



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 8, 2020 – 10:22 PM BST

PDB ID : 6P4Q
Title : Salmonella typhi PltB Homopentamer N29K Mutant with Neu5Ac-alpha-2-3-Gal-beta-1-4-GlcNAc Glycans
Authors : Nguyen, T.; Milano, S.K.; Hillpot, E.C.; Yang, Y.A.; Song, J.
Deposited on : 2019-05-28
Resolution : 1.77 Å(reported)

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The 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 : 2.13.1
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) : 2.13.1

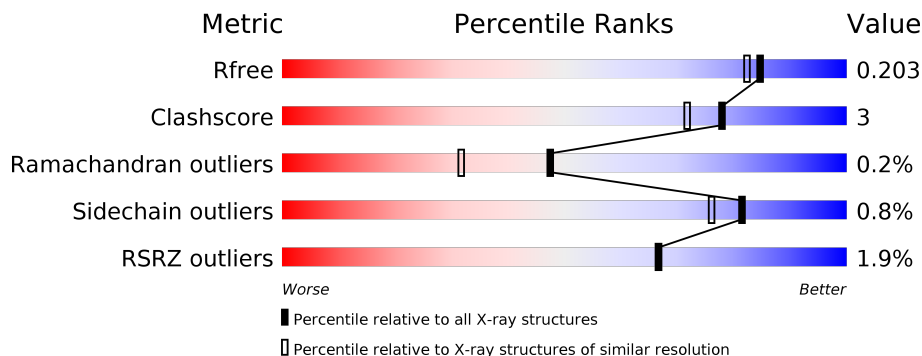
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.77 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	9185 (1.80-1.76)
Clashscore	141614	10184 (1.80-1.76)
Ramachandran outliers	138981	10051 (1.80-1.76)
Sidechain outliers	138945	10050 (1.80-1.76)
RSRZ outliers	127900	9032 (1.80-1.76)

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 on 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	145	
1	B	145	
1	C	145	
1	D	145	
1	E	145	
2	F	3	

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Mol	Chain	Length	Quality of chain
2	G	3	
2	H	3	
2	I	3	
2	J	3	
2	K	3	

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	F	1	-	-	-	X
2	NAG	G	1	-	-	-	X
2	NAG	H	1	-	-	-	X
2	NAG	J	1	-	-	-	X
2	GAL	J	2	-	-	-	X
2	NAG	K	1	-	-	-	X
2	GAL	K	2	-	-	-	X

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 5090 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 Putative pertussis-like toxin subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	114	886	568	145	169	4	0	0	0
1	B	115	894	574	146	170	4	0	0	0
1	C	114	886	568	145	169	4	0	0	0
1	D	114	898	577	146	171	4	0	1	0
1	E	114	886	568	145	169	4	0	0	0

There are 45 discrepancies between the modelled and reference sequences:

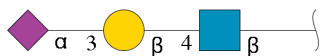
Chain	Residue	Modelled	Actual	Comment	Reference
A	29	LYS	ASN	engineered mutation	UNP Q8Z6A3
A	138	LEU	-	expression tag	UNP Q8Z6A3
A	139	GLU	-	expression tag	UNP Q8Z6A3
A	140	HIS	-	expression tag	UNP Q8Z6A3
A	141	HIS	-	expression tag	UNP Q8Z6A3
A	142	HIS	-	expression tag	UNP Q8Z6A3
A	143	HIS	-	expression tag	UNP Q8Z6A3
A	144	HIS	-	expression tag	UNP Q8Z6A3
A	145	HIS	-	expression tag	UNP Q8Z6A3
B	29	LYS	ASN	engineered mutation	UNP Q8Z6A3
B	138	LEU	-	expression tag	UNP Q8Z6A3
B	139	GLU	-	expression tag	UNP Q8Z6A3
B	140	HIS	-	expression tag	UNP Q8Z6A3
B	141	HIS	-	expression tag	UNP Q8Z6A3
B	142	HIS	-	expression tag	UNP Q8Z6A3
B	143	HIS	-	expression tag	UNP Q8Z6A3
B	144	HIS	-	expression tag	UNP Q8Z6A3
B	145	HIS	-	expression tag	UNP Q8Z6A3
C	29	LYS	ASN	engineered mutation	UNP Q8Z6A3

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Chain	Residue	Modelled	Actual	Comment	Reference
C	138	LEU	-	expression tag	UNP Q8Z6A3
C	139	GLU	-	expression tag	UNP Q8Z6A3
C	140	HIS	-	expression tag	UNP Q8Z6A3
C	141	HIS	-	expression tag	UNP Q8Z6A3
C	142	HIS	-	expression tag	UNP Q8Z6A3
C	143	HIS	-	expression tag	UNP Q8Z6A3
C	144	HIS	-	expression tag	UNP Q8Z6A3
C	145	HIS	-	expression tag	UNP Q8Z6A3
D	29	LYS	ASN	engineered mutation	UNP Q8Z6A3
D	138	LEU	-	expression tag	UNP Q8Z6A3
D	139	GLU	-	expression tag	UNP Q8Z6A3
D	140	HIS	-	expression tag	UNP Q8Z6A3
D	141	HIS	-	expression tag	UNP Q8Z6A3
D	142	HIS	-	expression tag	UNP Q8Z6A3
D	143	HIS	-	expression tag	UNP Q8Z6A3
D	144	HIS	-	expression tag	UNP Q8Z6A3
D	145	HIS	-	expression tag	UNP Q8Z6A3
E	29	LYS	ASN	engineered mutation	UNP Q8Z6A3
E	138	LEU	-	expression tag	UNP Q8Z6A3
E	139	GLU	-	expression tag	UNP Q8Z6A3
E	140	HIS	-	expression tag	UNP Q8Z6A3
E	141	HIS	-	expression tag	UNP Q8Z6A3
E	142	HIS	-	expression tag	UNP Q8Z6A3
E	143	HIS	-	expression tag	UNP Q8Z6A3
E	144	HIS	-	expression tag	UNP Q8Z6A3
E	145	HIS	-	expression tag	UNP Q8Z6A3

- Molecule 2 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace	
			Total	C	N				O
2	F	3	46	25	2	19	0	0	0
2	G	3	46	25	2	19	0	0	0
2	H	3	46	25	2	19	0	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	I	3	Total	C	N	O	0	0	0
			46	25	2	19			
2	J	3	Total	C	N	O	0	0	0
			46	25	2	19			
2	K	3	Total	C	N	O	0	0	0
			46	25	2	19			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	96	Total	O	0	0
			96	96		
3	B	75	Total	O	0	0
			75	75		
3	C	90	Total	O	0	0
			90	90		
3	D	57	Total	O	0	0
			57	57		
3	E	46	Total	O	0	0
			46	46		

Chain F:  33% 67%

NA01
GAL2
SIA3

- Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:  33% 67%

NA01
GAL2
SIA3

- Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain H:  67% 33%

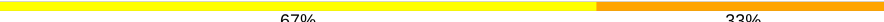
NA01
GAL2
SIA3

- Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain I:  33% 67%

NA01
GAL2
SIA3

- Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain J:  67% 33%

NA01
GAL2
SIA3

- Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain K:  67% 33%

NA01
GAL2
SIA3

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	61.05Å 96.89Å 119.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	27.42 – 1.77 27.42 – 1.77	Depositor EDS
% Data completeness (in resolution range)	99.5 (27.42-1.77) 99.5 (27.42-1.77)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.95 (at 1.77Å)	Xtrriage
Refinement program	PHENIX 1.12-2829	Depositor
R, R_{free}	0.180 , 0.203 0.181 , 0.203	Depositor DCC
R_{free} test set	2000 reflections (2.89%)	wwPDB-VP
Wilson B-factor (Å ²)	11.0	Xtrriage
Anisotropy	0.260	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 44.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5090	wwPDB-VP
Average B, all atoms (Å ²)	12.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.78% 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: SIA, GAL, NAG

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	0.46	1/910 (0.1%)	0.58	0/1240
1	B	0.39	0/918	0.57	0/1251
1	C	0.39	0/910	0.56	0/1240
1	D	0.38	0/923	0.58	0/1259
1	E	0.35	0/910	0.54	0/1240
All	All	0.39	1/4571 (0.0%)	0.57	0/6230

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	128	CYS	CB-SG	-6.46	1.71	1.82

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	886	0	853	1	0
1	B	894	0	864	0	0
1	C	886	0	853	3	0
1	D	898	0	862	9	0
1	E	886	0	853	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	46	0	39	1	0
2	G	46	0	40	4	0
2	H	46	0	39	1	0
2	I	46	0	39	1	0
2	J	46	0	39	5	0
2	K	46	0	40	1	0
3	A	96	0	0	0	0
3	B	75	0	0	0	0
3	C	90	0	0	0	0
3	D	57	0	0	0	0
3	E	46	0	0	0	0
All	All	5090	0	4521	27	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.

All (27) 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:E:109:THR:H	2:J:3:SIA:H113	1.56	0.70
2:G:2:GAL:O4	2:G:2:GAL:O6	2.05	0.68
1:D:100:ARG:HH12	1:D:137:LYS:HE2	1.59	0.68
2:G:1:NAG:H82	2:G:2:GAL:H62	1.77	0.67
1:D:100:ARG:HH12	1:D:137:LYS:CD	2.13	0.62
1:D:47:ILE:HD11	1:D:110[A]:TYR:HD2	1.67	0.60
1:D:135:GLY:O	1:D:137:LYS:HD2	2.04	0.58
1:E:110:TYR:H	2:J:3:SIA:H112	1.68	0.57
1:D:100:ARG:HH12	1:D:137:LYS:CE	2.18	0.57
1:E:32:ALA:HB1	2:K:3:SIA:H113	1.92	0.51
1:C:100:ARG:NH1	1:C:137:LYS:HB3	2.29	0.48
1:E:126:SER:HB3	1:E:134:PHE:O	2.13	0.48
1:D:47:ILE:HD11	1:D:110[A]:TYR:CD2	2.49	0.48
1:E:110:TYR:H	2:J:3:SIA:C11	2.26	0.48
2:G:2:GAL:HO6	2:G:2:GAL:HO4	1.56	0.48
1:D:128:CYS:HA	1:D:133:CYS:HA	1.98	0.46
1:D:53:PHE:CE1	1:D:71:ALA:HB3	2.52	0.45
1:C:59:LYS:HE3	2:H:1:NAG:H81	1.99	0.45
1:D:100:ARG:NH1	1:D:137:LYS:HE2	2.31	0.45
1:E:75:GLN:OE1	2:J:3:SIA:N5	2.35	0.43
2:G:1:NAG:H3	2:G:2:GAL:O5	2.18	0.43
1:E:109:THR:N	2:J:3:SIA:H113	2.30	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:24:GLU:HG3	1:E:77:ILE:HD12	2.02	0.41
2:F:1:NAG:H3	2:F:2:GAL:O5	2.21	0.41
2:I:1:NAG:H61	2:I:2:GAL:O2	2.21	0.41
1:A:104:GLN:NE2	1:A:107:ILE:HD11	2.36	0.40
1:C:85:LEU:HA	1:C:85:LEU:HD23	1.95	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	112/145 (77%)	107 (96%)	5 (4%)	0	100	100
1	B	113/145 (78%)	110 (97%)	3 (3%)	0	100	100
1	C	112/145 (77%)	107 (96%)	4 (4%)	1 (1%)	17	5
1	D	113/145 (78%)	110 (97%)	3 (3%)	0	100	100
1	E	112/145 (77%)	109 (97%)	3 (3%)	0	100	100
All	All	562/725 (78%)	543 (97%)	18 (3%)	1 (0%)	47	32

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	129	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	98/127 (77%)	98 (100%)	0	100	100
1	B	99/127 (78%)	98 (99%)	1 (1%)	76	68
1	C	98/127 (77%)	97 (99%)	1 (1%)	76	68
1	D	99/127 (78%)	96 (97%)	3 (3%)	41	24
1	E	98/127 (77%)	98 (100%)	0	100	100
All	All	492/635 (78%)	487 (99%)	5 (1%)	81	68

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	110	TYR
1	C	132	GLN
1	D	110[A]	TYR
1	D	110[B]	TYR
1	D	137	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	132	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](#)

18 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	F	1	2	15,15,15	2.45	4 (26%)	21,21,21	2.15	8 (38%)
2	GAL	F	2	2	11,11,12	1.81	3 (27%)	15,15,17	1.32	2 (13%)
2	SIA	F	3	2	17,20,21	1.90	4 (23%)	21,28,31	1.26	2 (9%)
2	NAG	G	1	2	15,15,15	2.57	6 (40%)	21,21,21	1.97	6 (28%)
2	GAL	G	2	2	11,11,12	2.00	3 (27%)	15,15,17	2.36	6 (40%)
2	SIA	G	3	2	17,20,21	1.99	3 (17%)	21,28,31	1.33	3 (14%)
2	NAG	H	1	2	15,15,15	2.57	4 (26%)	21,21,21	2.22	8 (38%)
2	GAL	H	2	2	11,11,12	1.87	3 (27%)	15,15,17	1.22	2 (13%)
2	SIA	H	3	2	17,20,21	1.94	3 (17%)	21,28,31	1.35	4 (19%)
2	NAG	I	1	2	15,15,15	2.32	4 (26%)	21,21,21	1.26	2 (9%)
2	GAL	I	2	2	11,11,12	1.84	3 (27%)	15,15,17	0.75	0
2	SIA	I	3	2	17,20,21	1.97	4 (23%)	21,28,31	1.49	4 (19%)
2	NAG	J	1	2	15,15,15	2.36	4 (26%)	21,21,21	1.14	2 (9%)
2	GAL	J	2	2	11,11,12	2.07	3 (27%)	15,15,17	1.41	4 (26%)
2	SIA	J	3	2	17,20,21	2.19	4 (23%)	21,28,31	1.21	2 (9%)
2	NAG	K	1	2	15,15,15	2.49	6 (40%)	21,21,21	2.47	10 (47%)
2	GAL	K	2	2	11,11,12	1.92	4 (36%)	15,15,17	2.12	6 (40%)
2	SIA	K	3	2	17,20,21	2.36	5 (29%)	21,28,31	1.39	3 (14%)

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	F	1	2	-	4/6/26/26	0/1/1/1
2	GAL	F	2	2	-	2/2/19/22	0/1/1/1
2	SIA	F	3	2	-	0/14/34/38	0/1/1/1
2	NAG	G	1	2	-	5/6/26/26	0/1/1/1
2	GAL	G	2	2	-	2/2/19/22	0/1/1/1
2	SIA	G	3	2	-	1/14/34/38	0/1/1/1
2	NAG	H	1	2	-	5/6/26/26	0/1/1/1
2	GAL	H	2	2	-	1/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	SIA	H	3	2	-	1/14/34/38	0/1/1/1
2	NAG	I	1	2	-	0/6/26/26	0/1/1/1
2	GAL	I	2	2	-	1/2/19/22	0/1/1/1
2	SIA	I	3	2	-	0/14/34/38	0/1/1/1
2	NAG	J	1	2	-	2/6/26/26	0/1/1/1
2	GAL	J	2	2	-	0/2/19/22	0/1/1/1
2	SIA	J	3	2	-	2/14/34/38	0/1/1/1
2	NAG	K	1	2	-	4/6/26/26	0/1/1/1
2	GAL	K	2	2	-	1/2/19/22	0/1/1/1
2	SIA	K	3	2	-	0/14/34/38	0/1/1/1

All (70) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	1	NAG	C2-N2	5.83	1.55	1.45
2	K	3	SIA	C4-C5	-5.75	1.48	1.53
2	F	1	NAG	C2-N2	5.62	1.54	1.45
2	G	1	NAG	C2-N2	5.31	1.54	1.45
2	H	1	NAG	C7-N2	5.28	1.52	1.34
2	J	3	SIA	C4-C5	-5.25	1.48	1.53
2	G	3	SIA	C4-C5	-5.20	1.48	1.53
2	F	3	SIA	C4-C5	-5.13	1.48	1.53
2	H	3	SIA	C4-C5	-5.08	1.48	1.53
2	F	1	NAG	C7-N2	5.06	1.51	1.34
2	G	1	NAG	C7-N2	4.94	1.51	1.34
2	I	3	SIA	C4-C5	-4.94	1.48	1.53
2	K	1	NAG	C2-N2	4.83	1.53	1.45
2	J	1	NAG	C2-N2	4.82	1.53	1.45
2	J	1	NAG	C7-N2	4.80	1.50	1.34
2	I	1	NAG	C7-N2	4.80	1.50	1.34
2	K	3	SIA	O6-C6	4.79	1.51	1.44
2	K	1	NAG	C7-N2	4.68	1.50	1.34
2	I	1	NAG	C2-N2	4.67	1.53	1.45
2	J	2	GAL	O5-C1	4.12	1.50	1.43
2	G	2	GAL	O5-C1	4.12	1.50	1.43
2	J	3	SIA	O6-C6	4.02	1.50	1.44
2	K	1	NAG	O5-C1	3.86	1.52	1.42
2	G	2	GAL	O3-C3	3.79	1.51	1.43
2	J	3	SIA	C10-N5	3.71	1.47	1.34
2	G	1	NAG	O5-C1	3.68	1.52	1.42
2	J	2	GAL	O3-C3	3.62	1.51	1.43
2	K	3	SIA	C10-N5	3.56	1.46	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	1	NAG	C8-C7	3.44	1.57	1.50
2	K	2	GAL	O3-C3	3.44	1.51	1.43
2	I	3	SIA	C10-N5	3.40	1.46	1.34
2	I	3	SIA	O6-C6	3.39	1.49	1.44
2	H	3	SIA	C10-N5	3.38	1.46	1.34
2	F	2	GAL	O5-C1	3.38	1.49	1.43
2	J	1	NAG	C8-C7	3.35	1.57	1.50
2	I	2	GAL	O5-C1	3.34	1.49	1.43
2	K	2	GAL	O5-C1	3.34	1.49	1.43
2	J	1	NAG	O5-C1	3.33	1.51	1.42
2	H	2	GAL	C2-C3	-3.33	1.47	1.52
2	F	2	GAL	O3-C3	3.32	1.50	1.43
2	G	3	SIA	C10-N5	3.32	1.45	1.34
2	H	2	GAL	O5-C1	3.32	1.49	1.43
2	G	1	NAG	C8-C7	3.32	1.57	1.50
2	F	3	SIA	C10-N5	3.32	1.45	1.34
2	K	1	NAG	C8-C7	3.25	1.57	1.50
2	G	3	SIA	O6-C6	3.23	1.49	1.44
2	I	1	NAG	C8-C7	3.21	1.57	1.50
2	F	1	NAG	C8-C7	3.18	1.57	1.50
2	I	1	NAG	O5-C1	3.17	1.50	1.42
2	H	1	NAG	O5-C1	3.10	1.50	1.42
2	F	1	NAG	O5-C1	3.06	1.50	1.42
2	I	2	GAL	O3-C3	3.05	1.50	1.43
2	H	3	SIA	O6-C6	3.03	1.48	1.44
2	I	2	GAL	C2-C3	-3.00	1.48	1.52
2	H	2	GAL	O3-C3	2.84	1.49	1.43
2	J	2	GAL	C2-C3	-2.75	1.48	1.52
2	K	2	GAL	C2-C3	-2.63	1.48	1.52
2	K	3	SIA	C3-C2	2.57	1.56	1.52
2	F	2	GAL	C2-C3	-2.57	1.48	1.52
2	F	3	SIA	C3-C2	2.50	1.56	1.52
2	F	3	SIA	O6-C6	2.46	1.47	1.44
2	G	2	GAL	C2-C3	-2.45	1.48	1.52
2	K	1	NAG	O5-C5	2.22	1.49	1.44
2	K	2	GAL	C1-C2	2.16	1.57	1.52
2	G	1	NAG	O5-C5	2.11	1.49	1.44
2	G	1	NAG	O4-C4	2.10	1.47	1.43
2	K	3	SIA	O6-C2	2.08	1.49	1.43
2	K	1	NAG	C3-C2	-2.07	1.49	1.53
2	J	3	SIA	C5-N5	2.05	1.49	1.45
2	I	3	SIA	C3-C2	2.03	1.55	1.52

All (74) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	1	NAG	C8-C7-N2	5.81	125.94	116.10
2	K	1	NAG	C1-C2-N2	5.78	117.42	110.73
2	G	2	GAL	C1-O5-C5	5.49	119.63	112.19
2	F	1	NAG	C8-C7-N2	4.90	124.39	116.10
2	F	1	NAG	C4-C3-C2	4.88	117.50	110.34
2	K	2	GAL	C1-C2-C3	4.31	114.97	109.67
2	K	1	NAG	C4-C3-C2	-4.31	104.03	110.34
2	K	1	NAG	O3-C3-C4	4.30	120.28	110.35
2	K	3	SIA	C4-C3-C2	4.05	117.07	109.81
2	G	1	NAG	C8-C7-N2	3.95	122.78	116.10
2	H	1	NAG	C2-N2-C7	3.83	132.50	123.18
2	I	3	SIA	C8-C7-C6	-3.76	105.90	113.03
2	G	1	NAG	O5-C1-C2	3.73	113.26	109.52
2	K	2	GAL	O2-C2-C3	-3.64	102.85	110.14
2	G	2	GAL	C3-C4-C5	3.62	116.69	110.24
2	G	1	NAG	C4-C3-C2	3.35	115.25	110.34
2	K	1	NAG	O4-C4-C3	3.22	117.79	110.35
2	G	1	NAG	C1-C2-C3	-3.13	106.28	110.54
2	G	1	NAG	O5-C5-C4	3.11	115.34	109.69
2	F	1	NAG	C3-C4-C5	3.10	115.77	110.24
2	G	2	GAL	O5-C5-C6	3.10	112.06	107.20
2	K	2	GAL	O3-C3-C4	-3.05	103.29	110.35
2	K	2	GAL	C3-C4-C5	2.94	115.49	110.24
2	J	2	GAL	C1-O5-C5	2.86	116.06	112.19
2	G	2	GAL	C1-C2-C3	2.82	113.14	109.67
2	H	2	GAL	C1-C2-C3	2.78	113.08	109.67
2	H	1	NAG	O7-C7-C8	-2.78	116.90	122.06
2	H	3	SIA	C6-C5-N5	-2.78	106.30	110.91
2	I	1	NAG	O5-C1-C2	2.76	112.29	109.52
2	H	1	NAG	O5-C5-C4	2.75	114.69	109.69
2	J	1	NAG	O5-C1-C2	2.75	112.28	109.52
2	I	3	SIA	C6-C5-N5	-2.74	106.36	110.91
2	J	2	GAL	O5-C5-C6	2.72	111.46	107.20
2	K	1	NAG	C3-C4-C5	-2.72	105.39	110.24
2	H	2	GAL	O3-C3-C2	-2.69	104.85	109.99
2	H	1	NAG	C3-C2-N2	2.69	115.69	110.62
2	H	1	NAG	C4-C3-C2	2.68	114.27	110.34
2	G	3	SIA	C8-C7-C6	-2.68	107.95	113.03
2	F	1	NAG	C2-N2-C7	2.65	129.61	123.18
2	I	3	SIA	O9-C9-C8	-2.64	105.32	111.07
2	K	1	NAG	C3-C2-N2	-2.62	105.67	110.62
2	H	1	NAG	O7-C7-N2	-2.61	117.16	121.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	3	SIA	O9-C9-C8	-2.57	105.47	111.07
2	K	1	NAG	O5-C1-C2	2.57	112.09	109.52
2	F	3	SIA	C8-C7-C6	-2.56	108.18	113.03
2	G	2	GAL	C2-C3-C4	2.56	115.32	110.89
2	J	2	GAL	C3-C4-C5	2.49	114.69	110.24
2	F	1	NAG	O7-C7-C8	-2.49	117.43	122.06
2	I	1	NAG	C8-C7-N2	2.47	120.29	116.10
2	J	3	SIA	C11-C10-N5	2.47	120.28	116.10
2	F	3	SIA	C6-C5-N5	-2.46	106.82	110.91
2	H	3	SIA	C8-C7-C6	-2.44	108.41	113.03
2	G	1	NAG	C1-O5-C5	2.38	118.15	113.66
2	F	1	NAG	C1-C2-C3	2.37	113.77	110.54
2	K	1	NAG	C1-C2-C3	-2.36	107.32	110.54
2	K	1	NAG	O5-C5-C4	2.35	113.96	109.69
2	F	2	GAL	C1-C2-C3	2.34	112.54	109.67
2	K	1	NAG	C1-O5-C5	2.33	118.06	113.66
2	F	2	GAL	C1-O5-C5	-2.30	109.07	112.19
2	J	2	GAL	O5-C1-C2	2.28	114.29	110.77
2	G	3	SIA	O9-C9-C8	-2.25	106.17	111.07
2	I	3	SIA	C4-C3-C2	2.25	113.83	109.81
2	J	3	SIA	C8-C7-C6	-2.24	108.78	113.03
2	J	1	NAG	C8-C7-N2	2.22	119.87	116.10
2	F	1	NAG	O5-C5-C4	2.22	113.73	109.69
2	H	1	NAG	C3-C4-C5	2.18	114.13	110.24
2	G	2	GAL	O4-C4-C5	-2.15	103.97	109.30
2	G	3	SIA	C6-C5-N5	-2.14	107.36	110.91
2	K	3	SIA	C8-C7-C6	-2.12	109.01	113.03
2	K	2	GAL	C1-O5-C5	-2.09	109.36	112.19
2	H	3	SIA	C4-C3-C2	2.08	113.54	109.81
2	F	1	NAG	O7-C7-N2	-2.06	118.17	121.95
2	K	3	SIA	C11-C10-N5	2.05	119.56	116.10
2	K	2	GAL	C2-C3-C4	2.03	114.40	110.89

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	H	1	NAG	C3-C2-N2-C7
2	G	1	NAG	C1-C2-N2-C7
2	G	2	GAL	C4-C5-C6-O6
2	H	1	NAG	O5-C5-C6-O6
2	G	2	GAL	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
2	H	1	NAG	C8-C7-N2-C2
2	H	1	NAG	O7-C7-N2-C2
2	J	3	SIA	C11-C10-N5-C5
2	J	3	SIA	O10-C10-N5-C5
2	G	1	NAG	C8-C7-N2-C2
2	G	1	NAG	O7-C7-N2-C2
2	F	1	NAG	C8-C7-N2-C2
2	F	1	NAG	O7-C7-N2-C2
2	F	2	GAL	C4-C5-C6-O6
2	K	1	NAG	O5-C5-C6-O6
2	H	1	NAG	C4-C5-C6-O6
2	K	1	NAG	C3-C2-N2-C7
2	I	2	GAL	O5-C5-C6-O6
2	J	1	NAG	C4-C5-C6-O6
2	K	2	GAL	O5-C5-C6-O6
2	H	2	GAL	O5-C5-C6-O6
2	F	2	GAL	O5-C5-C6-O6
2	K	1	NAG	C1-C2-N2-C7
2	J	1	NAG	O5-C5-C6-O6
2	F	1	NAG	C3-C2-N2-C7
2	G	1	NAG	C3-C2-N2-C7
2	H	3	SIA	O7-C7-C8-C9
2	K	1	NAG	C4-C5-C6-O6
2	G	1	NAG	O5-C5-C6-O6
2	G	3	SIA	O7-C7-C8-C9
2	F	1	NAG	C1-C2-N2-C7

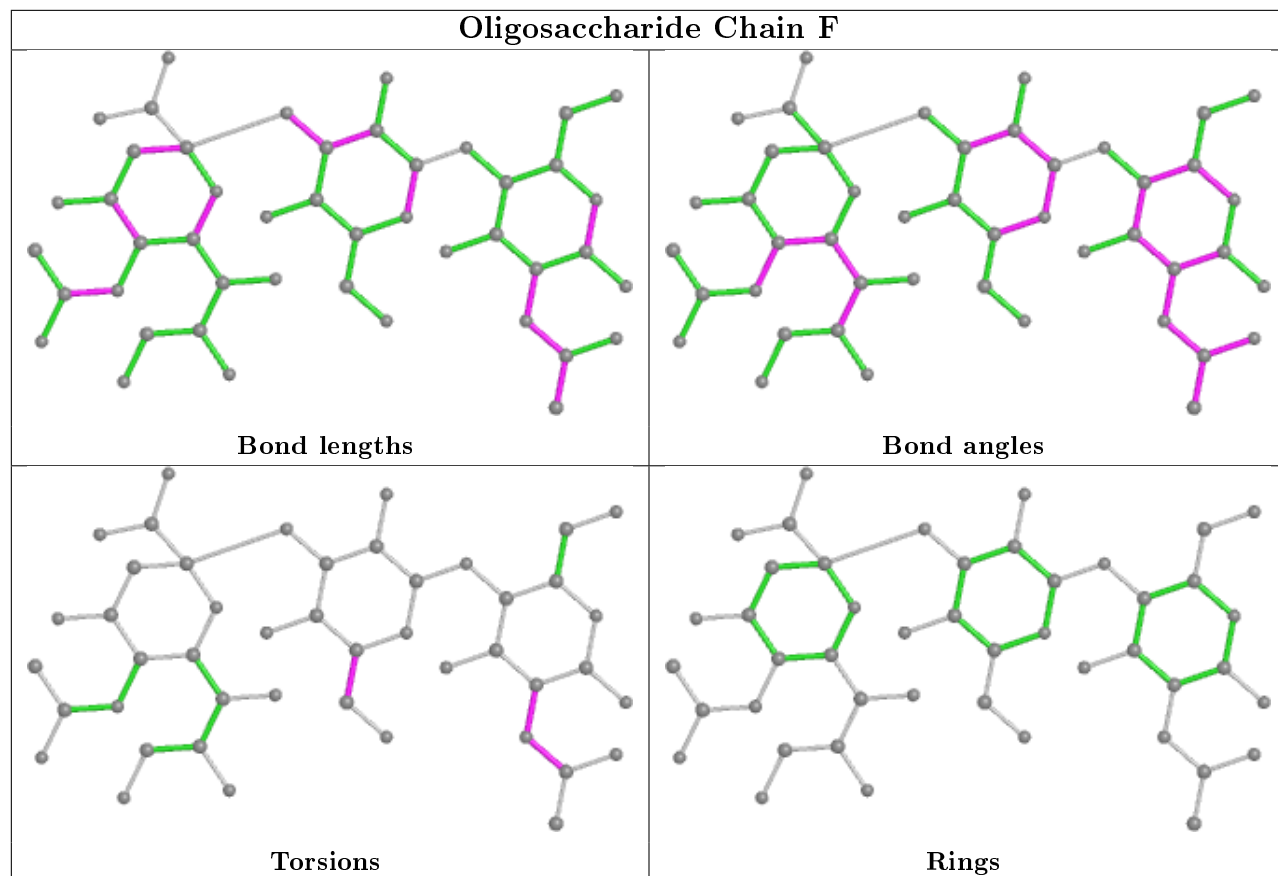
There are no ring outliers.

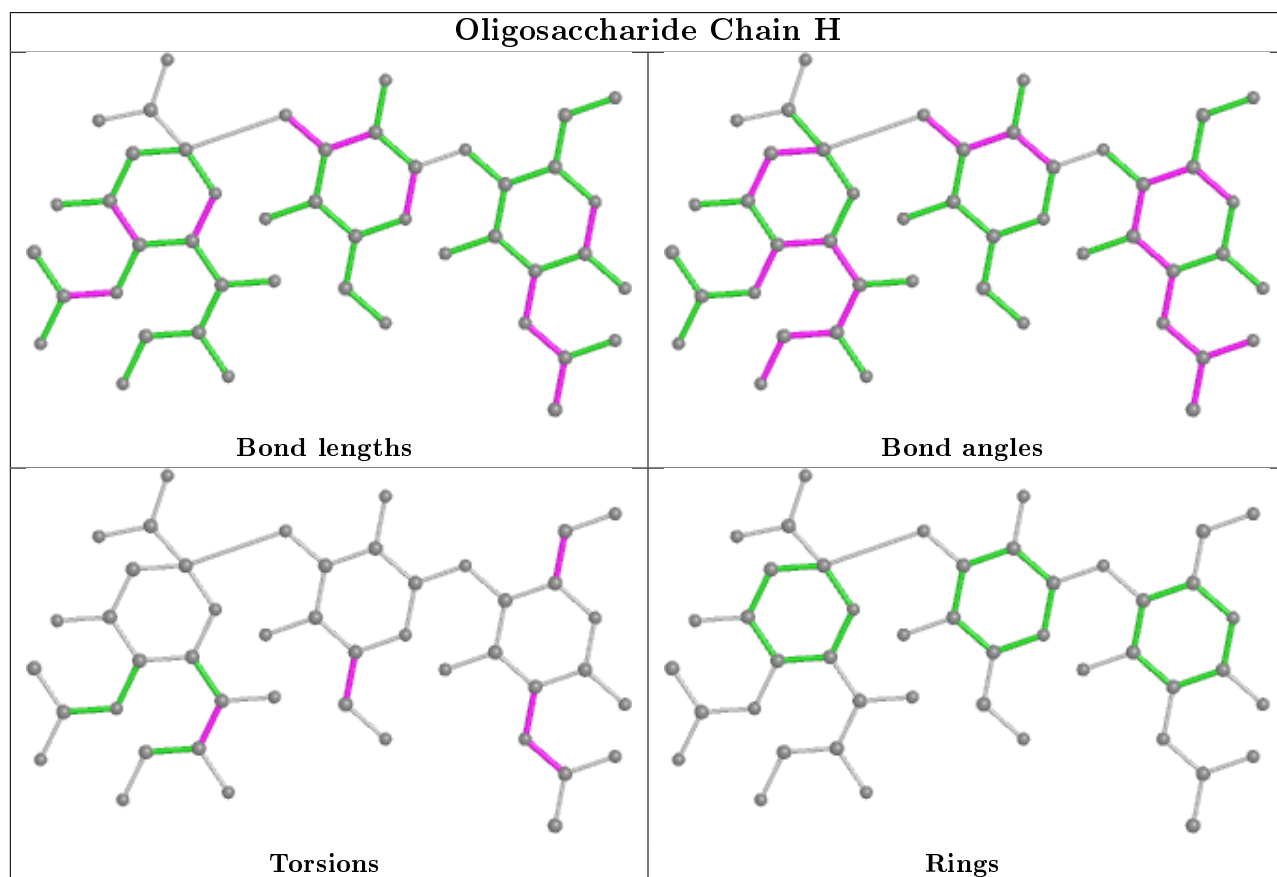
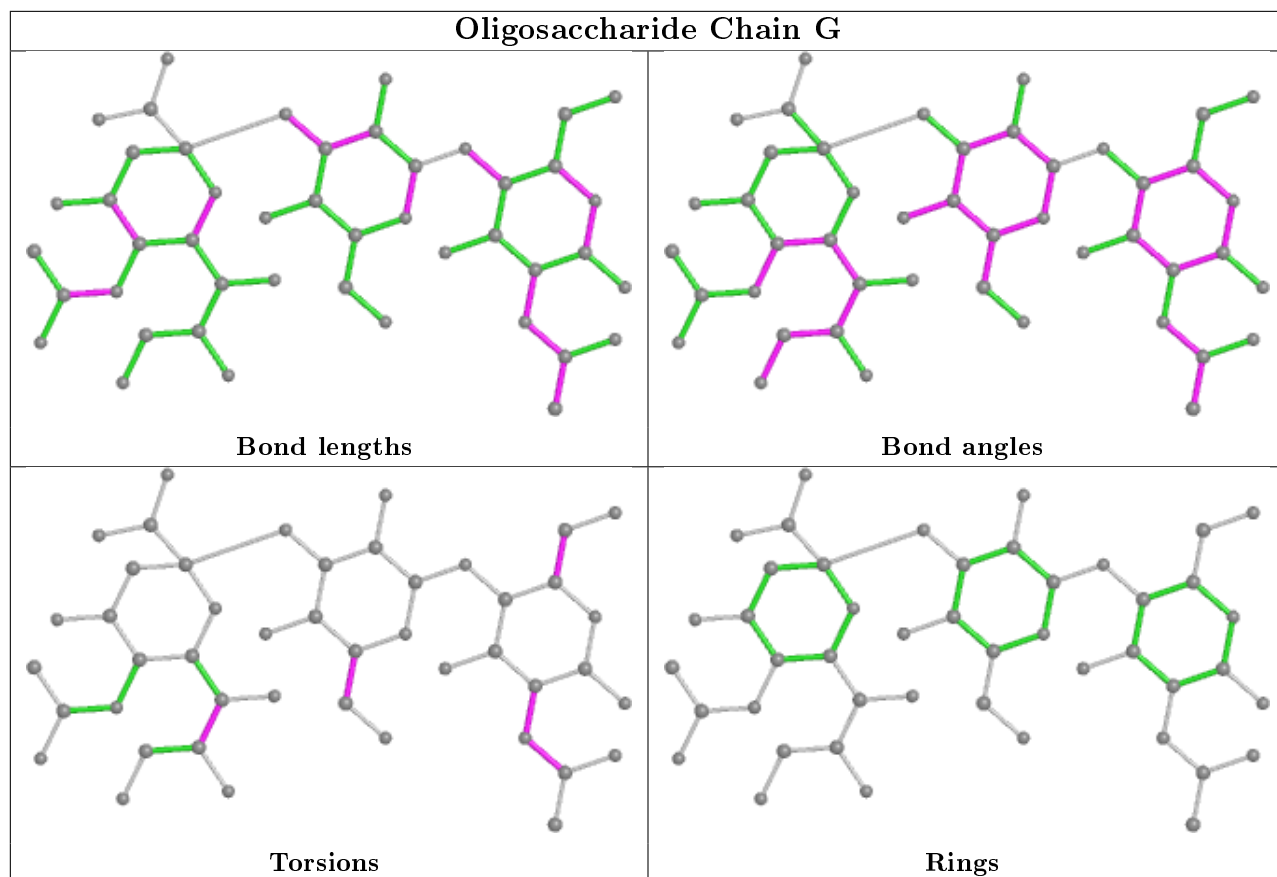
9 monomers are involved in 13 short contacts:

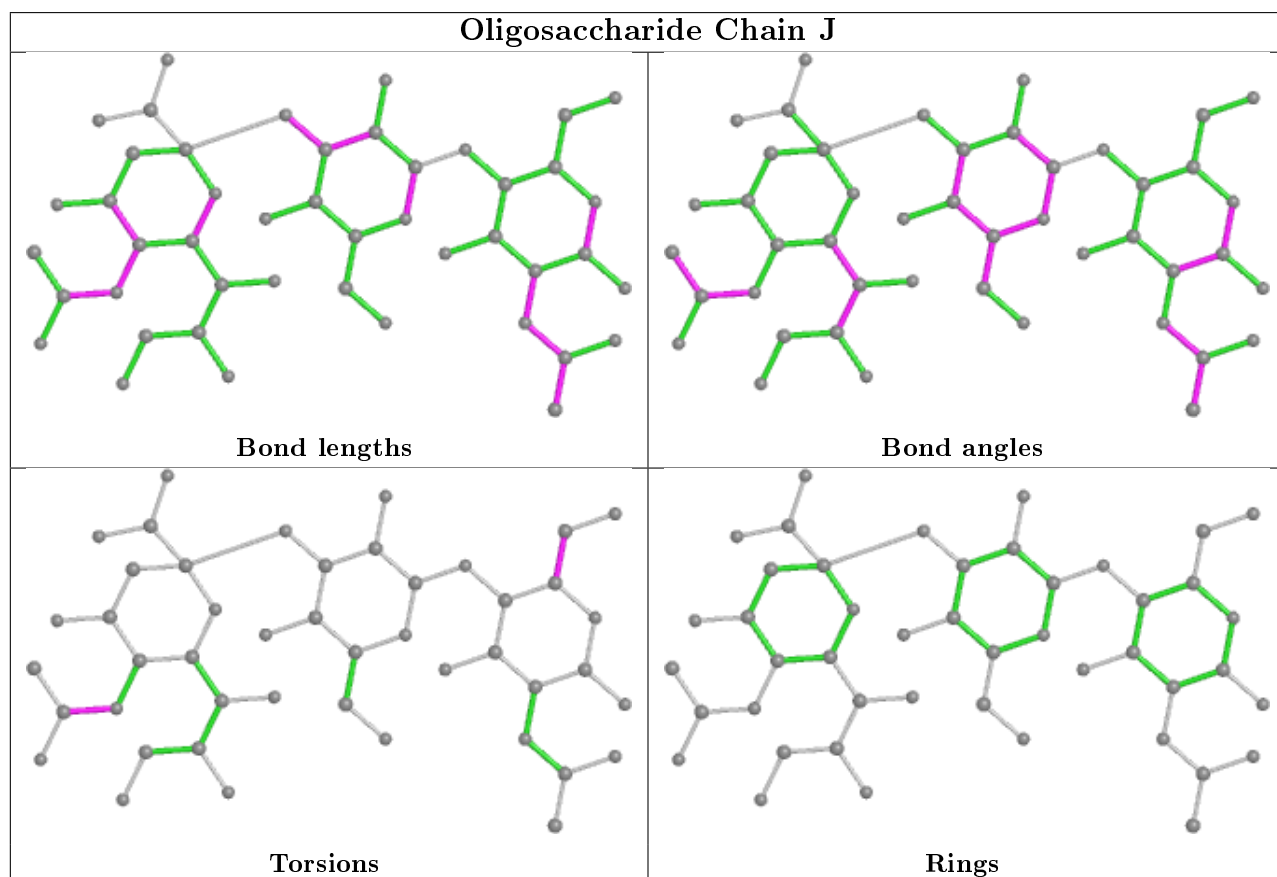
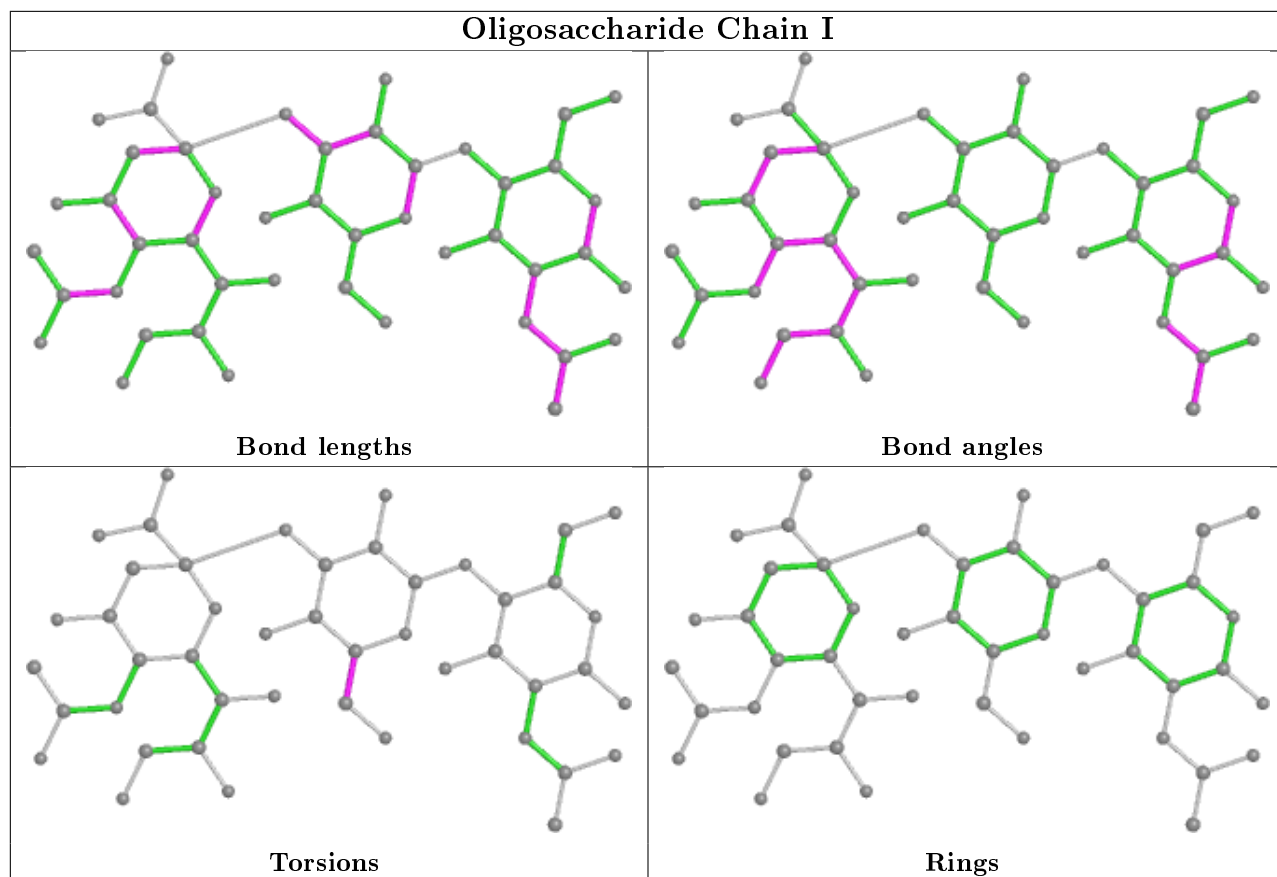
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	I	1	NAG	1	0
2	K	3	SIA	1	0
2	H	1	NAG	1	0
2	J	3	SIA	5	0
2	G	2	GAL	4	0
2	G	1	NAG	2	0
2	I	2	GAL	1	0
2	F	1	NAG	1	0
2	F	2	GAL	1	0

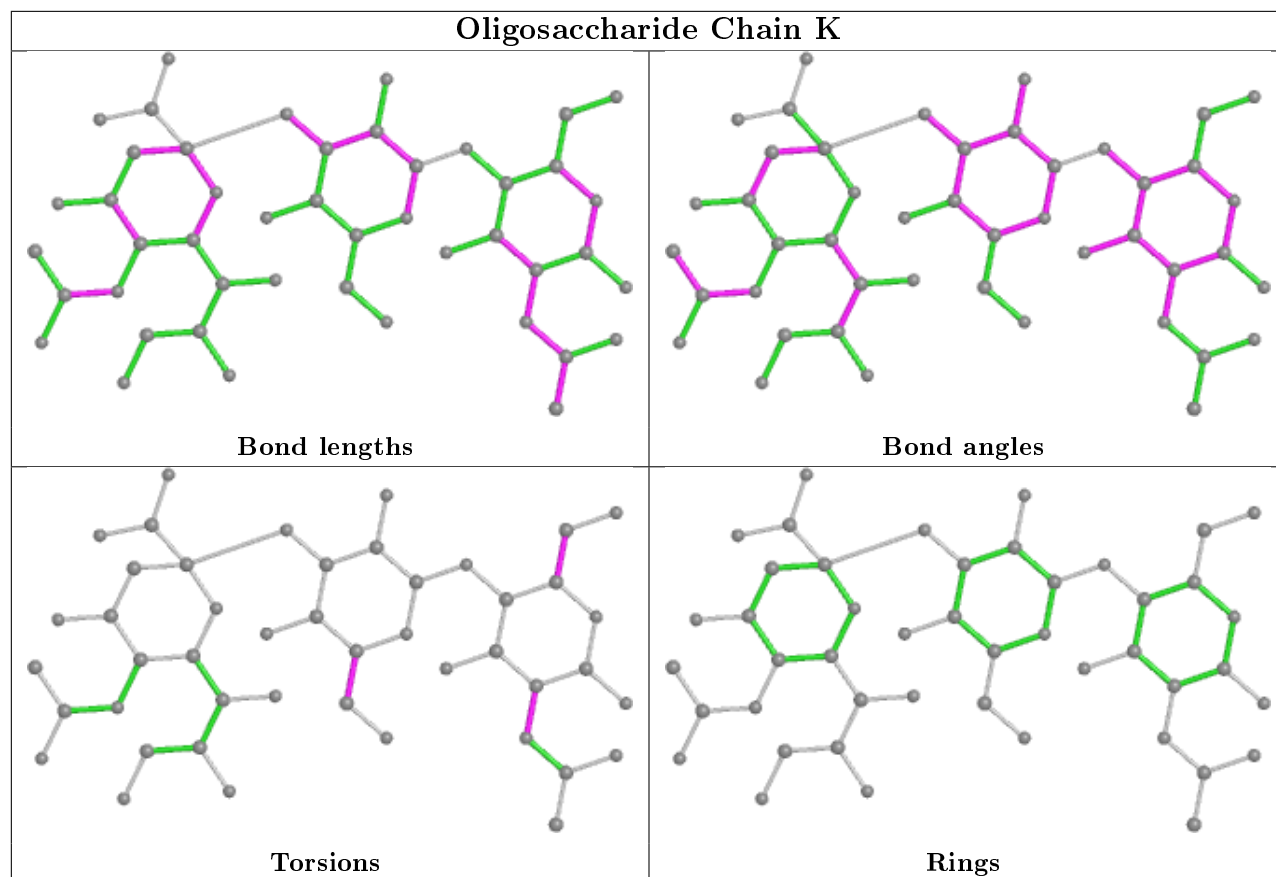
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for oligosaccharide.









5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	114/145 (78%)	-0.20	0 100 100	5, 7, 14, 19	0
1	B	115/145 (79%)	-0.02	2 (1%) 70 70	5, 9, 18, 42	0
1	C	114/145 (78%)	-0.09	4 (3%) 44 42	5, 8, 18, 45	0
1	D	114/145 (78%)	0.04	3 (2%) 56 55	5, 11, 20, 32	0
1	E	114/145 (78%)	0.08	2 (1%) 68 68	8, 13, 28, 33	0
All	All	571/725 (78%)	-0.04	11 (1%) 66 67	5, 10, 20, 45	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	138	LEU	9.8
1	D	110[A]	TYR	4.6
1	C	131	THR	4.5
1	D	131	THR	3.9
1	D	130	ALA	3.0
1	C	132	GLN	2.8
1	C	129	SER	2.7
1	C	130	ALA	2.6
1	E	131	THR	2.4
1	B	132	GLN	2.3
1	E	29	LYS	2.0

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](#)

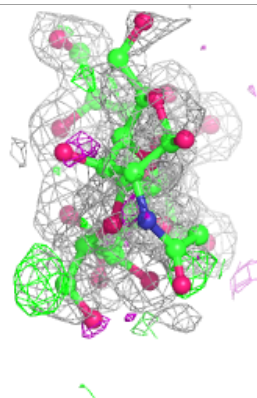
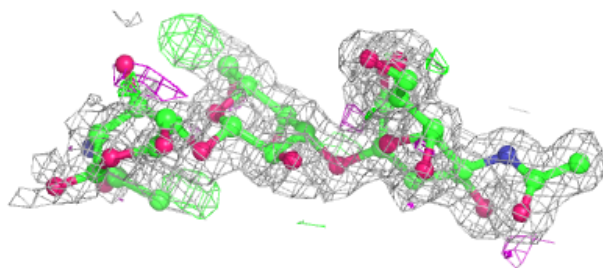
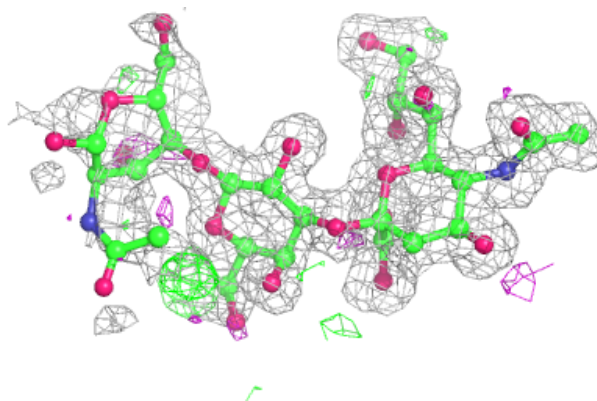
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	NAG	K	1	15/15	0.32	0.79	63,79,85,85	0
2	NAG	J	1	15/15	0.38	0.53	60,78,85,88	0
2	GAL	K	2	11/12	0.47	0.54	50,67,72,79	0
2	GAL	J	2	11/12	0.48	0.48	80,89,93,97	0
2	NAG	G	1	15/15	0.49	0.55	52,61,67,69	0
2	SIA	J	3	20/21	0.50	0.23	53,71,90,97	0
2	NAG	H	1	15/15	0.56	0.53	42,61,66,70	0
2	NAG	F	1	15/15	0.64	0.42	30,56,68,69	0
2	NAG	I	1	15/15	0.68	0.34	42,51,58,61	0
2	GAL	G	2	11/12	0.80	0.34	18,39,48,52	0
2	SIA	K	3	20/21	0.88	0.17	21,26,33,34	0
2	GAL	H	2	11/12	0.90	0.22	14,27,38,38	0
2	GAL	I	2	11/12	0.91	0.17	18,24,30,35	0
2	SIA	F	3	20/21	0.93	0.11	8,10,16,19	0
2	SIA	I	3	20/21	0.93	0.13	10,16,20,23	0
2	GAL	F	2	11/12	0.93	0.16	8,17,21,38	0
2	SIA	G	3	20/21	0.94	0.12	10,15,21,29	0
2	SIA	H	3	20/21	0.96	0.09	10,12,19,23	0

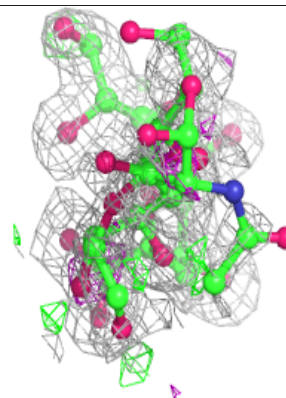
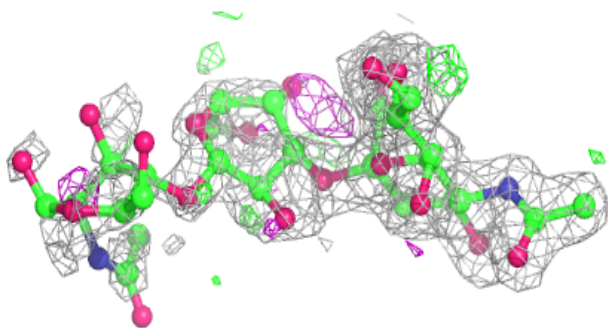
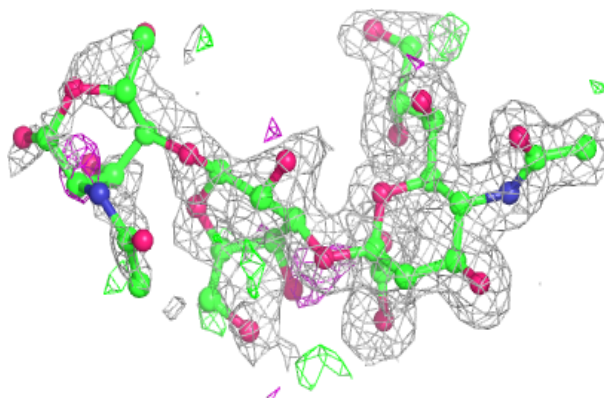
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain F:

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

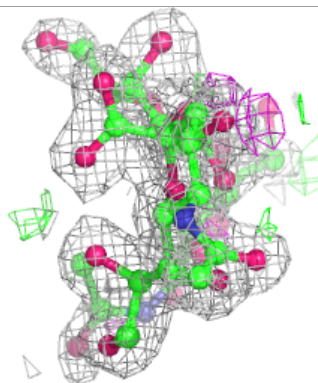
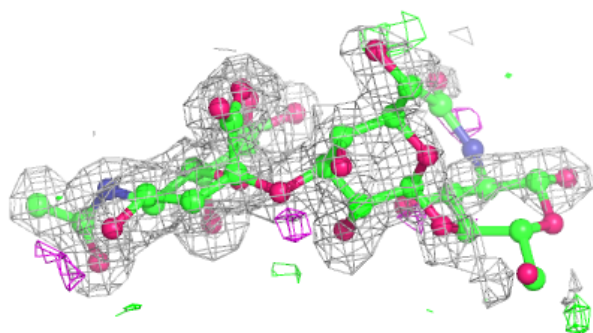
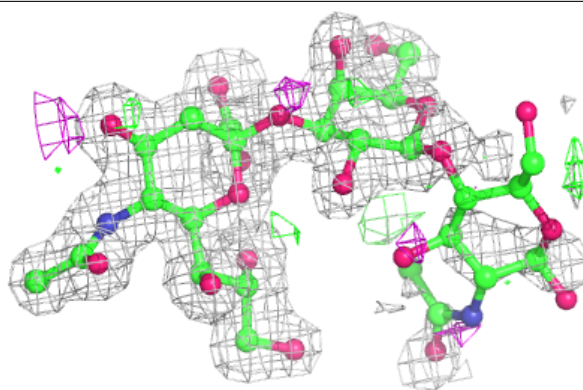
**Electron density around Chain G:**

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

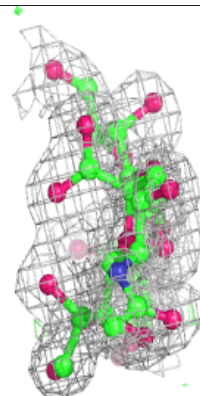
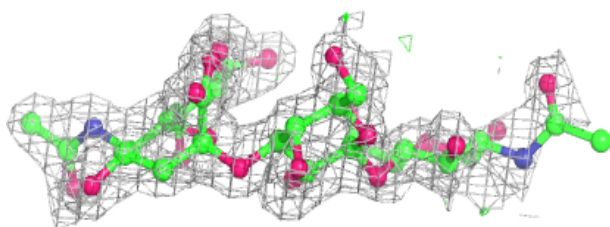
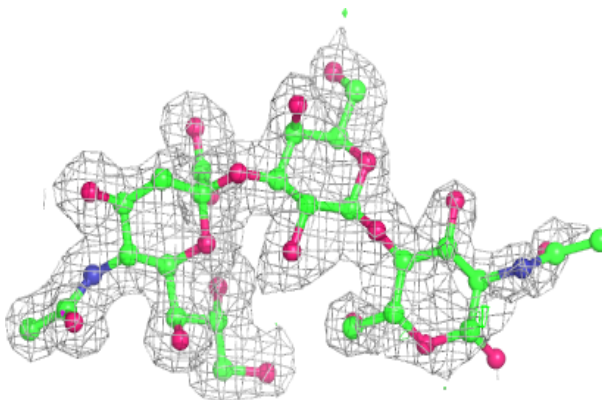


Electron density around Chain H:

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

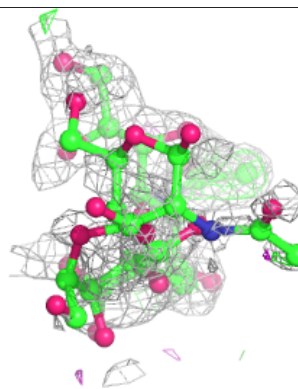
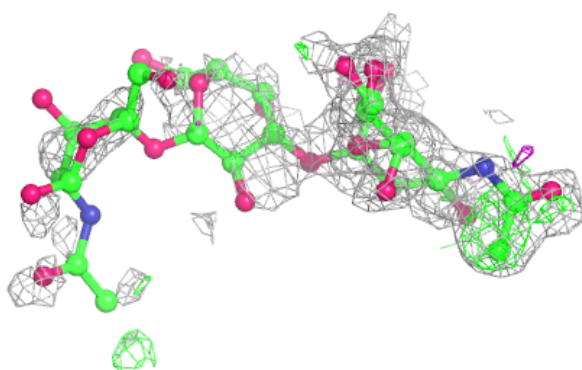
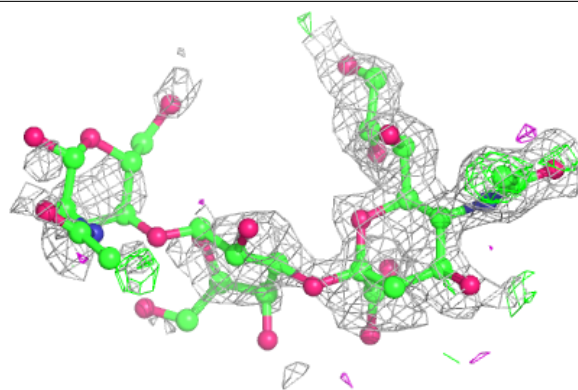
**Electron density around Chain I:**

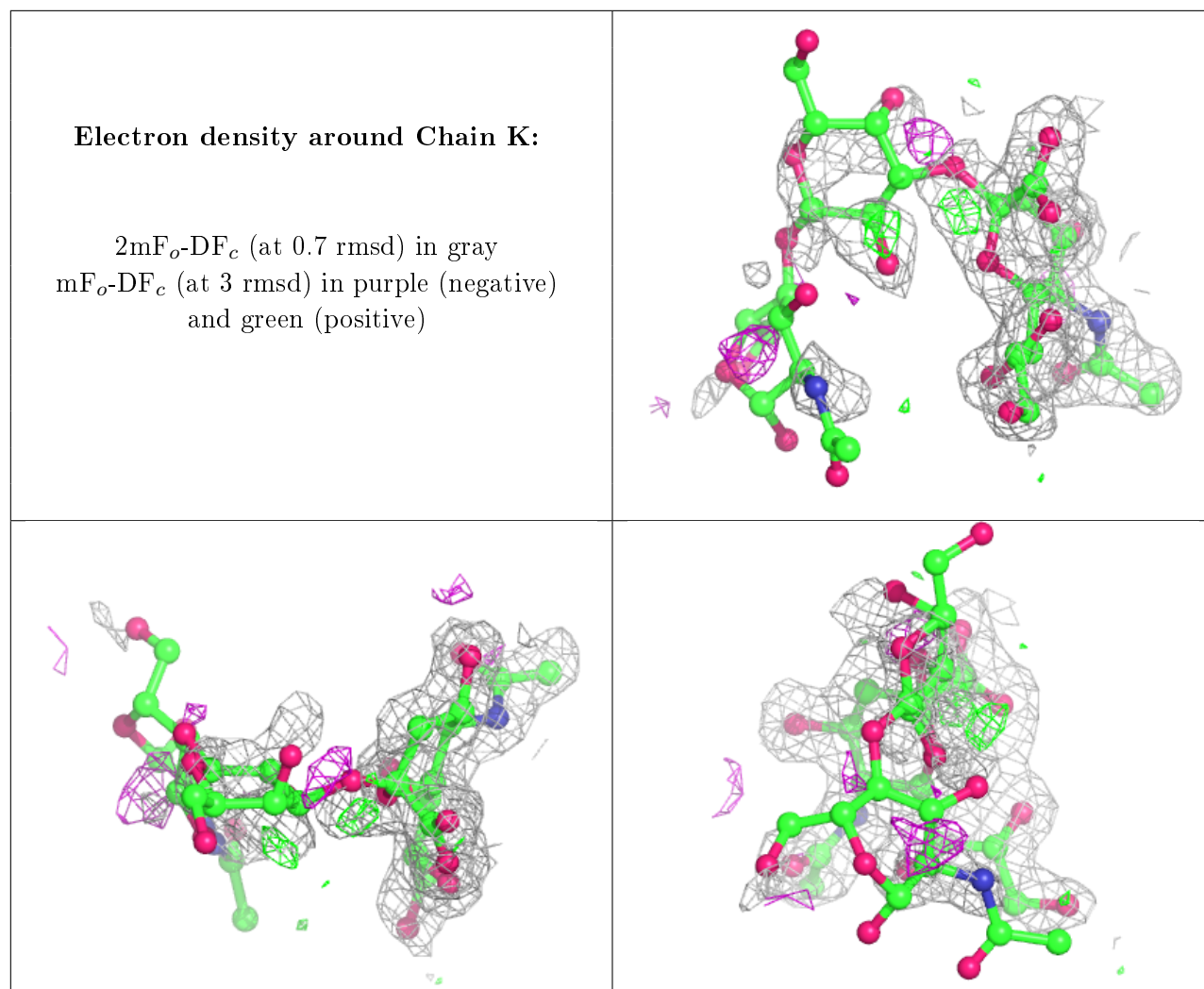
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



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)





6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.