



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 17, 2022 – 02:13 PM EDT

PDB ID : 5SZR
Title : Protocadherin Gamma B2 extracellular cadherin domains 3-6
Authors : Goodman, K.M.; Mannepalli, S.; Bahna, F.; Rubinstein, R.; Honig, B.; Shapiro, L.
Deposited on : 2016-08-14
Resolution : 2.30 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.27
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)	:	2.27

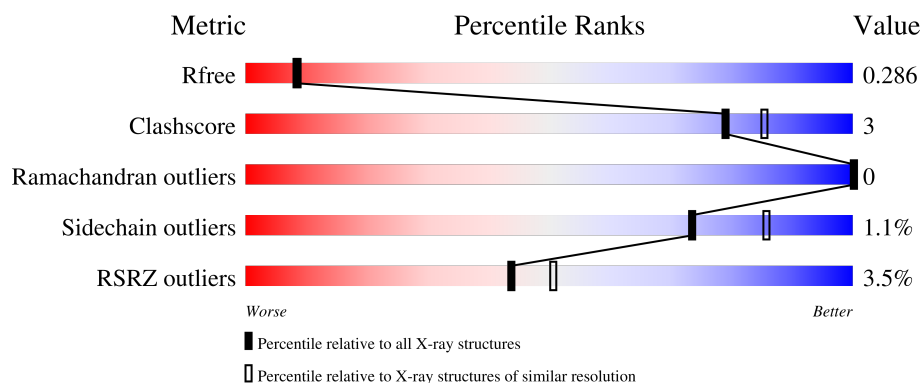
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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.






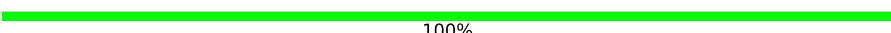
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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	441	<div> <div>0%</div> <div>89%</div> <div>7%</div> <div>.</div> </div>
1	B	441	<div> <div>3%</div> <div>86%</div> <div>9%</div> <div>.</div> </div>
1	C	441	<div> <div>6%</div> <div>87%</div> <div>7%</div> <div>6%</div> </div>
2	D	4	<div> <div>25%</div> <div>50%</div> <div>25%</div> </div>
2	F	4	<div> <div>50%</div> <div>50%</div> </div>

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Mol	Chain	Length	Quality of chain
3	E	2	 50% 50%
3	G	2	 100%
3	I	2	 50% 50%
4	H	3	 100%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	FUC	G	2	-	-	-	X

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 10333 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 Protein Pcdhgb2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	424	Total	C	N	O	S	0	2	0
			3222	2017	554	645	6			
1	B	422	Total	C	N	O	S	0	1	0
			3205	2007	550	642	6			
1	C	415	Total	C	N	O	S	0	0	0
			3144	1967	539	632	6			

There are 24 discrepancies between the modelled and reference sequences:

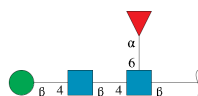
Chain	Residue	Modelled	Actual	Comment	Reference
A	641	HIS	-	expression tag	UNP Q91XX7
A	642	HIS	-	expression tag	UNP Q91XX7
A	643	HIS	-	expression tag	UNP Q91XX7
A	644	HIS	-	expression tag	UNP Q91XX7
A	645	HIS	-	expression tag	UNP Q91XX7
A	646	HIS	-	expression tag	UNP Q91XX7
A	647	HIS	-	expression tag	UNP Q91XX7
A	648	HIS	-	expression tag	UNP Q91XX7
B	641	HIS	-	expression tag	UNP Q91XX7
B	642	HIS	-	expression tag	UNP Q91XX7
B	643	HIS	-	expression tag	UNP Q91XX7
B	644	HIS	-	expression tag	UNP Q91XX7
B	645	HIS	-	expression tag	UNP Q91XX7
B	646	HIS	-	expression tag	UNP Q91XX7
B	647	HIS	-	expression tag	UNP Q91XX7
B	648	HIS	-	expression tag	UNP Q91XX7
C	641	HIS	-	expression tag	UNP Q91XX7
C	642	HIS	-	expression tag	UNP Q91XX7
C	643	HIS	-	expression tag	UNP Q91XX7
C	644	HIS	-	expression tag	UNP Q91XX7
C	645	HIS	-	expression tag	UNP Q91XX7
C	646	HIS	-	expression tag	UNP Q91XX7
C	647	HIS	-	expression tag	UNP Q91XX7

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Chain	Residue	Modelled	Actual	Comment	Reference
C	648	HIS	-	expression tag	UNP Q91XX7

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



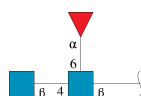
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	D	4	Total	C	N	O	0	0	0
			49	28	2	19			
2	F	4	Total	C	N	O	0	0	0
			49	28	2	19			

- Molecule 3 is an oligosaccharide called alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	E	2	Total	C	N	O	0	0	0
			24	14	1	9			
3	G	2	Total	C	N	O	0	0	0
			24	14	1	9			
3	I	2	Total	C	N	O	0	0	0
			24	14	1	9			

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

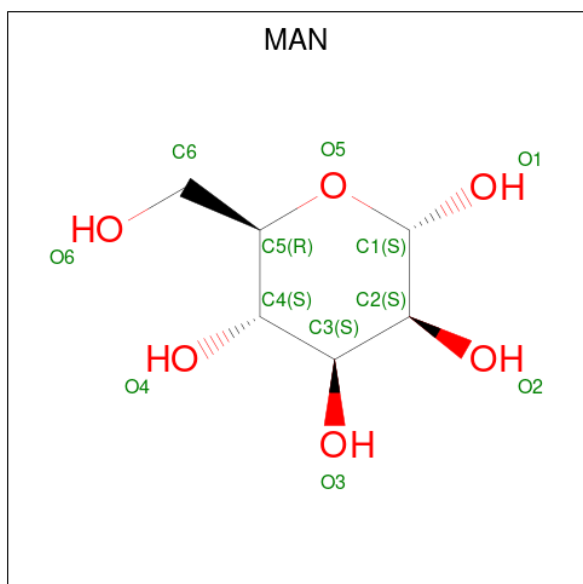


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	H	3	Total	C	N	O	0	0	0
			38	22	2	14			

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	9	Total	Ca	0	0
			9	9		
5	B	9	Total	Ca	0	0
			9	9		
5	C	9	Total	Ca	0	0
			9	9		

- Molecule 6 is alpha-D-mannopyranose (three-letter code: MAN) (formula: C₆H₁₂O₆).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			11	6	5		
6	A	1	Total	C	O	0	0
			11	6	5		
6	A	1	Total	C	O	0	0
			11	6	5		
6	A	1	Total	C	O	0	0
			11	6	5		
6	A	1	Total	C	O	0	0
			11	6	5		
6	A	1	Total	C	O	0	0
			11	6	5		
6	B	1	Total	C	O	0	0
			11	6	5		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	C	O	0	0
			11	6	5		
6	B	1	Total	C	O	0	0
			11	6	5		
6	B	1	Total	C	O	0	0
			11	6	5		
6	B	1	Total	C	O	0	0
			11	6	5		
6	B	1	Total	C	O	0	0
			11	6	5		
6	C	1	Total	C	O	0	0
			11	6	5		
6	C	1	Total	C	O	0	0
			11	6	5		
6	C	1	Total	C	O	0	0
			11	6	5		
6	C	1	Total	C	O	0	0
			11	6	5		
6	C	1	Total	C	O	0	0
			11	6	5		
6	C	1	Total	C	O	0	0
			11	6	5		

- Molecule 7 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			4	2	2		
7	A	1	Total	C	O	0	0
			4	2	2		
7	A	1	Total	C	O	0	0
			4	2	2		
7	A	1	Total	C	O	0	0
			4	2	2		
7	C	1	Total	C	O	0	0
			4	2	2		

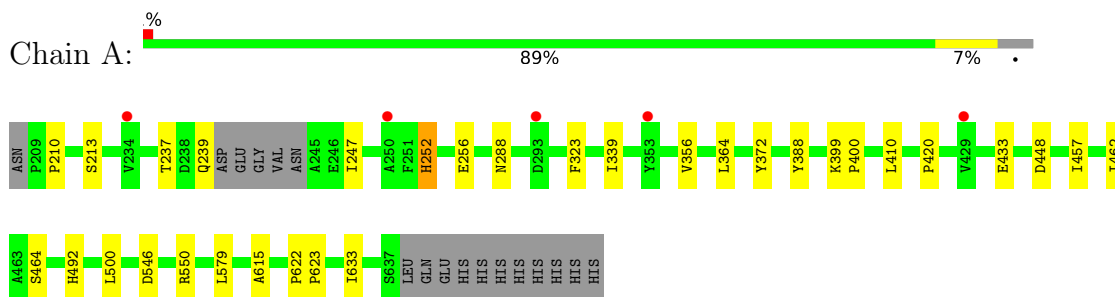
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	114	Total	O	0	0
			114	114		
8	B	82	Total	O	0	0
			82	82		
8	C	80	Total	O	0	0
			80	80		

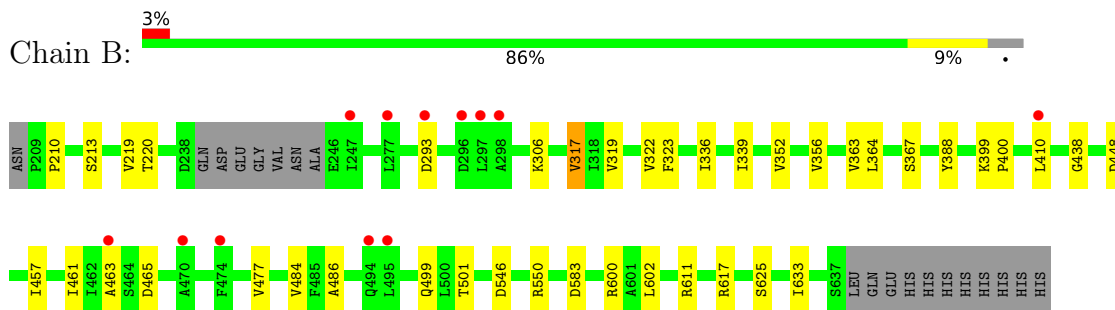
3 Residue-property plots

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.

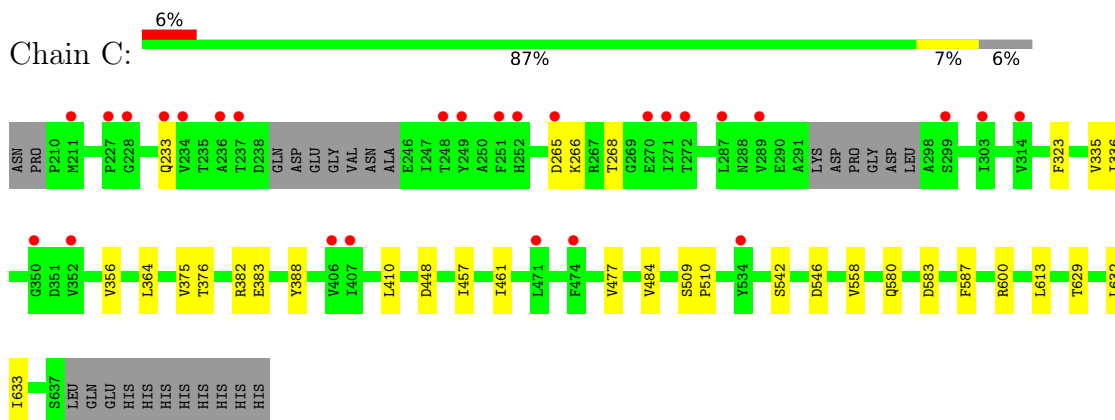
• Molecule 1: Protein Pcdhgb2



• Molecule 1: Protein Pcdhgb2



• Molecule 1: Protein Pcdhgb2



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

Chain D:  25% 50% 25%




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

Chain F:  50% 50%



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

Chain E:  50% 50%



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

Chain G:  100%



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

Chain I:  50% 50%



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

Chain H:  100%



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	104.75Å 104.75Å 352.14Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.95 – 2.30 39.08 – 2.30	Depositor EDS
% Data completeness (in resolution range)	98.2 (19.95-2.30) 83.2 (39.08-2.30)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.92 (at 2.29Å)	Xtrriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, R_{free}	0.250 , 0.278 0.254 , 0.286	Depositor DCC
R_{free} test set	4348 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	38.3	Xtrriage
Anisotropy	0.843	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 36.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	10333	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 60.90 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.4198e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: EDO, MAN, BMA, NAG, FUC, CA

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	0.27	0/3292	0.48	0/4497
1	B	0.26	0/3272	0.47	0/4470
1	C	0.25	0/3205	0.46	0/4378
All	All	0.26	0/9769	0.47	0/13345

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3222	0	3112	18	0
1	B	3205	0	3092	18	0
1	C	3144	0	3020	17	0
2	D	49	0	43	1	0
2	F	49	0	43	0	0
3	E	24	0	22	1	0
3	G	24	0	22	1	0
3	I	24	0	22	0	0
4	H	38	0	34	0	0
5	A	9	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	9	0	0	0	0
5	C	9	0	0	0	0
6	A	77	0	70	0	0
6	B	77	0	70	1	0
6	C	77	0	70	0	0
7	A	16	0	24	1	0
7	C	4	0	6	0	0
8	A	114	0	0	1	0
8	B	82	0	0	0	0
8	C	80	0	0	0	0
All	All	10333	0	9650	55	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 55 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:C:477:VAL:HG12	1:C:484:VAL:HG22	1.77	0.67
1:B:477:VAL:HG12	1:B:484:VAL:HG22	1.77	0.66
1:A:388:TYR:HB2	1:A:410:LEU:HB2	1.78	0.65
1:C:336:ILE:HD11	1:C:376:THR:HG23	1.79	0.64
1:B:388:TYR:HB2	1:B:410:LEU:HB2	1.80	0.63

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	422/441 (96%)	410 (97%)	12 (3%)	0	100	100
1	B	419/441 (95%)	407 (97%)	12 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	409/441 (93%)	401 (98%)	8 (2%)	0	100	100
All	All	1250/1323 (94%)	1218 (97%)	32 (3%)	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	357/380 (94%)	354 (99%)	3 (1%)	81	91
1	B	355/380 (93%)	347 (98%)	8 (2%)	50	67
1	C	348/380 (92%)	347 (100%)	1 (0%)	92	97
All	All	1060/1140 (93%)	1048 (99%)	12 (1%)	73	86

5 of 12 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	323	PHE
1	B	352	VAL
1	C	323	PHE
1	B	363	VAL
1	B	213	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 ⓘ

17 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	0.45	0	17,19,21	0.53	0
2	NAG	D	2	2	14,14,15	0.78	2 (14%)	17,19,21	0.91	1 (5%)
2	BMA	D	3	2	11,11,12	0.82	1 (9%)	15,15,17	1.58	3 (20%)
2	FUC	D	4	2	10,10,11	0.75	0	14,14,16	0.75	0
3	NAG	E	1	1,3	14,14,15	0.58	1 (7%)	17,19,21	0.40	0
3	FUC	E	2	3	10,10,11	1.16	2 (20%)	14,14,16	1.41	2 (14%)
2	NAG	F	1	1,2	14,14,15	0.22	0	17,19,21	0.55	0
2	NAG	F	2	2	14,14,15	0.80	1 (7%)	17,19,21	0.77	1 (5%)
2	BMA	F	3	2	11,11,12	0.75	0	15,15,17	1.21	1 (6%)
2	FUC	F	4	2	10,10,11	0.83	0	14,14,16	0.82	0
3	NAG	G	1	1,3	14,14,15	0.50	0	17,19,21	1.18	1 (5%)
3	FUC	G	2	3	10,10,11	2.08	3 (30%)	14,14,16	1.77	4 (28%)
4	NAG	H	1	4,1	14,14,15	0.40	0	17,19,21	0.54	0
4	NAG	H	2	4	14,14,15	0.27	0	17,19,21	0.34	0
4	FUC	H	3	4	10,10,11	0.94	0	14,14,16	0.99	0
3	NAG	I	1	1,3	14,14,15	0.51	0	17,19,21	0.67	0
3	FUC	I	2	3	10,10,11	1.47	1 (10%)	14,14,16	1.10	1 (7%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	D	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	2	2	-	4/6/23/26	0/1/1/1
2	BMA	D	3	2	-	2/2/19/22	0/1/1/1
2	FUC	D	4	2	-	-	0/1/1/1
3	NAG	E	1	1,3	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	FUC	E	2	3	-	-	0/1/1/1
2	NAG	F	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	2	2	-	2/6/23/26	0/1/1/1
2	BMA	F	3	2	-	0/2/19/22	0/1/1/1
2	FUC	F	4	2	-	-	0/1/1/1
3	NAG	G	1	1,3	-	1/6/23/26	0/1/1/1
3	FUC	G	2	3	-	-	0/1/1/1
4	NAG	H	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	H	2	4	-	2/6/23/26	0/1/1/1
4	FUC	H	3	4	-	-	0/1/1/1
3	NAG	I	1	1,3	-	0/6/23/26	0/1/1/1
3	FUC	I	2	3	-	-	0/1/1/1

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	2	FUC	C1-C2	4.90	1.63	1.52
3	I	2	FUC	O5-C1	-3.31	1.38	1.43
3	G	2	FUC	C2-C3	3.15	1.57	1.52
3	E	2	FUC	O5-C5	2.74	1.49	1.43
2	F	2	NAG	C1-C2	2.44	1.56	1.52

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	2	FUC	C1-C2-C3	4.38	115.04	109.67
2	D	3	BMA	C1-O5-C5	4.01	117.62	112.19
3	E	2	FUC	C1-O5-C5	3.59	120.91	112.78
3	G	1	NAG	C1-O5-C5	3.55	117.00	112.19
3	G	2	FUC	C1-O5-C5	3.49	120.68	112.78

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

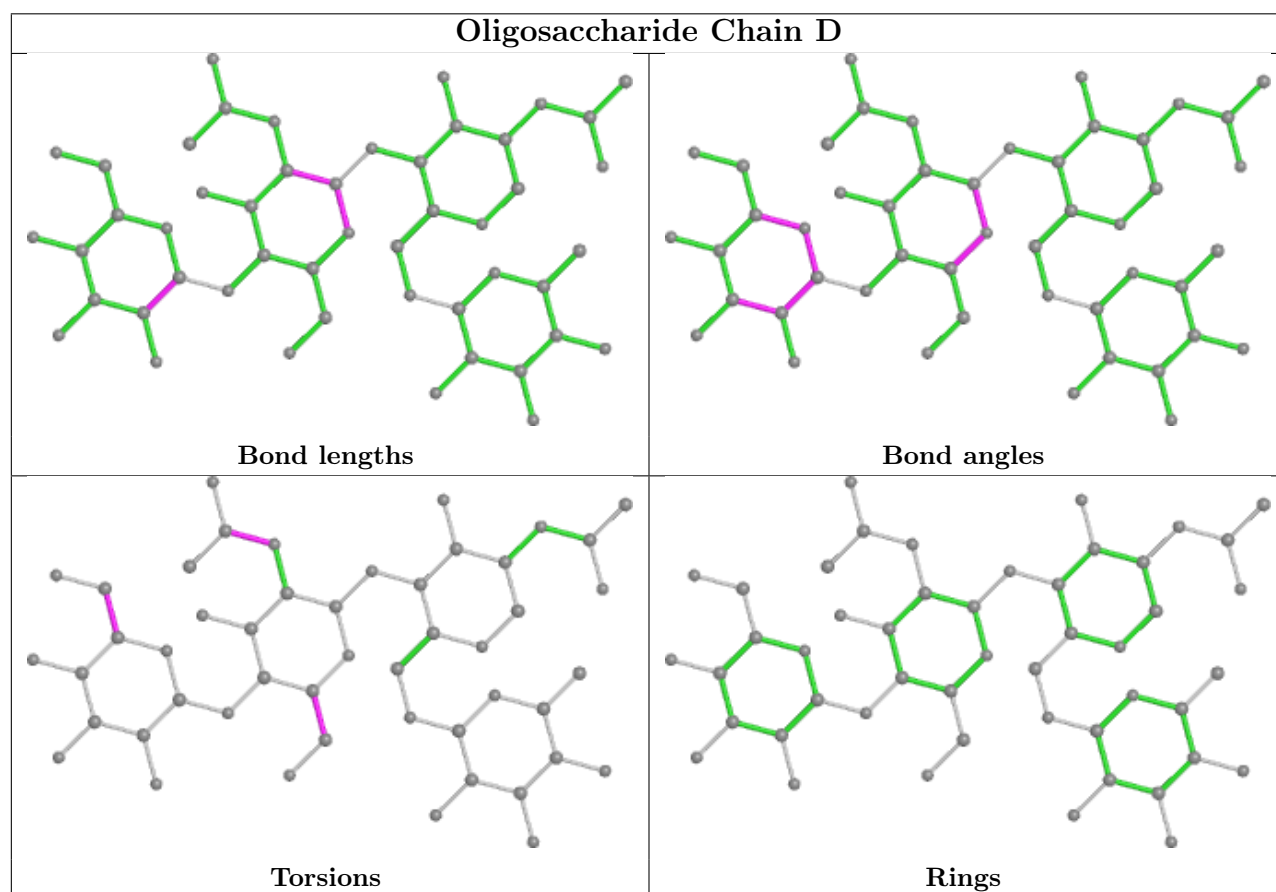
Mol	Chain	Res	Type	Atoms
3	E	1	NAG	C4-C5-C6-O6
2	D	2	NAG	O5-C5-C6-O6
4	H	2	NAG	O5-C5-C6-O6
2	D	3	BMA	O5-C5-C6-O6
3	E	1	NAG	O5-C5-C6-O6

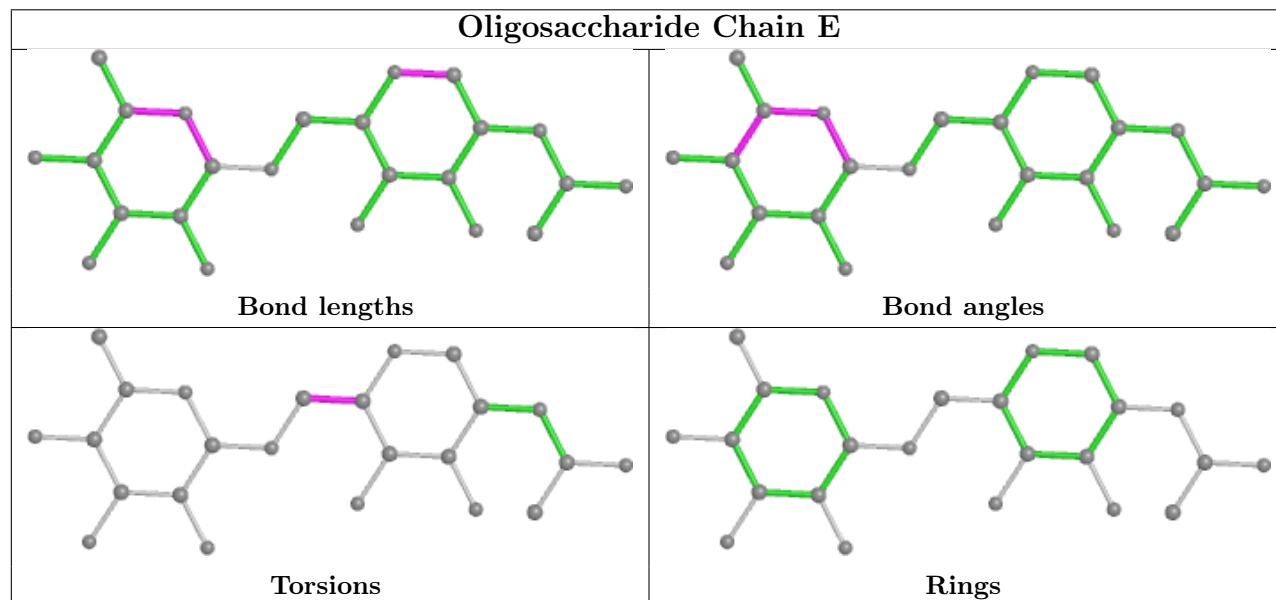
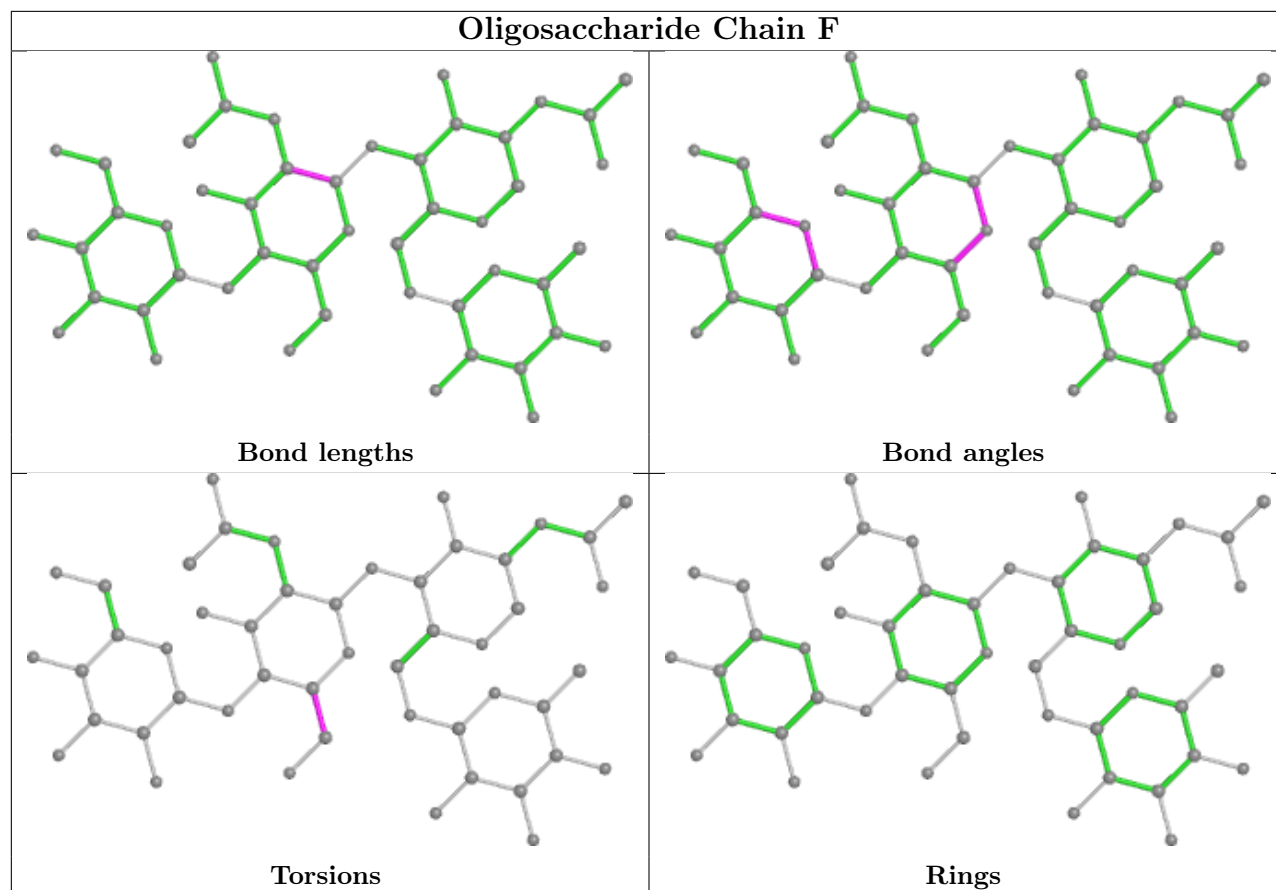
There are no ring outliers.

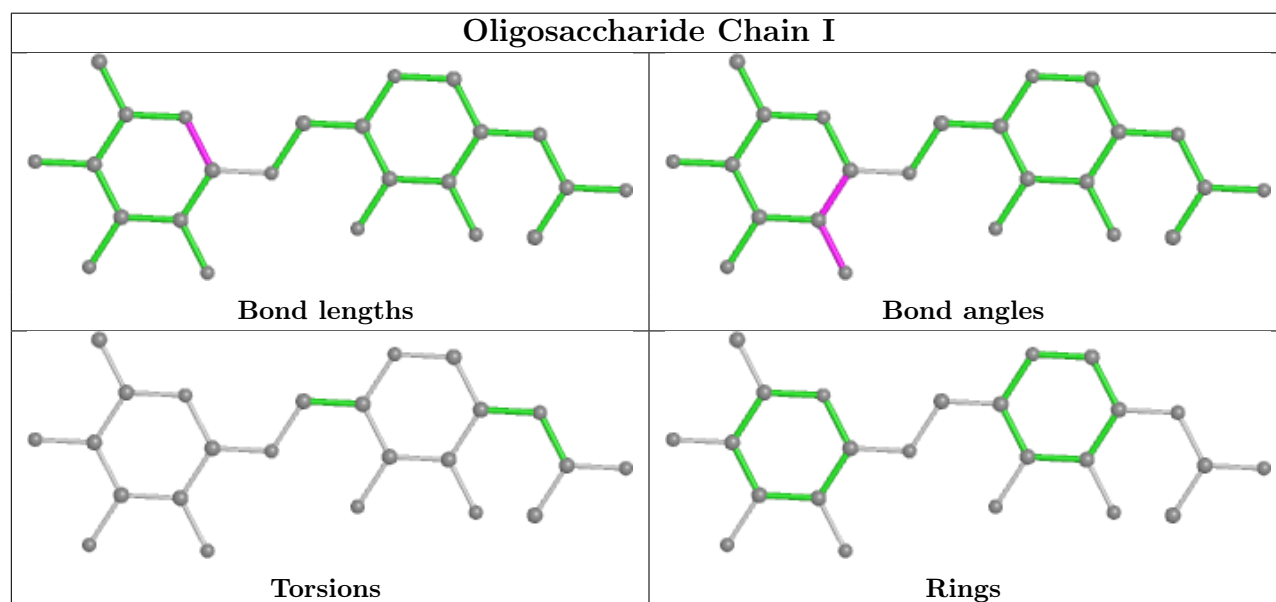
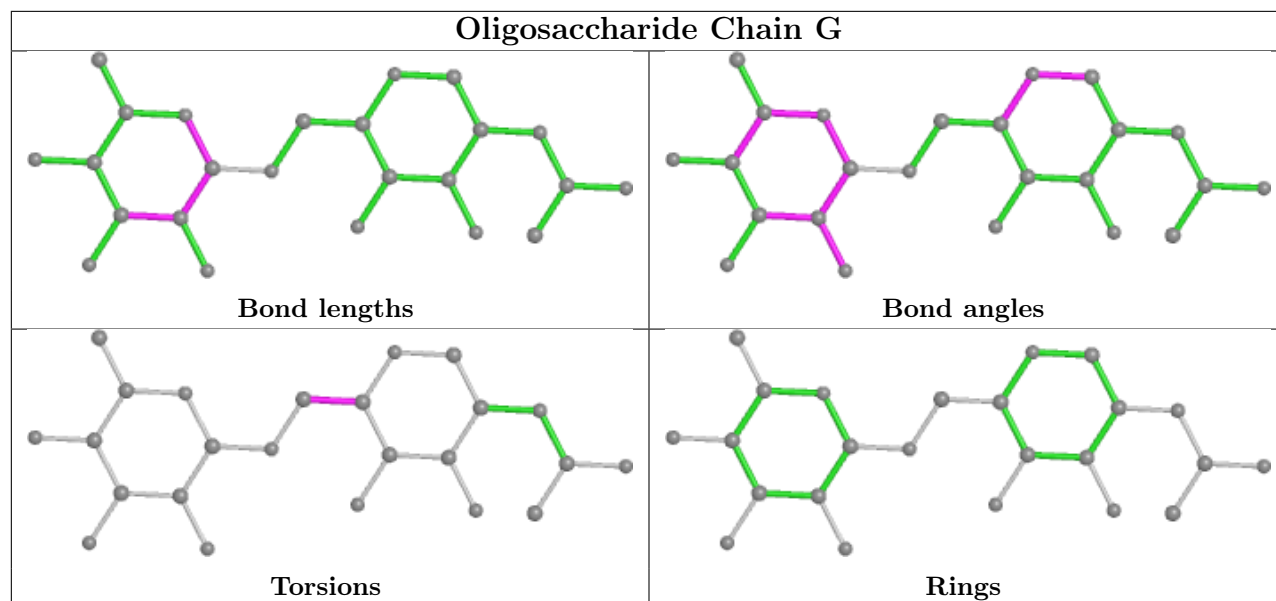
5 monomers are involved in 3 short contacts:

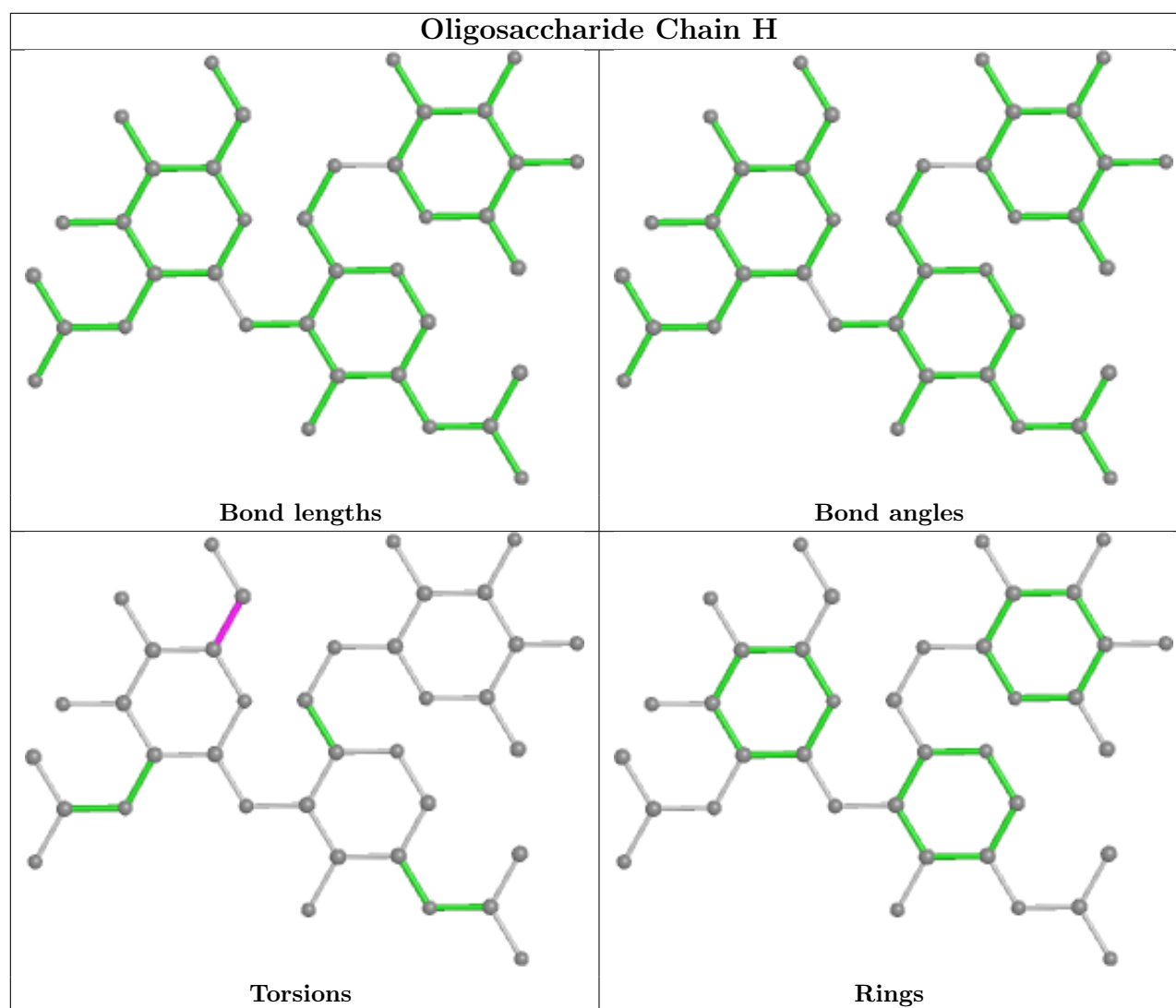
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	1	NAG	1	0
3	G	2	FUC	1	0
3	G	1	NAG	1	0
2	D	2	NAG	1	0
3	E	1	NAG	1	0

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](#)

Of 53 ligands modelled in this entry, 27 are monoatomic - leaving 26 for Mogul analysis.

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	$\# Z > 2$
6	MAN	C	717	1	11,11,12	0.77	0	15,15,17	0.98	2 (13%)
6	MAN	C	719	1	11,11,12	0.69	0	15,15,17	1.27	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	MAN	A	719	1	11,11,12	0.64	0	15,15,17	1.05	2 (13%)
6	MAN	C	721	1	11,11,12	0.74	0	15,15,17	1.05	1 (6%)
6	MAN	A	720	1	11,11,12	0.73	0	15,15,17	1.23	1 (6%)
6	MAN	B	718	1	11,11,12	0.76	0	15,15,17	1.05	2 (13%)
6	MAN	B	720	1	11,11,12	0.88	0	15,15,17	1.06	1 (6%)
6	MAN	B	719	1	11,11,12	0.70	0	15,15,17	1.05	2 (13%)
7	EDO	C	722	-	3,3,3	0.45	0	2,2,2	0.34	0
6	MAN	A	722	1	11,11,12	0.65	0	15,15,17	1.07	2 (13%)
6	MAN	B	721	1	11,11,12	0.77	0	15,15,17	1.16	2 (13%)
6	MAN	B	717	1	11,11,12	0.73	0	15,15,17	1.24	2 (13%)
6	MAN	A	716	1	11,11,12	0.77	0	15,15,17	1.04	1 (6%)
7	EDO	A	726	-	3,3,3	0.44	0	2,2,2	0.33	0
6	MAN	A	718	1	11,11,12	0.66	0	15,15,17	1.09	2 (13%)
6	MAN	A	721	1	11,11,12	0.72	0	15,15,17	1.11	2 (13%)
6	MAN	C	716	1	11,11,12	0.80	0	15,15,17	1.09	2 (13%)
7	EDO	A	723	-	3,3,3	0.47	0	2,2,2	0.31	0
7	EDO	A	725	-	3,3,3	0.45	0	2,2,2	0.36	0
7	EDO	A	724	-	3,3,3	0.46	0	2,2,2	0.33	0
6	MAN	A	717	1	11,11,12	0.83	1 (9%)	15,15,17	1.05	2 (13%)
6	MAN	C	715	1	11,11,12	0.80	0	15,15,17	1.32	3 (20%)
6	MAN	B	722	1	11,11,12	0.81	0	15,15,17	0.97	2 (13%)
6	MAN	C	720	1	11,11,12	0.94	0	15,15,17	1.06	1 (6%)
6	MAN	B	716	1	11,11,12	0.92	0	15,15,17	1.00	0
6	MAN	C	718	1	11,11,12	0.69	0	15,15,17	1.02	2 (13%)

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
6	MAN	C	717	1	-	1/2/19/22	0/1/1/1
6	MAN	C	719	1	-	0/2/19/22	0/1/1/1
6	MAN	A	719	1	-	0/2/19/22	0/1/1/1
6	MAN	C	721	1	-	2/2/19/22	0/1/1/1
6	MAN	A	720	1	-	0/2/19/22	0/1/1/1
6	MAN	B	718	1	-	0/2/19/22	0/1/1/1
6	MAN	B	720	1	-	2/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	MAN	B	719	1	-	1/2/19/22	0/1/1/1
7	EDO	C	722	-	-	0/1/1/1	-
6	MAN	A	722	1	-	0/2/19/22	0/1/1/1
6	MAN	B	721	1	-	1/2/19/22	0/1/1/1
6	MAN	B	717	1	-	0/2/19/22	0/1/1/1
6	MAN	A	716	1	-	1/2/19/22	0/1/1/1
7	EDO	A	726	-	-	0/1/1/1	-
6	MAN	A	718	1	-	1/2/19/22	0/1/1/1
6	MAN	A	721	1	-	2/2/19/22	0/1/1/1
6	MAN	C	716	1	-	1/2/19/22	0/1/1/1
7	EDO	A	723	-	-	1/1/1/1	-
7	EDO	A	725	-	-	0/1/1/1	-
7	EDO	A	724	-	-	0/1/1/1	-
6	MAN	A	717	1	-	0/2/19/22	0/1/1/1
6	MAN	C	715	1	-	2/2/19/22	0/1/1/1
6	MAN	B	722	1	-	0/2/19/22	0/1/1/1
6	MAN	C	720	1	-	0/2/19/22	0/1/1/1
6	MAN	B	716	1	-	1/2/19/22	0/1/1/1
6	MAN	C	718	1	-	0/2/19/22	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	717	MAN	O5-C1	-2.07	1.40	1.43

The worst 5 of 35 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	C	719	MAN	C1-O5-C5	3.90	117.48	112.19
6	A	720	MAN	C1-O5-C5	3.75	117.27	112.19
6	C	715	MAN	C1-O5-C5	3.52	116.96	112.19
6	B	717	MAN	C1-O5-C5	3.17	116.48	112.19
6	C	716	MAN	C1-O5-C5	2.85	116.05	112.19

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	720	MAN	O5-C5-C6-O6
6	A	721	MAN	O5-C5-C6-O6
6	B	720	MAN	C4-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
6	C	715	MAN	O5-C5-C6-O6
6	A	721	MAN	C4-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	720	MAN	1	0
7	A	726	EDO	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 [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	424/441 (96%)	0.15	5 (1%) 79 83	44, 64, 104, 161	0
1	B	422/441 (95%)	0.20	12 (2%) 53 60	48, 72, 114, 171	0
1	C	415/441 (94%)	0.39	27 (6%) 18 24	46, 67, 131, 169	0
All	All	1261/1323 (95%)	0.24	44 (3%) 44 51	44, 68, 121, 171	0

The worst 5 of 44 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	234	VAL	6.5
1	C	271	ILE	5.3
1	C	289	VAL	5.2
1	C	236	ALA	5.1
1	B	296	ASP	5.0

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	BMA	F	3	11/12	0.64	0.25	118,119,120,120	0
3	FUC	E	2	10/11	0.65	0.28	109,112,114,116	0
3	FUC	I	2	10/11	0.71	0.34	109,112,115,115	0

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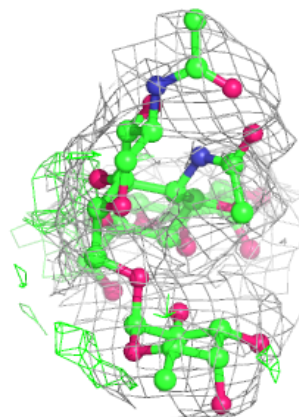
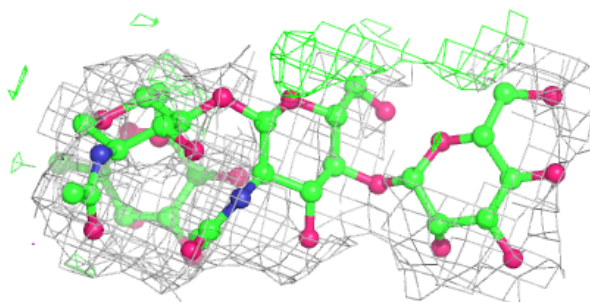
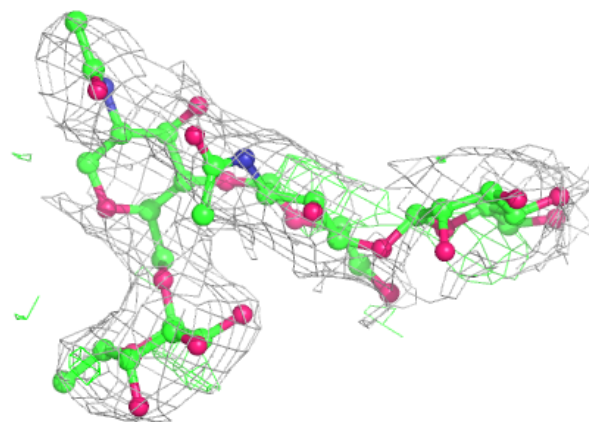
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	FUC	G	2	10/11	0.76	0.43	108,111,113,115	0
2	NAG	D	2	14/15	0.79	0.18	99,106,109,112	0
4	FUC	H	3	10/11	0.80	0.24	98,100,100,101	0
2	NAG	F	1	14/15	0.81	0.25	78,85,99,100	0
3	NAG	E	1	14/15	0.83	0.32	72,82,97,104	0
2	NAG	D	1	14/15	0.84	0.19	66,75,92,93	0
3	NAG	I	1	14/15	0.84	0.29	76,84,96,103	0
2	BMA	D	3	11/12	0.85	0.20	114,115,116,116	0
2	FUC	F	4	10/11	0.86	0.25	105,108,109,110	0
4	NAG	H	2	14/15	0.86	0.19	97,102,105,106	0
3	NAG	G	1	14/15	0.86	0.27	77,84,96,102	0
2	NAG	F	2	14/15	0.87	0.23	105,109,111,115	0
4	NAG	H	1	14/15	0.88	0.22	70,77,92,93	0
2	FUC	D	4	10/11	0.89	0.21	97,100,101,102	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.

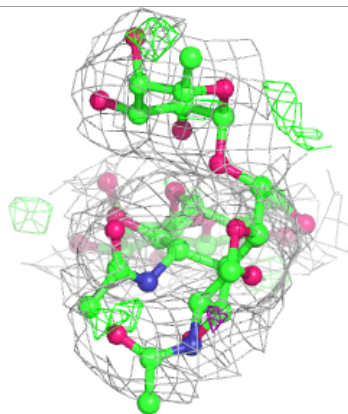
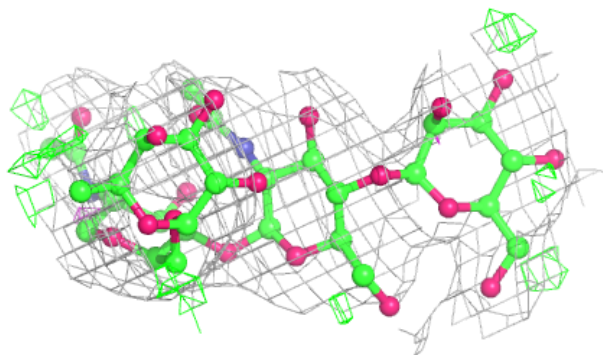
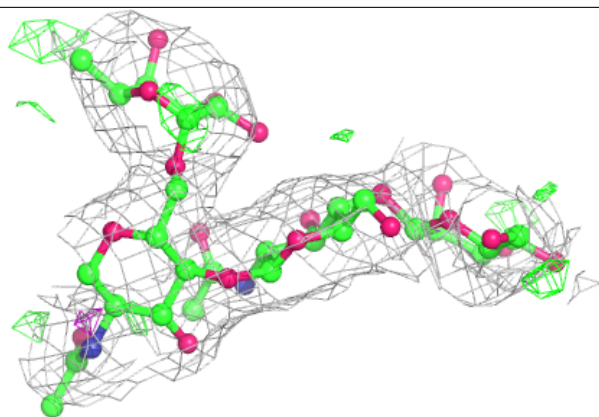
Electron density around Chain D:

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



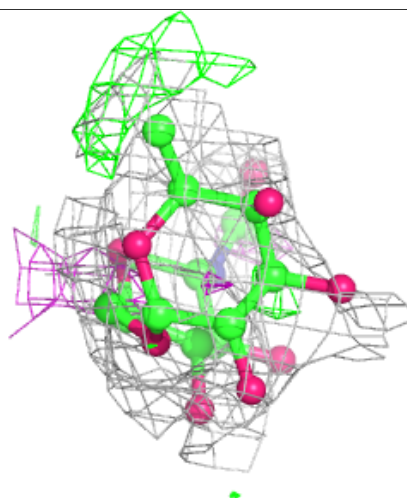
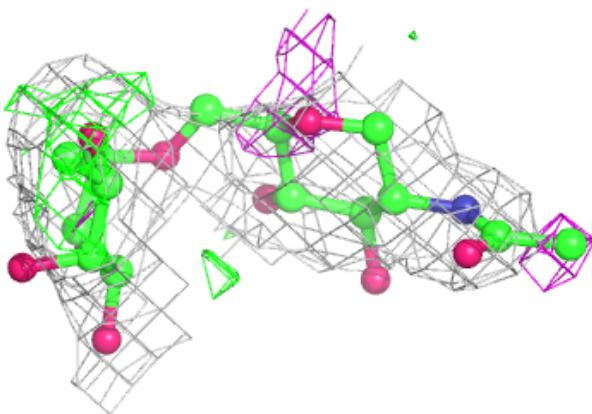
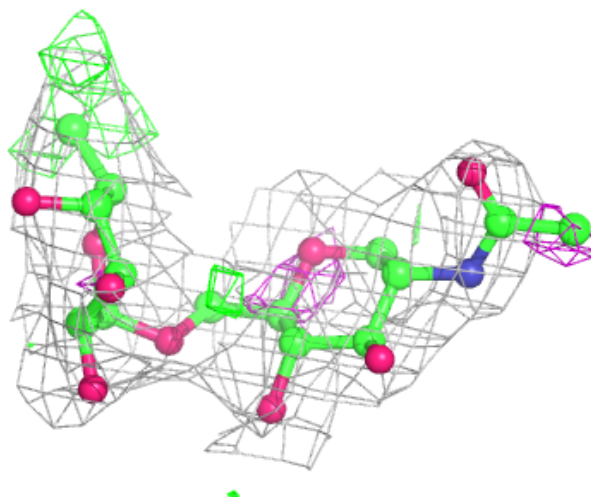
Electron density around Chain F:

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



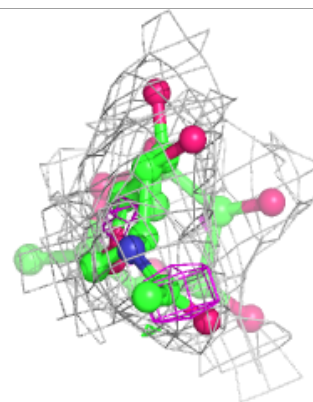
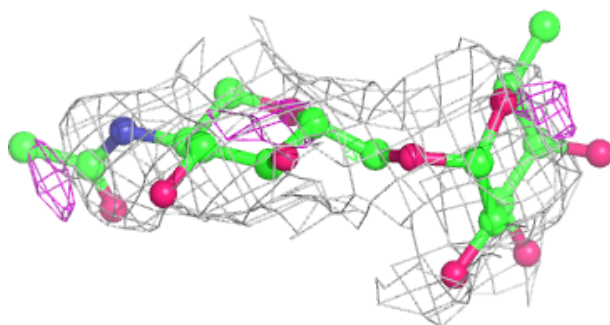
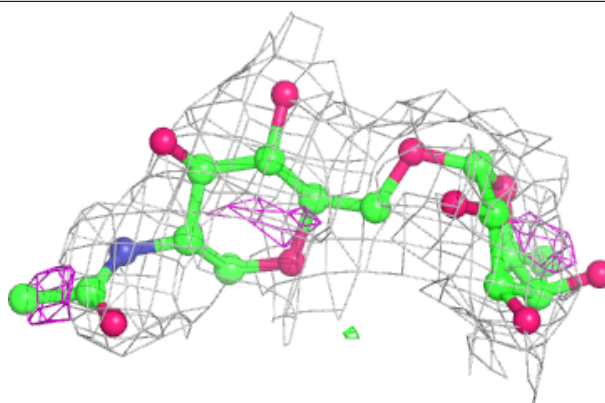
Electron density around Chain E:

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

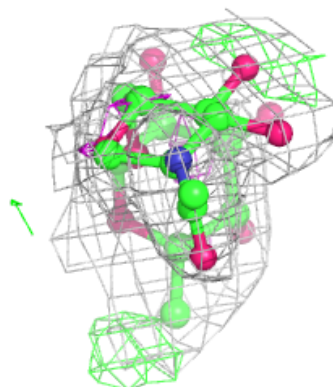
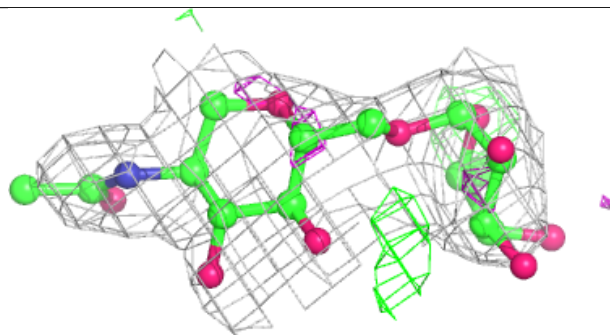
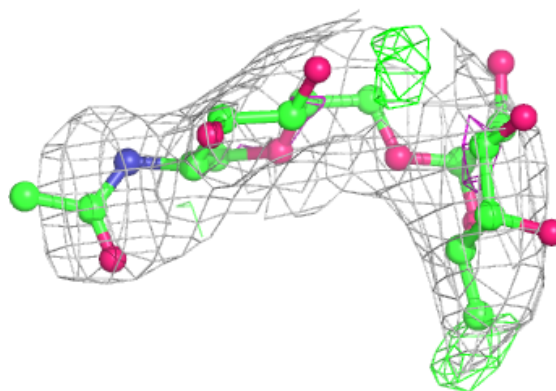


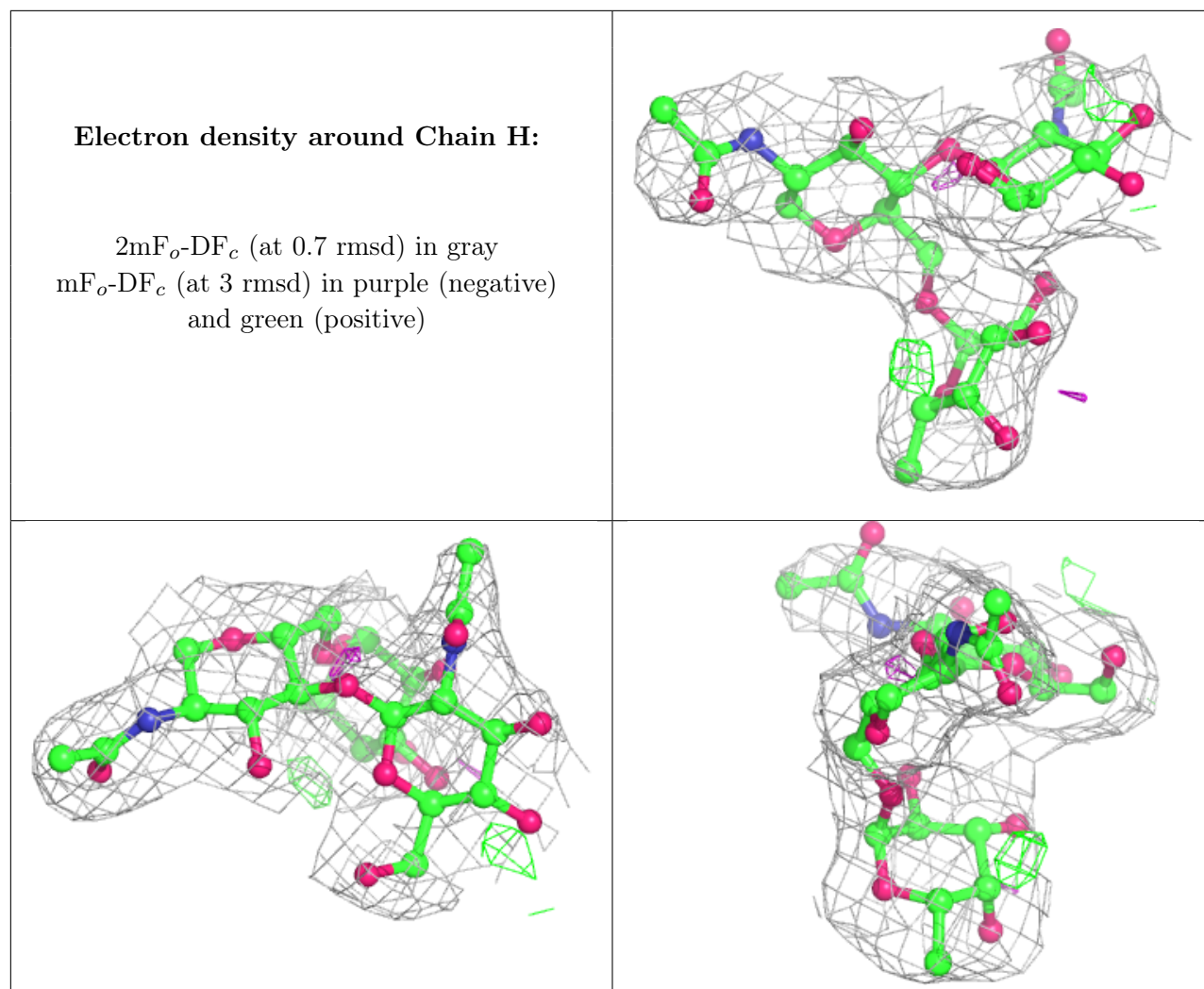
Electron density around Chain G:

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

**Electron density around Chain 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(\AA^2)	Q<0.9
7	EDO	A	723	4/4	0.79	0.38	62,64,66,67	0
7	EDO	A	726	4/4	0.81	0.33	76,78,82,84	0
6	MAN	B	721	11/12	0.83	0.15	76,85,89,91	0
6	MAN	C	719	11/12	0.83	0.35	65,73,76,77	0
6	MAN	A	717	11/12	0.86	0.18	60,70,75,77	0
7	EDO	A	725	4/4	0.86	0.21	73,73,75,77	0
6	MAN	A	721	11/12	0.86	0.15	71,81,87,93	0
6	MAN	C	715	11/12	0.87	0.34	72,79,82,83	0
6	MAN	C	721	11/12	0.88	0.25	68,76,80,82	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
7	EDO	C	722	4/4	0.88	0.27	76,76,78,80	0
6	MAN	C	720	11/12	0.89	0.17	73,80,83,83	0
6	MAN	A	722	11/12	0.90	0.20	61,70,74,77	0
6	MAN	B	716	11/12	0.90	0.26	70,74,78,80	0
6	MAN	B	720	11/12	0.90	0.18	58,68,75,77	0
6	MAN	A	716	11/12	0.90	0.17	70,78,82,84	0
6	MAN	B	722	11/12	0.91	0.30	69,78,82,86	0
5	CA	B	708	1/1	0.91	0.12	68,68,68,68	0
7	EDO	A	724	4/4	0.91	0.17	72,73,73,73	4
5	CA	B	707	1/1	0.92	0.09	64,64,64,64	0
6	MAN	B	719	11/12	0.92	0.24	65,71,78,81	0
6	MAN	A	720	11/12	0.92	0.23	55,63,70,75	0
6	MAN	C	716	11/12	0.92	0.13	53,61,64,68	0
5	CA	C	706	1/1	0.93	0.09	81,81,81,81	0
5	CA	B	711	1/1	0.94	0.16	63,63,63,63	0
5	CA	A	712	1/1	0.94	0.12	47,47,47,47	0
6	MAN	A	718	11/12	0.94	0.08	47,53,58,58	0
6	MAN	A	719	11/12	0.94	0.17	59,68,71,72	0
6	MAN	C	717	11/12	0.94	0.10	52,59,61,62	0
6	MAN	C	718	11/12	0.94	0.14	65,69,74,74	0
5	CA	C	707	1/1	0.94	0.07	74,74,74,74	0
5	CA	C	714	1/1	0.95	0.15	51,51,51,51	0
5	CA	A	708	1/1	0.95	0.12	62,62,62,62	0
5	CA	B	713	1/1	0.95	0.09	68,68,68,68	0
6	MAN	B	718	11/12	0.95	0.11	50,59,62,63	0
5	CA	C	712	1/1	0.96	0.12	55,55,55,55	0
5	CA	C	713	1/1	0.96	0.16	52,52,52,52	0
5	CA	A	709	1/1	0.96	0.08	63,63,63,63	0
5	CA	A	707	1/1	0.96	0.10	61,61,61,61	0
5	CA	A	713	1/1	0.97	0.13	50,50,50,50	0
5	CA	C	708	1/1	0.97	0.04	75,75,75,75	0
5	CA	B	712	1/1	0.97	0.12	60,60,60,60	0
5	CA	A	715	1/1	0.97	0.16	43,43,43,43	0
5	CA	B	714	1/1	0.97	0.11	55,55,55,55	0
5	CA	B	715	1/1	0.97	0.23	66,66,66,66	0
6	MAN	B	717	11/12	0.97	0.12	66,73,76,77	0
5	CA	B	709	1/1	0.97	0.07	69,69,69,69	0
5	CA	C	711	1/1	0.98	0.07	54,54,54,54	0
5	CA	B	710	1/1	0.98	0.13	61,61,61,61	0
5	CA	A	710	1/1	0.98	0.16	54,54,54,54	0
5	CA	A	714	1/1	0.98	0.20	52,52,52,52	0
5	CA	C	710	1/1	0.98	0.15	55,55,55,55	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	CA	C	709	1/1	0.99	0.12	59,59,59,59	0
5	CA	A	711	1/1	0.99	0.20	56,56,56,56	0

6.5 Other polymers [i](#)

There are no such residues in this entry.