



wwPDB X-ray Structure Validation Summary Report ⓘ

May 27, 2024 – 09:19 PM EDT

PDB ID : 6MF0
Title : Crystal Structure Determination of Human/Porcine Chimera Coagulation Factor VIII
Authors : Smith, I.W.; Spiegel, P.C.
Deposited on : 2018-09-07
Resolution : 3.20 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36.2
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

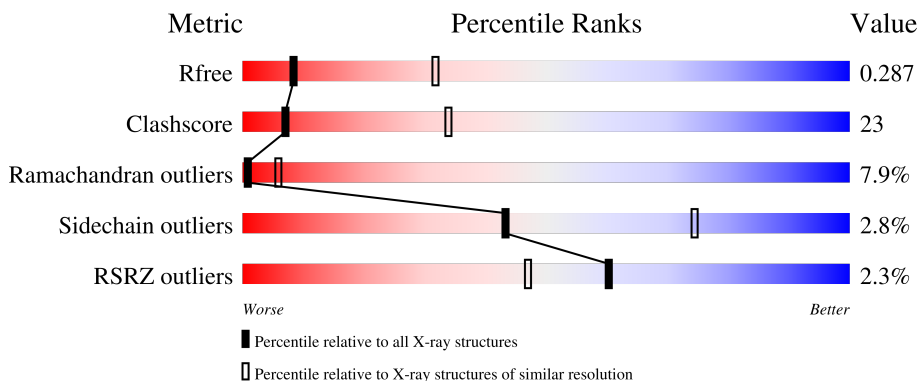
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 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.



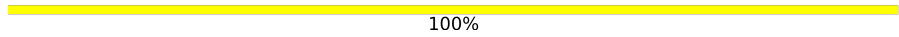
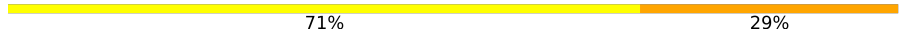

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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	1467	
1	B	1467	
2	C	5	
2	E	5	
2	F	5	

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Mol	Chain	Length	Quality of chain
3	D	3	 100%
4	G	7	 71%
5	H	6	 50%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NAG	C	2	-	-	-	X
2	BMA	C	3	-	-	-	X
2	MAN	C	4	-	-	-	X
2	MAN	C	5	-	-	-	X
2	BMA	F	3	-	-	-	X
2	MAN	F	4	-	-	-	X
2	MAN	F	5	-	-	-	X
3	BMA	D	3	-	-	-	X
4	FUC	G	7	-	-	-	X
5	MAN	H	5	-	-	-	X

2 Entry composition [i](#)

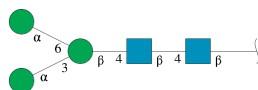
There are 9 unique types of molecules in this entry. The entry contains 20622 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Coagulation factor VIII chimera.

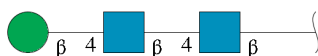
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1256	10147	6520	1738	1837	52	0	0	0
1	B	1247	10084	6476	1729	1827	52	0	0	0

- Molecule 2 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



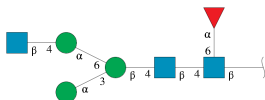
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	5	61	34	2	25	0	0	0
2	E	5	61	34	2	25	0	0	0
2	F	5	61	34	2	25	0	0	0

- 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.



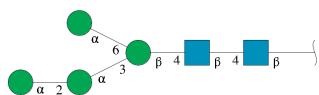
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	D	3	39	22	2	15	0	0	0

- Molecule 4 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]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
			Total	C	N	O			
4	G	7	85	48	3	34	0	0	0

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
5	H	6	72	40	2	30	0	0	0

- Molecule 6 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Ca	0	0
			1	1		
6	B	1	Total	Ca	0	0
			1	1		

- Molecule 7 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Zn	0	0
			1	1		
7	B	1	Total	Zn	0	0
			1	1		

- Molecule 8 is COPPER (I) ION (three-letter code: CU1) (formula: Cu).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total Cu 1 1	0	0
8	B	1	Total Cu 1 1	0	0

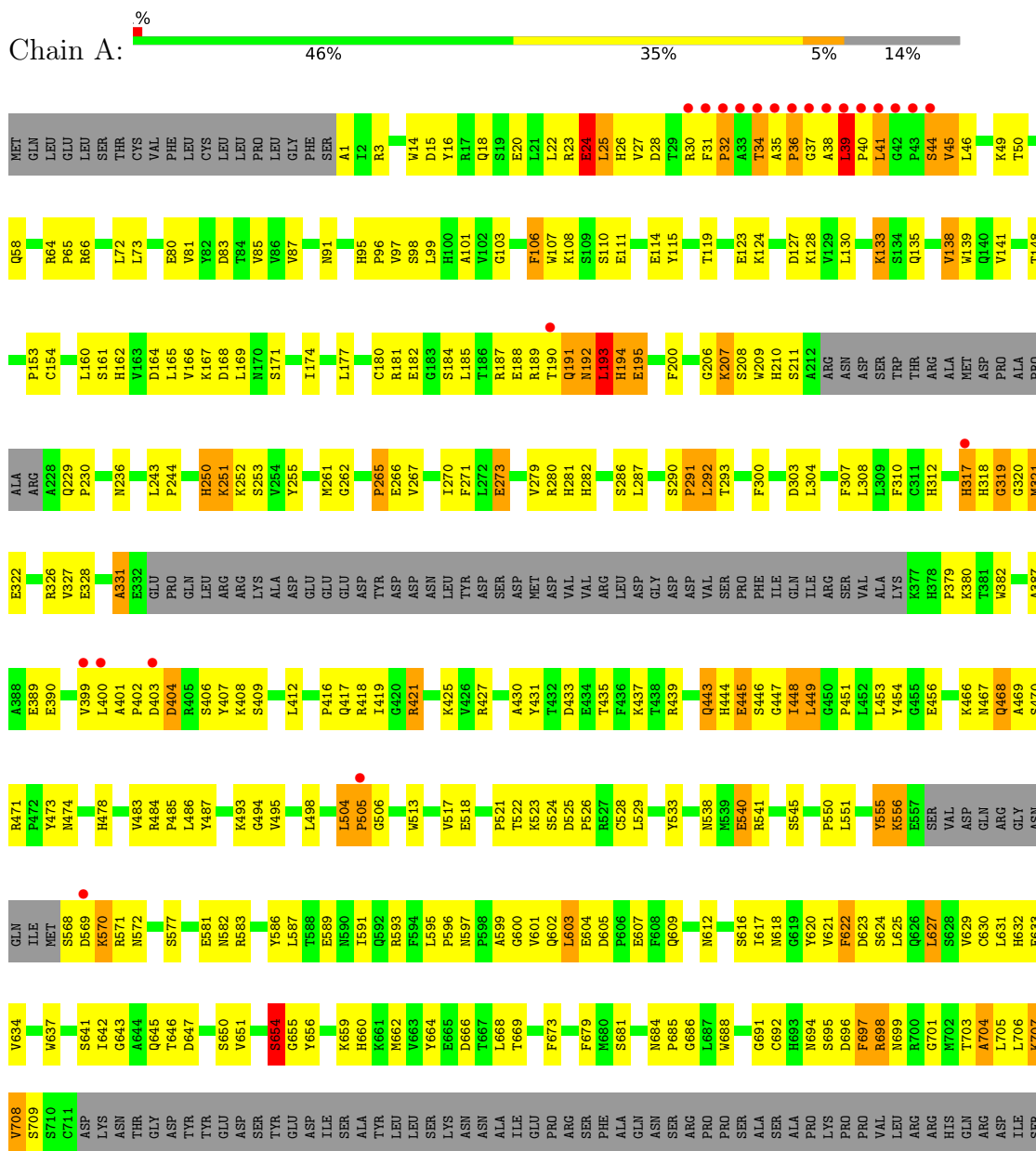
- Molecule 9 is water.

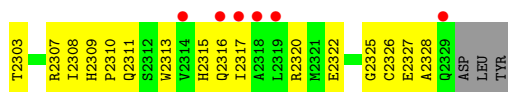
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	5	Total O 5 5	0	0
9	B	1	Total O 1 1	0	0

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: Coagulation factor VIII chimera





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

Chain C: 80% 20%



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

Chain E: 20% 60% 20%



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

Chain F: 20% 60% 20%



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

Chain D: 100%

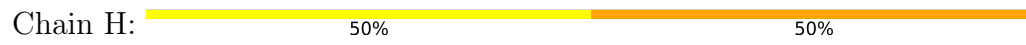


- Molecule 4: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G: 71% 29%



- Molecule 5: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



MAN1
MAN2
MAN3
MAN4
MAN5
MAN6

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	72.00Å 135.86Å 196.11Å 90.00° 90.15° 90.00°	Depositor
Resolution (Å)	49.03 – 3.20 49.03 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (49.03-3.20) 99.9 (49.03-3.20)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.27 (at 3.19Å)	Xtrriage
Refinement program	PHENIX 1.12_2829, PHENIX 1.12_2829	Depositor
R, R_{free}	0.206 , 0.287 0.206 , 0.287	Depositor DCC
R_{free} test set	3077 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	62.6	Xtrriage
Anisotropy	0.515	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 47.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.031 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	20622	wwPDB-VP
Average B, all atoms (Å ²)	61.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.83% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MAN, BMA, ZN, CA, NAG, CU1, FUC

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	0.54	5/10434 (0.0%)	0.78	8/14149 (0.1%)
1	B	0.49	1/10367 (0.0%)	0.72	7/14053 (0.0%)
All	All	0.51	6/20801 (0.0%)	0.75	15/28202 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	11
1	B	0	6
All	All	0	17

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	2150	ARG	CZ-NH2	-7.05	1.23	1.33
1	A	191	GLN	CD-NE2	6.91	1.50	1.32
1	A	2174	CYS	CA-CB	-6.57	1.39	1.53
1	A	191	GLN	CD-OE1	-6.53	1.09	1.24
1	A	2016	VAL	CB-CG2	-5.65	1.41	1.52

The worst 5 of 15 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	191	GLN	CG-CD-OE1	29.15	179.90	121.60
1	A	191	GLN	CA-CB-CG	19.14	155.50	113.40
1	A	191	GLN	CG-CD-NE2	-14.70	81.43	116.70
1	A	191	GLN	OE1-CD-NE2	-10.11	98.66	121.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	191	GLN	CB-CG-CD	-8.73	88.89	111.60

There are no chirality outliers.

5 of 17 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	24	GLU	Peptide
1	A	39	LEU	Peptide
1	A	404	ASP	Peptide
1	A	473	TYR	Peptide
1	A	570	LYS	Peptide

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	10147	0	9905	424	2
1	B	10084	0	9837	506	1
2	C	61	0	52	3	0
2	E	61	0	52	2	0
2	F	61	0	52	0	2
3	D	39	0	34	0	0
4	G	85	0	73	2	0
5	H	72	0	61	2	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
8	A	1	0	0	0	0
8	B	1	0	0	0	0
9	A	5	0	0	0	0
9	B	1	0	0	0	0
All	All	20622	0	20066	927	3

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 23.

The worst 5 of 927 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:2104:MET:CE	1:B:2150:ARG:HH21	1.60	1.12
1:B:2104:MET:HE2	1:B:2150:ARG:HH21	1.04	1.10
1:B:44:SER:O	1:B:46:LEU:HD12	1.66	0.95
1:A:1728:PRO:HG3	1:A:1897:ARG:HH21	1.29	0.94
1:B:1776:LYS:HG3	1:B:1812:THR:HG22	1.49	0.92

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:504:LEU:O	2:F:4:MAN:O6[1_455]	1.98	0.22
1:A:469:ALA:O	2:F:4:MAN:O2[1_455]	2.04	0.16
1:B:326:ARG:NH2	1:B:2094:SER:OG[2_457]	2.11	0.09

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	1242/1467 (85%)	966 (78%)	174 (14%)	102 (8%)	1	5
1	B	1231/1467 (84%)	955 (78%)	182 (15%)	94 (8%)	1	7
All	All	2473/2934 (84%)	1921 (78%)	356 (14%)	196 (8%)	1	6

5 of 196 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	32	PRO
1	A	36	PRO
1	A	39	LEU
1	A	40	PRO
1	A	44	SER

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	1110/1301 (85%)	1074 (97%)	36 (3%)	39 71
1	B	1104/1301 (85%)	1079 (98%)	25 (2%)	50 78
All	All	2214/2602 (85%)	2153 (97%)	61 (3%)	43 74

5 of 61 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2110	LYS
1	B	1946	SER
1	A	2319	LEU
1	B	1919	HIS
1	B	2206	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	162	HIS
1	B	233	HIS
1	B	2225	ASN
1	B	318	HIS
1	A	2007	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates i

31 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	C	1	1,2	14,14,15	1.07	1 (7%)	17,19,21	2.05	3 (17%)
2	NAG	C	2	2	14,14,15	0.37	0	17,19,21	0.44	0
2	BMA	C	3	2	11,11,12	1.38	3 (27%)	15,15,17	1.21	0
2	MAN	C	4	2	11,11,12	0.81	0	15,15,17	1.00	1 (6%)
2	MAN	C	5	2	11,11,12	1.47	3 (27%)	15,15,17	2.08	4 (26%)
3	NAG	D	1	1,3	14,14,15	0.79	1 (7%)	17,19,21	1.41	3 (17%)
3	NAG	D	2	3	14,14,15	0.87	1 (7%)	17,19,21	1.29	2 (11%)
3	BMA	D	3	3	11,11,12	1.49	2 (18%)	15,15,17	0.91	0
2	NAG	E	1	1,2	14,14,15	0.54	0	17,19,21	0.67	0
2	NAG	E	2	2	14,14,15	0.68	0	17,19,21	1.85	5 (29%)
2	BMA	E	3	2	11,11,12	1.98	4 (36%)	15,15,17	1.27	1 (6%)
2	MAN	E	4	2	11,11,12	1.59	2 (18%)	15,15,17	1.36	2 (13%)
2	MAN	E	5	2	11,11,12	0.87	0	15,15,17	1.05	0
2	NAG	F	1	1,2	14,14,15	0.27	0	17,19,21	0.44	0
2	NAG	F	2	2	14,14,15	0.73	1 (7%)	17,19,21	0.68	0
2	BMA	F	3	2	11,11,12	1.69	3 (27%)	15,15,17	2.41	8 (53%)
2	MAN	F	4	2	11,11,12	2.04	4 (36%)	15,15,17	2.98	5 (33%)
2	MAN	F	5	2	11,11,12	0.62	0	15,15,17	2.20	3 (20%)
4	NAG	G	1	1,4	14,14,15	0.55	0	17,19,21	1.07	1 (5%)
4	NAG	G	2	4	14,14,15	0.55	0	17,19,21	1.42	3 (17%)
4	BMA	G	3	4	11,11,12	1.20	2 (18%)	15,15,17	1.17	2 (13%)
4	MAN	G	4	4	11,11,12	1.09	1 (9%)	15,15,17	1.65	2 (13%)
4	NAG	G	5	4	14,14,15	0.41	0	17,19,21	1.50	3 (17%)
4	MAN	G	6	4	11,11,12	1.04	1 (9%)	15,15,17	1.81	4 (26%)
4	FUC	G	7	4	10,10,11	1.17	1 (10%)	14,14,16	1.20	1 (7%)
5	NAG	H	1	1,5	14,14,15	0.68	1 (7%)	17,19,21	0.76	0
5	NAG	H	2	5	14,14,15	0.61	0	17,19,21	0.67	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	BMA	H	3	5	11,11,12	1.09	0	15,15,17	1.41	2 (13%)
5	MAN	H	4	5	11,11,12	0.99	0	15,15,17	1.26	1 (6%)
5	MAN	H	5	5	11,11,12	1.28	1 (9%)	15,15,17	1.17	1 (6%)
5	MAN	H	6	5	11,11,12	1.57	3 (27%)	15,15,17	1.04	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	C	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
2	BMA	C	3	2	-	1/2/19/22	0/1/1/1
2	MAN	C	4	2	-	2/2/19/22	0/1/1/1
2	MAN	C	5	2	-	1/2/19/22	0/1/1/1
3	NAG	D	1	1,3	-	1/6/23/26	0/1/1/1
3	NAG	D	2	3	-	2/6/23/26	0/1/1/1
3	BMA	D	3	3	-	2/2/19/22	0/1/1/1
2	NAG	E	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	E	2	2	-	6/6/23/26	0/1/1/1
2	BMA	E	3	2	-	2/2/19/22	0/1/1/1
2	MAN	E	4	2	-	2/2/19/22	1/1/1/1
2	MAN	E	5	2	-	2/2/19/22	1/1/1/1
2	NAG	F	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	F	2	2	-	0/6/23/26	0/1/1/1
2	BMA	F	3	2	-	0/2/19/22	0/1/1/1
2	MAN	F	4	2	-	2/2/19/22	0/1/1/1
2	MAN	F	5	2	-	1/2/19/22	0/1/1/1
4	NAG	G	1	1,4	-	1/6/23/26	0/1/1/1
4	NAG	G	2	4	-	5/6/23/26	0/1/1/1
4	BMA	G	3	4	-	2/2/19/22	0/1/1/1
4	MAN	G	4	4	-	1/2/19/22	0/1/1/1
4	NAG	G	5	4	-	0/6/23/26	0/1/1/1
4	MAN	G	6	4	-	2/2/19/22	0/1/1/1
4	FUC	G	7	4	-	-	0/1/1/1
5	NAG	H	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	H	2	5	-	1/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	BMA	H	3	5	-	0/2/19/22	0/1/1/1
5	MAN	H	4	5	-	1/2/19/22	0/1/1/1
5	MAN	H	5	5	-	2/2/19/22	0/1/1/1
5	MAN	H	6	5	-	1/2/19/22	0/1/1/1

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	4	MAN	C4-C5	-4.45	1.43	1.53
2	E	4	MAN	O5-C5	3.91	1.51	1.43
2	E	3	BMA	C1-C2	3.83	1.60	1.52
2	E	3	BMA	C2-C3	3.64	1.57	1.52
2	C	1	NAG	O5-C1	3.62	1.49	1.43

The worst 5 of 57 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	4	MAN	C1-O5-C5	7.18	121.92	112.19
2	F	5	MAN	C1-O5-C5	6.92	121.56	112.19
2	C	5	MAN	C1-O5-C5	6.20	120.59	112.19
2	F	4	MAN	C2-C3-C4	6.07	121.39	110.89
2	C	1	NAG	C1-O5-C5	5.99	120.31	112.19

There are no chirality outliers.

5 of 52 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	G	1	NAG	C3-C2-N2-C7
2	E	4	MAN	O5-C5-C6-O6
2	C	4	MAN	C4-C5-C6-O6
4	G	2	NAG	O5-C5-C6-O6
2	E	1	NAG	O5-C5-C6-O6

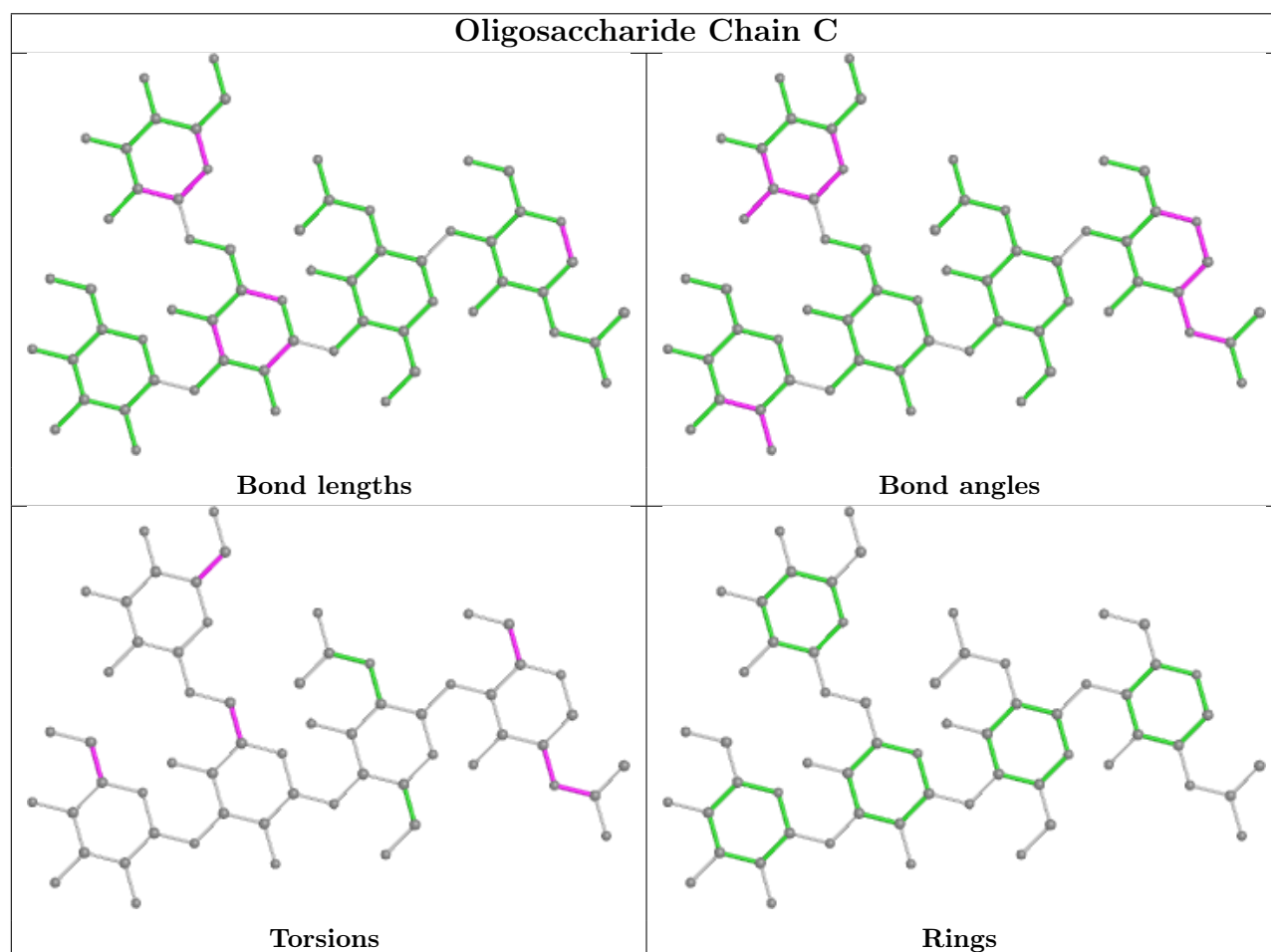
All (2) ring outliers are listed below:

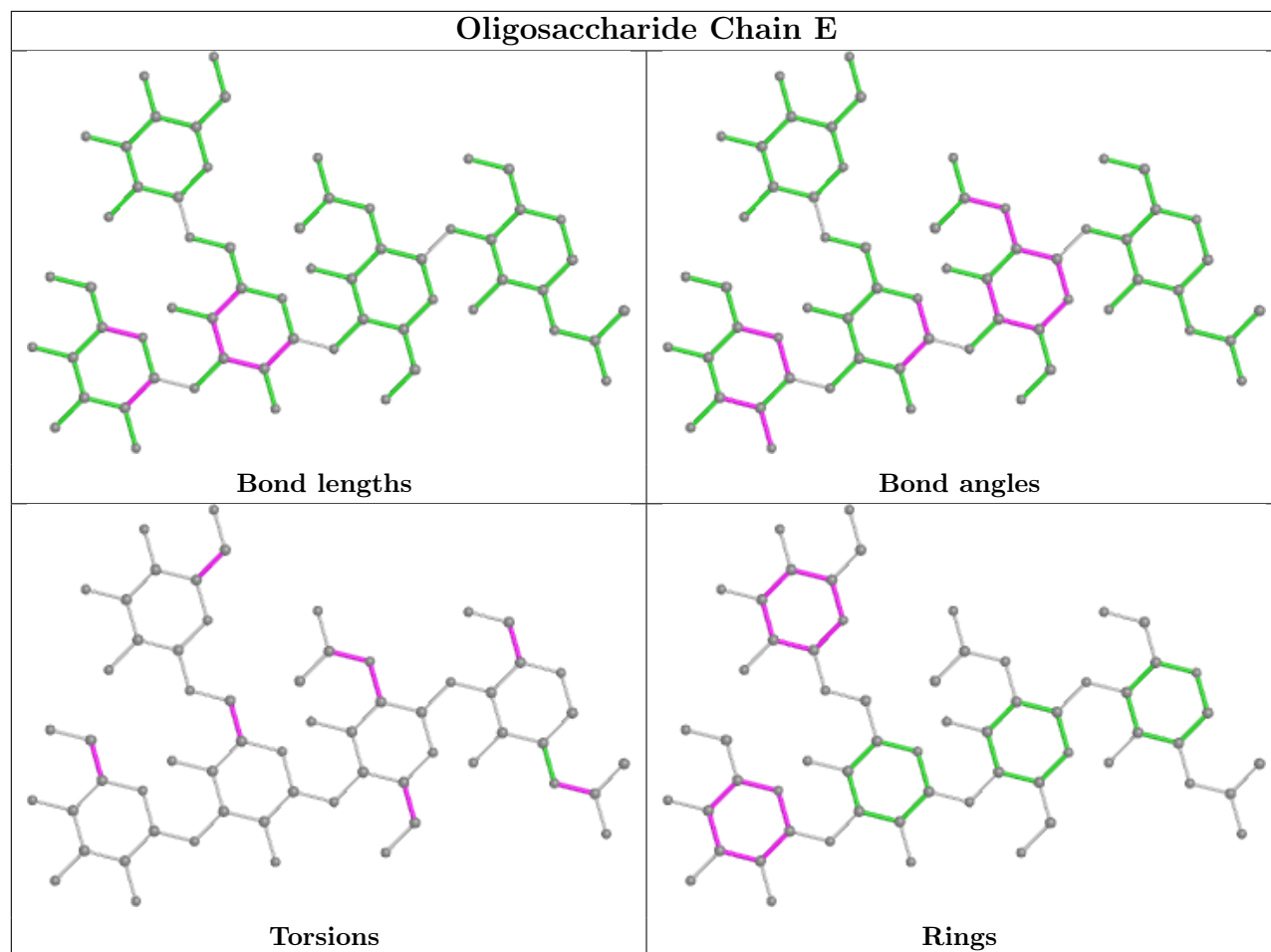
Mol	Chain	Res	Type	Atoms
2	E	5	MAN	C1-C2-C3-C4-C5-O5
2	E	4	MAN	C1-C2-C3-C4-C5-O5

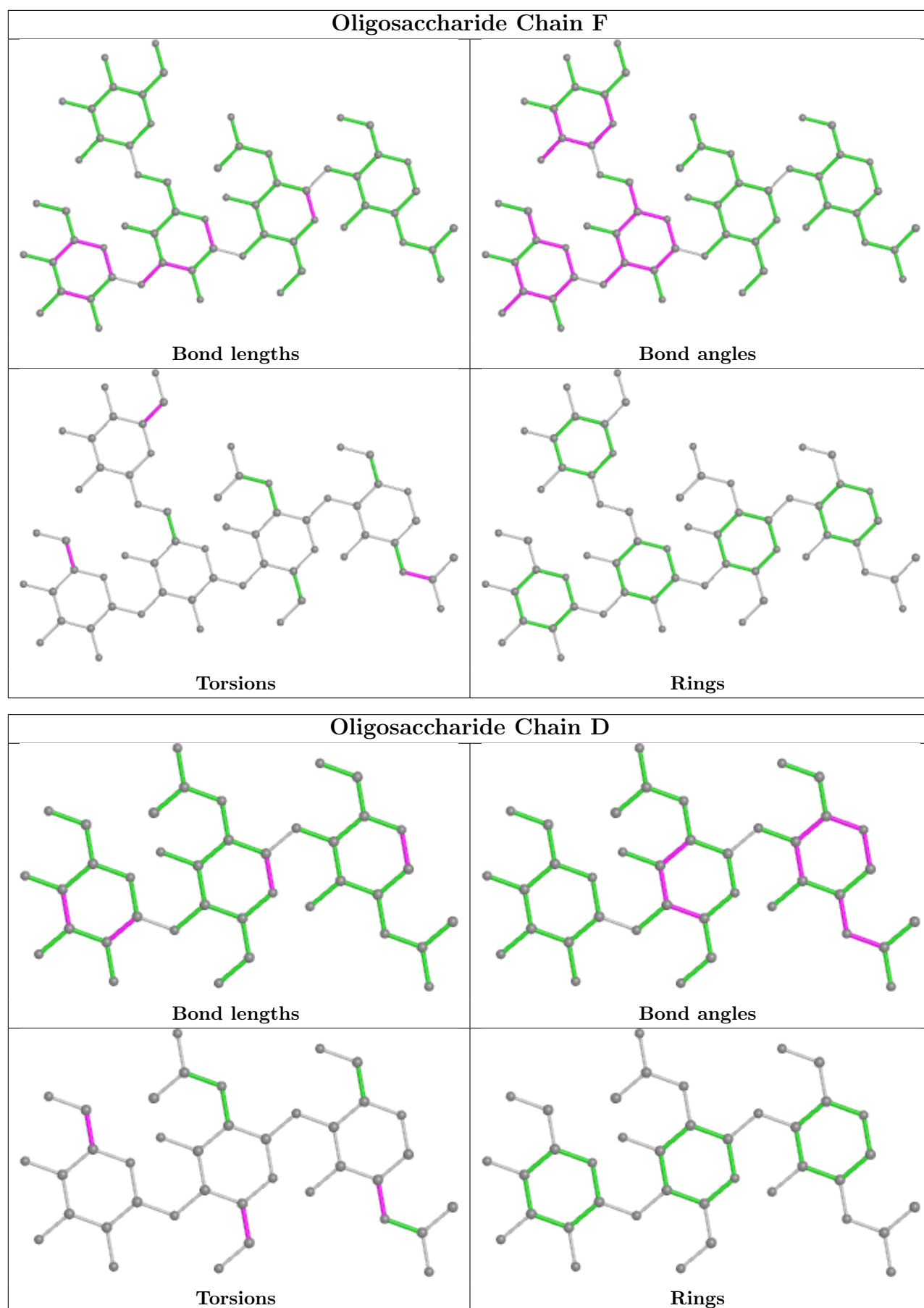
11 monomers are involved in 11 short contacts:

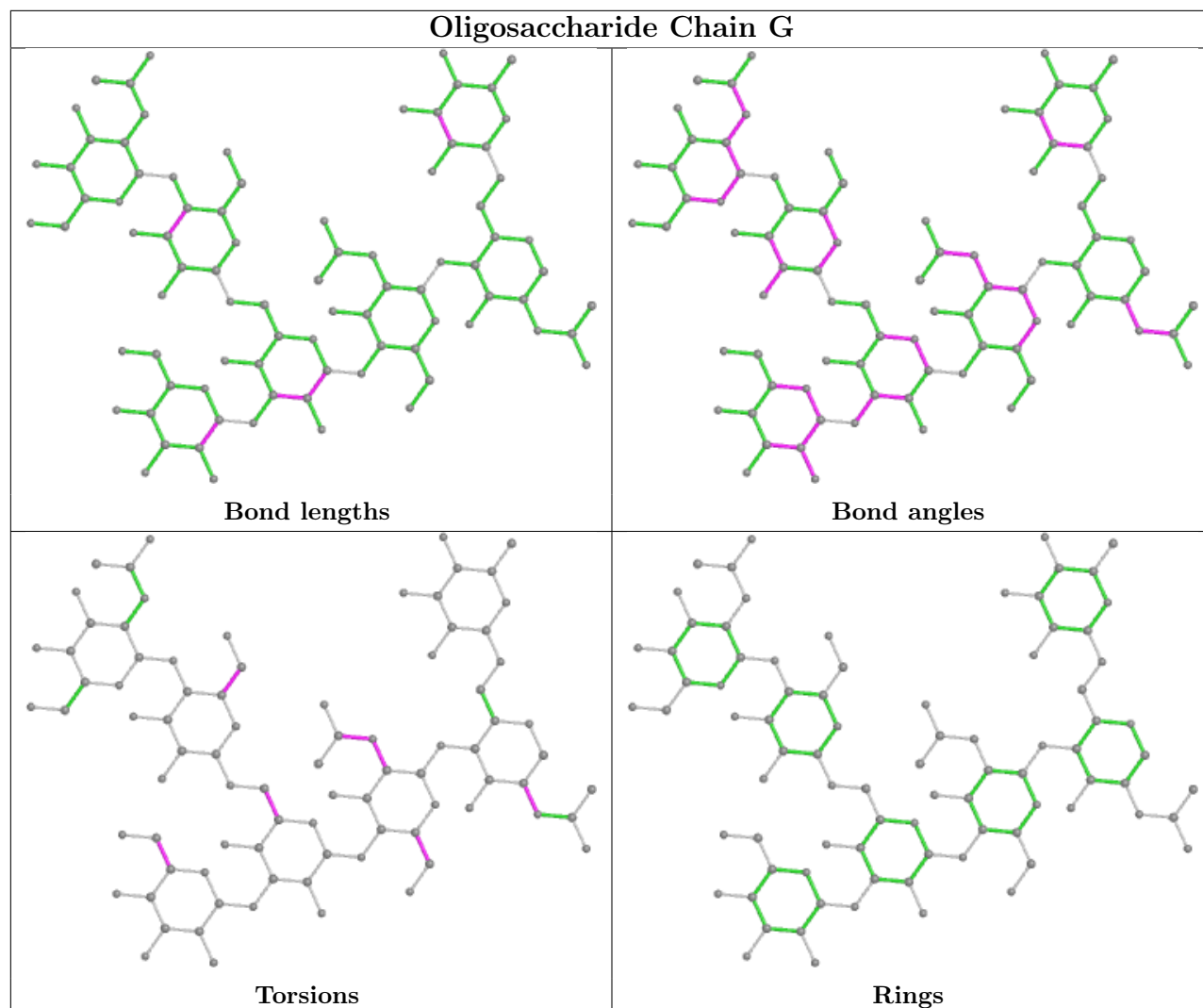
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	H	2	NAG	1	0
2	C	2	NAG	2	0
5	H	4	MAN	1	0
2	C	1	NAG	1	0
4	G	1	NAG	1	0
2	E	1	NAG	1	0
2	E	2	NAG	1	0
4	G	2	NAG	2	0
5	H	1	NAG	1	0
2	F	4	MAN	0	2
5	H	5	MAN	1	0

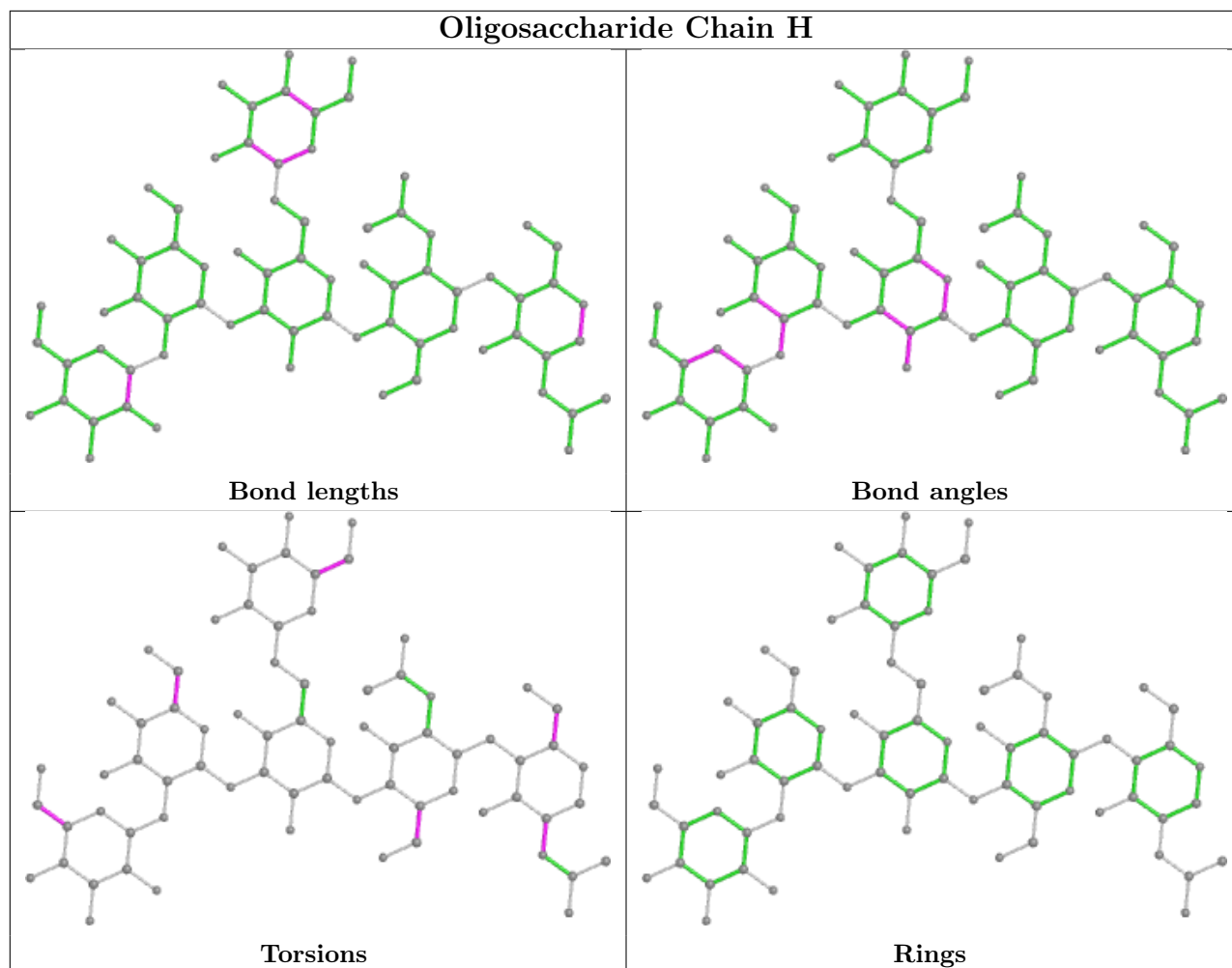
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.











5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 6 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

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	1256/1467 (85%)	-0.29	22 (1%) 68 55	30, 48, 88, 273	0
1	B	1247/1467 (85%)	-0.13	35 (2%) 53 37	30, 58, 130, 157	0
All	All	2503/2934 (85%)	-0.21	57 (2%) 60 47	30, 52, 119, 273	0

The worst 5 of 57 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	34	THR	9.4
1	A	37	GLY	9.1
1	A	40	PRO	8.6
1	A	33	ALA	7.9
1	B	2318	ALA	6.3

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	MAN	F	5	11/12	0.49	0.59	149,151,160,160	0
2	MAN	E	4	11/12	0.52	0.33	117,124,129,131	0
5	MAN	H	5	11/12	0.57	0.42	125,134,142,149	0
2	BMA	F	3	11/12	0.59	0.60	131,138,150,151	0

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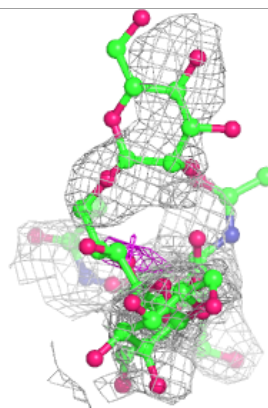
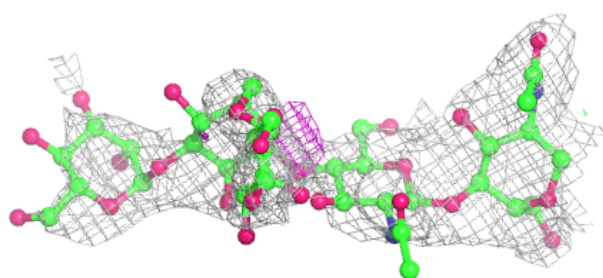
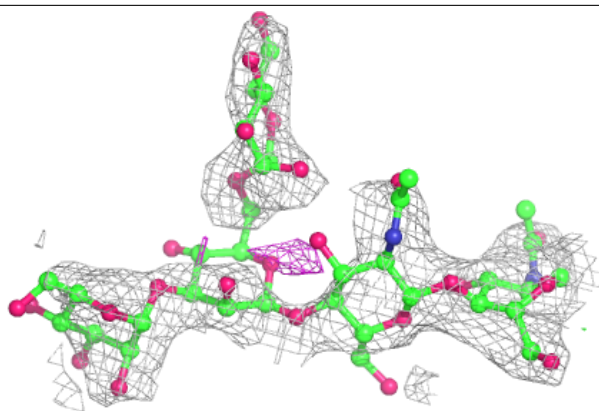
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	BMA	C	3	11/12	0.60	0.61	144,158,163,164	0
4	NAG	G	2	14/15	0.61	0.39	118,133,142,145	0
2	NAG	F	2	14/15	0.61	0.37	130,144,153,154	0
3	BMA	D	3	11/12	0.62	0.56	134,157,162,163	0
5	MAN	H	6	11/12	0.63	0.30	99,113,125,126	0
2	NAG	C	2	14/15	0.64	0.47	128,137,149,156	0
2	MAN	C	4	11/12	0.64	0.56	148,158,161,163	0
4	NAG	G	5	14/15	0.67	0.32	78,93,101,102	0
2	MAN	C	5	11/12	0.70	0.51	138,145,151,156	0
2	MAN	F	4	11/12	0.71	0.43	77,96,119,134	0
2	NAG	F	1	14/15	0.72	0.33	86,120,136,142	0
3	NAG	D	2	14/15	0.74	0.38	114,145,152,154	0
4	BMA	G	3	11/12	0.75	0.39	123,144,149,152	0
5	NAG	H	2	14/15	0.75	0.28	73,95,100,103	0
4	MAN	G	6	11/12	0.77	0.36	128,135,144,145	0
4	NAG	G	1	14/15	0.78	0.23	99,116,124,128	0
2	NAG	E	2	14/15	0.79	0.28	74,105,116,122	0
2	BMA	E	3	11/12	0.79	0.24	112,121,126,127	0
4	FUC	G	7	10/11	0.80	0.41	124,134,139,144	0
4	MAN	G	4	11/12	0.80	0.22	69,97,108,110	0
3	NAG	D	1	14/15	0.82	0.38	95,131,141,144	0
2	MAN	E	5	11/12	0.84	0.16	84,109,119,120	0
5	MAN	H	4	11/12	0.84	0.18	105,120,127,133	0
5	BMA	H	3	11/12	0.86	0.18	108,114,120,123	0
2	NAG	C	1	14/15	0.88	0.28	79,89,109,121	0
2	NAG	E	1	14/15	0.89	0.18	78,83,92,104	0
5	NAG	H	1	14/15	0.91	0.18	81,86,93,93	0

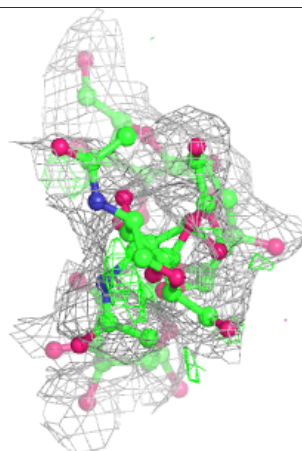
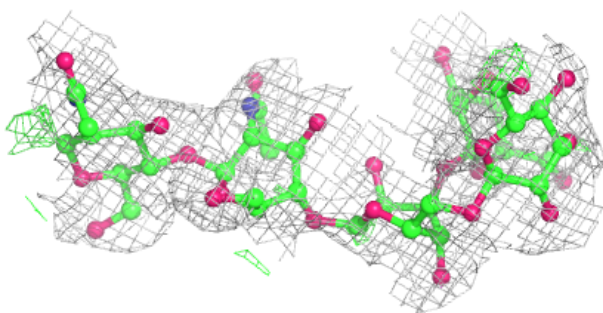
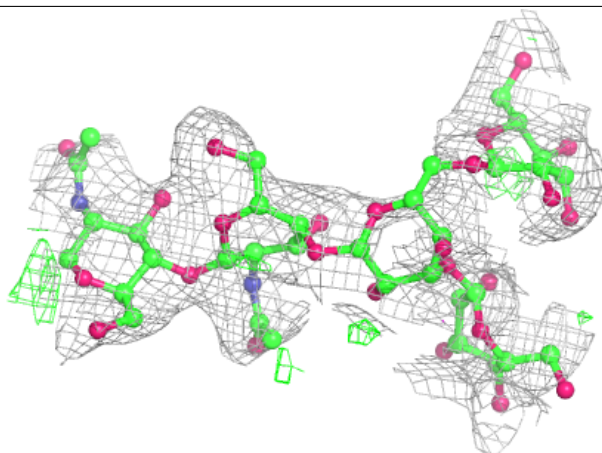
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain C:

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

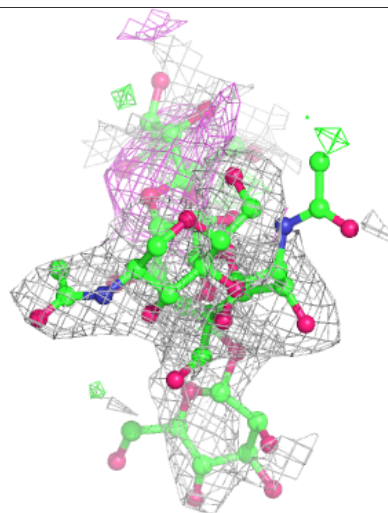
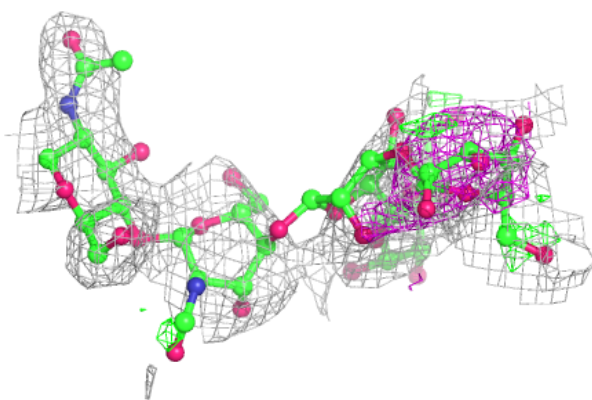
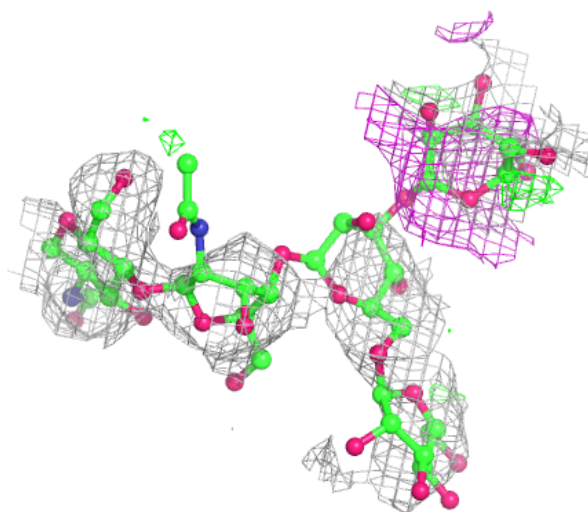
**Electron density around Chain E:**

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



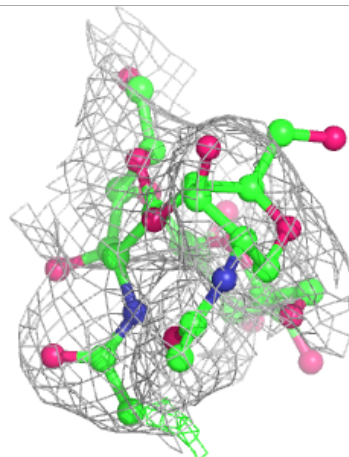
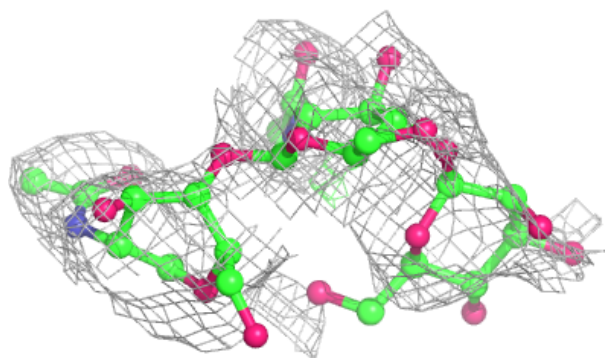
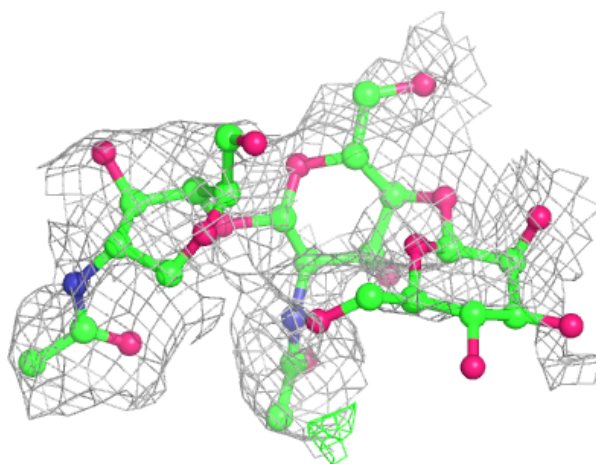
Electron density around Chain F:

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



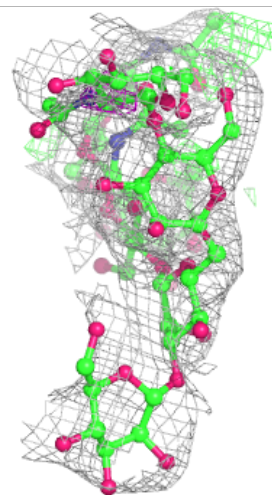
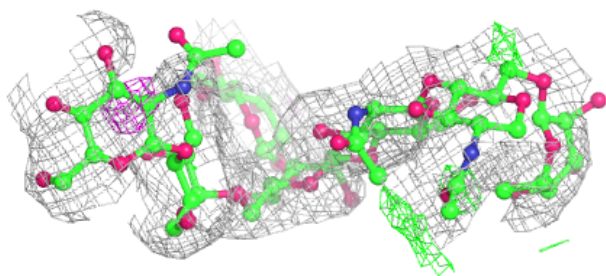
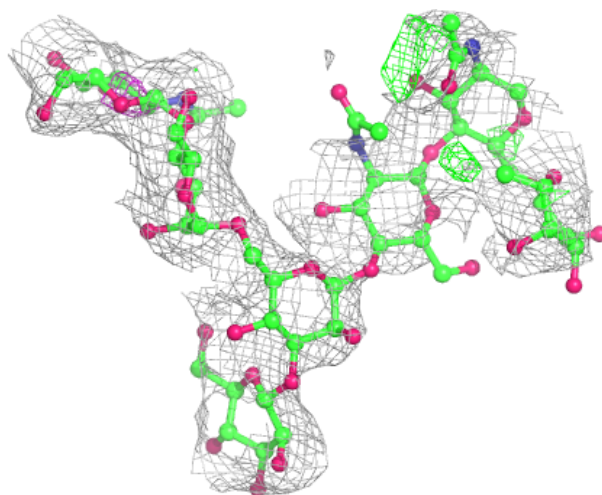
Electron density around Chain D:

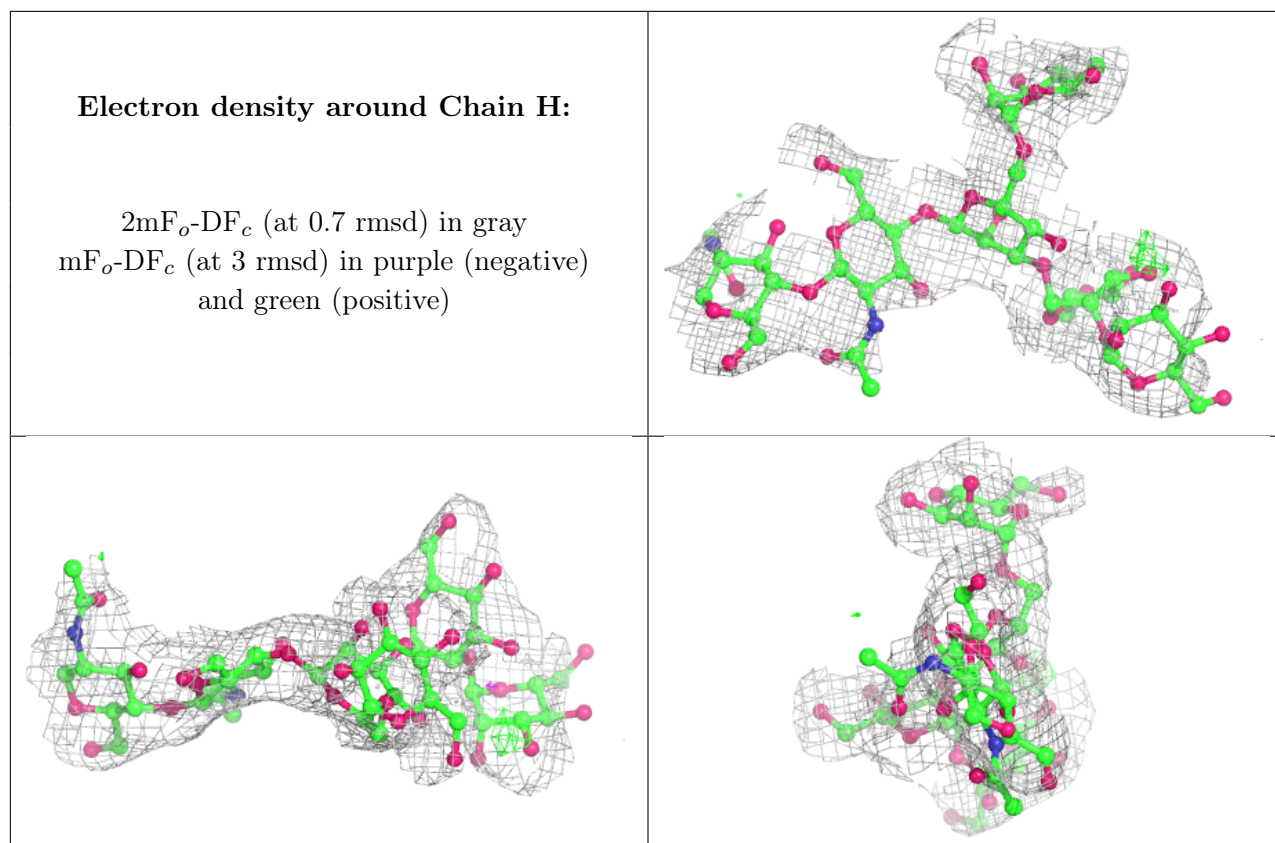
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain G:

$2mF_o-DF_c$ (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	ZN	A	2415	1/1	0.97	0.15	46,46,46,46	0
6	CA	B	2419	1/1	0.98	0.20	59,59,59,59	0
6	CA	A	2414	1/1	0.99	0.20	40,40,40,40	0
8	CU1	A	2416	1/1	0.99	0.20	40,40,40,40	0
8	CU1	B	2421	1/1	0.99	0.22	48,48,48,48	0
7	ZN	B	2420	1/1	1.00	0.19	47,47,47,47	0

6.5 Other polymers [i](#)

There are no such residues in this entry.