



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 8, 2020 – 09:08 AM BST

PDB ID : 3NTG  
Title : Crystal structure of COX-2 with selective compound 23d-(R)  
Authors : Wang, J.L.; Limburg, D.; Graneto, M.J.; Carter, J.C.; Talley, J.J.; Kiefer, J.R.  
Deposited on : 2010-07-04  
Resolution : 2.19 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

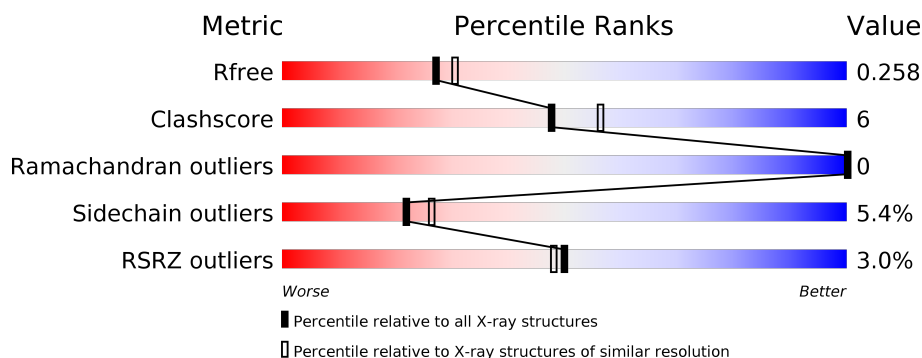
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.19 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.



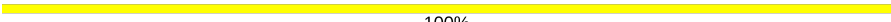
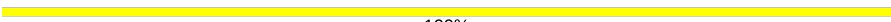
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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 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	552	<div> <div>3%</div> <div> <div></div> <div>86%</div> <div>13%</div> </div> <div></div> </div>
1	B	552	<div> <div>2%</div> <div> <div></div> <div>84%</div> <div>14%</div> </div> <div></div> </div>
1	C	552	<div> <div>3%</div> <div> <div></div> <div>85%</div> <div>13%</div> </div> <div></div> </div>
1	D	552	<div> <div>3%</div> <div> <div></div> <div>84%</div> <div>14%</div> </div> <div></div> </div>
2	E	2	<div> <div></div> <div>100%</div> </div>
2	F	2	<div> <div></div> <div>100%</div> </div>

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

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 19469 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.

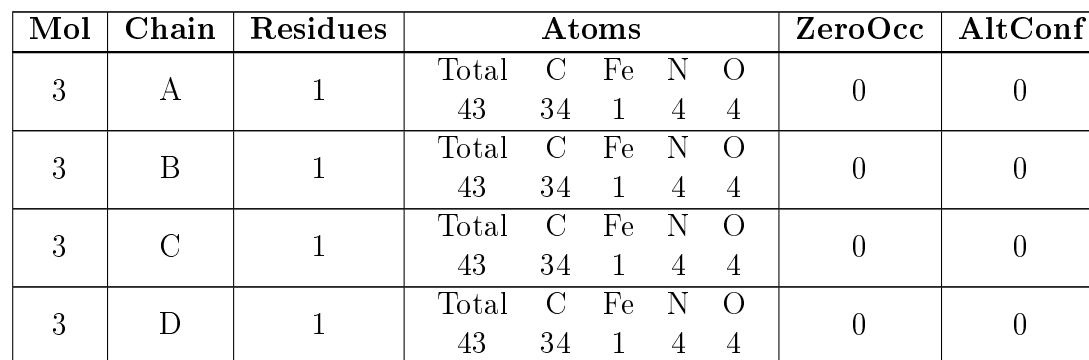
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	552	Total	C	N	O	S	0	1	0
			4484	2890	752	817	25			
1	B	552	Total	C	N	O	S	0	0	0
			4475	2885	750	815	25			
1	C	552	Total	C	N	O	S	0	0	0
			4475	2885	750	815	25			
1	D	552	Total	C	N	O	S	0	1	0
			4482	2890	751	816	25			

- 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	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			
2	G	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	H	2	Total	C	N	O	0	0	0
			28	16	2	10			

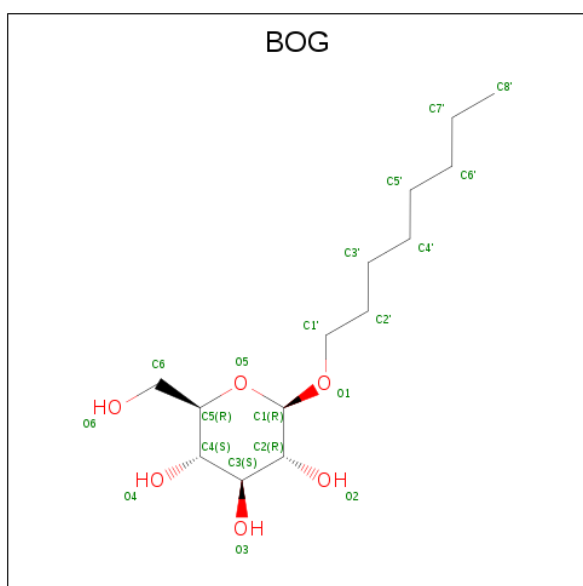
- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: C<sub>34</sub>H<sub>32</sub>FeN<sub>4</sub>O<sub>4</sub>).



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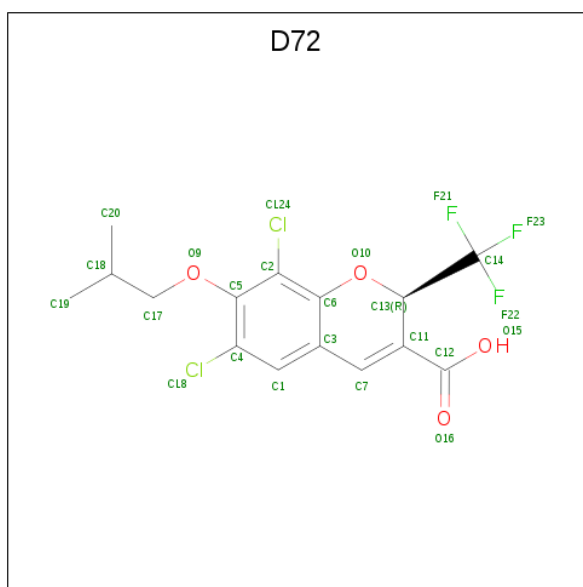
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	B	1	Total	C	N	O	0	0
			14	8	1	5		
4	C	1	Total	C	N	O	0	0
			14	8	1	5		
4	D	1	Total	C	N	O	0	0
			14	8	1	5		

- 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	D	1	Total	C	O	0	0
			20	14	6		

- Molecule 6 is (2R)-6,8-dichloro-7-(2-methylpropoxy)-2-(trifluoromethyl)-2H-chromene-3-carboxylic acid (three-letter code: D72) (formula:  $C_{15}H_{13}Cl_2F_3O_4$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	Cl	F	O	0	0
			24	15	2	3	4		
6	B	1	Total	C	Cl	F	O	0	0
			24	15	2	3	4		
6	C	1	Total	C	Cl	F	O	0	0
			24	15	2	3	4		
6	D	1	Total	C	Cl	F	O	0	0
			24	15	2	3	4		

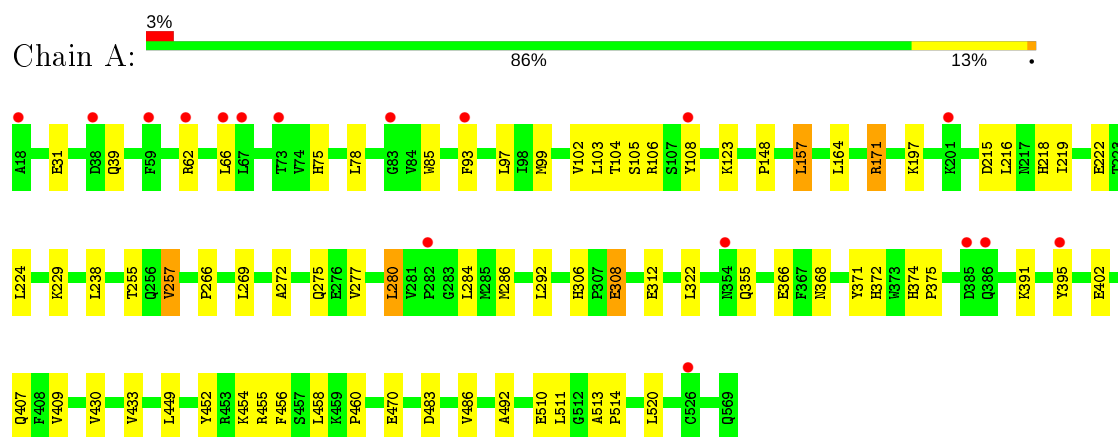
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	264	Total	O	0	0
			264	264		
7	B	296	Total	O	0	0
			296	296		
7	C	252	Total	O	0	0
			252	252		
7	D	265	Total	O	0	0
			265	265		

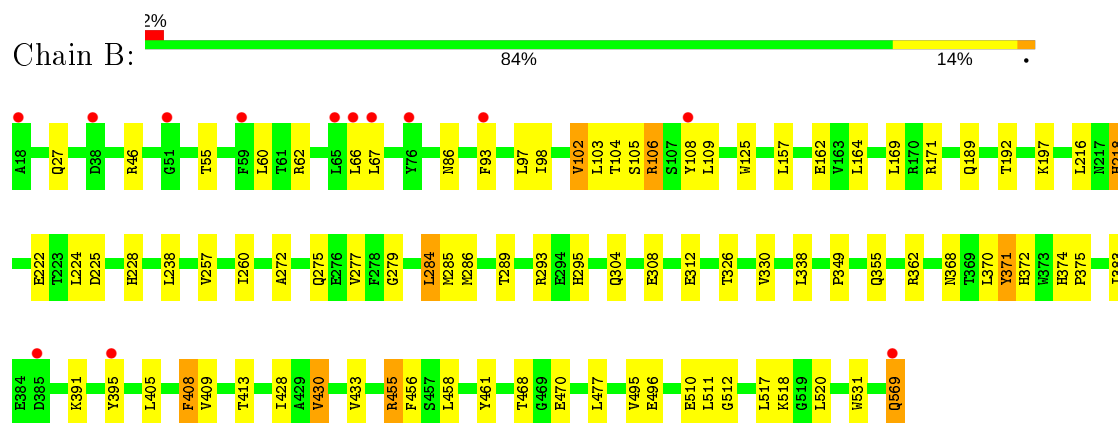
### 3 Residue-property plots [i](#)

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.

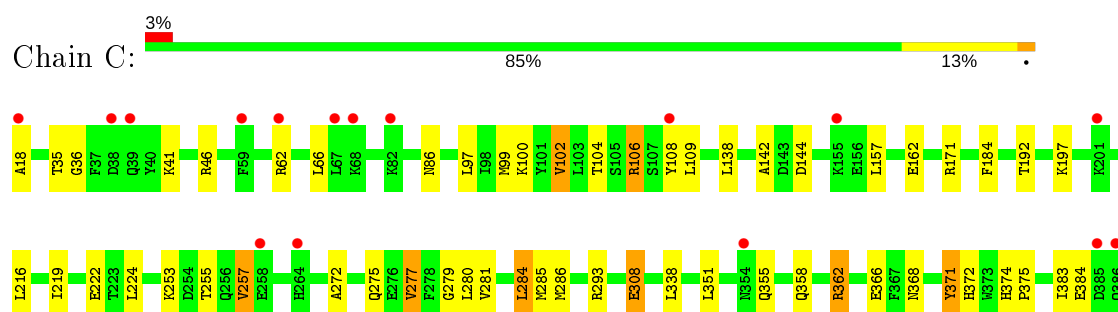
#### • Molecule 1: Prostaglandin G/H synthase 2



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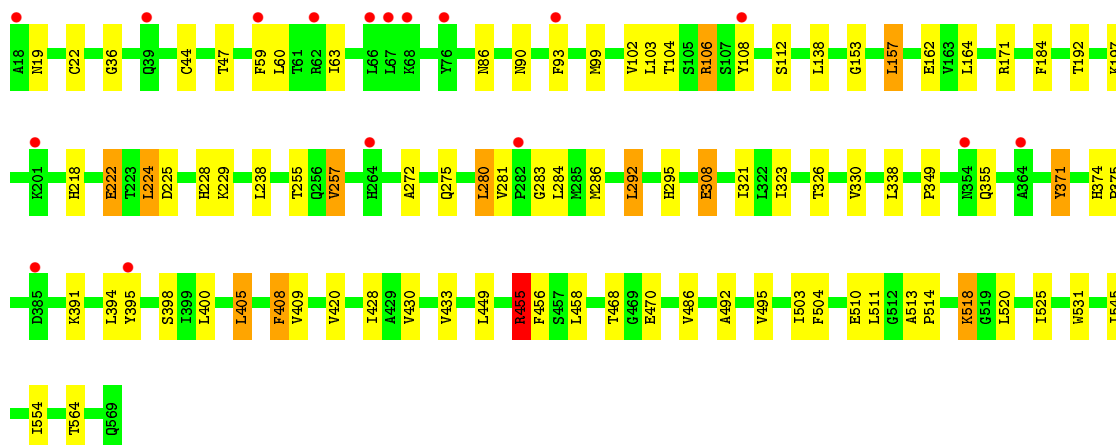
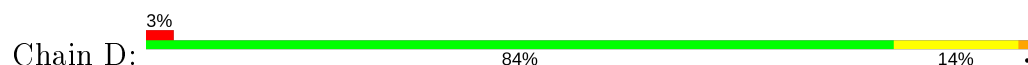
#### • Molecule 1: Prostaglandin G/H synthase 2







- Molecule 1: Prostaglandin G/H synthase 2



- Molecule 2: 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



- Molecule 2: 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



MAG1  
MAG2

## 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, $\alpha$ , $\beta$ , $\gamma$	180.27Å 134.27Å 122.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.19 – 2.19 19.93 – 2.19	Depositor EDS
% Data completeness (in resolution range)	88.2 (20.19-2.19) 88.2 (19.93-2.19)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.11	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.26 (at 2.19Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, $R_{free}$	0.206 , 0.255 0.213 , 0.258	Depositor DCC
$R_{free}$ test set	13440 reflections (10.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	33.4	Xtriage
Anisotropy	0.155	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 35.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	19469	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	43.0	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 45.75 % 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 1.2634e-04. 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: D72, HEM, 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	0.47	0/4611	0.62	2/6251 (0.0%)
1	B	0.47	0/4602	0.61	0/6239
1	C	0.43	0/4602	0.60	2/6239 (0.0%)
1	D	0.46	0/4609	0.61	2/6249 (0.0%)
All	All	0.46	0/18424	0.61	6/24978 (0.0%)

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	455	ARG	NE-CZ-NH2	-6.31	117.14	120.30
1	C	362	ARG	NE-CZ-NH2	-6.14	117.23	120.30
1	C	362	ARG	NE-CZ-NH1	5.85	123.23	120.30
1	D	455	ARG	NE-CZ-NH1	5.65	123.13	120.30
1	A	455	ARG	NE-CZ-NH2	-5.47	117.56	120.30

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	4484	0	4381	39	0
1	B	4475	0	4374	58	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	4475	0	4374	50	0
1	D	4482	0	4382	70	0
2	E	28	0	25	0	0
2	F	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	0	0
3	A	43	0	30	0	0
3	B	43	0	30	1	0
3	C	43	0	30	0	0
3	D	43	0	30	0	0
4	A	14	0	13	0	0
4	B	14	0	13	0	0
4	C	14	0	13	0	0
4	D	14	0	13	0	0
5	A	20	0	28	0	0
5	D	20	0	28	3	0
6	A	24	0	12	2	0
6	B	24	0	12	2	0
6	C	24	0	12	1	0
6	D	24	0	12	2	0
7	A	264	0	0	2	0
7	B	296	0	0	1	0
7	C	252	0	0	5	0
7	D	265	0	0	1	0
All	All	19469	0	17887	221	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 6.

The worst 5 of 221 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:D:280:LEU:HD12	1:D:281:VAL:CG2	1.60	1.30
1:D:280:LEU:HD12	1:D:281:VAL:HG23	1.19	1.13
1:B:260:ILE:HD12	1:B:277:VAL:HG12	1.51	0.90
1:D:280:LEU:HD12	1:D:281:VAL:HG22	1.50	0.89
1:D:104:THR:HG21	1:D:355:GLN:HG2	1.57	0.86

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	551/552 (100%)	537 (98%)	14 (2%)	0	100	100
1	B	550/552 (100%)	535 (97%)	15 (3%)	0	100	100
1	C	550/552 (100%)	535 (97%)	15 (3%)	0	100	100
1	D	551/552 (100%)	536 (97%)	15 (3%)	0	100	100
All	All	2202/2208 (100%)	2143 (97%)	59 (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	494/493 (100%)	471 (95%)	23 (5%)	26	33
1	B	493/493 (100%)	464 (94%)	29 (6%)	19	23
1	C	493/493 (100%)	468 (95%)	25 (5%)	24	29
1	D	494/493 (100%)	465 (94%)	29 (6%)	19	23
All	All	1974/1972 (100%)	1868 (95%)	106 (5%)	22	26

5 of 106 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	455	ARG
1	C	224	LEU
1	D	391	LYS

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Mol	Chain	Res	Type
1	B	518	LYS
1	C	102	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	86	ASN
1	B	355	GLN
1	C	567	ASN
1	A	407	GLN
1	C	86	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 ⓘ

8 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	0.55	0	17,19,21	1.31	2 (11%)
2	NAG	E	2	2	14,14,15	0.50	0	17,19,21	1.37	2 (11%)
2	NAG	F	1	1,2	14,14,15	0.62	0	17,19,21	1.35	1 (5%)
2	NAG	F	2	2	14,14,15	0.43	0	17,19,21	1.27	2 (11%)
2	NAG	G	1	1,2	14,14,15	0.69	0	17,19,21	1.17	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	NAG	G	2	2	14,14,15	0.49	0	17,19,21	1.39	2 (11%)
2	NAG	H	1	1,2	14,14,15	0.64	0	17,19,21	1.44	1 (5%)
2	NAG	H	2	2	14,14,15	0.52	0	17,19,21	1.37	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	E	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	2/6/23/26	0/1/1/1
2	NAG	F	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	2	2	-	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	H	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	H	2	2	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	1	NAG	C1-O5-C5	5.05	119.04	112.19
2	H	1	NAG	C1-O5-C5	4.77	118.66	112.19
2	E	1	NAG	C1-O5-C5	4.17	117.84	112.19
2	G	1	NAG	C1-O5-C5	4.04	117.67	112.19
2	H	2	NAG	O5-C1-C2	-3.64	105.54	111.29

There are no chirality outliers.

5 of 9 torsion outliers are listed below:

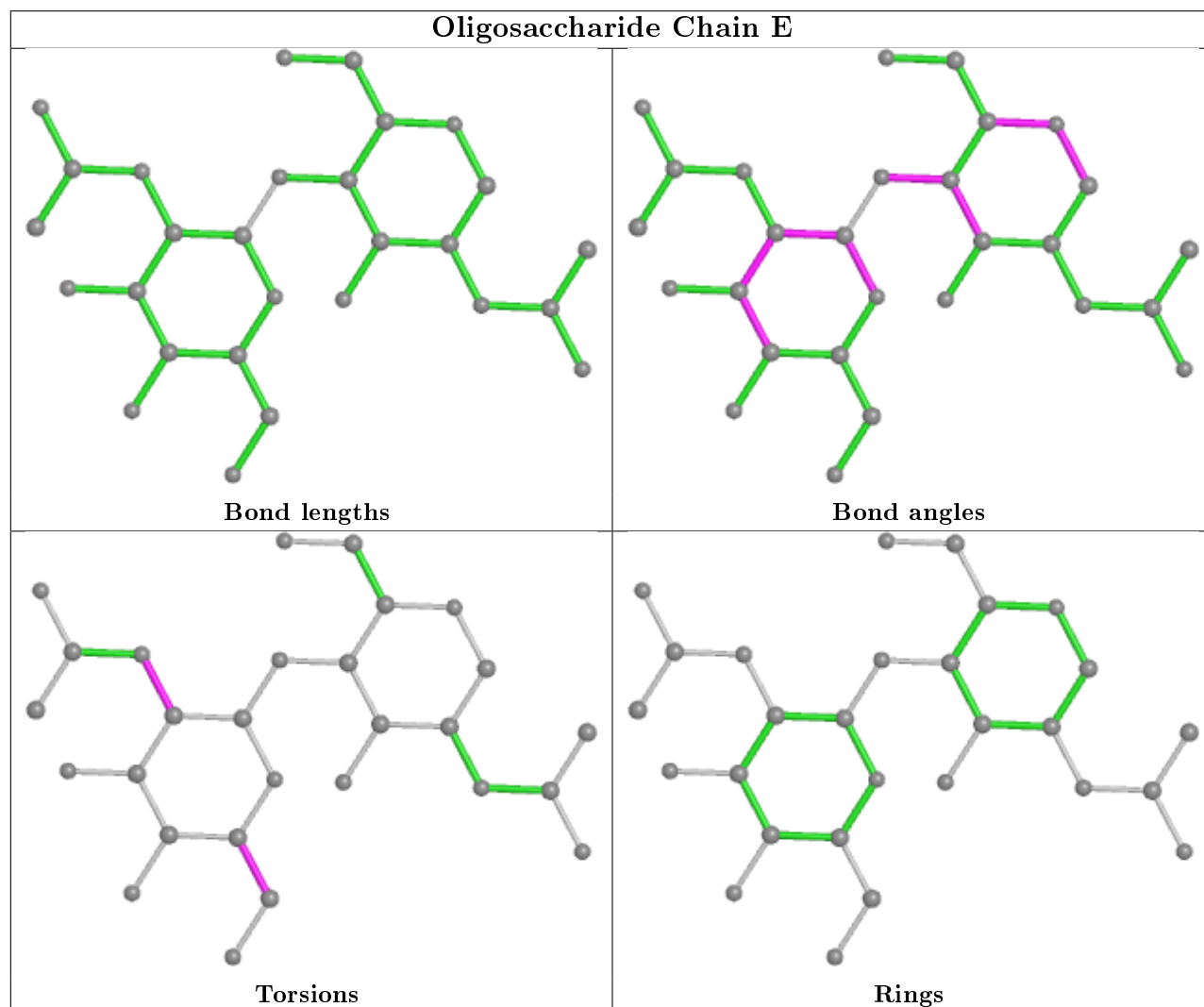
Mol	Chain	Res	Type	Atoms
2	F	2	NAG	O5-C5-C6-O6
2	F	2	NAG	C4-C5-C6-O6
2	G	2	NAG	O5-C5-C6-O6
2	F	2	NAG	C3-C2-N2-C7
2	H	2	NAG	O5-C5-C6-O6

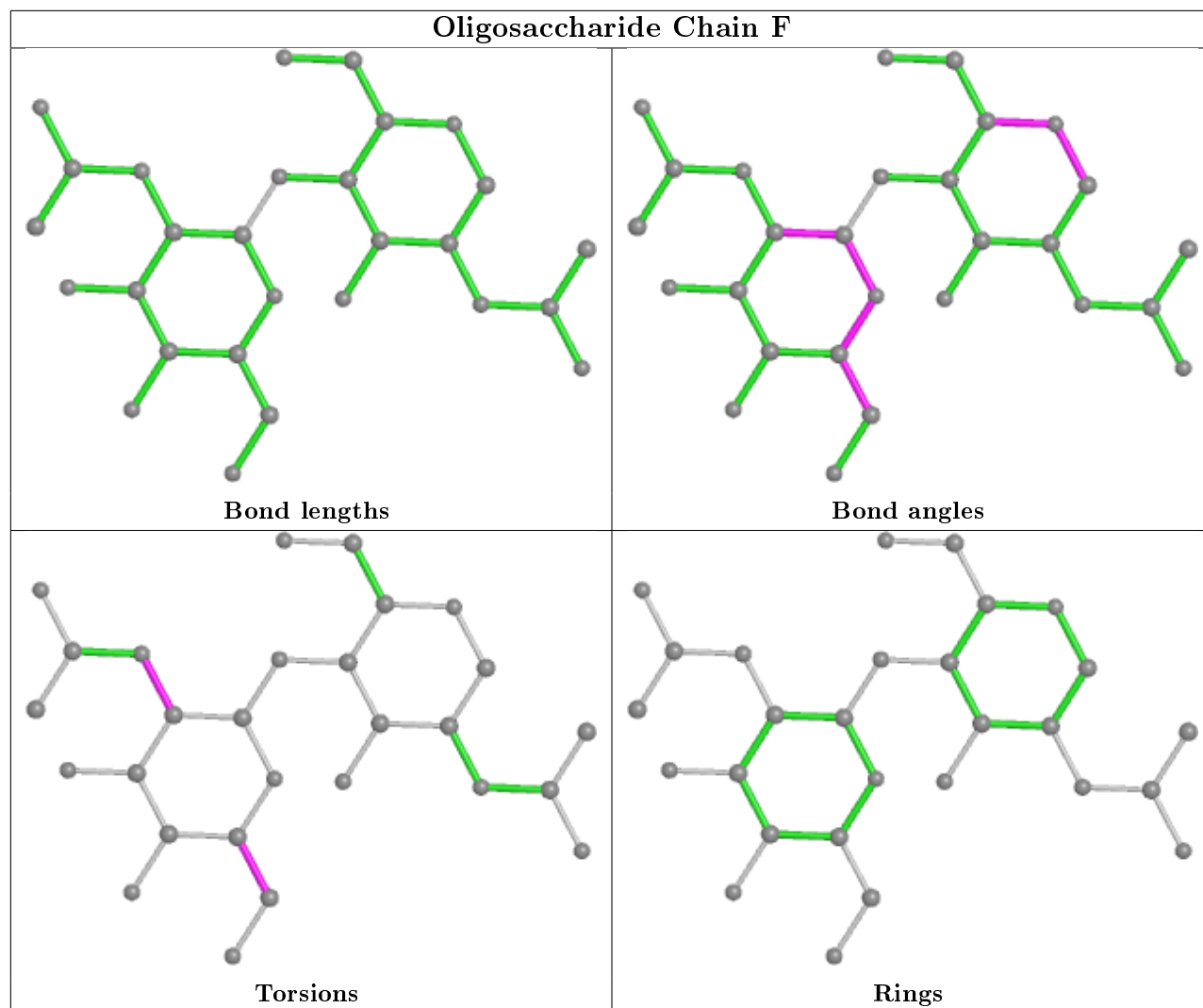
There are no ring outliers.

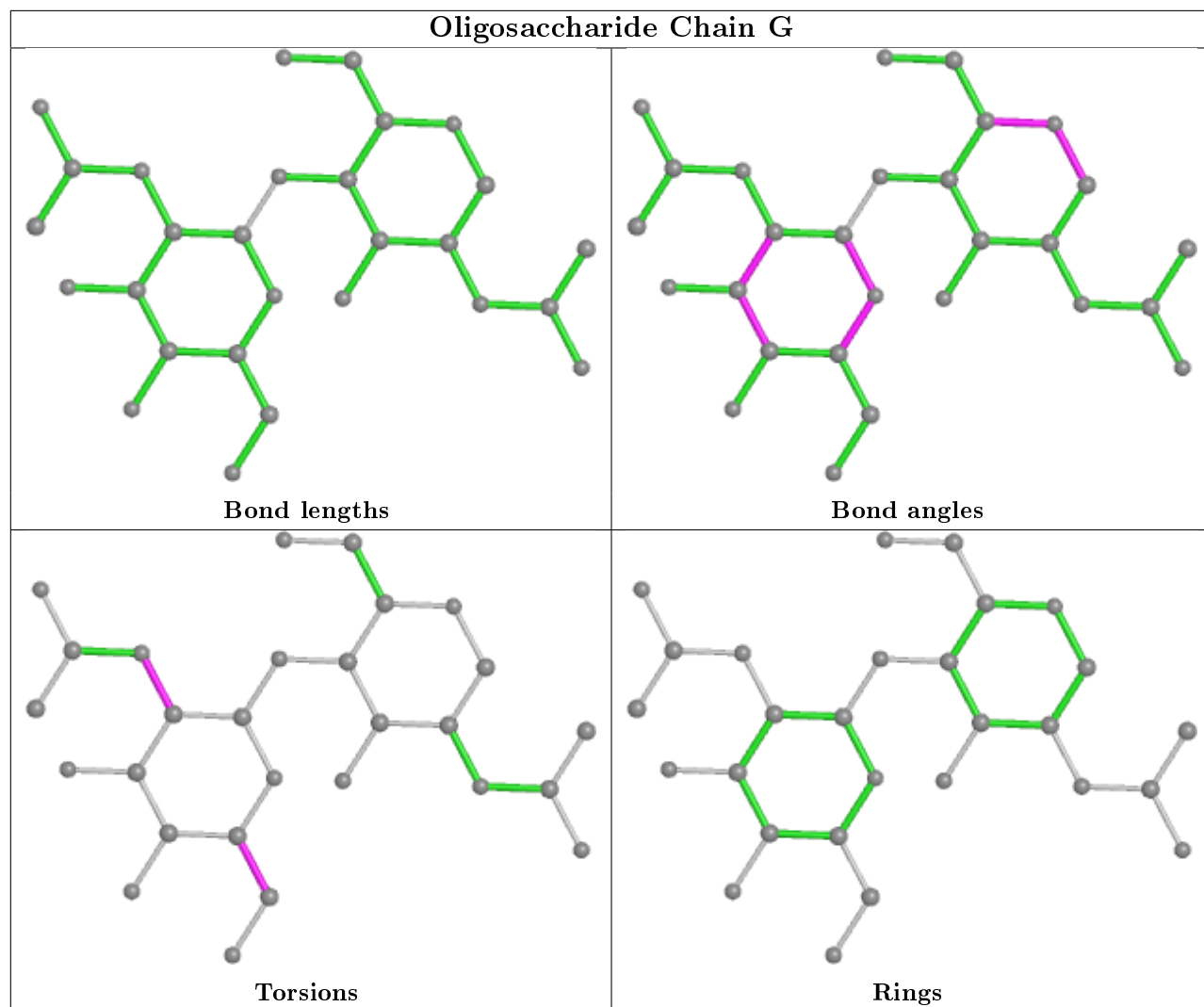


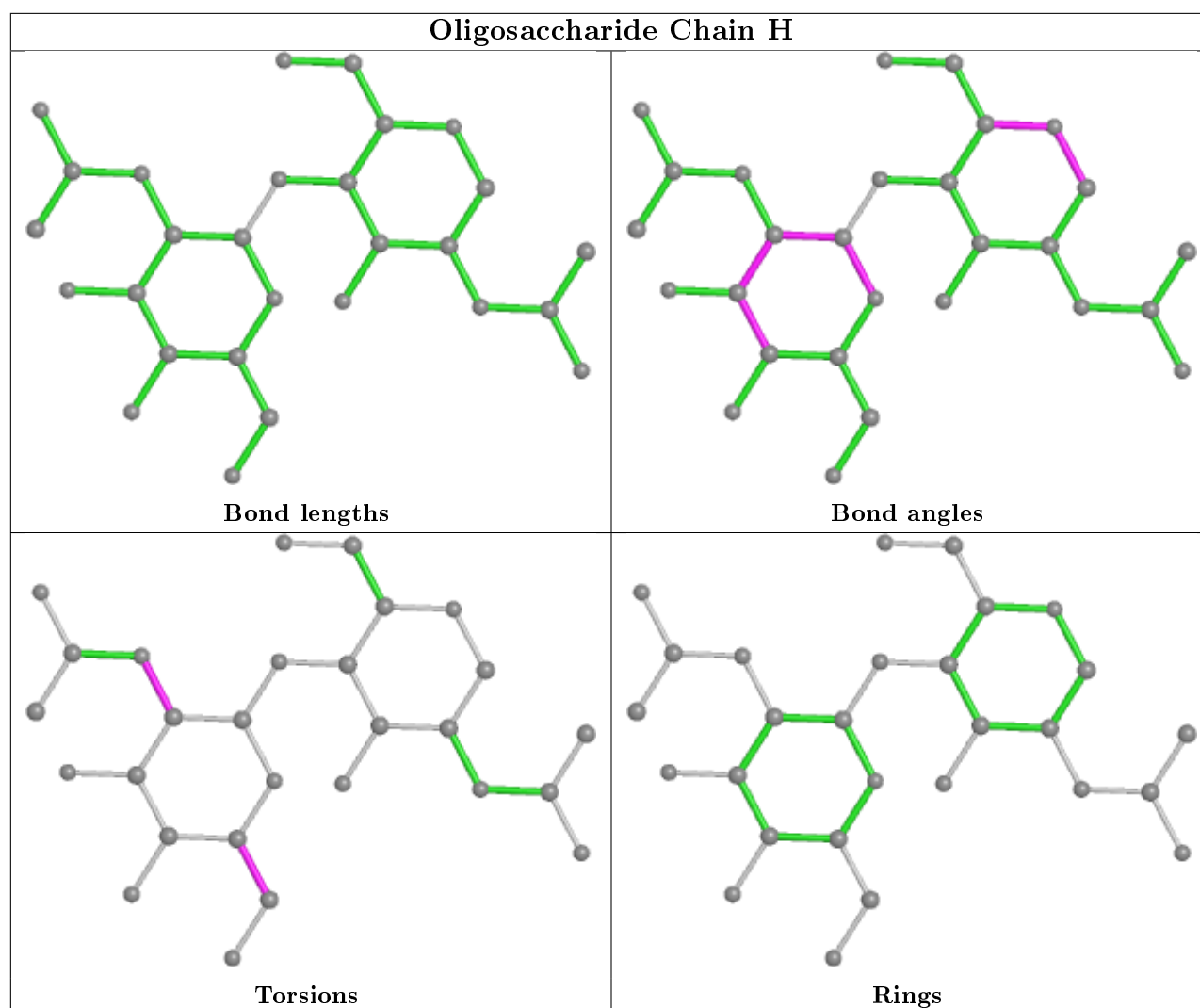
No monomer is involved in short contacts.

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](#)

14 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	0.61	0	17,19,21	1.26	1 (5%)
3	HEM	D	601	1	27,50,50	2.17	5 (18%)	17,82,82	1.68	3 (17%)
4	NAG	B	681	1	14,14,15	0.71	0	17,19,21	1.46	3 (17%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	BOG	D	703	-	20,20,20	0.44	0	25,25,25	0.75	0
4	NAG	D	681	1	14,14,15	0.58	0	17,19,21	1.11	0
6	D72	A	701	-	21,25,25	1.03	1 (4%)	27,38,38	1.78	7 (25%)
3	HEM	B	601	1,7	27,50,50	2.15	6 (22%)	17,82,82	1.78	4 (23%)
6	D72	C	701	-	21,25,25	0.97	1 (4%)	27,38,38	1.80	6 (22%)
3	HEM	C	601	1,7	27,50,50	2.15	6 (22%)	17,82,82	1.74	3 (17%)
5	BOG	A	703	-	20,20,20	0.43	0	25,25,25	0.94	1 (4%)
6	D72	D	701	-	21,25,25	0.99	1 (4%)	27,38,38	1.68	3 (11%)
4	NAG	A	681	1	14,14,15	0.54	0	17,19,21	1.06	0
3	HEM	A	601	1,7	27,50,50	2.09	5 (18%)	17,82,82	1.88	5 (29%)
6	D72	B	701	-	21,25,25	0.99	1 (4%)	27,38,38	1.75	6 (22%)

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	-	0/6/23/26	0/1/1/1
3	HEM	D	601	1	-	0/6/54/54	-
4	NAG	B	681	1	-	0/6/23/26	0/1/1/1
5	BOG	D	703	-	-	7/11/31/31	0/1/1/1
4	NAG	D	681	1	-	2/6/23/26	0/1/1/1
6	D72	A	701	-	-	4/11/27/27	0/2/2/2
3	HEM	B	601	1,7	-	0/6/54/54	-
6	D72	C	701	-	-	4/11/27/27	0/2/2/2
3	HEM	C	601	1,7	-	0/6/54/54	-
5	BOG	A	703	-	-	3/11/31/31	0/1/1/1
6	D72	D	701	-	-	1/11/27/27	0/2/2/2
4	NAG	A	681	1	-	0/6/23/26	0/1/1/1
3	HEM	A	601	1,7	-	0/6/54/54	-
6	D72	B	701	-	-	4/11/27/27	0/2/2/2

The worst 5 of 26 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	601	HEM	C3C-C2C	-5.17	1.33	1.40
3	A	601	HEM	C3C-C2C	-5.12	1.33	1.40
3	D	601	HEM	C3B-C2B	-5.11	1.33	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	601	HEM	C3D-C2D	5.10	1.52	1.37
3	A	601	HEM	C3D-C2D	5.06	1.52	1.37

The worst 5 of 42 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	C	701	D72	C3-C7-C11	-5.23	115.80	122.54
6	B	701	D72	C3-C7-C11	-4.84	116.30	122.54
3	B	601	HEM	CBD-CAD-C3D	-4.80	103.63	112.48
6	D	701	D72	C3-C7-C11	-4.79	116.36	122.54
3	D	601	HEM	CBA-CAA-C2A	-4.54	104.12	112.49

There are no chirality outliers.

5 of 25 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	701	D72	C4-C5-O9-C17
4	D	681	NAG	C4-C5-C6-O6
4	D	681	NAG	O5-C5-C6-O6
6	C	701	D72	O9-C17-C18-C19
6	B	701	D72	O9-C17-C18-C19

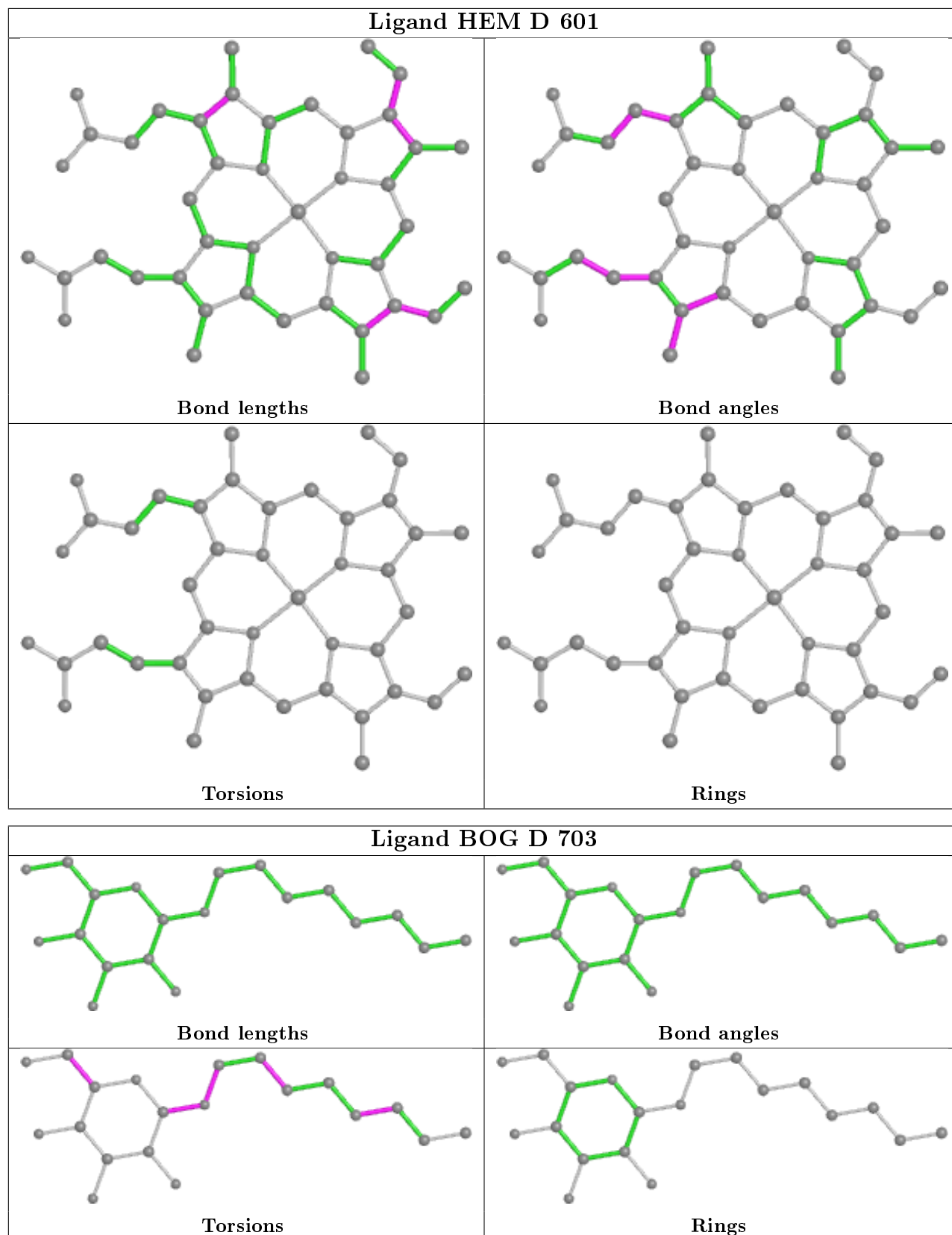
There are no ring outliers.

6 monomers are involved in 11 short contacts:

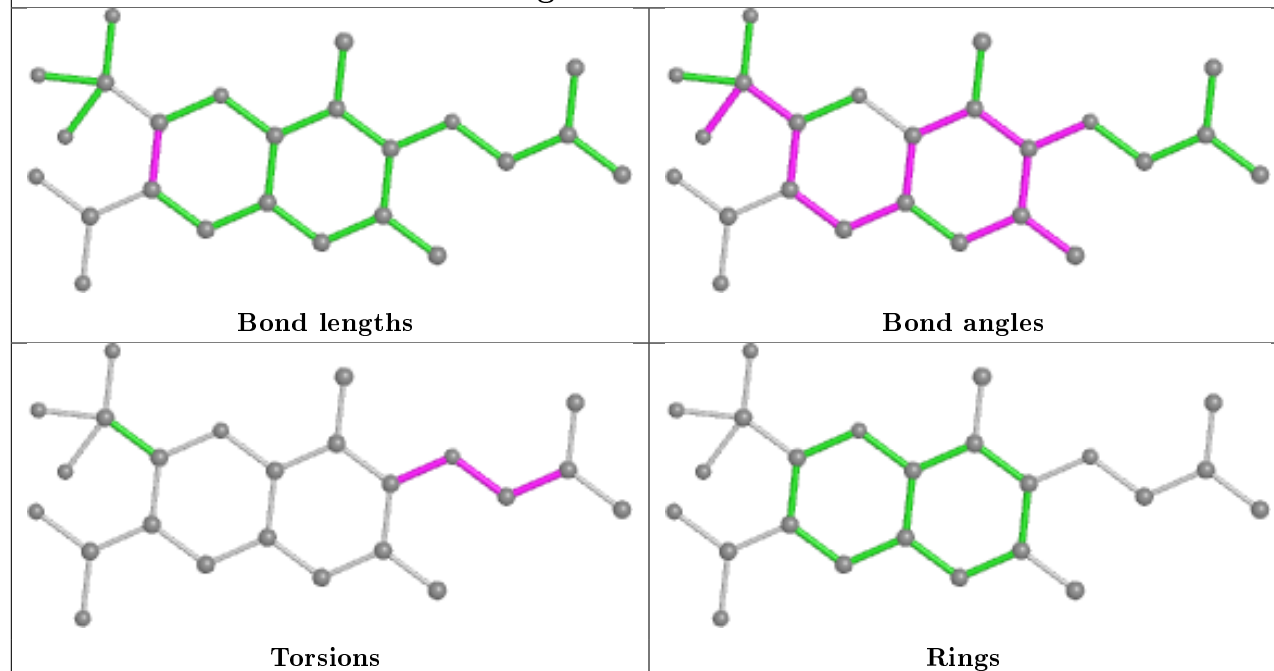
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	703	BOG	3	0
6	A	701	D72	2	0
3	B	601	HEM	1	0
6	C	701	D72	1	0
6	D	701	D72	2	0
6	B	701	D72	2	0

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

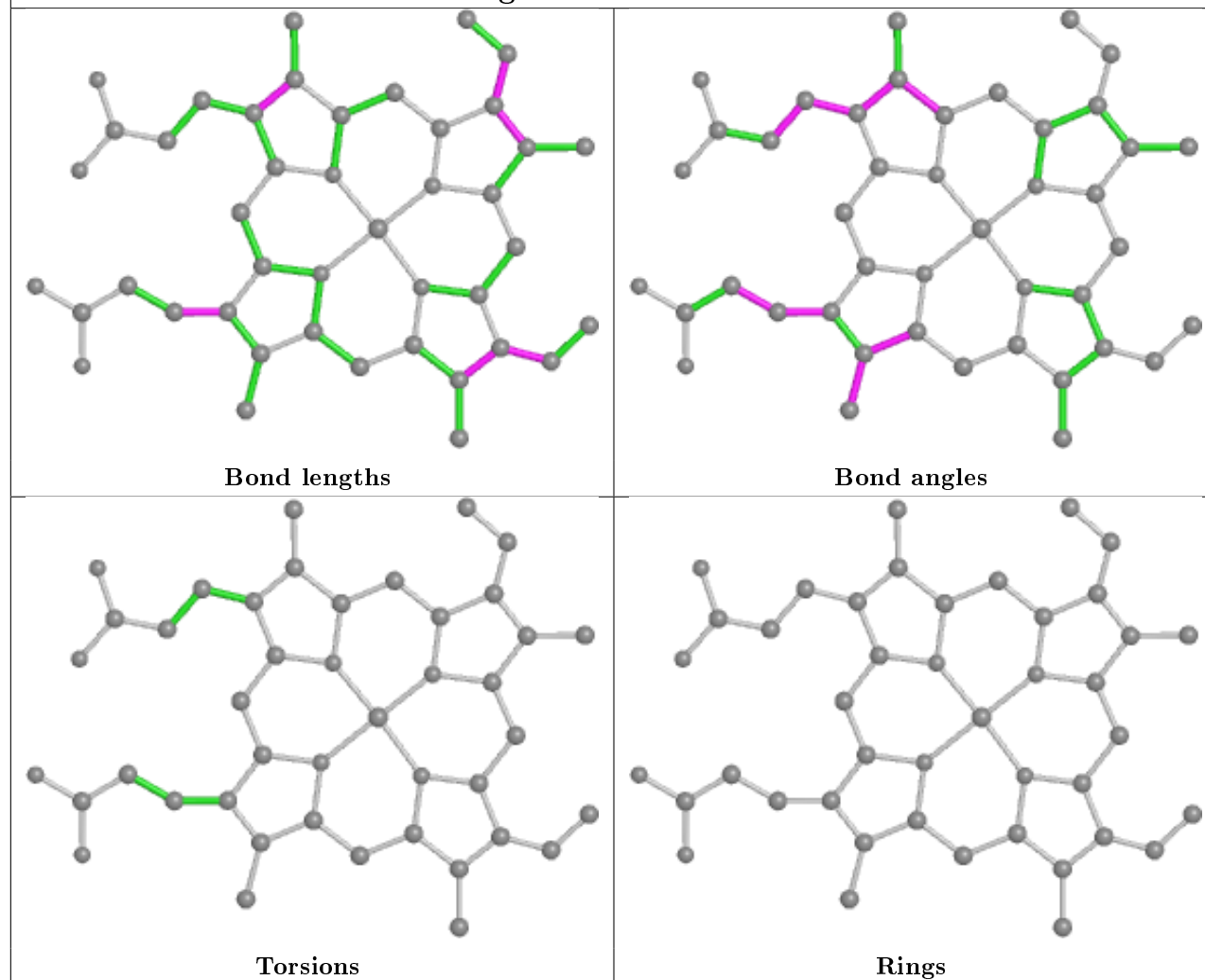
any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## Ligand D72 A 701

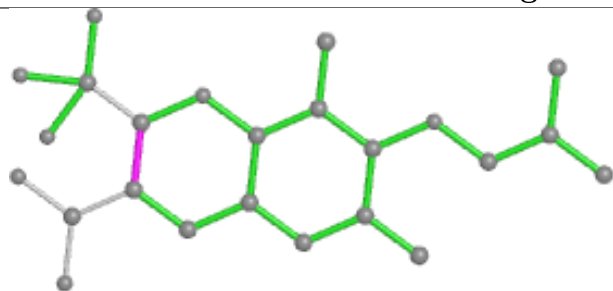


## Ligand HEM B 601

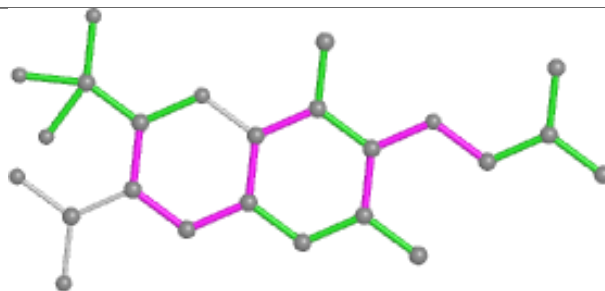




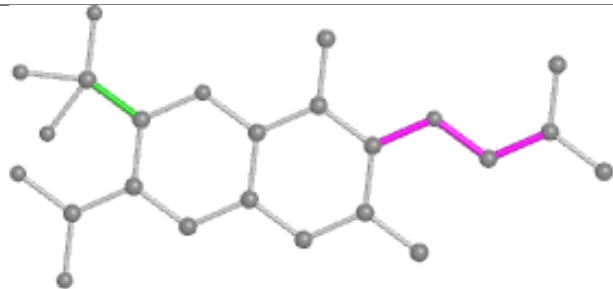
## Ligand D72 C 701



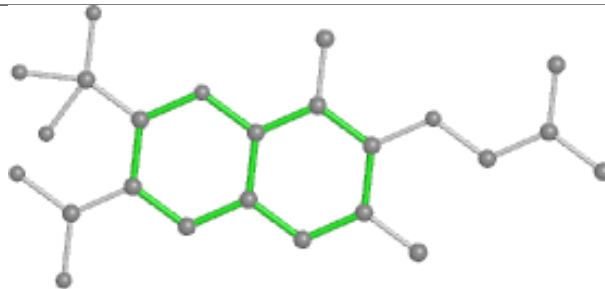
Bond lengths



Bond angles

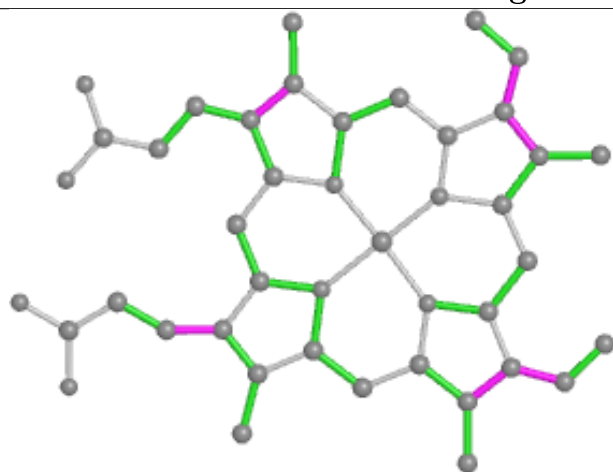


Torsions

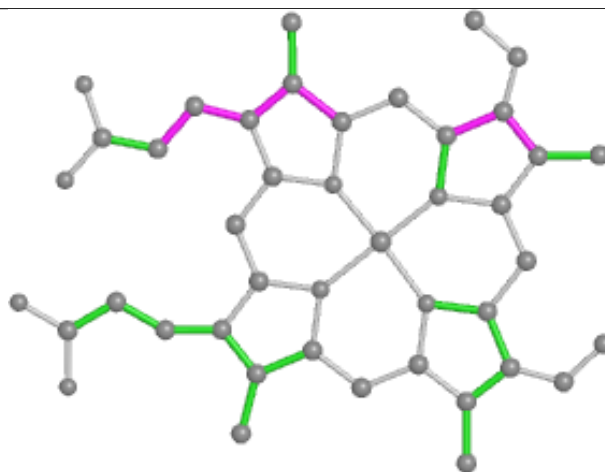


Rings

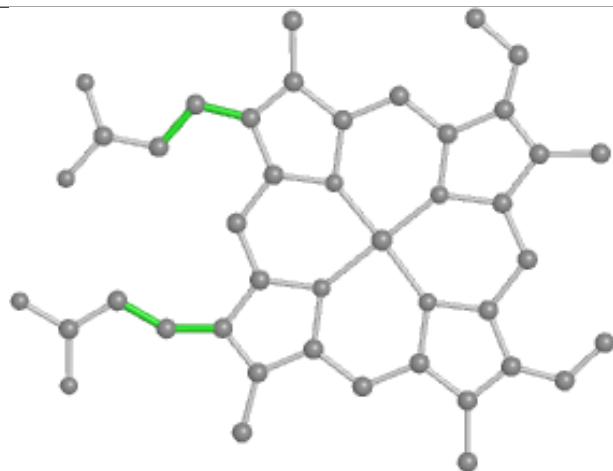
## Ligand HEM C 601



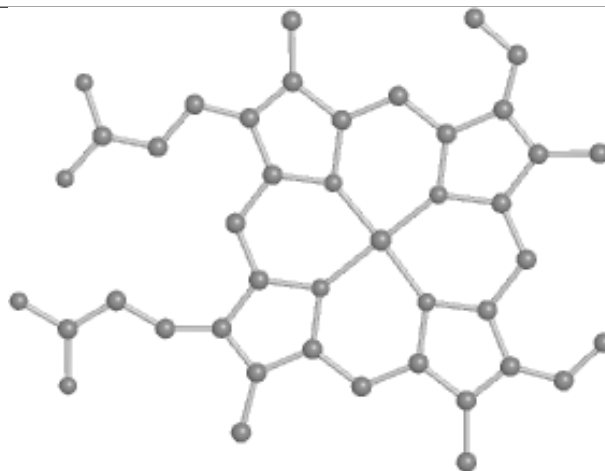
Bond lengths



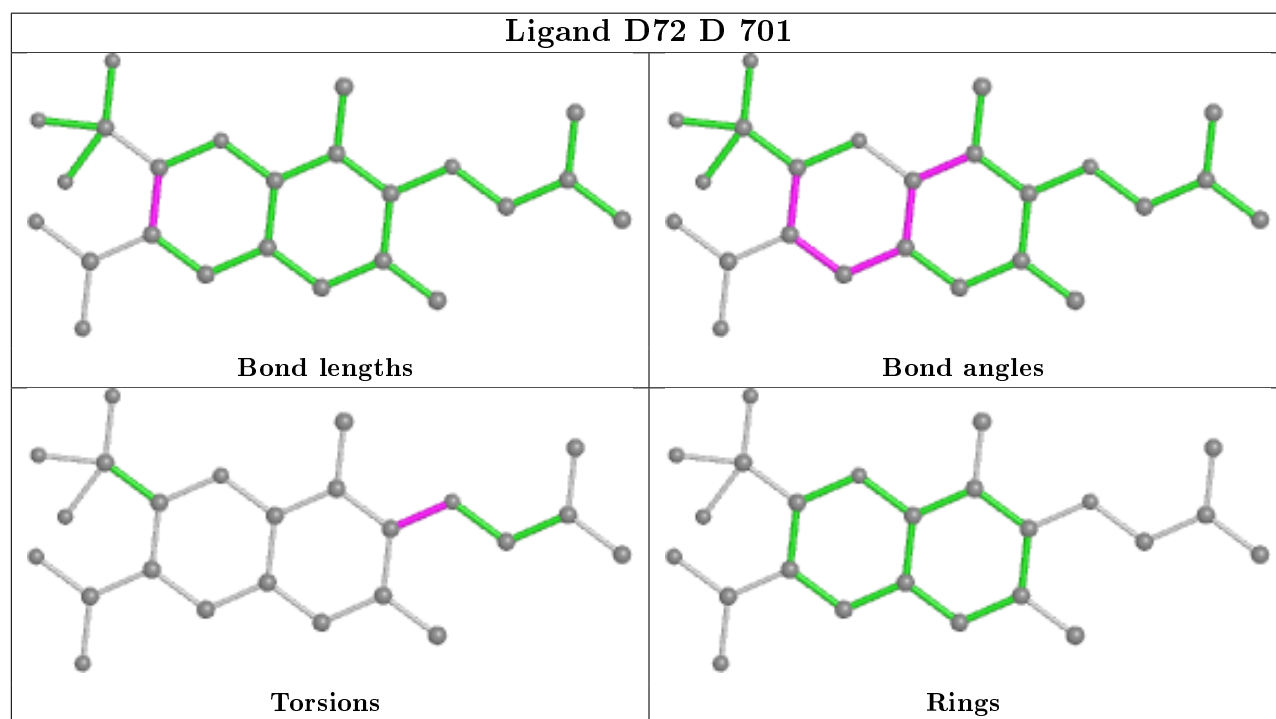
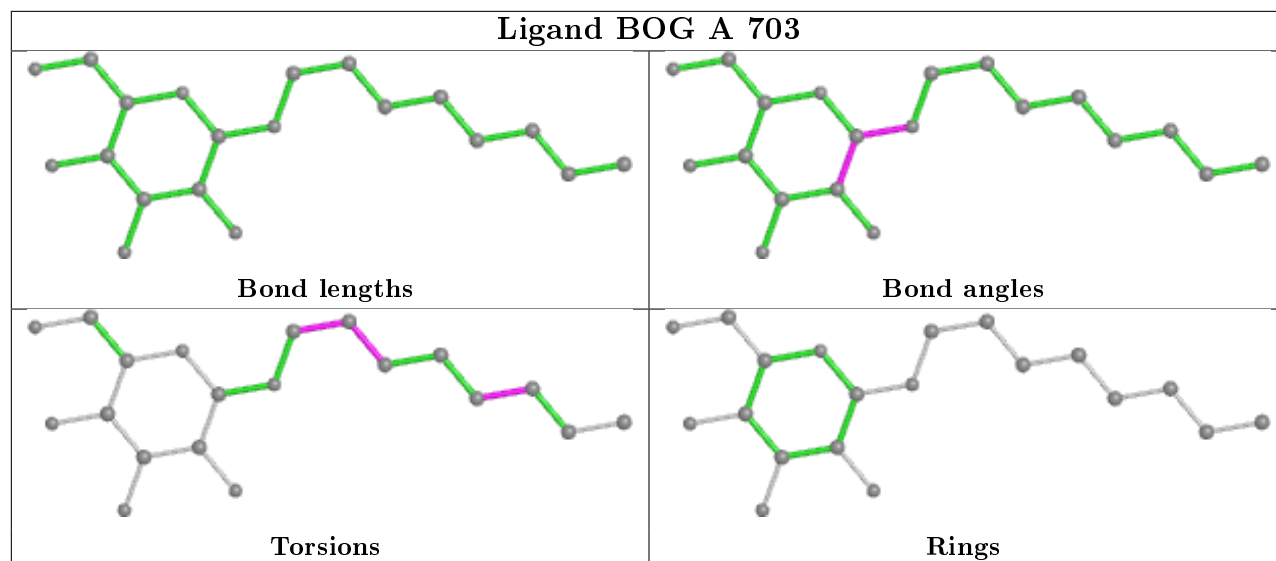
Bond angles

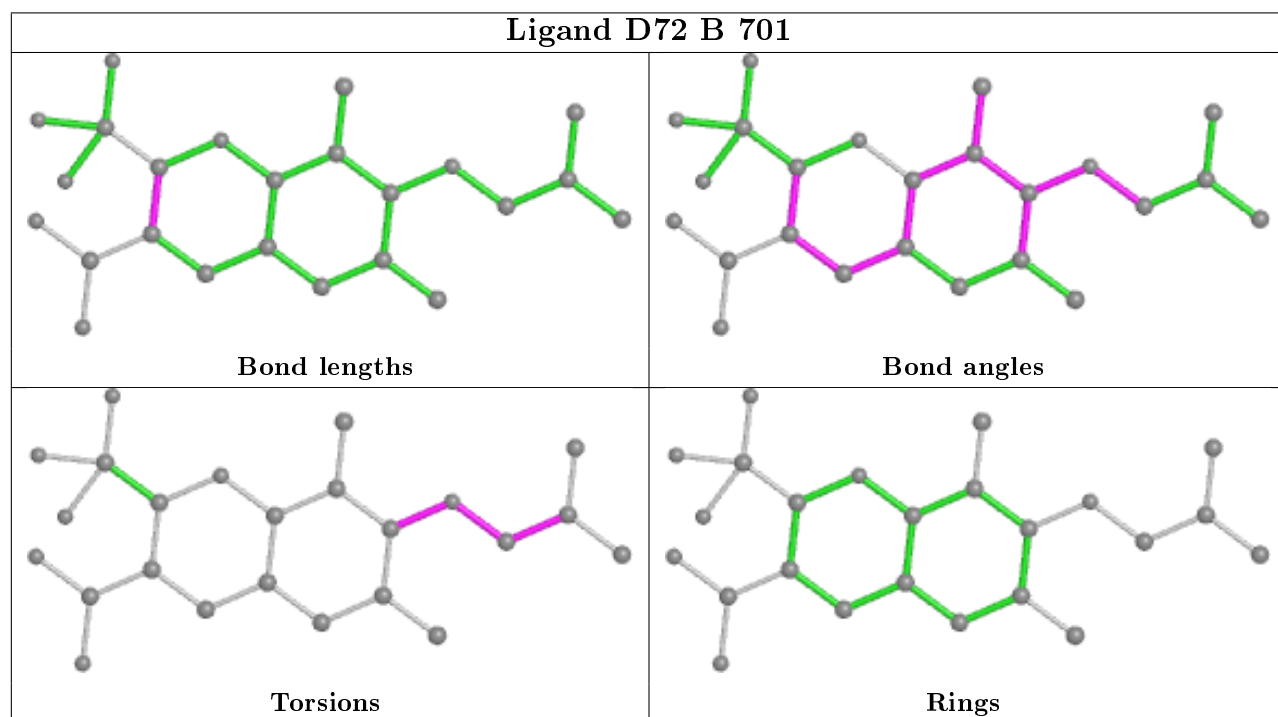
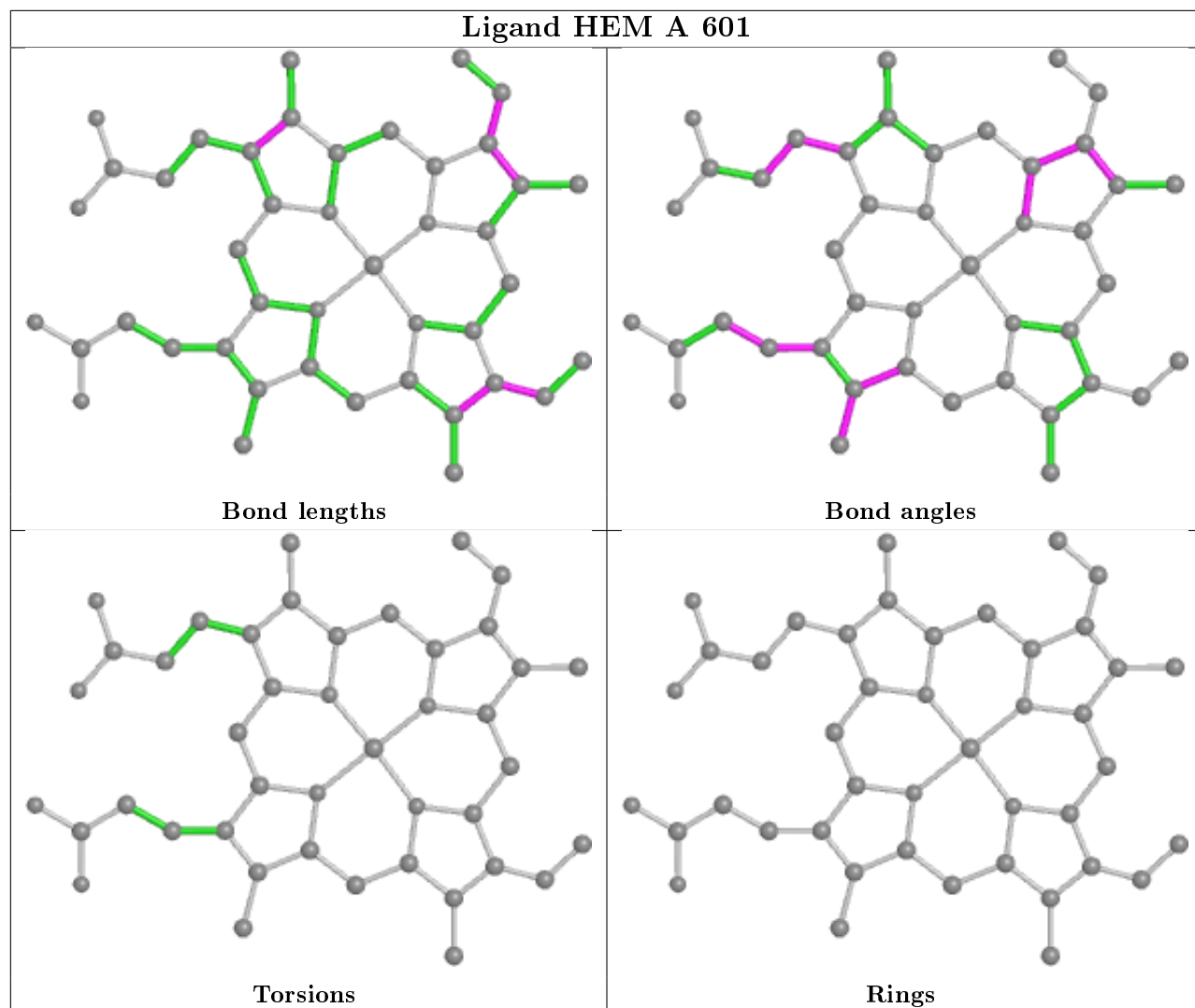


Torsions



Rings





## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	552/552 (100%)	0.11	17 (3%) 49 47	29, 41, 56, 73	0
1	B	552/552 (100%)	0.03	13 (2%) 59 56	30, 41, 57, 74	0
1	C	552/552 (100%)	0.16	19 (3%) 45 43	32, 45, 64, 79	0
1	D	552/552 (100%)	0.18	17 (3%) 49 47	30, 44, 62, 76	0
All	All	2208/2208 (100%)	0.12	66 (2%) 50 48	29, 43, 61, 79	0

The worst 5 of 66 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	569	GLN	7.5
1	D	108	TYR	7.0
1	B	569	GLN	7.0
1	A	108	TYR	6.9
1	D	18	ALA	6.0

### 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, 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.

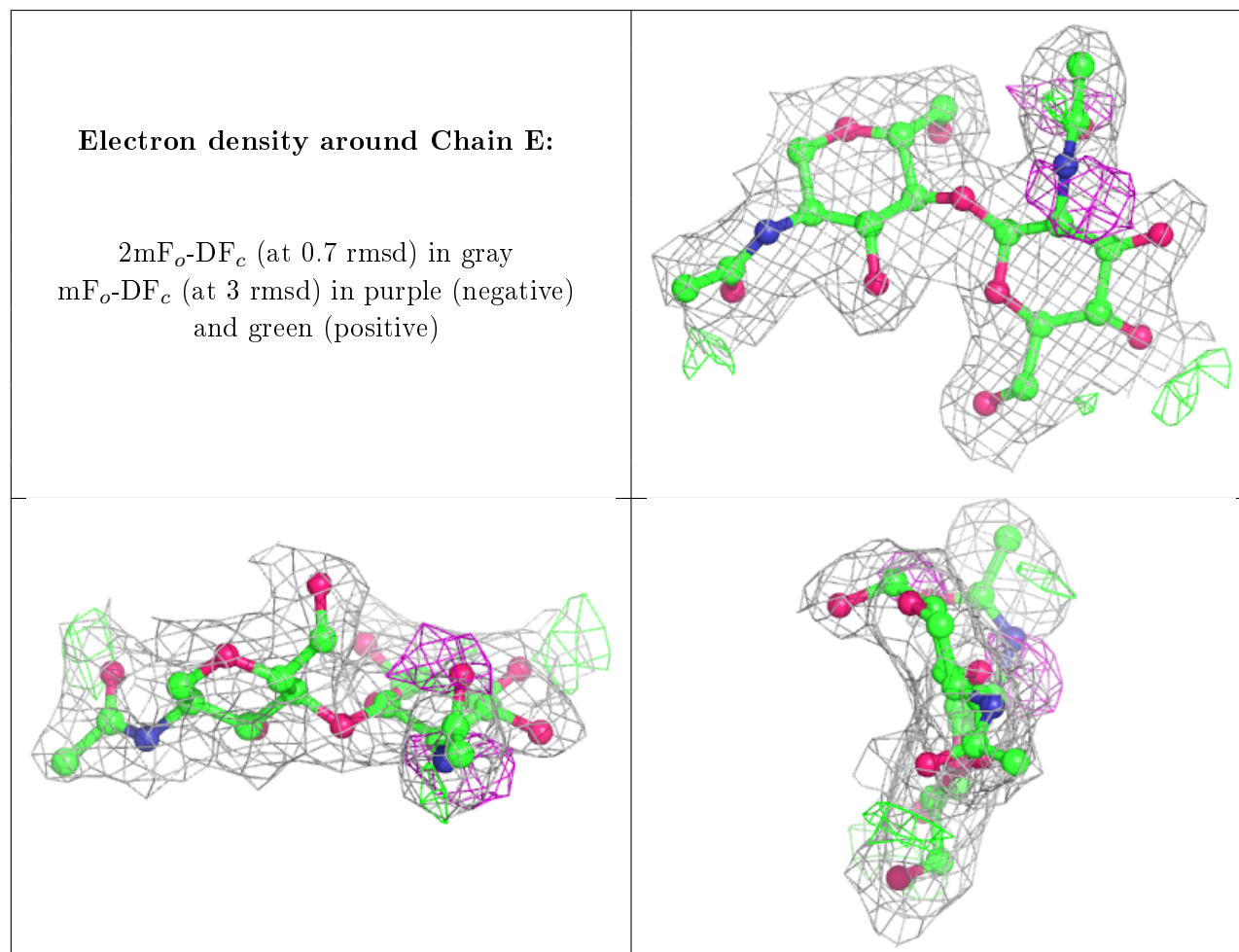
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	NAG	E	2	14/15	0.78	0.24	47,51,52,53	0
2	NAG	H	2	14/15	0.84	0.20	47,50,50,52	0

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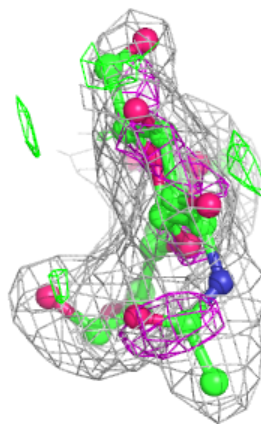
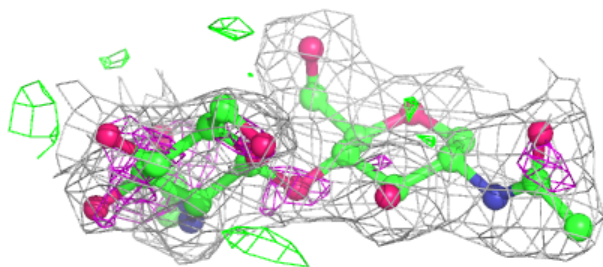
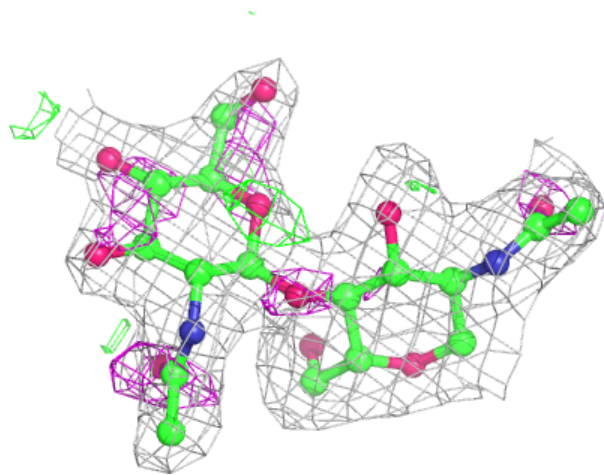
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NAG	F	2	14/15	0.85	0.32	45,48,50,50	0
2	NAG	G	2	14/15	0.86	0.30	48,51,52,54	0
2	NAG	F	1	14/15	0.91	0.13	32,35,37,42	0
2	NAG	H	1	14/15	0.92	0.10	36,40,41,44	0
2	NAG	G	1	14/15	0.94	0.12	35,39,41,44	0
2	NAG	E	1	14/15	0.96	0.10	34,36,39,43	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.



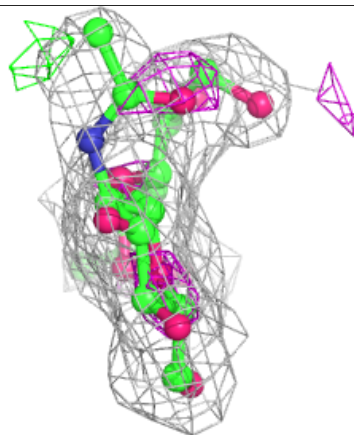
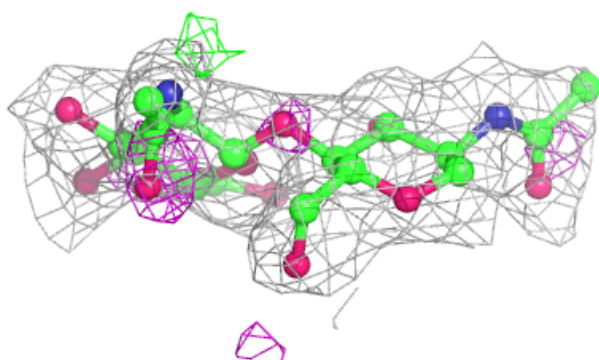
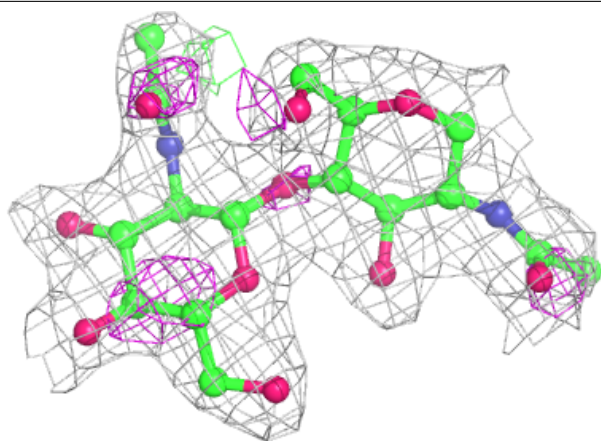
**Electron density around Chain F:**

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

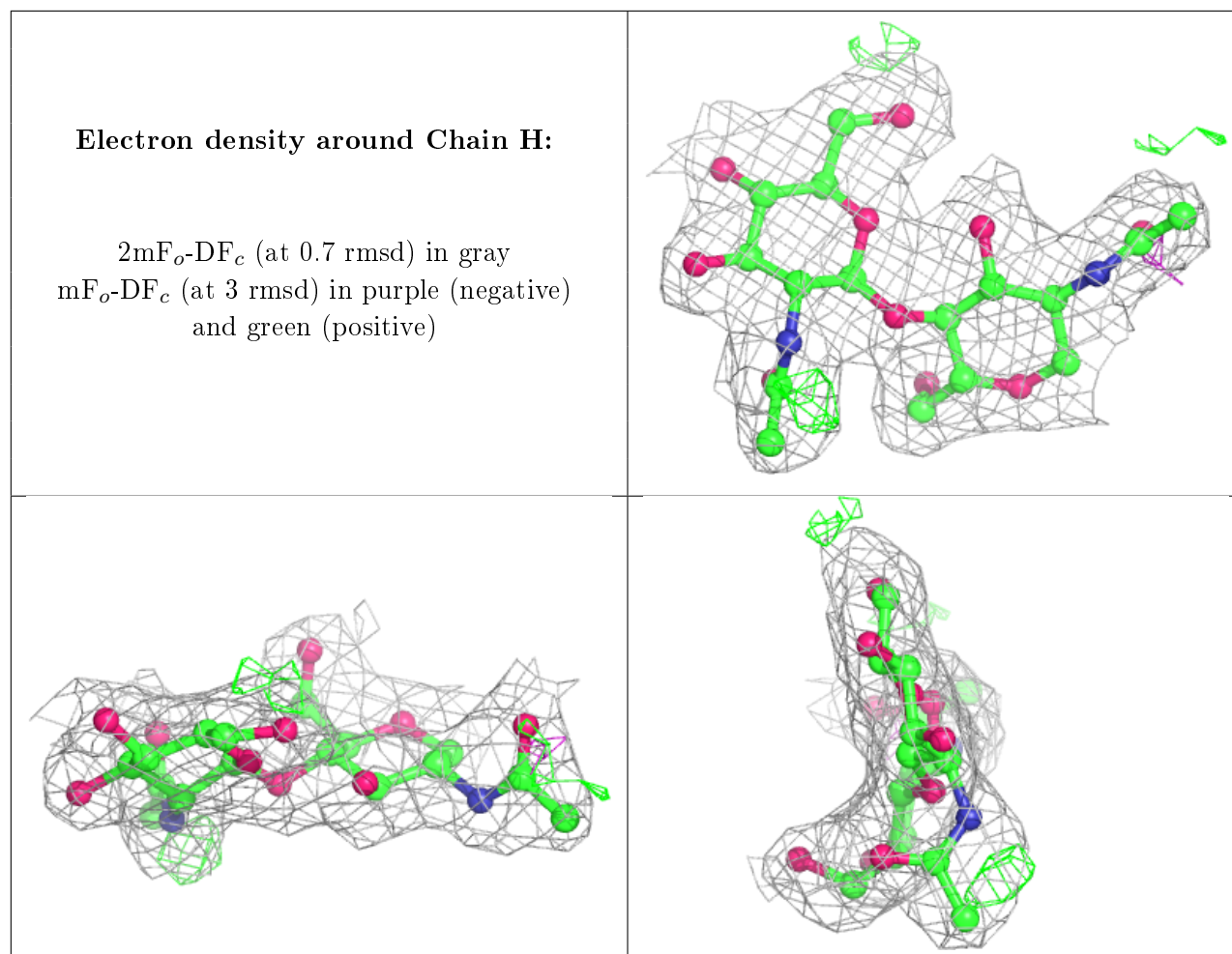


**Electron density around Chain G:**

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







## 6.4 Ligands [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, 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
4	NAG	A	681	14/15	0.80	0.22	46,49,50,50	0
4	NAG	B	681	14/15	0.83	0.29	50,53,54,54	0
4	NAG	D	681	14/15	0.83	0.27	47,49,50,50	0
4	NAG	C	681	14/15	0.83	0.37	53,56,58,58	0
5	BOG	D	703	20/20	0.92	0.12	43,48,57,58	0
6	D72	D	701	24/24	0.93	0.10	41,43,47,48	0
6	D72	A	701	24/24	0.94	0.11	38,42,43,45	0
6	D72	C	701	24/24	0.94	0.12	42,44,47,48	0
3	HEM	C	601	43/43	0.95	0.12	29,34,48,53	0
3	HEM	B	601	43/43	0.95	0.13	28,33,47,51	0

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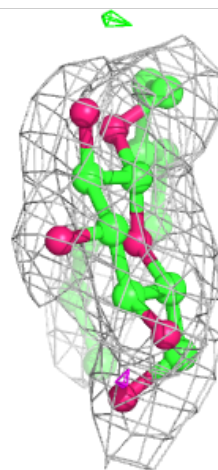
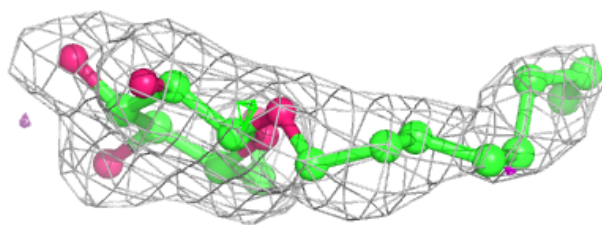
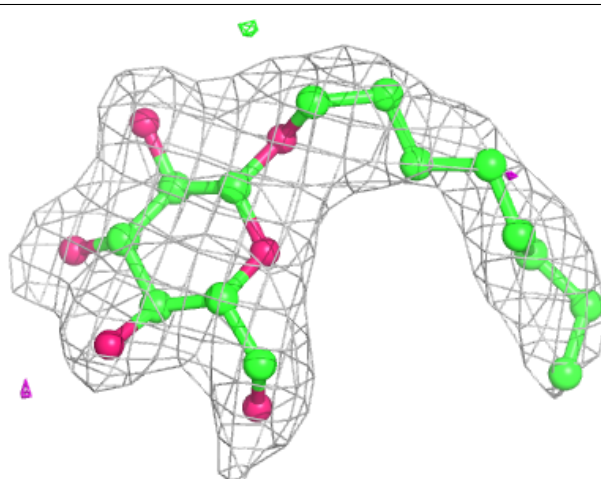
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	HEM	D	601	43/43	0.95	0.12	31,33,40,46	0
6	D72	B	701	24/24	0.95	0.10	38,40,41,42	0
3	HEM	A	601	43/43	0.96	0.11	29,32,43,49	0
5	BOG	A	703	20/20	0.96	0.12	35,40,49,49	0

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.

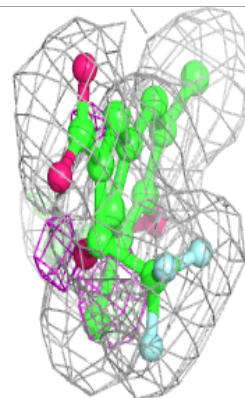
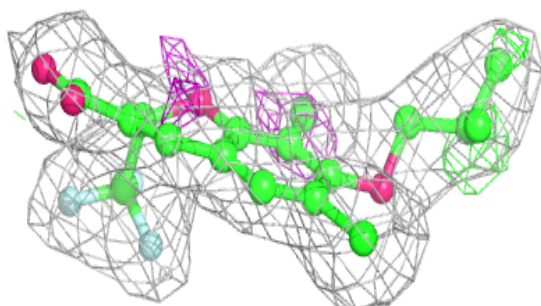
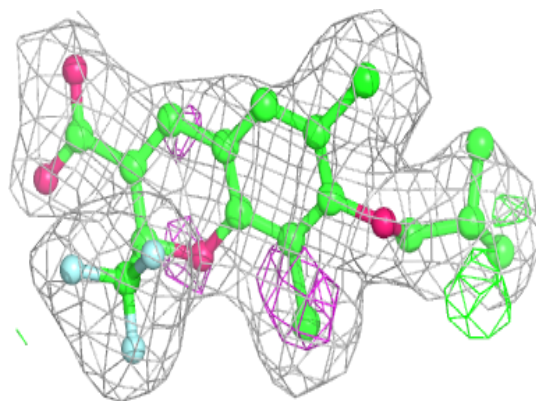
**Electron density around BOG D 703:**

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mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)

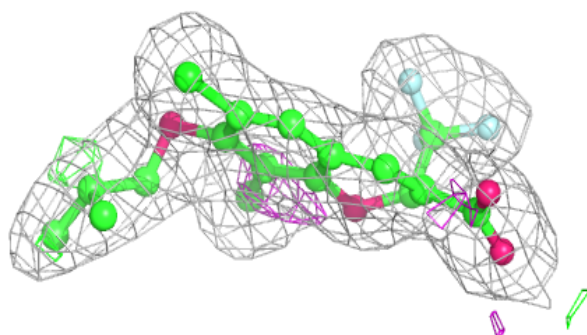
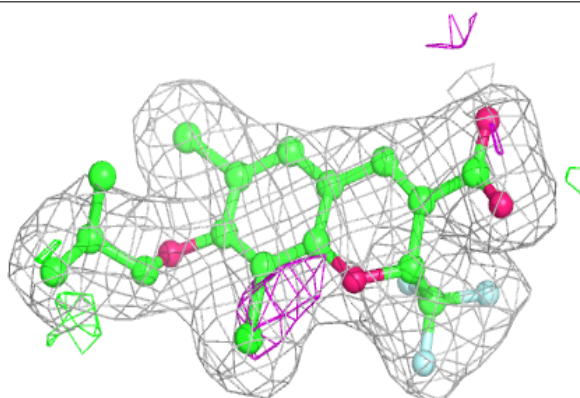


**Electron density around D72 D 701:**

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

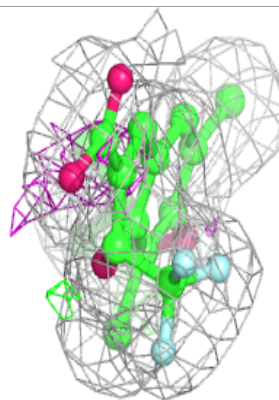
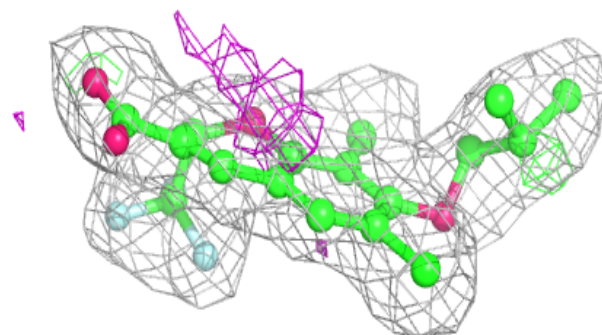
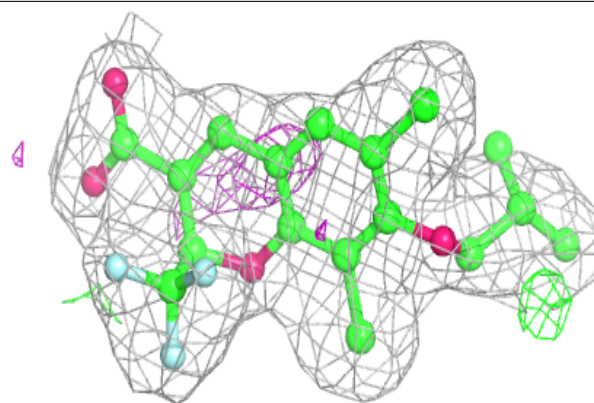
**Electron density around D72 A 701:**

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and green (positive)



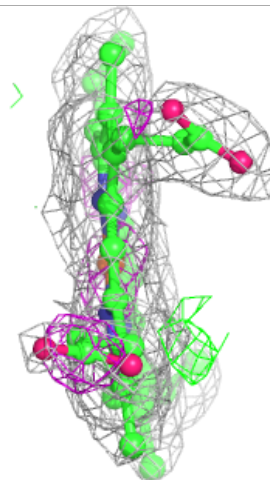
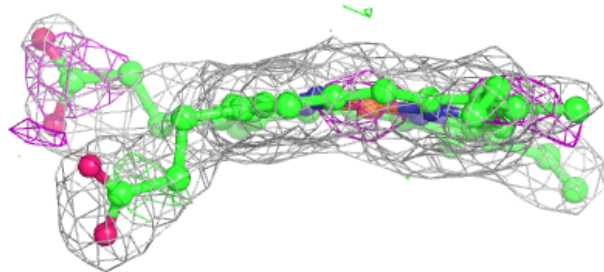
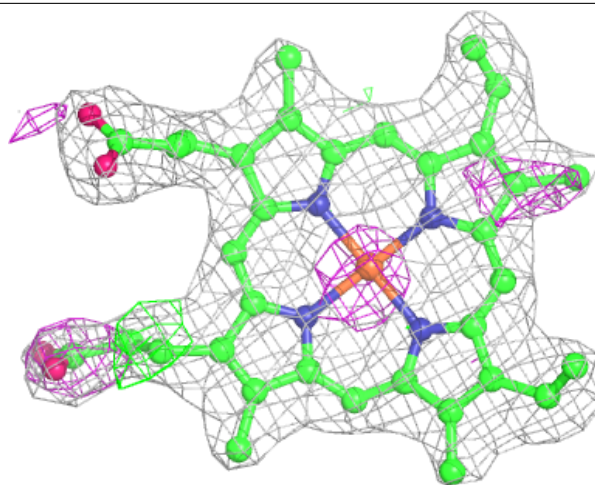
**Electron density around D72 C 701:**

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



**Electron density around HEM C 601:**

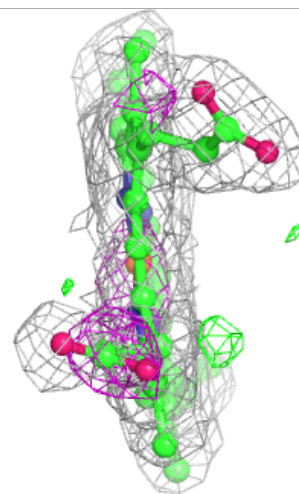
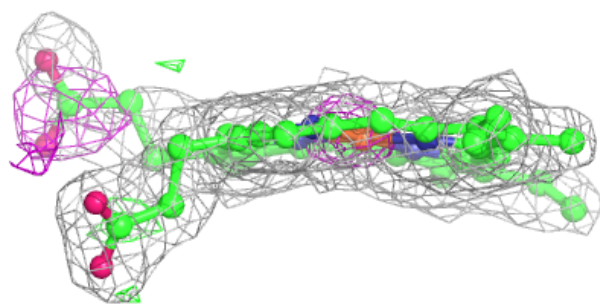
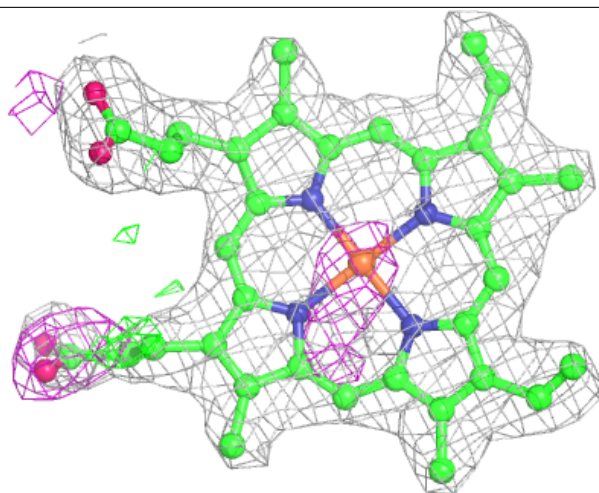
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





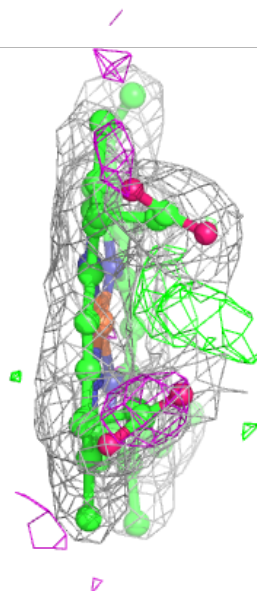
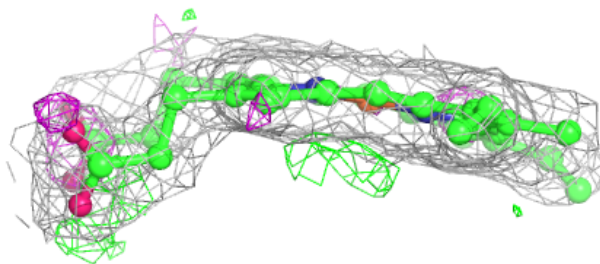
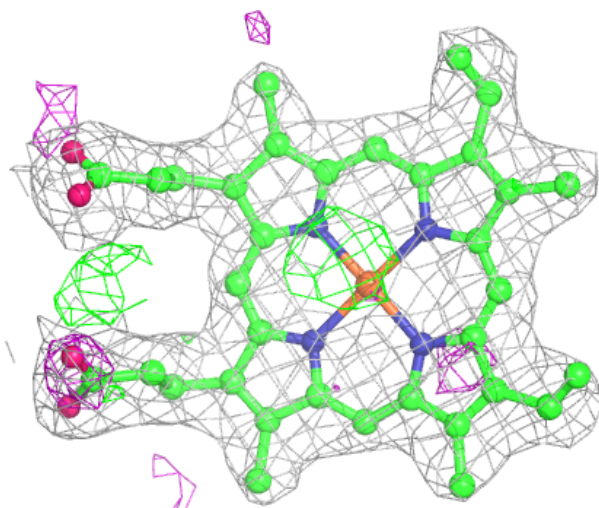
**Electron density around HEM B 601:**

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



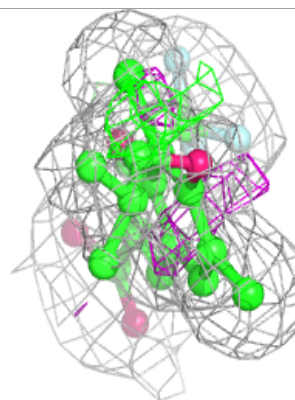
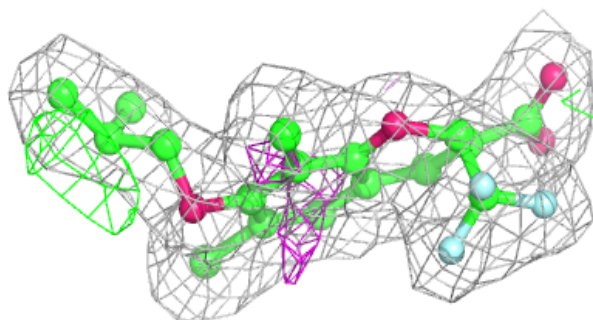
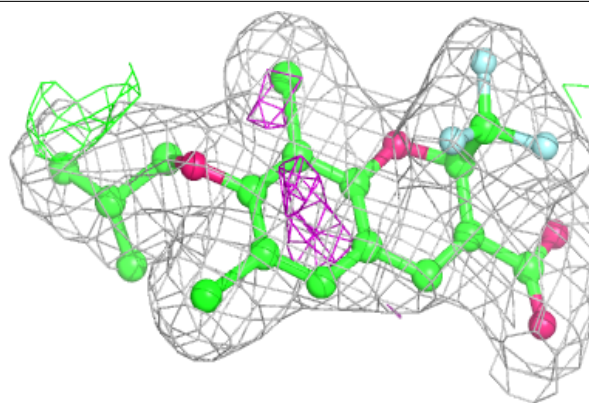
**Electron density around HEM D 601:**

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



**Electron density around D72 B 701:**

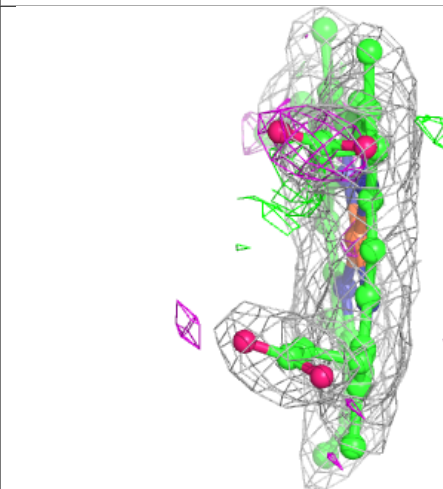
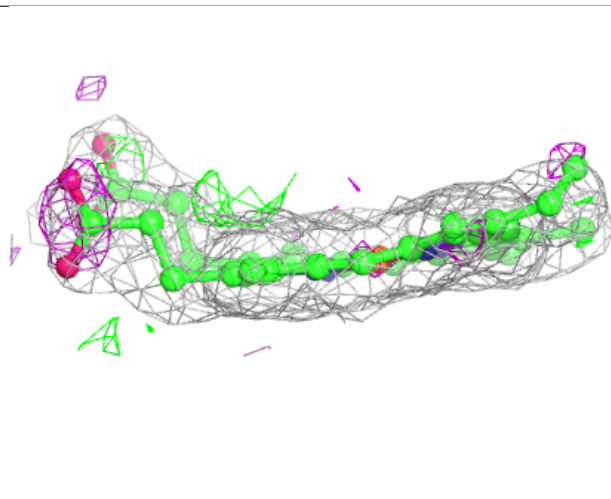
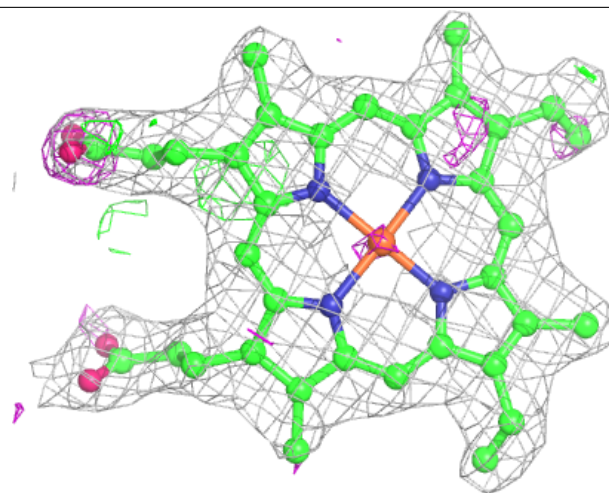
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

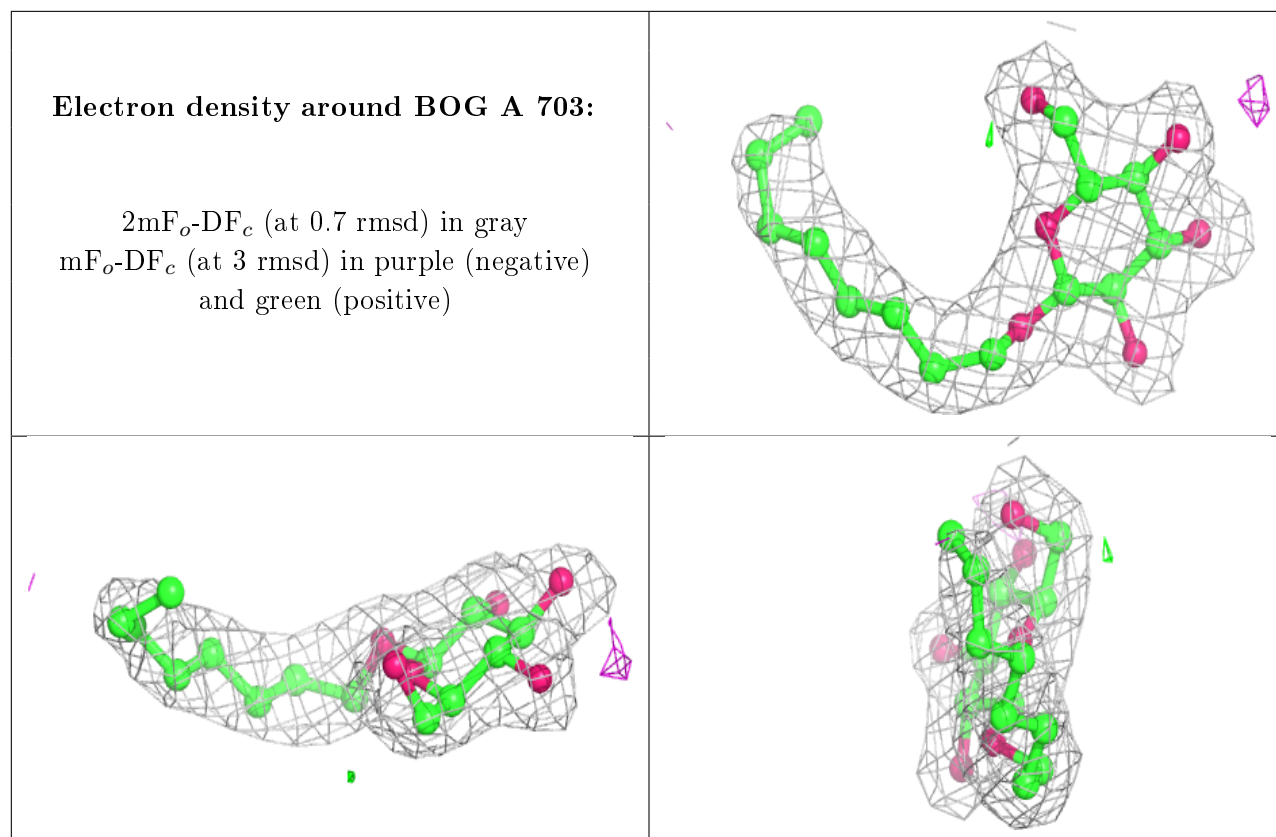




**Electron density around HEM A 601:**

$2mF_o-DF_c$  (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.