



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:20 AM UTC

PDB ID : 6MXU / pdb_00006mxu
Title : Crystal structure of hemagglutinin from influenza virus A/Texas/1/1977 (H3N2)
Authors : Dai, Y.N.; Fremont, D.H.; Center for Structural Genomics of Infectious Diseases (CSGID)
Deposited on : 2018-10-31
Resolution : 1.85 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 : 4-5-2 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

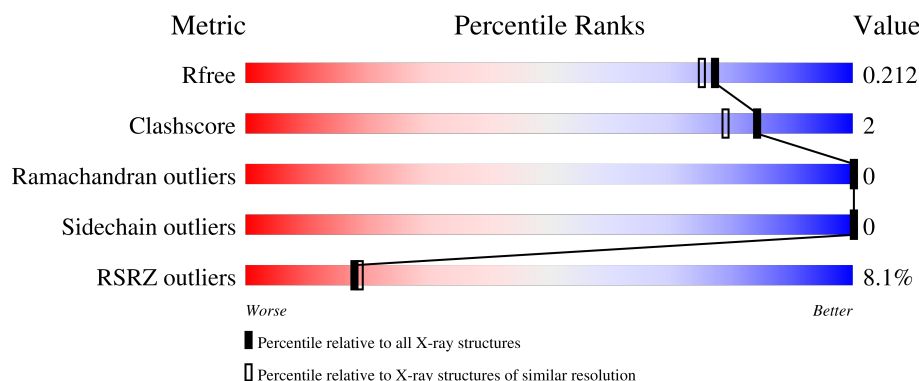
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 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.



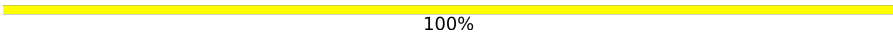
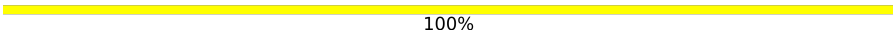
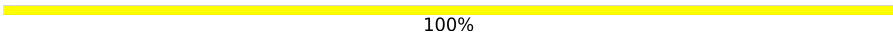
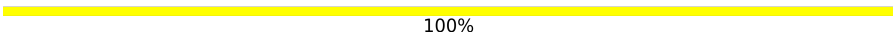
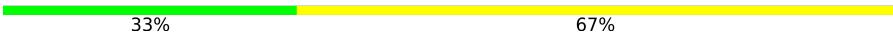
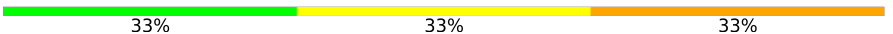
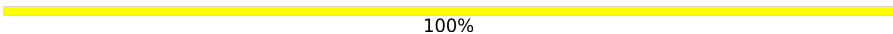
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3428 (1.86-1.86)
Clashscore	190562	3579 (1.86-1.86)
Ramachandran outliers	187476	3553 (1.86-1.86)
Sidechain outliers	187428	3553 (1.86-1.86)
RSRZ outliers	180081	3429 (1.86-1.86)

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	497	7% 93% • •
1	B	497	7% 92% 6% •
1	C	497	10% 93% 5% •
2	D	2	100%
2	E	2	50% 50%

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

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 13254 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
1	A	486	Total	C	N	O	S	0	0	0
			3831	2392	673	748	18			
1	B	488	Total	C	N	O	S	0	0	0
			3848	2402	677	751	18			
1	C	488	Total	C	N	O	S	0	0	0
			3843	2399	677	749	18			

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



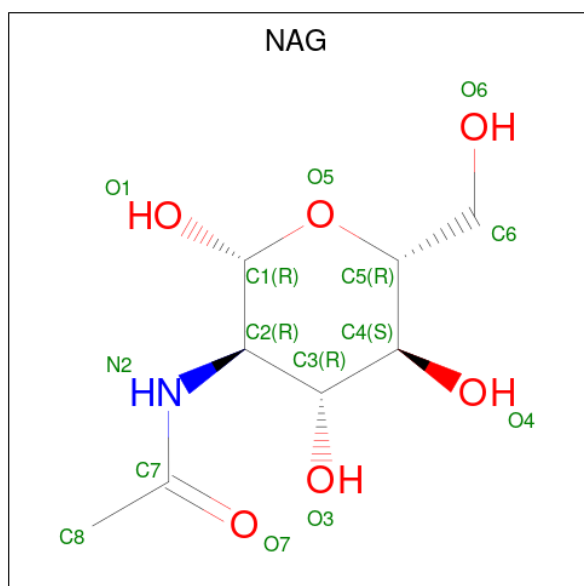
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	D	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	E	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	F	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	H	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	J	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	K	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	M	2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

- Molecule 3 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
3	G	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	I	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	L	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

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

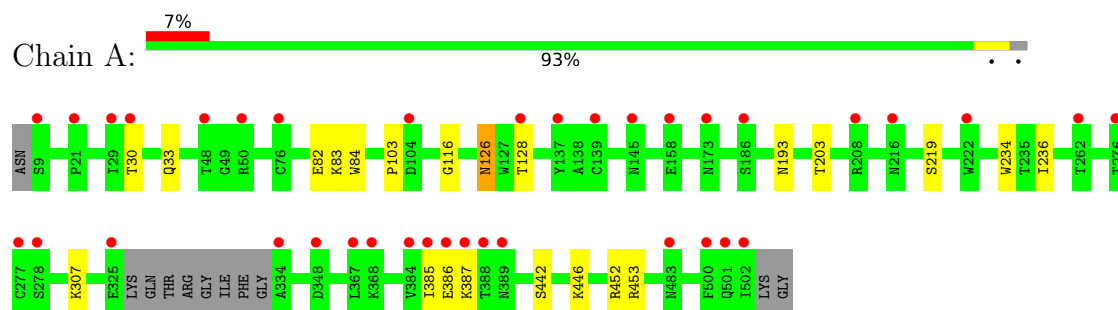
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	462	Total	O	0	0
			462	462		
5	B	466	Total	O	0	0
			466	466		
5	C	393	Total	O	0	0
			393	393		

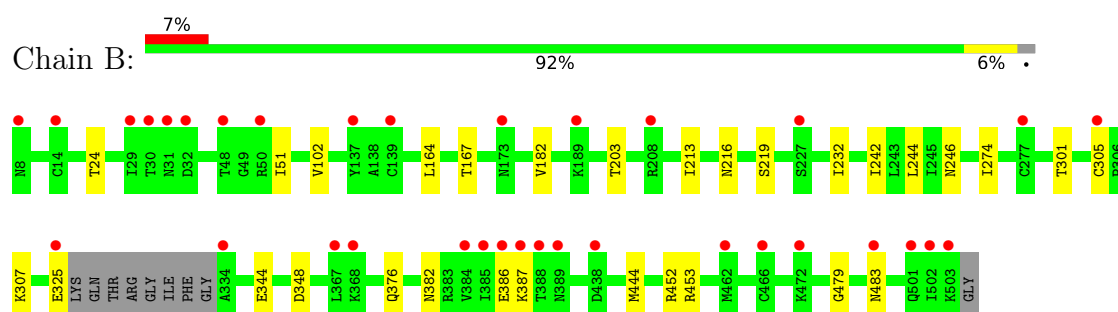
3 Residue-property plots [i](#)

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.

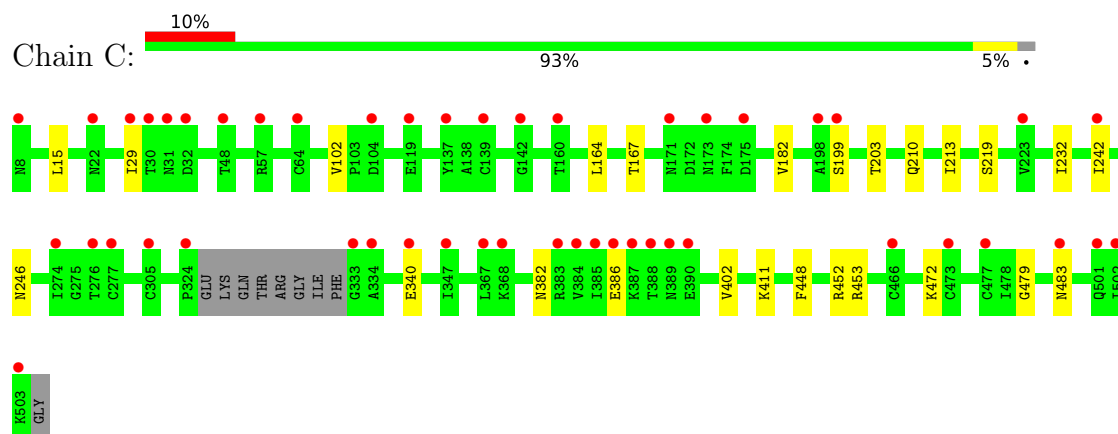
- Molecule 1: Hemagglutinin



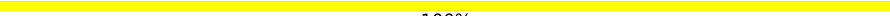
- Molecule 1: Hemagglutinin



- Molecule 1: Hemagglutinin



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

Chain D:  100%

NAG1
NAG2

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

Chain E:  50% 50%

NAG1
NAG2

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

Chain F:  50% 50%

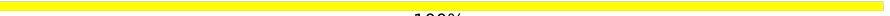
NAG1
NAG2

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

Chain H:  100%

NAG1
NAG2

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

Chain J:  100%

NAG1
NAG2

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

Chain K:  100%

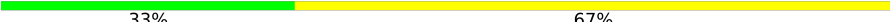
NAG1
NAG2

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

Chain M:  100%

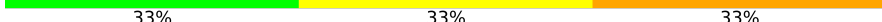
NAG1
NAG2

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

Chain G:  33% 67%

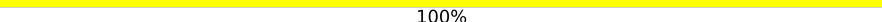
MAG1
MAG2
BMA3

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

Chain I:  33% 33% 33%

MAG1
MAG2
BMA3

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

Chain L:  100%

MAG1
MAG2
BMA3

4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	197.89Å 186.24Å 106.96Å 90.00° 110.09° 90.00°	Depositor
Resolution (Å)	46.37 – 1.85 46.37 – 1.85	Depositor EDS
% Data completeness (in resolution range)	99.3 (46.37-1.85) 99.4 (46.37-1.85)	Depositor EDS
R_{merge}	0.27	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.69 (at 1.86Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.193 , 0.212 0.194 , 0.212	Depositor DCC
R_{free} test set	15275 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	27.8	Xtriage
Anisotropy	0.444	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 51.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	13254	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.00% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, 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	0.91	2/3912 (0.1%)	0.91	2/5302 (0.0%)
1	B	0.87	0/3929	0.89	0/5324
1	C	0.75	0/3924	0.83	2/5317 (0.0%)
All	All	0.85	2/11765 (0.0%)	0.88	4/15943 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	126	ASN	CG-ND2	-5.37	1.22	1.33
1	A	126	ASN	C-O	-5.22	1.16	1.23

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	103	PRO	CA-C-N	-5.60	114.07	122.07
1	A	103	PRO	C-N-CA	-5.60	114.07	122.07
1	C	29	ILE	CA-C-N	5.15	132.61	121.64
1	C	29	ILE	C-N-CA	5.15	132.61	121.64

There are no chirality outliers.

There are no planarity outliers.

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	3831	0	3692	18	0
1	B	3848	0	3710	22	0
1	C	3843	0	3707	19	0
2	D	28	0	25	0	0
2	E	28	0	25	0	0
2	F	28	0	25	1	0
2	H	28	0	25	0	0
2	J	28	0	25	0	0
2	K	28	0	25	0	0
2	M	28	0	25	0	0
3	G	39	0	34	0	0
3	I	39	0	34	1	0
3	L	39	0	34	2	0
4	B	42	0	39	1	0
4	C	56	0	52	0	0
5	A	462	0	0	3	0
5	B	466	0	0	0	0
5	C	393	0	0	4	0
All	All	13254	0	11477	52	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 (52) 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:219:SER:HB2	1:B:203:THR:HG21	1.74	0.69
1:A:126:ASN:OD1	1:A:128:THR:HG23	1.94	0.66
1:C:340:GLU:OE2	5:C:801:HOH:O	2.15	0.65
1:B:219:SER:HB2	1:C:203:THR:HG21	1.79	0.64
1:B:307:LYS:NZ	1:B:387:LYS:HE2	2.14	0.62
1:A:203:THR:HG21	1:C:219:SER:HB2	1.83	0.60
1:C:242:ILE:CD1	3:L:2:NAG:H81	2.33	0.59
1:B:479:GLY:O	1:B:483:ASN:HB2	2.02	0.59
1:C:15:LEU:HD22	1:C:448:PHE:HA	1.86	0.57
1:A:128:THR:HG21	5:A:1225:HOH:O	2.05	0.55
1:A:307:LYS:NZ	1:A:387:LYS:HE2	2.22	0.55
1:C:242:ILE:HD12	3:L:2:NAG:H81	1.89	0.54
1:A:386:GLU:HG3	1:A:387:LYS:N	2.24	0.50
1:C:382:ASN:O	1:C:386:GLU:HB3	2.11	0.50
1:A:128:THR:OG1	2:F:1:NAG:H62	2.12	0.49
1:B:24:THR:OG1	4:B:608:NAG:H81	2.11	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:452:ARG:HD2	1:B:453:ARG:CZ	2.43	0.48
1:C:411:LYS:NZ	5:C:812:HOH:O	2.46	0.48
1:A:236:ILE:HD13	1:C:402:VAL:HB	1.95	0.47
1:B:244:LEU:C	1:B:244:LEU:HD23	2.40	0.47
1:B:348:ASP:OD1	1:B:348:ASP:N	2.45	0.47
1:C:167:THR:HB	1:C:242:ILE:HD11	1.97	0.46
1:A:307:LYS:HZ3	1:A:387:LYS:HE2	1.81	0.46
1:C:102:VAL:HG22	1:C:232:ILE:HB	1.97	0.46
1:B:382:ASN:O	1:B:386:GLU:HB2	2.15	0.46
1:B:325:GLU:HG3	1:B:344:GLU:H	1.80	0.45
1:C:164:LEU:O	1:C:246:ASN:HA	2.17	0.45
1:C:182:VAL:HG21	1:C:213:ILE:HB	1.99	0.45
1:A:30:THR:HG21	1:B:376:GLN:HG2	2.00	0.44
1:C:472:LYS:NZ	5:C:818:HOH:O	2.50	0.44
1:B:307:LYS:HZ3	1:B:387:LYS:HE2	1.79	0.44
1:A:385:ILE:HG22	1:A:385:ILE:O	2.19	0.43
1:B:164:LEU:O	1:B:246:ASN:HA	2.19	0.43
1:B:216:ASN:ND2	1:C:210:GLN:OE1	2.47	0.43
1:B:242:ILE:HD12	3:I:2:NAG:H81	2.00	0.43
1:A:82:GLU:HG3	1:A:83:LYS:H	1.82	0.43
1:A:33:GLN:HG2	5:A:1094:HOH:O	2.18	0.43
1:A:193:ASN:ND2	5:A:819:HOH:O	2.51	0.43
1:C:452:ARG:HD2	1:C:453:ARG:CZ	2.48	0.43
1:B:102:VAL:HG22	1:B:232:ILE:HB	2.00	0.43
1:A:442:SER:O	1:A:446:LYS:HG3	2.19	0.42
1:B:167:THR:HB	1:B:242:ILE:HD11	2.01	0.42
1:B:51:ILE:HB	1:B:274:ILE:HD13	2.02	0.41
1:B:301:THR:HB	1:B:305:CYS:SG	2.61	0.41
1:B:444:MET:HA	1:B:444:MET:HE3	2.02	0.41
1:A:452:ARG:HD2	1:A:453:ARG:CZ	2.51	0.41
1:B:182:VAL:HG21	1:B:213:ILE:HB	2.02	0.41
1:A:234:TRP:HZ3	1:A:236:ILE:HD12	1.86	0.41
1:C:479:GLY:O	1:C:483:ASN:HB2	2.21	0.41
1:C:199:SER:HA	5:C:1046:HOH:O	2.20	0.40
1:B:219:SER:CB	1:C:203:THR:HG21	2.50	0.40
1:A:84:TRP:CE2	1:A:116:GLY:HA2	2.57	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	482/497 (97%)	462 (96%)	20 (4%)	0	100	100
1	B	484/497 (97%)	462 (96%)	22 (4%)	0	100	100
1	C	484/497 (97%)	463 (96%)	21 (4%)	0	100	100
All	All	1450/1491 (97%)	1387 (96%)	63 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	424/432 (98%)	424 (100%)	0	100	100
1	B	426/432 (99%)	426 (100%)	0	100	100
1	C	425/432 (98%)	425 (100%)	0	100	100
All	All	1275/1296 (98%)	1275 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	341	ASN
1	A	371	GLN
1	A	434	GLN

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Mol	Chain	Res	Type
1	B	211	GLN
1	B	371	GLN
1	C	246	ASN
1	C	341	ASN
1	C	371	GLN
1	C	434	GLN
1	C	488	HIS

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 ⓘ

23 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	D	1	1,2	14,14,15	0.47	0	17,19,21	0.88	1 (5%)
2	NAG	D	2	2	14,14,15	0.93	1 (7%)	17,19,21	1.03	1 (5%)
2	NAG	E	1	1,2	14,14,15	0.38	0	17,19,21	0.89	1 (5%)
2	NAG	E	2	2	14,14,15	0.67	0	17,19,21	0.45	0
2	NAG	F	1	1,2	14,14,15	2.65	2 (14%)	17,19,21	3.21	5 (29%)
2	NAG	F	2	2	14,14,15	1.06	2 (14%)	17,19,21	2.26	4 (23%)
3	NAG	G	1	3,1	14,14,15	0.36	0	17,19,21	0.94	1 (5%)
3	NAG	G	2	3	14,14,15	0.43	0	17,19,21	0.56	0
3	BMA	G	3	3	11,11,12	0.83	0	15,15,17	0.88	1 (6%)
2	NAG	H	1	1,2	14,14,15	1.00	1 (7%)	17,19,21	0.58	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	H	2	2	14,14,15	0.74	1 (7%)	17,19,21	1.06	1 (5%)
3	NAG	I	1	3,1	14,14,15	0.73	0	17,19,21	0.72	0
3	NAG	I	2	3	14,14,15	0.75	1 (7%)	17,19,21	0.71	0
3	BMA	I	3	3	11,11,12	1.13	0	15,15,17	1.20	1 (6%)
2	NAG	J	1	1,2	14,14,15	0.64	1 (7%)	17,19,21	0.59	0
2	NAG	J	2	2	14,14,15	0.77	1 (7%)	17,19,21	0.70	0
2	NAG	K	1	1,2	14,14,15	0.44	0	17,19,21	1.92	3 (17%)
2	NAG	K	2	2	14,14,15	0.71	0	17,19,21	0.79	1 (5%)
3	NAG	L	1	3,1	14,14,15	0.46	0	17,19,21	0.91	1 (5%)
3	NAG	L	2	3	14,14,15	0.21	0	17,19,21	0.61	0
3	BMA	L	3	3	11,11,12	0.83	1 (9%)	15,15,17	0.85	0
2	NAG	M	1	1,2	14,14,15	0.75	1 (7%)	17,19,21	0.58	0
2	NAG	M	2	2	14,14,15	0.74	1 (7%)	17,19,21	0.69	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
2	NAG	D	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	2	2	-	0/6/23/26	0/1/1/1
2	NAG	E	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	2/6/23/26	0/1/1/1
2	NAG	F	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	2	2	-	4/6/23/26	0/1/1/1
3	NAG	G	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	G	2	3	-	0/6/23/26	0/1/1/1
3	BMA	G	3	3	-	2/2/19/22	0/1/1/1
2	NAG	H	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	H	2	2	-	2/6/23/26	0/1/1/1
3	NAG	I	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	I	2	3	-	2/6/23/26	0/1/1/1
3	BMA	I	3	3	-	2/2/19/22	0/1/1/1
2	NAG	J	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	J	2	2	-	2/6/23/26	0/1/1/1
2	NAG	K	1	1,2	-	3/6/23/26	0/1/1/1
2	NAG	K	2	2	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	L	1	3,1	-	3/6/23/26	0/1/1/1
3	NAG	L	2	3	-	2/6/23/26	0/1/1/1
3	BMA	L	3	3	-	2/2/19/22	0/1/1/1
2	NAG	M	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	M	2	2	-	2/6/23/26	0/1/1/1

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	1	NAG	C1-C2	8.99	1.64	1.52
2	H	1	NAG	C1-C2	3.45	1.57	1.52
2	D	2	NAG	C1-C2	2.73	1.56	1.52
2	H	2	NAG	O5-C1	-2.54	1.39	1.43
2	F	2	NAG	O5-C1	-2.40	1.39	1.43
2	M	2	NAG	C1-C2	2.38	1.55	1.52
2	J	2	NAG	O5-C1	-2.29	1.39	1.43
3	I	2	NAG	O5-C1	-2.29	1.39	1.43
2	M	1	NAG	C1-C2	2.24	1.55	1.52
2	F	2	NAG	C2-N2	-2.09	1.42	1.46
3	L	3	BMA	O4-C4	-2.04	1.37	1.43
2	J	1	NAG	C1-C2	2.02	1.55	1.52
2	F	1	NAG	C3-C2	-2.01	1.48	1.52

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	1	NAG	C1-C2-N2	-11.05	93.02	110.43
2	K	1	NAG	C2-N2-C7	5.01	129.61	122.90
2	F	2	NAG	C2-N2-C7	-4.94	116.28	122.90
2	F	2	NAG	C4-C3-C2	-4.14	104.95	111.02
2	F	2	NAG	O5-C1-C2	-4.11	104.93	111.29
2	F	1	NAG	O5-C1-C2	-3.92	105.22	111.29
2	F	1	NAG	C1-O5-C5	3.75	117.21	112.19
2	H	2	NAG	C1-O5-C5	3.69	117.14	112.19
2	K	1	NAG	C1-O5-C5	3.64	117.06	112.19
2	D	2	NAG	C1-O5-C5	3.52	116.91	112.19
2	F	1	NAG	O3-C3-C2	-3.49	102.16	109.40
3	I	3	BMA	C1-O5-C5	3.27	116.57	112.19
2	K	1	NAG	C1-C2-N2	3.11	115.34	110.43
2	E	1	NAG	C1-O5-C5	3.07	116.30	112.19
3	G	1	NAG	C1-O5-C5	2.91	116.09	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	3	BMA	C1-O5-C5	2.82	115.97	112.19
2	K	2	NAG	C1-O5-C5	2.40	115.41	112.19
3	L	1	NAG	C1-O5-C5	2.29	115.26	112.19
2	D	1	NAG	C1-O5-C5	2.24	115.19	112.19
2	F	2	NAG	O3-C3-C4	-2.23	105.13	110.38
2	F	1	NAG	O5-C5-C6	2.22	111.97	107.66

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	K	1	NAG	C1-C2-N2-C7
3	L	3	BMA	O5-C5-C6-O6
3	I	3	BMA	O5-C5-C6-O6
2	M	2	NAG	O5-C5-C6-O6
3	I	3	BMA	C4-C5-C6-O6
2	J	2	NAG	O5-C5-C6-O6
2	H	2	NAG	O5-C5-C6-O6
2	J	2	NAG	C4-C5-C6-O6
2	M	2	NAG	C4-C5-C6-O6
2	H	2	NAG	C4-C5-C6-O6
3	L	2	NAG	O5-C5-C6-O6
3	L	3	BMA	C4-C5-C6-O6
2	K	1	NAG	C8-C7-N2-C2
2	K	1	NAG	O7-C7-N2-C2
3	L	1	NAG	C8-C7-N2-C2
3	L	1	NAG	O7-C7-N2-C2
3	G	1	NAG	O5-C5-C6-O6
2	F	2	NAG	O5-C5-C6-O6
3	L	2	NAG	C4-C5-C6-O6
2	E	2	NAG	O5-C5-C6-O6
2	E	2	NAG	C4-C5-C6-O6
2	K	2	NAG	O5-C5-C6-O6
2	K	2	NAG	C4-C5-C6-O6
3	G	1	NAG	C4-C5-C6-O6
3	I	2	NAG	O5-C5-C6-O6
2	F	2	NAG	C4-C5-C6-O6
3	G	3	BMA	C4-C5-C6-O6
3	I	1	NAG	C4-C5-C6-O6
3	L	1	NAG	C1-C2-N2-C7
2	F	2	NAG	O7-C7-N2-C2
3	I	2	NAG	C4-C5-C6-O6

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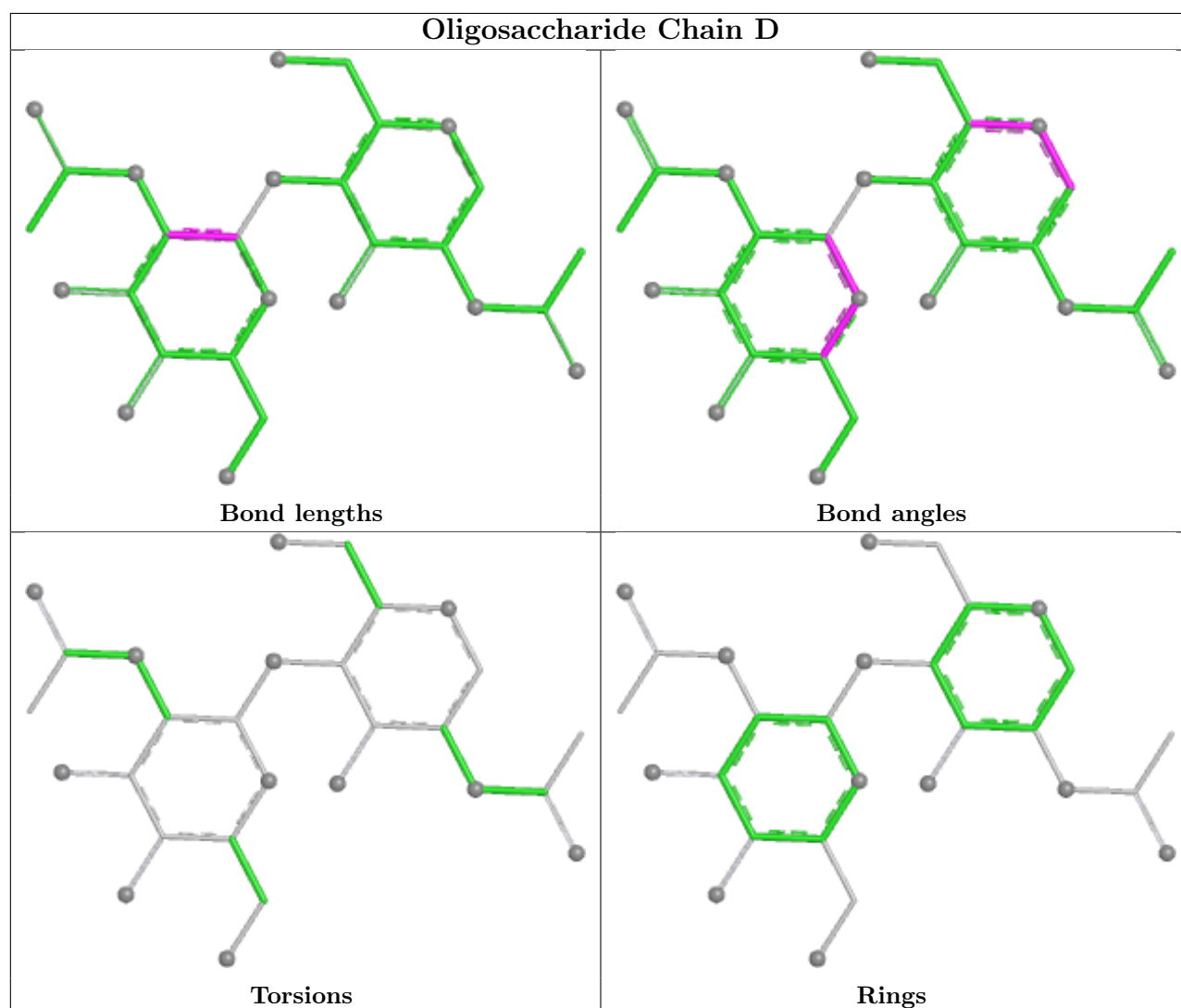
Mol	Chain	Res	Type	Atoms
2	F	2	NAG	C8-C7-N2-C2
3	I	1	NAG	O5-C5-C6-O6
3	G	3	BMA	O5-C5-C6-O6

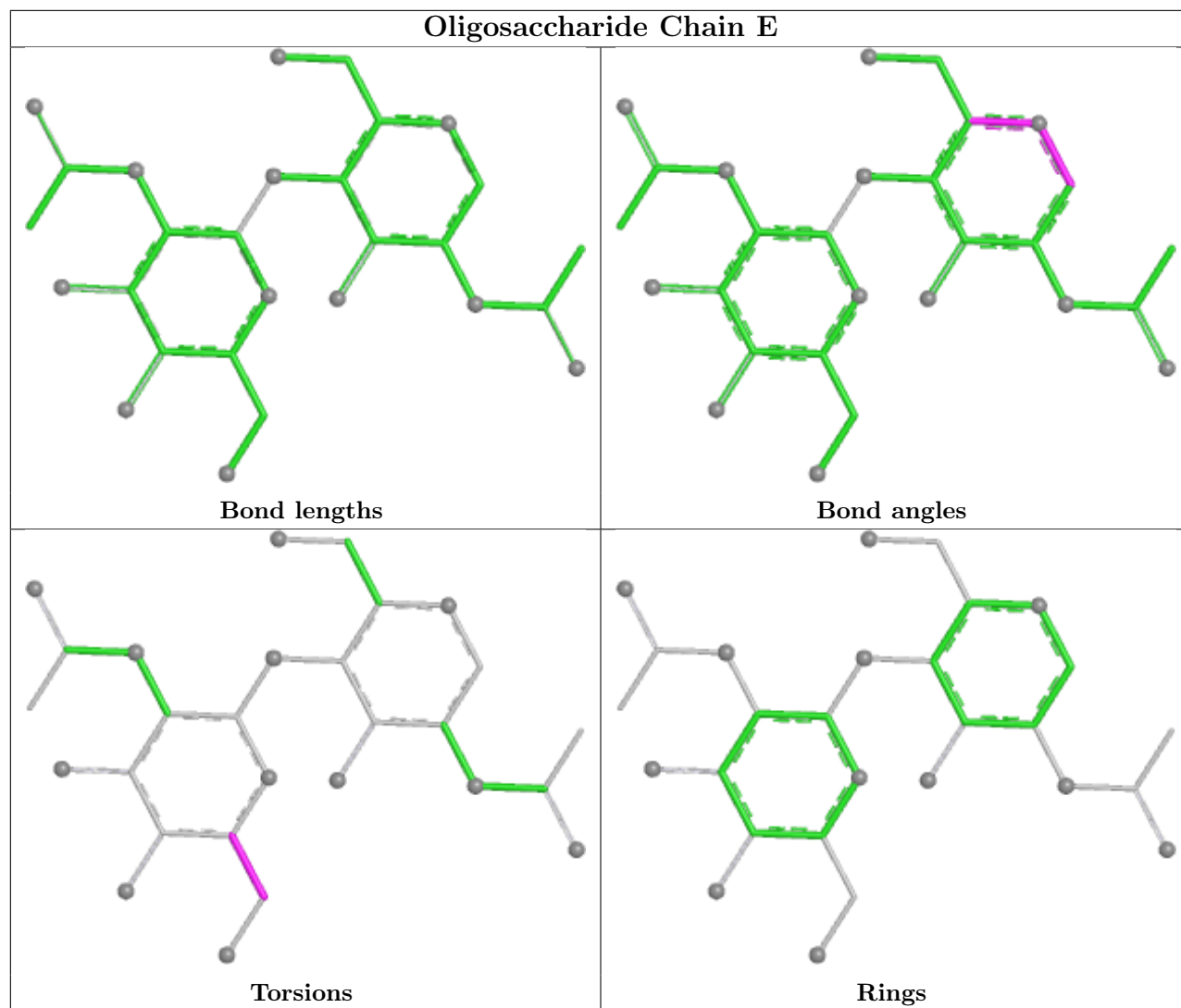
There are no ring outliers.

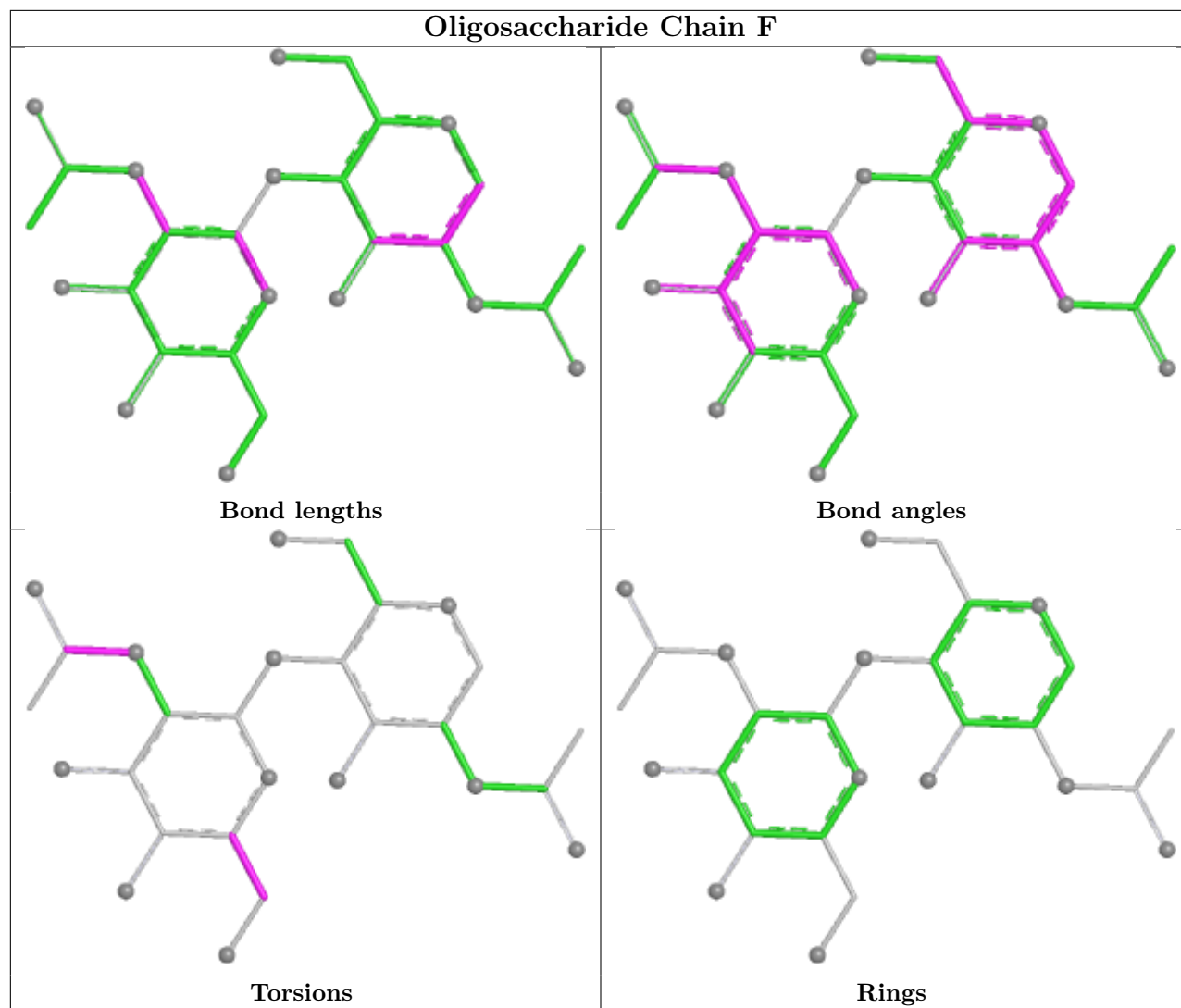
3 monomers are involved in 4 short contacts:

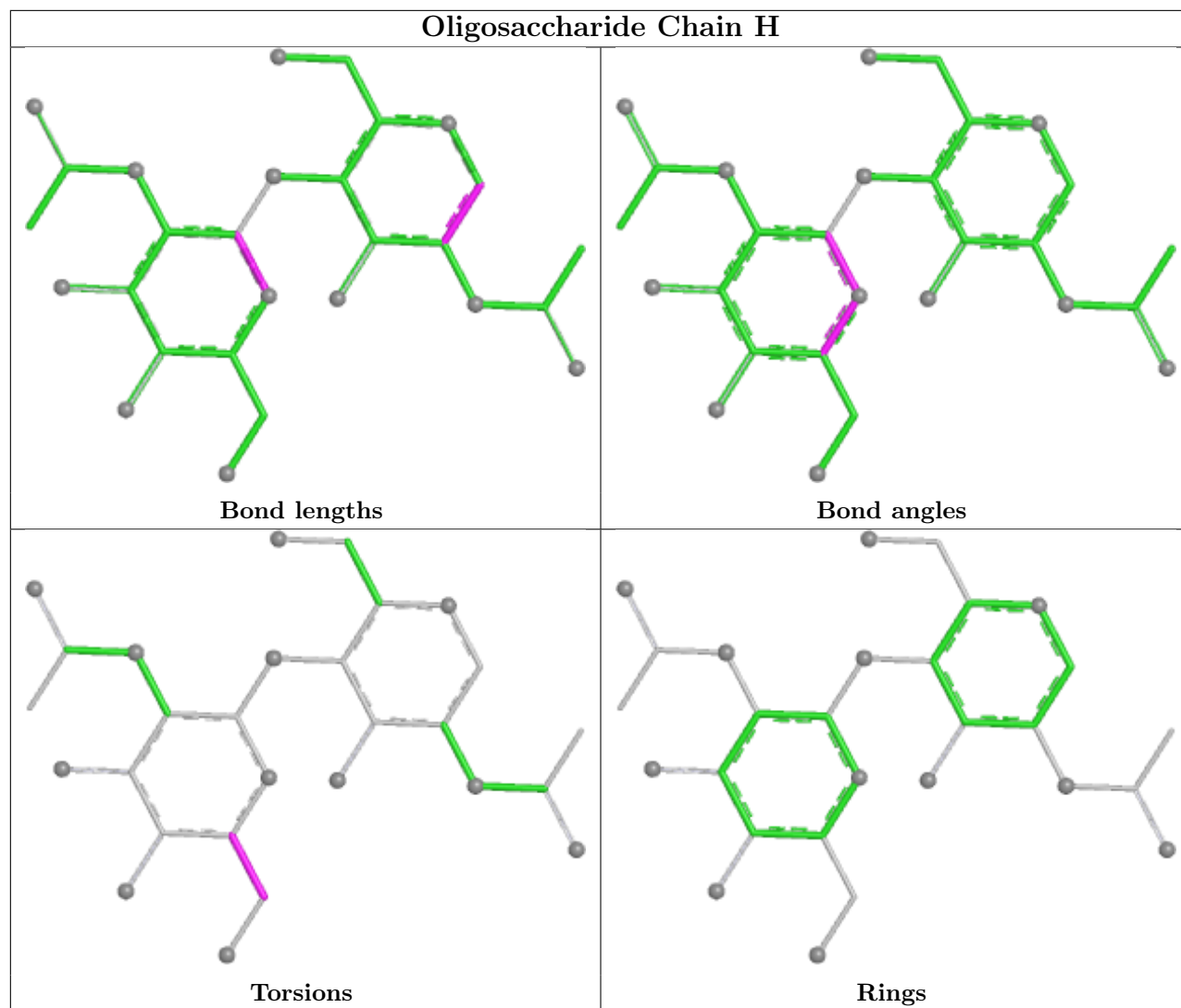
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	I	2	NAG	1	0
3	L	2	NAG	2	0
2	F	1	NAG	1	0

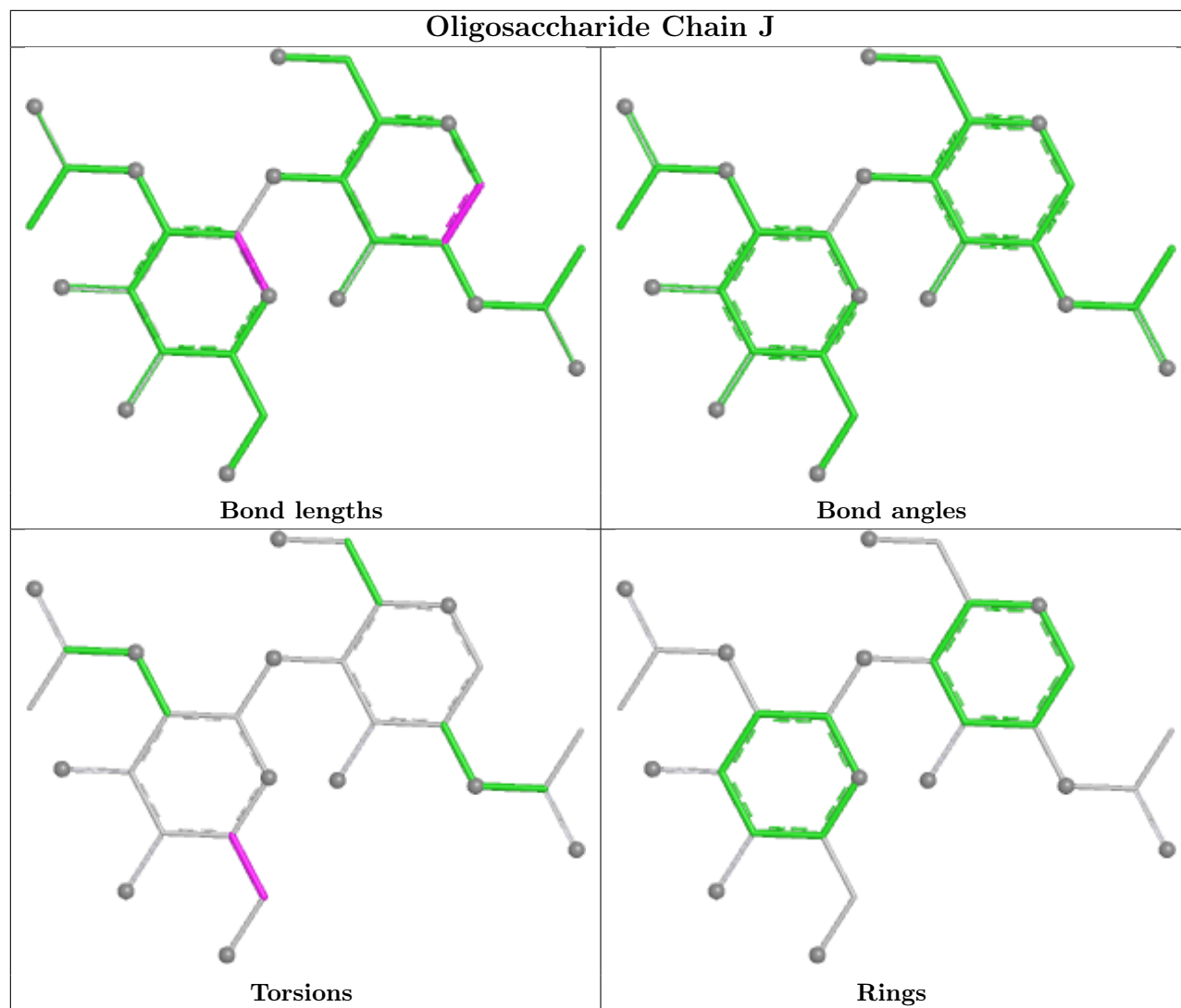
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

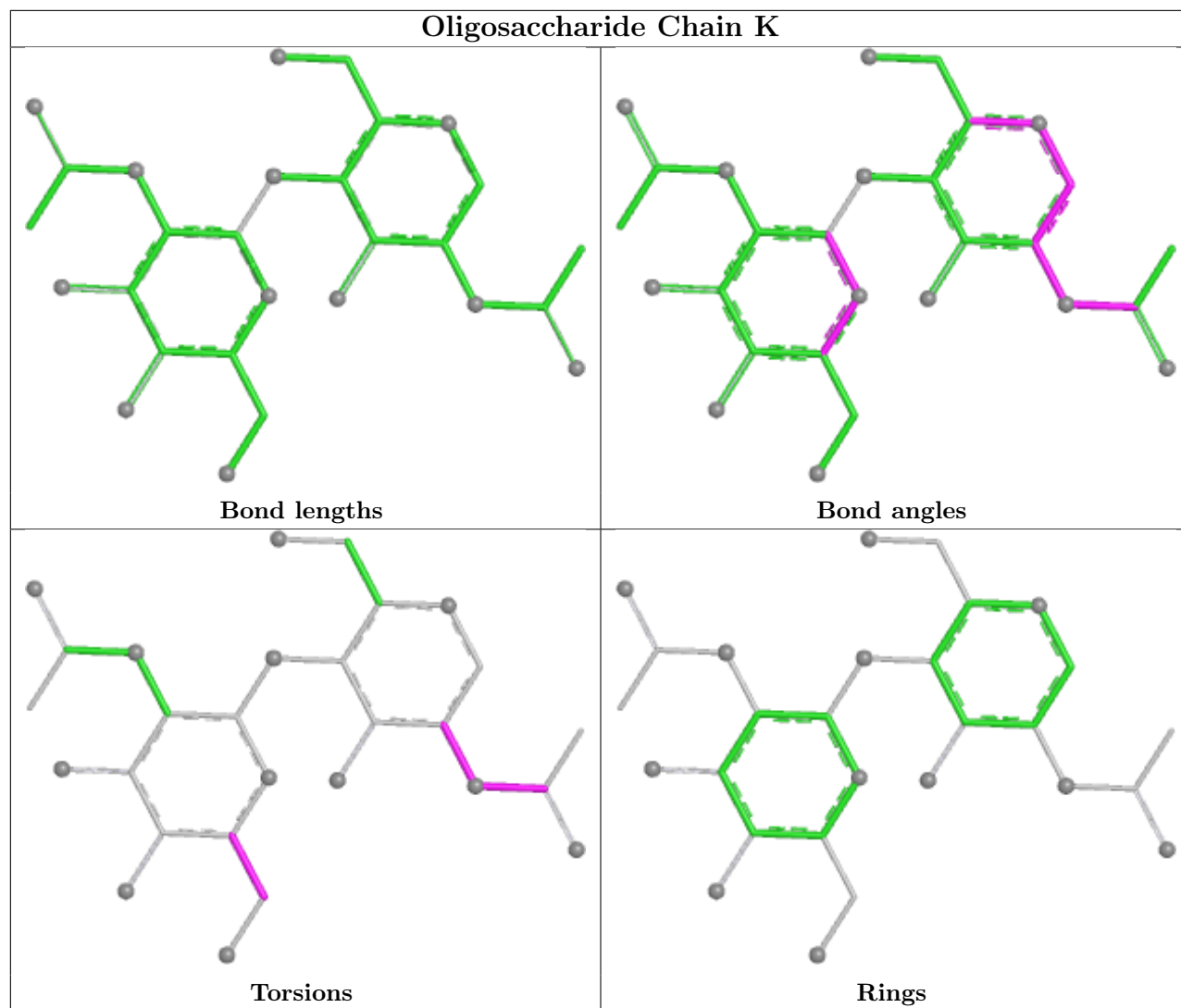


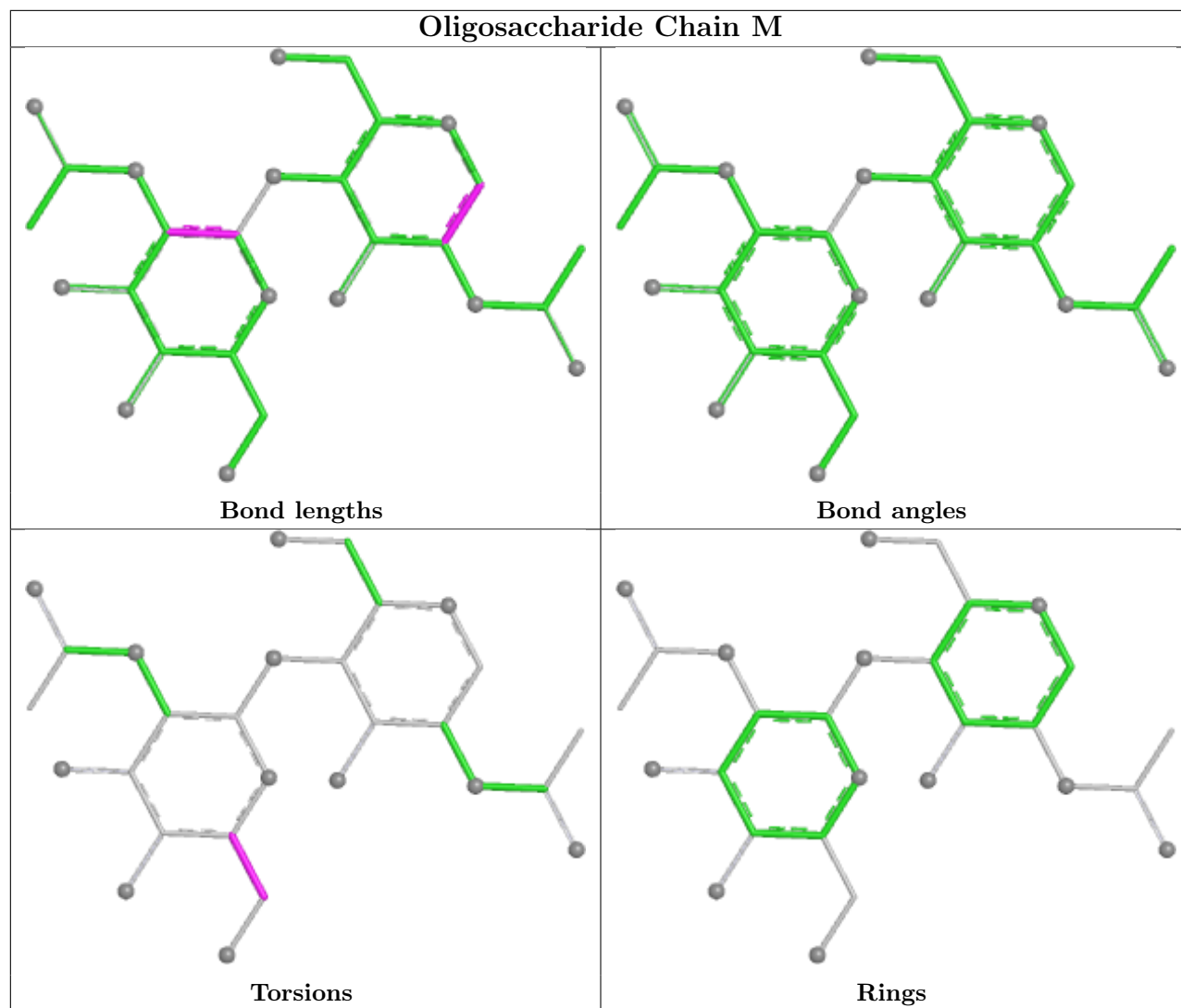


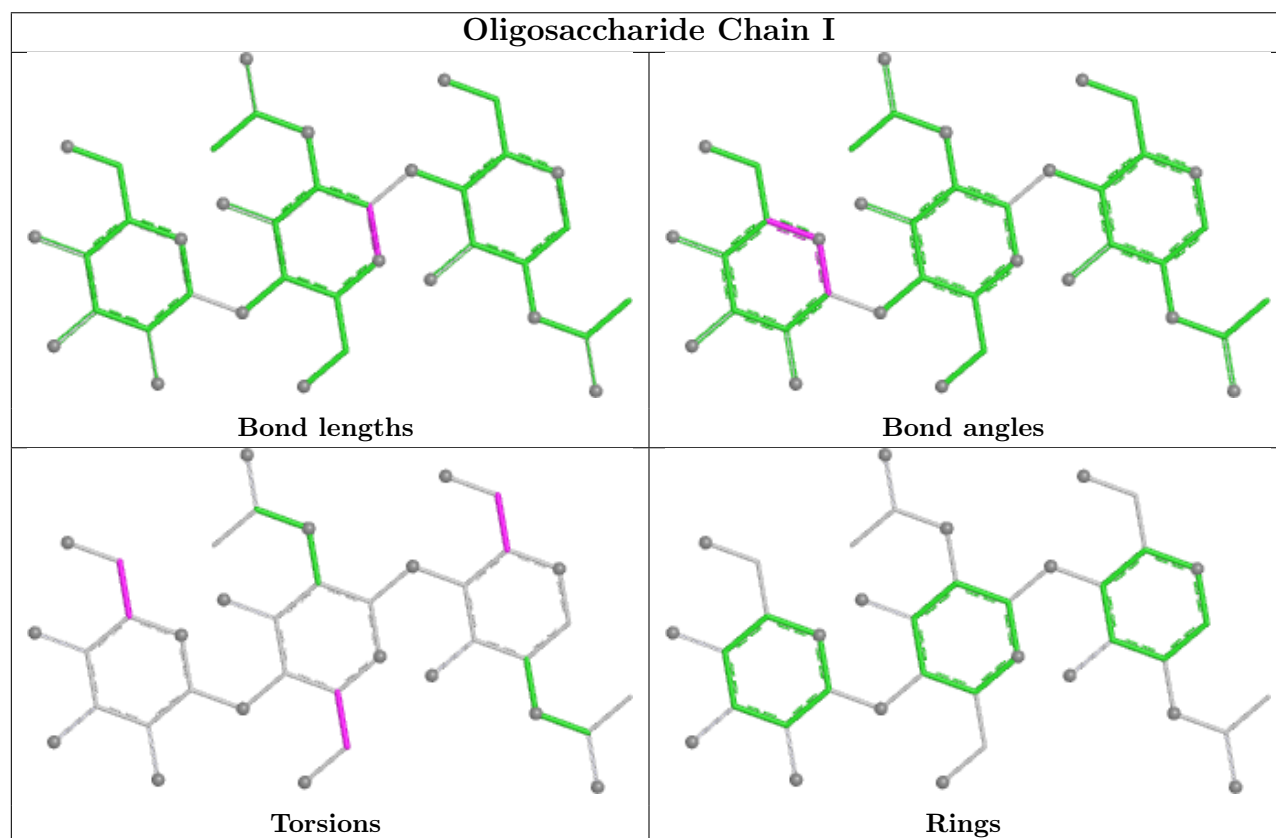
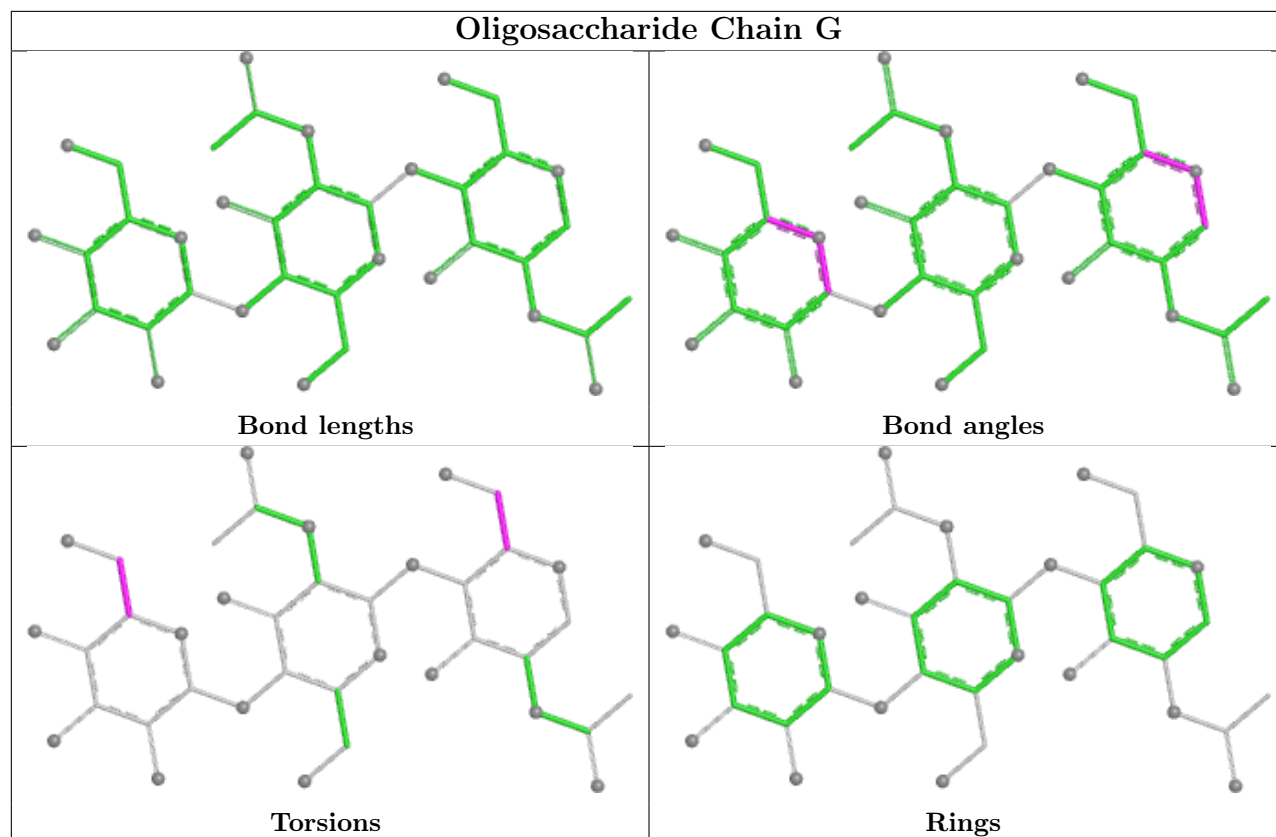


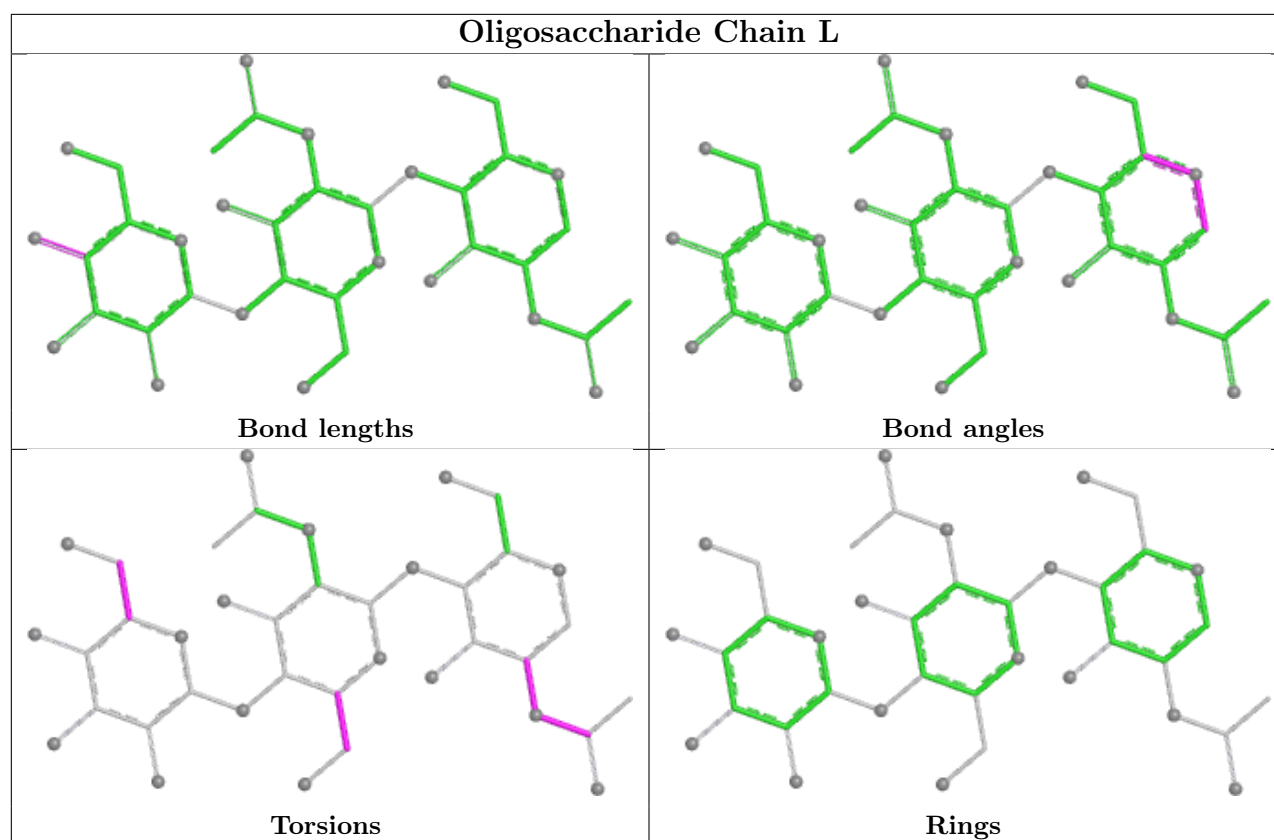












5.6 Ligand geometry [i](#)

7 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	$\# Z > 2$
4	NAG	B	602	1	14,14,15	0.29	0	17,19,21	0.82	1 (5%)
4	NAG	B	608	1	14,14,15	1.30	2 (14%)	17,19,21	0.99	1 (5%)
4	NAG	C	701	1	14,14,15	0.94	1 (7%)	17,19,21	0.70	1 (5%)
4	NAG	B	601	1	14,14,15	0.71	1 (7%)	17,19,21	1.14	1 (5%)
4	NAG	C	702	1	14,14,15	0.34	0	17,19,21	0.96	1 (5%)
4	NAG	C	709	1	14,14,15	0.97	1 (7%)	17,19,21	0.90	1 (5%)
4	NAG	C	703	1	14,14,15	0.56	0	17,19,21	0.56	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
4	NAG	B	602	1	-	2/6/23/26	0/1/1/1
4	NAG	B	608	1	-	0/6/23/26	0/1/1/1
4	NAG	C	701	1	-	0/6/23/26	0/1/1/1
4	NAG	B	601	1	-	0/6/23/26	0/1/1/1
4	NAG	C	702	1	-	0/6/23/26	0/1/1/1
4	NAG	C	709	1	-	2/6/23/26	0/1/1/1
4	NAG	C	703	1	-	2/6/23/26	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	608	NAG	C1-C2	3.84	1.57	1.52
4	C	701	NAG	O5-C1	3.14	1.49	1.43
4	C	709	NAG	O5-C1	2.97	1.48	1.43
4	B	608	NAG	O5-C1	2.75	1.48	1.43
4	B	601	NAG	O5-C1	-2.43	1.39	1.43

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	601	NAG	C1-O5-C5	3.48	116.86	112.19
4	C	709	NAG	C1-O5-C5	3.17	116.43	112.19
4	C	702	NAG	C1-O5-C5	3.11	116.35	112.19
4	B	602	NAG	C1-O5-C5	2.99	116.19	112.19
4	B	608	NAG	C2-N2-C7	2.60	126.39	122.90
4	C	701	NAG	C1-O5-C5	2.06	114.95	112.19

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	703	NAG	C4-C5-C6-O6
4	C	703	NAG	O5-C5-C6-O6
4	C	709	NAG	O5-C5-C6-O6
4	C	709	NAG	C4-C5-C6-O6
4	B	602	NAG	C4-C5-C6-O6
4	B	602	NAG	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	608	NAG	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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	486/497 (97%)	0.37	37 (7%)	20 21	20, 35, 59, 82	0
1	B	488/497 (98%)	0.40	34 (6%)	22 24	21, 36, 60, 82	0
1	C	488/497 (98%)	0.60	48 (9%)	13 13	22, 41, 66, 84	0
All	All	1462/1491 (98%)	0.46	119 (8%)	18 19	20, 38, 63, 84	0

All (119) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	502	ILE	7.2
1	A	388	THR	7.1
1	C	385	ILE	6.2
1	C	503	LYS	6.0
1	C	388	THR	5.9
1	B	277	CYS	5.9
1	A	277	CYS	5.8
1	A	387	LYS	5.7
1	C	387	LYS	5.7
1	B	385	ILE	5.6
1	A	334	ALA	5.4
1	C	386	GLU	5.4
1	B	502	ILE	5.2
1	A	385	ILE	4.9
1	B	388	THR	4.9
1	A	137	TYR	4.8
1	C	277	CYS	4.7
1	C	137	TYR	4.7
1	C	502	ILE	4.7
1	B	387	LYS	4.7
1	B	30	THR	4.5
1	B	367	LEU	4.4
1	B	8	ASN	4.1

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Mol	Chain	Res	Type	RSRZ
1	B	503	LYS	4.1
1	C	324	PRO	4.1
1	C	30	THR	3.8
1	C	483	ASN	3.8
1	A	501	GLN	3.7
1	A	30	THR	3.7
1	A	386	GLU	3.6
1	C	501	GLN	3.6
1	A	21	PRO	3.5
1	B	483	ASN	3.5
1	C	173	ASN	3.4
1	C	139	CYS	3.3
1	A	483	ASN	3.3
1	B	14	CYS	3.2
1	C	8	ASN	3.1
1	B	466	CYS	3.1
1	B	173	ASN	3.1
1	B	48	THR	3.1
1	A	367	LEU	3.1
1	B	384	VAL	3.1
1	A	50	ARG	3.0
1	C	367	LEU	2.9
1	C	333	GLY	2.9
1	B	29	ILE	2.9
1	C	22	ASN	2.9
1	B	334	ALA	2.9
1	A	9	SER	2.9
1	A	222	TRP	2.9
1	C	32	ASP	2.8
1	C	473	CYS	2.8
1	C	389	ASN	2.8
1	C	276	THR	2.8
1	C	31	ASN	2.7
1	A	348	ASP	2.7
1	B	501	GLN	2.7
1	B	31	ASN	2.7
1	B	137	TYR	2.7
1	C	305	CYS	2.7
1	B	32	ASP	2.7
1	C	104	ASP	2.7
1	A	48	THR	2.7
1	A	389	ASN	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	139	CYS	2.6
1	B	386	GLU	2.6
1	C	29	ILE	2.6
1	C	347	ILE	2.6
1	B	50	ARG	2.6
1	A	76	CYS	2.6
1	C	242	ILE	2.6
1	C	334	ALA	2.6
1	C	384	VAL	2.6
1	A	278	SER	2.6
1	C	64	CYS	2.5
1	A	500	PHE	2.5
1	B	472	LYS	2.5
1	C	48	THR	2.4
1	C	57	ARG	2.4
1	C	340	GLU	2.4
1	B	368	LYS	2.4
1	C	171	ASN	2.4
1	B	139	CYS	2.4
1	C	274	ILE	2.3
1	A	368	LYS	2.3
1	A	186	SER	2.3
1	C	383	ARG	2.3
1	C	119	GLU	2.3
1	B	325	GLU	2.3
1	C	390	GLU	2.3
1	B	305	CYS	2.3
1	B	389	ASN	2.3
1	A	384	VAL	2.2
1	C	477	CYS	2.2
1	C	142	GLY	2.2
1	B	462	MET	2.2
1	B	208	ARG	2.2
1	A	262	THR	2.2
1	B	438	ASP	2.2
1	C	198	ALA	2.2
1	C	223	VAL	2.2
1	C	199	SER	2.2
1	C	368	LYS	2.2
1	A	276	THR	2.1
1	A	158	GLU	2.1
1	A	216	ASN	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	104	ASP	2.1
1	A	173	ASN	2.1
1	A	29	ILE	2.1
1	A	325	GLU	2.1
1	C	160	THR	2.1
1	A	145	ASN	2.1
1	C	466	CYS	2.1
1	C	175	ASP	2.1
1	A	208	ARG	2.0
1	B	189	LYS	2.0
1	B	227	SER	2.0
1	A	128	THR	2.0

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

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

6.3 Carbohydrates ⓘ

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

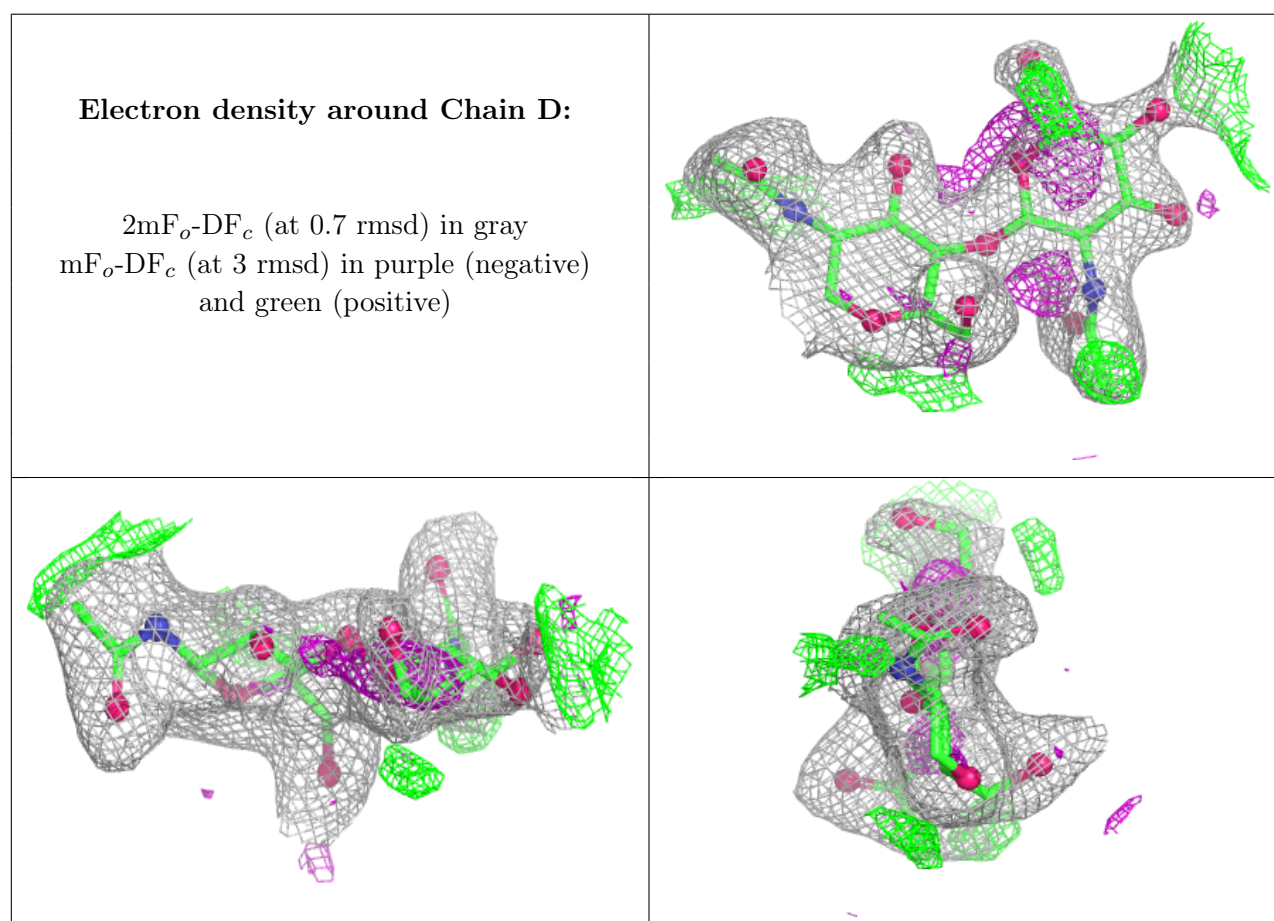
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NAG	D	2	14/15	0.71	0.18	61,67,74,77	0
3	BMA	L	3	11/12	0.71	0.16	78,82,86,87	0
2	NAG	K	2	14/15	0.72	0.18	57,64,71,73	0
2	NAG	K	1	14/15	0.72	0.19	41,51,63,64	0
2	NAG	H	2	14/15	0.74	0.19	70,77,82,82	0
2	NAG	F	2	14/15	0.74	0.18	59,76,94,95	0
2	NAG	J	2	14/15	0.77	0.20	72,77,84,85	0
2	NAG	E	2	14/15	0.77	0.17	86,96,101,102	0
3	BMA	I	3	11/12	0.78	0.15	71,77,83,87	0
2	NAG	M	2	14/15	0.78	0.18	73,77,83,84	0
3	NAG	L	1	14/15	0.79	0.18	49,60,78,86	0
3	BMA	G	3	11/12	0.82	0.13	73,75,77,79	0
2	NAG	F	1	14/15	0.87	0.12	38,48,59,62	0
2	NAG	E	1	14/15	0.89	0.13	46,59,67,79	0
3	NAG	G	1	14/15	0.89	0.12	42,55,70,70	0
2	NAG	D	1	14/15	0.89	0.11	42,50,55,58	0

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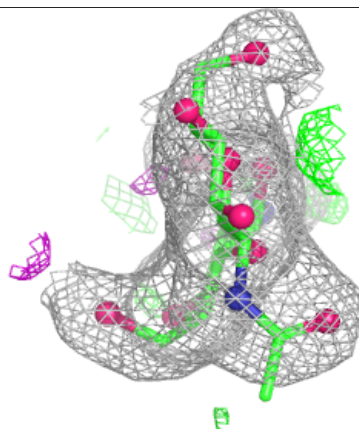
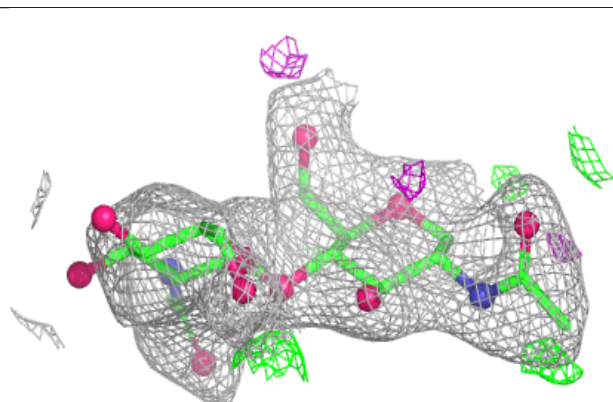
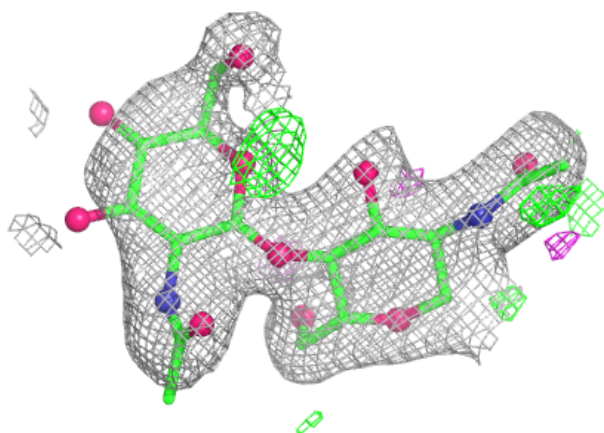
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	NAG	L	2	14/15	0.90	0.11	65,68,71,77	0
3	NAG	G	2	14/15	0.91	0.13	55,60,65,67	0
3	NAG	I	1	14/15	0.91	0.13	38,51,63,65	0
2	NAG	H	1	14/15	0.92	0.10	38,45,52,62	0
2	NAG	J	1	14/15	0.92	0.10	40,46,56,62	0
3	NAG	I	2	14/15	0.94	0.11	47,51,55,63	0
2	NAG	M	1	14/15	0.95	0.08	43,50,54,64	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.



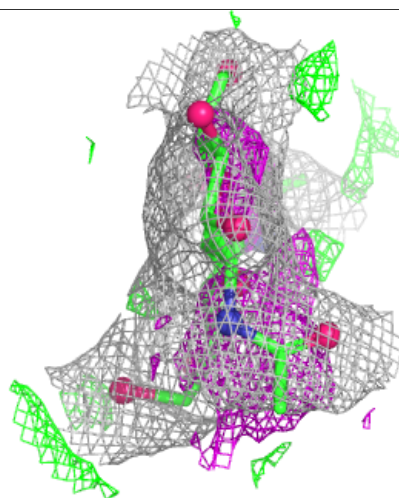
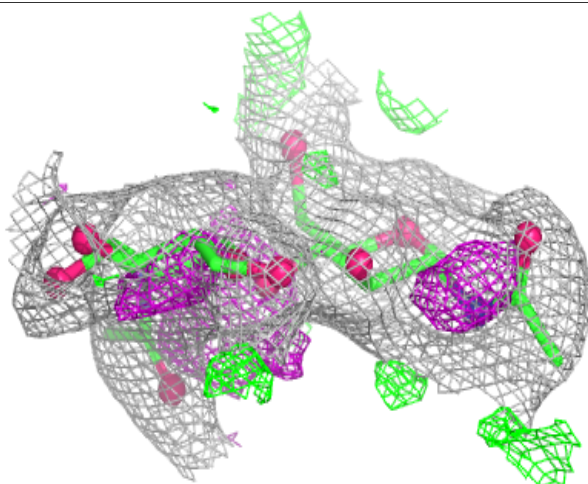
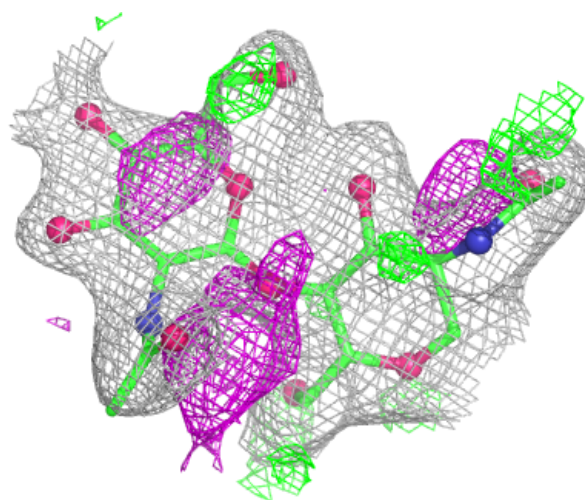
Electron density around Chain E:

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



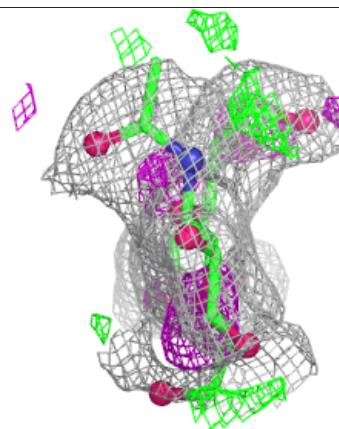
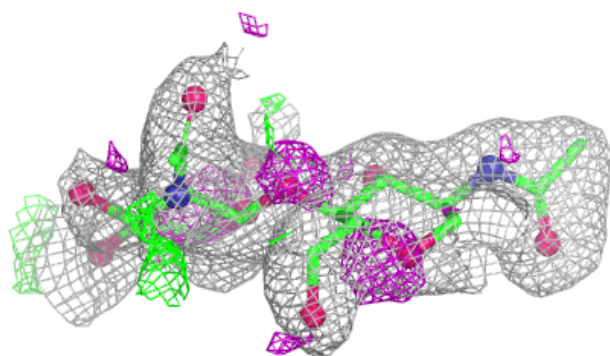
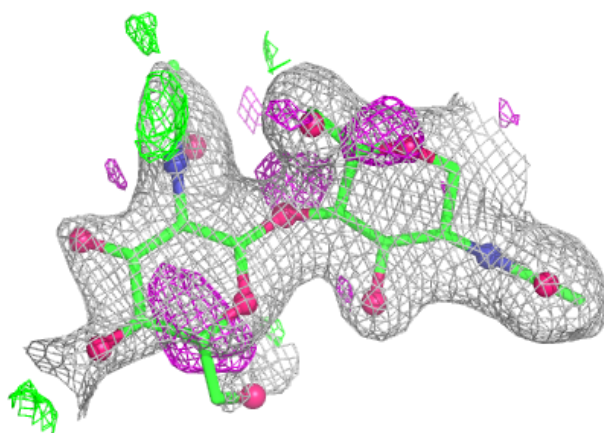
Electron density around Chain F:

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

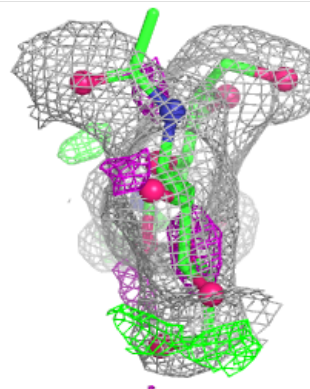
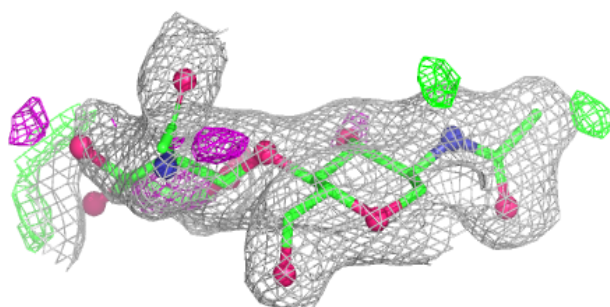
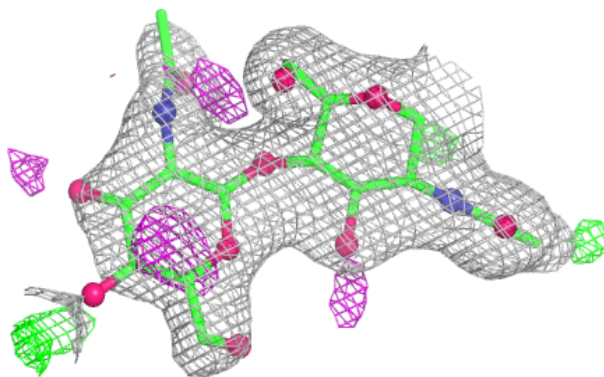


Electron density around Chain H:

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

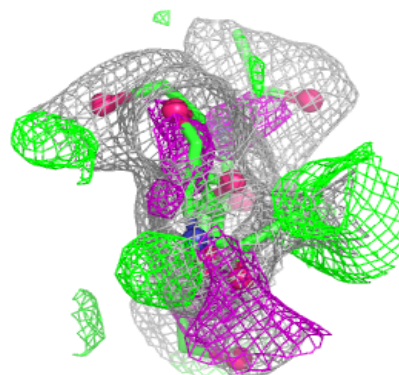
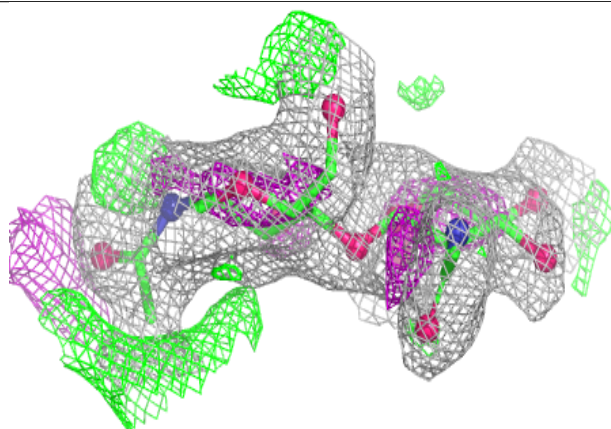
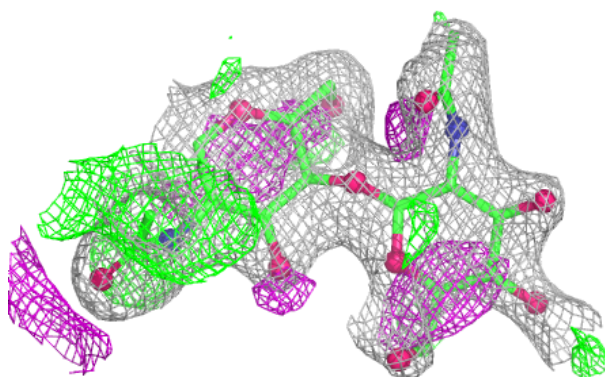
**Electron density around Chain J:**

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

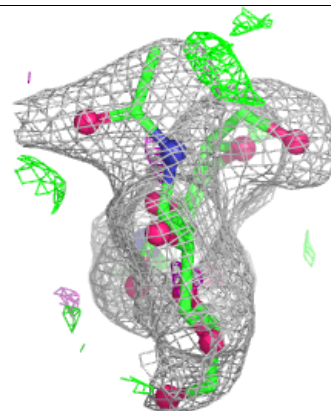
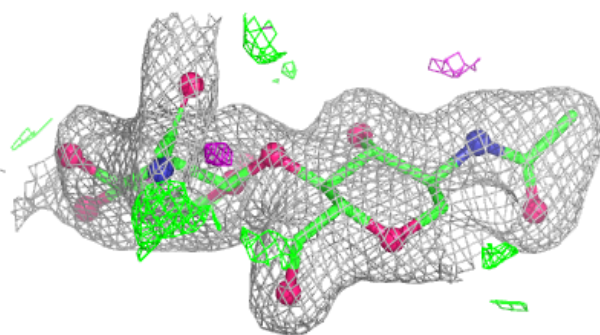
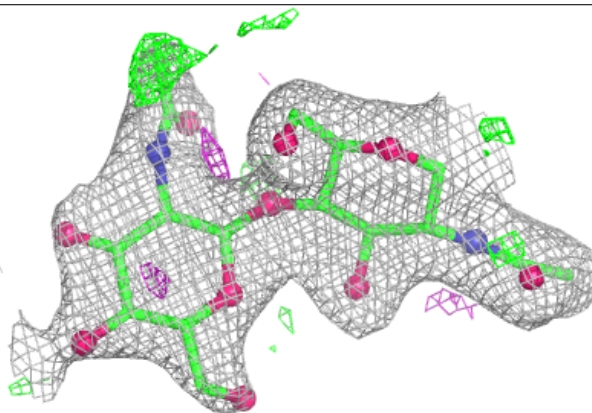


Electron density around Chain K:

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

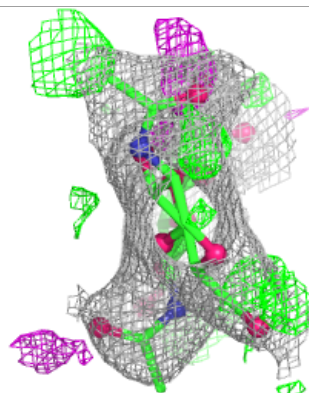
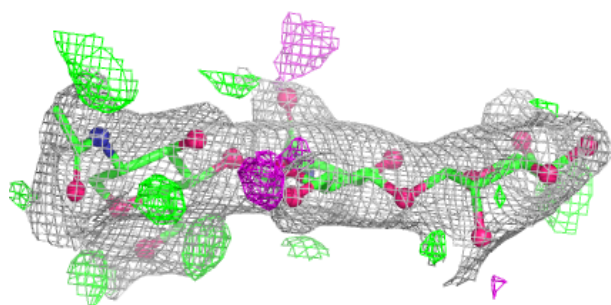
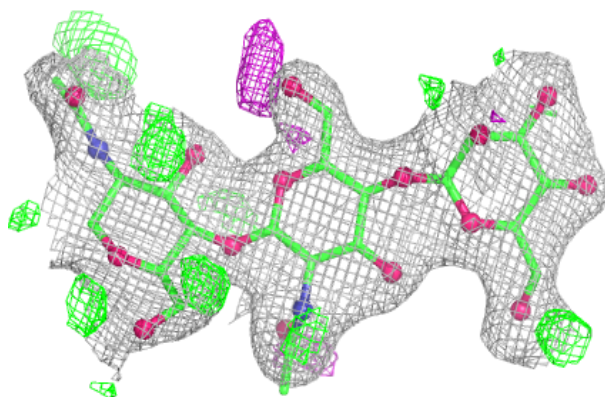
**Electron density around Chain M:**

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

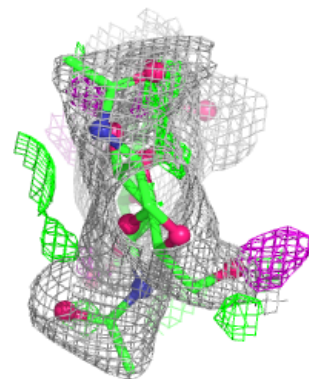
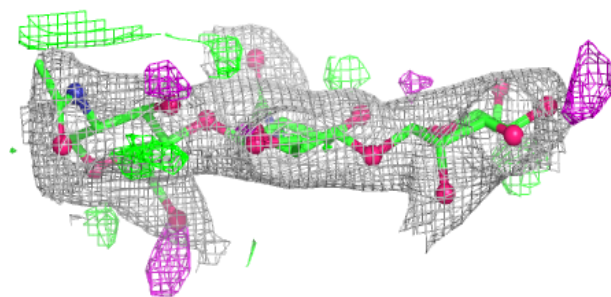
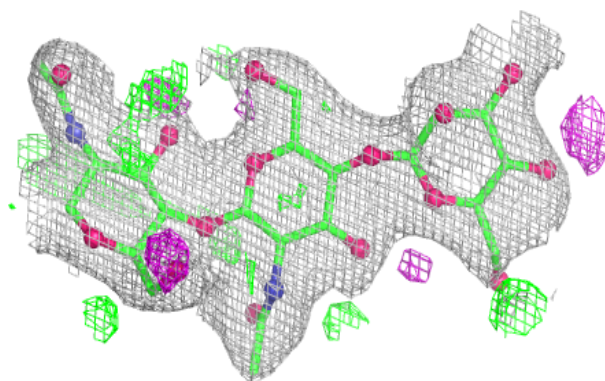


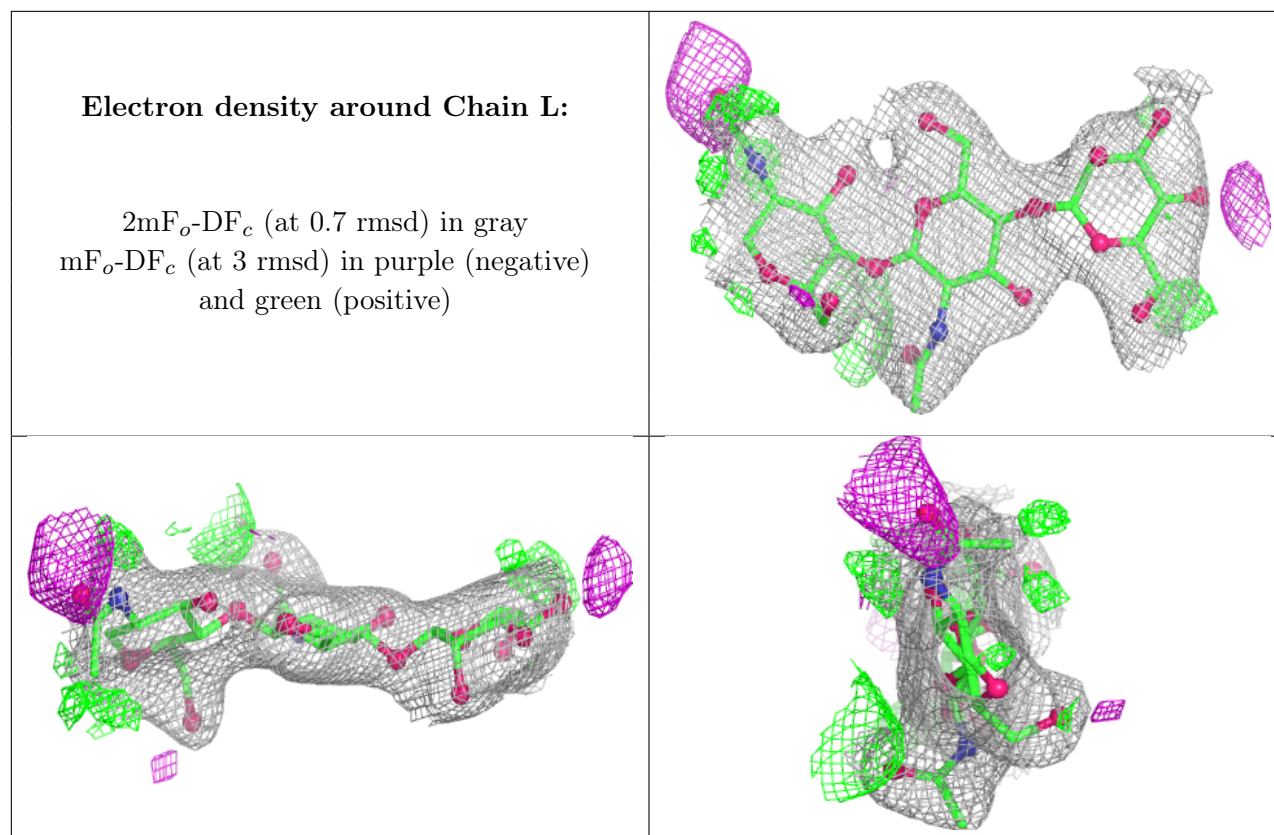
Electron density around Chain G:

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

**Electron density around Chain I:**

$2mF_o-DF_c$ (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
4	NAG	C	703	14/15	0.53	0.21	67,84,90,93	0
4	NAG	C	709	14/15	0.59	0.23	74,91,95,96	0
4	NAG	B	602	14/15	0.60	0.20	58,74,79,80	0
4	NAG	B	608	14/15	0.65	0.19	53,61,66,66	0
4	NAG	C	701	14/15	0.82	0.15	53,62,63,63	0
4	NAG	C	702	14/15	0.84	0.13	49,59,66,68	0
4	NAG	B	601	14/15	0.88	0.13	39,51,60,63	0

6.5 Other polymers [i](#)

There are no such residues in this entry.