



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 30, 2021 – 02:07 PM EDT

PDB ID : 3MDL
Title : X-ray crystal structure of 1-arachidonoyl glycerol bound to the cyclooxygenase channel of cyclooxygenase-2
Authors : Vecchio, A.J.; Malkowski, M.G.
Deposited on : 2010-03-30
Resolution : 2.20 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 : 2.23.2
buster-report : 1.1.7 (2018)
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) : 2.23.2

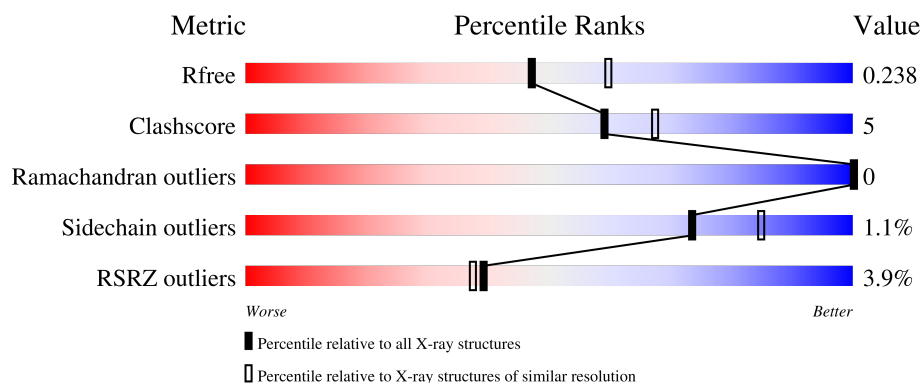
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.




Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	587	<div> <div>3%</div> <div>86%</div> <div>8%</div> <div>6%</div> </div>
1	B	587	<div> <div>4%</div> <div>87%</div> <div>7%</div> <div>6%</div> </div>
2	C	2	<div> <div>50%</div> <div>50%</div> </div>
2	E	2	<div> <div>50%</div> <div>50%</div> </div>
2	F	2	<div> <div>50%</div> <div>50%</div> </div>

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Mol	Chain	Length	Quality of chain
3	D	3	 <div>33% 67%</div>

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NAG	C	1	X	-	-	-
2	NAG	E	2	-	-	-	X
3	MAN	D	3	X	-	-	-
5	AKR	A	2	-	-	X	-
5	AKR	B	3	-	-	X	-

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 10254 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 Prostaglandin G/H synthase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	552	Total	C	N	O	S	0	4	0
			4485	2897	753	810	25			
1	B	551	Total	C	N	O	S	0	2	0
			4455	2877	747	806	25			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	28	ASN	-	expression tag	UNP Q05769
A	29	HIS	-	expression tag	UNP Q05769
A	30	HIS	-	expression tag	UNP Q05769
A	31	HIS	-	expression tag	UNP Q05769
A	32	HIS	-	expression tag	UNP Q05769
A	33	HIS	-	expression tag	UNP Q05769
A	34	HIS	-	expression tag	UNP Q05769
A	594	ALA	ASN	engineered mutation	UNP Q05769
B	28	ASN	-	expression tag	UNP Q05769
B	29	HIS	-	expression tag	UNP Q05769
B	30	HIS	-	expression tag	UNP Q05769
B	31	HIS	-	expression tag	UNP Q05769
B	32	HIS	-	expression tag	UNP Q05769
B	33	HIS	-	expression tag	UNP Q05769
B	34	HIS	-	expression tag	UNP Q05769
B	594	ALA	ASN	engineered mutation	UNP Q05769

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



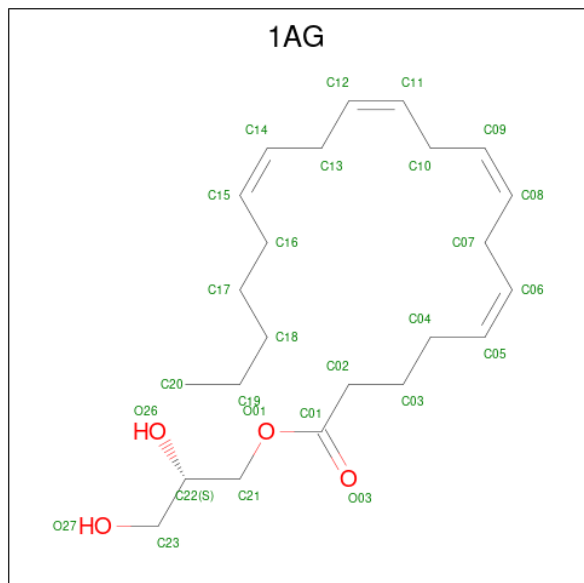
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	E	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	F	2	Total	C	N	O	0	0	0
			28	16	2	10			

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



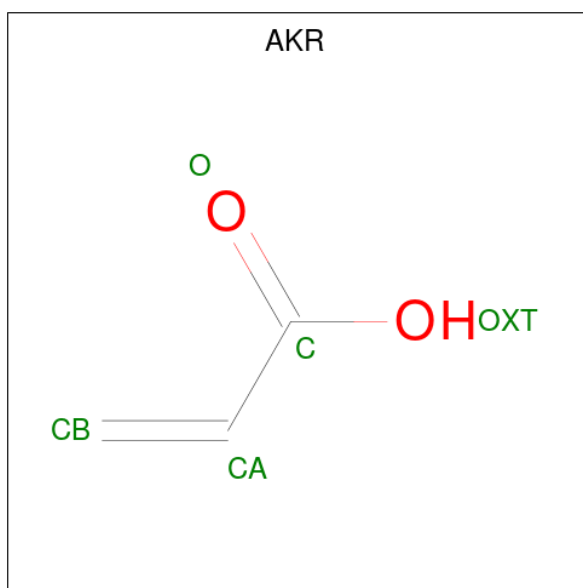
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	D	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 4 is (2S)-2,3-dihydroxypropyl (5Z,8Z,11Z,14Z)-icosa-5,8,11,14-tetraenoate (three-letter code: 1AG) (formula: C₂₃H₃₈O₄).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			27	23	4		
4	B	1	Total	C	O	0	0
			27	23	4		

- Molecule 5 is ACRYLIC ACID (three-letter code: AKR) (formula: $C_3H_4O_2$).



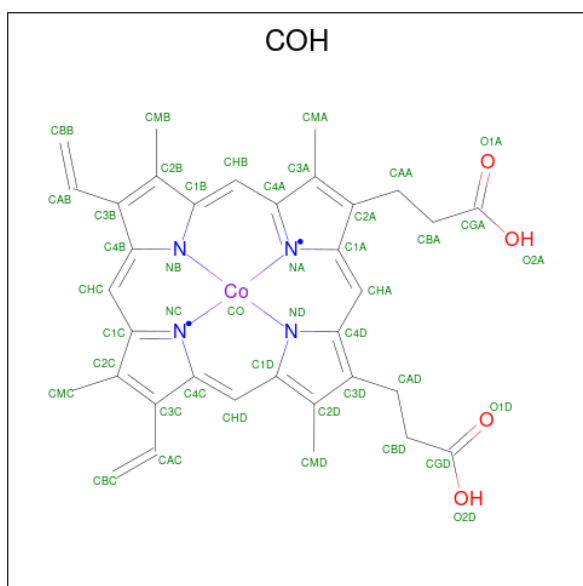
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			5	3	2		
5	A	1	Total	C	O	0	0
			5	3	2		
5	B	1	Total	C	O	0	0
			5	3	2		
5	B	1	Total	C	O	0	0
			5	3	2		
5	B	1	Total	C	O	0	0
			5	3	2		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



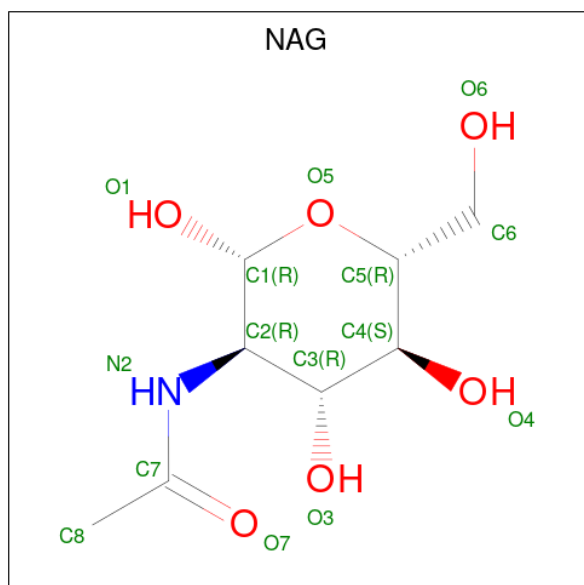
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			6	3	3		
6	B	1	Total	C	O	0	0
			6	3	3		
6	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 7 is PROTOPORPHYRIN IX CONTAINING CO (three-letter code: COH) (formula: $C_{34}H_{32}CoN_4O_4$).



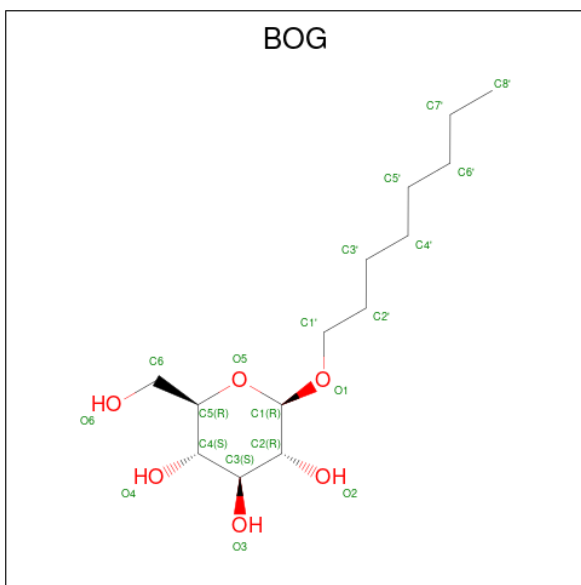
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	A	1	Total 43	C 34	Co 1	N 4	O 4	0	0
7	B	1	Total 43	C 34	Co 1	N 4	O 4	0	0

- Molecule 8 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 9 is octyl beta-D-glucopyranoside (three-letter code: BOG) (formula: $C_{14}H_{28}O_6$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	1	Total	C O	0	0
			20	14 6		


- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	476	Total	O	0	0
			476	476		
10	B	484	Total	O	0	0
			484	484		

Chain E:  50% 50%


MAG1
MAG2

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

Chain F:  50% 50%


MAG1
MAG2

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

Chain D:  33% 67%


MAG1
MAG2
MAG3

4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	118.96Å 131.77Å 179.86Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.97 – 2.20 19.97 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.2 (19.97-2.20) 99.2 (19.97-2.20)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.29 (at 2.19Å)	Xtriage
Refinement program	REFMAC 5.5.0088	Depositor
R, R_{free}	0.165 , 0.215 0.193 , 0.238	Depositor DCC
R_{free} test set	3597 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	28.7	Xtriage
Anisotropy	0.095	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 37.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	10254	wwPDB-VP
Average B, all atoms (Å ²)	25.0	wwPDB-VP

Xtriage'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: AKR, COH, GOL, MAN, 1AG, NAG, BOG

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	0.42	0/4624	0.53	0/6272
1	B	0.42	0/4588	0.53	1/6227 (0.0%)
All	All	0.42	0/9212	0.53	1/12499 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	531	LEU	CA-CB-CG	6.35	129.90	115.30

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	4485	0	4363	40	0
1	B	4455	0	4306	40	0
2	C	28	0	25	0	0
2	E	28	0	25	0	0
2	F	28	0	25	2	0
3	D	39	0	34	5	0
4	A	27	0	36	12	0
4	B	27	0	36	18	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	10	0	6	2	0
5	B	15	0	9	2	0
6	A	6	0	8	0	0
6	B	12	0	16	0	0
7	A	43	0	30	2	0
7	B	43	0	30	1	0
8	A	14	0	13	0	0
8	B	14	0	13	0	0
9	A	20	0	28	0	0
10	A	476	0	0	0	0
10	B	484	0	0	3	0
All	All	10254	0	9003	86	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 (86) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:205:PHE:HE2	4:B:1:1AG:H15	1.02	1.10
1:B:205:PHE:CE2	4:B:1:1AG:H15	1.93	1.02
1:B:477:SER:HB2	5:B:3:AKR:HA1	1.50	0.94
1:A:216:ARG:HH11	3:D:2:NAG:H83	1.38	0.88
1:A:216:ARG:NH1	3:D:2:NAG:H83	1.90	0.86
1:B:534:LEU:HG	4:B:1:1AG:H17	1.58	0.85
7:A:614:COH:HBA2	7:A:614:COH:HHA	1.63	0.81
1:B:385:TYR:OH	4:B:1:1AG:H14	1.83	0.77
1:A:348:TYR:HE2	4:A:1:1AG:H15	1.51	0.75
1:B:530:SER:HB2	4:B:1:1AG:H13A	1.69	0.73
1:A:385:TYR:OH	4:A:1:1AG:H17A	1.88	0.73
1:B:205:PHE:HE2	4:B:1:1AG:C15	1.94	0.70
1:B:492:LYS:HD3	5:B:3:AKR:HB2	1.72	0.70
1:A:348:TYR:CE2	4:A:1:1AG:H15	2.27	0.68
1:A:414:LEU:HD11	1:A:419:LEU:HD12	1.80	0.62
1:A:216:ARG:HH11	3:D:2:NAG:C8	2.11	0.61
1:B:289:GLN:HG2	1:B:292:PHE:CE1	2.35	0.61
1:A:289:GLN:HG2	1:A:292:PHE:CE1	2.36	0.60
1:B:352:LEU:HD22	1:B:518:PHE:CE2	2.37	0.59
1:B:530:SER:CB	4:B:1:1AG:H13A	2.34	0.58
1:A:523:VAL:HG13	4:A:1:1AG:H04	1.85	0.57
1:A:353:SER:HB3	4:A:1:1AG:H05	1.86	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:478:PHE:HD2	5:A:2:AKR:HA1	1.69	0.57
4:B:1:1AG:H20B	10:B:630:HOH:O	2.05	0.56
1:A:382:ASN:O	1:A:386:HIS:HD2	1.89	0.56
1:B:209:PHE:CE1	4:B:1:1AG:H19A	2.42	0.54
1:B:533:GLY:HA3	4:B:1:1AG:H19	1.90	0.54
1:A:348:TYR:HE2	4:A:1:1AG:C15	2.22	0.52
4:B:1:1AG:H06	4:B:1:1AG:H11	1.91	0.52
1:B:381:PHE:HE2	4:B:1:1AG:H20A	1.75	0.52
1:B:380:GLU:HG2	1:B:466:TYR:CE2	2.45	0.52
1:A:382:ASN:O	1:A:386:HIS:CD2	2.63	0.52
1:B:530:SER:HB2	4:B:1:1AG:C13	2.38	0.50
1:B:294:LEU:HA	1:B:409:TYR:CE1	2.48	0.49
1:B:382:ASN:O	1:B:386:HIS:CD2	2.65	0.48
7:A:614:COH:HBA2	7:A:614:COH:CHA	2.37	0.48
1:B:447:VAL:HG13	7:B:615:COH:HBA2	1.94	0.48
1:A:163:MET:CE	1:A:502:GLU:HG2	2.44	0.48
1:A:222:ARG:NH1	1:A:290:GLU:OE2	2.46	0.48
1:A:340:THR:O	1:A:344:VAL:HG23	2.14	0.47
1:B:216:ARG:HG2	2:F:2:NAG:H81	1.95	0.47
3:D:2:NAG:O3	3:D:3:MAN:H2	2.15	0.47
1:B:534:LEU:CG	4:B:1:1AG:H17	2.38	0.46
1:A:294:LEU:HG	1:A:295:VAL:HG23	1.97	0.46
1:A:216:ARG:HG2	3:D:2:NAG:H81	1.99	0.45
1:A:381:PHE:HZ	4:A:1:1AG:H18A	1.81	0.45
1:B:382:ASN:O	1:B:386:HIS:HD2	2.00	0.45
1:A:530:SER:HA	4:A:1:1AG:H20B	1.98	0.45
1:B:114:LYS:HD3	1:B:365:LEU:O	2.16	0.45
1:A:198:PHE:CZ	1:A:352:LEU:HD21	2.52	0.45
1:A:530:SER:OG	4:A:1:1AG:H19	2.17	0.45
1:B:344:VAL:HA	1:B:348:TYR:HB3	1.98	0.44
1:B:484:GLU:HG2	1:B:485:LYS:H	1.82	0.44
1:B:206:THR:HG21	1:B:385:TYR:CE2	2.53	0.44
1:A:200:PHE:CE1	1:A:295:VAL:HG11	2.52	0.44
1:A:181:VAL:HG21	1:A:491:LEU:HD21	2.00	0.44
4:B:1:1AG:H07	4:B:1:1AG:H04A	1.83	0.44
1:A:196:MET:CE	1:A:431:ALA:HA	2.48	0.44
1:A:198:PHE:HZ	1:A:352:LEU:HD21	1.83	0.44
1:A:117:LEU:HD22	1:A:531:LEU:HD23	1.99	0.43
1:A:386:HIS:HB3	1:A:388[B]:HIS:CE1	2.53	0.43
1:B:386:HIS:HB3	1:B:388[B]:HIS:CE1	2.54	0.43
1:A:380:GLU:HG2	1:A:466:TYR:CE1	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:374:GLN:NE2	10:B:1070:HOH:O	2.47	0.43
1:B:352:LEU:HD22	1:B:518:PHE:HE2	1.80	0.43
1:A:352:LEU:HD22	1:A:518:PHE:CE2	2.54	0.43
1:B:581:ASN:O	1:B:582:VAL:HB	2.18	0.43
1:B:533:GLY:HA3	4:B:1:1AG:C19	2.48	0.43
1:B:441:PRO:HG2	1:B:444:VAL:HG22	2.01	0.42
1:A:353:SER:CB	4:A:1:1AG:H05	2.48	0.42
1:A:534:LEU:HG	4:A:1:1AG:H20	2.02	0.42
1:B:534:LEU:HD11	4:B:1:1AG:H16A	2.01	0.42
1:B:204:HIS:CD2	1:B:292:PHE:CE2	3.08	0.42
1:A:344:VAL:HA	1:A:348:TYR:HB3	2.01	0.42
1:B:198:PHE:HZ	1:B:352:LEU:HD21	1.85	0.41
1:A:287:VAL:HG11	1:A:302:ALA:HB1	2.03	0.41
4:A:1:1AG:H13A	4:A:1:1AG:H10A	1.82	0.41
1:B:511:LYS:NZ	10:B:1073:HOH:O	2.53	0.41
1:A:124:ILE:HD11	1:A:528:PRO:HB2	2.03	0.41
1:A:414:LEU:HA	1:A:422:PHE:CE1	2.56	0.41
1:A:142:PHE:CE2	1:B:538:PRO:HG3	2.56	0.40
1:A:478:PHE:CD2	5:A:2:AKR:HA1	2.54	0.40
1:A:117:LEU:HD22	1:A:531:LEU:CD2	2.50	0.40
1:B:216:ARG:HH11	2:F:2:NAG:H83	1.85	0.40
1:B:523:VAL:HG13	4:B:1:1AG:H04A	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	554/587 (94%)	543 (98%)	11 (2%)	0	100	100
1	B	551/587 (94%)	541 (98%)	10 (2%)	0	100	100
All	All	1105/1174 (94%)	1084 (98%)	21 (2%)	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	489/525 (93%)	484 (99%)	5 (1%)	76	86
1	B	482/525 (92%)	476 (99%)	6 (1%)	71	83
All	All	971/1050 (92%)	960 (99%)	11 (1%)	73	85

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	232	HIS
1	A	282	ASN
1	A	385	TYR
1	A	484	GLU
1	A	556	PHE
1	B	108	LEU
1	B	232	HIS
1	B	289	GLN
1	B	385	TYR
1	B	484	GLU
1	B	531	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	386	HIS
1	B	374	GLN

5.3.3 RNA [i](#)

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 ⓘ

9 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	NAG	C	1	1,2	14,14,15	0.55	0	17,19,21	1.43	1 (5%)
2	NAG	C	2	2	14,14,15	0.51	0	17,19,21	0.66	0
3	NAG	D	1	1,3	14,14,15	0.52	0	17,19,21	1.20	1 (5%)
3	NAG	D	2	3	14,14,15	0.52	0	17,19,21	1.19	1 (5%)
3	MAN	D	3	3	11,11,12	0.57	0	15,15,17	2.17	4 (26%)
2	NAG	E	1	1,2	14,14,15	0.64	0	17,19,21	0.79	0
2	NAG	E	2	2	14,14,15	0.56	0	17,19,21	2.08	4 (23%)
2	NAG	F	1	1,2	14,14,15	0.46	0	17,19,21	1.08	1 (5%)
2	NAG	F	2	2	14,14,15	0.55	0	17,19,21	1.09	2 (11%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	C	1	1,2	1/1/5/7	2/6/23/26	0/1/1/1
2	NAG	C	2	2	-	4/6/23/26	0/1/1/1
3	NAG	D	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	D	2	3	-	4/6/23/26	0/1/1/1
3	MAN	D	3	3	1/1/4/5	2/2/19/22	0/1/1/1
2	NAG	E	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	E	2	2	-	4/6/23/26	0/1/1/1
2	NAG	F	1	1,2	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	F	2	2	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	2	NAG	O5-C1-C2	4.77	118.81	111.29
2	C	1	NAG	C1-O5-C5	4.47	118.25	112.19
3	D	3	MAN	C1-O5-C5	4.45	118.23	112.19
3	D	1	NAG	C1-O5-C5	4.34	118.07	112.19
2	E	2	NAG	C4-C3-C2	4.22	117.20	111.02
2	E	2	NAG	C1-O5-C5	4.20	117.88	112.19
3	D	3	MAN	C1-C2-C3	-4.10	104.63	109.67
3	D	3	MAN	C3-C4-C5	3.98	117.34	110.24
2	F	1	NAG	C1-O5-C5	3.71	117.22	112.19
3	D	2	NAG	C4-C3-C2	3.09	115.55	111.02
3	D	3	MAN	O5-C5-C4	2.84	117.75	110.83
2	E	2	NAG	C3-C4-C5	2.80	115.23	110.24
2	F	2	NAG	O5-C5-C6	2.15	110.58	107.20
2	F	2	NAG	C4-C3-C2	2.02	113.97	111.02

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	C	1	NAG	C5
3	D	3	MAN	C1

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	F	2	NAG	C8-C7-N2-C2
2	F	2	NAG	O7-C7-N2-C2
2	C	2	NAG	O5-C5-C6-O6
2	C	1	NAG	C4-C5-C6-O6
2	C	2	NAG	C4-C5-C6-O6
2	C	1	NAG	O5-C5-C6-O6
2	E	2	NAG	O5-C5-C6-O6
2	E	2	NAG	C4-C5-C6-O6
3	D	2	NAG	C8-C7-N2-C2
3	D	2	NAG	O7-C7-N2-C2
3	D	3	MAN	C4-C5-C6-O6

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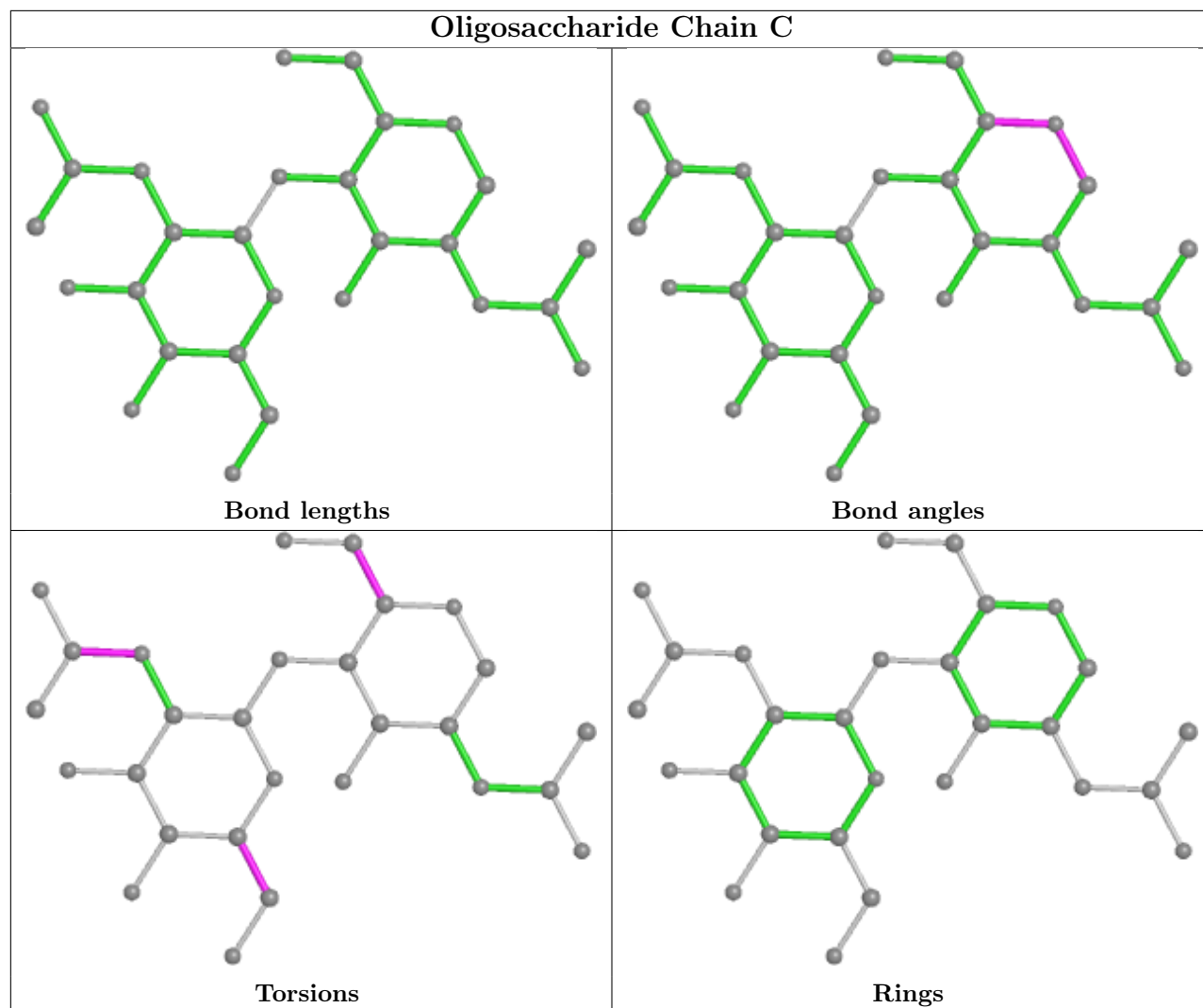
Mol	Chain	Res	Type	Atoms
3	D	2	NAG	O5-C5-C6-O6
3	D	2	NAG	C4-C5-C6-O6
2	C	2	NAG	C8-C7-N2-C2
2	C	2	NAG	O7-C7-N2-C2
2	E	2	NAG	C8-C7-N2-C2
2	E	1	NAG	O5-C5-C6-O6
3	D	3	MAN	O5-C5-C6-O6
2	E	1	NAG	C4-C5-C6-O6
2	E	2	NAG	O7-C7-N2-C2

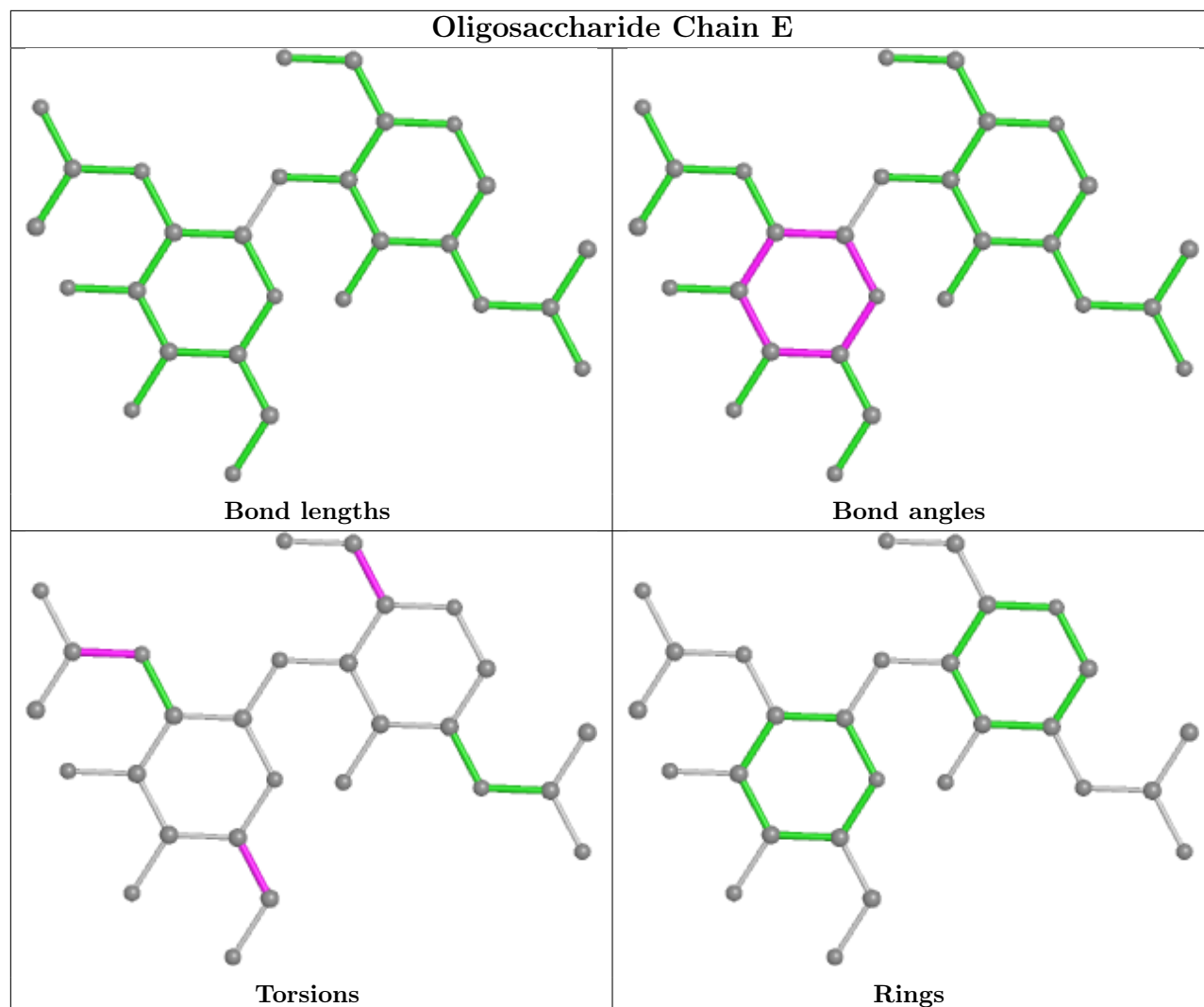
There are no ring outliers.

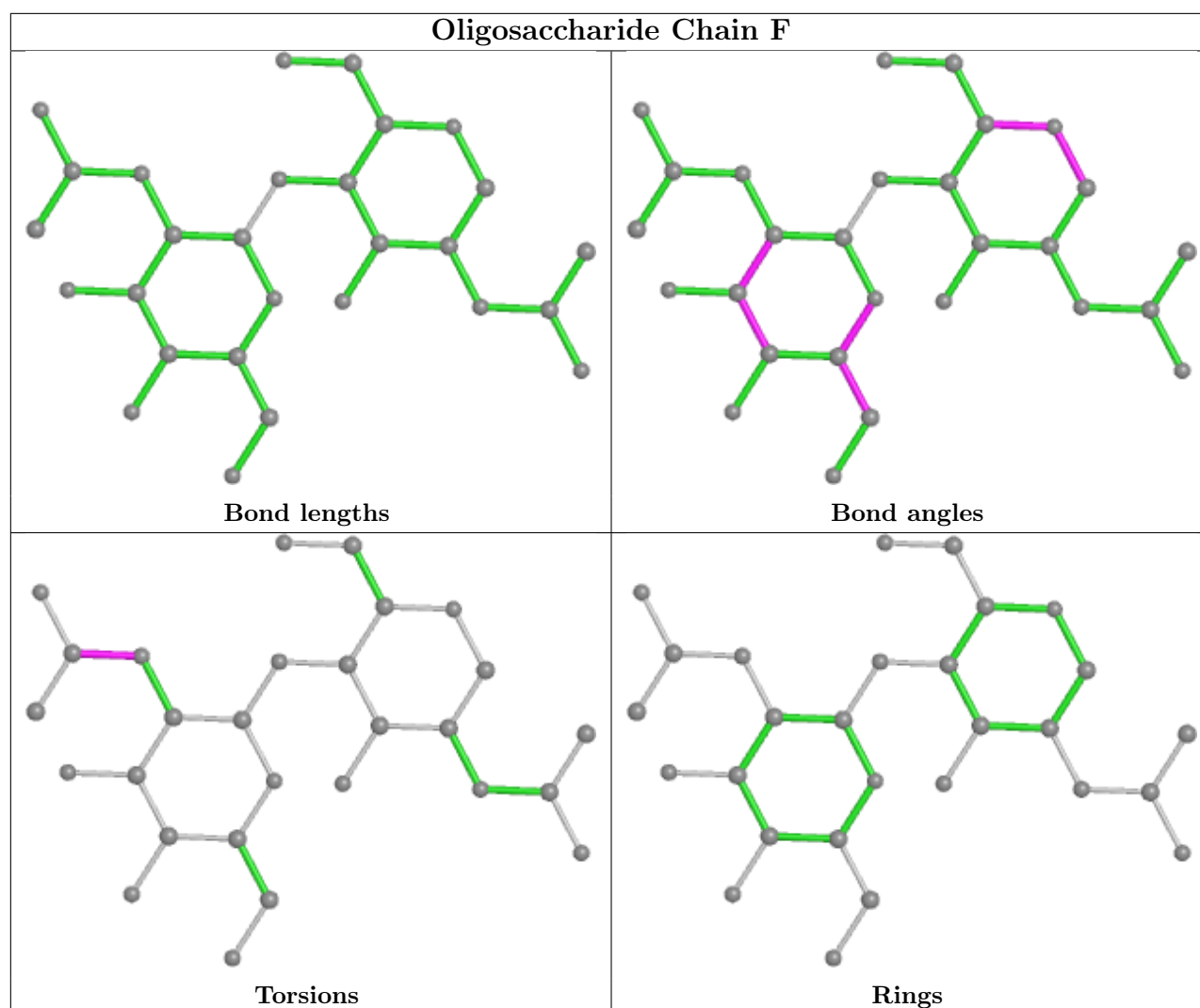
3 monomers are involved in 7 short contacts:

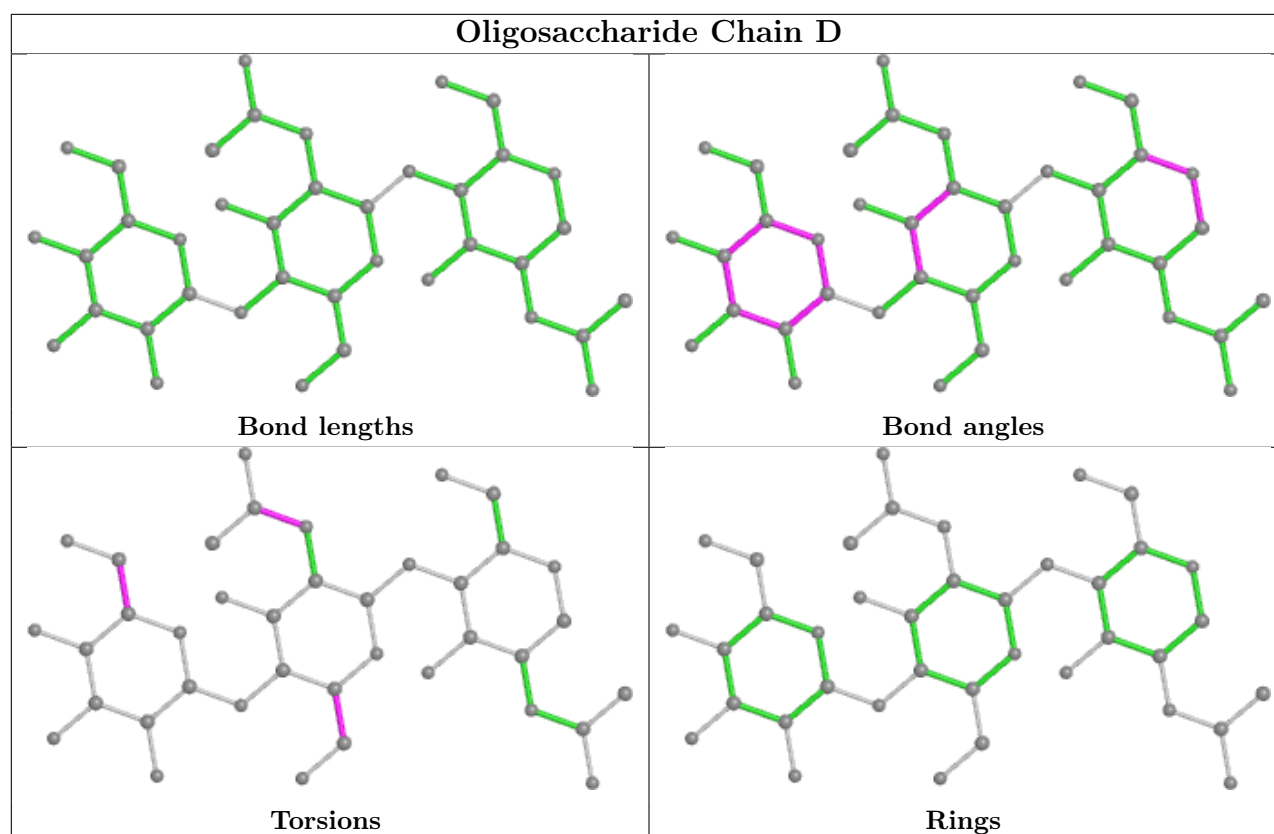
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	2	NAG	5	0
3	D	3	MAN	1	0
2	F	2	NAG	2	0

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](#)

15 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	$\# Z > 2$
4	1AG	A	1	-	26,26,26	2.22	4 (15%)	27,27,27	0.87	0
5	AKR	A	3	-	1,4,4	1.61	0	0,4,4	-	-
7	COH	A	614	1	31,50,50	5.51	22 (70%)	23,82,82	4.54	8 (34%)
9	BOG	A	703	-	20,20,20	0.46	0	25,25,25	0.52	0
6	GOL	B	7	-	5,5,5	0.39	0	5,5,5	0.17	0
7	COH	B	615	1	31,50,50	5.51	22 (70%)	23,82,82	4.71	11 (47%)
8	NAG	A	681	1	14,14,15	0.54	0	17,19,21	0.84	0
5	AKR	A	2	-	1,4,4	1.64	0	0,4,4	-	-
6	GOL	A	4	-	5,5,5	0.33	0	5,5,5	0.36	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	GOL	B	6	-	5,5,5	0.36	0	5,5,5	0.15	0
5	AKR	B	5	-	1,4,4	1.59	0	0,4,4	-	-
8	NAG	B	681	1	14,14,15	0.57	0	17,19,21	0.89	1 (5%)
5	AKR	B	4	-	1,4,4	1.63	0	0,4,4	-	-
5	AKR	B	3	-	1,4,4	1.61	0	0,4,4	-	-
4	1AG	B	1	-	26,26,26	2.26	4 (15%)	27,27,27	0.77	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	1AG	A	1	-	-	7/26/26/26	-
5	AKR	A	3	-	-	0/0/2/2	-
7	COH	A	614	1	-	0/8/94/94	-
9	BOG	A	703	-	-	4/11/31/31	0/1/1/1
6	GOL	B	7	-	-	0/4/4/4	-
7	COH	B	615	1	-	3/8/94/94	-
8	NAG	A	681	1	-	0/6/23/26	0/1/1/1
5	AKR	A	2	-	-	0/0/2/2	-
6	GOL	A	4	-	-	2/4/4/4	-
6	GOL	B	6	-	-	2/4/4/4	-
5	AKR	B	5	-	-	0/0/2/2	-
8	NAG	B	681	1	-	0/6/23/26	0/1/1/1
5	AKR	B	4	-	-	0/0/2/2	-
5	AKR	B	3	-	-	0/0/2/2	-
4	1AG	B	1	-	-	8/26/26/26	-

All (52) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	614	COH	C1D-ND	10.53	1.39	1.34
7	B	615	COH	C1D-ND	10.38	1.39	1.34
7	B	615	COH	C4D-ND	10.04	1.39	1.34
7	A	614	COH	C4D-ND	9.61	1.39	1.34
7	B	615	COH	CHA-C1A	-8.75	1.38	1.53
7	A	614	COH	C4B-NB	8.74	1.39	1.34
7	B	615	COH	C4B-NB	8.62	1.38	1.34
7	A	614	COH	CHA-C1A	-8.61	1.38	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	B	615	COH	CHB-C4A	-8.60	1.38	1.53
7	A	614	COH	CHB-C4A	-8.50	1.38	1.53
4	B	1	1AG	O01-C21	-8.47	1.25	1.45
7	A	614	COH	C1B-NB	8.44	1.38	1.34
7	B	615	COH	CHD-C4C	-8.43	1.38	1.53
7	B	615	COH	CHC-C1C	-8.39	1.38	1.53
7	A	614	COH	CHD-C4C	-8.25	1.39	1.53
4	A	1	1AG	O01-C21	-8.21	1.26	1.45
7	B	615	COH	C1B-NB	8.10	1.38	1.34
7	A	614	COH	CHC-C1C	-8.01	1.39	1.53
4	A	1	1AG	O26-C22	-6.02	1.25	1.43
4	B	1	1AG	O26-C22	-5.80	1.26	1.43
7	A	614	COH	C1D-C2D	5.76	1.46	1.38
7	B	615	COH	C3D-C2D	5.63	1.54	1.37
7	B	615	COH	C1B-C2B	5.60	1.45	1.38
7	A	614	COH	C1B-C2B	5.56	1.45	1.38
7	A	614	COH	C3D-C2D	5.54	1.54	1.37
7	A	614	COH	CHB-C1B	-5.34	1.38	1.51
7	B	615	COH	C1D-C2D	5.22	1.45	1.38
7	A	614	COH	CHA-C4D	-5.20	1.38	1.51
7	B	615	COH	CHA-C4D	-5.19	1.38	1.51
7	B	615	COH	CHB-C1B	-5.16	1.38	1.51
7	B	615	COH	CHD-C1D	-5.11	1.38	1.51
7	A	614	COH	C4D-C3D	5.10	1.45	1.38
7	B	615	COH	C4D-C3D	5.04	1.45	1.38
7	B	615	COH	CHC-C4B	-5.03	1.38	1.51
7	A	614	COH	CHD-C1D	-4.94	1.39	1.51
7	A	614	COH	CHC-C4B	-4.89	1.39	1.51
7	B	615	COH	C3B-C2B	-4.48	1.34	1.40
7	A	614	COH	C3B-C2B	-4.33	1.34	1.40
4	B	1	1AG	O27-C23	-4.08	1.25	1.42
4	A	1	1AG	O27-C23	-3.95	1.25	1.42
7	B	615	COH	C4C-C3C	-3.68	1.45	1.51
7	A	614	COH	CAA-C2A	3.68	1.56	1.51
7	A	614	COH	C3B-CAB	3.64	1.55	1.47
7	A	614	COH	C4C-C3C	-3.46	1.45	1.51
7	B	615	COH	C3B-CAB	3.37	1.54	1.47
7	B	615	COH	CMA-C3A	3.19	1.55	1.50
7	A	614	COH	CMA-C3A	3.13	1.55	1.50
7	A	614	COH	CMC-C2C	3.00	1.55	1.50
7	B	615	COH	CAA-C2A	2.85	1.55	1.51
7	B	615	COH	CMC-C2C	2.83	1.55	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1	1AG	O01-C01	-2.39	1.26	1.33
4	A	1	1AG	O01-C01	-2.32	1.26	1.33

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	614	COH	CHC-C1C-NC	10.74	125.93	110.12
7	B	615	COH	CHA-C1A-NA	10.66	125.81	110.12
7	B	615	COH	CHD-C4C-NC	10.56	125.66	110.12
7	B	615	COH	CHC-C1C-NC	10.46	125.52	110.12
7	B	615	COH	CHB-C4A-NA	10.44	125.48	110.12
7	A	614	COH	CHD-C4C-NC	10.38	125.39	110.12
7	A	614	COH	CHB-C4A-NA	10.37	125.39	110.12
7	A	614	COH	CHA-C1A-NA	9.83	124.59	110.12
7	B	615	COH	CBA-CAA-C2A	-4.08	107.13	114.35
7	A	614	COH	CBD-CAD-C3D	-3.09	106.78	112.49
7	B	615	COH	CBD-CAD-C3D	-3.07	106.82	112.49
7	B	615	COH	C4B-C3B-C2B	2.50	108.24	104.41
7	A	614	COH	C4B-C3B-C2B	2.45	108.17	104.41
7	A	614	COH	CMC-C2C-C3C	-2.45	125.56	129.73
7	A	614	COH	C3C-C4C-NC	-2.42	107.17	109.03
8	B	681	NAG	C1-O5-C5	2.37	115.40	112.19
7	B	615	COH	CMC-C2C-C3C	-2.23	125.93	129.73
7	B	615	COH	CHD-C1D-C2D	-2.15	125.73	129.45
7	B	615	COH	CBC-CAC-C3C	-2.10	119.91	127.20
7	B	615	COH	C3C-C4C-NC	-2.03	107.47	109.03

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1	1AG	C02-C01-O01-C21
4	A	1	1AG	O01-C21-C22-C23
6	A	4	GOL	C1-C2-C3-O3
7	B	615	COH	C2A-CAA-CBA-CGA
4	A	1	1AG	O03-C01-O01-C21
4	B	1	1AG	O03-C01-O01-C21
4	B	1	1AG	C02-C01-O01-C21
4	A	1	1AG	O01-C21-C22-O26
4	B	1	1AG	C01-C02-C03-C04
4	A	1	1AG	C01-C02-C03-C04
6	B	6	GOL	O1-C1-C2-C3

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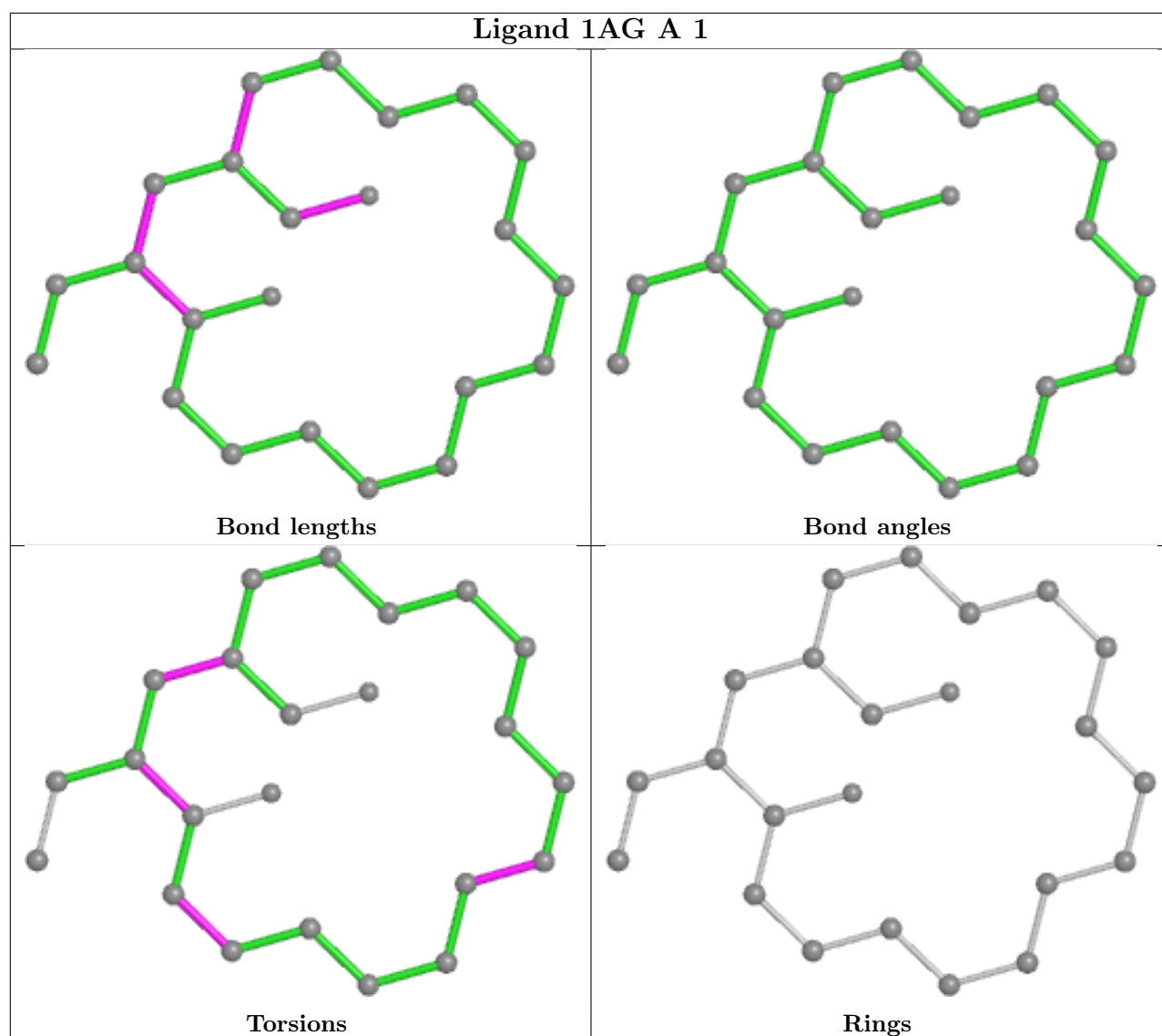
Mol	Chain	Res	Type	Atoms
7	B	615	COH	C2C-C3C-CAC-CBC
7	B	615	COH	C4C-C3C-CAC-CBC
4	B	1	1AG	C15-C16-C17-C18
9	A	703	BOG	C3'-C4'-C5'-C6'
6	A	4	GOL	O2-C2-C3-O3
9	A	703	BOG	C5'-C6'-C7'-C8'
9	A	703	BOG	C2'-C1'-O1-C1
4	A	1	1AG	C06-C07-C08-C09
4	B	1	1AG	C09-C10-C11-C12
4	B	1	1AG	O26-C22-C23-O27
4	A	1	1AG	C15-C16-C17-C18
6	B	6	GOL	O1-C1-C2-O2
9	A	703	BOG	O5-C1-O1-C1'
4	B	1	1AG	C16-C17-C18-C19
4	B	1	1AG	C21-C22-C23-O27

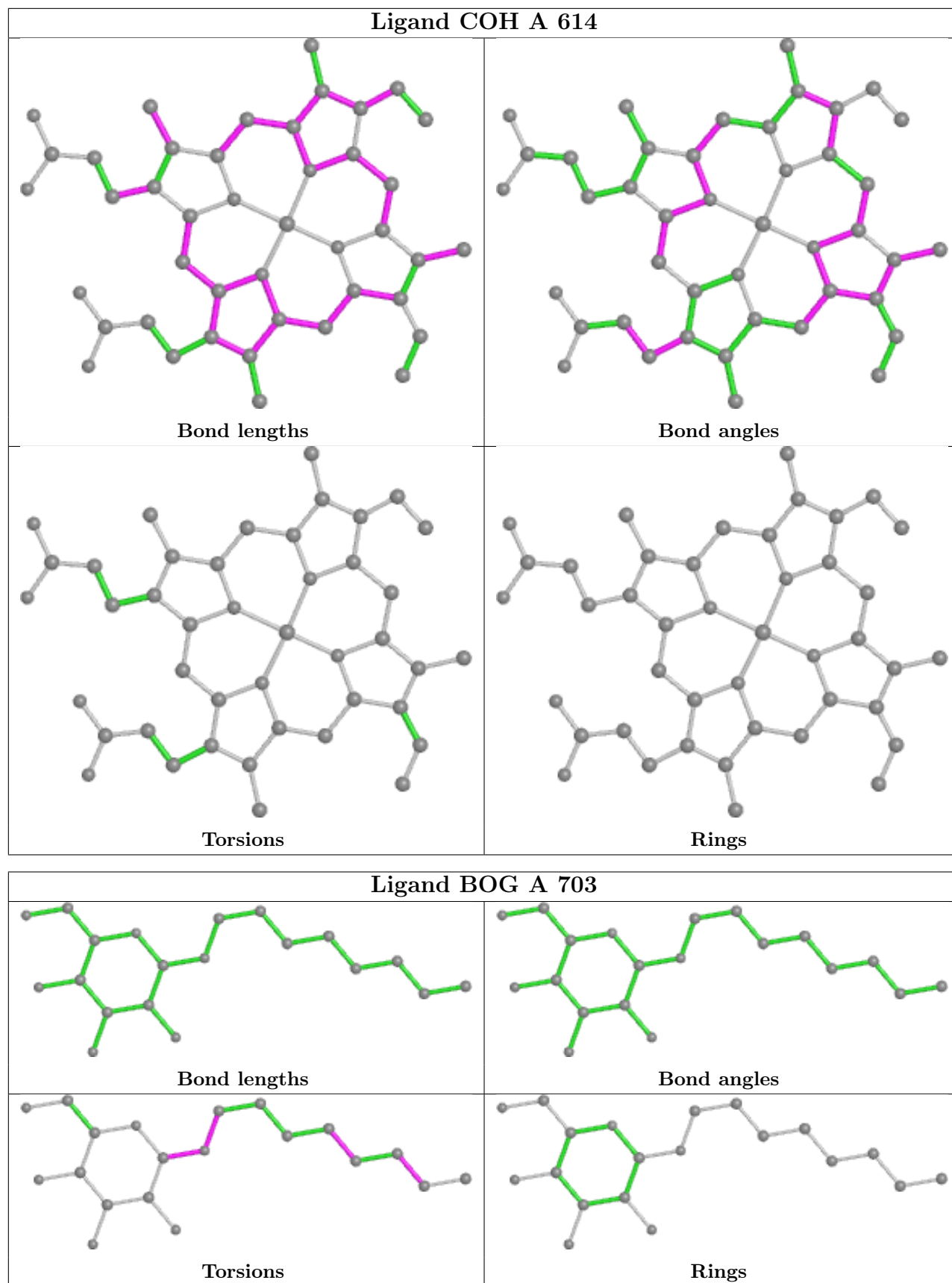
There are no ring outliers.

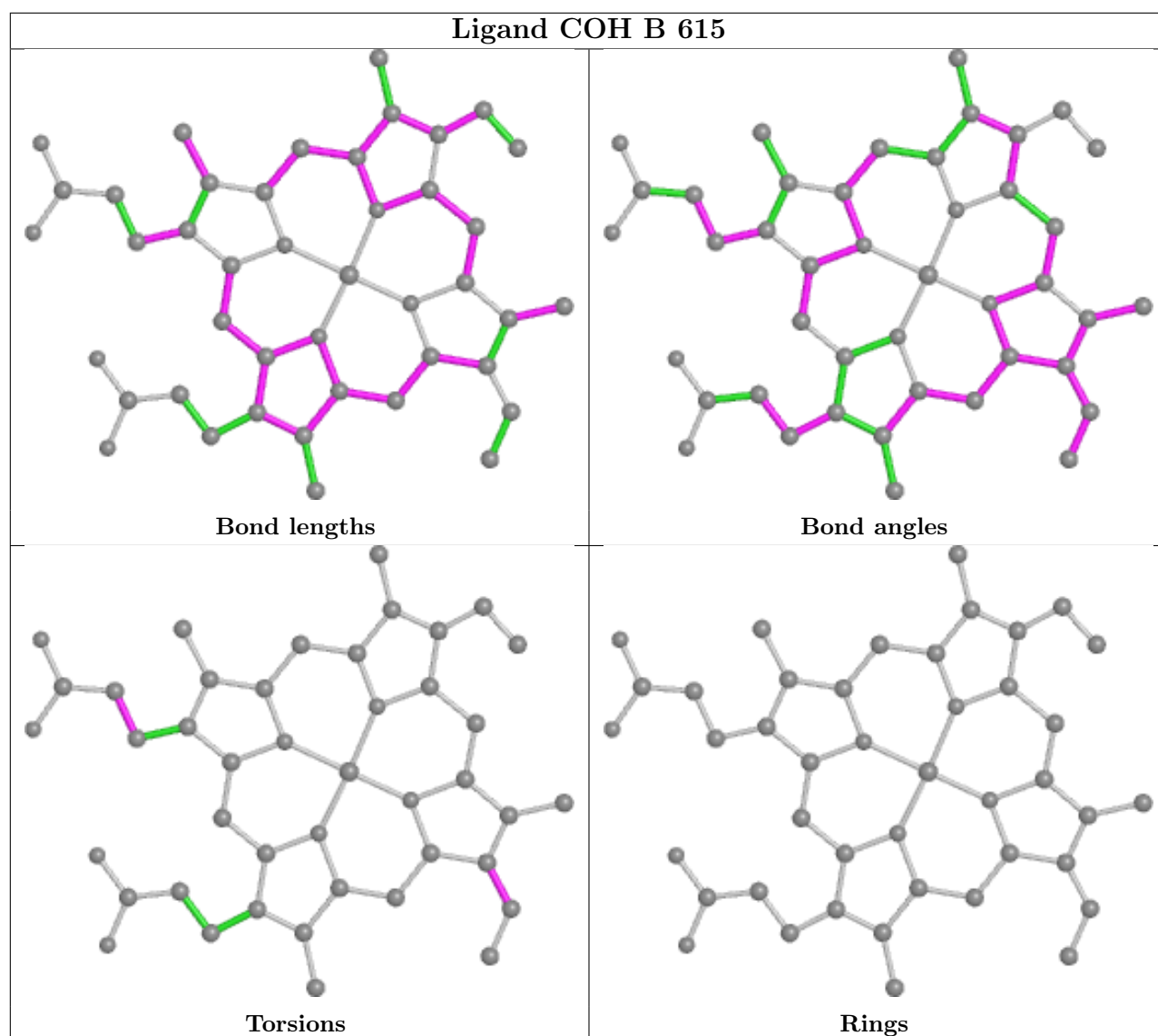
6 monomers are involved in 37 short contacts:

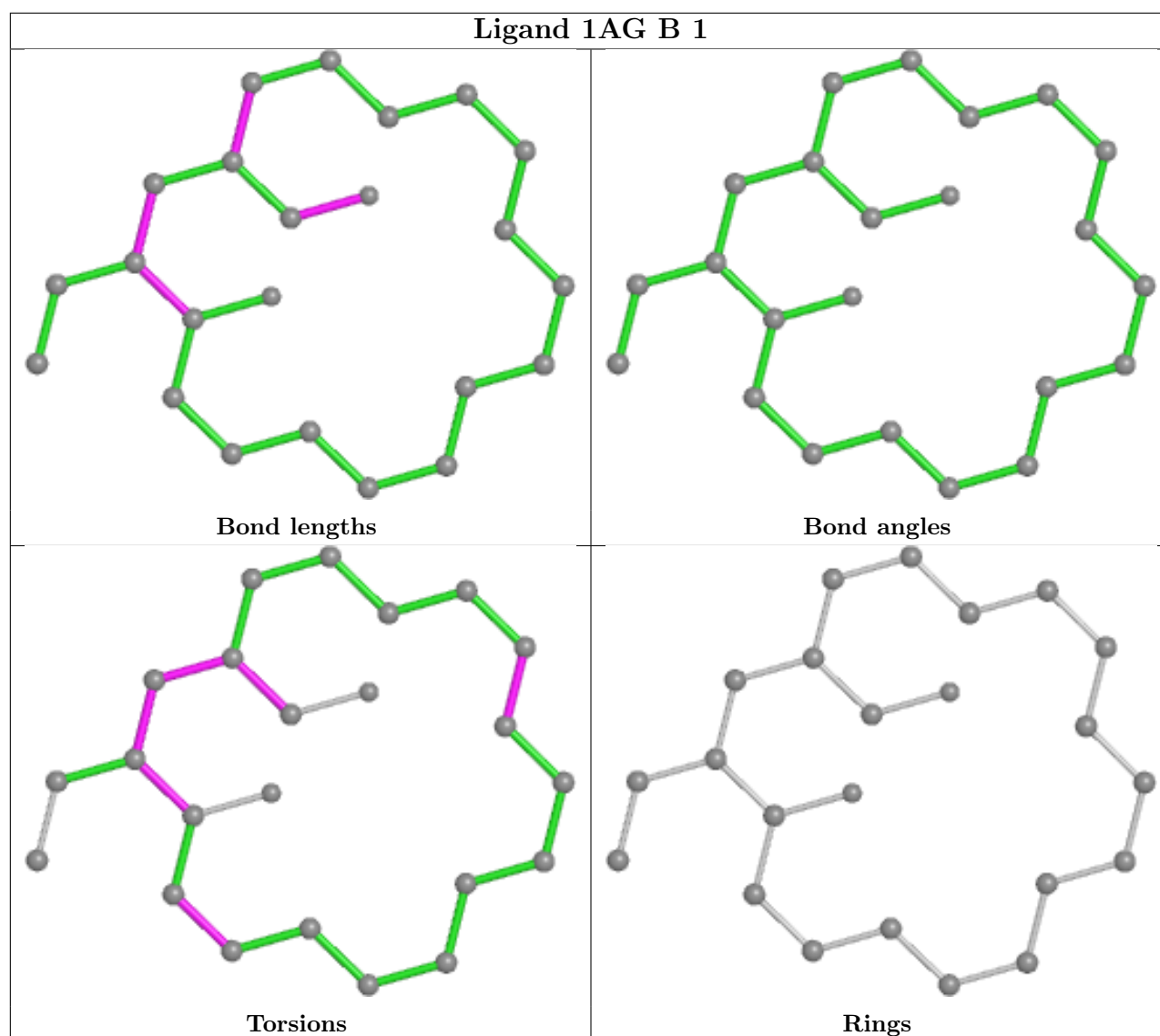
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1	1AG	12	0
7	A	614	COH	2	0
7	B	615	COH	1	0
5	A	2	AKR	2	0
5	B	3	AKR	2	0
4	B	1	1AG	18	0

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.









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	552/587 (94%)	-0.13	18 (3%)	46 44	8, 23, 41, 48	1 (0%)
1	B	551/587 (93%)	0.05	25 (4%)	33 32	6, 27, 42, 51	1 (0%)
All	All	1103/1174 (93%)	-0.04	43 (3%)	39 37	6, 25, 42, 51	2 (0%)

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	82	LEU	4.6
1	B	74	PHE	4.6
1	B	399	ASP	4.0
1	B	78	ILE	3.9
1	A	115	TYR	3.9
1	B	107	PHE	3.8
1	B	115	TYR	3.8
1	B	81	LEU	3.8
1	A	399	ASP	3.5
1	A	74	PHE	3.5
1	A	122	TYR	3.5
1	A	583	GLN	3.3
1	B	122	TYR	3.1
1	A	121	SER	3.0
1	A	428	ARG	2.9
1	A	107	PHE	2.8
1	B	428	ARG	2.8
1	B	91	TYR	2.8
1	B	105(A)	ILE	2.7
1	A	81	LEU	2.7
1	A	117	LEU	2.7
1	A	83	LYS	2.6
1	B	409	TYR	2.6
1	A	414	LEU	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	106	PRO	2.5
1	A	111	LEU	2.5
1	B	79	LYS	2.5
1	B	517	ILE	2.4
1	B	239	ASP	2.4
1	B	101	ASN	2.4
1	B	215	LYS	2.3
1	B	65	TYR	2.3
1	B	157	ASP	2.3
1	B	297	GLY	2.3
1	B	287	VAL	2.2
1	A	506	ALA	2.2
1	B	96	PHE	2.2
1	B	481	LEU	2.2
1	B	244	LEU	2.1
1	A	426	PHE	2.1
1	A	501	MET	2.1
1	B	121	SER	2.1
1	A	181	VAL	2.0

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

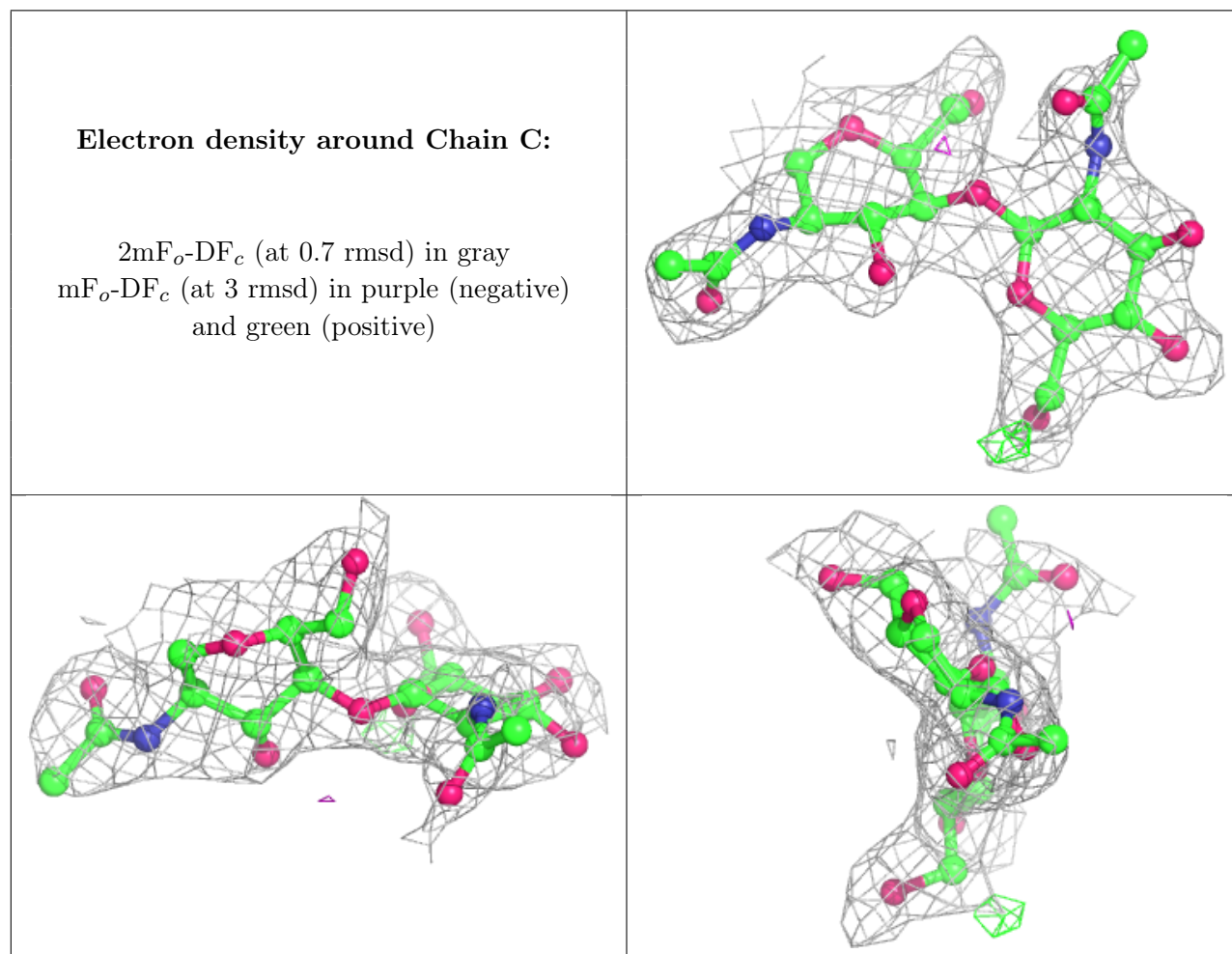
There are no non-standard protein/DNA/RNA residues in this entry.

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.

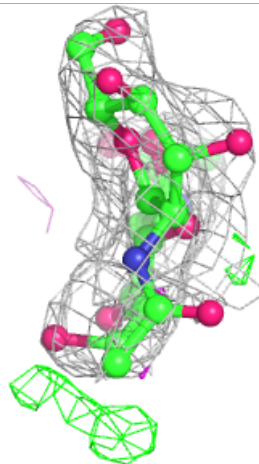
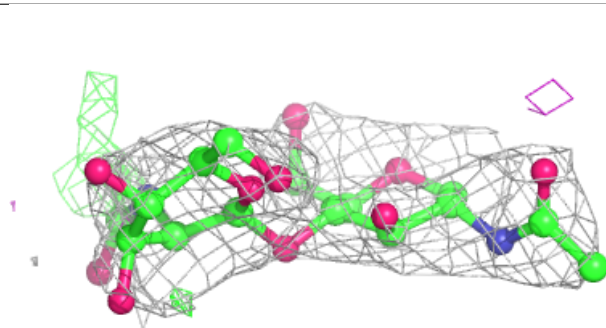
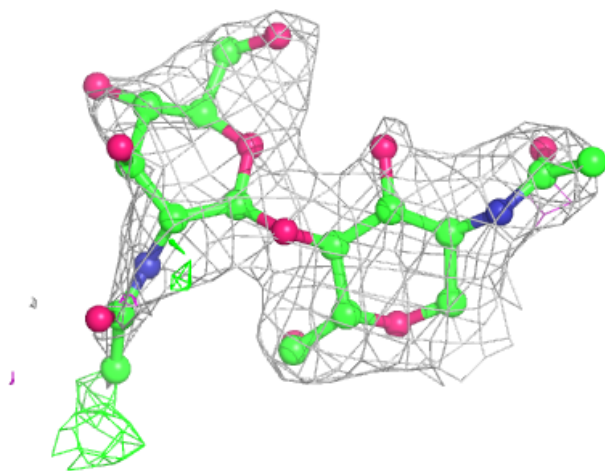
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NAG	E	2	14/15	0.76	0.45	62,65,67,67	0
2	NAG	F	2	14/15	0.79	0.29	39,43,44,45	0
3	NAG	D	2	14/15	0.81	0.17	38,40,45,49	0
3	MAN	D	3	11/12	0.81	0.41	53,55,57,57	0
2	NAG	C	2	14/15	0.83	0.40	57,60,61,61	0
2	NAG	E	1	14/15	0.84	0.31	43,51,53,58	0
2	NAG	C	1	14/15	0.88	0.22	40,46,49,53	0
3	NAG	D	1	14/15	0.95	0.11	21,26,30,33	0
2	NAG	F	1	14/15	0.97	0.09	18,24,27,33	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.



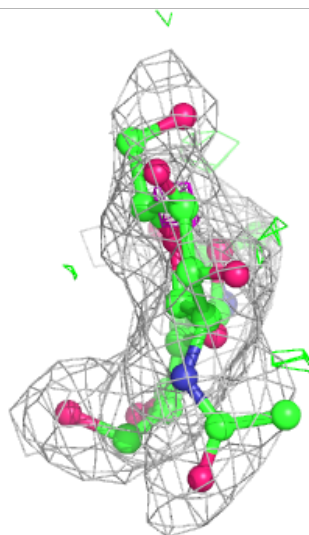
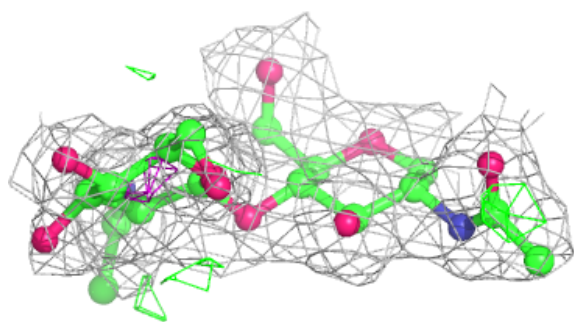
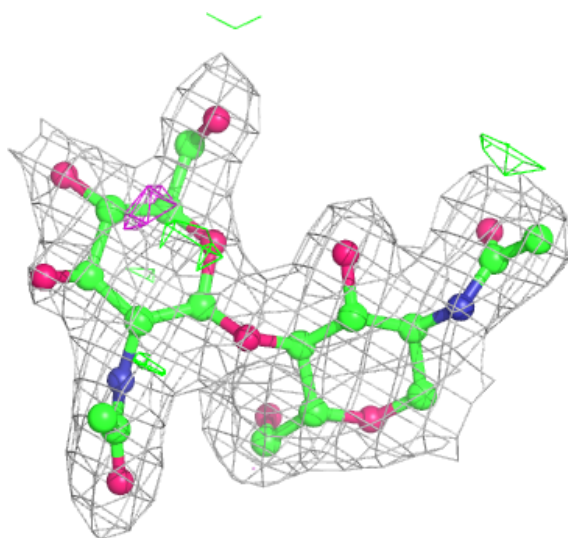
Electron density around Chain E:

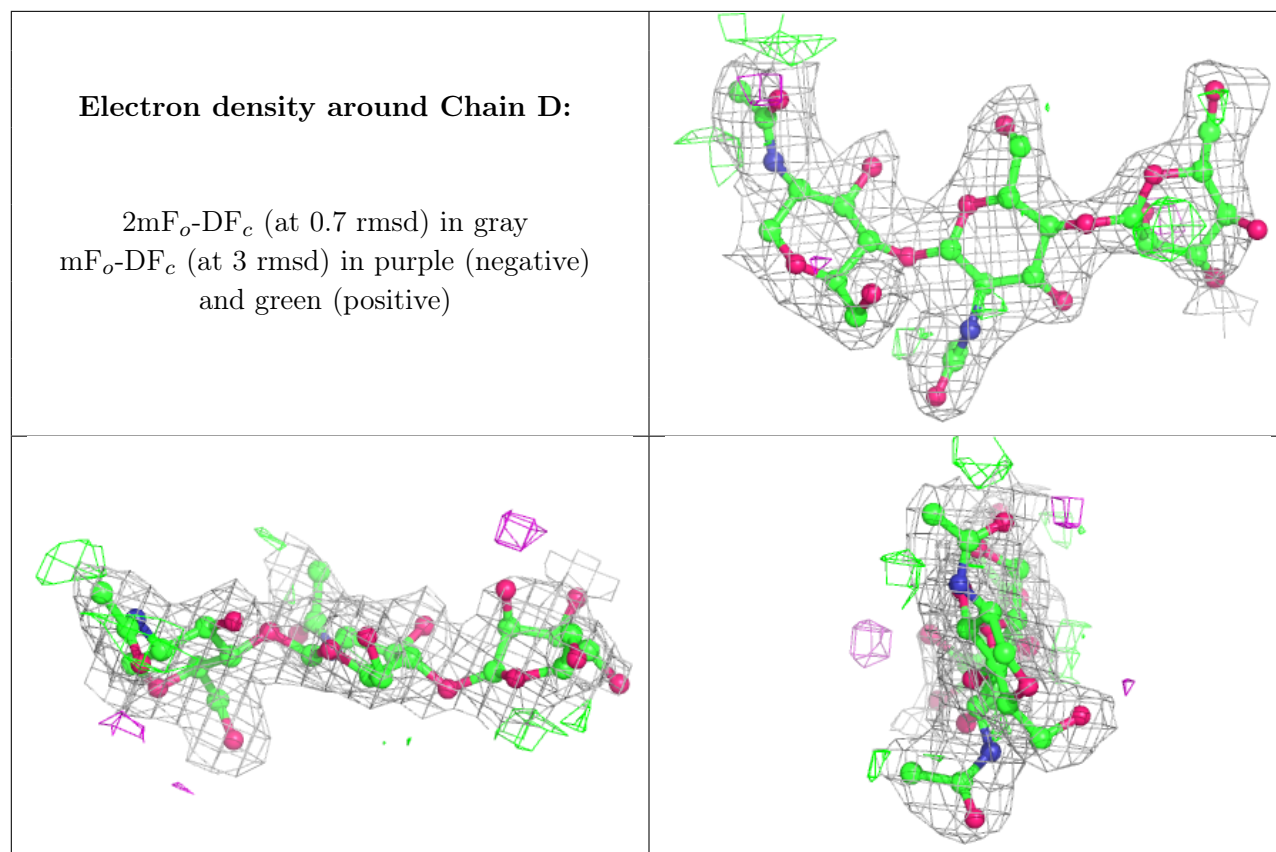
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain F:

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





6.4 Ligands [i](#)

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

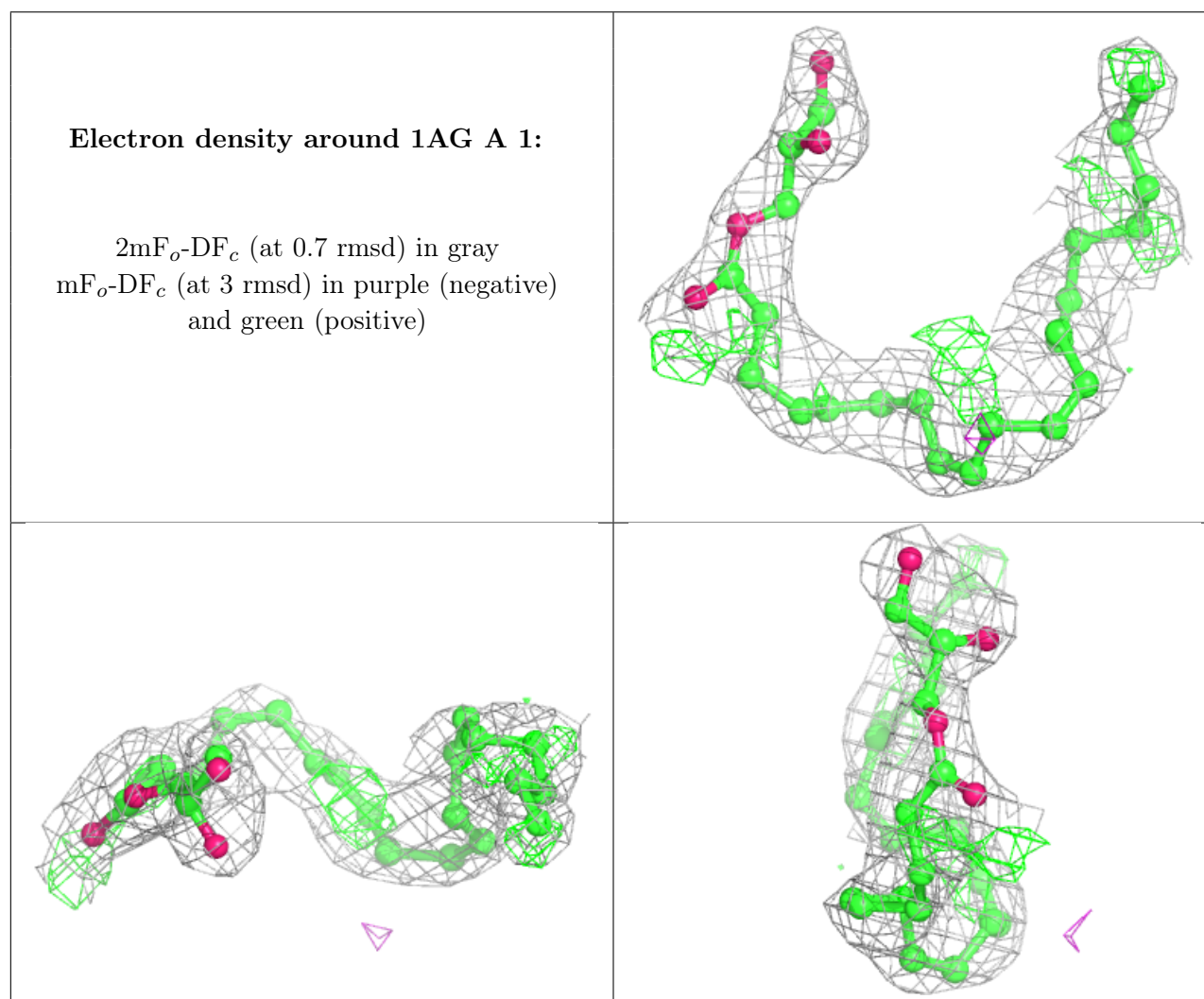
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	AKR	B	5	5/5	0.54	0.33	102,102,102,102	0
4	1AG	A	1	27/27	0.72	0.28	36,49,58,58	0
5	AKR	A	2	5/5	0.74	0.22	51,51,51,52	0
6	GOL	B	7	6/6	0.77	0.28	77,78,78,78	0
4	1AG	B	1	27/27	0.79	0.26	26,46,56,57	0
5	AKR	B	3	5/5	0.80	0.21	53,54,54,54	0
5	AKR	B	4	5/5	0.83	0.27	53,54,54,54	0
9	BOG	A	703	20/20	0.83	0.21	45,46,47,47	0
8	NAG	B	681	14/15	0.85	0.29	41,45,47,48	0
7	COH	B	615	43/43	0.86	0.19	40,44,54,58	0
5	AKR	A	3	5/5	0.86	0.23	39,40,40,40	0
7	COH	A	614	43/43	0.86	0.20	43,48,57,60	0
8	NAG	A	681	14/15	0.89	0.34	39,43,45,46	0
6	GOL	A	4	6/6	0.95	0.16	27,29,31,31	0

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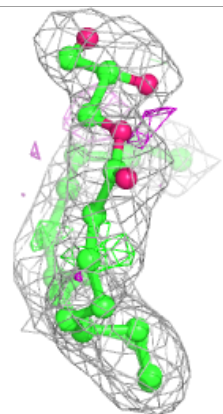
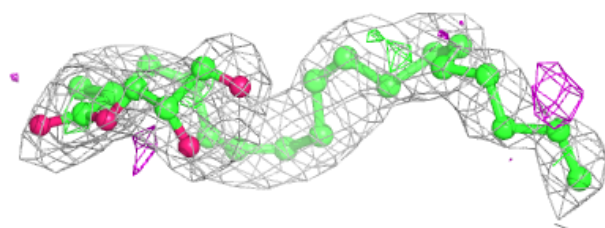
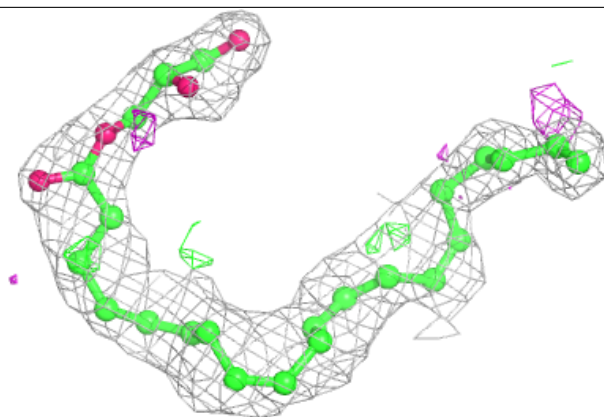
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
6	GOL	B	6	6/6	0.96	0.25	32,33,34,34	0

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.



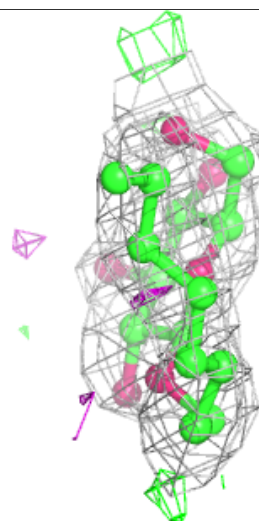
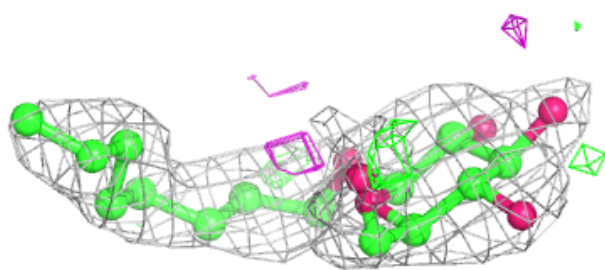
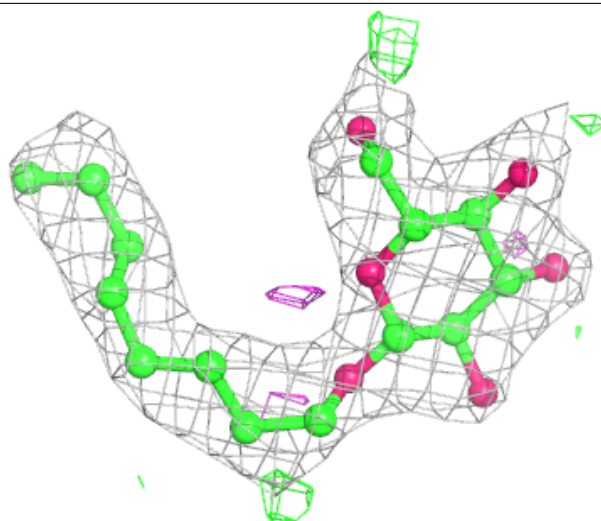
Electron density around 1AG B 1:

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



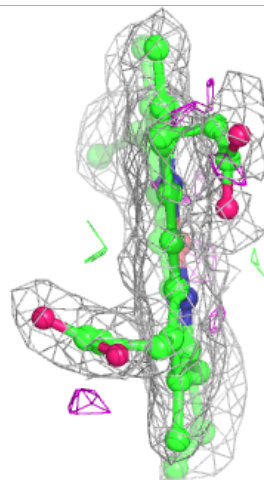
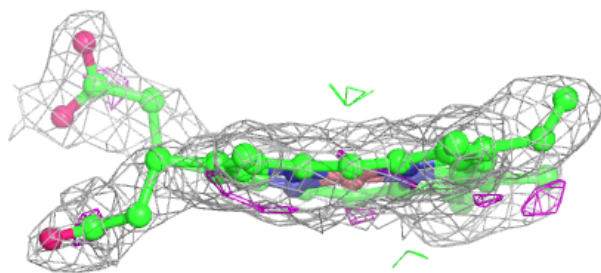
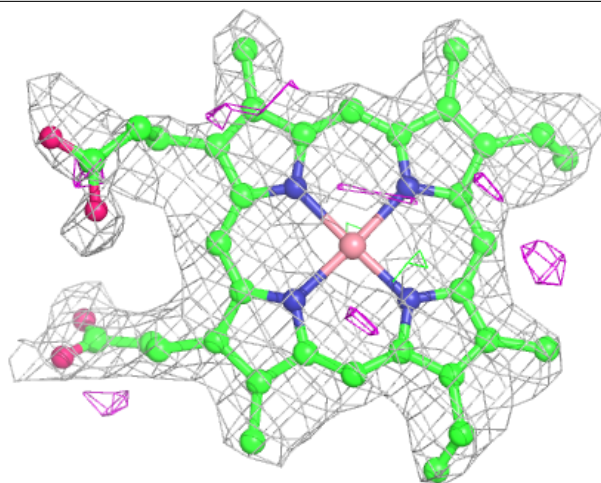
Electron density around BOG A 703:

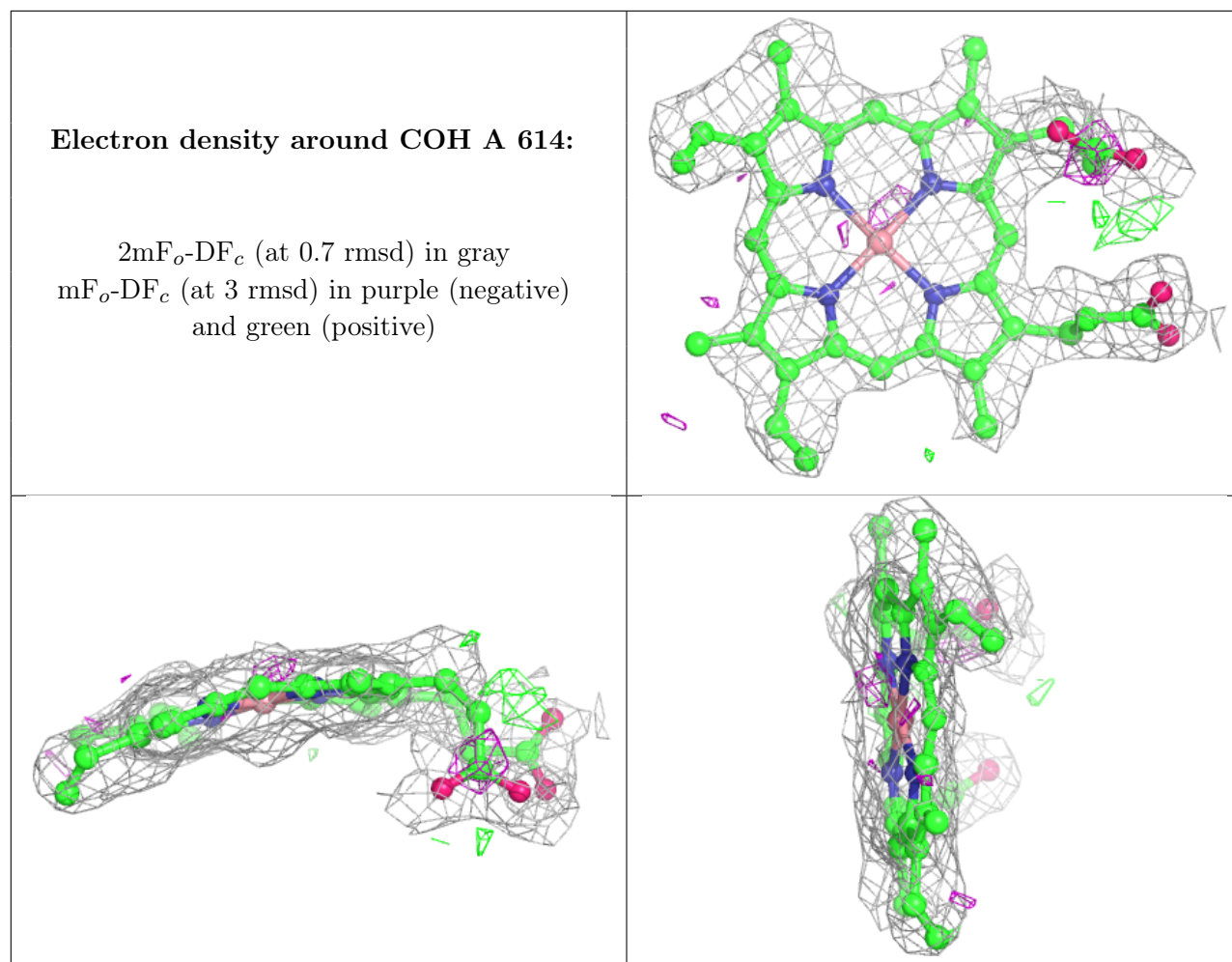
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around COH B 615:

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





6.5 Other polymers [i](#)

There are no such residues in this entry.