wwPDB X-ray Structure Validation Summary Report (i)

Sep 17, 2023 – 03:16 PM EDT

PDB ID	:	4Z0L
Title	:	The murine cyclooxygenase-2 complexed with a nido-dicarbaborate-containing indomethacin derivative
Authors	:	Xu, S.; Neumann, W.; Banerjee, S.; Hey-Hawkins, E.; Marnett, L.J.
Deposited on	:	2015-03-26
Resolution	:	2.29 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*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

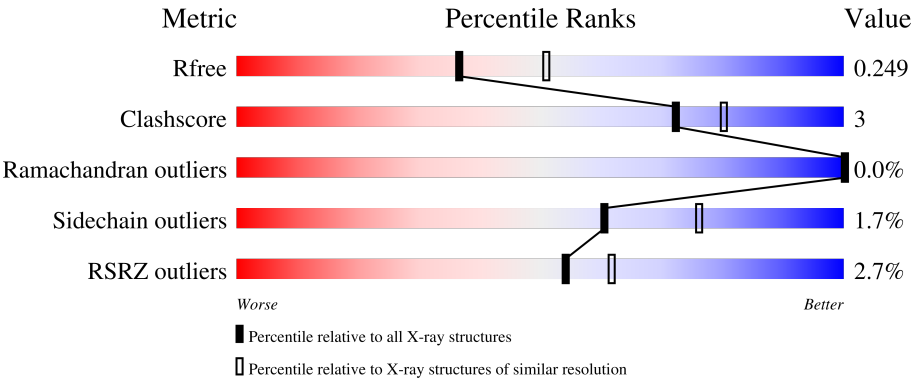
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.29 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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 <=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	3% 87% 7% 6%
1	B	587	3% 86% 7% 6%
1	C	587	2% 86% 7% 6%
1	D	587	2% 87% 6% 6%
2	E	2	50% 50%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	2	100%
2	G	2	100%
2	H	2	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
7	BOG	B	708	-	-	-	X

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 19280 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.

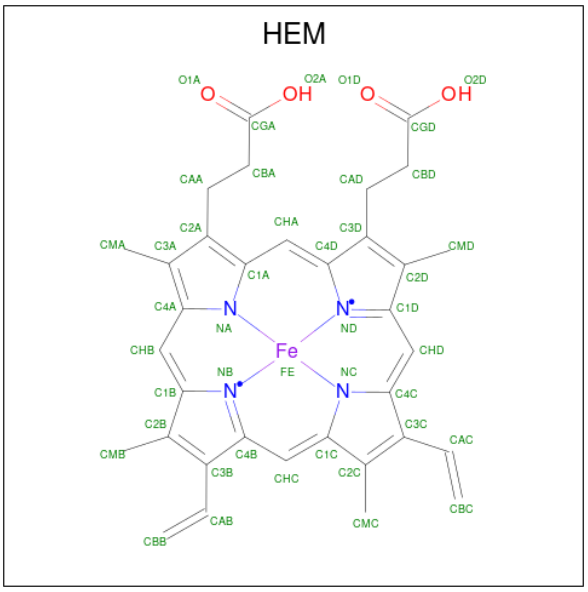
- Molecule 1 is a protein called Prostaglandin G/H synthase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	551	Total	C	N	O	S	0	1	0
			4473	2885	751	812	25			
1	B	551	Total	C	N	O	S	0	1	0
			4473	2885	751	812	25			
1	C	551	Total	C	N	O	S	0	1	0
			4473	2885	751	812	25			
1	D	551	Total	C	N	O	S	0	1	0
			4473	2885	751	812	25			

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

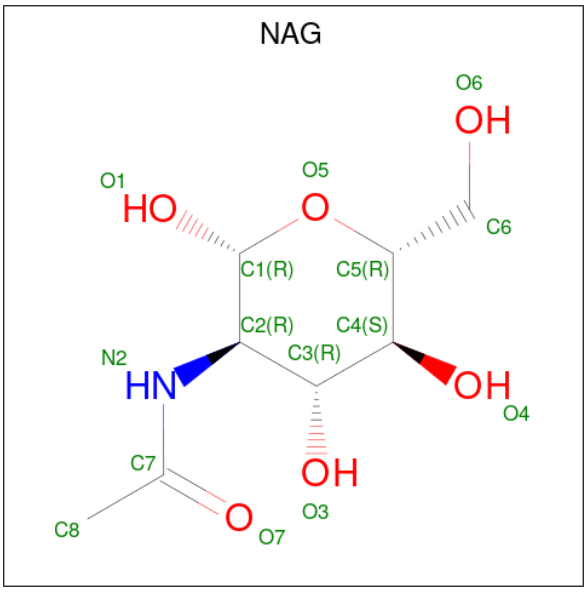
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	E	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	F	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	G	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	H	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



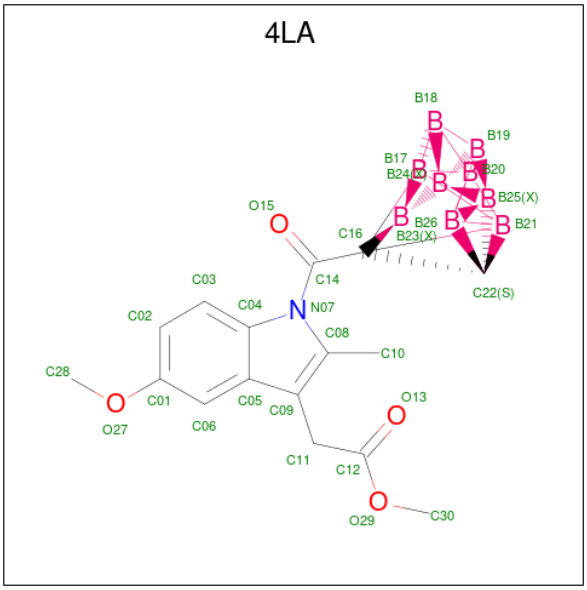
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	C	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	D	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 5 is (R)-7-{[5-methoxy-2-methyl-3-(methoxycarbonylmethyl)-1H-indolyl]carbonyl}-7,8-dicarba-nido-dodeca-hydroundecaborate (three-letter code: 4LA) (formula: $C_{16}H_{14}B_9NO_4$).



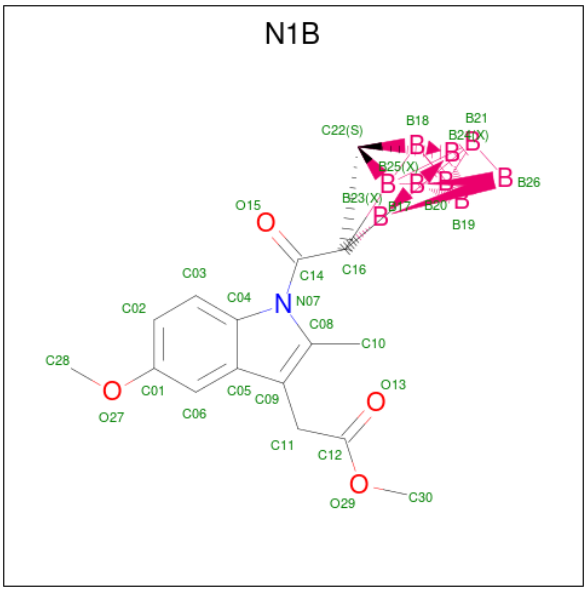
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total B C N O 30 9 16 1 4	0	1
5	B	1	Total B C N O 30 9 16 1 4	0	1
5	C	1	Total B C N O 30 9 16 1 4	0	1

Continued on next page...

Continued from previous page...

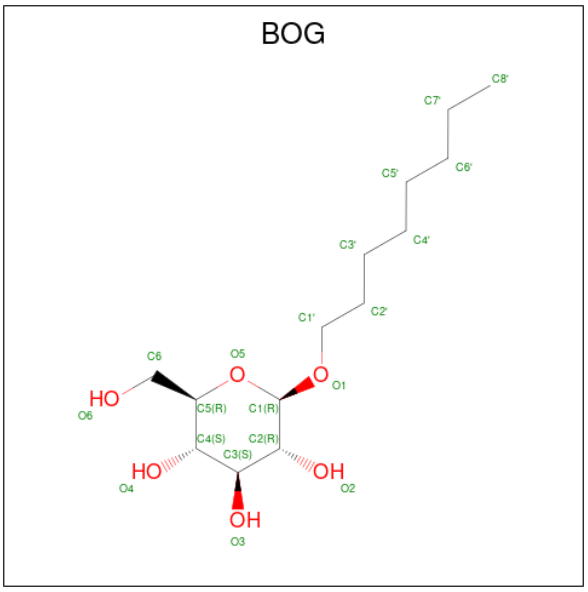
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	D	1	Total	B	C	N	O	0	1
			30	9	16	1	4		

- Molecule 6 is (S)-7-{[5-methoxy-2-methyl-3-(methoxycarbonylmethyl)-1H-indolyl]carbonyl}-7,8-dicarba-nido-dodeca-hydroundecaborate (three-letter code: N1B) (formula: $C_{16}H_{14}B_9NO_4$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	B	C	N	O	0	1
			30	9	16	1	4		
6	B	1	Total	B	C	N	O	0	1
			30	9	16	1	4		
6	C	1	Total	B	C	N	O	0	1
			30	9	16	1	4		
6	D	1	Total	B	C	N	O	0	1
			30	9	16	1	4		

- Molecule 7 is octyl beta-D-glucopyranoside (three-letter code: BOG) (formula: $C_{14}H_{28}O_6$).



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

- Molecule 8 is water.

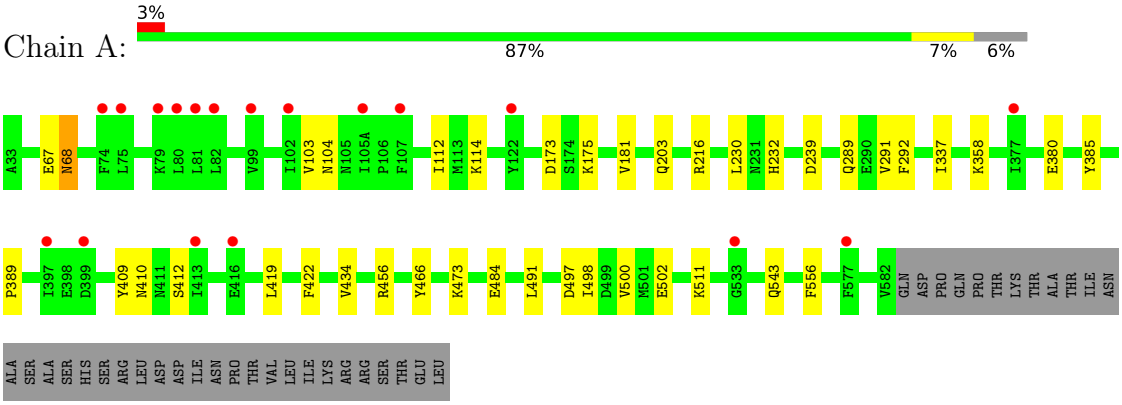
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	162	Total O 162 162	0	0
8	B	153	Total O 153 153	0	0
8	C	162	Total O 162 162	0	0
8	D	175	Total O 175 175	0	0

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.

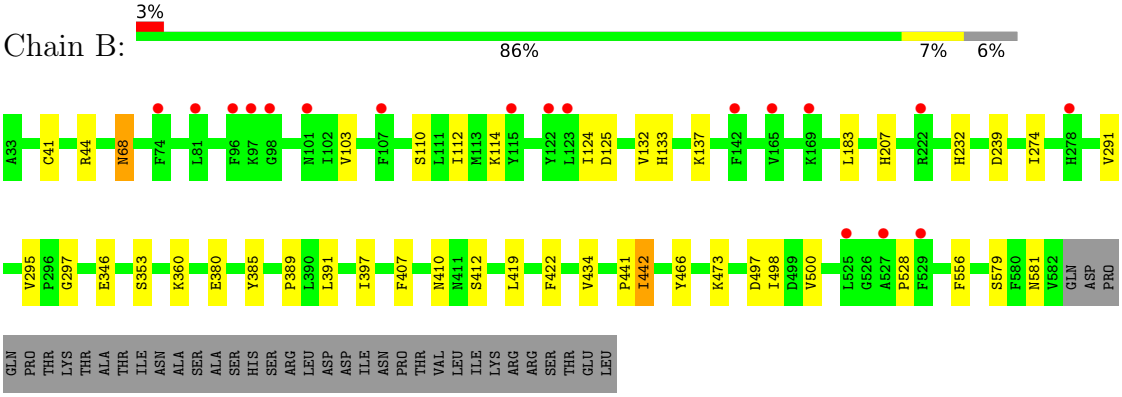
• Molecule 1: Prostaglandin G/H synthase 2

Chain A:



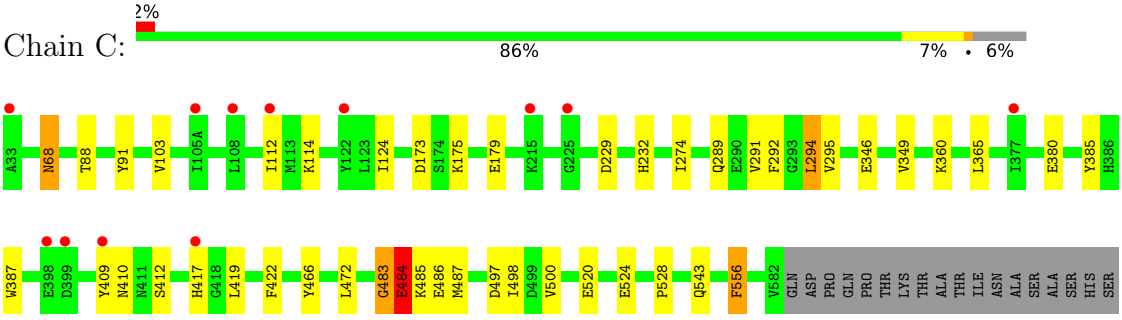
• Molecule 1: Prostaglandin G/H synthase 2

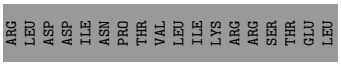
Chain B:



• Molecule 1: Prostaglandin G/H synthase 2

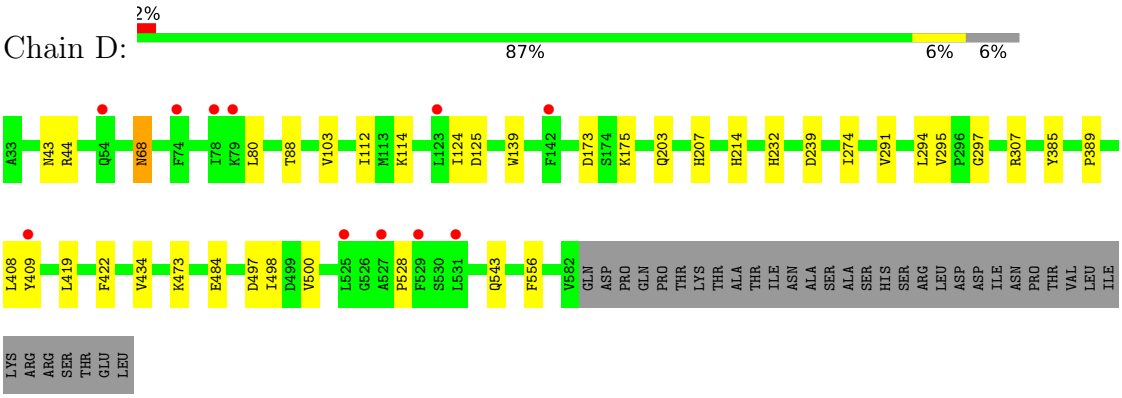
Chain C:





• Molecule 1: Prostaglandin G/H synthase 2

Chain D:

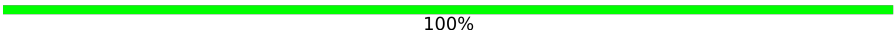


• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E:

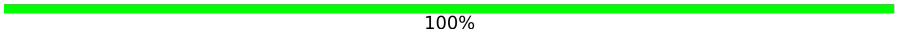
• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:



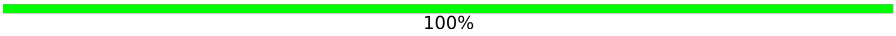
• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:



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

Chain H:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	180.94Å 135.01Å 124.19Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.60 – 2.29 49.60 – 2.29	Depositor EDS
% Data completeness (in resolution range)	98.4 (49.60-2.29) 87.2 (49.60-2.29)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.18 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.210 , 0.250 0.212 , 0.249	Depositor DCC
R_{free} test set	4057 reflections (2.99%)	wwPDB-VP
Wilson B-factor (Å^2)	37.8	Xtriage
Anisotropy	0.589	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 31.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	19280	wwPDB-VP
Average B, all atoms (Å^2)	52.0	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 48.16 % 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 8.9572e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: BOG, HEM, NAG, 4LA, N1B

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	0.23	0/4603	0.39	0/6241
1	B	0.23	0/4603	0.39	0/6241
1	C	0.29	0/4603	0.45	4/6241 (0.1%)
1	D	0.23	0/4603	0.39	0/6241
All	All	0.25	0/18412	0.41	4/24964 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	3

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	483	GLY	O-C-N	-11.07	104.98	122.70
1	C	483	GLY	C-N-CA	7.07	139.38	121.70
1	C	483	GLY	CA-C-N	6.75	132.06	117.20
1	C	484	GLU	CA-C-N	-5.28	105.58	117.20

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	483	GLY	Peptide,Mainchain
1	C	484	GLU	Mainchain

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	4473	0	4378	21	0
1	B	4473	0	4378	25	0
1	C	4473	0	4377	41	0
1	D	4473	0	4378	23	0
2	E	28	0	25	1	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	2	0
3	B	43	0	30	3	0
3	C	43	0	30	0	0
3	D	43	0	30	4	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	30	0	14	2	0
5	B	30	0	14	1	0
5	C	30	0	14	5	0
5	D	30	0	14	1	0
6	A	30	0	14	1	0
6	B	30	0	14	1	0
6	C	30	0	14	3	0
6	D	30	0	14	1	0
7	A	20	0	28	1	0
7	B	20	0	28	0	0
7	C	40	0	56	3	0
7	D	20	0	26	1	0
8	A	162	0	0	2	0
8	B	153	0	0	5	0
8	C	162	0	0	3	0
8	D	175	0	0	4	0
All	All	19280	0	18085	125	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 3.

The worst 5 of 125 close contacts within the same asymmetric unit are listed below, sorted by

their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:294:LEU:CD2	1:C:295:VAL:HG23	1.74	1.16
1:C:294:LEU:HD23	1:C:295:VAL:CG2	1.89	1.03
1:C:294:LEU:HD23	1:C:295:VAL:HG23	1.02	0.99
1:C:484:GLU:OE2	1:C:487:MET:N	2.07	0.88
1:C:294:LEU:CD2	1:C:295:VAL:CG2	2.48	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	550/587 (94%)	532 (97%)	18 (3%)	0	100	100
1	B	550/587 (94%)	533 (97%)	17 (3%)	0	100	100
1	C	550/587 (94%)	533 (97%)	16 (3%)	1 (0%)	47	58
1	D	550/587 (94%)	534 (97%)	16 (3%)	0	100	100
All	All	2200/2348 (94%)	2132 (97%)	67 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	484	GLU

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	493/525 (94%)	484 (98%)	9 (2%)	59	75
1	B	493/525 (94%)	485 (98%)	8 (2%)	62	78
1	C	493/525 (94%)	485 (98%)	8 (2%)	62	78
1	D	493/525 (94%)	485 (98%)	8 (2%)	62	78
All	All	1972/2100 (94%)	1939 (98%)	33 (2%)	60	76

5 of 33 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	239	ASP
1	D	385	TYR
1	D	556	PHE
1	B	385	TYR
1	B	239	ASP

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

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

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	0.32	0	17,19,21	0.48	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	NAG	E	2	2	14,14,15	1.03	0	17,19,21	1.36	3 (17%)
2	NAG	F	1	1,2	14,14,15	0.30	0	17,19,21	0.42	0
2	NAG	F	2	2	14,14,15	0.26	0	17,19,21	0.43	0
2	NAG	G	1	1,2	14,14,15	0.30	0	17,19,21	0.43	0
2	NAG	G	2	2	14,14,15	0.24	0	17,19,21	0.38	0
2	NAG	H	1	1,2	14,14,15	0.33	0	17,19,21	0.44	0
2	NAG	H	2	2	14,14,15	0.23	0	17,19,21	0.42	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
2	NAG	E	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	0/6/23/26	0/1/1/1
2	NAG	F	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	2	2	-	0/6/23/26	0/1/1/1
2	NAG	G	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	G	2	2	-	0/6/23/26	0/1/1/1
2	NAG	H	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	H	2	2	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	E	2	NAG	C1-O5-C5	3.39	116.79	112.19
2	E	2	NAG	C6-C5-C4	-2.72	106.63	113.00
2	E	2	NAG	O3-C3-C4	-2.06	105.58	110.35

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

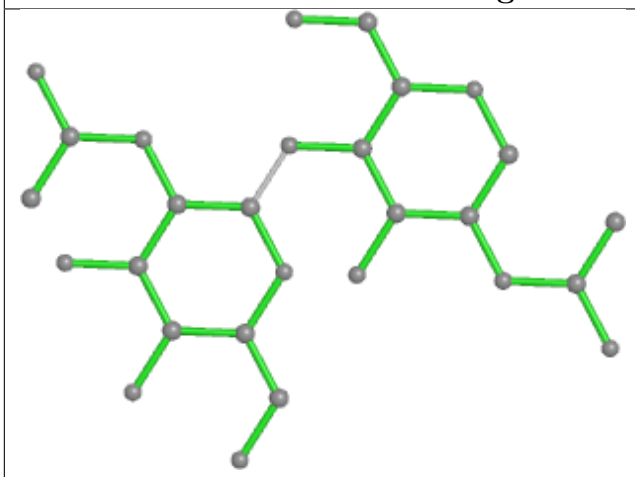
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	2	NAG	1	0

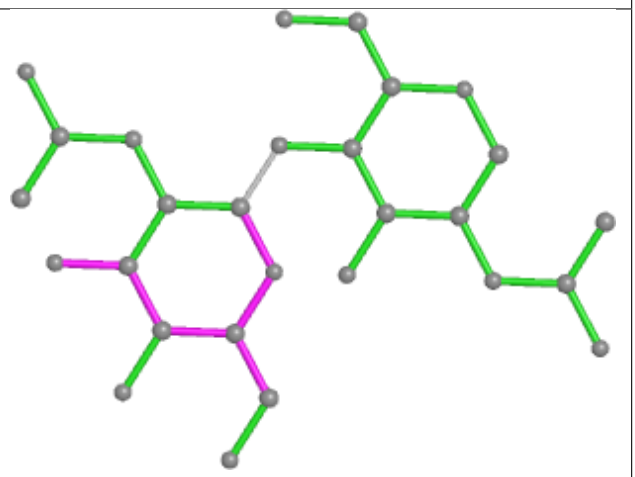
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for oligosaccharide.

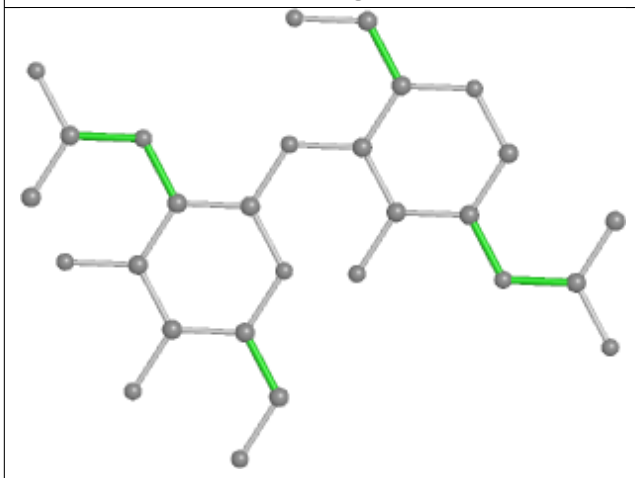
Oligosaccharide Chain E



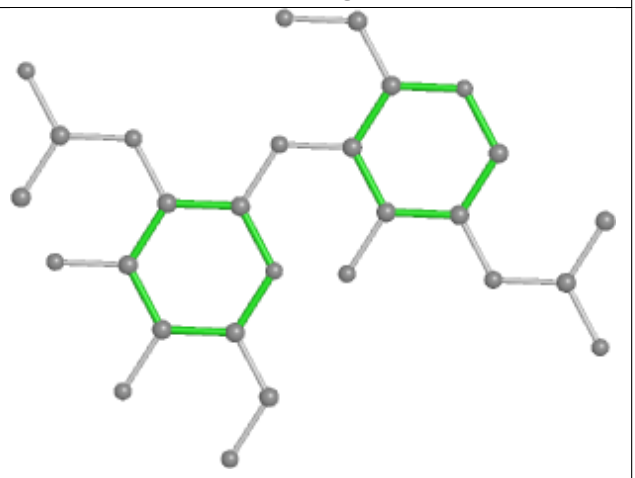
Bond lengths



Bond angles

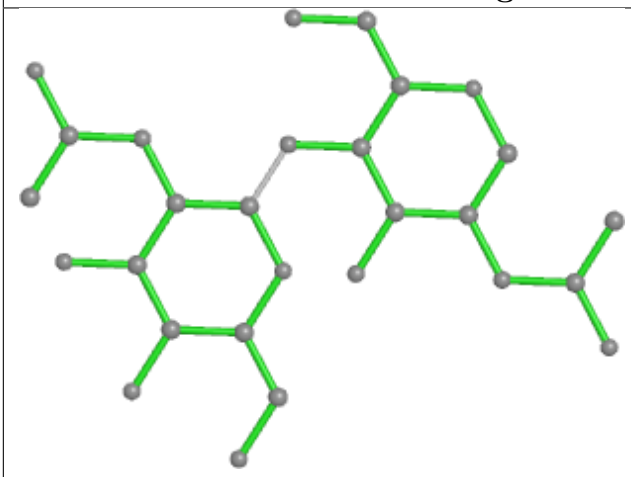


Torsions

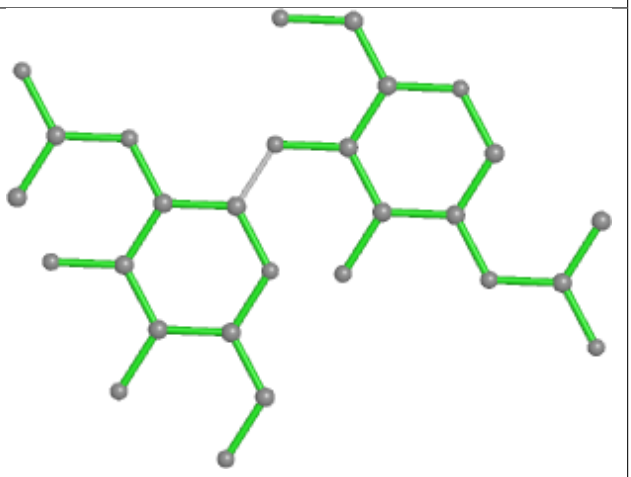


Rings

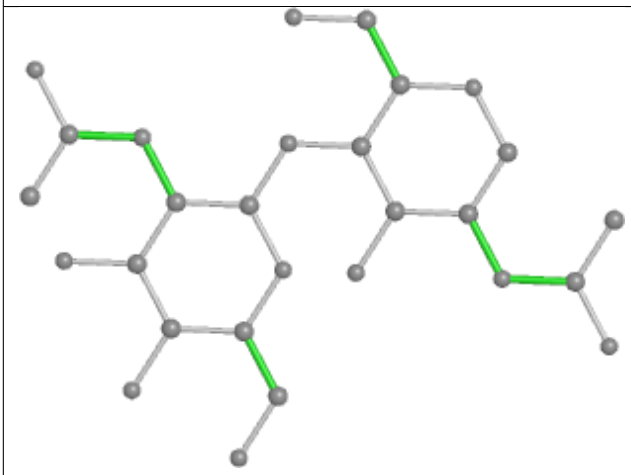
Oligosaccharide Chain F



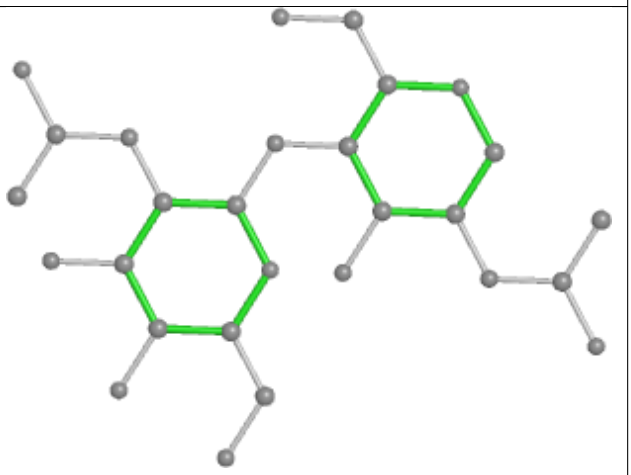
Bond lengths



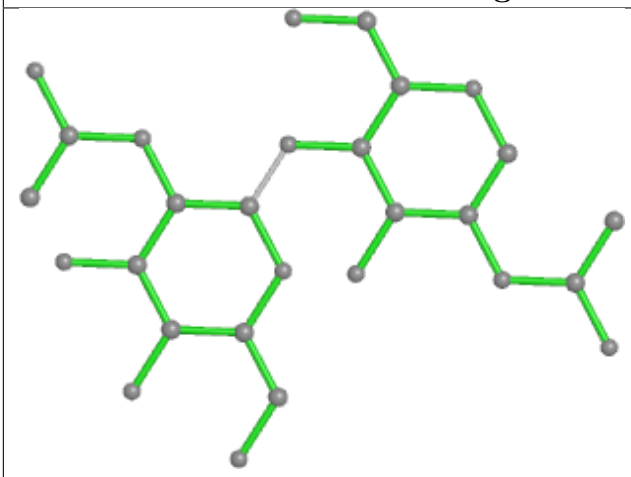
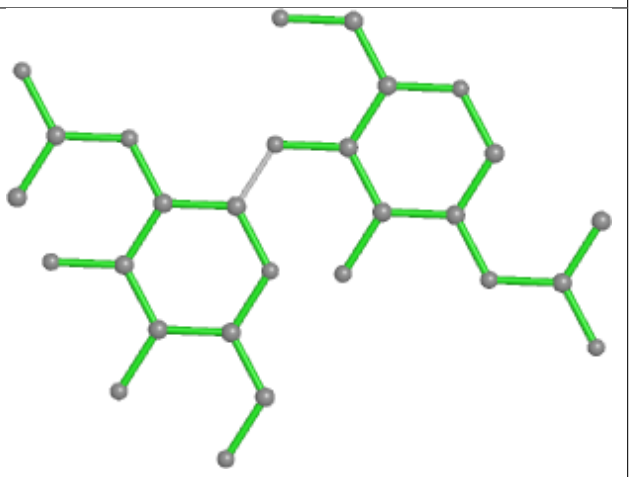
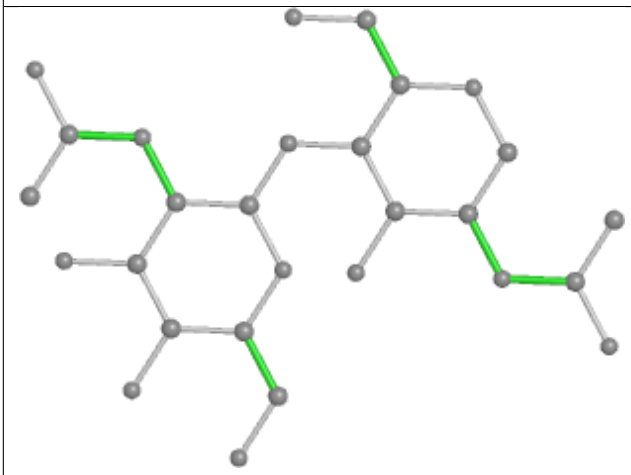
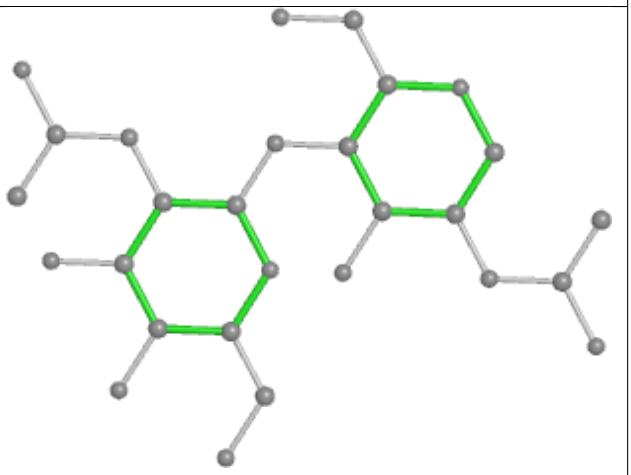
Bond angles



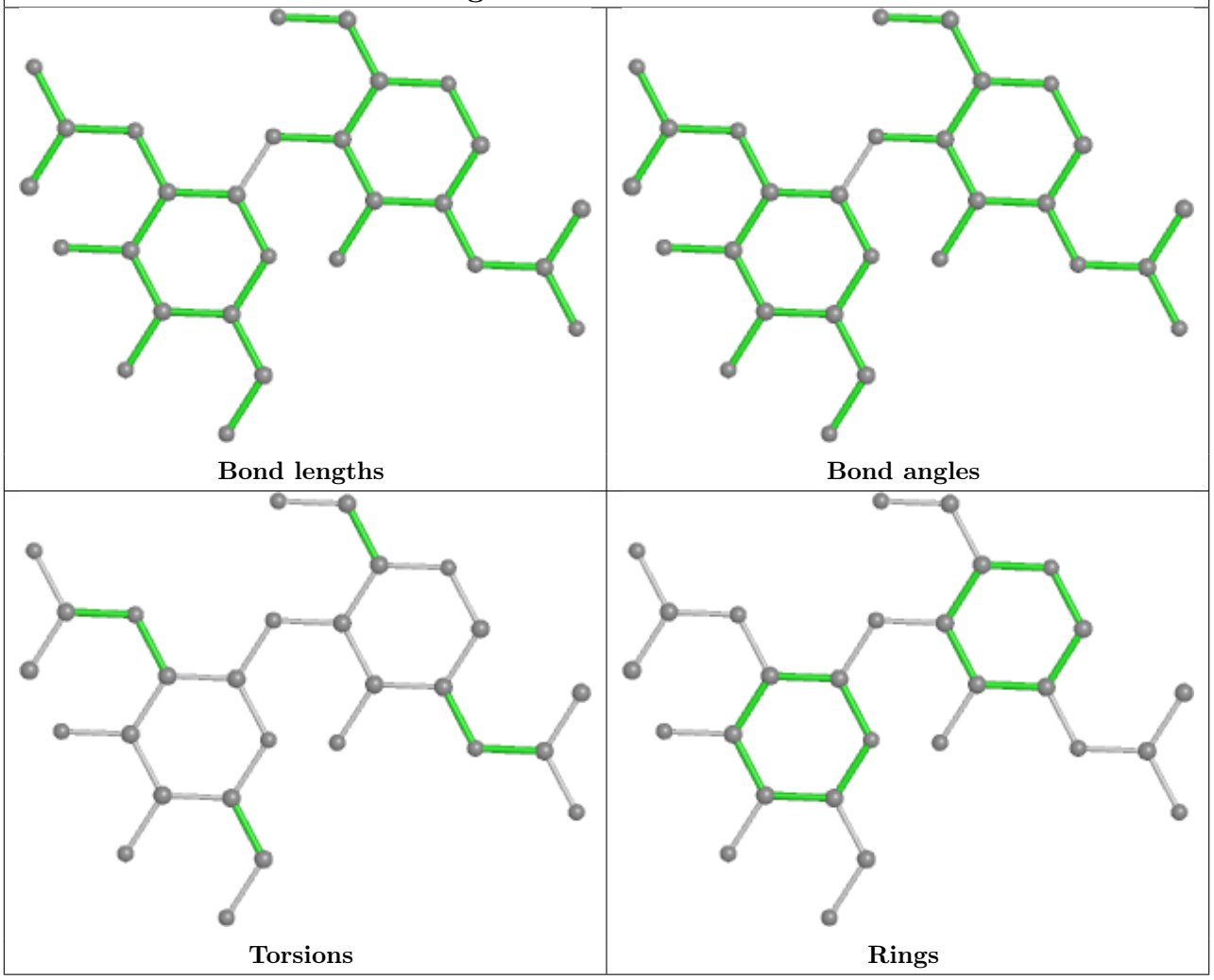
Torsions



Rings

Oligosaccharide Chain G	
	
Bond lengths	**Bond angles**
	
Torsions	**Rings**

Oligosaccharide Chain H



5.6 Ligand geometry (i)

25 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	B	705	1	14,14,15	0.26	0	17,19,21	0.43	0
4	NAG	C	702	1	14,14,15	0.31	0	17,19,21	0.35	0
5	4LA	D	706[A]	-	33,46,46	1.35	4 (12%)	78,124,124	1.36	9 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
6	N1B	B	707[B]	-	33,46,46	1.42	4 (12%)	78,124,124	1.47	12 (15%)
7	BOG	C	708	-	20,20,20	1.08	1 (5%)	25,25,25	1.04	3 (12%)
4	NAG	B	702	1	14,14,15	0.30	0	17,19,21	0.33	0
5	4LA	C	706[A]	-	33,46,46	1.31	3 (9%)	78,124,124	1.43	9 (11%)
3	HEM	B	701	1,8	41,50,50	1.93	11 (26%)	45,82,82	1.95	11 (24%)
7	BOG	D	708	-	20,20,20	1.30	2 (10%)	25,25,25	1.12	2 (8%)
5	4LA	A	706[A]	-	33,46,46	1.49	5 (15%)	78,124,124	1.45	10 (12%)
4	NAG	A	705	1	14,14,15	0.20	0	17,19,21	0.40	0
5	4LA	B	706[A]	-	33,46,46	1.41	4 (12%)	78,124,124	1.48	13 (16%)
6	N1B	A	707[B]	-	33,46,46	1.49	5 (15%)	78,124,124	1.48	11 (14%)
7	BOG	C	709	-	20,20,20	1.05	1 (5%)	25,25,25	1.12	2 (8%)
3	HEM	D	701	1	41,50,50	1.91	13 (31%)	45,82,82	1.93	13 (28%)
4	NAG	D	705	1	14,14,15	0.20	0	17,19,21	0.40	0
6	N1B	D	707[B]	-	33,46,46	1.35	4 (12%)	78,124,124	1.36	10 (12%)
3	HEM	C	701	1	41,50,50	1.87	13 (31%)	45,82,82	1.94	13 (28%)
4	NAG	D	702	1	14,14,15	0.31	0	17,19,21	0.31	0
7	BOG	B	708	-	20,20,20	1.06	1 (5%)	25,25,25	1.15	2 (8%)
7	BOG	A	708	-	20,20,20	1.08	1 (5%)	25,25,25	1.07	2 (8%)
3	HEM	A	701	1	41,50,50	1.91	13 (31%)	45,82,82	1.90	11 (24%)
4	NAG	C	705	1	14,14,15	0.24	0	17,19,21	0.42	0
4	NAG	A	702	1	14,14,15	0.31	0	17,19,21	0.33	0
6	N1B	C	707[B]	-	33,46,46	1.36	4 (12%)	78,124,124	1.40	9 (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	B	705	1	-	2/6/23/26	0/1/1/1
4	NAG	C	702	1	-	2/6/23/26	0/1/1/1
5	4LA	D	706[A]	-	-	4/8/314/314	0/2/17/17
6	N1B	B	707[B]	-	-	4/8/314/314	0/2/17/17
7	BOG	C	708	-	-	1/11/31/31	0/1/1/1
4	NAG	B	702	1	-	2/6/23/26	0/1/1/1
5	4LA	C	706[A]	-	-	5/8/314/314	0/2/17/17
3	HEM	B	701	1,8	-	0/12/54/54	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	BOG	D	708	-	-	5/11/31/31	0/1/1/1
5	4LA	A	706[A]	-	-	2/8/314/314	0/2/17/17
4	NAG	A	705	1	-	0/6/23/26	0/1/1/1
5	4LA	B	706[A]	-	-	4/8/314/314	0/2/17/17
6	N1B	A	707[B]	-	-	2/8/314/314	0/2/17/17
7	BOG	C	709	-	-	0/11/31/31	0/1/1/1
3	HEM	D	701	1	-	2/12/54/54	-
4	NAG	D	705	1	-	1/6/23/26	0/1/1/1
6	N1B	D	707[B]	-	-	4/8/314/314	0/2/17/17
3	HEM	C	701	1	-	1/12/54/54	-
4	NAG	D	702	1	-	2/6/23/26	0/1/1/1
7	BOG	B	708	-	-	4/11/31/31	0/1/1/1
7	BOG	A	708	-	-	3/11/31/31	0/1/1/1
3	HEM	A	701	1	-	0/12/54/54	-
4	NAG	C	705	1	-	0/6/23/26	0/1/1/1
4	NAG	A	702	1	-	3/6/23/26	0/1/1/1
6	N1B	C	707[B]	-	-	5/8/314/314	0/2/17/17

The worst 5 of 89 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	701	HEM	C1B-NB	-4.94	1.31	1.40
3	B	701	HEM	C1B-NB	-4.85	1.31	1.40
3	C	701	HEM	C1B-NB	-4.85	1.32	1.40
3	D	701	HEM	C4D-ND	-4.79	1.32	1.40
3	A	701	HEM	C4D-ND	-4.77	1.32	1.40

The worst 5 of 142 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	A	706[A]	4LA	O29-C12-C11	6.85	120.95	111.45
6	A	707[B]	N1B	O29-C12-C11	6.84	120.94	111.45
5	B	706[A]	4LA	O29-C12-C11	6.83	120.91	111.45
6	B	707[B]	N1B	O29-C12-C11	6.81	120.89	111.45
5	C	706[A]	4LA	O29-C12-C11	6.66	120.68	111.45

There are no chirality outliers.

5 of 58 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	C	706[A]	4LA	C11-C12-O29-C30
6	C	707[B]	N1B	C11-C12-O29-C30
7	B	708	BOG	C2-C1-O1-C1'
7	B	708	BOG	O5-C1-O1-C1'
7	D	708	BOG	C2'-C1'-O1-C1

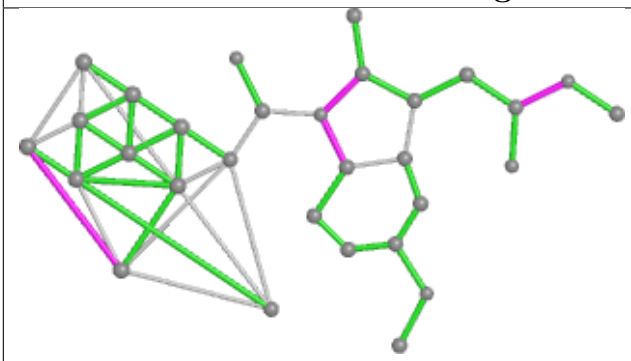
There are no ring outliers.

15 monomers are involved in 29 short contacts:

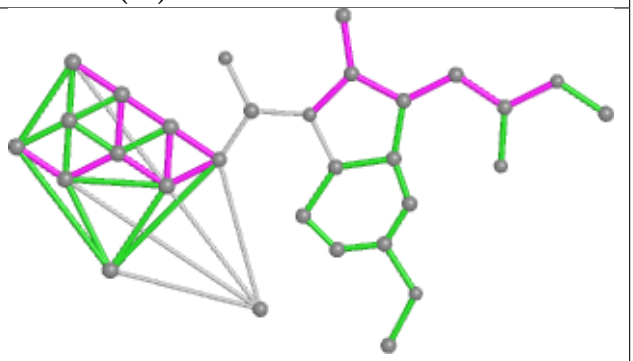
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	706[A]	4LA	1	0
6	B	707[B]	N1B	1	0
7	C	708	BOG	1	0
5	C	706[A]	4LA	5	0
3	B	701	HEM	3	0
7	D	708	BOG	1	0
5	A	706[A]	4LA	2	0
5	B	706[A]	4LA	1	0
6	A	707[B]	N1B	1	0
7	C	709	BOG	2	0
3	D	701	HEM	4	0
6	D	707[B]	N1B	1	0
7	A	708	BOG	1	0
3	A	701	HEM	2	0
6	C	707[B]	N1B	3	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 then 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.

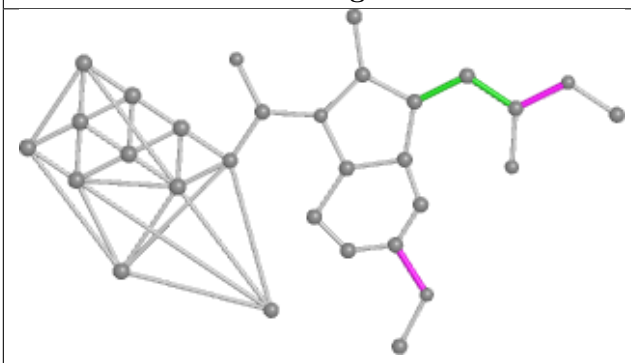
Ligand 4LA D 706 (A)



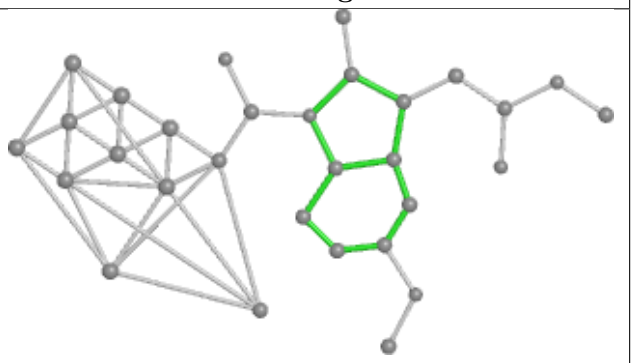
Bond lengths



Bond angles

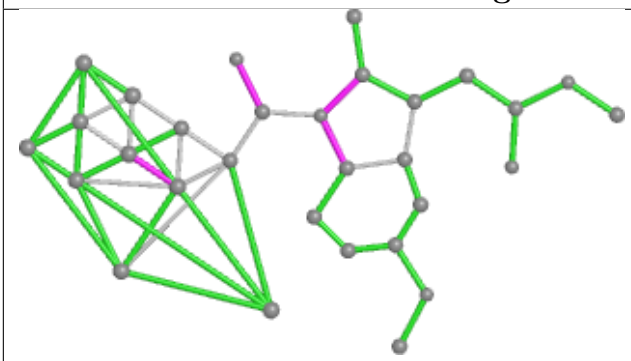


Torsions

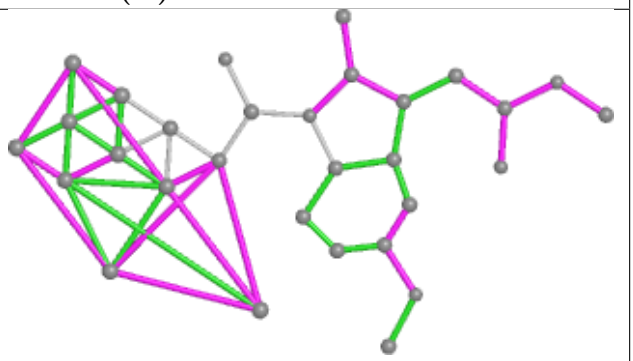


Rings

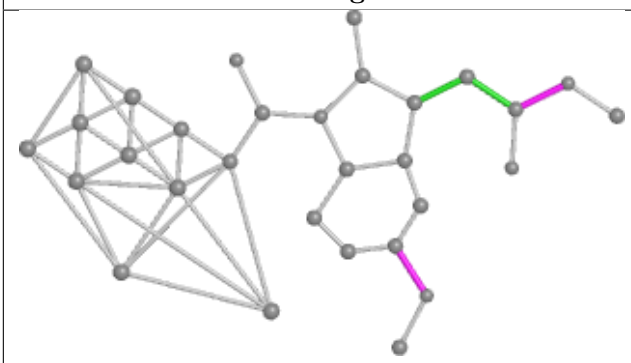
Ligand N1B B 707 (B)



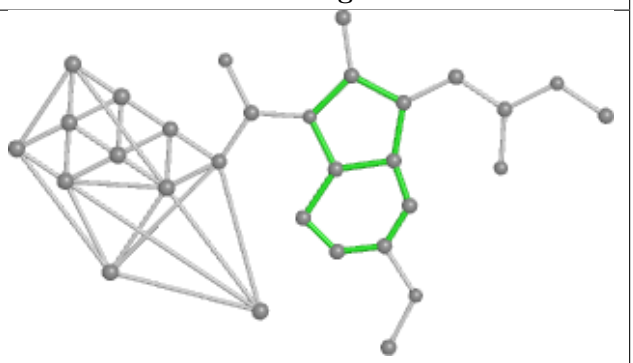
Bond lengths



Bond angles

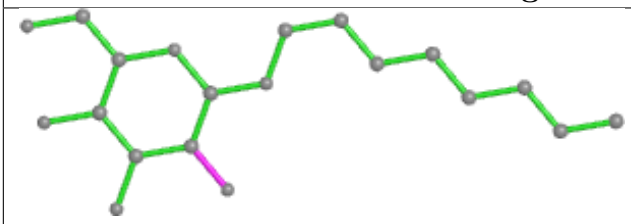


Torsions

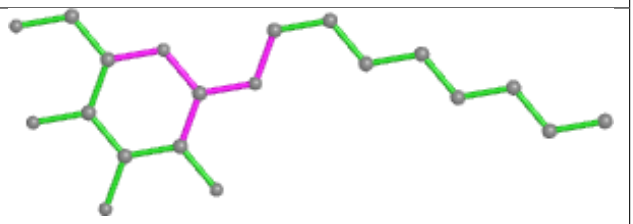


Rings

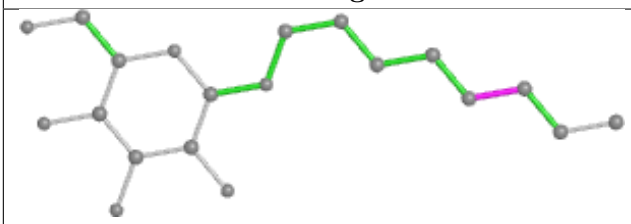
Ligand BOG C 708



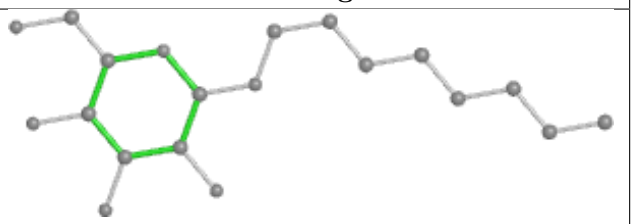
Bond lengths



Bond angles

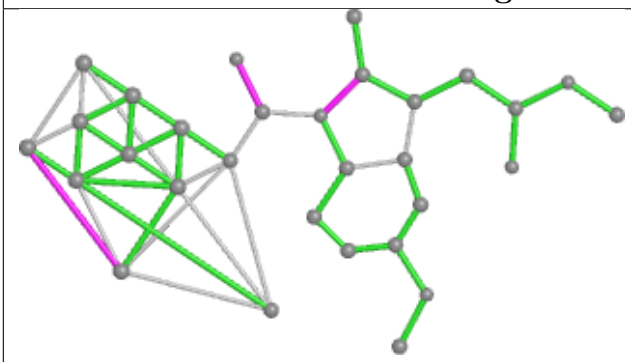


Torsions

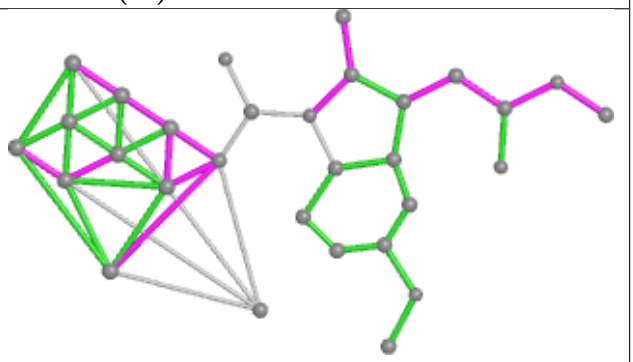


Rings

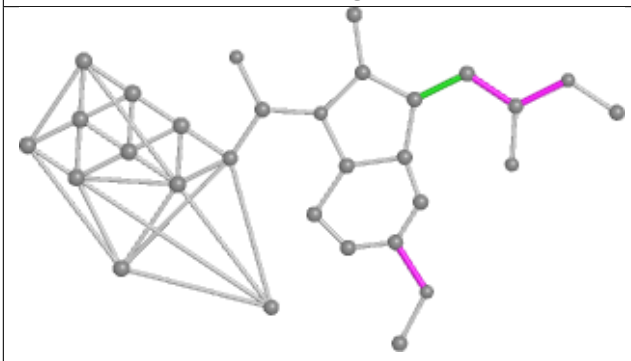
Ligand 4LA C 706 (A)



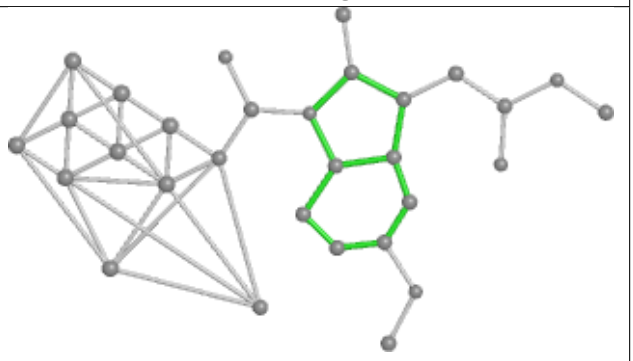
Bond lengths



Bond angles

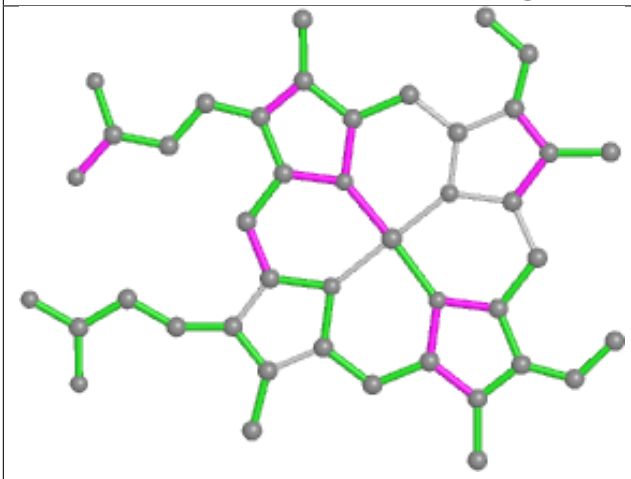


Torsions

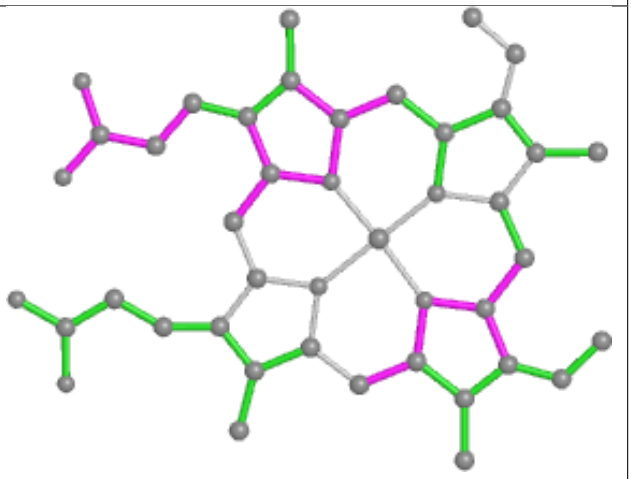


Rings

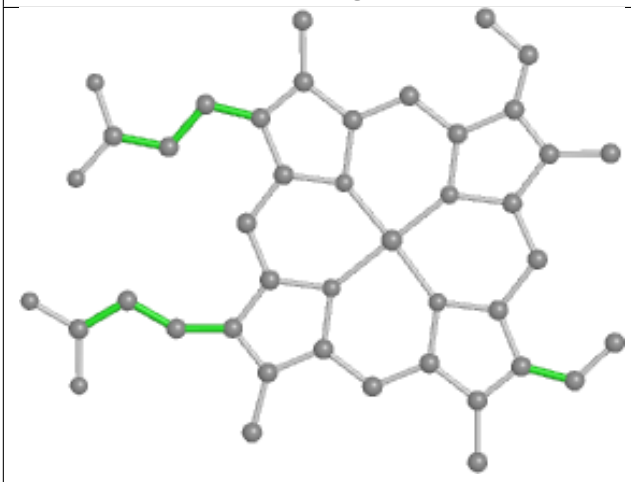
Ligand HEM B 701



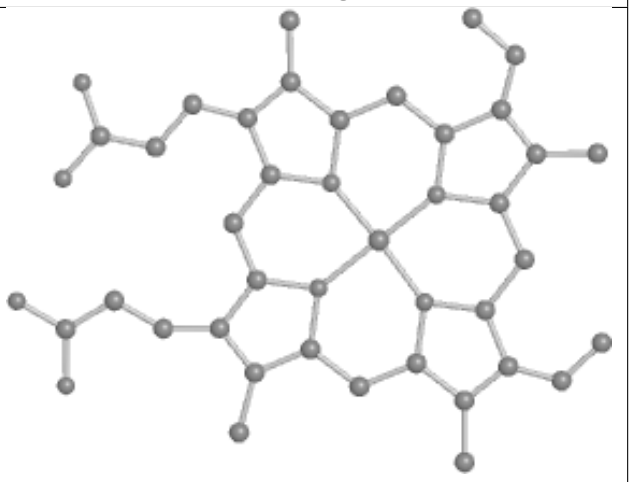
Bond lengths



Bond angles

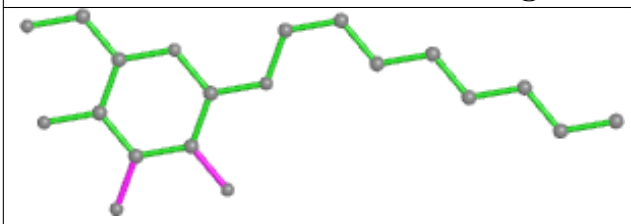


Torsions

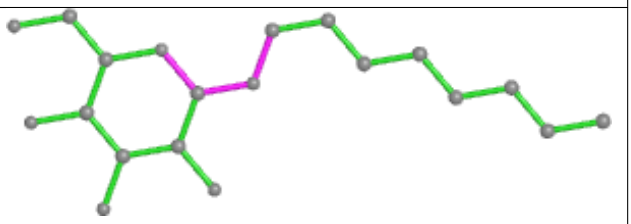


Rings

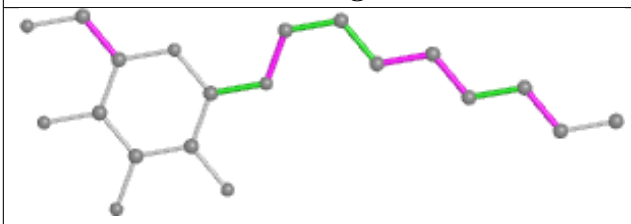
Ligand BOG D 708



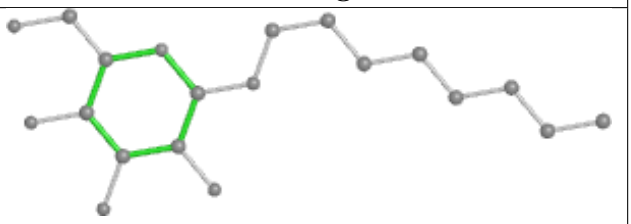
Bond lengths



Bond angles

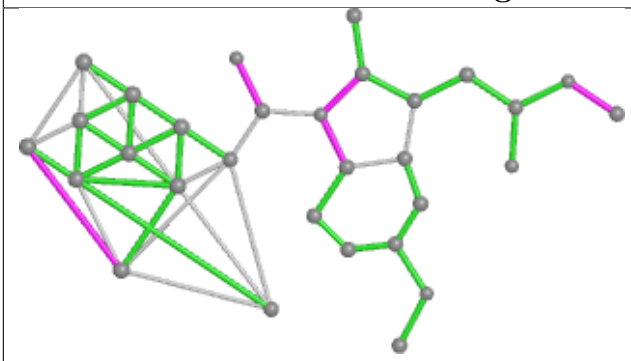


Torsions

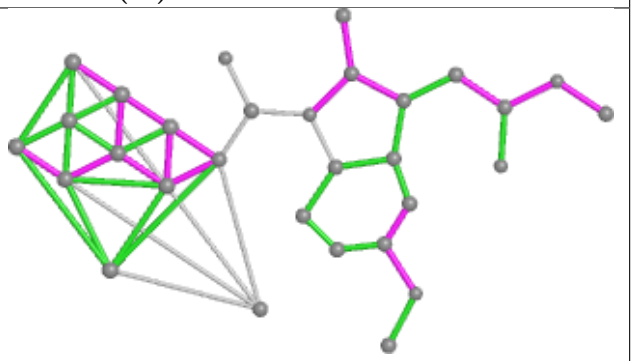


Rings

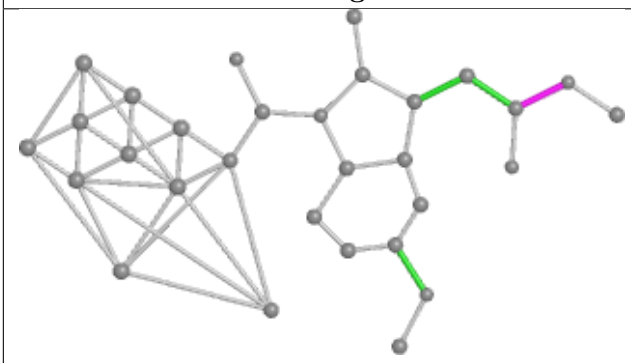
Ligand 4LA A 706 (A)



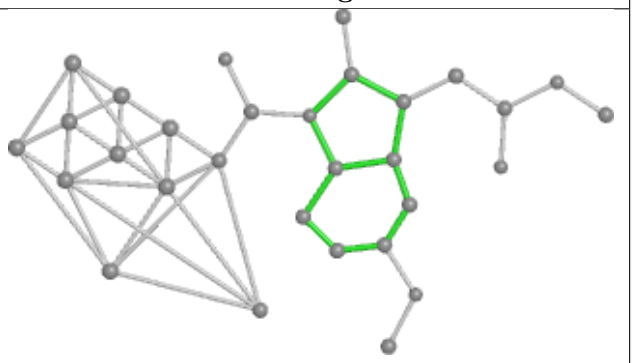
Bond lengths



Bond angles

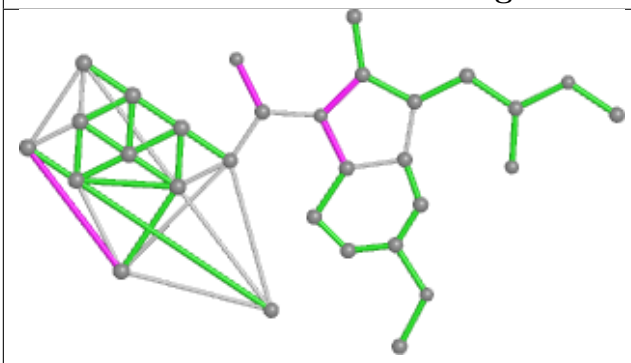


Torsions

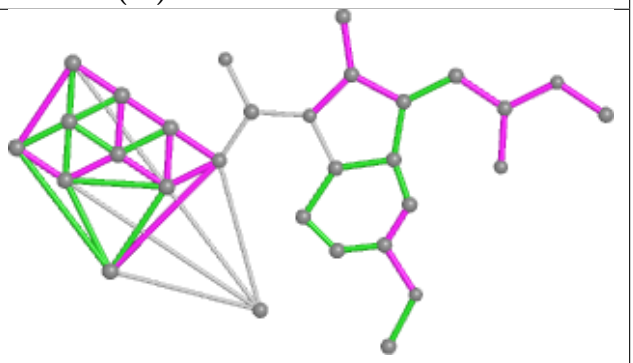


Rings

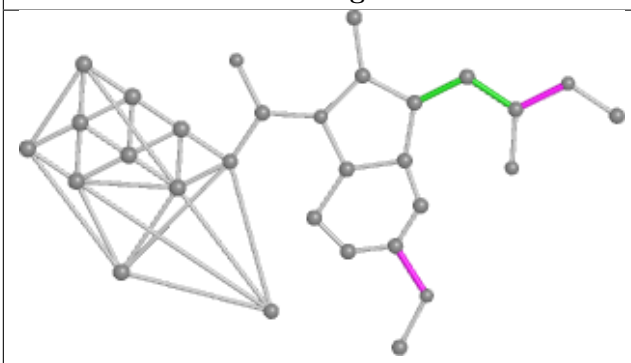
Ligand 4LA B 706 (A)



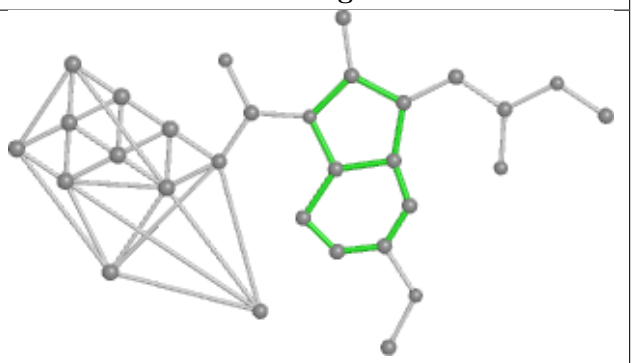
Bond lengths



Bond angles

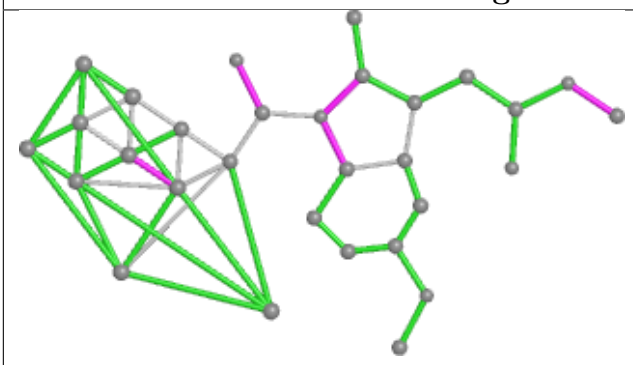


Torsions

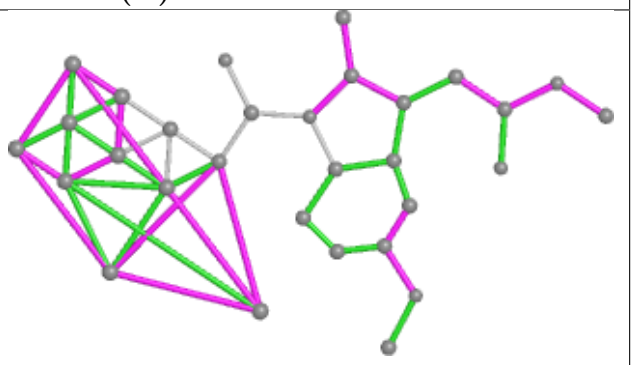


Rings

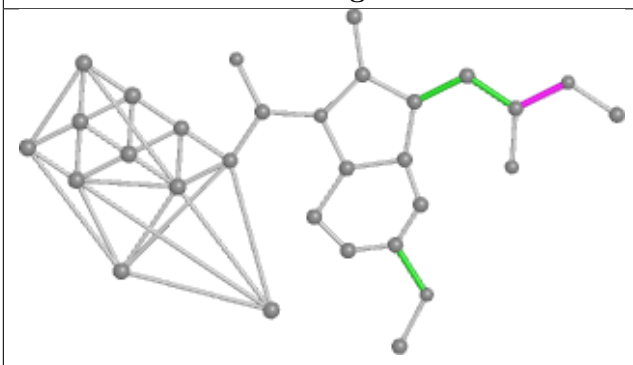
Ligand N1B A 707 (B)



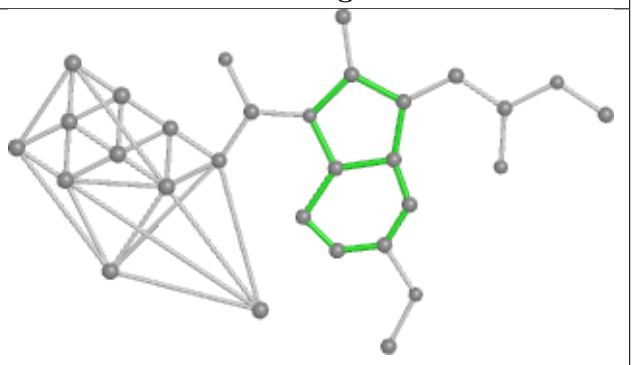
Bond lengths



Bond angles

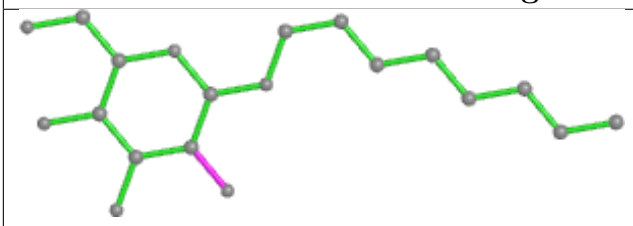


Torsions

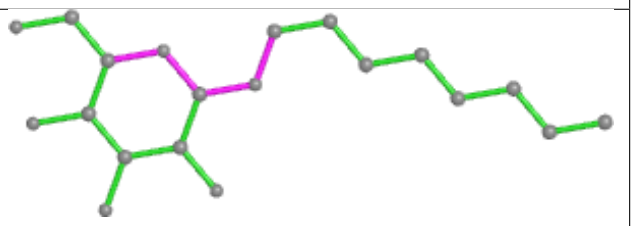


Rings

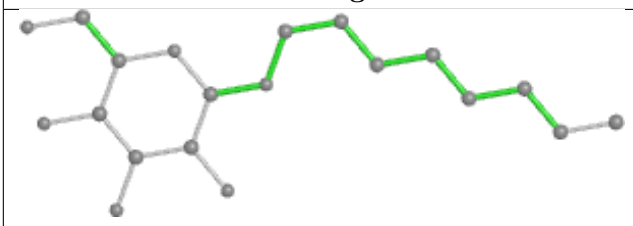
Ligand BOG C 709



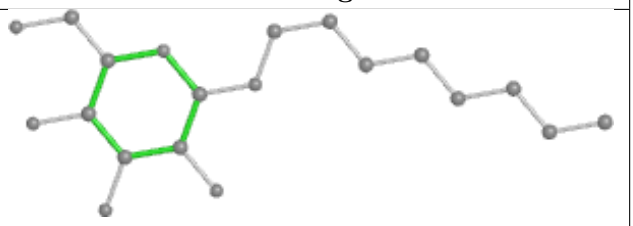
Bond lengths



Bond angles

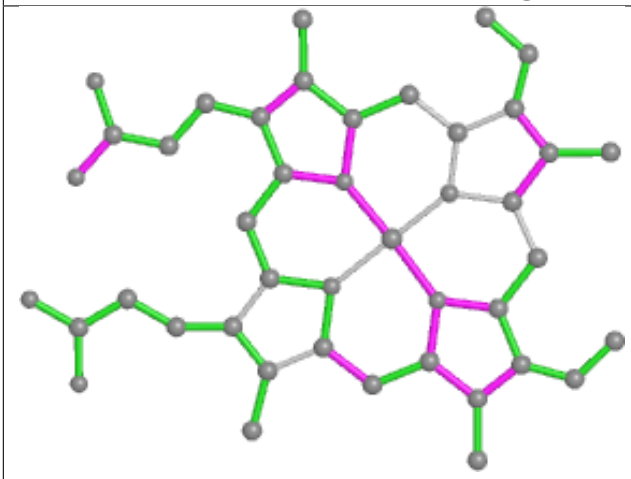


Torsions

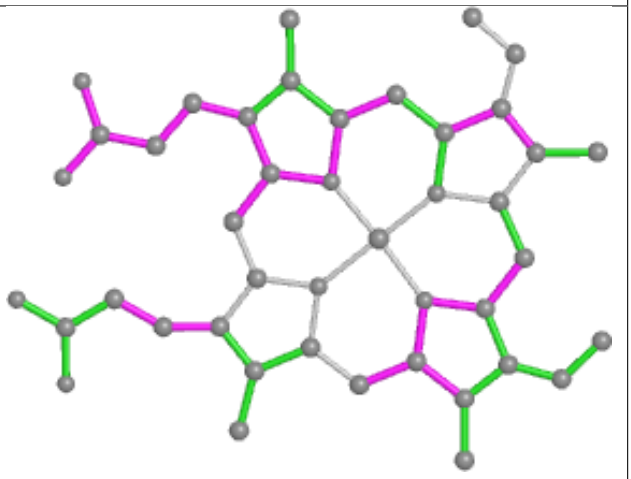


Rings

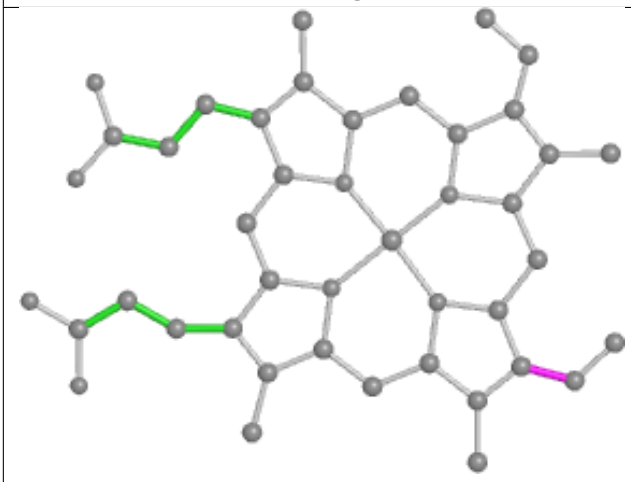
Ligand HEM D 701



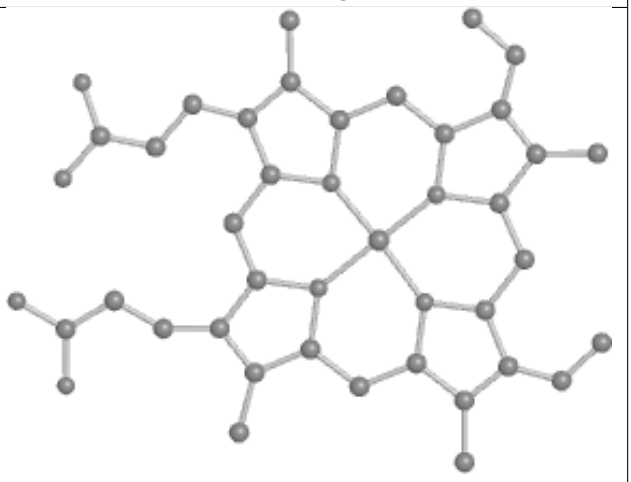
Bond lengths



Bond angles

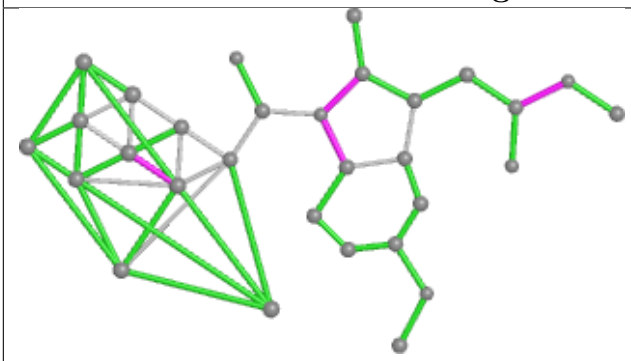


Torsions

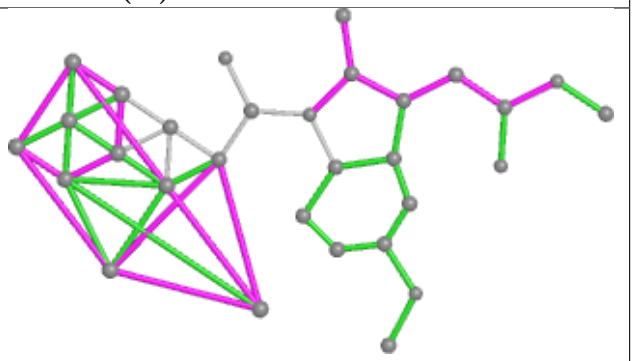


Rings

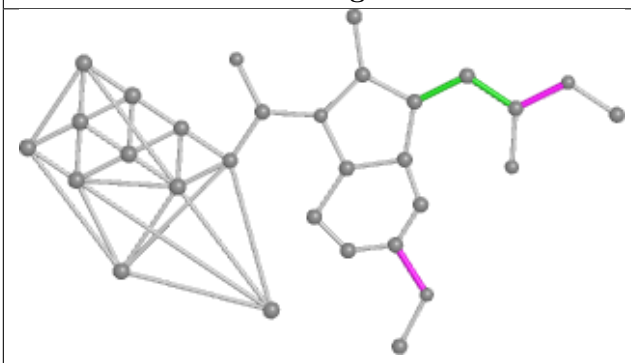
Ligand N1B D 707 (B)



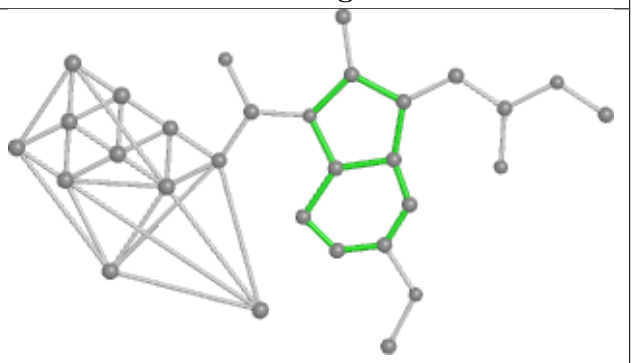
Bond lengths



Bond angles

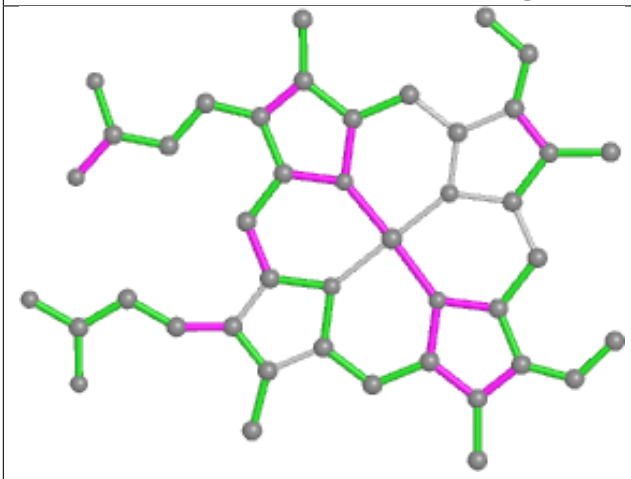


Torsions

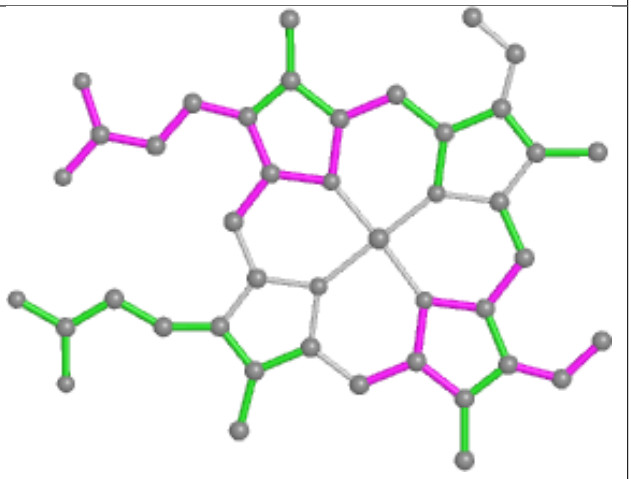


Rings

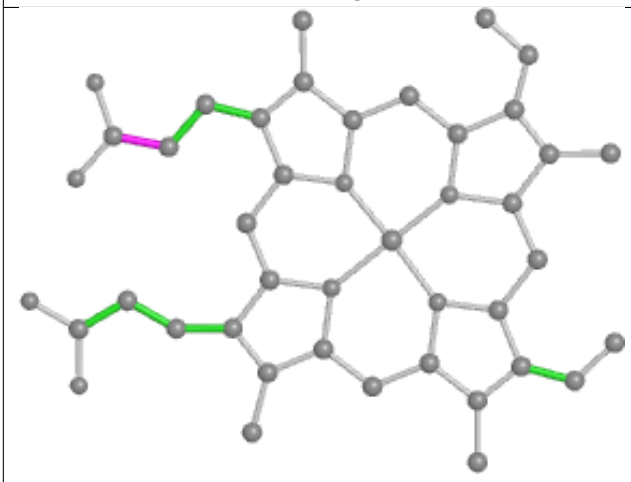
Ligand HEM C 701



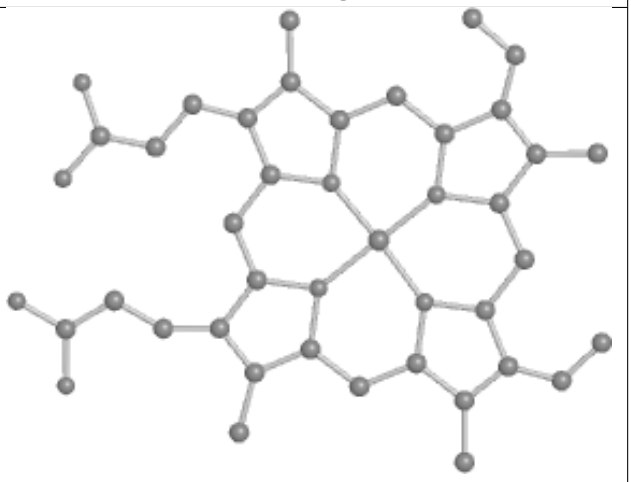
Bond lengths



Bond angles

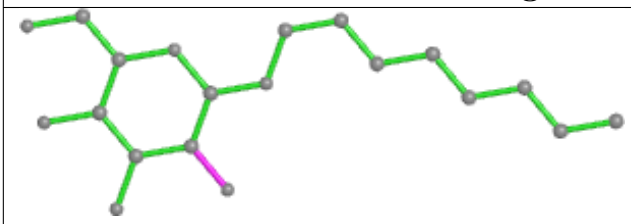


Torsions

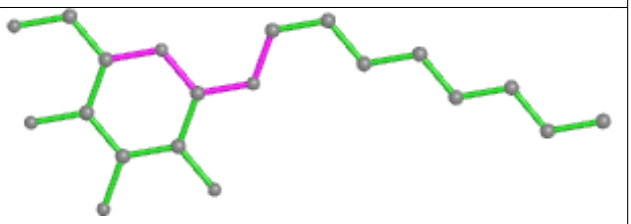


Rings

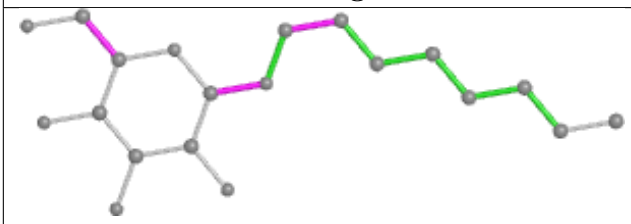
Ligand BOG B 708



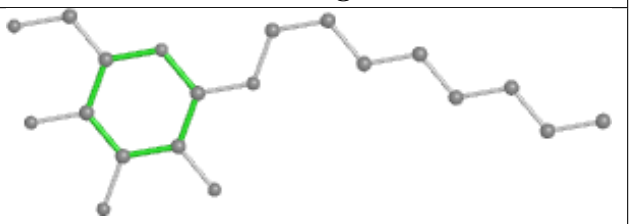
Bond lengths



Bond angles

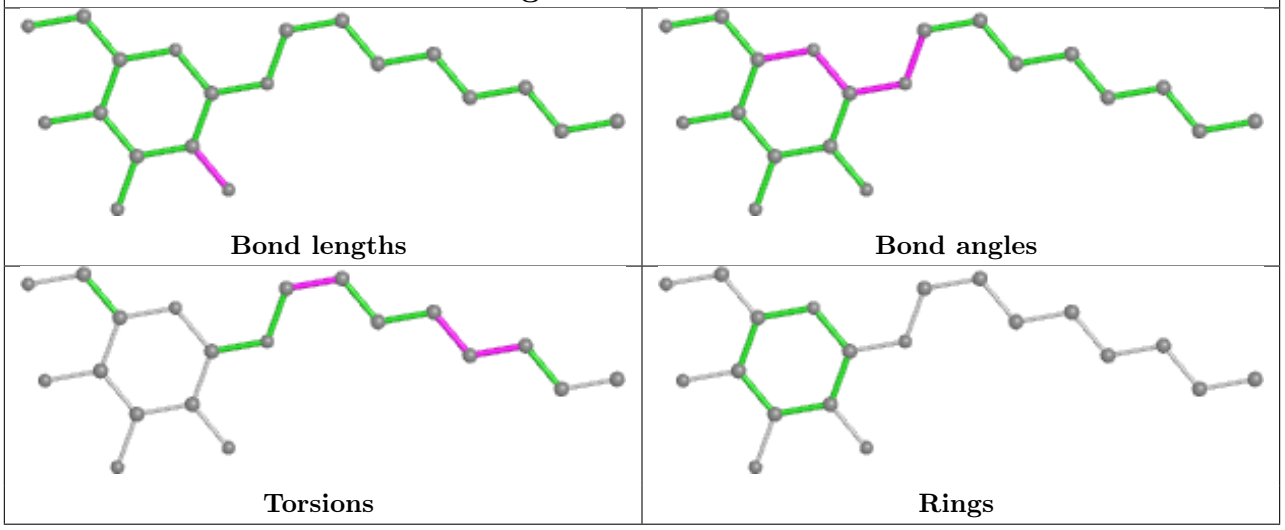


Torsions

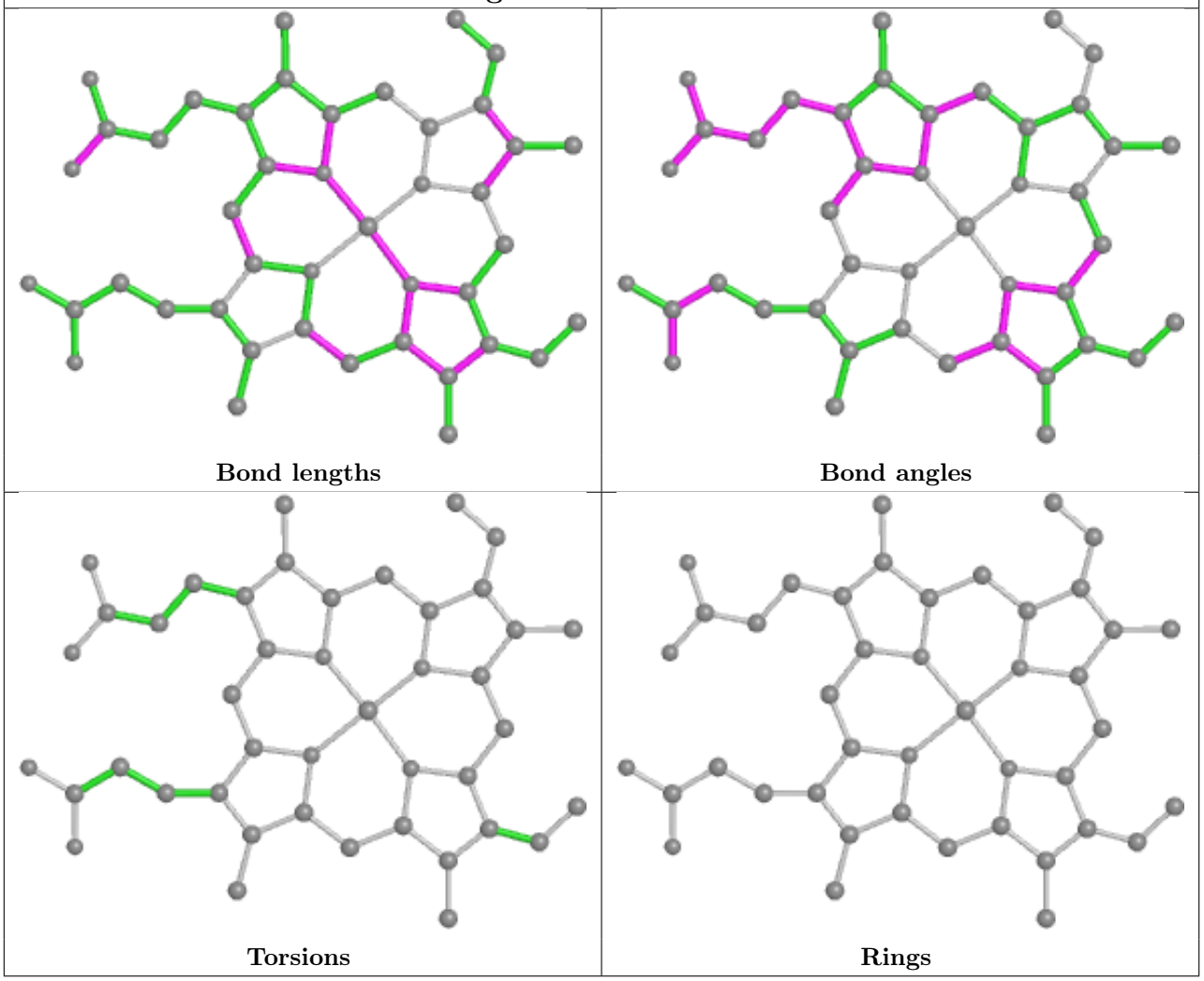


Rings

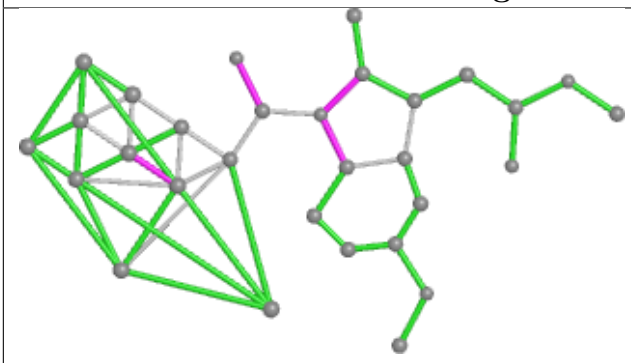
Ligand BOG A 708



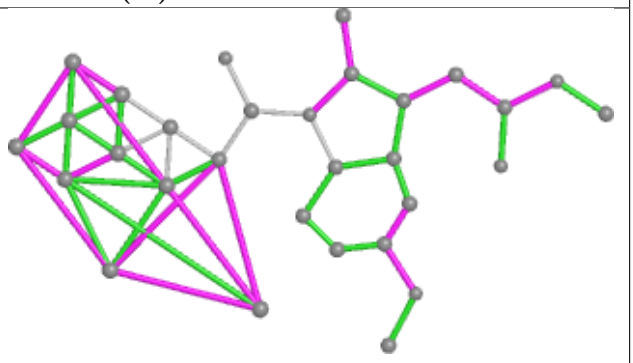
Ligand HEM A 701



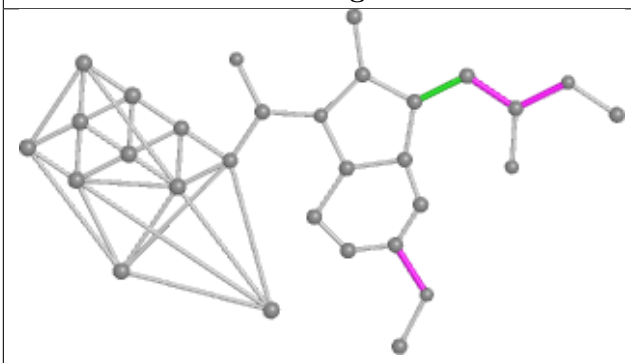
Ligand N1B C 707 (B)



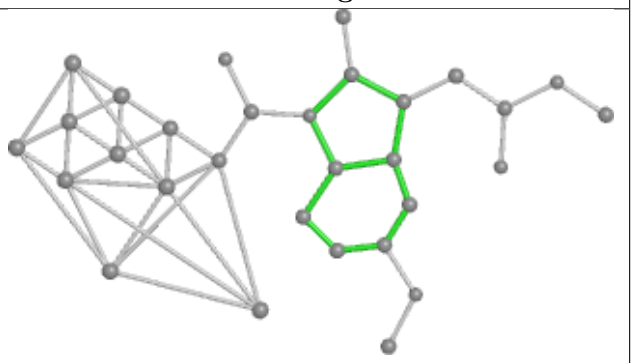
Bond lengths



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

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^{th} 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	551/587 (93%)	0.04	18 (3%)	46	53	33, 52, 77, 95	0
1	B	551/587 (93%)	0.10	18 (3%)	46	53	33, 50, 76, 97	0
1	C	551/587 (93%)	0.05	12 (2%)	62	69	32, 49, 73, 99	0
1	D	551/587 (93%)	0.02	11 (1%)	65	71	33, 47, 73, 102	0
All	All	2204/2348 (93%)	0.05	59 (2%)	54	62	32, 50, 75, 102	0

The worst 5 of 59 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	399	ASP	4.9
1	A	122	TYR	4.6
1	C	399	ASP	4.0
1	B	74	PHE	3.8
1	B	115	TYR	3.4

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^{th} 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	0.88	0.22	67,70,76,76	0
2	NAG	F	2	14/15	0.90	0.16	62,67,73,75	0

Continued on next page...

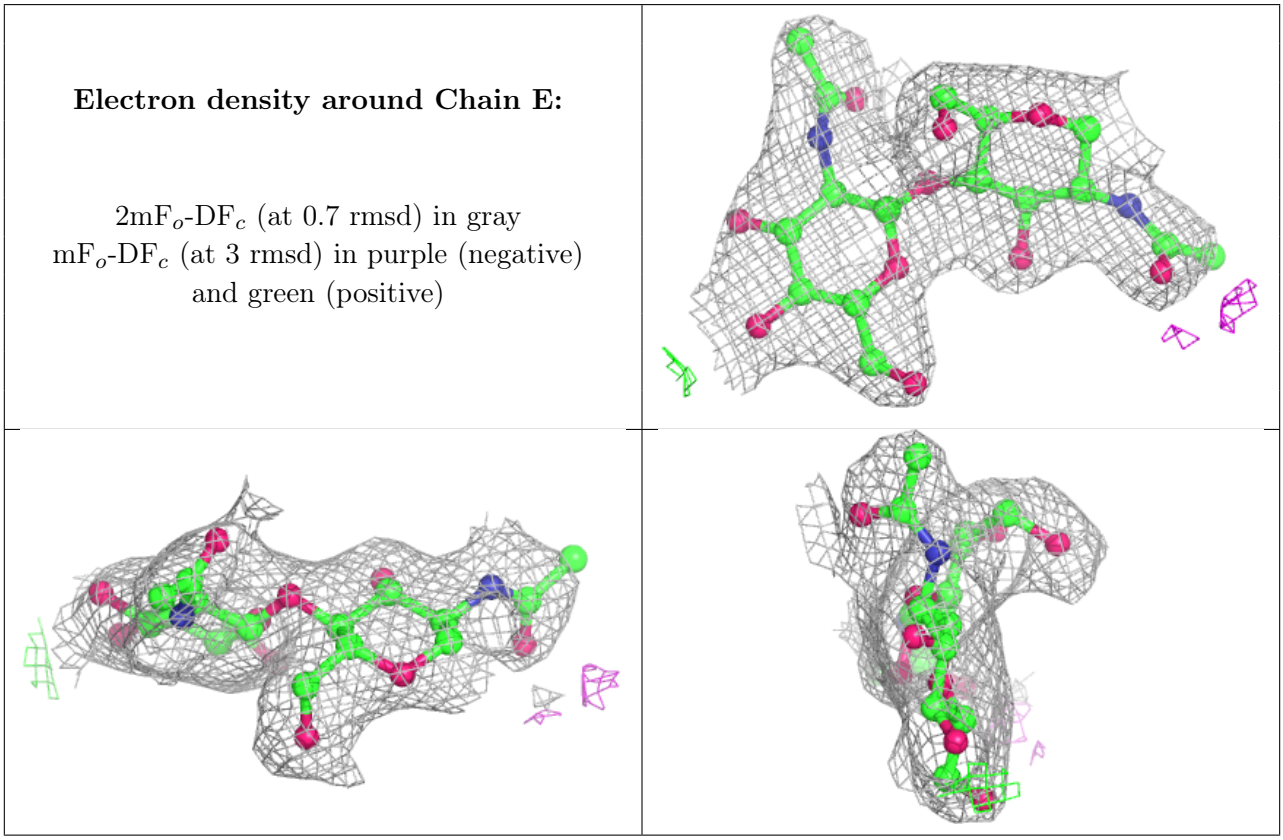
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NAG	H	2	14/15	0.92	0.15	61,66,72,75	0
2	NAG	G	2	14/15	0.93	0.18	64,68,72,73	0
2	NAG	H	1	14/15	0.94	0.13	40,49,54,60	0
2	NAG	F	1	14/15	0.94	0.11	45,48,56,62	0
2	NAG	G	1	14/15	0.96	0.10	37,45,55,62	0
2	NAG	E	1	14/15	0.96	0.13	35,49,54,62	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.

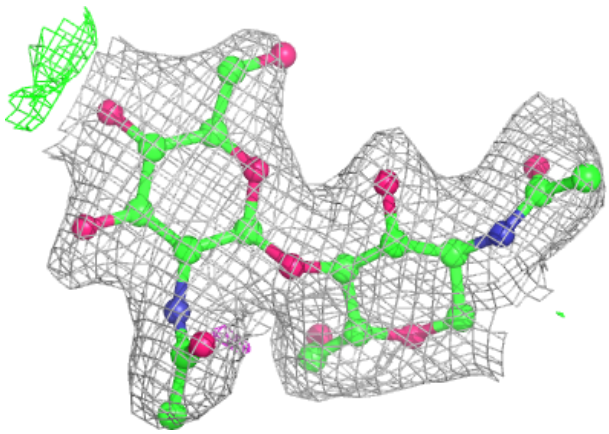
Electron density around Chain E:

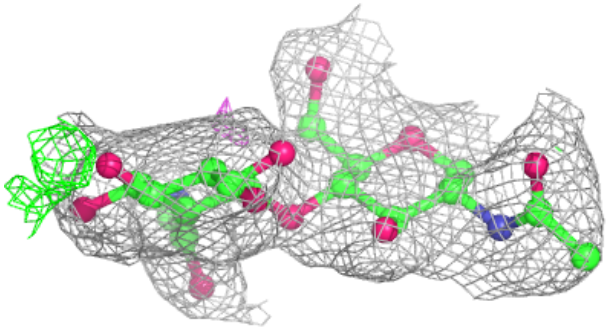
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

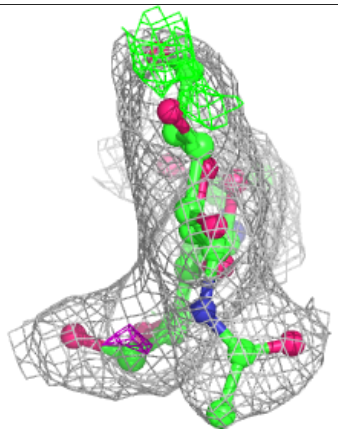


Electron density around Chain F:

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

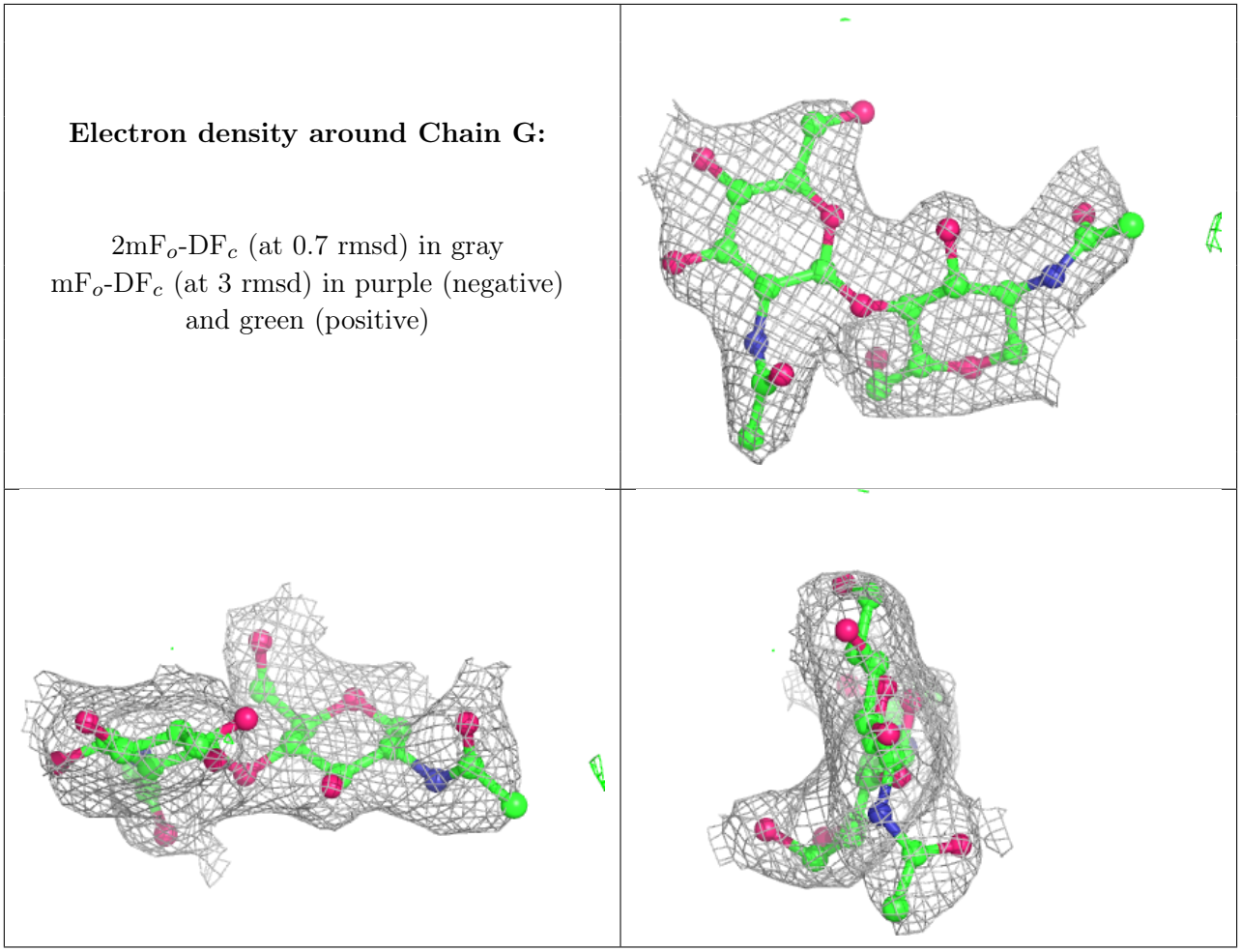






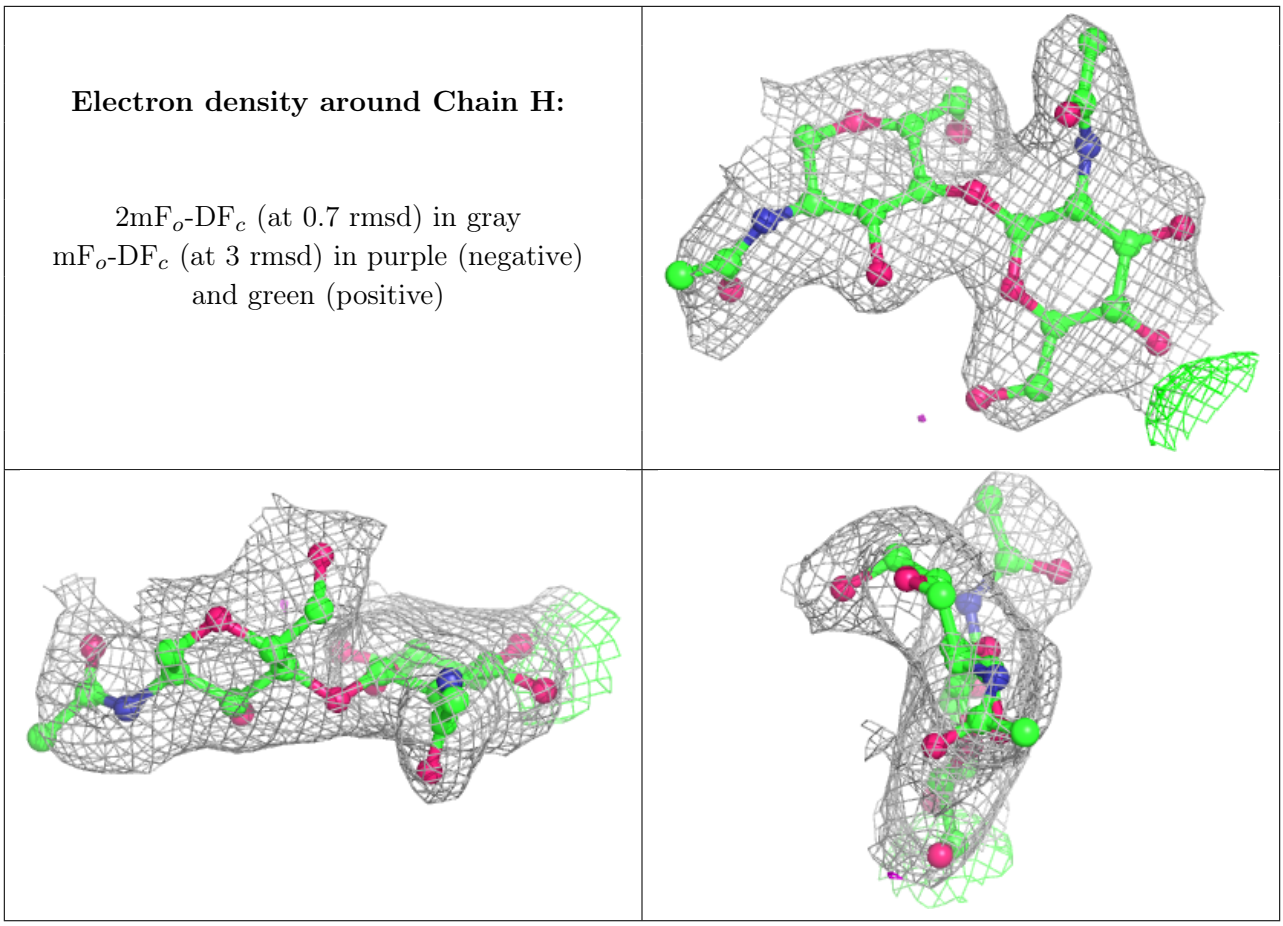
Electron density around Chain G:

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



Electron density around Chain H:

$2mF_o$-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^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
7	BOG	B	708	20/20	0.75	0.41	68,84,104,105	0
4	NAG	B	702	14/15	0.79	0.23	85,92,98,98	0
7	BOG	D	708	20/20	0.81	0.35	67,77,82,83	0
7	BOG	C	709	20/20	0.82	0.31	64,75,79,81	0
4	NAG	C	702	14/15	0.83	0.29	66,76,79,83	0
4	NAG	A	702	14/15	0.83	0.16	69,81,84,85	0
4	NAG	D	702	14/15	0.84	0.19	82,86,91,94	0
5	4LA	B	706[A]	30/30	0.86	0.20	41,48,56,60	30
6	N1B	B	707[B]	30/30	0.87	0.20	40,48,56,60	30
4	NAG	A	705	14/15	0.87	0.30	62,76,80,80	0
5	4LA	C	706[A]	30/30	0.91	0.15	40,49,57,61	30
4	NAG	C	705	14/15	0.91	0.31	61,69,76,79	0

Continued on next page...

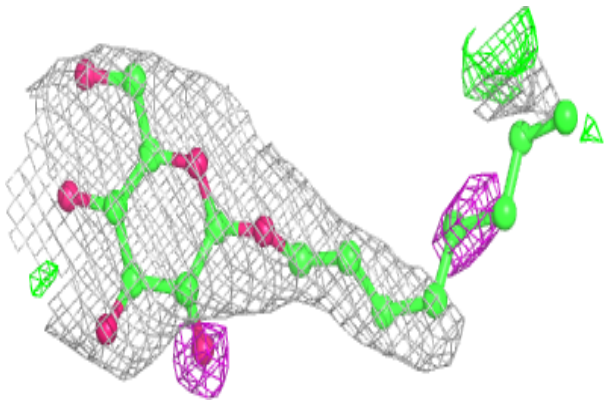
Continued from previous page...

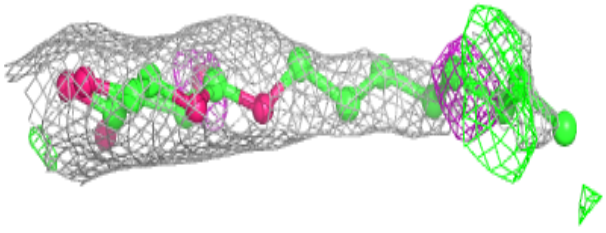
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	N1B	C	707[B]	30/30	0.91	0.15	40,49,57,61	30
4	NAG	B	705	14/15	0.92	0.16	70,74,78,79	0
6	N1B	D	707[B]	30/30	0.94	0.15	32,47,58,68	30
5	4LA	D	706[A]	30/30	0.94	0.15	32,47,58,68	30
7	BOG	C	708	20/20	0.94	0.16	47,56,58,59	0
4	NAG	D	705	14/15	0.94	0.12	70,76,78,80	0
5	4LA	A	706[A]	30/30	0.94	0.13	45,48,54,56	30
6	N1B	A	707[B]	30/30	0.95	0.13	44,48,54,56	30
3	HEM	A	701	43/43	0.95	0.12	35,44,64,76	0
3	HEM	C	701	43/43	0.96	0.12	37,41,59,71	0
3	HEM	D	701	43/43	0.96	0.14	30,41,64,77	0
3	HEM	B	701	43/43	0.96	0.14	35,43,66,75	0
7	BOG	A	708	20/20	0.96	0.12	48,52,67,69	0

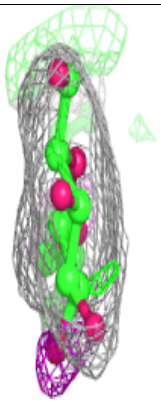
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around BOG B 708:

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

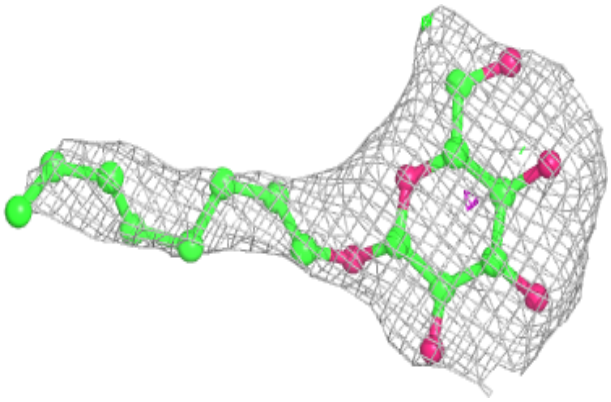


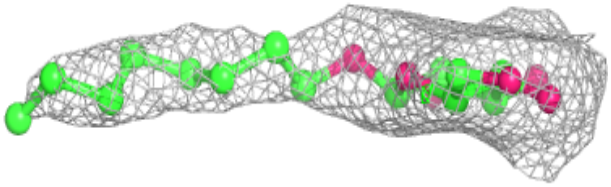


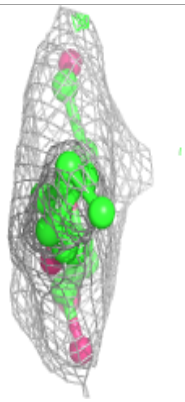


Electron density around BOG D 708:

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

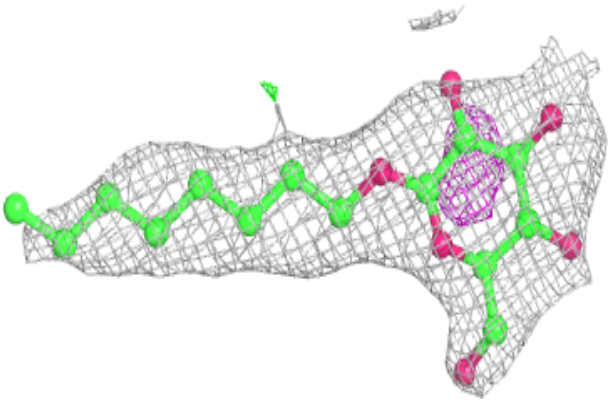


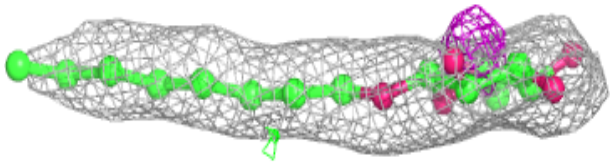


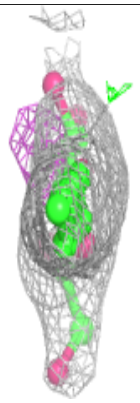


Electron density around BOG C 709:

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

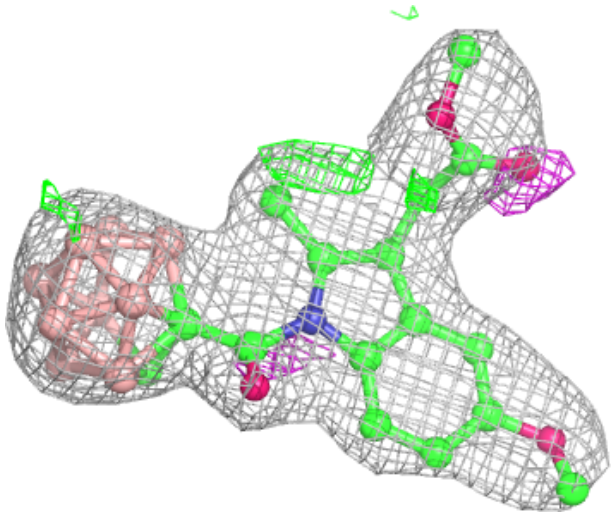


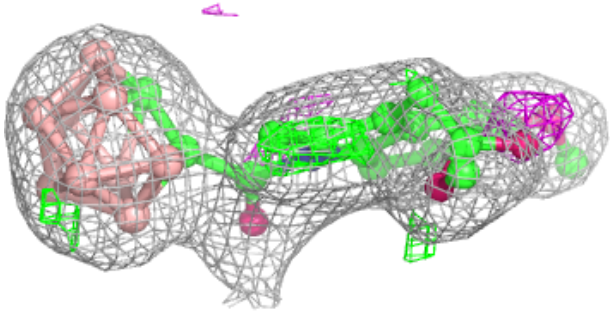


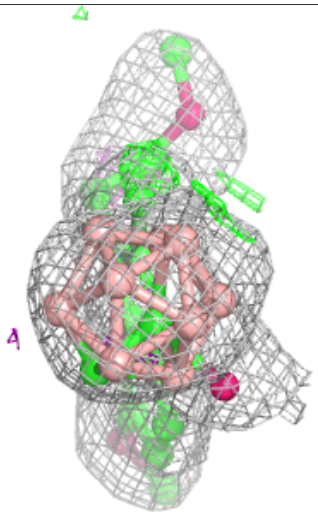


Electron density around 4LA B 706 (A):

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

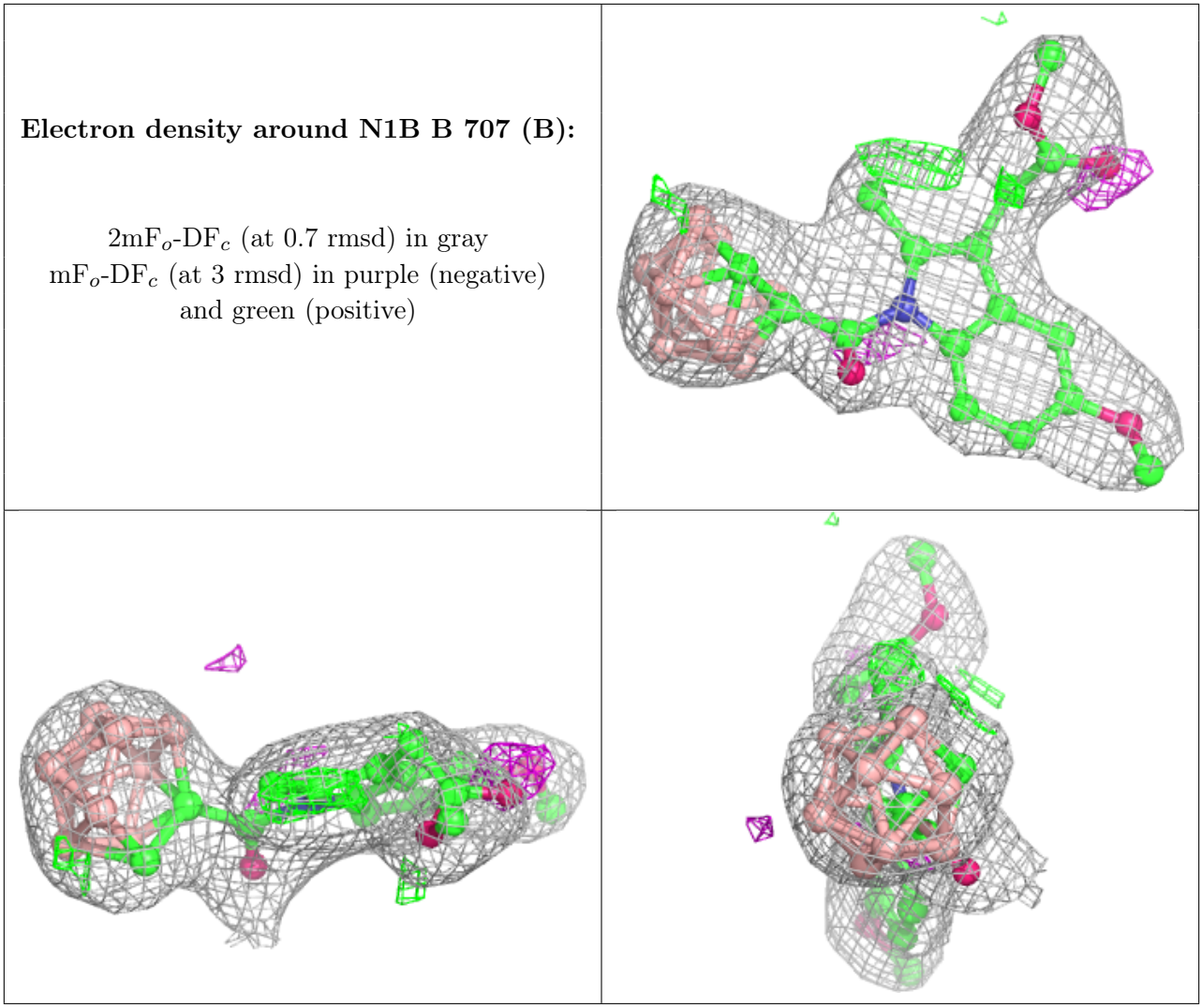






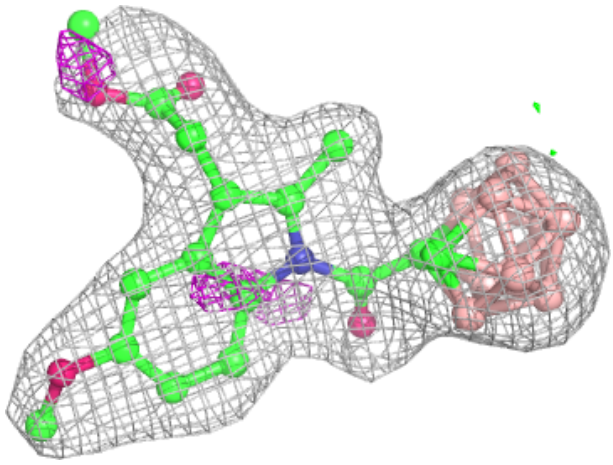
Electron density around N1B B 707 (B):

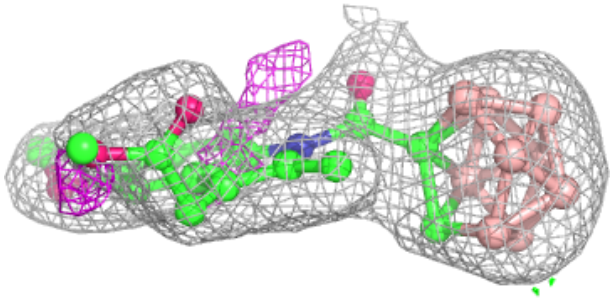
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

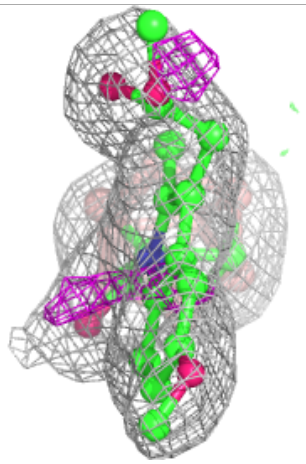


Electron density around 4LA C 706 (A):

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

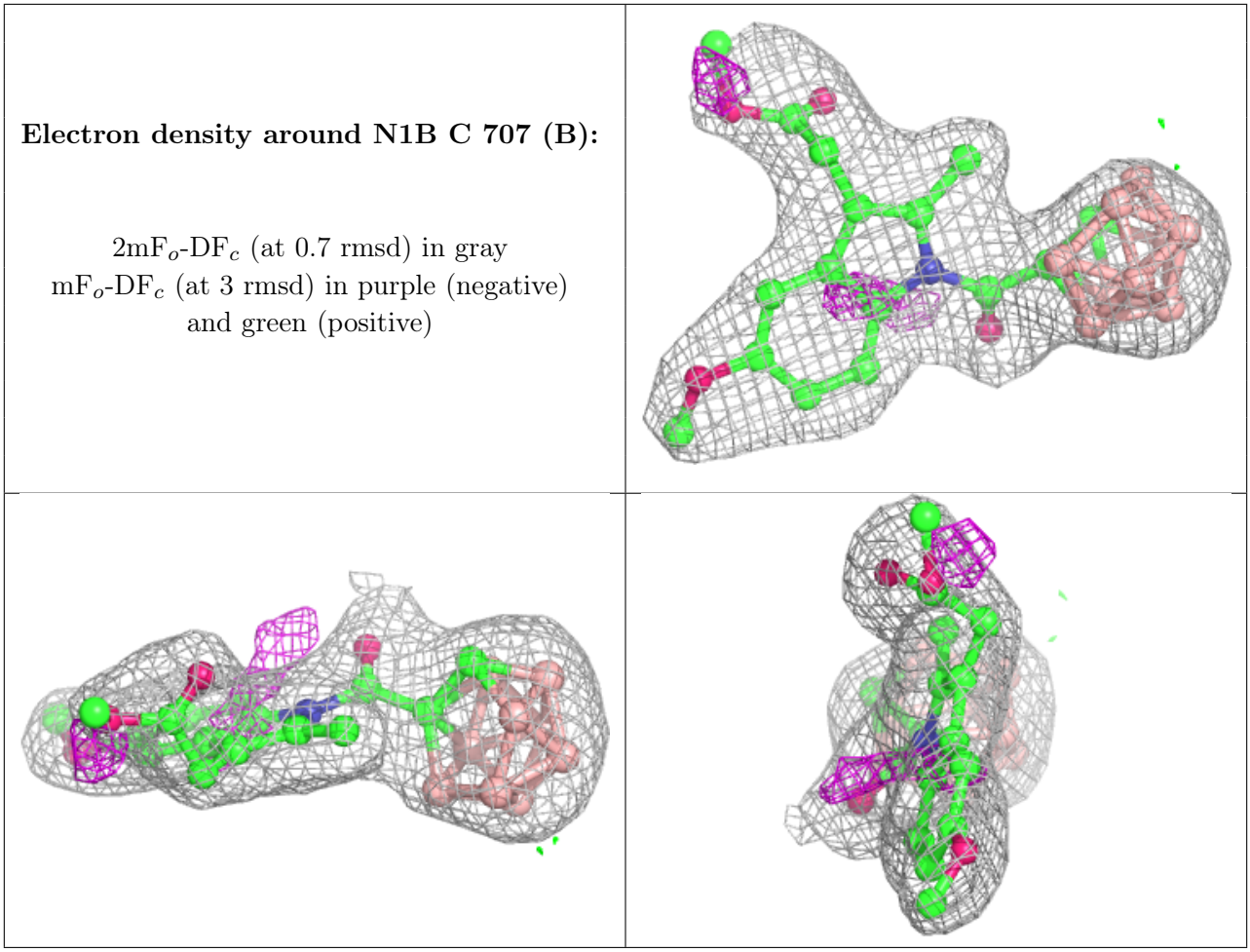






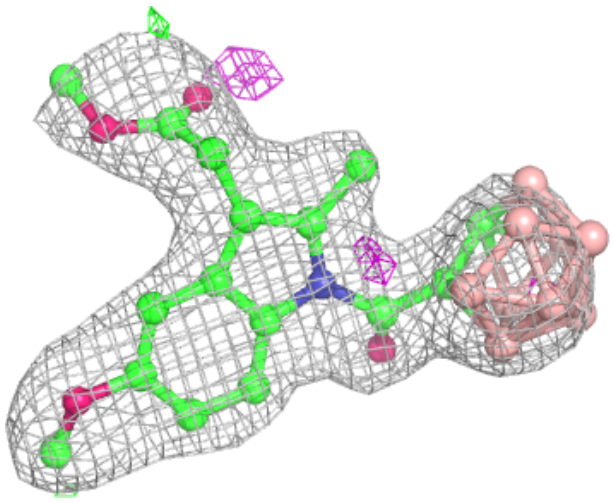
Electron density around N1B C 707 (B):

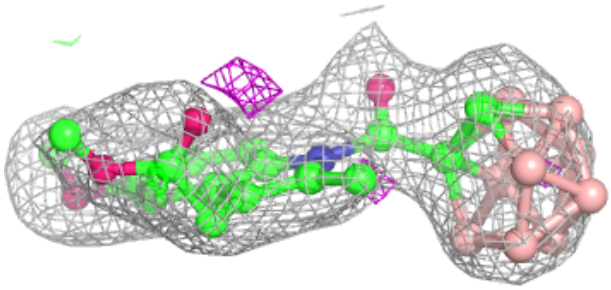
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

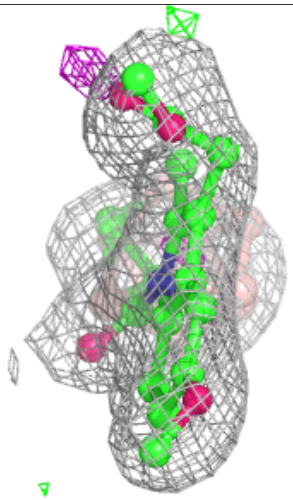


Electron density around N1B D 707 (B):

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

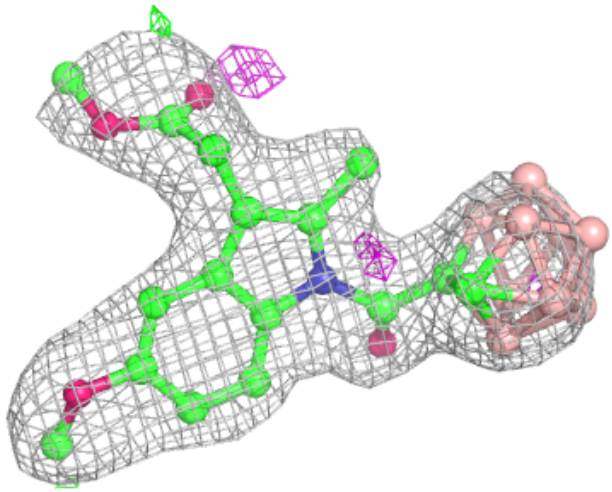


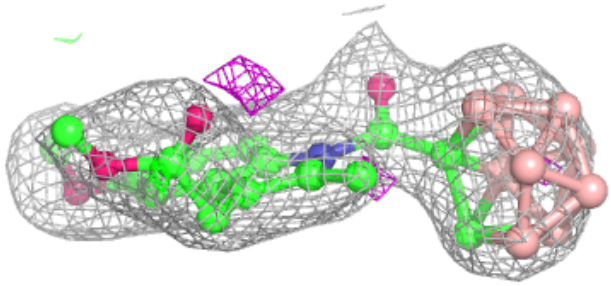


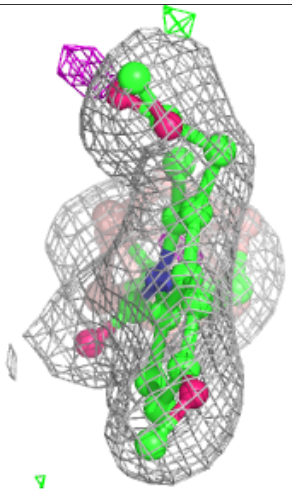


Electron density around 4LA D 706 (A):

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

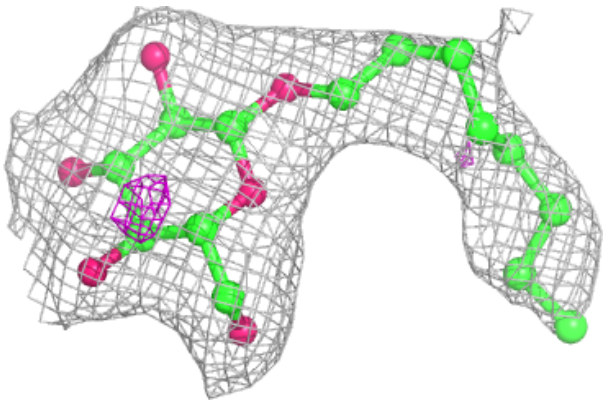


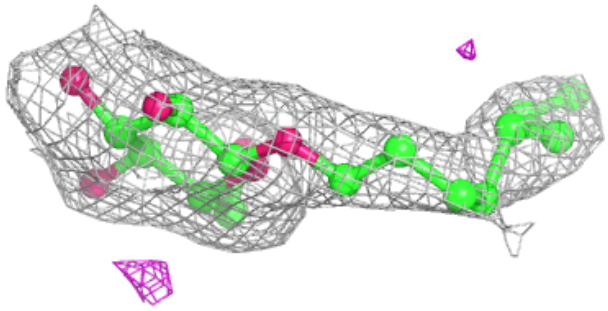


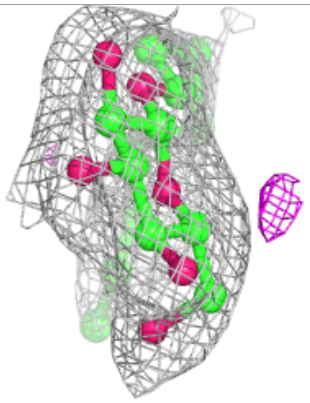


Electron density around BOG C 708:

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

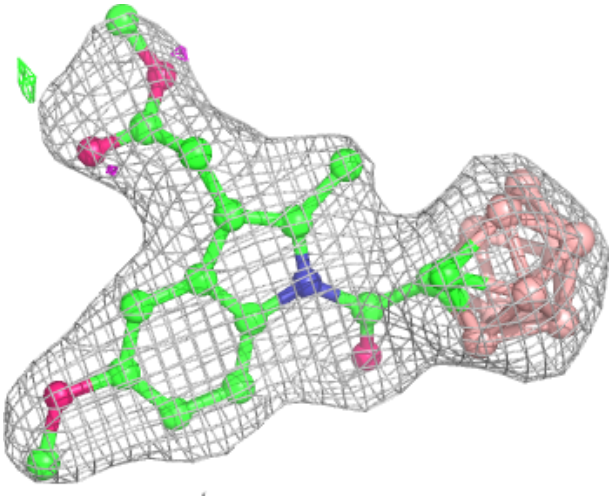


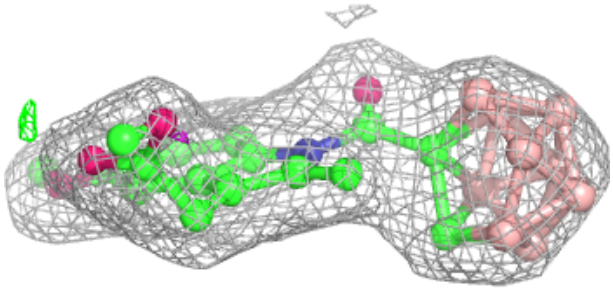


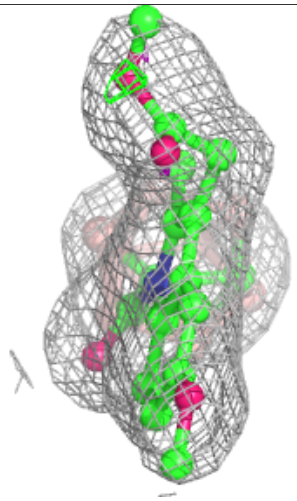


Electron density around 4LA A 706 (A):

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

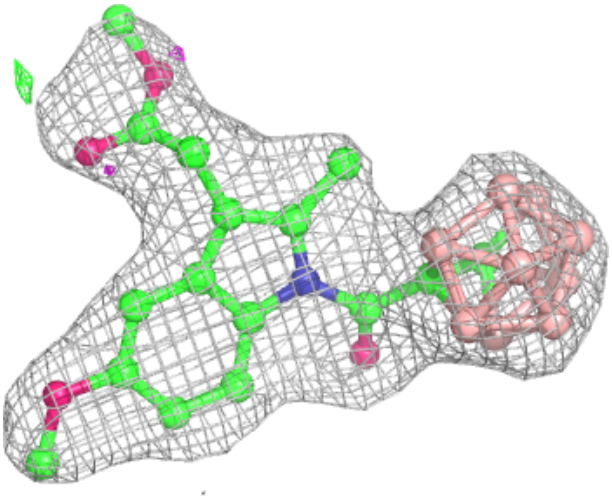


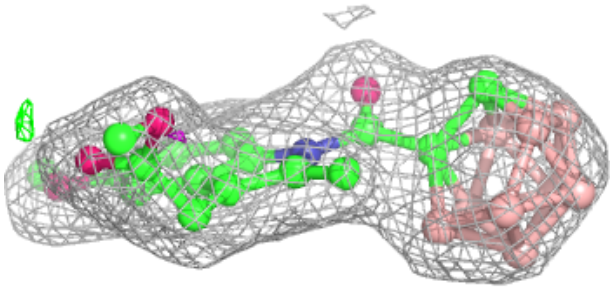


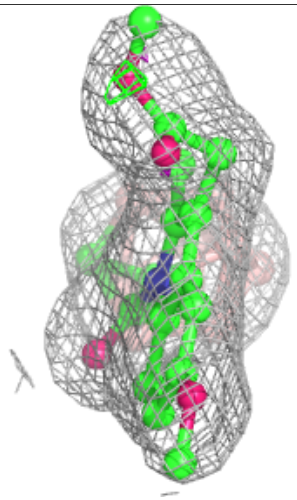


Electron density around N1B A 707 (B):

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

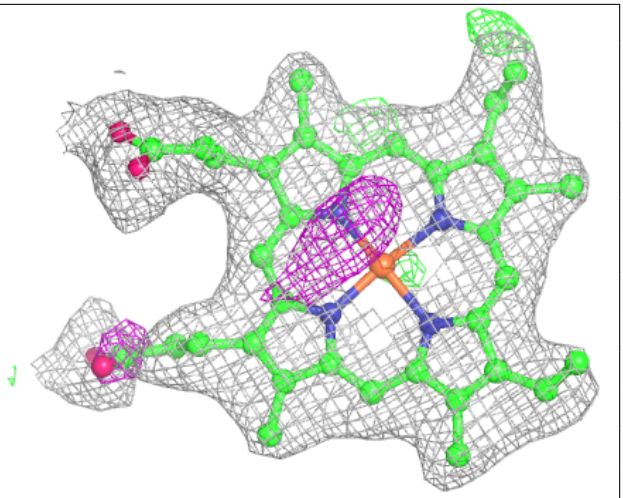


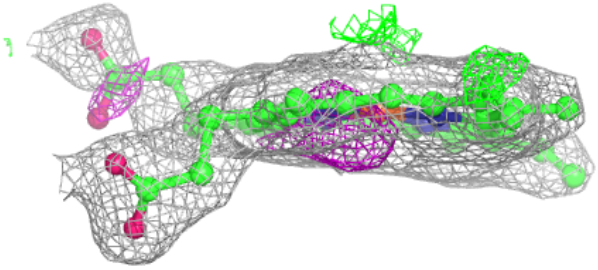


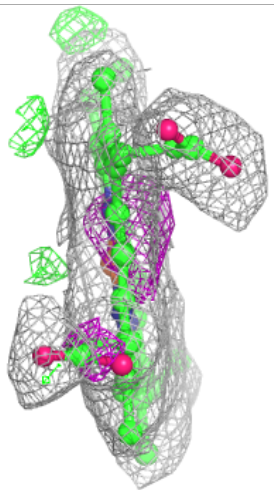


Electron density around HEM A 701:

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

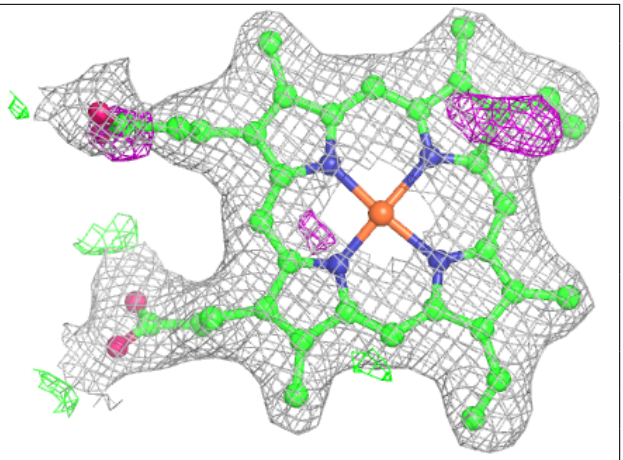


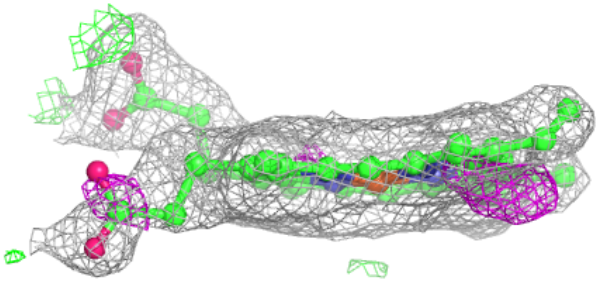


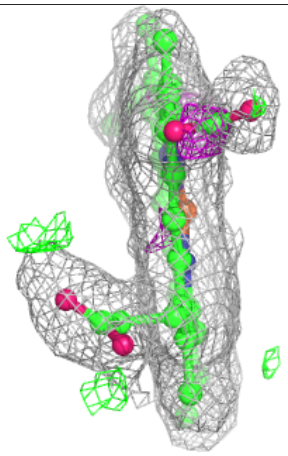


Electron density around HEM C 701:

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

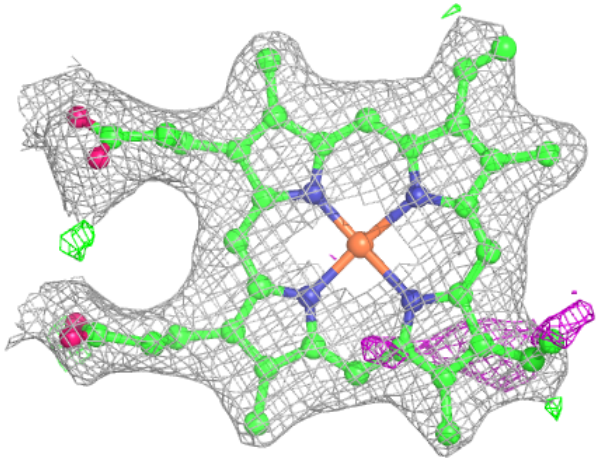


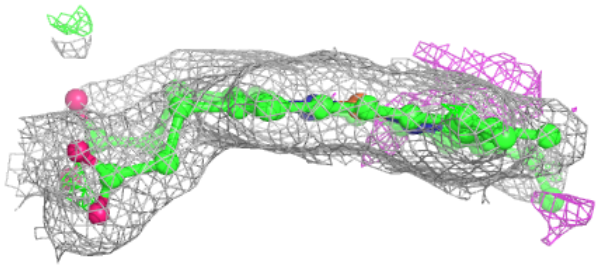


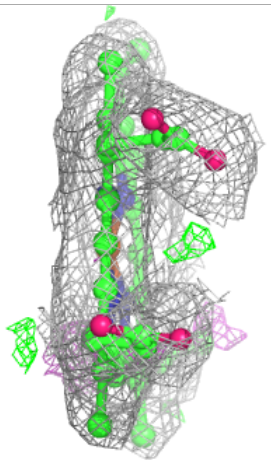


Electron density around HEM D 701:

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

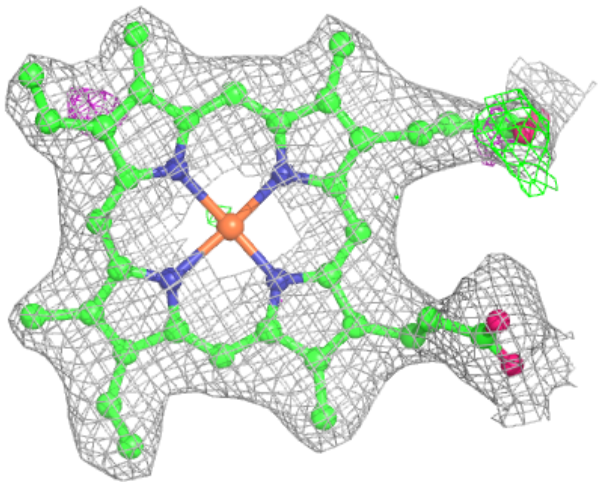


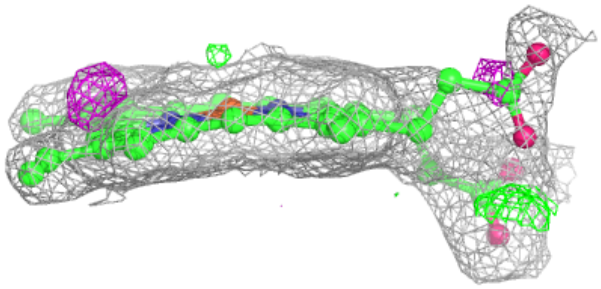


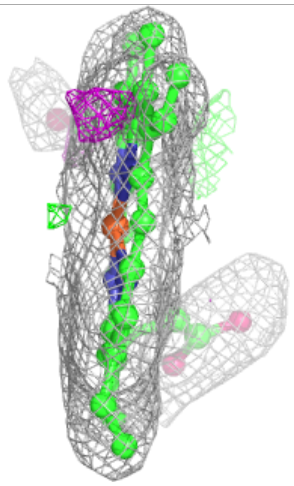


Electron density around HEM B 701:

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

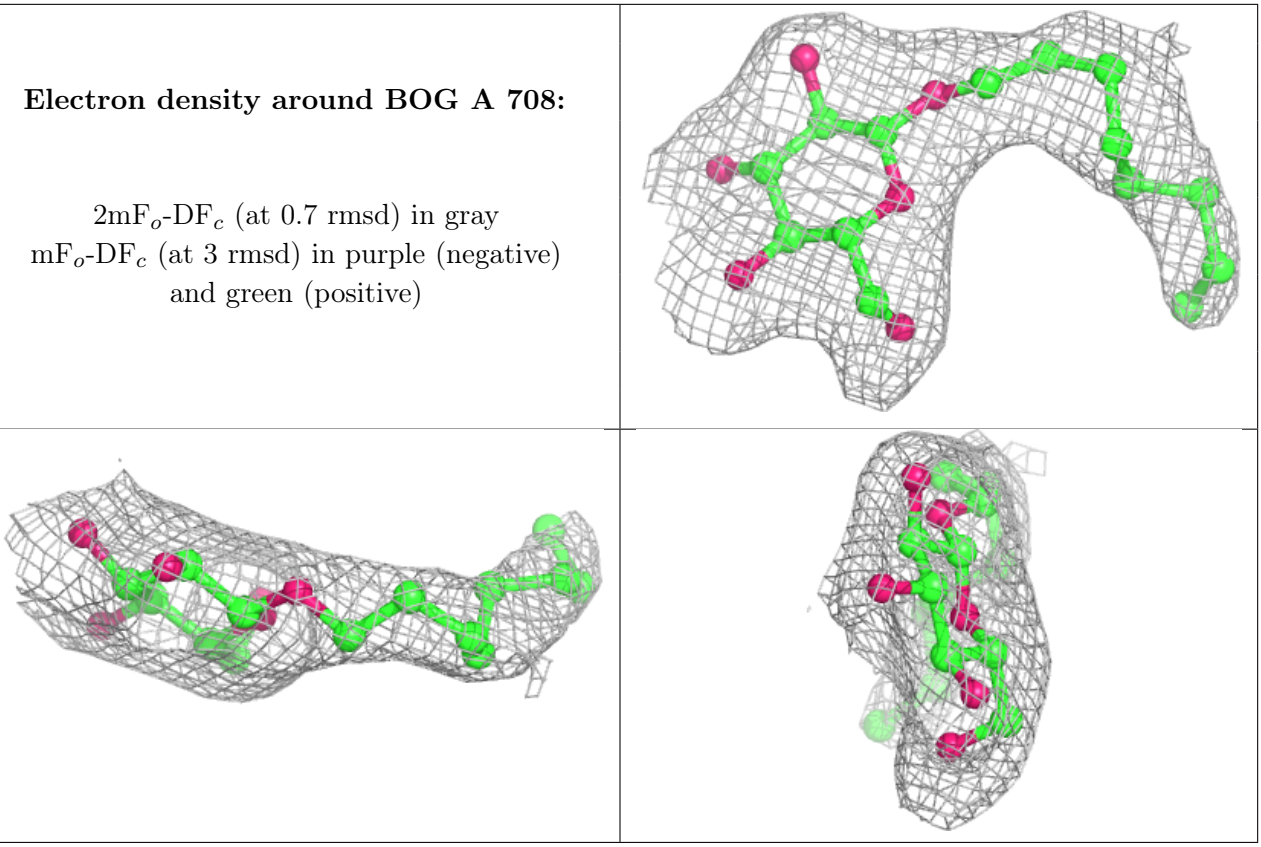






Electron density around BOG A 708:

$2mF_o$-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.