Full wwPDB X-ray Structure Validation Report ⓘ

Nov 18, 2025 – 10:24 AM EST

PDB ID	:	9MWW / pdb_00009mww
Title	:	Structure of human endothelial nitric oxide synthase heme domain bound with N-(3-(((2-(3-(aminomethyl)-[1,1'-biphenyl]-4-yl)ethyl)amino)methyl)phenyl)thiazole-5-carboximidamide
Authors	:	Li, H.; Poulos, T.L.
Deposited on	:	2025-01-17
Resolution	:	1.80 Å(reported)

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

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

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

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

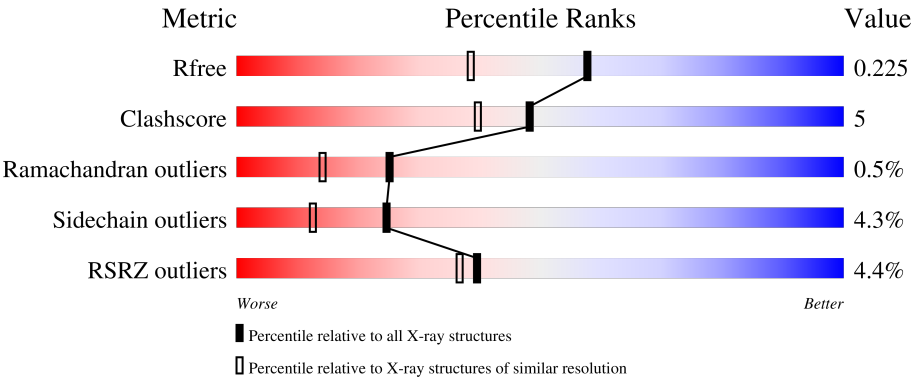
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 1.80 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}	164625	7108 (1.80-1.80)
Clashscore	180529	8162 (1.80-1.80)
Ramachandran outliers	177936	8077 (1.80-1.80)
Sidechain outliers	177891	8076 (1.80-1.80)
RSRZ outliers	164620	7108 (1.80-1.80)

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	440	2% 79% 11% • 9%
1	B	440	2% 81% 9% • 9%
1	C	440	11% 74% 15% • 9%
1	D	440	2% 82% 8% • 9%

2 Entry composition (i)

There are 12 unique types of molecules in this entry. The entry contains 14209 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.

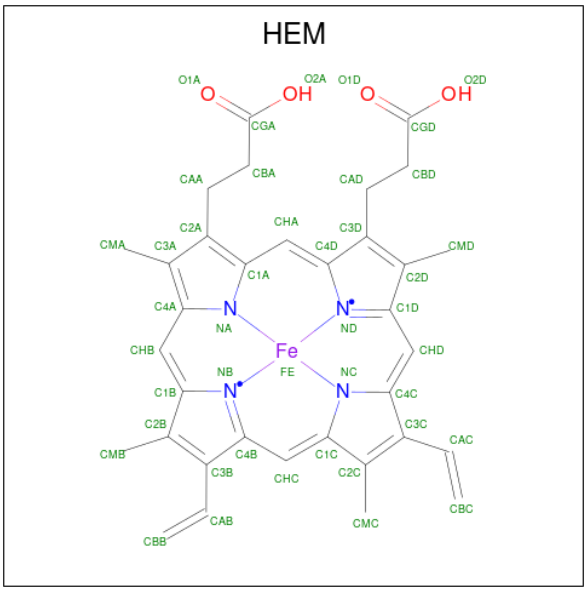
- Molecule 1 is a protein called Nitric oxide synthase, endothelial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	401	Total	C	N	O	S	0	1	0
			3207	2043	564	584	16			
1	B	401	Total	C	N	O	S	0	1	0
			3203	2040	563	584	16			
1	C	401	Total	C	N	O	S	0	1	0
			3207	2043	564	584	16			
1	D	402	Total	C	N	O	S	0	2	0
			3217	2049	566	586	16			

There are 4 discrepancies between the modelled and reference sequences:

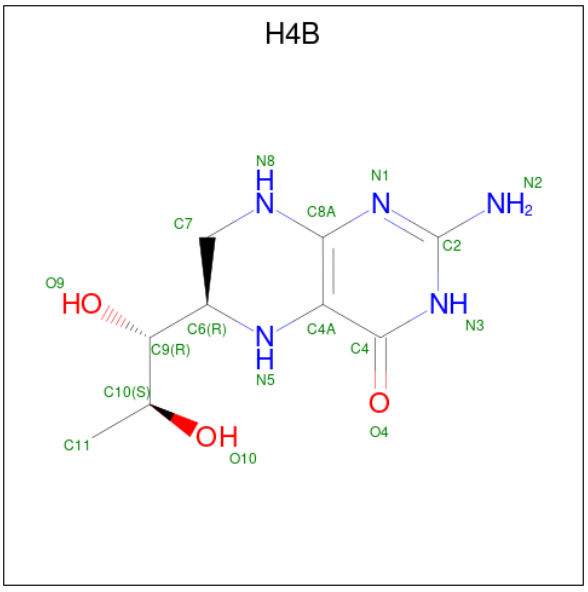
Chain	Residue	Modelled	Actual	Comment	Reference
A	298	GLU	ASP	variant	UNP P29474
B	298	GLU	ASP	variant	UNP P29474
C	298	GLU	ASP	variant	UNP P29474
D	298	GLU	ASP	variant	UNP P29474

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (CCD ID: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



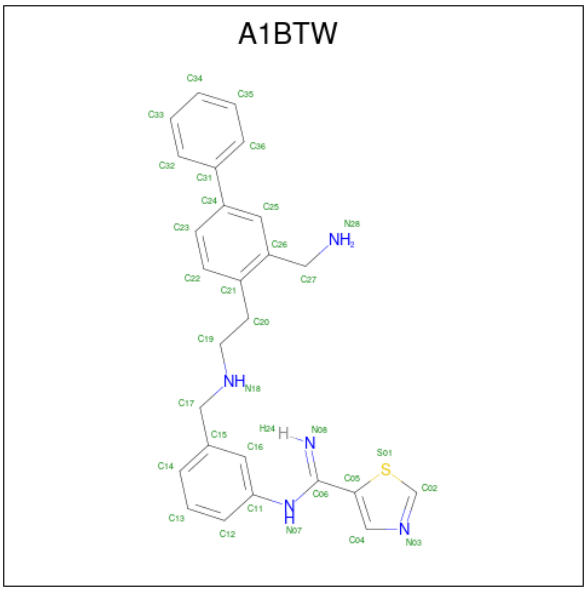
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	C	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	D	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 3 is 5,6,7,8-TETRAHYDROBIOPTERIN (CCD ID: H4B) (formula: $C_9H_{15}N_5O_3$).



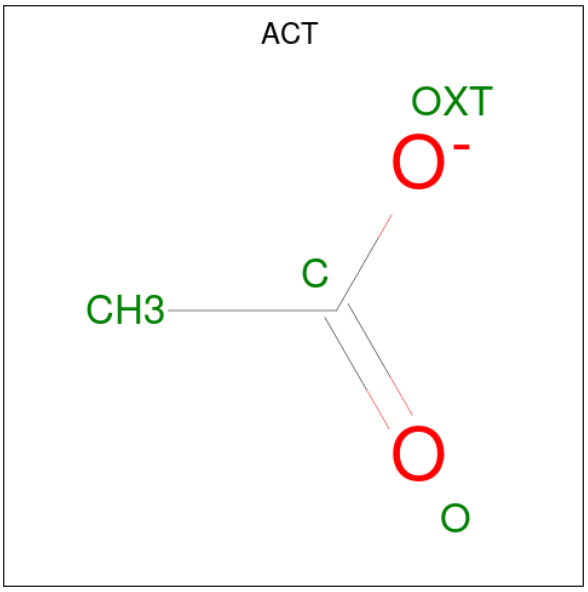
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N O 17 9 5 3	0	0
3	B	1	Total C N O 17 9 5 3	0	0
3	C	1	Total C N O 17 9 5 3	0	0
3	D	1	Total C N O 17 9 5 3	0	0

- Molecule 4 is N-{3-[({2-[3-(aminomethyl)[1,1'-biphenyl]-4-yl]ethyl}amino)methyl]phenyl}-1,3-thiazole-5-carboximidamide (CCD ID: A1BTW) (formula: $C_{26}H_{27}N_5S$) (labeled as "Ligand of Interest" by depositor).



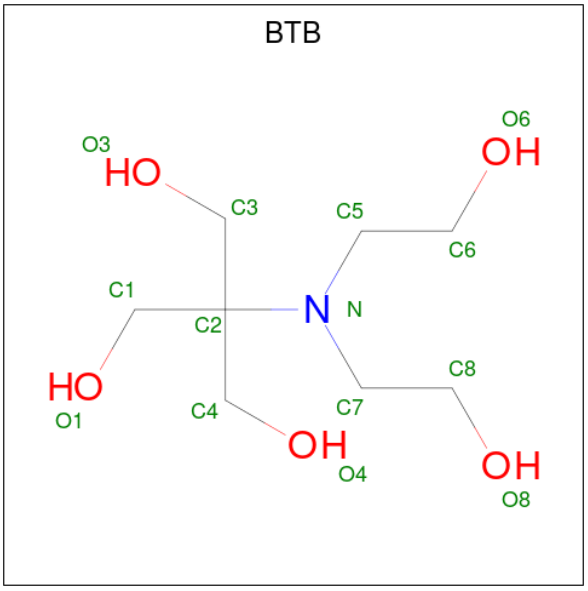
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N S 32 26 5 1	0	0
4	B	1	Total C N S 32 26 5 1	0	0
4	C	1	Total C N S 32 26 5 1	0	0
4	D	1	Total C N S 32 26 5 1	0	0

- Molecule 5 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).



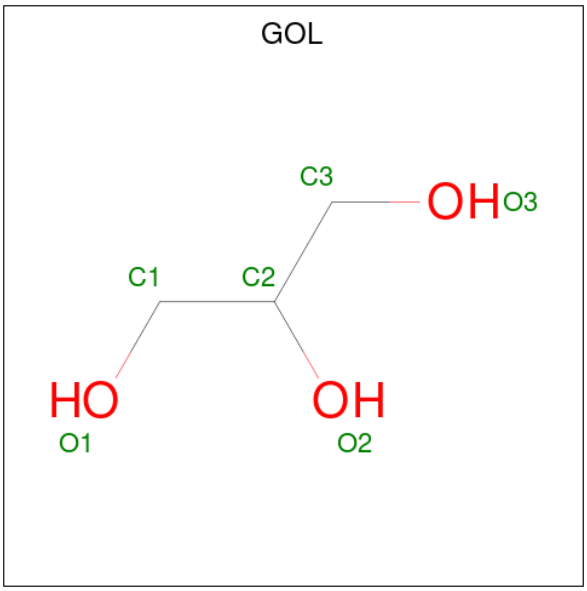
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	D	1	Total C O 4 2 2	0	0

- Molecule 6 is 2-[BIS-(2-HYDROXY-ETHYL)-AMINO]-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: BTB) (formula: $C_8H_{19}NO_5$).



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

- Molecule 7 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

Continued on next page...

Continued from previous page...

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

- Molecule 8 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total Cl 1 1	0	0
8	B	1	Total Cl 1 1	0	0
8	C	1	Total Cl 1 1	0	0
8	D	1	Total Cl 1 1	0	0

- Molecule 9 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	1	Total Zn 1 1	0	0
9	C	1	Total Zn 1 1	0	0

- Molecule 10 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	1	Total Ca 1 1	0	0
10	B	1	Total Ca 1 1	0	0

- Molecule 11 is GADOLINIUM ATOM (CCD ID: GD) (formula: Gd).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
11	B	1	Total Gd 1 1	0	0
11	C	1	Total Gd 1 1	0	0
11	D	2	Total Gd 2 2	0	0

- Molecule 12 is water.

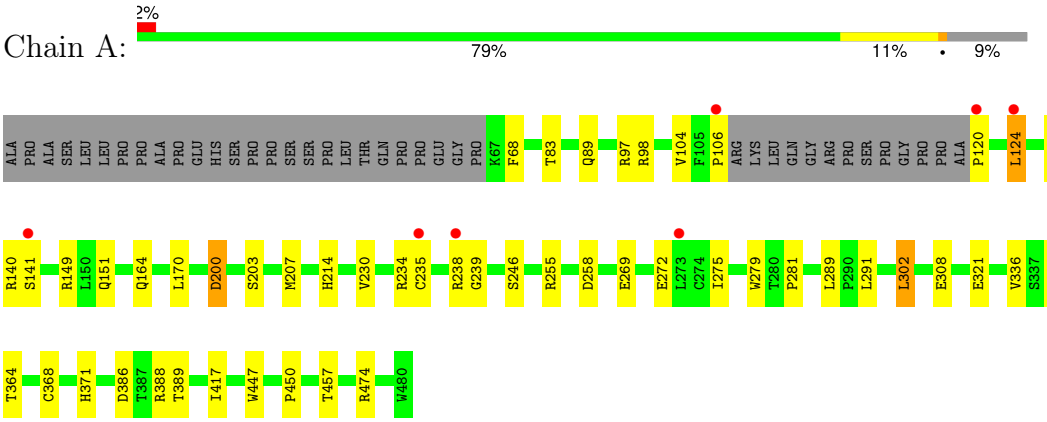
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
12	A	172	Total O 172 172	0	0
12	B	249	Total O 249 249	0	0
12	C	134	Total O 134 134	0	0
12	D	246	Total O 246 246	0	0

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.

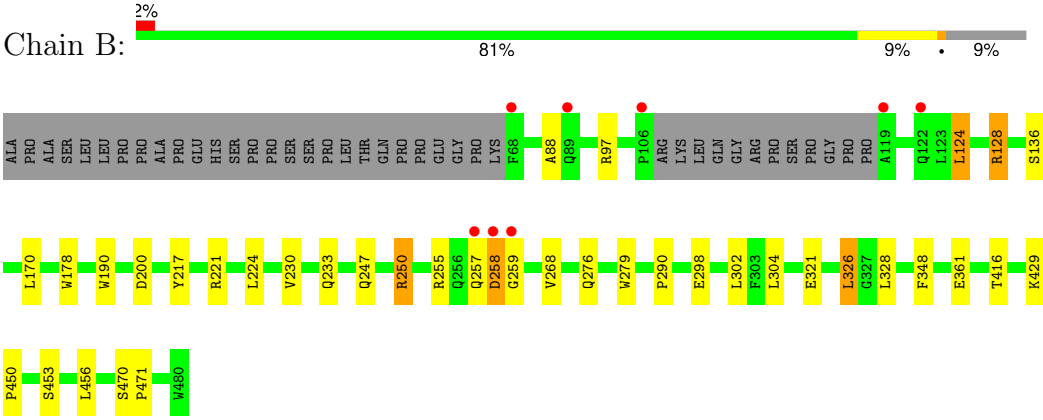
• Molecule 1: Nitric oxide synthase, endothelial

Chain A:



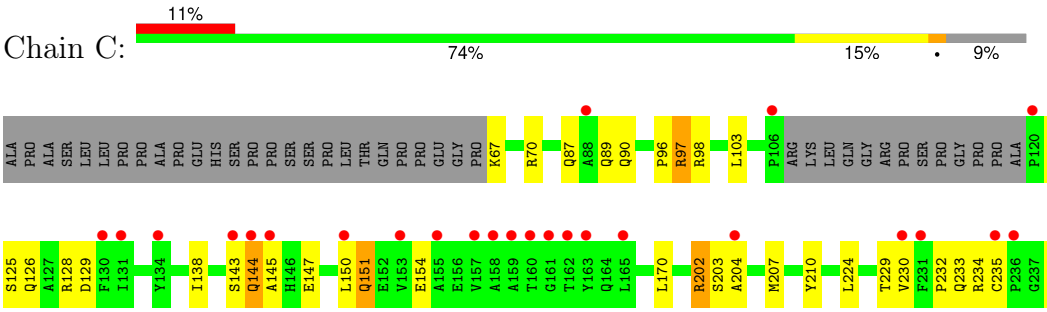
• Molecule 1: Nitric oxide synthase, endothelial

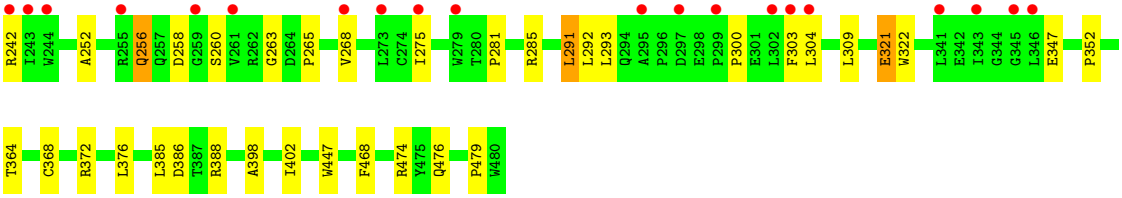
Chain B:



• Molecule 1: Nitric oxide synthase, endothelial

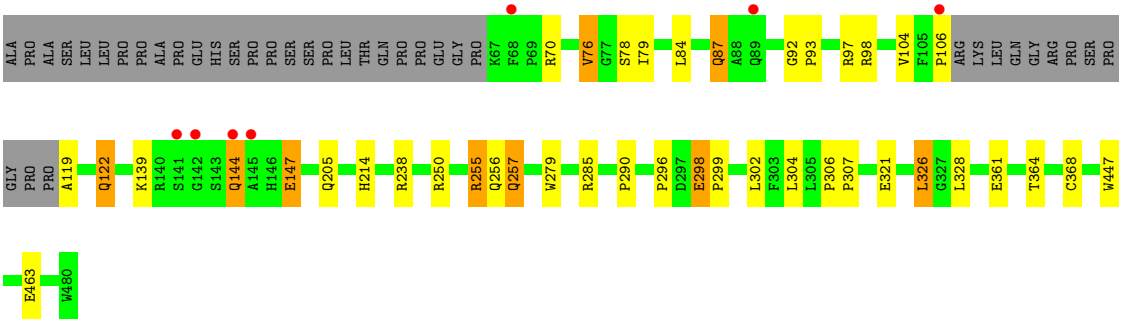
Chain C:





• Molecule 1: Nitric oxide synthase, endothelial

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	59.35Å 152.63Å 108.80Å 90.00° 90.92° 90.00°	Depositor
Resolution (Å)	49.01 – 1.80 49.01 – 1.80	Depositor EDS
% Data completeness (in resolution range)	98.9 (49.01-1.80) 99.1 (49.01-1.80)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.34 (at 1.79Å)	Xtriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, R_{free}	0.194 , 0.231 0.189 , 0.225	Depositor DCC
R_{free} test set	8892 reflections (4.21%)	wwPDB-VP
Wilson B-factor (Å^2)	29.1	Xtriage
Anisotropy	1.036	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 50.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.079 for h,-k,-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	14209	wwPDB-VP
Average B, all atoms (Å^2)	54.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: GD, CL, BTB, HEM, ZN, GOL, ACT, H4B, CA, A1BTW

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	0.27	0/3302	0.46	0/4498
1	B	0.31	0/3298	0.51	0/4495
1	C	0.24	0/3302	0.47	0/4498
1	D	0.30	0/3315	0.51	0/4517
All	All	0.28	0/13217	0.48	0/18008

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	1
1	D	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	143	SER	Peptide
1	D	255	ARG	Peptide

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	3207	0	3112	24	0
1	B	3203	0	3103	23	0
1	C	3207	0	3112	48	0
1	D	3217	0	3122	30	0
2	A	43	0	30	2	0
2	B	43	0	30	2	0
2	C	43	0	30	2	0
2	D	43	0	30	3	0
3	A	17	0	15	1	0
3	B	17	0	15	1	0
3	C	17	0	15	1	0
3	D	17	0	15	1	0
4	A	32	0	0	2	0
4	B	32	0	0	1	0
4	C	32	0	0	0	0
4	D	32	0	0	1	0
5	A	4	0	3	0	0
5	B	4	0	3	0	0
5	C	4	0	3	0	0
5	D	4	0	3	1	0
6	A	28	0	37	5	0
6	B	28	0	35	5	0
6	C	28	0	38	4	0
6	D	28	0	37	3	0
7	A	18	0	24	0	0
7	B	12	0	16	0	0
7	C	18	0	24	0	0
7	D	18	0	24	0	0
8	A	1	0	0	0	0
8	B	1	0	0	0	0
8	C	1	0	0	0	0
8	D	1	0	0	0	0
9	A	1	0	0	0	0
9	C	1	0	0	0	0
10	A	1	0	0	0	0
10	B	1	0	0	0	0
11	B	1	0	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
11	C	1	0	0	0	0
11	D	2	0	0	0	0
12	A	172	0	0	1	0
12	B	249	0	0	1	0
12	C	134	0	0	7	0
12	D	246	0	0	4	0
All	All	14209	0	12876	142	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (142) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:256:GLN:HG3	1:D:257:GLN:H	1.48	0.79
2:A:501:HEM:HBB2	2:A:501:HEM:HHC	1.63	0.78
6:B:505:BTB:O4	6:B:505:BTB:H72	1.82	0.77
1:C:233:GLN:OE1	12:C:601:HOH:O	2.04	0.73
1:A:279:TRP:HB2	1:A:302:LEU:HD11	1.70	0.73
2:C:501:HEM:HBB2	2:C:501:HEM:HHC	1.71	0.72
1:C:235:CYS:SG	12:C:604:HOH:O	2.47	0.71
1:A:200:ASP:N	1:A:200:ASP:OD1	2.22	0.71
1:C:321:GLU:H	1:C:321:GLU:CD	2.00	0.70
1:C:147:GLU:O	1:C:151:GLN:NE2	2.26	0.69
1:C:275:ILE:HD11	1:C:281:PRO:HB3	1.73	0.69
6:D:507:BTB:O1	6:D:507:BTB:O3	2.12	0.68
1:B:128:ARG:HB2	1:B:128:ARG:HH11	1.61	0.65
1:C:128:ARG:NH2	1:C:154:GLU:OE2	2.30	0.65
1:B:128:ARG:HB2	1:B:128:ARG:NH1	2.13	0.64
1:C:234:ARG:NH1	1:C:347:GLU:OE1	2.30	0.64
1:C:147:GLU:HA	1:C:150:LEU:HD12	1.79	0.64
2:C:501:HEM:HBC2	2:C:501:HEM:HMC2	1.80	0.64
1:C:70:ARG:NH2	12:C:605:HOH:O	2.31	0.63
1:C:97:ARG:HG2	1:C:98:ARG:HG2	1.80	0.62
1:B:279:TRP:HB2	1:B:302:LEU:HD21	1.81	0.62
1:D:238:ARG:NH2	12:D:603:HOH:O	2.32	0.61
1:C:210:TYR:O	12:C:602:HOH:O	2.16	0.61
2:B:501:HEM:HBC2	2:B:501:HEM:HMC2	1.83	0.61
1:C:238:ARG:NH1	1:C:239:GLY:O	2.34	0.60
1:B:128:ARG:HD3	1:B:150:LEU:HD22	1.84	0.60
1:A:342:GLU:OE1	1:A:474:ARG:NH1	2.34	0.60

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:505:BTB:H41	1:D:326:LEU:HD12	1.83	0.59
6:B:505:BTB:O4	6:B:505:BTB:C7	2.49	0.59
1:A:371:HIS:HD2	4:A:503:A1BTW:C33	2.16	0.59
1:D:298:GLU:HG3	1:D:299:PRO:HD2	1.85	0.58
1:B:217:TYR:OH	12:B:601:HOH:O	2.02	0.58
1:A:234:ARG:HA	1:A:238:ARG:HH12	1.68	0.58
2:A:501:HEM:HMC2	2:A:501:HEM:HBC2	1.86	0.58
1:B:124:LEU:HD21	1:B:154:GLU:HG2	1.88	0.56
6:C:505:BTB:O4	6:C:505:BTB:O3	2.13	0.56
1:D:279:TRP:HB2	1:D:302:LEU:HD21	1.87	0.56
1:A:149:ARG:NH2	1:A:164:GLN:O	2.36	0.55
1:C:256:GLN:HB2	1:C:260:SER:O	2.06	0.55
1:B:124:LEU:HD11	1:B:128:ARG:HH22	1.71	0.55
1:C:238:ARG:HB3	12:C:604:HOH:O	2.05	0.55
1:D:76:VAL:HG12	1:D:78:SER:H	1.73	0.54
1:D:285:ARG:NH1	12:D:601:HOH:O	2.21	0.54
1:C:97:ARG:HB2	1:C:97:ARG:HH11	1.73	0.54
1:D:144:GLN:NE2	12:D:604:HOH:O	2.33	0.54
1:D:326:LEU:HB3	1:D:328:LEU:HG	1.89	0.54
1:D:147:GLU:H	1:D:147:GLU:CD	2.16	0.54
1:B:321:GLU:OE2	6:B:505:BTB:O4	2.27	0.53
1:C:242:ARG:NH1	1:C:476:GLN:OE1	2.41	0.53
1:C:144:GLN:HG3	1:C:145:ALA:N	2.24	0.53
2:D:502:HEM:HMC2	2:D:502:HEM:HBC2	1.91	0.52
1:B:298:GLU:OE2	6:B:506:BTB:O8	2.28	0.52
1:A:447:TRP:HA	3:A:502:H4B:N1	2.25	0.51
1:C:204:ALA:HB1	1:C:303:PHE:HE1	1.75	0.51
1:A:321:GLU:H	1:A:321:GLU:CD	2.18	0.51
2:B:501:HEM:HHC	2:B:501:HEM:HBB2	1.93	0.51
1:C:265:PRO:HA	1:C:268:VAL:HG23	1.92	0.51
1:A:364:THR:O	1:A:368:CYS:HB2	2.12	0.50
6:A:506:BTB:O4	6:A:506:BTB:O3	2.17	0.50
1:C:150:LEU:HB2	1:C:151:GLN:HE21	1.77	0.50
6:B:505:BTB:H61	6:B:505:BTB:O3	2.12	0.49
1:C:292:LEU:HD22	1:C:300:PRO:HB2	1.94	0.48
1:C:252:ALA:O	1:C:263:GLY:HA3	2.12	0.48
1:C:364:THR:O	1:C:368:CYS:HB2	2.12	0.48
1:D:364:THR:O	1:D:368:CYS:HB2	2.12	0.48
1:A:386:ASP:OD2	1:A:388:ARG:HG3	2.14	0.48
1:B:326:LEU:HB3	1:B:328:LEU:HG	1.95	0.48
6:C:506:BTB:O3	6:C:506:BTB:O4	2.30	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:502:HEM:HMB3	5:D:505:ACT:H2	1.95	0.48
1:A:97:ARG:HG2	1:A:98:ARG:HG2	1.95	0.47
1:A:336:VAL:HG21	4:A:503:A1BTW:C14	2.45	0.47
6:A:505:BTB:H41	1:D:326:LEU:CD1	2.44	0.47
1:C:170:LEU:HD11	1:C:230:VAL:HG11	1.96	0.47
1:D:93:PRO:HG3	1:D:106:PRO:HB3	1.96	0.47
1:B:170:LEU:HD11	1:B:230:VAL:HG11	1.97	0.47
1:D:104:VAL:O	1:D:106:PRO:HD3	2.14	0.47
1:C:242:ARG:NE	1:C:479:PRO:HB3	2.30	0.46
6:A:506:BTB:H11	6:A:506:BTB:H51	1.67	0.46
1:B:178:TRP:CE3	1:B:190:TRP:HA	2.51	0.46
1:A:235:CYS:SG	1:A:238:ARG:HD3	2.55	0.46
1:C:322:TRP:CD1	6:C:505:BTB:H52	2.50	0.46
1:B:257:GLN:C	1:B:259:GLY:H	2.22	0.46
1:C:291:LEU:HD23	1:C:293:LEU:HD21	1.97	0.46
6:C:505:BTB:H51	6:C:505:BTB:H32	1.65	0.46
1:D:238:ARG:HG2	1:D:296:PRO:HB3	1.98	0.45
1:C:238:ARG:HD2	1:C:239:GLY:N	2.32	0.45
1:D:290:PRO:HB3	1:D:304:LEU:HD23	1.97	0.45
1:D:84:LEU:HD12	1:D:87:GLN:HG3	1.99	0.45
1:C:242:ARG:HE	1:C:479:PRO:HB3	1.81	0.45
1:D:361:GLU:OE1	4:D:504:A1BTW:N07	2.50	0.45
1:B:447:TRP:HA	3:B:502:H4B:N1	2.32	0.45
1:C:386:ASP:OD2	1:C:388:ARG:HG2	2.17	0.45
1:A:275:ILE:HD11	1:A:281:PRO:HB3	1.99	0.44
1:C:447:TRP:HA	3:C:502:H4B:N1	2.32	0.44
1:A:269:GLU:O	1:A:272:GLU:HG2	2.17	0.44
1:A:214:HIS:C	1:A:214:HIS:CD2	2.96	0.44
1:C:202:ARG:HA	1:C:241:PHE:HZ	1.81	0.44
1:A:450:PRO:HG2	1:A:457:THR:HG21	2.00	0.44
1:D:70:ARG:HD2	1:D:79:ILE:HD13	2.00	0.44
1:C:258:ASP:OD1	1:C:258:ASP:N	2.51	0.44
1:D:119:ALA:HB1	1:D:122:GLN:HG2	1.99	0.44
1:D:250:ARG:HA	1:D:250:ARG:HD2	1.74	0.43
1:D:447:TRP:HA	3:D:503:H4B:N1	2.32	0.43
1:A:104:VAL:O	1:A:106:PRO:HD3	2.18	0.43
1:C:151:GLN:HE21	1:C:151:GLN:N	2.17	0.43
1:B:470:SER:HA	1:B:471:PRO:C	2.43	0.43
1:C:234:ARG:NH2	1:C:242:ARG:HH12	2.17	0.43
1:B:290:PRO:HB3	1:B:304:LEU:HD23	2.01	0.43
1:C:372:ARG:NH2	12:C:612:HOH:O	2.45	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:255:ARG:HG2	1:D:255:ARG:HH11	1.83	0.43
1:D:321:GLU:OE2	6:D:506:BTB:O4	2.37	0.43
2:D:502:HEM:HBB2	2:D:502:HEM:HHC	2.00	0.43
1:A:120:PRO:O	1:A:124:LEU:HD12	2.19	0.43
1:D:306:PRO:HA	1:D:307:PRO:HD2	1.90	0.43
1:C:292:LEU:HD23	1:C:292:LEU:HA	1.93	0.42
1:C:202:ARG:HE	1:C:202:ARG:HB3	1.69	0.42
1:C:398:ALA:O	1:C:402:ILE:HG13	2.20	0.42
1:A:246:SER:HA	1:A:338:ASN:HB3	2.01	0.42
1:B:449:VAL:HA	1:B:450:PRO:HD3	1.91	0.42
1:D:122:GLN:CD	1:D:122:GLN:N	2.78	0.42
1:A:128:ARG:NH1	12:A:615:HOH:O	2.52	0.41
1:B:233:GLN:HB3	1:B:348:PHE:CE2	2.55	0.41
1:B:361:GLU:OE1	4:B:503:A1BTW:N07	2.54	0.41
1:C:229:THR:O	1:C:352:PRO:HD2	2.19	0.41
6:D:506:BTB:H72	6:D:506:BTB:H11	1.80	0.41
1:C:96:PRO:O	1:D:92:GLY:N	2.40	0.41
1:C:232:PRO:HA	12:C:607:HOH:O	2.20	0.41
1:B:453:SER:HB3	1:B:456:LEU:HD12	2.01	0.41
1:A:170:LEU:HD11	1:A:230:VAL:HG11	2.02	0.41
1:B:224:LEU:HB2	1:B:416:THR:HB	2.03	0.41
1:D:205:GLN:HG3	12:D:798:HOH:O	2.19	0.41
1:B:247:GLN:HB2	1:B:250:ARG:HG2	2.03	0.41
6:A:506:BTB:O4	6:A:506:BTB:H72	2.17	0.40
1:C:97:ARG:HB2	1:C:97:ARG:NH1	2.34	0.40
1:C:207:MET:HE2	1:C:207:MET:HB3	1.96	0.40
1:A:68:PHE:CD1	1:A:83:THR:HG22	2.56	0.40
1:A:97:ARG:HG3	1:B:88:ALA:HB3	2.04	0.40
1:C:90:GLN:HB3	1:C:468:PHE:CD2	2.56	0.40
1:C:368:CYS:SG	1:C:376:LEU:HD13	2.61	0.40
1:D:214:HIS:CD2	1:D:214:HIS:C	2.98	0.40
1:C:103:LEU:HD12	1:D:463:GLU:HB3	2.03	0.40
1:C:385:LEU:HD23	1:C:385:LEU:HA	1.93	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	398/440 (90%)	382 (96%)	15 (4%)	1 (0%)	37 25
1	B	398/440 (90%)	390 (98%)	6 (2%)	2 (0%)	25 14
1	C	398/440 (90%)	381 (96%)	13 (3%)	4 (1%)	13 4
1	D	400/440 (91%)	385 (96%)	14 (4%)	1 (0%)	37 25
All	All	1594/1760 (91%)	1538 (96%)	48 (3%)	8 (0%)	25 14

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	144	GLN
1	D	144	GLN
1	C	89	GLN
1	B	255	ARG
1	B	258	ASP
1	C	203	SER
1	A	239	GLY
1	C	239	GLY

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	342/373 (92%)	325 (95%)	17 (5%)	20 9
1	B	341/373 (91%)	329 (96%)	12 (4%)	31 19

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	C	342/373 (92%)	323 (94%)	19 (6%)	17 7
1	D	343/373 (92%)	333 (97%)	10 (3%)	37 26
All	All	1368/1492 (92%)	1310 (96%)	58 (4%)	25 13

All (58) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	89	GLN
1	A	124	LEU
1	A	139	LYS
1	A	140	ARG
1	A	141	SER
1	A	151	GLN
1	A	200	ASP
1	A	203	SER
1	A	207	MET
1	A	255	ARG
1	A	258	ASP
1	A	289	LEU
1	A	291	LEU
1	A	302	LEU
1	A	308	GLU
1	A	389	THR
1	A	417	ILE
1	B	97	ARG
1	B	124	LEU
1	B	128	ARG
1	B	136	SER
1	B	200	ASP
1	B	221	ARG
1	B	250	ARG
1	B	258	ASP
1	B	268	VAL
1	B	276	GLN
1	B	326	LEU
1	B	429	LYS
1	C	67	LYS
1	C	87	GLN
1	C	97	ARG
1	C	121	GLU
1	C	125	SER

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	126	GLN
1	C	129	ASP
1	C	138	ILE
1	C	151	GLN
1	C	202	ARG
1	C	224	LEU
1	C	240	ASP
1	C	256	GLN
1	C	285	ARG
1	C	291	LEU
1	C	304	LEU
1	C	309	LEU
1	C	321	GLU
1	C	474	ARG
1	D	76	VAL
1	D	87	GLN
1	D	97	ARG
1	D	98	ARG
1	D	122	GLN
1	D	139	LYS
1	D	147	GLU
1	D	257	GLN
1	D	298	GLU
1	D	326	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	87	GLN
1	A	122	GLN
1	A	133	GLN
1	A	205	GLN
1	A	277	HIS
1	A	408	HIS
1	C	132	ASN
1	C	151	GLN
1	D	122	GLN

5.3.3 RNA

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)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 47 ligands modelled in this entry, 12 are monoatomic - leaving 35 for Mogul analysis.

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	HEM	B	501	1	42,50,50	1.64	7 (16%)	46,82,82	1.77	11 (23%)
2	HEM	C	501	1	42,50,50	1.48	6 (14%)	46,82,82	1.62	11 (23%)
4	A1BTW	C	503	-	33,35,35	0.95	3 (9%)	37,46,46	1.36	1 (2%)
3	H4B	C	502	-	16,18,18	0.76	0	14,26,26	2.42	6 (42%)
5	ACT	C	504	-	3,3,3	0.81	0	3,3,3	0.79	0
6	BTB	B	505	11	13,13,13	0.49	0	7,16,16	0.94	1 (14%)
6	BTB	B	506	-	13,13,13	0.54	0	7,16,16	1.86	2 (28%)
7	GOL	B	508	-	5,5,5	0.38	0	5,5,5	0.31	0
7	GOL	A	509	-	5,5,5	0.37	0	5,5,5	0.51	0
2	HEM	A	501	1	42,50,50	1.52	7 (16%)	46,82,82	1.81	9 (19%)
3	H4B	A	502	-	16,18,18	0.86	0	14,26,26	2.27	4 (28%)
4	A1BTW	A	503	-	33,35,35	0.96	3 (9%)	37,46,46	1.60	4 (10%)
7	GOL	B	507	-	5,5,5	0.36	0	5,5,5	0.39	0
5	ACT	A	504	-	3,3,3	0.78	0	3,3,3	0.91	0
7	GOL	A	508	-	5,5,5	0.37	0	5,5,5	0.34	0
7	GOL	A	507	-	5,5,5	0.35	0	5,5,5	1.00	0
6	BTB	C	505	11	13,13,13	0.44	0	7,16,16	0.60	0
6	BTB	C	506	-	13,13,13	0.60	0	7,16,16	1.19	1 (14%)
6	BTB	A	505	11	13,13,13	0.40	0	7,16,16	1.48	2 (28%)
6	BTB	A	506	-	13,13,13	0.80	0	7,16,16	0.96	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
7	GOL	C	508	-	5,5,5	0.35	0	5,5,5	0.48	0
4	A1BTW	B	503	-	33,35,35	0.99	3 (9%)	37,46,46	1.58	2 (5%)
7	GOL	D	510	-	5,5,5	0.39	0	5,5,5	0.16	0
2	HEM	D	502	1	42,50,50	1.53	7 (16%)	46,82,82	1.64	9 (19%)
6	BTB	D	506	11	13,13,13	0.40	0	7,16,16	0.69	0
5	ACT	D	505	-	3,3,3	0.81	0	3,3,3	0.75	0
7	GOL	D	508	-	5,5,5	0.38	0	5,5,5	0.21	0
7	GOL	C	507	-	5,5,5	0.40	0	5,5,5	0.28	0
3	H4B	D	503	-	16,18,18	0.85	0	14,26,26	2.31	5 (35%)
3	H4B	B	502	-	16,18,18	0.71	0	14,26,26	2.44	7 (50%)
5	ACT	B	504	-	3,3,3	0.81	0	3,3,3	0.75	0
6	BTB	D	507	-	13,13,13	0.61	0	7,16,16	0.88	0
4	A1BTW	D	504	-	33,35,35	0.98	3 (9%)	37,46,46	1.65	2 (5%)
7	GOL	D	509	-	5,5,5	0.33	0	5,5,5	0.87	0
7	GOL	C	509	-	5,5,5	0.39	0	5,5,5	0.51	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	HEM	B	501	1	-	0/12/54/54	-
2	HEM	C	501	1	-	2/12/54/54	-
4	A1BTW	C	503	-	-	1/17/21/21	0/4/4/4
3	H4B	C	502	-	-	0/8/17/17	0/2/2/2
6	BTB	B	505	11	-	5/21/21/21	-
6	BTB	B	506	-	-	8/21/21/21	-
7	GOL	B	508	-	-	1/4/4/4	-
7	GOL	A	509	-	-	3/4/4/4	-
2	HEM	A	501	1	-	1/12/54/54	-
3	H4B	A	502	-	-	0/8/17/17	0/2/2/2
4	A1BTW	A	503	-	-	1/17/21/21	0/4/4/4
7	GOL	B	507	-	-	4/4/4/4	-
7	GOL	A	508	-	-	4/4/4/4	-
7	GOL	A	507	-	-	4/4/4/4	-
6	BTB	C	505	11	-	5/21/21/21	-
6	BTB	C	506	-	-	12/21/21/21	-
6	BTB	A	505	11	-	1/21/21/21	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	BTB	A	506	-	-	12/21/21/21	-
7	GOL	C	508	-	-	2/4/4/4	-
4	A1BTW	B	503	-	-	1/17/21/21	0/4/4/4
7	GOL	D	510	-	-	3/4/4/4	-
2	HEM	D	502	1	-	0/12/54/54	-
6	BTB	D	506	11	-	4/21/21/21	-
7	GOL	D	508	-	-	2/4/4/4	-
7	GOL	C	507	-	-	2/4/4/4	-
3	H4B	D	503	-	-	0/8/17/17	0/2/2/2
3	H4B	B	502	-	-	0/8/17/17	0/2/2/2
6	BTB	D	507	-	-	9/21/21/21	-
4	A1BTW	D	504	-	-	1/17/21/21	0/4/4/4
7	GOL	D	509	-	-	3/4/4/4	-
7	GOL	C	509	-	-	0/4/4/4	-

All (39) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	HEM	C3C-C2C	-4.90	1.33	1.40
2	B	501	HEM	C3C-C4C	3.57	1.46	1.41
2	D	502	HEM	C3C-C4C	3.57	1.46	1.41
2	C	501	HEM	C3C-C2C	-3.43	1.35	1.40
2	A	501	HEM	C3C-C2C	-3.39	1.35	1.40
2	D	502	HEM	C3C-CAC	3.32	1.55	1.47
2	A	501	HEM	C3C-CAC	3.32	1.55	1.47
4	D	504	A1BTW	C06-N07	-3.31	1.32	1.38
2	C	501	HEM	C3C-CAC	3.28	1.55	1.47
4	B	503	A1BTW	C06-N07	-3.27	1.32	1.38
2	D	502	HEM	CAB-C3B	3.25	1.56	1.47
4	C	503	A1BTW	C06-N07	-3.18	1.32	1.38
4	A	503	A1BTW	C05-C06	3.16	1.50	1.46
2	D	502	HEM	C3C-C2C	-3.11	1.36	1.40
2	A	501	HEM	CAB-C3B	3.10	1.55	1.47
2	C	501	HEM	CAB-C3B	3.01	1.55	1.47
2	B	501	HEM	C3C-CAC	2.98	1.54	1.47
2	A	501	HEM	C3C-C4C	2.92	1.45	1.41
4	A	503	A1BTW	C06-N07	-2.89	1.33	1.38
2	B	501	HEM	CAB-C3B	2.89	1.55	1.47
4	A	503	A1BTW	C11-N07	-2.80	1.36	1.41
4	C	503	A1BTW	C11-N07	-2.70	1.36	1.41

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	501	HEM	C3C-C4C	2.62	1.45	1.41
4	D	504	A1BTW	C05-C06	2.58	1.49	1.46
4	B	503	A1BTW	C11-N07	-2.53	1.36	1.41
4	C	503	A1BTW	C05-C06	2.52	1.49	1.46
2	A	501	HEM	FE-NB	2.44	2.11	1.98
2	C	501	HEM	FE-ND	2.44	2.11	1.98
2	D	502	HEM	CMD-C2D	2.43	1.55	1.50
4	D	504	A1BTW	C11-N07	-2.41	1.36	1.41
4	B	503	A1BTW	C05-C06	2.34	1.49	1.46
2	D	502	HEM	CMB-C2B	2.34	1.55	1.50
2	D	502	HEM	FE-NB	2.21	2.10	1.98
2	A	501	HEM	FE-ND	2.17	2.10	1.98
2	B	501	HEM	CMD-C2D	2.16	1.55	1.50
2	A	501	HEM	CMB-C2B	2.10	1.55	1.50
2	C	501	HEM	CMB-C2B	2.07	1.55	1.50
2	B	501	HEM	CMB-C2B	2.06	1.55	1.50
2	B	501	HEM	FE-NB	2.01	2.09	1.98

All (77) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	D	504	A1BTW	C04-N03-C02	8.69	119.46	105.72
4	B	503	A1BTW	C04-N03-C02	7.80	118.06	105.72
4	C	503	A1BTW	C04-N03-C02	7.23	117.16	105.72
4	A	503	A1BTW	C04-N03-C02	7.14	117.02	105.72
3	A	502	H4B	C8A-C4A-C4	5.93	119.90	114.50
2	A	501	HEM	CBA-CAA-C2A	-5.20	103.80	112.54
3	C	502	H4B	C8A-C4A-C4	5.09	119.13	114.50
3	B	502	H4B	C8A-C4A-C4	4.92	118.97	114.50
2	A	501	HEM	C4B-CHC-C1C	4.79	128.88	122.56
3	D	503	H4B	C8A-C4A-C4	4.75	118.82	114.50
2	D	502	HEM	CBA-CAA-C2A	-4.30	105.31	112.54
2	C	501	HEM	C4B-CHC-C1C	4.24	128.15	122.56
2	D	502	HEM	C4B-CHC-C1C	4.21	128.12	122.56
3	B	502	H4B	C2-N3-C4	4.00	121.52	115.96
2	B	501	HEM	CBA-CAA-C2A	-3.98	105.84	112.54
3	C	502	H4B	C2-N3-C4	3.83	121.29	115.96
6	B	506	BTB	O4-C4-C2	3.68	120.06	111.40
3	D	503	H4B	N1-C2-N3	-3.60	119.96	125.48
3	C	502	H4B	N1-C2-N3	-3.49	120.14	125.48
2	B	501	HEM	CMA-C3A-C4A	-3.44	123.41	128.46
2	D	502	HEM	C3B-C4B-NB	-3.43	107.01	109.47

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	501	HEM	C3B-C4B-NB	-3.39	107.03	109.47
3	B	502	H4B	N1-C2-N3	-3.31	120.41	125.48
3	D	503	H4B	C2-N3-C4	3.21	120.42	115.96
6	A	505	BTB	O3-C3-C2	3.20	118.92	111.40
2	B	501	HEM	C3D-C4D-ND	-3.09	106.78	110.17
2	B	501	HEM	C1B-NB-C4B	3.01	108.78	105.21
3	A	502	H4B	N1-C2-N3	-3.01	120.87	125.48
2	A	501	HEM	C3B-C4B-NB	-2.99	107.32	109.47
3	A	502	H4B	C2-N3-C4	2.97	120.09	115.96
2	B	501	HEM	C4B-CHC-C1C	2.96	126.47	122.56
2	A	501	HEM	C4D-ND-C1D	2.88	108.62	105.21
2	C	501	HEM	C3B-C2B-C1B	2.86	108.56	106.41
2	C	501	HEM	CBA-CAA-C2A	-2.86	107.74	112.54
2	B	501	HEM	C4D-ND-C1D	2.79	108.52	105.21
2	D	502	HEM	C1B-NB-C4B	2.79	108.51	105.21
2	A	501	HEM	C3D-C4D-ND	-2.77	107.14	110.17
2	C	501	HEM	C1B-NB-C4B	2.71	108.42	105.21
2	B	501	HEM	C3B-C2B-C1B	2.71	108.45	106.41
2	D	502	HEM	CHC-C4B-C3B	2.69	128.68	124.57
2	D	502	HEM	CHA-C4D-ND	2.69	127.70	124.37
4	A	503	A1BTW	C19-C20-C21	-2.66	107.24	112.85
4	B	503	A1BTW	C19-C20-C21	-2.65	107.26	112.85
2	C	501	HEM	C3B-C4B-NB	-2.64	107.57	109.47
3	D	503	H4B	C2-N1-C8A	2.61	120.79	114.59
6	B	506	BTB	C8-C7-N	-2.57	101.54	111.59
2	A	501	HEM	CMA-C3A-C4A	-2.57	124.69	128.46
3	C	502	H4B	C2-N1-C8A	2.54	120.63	114.59
6	C	506	BTB	O3-C3-C2	-2.53	105.44	111.40
3	C	502	H4B	C11-C10-C9	-2.53	109.02	112.11
2	C	501	HEM	C4C-CHD-C1D	2.50	125.86	122.56
2	C	501	HEM	C4D-ND-C1D	2.49	108.16	105.21
3	D	503	H4B	N2-C2-N3	2.49	120.96	117.22
3	B	502	H4B	O10-C10-C9	-2.48	105.67	109.77
3	A	502	H4B	C2-N1-C8A	2.46	120.45	114.59
2	B	501	HEM	CHC-C4B-NB	2.45	127.07	124.44
4	D	504	A1BTW	C19-C20-C21	-2.44	107.71	112.85
3	C	502	H4B	N2-C2-N1	2.43	120.87	117.22
2	A	501	HEM	C1B-NB-C4B	2.41	108.06	105.21
3	B	502	H4B	C2-N1-C8A	2.39	120.27	114.59
2	B	501	HEM	C4C-CHD-C1D	2.37	125.69	122.56
2	B	501	HEM	CMC-C2C-C3C	2.30	129.28	124.68
2	A	501	HEM	C3B-C2B-C1B	2.29	108.13	106.41

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	502	HEM	CMC-C2C-C3C	2.27	129.23	124.68
4	A	503	A1BTW	C11-N07-C06	-2.24	123.25	128.41
2	C	501	HEM	C4A-C3A-C2A	2.22	108.54	107.00
2	D	502	HEM	C3D-C4D-ND	-2.17	107.79	110.17
4	A	503	A1BTW	C15-C17-N18	-2.14	106.05	112.79
2	C	501	HEM	CMA-C3A-C4A	-2.13	125.33	128.46
3	B	502	H4B	C4-C4A-N5	2.13	121.61	118.57
2	D	502	HEM	C4D-ND-C1D	2.08	107.67	105.21
3	B	502	H4B	C4A-C4-N3	-2.05	118.75	123.91
6	A	505	BTB	O4-C4-C2	2.04	116.21	111.40
6	B	505	BTB	O1-C1-C2	2.03	116.18	111.40
2	A	501	HEM	CAD-C3D-C2D	-2.02	124.08	127.87
2	C	501	HEM	CMC-C2C-C3C	2.01	128.69	124.68
2	C	501	HEM	CHC-C4B-C3B	2.00	127.63	124.57

There are no chirality outliers.

All (91) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	503	A1BTW	C21-C26-C27-N28
6	A	506	BTB	O1-C1-C2-C4
6	A	506	BTB	O1-C1-C2-N
6	A	506	BTB	C1-C2-C4-O4
6	A	506	BTB	C3-C2-C4-O4
6	A	506	BTB	N-C2-C4-O4
6	B	505	BTB	C1-C2-C4-O4
6	B	505	BTB	C3-C2-C4-O4
6	B	505	BTB	N-C2-C4-O4
6	B	506	BTB	C1-C2-C3-O3
6	B	506	BTB	C4-C2-C3-O3
6	B	506	BTB	N-C2-C3-O3
6	B	506	BTB	C1-C2-C4-O4
6	B	506	BTB	C3-C2-C4-O4
6	B	506	BTB	N-C2-C4-O4
6	C	505	BTB	O1-C1-C2-C3
6	C	505	BTB	O1-C1-C2-N
6	C	505	BTB	C1-C2-C4-O4
6	C	505	BTB	C3-C2-C4-O4
6	C	505	BTB	N-C2-C4-O4
6	C	506	BTB	C1-C2-C4-O4
6	C	506	BTB	C3-C2-C4-O4
6	C	506	BTB	N-C2-C4-O4

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
6	C	506	BTB	C1-C2-N-C5
6	C	506	BTB	C1-C2-N-C7
6	C	506	BTB	C3-C2-N-C5
6	C	506	BTB	C3-C2-N-C7
6	C	506	BTB	C4-C2-N-C5
6	C	506	BTB	C4-C2-N-C7
6	D	506	BTB	O1-C1-C2-C3
6	D	506	BTB	O1-C1-C2-C4
6	D	506	BTB	O1-C1-C2-N
6	D	507	BTB	O1-C1-C2-C3
6	D	507	BTB	O1-C1-C2-C4
6	D	507	BTB	O1-C1-C2-N
6	D	507	BTB	C1-C2-C4-O4
6	D	507	BTB	C3-C2-C4-O4
6	D	507	BTB	N-C2-C4-O4
6	D	507	BTB	C8-C7-N-C5
7	A	507	GOL	O1-C1-C2-C3
7	A	507	GOL	C1-C2-C3-O3
7	A	508	GOL	O1-C1-C2-C3
7	A	508	GOL	C1-C2-C3-O3
7	A	509	GOL	O1-C1-C2-C3
7	B	507	GOL	O1-C1-C2-C3
7	C	507	GOL	O1-C1-C2-C3
7	C	508	GOL	O1-C1-C2-C3
6	B	506	BTB	N-C7-C8-O8
6	C	506	BTB	N-C7-C8-O8
7	A	508	GOL	O2-C2-C3-O3
7	B	507	GOL	O1-C1-C2-O2
6	D	507	BTB	N-C7-C8-O8
6	A	506	BTB	N-C7-C8-O8
7	B	507	GOL	C1-C2-C3-O3
7	D	508	GOL	O1-C1-C2-C3
7	D	510	GOL	C1-C2-C3-O3
6	D	507	BTB	N-C5-C6-O6
2	C	501	HEM	C2A-CAA-CBA-CGA
7	B	507	GOL	O2-C2-C3-O3
7	C	507	GOL	O1-C1-C2-O2
7	A	507	GOL	O1-C1-C2-O2
7	A	507	GOL	O2-C2-C3-O3
7	A	509	GOL	O1-C1-C2-O2
7	C	508	GOL	O1-C1-C2-O2
7	D	508	GOL	O1-C1-C2-O2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
6	B	505	BTB	C4-C2-C3-O3
6	C	506	BTB	O1-C1-C2-C4
7	A	508	GOL	O1-C1-C2-O2
7	D	509	GOL	O1-C1-C2-O2
7	D	509	GOL	O2-C2-C3-O3
6	B	506	BTB	N-C5-C6-O6
6	C	506	BTB	N-C5-C6-O6
7	B	508	GOL	O1-C1-C2-O2
7	D	510	GOL	O2-C2-C3-O3
4	A	503	A1BTW	C21-C26-C27-N28
4	C	503	A1BTW	C21-C26-C27-N28
4	D	504	A1BTW	C21-C26-C27-N28
2	A	501	HEM	C4B-C3B-CAB-CBB
2	C	501	HEM	C4B-C3B-CAB-CBB
6	A	505	BTB	C4-C2-C3-O3
6	A	506	BTB	C3-C2-N-C7
6	A	506	BTB	C4-C2-N-C5
6	A	506	BTB	C4-C2-N-C7
6	D	506	BTB	N-C5-C6-O6
7	D	509	GOL	C1-C2-C3-O3
7	D	510	GOL	O1-C1-C2-C3
7	A	509	GOL	O2-C2-C3-O3
6	A	506	BTB	C1-C2-N-C5
6	A	506	BTB	C1-C2-N-C7
6	A	506	BTB	C3-C2-N-C5
6	B	505	BTB	N-C2-C3-O3

There are no ring outliers.

20 monomers are involved in 34 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	501	HEM	2	0
2	C	501	HEM	2	0
3	C	502	H4B	1	0
6	B	505	BTB	4	0
6	B	506	BTB	1	0
2	A	501	HEM	2	0
3	A	502	H4B	1	0
4	A	503	A1BTW	2	0
6	C	505	BTB	3	0
6	C	506	BTB	1	0
6	A	505	BTB	2	0

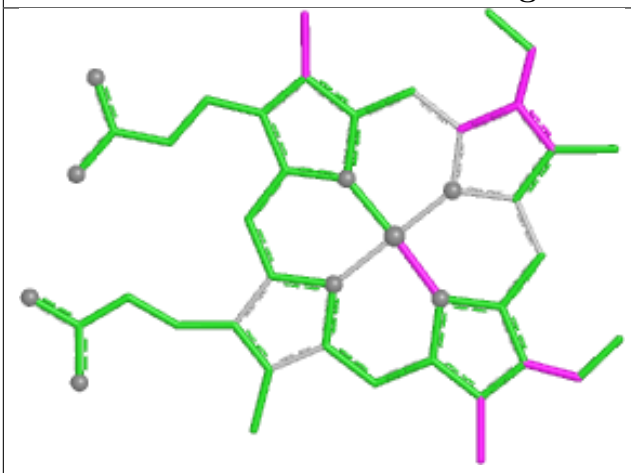
Continued on next page...

Continued from previous page...

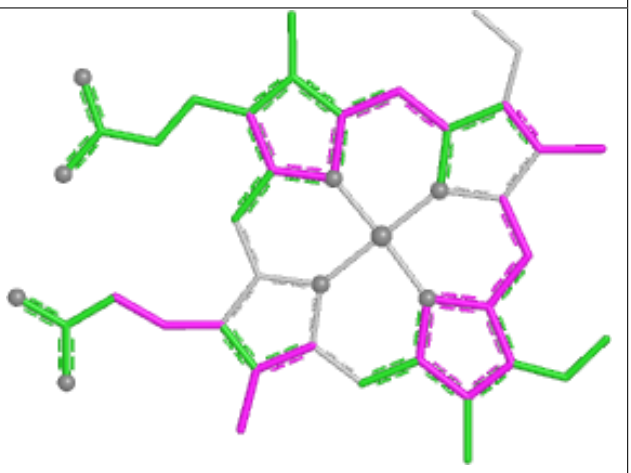
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	506	BTB	3	0
4	B	503	A1BTW	1	0
2	D	502	HEM	3	0
6	D	506	BTB	2	0
5	D	505	ACT	1	0
3	D	503	H4B	1	0
3	B	502	H4B	1	0
6	D	507	BTB	1	0
4	D	504	A1BTW	1	0

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

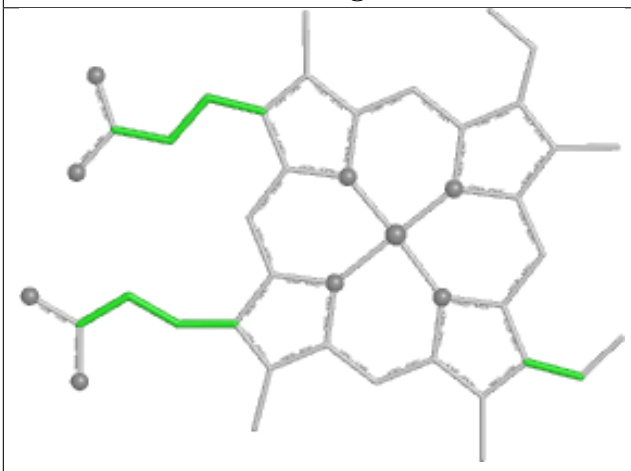
Ligand HEM B 501



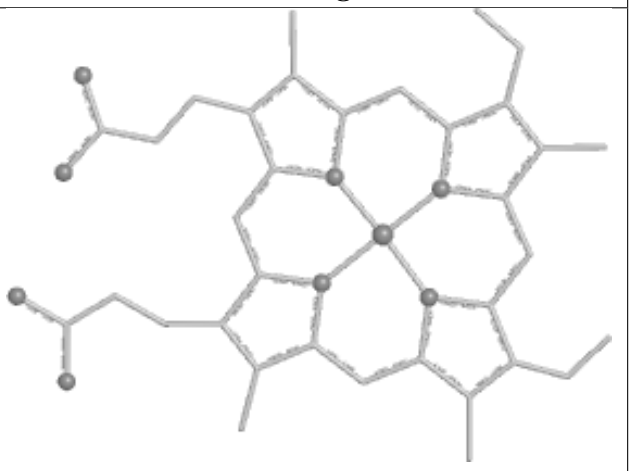
Bond lengths



Bond angles

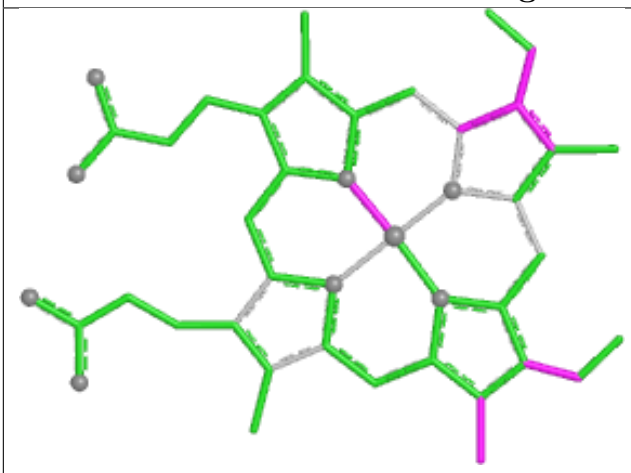


Torsions

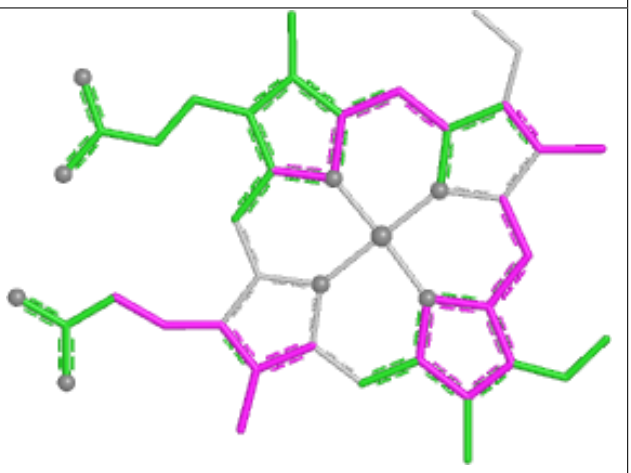


Rings

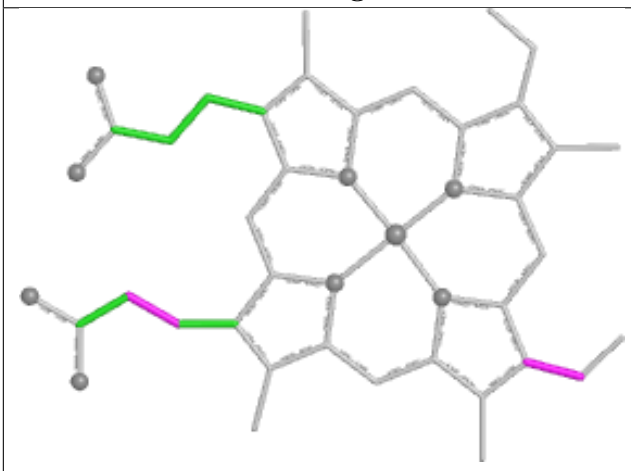
Ligand HEM C 501



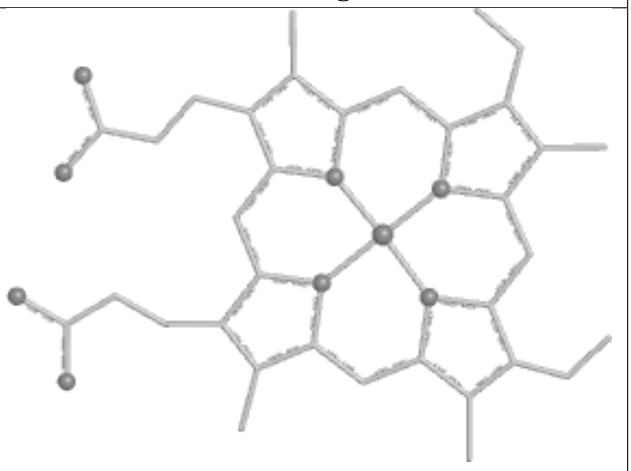
Bond lengths



Bond angles

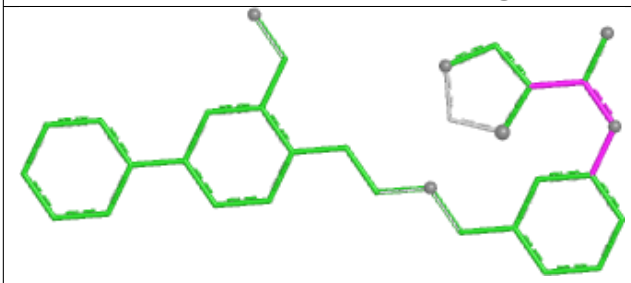


Torsions

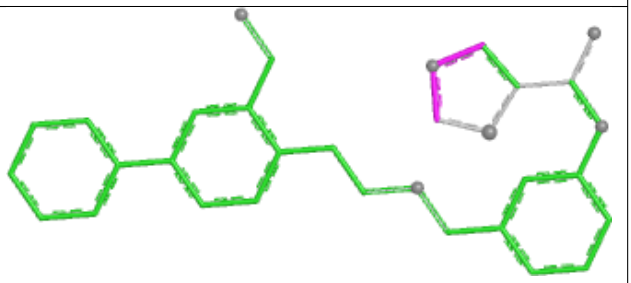


Rings

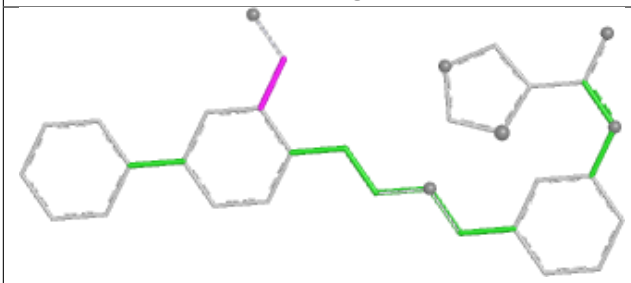
Ligand A1BTW C 503



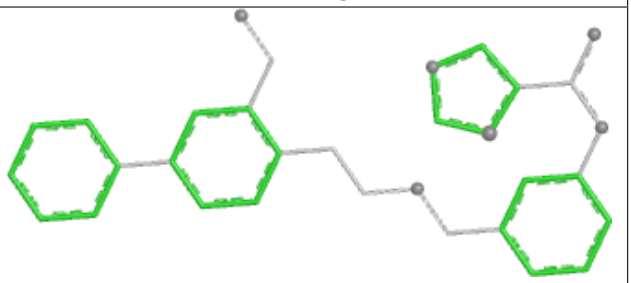
Bond lengths



Bond angles

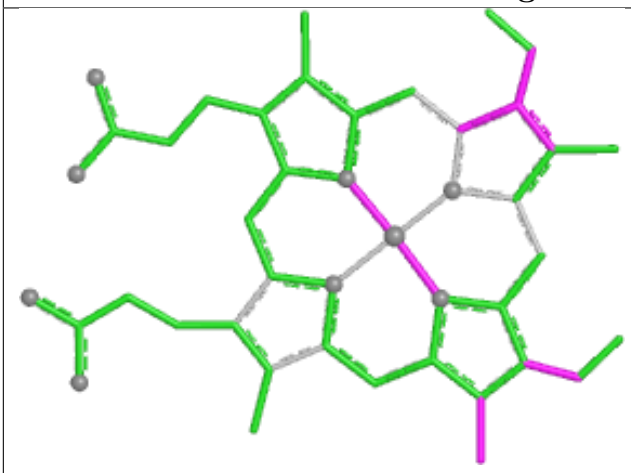


Torsions

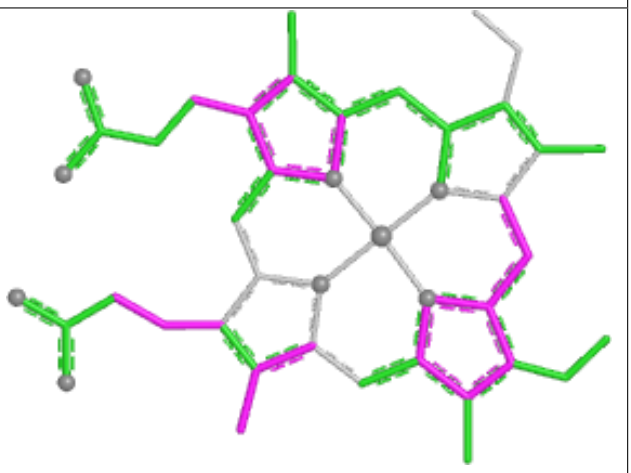


Rings

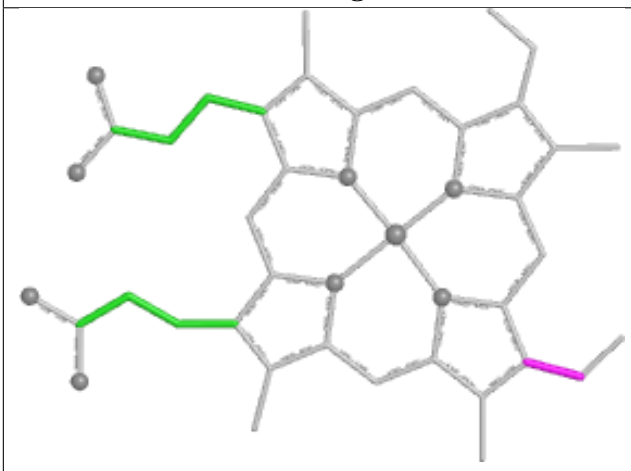
Ligand HEM A 501



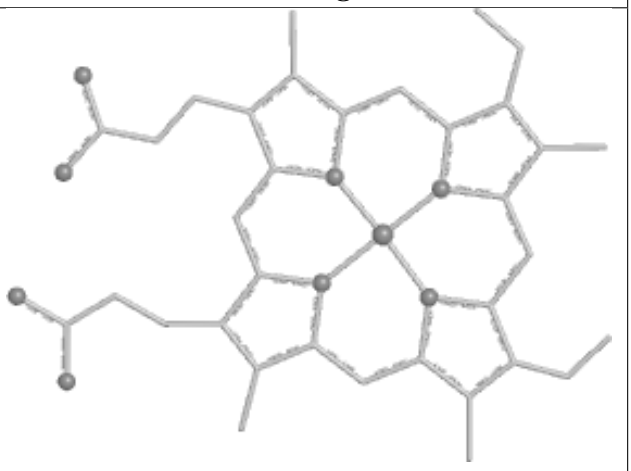
Bond lengths



Bond angles

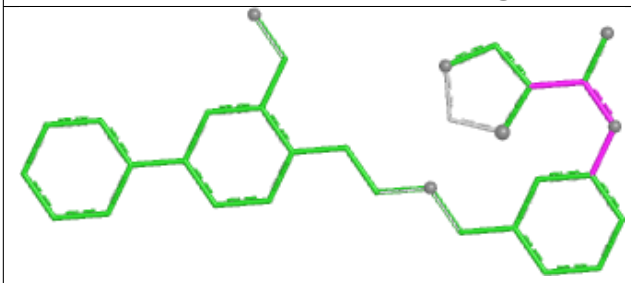


Torsions

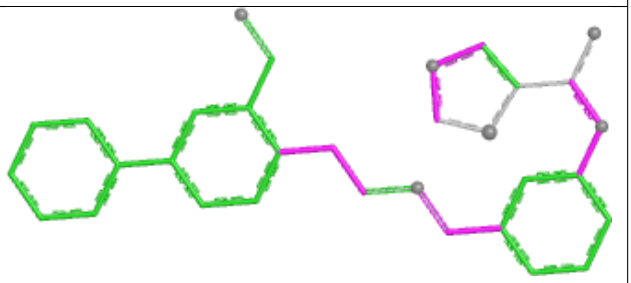


Rings

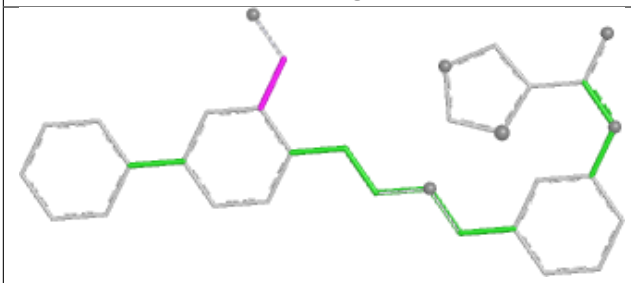
Ligand A1BTW A 503



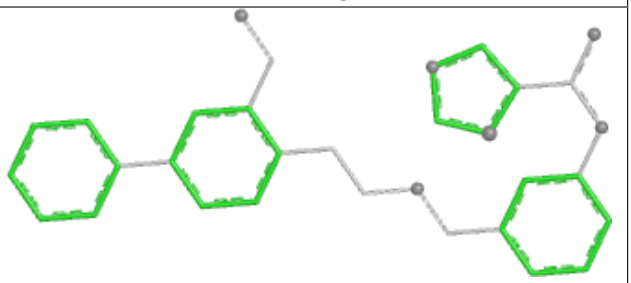
Bond lengths



Bond angles

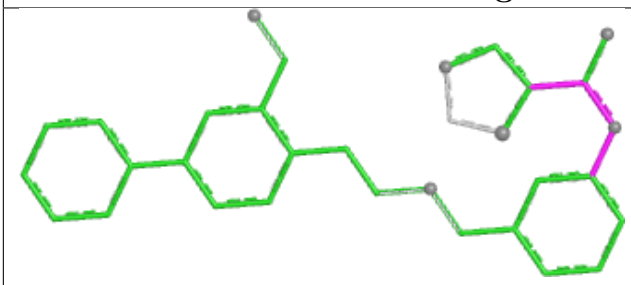


Torsions

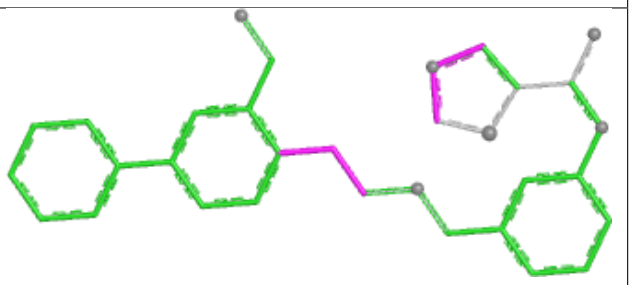


Rings

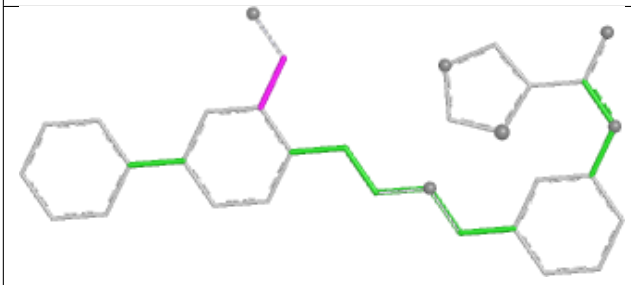
Ligand A1BTW B 503



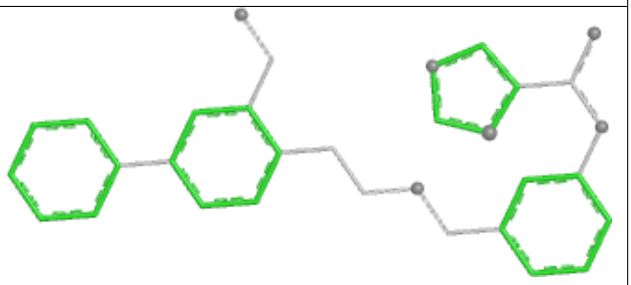
Bond lengths



Bond angles

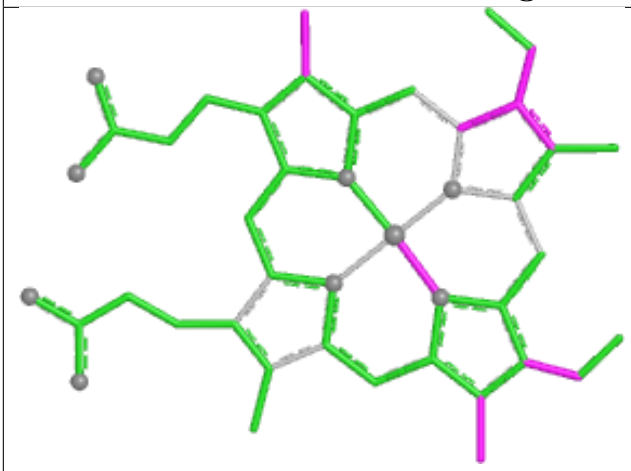


Torsions

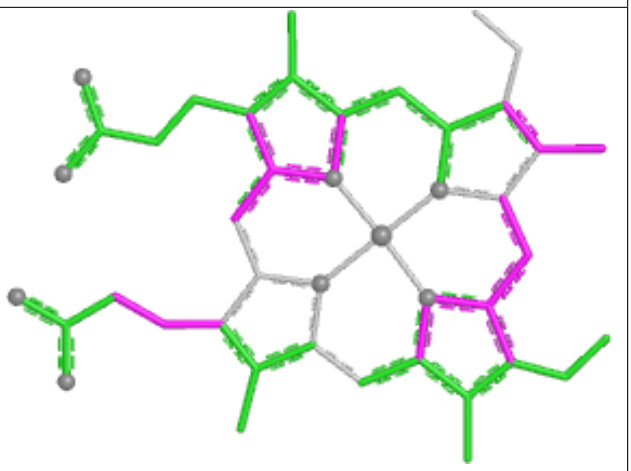


Rings

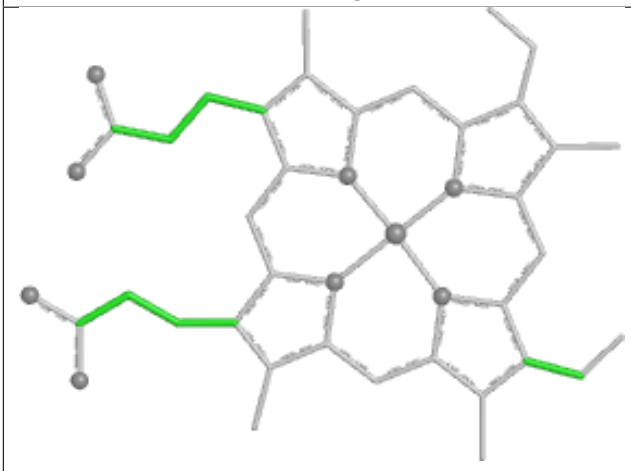
Ligand HEM D 502



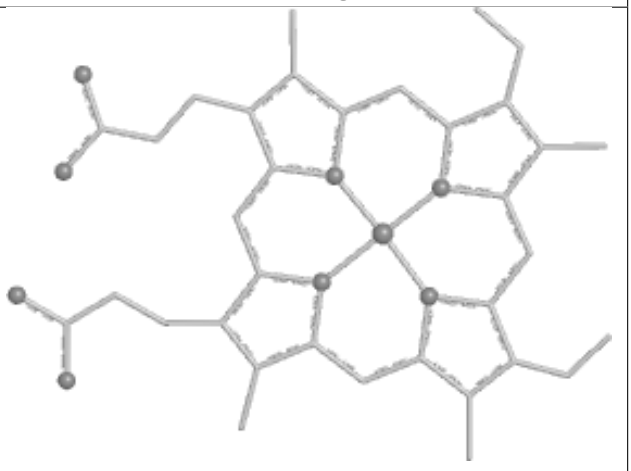
Bond lengths



Bond angles

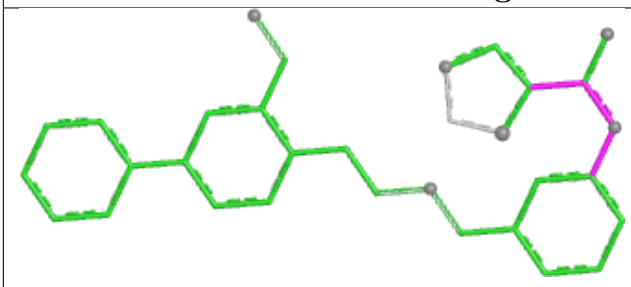


Torsions

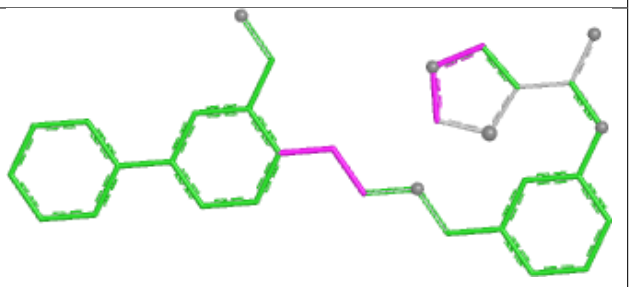


Rings

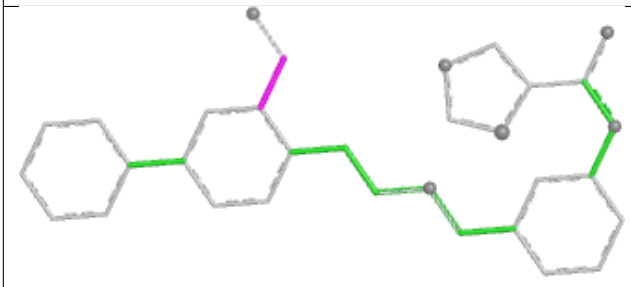
Ligand A1BTW D 504



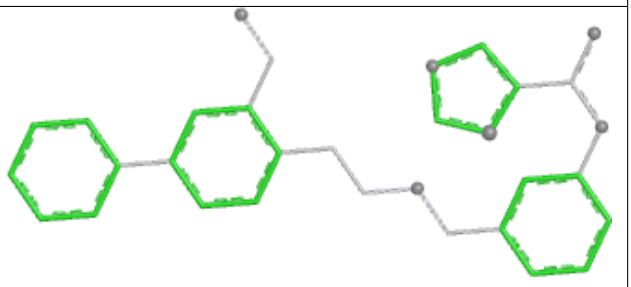
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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	401/440 (91%)	0.26	8 (1%) 64 63	28, 54, 96, 139	1 (0%)
1	B	401/440 (91%)	-0.14	8 (1%) 64 63	25, 40, 72, 118	1 (0%)
1	C	401/440 (91%)	0.68	48 (11%) 10 8	25, 63, 121, 152	1 (0%)
1	D	402/440 (91%)	-0.07	7 (1%) 69 67	22, 40, 81, 117	2 (0%)
All	All	1605/1760 (91%)	0.18	71 (4%) 39 37	22, 48, 103, 152	5 (0%)

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	106	PRO	5.8
1	B	106	PRO	5.1
1	C	204	ALA	5.0
1	D	141	SER	4.6
1	A	120	PRO	4.3
1	C	106	PRO	4.2
1	C	88	ALA	3.9
1	D	106	PRO	3.8
1	C	120	PRO	3.8
1	C	124	LEU	3.1
1	C	158	ALA	3.0
1	C	242	ARG	3.0
1	C	275	ILE	3.0
1	C	159	ALA	3.0
1	C	145	ALA	2.9
1	C	279	TRP	2.9
1	C	346	LEU	2.9
1	B	119	ALA	2.9
1	C	163	TYR	2.9
1	C	345	GLY	2.8
1	C	268	VAL	2.8

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	244	TRP	2.8
1	B	68	PHE	2.8
1	C	302	LEU	2.7
1	C	299	PRO	2.7
1	C	295	ALA	2.7
1	D	145	ALA	2.7
1	C	303	PHE	2.7
1	C	131	ILE	2.7
1	C	155	ALA	2.6
1	C	304	LEU	2.6
1	B	122	GLN	2.6
1	C	161	GLY	2.6
1	C	165	LEU	2.5
1	C	241	PHE	2.5
1	C	157	VAL	2.5
1	D	142	GLY	2.4
1	C	261	VAL	2.4
1	C	144	GLN	2.4
1	D	144	GLN	2.4
1	C	150	LEU	2.4
1	C	143	SER	2.4
1	C	153	VAL	2.4
1	B	89	GLN	2.4
1	C	343	ILE	2.3
1	C	259	GLY	2.3
1	A	124	LEU	2.3
1	B	257	GLN	2.3
1	A	138	ILE	2.3
1	C	160	THR	2.3
1	C	341	LEU	2.2
1	C	123	LEU	2.2
1	C	273	LEU	2.2
1	C	236	PRO	2.2
1	A	238	ARG	2.2
1	B	258	ASP	2.1
1	A	141	SER	2.1
1	A	235	CYS	2.1
1	C	130	PHE	2.1
1	D	68	PHE	2.1
1	C	243	ILE	2.1
1	B	259	GLY	2.1
1	C	255	ARG	2.1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	273	LEU	2.1
1	C	134	TYR	2.1
1	C	162	THR	2.1
1	C	297	ASP	2.0
1	C	230	VAL	2.0
1	C	235	CYS	2.0
1	C	231	PHE	2.0
1	D	89	GLN	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)

There are no oligosaccharides in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{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	GOL	C	508	6/6	0.42	0.16	88,93,94,96	0
7	GOL	A	508	6/6	0.46	0.15	94,95,95,96	0
7	GOL	C	507	6/6	0.54	0.19	87,94,94,95	0
7	GOL	B	507	6/6	0.66	0.17	86,94,98,99	0
7	GOL	D	510	6/6	0.68	0.14	83,84,87,89	0
7	GOL	D	508	6/6	0.79	0.15	62,77,83,89	0
6	BTB	B	506	14/14	0.84	0.14	50,84,90,92	0
6	BTB	C	506	14/14	0.85	0.15	48,70,76,78	0
6	BTB	D	506	14/14	0.87	0.14	53,57,77,86	0
6	BTB	D	507	14/14	0.87	0.14	29,68,79,80	0
5	ACT	A	504	4/4	0.87	0.13	55,58,60,65	0
6	BTB	A	506	14/14	0.87	0.17	16,62,69,73	0
4	A1BTW	C	503	32/32	0.88	0.16	37,63,96,98	0
5	ACT	C	504	4/4	0.88	0.16	68,70,72,74	0
6	BTB	C	505	14/14	0.88	0.15	36,87,99,104	0

Continued on next page...

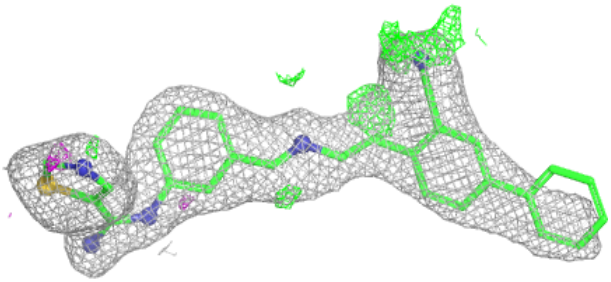
Continued from previous page...

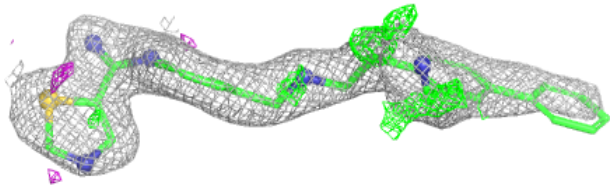
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	BTB	B	505	14/14	0.90	0.11	41,57,67,67	0
7	GOL	A	507	6/6	0.90	0.11	40,49,61,64	0
4	A1BTW	A	503	32/32	0.91	0.15	24,48,109,111	0
7	GOL	C	509	6/6	0.91	0.14	58,62,67,71	0
5	ACT	D	505	4/4	0.92	0.10	47,51,53,55	0
7	GOL	A	509	6/6	0.92	0.14	56,64,66,72	0
7	GOL	B	508	6/6	0.93	0.12	40,58,66,72	0
5	ACT	B	504	4/4	0.93	0.11	46,53,54,59	0
7	GOL	D	509	6/6	0.94	0.10	41,46,47,47	0
6	BTB	A	505	14/14	0.94	0.10	27,60,67,69	0
4	A1BTW	D	504	32/32	0.95	0.10	11,41,61,66	0
4	A1BTW	B	503	32/32	0.95	0.10	9,40,73,76	0
11	GD	C	511	1/1	0.95	0.09	107,107,107,107	0
2	HEM	C	501	43/43	0.96	0.09	35,47,58,61	0
8	CL	C	510	1/1	0.96	0.08	55,55,55,55	0
11	GD	B	510	1/1	0.96	0.06	48,48,48,48	0
3	H4B	C	502	17/17	0.96	0.07	39,45,50,50	0
3	H4B	A	502	17/17	0.97	0.06	31,35,40,47	0
3	H4B	B	502	17/17	0.97	0.05	28,32,38,42	0
2	HEM	A	501	43/43	0.97	0.08	31,38,47,55	0
8	CL	A	510	1/1	0.98	0.06	45,45,45,45	0
2	HEM	D	502	43/43	0.98	0.06	23,30,37,39	0
9	ZN	C	512	1/1	0.98	0.04	39,39,39,39	0
10	CA	A	512	1/1	0.98	0.05	55,55,55,55	0
2	HEM	B	501	43/43	0.98	0.06	23,28,35,38	0
3	H4B	D	503	17/17	0.98	0.05	28,30,37,38	0
11	GD	D	501	1/1	0.98	0.09	68,68,68,68	0
11	GD	D	512	1/1	0.98	0.04	44,44,44,44	0
8	CL	D	511	1/1	0.99	0.04	34,34,34,34	0
10	CA	B	511	1/1	0.99	0.04	38,38,38,38	0
8	CL	B	509	1/1	0.99	0.05	37,37,37,37	0
9	ZN	A	511	1/1	1.00	0.03	34,34,34,34	0

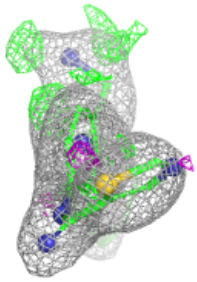
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around A1BTW C 503:

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

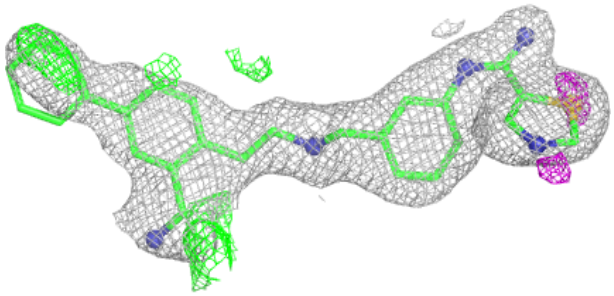


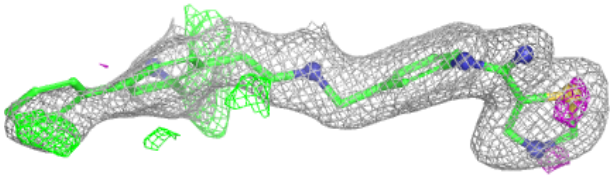


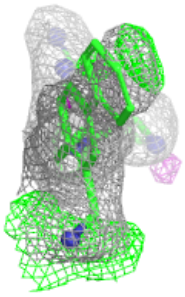


Electron density around A1BTW A 503:

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

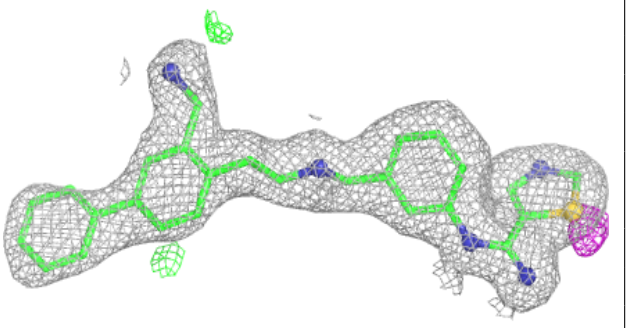


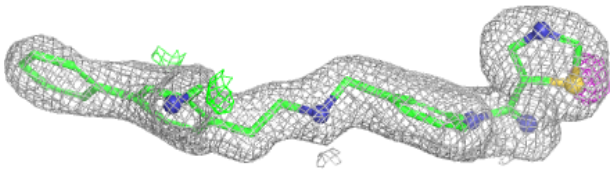


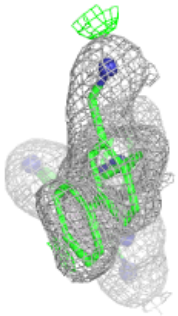


Electron density around A1BTW D 504:

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

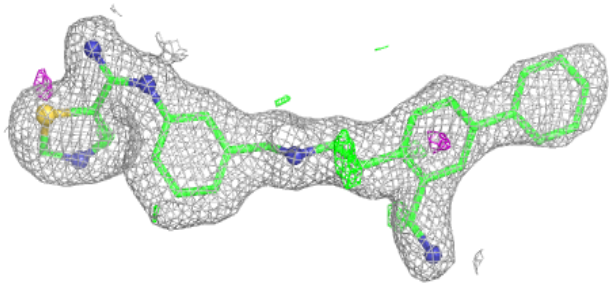


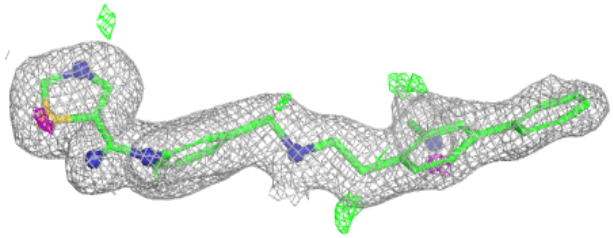


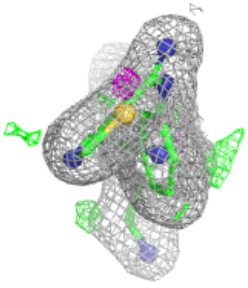


Electron density around A1BTW B 503:

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

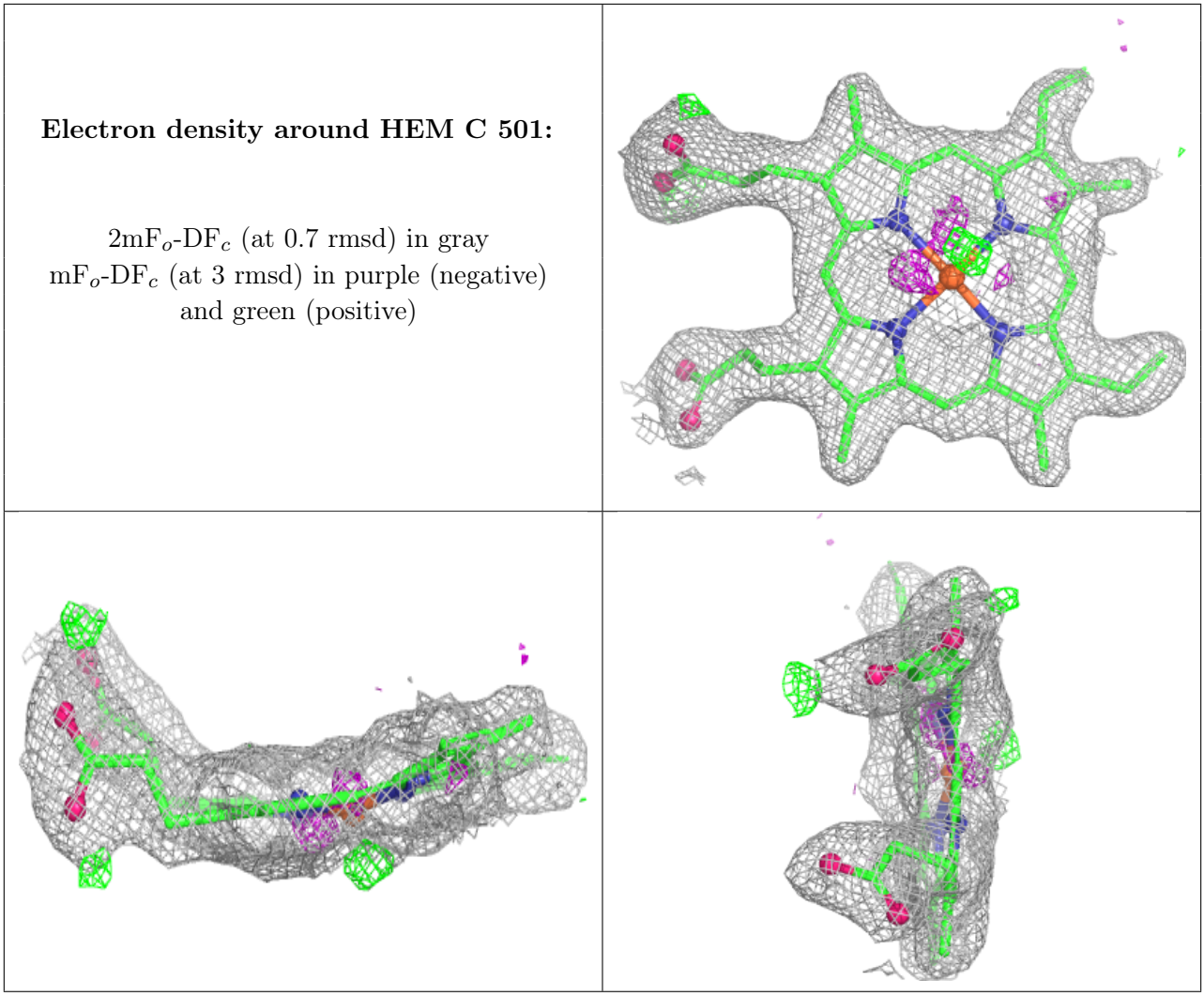






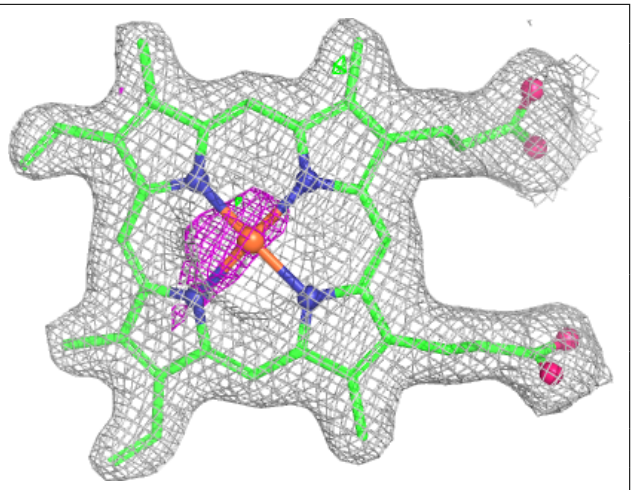
Electron density around HEM C 501:

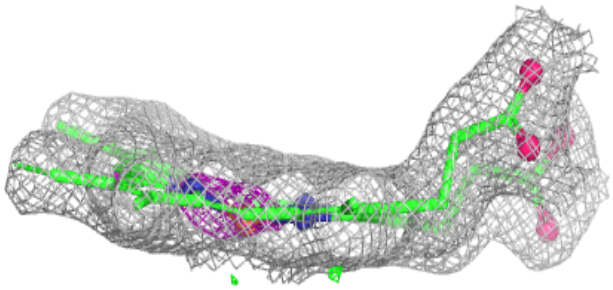
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

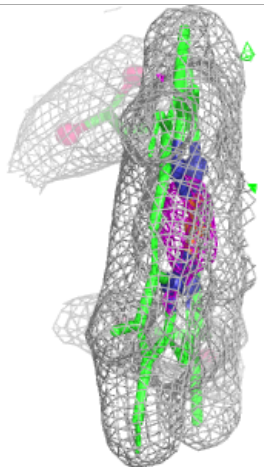


Electron density around HEM A 501:

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

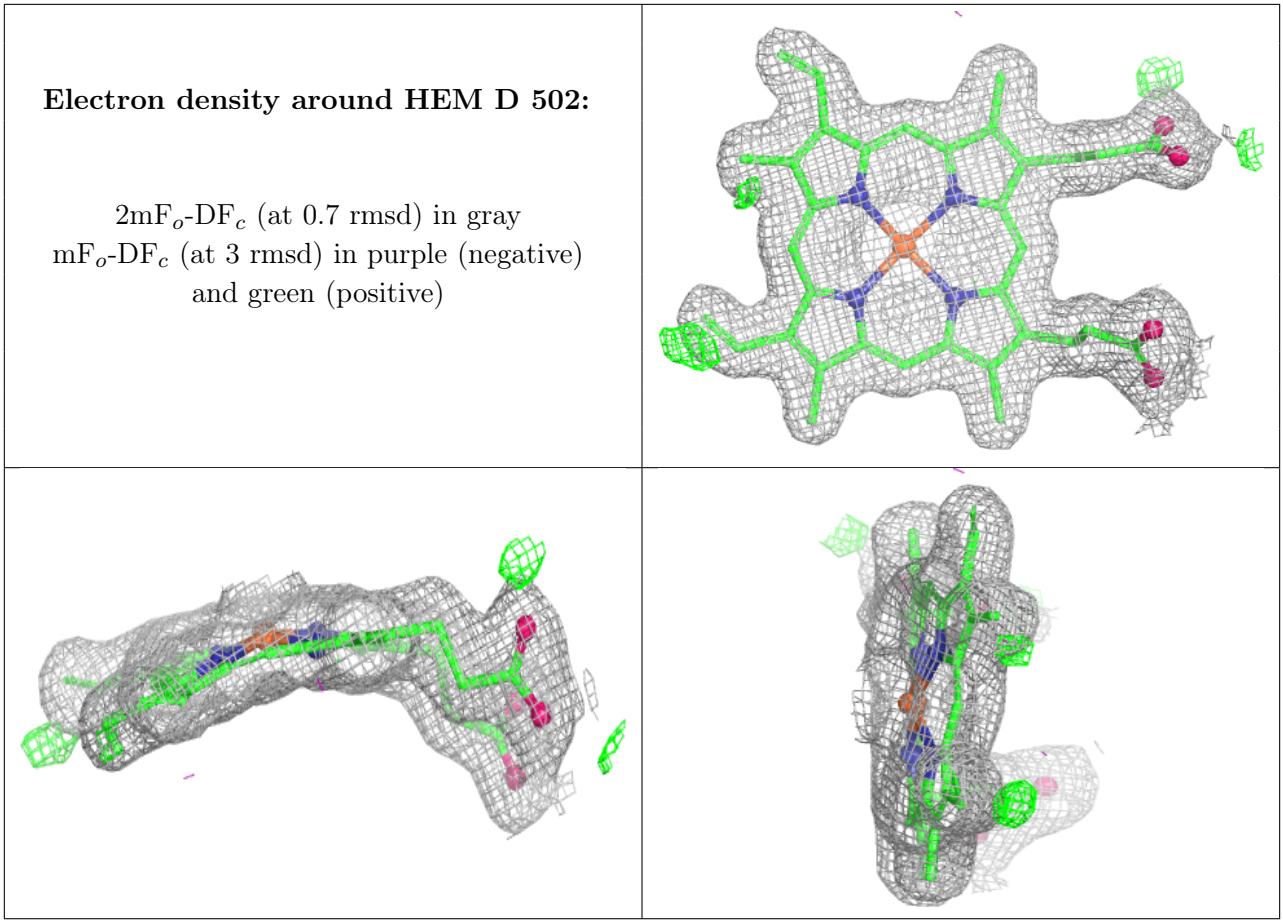






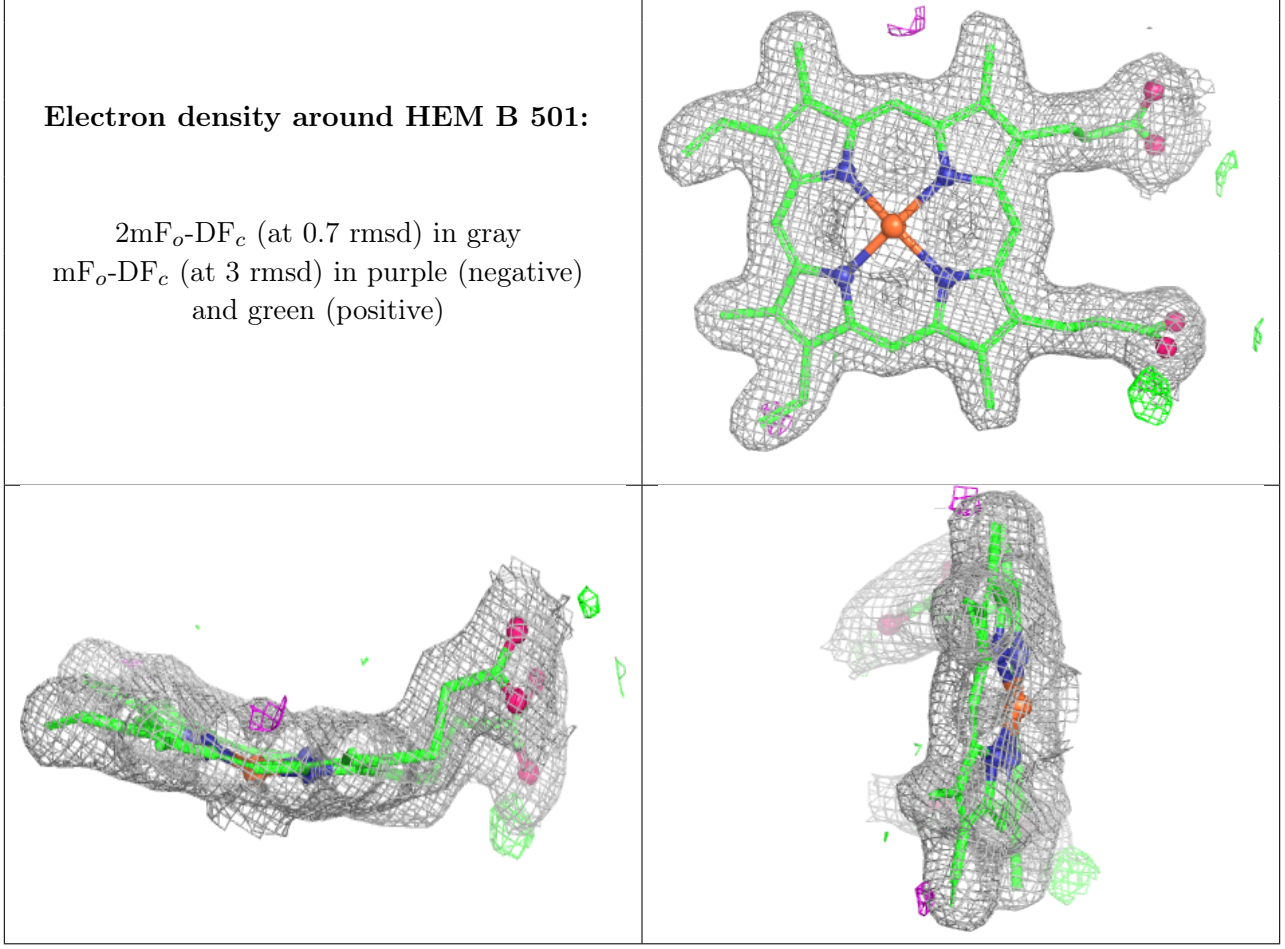
Electron density around HEM D 502:

$2mF_o$-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 501:

$2mF_o$-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.