Full wwPDB X-ray Structure Validation Report (i)

Sep 11, 2023 – 08:32 PM EDT

PDB ID	:	4M10
Title	:	Crystal Structure of Murine Cyclooxygenase-2 Complex with Isoxicam
Authors	:	Xu, S.; Hermanson, D.J.; Banerjee, S.; Ghebreelasie, K.; Marnett, L.J.
Deposited on	:	2013-08-02
Resolution	:	2.01 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (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:

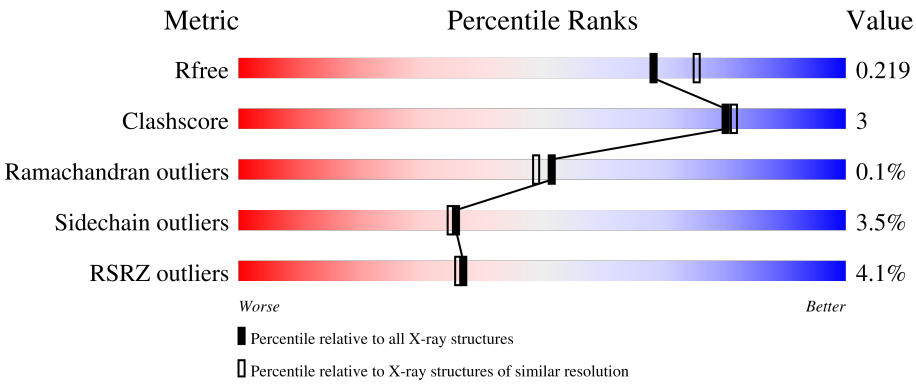
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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 2.01 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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	4% 88% 5% 6%
1	B	587	4% 85% 9% 6%
1	C	587	4% 86% 7% 6%
1	D	587	4% 88% 6% • 6%
2	E	2	100%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	2	100%
2	G	2	50% 50%
2	H	2	100%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 20207 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.

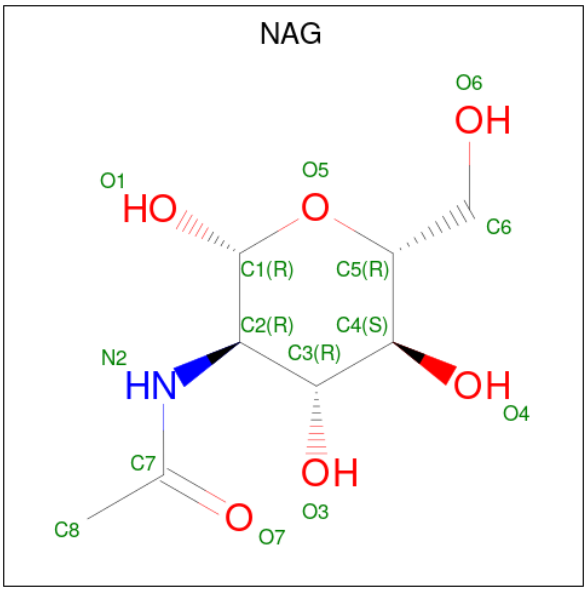
- Molecule 1 is a protein called Prostaglandin G/H synthase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	552	4480	2889	750	816	25	0	1	0
1	B	552	4474	2885	750	814	25	0	0	0
1	C	551	4465	2880	748	812	25	0	0	0
1	D	552	4482	2890	753	814	25	0	1	0

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

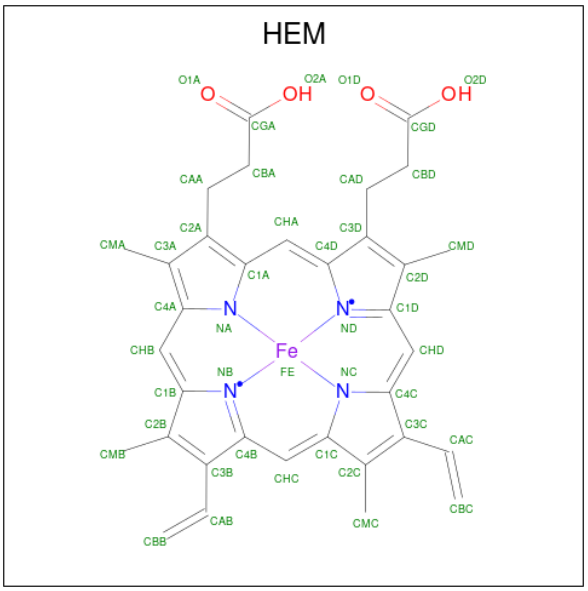
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	E	2	28	16	2	10	0	0	0
2	F	2	28	16	2	10	0	0	0
2	G	2	28	16	2	10	0	0	0
2	H	2	28	16	2	10	0	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



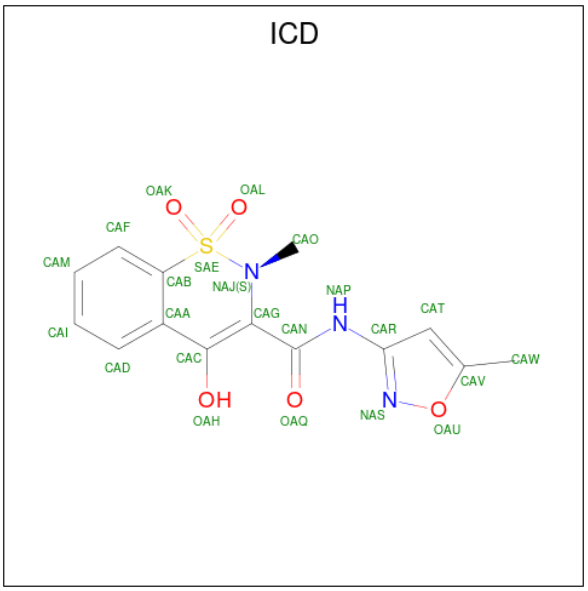
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	14	8	1	5	0	0
			Total	C	N	O		
3	A	1	14	8	1	5	0	0
			Total	C	N	O		
3	B	1	14	8	1	5	0	0
			Total	C	N	O		
3	B	1	14	8	1	5	0	0
			Total	C	N	O		
3	C	1	14	8	1	5	0	0
			Total	C	N	O		
3	C	1	14	8	1	5	0	0
			Total	C	N	O		
3	D	1	14	8	1	5	0	0
			Total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

- Molecule 4 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



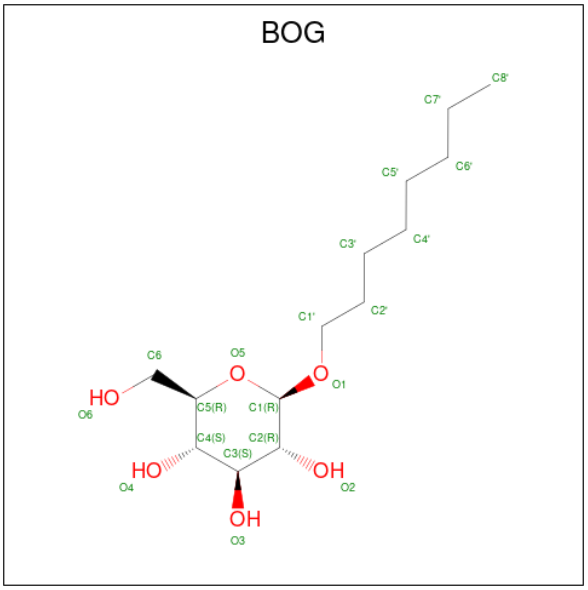
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	Fe	N	O		
4	A	1	43	34	1	4	4	0	0
			Total	C	Fe	N	O		
4	B	1	43	34	1	4	4	0	0
			Total	C	Fe	N	O		
4	C	1	43	34	1	4	4	0	0
			Total	C	Fe	N	O		
4	D	1	43	34	1	4	4	0	0

- Molecule 5 is 4-hydroxy-2-methyl-N-(5-methyl-1,2-oxazol-3-yl)-2H-1,2-benzothiazine-3-carb oxamide 1,1-dioxide (three-letter code: ICD) (formula: $C_{14}H_{13}N_3O_5S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
5	A	1	23	14	3	5	1	0	0
5	B	1	23	14	3	5	1	0	0
5	C	1	23	14	3	5	1	0	0
5	D	1	23	14	3	5	1	0	0

- Molecule 6 is octyl beta-D-glucopyranoside (three-letter code: BOG) (formula: $C_{14}H_{28}O_6$).



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

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	403	403	403	0	0
7	B	412	412	412	0	0

Continued on next page...

Continued from previous page...

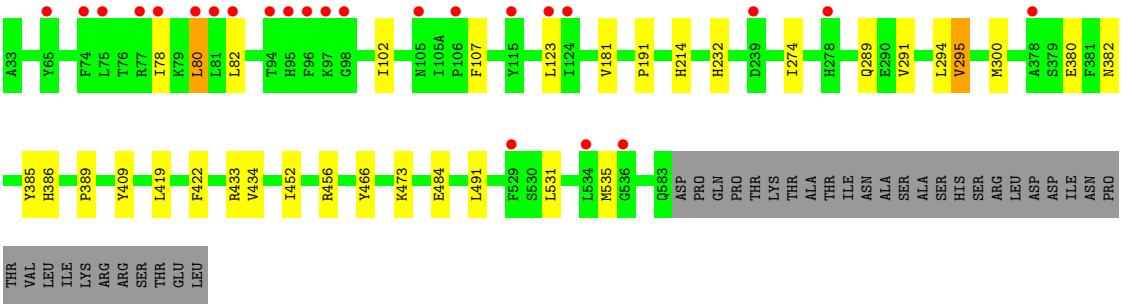
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	C	472	472	472	0	0
			Total	O		
7	D	451	451	451	0	0

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.

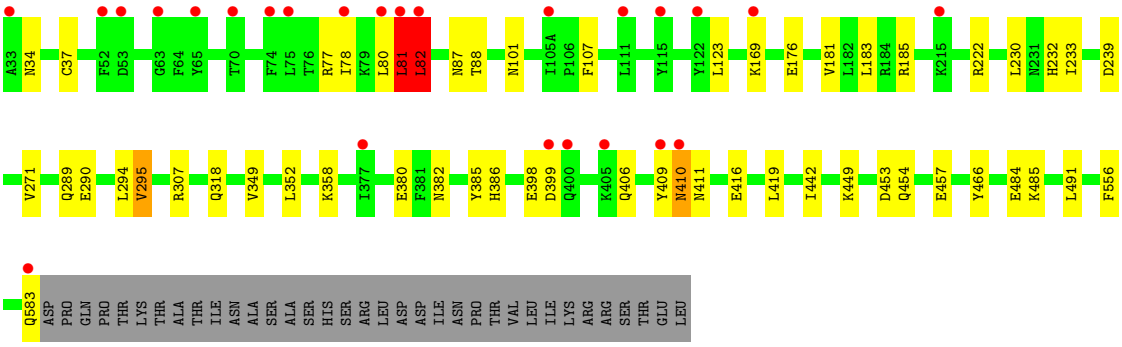
• Molecule 1: Prostaglandin G/H synthase 2

Chain A: 4% 88% 5% 6%



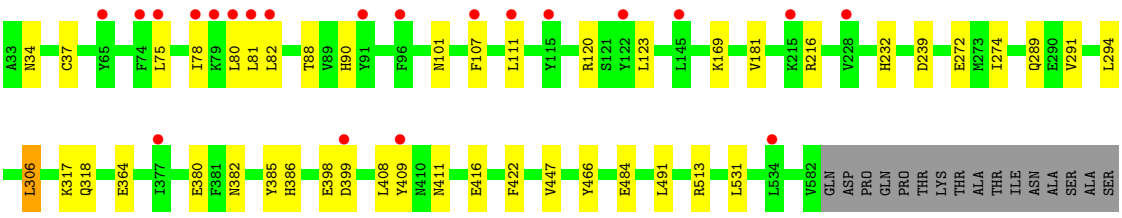
• Molecule 1: Prostaglandin G/H synthase 2

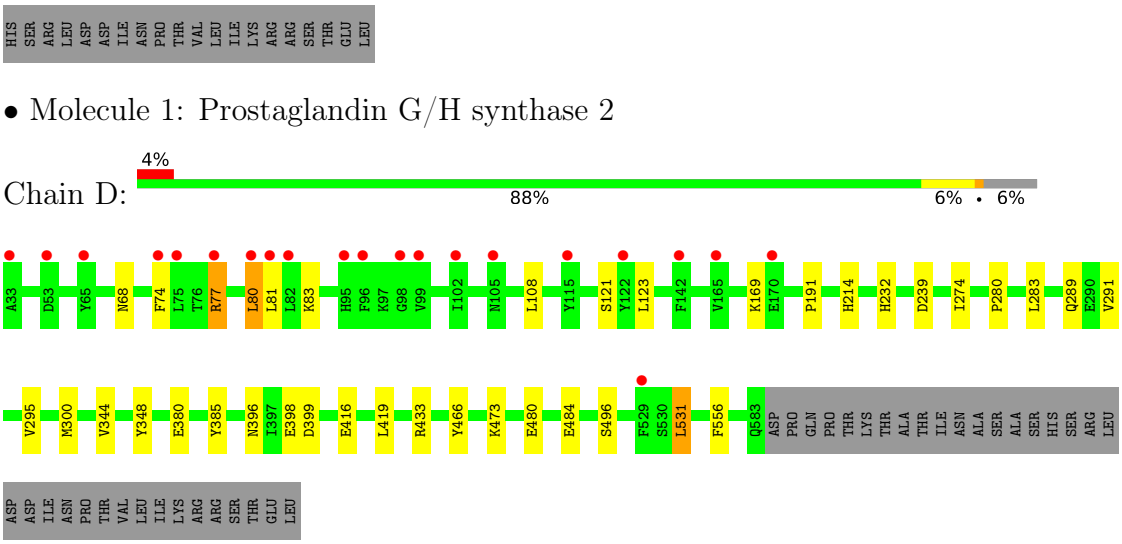
Chain B: 4% 85% 9% 6%



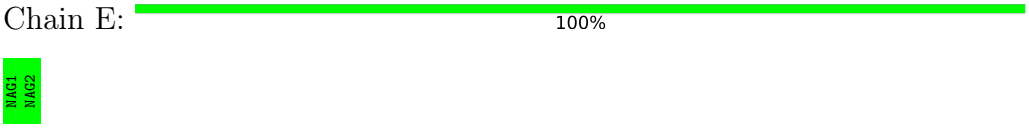
• Molecule 1: Prostaglandin G/H synthase 2

Chain C: 4% 86% 7% 6%

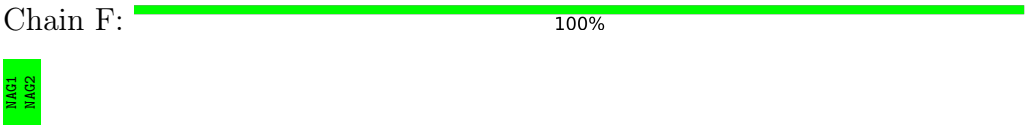




• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

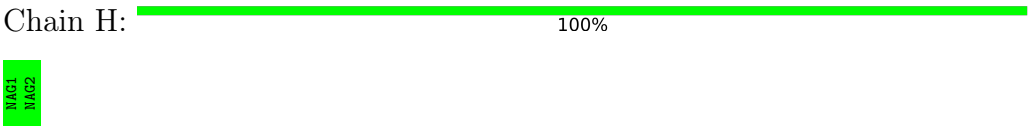


• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



• 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



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 2 21 21	Depositor
Cell constants a, b, c, α, β, γ	122.61Å 134.08Å 180.44Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.27 – 2.01 49.27 – 2.01	Depositor EDS
% Data completeness (in resolution range)	99.1 (49.27-2.01) 89.0 (49.27-2.01)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$< I/\sigma(I) >$ [1]	4.05 (at 2.01Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, R_{free}	0.189 , 0.220 0.189 , 0.219	Depositor DCC
R_{free} test set	9856 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	23.5	Xtriage
Anisotropy	0.519	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 49.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	20207	wwPDB-VP
Average B, all atoms (Å^2)	29.0	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 52.32 % 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 4.9494e-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 (i)

5.1 Standard geometry (i)

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

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	0.48	0/4610	0.55	0/6251
1	B	0.48	0/4601	0.55	0/6239
1	C	0.50	0/4592	0.57	1/6227 (0.0%)
1	D	0.51	0/4612	0.56	1/6253 (0.0%)
All	All	0.49	0/18415	0.56	2/24970 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	306	LEU	CA-CB-CG	6.71	130.74	115.30
1	D	531	LEU	CA-CB-CG	6.62	130.52	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4480	0	4379	17	0
1	B	4474	0	4373	32	0
1	C	4465	0	4364	17	0
1	D	4482	0	4386	16	0
2	E	28	0	25	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	28	0	25	0	0
2	G	28	0	25	1	0
2	H	28	0	25	0	0
3	A	28	0	26	0	0
3	B	28	0	26	5	0
3	C	28	0	26	1	0
3	D	28	0	26	1	0
4	A	43	0	30	4	0
4	B	43	0	30	2	0
4	C	43	0	30	1	0
4	D	43	0	30	3	0
5	A	23	0	12	3	0
5	B	23	0	12	2	0
5	C	23	0	12	2	0
5	D	23	0	12	2	0
6	B	40	0	56	9	0
6	C	20	0	28	1	0
6	D	20	0	28	0	0
7	A	403	0	0	1	0
7	B	412	0	0	2	0
7	C	472	0	0	4	0
7	D	451	0	0	3	0
All	All	20207	0	17986	98	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:410:ASN:HD21	3:B:704:NAG:C1	1.16	1.58
1:B:410:ASN:CG	3:B:704:NAG:C1	2.38	0.90
1:B:410:ASN:OD1	3:B:704:NAG:C1	2.31	0.78
1:B:185:ARG:HE	6:B:707:BOG:H62	1.53	0.73
1:B:185:ARG:HH21	6:B:707:BOG:H62	1.55	0.70
1:B:88:THR:HG23	6:B:708:BOG:H4'1	1.74	0.69
1:D:280:PRO:HG2	1:D:283:LEU:HD12	1.76	0.68
1:B:294:LEU:HG	1:B:295:VAL:HG12	1.76	0.66
5:B:706:ICD:OAH	5:B:706:ICD:NAP	2.22	0.65
4:A:705:HEM:HBC2	4:A:705:HEM:HHD	1.80	0.64
1:C:447:VAL:HG13	4:C:705:HEM:HBA1	1.81	0.62

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:216:ARG:NH1	2:G:2:NAG:O7	2.34	0.60
1:B:222:ARG:NH2	1:B:290:GLU:OE2	2.34	0.60
4:D:705:HEM:HBC2	4:D:705:HEM:HHD	1.84	0.58
1:C:531:LEU:HD13	5:C:706:ICD:CAM	2.35	0.57
5:C:706:ICD:OAH	5:C:706:ICD:NAP	2.31	0.56
4:B:705:HEM:HBB2	4:B:705:HEM:HMB2	1.87	0.55
1:A:274:ILE:HD12	1:A:291:VAL:HG12	1.88	0.55
1:B:411:ASN:ND2	7:B:1065:HOH:O	2.40	0.55
1:C:294:LEU:HD22	1:C:409:TYR:CD1	2.42	0.55
5:D:706:ICD:OAH	5:D:706:ICD:NAP	2.28	0.55
1:B:185:ARG:NH2	6:B:707:BOG:H62	2.22	0.54
1:B:185:ARG:NE	6:B:707:BOG:H62	2.24	0.53
1:D:274:ILE:HD12	1:D:291:VAL:HG12	1.91	0.53
1:A:386:HIS:HE1	7:A:1193:HOH:O	1.91	0.52
1:D:191:PRO:HD2	1:D:433[A]:ARG:HD3	1.92	0.51
1:A:531:LEU:HD13	5:A:706:ICD:CAM	2.41	0.51
1:C:88:THR:HG23	6:C:707:BOG:H3'1	1.92	0.51
1:C:181:VAL:HG21	1:C:491:LEU:HD21	1.92	0.51
5:A:706:ICD:OAH	5:A:706:ICD:NAP	2.32	0.50
1:B:80:LEU:O	1:B:82:LEU:N	2.41	0.50
1:A:214:HIS:NE2	4:A:705:HEM:O1A	2.41	0.49
1:B:294:LEU:HA	1:B:409:TYR:CE1	2.47	0.49
1:C:274:ILE:HD12	1:C:291:VAL:HG12	1.95	0.48
3:C:701:NAG:H61	7:C:1245:HOH:O	2.12	0.48
1:D:380:GLU:HG2	1:D:466:TYR:CE1	2.49	0.48
1:C:34:ASN:HB3	1:C:37:CYS:SG	2.54	0.48
1:B:410:ASN:ND2	3:B:704:NAG:O5	2.41	0.47
1:B:449:LYS:NZ	1:B:453:ASP:OD2	2.46	0.47
1:C:120:ARG:HD3	7:C:1195:HOH:O	2.13	0.47
4:D:705:HEM:HMB2	4:D:705:HEM:HBB2	1.97	0.46
1:B:185:ARG:HE	6:B:707:BOG:C6	2.25	0.46
1:B:230:LEU:HG	1:B:233:ILE:HD12	1.97	0.46
1:C:382:ASN:O	1:C:386:HIS:HD2	1.99	0.46
1:D:396:ASN:HB3	7:D:1037:HOH:O	2.14	0.46
1:B:80:LEU:C	1:B:82:LEU:H	2.18	0.46
4:A:705:HEM:HMB2	4:A:705:HEM:HBB2	1.98	0.46
1:B:87:ASN:HB2	6:B:708:BOG:H62	1.98	0.45
1:B:382:ASN:O	1:B:386:HIS:HD2	2.00	0.45
1:B:406:GLN:O	1:B:410:ASN:OD1	2.35	0.45
1:D:214:HIS:NE2	4:D:705:HEM:O1A	2.49	0.45
1:D:473:LYS:NZ	7:D:1134:HOH:O	2.49	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:380:GLU:HG2	1:A:466:TYR:CE1	2.52	0.45
1:A:419:LEU:HD23	1:A:419:LEU:HA	1.77	0.45
1:A:300:MET:HG3	1:A:419:LEU:CD2	2.46	0.45
1:D:398:GLU:HB3	1:D:399:ASP:H	1.63	0.45
1:D:68:ASN:HD22	3:D:701:NAG:H83	1.82	0.44
1:A:531:LEU:HD12	1:A:535:MET:HG2	1.99	0.44
1:A:382:ASN:O	1:A:386:HIS:HD2	2.01	0.44
1:C:411:ASN:ND2	7:C:1171:HOH:O	2.51	0.43
1:A:294:LEU:HA	1:A:409:TYR:CE1	2.53	0.43
1:D:80:LEU:HD12	1:D:80:LEU:HA	1.86	0.43
1:D:300:MET:HG3	1:D:419:LEU:HD22	2.01	0.43
1:A:181:VAL:HG21	1:A:491:LEU:HD21	2.01	0.43
1:A:389:PRO:HB2	1:A:434:VAL:HA	2.00	0.43
1:A:452:ILE:O	1:A:456:ARG:HG3	2.18	0.43
1:D:74:PHE:O	1:D:77:ARG:HG3	2.18	0.43
1:C:75:LEU:HA	1:C:78:ILE:HD12	1.99	0.43
1:D:83:LYS:HE3	1:D:83:LYS:HB2	1.89	0.43
1:C:317:LYS:HB2	7:C:1229:HOH:O	2.19	0.43
1:B:77:ARG:O	1:B:81:LEU:HG	2.18	0.43
1:A:78:ILE:O	1:A:82:LEU:HG	2.18	0.42
5:B:706:ICD:HAT	5:B:706:ICD:OAQ	2.19	0.42
1:D:191:PRO:CD	1:D:433[A]:ARG:HD3	2.48	0.42
1:D:480:GLU:OE1	7:D:1134:HOH:O	2.21	0.42
1:A:80:LEU:HD12	1:A:80:LEU:HA	1.86	0.42
1:A:295:VAL:HG11	4:A:705:HEM:CBB	2.50	0.42
1:B:307:ARG:NH1	1:B:419:LEU:HD12	2.34	0.42
1:C:90:HIS:CE1	1:C:513:ARG:HG2	2.55	0.42
1:B:454:GLN:HA	1:B:457:GLU:HB2	2.02	0.42
4:B:705:HEM:HBC2	4:B:705:HEM:HHD	2.01	0.42
1:A:191:PRO:HD2	1:A:433:ARG:HD3	2.02	0.42
1:B:181:VAL:HG21	1:B:491:LEU:HD21	2.02	0.41
1:B:398:GLU:HB3	1:B:399:ASP:H	1.66	0.41
6:B:708:BOG:H7'1	6:B:708:BOG:H4'2	1.86	0.41
6:B:707:BOG:H5'1	6:B:707:BOG:H2'2	1.77	0.41
1:B:442:ILE:HG13	7:B:847:HOH:O	2.20	0.41
5:A:706:ICD:HAT	5:A:706:ICD:OAQ	2.21	0.41
1:C:398:GLU:HB3	1:C:399:ASP:H	1.63	0.41
1:C:380:GLU:HG2	1:C:466:TYR:CE1	2.55	0.41
1:B:34:ASN:HB3	1:B:37:CYS:SG	2.61	0.41
1:B:410:ASN:OD1	3:B:704:NAG:C2	2.68	0.41
1:B:380:GLU:HG2	1:B:466:TYR:CE1	2.56	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:344:VAL:HA	1:D:348:TYR:HB3	2.03	0.41
1:B:349:VAL:HA	1:B:352:LEU:HG	2.01	0.41
1:B:78:ILE:O	1:B:82:LEU:HG	2.21	0.40
1:C:78:ILE:O	1:C:82:LEU:HG	2.21	0.40
5:D:706:ICD:OAQ	5:D:706:ICD:HAT	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	551/587 (94%)	534 (97%)	17 (3%)	0	100	100
1	B	550/587 (94%)	529 (96%)	19 (4%)	2 (0%)	34	30
1	C	549/587 (94%)	535 (97%)	14 (3%)	0	100	100
1	D	551/587 (94%)	536 (97%)	15 (3%)	0	100	100
All	All	2201/2348 (94%)	2134 (97%)	65 (3%)	2 (0%)	51	49

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	82	LEU
1	B	81	LEU

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	494/525 (94%)	483 (98%)	11 (2%)	52	55
1	B	493/525 (94%)	471 (96%)	22 (4%)	27	24
1	C	492/525 (94%)	473 (96%)	19 (4%)	32	30
1	D	494/525 (94%)	477 (97%)	17 (3%)	37	36
All	All	1973/2100 (94%)	1904 (96%)	69 (4%)	36	35

All (69) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	80	LEU
1	A	102	ILE
1	A	107	PHE
1	A	123	LEU
1	A	232	HIS
1	A	289	GLN
1	A	295	VAL
1	A	385	TYR
1	A	422	PHE
1	A	473	LYS
1	A	484	GLU
1	B	81	LEU
1	B	82	LEU
1	B	101	ASN
1	B	107	PHE
1	B	123	LEU
1	B	169	LYS
1	B	176	GLU
1	B	183	LEU
1	B	232	HIS
1	B	239	ASP
1	B	271	VAL
1	B	289	GLN
1	B	295	VAL
1	B	318	GLN
1	B	358	LYS
1	B	385	TYR
1	B	410	ASN
1	B	416	GLU
1	B	484	GLU
1	B	485	LYS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	556	PHE
1	B	583	GLN
1	C	80	LEU
1	C	81	LEU
1	C	101	ASN
1	C	107	PHE
1	C	111	LEU
1	C	123	LEU
1	C	169	LYS
1	C	232	HIS
1	C	239	ASP
1	C	272	GLU
1	C	289	GLN
1	C	306	LEU
1	C	318	GLN
1	C	364	GLU
1	C	385	TYR
1	C	408	LEU
1	C	416	GLU
1	C	422	PHE
1	C	484	GLU
1	D	77	ARG
1	D	80	LEU
1	D	81	LEU
1	D	108	LEU
1	D	121	SER
1	D	123	LEU
1	D	169	LYS
1	D	232	HIS
1	D	239	ASP
1	D	289	GLN
1	D	295	VAL
1	D	385	TYR
1	D	416	GLU
1	D	484	GLU
1	D	496	SER
1	D	531	LEU
1	D	556	PHE

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

Mol	Chain	Res	Type
1	B	410	ASN
1	C	386	HIS

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	2,1	14,14,15	0.27	0	17,19,21	0.59	0
2	NAG	E	2	2	14,14,15	0.40	0	17,19,21	0.35	0
2	NAG	F	1	2,1	14,14,15	0.23	0	17,19,21	0.45	0
2	NAG	F	2	2	14,14,15	0.50	0	17,19,21	0.43	0
2	NAG	G	1	2,1	14,14,15	0.35	0	17,19,21	0.50	0
2	NAG	G	2	2	14,14,15	0.35	0	17,19,21	0.55	0
2	NAG	H	1	2,1	14,14,15	0.23	0	17,19,21	0.66	0
2	NAG	H	2	2	14,14,15	0.49	0	17,19,21	0.45	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	2,1	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	2/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	F	1	2,1	-	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	2,1	-	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	2,1	-	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.

There are no bond angle outliers.

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	G	2	NAG	O5-C5-C6-O6
2	H	2	NAG	O5-C5-C6-O6
2	G	2	NAG	C4-C5-C6-O6
2	H	2	NAG	C4-C5-C6-O6
2	E	2	NAG	C4-C5-C6-O6
2	E	2	NAG	O5-C5-C6-O6

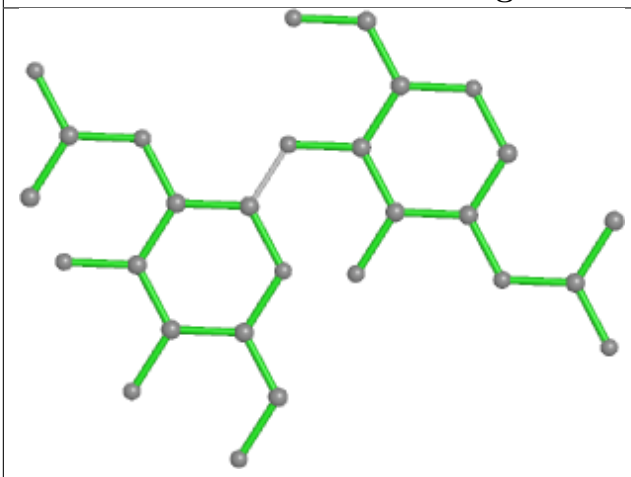
There are no ring outliers.

1 monomer is involved in 1 short contact:

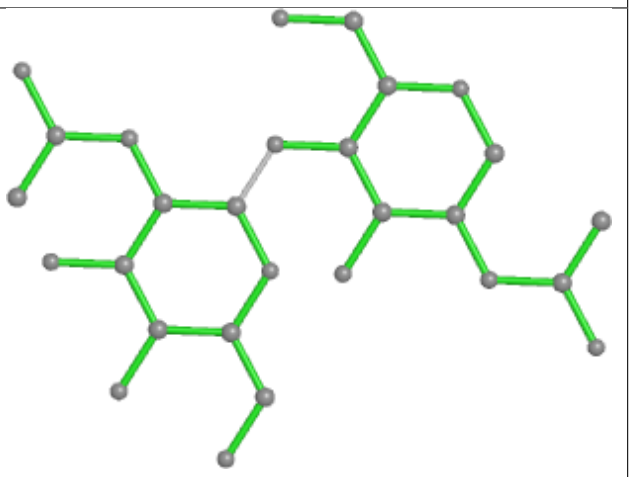
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	G	2	NAG	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

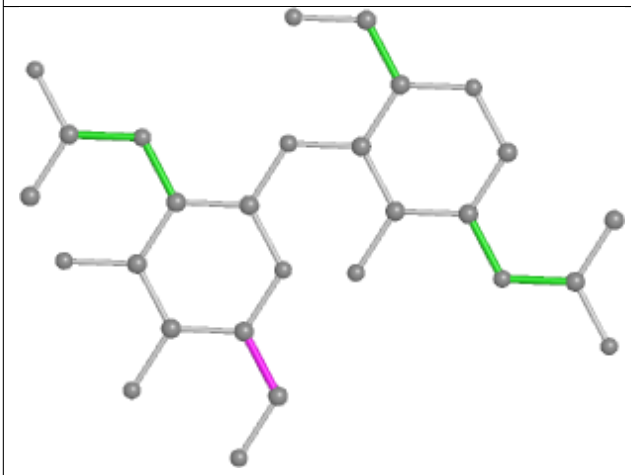
Oligosaccharide Chain E



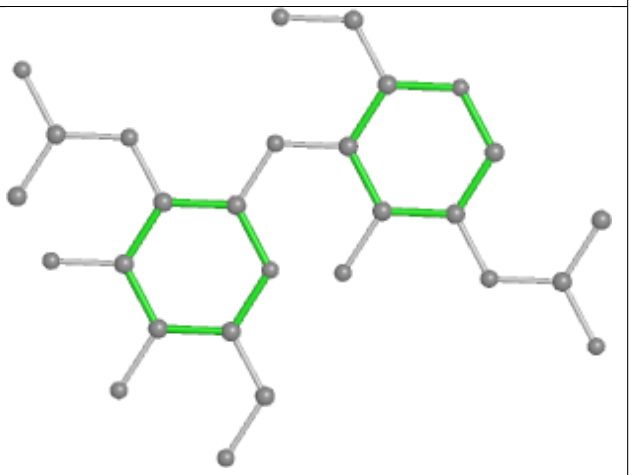
Bond lengths



Bond angles

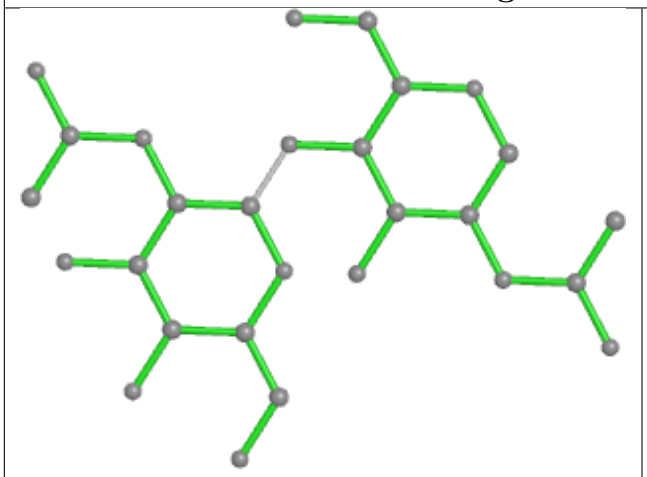


Torsions

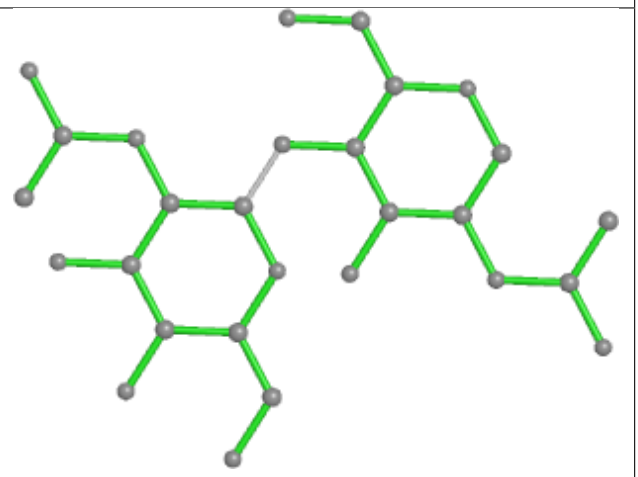


Rings

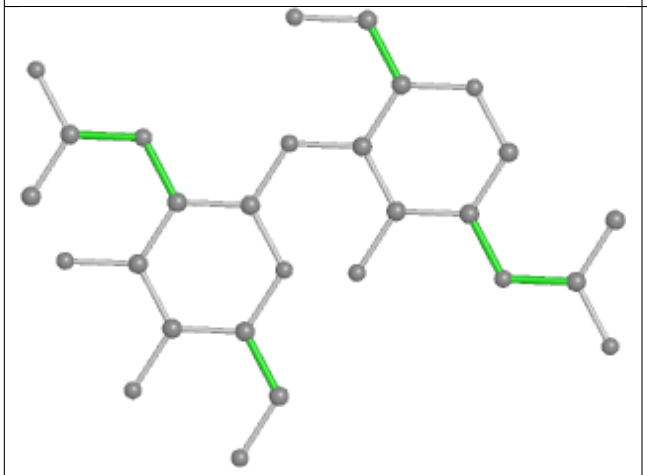
Oligosaccharide Chain F



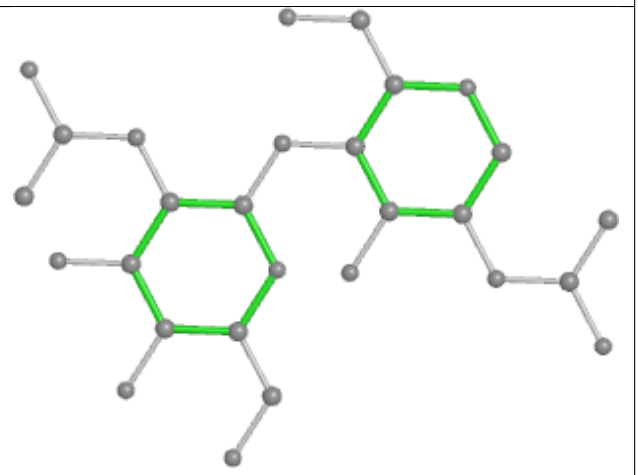
Bond lengths



Bond angles

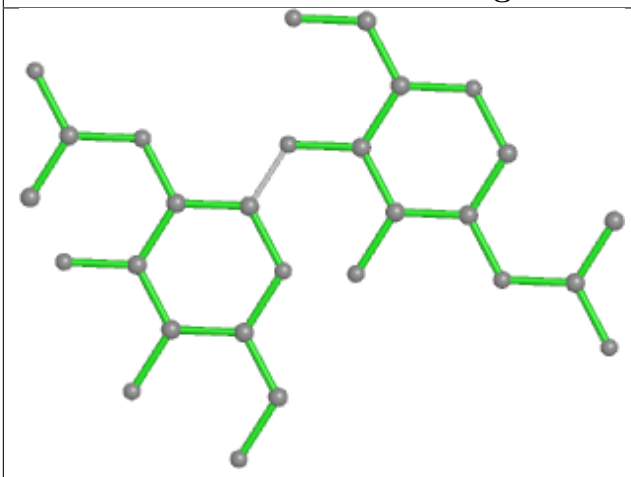


Torsions

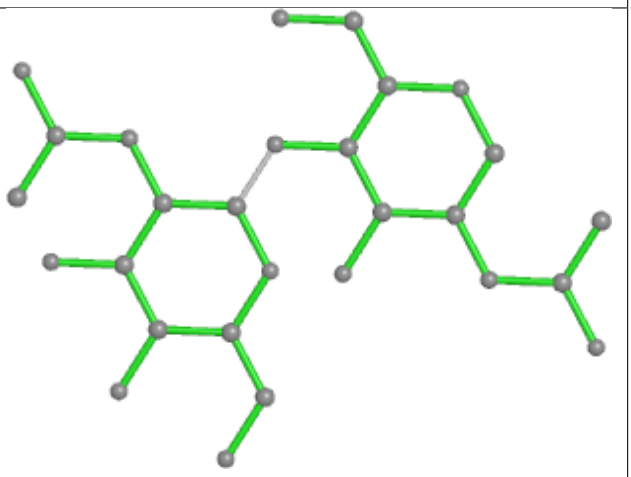


Rings

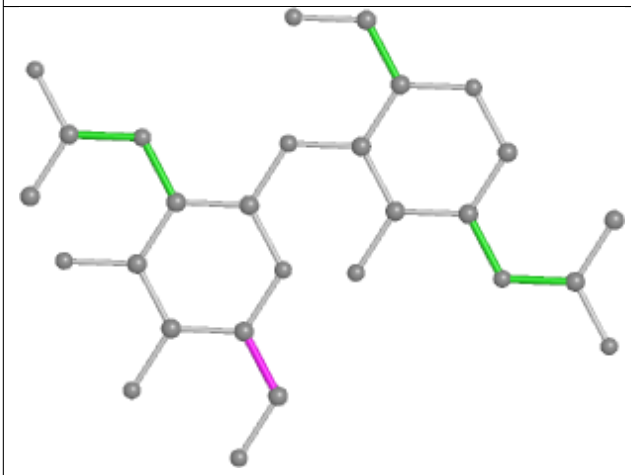
Oligosaccharide Chain G



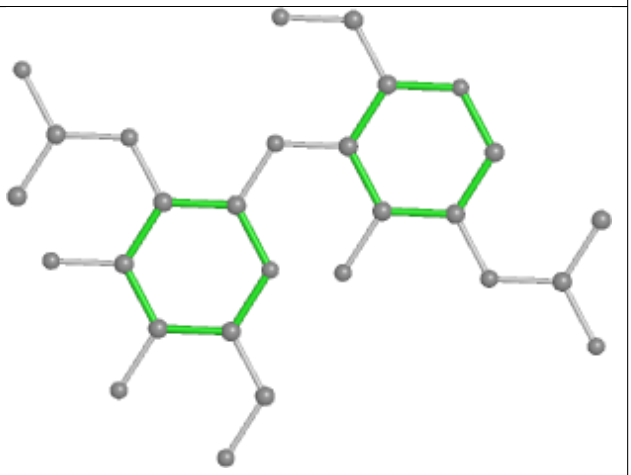
Bond lengths



Bond angles

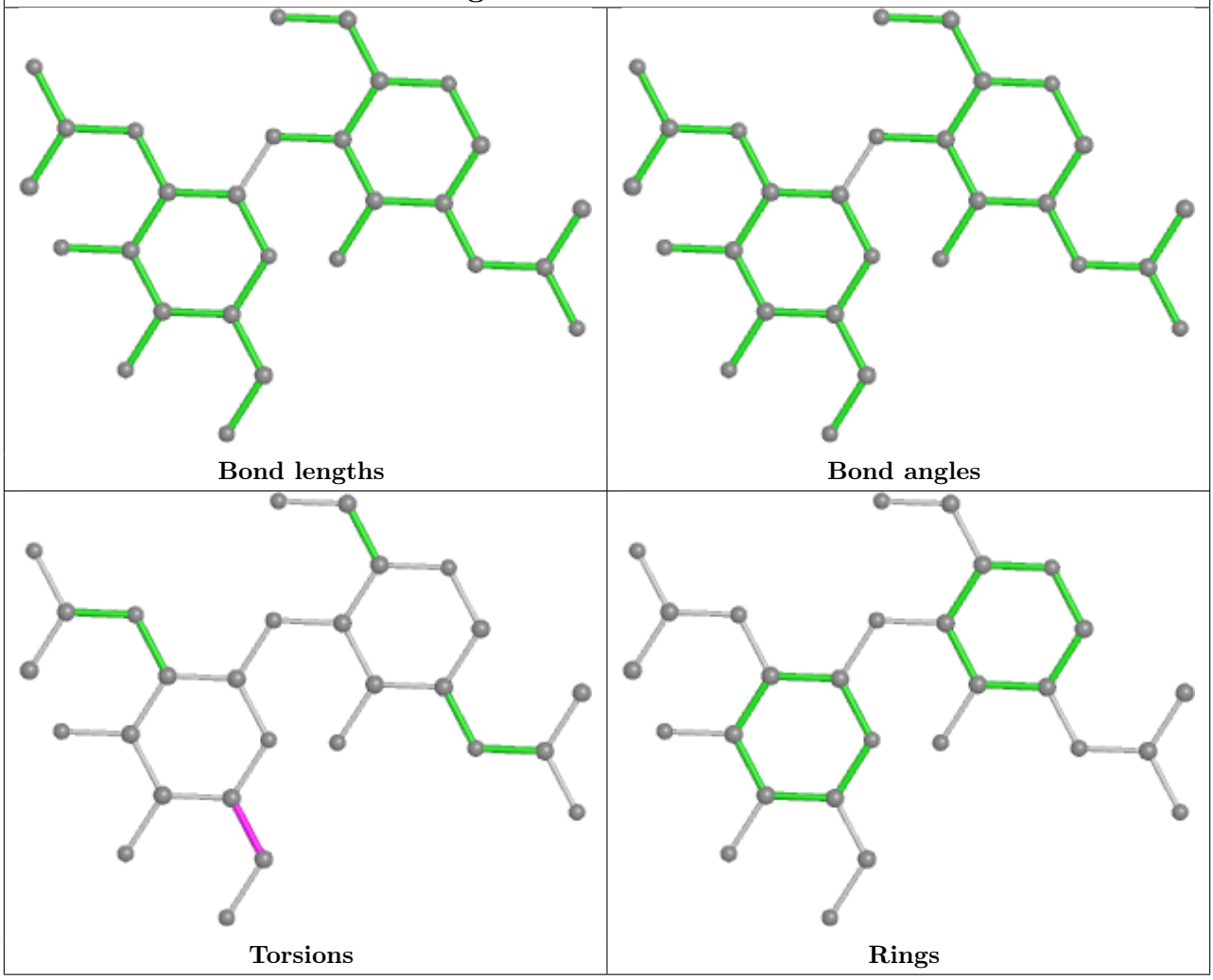


Torsions



Rings

Oligosaccharide Chain H



5.6 Ligand geometry (i)

20 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	ICD	B	706	-	22,25,25	4.21	12 (54%)	31,38,38	4.42	15 (48%)
3	NAG	B	704	1	14,14,15	0.86	1 (7%)	17,19,21	0.57	0
3	NAG	B	701	1	14,14,15	0.96	1 (7%)	17,19,21	1.30	3 (17%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	HEM	A	705	7,1	41,50,50	1.92	7 (17%)	45,82,82	1.91	7 (15%)
3	NAG	D	701	1	14,14,15	0.61	1 (7%)	17,19,21	0.71	0
6	BOG	C	707	-	20,20,20	1.06	1 (5%)	25,25,25	1.08	1 (4%)
4	HEM	C	705	7,1	41,50,50	1.97	7 (17%)	45,82,82	1.86	9 (20%)
6	BOG	B	708	-	20,20,20	1.04	1 (5%)	25,25,25	1.25	2 (8%)
6	BOG	D	707	-	20,20,20	1.04	1 (5%)	25,25,25	1.15	2 (8%)
3	NAG	C	704	1	14,14,15	0.26	0	17,19,21	0.46	0
4	HEM	B	705	7,1	41,50,50	1.92	7 (17%)	45,82,82	1.60	7 (15%)
4	HEM	D	705	1	41,50,50	1.93	6 (14%)	45,82,82	1.80	7 (15%)
3	NAG	C	701	1	14,14,15	1.31	1 (7%)	17,19,21	2.16	3 (17%)
3	NAG	A	701	1	14,14,15	0.30	0	17,19,21	0.72	0
3	NAG	A	704	1	14,14,15	0.28	0	17,19,21	0.45	0
5	ICD	D	706	-	22,25,25	3.96	13 (59%)	31,38,38	4.70	17 (54%)
3	NAG	D	704	1	14,14,15	0.32	0	17,19,21	0.34	0
6	BOG	B	707	-	20,20,20	0.83	1 (5%)	25,25,25	1.55	5 (20%)
5	ICD	A	706	-	22,25,25	4.79	13 (59%)	31,38,38	4.37	16 (51%)
5	ICD	C	706	-	22,25,25	4.02	11 (50%)	31,38,38	4.36	16 (51%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	ICD	B	706	-	-	0/6/32/32	0/3/3/3
3	NAG	B	704	1	-	0/6/23/26	0/1/1/1
3	NAG	B	701	1	-	4/6/23/26	0/1/1/1
4	HEM	A	705	7,1	-	2/12/54/54	-
3	NAG	D	701	1	-	4/6/23/26	0/1/1/1
6	BOG	C	707	-	-	7/11/31/31	0/1/1/1
4	HEM	C	705	7,1	-	0/12/54/54	-
6	BOG	B	708	-	-	7/11/31/31	0/1/1/1
6	BOG	D	707	-	-	8/11/31/31	0/1/1/1
3	NAG	C	704	1	-	2/6/23/26	0/1/1/1
4	HEM	B	705	7,1	-	0/12/54/54	-
4	HEM	D	705	1	-	1/12/54/54	-
3	NAG	C	701	1	-	3/6/23/26	0/1/1/1
3	NAG	A	701	1	-	4/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	A	704	1	-	0/6/23/26	0/1/1/1
5	ICD	D	706	-	-	0/6/32/32	0/3/3/3
3	NAG	D	704	1	-	0/6/23/26	0/1/1/1
6	BOG	B	707	-	-	6/11/31/31	0/1/1/1
5	ICD	A	706	-	-	0/6/32/32	0/3/3/3
5	ICD	C	706	-	-	0/6/32/32	0/3/3/3

All (84) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	706	ICD	CAB-SAE	-10.88	1.60	1.75
5	A	706	ICD	OAL-SAE	9.12	1.53	1.43
5	A	706	ICD	SAE-NAJ	-9.00	1.52	1.64
5	B	706	ICD	OAL-SAE	8.89	1.53	1.43
5	C	706	ICD	OAL-SAE	8.89	1.53	1.43
5	C	706	ICD	CAB-SAE	-8.14	1.64	1.75
5	D	706	ICD	SAE-NAJ	-7.79	1.53	1.64
4	A	705	HEM	C3D-C2D	7.78	1.53	1.36
4	C	705	HEM	C3D-C2D	7.76	1.53	1.36
4	B	705	HEM	C3D-C2D	7.67	1.53	1.36
4	D	705	HEM	C3D-C2D	7.60	1.52	1.36
5	A	706	ICD	OAK-SAE	7.45	1.51	1.43
5	C	706	ICD	CAG-CAC	7.43	1.46	1.36
5	B	706	ICD	SAE-NAJ	-7.33	1.54	1.64
5	A	706	ICD	CAG-CAC	7.17	1.46	1.36
5	D	706	ICD	OAL-SAE	7.14	1.51	1.43
5	B	706	ICD	OAK-SAE	7.07	1.51	1.43
5	B	706	ICD	CAG-CAC	7.02	1.46	1.36
5	A	706	ICD	OAQ-CAN	6.91	1.36	1.23
5	D	706	ICD	CAG-CAC	6.77	1.45	1.36
5	D	706	ICD	OAK-SAE	6.66	1.50	1.43
5	B	706	ICD	CAB-SAE	-6.39	1.66	1.75
5	B	706	ICD	OAQ-CAN	6.20	1.35	1.23
5	D	706	ICD	OAQ-CAN	6.16	1.35	1.23
5	C	706	ICD	OAQ-CAN	6.06	1.35	1.23
5	C	706	ICD	OAK-SAE	5.89	1.50	1.43
5	D	706	ICD	CAB-SAE	-5.87	1.67	1.75
5	C	706	ICD	SAE-NAJ	-4.97	1.57	1.64
4	C	705	HEM	C3C-C2C	-4.51	1.34	1.40
5	A	706	ICD	CAW-CAV	4.39	1.53	1.48
3	C	701	NAG	O5-C1	4.35	1.50	1.43
4	D	705	HEM	C3C-C2C	-4.34	1.34	1.40

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	706	ICD	CAW-CAV	4.34	1.53	1.48
4	A	705	HEM	C3C-C2C	-4.21	1.34	1.40
5	B	706	ICD	CAT-CAV	-4.12	1.33	1.39
5	D	706	ICD	CAT-CAV	-4.08	1.34	1.39
5	A	706	ICD	CAT-CAV	-3.85	1.34	1.39
4	A	705	HEM	C3C-CAC	3.85	1.55	1.47
4	B	705	HEM	C3C-C2C	-3.85	1.35	1.40
4	C	705	HEM	C3C-CAC	3.72	1.55	1.47
5	C	706	ICD	CAT-CAV	-3.67	1.34	1.39
5	D	706	ICD	CAW-CAV	3.57	1.52	1.48
4	B	705	HEM	C3C-CAC	3.44	1.54	1.47
5	C	706	ICD	CAW-CAV	3.34	1.52	1.48
5	B	706	ICD	OAH-CAC	-3.33	1.24	1.33
4	A	705	HEM	CAB-C3B	3.26	1.56	1.47
3	B	704	NAG	C1-C2	3.14	1.57	1.52
5	D	706	ICD	OAH-CAC	-3.14	1.24	1.33
4	D	705	HEM	C3C-CAC	3.09	1.54	1.47
4	C	705	HEM	CAB-C3B	3.09	1.55	1.47
4	B	705	HEM	CAB-C3B	3.03	1.55	1.47
4	D	705	HEM	CAB-C3B	3.03	1.55	1.47
5	A	706	ICD	OAH-CAC	-2.94	1.25	1.33
5	C	706	ICD	OAH-CAC	-2.85	1.25	1.33
5	D	706	ICD	CAA-CAB	-2.68	1.37	1.40
4	C	705	HEM	FE-ND	2.64	2.09	1.96
5	D	706	ICD	CAR-NAP	-2.62	1.34	1.40
5	B	706	ICD	CAR-NAP	-2.62	1.34	1.40
4	C	705	HEM	FE-NB	2.60	2.09	1.96
6	C	707	BOG	O2-C2	-2.58	1.36	1.43
6	D	707	BOG	O2-C2	-2.57	1.36	1.43
6	B	708	BOG	O2-C2	-2.53	1.37	1.43
5	C	706	ICD	CAR-NAP	-2.53	1.34	1.40
5	B	706	ICD	CAA-CAC	-2.41	1.41	1.45
4	D	705	HEM	FE-NB	2.38	2.08	1.96
5	B	706	ICD	CAG-NAJ	-2.37	1.41	1.44
5	A	706	ICD	CAR-NAP	-2.32	1.35	1.40
5	C	706	ICD	CAA-CAB	-2.30	1.38	1.40
4	D	705	HEM	FE-ND	2.30	2.08	1.96
4	A	705	HEM	FE-NB	2.28	2.08	1.96
5	A	706	ICD	CAG-NAJ	-2.26	1.41	1.44
6	B	707	BOG	O2-C2	-2.23	1.37	1.43
3	B	701	NAG	C1-C2	-2.23	1.49	1.52
5	D	706	ICD	CAA-CAC	-2.22	1.42	1.45

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	705	HEM	CMB-C2B	2.21	1.55	1.50
5	D	706	ICD	CAG-NAJ	-2.19	1.41	1.44
4	B	705	HEM	FE-NB	2.13	2.07	1.96
4	B	705	HEM	C4A-NA	2.10	1.40	1.36
5	A	706	ICD	CAA-CAB	-2.10	1.38	1.40
3	D	701	NAG	O5-C1	2.07	1.47	1.43
4	A	705	HEM	FE-ND	2.06	2.07	1.96
5	A	706	ICD	CAA-CAC	-2.06	1.42	1.45
4	C	705	HEM	CAA-C2A	2.06	1.55	1.52
4	A	705	HEM	CMB-C2B	2.00	1.55	1.50

All (110) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	D	706	ICD	CAO-NAJ-SAE	13.19	137.66	116.94
5	B	706	ICD	CAO-NAJ-SAE	12.76	136.98	116.94
5	C	706	ICD	CAO-NAJ-SAE	12.44	136.49	116.94
5	A	706	ICD	CAO-NAJ-SAE	12.22	136.13	116.94
5	D	706	ICD	OAL-SAE-OAK	-10.50	105.70	118.59
5	A	706	ICD	OAL-SAE-OAK	-10.06	106.24	118.59
5	B	706	ICD	CAG-NAJ-SAE	-9.92	99.69	113.15
5	D	706	ICD	CAG-NAJ-SAE	-9.40	100.40	113.15
5	C	706	ICD	CAG-NAJ-SAE	-9.18	100.69	113.15
5	B	706	ICD	OAL-SAE-OAK	-9.07	107.45	118.59
5	D	706	ICD	OAL-SAE-NAJ	8.76	114.59	108.14
5	C	706	ICD	OAL-SAE-OAK	-8.55	108.10	118.59
5	A	706	ICD	CAG-NAJ-SAE	-8.55	101.55	113.15
4	C	705	HEM	C4D-ND-C1D	7.72	113.04	105.07
5	C	706	ICD	OAL-SAE-NAJ	7.60	113.73	108.14
5	A	706	ICD	OAL-SAE-NAJ	7.29	113.50	108.14
4	A	705	HEM	C4D-ND-C1D	7.07	112.37	105.07
5	A	706	ICD	CAB-SAE-NAJ	7.03	111.11	101.91
3	C	701	NAG	C1-O5-C5	7.02	121.70	112.19
5	D	706	ICD	CAO-NAJ-CAG	-6.52	106.11	115.09
4	D	705	HEM	C4D-ND-C1D	6.47	111.75	105.07
5	B	706	ICD	CAA-CAB-SAE	-6.39	109.57	117.26
5	B	706	ICD	CAB-SAE-NAJ	6.36	110.24	101.91
5	D	706	ICD	CAB-SAE-NAJ	6.24	110.08	101.91
5	C	706	ICD	CAA-CAB-SAE	-6.23	109.75	117.26
5	B	706	ICD	CAC-CAG-CAN	-6.11	115.23	120.87
5	A	706	ICD	CAA-CAB-SAE	-6.10	109.91	117.26
5	A	706	ICD	CAO-NAJ-CAG	-6.07	106.74	115.09

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	D	706	ICD	CAA-CAB-SAE	-6.06	109.97	117.26
4	B	705	HEM	C4D-ND-C1D	6.03	111.30	105.07
5	C	706	ICD	CAB-SAE-NAJ	6.03	109.80	101.91
4	A	705	HEM	CBA-CAA-C2A	-5.94	102.48	112.62
5	C	706	ICD	CAO-NAJ-CAG	-5.92	106.94	115.09
4	D	705	HEM	CBA-CAA-C2A	-5.46	103.31	112.62
5	B	706	ICD	CAO-NAJ-CAG	-5.34	107.74	115.09
5	C	706	ICD	CAC-CAG-CAN	-5.04	116.22	120.87
5	D	706	ICD	CAB-CAA-CAC	-4.69	117.79	120.47
5	B	706	ICD	CAB-CAA-CAC	-4.65	117.81	120.47
5	D	706	ICD	OAH-CAC-CAG	-4.58	118.42	122.66
6	B	708	BOG	C1'-O1-C1	4.54	121.37	113.84
5	D	706	ICD	CAC-CAG-CAN	-4.49	116.72	120.87
5	B	706	ICD	OAH-CAC-CAG	-4.20	118.77	122.66
5	B	706	ICD	OAL-SAE-NAJ	4.05	111.12	108.14
5	A	706	ICD	CAC-CAG-CAN	-3.97	117.21	120.87
6	D	707	BOG	C1'-O1-C1	3.86	120.25	113.84
5	C	706	ICD	OAK-SAE-CAB	-3.85	104.20	109.13
4	C	705	HEM	CBA-CAA-C2A	-3.81	106.12	112.62
5	B	706	ICD	CAF-CAB-SAE	3.76	126.50	120.56
3	B	701	NAG	C1-O5-C5	3.60	117.07	112.19
6	C	707	BOG	C1'-O1-C1	3.59	119.80	113.84
5	A	706	ICD	CAR-NAP-CAN	-3.59	122.98	128.16
6	B	707	BOG	O2-C2-C1	-3.57	101.38	110.05
4	A	705	HEM	C4B-CHC-C1C	3.50	127.17	122.56
5	B	706	ICD	CAR-NAP-CAN	-3.39	123.28	128.16
4	D	705	HEM	C4C-CHD-C1D	3.38	127.03	122.56
5	C	706	ICD	OAH-CAC-CAG	-3.37	119.54	122.66
6	B	707	BOG	O5-C5-C4	3.27	115.63	109.69
5	A	706	ICD	OAH-CAC-CAG	-3.21	119.68	122.66
3	C	701	NAG	C4-C3-C2	-3.21	106.32	111.02
5	D	706	ICD	CAR-NAP-CAN	-3.20	123.55	128.16
5	C	706	ICD	CAR-NAP-CAN	-3.15	123.63	128.16
4	C	705	HEM	C1B-NB-C4B	3.14	108.31	105.07
4	B	705	HEM	CBD-CAD-C3D	-3.09	104.05	112.63
3	C	701	NAG	C2-N2-C7	3.06	127.27	122.90
5	D	706	ICD	CAF-CAB-SAE	3.04	125.37	120.56
5	A	706	ICD	CAB-CAA-CAC	-2.99	118.76	120.47
6	B	708	BOG	O5-C5-C4	2.91	114.98	109.69
5	C	706	ICD	OAL-SAE-CAB	2.90	112.84	109.13
5	B	706	ICD	CAN-CAG-NAJ	2.87	122.50	116.30
5	C	706	ICD	CAN-CAG-NAJ	2.84	122.45	116.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	705	HEM	CBA-CAA-C2A	-2.84	107.77	112.62
5	A	706	ICD	OAK-SAE-NAJ	-2.83	106.06	108.14
4	B	705	HEM	C4C-CHD-C1D	2.81	126.27	122.56
4	C	705	HEM	CBD-CAD-C3D	-2.76	104.95	112.63
5	C	706	ICD	CAB-CAA-CAC	-2.62	118.98	120.47
4	D	705	HEM	C4B-CHC-C1C	2.62	126.01	122.56
4	D	705	HEM	CBD-CAD-C3D	-2.60	105.40	112.63
5	A	706	ICD	CAN-CAG-NAJ	2.60	121.92	116.30
6	B	707	BOG	C1-O5-C5	2.51	118.62	113.69
5	B	706	ICD	CAA-CAC-CAG	2.50	124.25	122.65
4	C	705	HEM	C4C-CHD-C1D	2.49	125.84	122.56
5	B	706	ICD	OAL-SAE-CAB	2.47	112.30	109.13
5	A	706	ICD	OAL-SAE-CAB	2.46	112.29	109.13
4	A	705	HEM	C1B-NB-C4B	2.44	107.59	105.07
5	C	706	ICD	CAF-CAB-SAE	2.42	124.39	120.56
4	C	705	HEM	C4B-CHC-C1C	2.41	125.74	122.56
4	D	705	HEM	C1B-NB-C4B	2.40	107.55	105.07
5	D	706	ICD	CAA-CAC-CAG	2.39	124.18	122.65
4	B	705	HEM	C1B-NB-C4B	2.38	107.53	105.07
5	D	706	ICD	OAQ-CAN-CAG	-2.37	117.31	122.03
6	B	707	BOG	C3-C4-C5	2.35	114.44	110.24
6	D	707	BOG	C1-O5-C5	-2.35	109.07	113.69
4	B	705	HEM	C4B-CHC-C1C	2.35	125.65	122.56
4	C	705	HEM	CHC-C4B-NB	2.34	126.97	124.43
5	D	706	ICD	OAL-SAE-CAB	2.32	112.10	109.13
4	A	705	HEM	C4C-CHD-C1D	2.28	125.57	122.56
5	D	706	ICD	CAN-CAG-NAJ	2.28	121.23	116.30
4	C	705	HEM	C2D-C1D-ND	-2.26	107.18	109.88
6	B	707	BOG	O3-C3-C2	2.25	115.55	110.35
4	B	705	HEM	CHA-C4D-ND	2.24	127.15	124.38
4	A	705	HEM	C3B-C2B-C1B	2.19	108.11	106.49
5	A	706	ICD	CAF-CAB-SAE	2.15	123.97	120.56
4	A	705	HEM	CHC-C4B-NB	2.15	126.77	124.43
4	C	705	HEM	CHD-C1D-ND	2.09	126.70	124.43
4	D	705	HEM	C3B-C2B-C1B	2.09	108.04	106.49
5	C	706	ICD	OAQ-CAN-CAG	-2.07	117.91	122.03
5	A	706	ICD	CAC-CAG-NAJ	-2.03	119.22	120.86
3	B	701	NAG	O5-C1-C2	-2.02	108.10	111.29
5	D	706	ICD	OAK-SAE-NAJ	-2.01	106.66	108.14
3	B	701	NAG	C3-C4-C5	2.01	113.83	110.24

There are no chirality outliers.

All (48) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	708	BOG	C2-C1-O1-C1'
6	B	708	BOG	O5-C1-O1-C1'
6	C	707	BOG	C2'-C1'-O1-C1
3	A	701	NAG	O5-C5-C6-O6
3	A	701	NAG	C4-C5-C6-O6
3	C	701	NAG	C4-C5-C6-O6
3	D	701	NAG	C4-C5-C6-O6
3	B	701	NAG	O5-C5-C6-O6
6	B	707	BOG	O5-C5-C6-O6
3	D	701	NAG	O5-C5-C6-O6
6	C	707	BOG	C4-C5-C6-O6
3	A	701	NAG	C8-C7-N2-C2
3	A	701	NAG	O7-C7-N2-C2
3	B	701	NAG	C8-C7-N2-C2
3	B	701	NAG	O7-C7-N2-C2
3	D	701	NAG	C8-C7-N2-C2
3	D	701	NAG	O7-C7-N2-C2
3	B	701	NAG	C4-C5-C6-O6
3	C	704	NAG	C4-C5-C6-O6
6	C	707	BOG	O5-C5-C6-O6
3	C	701	NAG	O5-C5-C6-O6
6	C	707	BOG	O5-C1-O1-C1'
6	B	708	BOG	O1-C1'-C2'-C3'
6	D	707	BOG	O1-C1'-C2'-C3'
6	B	707	BOG	C4-C5-C6-O6
6	B	708	BOG	O5-C5-C6-O6
3	C	704	NAG	O5-C5-C6-O6
6	C	707	BOG	C2-C1-O1-C1'
6	B	707	BOG	C2'-C1'-O1-C1
6	B	708	BOG	C2'-C1'-O1-C1
6	B	707	BOG	C1'-C2'-C3'-C4'
6	C	707	BOG	O1-C1'-C2'-C3'
6	B	707	BOG	C2'-C3'-C4'-C5'
6	D	707	BOG	C2-C1-O1-C1'
6	B	707	BOG	C5'-C6'-C7'-C8'
6	D	707	BOG	C2'-C1'-O1-C1
6	D	707	BOG	C5'-C6'-C7'-C8'
6	D	707	BOG	O5-C1-O1-C1'
6	D	707	BOG	C4'-C5'-C6'-C7'
6	B	708	BOG	C4'-C5'-C6'-C7'
3	C	701	NAG	C3-C2-N2-C7
6	D	707	BOG	C2'-C3'-C4'-C5'

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
4	A	705	HEM	CAA-CBA-CGA-O2A
6	D	707	BOG	C3'-C4'-C5'-C6'
4	A	705	HEM	CAA-CBA-CGA-O1A
4	D	705	HEM	CAA-CBA-CGA-O2A
6	C	707	BOG	C5'-C6'-C7'-C8'
6	B	708	BOG	C3'-C4'-C5'-C6'

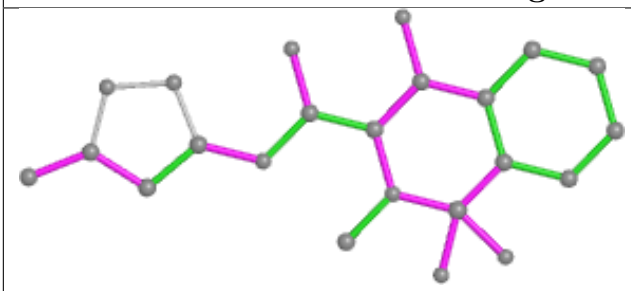
There are no ring outliers.

14 monomers are involved in 36 short contacts:

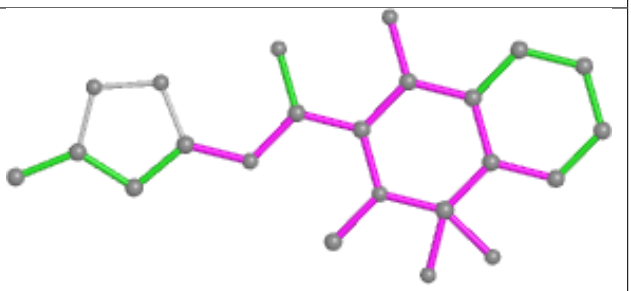
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	706	ICD	2	0
3	B	704	NAG	5	0
4	A	705	HEM	4	0
3	D	701	NAG	1	0
6	C	707	BOG	1	0
4	C	705	HEM	1	0
6	B	708	BOG	3	0
4	B	705	HEM	2	0
4	D	705	HEM	3	0
3	C	701	NAG	1	0
5	D	706	ICD	2	0
6	B	707	BOG	6	0
5	A	706	ICD	3	0
5	C	706	ICD	2	0

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 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.

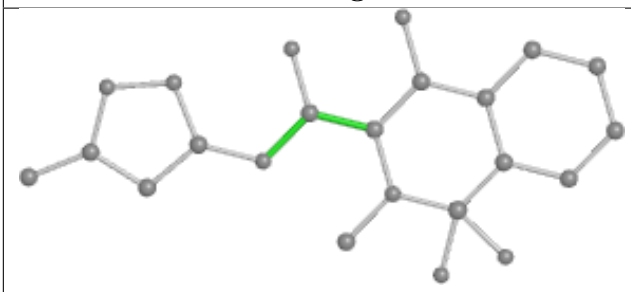
Ligand ICD B 706



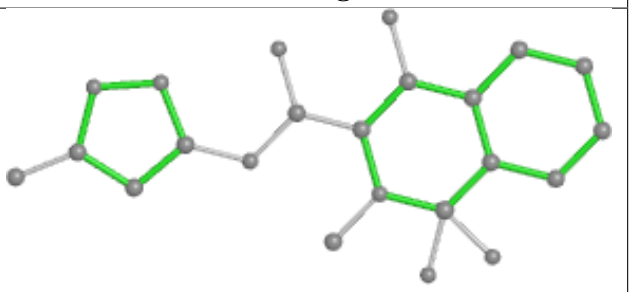
Bond lengths



Bond angles

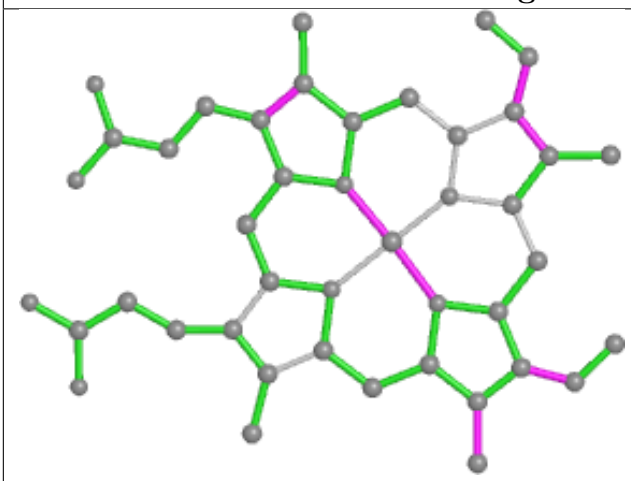


Torsions

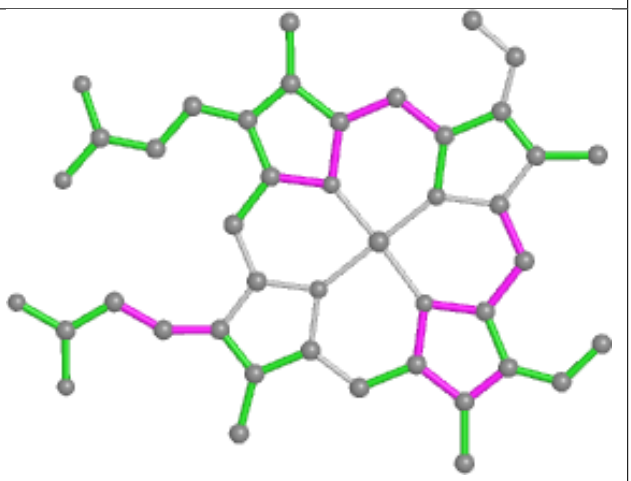


Rings

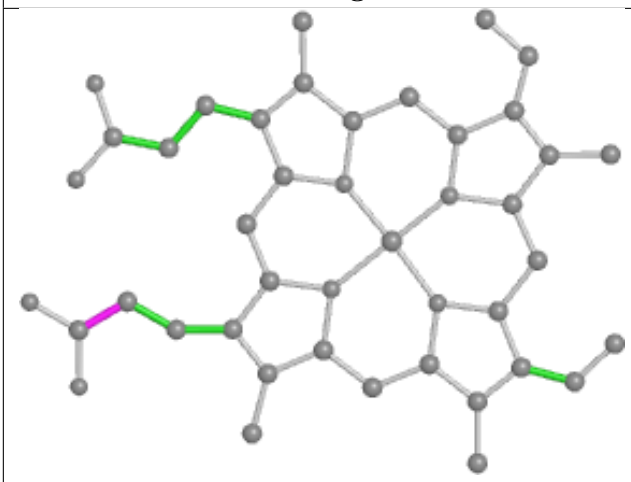
Ligand HEM A 705



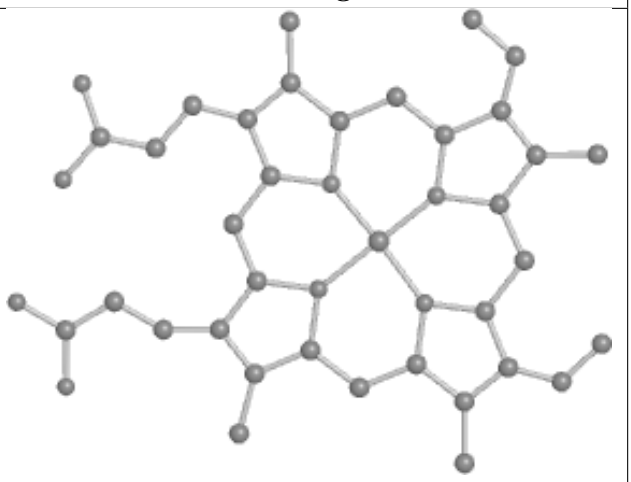
Bond lengths



Bond angles

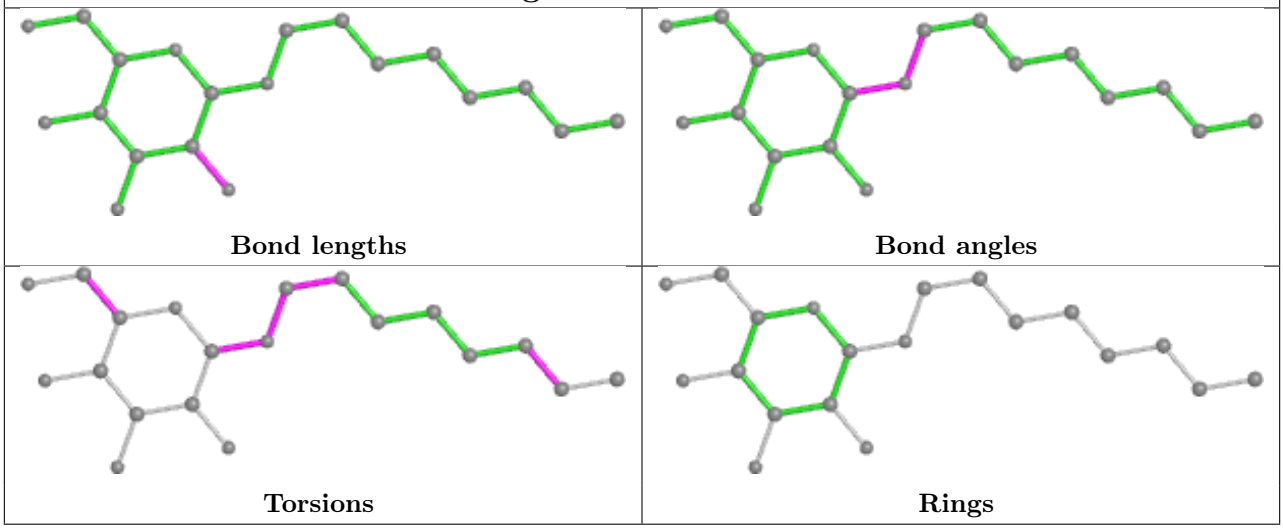


Torsions

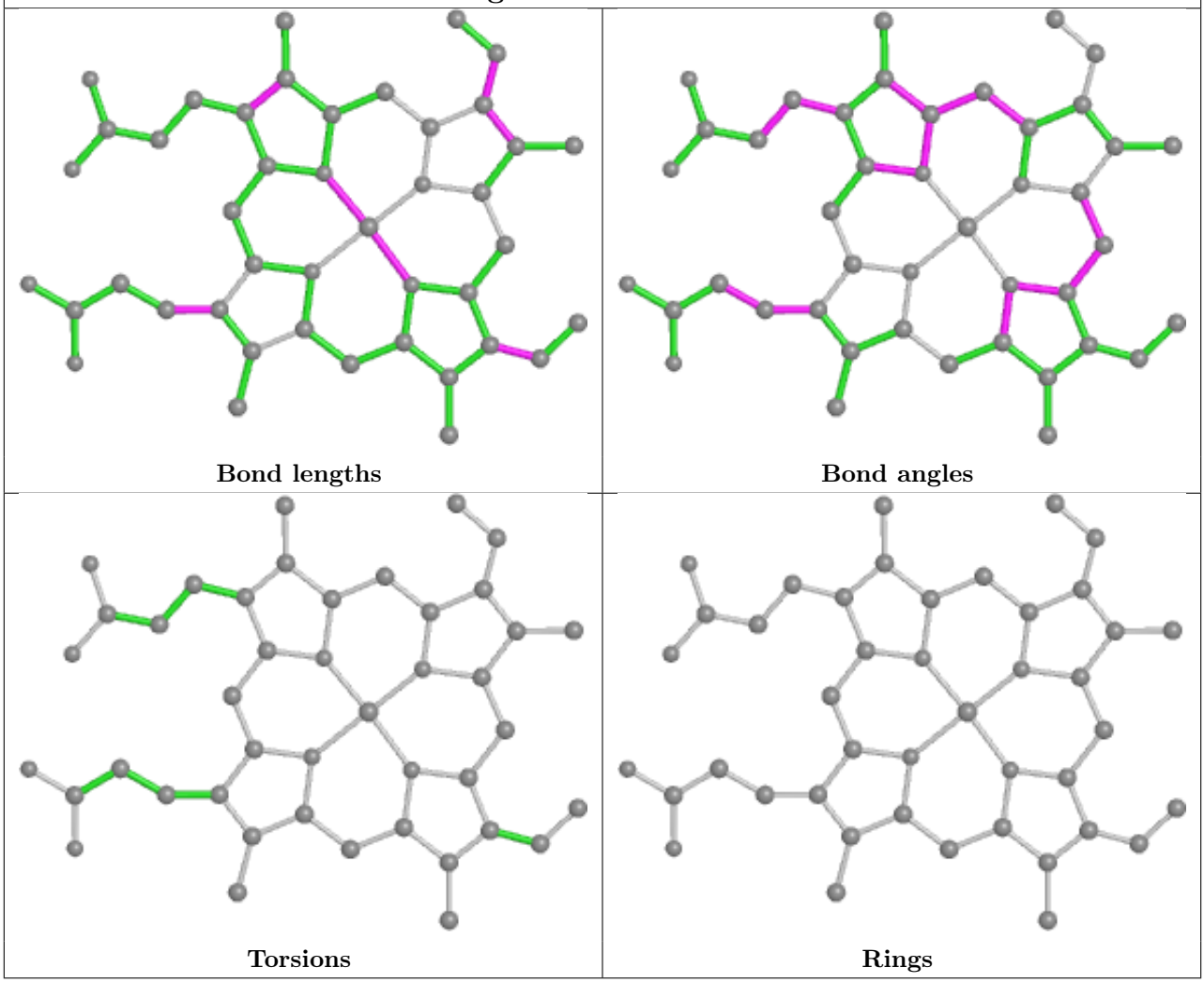


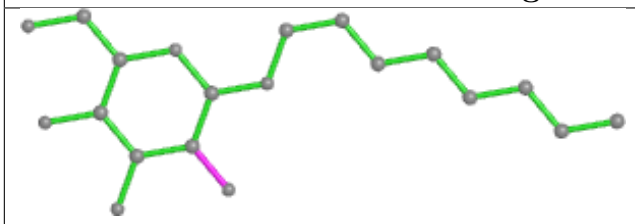
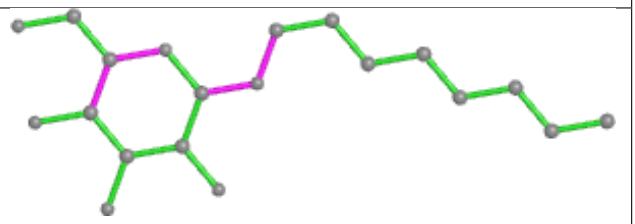
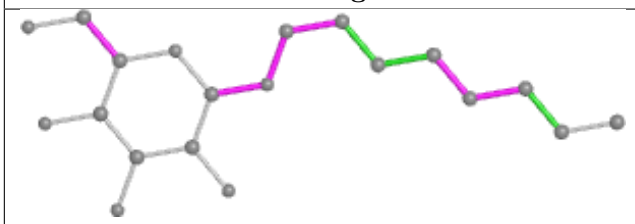
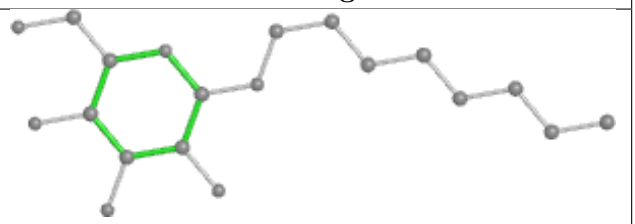
Rings

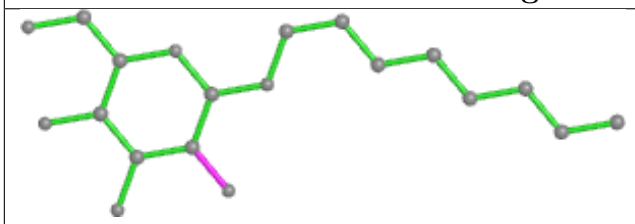
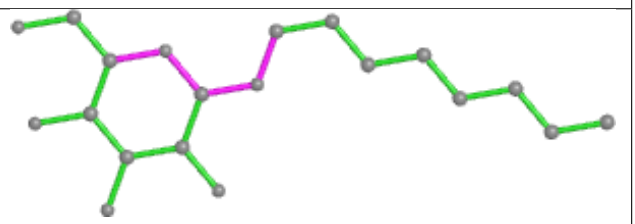
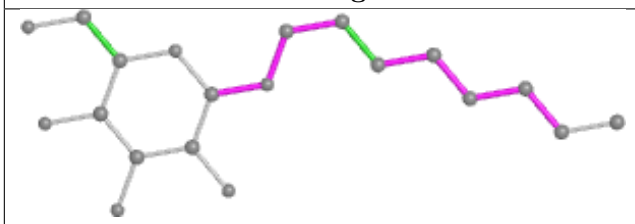
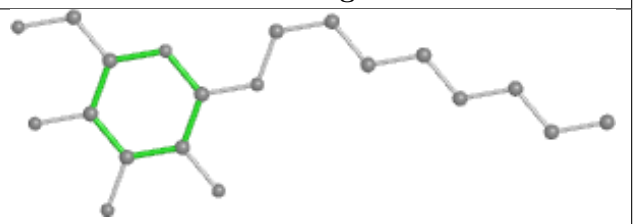
Ligand BOG C 707



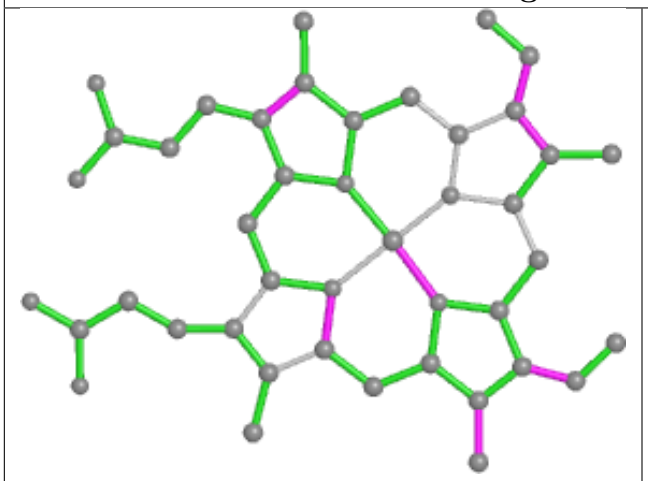
Ligand HEM C 705



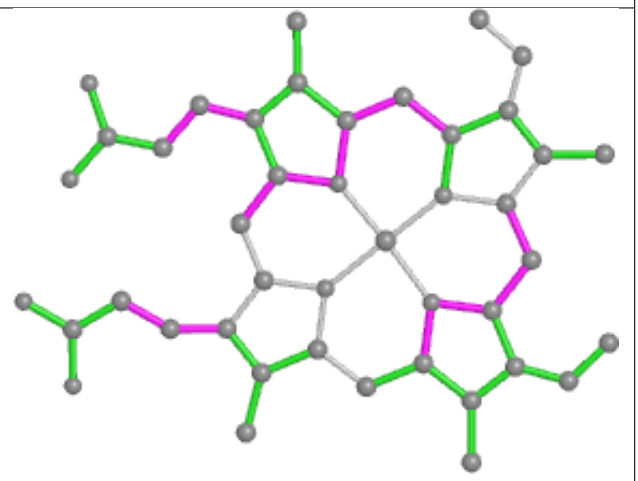
Ligand BOG B 708	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand BOG D 707	
 Bond lengths	 Bond angles
 Torsions	 Rings

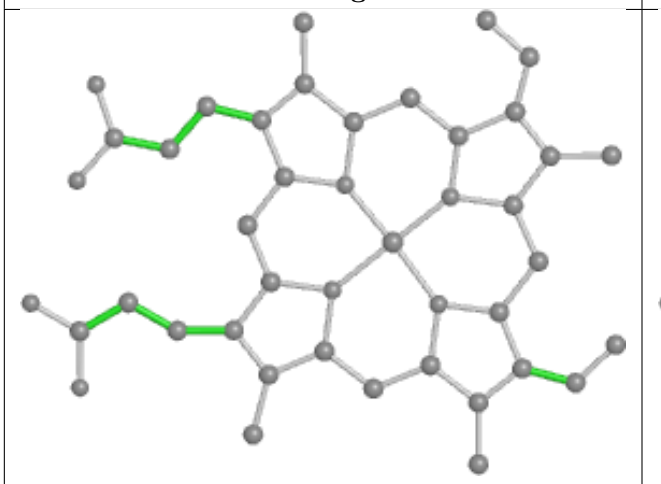
Ligand HEM B 705



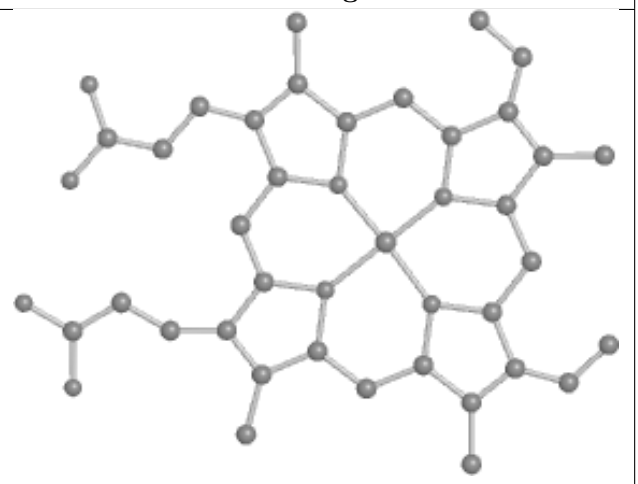
Bond lengths



Bond angles

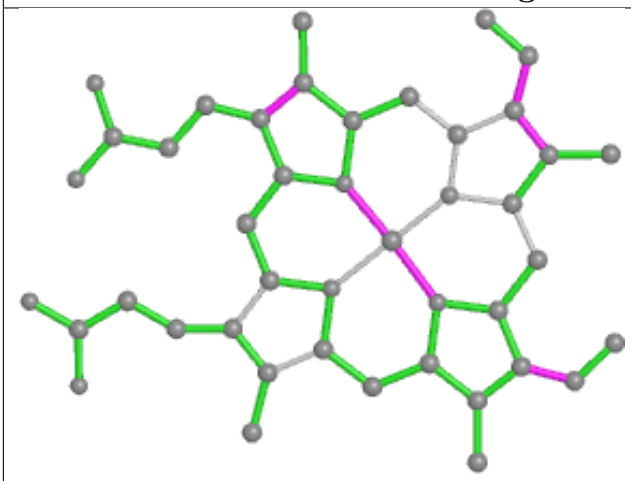


Torsions

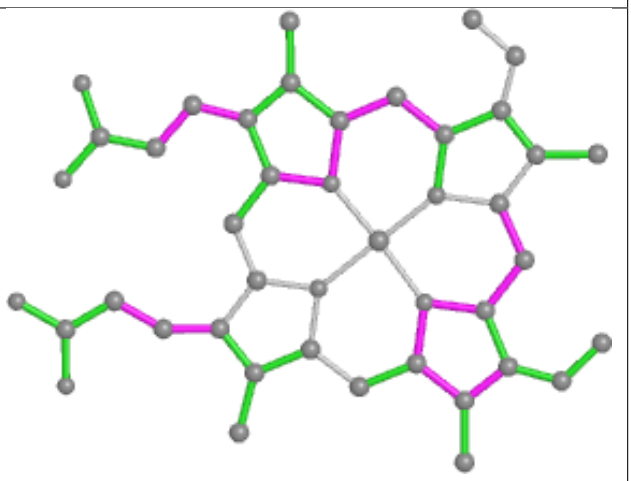


Rings

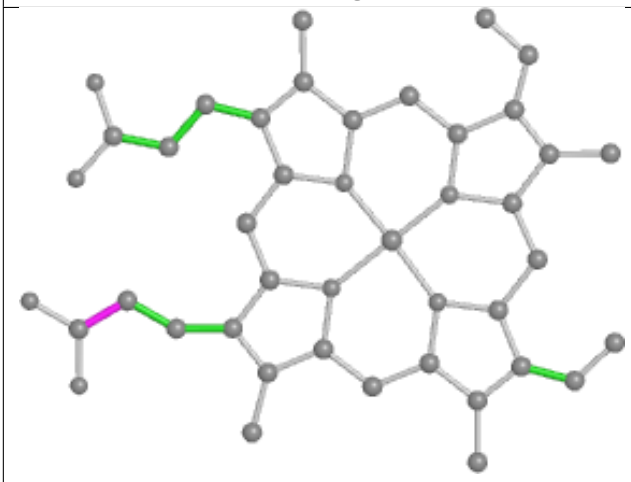
Ligand HEM D 705



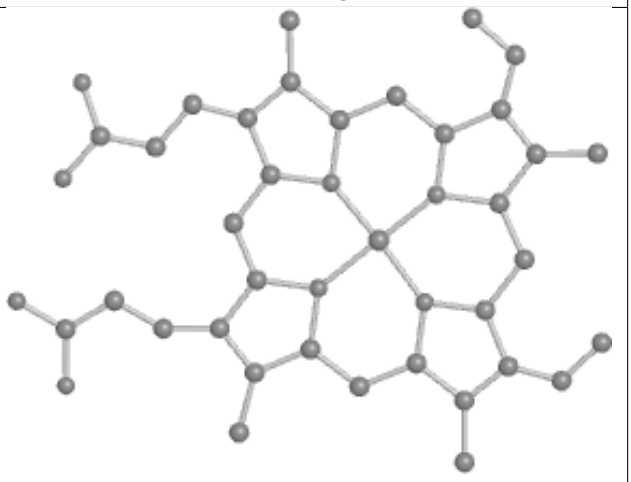
Bond lengths



Bond angles

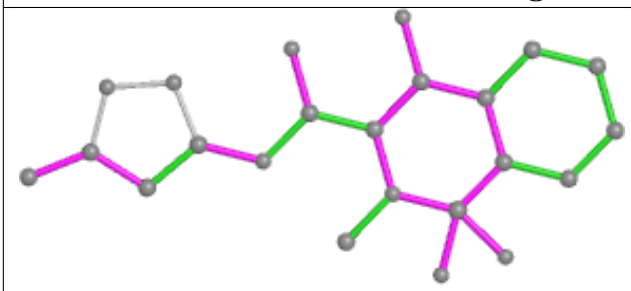


Torsions

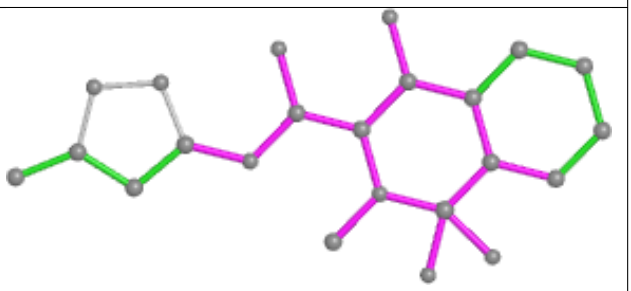


Rings

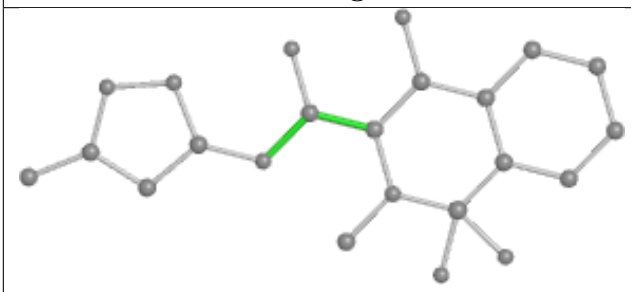
Ligand ICD D 706



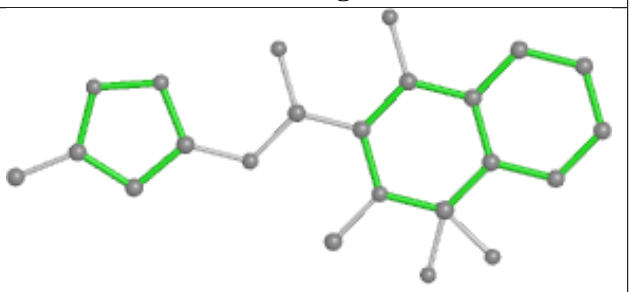
Bond lengths



Bond angles

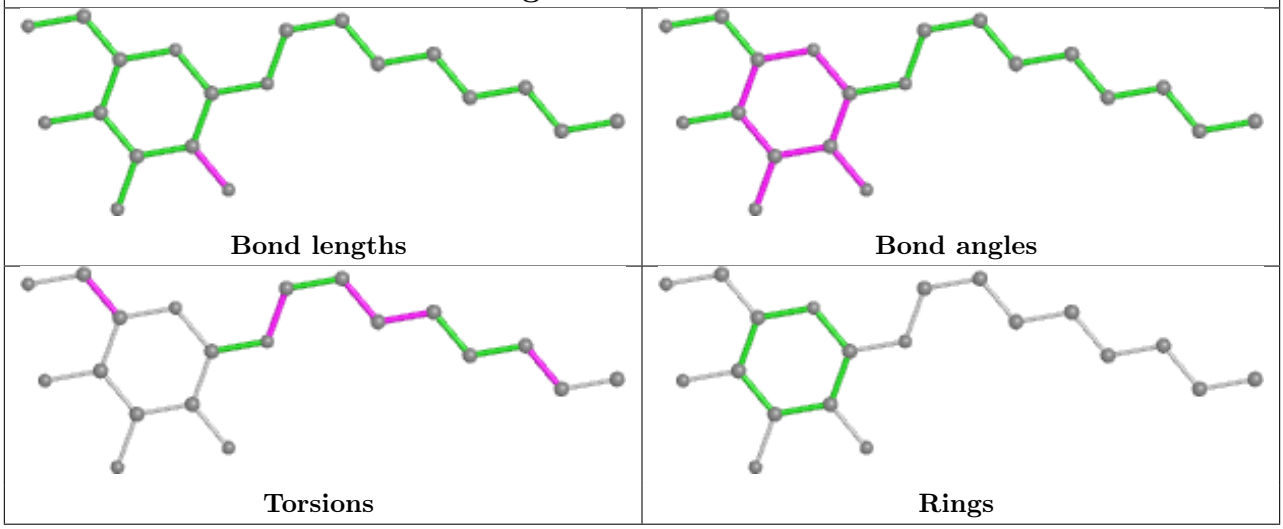


Torsions

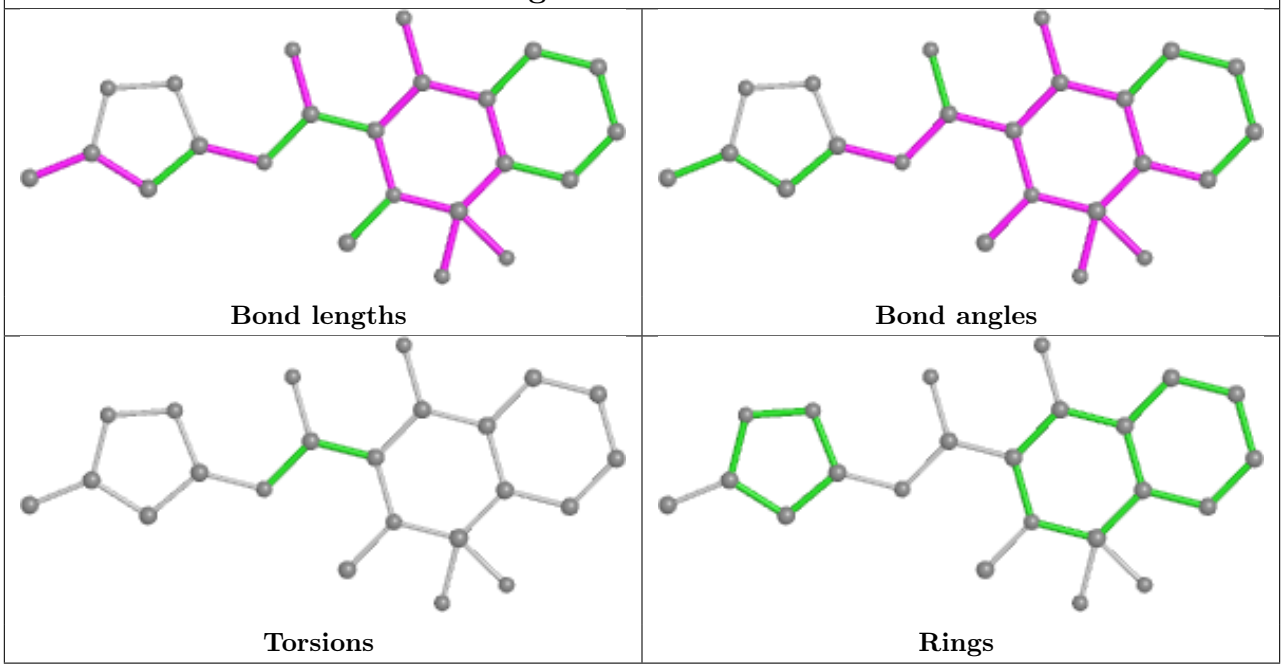


Rings

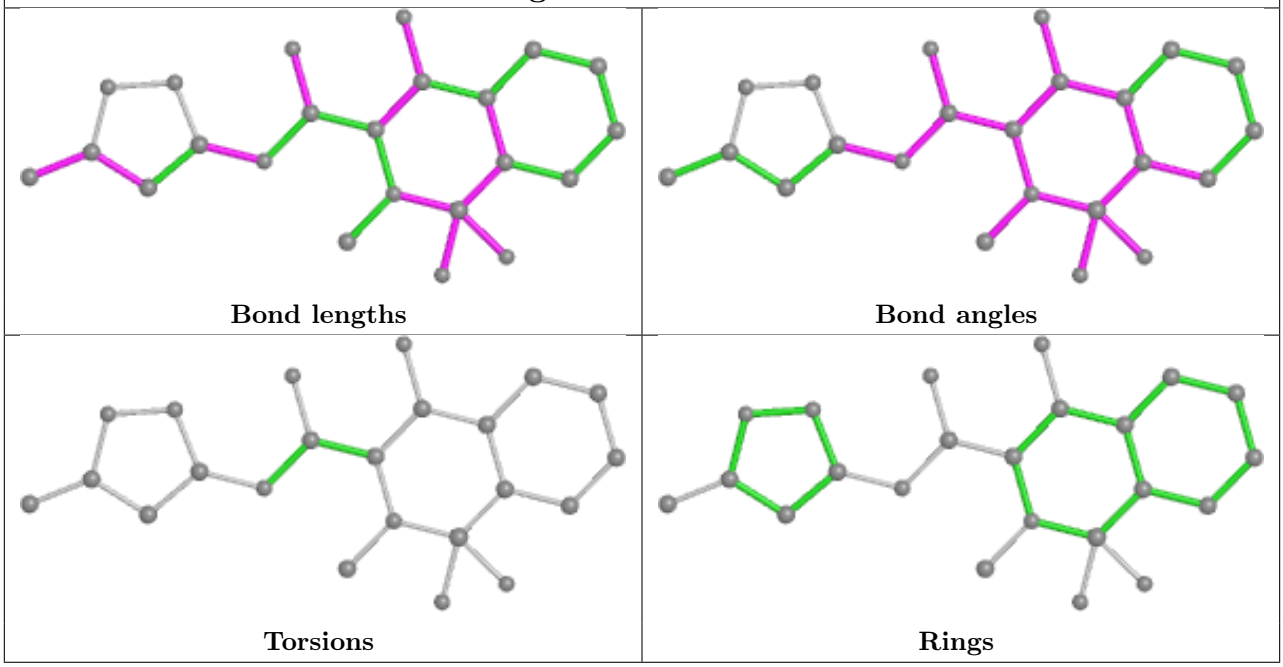
Ligand BOG B 707



Ligand ICD A 706



Ligand ICD C 706



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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	552/587 (94%)	0.12	24 (4%)	35	34	16, 27, 51, 71	0
1	B	552/587 (94%)	0.04	25 (4%)	33	32	15, 29, 53, 89	0
1	C	551/587 (93%)	-0.02	21 (3%)	40	39	14, 25, 45, 72	0
1	D	552/587 (94%)	0.04	21 (3%)	40	39	13, 24, 49, 71	0
All	All	2207/2348 (93%)	0.05	91 (4%)	37	36	13, 26, 51, 89	0

All (91) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	81	LEU	9.3
1	D	81	LEU	5.1
1	B	409	TYR	4.5
1	A	74	PHE	4.4
1	A	81	LEU	4.3
1	B	399	ASP	4.3
1	D	82	LEU	4.3
1	C	75	LEU	4.2
1	C	82	LEU	4.2
1	D	74	PHE	4.0
1	C	80	LEU	3.9
1	C	107	PHE	3.9
1	A	96	PHE	3.8
1	B	33	ALA	3.8
1	A	80	LEU	3.7
1	A	115	TYR	3.6
1	A	82	LEU	3.6
1	C	81	LEU	3.6
1	B	74	PHE	3.5
1	C	74	PHE	3.5
1	C	115	TYR	3.4

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	75	LEU	3.3
1	B	52	PHE	3.3
1	D	80	LEU	3.2
1	C	399	ASP	3.2
1	B	377	ILE	3.1
1	A	534	LEU	3.0
1	B	53	ASP	3.0
1	D	65	TYR	3.0
1	B	115	TYR	2.9
1	B	75	LEU	2.9
1	D	77	ARG	2.8
1	D	33	ALA	2.7
1	B	65	TYR	2.7
1	B	111	LEU	2.6
1	C	65	TYR	2.6
1	B	169	LYS	2.6
1	B	215	LYS	2.6
1	A	65	TYR	2.6
1	A	98	GLY	2.6
1	D	170	GLU	2.6
1	B	80	LEU	2.6
1	D	115	TYR	2.5
1	C	78	ILE	2.5
1	B	105(A)	ILE	2.5
1	A	536	GLY	2.5
1	C	96	PHE	2.5
1	A	94	THR	2.5
1	A	529	PHE	2.4
1	B	70	THR	2.4
1	A	105	ASN	2.4
1	C	228	VAL	2.4
1	A	278	HIS	2.4
1	C	111	LEU	2.4
1	D	75	LEU	2.4
1	B	400	GLN	2.4
1	A	124	ILE	2.4
1	B	410	ASN	2.3
1	C	215	LYS	2.3
1	D	142	PHE	2.3
1	D	105	ASN	2.3
1	A	78	ILE	2.3
1	B	82	LEU	2.2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	77	ARG	2.2
1	D	98	GLY	2.2
1	C	377	ILE	2.2
1	A	95	HIS	2.2
1	C	145	LEU	2.2
1	C	534	LEU	2.2
1	D	99	VAL	2.2
1	A	123	LEU	2.2
1	D	53	ASP	2.2
1	D	122	TYR	2.2
1	B	63	GLY	2.2
1	D	102	ILE	2.2
1	C	409	TYR	2.2
1	C	122	TYR	2.1
1	A	378	ALA	2.1
1	B	405	LYS	2.1
1	A	239	ASP	2.1
1	C	79	LYS	2.1
1	B	122	TYR	2.1
1	B	583	GLN	2.1
1	D	165	VAL	2.1
1	D	96	PHE	2.1
1	D	529	PHE	2.1
1	A	106	PRO	2.0
1	C	91	TYR	2.0
1	D	95	HIS	2.0
1	B	78	ILE	2.0
1	A	97	LYS	2.0

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

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

6.3 Carbohydrates (i)

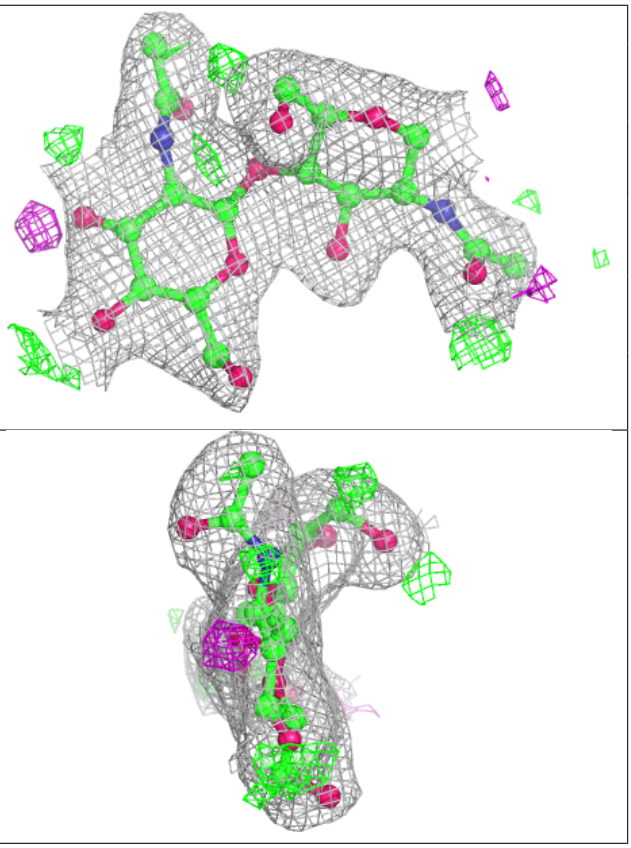
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NAG	E	2	14/15	0.83	0.15	37,48,56,60	0
2	NAG	G	2	14/15	0.88	0.21	44,54,57,60	0
2	NAG	F	2	14/15	0.91	0.19	37,41,49,54	0
2	NAG	H	2	14/15	0.91	0.14	39,45,53,60	0
2	NAG	E	1	14/15	0.95	0.11	17,29,37,38	0
2	NAG	H	1	14/15	0.95	0.11	21,28,33,37	0
2	NAG	G	1	14/15	0.95	0.10	16,27,33,39	0
2	NAG	F	1	14/15	0.96	0.07	19,26,34,38	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.

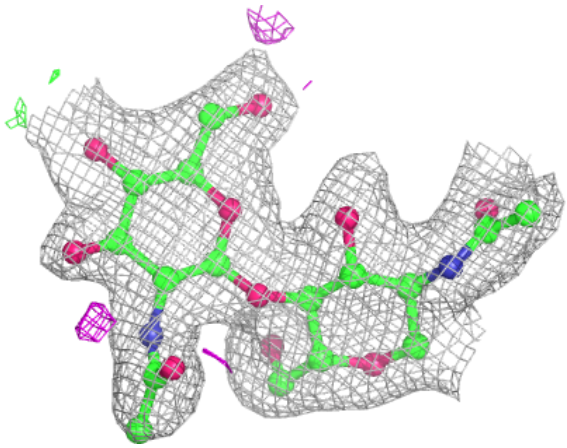
Electron density around Chain E:

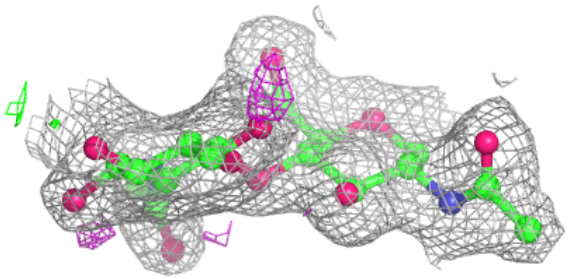
2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)

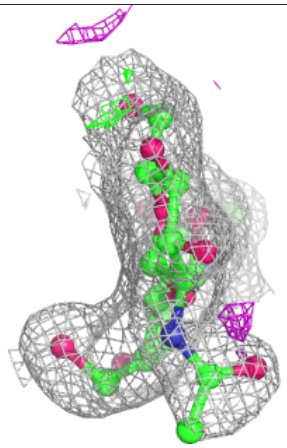


Electron density around Chain F:

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

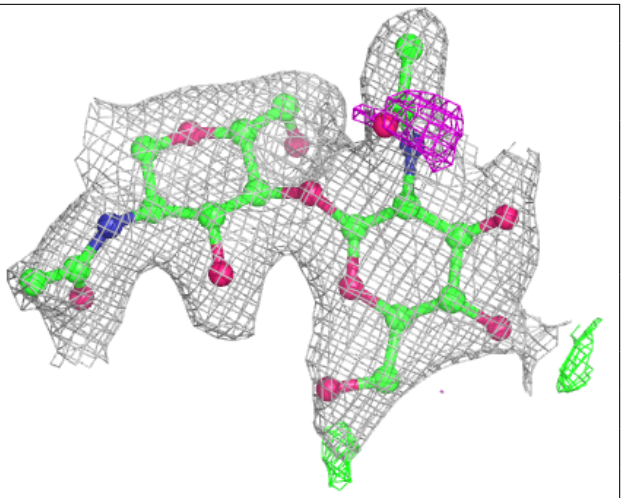


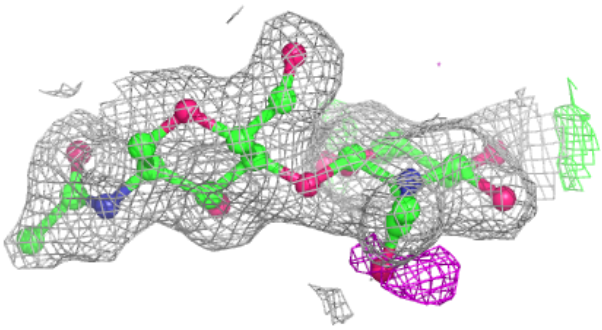


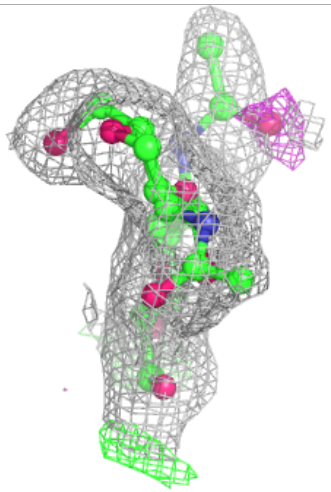


Electron density around Chain G:

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

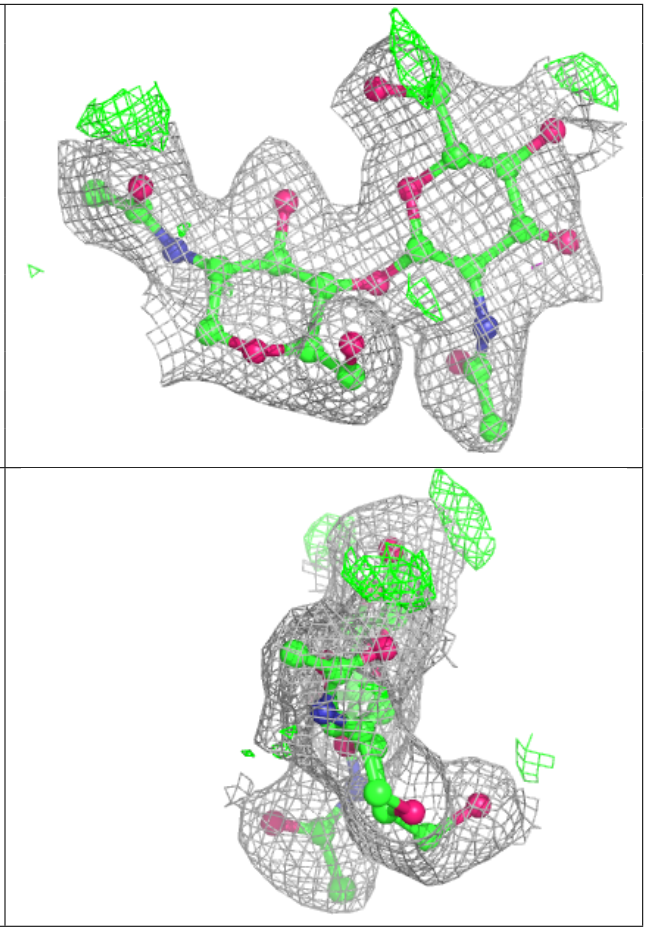






Electron density around Chain H:

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



6.4 Ligands (i)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	BOG	B	708	20/20	0.70	0.26	46,62,65,66	20
3	NAG	D	701	14/15	0.76	0.31	40,50,56,60	0
3	NAG	C	701	14/15	0.76	0.25	43,54,58,60	0
3	NAG	B	701	14/15	0.81	0.31	42,55,61,63	0
3	NAG	B	704	14/15	0.86	0.29	44,52,56,56	0
3	NAG	A	701	14/15	0.87	0.24	41,53,57,58	0
6	BOG	C	707	20/20	0.88	0.24	51,54,56,58	9
6	BOG	B	707	20/20	0.89	0.17	29,36,53,53	10
3	NAG	D	704	14/15	0.91	0.13	33,45,50,56	0
3	NAG	A	704	14/15	0.91	0.14	31,42,46,50	0
3	NAG	C	704	14/15	0.92	0.25	35,45,52,54	0
5	ICD	B	706	23/23	0.92	0.16	18,29,38,41	0

Continued on next page...

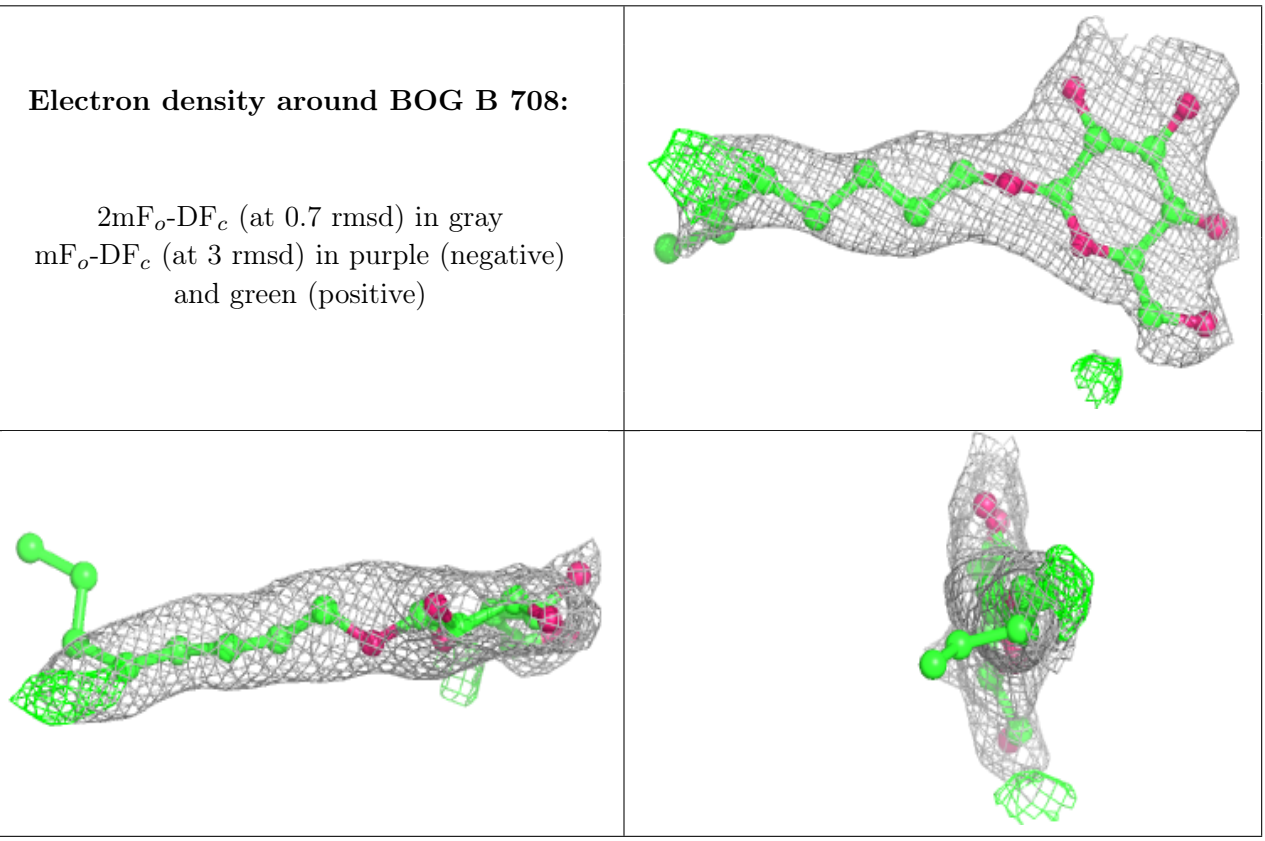
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	ICD	C	706	23/23	0.92	0.14	21,25,29,33	0
5	ICD	A	706	23/23	0.93	0.15	24,28,32,33	0
6	BOG	D	707	20/20	0.94	0.12	22,26,46,46	7
5	ICD	D	706	23/23	0.95	0.14	22,26,31,32	0
4	HEM	A	705	43/43	0.96	0.13	16,22,39,57	0
4	HEM	C	705	43/43	0.96	0.12	15,21,45,62	0
4	HEM	B	705	43/43	0.97	0.12	15,22,43,56	0
4	HEM	D	705	43/43	0.97	0.12	14,20,42,55	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.

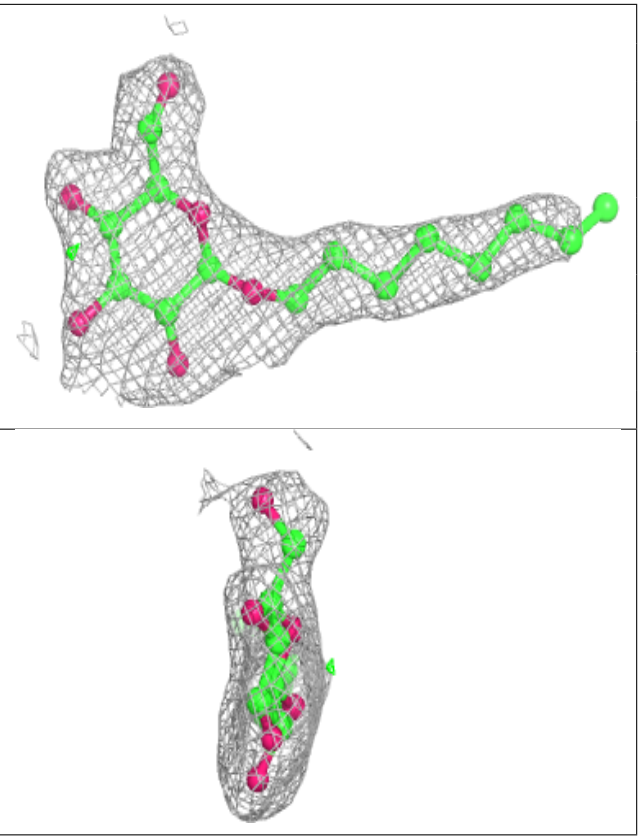
Electron density around BOG B 708:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)



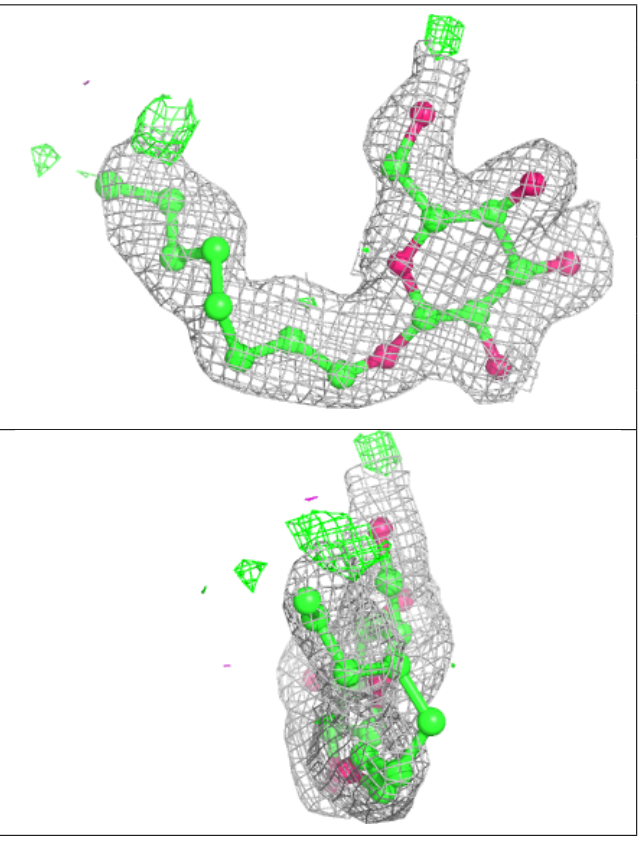
Electron density around BOG C 707:

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



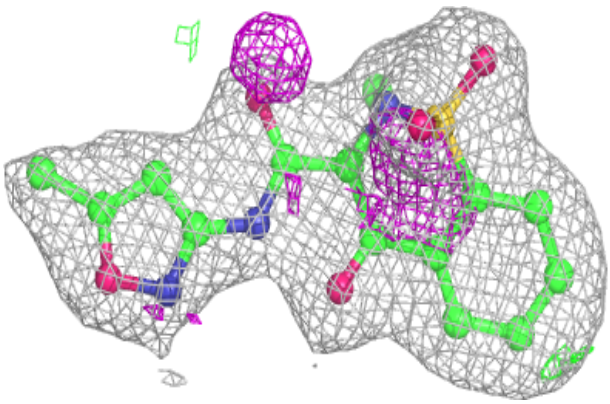
Electron density around BOG B 707:

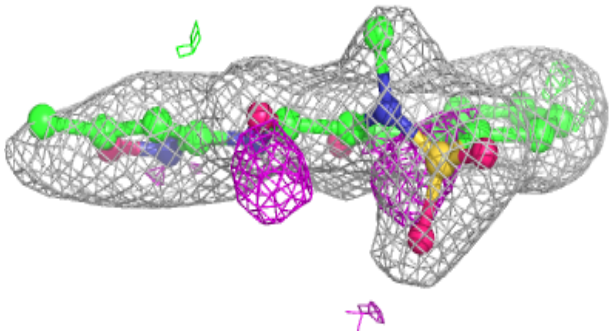
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

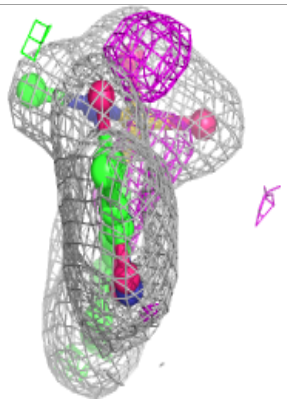


Electron density around ICD B 706:

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

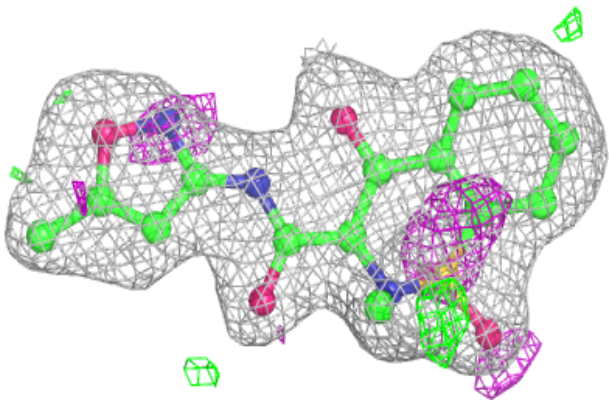


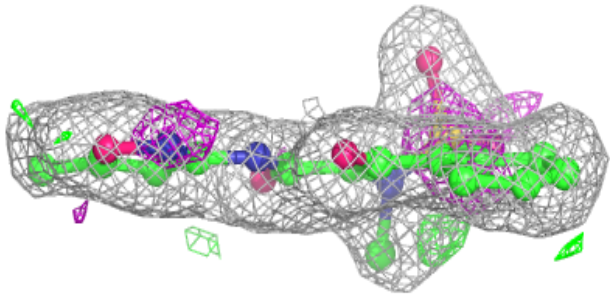


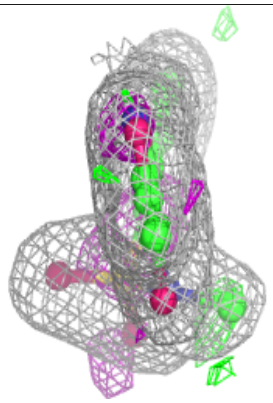


Electron density around ICD C 706:

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

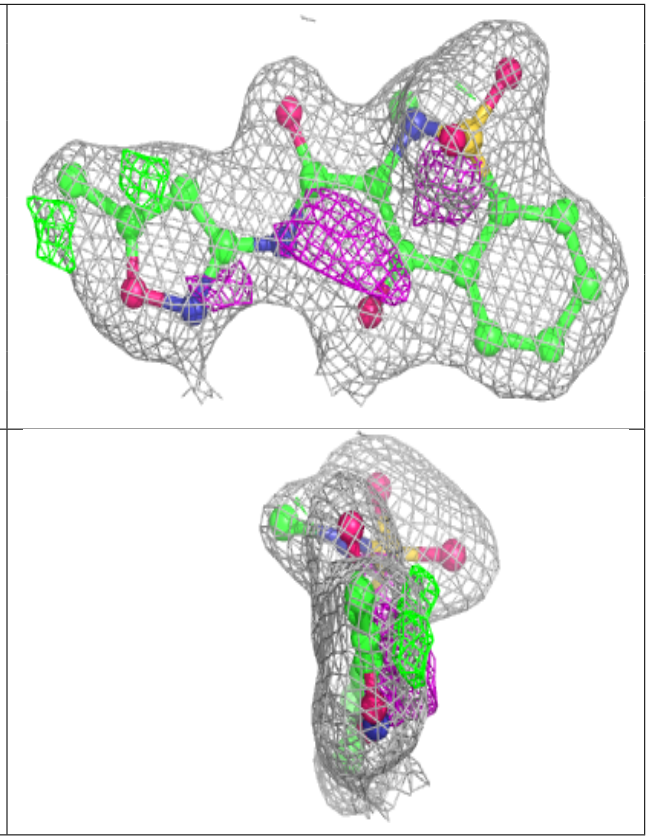






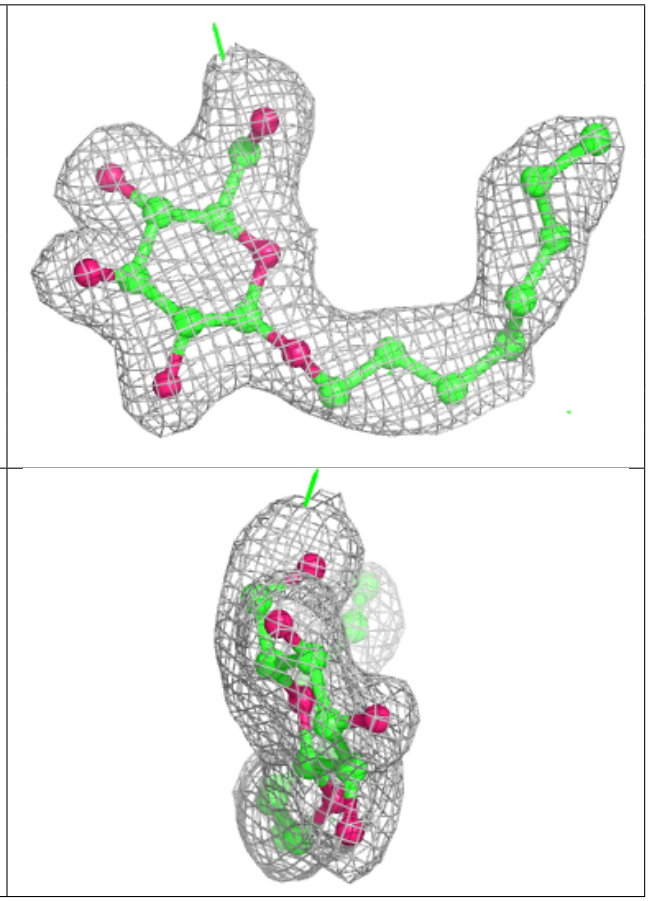
Electron density around ICD A 706:

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



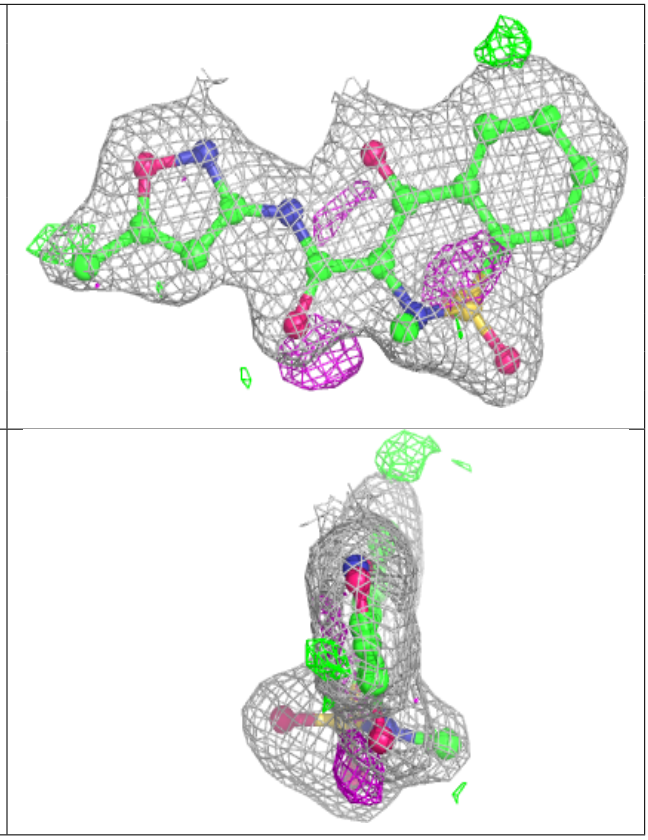
Electron density around BOG D 707:

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



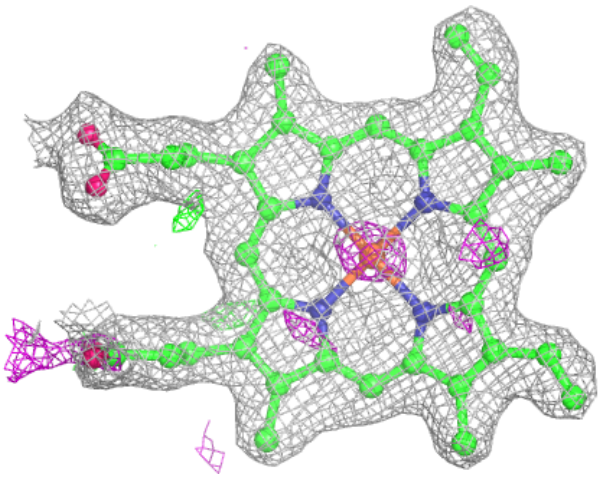
Electron density around ICD D 706:

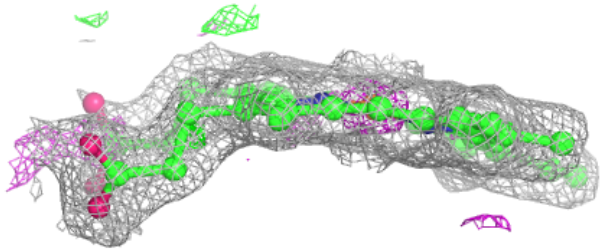
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM A 705:

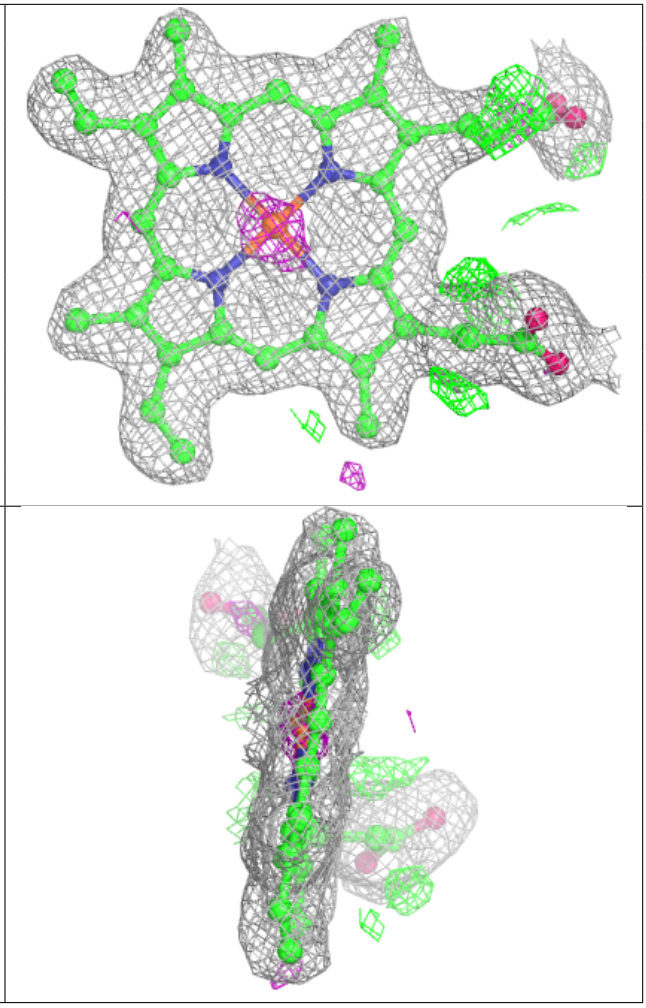
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





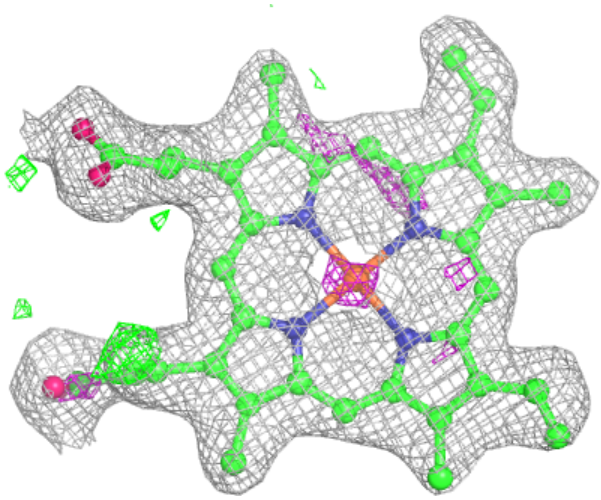
Electron density around HEM C 705:

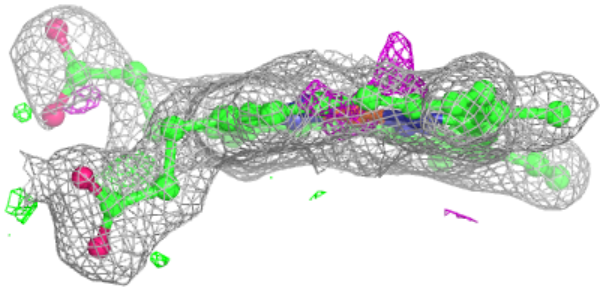
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

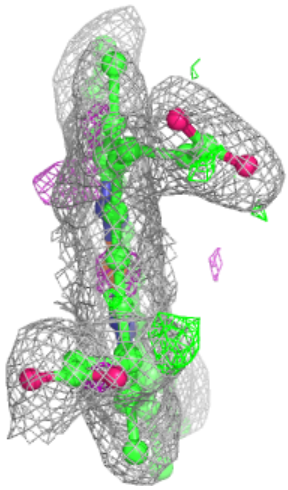


Electron density around HEM B 705:

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

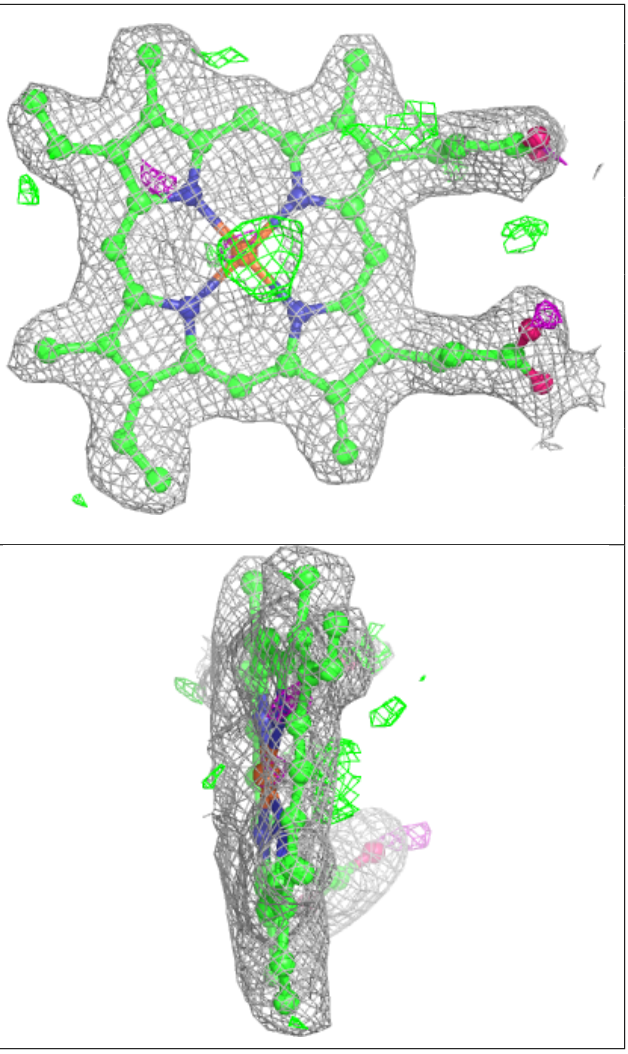






Electron density around HEM D 705:

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.