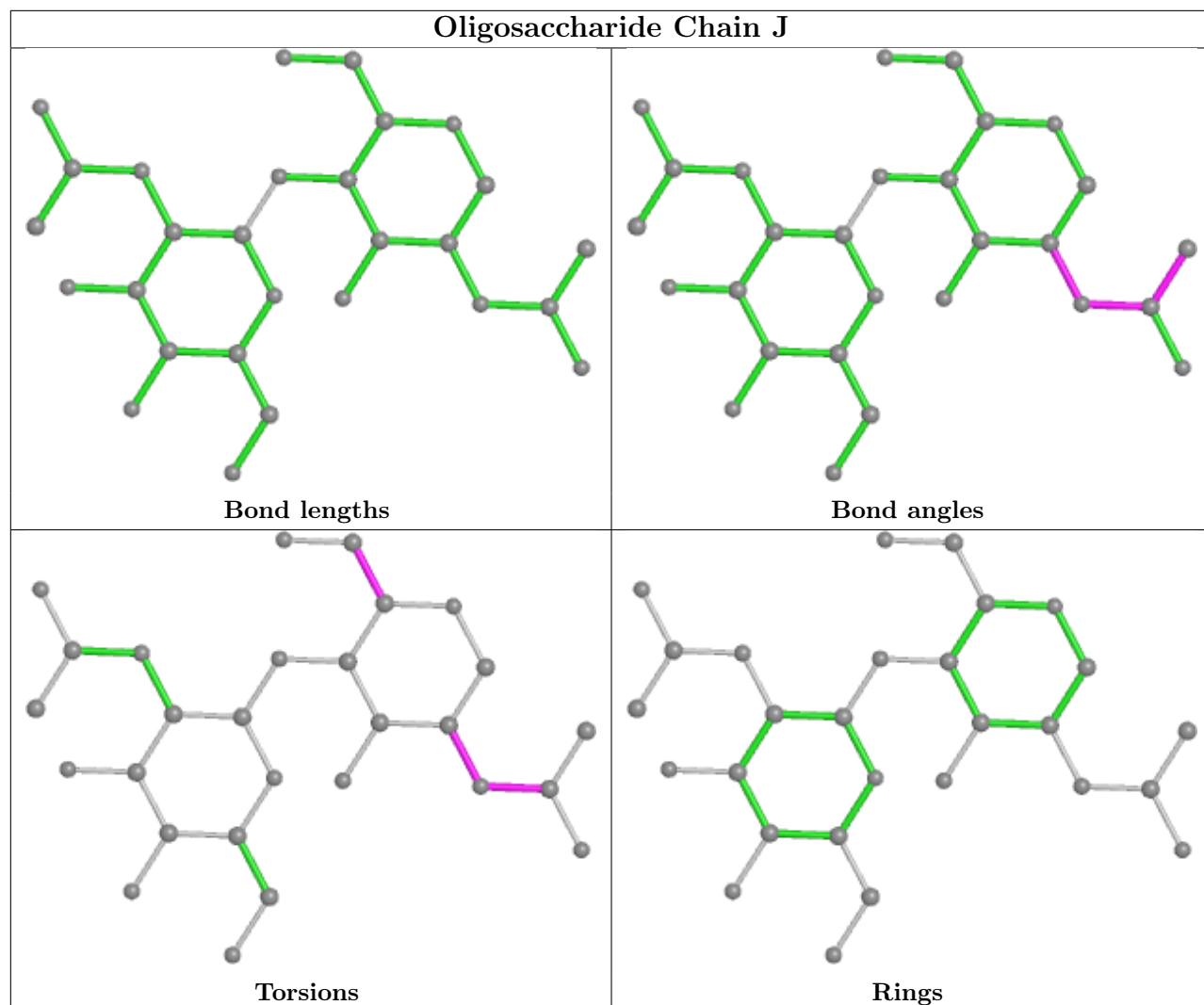


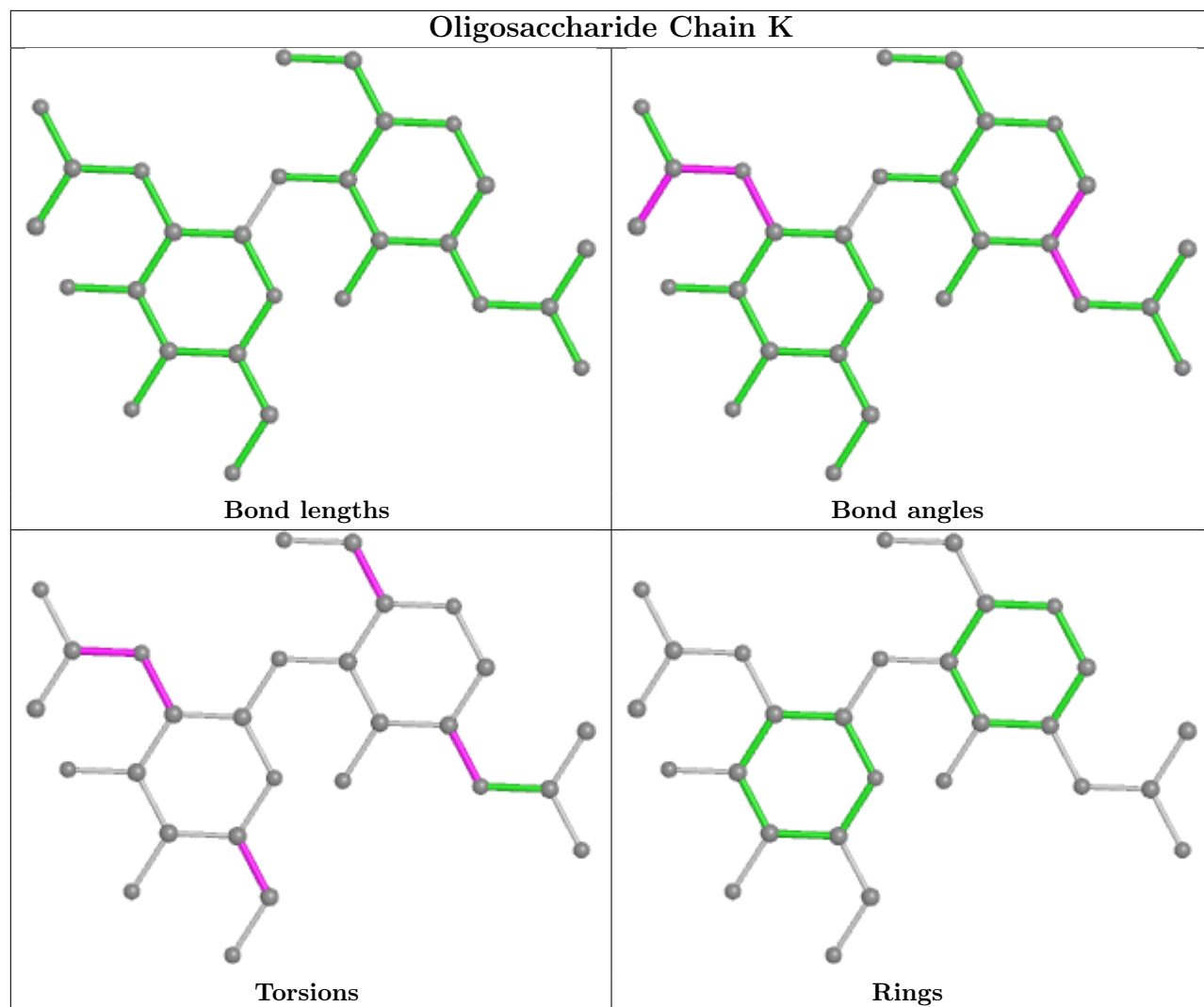


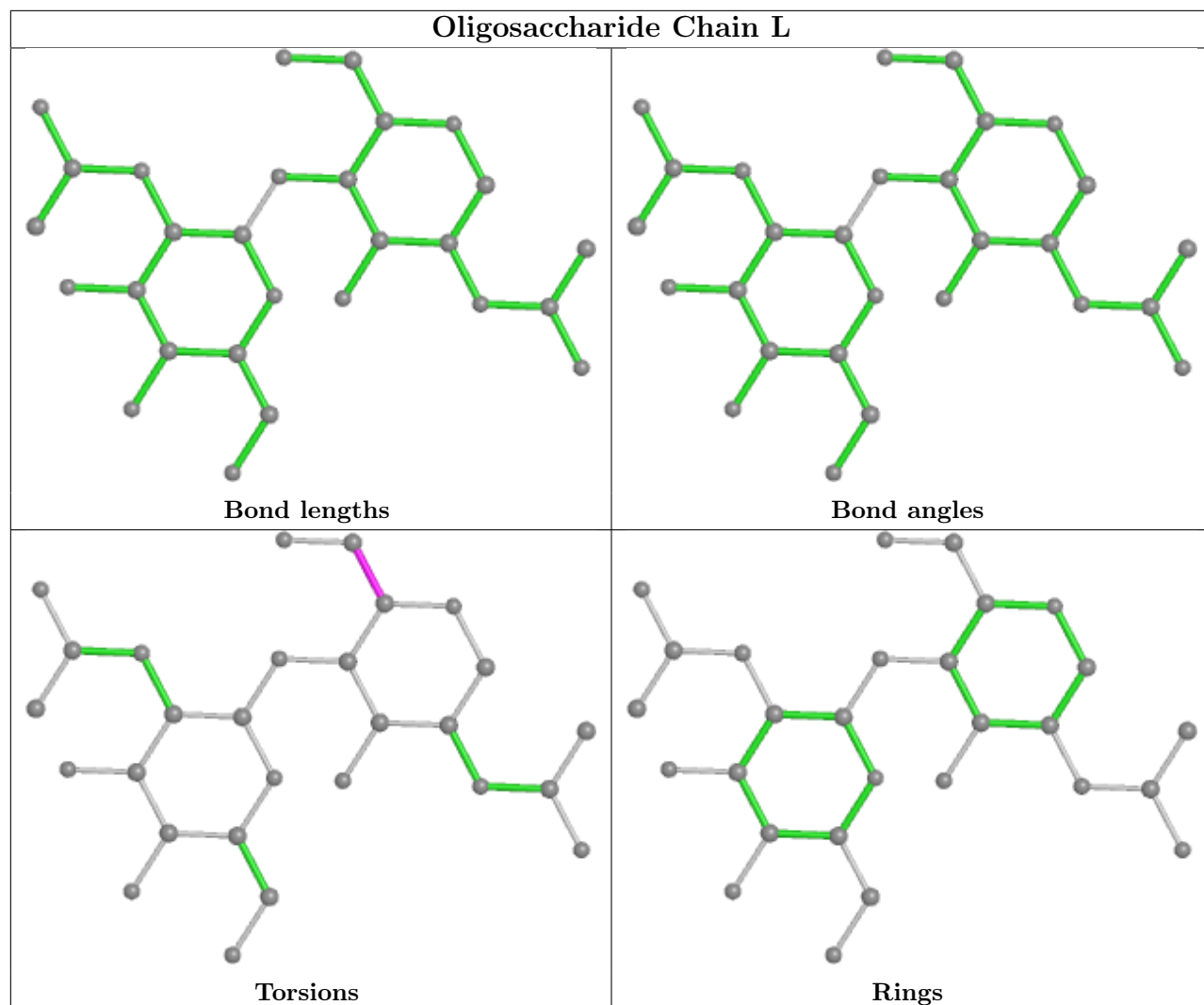


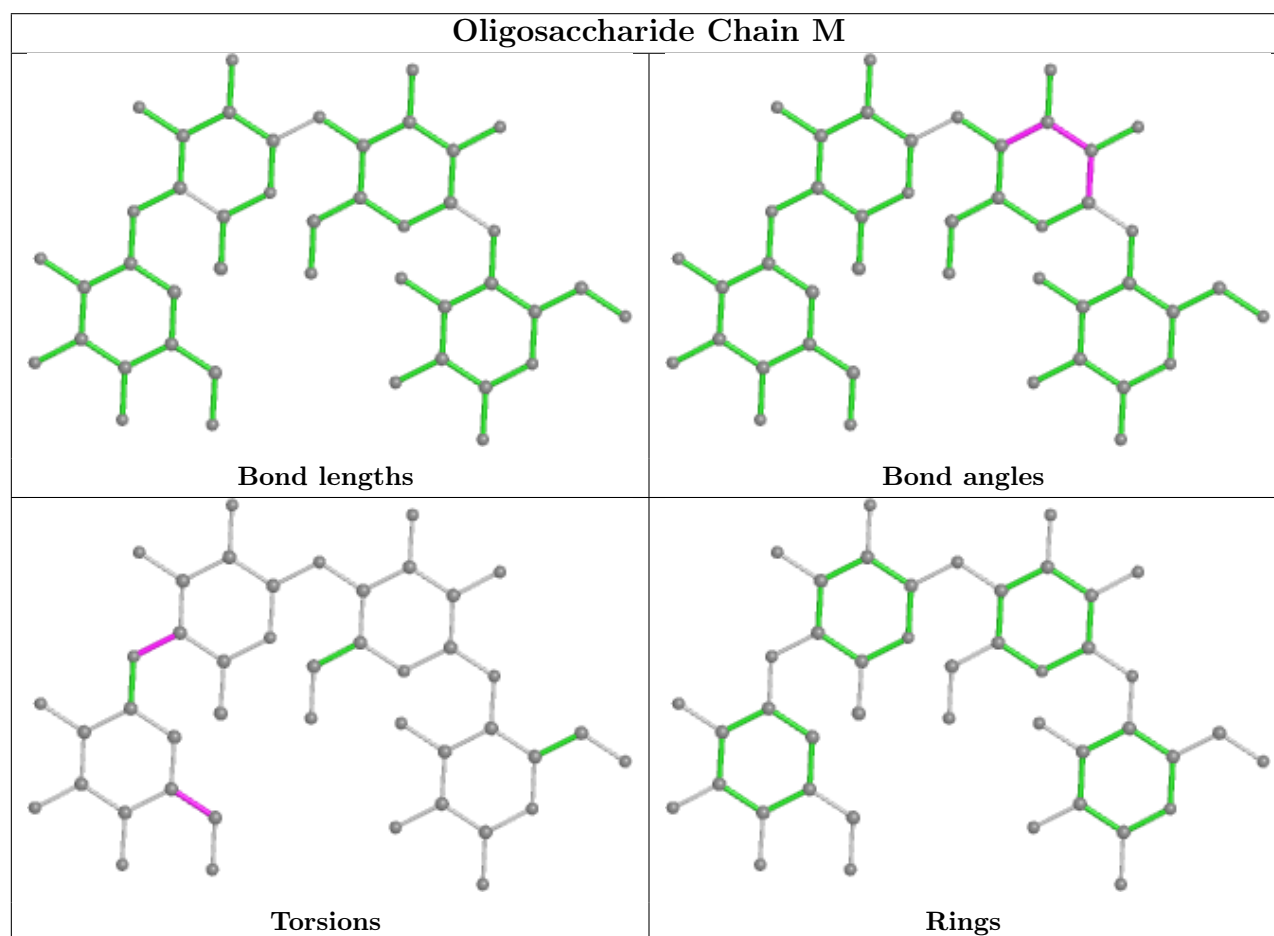
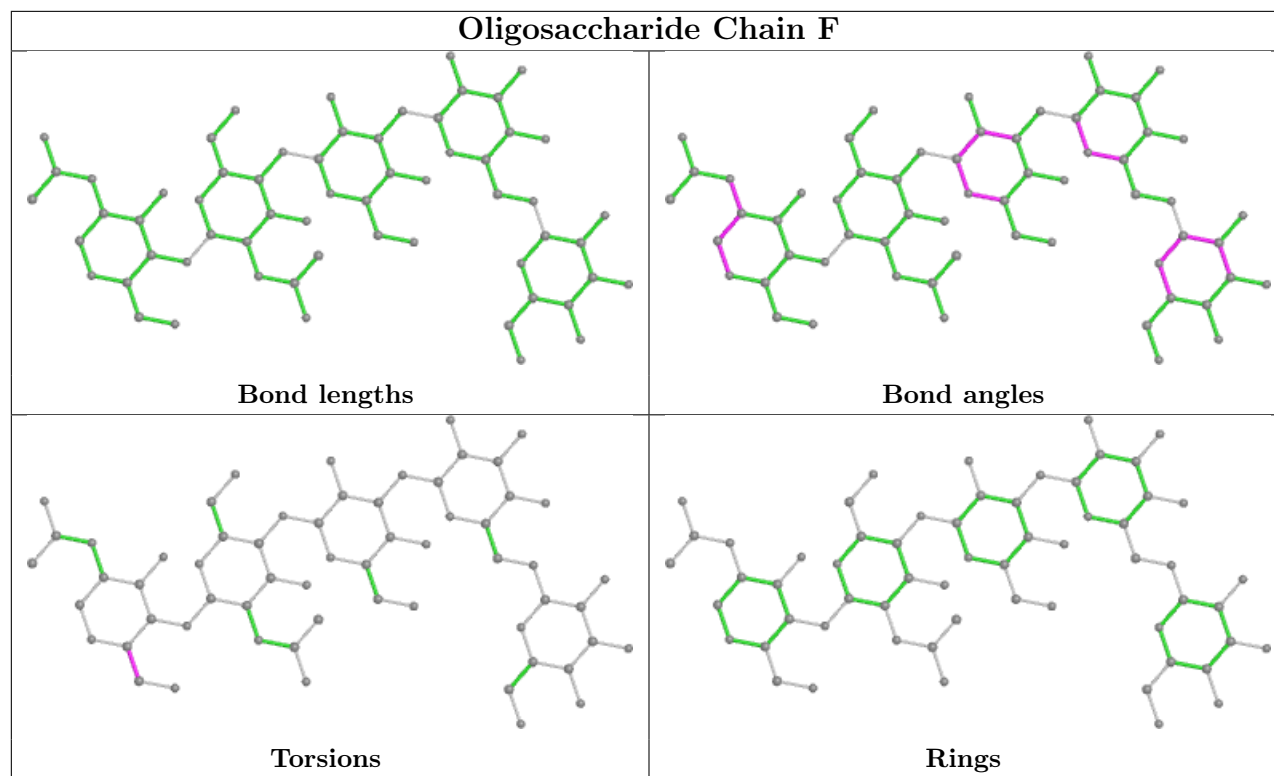


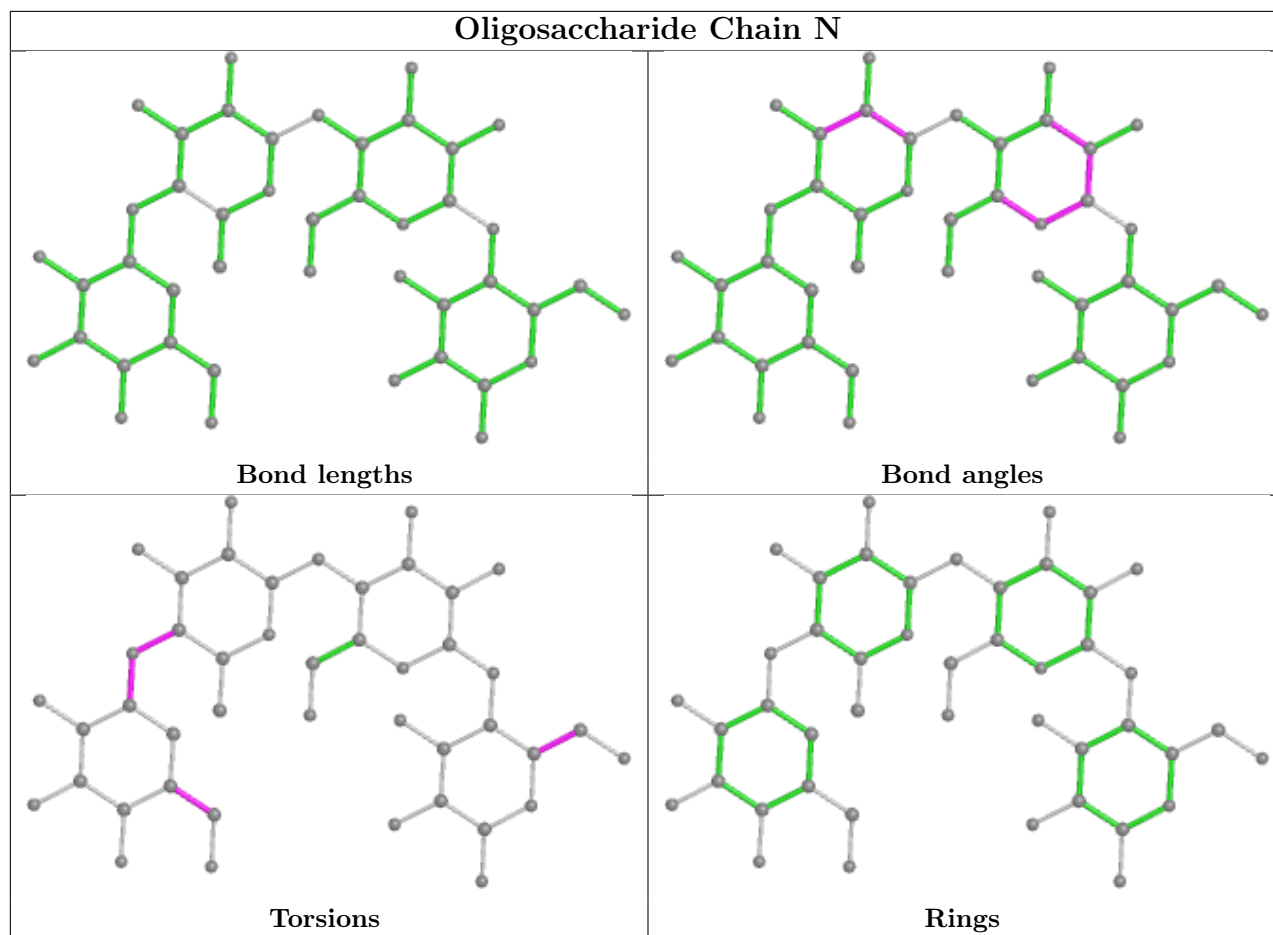












5.6 Ligand geometry [i](#)

2 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$
5	NAG	A	814	1	14,14,15	0.32	0	17,19,21	1.41	3 (17%)
5	NAG	A	808	1	14,14,15	0.33	0	17,19,21	0.61	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	A	814	1	-	3/6/23/26	0/1/1/1
5	NAG	A	808	1	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	814	NAG	C8-C7-N2	2.69	120.65	116.10
5	A	814	NAG	C1-O5-C5	2.64	115.77	112.19
5	A	814	NAG	C2-N2-C7	2.46	126.41	122.90

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	814	NAG	C8-C7-N2-C2
5	A	814	NAG	O7-C7-N2-C2
5	A	814	NAG	O5-C5-C6-O6
5	A	808	NAG	O5-C5-C6-O6

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	586/616 (95%)	-0.01	1 (0%) 95 91	32, 51, 84, 104	0
1	B	587/616 (95%)	-0.01	0 100 100	33, 55, 87, 104	0
All	All	1173/1232 (95%)	-0.01	1 (0%) 95 93	32, 53, 86, 104	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	616	CYS	2.1

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	MAN	F	5	11/12	0.72	0.49	97,98,100,102	0
2	NAG	K	2	14/15	0.77	0.42	81,85,88,88	0
3	MAN	F	4	11/12	0.81	0.44	93,95,96,97	0
3	BMA	F	3	11/12	0.82	0.34	78,83,86,90	0
2	NAG	H	2	14/15	0.82	0.44	85,87,93,95	0
2	NAG	D	2	14/15	0.82	0.31	94,97,99,100	0
2	NAG	I	2	14/15	0.85	0.31	68,69,71,72	0
2	NAG	E	1	14/15	0.86	0.31	80,84,87,91	0

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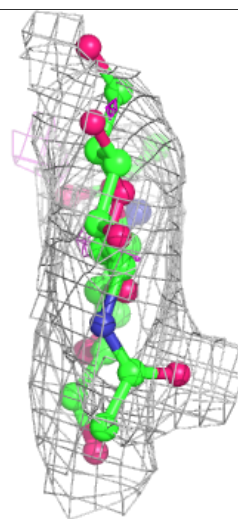
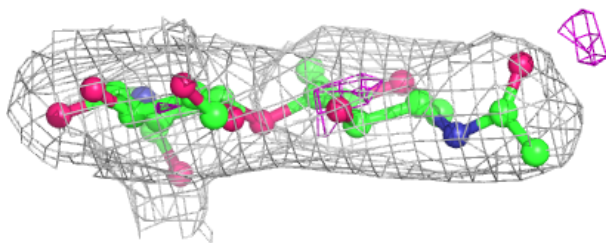
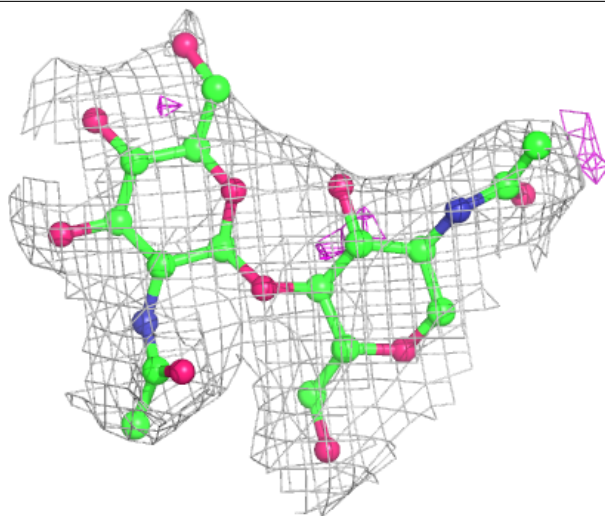
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	NAG	E	2	14/15	0.87	0.39	93,95,95,96	0
2	NAG	J	2	14/15	0.88	0.35	79,82,83,83	0
2	NAG	L	1	14/15	0.89	0.33	101,102,103,103	0
2	NAG	L	2	14/15	0.90	0.49	103,104,105,105	0
2	NAG	H	1	14/15	0.90	0.29	71,75,78,81	0
2	NAG	C	2	14/15	0.90	0.28	68,71,72,72	0
2	NAG	G	2	14/15	0.90	0.30	73,75,77,77	0
2	NAG	D	1	14/15	0.91	0.28	80,84,85,90	0
2	NAG	C	1	14/15	0.92	0.27	58,60,62,65	0
2	NAG	K	1	14/15	0.92	0.27	71,73,75,79	0
3	NAG	F	2	14/15	0.93	0.27	56,59,63,71	0
2	NAG	J	1	14/15	0.94	0.25	67,69,71,75	0
2	NAG	G	1	14/15	0.94	0.28	62,66,68,70	0
2	NAG	I	1	14/15	0.95	0.25	60,62,64,66	0
4	GLC	M	1	12/12	0.95	0.25	41,43,43,44	0
4	GLC	N	1	12/12	0.95	0.26	44,45,45,45	0
3	NAG	F	1	14/15	0.96	0.23	46,48,49,53	0
4	AC1	M	3	21/22	0.98	0.29	35,35,36,36	0
4	GLC	M	2	11/12	0.98	0.20	37,39,39,40	0
4	GLC	N	2	11/12	0.98	0.23	42,44,44,44	0
4	AC1	N	3	21/22	0.98	0.30	40,41,43,43	0

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

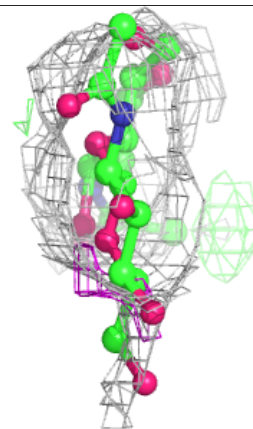
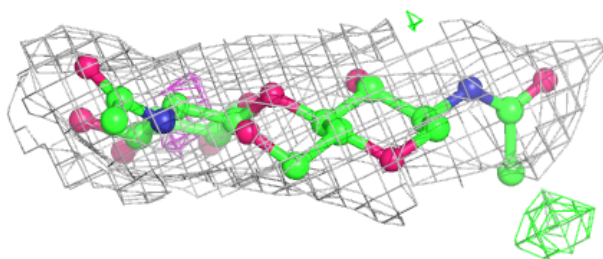
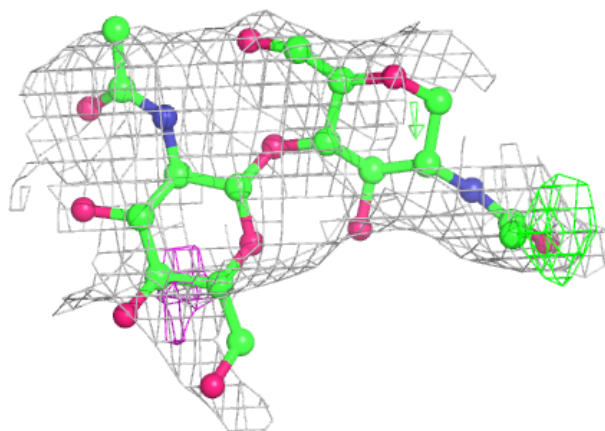
Electron density around Chain C:

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



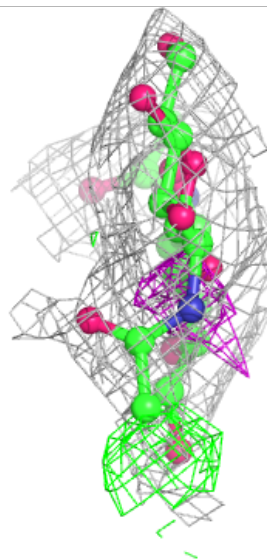
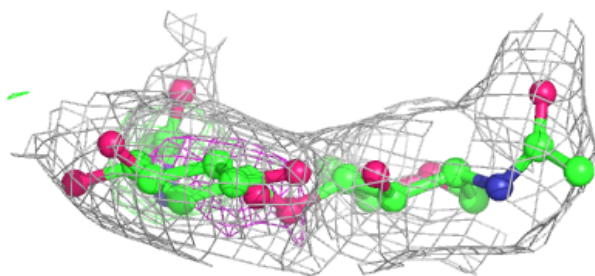
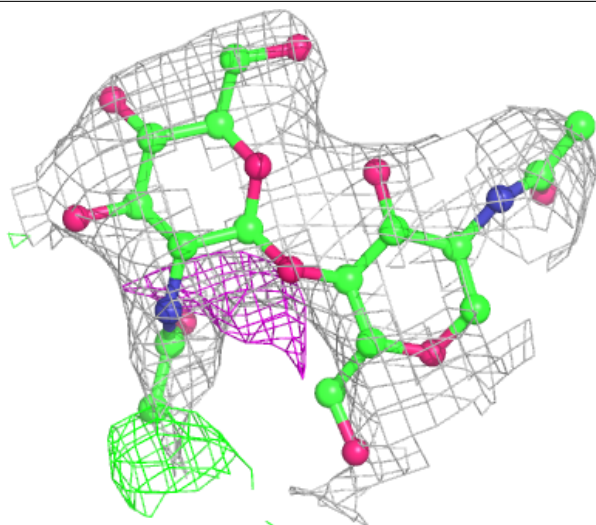
Electron density around Chain D:

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



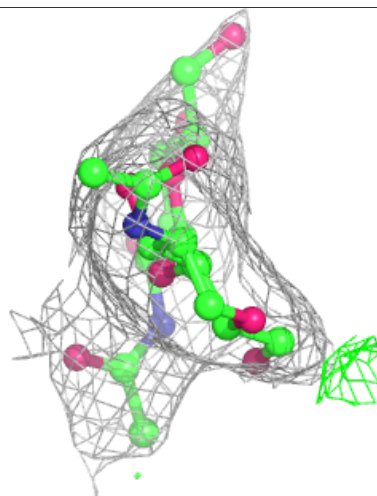
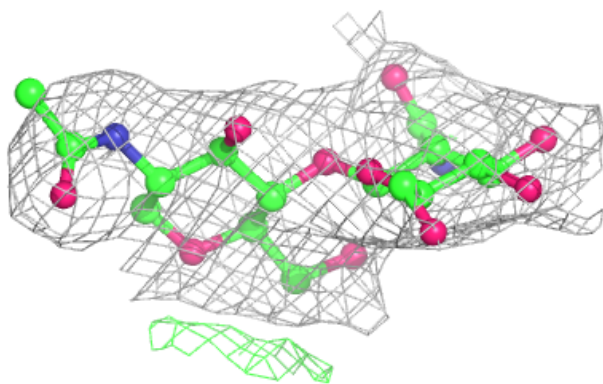
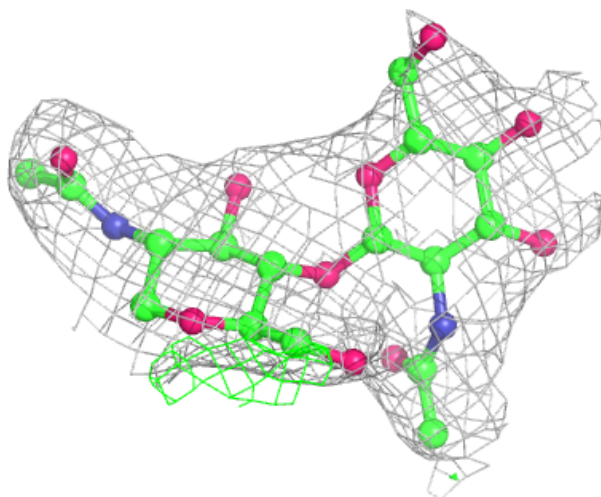
Electron density around Chain E:

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



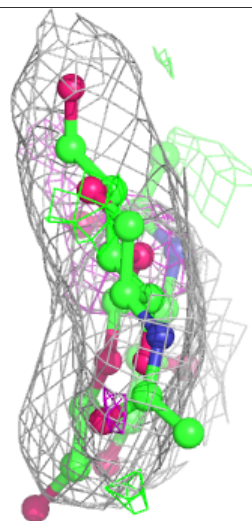
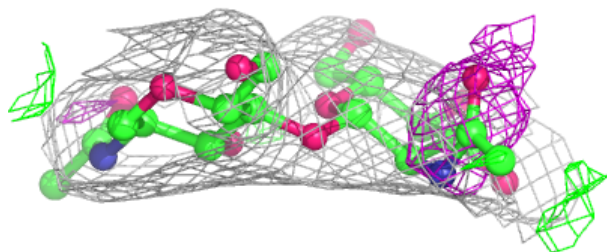
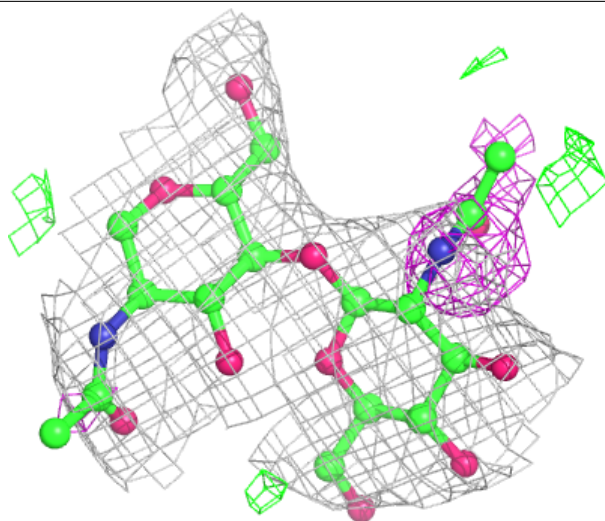
Electron density around Chain G:

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



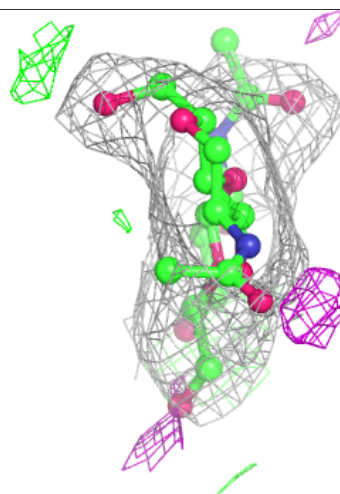
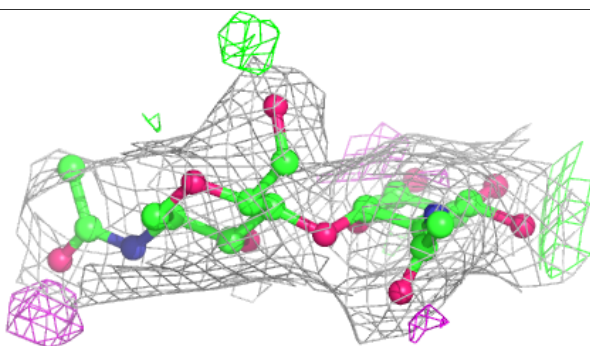
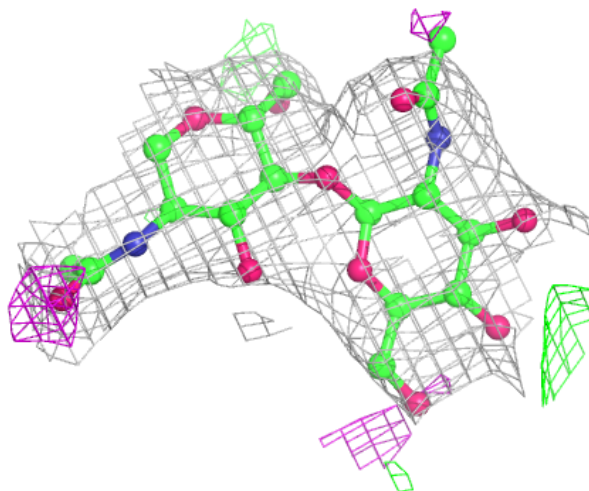
Electron density around Chain H:

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



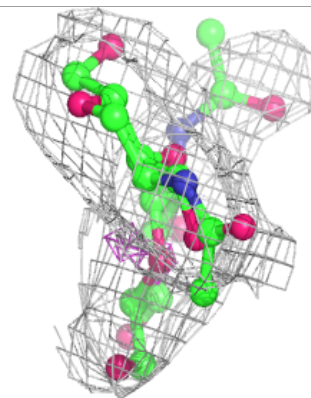
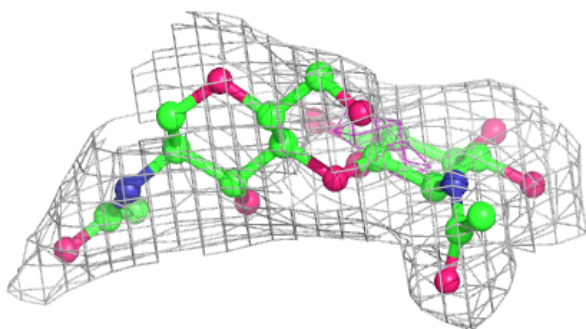
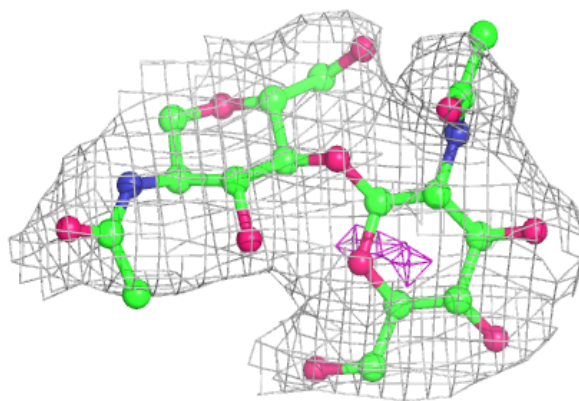
Electron density around Chain I:

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

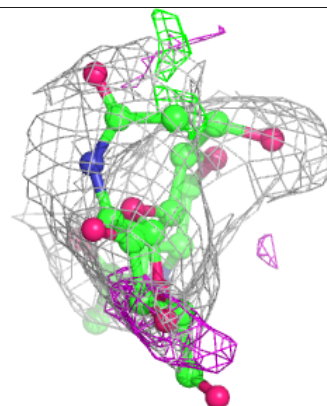
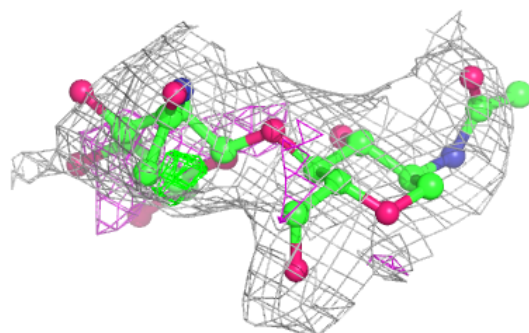
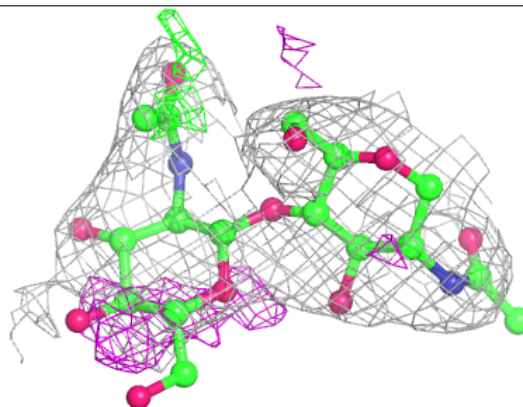


Electron density around Chain J:

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

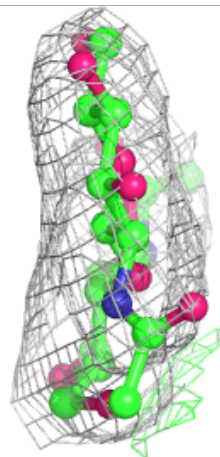
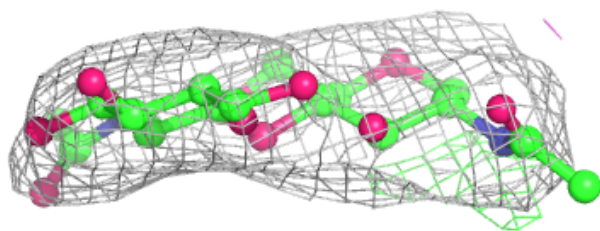
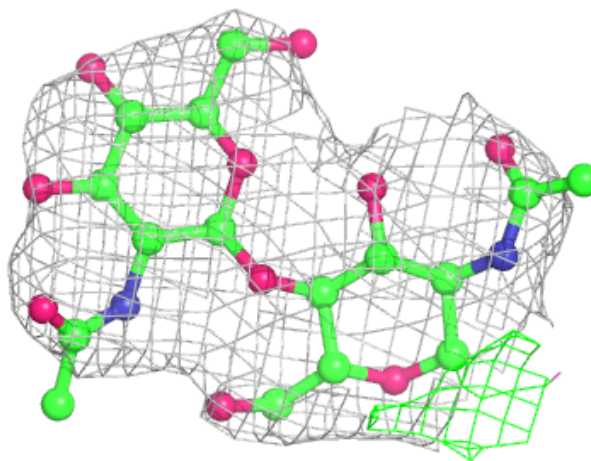
**Electron density around Chain K:**

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



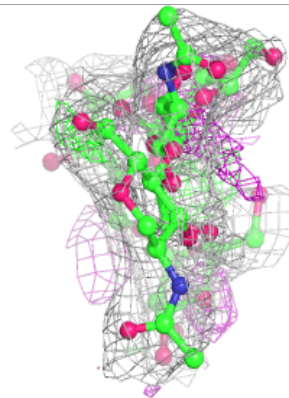
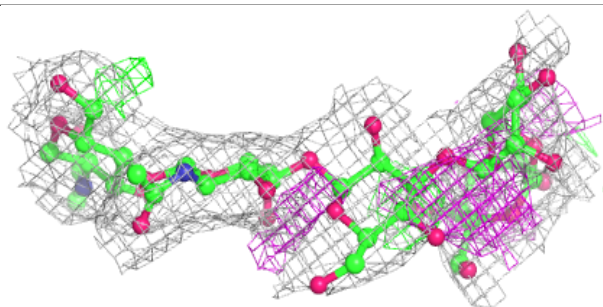
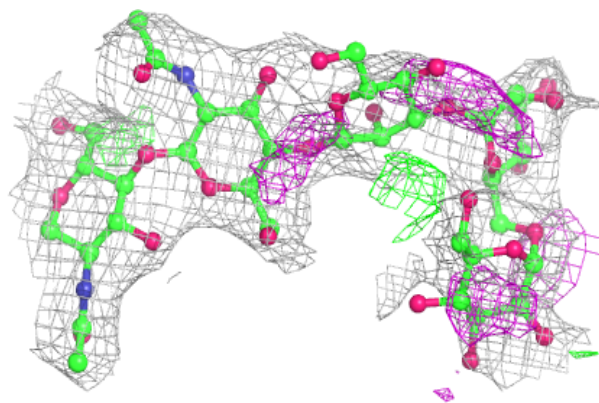
Electron density around Chain L:

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

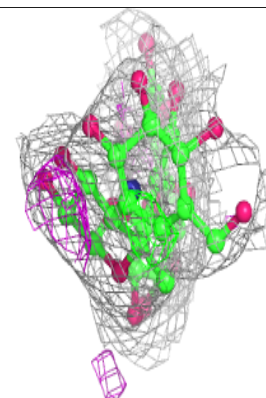
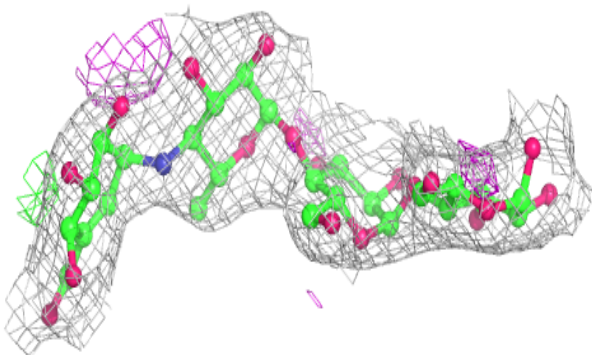
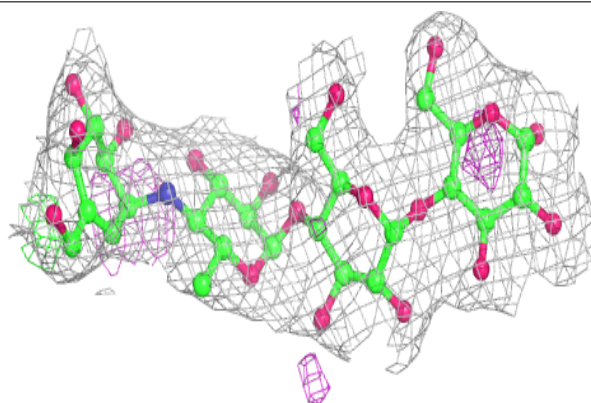


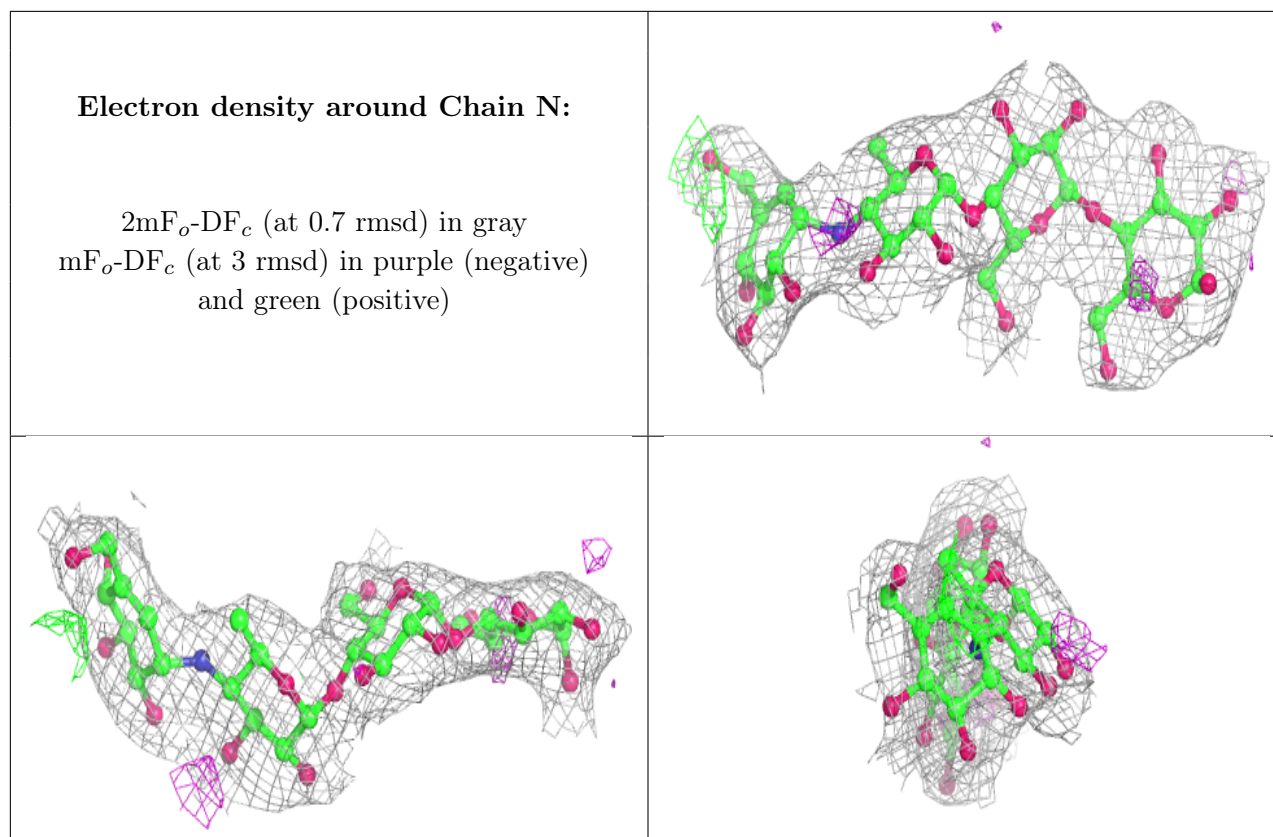
Electron density around Chain F:

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

**Electron density around Chain M:**

$2mF_o-DF_c$ (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
5	NAG	A	814	14/15	0.83	0.28	76,78,79,80	0
5	NAG	A	808	14/15	0.84	0.38	85,86,88,89	0

6.5 Other polymers [i](#)

There are no such residues in this entry.