



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 04:54 PM UTC

PDB ID : 6M4W / pdb_00006m4w
Title : Crystal structure of MBP fused split FKBP-FRB T2098L mutant in complex with rapamycin
Authors : Kikuchi, M.; Wu, D.; Inoue, T.; Umehara, T.
Deposited on : 2020-03-09
Resolution : 3.11 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

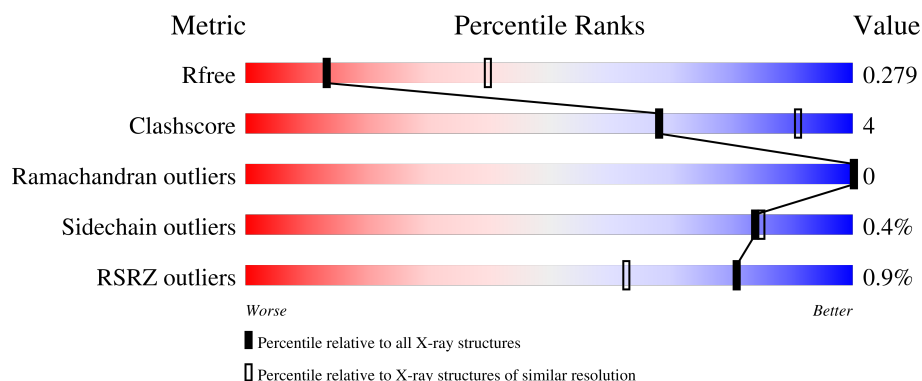
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.11 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}	180053	1816 (3.14-3.10)
Clashscore	190562	1906 (3.14-3.10)
Ramachandran outliers	187476	1802 (3.14-3.10)
Sidechain outliers	187428	1802 (3.14-3.10)
RSRZ outliers	180081	1816 (3.14-3.10)

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	405	 90% 10%
1	B	405	 91% 7% .
1	C	405	 2% 84% 14% .
2	D	76	 84% 14% .
2	E	76	 93% 7%

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Mol	Chain	Length	Quality of chain
2	F	76	% 92% 8%
3	G	95	92% 5% ••
3	H	95	% 89% 8% •
3	I	95	3% 85% 12% ••
4	J	2	50% 50%
4	K	2	50% 50%
4	L	2	100%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 13794 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 chimera of Maltose/maltodextrin-binding periplasmic protein and Peptidyl-prolyl cis-trans isomerase FKBP1A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	403	Total	C	N	O	S	0	0	0
			3087	1983	506	589	9			
1	B	399	Total	C	N	O	S	0	0	0
			3058	1965	498	586	9			
1	C	399	Total	C	N	O	S	0	0	0
			3055	1963	497	586	9			

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-372	GLY	-	linker	UNP P0AEX9
A	-371	SER	-	linker	UNP P0AEX9
A	-370	MET	-	linker	UNP P0AEX9
A	-288	ALA	ASP	engineered mutation	UNP P0AEX9
A	-287	ALA	LYS	engineered mutation	UNP P0AEX9
A	-198	ALA	GLU	engineered mutation	UNP P0AEX9
A	-197	ALA	ASN	engineered mutation	UNP P0AEX9
A	-131	ALA	LYS	engineered mutation	UNP P0AEX9
A	-3	ASN	-	linker	UNP P0AEX9
A	-2	ALA	-	linker	UNP P0AEX9
A	-1	ALA	-	linker	UNP P0AEX9
A	0	ALA	-	linker	UNP P0AEX9
B	-372	GLY	-	linker	UNP P0AEX9
B	-371	SER	-	linker	UNP P0AEX9
B	-370	MET	-	linker	UNP P0AEX9
B	-288	ALA	ASP	engineered mutation	UNP P0AEX9
B	-287	ALA	LYS	engineered mutation	UNP P0AEX9
B	-198	ALA	GLU	engineered mutation	UNP P0AEX9
B	-197	ALA	ASN	engineered mutation	UNP P0AEX9
B	-131	ALA	LYS	engineered mutation	UNP P0AEX9
B	-3	ASN	-	linker	UNP P0AEX9
B	-2	ALA	-	linker	UNP P0AEX9

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-1	ALA	-	linker	UNP P0AEX9
B	0	ALA	-	linker	UNP P0AEX9
C	-372	GLY	-	linker	UNP P0AEX9
C	-371	SER	-	linker	UNP P0AEX9
C	-370	MET	-	linker	UNP P0AEX9
C	-288	ALA	ASP	engineered mutation	UNP P0AEX9
C	-287	ALA	LYS	engineered mutation	UNP P0AEX9
C	-198	ALA	GLU	engineered mutation	UNP P0AEX9
C	-197	ALA	ASN	engineered mutation	UNP P0AEX9
C	-131	ALA	LYS	engineered mutation	UNP P0AEX9
C	-3	ASN	-	linker	UNP P0AEX9
C	-2	ALA	-	linker	UNP P0AEX9
C	-1	ALA	-	linker	UNP P0AEX9
C	0	ALA	-	linker	UNP P0AEX9

- Molecule 2 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	75	Total	C	N	O	S	0	0	0
			590	378	103	107	2			
2	E	76	Total	C	N	O	S	0	0	0
			595	381	104	108	2			
2	F	76	Total	C	N	O	S	0	0	0
			591	378	103	108	2			

- Molecule 3 is a protein called Serine/threonine-protein kinase mTOR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	93	Total	C	N	O	S	0	0	0
			785	502	137	139	7			
3	H	93	Total	C	N	O	S	0	0	0
			783	502	135	139	7			
3	I	93	Total	C	N	O	S	0	0	0
			789	505	138	139	7			

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	2019	GLY	-	expression tag	UNP P42345
G	2020	SER	-	expression tag	UNP P42345
G	2098	LEU	THR	engineered mutation	UNP P42345
H	2019	GLY	-	expression tag	UNP P42345

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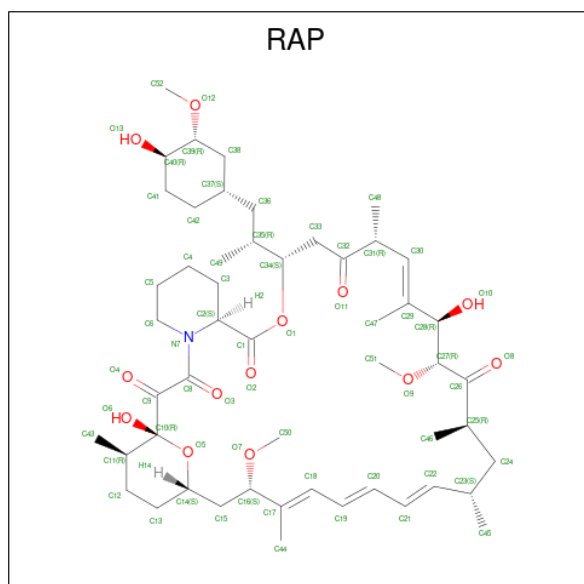
Chain	Residue	Modelled	Actual	Comment	Reference
H	2020	SER	-	expression tag	UNP P42345
H	2098	LEU	THR	engineered mutation	UNP P42345
I	2019	GLY	-	expression tag	UNP P42345
I	2020	SER	-	expression tag	UNP P42345
I	2098	LEU	THR	engineered mutation	UNP P42345

- Molecule 4 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
4	J	2	Total	C	O	0	0	0
			23	12	11			
4	K	2	Total	C	O	0	0	0
			23	12	11			
4	L	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 5 is RAPAMYCIN IMMUNOSUPPRESSANT DRUG (CCD ID: RAP) (formula: C₅₁H₇₉NO₁₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	D	1	Total	C	N	O	0	0
			65	51	1	13		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	E	1	Total	C	N	O	0	0
			65	51	1	13		
5	F	1	Total	C	N	O	0	0
			65	51	1	13		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	G	1	Total	C	O	0	0
			6	3	3		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	64	Total	O	0	0
			64	64		
7	B	26	Total	O	0	0
			26	26		
7	C	22	Total	O	0	0
			22	22		
7	D	13	Total	O	0	0
			13	13		
7	E	12	Total	O	0	0
			12	12		
7	F	3	Total	O	0	0
			3	3		

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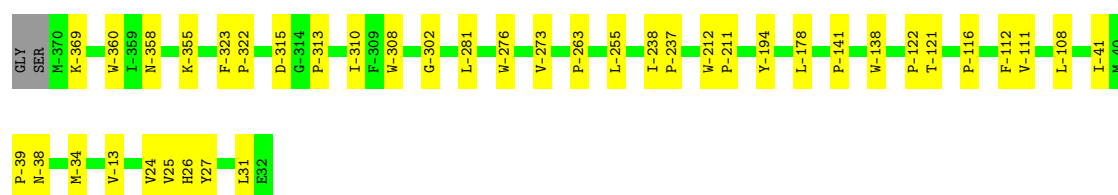
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	G	22	Total 22	O 22	0	0
7	H	17	Total 17	O 17	0	0
7	I	12	Total 12	O 12	0	0

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.

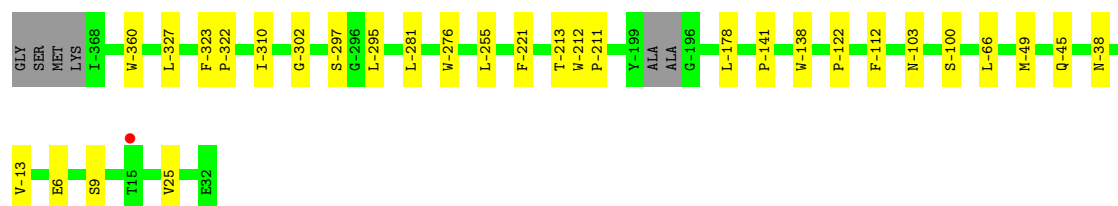
- Molecule 1: chimera of Maltose/maltodextrin-binding periplasmic protein and Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain A: 



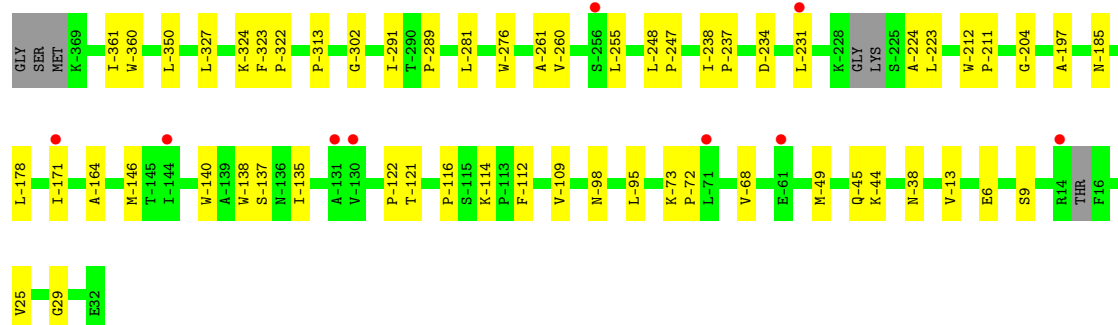
- Molecule 1: chimera of Maltose/maltodextrin-binding periplasmic protein and Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain B: 



- Molecule 1: chimera of Maltose/maltodextrin-binding periplasmic protein and Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain C: 

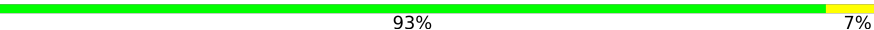


- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain D:  84% 14%

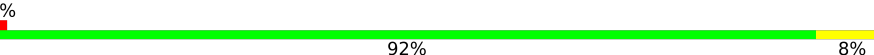


- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain E:  93% 7%

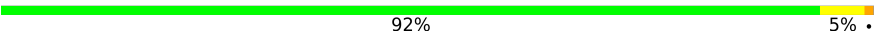


- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain F:  92% 8%



- Molecule 3: Serine/threonine-protein kinase mTOR

Chain G:  92% 5%



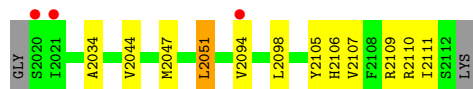
- Molecule 3: Serine/threonine-protein kinase mTOR

Chain H:  89% 8%



- Molecule 3: Serine/threonine-protein kinase mTOR

Chain I:  85% 12%



- Molecule 4: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain J:  50% 50%



- Molecule 4: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain K:  50% 50%

GLC1
GLC2

- Molecule 4: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain L:  100%

GLC1
GLC2

4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	127.55Å 127.55Å 278.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.65 – 3.11 48.65 – 3.11	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.65-3.11) 100.0 (48.65-3.11)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.74 (at 3.12Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.236 , 0.278 0.236 , 0.279	Depositor DCC
R_{free} test set	2142 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	66.6	Xtriage
Anisotropy	0.269	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 42.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	13794	wwPDB-VP
Average B, all atoms (Å ²)	70.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.64% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, GLC, RAP

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	0.44	0/3161	0.91	0/4296
1	B	0.43	0/3131	0.91	0/4255
1	C	0.43	0/3127	0.91	0/4250
2	D	0.46	0/604	0.86	0/811
2	E	0.44	0/609	0.82	0/818
2	F	0.46	0/605	0.89	0/814
3	G	0.40	0/807	0.95	0/1086
3	H	0.40	0/805	0.98	0/1083
3	I	0.40	0/811	0.97	0/1090
All	All	0.43	0/13660	0.91	0/18503

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

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	3087	0	3047	25	0
1	B	3058	0	3010	18	0
1	C	3055	0	3003	32	0
2	D	590	0	594	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	595	0	596	5	0
2	F	591	0	585	6	0
3	G	785	0	741	6	0
3	H	783	0	741	6	0
3	I	789	0	752	9	0
4	J	23	0	21	0	0
4	K	23	0	21	0	0
4	L	23	0	21	0	0
5	D	65	0	79	1	0
5	E	65	0	79	2	0
5	F	65	0	79	1	0
6	G	6	0	8	0	0
7	A	64	0	0	0	0
7	B	26	0	0	0	0
7	C	22	0	0	0	0
7	D	13	0	0	0	0
7	E	12	0	0	0	0
7	F	3	0	0	0	0
7	G	22	0	0	0	0
7	H	17	0	0	0	0
7	I	12	0	0	0	0
All	All	13794	0	13377	98	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 4.

All (98) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:-234:ASP:HA	1:C:-224:ALA:HB2	1.66	0.77
3:I:2109:ARG:HH21	3:I:2109:ARG:HG2	1.52	0.75
1:C:-302:GLY:HA3	1:C:-38:ASN:O	1.88	0.74
1:C:6:GLU:HB2	2:F:74:LYS:HB3	1.72	0.71
1:A:-302:GLY:HA3	1:A:-38:ASN:O	1.93	0.69
1:A:-358:ASN:HD22	1:A:-308:TRP:HZ3	1.40	0.69
1:B:-302:GLY:HA3	1:B:-38:ASN:O	1.95	0.67
1:B:-212:TRP:N	1:B:-211:PRO:HD2	2.11	0.65
1:A:-238:ILE:N	1:A:-237:PRO:HD2	2.14	0.63
1:C:-281:LEU:HD12	1:C:-276:TRP:CZ2	2.34	0.61
2:F:90:GLY:HA3	3:I:2094:VAL:HG11	1.81	0.61
1:B:-281:LEU:HD12	1:B:-276:TRP:CZ2	2.36	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:I:2044:VAL:O	3:I:2047:MET:HG2	2.02	0.60
1:A:25:VAL:HG12	2:D:104:LEU:HA	1.84	0.60
1:A:-39:PRO:HG2	1:A:-34:MET:SD	2.41	0.60
1:C:-361:ILE:HG21	1:C:-350:LEU:HD21	1.84	0.58
1:B:-49:MET:O	1:B:-45:GLN:HG2	2.04	0.58
1:A:-369:LYS:HD3	1:A:-315:ASP:HB2	1.85	0.57
2:D:85:ALA:O	2:D:94:PRO:HB3	2.05	0.57
3:I:2107:VAL:O	3:I:2111:ILE:HG12	2.06	0.56
1:C:-231:LEU:HD13	1:C:-224:ALA:HA	1.86	0.56
1:C:-204:GLY:HA2	1:C:-185:ASN:HD21	1.72	0.54
1:A:-41:ILE:H	1:A:-41:ILE:HD12	1.72	0.54
1:C:-255:LEU:HD22	1:C:-122:PRO:HD3	1.90	0.54
1:B:9:SER:O	2:E:71:GLN:HA	2.09	0.53
1:B:-360:TRP:HB3	1:B:-327:LEU:HD11	1.91	0.53
1:C:-197:ALA:HA	3:G:2032:GLU:CG	2.39	0.53
5:F:201:RAP:H21	3:I:2105:TYR:CD1	2.44	0.52
1:A:31:LEU:O	2:D:34:GLY:HA3	2.10	0.52
2:E:87:GLY:O	3:H:2042:ARG:NH1	2.42	0.52
1:C:-178:LEU:HD23	1:C:-13:VAL:HG13	1.92	0.52
1:C:-137:SER:HB3	1:C:-72:PRO:HD3	1.91	0.51
1:A:-141:PRO:HA	1:A:-138:TRP:CE2	2.45	0.51
3:I:2109:ARG:HG2	3:I:2109:ARG:NH2	2.21	0.51
1:C:-140:TRP:O	1:C:-73:LYS:HD3	2.11	0.50
1:B:25:VAL:HG12	2:E:104:LEU:HA	1.93	0.50
1:C:-197:ALA:HA	3:G:2032:GLU:HG3	1.93	0.50
1:C:-223:LEU:HB2	1:C:-146:MET:HE3	1.94	0.49
5:E:201:RAP:H21	3:H:2105:TYR:CD1	2.47	0.49
1:B:-178:LEU:HD23	1:B:-13:VAL:HG13	1.93	0.49
5:D:201:RAP:H21	3:G:2105:TYR:CD1	2.48	0.49
1:A:-212:TRP:N	1:A:-211:PRO:CD	2.76	0.48
1:C:-291:ILE:HD12	1:C:-289:PRO:HD3	1.96	0.48
3:G:2026:MET:SD	3:G:2057:MET:HE1	2.54	0.48
1:C:-260:VAL:HG22	1:C:-109:VAL:HG22	1.95	0.48
1:A:27:TYR:HB2	2:D:102:VAL:HG12	1.94	0.48
1:C:-138:TRP:HA	1:C:-135:ILE:HD12	1.96	0.48
1:A:-111:VAL:HB	1:A:-41:ILE:HA	1.96	0.48
1:B:6:GLU:HB3	2:E:74:LYS:HB3	1.96	0.48
1:C:29:GLY:O	2:F:36:LYS:HA	2.15	0.47
1:C:-327:LEU:HA	1:C:-324:LYS:HB2	1.96	0.47
1:A:-273:VAL:HG21	1:A:-263:PRO:HD3	1.96	0.47
1:B:-323:PHE:N	1:B:-322:PRO:HD2	2.30	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:-221:PHE:HE2	1:B:-213:THR:HG22	1.80	0.46
2:E:83:TYR:OH	5:E:201:RAP:O3	2.25	0.46
1:C:-238:ILE:N	1:C:-237:PRO:CD	2.79	0.45
3:I:2106:HIS:O	3:I:2110:ARG:HG3	2.16	0.45
1:C:9:SER:O	2:F:71:GLN:HG3	2.17	0.45
1:B:-141:PRO:HA	1:B:-138:TRP:CE2	2.52	0.45
1:B:-297:SER:HB2	1:B:-295:LEU:HG	1.99	0.45
1:C:-49:MET:O	1:C:-45:GLN:HG2	2.16	0.45
1:A:-360:TRP:CD2	1:A:-313:PRO:HG3	2.52	0.44
1:B:-323:PHE:CG	1:B:-310:ILE:HD12	2.53	0.44
1:C:25:VAL:HG12	2:F:104:LEU:HA	1.99	0.44
1:C:-121:THR:HG22	1:C:-116:PRO:HA	1.99	0.44
3:H:2055:HIS:O	3:H:2059:GLU:HG2	2.18	0.44
1:C:-98:ASN:HB2	1:C:-95:LEU:HB2	2.00	0.43
3:H:2052:GLU:N	3:H:2053:PRO:CD	2.81	0.43
3:H:2055:HIS:CE1	3:H:2082:GLN:HB2	2.54	0.43
1:B:-103:ASN:HB3	1:B:-100:SER:HB2	2.01	0.43
1:A:-355:LYS:HE2	1:A:-108:LEU:HD13	1.99	0.43
1:A:-281:LEU:HD12	1:A:-276:TRP:CZ2	2.54	0.42
1:C:-360:TRP:CD1	1:C:-313:PRO:HB3	2.54	0.42
3:G:2051:LEU:HD12	3:G:2051:LEU:HA	1.90	0.42
1:C:-248:LEU:HD12	1:C:-247:PRO:HD2	2.01	0.42
1:C:-212:TRP:N	1:C:-211:PRO:CD	2.82	0.42
1:C:-114:LYS:HG2	1:C:-44:LYS:O	2.19	0.42
2:D:88:HIS:CD2	2:D:91:ILE:HD12	2.54	0.42
3:G:2023:TRP:NE1	3:G:2057:MET:HE2	2.34	0.42
1:A:-323:PHE:CG	1:A:-310:ILE:HD12	2.54	0.42
1:B:-281:LEU:HD23	1:B:-66:LEU:HA	2.01	0.42
3:I:2034:ALA:HB2	3:I:2051:LEU:HD13	2.01	0.42
1:A:-238:ILE:N	1:A:-237:PRO:CD	2.82	0.41
1:B:-212:TRP:N	1:B:-211:PRO:CD	2.81	0.41
2:D:43:ARG:O	2:D:44:ASN:HB2	2.21	0.41
1:C:-261:ALA:HA	1:C:-68:VAL:HA	2.02	0.41
1:B:-255:LEU:HD22	1:B:-122:PRO:HD3	2.02	0.41
3:H:2105:TYR:O	3:H:2109:ARG:HG3	2.21	0.41
1:A:-255:LEU:HD22	1:A:-122:PRO:HD3	2.03	0.41
1:A:-194:TYR:CZ	1:A:-39:PRO:HB3	2.56	0.41
1:A:-323:PHE:N	1:A:-322:PRO:HD2	2.36	0.41
1:A:24:VAL:HG22	2:D:48:LYS:HG2	2.03	0.41
1:A:-178:LEU:HD23	1:A:-13:VAL:HG13	2.02	0.41
1:A:26:HIS:ND1	2:D:105:LEU:HD11	2.36	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:-171:ILE:HG21	1:C:-164:ALA:HB2	2.02	0.40
1:C:-323:PHE:N	1:C:-322:PRO:HD2	2.37	0.40
1:A:-121:THR:HG22	1:A:-116:PRO:HA	2.03	0.40
2:F:91:ILE:HD11	3:I:2098:LEU:HD11	2.03	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	401/405 (99%)	390 (97%)	11 (3%)	0	100	100
1	B	395/405 (98%)	380 (96%)	15 (4%)	0	100	100
1	C	393/405 (97%)	384 (98%)	9 (2%)	0	100	100
2	D	73/76 (96%)	70 (96%)	3 (4%)	0	100	100
2	E	74/76 (97%)	68 (92%)	6 (8%)	0	100	100
2	F	74/76 (97%)	68 (92%)	6 (8%)	0	100	100
3	G	91/95 (96%)	91 (100%)	0	0	100	100
3	H	91/95 (96%)	91 (100%)	0	0	100	100
3	I	91/95 (96%)	87 (96%)	4 (4%)	0	100	100
All	All	1683/1728 (97%)	1629 (97%)	54 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	314/318 (99%)	313 (100%)	1 (0%)	86	86
1	B	312/318 (98%)	311 (100%)	1 (0%)	86	86
1	C	311/318 (98%)	310 (100%)	1 (0%)	86	86
2	D	62/63 (98%)	62 (100%)	0	100	100
2	E	62/63 (98%)	62 (100%)	0	100	100
2	F	61/63 (97%)	61 (100%)	0	100	100
3	G	80/83 (96%)	79 (99%)	1 (1%)	61	75
3	H	80/83 (96%)	80 (100%)	0	100	100
3	I	81/83 (98%)	80 (99%)	1 (1%)	63	76
All	All	1363/1392 (98%)	1358 (100%)	5 (0%)	84	85

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

Mol	Chain	Res	Type
1	A	-112	PHE
1	B	-112	PHE
1	C	-112	PHE
3	G	2051	LEU
3	I	2051	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	-5	GLN
1	B	26	HIS
1	C	-98	ASN
1	C	26	HIS
2	E	95	HIS
3	G	2082	GLN
3	H	2106	HIS
3	I	2093	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

6 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	$\# Z > 2$
4	GLC	J	1	4	12,12,12	0.53	0	17,17,17	0.59	0
4	GLC	J	2	4	11,11,12	0.31	0	15,15,17	0.78	1 (6%)
4	GLC	K	1	4	12,12,12	0.52	0	17,17,17	0.72	0
4	GLC	K	2	4	11,11,12	0.31	0	15,15,17	0.98	1 (6%)
4	GLC	L	1	4	12,12,12	0.54	0	17,17,17	0.66	0
4	GLC	L	2	4	11,11,12	0.32	0	15,15,17	0.71	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
4	GLC	J	1	4	-	0/2/22/22	0/1/1/1
4	GLC	J	2	4	-	1/2/19/22	0/1/1/1
4	GLC	K	1	4	-	0/2/22/22	0/1/1/1
4	GLC	K	2	4	-	0/2/19/22	0/1/1/1
4	GLC	L	1	4	-	0/2/22/22	0/1/1/1
4	GLC	L	2	4	-	1/2/19/22	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	K	2	GLC	C1-O5-C5	2.87	116.03	112.19
4	J	2	GLC	C1-O5-C5	2.37	115.36	112.19

There are no chirality outliers.

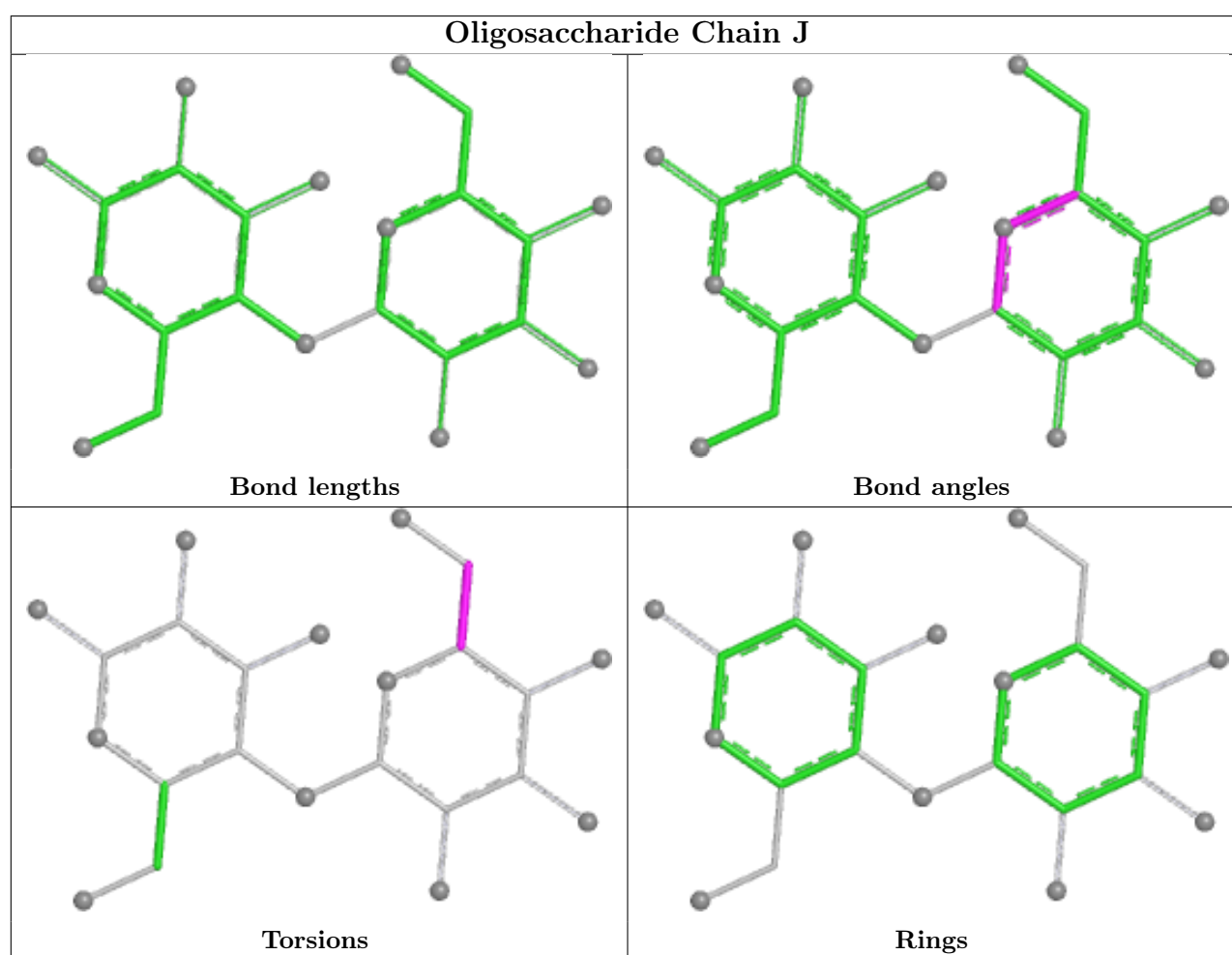
All (2) torsion outliers are listed below:

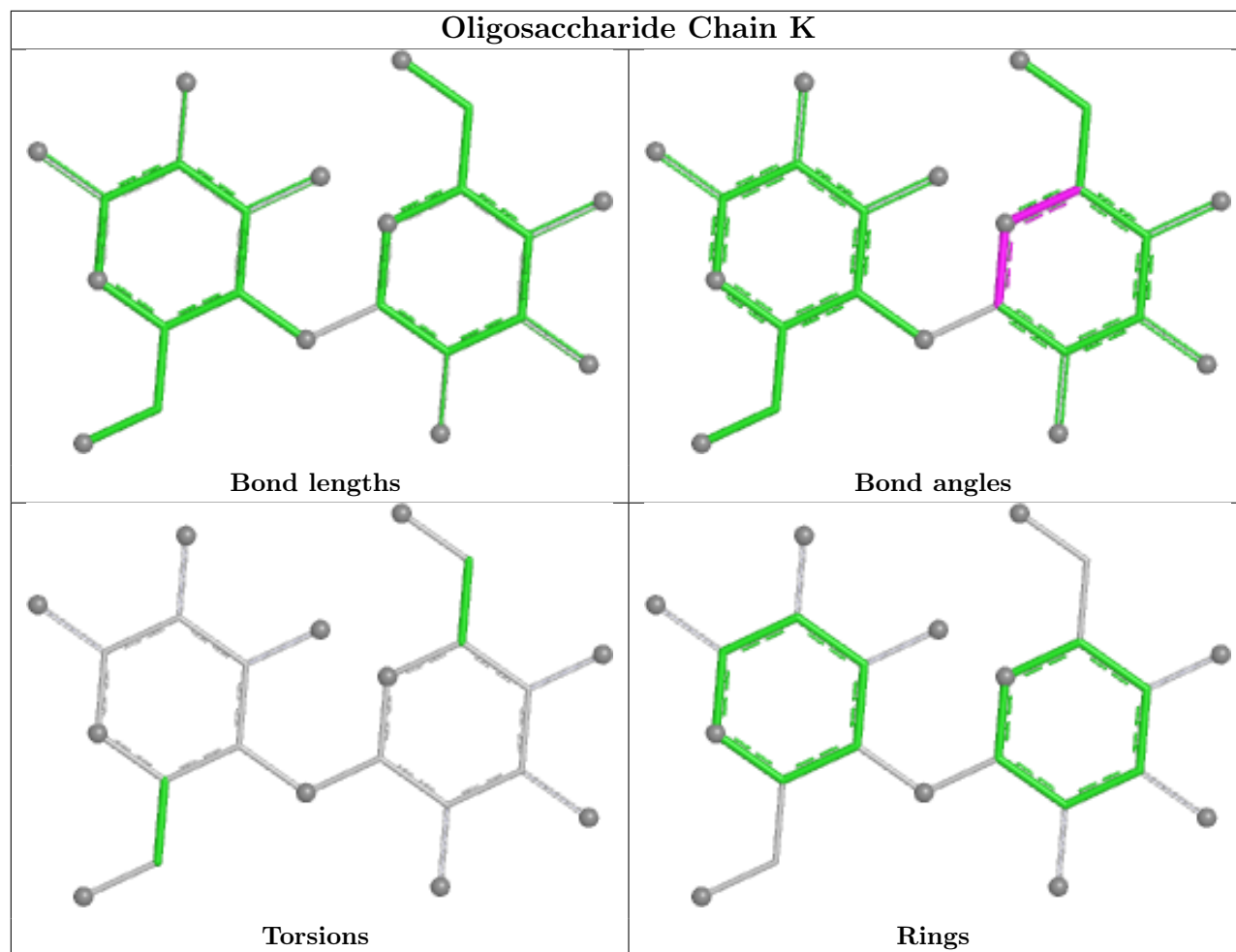
Mol	Chain	Res	Type	Atoms
4	L	2	GLC	C4-C5-C6-O6
4	J	2	GLC	C4-C5-C6-O6

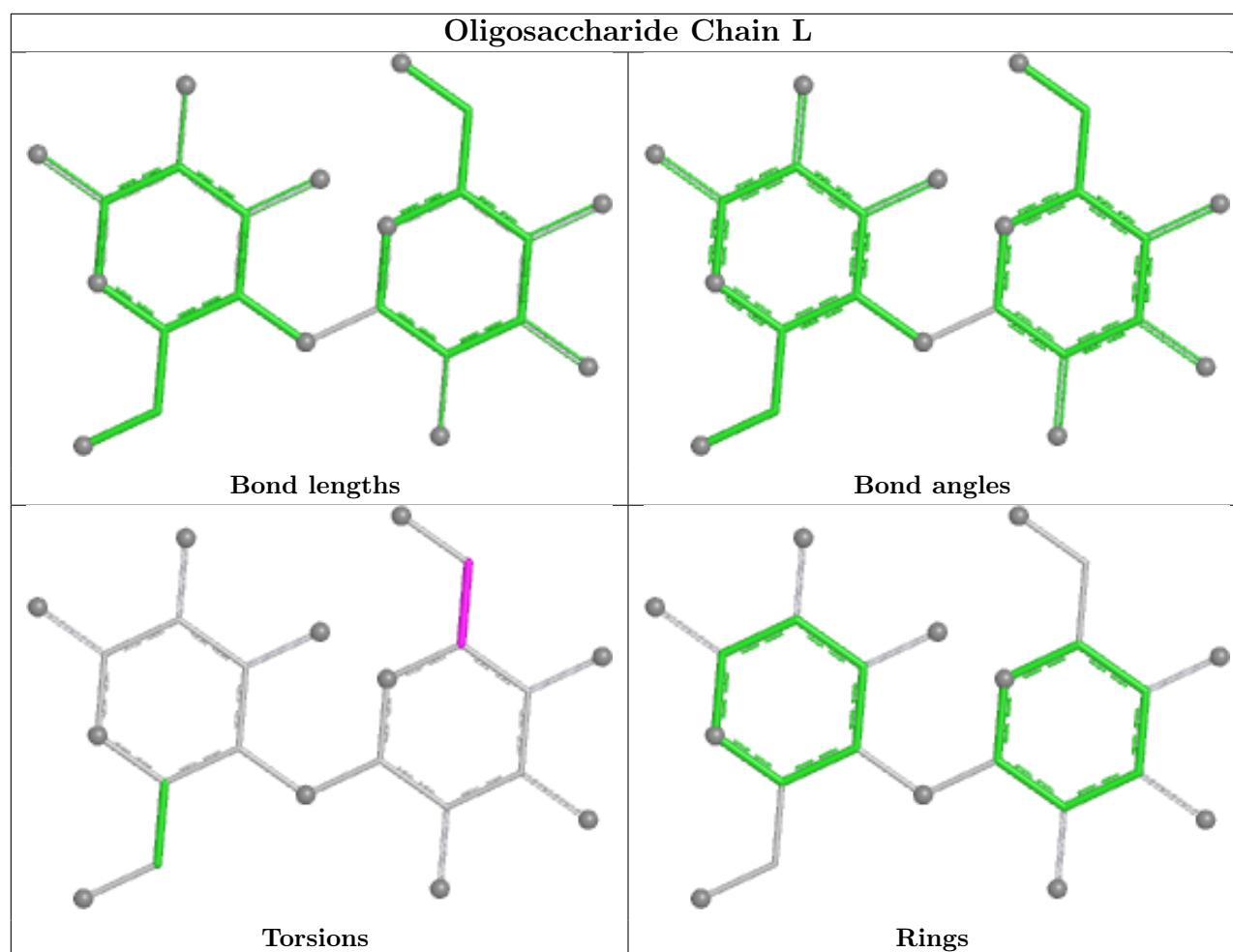
There are no ring outliers.

No monomer is involved in short contacts.

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](#)

4 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
5	RAP	E	201	-	65,68,68	1.82	1 (1%)	77,96,96	0.80	2 (2%)
5	RAP	F	201	-	65,68,68	1.82	1 (1%)	77,96,96	0.86	3 (3%)
5	RAP	D	201	-	65,68,68	1.82	1 (1%)	77,96,96	0.78	3 (3%)
6	GOL	G	2201	-	5,5,5	0.11	0	5,5,5	0.30	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	RAP	E	201	-	-	9/81/124/124	0/3/4/4
5	RAP	F	201	-	-	9/81/124/124	0/3/4/4
5	RAP	D	201	-	-	11/81/124/124	0/3/4/4
6	GOL	G	2201	-	-	4/4/4/4	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	201	RAP	C8-C9	-14.36	1.35	1.53
5	D	201	RAP	C8-C9	-14.29	1.35	1.53
5	F	201	RAP	C8-C9	-14.24	1.35	1.53

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	201	RAP	C20-C19-C18	4.36	132.45	123.52
5	F	201	RAP	C20-C19-C18	4.15	132.00	123.52
5	D	201	RAP	C20-C19-C18	3.51	130.70	123.52
5	D	201	RAP	C48-C31-C32	2.58	113.03	109.31
5	F	201	RAP	C48-C31-C32	2.32	112.65	109.31
5	E	201	RAP	C48-C31-C32	2.13	112.38	109.31
5	D	201	RAP	C15-C16-C17	-2.11	109.86	113.28
5	F	201	RAP	C1-C2-N7	2.11	115.99	112.10

There are no chirality outliers.

All (33) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	D	201	RAP	C15-C16-O7-C50
5	E	201	RAP	C15-C16-O7-C50
5	F	201	RAP	O5-C14-C15-C16
5	F	201	RAP	C15-C16-O7-C50
5	F	201	RAP	C26-C27-O9-C51
5	F	201	RAP	C35-C36-C37-C42
6	G	2201	GOL	O1-C1-C2-C3
6	G	2201	GOL	C1-C2-C3-O3
5	D	201	RAP	O5-C14-C15-C16

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Mol	Chain	Res	Type	Atoms
5	D	201	RAP	C13-C14-C15-C16
5	F	201	RAP	C13-C14-C15-C16
6	G	2201	GOL	O1-C1-C2-O2
5	E	201	RAP	C32-C33-C34-C35
5	F	201	RAP	C32-C33-C34-C35
5	D	201	RAP	O7-C16-C17-C44
5	E	201	RAP	C32-C33-C34-O1
5	F	201	RAP	C32-C33-C34-O1
5	D	201	RAP	C46-C25-C26-O8
5	D	201	RAP	O7-C16-C17-C18
5	E	201	RAP	C28-C27-O9-C51
5	E	201	RAP	C48-C31-C32-O11
5	E	201	RAP	C48-C31-C32-C33
5	D	201	RAP	C26-C27-O9-C51
5	E	201	RAP	C26-C27-O9-C51
5	D	201	RAP	C17-C16-O7-C50
5	E	201	RAP	C17-C16-O7-C50
5	F	201	RAP	C17-C16-O7-C50
6	G	2201	GOL	O2-C2-C3-O3
5	F	201	RAP	O7-C16-C17-C44
5	D	201	RAP	C46-C25-C26-C27
5	E	201	RAP	C46-C25-C26-C27
5	D	201	RAP	C28-C27-O9-C51
5	D	201	RAP	C32-C33-C34-C35

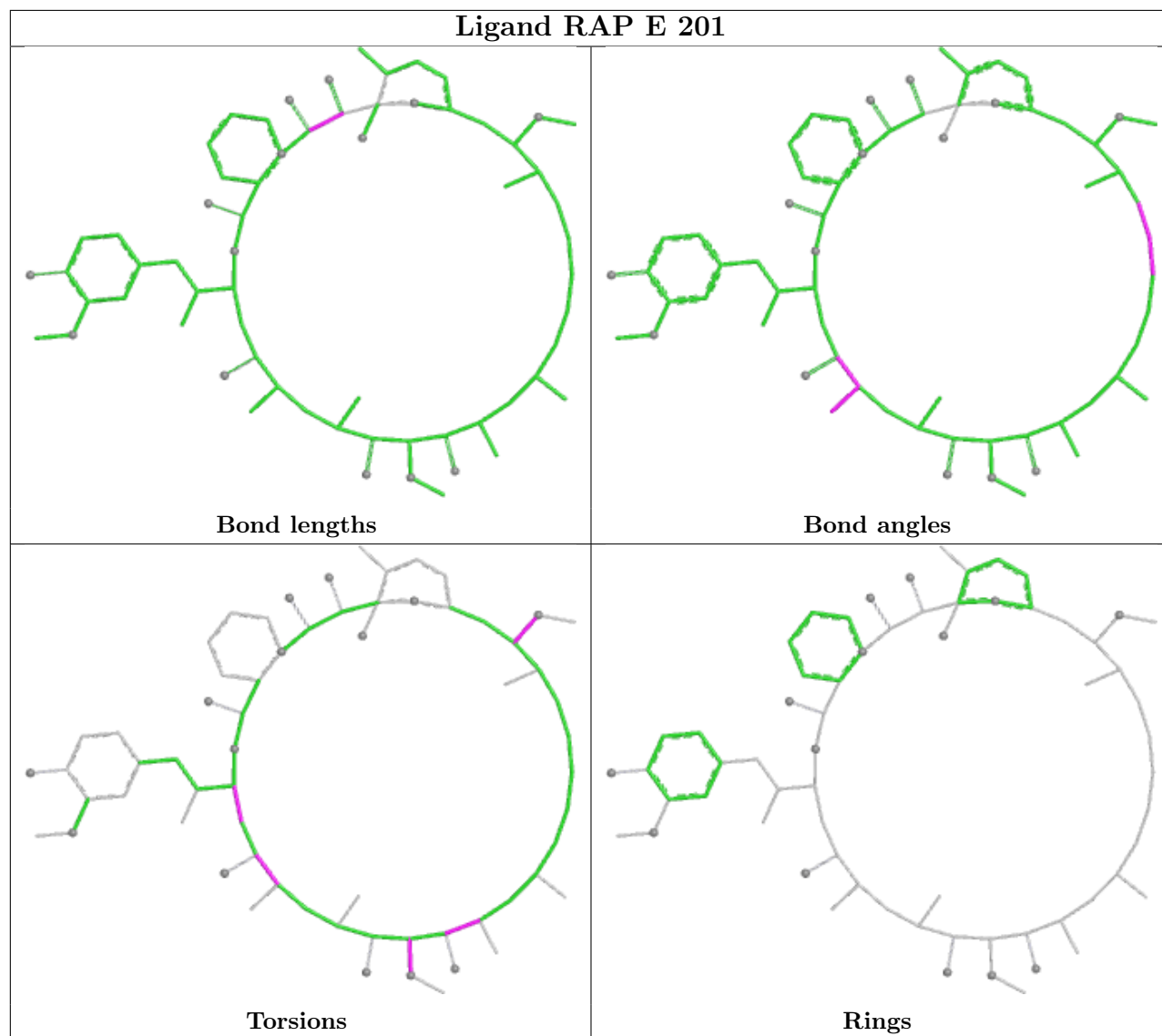
There are no ring outliers.

3 monomers are involved in 4 short contacts:

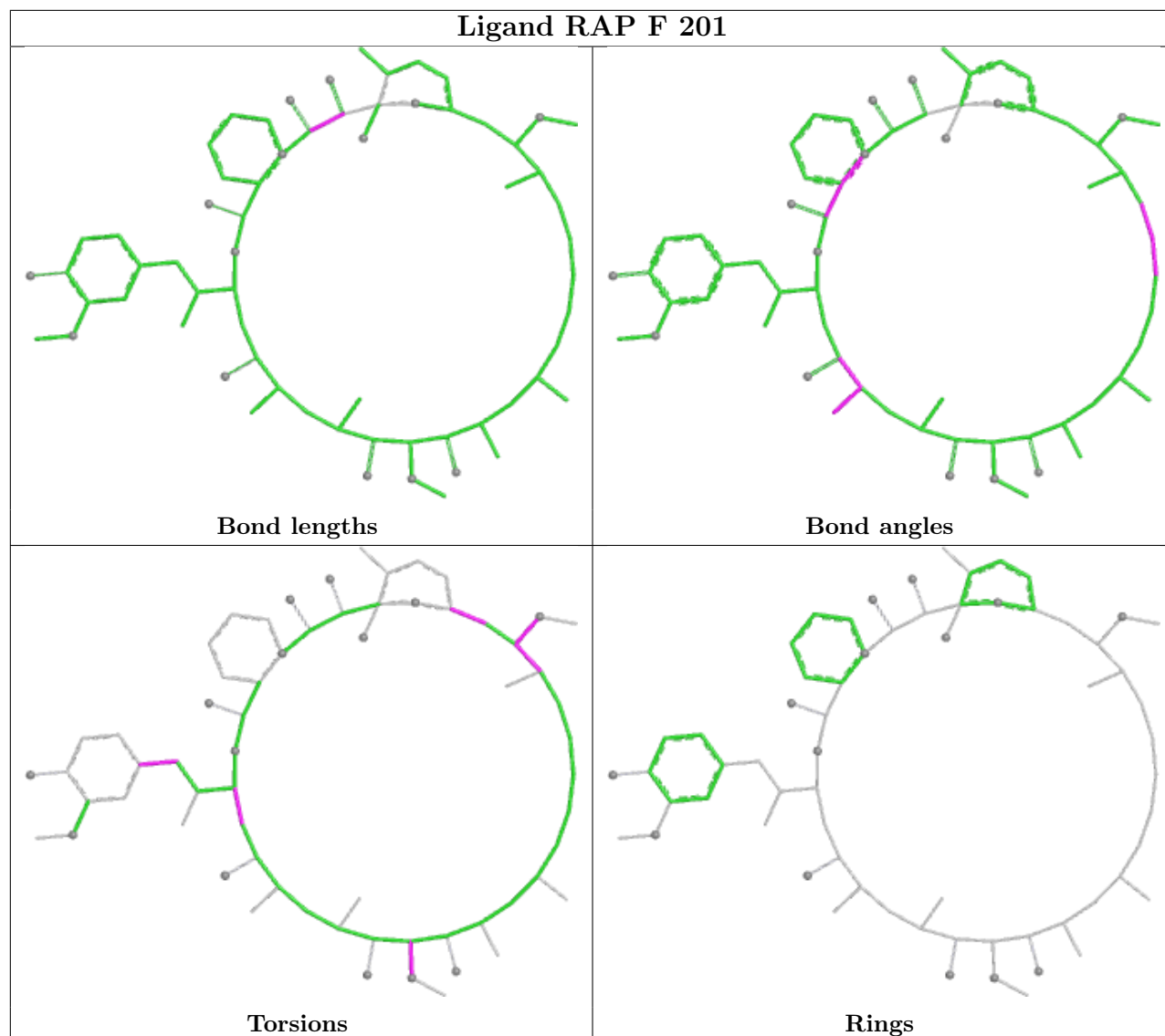
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	201	RAP	2	0
5	F	201	RAP	1	0
5	D	201	RAP	1	0

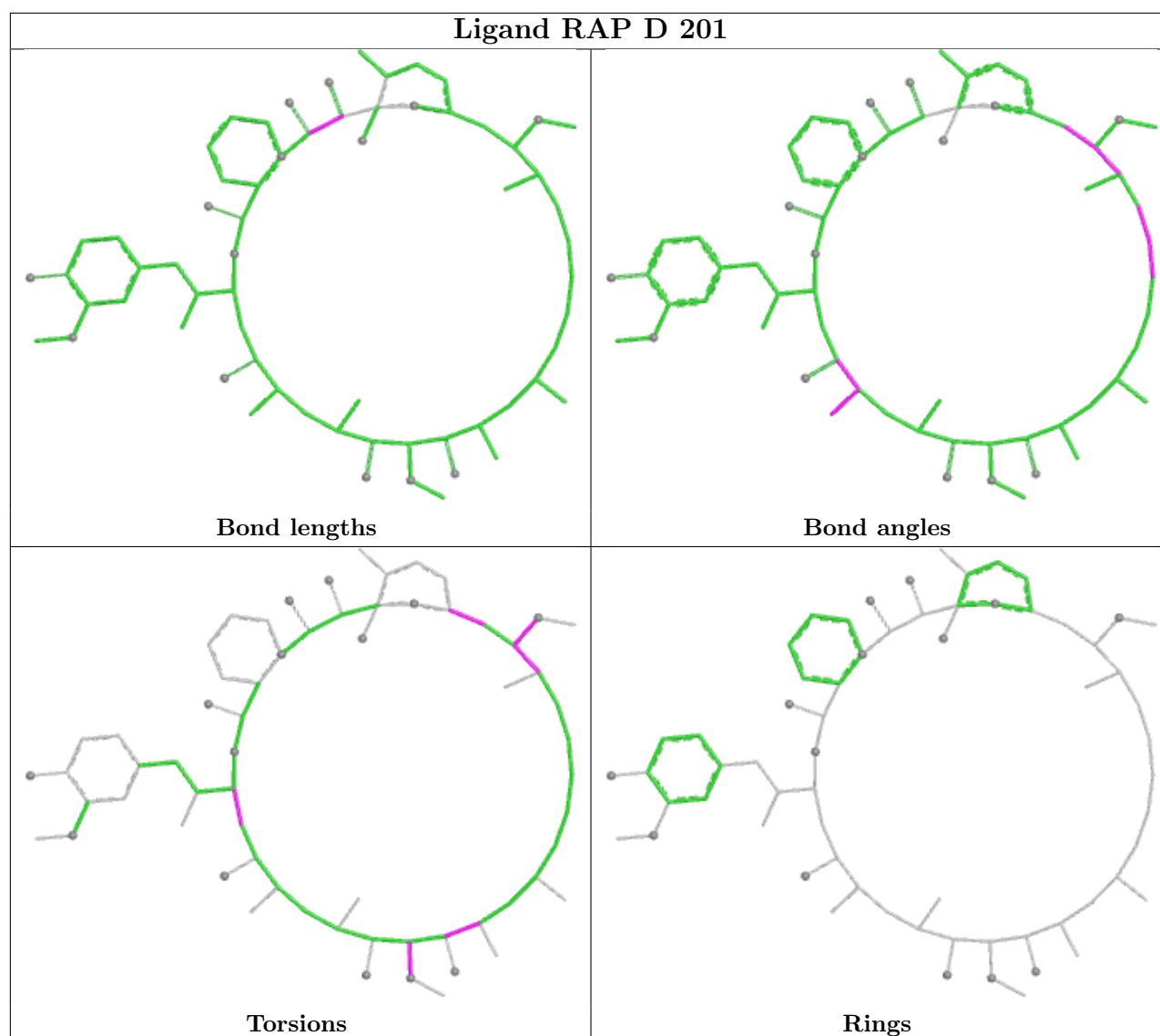
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



Ligand RAP F 201





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	403/405 (99%)	-0.19	0 100 100	37, 54, 76, 90	0
1	B	399/405 (98%)	0.17	1 (0%) 90 80	56, 76, 98, 103	0
1	C	399/405 (98%)	0.51	9 (2%) 61 39	57, 85, 115, 130	0
2	D	75/76 (98%)	-0.08	0 100 100	49, 60, 77, 83	0
2	E	76/76 (100%)	0.12	0 100 100	57, 69, 84, 91	0
2	F	76/76 (100%)	0.35	1 (1%) 75 56	69, 84, 103, 112	0
3	G	93/95 (97%)	-0.02	0 100 100	46, 57, 72, 76	0
3	H	93/95 (97%)	-0.01	1 (1%) 78 59	54, 65, 76, 81	0
3	I	93/95 (97%)	0.09	3 (3%) 50 30	54, 69, 91, 97	0
All	All	1707/1728 (98%)	0.13	15 (0%) 81 63	37, 70, 100, 130	0

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	15	THR	3.9
2	F	33	ASP	3.1
1	C	-231	LEU	3.1
3	I	2020	SER	3.1
3	I	2021	ILE	2.7
1	C	-130	VAL	2.7
1	C	-131	ALA	2.6
1	C	-171	ILE	2.4
3	H	2020	SER	2.4
1	C	-71	LEU	2.3
1	C	-256	SER	2.2
1	C	14	ARG	2.1
3	I	2094	VAL	2.0
1	C	-61	GLU	2.0
1	C	-144	ILE	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](#)

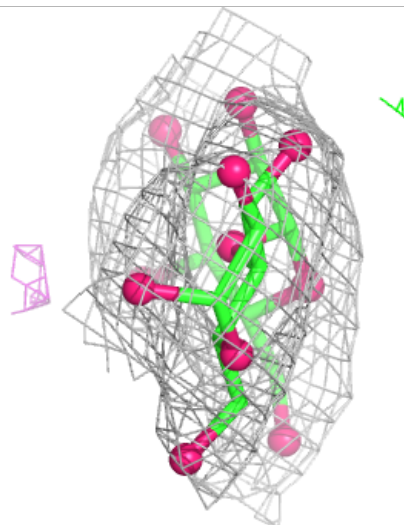
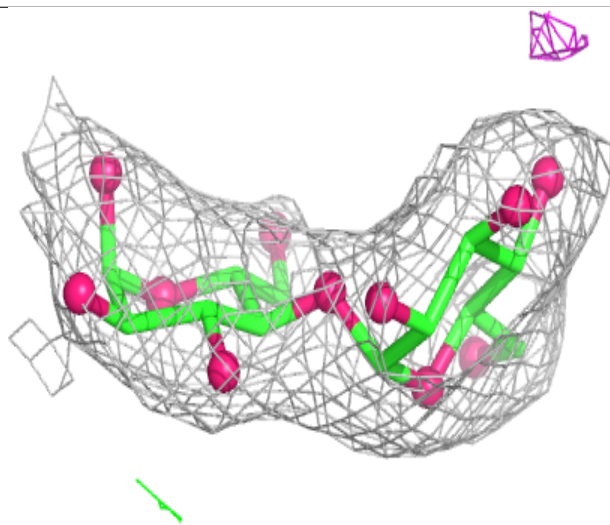
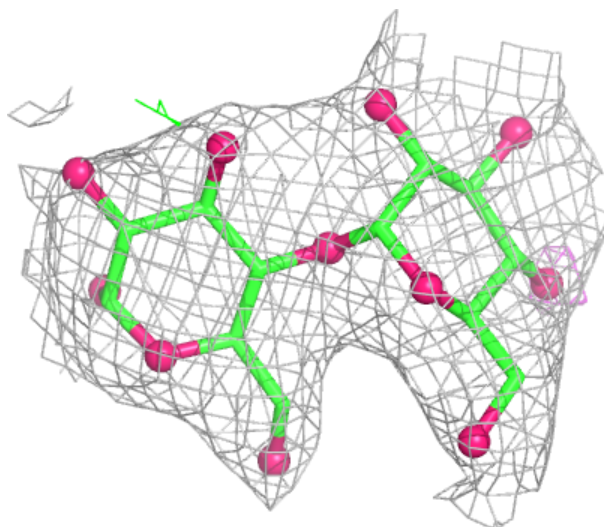
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	GLC	K	2	11/12	0.90	0.10	55,56,58,58	0
4	GLC	L	1	12/12	0.91	0.10	54,54,55,55	0
4	GLC	K	1	12/12	0.92	0.10	52,52,53,54	0
4	GLC	L	2	11/12	0.92	0.08	53,53,54,54	0
4	GLC	J	1	12/12	0.94	0.08	39,40,40,41	0
4	GLC	J	2	11/12	0.96	0.07	38,38,39,39	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.

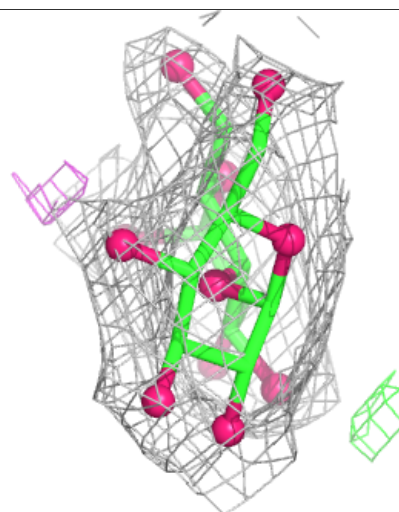
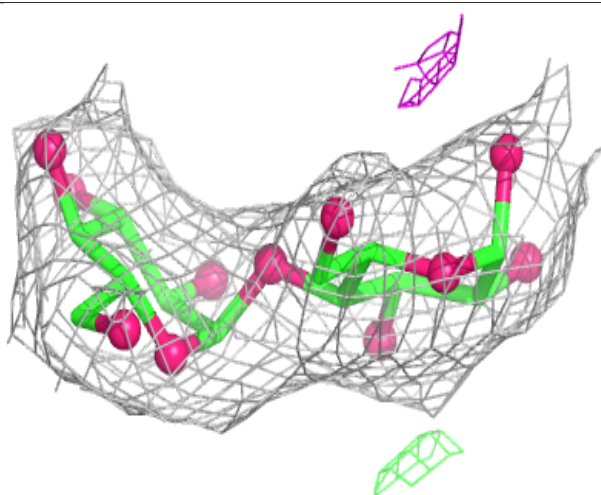
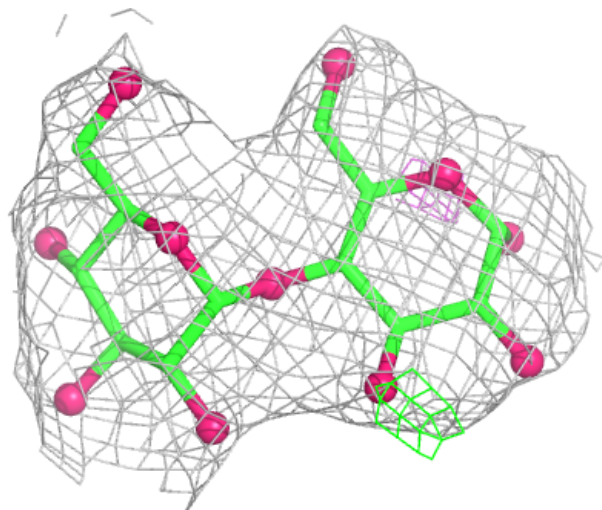
Electron density around Chain J:

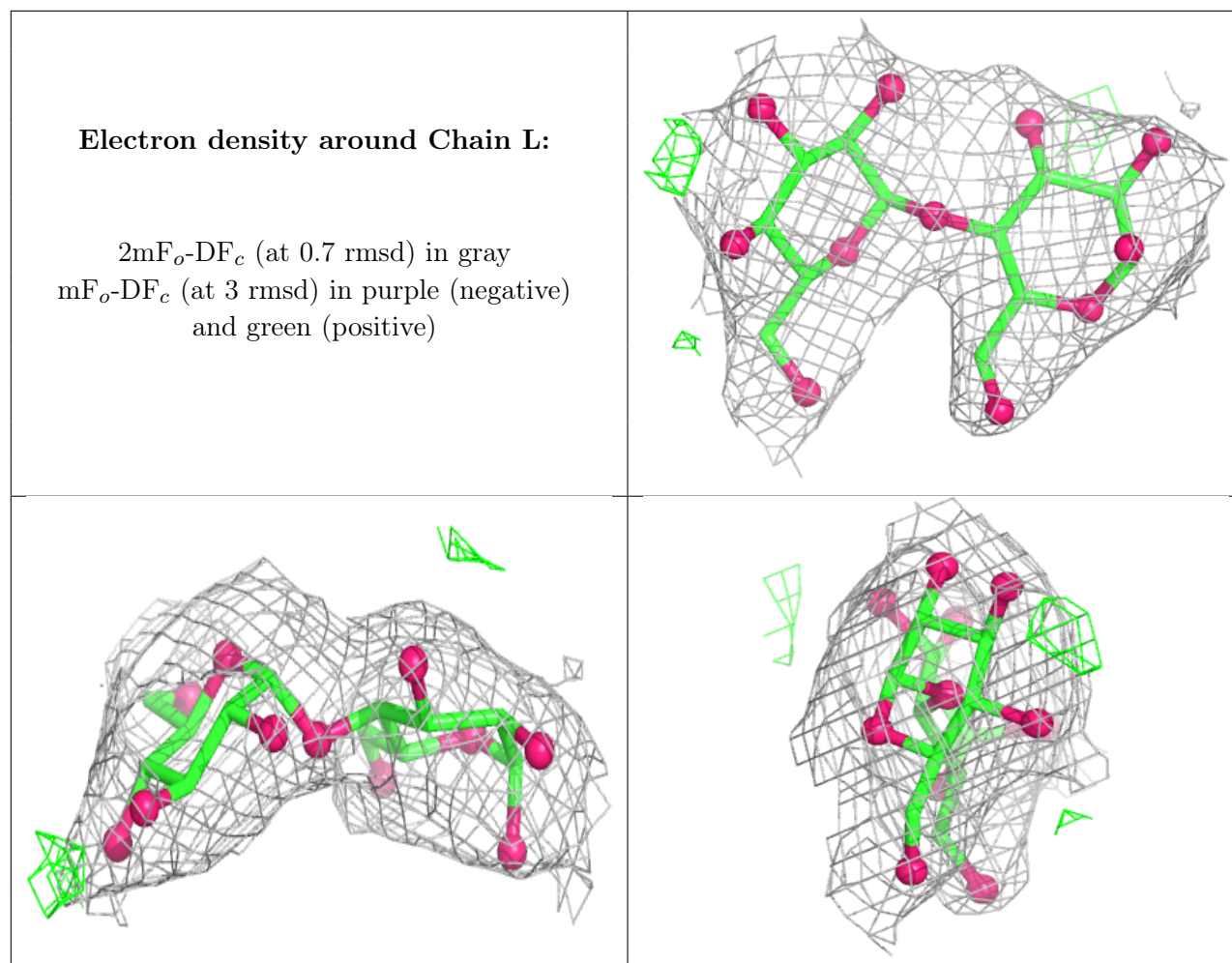
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain K:

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





6.4 Ligands ⓘ

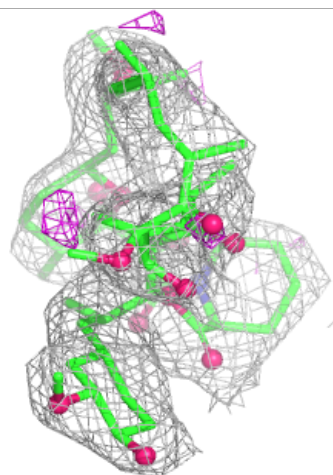
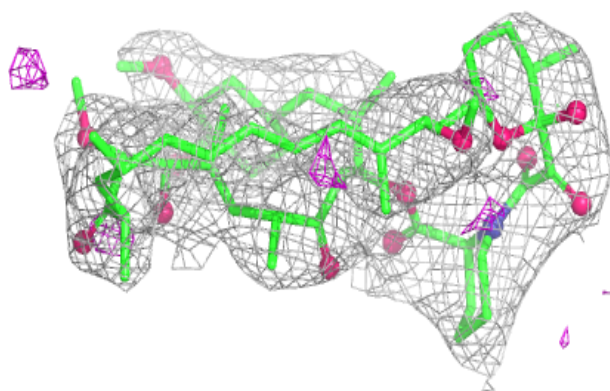
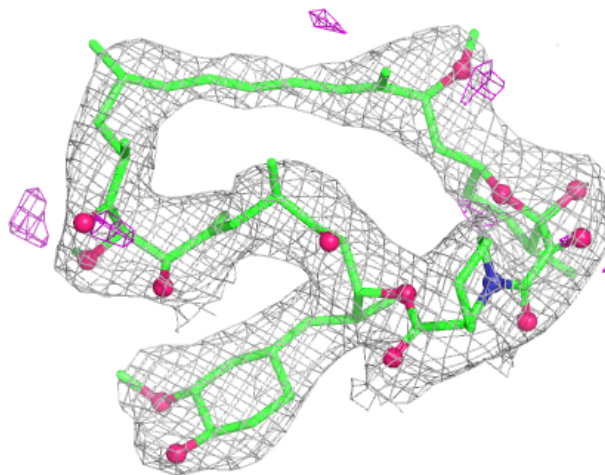
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	GOL	G	2201	6/6	0.72	0.23	56,57,57,58	0
5	RAP	F	201	65/65	0.93	0.12	60,61,65,65	0
5	RAP	E	201	65/65	0.93	0.11	53,54,61,63	0
5	RAP	D	201	65/65	0.95	0.10	46,48,51,52	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

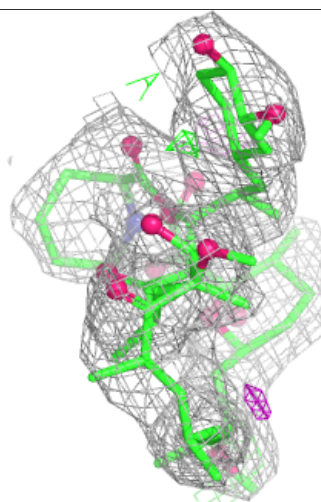
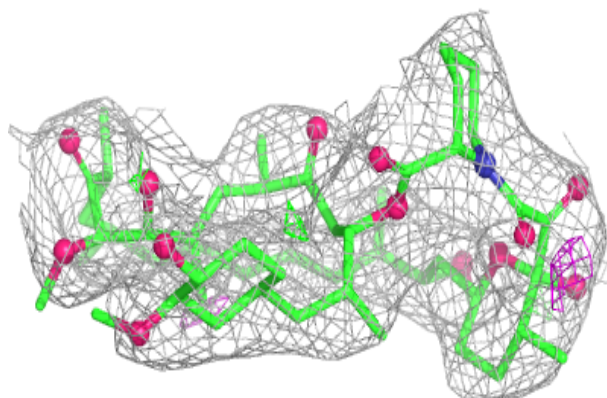
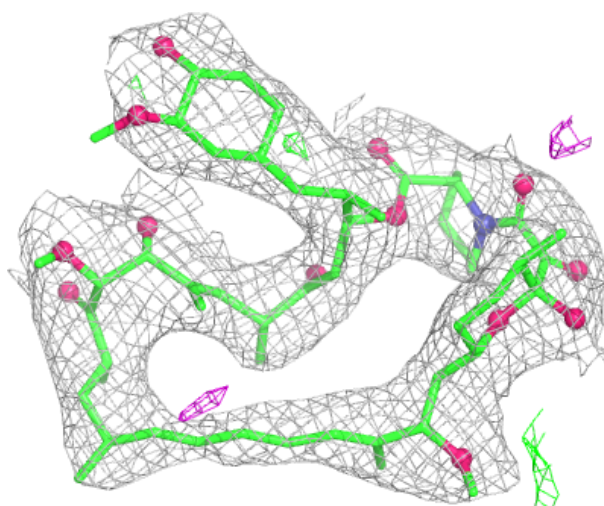
Electron density around RAP F 201:

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



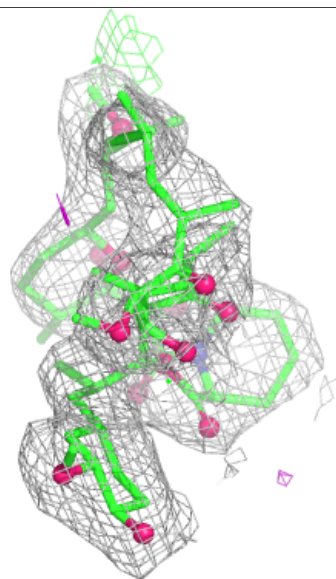
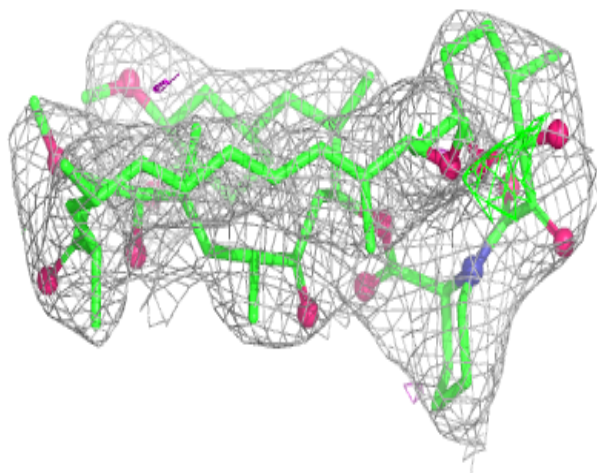
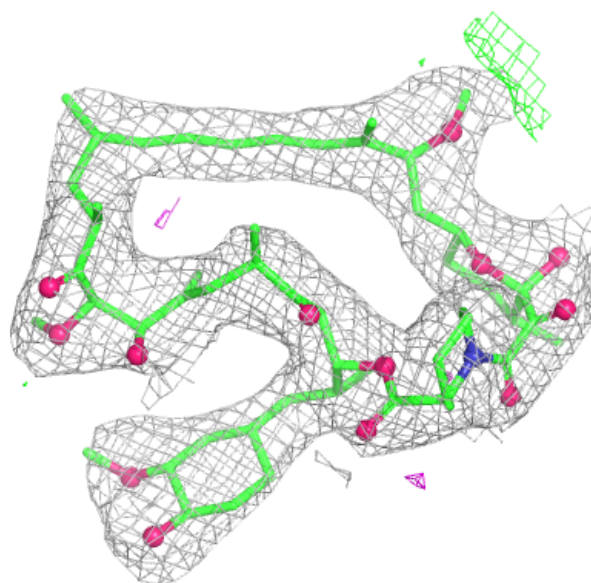
Electron density around RAP E 201:

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



Electron density around RAP D 201:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.