



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 24, 2025 – 05:53 pm BST

PDB ID : 7QQH / pdb_00007qqh
Title : Crystal structure of MYORG (D520N) in complex with Gal- α 1,4-Glc
Authors : Meek, R.W.; Davies, G.J.
Deposited on : 2022-01-07
Resolution : 2.25 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 Phenix2.0rc1
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 2.0rc1
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

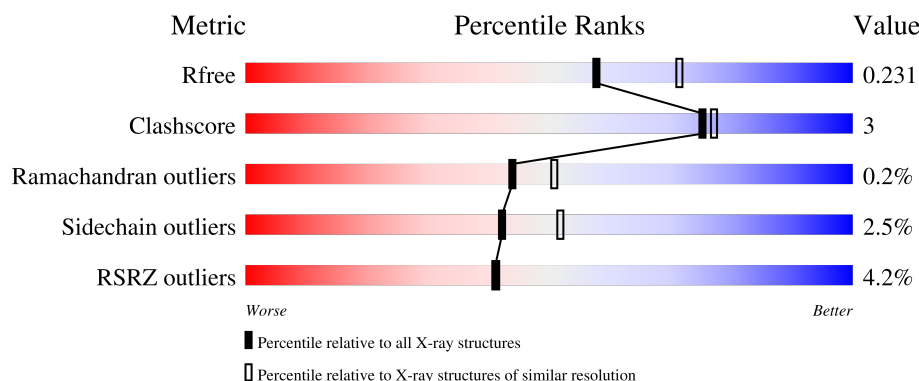
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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.



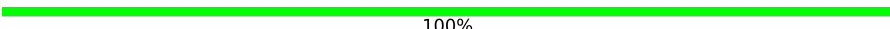
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1763 (2.26-2.26)
Clashscore	180529	1919 (2.26-2.26)
Ramachandran outliers	177936	1884 (2.26-2.26)
Sidechain outliers	177891	1885 (2.26-2.26)
RSRZ outliers	164620	1763 (2.26-2.26)

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	636	7% 89% 7% ..
1	B	636	3% 89% 8% .
1	C	636	5% 90% 6% .
1	D	636	3% 90% 7% .
2	E	2	100%

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Mol	Chain	Length	Quality of chain
2	F	2	 50%50%
2	G	2	 100%
2	H	2	 50%50%
2	I	2	 50%50%
2	J	2	 50%50%
2	K	2	 50%50%
2	L	2	 100%
3	M	2	 50%50%
3	N	2	 50%50%
3	O	2	 50%50%
3	P	2	 50%50%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 20830 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.

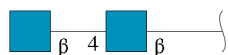
- Molecule 1 is a protein called Myogenesis-regulating glycosidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	615	Total	C	N	O	S	0	1	0
			4916	3176	843	881	16			
1	B	618	Total	C	N	O	S	0	3	0
			5004	3225	870	893	16			
1	C	617	Total	C	N	O	S	0	2	0
			4933	3183	850	884	16			
1	D	618	Total	C	N	O	S	0	0	0
			4971	3208	863	884	16			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	79	GLY	-	expression tag	UNP Q6NSJ0
A	520	ASN	ASP	engineered mutation	UNP Q6NSJ0
B	79	GLY	-	expression tag	UNP Q6NSJ0
B	520	ASN	ASP	engineered mutation	UNP Q6NSJ0
C	79	GLY	-	expression tag	UNP Q6NSJ0
C	520	ASN	ASP	engineered mutation	UNP Q6NSJ0
D	79	GLY	-	expression tag	UNP Q6NSJ0
D	520	ASN	ASP	engineered mutation	UNP Q6NSJ0

- 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	E	2	Total	C	N	O	0	0	0
			28	16	2	10			

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

- Molecule 3 is an oligosaccharide called alpha-D-galactopyranose-(1-4)-beta-D-glucopyranoside.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	M	2	Total	C	O	0	0	0
			23	12	11			
3	N	2	Total	C	O	0	0	0
			23	12	11			
3	O	2	Total	C	O	0	0	0
			23	12	11			
3	P	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



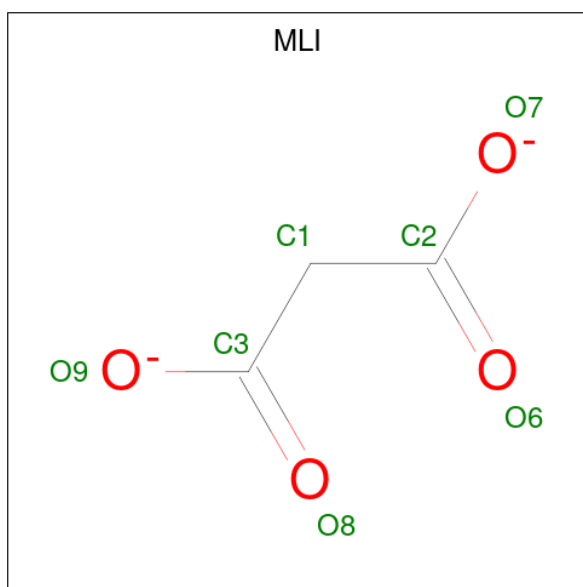
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	B	1	Total	C	N	O	0	0
			14	8	1	5		
4	B	1	Total	C	N	O	0	0
			14	8	1	5		
4	C	1	Total	C	N	O	0	0
			14	8	1	5		
4	C	1	Total	C	N	O	0	0
			14	8	1	5		
4	C	1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

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	C	1	Total	C	O	0	0
			4	2	2		
5	C	1	Total	C	O	0	0
			4	2	2		
5	D	1	Total	C	O	0	0
			4	2	2		
5	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is MALONATE ION (CCD ID: MLI) (formula: $C_3H_2O_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			7	3	4		
6	B	1	Total	C	O	0	0
			7	3	4		
6	C	1	Total	C	O	0	0
			7	3	4		
6	D	1	Total	C	O	0	0
			7	3	4		

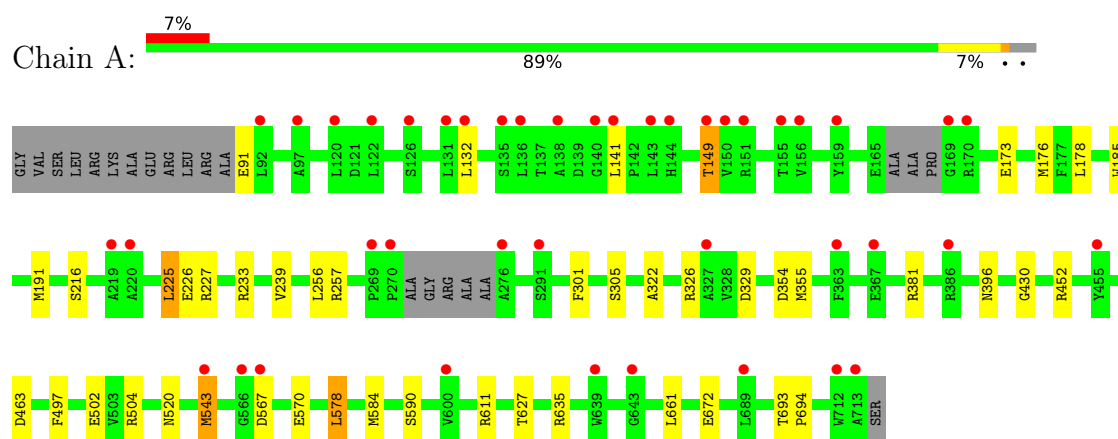
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	87	Total	O	0	0
			87	87		
7	B	152	Total	O	0	0
			152	152		
7	C	92	Total	O	0	0
			92	92		
7	D	155	Total	O	0	0
			155	155		

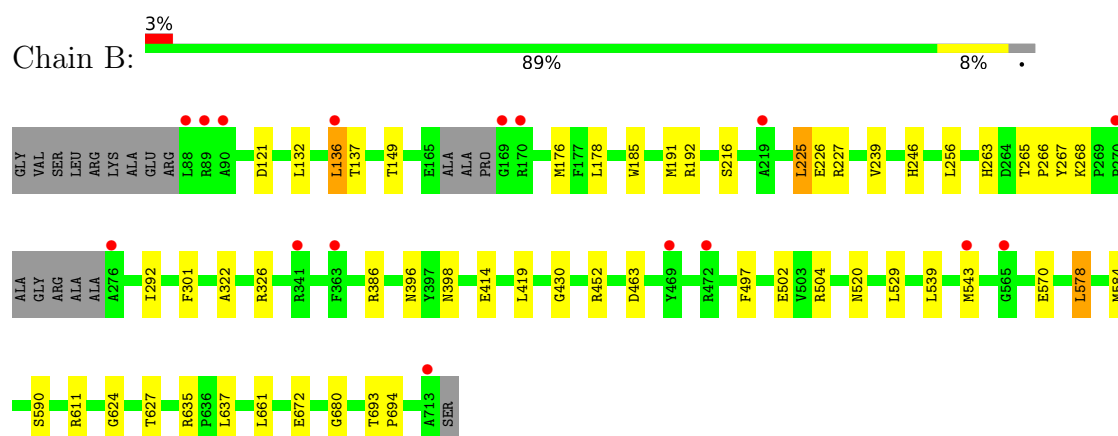
3 Residue-property plots [i](#)

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.

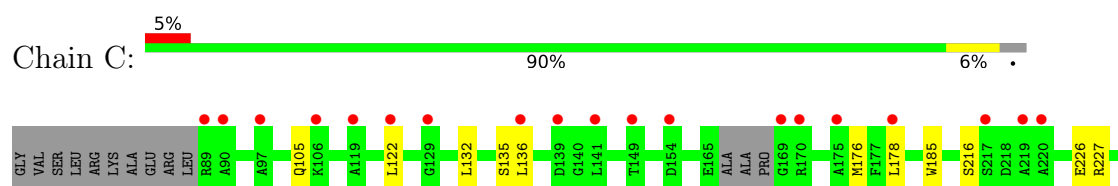
• Molecule 1: Myogenesis-regulating glycosidase

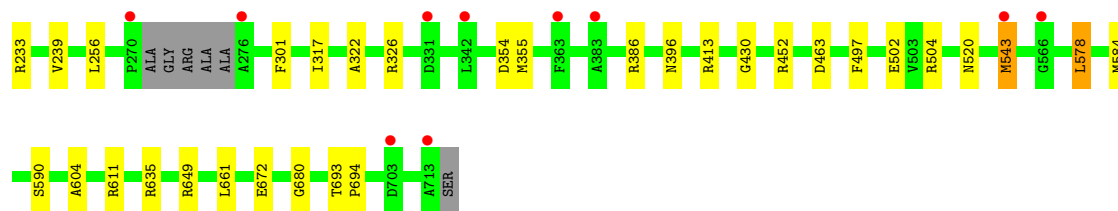


• Molecule 1: Myogenesis-regulating glycosidase

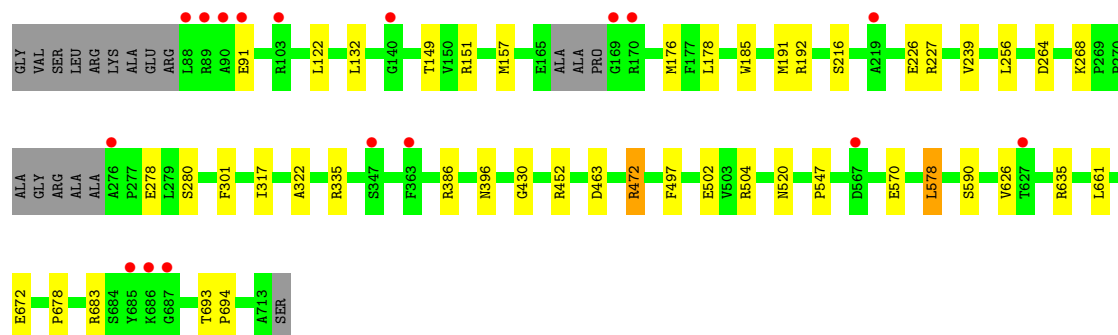
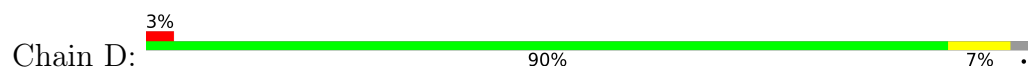


• Molecule 1: Myogenesis-regulating glycosidase





• Molecule 1: Myogenesis-regulating glycosidase



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



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



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



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





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

Chain I:  50% 50%



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

Chain J:  50% 50%



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

Chain K:  50% 50%



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

Chain L:  100%



- Molecule 3: alpha-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain M:  50% 50%



- Molecule 3: alpha-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain N:  50% 50%



- Molecule 3: alpha-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain O:  50% 50%



- Molecule 3: alpha-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain P:  50% 50%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	73.29Å 79.10Å 178.02Å 80.91° 79.11° 62.67°	Depositor
Resolution (Å)	64.53 – 2.25 64.53 – 2.25	Depositor EDS
% Data completeness (in resolution range)	98.2 (64.53-2.25) 94.7 (64.53-2.25)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.95 (at 2.25Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.212 , 0.227 0.217 , 0.231	Depositor DCC
R_{free} test set	8099 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	39.3	Xtriage
Anisotropy	0.102	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 36.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.008 for h,h-k,h-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	20830	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.95% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, EDO, MLI, GLA, BGC

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	0.99	0/5073	1.30	3/6917 (0.0%)
1	B	0.97	0/5158	1.30	3/7025 (0.0%)
1	C	0.99	0/5090	1.30	1/6943 (0.0%)
1	D	0.98	0/5125	1.30	2/6980 (0.0%)
All	All	0.98	0/20446	1.30	9/27865 (0.0%)

There are no bond length outliers.

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	680	GLY	CA-C-O	-5.46	118.21	122.52
1	D	570	GLU	CA-C-N	5.30	127.69	120.54
1	D	570	GLU	C-N-CA	5.30	127.69	120.54
1	A	329	ASP	CA-CB-CG	5.25	117.85	112.60
1	C	680	GLY	CA-C-O	-5.22	118.39	122.52

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4916	0	4695	24	0
1	B	5004	0	4825	42	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	4933	0	4704	21	0
1	D	4971	0	4796	25	0
2	E	28	0	25	0	0
2	F	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	1	0
2	I	28	0	25	0	0
2	J	28	0	25	0	0
2	K	28	0	25	0	0
2	L	28	0	25	0	0
3	M	23	0	21	1	0
3	N	23	0	21	1	0
3	O	23	0	21	1	0
3	P	23	0	21	1	0
4	A	42	0	39	0	0
4	B	28	0	26	0	0
4	C	42	0	39	0	0
4	D	28	0	26	0	0
5	A	8	0	12	0	0
5	B	8	0	12	0	0
5	C	8	0	12	1	0
5	D	12	0	18	1	0
6	A	7	0	2	0	0
6	B	7	0	2	0	0
6	C	7	0	2	0	0
6	D	7	0	2	0	0
7	A	87	0	0	0	0
7	B	152	0	0	3	0
7	C	92	0	0	0	0
7	D	155	0	0	3	0
All	All	20830	0	19496	116	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 3.

The worst 5 of 116 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:B:543:MET:HA	1:B:543:MET:HE2	1.56	0.87
1:A:173:GLU:OE2	1:A:257:ARG:HD2	1.85	0.76
1:B:246:HIS:NE2	1:B:265[B]:THR:CG2	2.53	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:584:MET:O	1:A:611:ARG:NH2	2.25	0.70
1:B:584:MET:O	1:B:611:ARG:NH2	2.25	0.69

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	610/636 (96%)	589 (97%)	20 (3%)	1 (0%)	44	51
1	B	615/636 (97%)	592 (96%)	22 (4%)	1 (0%)	44	51
1	C	613/636 (96%)	589 (96%)	23 (4%)	1 (0%)	44	51
1	D	612/636 (96%)	588 (96%)	23 (4%)	1 (0%)	44	51
All	All	2450/2544 (96%)	2358 (96%)	88 (4%)	4 (0%)	44	51

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	520	ASN
1	B	520	ASN
1	C	520	ASN
1	D	520	ASN

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	506/533 (95%)	492 (97%)	14 (3%)	38	47
1	B	521/533 (98%)	509 (98%)	12 (2%)	45	54
1	C	508/533 (95%)	494 (97%)	14 (3%)	38	47
1	D	516/533 (97%)	504 (98%)	12 (2%)	45	54
All	All	2051/2132 (96%)	1999 (98%)	52 (2%)	42	52

5 of 52 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	132	LEU
1	C	543	MET
1	D	578	LEU
1	C	216	SER
1	C	386	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	338	GLN
1	D	344	HIS
1	B	561	GLN
1	C	204	GLN
1	C	338	GLN

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 ⓘ

24 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	E	1	2,1	14,14,15	0.37	0	17,19,21	1.09	2 (11%)
2	NAG	E	2	2	14,14,15	0.27	0	17,19,21	1.13	1 (5%)
2	NAG	F	1	2,1	14,14,15	0.51	0	17,19,21	0.91	1 (5%)
2	NAG	F	2	2	14,14,15	0.45	0	17,19,21	0.95	0
2	NAG	G	1	2,1	14,14,15	0.32	0	17,19,21	0.87	0
2	NAG	G	2	2	14,14,15	0.38	0	17,19,21	0.74	0
2	NAG	H	1	2,1	14,14,15	0.52	0	17,19,21	1.49	4 (23%)
2	NAG	H	2	2	14,14,15	0.44	0	17,19,21	1.38	3 (17%)
2	NAG	I	1	2,1	14,14,15	0.37	0	17,19,21	0.95	1 (5%)
2	NAG	I	2	2	14,14,15	0.30	0	17,19,21	0.87	0
2	NAG	J	1	2,1	14,14,15	0.30	0	17,19,21	1.09	1 (5%)
2	NAG	J	2	2	14,14,15	0.26	0	17,19,21	0.82	0
2	NAG	K	1	2,1	14,14,15	0.35	0	17,19,21	1.38	2 (11%)
2	NAG	K	2	2	14,14,15	0.34	0	17,19,21	0.99	0
2	NAG	L	1	2,1	14,14,15	0.46	0	17,19,21	0.54	0
2	NAG	L	2	2	14,14,15	0.26	0	17,19,21	0.72	0
3	BGC	M	1	3	12,12,12	0.42	0	17,17,17	0.73	0
3	GLA	M	2	3	11,11,12	0.30	0	15,15,17	1.21	1 (6%)
3	BGC	N	1	3	12,12,12	0.46	0	17,17,17	0.70	0
3	GLA	N	2	3	11,11,12	0.50	0	15,15,17	1.19	1 (6%)
3	BGC	O	1	3	12,12,12	0.53	0	17,17,17	0.85	0
3	GLA	O	2	3	11,11,12	0.57	0	15,15,17	1.14	1 (6%)
3	BGC	P	1	3	12,12,12	0.48	0	17,17,17	0.70	0
3	GLA	P	2	3	11,11,12	0.46	0	15,15,17	1.20	1 (6%)

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	E	1	2,1	-	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	2,1	-	0/6/23/26	0/1/1/1
2	NAG	F	2	2	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	G	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	G	2	2	-	0/6/23/26	0/1/1/1
2	NAG	H	1	2,1	-	3/6/23/26	0/1/1/1
2	NAG	H	2	2	-	2/6/23/26	0/1/1/1
2	NAG	I	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	I	2	2	-	0/6/23/26	0/1/1/1
2	NAG	J	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	J	2	2	-	0/6/23/26	0/1/1/1
2	NAG	K	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	K	2	2	-	0/6/23/26	0/1/1/1
2	NAG	L	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	L	2	2	-	1/6/23/26	0/1/1/1
3	BGC	M	1	3	-	0/2/22/22	0/1/1/1
3	GLA	M	2	3	-	0/2/19/22	0/1/1/1
3	BGC	N	1	3	-	0/2/22/22	0/1/1/1
3	GLA	N	2	3	-	0/2/19/22	0/1/1/1
3	BGC	O	1	3	-	0/2/22/22	0/1/1/1
3	GLA	O	2	3	-	0/2/19/22	0/1/1/1
3	BGC	P	1	3	-	0/2/22/22	0/1/1/1
3	GLA	P	2	3	-	0/2/19/22	0/1/1/1

There are no bond length outliers.

The worst 5 of 19 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	P	2	GLA	C1-O5-C5	3.91	117.49	112.19
3	M	2	GLA	C1-O5-C5	3.64	117.13	112.19
3	N	2	GLA	C1-O5-C5	3.56	117.02	112.19
2	K	1	NAG	C1-C2-N2	3.18	115.92	110.49
2	E	2	NAG	O5-C5-C6	3.03	111.96	107.20

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

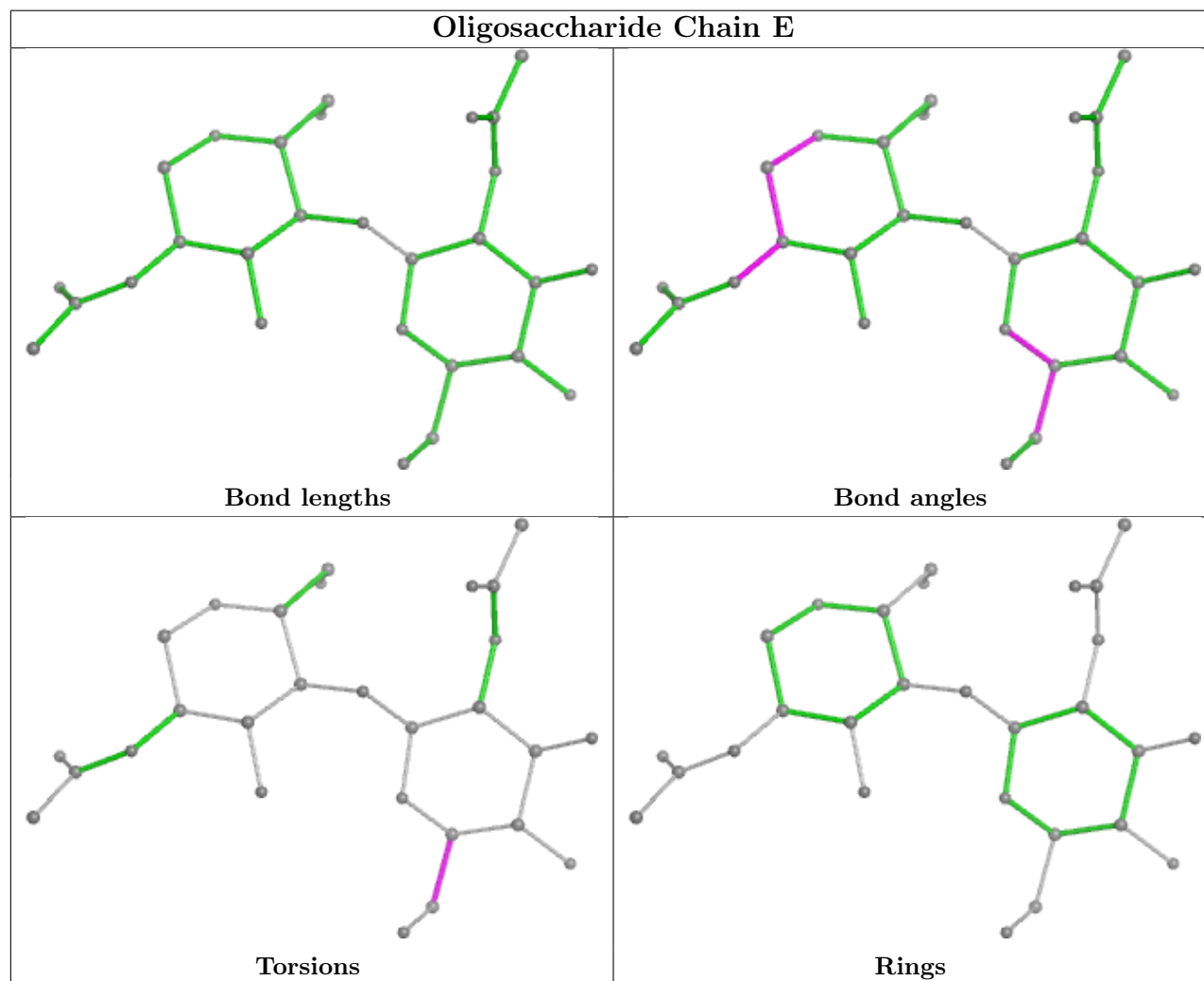
Mol	Chain	Res	Type	Atoms
2	H	1	NAG	C8-C7-N2-C2
2	H	1	NAG	O7-C7-N2-C2
2	H	2	NAG	C8-C7-N2-C2
2	H	2	NAG	O7-C7-N2-C2
2	H	1	NAG	O5-C5-C6-O6

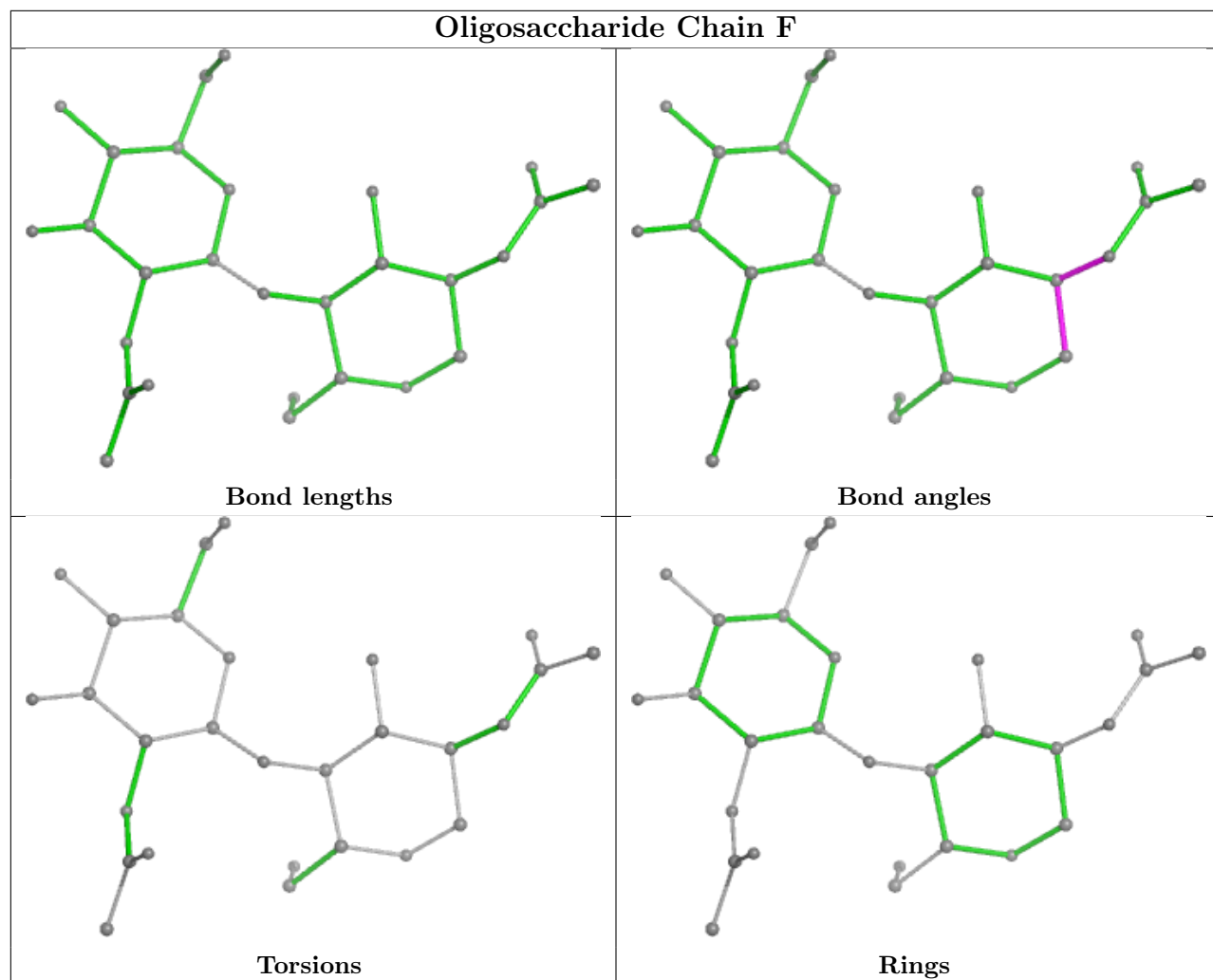
There are no ring outliers.

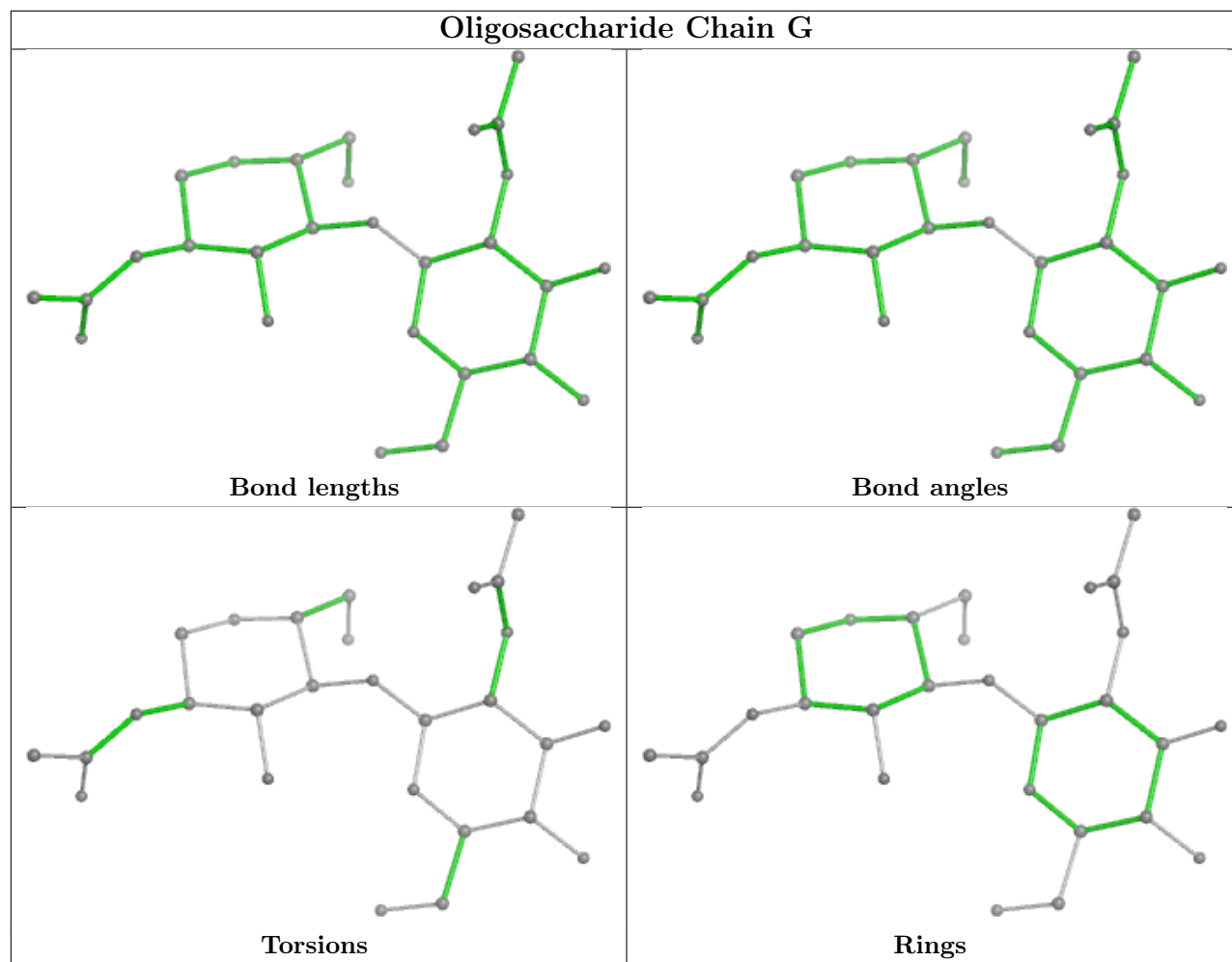
9 monomers are involved in 5 short contacts:

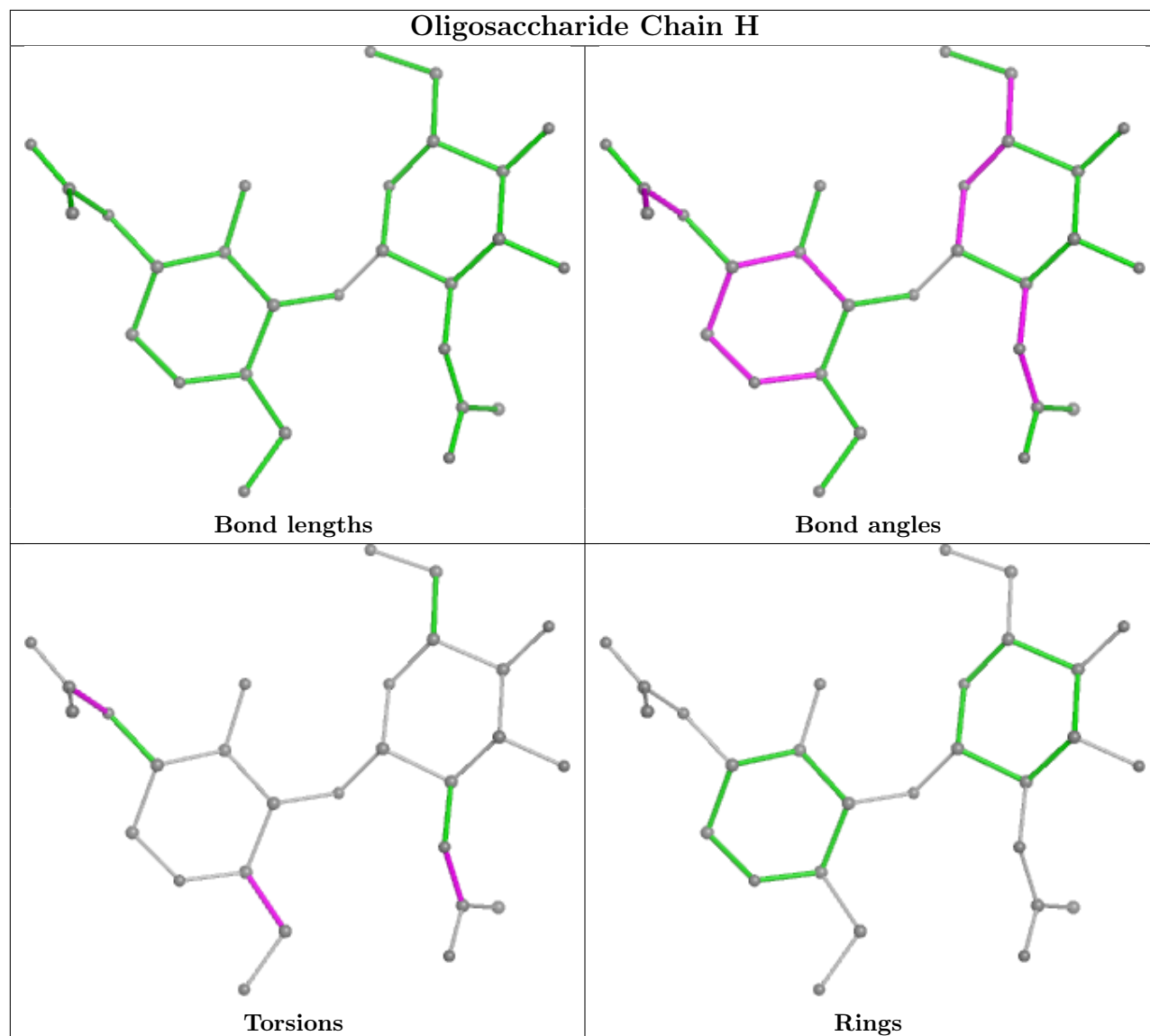
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	M	2	GLA	1	0
3	N	1	BGC	1	0
3	O	1	BGC	1	0
3	M	1	BGC	1	0
3	N	2	GLA	1	0
3	P	2	GLA	1	0
3	P	1	BGC	1	0
3	O	2	GLA	1	0
2	H	1	NAG	1	0

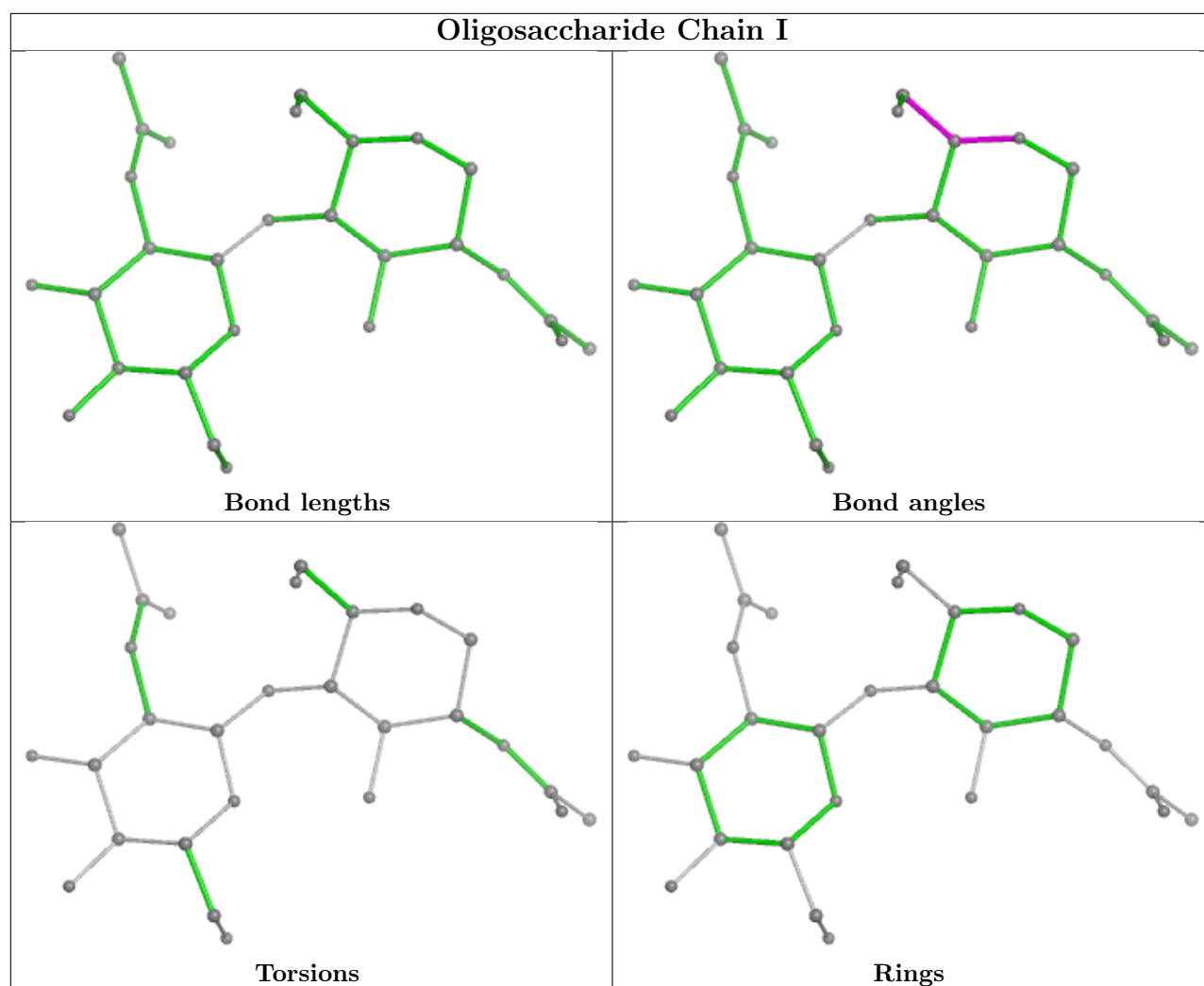
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



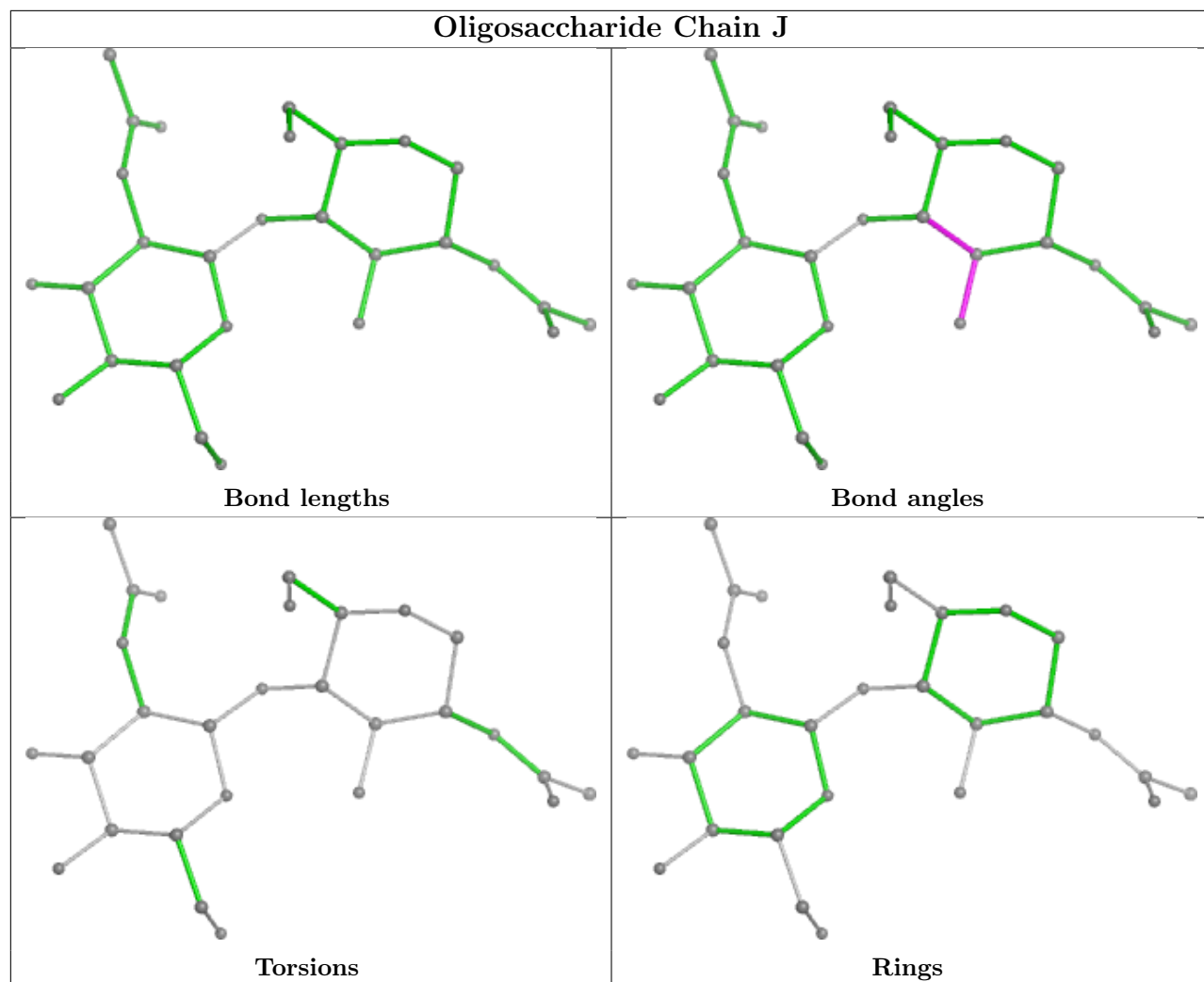




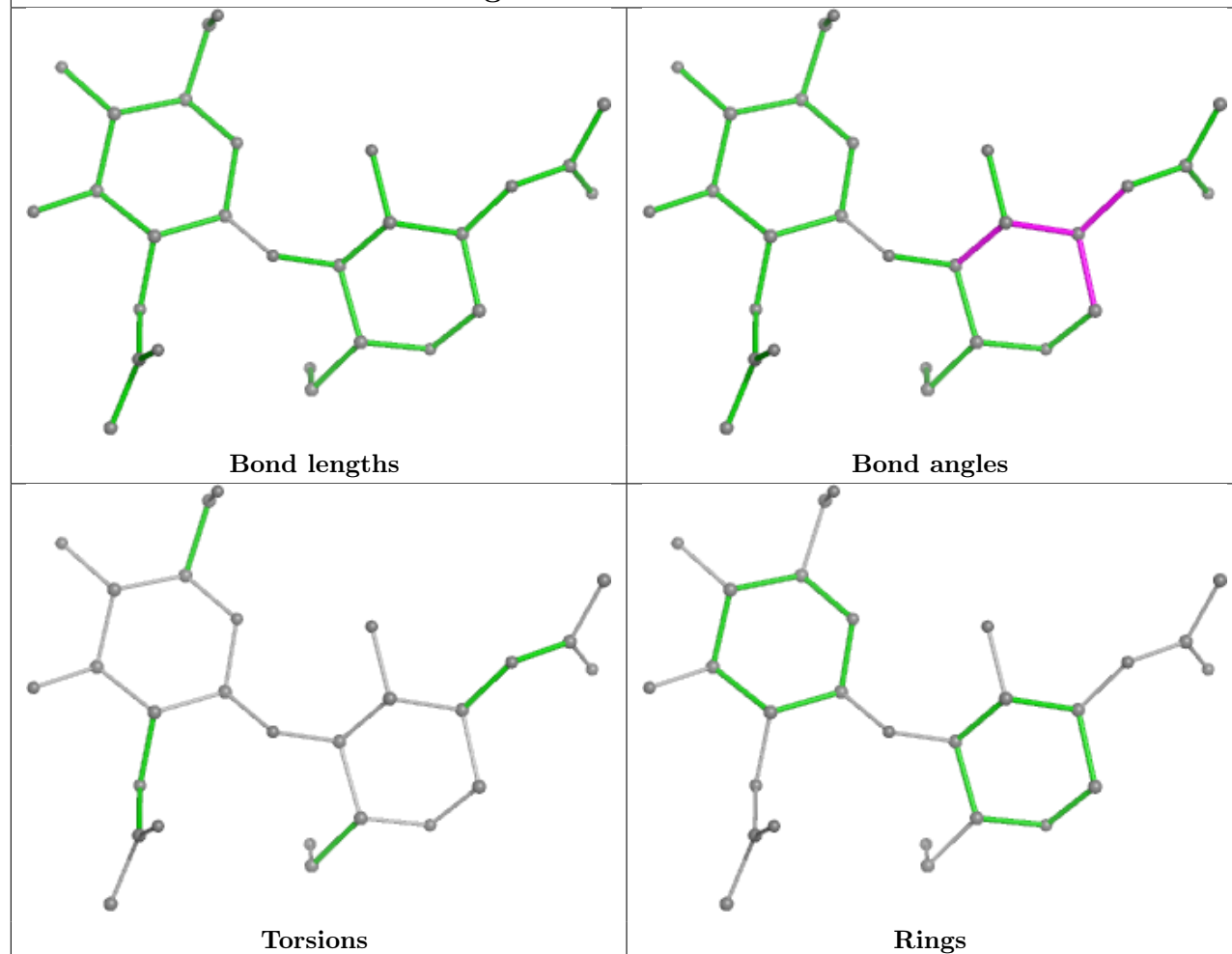


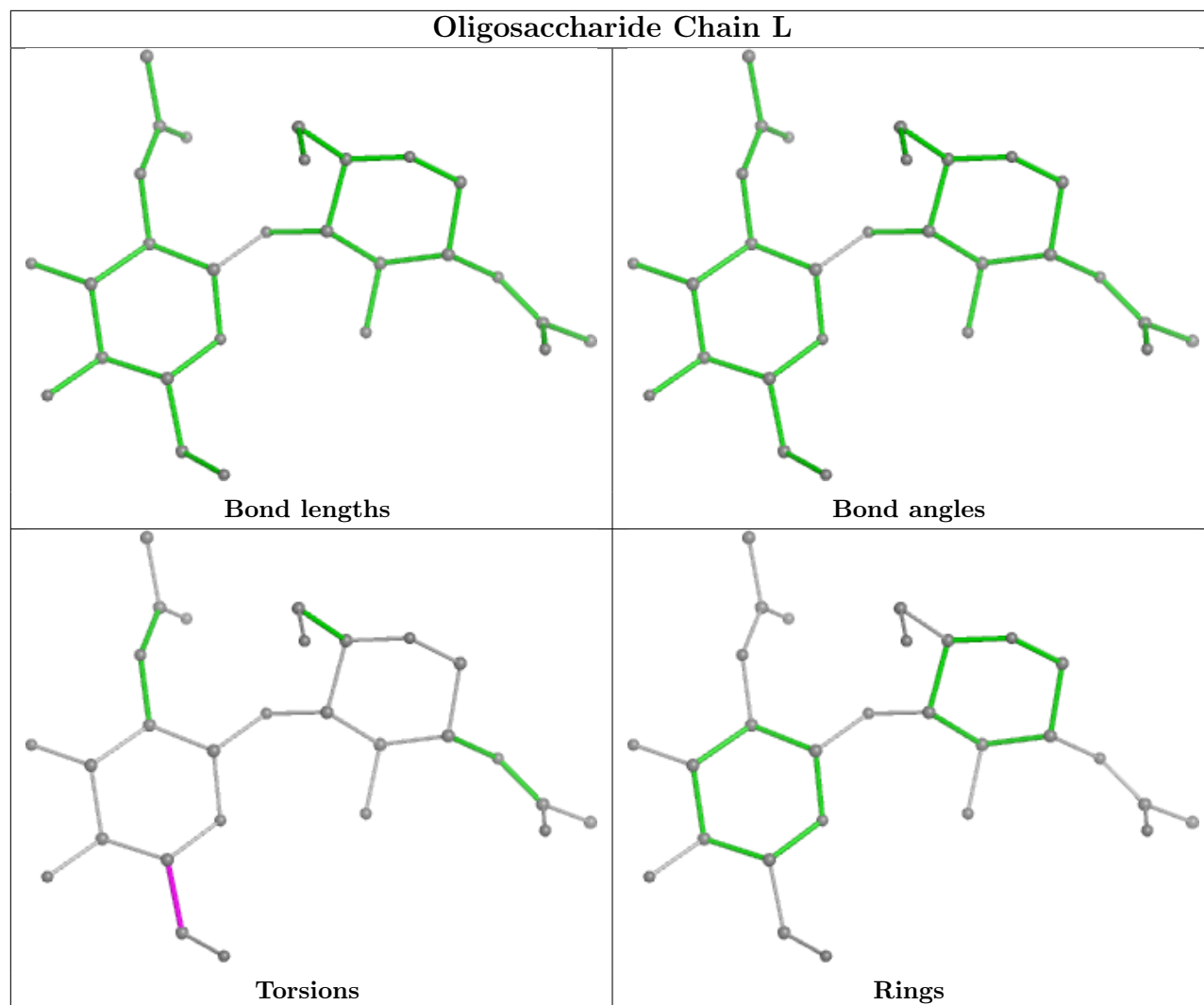


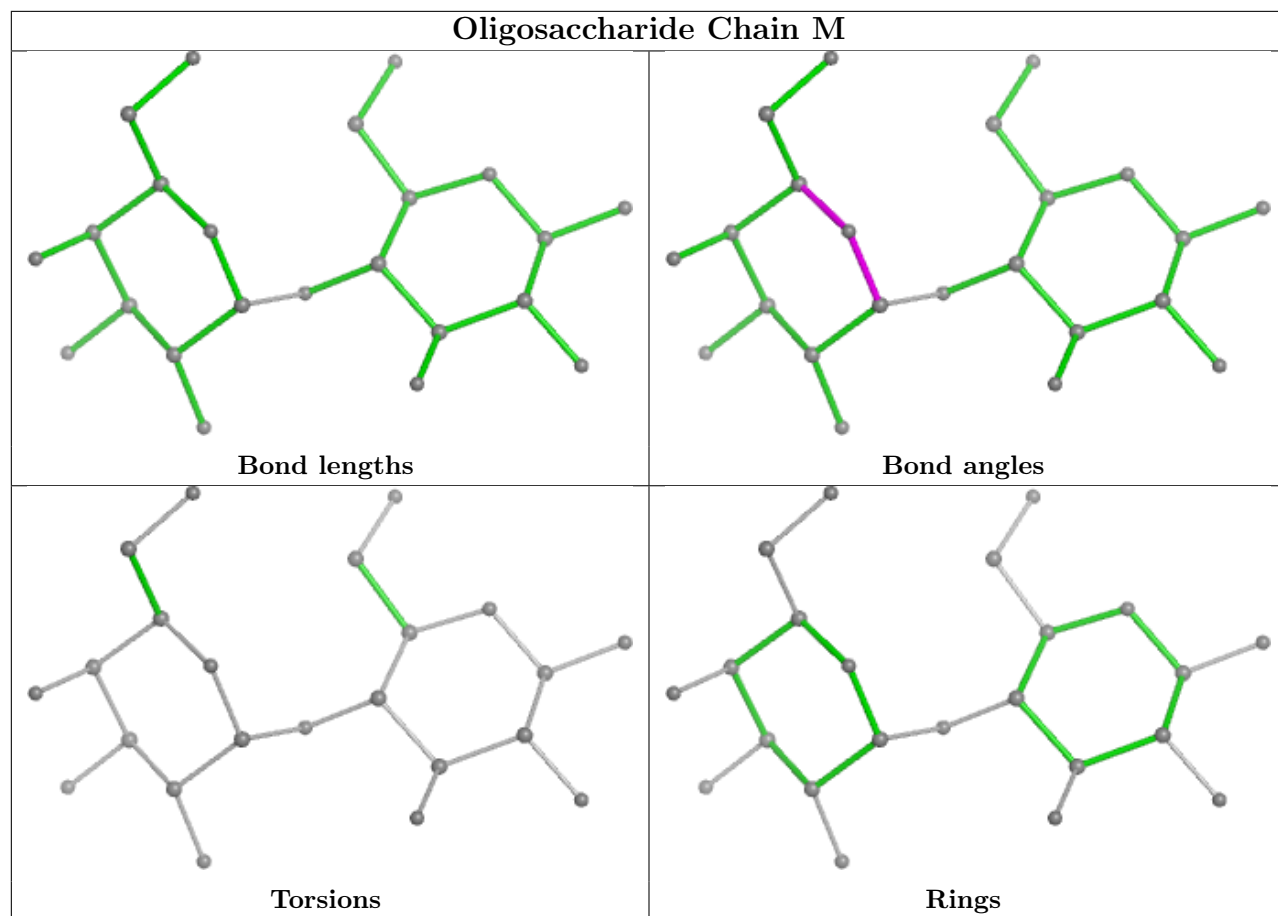
Oligosaccharide Chain J

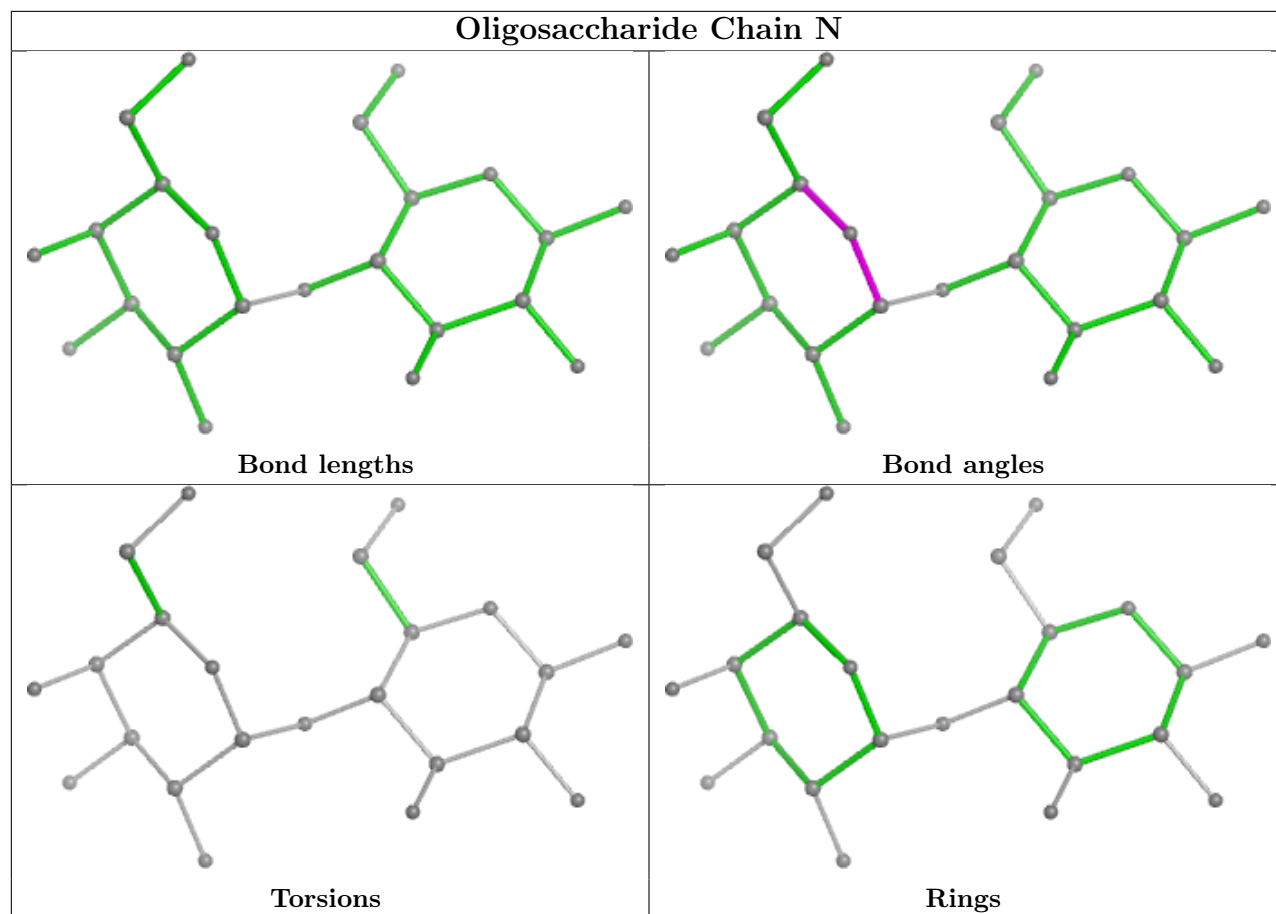


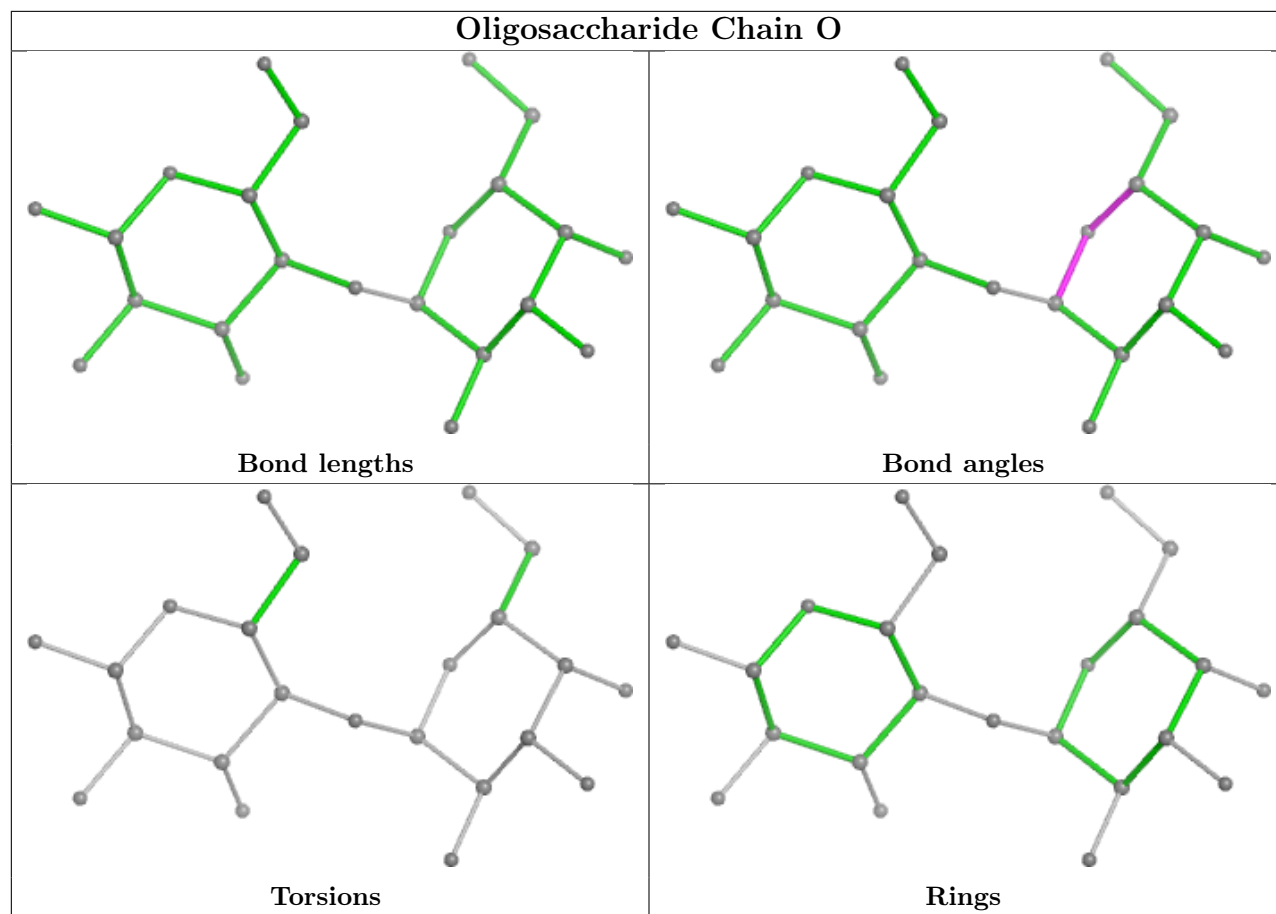
Oligosaccharide Chain K

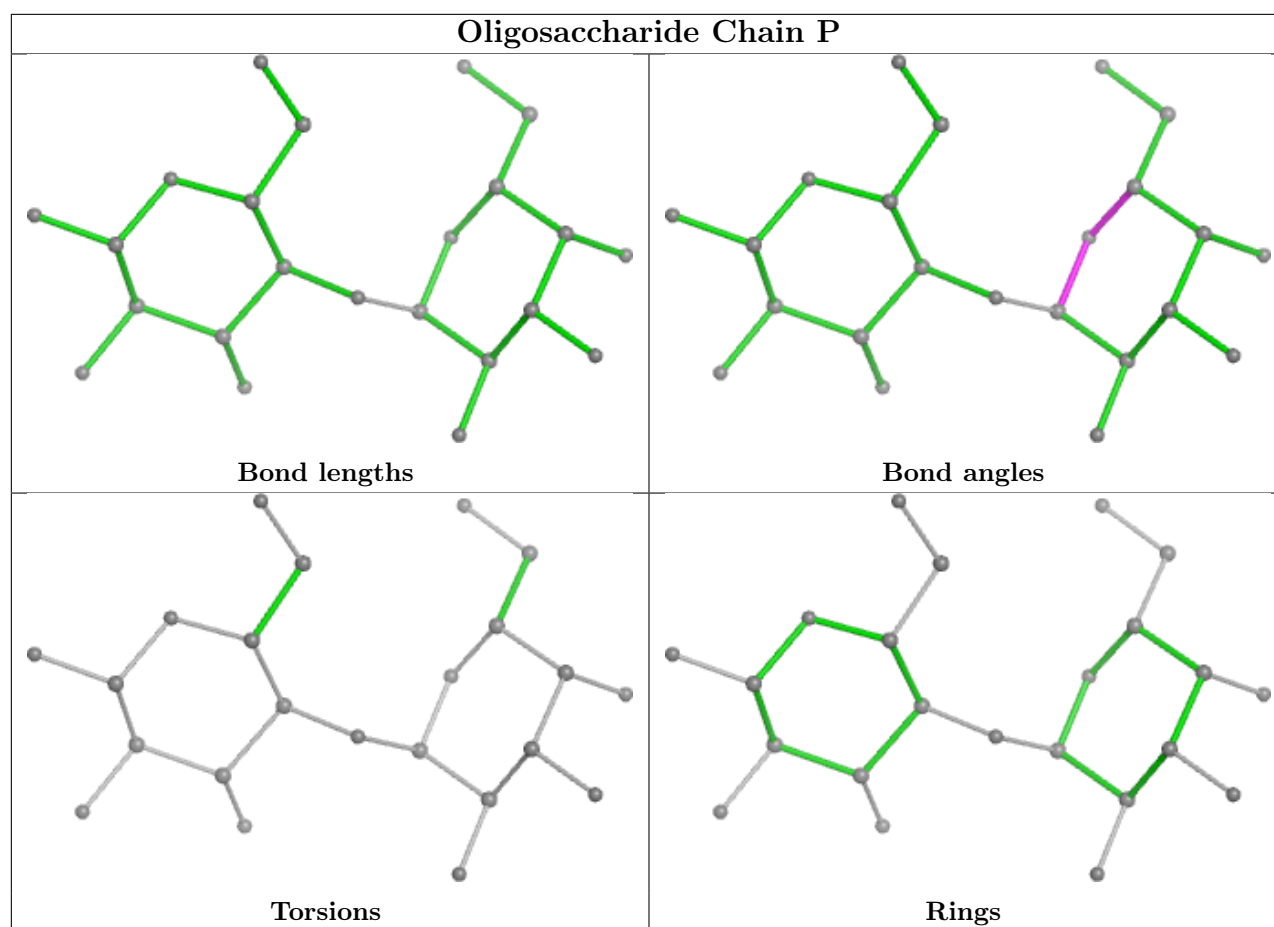












5.6 Ligand geometry [i](#)

23 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	EDO	D	803	-	3,3,3	0.11	0	2,2,2	0.20	0
5	EDO	C	806	-	3,3,3	0.04	0	2,2,2	0.11	0
6	MLI	D	805	-	6,6,6	1.12	0	7,7,7	1.64	1 (14%)
4	NAG	C	802	1	14,14,15	0.51	0	17,19,21	1.20	2 (11%)
5	EDO	D	806	-	3,3,3	0.08	0	2,2,2	0.25	0
4	NAG	A	802	1	14,14,15	0.37	0	17,19,21	1.10	0
4	NAG	C	803	1	14,14,15	0.66	0	17,19,21	1.32	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NAG	D	802	1	14,14,15	0.58	0	17,19,21	1.19	2 (11%)
5	EDO	D	804	-	3,3,3	0.17	0	2,2,2	0.42	0
6	MLI	C	805	-	6,6,6	1.41	0	7,7,7	1.62	2 (28%)
4	NAG	B	802	1	14,14,15	0.55	0	17,19,21	0.97	0
5	EDO	B	804	-	3,3,3	0.15	0	2,2,2	0.24	0
5	EDO	B	803	-	3,3,3	0.07	0	2,2,2	0.36	0
6	MLI	A	805	-	6,6,6	1.28	0	7,7,7	1.39	0
4	NAG	C	801	1	14,14,15	0.58	0	17,19,21	0.94	1 (5%)
4	NAG	A	801	1	14,14,15	0.37	0	17,19,21	1.17	2 (11%)
6	MLI	B	805	-	6,6,6	1.35	0	7,7,7	1.53	1 (14%)
5	EDO	C	804	-	3,3,3	0.09	0	2,2,2	0.11	0
4	NAG	B	801	1	14,14,15	0.46	0	17,19,21	1.17	1 (5%)
4	NAG	D	801	1	14,14,15	0.63	0	17,19,21	0.97	1 (5%)
5	EDO	A	806	-	3,3,3	0.12	0	2,2,2	0.34	0
4	NAG	A	804	1	14,14,15	0.48	0	17,19,21	0.77	0
5	EDO	A	803	-	3,3,3	0.04	0	2,2,2	0.32	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	EDO	D	803	-	-	0/1/1/1	-
5	EDO	C	806	-	-	0/1/1/1	-
6	MLI	D	805	-	-	0/4/4/4	-
4	NAG	C	802	1	-	0/6/23/26	0/1/1/1
5	EDO	D	806	-	-	1/1/1/1	-
4	NAG	A	802	1	-	0/6/23/26	0/1/1/1
4	NAG	C	803	1	-	0/6/23/26	0/1/1/1
4	NAG	D	802	1	-	0/6/23/26	0/1/1/1
5	EDO	D	804	-	-	0/1/1/1	-
6	MLI	C	805	-	-	2/4/4/4	-
4	NAG	B	802	1	-	0/6/23/26	0/1/1/1
5	EDO	B	804	-	-	1/1/1/1	-
5	EDO	B	803	-	-	1/1/1/1	-
6	MLI	A	805	-	-	0/4/4/4	-
4	NAG	C	801	1	-	0/6/23/26	0/1/1/1
4	NAG	A	801	1	-	2/6/23/26	0/1/1/1
6	MLI	B	805	-	-	0/4/4/4	-
5	EDO	C	804	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	B	801	1	-	0/6/23/26	0/1/1/1
4	NAG	D	801	1	-	0/6/23/26	0/1/1/1
5	EDO	A	806	-	-	1/1/1/1	-
4	NAG	A	804	1	-	0/6/23/26	0/1/1/1
5	EDO	A	803	-	-	1/1/1/1	-

There are no bond length outliers.

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	803	NAG	C1-C2-N2	-3.66	104.24	110.49
4	C	802	NAG	O5-C5-C6	3.40	112.53	107.20
4	D	802	NAG	C1-O5-C5	3.28	116.64	112.19
4	A	801	NAG	O5-C5-C6	2.92	111.78	107.20
6	C	805	MLI	O7-C2-C1	2.73	123.25	114.54

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	806	EDO	O1-C1-C2-O2
4	A	801	NAG	C4-C5-C6-O6
4	A	801	NAG	O5-C5-C6-O6
5	A	803	EDO	O1-C1-C2-O2
6	C	805	MLI	C2-C1-C3-O9

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	803	EDO	1	0
5	C	806	EDO	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

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

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

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	615/636 (96%)	0.75	42 (6%) 25 24	44, 63, 89, 112	1 (0%)
1	B	618/636 (97%)	0.19	16 (2%) 57 58	25, 43, 66, 89	3 (0%)
1	C	617/636 (97%)	0.59	29 (4%) 37 37	34, 56, 81, 92	2 (0%)
1	D	618/636 (97%)	0.25	17 (2%) 55 55	30, 47, 69, 85	0
All	All	2468/2544 (97%)	0.45	104 (4%) 41 41	25, 53, 79, 112	6 (0%)

The worst 5 of 104 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	219	ALA	6.2
1	B	169	GLY	4.5
1	A	270	PRO	4.4
1	A	276	ALA	4.3
1	A	169	GLY	4.2

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
2	NAG	H	2	14/15	0.81	0.14	73,81,84,84	0
2	NAG	J	2	14/15	0.81	0.12	77,80,84,84	0

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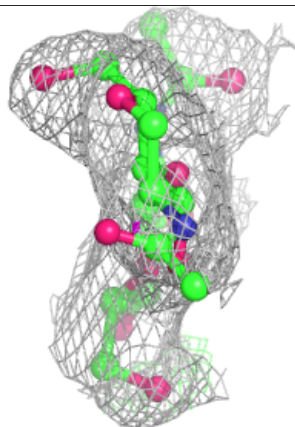
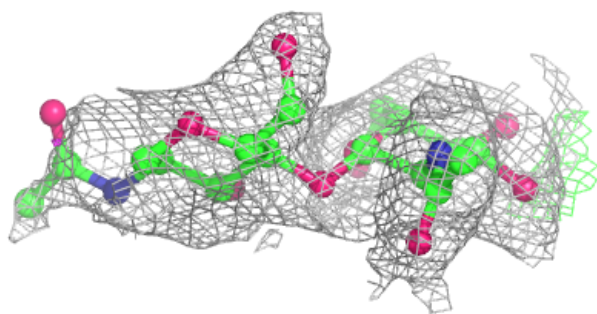
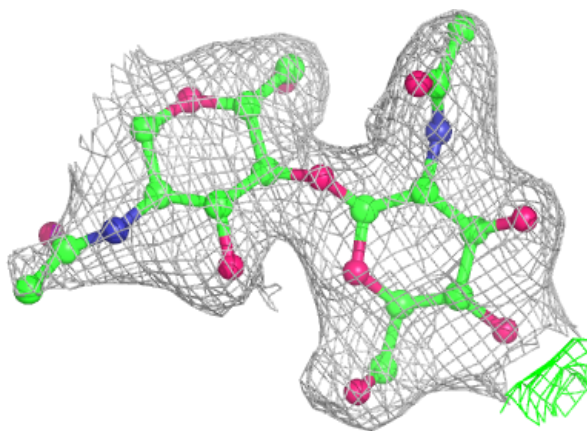
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	NAG	E	2	14/15	0.84	0.10	64,72,76,77	0
2	NAG	L	2	14/15	0.84	0.13	72,77,82,85	0
2	NAG	H	1	14/15	0.85	0.13	68,72,75,75	0
2	NAG	E	1	14/15	0.86	0.12	63,67,72,72	0
2	NAG	J	1	14/15	0.86	0.12	65,66,71,74	0
2	NAG	G	2	14/15	0.87	0.13	69,72,77,79	0
2	NAG	I	2	14/15	0.89	0.09	60,65,68,69	0
2	NAG	K	1	14/15	0.89	0.10	45,47,51,51	0
2	NAG	L	1	14/15	0.89	0.10	59,62,67,69	0
2	NAG	F	2	14/15	0.89	0.09	45,51,57,57	0
2	NAG	I	1	14/15	0.90	0.10	56,59,62,63	0
2	NAG	K	2	14/15	0.90	0.09	43,49,56,56	0
3	BGC	M	1	12/12	0.90	0.09	46,46,49,51	0
3	GLA	M	2	11/12	0.90	0.09	45,46,47,48	0
3	GLA	P	2	11/12	0.91	0.08	34,36,37,37	0
3	BGC	O	1	12/12	0.92	0.07	39,40,42,44	0
2	NAG	G	1	14/15	0.93	0.08	56,59,64,65	0
3	GLA	O	2	11/12	0.93	0.07	38,40,41,44	0
2	NAG	F	1	14/15	0.93	0.09	45,47,54,55	0
3	GLA	N	2	11/12	0.94	0.08	32,33,35,36	0
3	BGC	N	1	12/12	0.94	0.06	32,33,35,35	0
3	BGC	P	1	12/12	0.95	0.07	33,34,38,41	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.

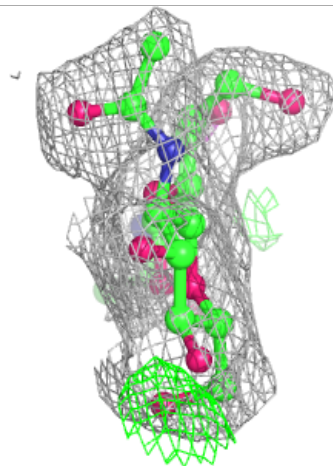
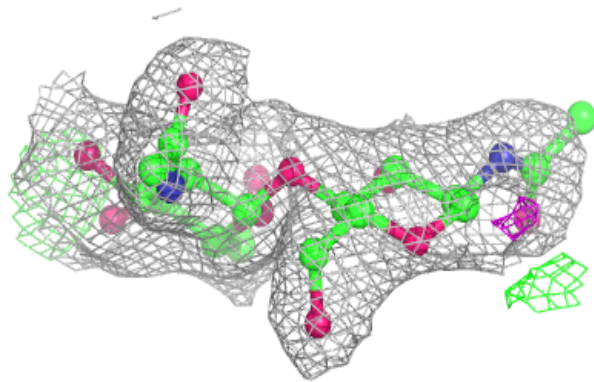
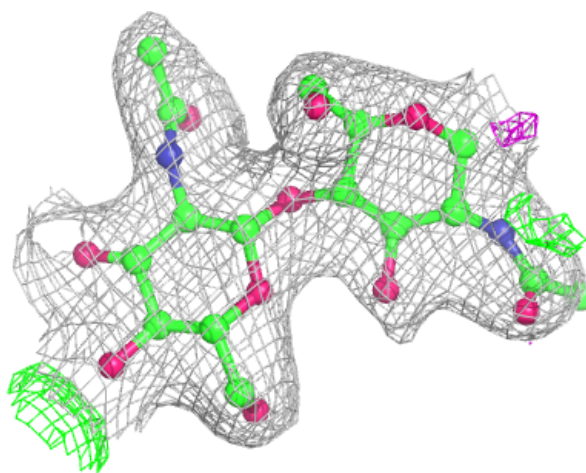
Electron density around Chain E:

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



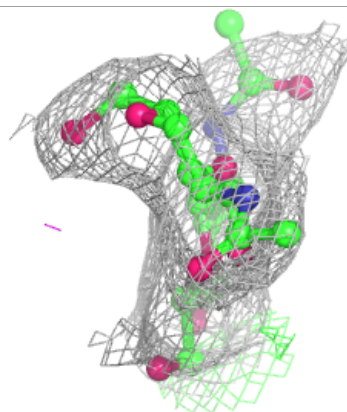
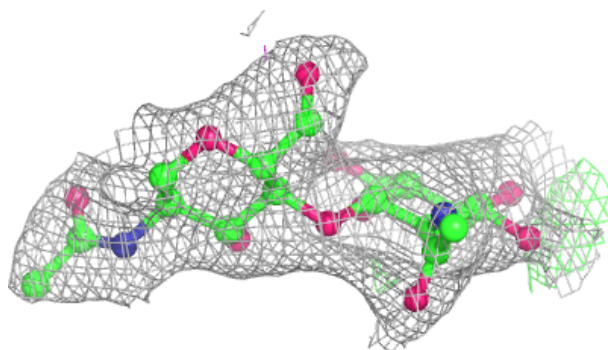
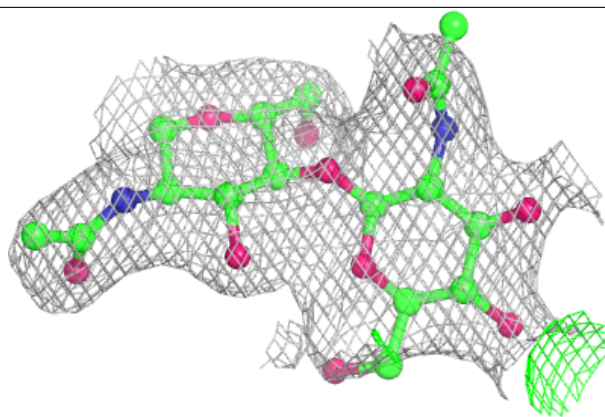
Electron density around Chain F:

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



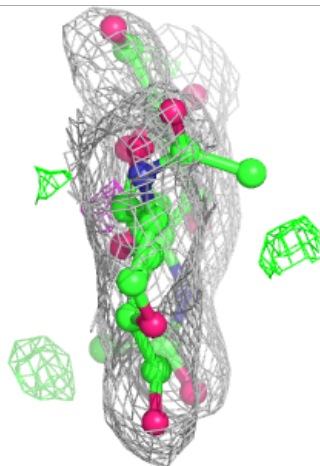
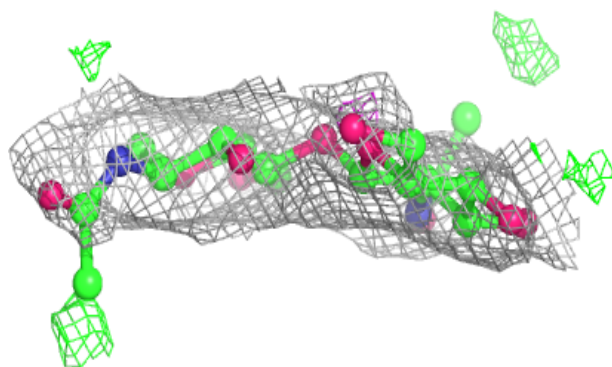
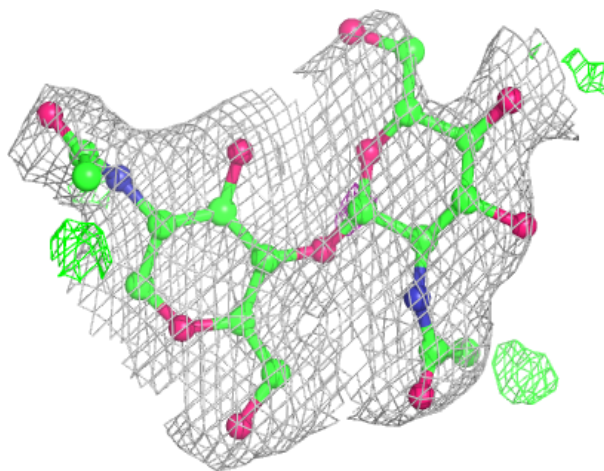
Electron density around Chain G:

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



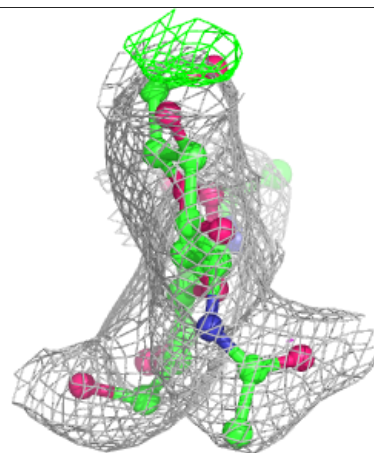
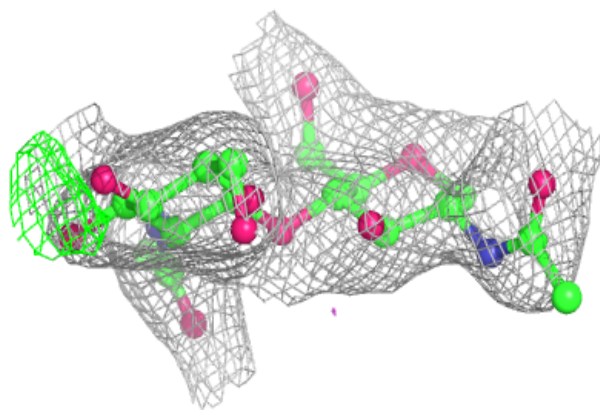
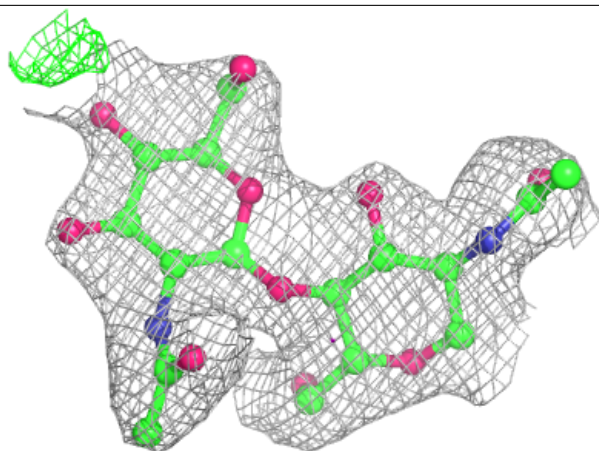
Electron density around Chain H:

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



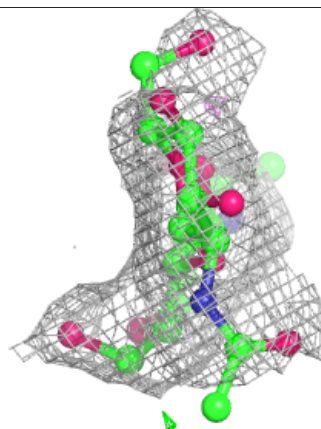
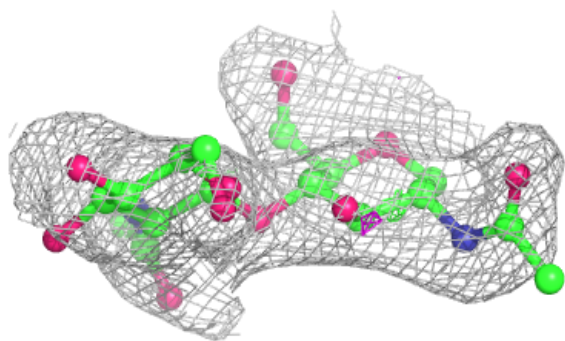
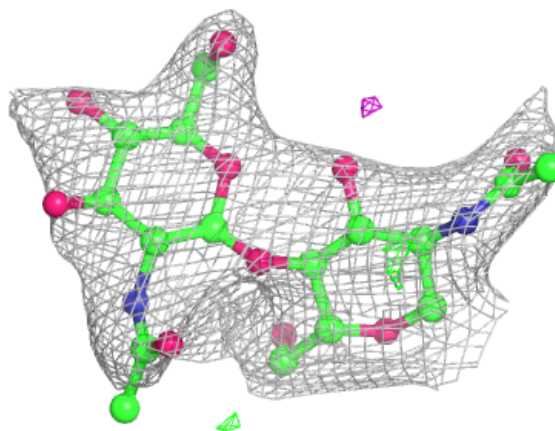
Electron density around Chain I:

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



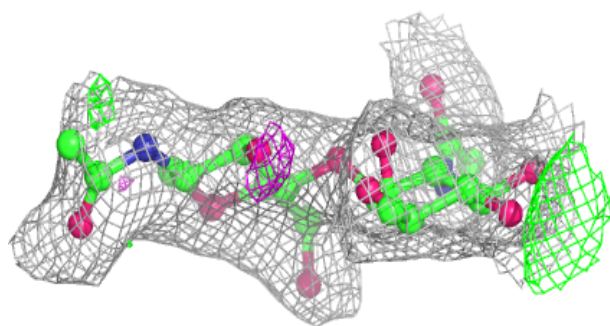
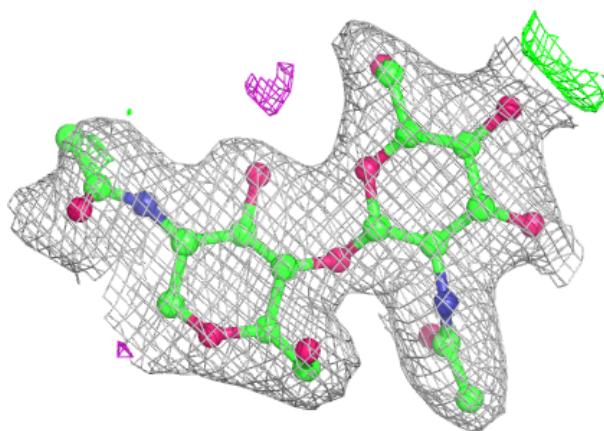
Electron density around Chain J:

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



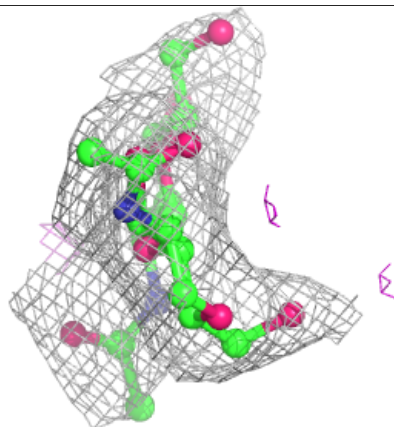
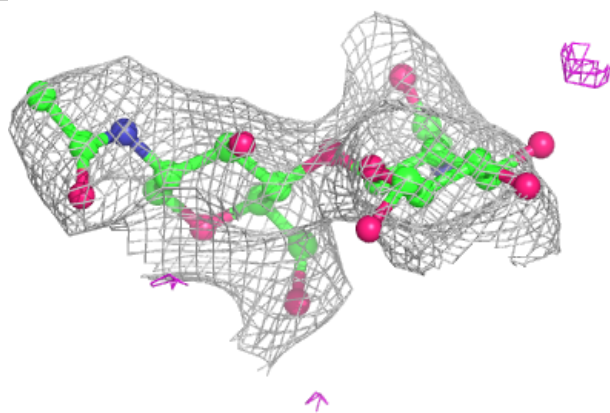
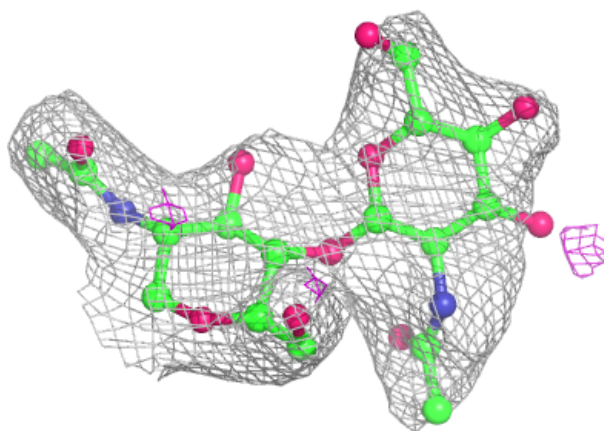
Electron density around Chain K:

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



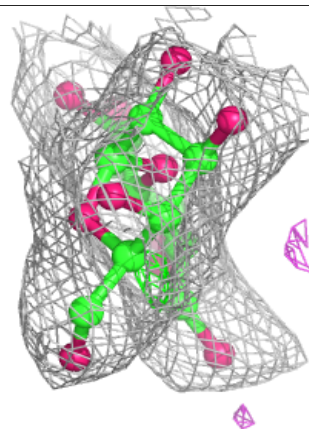
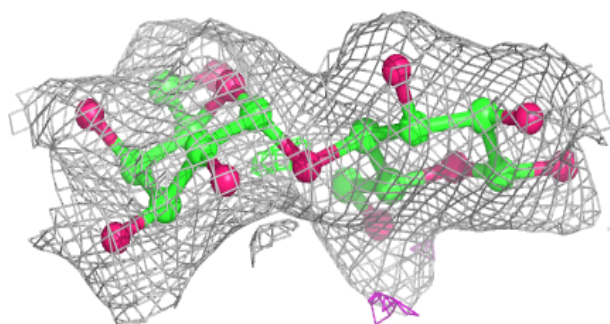
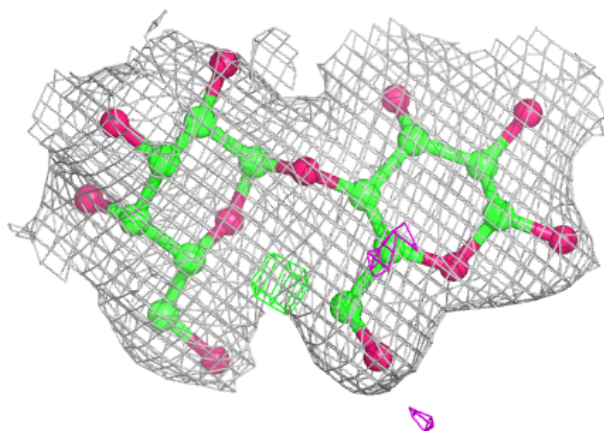
Electron density around Chain L:

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



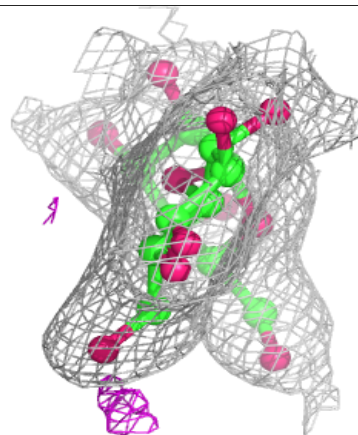
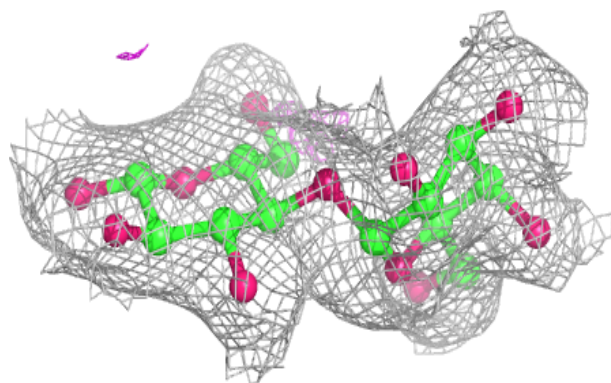
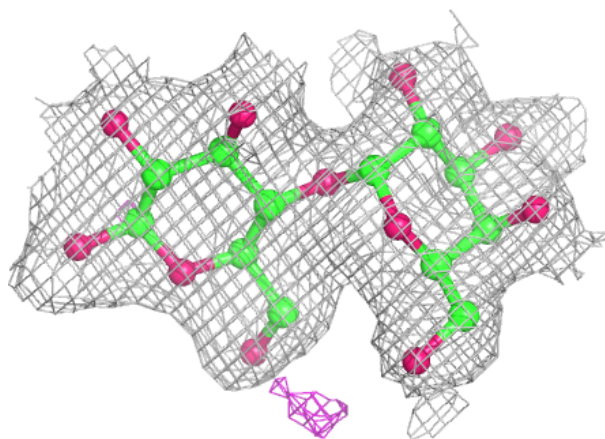
Electron density around Chain M:

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



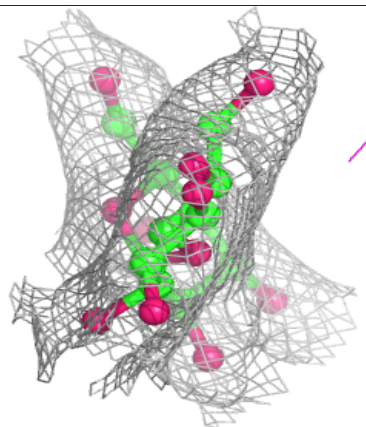
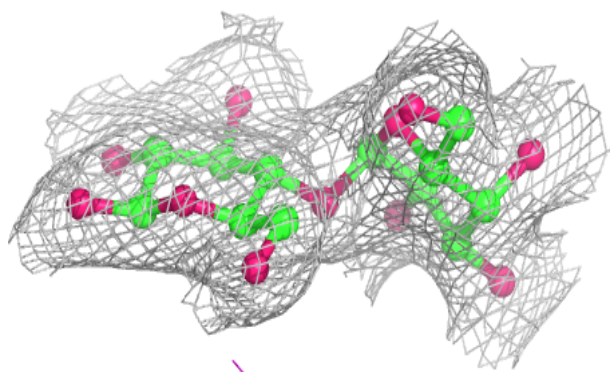
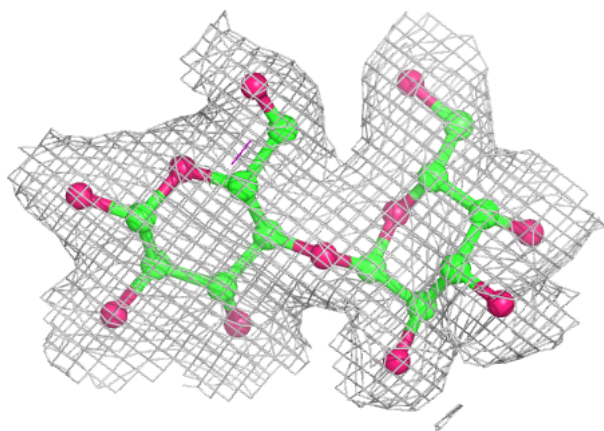
Electron density around Chain N:

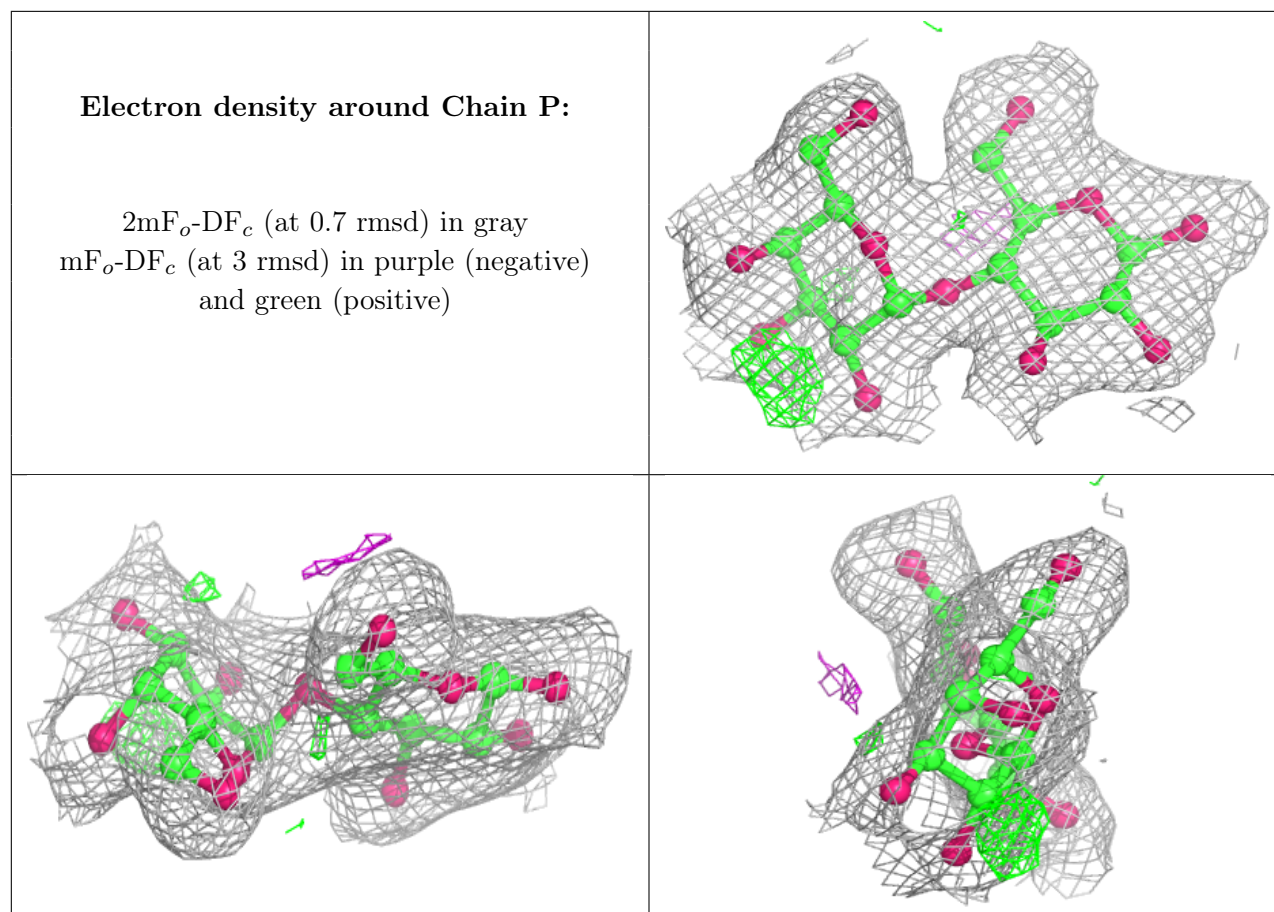
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



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)





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	803	14/15	0.70	0.18	70,75,82,83	0
4	NAG	A	804	14/15	0.77	0.14	83,86,89,92	0
4	NAG	A	801	14/15	0.81	0.14	70,71,75,77	0
4	NAG	D	802	14/15	0.81	0.12	64,66,69,70	0
6	MLI	A	805	7/7	0.82	0.12	71,72,74,74	0
4	NAG	C	802	14/15	0.83	0.12	70,72,74,75	0
4	NAG	A	802	14/15	0.84	0.12	72,75,78,78	0
5	EDO	D	804	4/4	0.85	0.16	53,54,54,55	0
4	NAG	B	802	14/15	0.85	0.12	56,58,61,61	0
6	MLI	C	805	7/7	0.85	0.13	56,58,59,61	0
5	EDO	A	806	4/4	0.86	0.20	82,83,83,84	0
4	NAG	C	801	14/15	0.88	0.10	59,60,63,64	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	EDO	D	803	4/4	0.90	0.19	61,61,61,62	0
4	NAG	B	801	14/15	0.91	0.09	46,48,53,54	0
6	MLI	B	805	7/7	0.91	0.09	41,42,46,46	0
5	EDO	C	806	4/4	0.91	0.15	67,67,67,68	0
5	EDO	A	803	4/4	0.92	0.10	43,45,45,46	0
4	NAG	D	801	14/15	0.92	0.08	47,49,51,53	0
6	MLI	D	805	7/7	0.92	0.08	41,42,45,48	0
5	EDO	B	803	4/4	0.96	0.10	53,54,54,55	0
5	EDO	D	806	4/4	0.96	0.07	33,33,34,34	0
5	EDO	C	804	4/4	0.96	0.08	41,41,41,41	0
5	EDO	B	804	4/4	0.98	0.06	30,32,32,32	0

6.5 Other polymers [i](#)

There are no such residues in this entry.