



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 9, 2020 – 07:13 PM BST

PDB ID : 3NTB  
Title : Structure of 6-methylthio naproxen analog bound to mCOX-2.  
Authors : Duggan, K.C.; Musee, J.; Walters, M.J.; Harp, J.M.; Kiefer, J.R.; Oates, J.A.;  
Marnett, L.J.  
Deposited on : 2010-07-03  
Resolution : 2.27 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.13.1  
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) : 2.13.1

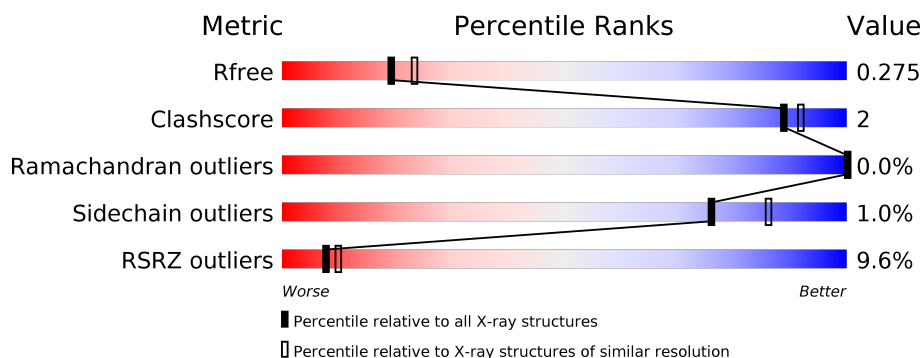
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.27 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.



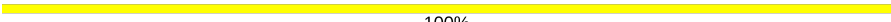
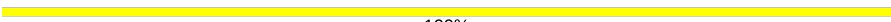
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	6980 (2.30-2.26)
Clashscore	141614	7711 (2.30-2.26)
Ramachandran outliers	138981	7597 (2.30-2.26)
Sidechain outliers	138945	7598 (2.30-2.26)
RSRZ outliers	127900	6849 (2.30-2.26)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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>9%</div> <div>89%</div> <div>5%</div> <div>6%</div> </div>
1	B	587	<div> <div>11%</div> <div>88%</div> <div>6%</div> <div>6%</div> </div>
1	C	587	<div> <div>8%</div> <div>88%</div> <div>6%</div> <div>6%</div> </div>
1	D	587	<div> <div>7%</div> <div>88%</div> <div>6%</div> <div>6%</div> </div>
2	E	3	<div> <div>100%</div> </div>
2	F	3	<div> <div>100%</div> </div>

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Mol	Chain	Length	Quality of chain
2	G	3	 100%
2	H	3	 100%

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	E	3	-	-	-	X
2	NAG	F	3	-	-	-	X
2	NAG	G	3	-	-	-	X
2	NAG	H	3	-	-	-	X
4	NAG	A	661	X	-	-	X
4	NAG	B	661	X	-	-	-
4	NAG	C	661	X	-	-	-
4	NAG	C	681	-	-	-	X
4	NAG	D	661	X	-	-	X

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 19636 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-endoperoxide synthase 2.

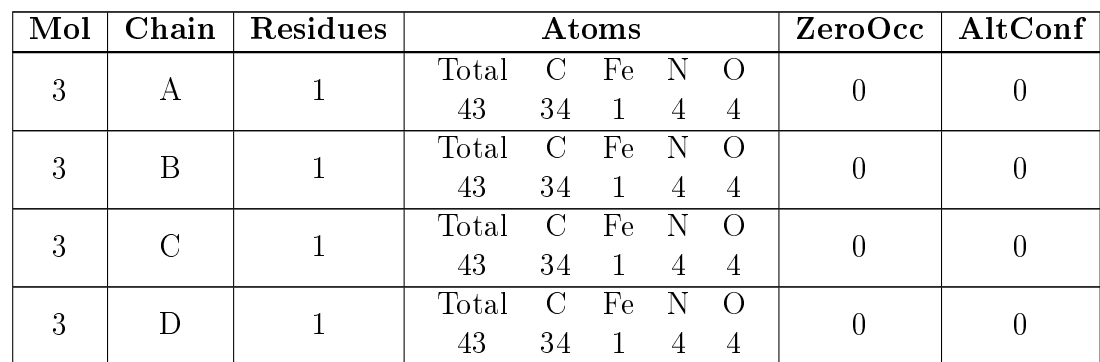
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	552	Total	C	N	O	S	0	0	0
			4474	2885	750	814	25			
1	B	551	Total	C	N	O	S	0	0	0
			4465	2880	748	812	25			
1	C	552	Total	C	N	O	S	0	0	0
			4474	2885	750	814	25			
1	D	552	Total	C	N	O	S	0	0	0
			4474	2885	750	814	25			

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(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
2	E	3	Total	C	N	O	0	0	0
			42	24	3	15			
2	F	3	Total	C	N	O	0	0	0
			42	24	3	15			
2	G	3	Total	C	N	O	0	0	0
			42	24	3	15			
2	H	3	Total	C	N	O	0	0	0
			42	24	3	15			

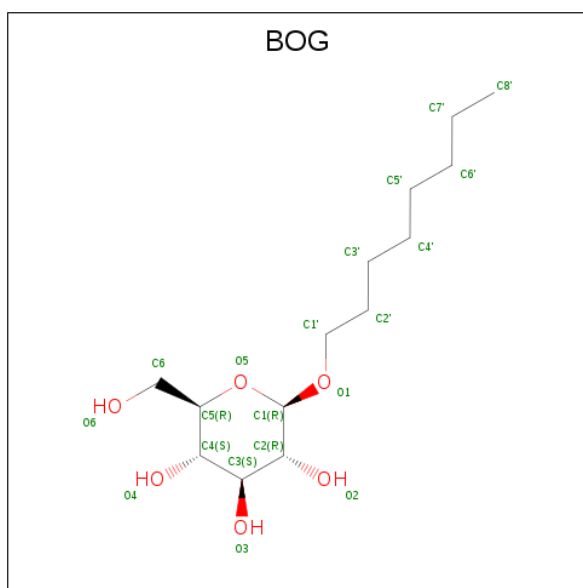
- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: C<sub>34</sub>H<sub>32</sub>FeN<sub>4</sub>O<sub>4</sub>).



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

- Molecule 5 is octyl beta-D-glucopyranoside (three-letter code: BOG) (formula:  $C_{14}H_{28}O_6$ ).



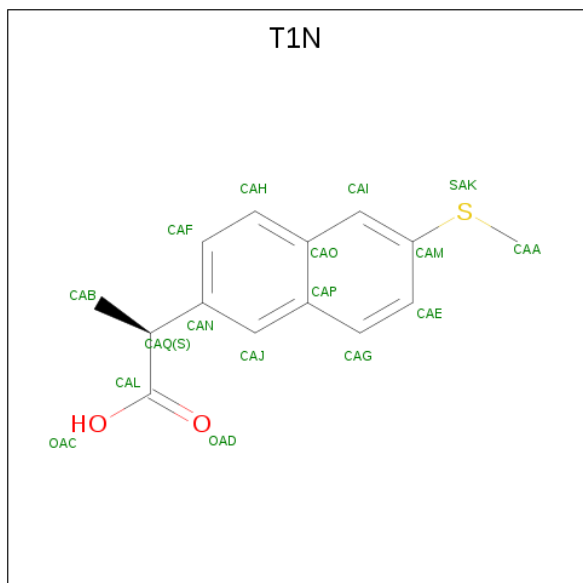
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			20	14	6		
5	A	1	Total	C	O	0	0
			20	14	6		
5	B	1	Total	C	O	0	0
			20	14	6		
5	C	1	Total	C	O	0	0
			20	14	6		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	D	1	Total	C	O	0	0
			20	14	6		
5	D	1	Total	C	O	0	0
			20	14	6		

- Molecule 6 is (2S)-2-[6-(methylsulfonyl)naphthalen-2-yl]propanoic acid (three-letter code: T1N) (formula: C<sub>14</sub>H<sub>14</sub>O<sub>2</sub>S).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	O	S	0	0
			17	14	2	1		
6	B	1	Total	C	O	S	0	0
			17	14	2	1		
6	C	1	Total	C	O	S	0	0
			17	14	2	1		
6	D	1	Total	C	O	S	0	0
			17	14	2	1		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	278	Total	O	0	0
			278	278		
7	B	245	Total	O	0	0
			245	245		
7	C	291	Total	O	0	0
			291	291		

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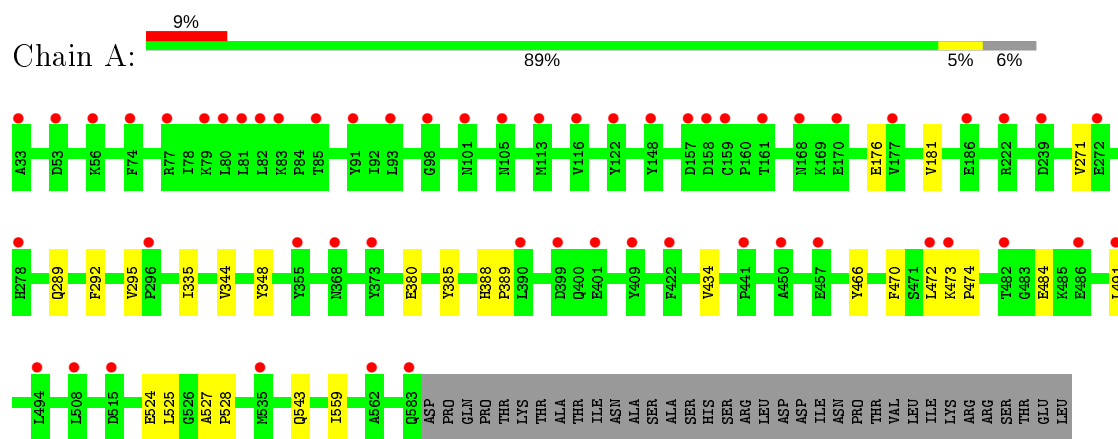
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	D	295	Total 295	O 295	0	0



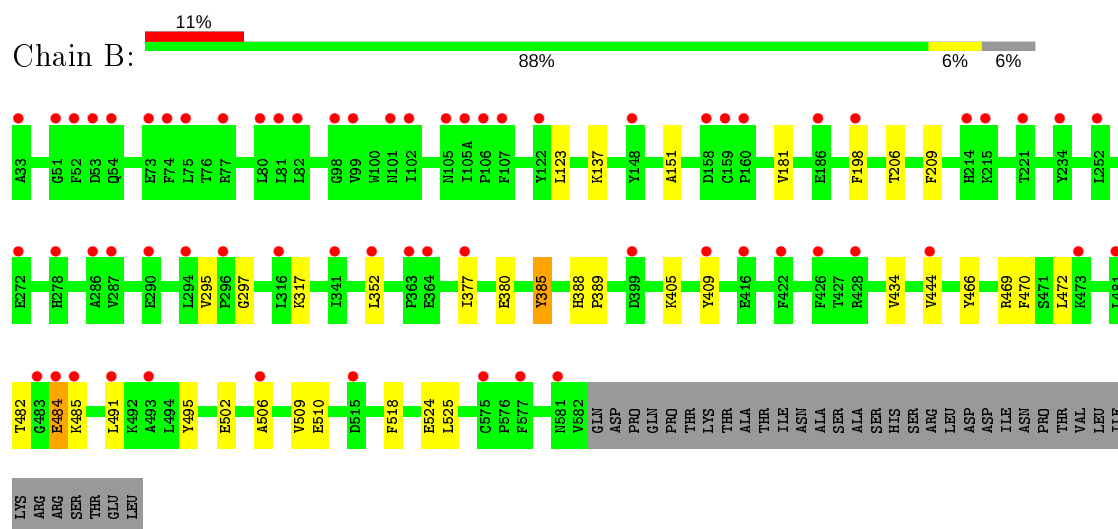
### 3 Residue-property plots [i](#)

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.

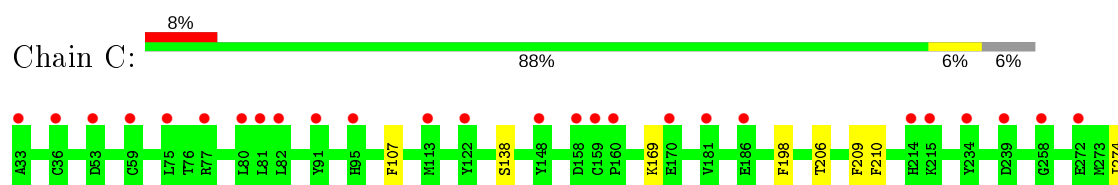
- Molecule 1: Prostaglandin-endoperoxide synthase 2

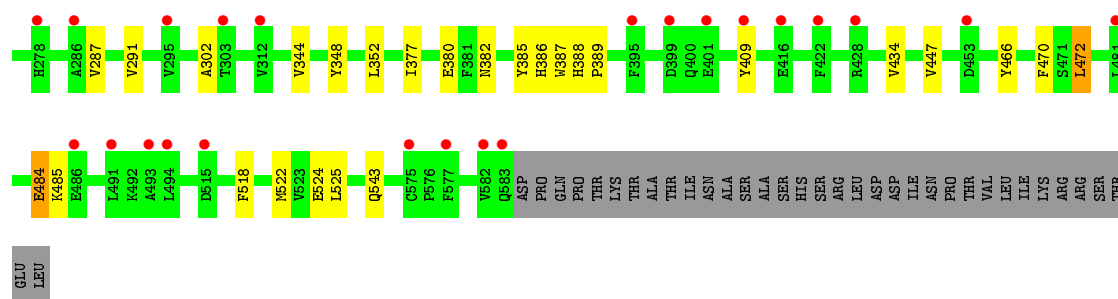


- Molecule 1: Prostaglandin-endoperoxide synthase 2

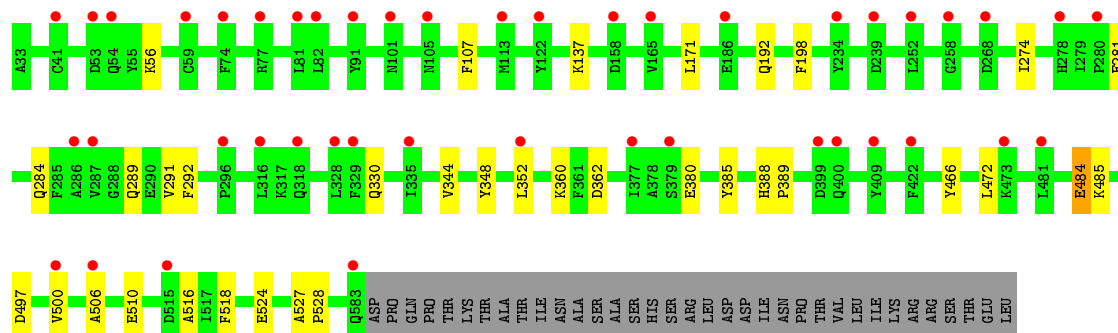
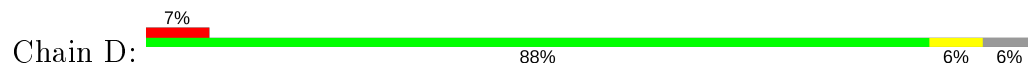


- Molecule 1: Prostaglandin-endoperoxide synthase 2





- Molecule 1: Prostaglandin-endoperoxide synthase 2



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



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



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



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

Chain H:

100%

MAP1  
MAP2  
MAP3

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 2 <sub>1</sub> 2 <sub>1</sub> 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	181.20 Å   134.22 Å   121.99 Å 90.00°   90.00°   90.00°	Depositor
Resolution (Å)	20.48 – 2.27 19.94 – 2.20	Depositor EDS
% Data completeness (in resolution range)	98.0 (20.48-2.27) 96.7 (19.94-2.20)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.23 (at 2.19 Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.231   ,   0.266 0.242   ,   0.275	Depositor DCC
$R_{free}$ test set	14625 reflections (10.04%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	40.1	Xtriage
Anisotropy	0.349	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 38.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	19636	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	49.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 50.01 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 6.8750e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> Theoretical 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: HEM, T1N, 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	0.34	0/4601	0.47	0/6239
1	B	0.34	0/4592	0.46	0/6227
1	C	0.34	0/4601	0.47	0/6239
1	D	0.34	0/4601	0.46	0/6239
All	All	0.34	0/18395	0.47	0/24944

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	4474	0	4373	12	0
1	B	4465	0	4365	21	0
1	C	4474	0	4373	20	0
1	D	4474	0	4373	18	0
2	E	42	0	37	0	0
2	F	42	0	37	0	0
2	G	42	0	37	0	0
2	H	42	0	37	0	0
3	A	43	0	30	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	43	0	30	0	0
3	C	43	0	30	2	0
3	D	43	0	30	0	0
4	A	28	0	26	0	0
4	B	28	0	26	0	0
4	C	28	0	26	0	0
4	D	28	0	26	0	0
5	A	40	0	56	0	0
5	B	20	0	28	0	0
5	C	20	0	28	0	0
5	D	40	0	56	0	0
6	A	17	0	13	0	0
6	B	17	0	13	0	0
6	C	17	0	13	0	0
6	D	17	0	13	0	0
7	A	278	0	0	0	0
7	B	245	0	0	0	0
7	C	291	0	0	0	0
7	D	295	0	0	0	0
All	All	19636	0	18076	68	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 2.

The worst 5 of 68 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:472:LEU:HD21	1:A:524:GLU:HG3	1.82	0.60
1:B:352:LEU:HD11	1:B:518:PHE:CE2	2.38	0.58
1:D:198:PHE:CZ	1:D:352:LEU:HD13	2.39	0.58
1:D:198:PHE:HZ	1:D:352:LEU:HD13	1.69	0.57
1:B:352:LEU:HD11	1:B:518:PHE:HE2	1.71	0.55

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	550/587 (94%)	536 (98%)	14 (2%)	0	100	100
1	B	549/587 (94%)	534 (97%)	14 (3%)	1 (0%)	47	57
1	C	550/587 (94%)	537 (98%)	13 (2%)	0	100	100
1	D	550/587 (94%)	534 (97%)	16 (3%)	0	100	100
All	All	2199/2348 (94%)	2141 (97%)	57 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	409	TYR

### 5.3.2 Protein sidechains

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	493/525 (94%)	488 (99%)	5 (1%)	76	86
1	B	492/525 (94%)	488 (99%)	4 (1%)	81	90
1	C	493/525 (94%)	487 (99%)	6 (1%)	71	82
1	D	493/525 (94%)	488 (99%)	5 (1%)	76	86
All	All	1971/2100 (94%)	1951 (99%)	20 (1%)	76	86

5 of 20 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	107	PHE
1	C	169	LYS
1	D	107	PHE
1	B	405	LYS
1	B	484	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	583	GLN
1	D	386	HIS
1	D	284	GLN
1	C	369	GLN
1	D	369	GLN

### 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 ⓘ

12 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	E	1	1,2	14,14,15	0.49	0	17,19,21	0.94	1 (5%)
2	NAG	E	2	2	14,14,15	0.50	0	17,19,21	1.66	6 (35%)
2	NAG	E	3	2	14,14,15	0.62	0	17,19,21	1.04	1 (5%)
2	NAG	F	1	1,2	14,14,15	0.50	0	17,19,21	0.81	1 (5%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	NAG	F	2	2	14,14,15	0.50	0	17,19,21	1.15	2 (11%)
2	NAG	F	3	2	14,14,15	0.52	0	17,19,21	1.69	3 (17%)
2	NAG	G	1	1,2	14,14,15	0.50	0	17,19,21	0.88	1 (5%)
2	NAG	G	2	2	14,14,15	0.53	0	17,19,21	1.21	1 (5%)
2	NAG	G	3	2	14,14,15	0.51	0	17,19,21	1.55	2 (11%)
2	NAG	H	1	1,2	14,14,15	0.49	0	17,19,21	0.90	1 (5%)
2	NAG	H	2	2	14,14,15	0.53	0	17,19,21	1.17	2 (11%)
2	NAG	H	3	2	14,14,15	0.56	0	17,19,21	1.87	3 (17%)

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	E	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	1/6/23/26	0/1/1/1
2	NAG	E	3	2	-	5/6/23/26	0/1/1/1
2	NAG	F	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	2	2	-	4/6/23/26	0/1/1/1
2	NAG	F	3	2	-	3/6/23/26	0/1/1/1
2	NAG	G	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	G	2	2	-	2/6/23/26	0/1/1/1
2	NAG	G	3	2	-	4/6/23/26	0/1/1/1
2	NAG	H	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	H	2	2	-	5/6/23/26	0/1/1/1
2	NAG	H	3	2	-	4/6/23/26	0/1/1/1

There are no bond length outliers.

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	3	NAG	C1-O5-C5	5.90	120.19	112.19
2	F	3	NAG	C1-O5-C5	5.17	119.20	112.19
2	G	3	NAG	C1-O5-C5	4.73	118.60	112.19
2	G	2	NAG	C2-N2-C7	3.05	127.25	122.90
2	E	2	NAG	C2-N2-C7	3.01	127.18	122.90

There are no chirality outliers.

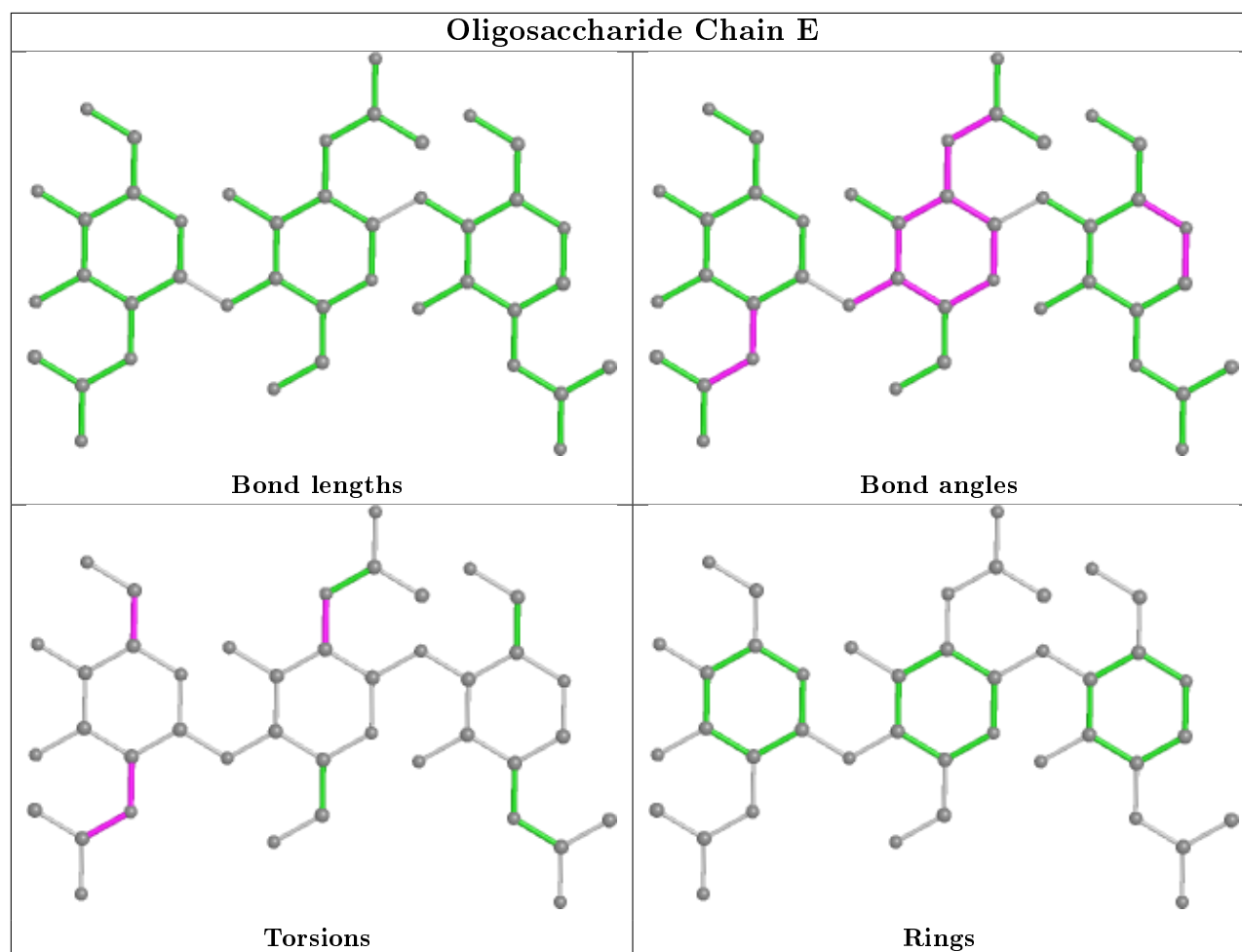
5 of 28 torsion outliers are listed below:

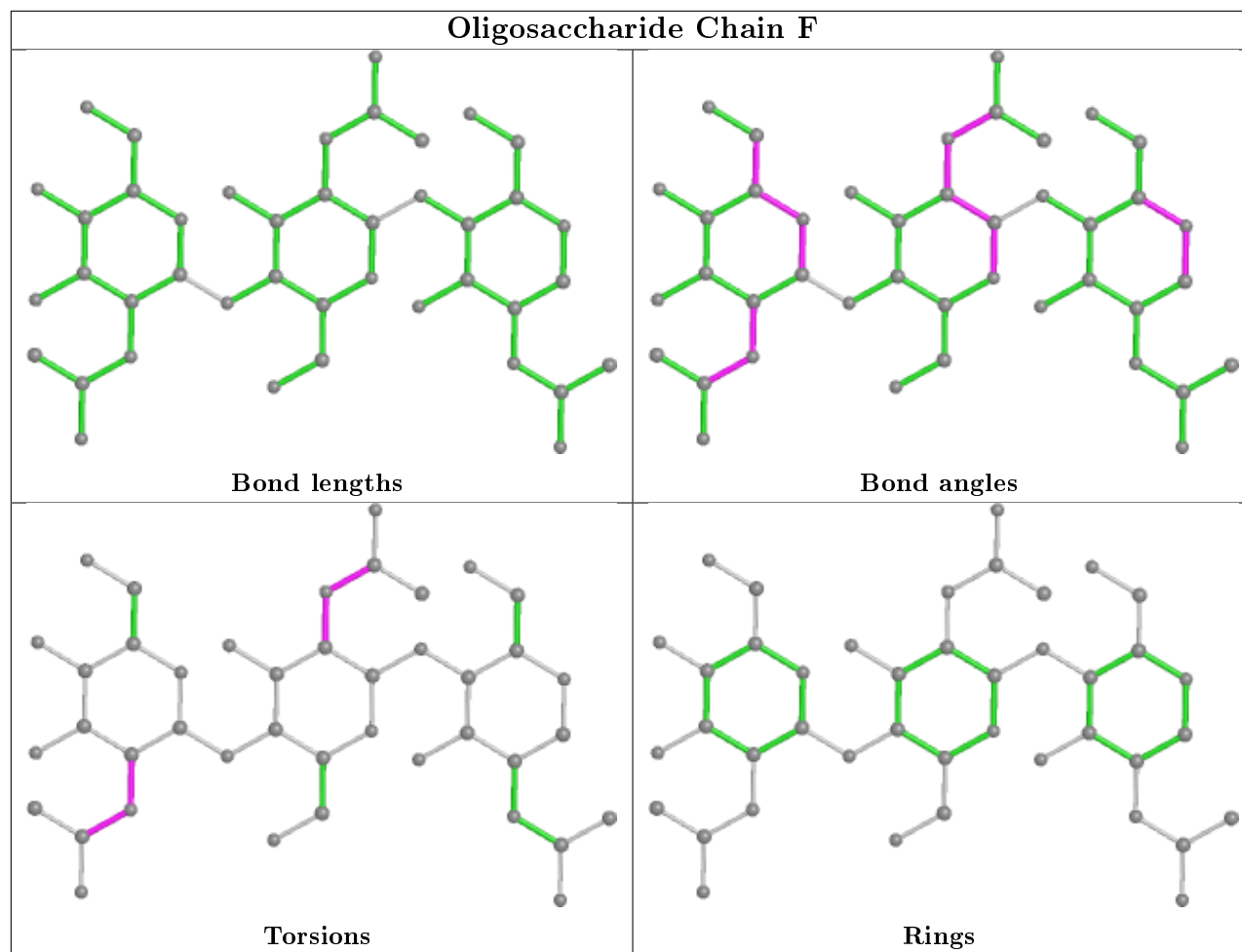
Mol	Chain	Res	Type	Atoms
2	G	3	NAG	C8-C7-N2-C2
2	G	3	NAG	O7-C7-N2-C2
2	E	3	NAG	C3-C2-N2-C7
2	E	3	NAG	C8-C7-N2-C2
2	E	3	NAG	O7-C7-N2-C2

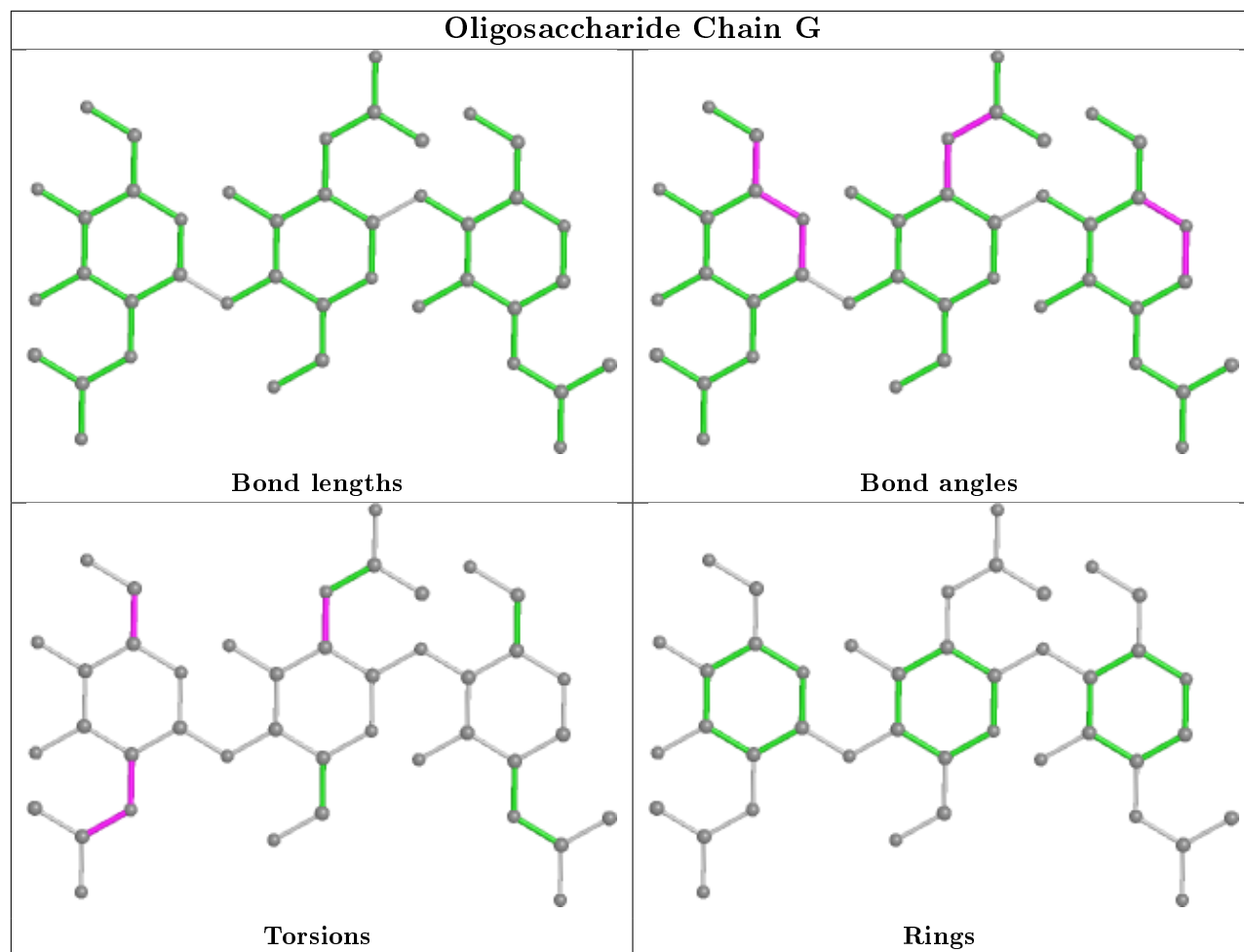
There are no ring outliers.

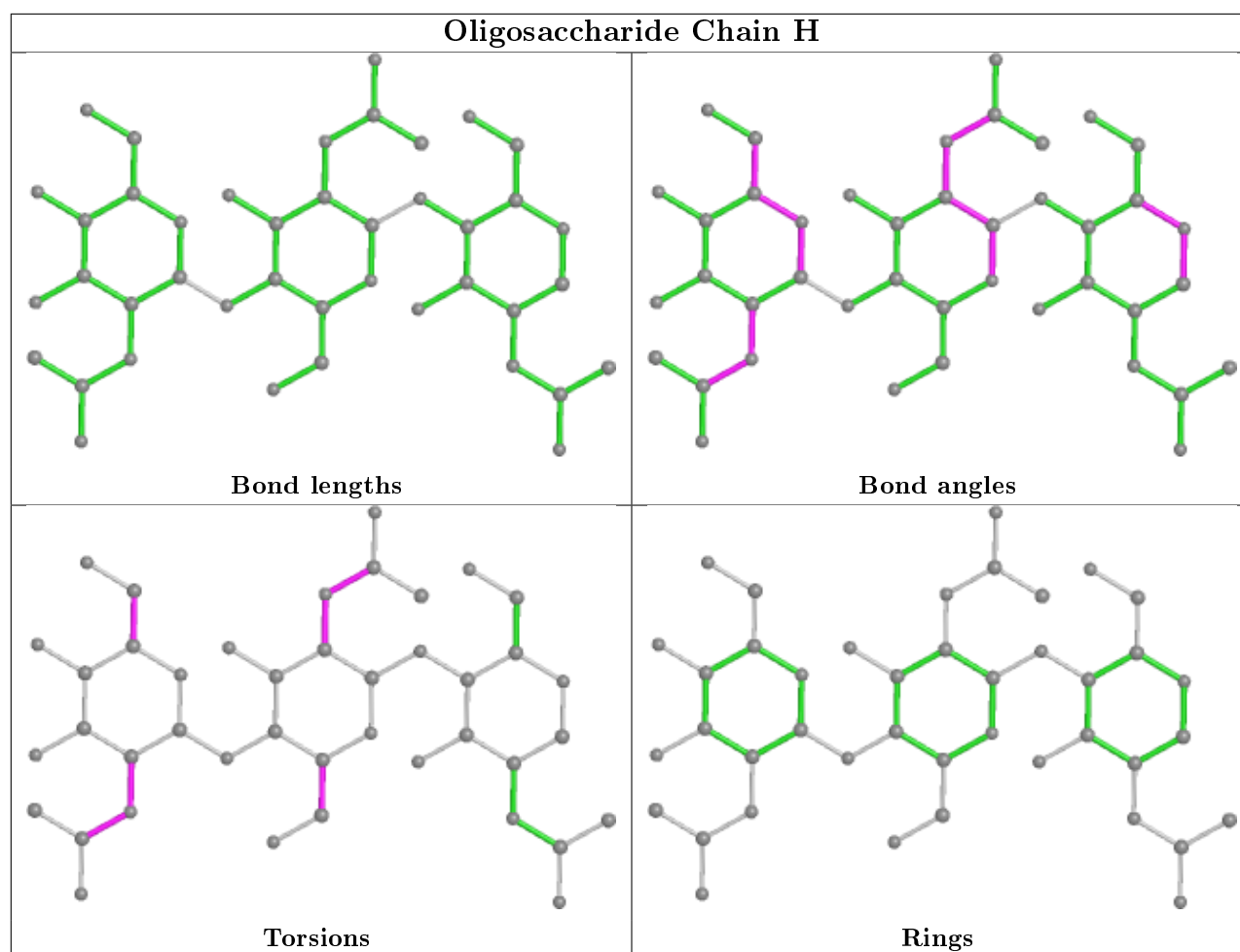
No monomer is involved in short contacts.

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](#)

22 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	NAG	C	681	1	14,14,15	0.59	0	17,19,21	1.34	3 (17%)
4	NAG	D	681	1	14,14,15	0.53	0	17,19,21	0.77	0
3	HEM	C	619	1	27,50,50	2.20	6 (22%)	17,82,82	1.41	3 (17%)
5	BOG	C	5	-	20,20,20	0.48	0	25,25,25	0.57	0
4	NAG	A	661	1	14,14,15	0.47	0	17,19,21	1.14	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	HEM	A	619	1	27,50,50	2.18	6 (22%)	17,82,82	1.33	2 (11%)
4	NAG	D	661	1	14,14,15	0.48	0	17,19,21	1.05	1 (5%)
4	NAG	B	661	1	14,14,15	0.50	0	17,19,21	1.59	3 (17%)
4	NAG	A	681	1	14,14,15	0.50	0	17,19,21	0.74	0
6	T1N	B	1	-	15,18,18	0.99	0	21,25,25	0.86	1 (4%)
6	T1N	C	2	-	15,18,18	1.01	0	21,25,25	0.89	1 (4%)
5	BOG	D	703	-	20,20,20	0.50	0	25,25,25	0.58	0
5	BOG	A	703	-	20,20,20	0.49	0	25,25,25	0.55	0
5	BOG	B	6	-	20,20,20	0.48	0	25,25,25	0.60	0
4	NAG	B	681	1	14,14,15	0.54	0	17,19,21	0.79	0
3	HEM	D	619	1	27,50,50	2.15	6 (22%)	17,82,82	1.37	2 (11%)
5	BOG	D	8	-	20,20,20	0.49	0	25,25,25	0.57	0
6	T1N	D	4	-	15,18,18	1.00	0	21,25,25	0.89	0
6	T1N	A	3	-	15,18,18	1.00	0	21,25,25	0.94	0
5	BOG	A	7	-	20,20,20	0.51	0	25,25,25	0.52	0
4	NAG	C	661	1	14,14,15	0.46	0	17,19,21	1.19	2 (11%)
3	HEM	B	619	1,7	27,50,50	2.18	6 (22%)	17,82,82	1.38	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
4	NAG	C	681	1	-	2/6/23/26	0/1/1/1
4	NAG	D	681	1	-	2/6/23/26	0/1/1/1
3	HEM	C	619	1	-	0/6/54/54	-
4	NAG	A	681	1	-	2/6/23/26	0/1/1/1
4	NAG	A	661	1	1/1/5/7	3/6/23/26	0/1/1/1
3	HEM	A	619	1	-	0/6/54/54	-
4	NAG	D	661	1	1/1/5/7	4/6/23/26	0/1/1/1
4	NAG	B	661	1	1/1/5/7	4/6/23/26	0/1/1/1
5	BOG	C	5	-	-	3/11/31/31	0/1/1/1
6	T1N	B	1	-	-	0/6/10/10	0/2/2/2
6	T1N	C	2	-	-	0/6/10/10	0/2/2/2
5	BOG	D	703	-	-	5/11/31/31	0/1/1/1
5	BOG	A	703	-	-	8/11/31/31	0/1/1/1
5	BOG	B	6	-	-	4/11/31/31	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	B	681	1	-	2/6/23/26	0/1/1/1
3	HEM	D	619	1	-	0/6/54/54	-
5	BOG	D	8	-	-	5/11/31/31	0/1/1/1
6	T1N	D	4	-	-	0/6/10/10	0/2/2/2
6	T1N	A	3	-	-	0/6/10/10	0/2/2/2
5	BOG	A	7	-	-	4/11/31/31	0/1/1/1
4	NAG	C	661	1	1/1/5/7	2/6/23/26	0/1/1/1
3	HEM	B	619	1,7	-	0/6/54/54	-

The worst 5 of 24 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	619	HEM	C3D-C2D	5.48	1.53	1.37
3	A	619	HEM	C3D-C2D	5.47	1.53	1.37
3	D	619	HEM	C3D-C2D	5.45	1.53	1.37
3	C	619	HEM	C3D-C2D	5.44	1.53	1.37
3	A	619	HEM	C3B-C2B	-4.51	1.34	1.40

The worst 5 of 21 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	661	NAG	C1-O5-C5	4.46	118.23	112.19
4	C	661	NAG	C1-O5-C5	3.89	117.46	112.19
4	A	661	NAG	C1-O5-C5	3.89	117.46	112.19
4	D	661	NAG	C1-O5-C5	3.21	116.54	112.19
4	B	661	NAG	C2-N2-C7	3.19	127.44	122.90

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	A	661	NAG	C1
4	D	661	NAG	C1
4	B	661	NAG	C1
4	C	661	NAG	C1

5 of 50 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	D	661	NAG	C8-C7-N2-C2
4	D	661	NAG	O7-C7-N2-C2
4	A	661	NAG	C8-C7-N2-C2

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Mol	Chain	Res	Type	Atoms
4	A	661	NAG	O7-C7-N2-C2
4	C	681	NAG	C4-C5-C6-O6

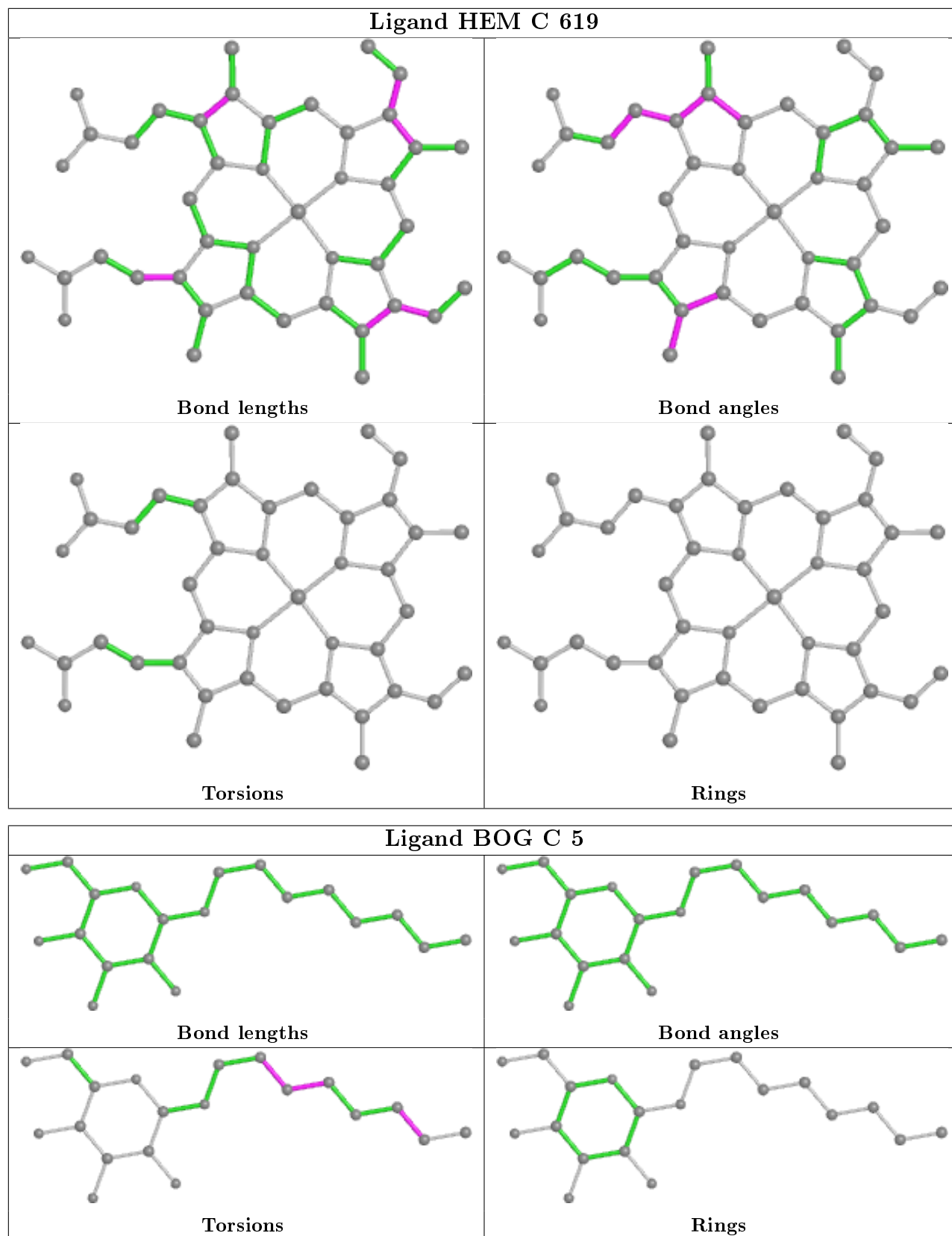
There are no ring outliers.

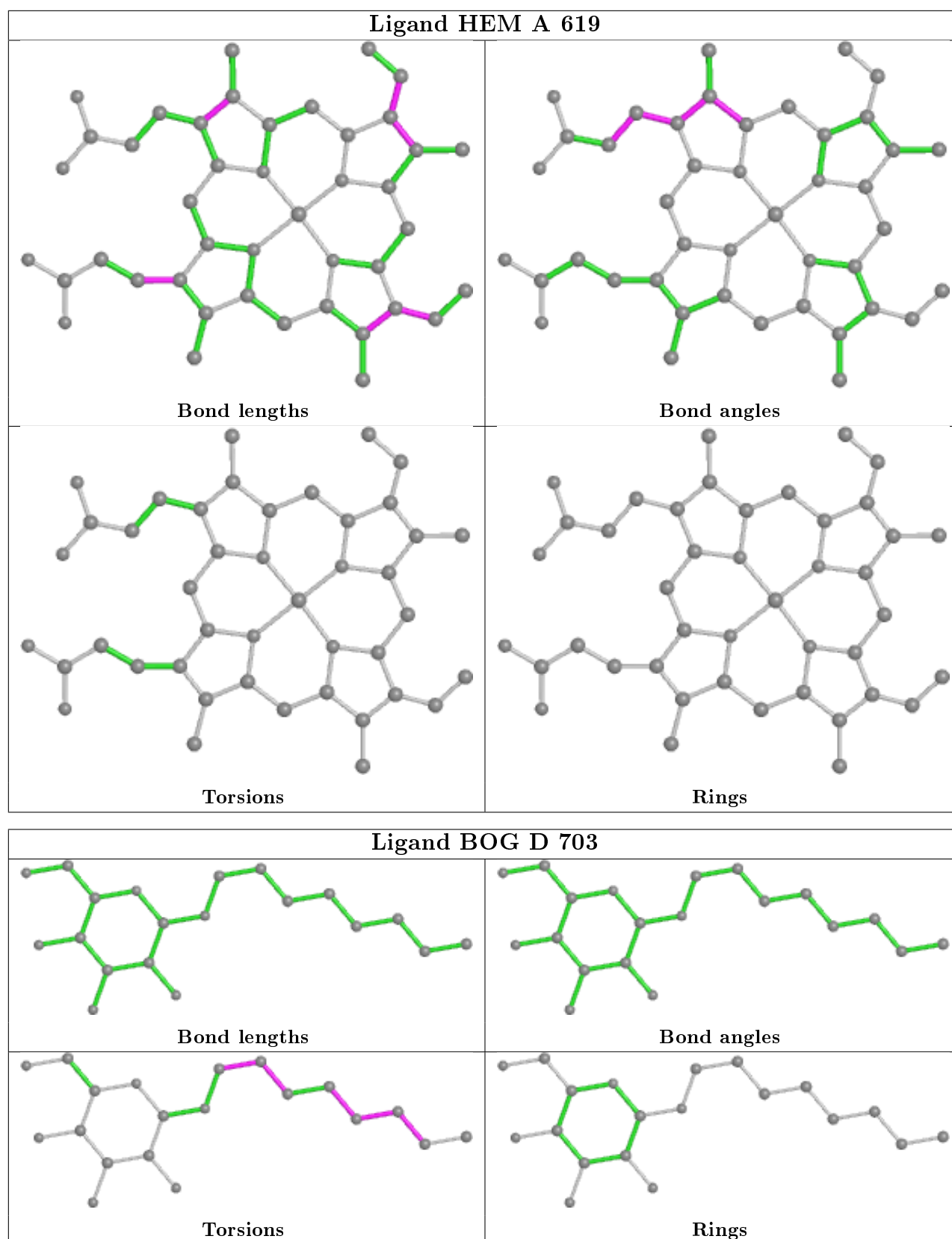
1 monomer is involved in 2 short contacts:

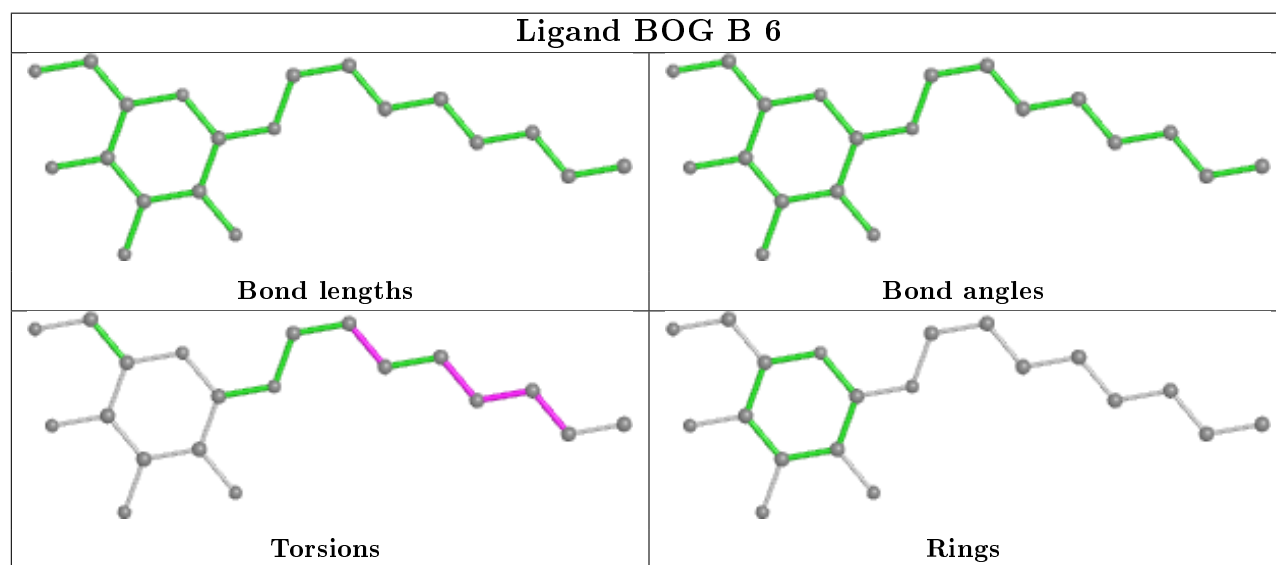
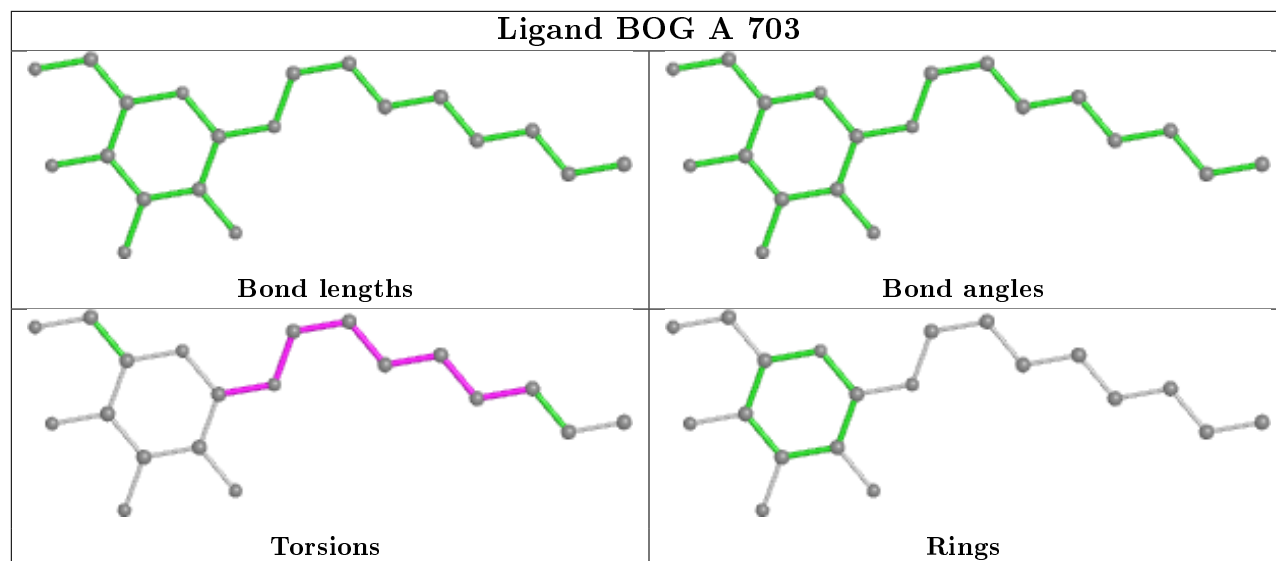
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	619	HEM	2	0

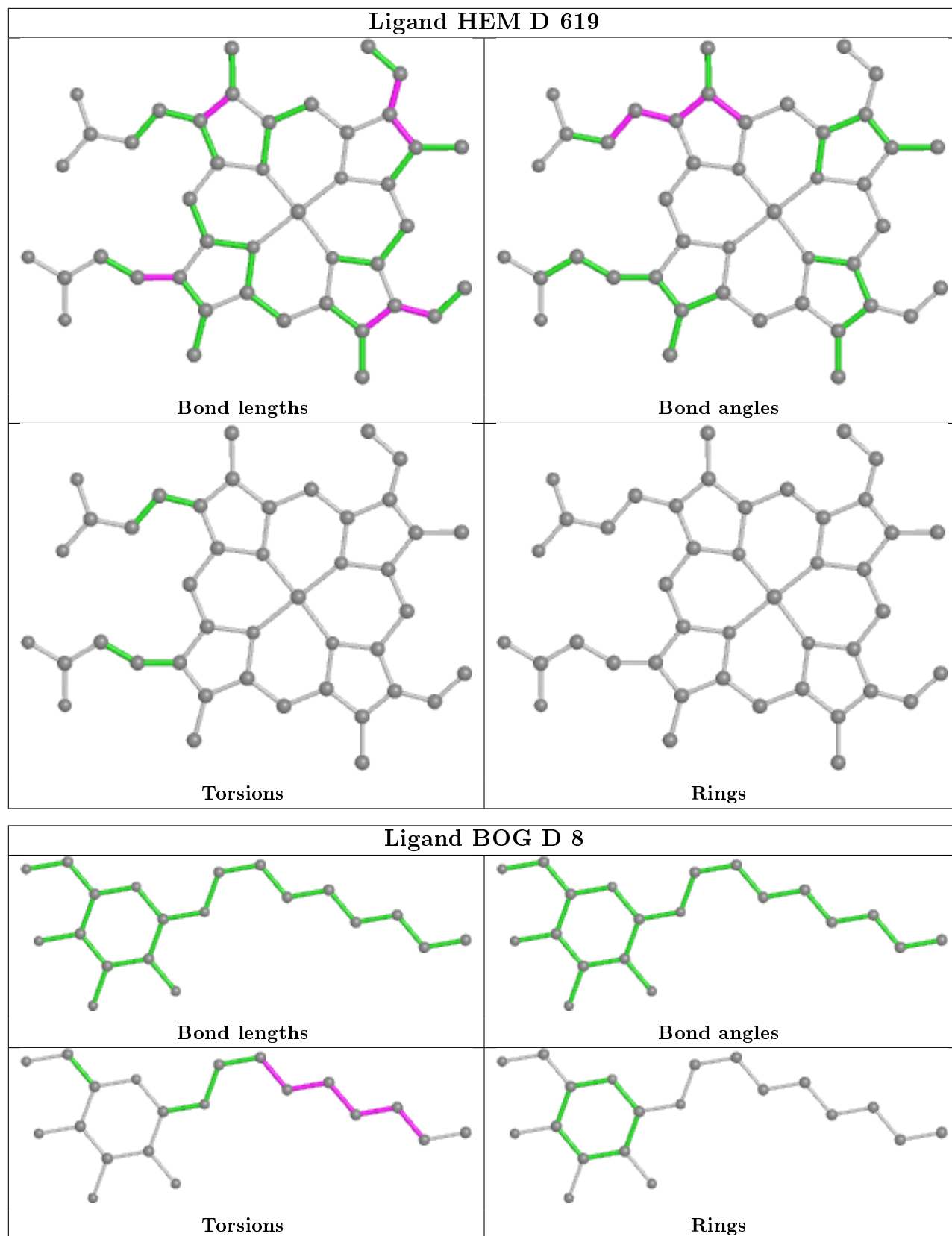
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.



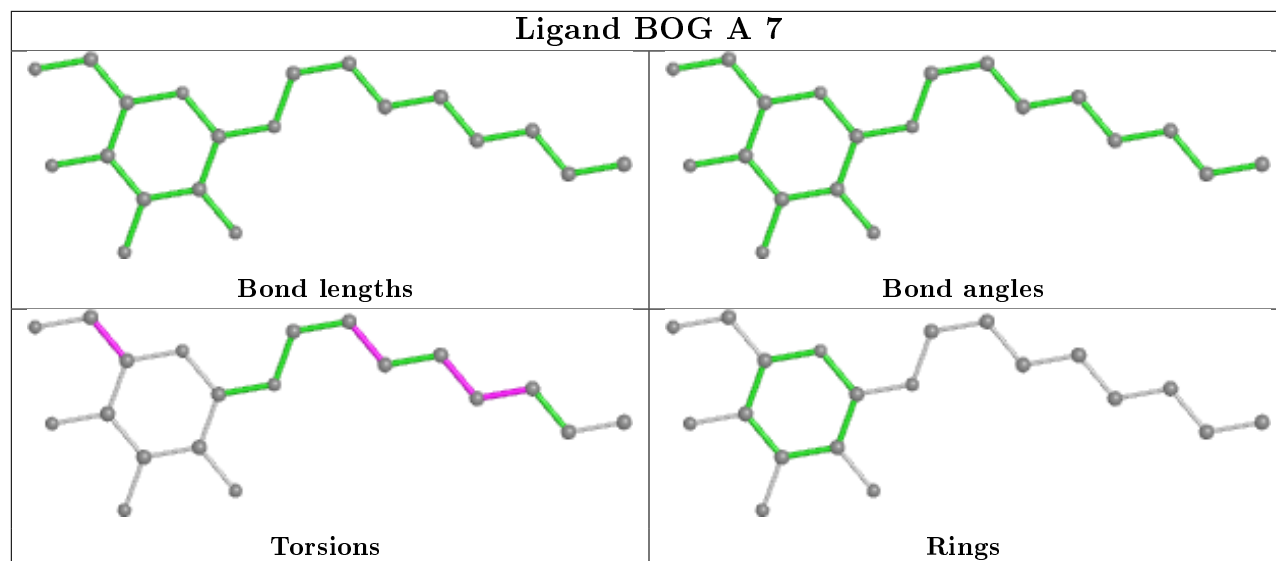




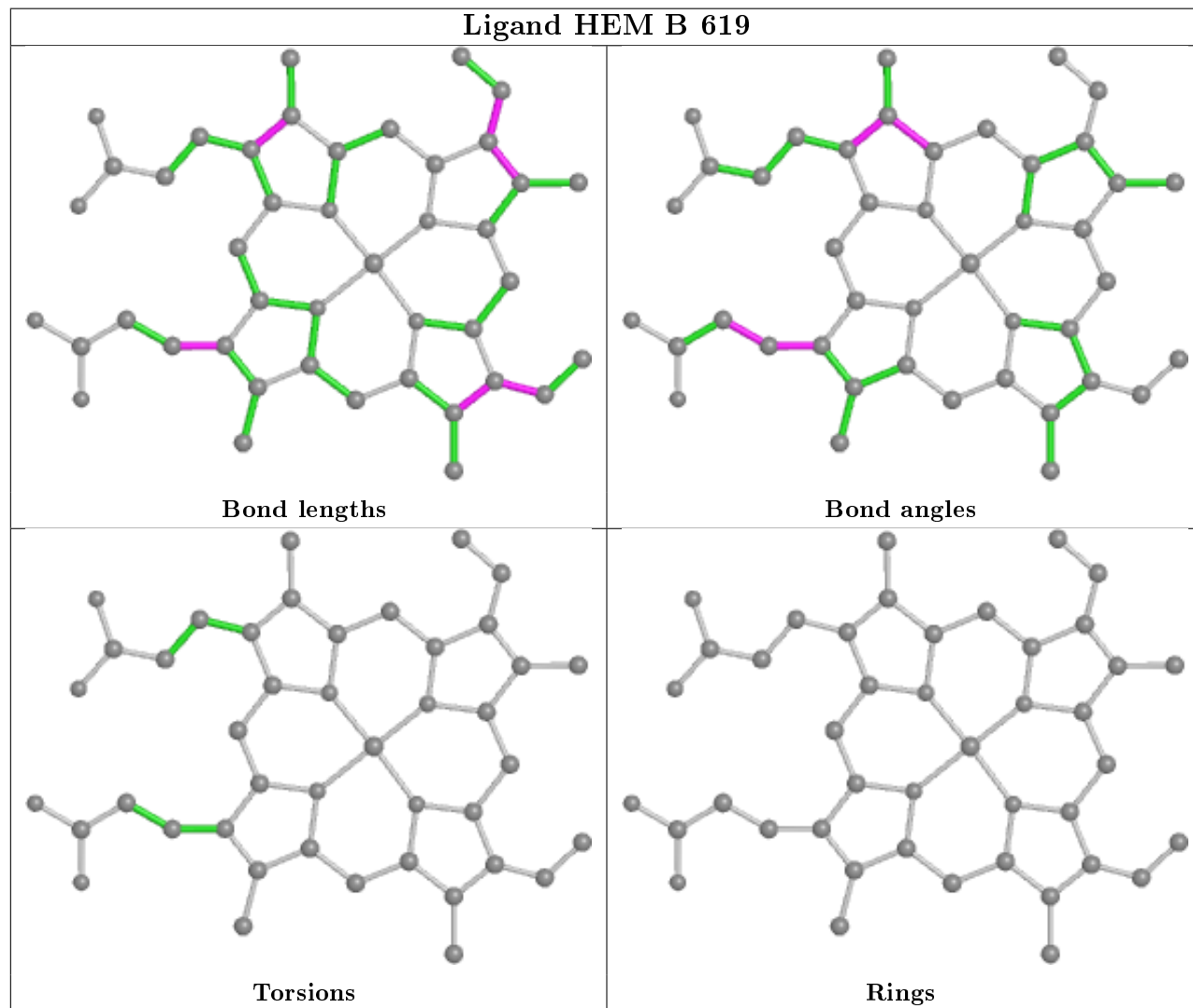




## Ligand BOG A 7



## Ligand HEM B 619



## 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	552/587 (94%)	0.76	55 (9%) 7 9	35, 49, 69, 84	0
1	B	551/587 (93%)	0.82	64 (11%) 4 6	36, 52, 75, 89	0
1	C	552/587 (94%)	0.67	49 (8%) 9 12	34, 47, 63, 77	0
1	D	552/587 (94%)	0.67	44 (7%) 12 15	35, 47, 62, 75	0
All	All	2207/2348 (93%)	0.73	212 (9%) 8 10	34, 48, 68, 89	0

The worst 5 of 212 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	409	TYR	9.9
1	C	583	GLN	7.2
1	C	80	LEU	6.3
1	D	122	TYR	5.3
1	B	33	ALA	5.2

### 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

### 6.3 Carbohydrates ⓘ

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, 95<sup>th</sup> 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.

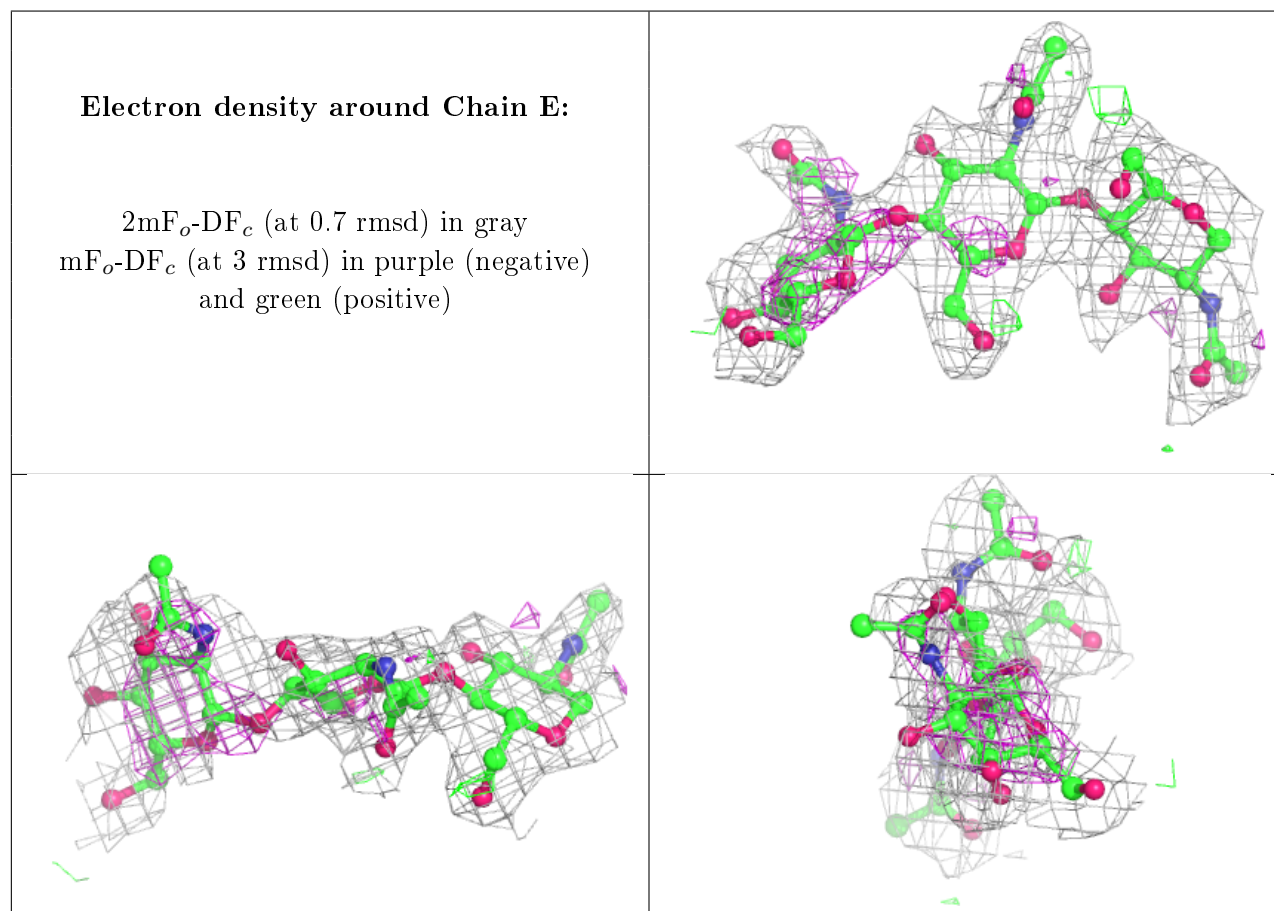
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	NAG	E	3	14/15	0.48	0.56	63,64,65,65	0
2	NAG	G	3	14/15	0.50	0.58	62,63,64,64	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NAG	F	3	14/15	0.57	0.69	63,65,66,66	0
2	NAG	G	2	14/15	0.59	0.38	53,56,57,60	0
2	NAG	H	3	14/15	0.59	0.51	62,64,64,64	0
2	NAG	E	2	14/15	0.68	0.26	53,55,58,60	0
2	NAG	F	2	14/15	0.77	0.39	54,58,59,61	0
2	NAG	H	2	14/15	0.79	0.32	53,56,57,60	0
2	NAG	G	1	14/15	0.86	0.18	39,42,45,49	0
2	NAG	E	1	14/15	0.86	0.15	40,43,46,50	0
2	NAG	F	1	14/15	0.90	0.12	40,42,46,50	0
2	NAG	H	1	14/15	0.92	0.12	38,41,44,49	0

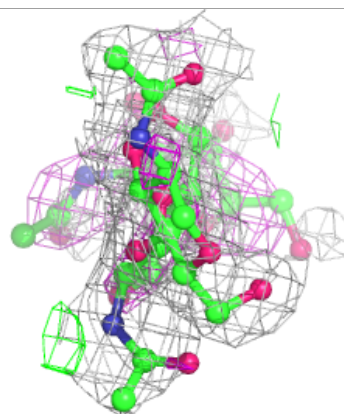
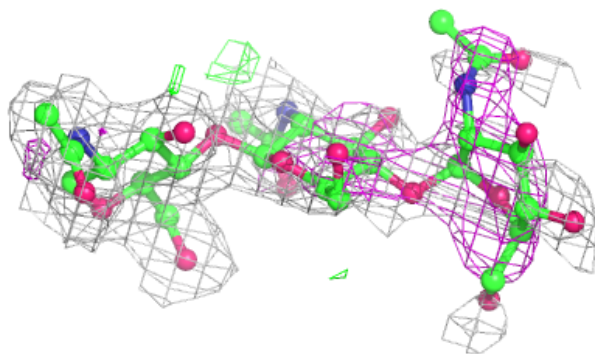
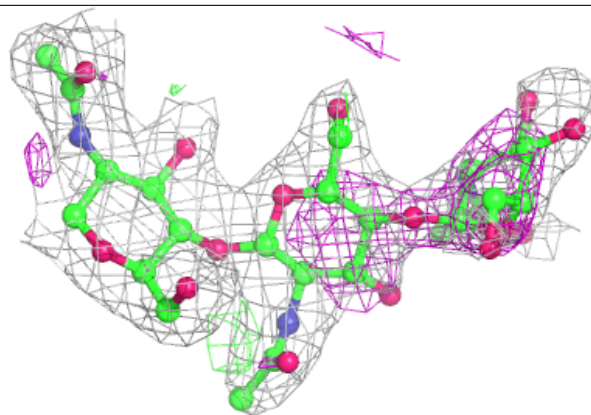
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



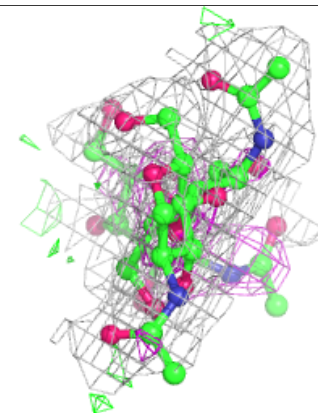
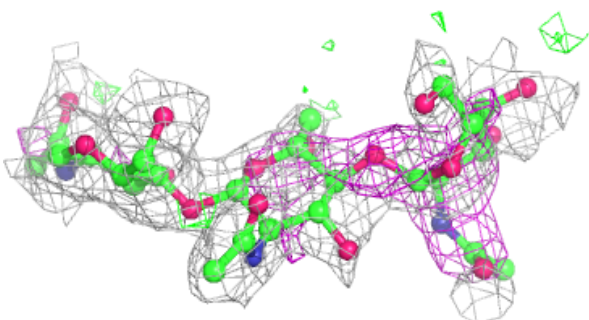
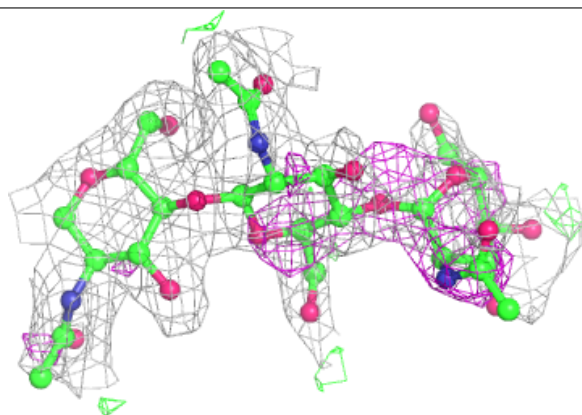


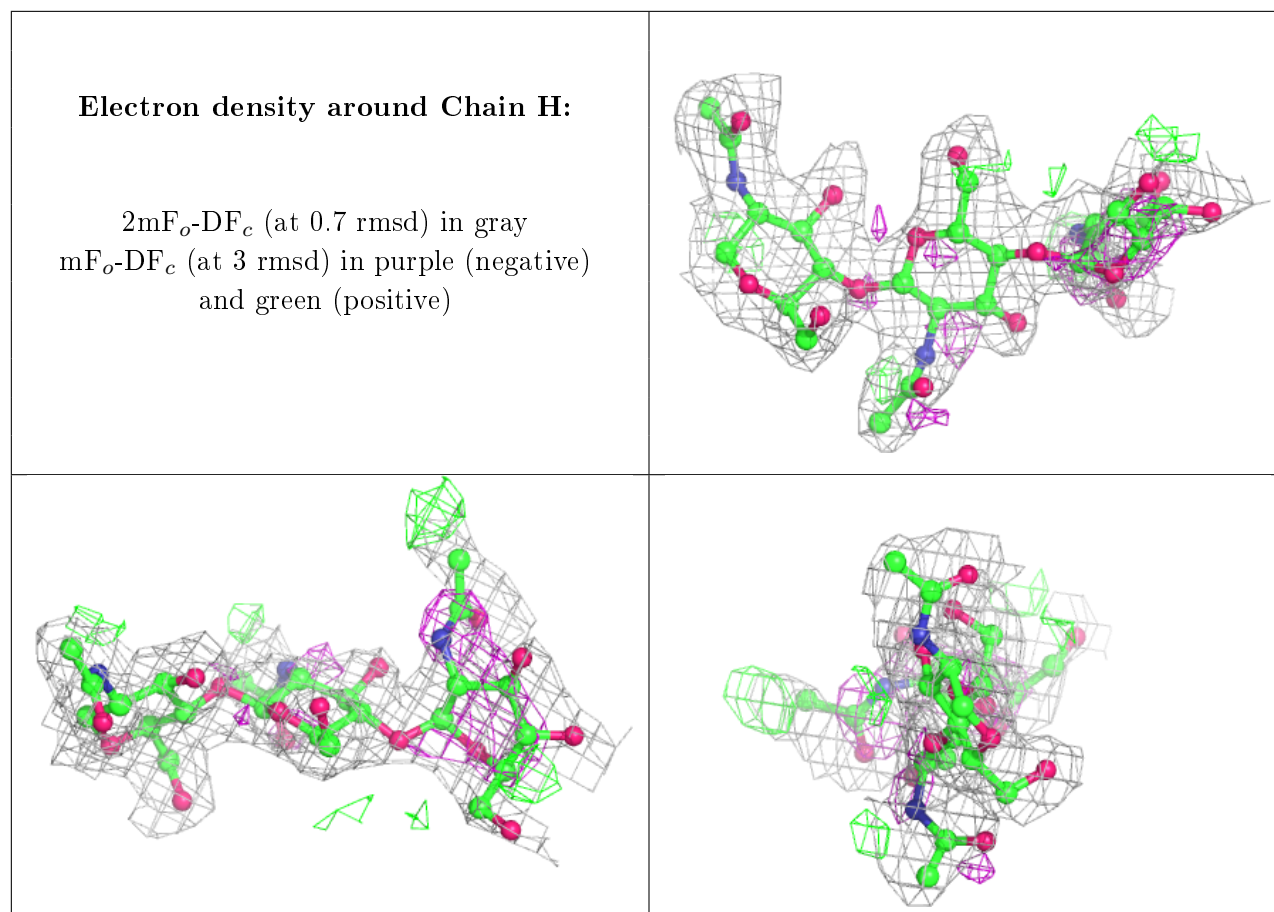
**Electron density around Chain F:**

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

**Electron density around Chain G:**

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





## 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, 95<sup>th</sup> 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.

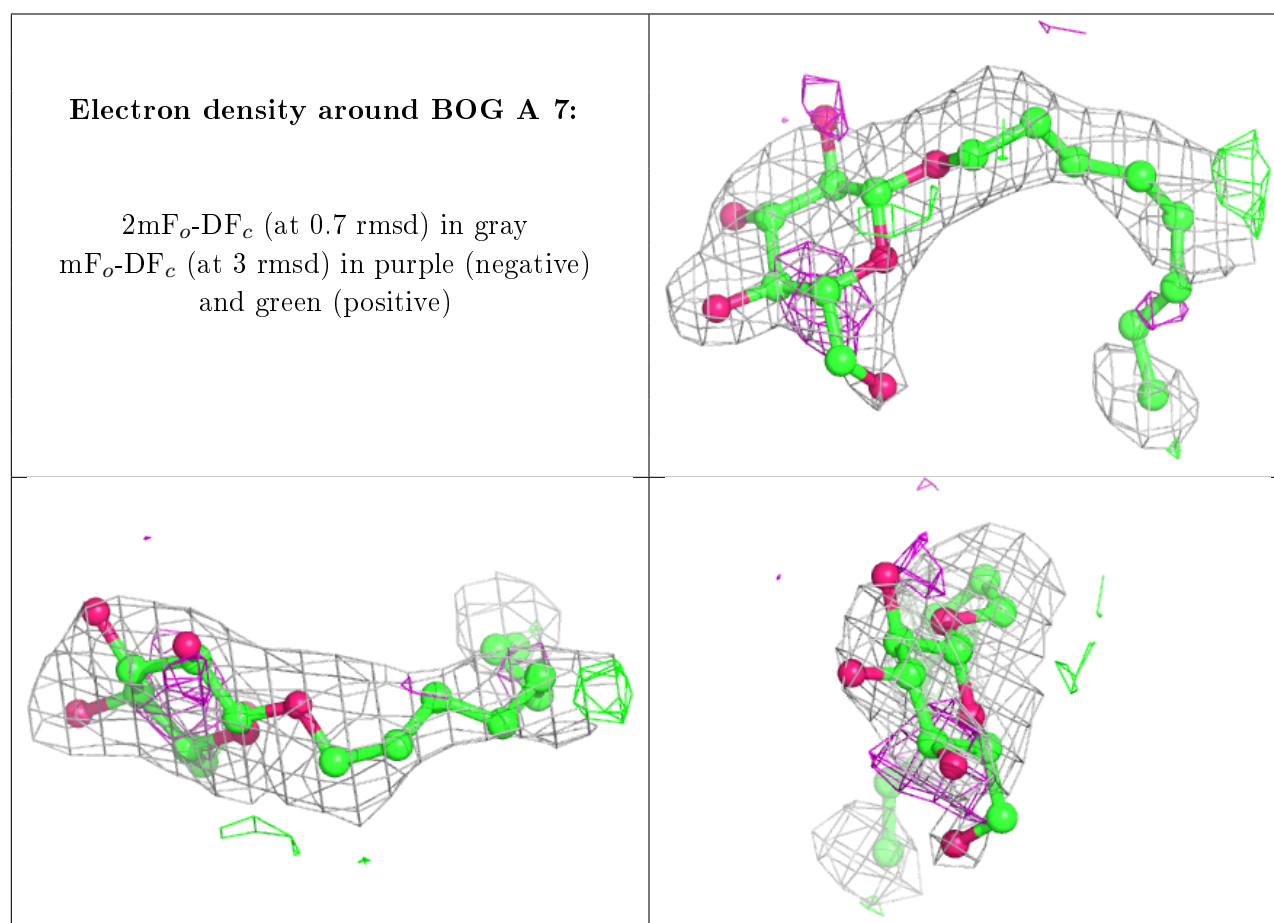
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
5	BOG	A	7	20/20	0.59	0.35	64,65,66,66	0
5	BOG	D	8	20/20	0.63	0.28	63,63,63,63	0
5	BOG	A	703	20/20	0.69	0.27	58,58,60,60	0
4	NAG	B	661	14/15	0.70	0.39	48,51,53,53	0
4	NAG	C	681	14/15	0.70	0.45	48,51,53,53	0
5	BOG	B	6	20/20	0.76	0.26	72,72,72,72	0
4	NAG	D	661	14/15	0.77	0.43	47,50,52,53	0
4	NAG	D	681	14/15	0.78	0.25	46,49,50,50	0
4	NAG	A	661	14/15	0.78	0.43	47,50,51,51	0
4	NAG	C	661	14/15	0.81	0.38	47,50,51,51	0
4	NAG	B	681	14/15	0.82	0.37	48,50,51,51	0
4	NAG	A	681	14/15	0.82	0.32	44,47,48,48	0

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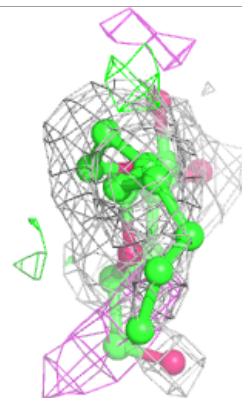
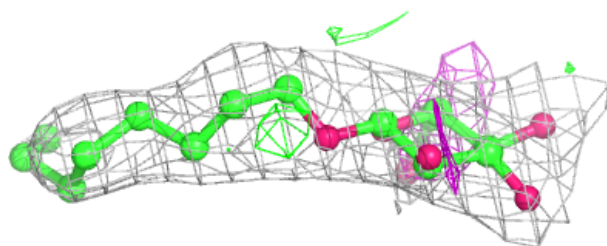
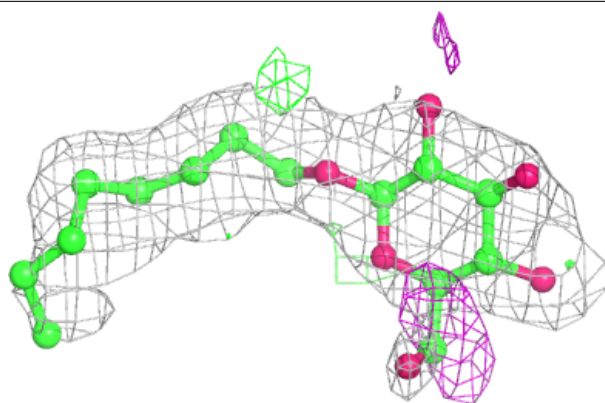
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	BOG	D	703	20/20	0.84	0.19	51,51,55,55	0
5	BOG	C	5	20/20	0.85	0.18	60,60,62,62	0
3	HEM	C	619	43/43	0.88	0.18	41,43,46,48	0
3	HEM	A	619	43/43	0.88	0.19	44,45,49,50	0
6	T1N	D	4	17/17	0.89	0.16	40,41,41,42	0
6	T1N	C	2	17/17	0.90	0.15	41,41,42,43	0
3	HEM	D	619	43/43	0.90	0.17	42,44,48,50	0
3	HEM	B	619	43/43	0.91	0.14	46,47,49,50	0
6	T1N	A	3	17/17	0.92	0.14	40,41,42,42	0
6	T1N	B	1	17/17	0.92	0.15	43,44,44,44	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.

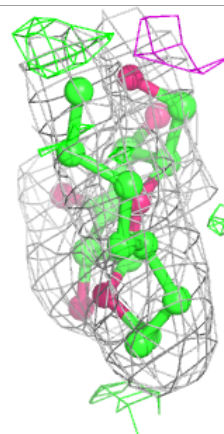
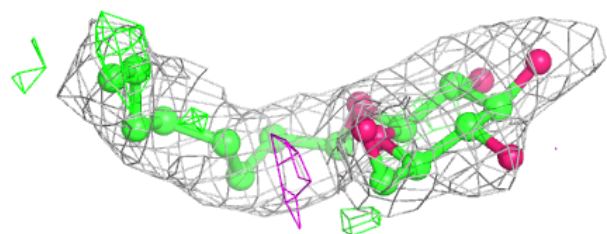
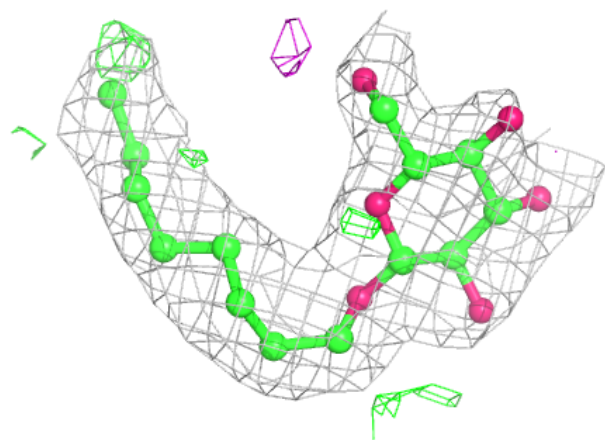


**Electron density around BOG D 8:**

$2mF_o-DF_c$  (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:**

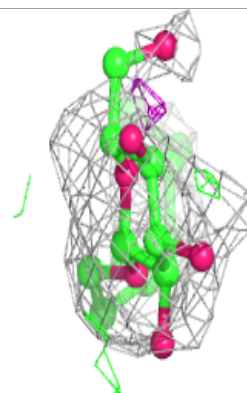
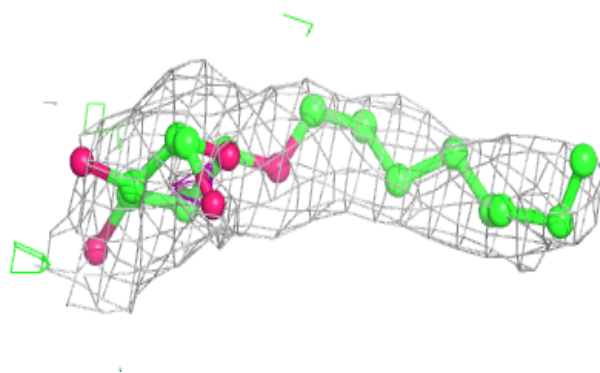
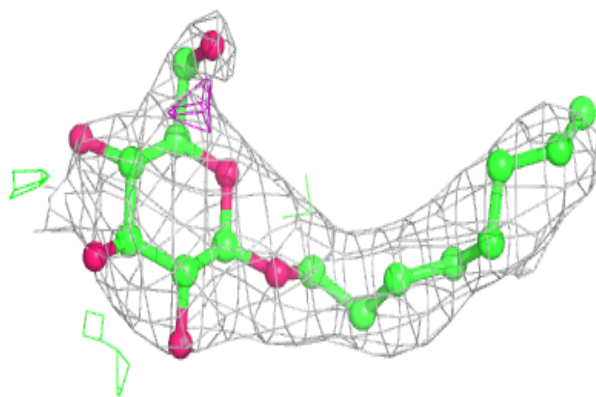
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



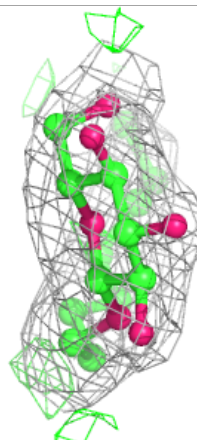
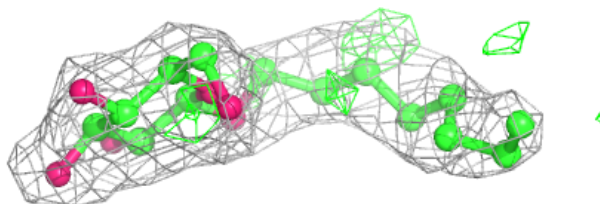
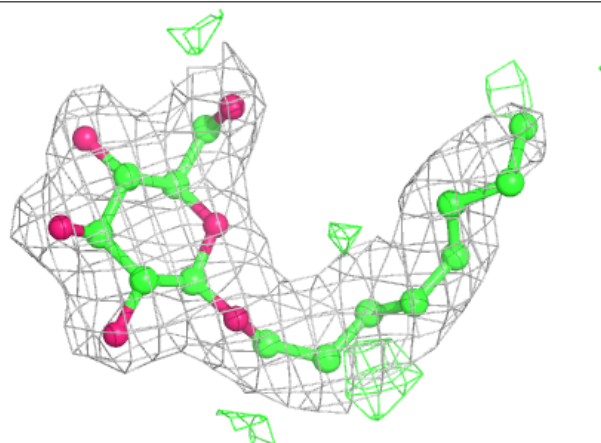


**Electron density around BOG B 6:**

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

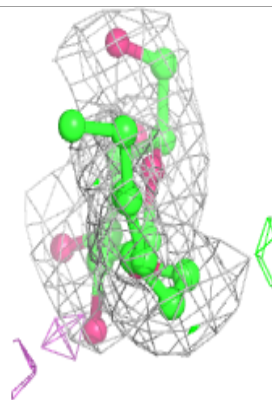
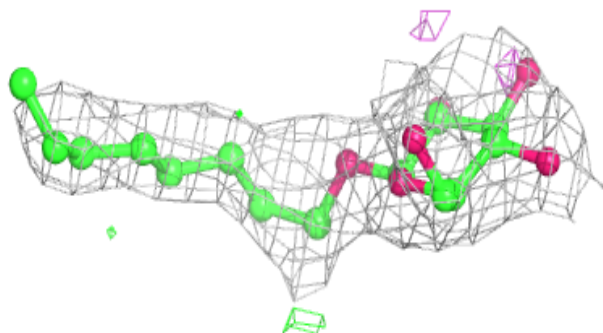
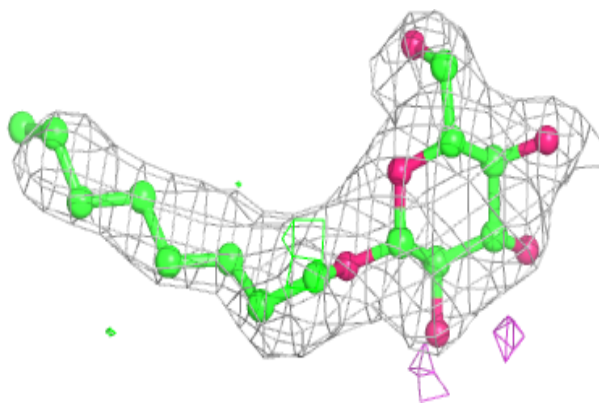
**Electron density around BOG D 703:**

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



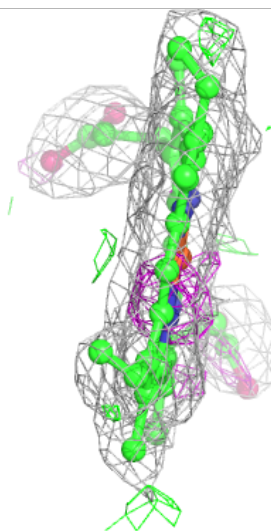
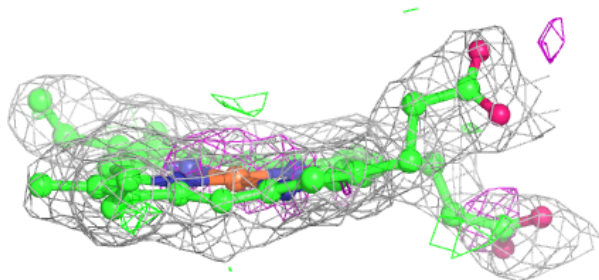
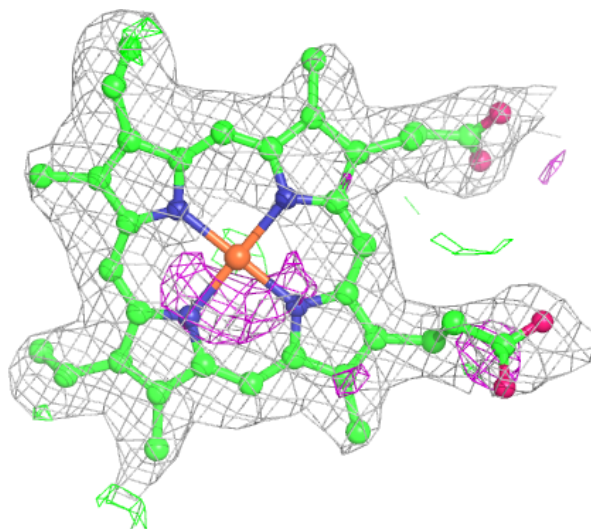
**Electron density around BOG C 5:**

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



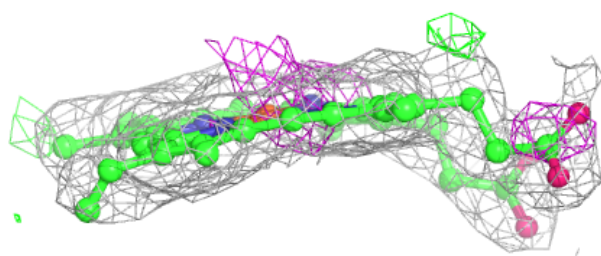
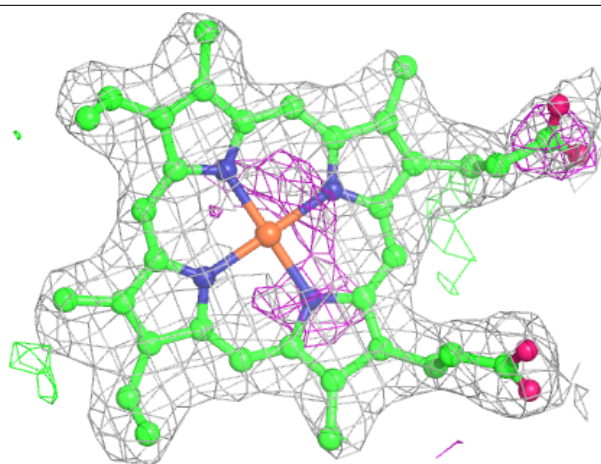
**Electron density around HEM C 619:**

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



**Electron density around HEM A 619:**

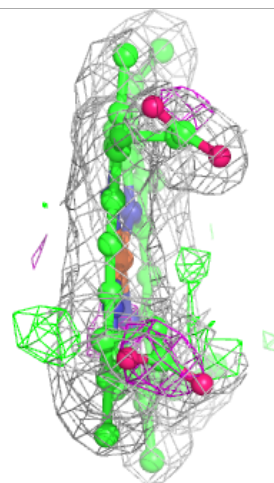
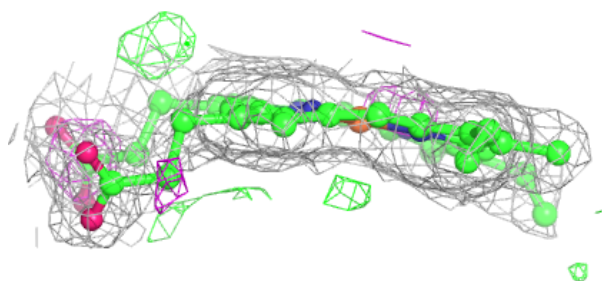
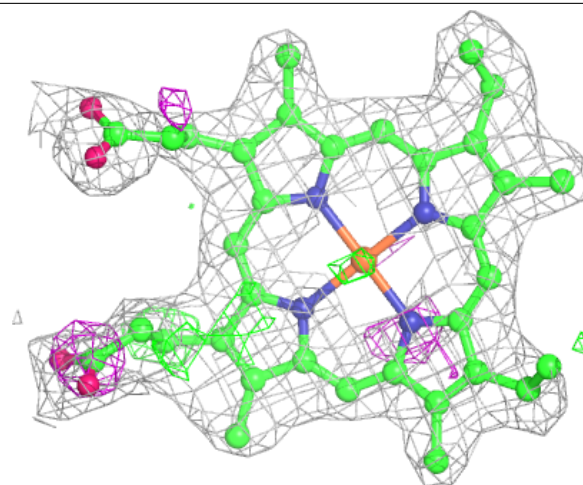
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





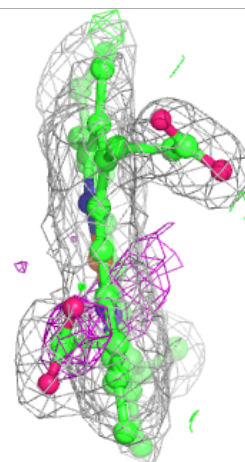
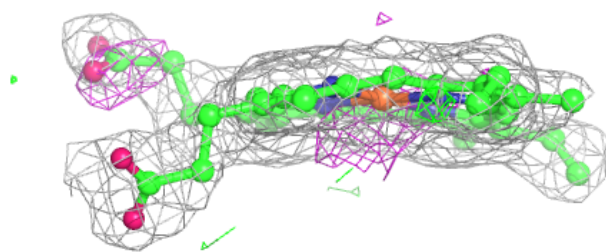
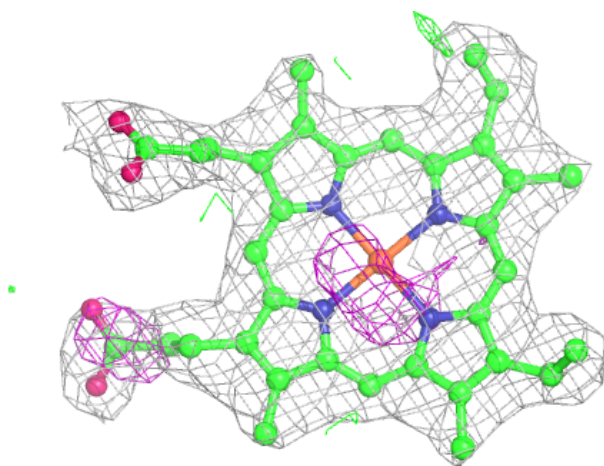
**Electron density around HEM D 619:**

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



**Electron density around HEM B 619:**

$2mF_o-DF_c$  (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.