



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 24, 2024 – 01:08 pm BST

PDB ID : 8RMJ
Title : Drosophila Semaphorin 2b in complex with glycosaminoglycan mimic SOS
Authors : Nourisanami, F.; Sobol, M.; Rozbesky, D.
Deposited on : 2024-01-08
Resolution : 2.79 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.37.1
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) : 2.37.1

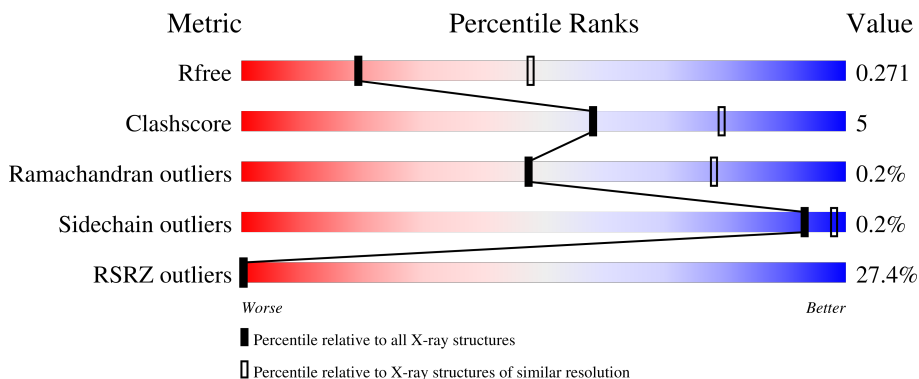
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.79 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	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

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	657	
2	B	2	
3	C	7	
4	D	9	
5	E	4	

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Mol	Chain	Length	Quality of chain
6	F	2	 50% 50%
6	G	2	 100%

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 5353 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 FI18622p1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	616	4935	3128	855	920	32	0	0	0

There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	32	GLU	-	expression tag	UNP A1ZAF5
A	33	THR	-	expression tag	UNP A1ZAF5
A	34	GLY	-	expression tag	UNP A1ZAF5
A	132	LYS	-	insertion	UNP A1ZAF5
A	680	GLY	-	expression tag	UNP A1ZAF5
A	681	THR	-	expression tag	UNP A1ZAF5
A	682	LYS	-	expression tag	UNP A1ZAF5
A	683	HIS	-	expression tag	UNP A1ZAF5
A	684	HIS	-	expression tag	UNP A1ZAF5
A	685	HIS	-	expression tag	UNP A1ZAF5
A	686	HIS	-	expression tag	UNP A1ZAF5
A	687	HIS	-	expression tag	UNP A1ZAF5
A	688	HIS	-	expression tag	UNP A1ZAF5

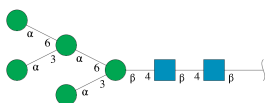
- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	2	28	16	2	10	0	0	0

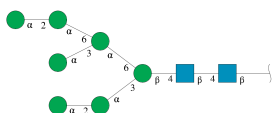
- Molecule 3 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyran

ose-(1-6)]alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]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	C	7	83	46	2	35	0	0	0

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



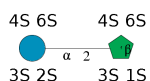
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	D	9	105	58	2	45	0	0	0

- Molecule 5 is an oligosaccharide called 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.



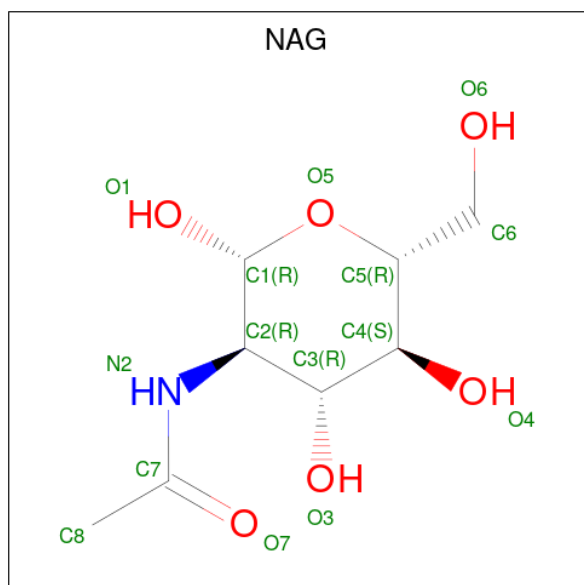
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
5	E	4	50	28	2	20	0	0	0

- Molecule 6 is an oligosaccharide called 1,3,4,6-tetra-O-sulfo-beta-D-fructofuranose-(2-1)-2,3,4,6-tetra-O-sulfonato-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
6	F	2	Total	C	O	S	0	0	0
			55	12	35	8			
6	G	2	Total	C	O	S	0	0	0
			55	12	35	8			

- Molecule 7 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).

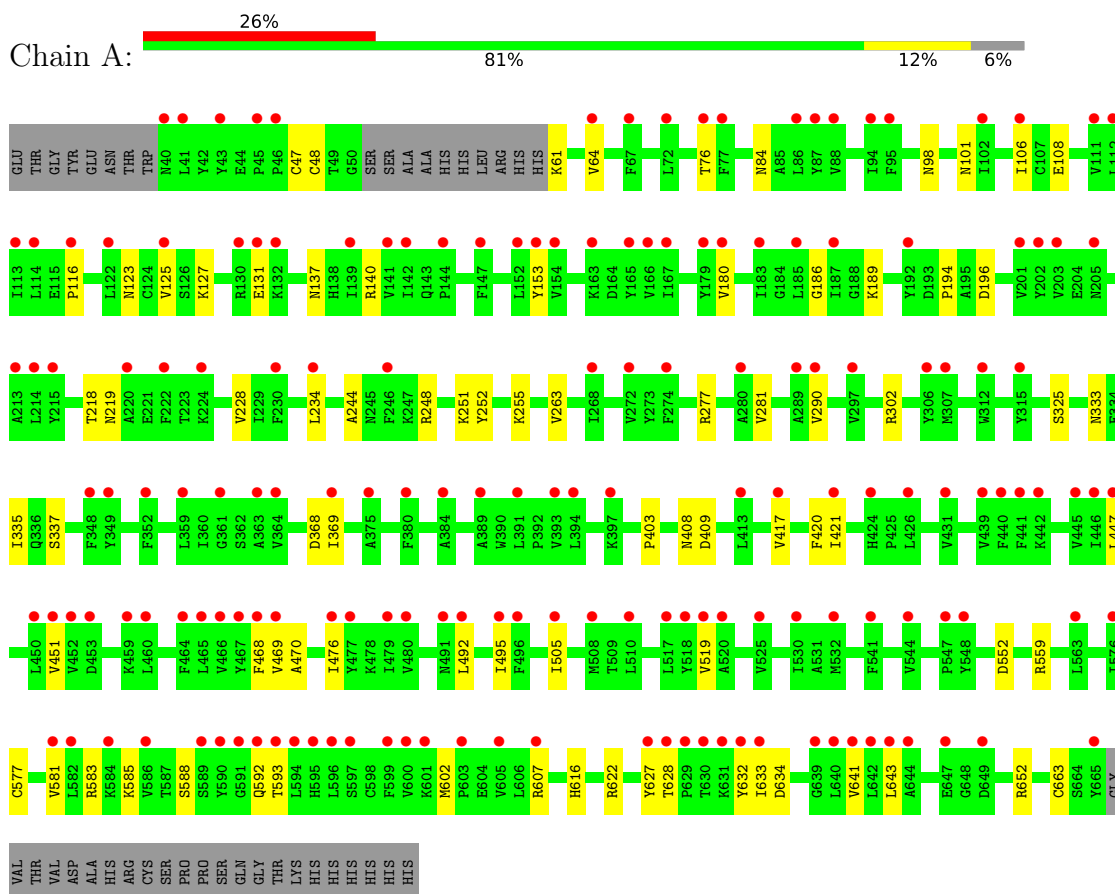


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	A	1	Total	C	N	O	0	0
			14	8	1	5		
7	A	1	Total	C	N	O	0	0
			14	8	1	5		
7	A	1	Total	C	N	O	0	0
			14	8	1	5		

3 Residue-property plots i

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

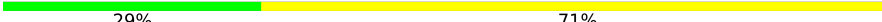
- Molecule 1: FI18622p1



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

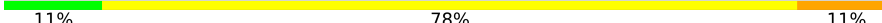


- Molecule 3: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:  29% 71%

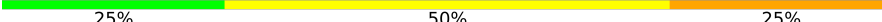


- Molecule 4: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:  11% 78% 11%



- Molecule 5: 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:  25% 50% 25%



- Molecule 6: 1,3,4,6-tetra-O-sulfo-beta-D-fructofuranose-(2-1)-2,3,4,6-tetra-O-sulfonato-alpha-D-glucopyranose

Chain F:  50% 50%



- Molecule 6: 1,3,4,6-tetra-O-sulfo-beta-D-fructofuranose-(2-1)-2,3,4,6-tetra-O-sulfonato-alpha-D-glucopyranose

Chain G:  100%



4 Data and refinement statistics i

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α , β , γ	181.49Å 181.49Å 168.38Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	45.67 – 2.79 157.17 – 2.79	Depositor EDS
% Data completeness (in resolution range)	56.7 (45.67-2.79) 53.5 (157.17-2.79)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.58 (at 2.77Å)	Xtrriage
Refinement program	PHENIX 1.19_4092, PHENIX 1.19_4092	Depositor
R, R_{free}	0.246 , 0.274 0.245 , 0.271	Depositor DCC
R_{free} test set	1193 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å ²)	89.1	Xtrriage
Anisotropy	0.125	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 61.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	5353	wwPDB-VP
Average B, all atoms (Å ²)	91.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% 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: BMA, MAN, YYJ, GU4, 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	0.24	0/5055	0.49	0/6845

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	4935	0	4785	49	0
2	B	28	0	25	0	0
3	C	83	0	70	1	0
4	D	105	0	88	1	0
5	E	50	0	43	1	0
6	F	55	0	6	1	0
6	G	55	0	6	3	0
7	A	42	0	39	0	0
All	All	5353	0	5062	50	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 5.

All (50) close contacts within the same asymmetric unit are listed below, sorted by their clash

magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:248:ARG:HH12	1:A:251:LYS:HB2	1.55	0.70
1:A:652:ARG:N	6:G:2:YYJ:O1S6	2.27	0.67
1:A:633:ILE:HB	1:A:641:VAL:HB	1.75	0.67
1:A:552:ASP:OD2	1:A:559:ARG:NH2	2.29	0.64
1:A:588:SER:OG	1:A:592:GLN:NE2	2.30	0.64
1:A:186:GLY:HA2	1:A:189:LYS:HD2	1.78	0.64
1:A:302:ARG:HD3	1:A:409:ASP:HA	1.80	0.64
1:A:228:VAL:HG21	1:A:248:ARG:HB2	1.83	0.60
1:A:61:LYS:NZ	6:F:1:GU4:O26	2.34	0.59
1:A:116:PRO:HG3	1:A:137:ASN:HB2	1.85	0.58
1:A:140:ARG:NH1	1:A:194:PRO:O	2.37	0.57
1:A:447:LEU:HD13	1:A:469:VAL:HG11	1.87	0.56
1:A:628:THR:H	1:A:632:TYR:HB2	1.71	0.55
1:A:277:ARG:HB3	1:A:335:ILE:HG22	1.89	0.54
1:A:106:ILE:HG22	1:A:108:GLU:H	1.73	0.54
1:A:492:LEU:HD21	1:A:495:ILE:HD11	1.90	0.54
1:A:123:ASN:O	1:A:127:LYS:HG2	2.10	0.52
1:A:196:ASP:HA	3:C:1:NAG:H82	1.92	0.52
1:A:234:LEU:HB2	1:A:244:ALA:HB3	1.92	0.51
1:A:616:HIS:ND1	1:A:622:ARG:HG3	2.26	0.51
1:A:451:VAL:HG23	1:A:468:PHE:HB2	1.93	0.49
1:A:84:ASN:ND2	1:A:98:ASN:OD1	2.39	0.49
1:A:505:ILE:HG23	1:A:519:VAL:HG13	1.94	0.49
1:A:652:ARG:NH1	6:G:1:GU4:O21	2.46	0.49
1:A:403:PRO:HB3	1:A:421:ILE:HB	1.94	0.48
1:A:408:ASN:N	1:A:408:ASN:OD1	2.46	0.48
1:A:251:LYS:HE2	1:A:252:TYR:CZ	2.48	0.48
1:A:263:VAL:HB	1:A:337:SER:HA	1.96	0.48
1:A:218:THR:OG1	1:A:219:ASN:N	2.45	0.46
1:A:368:ASP:OD1	1:A:369:ILE:N	2.49	0.46
1:A:634:ASP:OD1	1:A:634:ASP:N	2.42	0.46
1:A:593:THR:OG1	1:A:643:LEU:HA	2.17	0.45
1:A:403:PRO:HG3	1:A:417:VAL:HG13	1.97	0.45
1:A:581:VAL:HG13	1:A:663:CYS:HA	1.98	0.45
1:A:125:VAL:HG22	1:A:131:GLU:HB3	1.97	0.45
1:A:290:VAL:O	1:A:333:ASN:HB3	2.17	0.45
1:A:403:PRO:HG2	1:A:420:PHE:CD2	2.52	0.45
1:A:602:MET:HB3	1:A:607:ARG:HG2	2.00	0.44
1:A:153:TYR:OH	1:A:189:LYS:HD3	2.17	0.44
1:A:577:CYS:O	1:A:581:VAL:HG23	2.18	0.44
1:A:48:CYS:HB3	1:A:64:VAL:HG21	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:47:CYS:HA	1:A:48:CYS:HA	1.63	0.43
1:A:325:SER:OG	4:D:2:NAG:O7	2.33	0.43
1:A:98:ASN:HB3	1:A:101:ASN:O	2.19	0.42
1:A:583:ARG:HH22	1:A:652:ARG:HG3	1.85	0.42
1:A:585:LYS:HE3	6:G:2:YYJ:S4	2.59	0.42
1:A:627:TYR:CE1	1:A:634:ASP:HB3	2.54	0.42
1:A:255:LYS:HD3	1:A:281:VAL:HG11	2.02	0.42
1:A:470:ALA:HA	1:A:476:ILE:HD13	2.01	0.41
5:E:2:NAG:H4	5:E:3:BMA:H2	1.65	0.41

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	612/657 (93%)	575 (94%)	36 (6%)	1 (0%)	47 78

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	76	THR

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	545/580 (94%)	544 (100%)	1 (0%)	93 98

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	180	VAL

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

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](#)

26 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	B	1	1,2	14,14,15	0.21	0	17,19,21	0.56	0
2	NAG	B	2	2	14,14,15	0.81	1 (7%)	17,19,21	1.56	3 (17%)
3	NAG	C	1	1,3	14,14,15	0.36	0	17,19,21	0.47	0
3	NAG	C	2	3	14,14,15	0.34	0	17,19,21	0.49	0
3	BMA	C	3	3	11,11,12	0.62	0	15,15,17	0.75	0
3	MAN	C	4	3	11,11,12	0.80	0	15,15,17	0.90	1 (6%)
3	MAN	C	5	3	11,11,12	0.64	0	15,15,17	0.95	2 (13%)
3	MAN	C	6	3	11,11,12	1.62	2 (18%)	15,15,17	2.07	3 (20%)
3	MAN	C	7	3	11,11,12	0.67	0	15,15,17	1.11	2 (13%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NAG	D	1	1,4	14,14,15	0.18	0	17,19,21	0.51	0
4	NAG	D	2	4	14,14,15	0.28	0	17,19,21	0.90	1 (5%)
4	BMA	D	3	4	11,11,12	0.85	1 (9%)	15,15,17	0.88	0
4	MAN	D	4	4	11,11,12	0.85	0	15,15,17	0.99	2 (13%)
4	MAN	D	5	4	11,11,12	0.71	0	15,15,17	1.22	2 (13%)
4	MAN	D	6	4	11,11,12	0.76	0	15,15,17	0.91	1 (6%)
4	MAN	D	7	4	11,11,12	0.81	0	15,15,17	0.87	1 (6%)
4	MAN	D	8	4	11,11,12	0.85	1 (9%)	15,15,17	0.88	1 (6%)
4	MAN	D	9	4	11,11,12	0.72	0	15,15,17	0.94	2 (13%)
5	NAG	E	1	1,5	14,14,15	0.41	0	17,19,21	0.52	0
5	NAG	E	2	5	14,14,15	0.22	0	17,19,21	0.53	0
5	BMA	E	3	5	11,11,12	0.68	0	15,15,17	0.98	1 (6%)
5	MAN	E	4	5	11,11,12	0.66	0	15,15,17	1.02	2 (13%)
6	GU4	F	1	6	27,27,28	1.94	6 (22%)	29,43,45	1.47	6 (20%)
6	YYJ	F	2	6	27,28,28	3.24	10 (37%)	28,46,46	1.18	3 (10%)
6	GU4	G	1	6	27,27,28	2.01	7 (25%)	29,43,45	1.78	12 (41%)
6	YYJ	G	2	6	27,28,28	3.22	9 (33%)	28,46,46	1.47	6 (21%)

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	B	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	B	2	2	-	1/6/23/26	0/1/1/1
3	NAG	C	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	C	2	3	-	0/6/23/26	0/1/1/1
3	BMA	C	3	3	-	2/2/19/22	0/1/1/1
3	MAN	C	4	3	-	1/2/19/22	0/1/1/1
3	MAN	C	5	3	-	2/2/19/22	0/1/1/1
3	MAN	C	6	3	-	1/2/19/22	0/1/1/1
3	MAN	C	7	3	-	0/2/19/22	0/1/1/1
4	NAG	D	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	D	2	4	-	0/6/23/26	0/1/1/1
4	BMA	D	3	4	-	0/2/19/22	0/1/1/1
4	MAN	D	4	4	-	0/2/19/22	0/1/1/1
4	MAN	D	5	4	-	0/2/19/22	0/1/1/1
4	MAN	D	6	4	-	0/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	MAN	D	7	4	-	0/2/19/22	0/1/1/1
4	MAN	D	8	4	-	1/2/19/22	0/1/1/1
4	MAN	D	9	4	-	0/2/19/22	0/1/1/1
5	NAG	E	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	E	2	5	-	0/6/23/26	0/1/1/1
5	BMA	E	3	5	-	0/2/19/22	0/1/1/1
5	MAN	E	4	5	-	0/2/19/22	0/1/1/1
6	GU4	F	1	6	-	6/21/38/41	0/1/1/1
6	YYJ	F	2	6	-	17/23/42/42	0/1/1/1
6	GU4	G	1	6	-	11/21/38/41	0/1/1/1
6	YYJ	G	2	6	-	3/23/42/42	0/1/1/1

All (37) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	F	2	YYJ	O5-C5	8.11	1.61	1.43
6	G	2	YYJ	O5-C5	7.97	1.61	1.43
6	G	2	YYJ	O5-C2	-7.44	1.31	1.43
6	F	2	YYJ	O5-C2	-7.31	1.32	1.43
6	F	2	YYJ	C4-C5	-6.48	1.35	1.52
6	G	2	YYJ	C4-C5	-6.26	1.36	1.52
6	G	2	YYJ	O3-C3	-6.01	1.35	1.47
6	F	2	YYJ	O3-C3	-5.81	1.35	1.47
6	G	1	GU4	O5-C1	4.67	1.51	1.43
6	G	1	GU4	O6-S6	4.44	1.69	1.56
6	F	1	GU4	O6-S6	4.33	1.68	1.56
6	F	1	GU4	O5-C1	4.28	1.50	1.43
3	C	6	MAN	C1-C2	4.17	1.61	1.52
6	F	2	YYJ	O2-C2	4.03	1.47	1.40
6	F	2	YYJ	O6-S6	3.92	1.67	1.56
6	G	1	GU4	O3-S3	3.79	1.68	1.57
6	G	2	YYJ	O2-C2	3.78	1.47	1.40
6	G	2	YYJ	O6-S6	3.70	1.66	1.56
6	F	1	GU4	O3-S3	3.66	1.68	1.57
6	G	2	YYJ	O1-S1	3.50	1.66	1.56
6	F	2	YYJ	O1-S1	3.44	1.66	1.56
6	G	2	YYJ	O4-S4	3.14	1.66	1.57
6	F	2	YYJ	O4-S4	3.11	1.66	1.57
6	F	2	YYJ	O3-S3	3.02	1.66	1.57
6	F	1	GU4	O4-S4	2.98	1.66	1.57
6	G	2	YYJ	O3-S3	2.96	1.66	1.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	6	MAN	O5-C1	2.95	1.48	1.43
6	G	1	GU4	O2-S2	2.78	1.65	1.57
6	G	1	GU4	O4-S4	2.73	1.65	1.57
6	F	1	GU4	O2-S2	2.69	1.65	1.57
2	B	2	NAG	O5-C1	2.64	1.47	1.43
6	F	1	GU4	O2-C2	-2.63	1.43	1.47
6	G	1	GU4	O2-C2	-2.59	1.43	1.47
4	D	3	BMA	O5-C1	-2.36	1.39	1.43
6	G	1	GU4	O5-C5	2.17	1.47	1.43
4	D	8	MAN	O5-C1	-2.10	1.40	1.43
6	F	2	YYJ	O1-C1	-2.04	1.42	1.45

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	6	MAN	C1-O5-C5	6.32	120.75	112.19
2	B	2	NAG	C1-O5-C5	4.80	118.69	112.19
3	C	6	MAN	C1-C2-C3	3.46	113.92	109.67
6	G	1	GU4	C4-O4-S4	-3.17	112.76	118.88
6	F	1	GU4	C1-C2-C3	3.14	114.10	109.40
4	D	5	MAN	C1-O5-C5	3.11	116.41	112.19
4	D	5	MAN	O2-C2-C3	-3.04	104.04	110.14
3	C	7	MAN	C1-O5-C5	2.93	116.17	112.19
6	G	1	GU4	O5-C5-C6	2.90	114.04	107.61
6	G	2	YYJ	O5-C5-C4	2.86	108.27	103.49
6	G	2	YYJ	O3S3-S3-O2S3	-2.86	100.75	112.22
6	F	1	GU4	O27-S3-O28	-2.80	100.97	112.22
6	F	1	GU4	O5-C1-C2	2.77	115.02	109.41
6	G	2	YYJ	O3S6-S6-O2S6	-2.71	101.34	112.22
6	G	1	GU4	O23-S6-O22	-2.69	101.43	112.22
6	G	1	GU4	O2-C2-C3	2.66	109.59	106.65
4	D	2	NAG	C1-O5-C5	2.65	115.78	112.19
3	C	6	MAN	O2-C2-C3	-2.55	105.03	110.14
6	G	1	GU4	C3-O3-S3	-2.54	113.97	118.88
5	E	4	MAN	C1-O5-C5	2.43	115.49	112.19
6	G	1	GU4	C3-C4-C5	-2.38	105.58	110.55
6	G	2	YYJ	O1S4-S4-O3S4	-2.37	100.24	108.49
4	D	6	MAN	O2-C2-C3	-2.33	105.47	110.14
4	D	4	MAN	O2-C2-C3	-2.32	105.48	110.14
2	B	2	NAG	C1-C2-N2	2.29	114.40	110.49
6	F	1	GU4	O21-S6-O22	-2.29	100.54	108.49
3	C	5	MAN	O2-C2-C3	-2.28	105.56	110.14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	5	MAN	C1-O5-C5	2.27	115.27	112.19
4	D	9	MAN	O2-C2-C3	-2.27	105.58	110.14
3	C	7	MAN	O2-C2-C3	-2.25	105.63	110.14
5	E	4	MAN	O2-C2-C3	-2.23	105.67	110.14
6	G	1	GU4	O10-S2-O12	-2.20	100.84	108.49
6	F	2	YYJ	O1S1-S1-O2S1	-2.18	100.90	108.49
6	G	1	GU4	O29-S3-O28	-2.18	100.90	108.49
4	D	7	MAN	O2-C2-C3	-2.16	105.80	110.14
6	G	1	GU4	C2-O2-S2	-2.16	115.10	117.91
4	D	9	MAN	C1-O5-C5	2.15	115.10	112.19
6	F	1	GU4	O10-S2-O11	-2.14	101.04	108.49
6	G	1	GU4	O5-C1-C2	2.14	113.74	109.41
6	F	2	YYJ	O1S3-S3-O2S3	-2.13	101.08	108.49
4	D	8	MAN	O2-C2-C3	-2.13	105.88	110.14
3	C	4	MAN	O2-C2-C3	-2.13	105.88	110.14
6	G	2	YYJ	O6-S6-O2S6	2.10	113.25	106.88
6	G	1	GU4	C6-C5-C4	-2.09	108.14	113.33
6	F	2	YYJ	C4-O4-S4	-2.09	114.83	118.88
4	D	4	MAN	C1-O5-C5	2.04	114.96	112.19
5	E	3	BMA	C1-C2-C3	-2.04	107.16	109.67
2	B	2	NAG	C2-N2-C7	2.03	125.79	122.90
6	G	2	YYJ	O1S1-S1-O3S1	-2.02	101.48	108.49
6	G	1	GU4	O4-C4-C3	2.01	112.89	108.48
6	F	1	GU4	O24-S4-O25	-2.00	101.53	108.49

There are no chirality outliers.

All (45) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	2	NAG	C3-C2-N2-C7
6	F	1	GU4	O5-C5-C6-O6
6	F	1	GU4	C4-C5-C6-O6
6	F	1	GU4	C4-O4-S4-O24
6	F	1	GU4	C3-O3-S3-O27
6	F	2	YYJ	O1-C1-C2-O2
6	F	2	YYJ	O1-C1-C2-O5
6	F	2	YYJ	C4-C5-C6-O6
6	F	2	YYJ	C3-O3-S3-O1S3
6	F	2	YYJ	C3-O3-S3-O2S3
6	F	2	YYJ	C3-O3-S3-O3S3
6	F	2	YYJ	C4-O4-S4-O1S4
6	F	2	YYJ	C4-O4-S4-O3S4

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Mol	Chain	Res	Type	Atoms
6	G	1	GU4	C4-C5-C6-O6
6	G	1	GU4	C3-O3-S3-O29
6	G	1	GU4	C2-O2-S2-O10
6	G	2	YYJ	C5-C4-O4-S4
3	C	5	MAN	C4-C5-C6-O6
3	C	3	BMA	C4-C5-C6-O6
3	C	5	MAN	O5-C5-C6-O6
3	C	3	BMA	O5-C5-C6-O6
6	F	2	YYJ	C1-O1-S1-O2S1
6	F	2	YYJ	C6-O6-S6-O2S6
6	G	1	GU4	O5-C5-C6-O6
6	F	2	YYJ	O5-C5-C6-O6
3	C	4	MAN	O5-C5-C6-O6
6	F	1	GU4	C3-O3-S3-O28
6	F	2	YYJ	C4-O4-S4-O2S4
6	G	1	GU4	C3-O3-S3-O28
6	G	1	GU4	C3-O3-S3-O27
3	C	6	MAN	O5-C5-C6-O6
4	D	8	MAN	O5-C5-C6-O6
6	F	2	YYJ	C1-O1-S1-O3S1
6	F	2	YYJ	C6-O6-S6-O3S6
6	G	1	GU4	C6-O6-S6-O22
6	F	2	YYJ	C1-O1-S1-O1S1
6	F	1	GU4	C3-O3-S3-O29
6	G	2	YYJ	O1-C1-C2-O2
6	G	1	GU4	C6-O6-S6-O23
6	F	2	YYJ	C6-O6-S6-O1S6
6	G	1	GU4	C2-O2-S2-O11
6	G	1	GU4	C6-O6-S6-O21
6	G	1	GU4	C2-O2-S2-O12
6	G	2	YYJ	C3-O3-S3-O1S3
6	F	2	YYJ	C2-C1-O1-S1

There are no ring outliers.

7 monomers are involved in 7 short contacts:

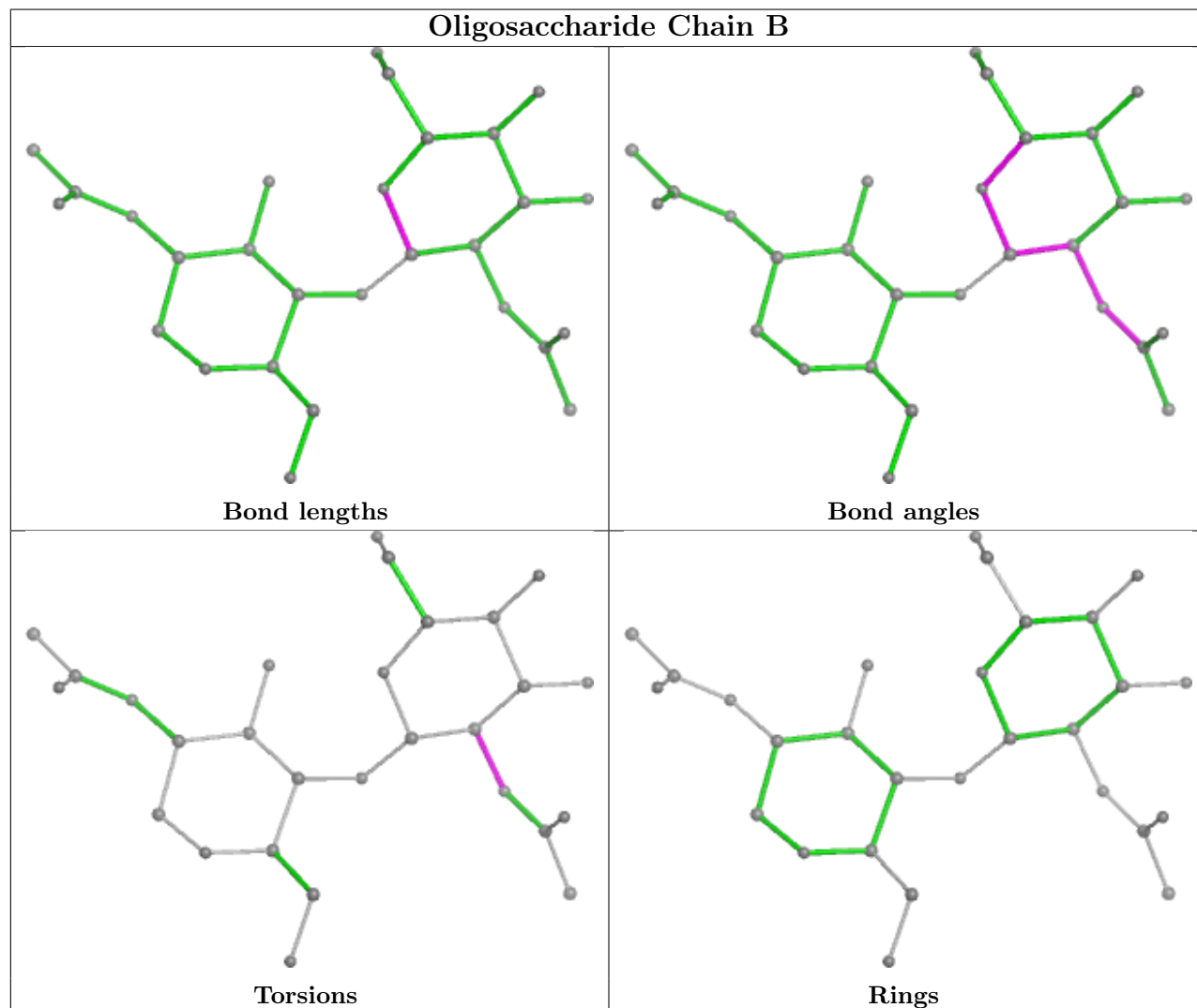
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	2	NAG	1	0
3	C	1	NAG	1	0
6	G	1	GU4	1	0
4	D	2	NAG	1	0
6	F	1	GU4	1	0

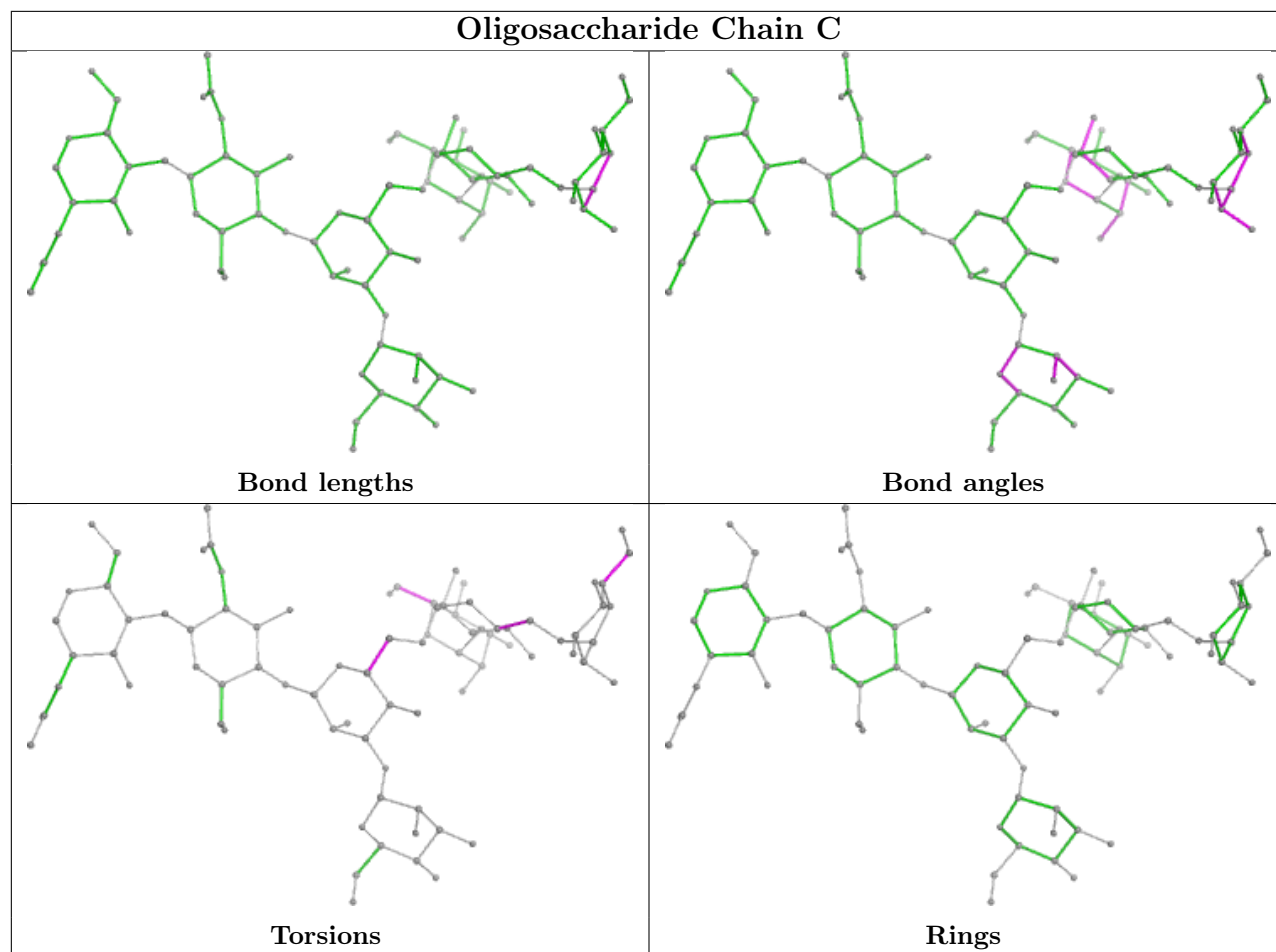
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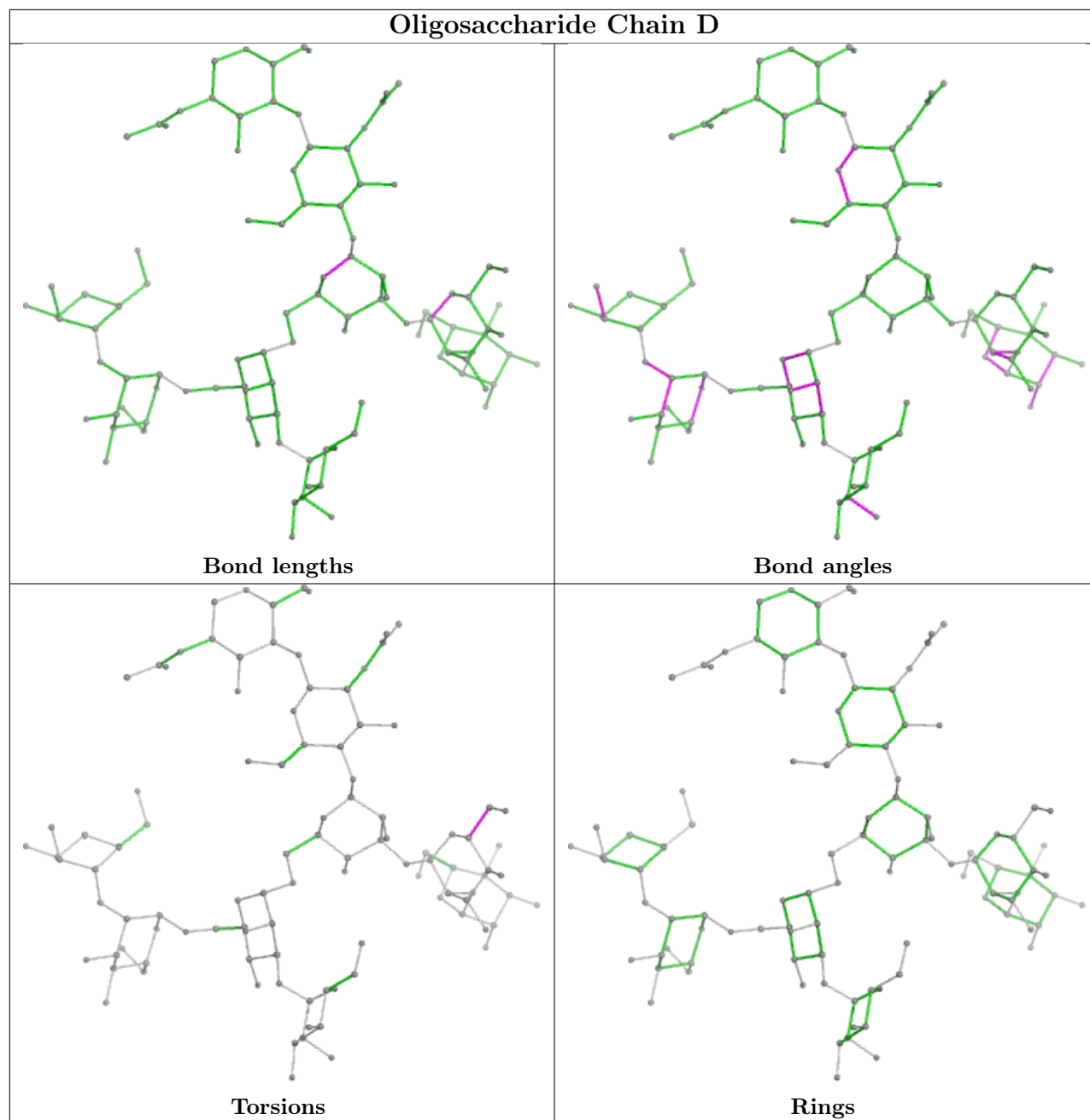
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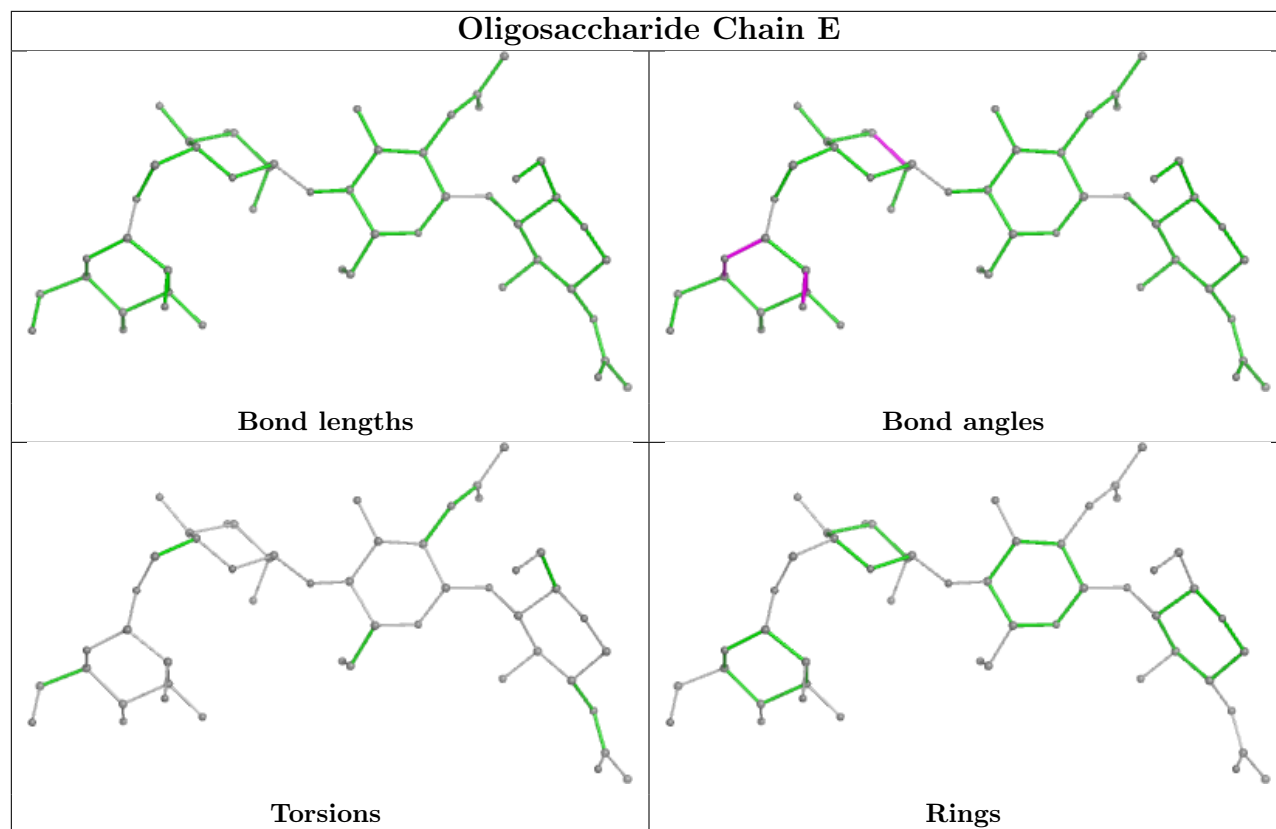
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	3	BMA	1	0
6	G	2	YYJ	2	0

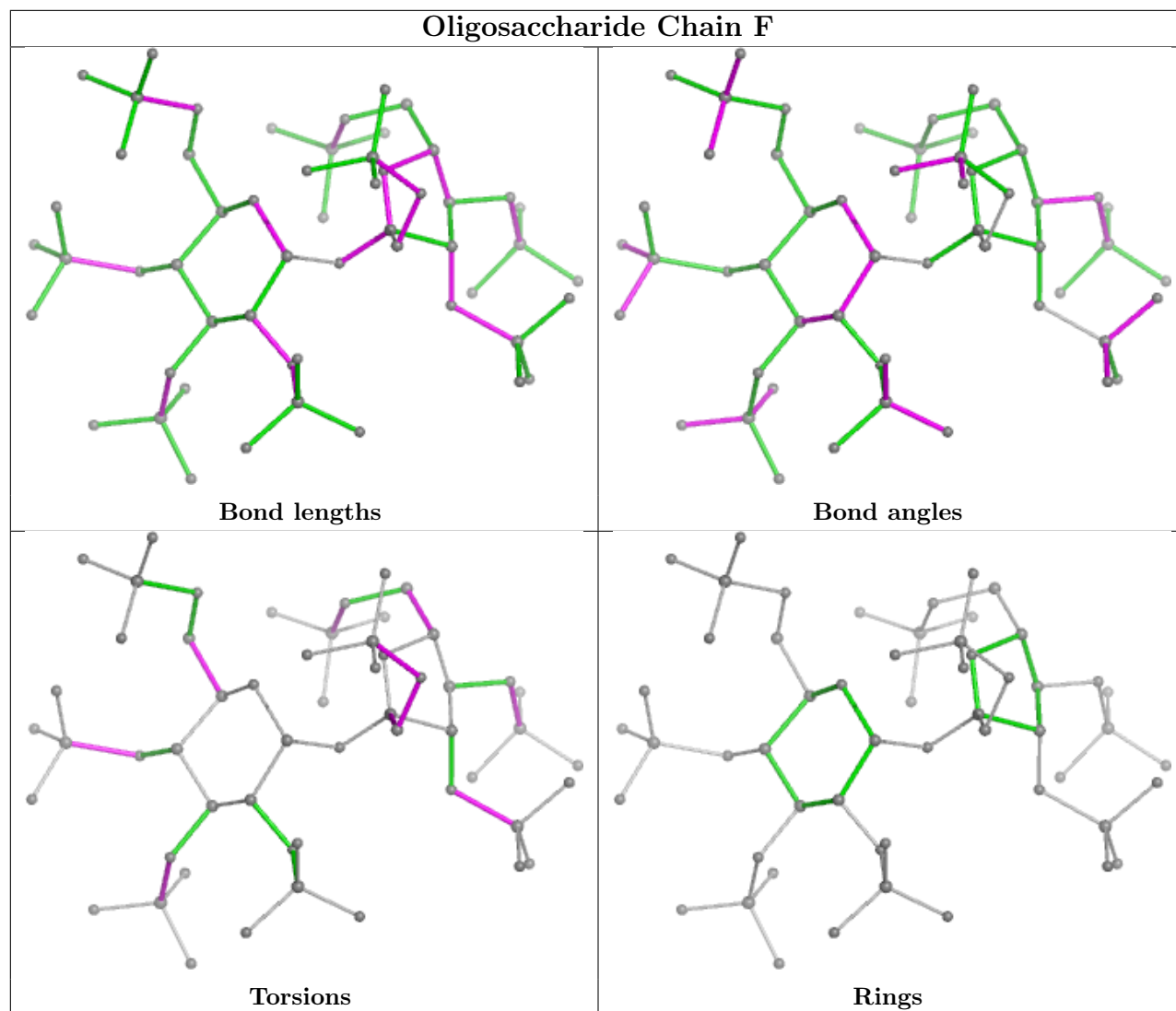
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

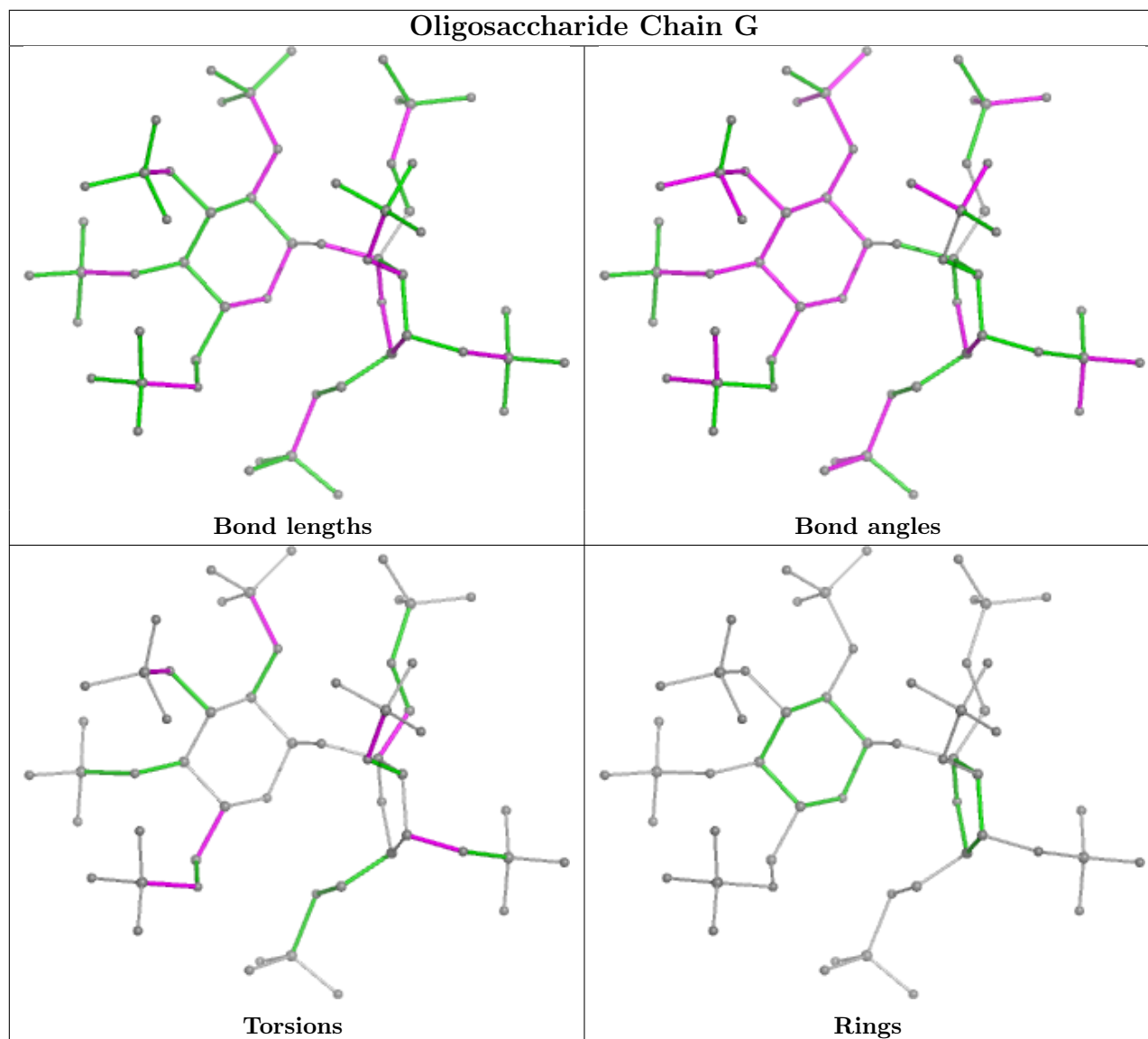












5.6 Ligand geometry [i](#)

3 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
7	NAG	A	701	1	14,14,15	0.22	0	17,19,21	0.41	0
7	NAG	A	703	1	14,14,15	0.24	0	17,19,21	0.43	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	NAG	A	702	1	14,14,15	0.35	0	17,19,21	0.51	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
7	NAG	A	701	1	-	2/6/23/26	0/1/1/1
7	NAG	A	703	1	-	2/6/23/26	0/1/1/1
7	NAG	A	702	1	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	703	NAG	O5-C5-C6-O6
7	A	701	NAG	C4-C5-C6-O6
7	A	701	NAG	O5-C5-C6-O6
7	A	702	NAG	C3-C2-N2-C7
7	A	703	NAG	C3-C2-N2-C7

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 [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	616/657 (93%)	1.53	169 (27%) 0 0	44, 84, 133, 173	0

All (169) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	633	ILE	12.1
1	A	630	THR	11.6
1	A	641	VAL	11.3
1	A	594	LEU	11.1
1	A	643	LEU	10.9
1	A	642	LEU	10.0
1	A	179	TYR	9.8
1	A	595	HIS	9.8
1	A	629	PRO	8.6
1	A	114	LEU	8.5
1	A	307	MET	7.4
1	A	596	LEU	6.7
1	A	222	PHE	5.7
1	A	147	PHE	5.6
1	A	584	LYS	5.5
1	A	632	TYR	5.2
1	A	639	GLY	4.9
1	A	132	LYS	4.8
1	A	86	LEU	4.8
1	A	187	ILE	4.8
1	A	665	TYR	4.8
1	A	154	VAL	4.6
1	A	649	ASP	4.5
1	A	644	ALA	4.4
1	A	582	LEU	4.4
1	A	152	LEU	4.4
1	A	214	LEU	4.3

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Mol	Chain	Res	Type	RSRZ
1	A	640	LEU	4.2
1	A	469	VAL	4.1
1	A	576	ILE	4.0
1	A	72	LEU	4.0
1	A	122	LEU	3.9
1	A	465	LEU	3.9
1	A	466	VAL	3.9
1	A	201	VAL	3.8
1	A	517	LEU	3.8
1	A	591	GLY	3.8
1	A	600	VAL	3.8
1	A	647	GLU	3.8
1	A	165	TYR	3.8
1	A	166	VAL	3.7
1	A	202	TYR	3.6
1	A	479	ILE	3.6
1	A	586	VAL	3.6
1	A	563	LEU	3.5
1	A	167	ILE	3.5
1	A	518	TYR	3.5
1	A	116	PRO	3.4
1	A	224	LYS	3.4
1	A	41	LEU	3.4
1	A	67	PHE	3.3
1	A	131	GLU	3.3
1	A	94	ILE	3.3
1	A	163	LYS	3.2
1	A	460	LEU	3.2
1	A	153	TYR	3.2
1	A	464	PHE	3.2
1	A	88	VAL	3.2
1	A	112	LEU	3.2
1	A	476	ILE	3.1
1	A	185	LEU	3.1
1	A	230	PHE	3.1
1	A	452	VAL	3.1
1	A	468	PHE	3.0
1	A	590	TYR	3.0
1	A	203	VAL	3.0
1	A	441	PHE	3.0
1	A	213	ALA	3.0
1	A	440	PHE	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	359	LEU	2.9
1	A	541	PHE	2.9
1	A	77	PHE	2.9
1	A	421	ILE	2.9
1	A	64	VAL	2.9
1	A	380	PHE	2.8
1	A	519	VAL	2.8
1	A	315	TYR	2.8
1	A	446	ILE	2.8
1	A	87	TYR	2.8
1	A	439	VAL	2.7
1	A	349	TYR	2.7
1	A	111	VAL	2.7
1	A	43	TYR	2.7
1	A	548	TYR	2.7
1	A	477	TYR	2.7
1	A	530	ILE	2.7
1	A	593	THR	2.7
1	A	445	VAL	2.7
1	A	394	LEU	2.7
1	A	510	LEU	2.7
1	A	467	TYR	2.7
1	A	597	SER	2.7
1	A	183	ILE	2.7
1	A	369	ILE	2.7
1	A	532	MET	2.7
1	A	40	ASN	2.6
1	A	139	ILE	2.6
1	A	220	ALA	2.6
1	A	205	ASN	2.6
1	A	361	GLY	2.6
1	A	601	LYS	2.6
1	A	627	TYR	2.6
1	A	431	VAL	2.6
1	A	192	TYR	2.6
1	A	364	VAL	2.6
1	A	599	PHE	2.6
1	A	442	LYS	2.5
1	A	495	ILE	2.5
1	A	459	LYS	2.5
1	A	113	ILE	2.5
1	A	384	ALA	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	352	PHE	2.5
1	A	631	LYS	2.5
1	A	492	LEU	2.5
1	A	297	VAL	2.5
1	A	215	TYR	2.5
1	A	280	ALA	2.5
1	A	142	ILE	2.5
1	A	592	GLN	2.4
1	A	102	ILE	2.4
1	A	417	VAL	2.4
1	A	106	ILE	2.4
1	A	607	ARG	2.4
1	A	141	VAL	2.4
1	A	290	VAL	2.4
1	A	544	VAL	2.4
1	A	496	PHE	2.4
1	A	272	VAL	2.4
1	A	508	MET	2.4
1	A	363	ALA	2.4
1	A	525	VAL	2.4
1	A	628	THR	2.3
1	A	246	PHE	2.3
1	A	348	PHE	2.3
1	A	76	THR	2.3
1	A	180	VAL	2.3
1	A	95	PHE	2.3
1	A	451	VAL	2.2
1	A	130	ARG	2.2
1	A	520	ALA	2.2
1	A	453	ASP	2.2
1	A	480	VAL	2.2
1	A	589	SER	2.2
1	A	234	LEU	2.2
1	A	424	HIS	2.2
1	A	505	ILE	2.2
1	A	413	LEU	2.2
1	A	450	LEU	2.2
1	A	289	ALA	2.2
1	A	447	LEU	2.2
1	A	274	PHE	2.2
1	A	393	VAL	2.1
1	A	125	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	268	ILE	2.1
1	A	581	VAL	2.1
1	A	605	VAL	2.1
1	A	312	TRP	2.1
1	A	45	PRO	2.1
1	A	603	PRO	2.1
1	A	389	ALA	2.1
1	A	397	LYS	2.1
1	A	306	TYR	2.1
1	A	391	LEU	2.1
1	A	375	ALA	2.1
1	A	547	PRO	2.1
1	A	426	LEU	2.1
1	A	491	ASN	2.1
1	A	144	PRO	2.0
1	A	46	PRO	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.

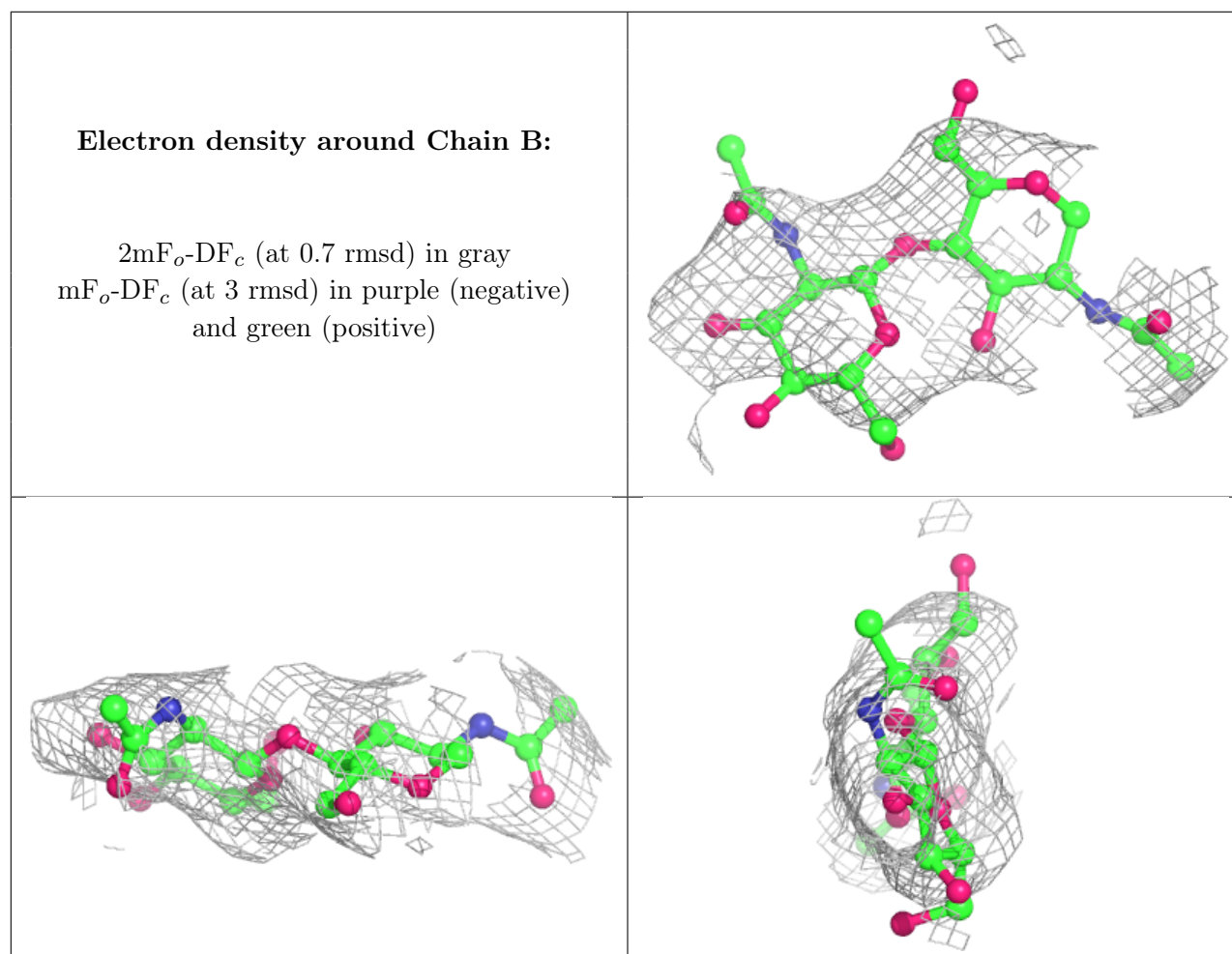
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	MAN	C	6	11/12	0.55	0.19	149,176,186,192	0
5	MAN	E	4	11/12	0.74	0.13	145,169,176,178	0
4	MAN	D	9	11/12	0.78	0.14	110,123,132,134	0
3	BMA	C	3	11/12	0.78	0.14	144,159,176,178	0
3	MAN	C	4	11/12	0.80	0.09	165,171,178,179	0
3	MAN	C	5	11/12	0.81	0.20	125,162,172,173	0
2	NAG	B	2	14/15	0.82	0.27	124,140,156,166	0
3	MAN	C	7	11/12	0.82	0.19	159,175,188,201	0
6	YYJ	F	2	28/28	0.82	0.17	97,140,158,168	0
4	MAN	D	7	11/12	0.84	0.17	76,82,97,99	0
6	GU4	G	1	27/28	0.88	0.14	131,173,184,190	0
5	BMA	E	3	11/12	0.89	0.12	143,151,166,177	0

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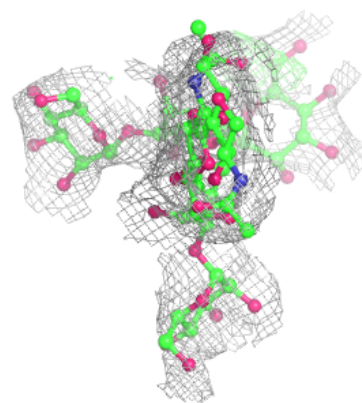
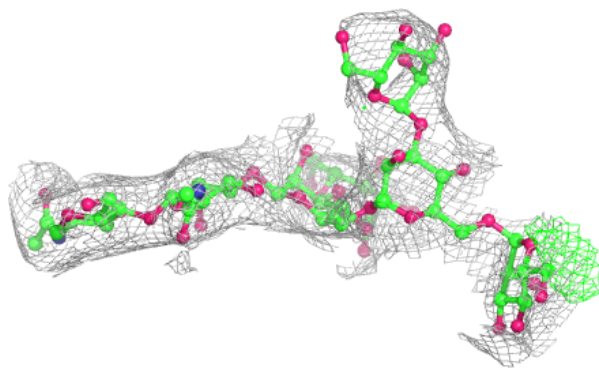
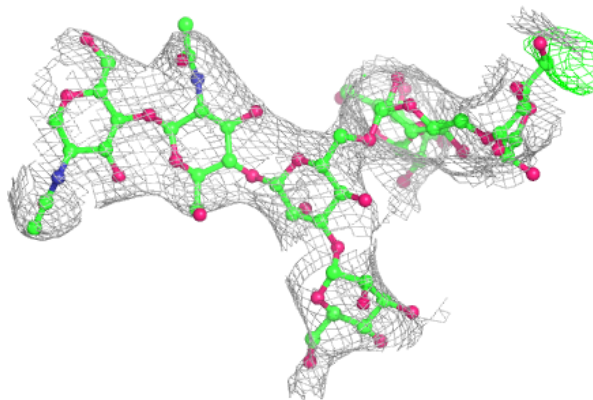
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	NAG	E	1	14/15	0.89	0.17	67,100,112,122	0
6	YYJ	G	2	28/28	0.89	0.15	135,163,190,222	0
2	NAG	B	1	14/15	0.90	0.18	106,112,124,131	0
4	BMA	D	3	11/12	0.91	0.21	79,89,98,101	0
4	MAN	D	8	11/12	0.91	0.14	104,110,117,128	0
6	GU4	F	1	27/28	0.91	0.15	93,125,151,159	0
4	MAN	D	4	11/12	0.92	0.18	78,84,90,100	0
4	NAG	D	2	14/15	0.93	0.28	57,73,88,95	0
4	MAN	D	5	11/12	0.94	0.22	70,76,83,83	0
5	NAG	E	2	14/15	0.94	0.15	109,121,131,150	0
4	MAN	D	6	11/12	0.95	0.23	60,75,80,101	0
4	NAG	D	1	14/15	0.95	0.26	46,54,69,78	0
3	NAG	C	1	14/15	0.96	0.21	62,73,82,109	0
3	NAG	C	2	14/15	0.96	0.20	94,106,123,137	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.



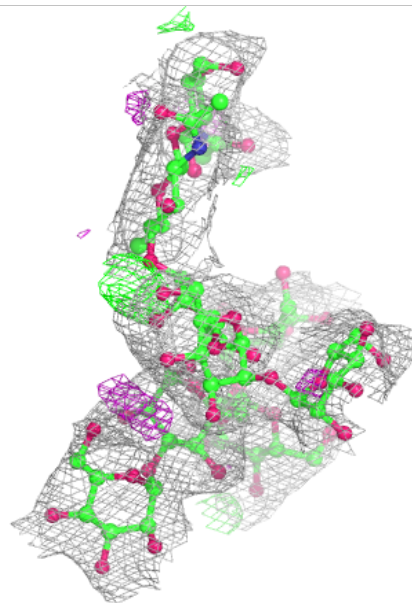
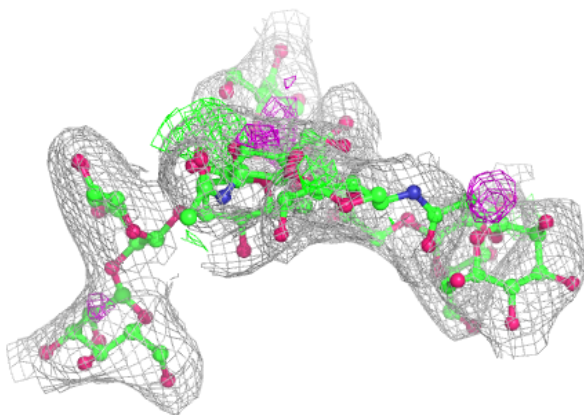
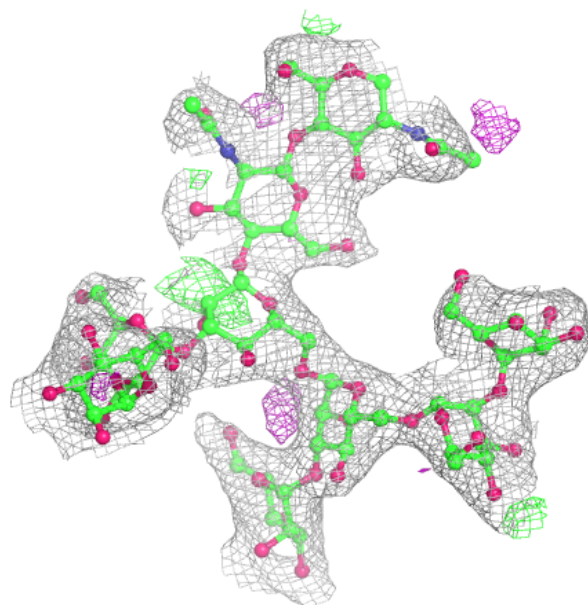
Electron density around Chain C:

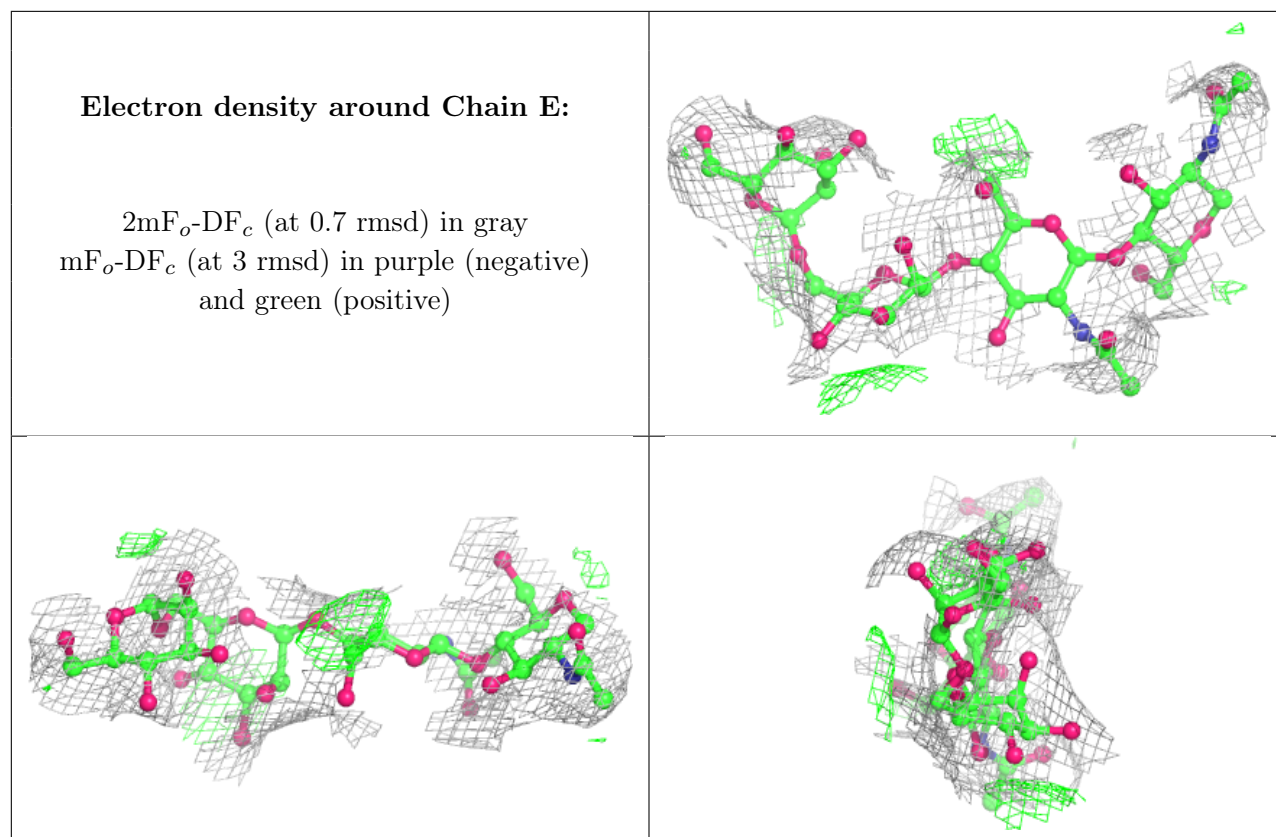
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain D:

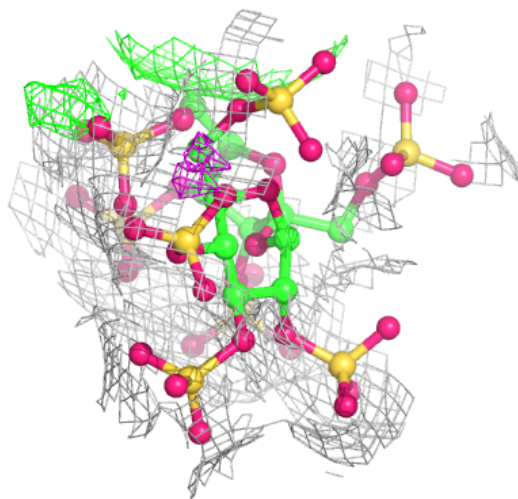
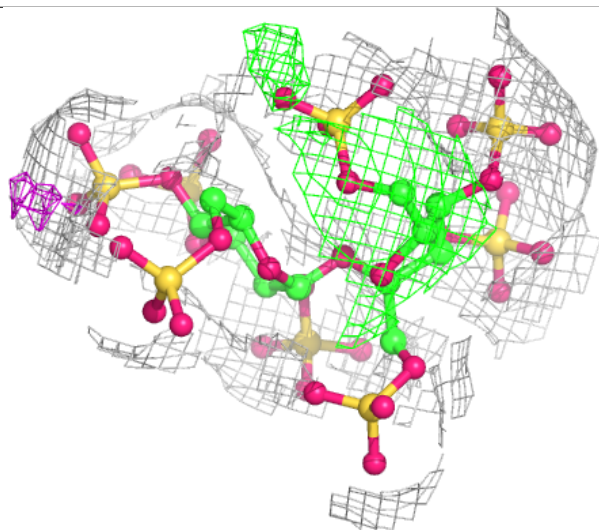
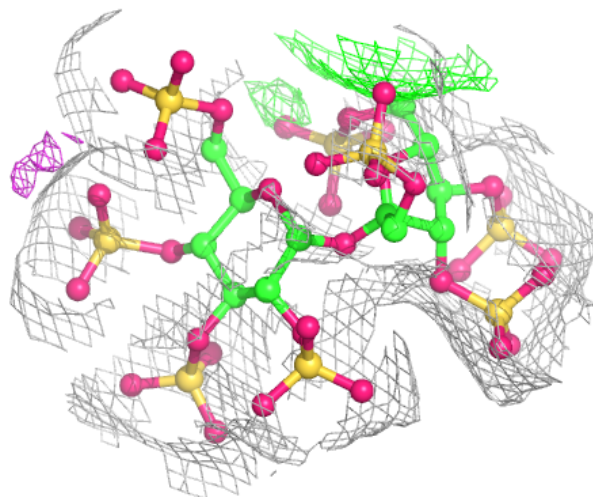
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

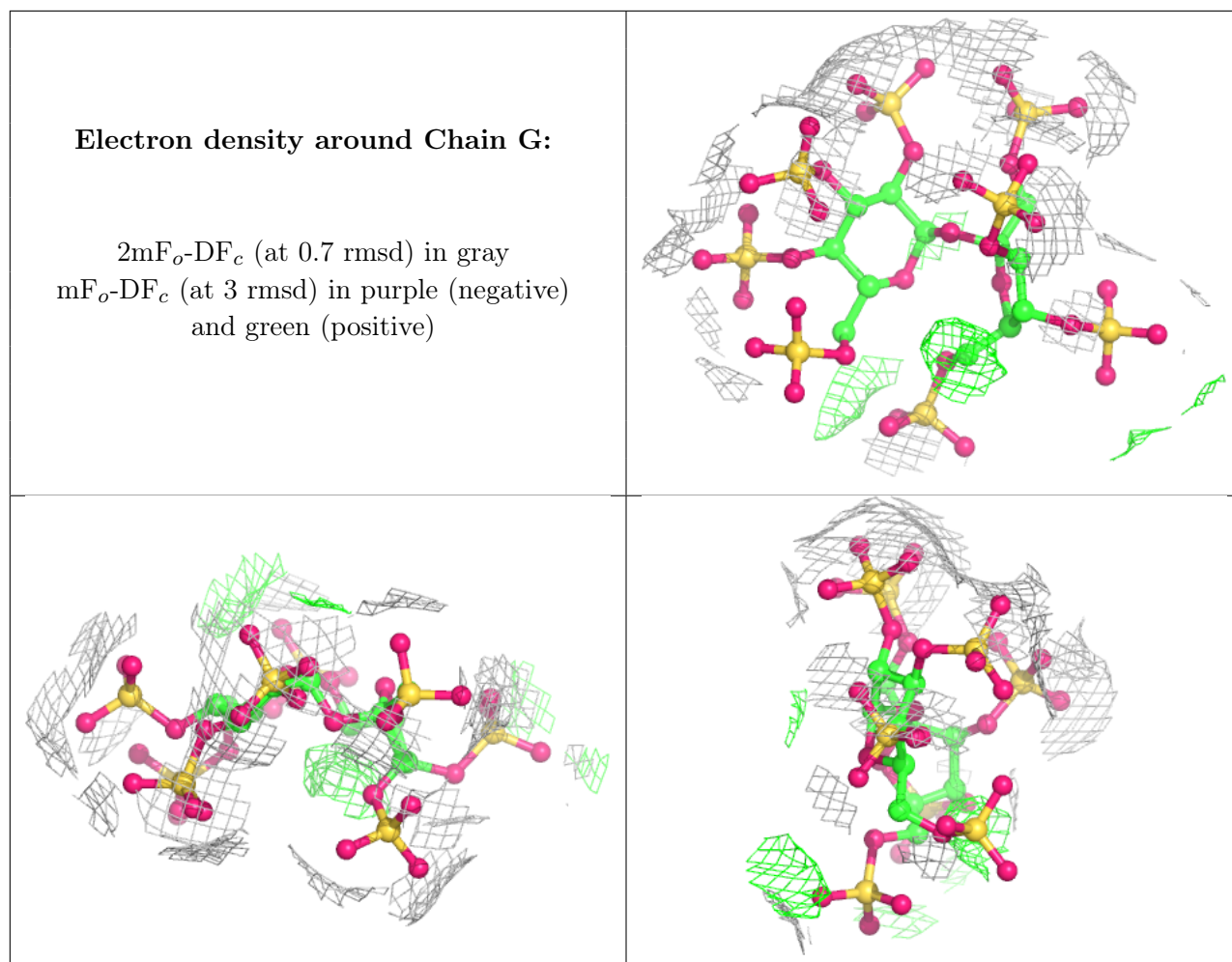




Electron density around Chain F:

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





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(Å ²)	Q<0.9
7	NAG	A	701	14/15	0.81	0.21	118,127,137,137	0
7	NAG	A	702	14/15	0.83	0.15	108,120,130,131	0
7	NAG	A	703	14/15	0.89	0.35	135,144,153,156	0

6.5 Other polymers [i](#)

There are no such residues in this entry.