Full wwPDB X-ray Structure Validation Report ⓘ

Sep 26, 2023 – 10:26 AM EDT

PDB ID	:	6CIC
Title	:	Structure of the human nitric oxide synthase R354A/G357D mutant heme domain in complex with N-(1-(2-(Ethyl(methyl)amino)ethyl)-1,2,3,4-tetrahydroquino-lin-6-yl)thiophene-2-carboximidamide
Authors	:	Li, H.; Poulos, T.L.
Deposited on	:	2018-02-23
Resolution	:	1.75 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:

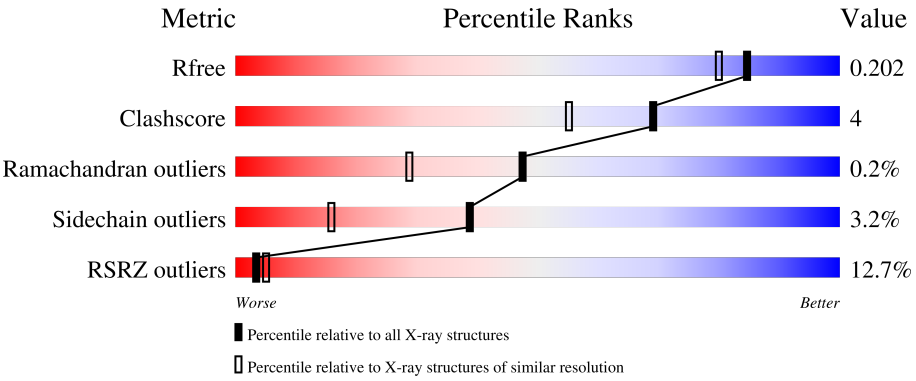
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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 1.75 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	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)
RSRZ outliers	127900	2298 (1.76-1.76)

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	421	12% 90% 9%
1	B	421	14% 88% 11%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 7811 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.

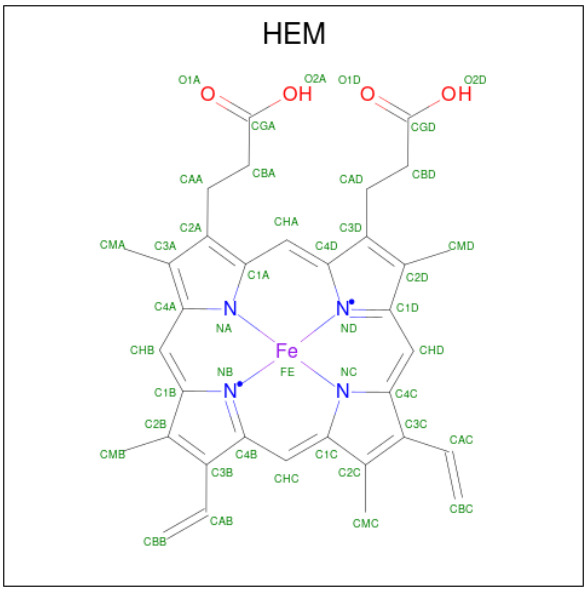
- Molecule 1 is a protein called Nitric oxide synthase, brain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	421	Total	C	N	O	S	0	4	0
			3450	2208	591	628	23			
1	B	419	Total	C	N	O	S	0	2	0
			3426	2190	589	626	21			

There are 4 discrepancies between the modelled and reference sequences:

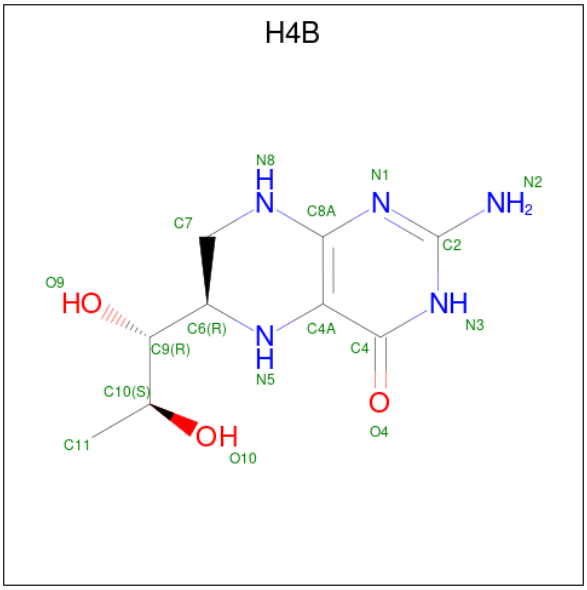
Chain	Residue	Modelled	Actual	Comment	Reference
A	354	ALA	ARG	engineered mutation	UNP P29475
A	357	ASP	GLY	engineered mutation	UNP P29475
B	354	ALA	ARG	engineered mutation	UNP P29475
B	357	ASP	GLY	engineered mutation	UNP P29475

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



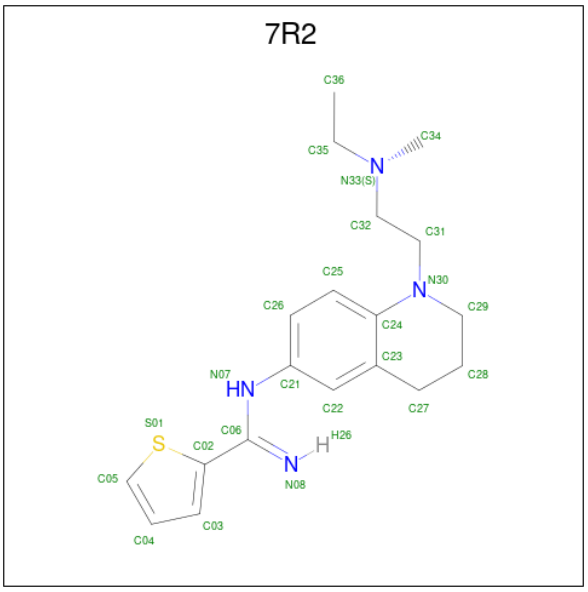
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

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



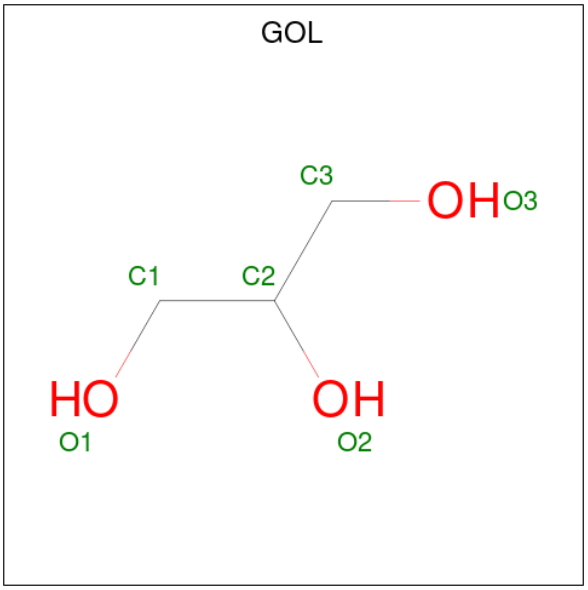
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			17	9	5	3		
3	B	1	Total	C	N	O	0	0
			17	9	5	3		

- Molecule 4 is N-(1-{2-[ethyl(methyl)amino]ethyl}-1,2,3,4-tetrahydroquinolin-6-yl)thiophene -2-carboximidamide (three-letter code: 7R2) (formula: $C_{19}H_{26}N_4S$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N S 24 19 4 1	0	0
4	B	1	Total C N S 24 19 4 1	0	0

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 6 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total Zn 1 1	0	0

- Molecule 7 is water.

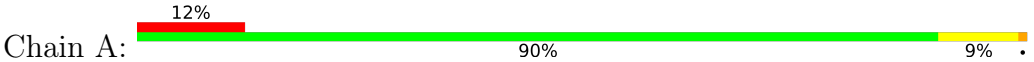
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	450	Total O 450 450	0	0
7	B	304	Total O 304 304	0	0

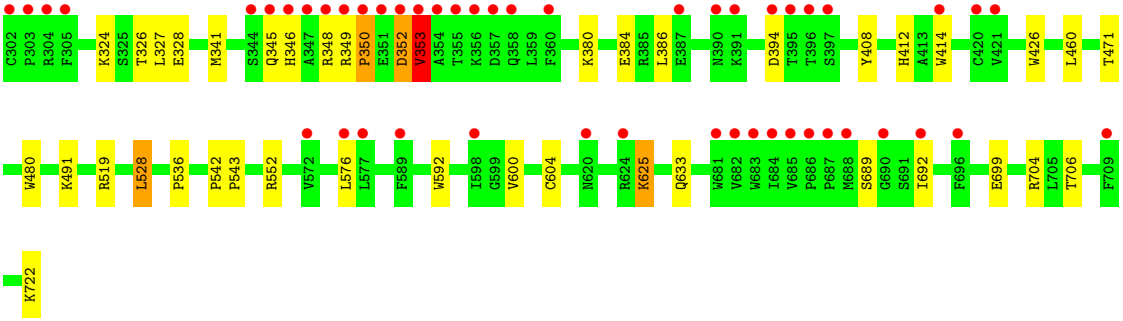
3 Residue-property plots (i)

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, brain

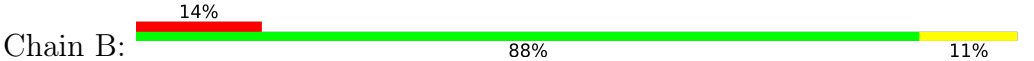
Chain A:

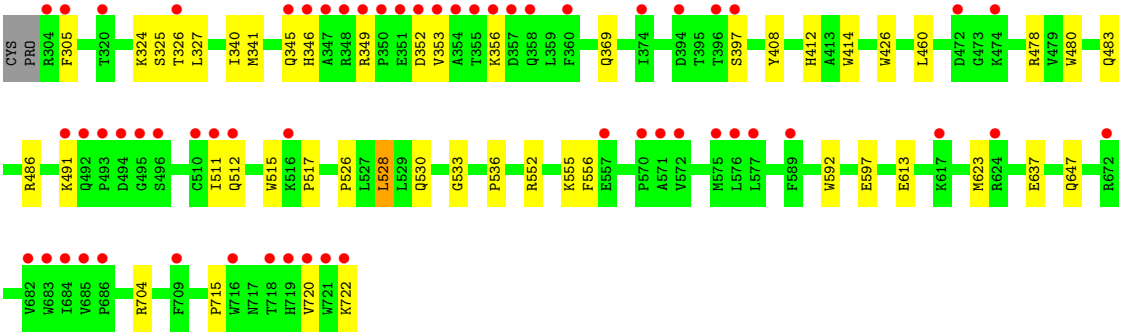




• Molecule 1: Nitric oxide synthase, brain

Chain B:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	52.32Å 122.16Å 165.13Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.92 – 1.75 38.63 – 1.75	Depositor EDS
% Data completeness (in resolution range)	97.0 (37.92-1.75) 97.1 (38.63-1.75)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	0.12	Depositor
$< I/\sigma(I) >$ [1]	1.13 (at 1.75Å)	Xtriage
Refinement program	PHENIX (1.11.1-2575_1496: ???)	Depositor
R, R_{free}	0.172 , 0.204 0.169 , 0.202	Depositor DCC
R_{free} test set	5097 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å^2)	31.1	Xtriage
Anisotropy	0.760	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 51.6	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	0.98	EDS
Total number of atoms	7811	wwPDB-VP
Average B, all atoms (Å^2)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.53% 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: GOL, 7R2, ZN, HEM, H4B

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	0.36	0/3562	0.53	0/4834
1	B	0.34	0/3530	0.50	0/4789
All	All	0.35	0/7092	0.51	0/9623

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	3450	0	3361	27	0
1	B	3426	0	3335	23	0
2	A	43	0	30	2	0
2	B	43	0	30	2	0
3	A	17	0	15	1	0
3	B	17	0	15	1	0
4	A	24	0	0	0	0
4	B	24	0	0	1	0
5	A	6	0	8	1	0
5	B	6	0	8	0	0
6	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	450	0	0	3	0
7	B	304	0	0	1	0
All	All	7811	0	6802	51	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 4.

All (51) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:328:GLU:HB2	1:A:345:GLN:HG2	1.55	0.88
1:A:528:LEU:HD22	1:A:536:PRO:HB2	1.73	0.70
2:A:801:HEM:HMC2	2:A:801:HEM:HBC2	1.76	0.68
1:A:326:THR:HG21	1:A:706:THR:HG22	1.76	0.66
1:A:722:LYS:NZ	7:A:904:HOH:O	2.30	0.65
1:B:528:LEU:HD22	1:B:536:PRO:HB2	1.79	0.64
1:A:349:ARG:HG2	1:A:350:PRO:HD2	1.81	0.63
1:B:341:MET:HE2	3:B:802:H4B:H9	1.81	0.62
1:B:356:LYS:HG2	1:B:397:SER:HA	1.82	0.61
1:A:704:ARG:HB3	1:A:704:ARG:HH11	1.67	0.60
2:B:801:HEM:HBB2	2:B:801:HEM:HHC	1.83	0.60
1:B:511:ILE:HG12	1:B:517:PRO:HG3	1.85	0.58
1:A:380:LYS:NZ	1:A:384:GLU:OE2	2.33	0.58
1:B:530:GLN:HE21	1:B:533:GLY:HA2	1.69	0.58
1:A:353:VAL:HG11	1:A:471:THR:O	2.03	0.57
1:A:519:ARG:NH2	7:A:905:HOH:O	2.31	0.57
1:A:324:LYS:HD3	5:A:804:GOL:H11	1.87	0.55
1:B:647:GLN:NE2	7:B:907:HOH:O	2.40	0.54
2:A:801:HEM:HBB2	2:A:801:HEM:HHC	1.91	0.52
1:B:483:GLN:HB2	1:B:486:ARG:HG3	1.92	0.51
1:B:597:GLU:OE1	4:B:803:7R2:N07	2.45	0.49
1:B:460:LEU:HD12	1:B:592:TRP:HB3	1.95	0.49
1:A:699:GLU:HB3	1:B:340:ILE:HD13	1.94	0.49
1:B:356:LYS:HE2	1:B:397:SER:OG	2.13	0.48
1:A:352:ASP:OD1	1:A:352:ASP:N	2.34	0.47
1:A:704:ARG:HB3	1:A:704:ARG:NH1	2.29	0.47
1:A:348:ARG:HG3	1:A:576:LEU:HD22	1.97	0.47
1:B:613:GLU:HG3	1:B:623:MET:HE3	1.96	0.47
1:B:325:SER:HB2	1:B:704:ARG:O	2.16	0.46
1:A:408:TYR:CE1	1:A:412:HIS:CE1	3.04	0.46
1:B:515:TRP:CE2	1:B:526:PRO:HD3	2.51	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:460:LEU:HD12	1:A:592:TRP:HB3	1.98	0.45
1:A:689:SER:HB3	1:A:692:ILE:HG12	1.99	0.44
1:A:625:LYS:HB2	1:A:625:LYS:HE3	1.61	0.44
1:A:633:GLN:NE2	1:B:637:GLU:OE2	2.43	0.43
1:B:345:GLN:N	1:B:345:GLN:OE1	2.50	0.43
1:B:327:LEU:HB2	1:B:704:ARG:HB2	2.00	0.43
1:A:480:TRP:HB2	1:A:528:LEU:HB3	2.00	0.43
1:A:352:ASP:OD2	7:A:901:HOH:O	2.21	0.43
1:A:600:VAL:O	1:A:604:CYS:HB2	2.19	0.42
1:A:414:TRP:CE3	1:A:426:TRP:HA	2.54	0.42
1:B:414:TRP:CE3	1:B:426:TRP:HA	2.55	0.42
1:A:341:MET:HE2	3:A:802:H4B:H9	2.02	0.41
1:B:480:TRP:HB2	1:B:528:LEU:HB3	2.02	0.41
1:A:542:PRO:HA	1:A:543:PRO:HD3	1.89	0.41
1:A:341:MET:HB2	1:A:341:MET:HE3	1.98	0.41
1:B:408:TYR:CE1	1:B:412:HIS:CE1	3.09	0.41
1:B:414:TRP:CZ3	2:B:801:HEM:HMC3	2.56	0.41
1:B:555:LYS:HE3	1:B:556:PHE:CE2	2.56	0.41
1:B:478:ARG:NH2	1:B:715:PRO:HD3	2.36	0.41
1:A:328:GLU:H	1:A:328:GLU:HG2	1.77	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	423/421 (100%)	414 (98%)	7 (2%)	2 (0%)	29 12
1	B	419/421 (100%)	412 (98%)	7 (2%)	0	100 100
All	All	842/842 (100%)	826 (98%)	14 (2%)	2 (0%)	47 29

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	353	VAL
1	A	350	PRO

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	380/376 (101%)	370 (97%)	10 (3%)	46 23
1	B	376/376 (100%)	362 (96%)	14 (4%)	34 12
All	All	756/752 (100%)	732 (97%)	24 (3%)	39 16

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	327	LEU
1	A	346	HIS
1	A	352	ASP
1	A	353	VAL
1	A	386	LEU
1	A	394	ASP
1	A	491	LYS
1	A	528	LEU
1	A	552	ARG
1	A	625	LYS
1	B	305	PHE
1	B	324	LYS
1	B	326	THR
1	B	346	HIS
1	B	349	ARG
1	B	352	ASP
1	B	353	VAL
1	B	369	GLN
1	B	491	LYS
1	B	512	GLN
1	B	528	LEU
1	B	552	ARG

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Mol	Chain	Res	Type
1	B	720	VAL
1	B	722	LYS

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

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 9 ligands modelled in this entry, 1 is monoatomic - leaving 8 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	$\#\|Z\| > 2$
3	H4B	B	802	-	16,18,18	0.91	0	11,26,26	2.91	8 (72%)
4	7R2	A	803	-	26,26,26	1.10	3 (11%)	26,35,35	1.61	2 (7%)
2	HEM	A	801	1	41,50,50	1.49	3 (7%)	45,82,82	1.55	8 (17%)
2	HEM	B	801	1	41,50,50	1.58	8 (19%)	45,82,82	1.72	8 (17%)
4	7R2	B	803	-	26,26,26	1.11	3 (11%)	26,35,35	1.59	2 (7%)
5	GOL	A	804	-	5,5,5	0.37	0	5,5,5	0.30	0
5	GOL	B	804	-	5,5,5	0.39	0	5,5,5	0.06	0
3	H4B	A	802	-	16,18,18	0.85	0	11,26,26	2.59	5 (45%)

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
3	H4B	B	802	-	-	0/8/17/17	0/2/2/2
4	7R2	A	803	-	-	1/11/25/25	0/3/3/3
2	HEM	A	801	1	-	4/12/54/54	-
2	HEM	B	801	1	-	4/12/54/54	-
4	7R2	B	803	-	-	0/11/25/25	0/3/3/3
5	GOL	A	804	-	-	2/4/4/4	-
5	GOL	B	804	-	-	2/4/4/4	-
3	H4B	A	802	-	-	0/8/17/17	0/2/2/2

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	801	HEM	C3C-C2C	-4.27	1.34	1.40
2	B	801	HEM	C3C-C2C	-4.25	1.34	1.40
2	B	801	HEM	C3C-CAC	3.47	1.54	1.47
4	A	803	7R2	C06-N07	-3.38	1.32	1.39
2	A	801	HEM	C3C-CAC	3.35	1.54	1.47
4	B	803	7R2	C06-N07	-3.24	1.32	1.39
2	B	801	HEM	FE-NB	2.92	2.11	1.96
2	A	801	HEM	CAB-C3B	2.84	1.55	1.47
2	B	801	HEM	CAB-C3B	2.84	1.55	1.47
4	A	803	7R2	C21-N07	-2.55	1.36	1.41
4	B	803	7R2	C21-N07	-2.42	1.36	1.41
4	A	803	7R2	C04-C05	2.34	1.41	1.34
2	B	801	HEM	CAA-C2A	2.21	1.55	1.52
2	B	801	HEM	CMD-C2D	2.14	1.55	1.50
4	B	803	7R2	C04-C05	2.12	1.40	1.34
2	B	801	HEM	CMB-C2B	2.03	1.55	1.50
2	B	801	HEM	CHA-C4D	2.01	1.40	1.35

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	803	7R2	C04-C05-S01	-6.63	107.60	112.98
4	B	803	7R2	C04-C05-S01	-6.35	107.83	112.98
2	A	801	HEM	CBA-CAA-C2A	-5.24	103.68	112.62
2	B	801	HEM	C4B-CHC-C1C	4.91	129.04	122.56
2	B	801	HEM	CBA-CAA-C2A	-4.86	104.32	112.62

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	802	H4B	C8A-C4A-C4	4.82	118.85	114.57
3	B	802	H4B	C8A-C4A-C4	4.65	118.70	114.57
3	B	802	H4B	C4-C4A-N5	4.25	122.69	119.12
3	B	802	H4B	C2-N3-C4	4.18	122.56	115.93
3	B	802	H4B	N1-C2-N3	-3.57	119.82	125.42
3	A	802	H4B	C2-N3-C4	3.53	121.54	115.93
3	A	802	H4B	N1-C2-N3	-3.31	120.23	125.42
2	B	801	HEM	CMA-C3A-C4A	-3.18	123.58	128.46
2	A	801	HEM	CMA-C3A-C4A	-2.93	123.95	128.46
2	A	801	HEM	C4B-CHC-C1C	2.91	126.40	122.56
3	A	802	H4B	C4-C4A-N5	2.89	121.55	119.12
2	B	801	HEM	CAD-CBD-CGD	-2.78	107.62	113.60
3	B	802	H4B	N2-C2-N3	2.77	121.56	117.25
2	A	801	HEM	C3B-C2B-C1B	2.74	108.52	106.49
3	A	802	H4B	C2-N1-C8A	2.59	120.35	114.54
2	B	801	HEM	C3B-C2B-C1B	2.46	108.31	106.49
2	A	801	HEM	CAD-CBD-CGD	-2.42	108.41	113.60
2	B	801	HEM	C4D-ND-C1D	2.40	107.55	105.07
3	B	802	H4B	C2-N1-C8A	2.40	119.91	114.54
2	B	801	HEM	C1B-NB-C4B	2.33	107.48	105.07
4	A	803	7R2	C22-C23-C24	2.29	121.06	118.95
2	A	801	HEM	CHA-C4D-ND	2.25	127.17	124.38
2	A	801	HEM	C4D-ND-C1D	2.25	107.40	105.07
4	B	803	7R2	C32-C31-N30	-2.22	102.80	114.42
2	A	801	HEM	CMC-C2C-C3C	2.21	128.82	124.68
3	B	802	H4B	C4A-C4-N3	-2.16	117.87	124.01
2	B	801	HEM	C3D-C4D-ND	-2.07	107.86	110.17
3	B	802	H4B	C4A-N5-C6	-2.03	115.62	121.16

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	804	GOL	O1-C1-C2-C3
5	B	804	GOL	O1-C1-C2-C3
2	B	801	HEM	C2D-C3D-CAD-CBD
2	B	801	HEM	C4D-C3D-CAD-CBD
5	A	804	GOL	O1-C1-C2-O2
5	B	804	GOL	O1-C1-C2-O2
4	A	803	7R2	C31-C32-N33-C35
2	A	801	HEM	C4D-C3D-CAD-CBD
2	A	801	HEM	C2D-C3D-CAD-CBD

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Mol	Chain	Res	Type	Atoms
2	B	801	HEM	CAD-CBD-CGD-O1D
2	B	801	HEM	CAD-CBD-CGD-O2D
2	A	801	HEM	CAD-CBD-CGD-O2D
2	A	801	HEM	CAD-CBD-CGD-O1D

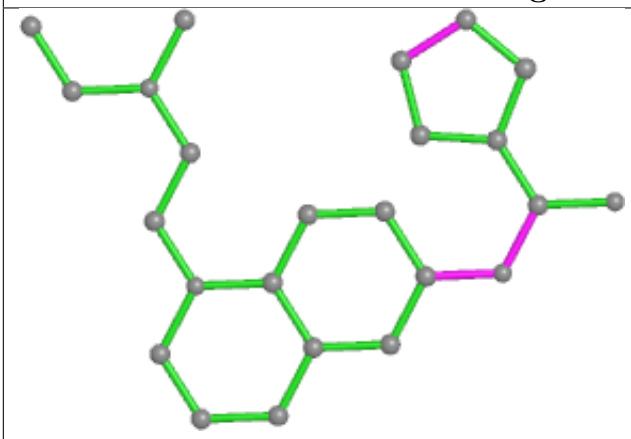
There are no ring outliers.

6 monomers are involved in 8 short contacts:

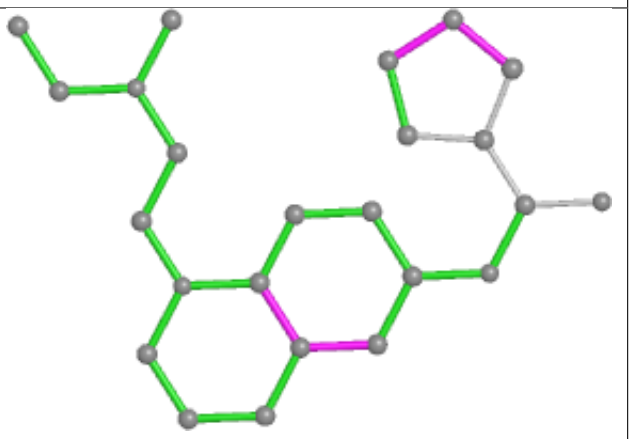
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	802	H4B	1	0
2	A	801	HEM	2	0
2	B	801	HEM	2	0
4	B	803	7R2	1	0
5	A	804	GOL	1	0
3	A	802	H4B	1	0

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.

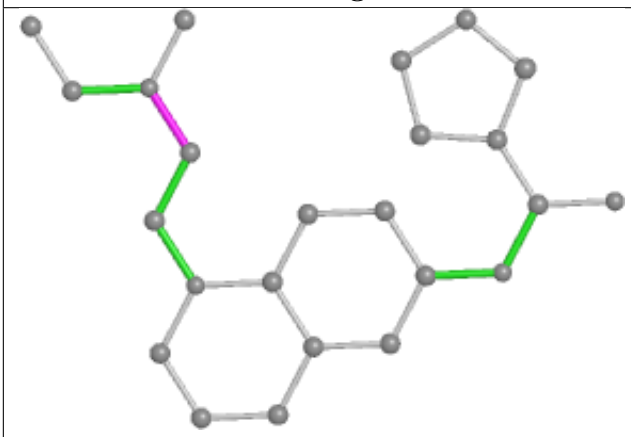
Ligand 7R2 A 803



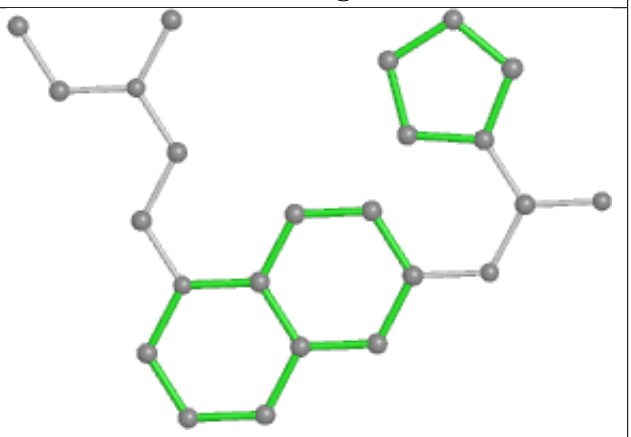
Bond lengths



Bond angles

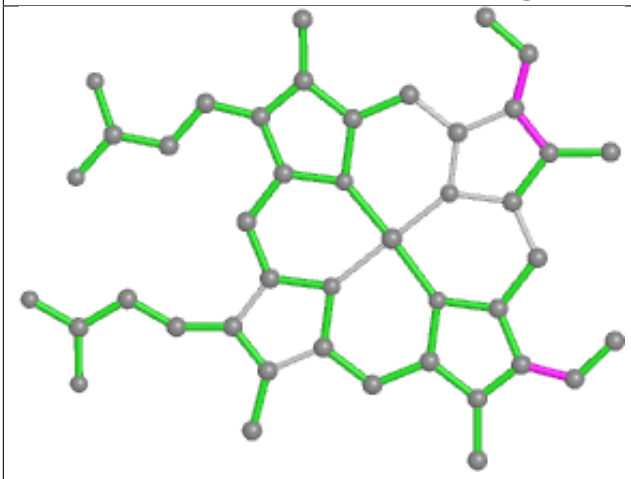


Torsions

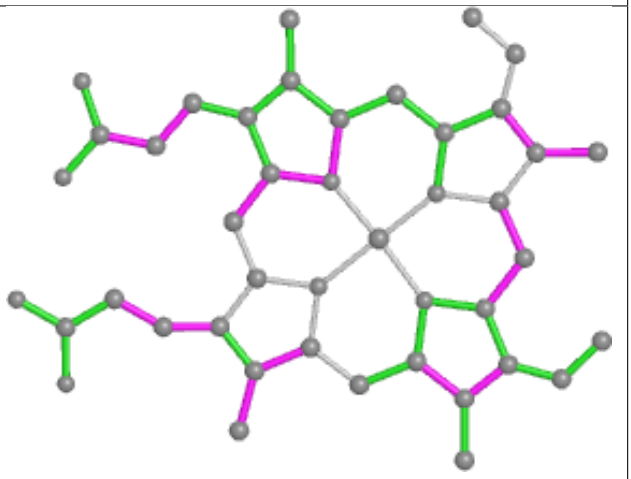


Rings

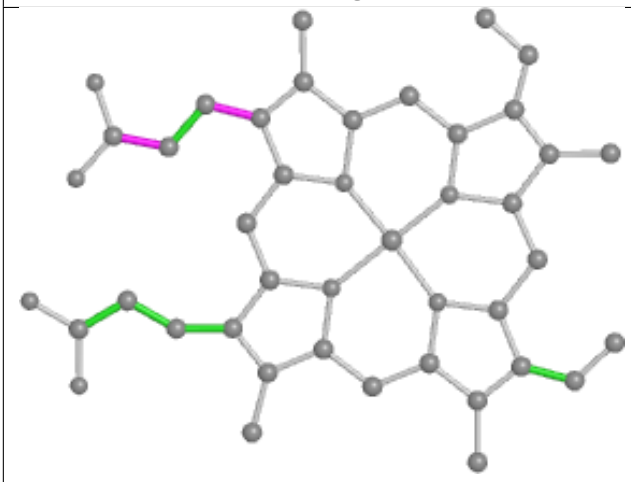
Ligand HEM A 801



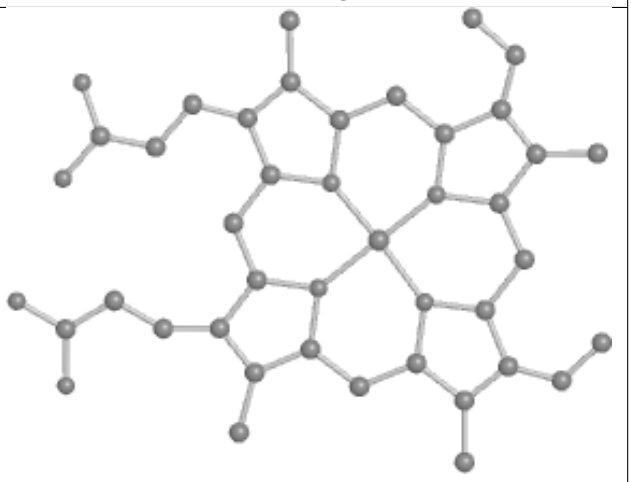
Bond lengths



Bond angles

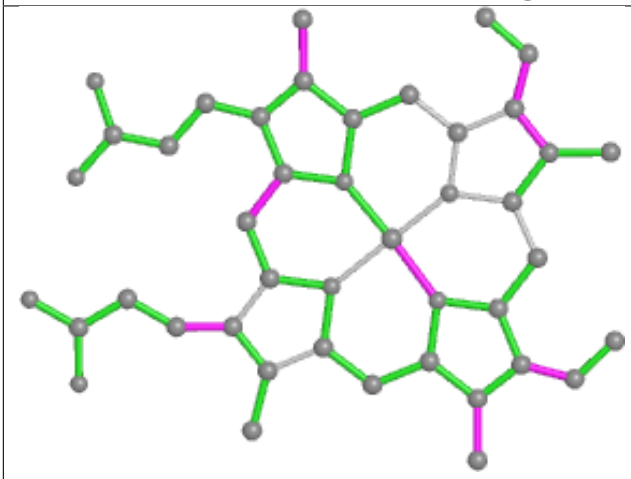


Torsions

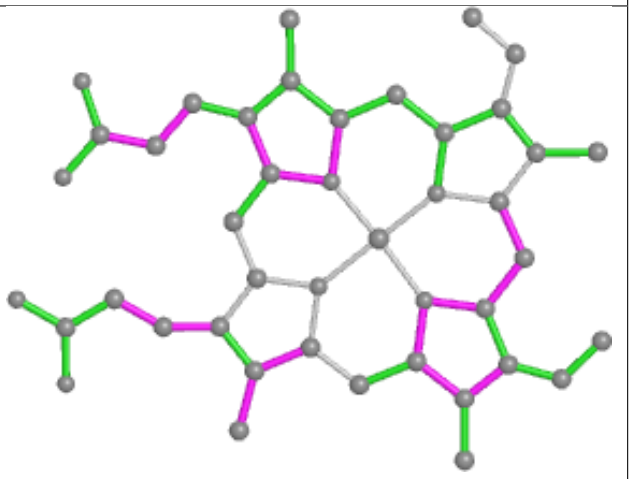


Rings

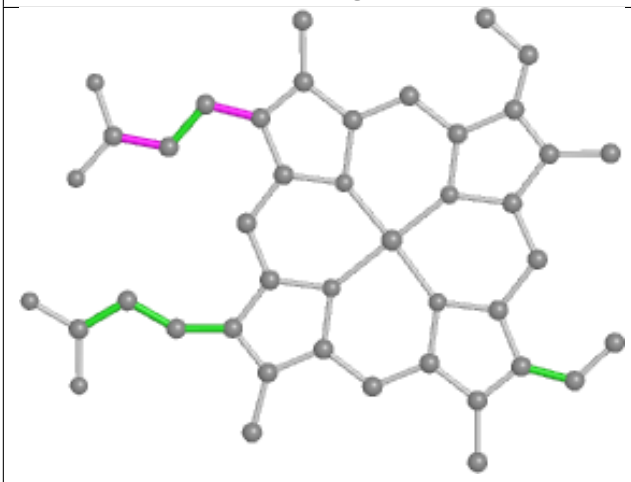
Ligand HEM B 801



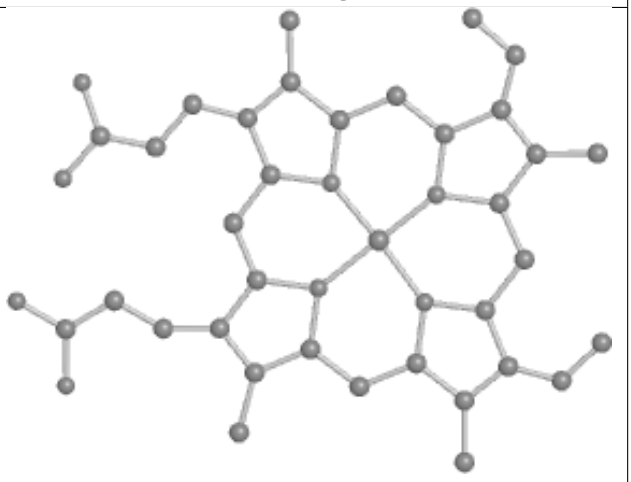
Bond lengths



Bond angles

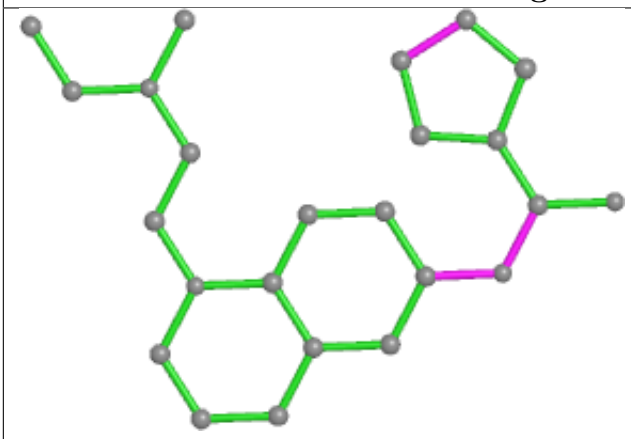


Torsions

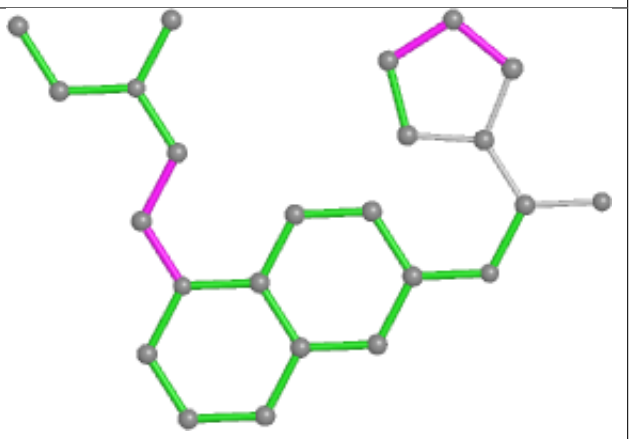


Rings

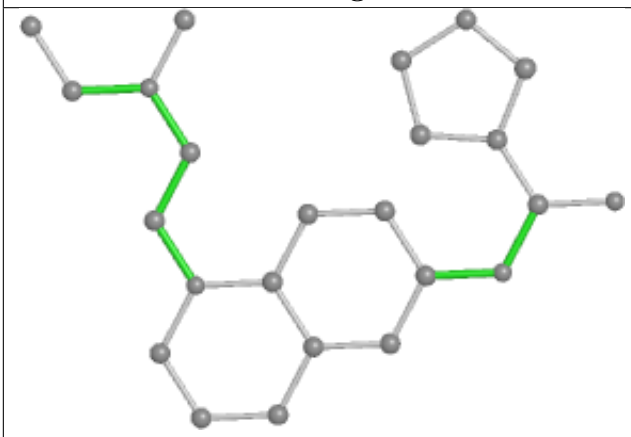
Ligand 7R2 B 803



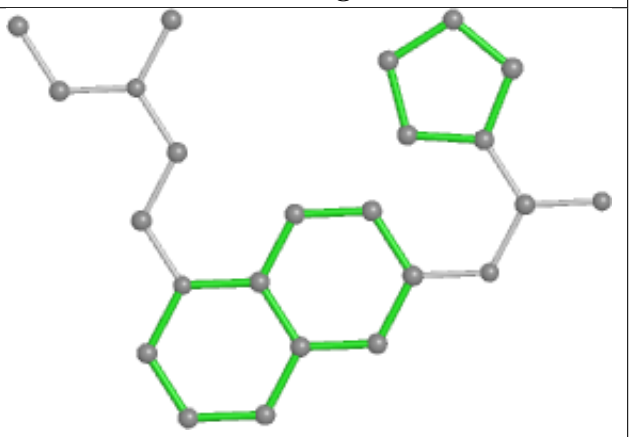
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	421/421 (100%)	0.41	49 (11%)	4	6	29, 41, 77, 149	0
1	B	419/421 (99%)	0.68	58 (13%)	2	4	29, 45, 89, 152	0
All	All	840/842 (99%)	0.54	107 (12%)	3	5	29, 43, 85, 152	0

All (107) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	353	VAL	9.9
1	B	352	ASP	8.2
1	B	721	TRP	7.3
1	B	353	VAL	6.4
1	B	349	ARG	6.3
1	A	302	CYS	5.9
1	A	352	ASP	5.9
1	B	722	LYS	5.6
1	B	357	ASP	5.2
1	B	350	PRO	5.2
1	B	354	ALA	5.1
1	B	360	PHE	5.1
1	A	305	PHE	5.0
1	B	493	PRO	4.9
1	B	304	ARG	4.9
1	B	720	VAL	4.8
1	B	305	PHE	4.7
1	A	347	ALA	4.7
1	B	351	GLU	4.6
1	B	572	VAL	4.4
1	A	395	THR	4.3
1	B	347	ALA	4.2
1	B	683	TRP	4.1
1	B	589	PHE	4.0

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Mol	Chain	Res	Type	RSRZ
1	A	685	VAL	4.0
1	B	346	HIS	4.0
1	B	624	ARG	3.9
1	A	351	GLU	3.7
1	A	304	ARG	3.6
1	A	572	VAL	3.6
1	B	718	THR	3.6
1	A	360[A]	PHE	3.5
1	A	355	THR	3.5
1	A	349	ARG	3.5
1	A	682	VAL	3.4
1	A	350	PRO	3.4
1	B	716	TRP	3.3
1	A	589	PHE	3.3
1	B	326	THR	3.3
1	A	357	ASP	3.2
1	A	344	SER	3.2
1	B	685	VAL	3.2
1	B	571	ALA	3.2
1	A	396	THR	3.2
1	B	682	VAL	3.1
1	A	354	ALA	3.1
1	A	684	ILE	3.1
1	A	421	VAL	3.1
1	A	624	ARG	3.1
1	A	687	PRO	3.0
1	B	355	THR	3.0
1	B	495	GLY	2.9
1	A	696	PHE	2.9
1	A	348	ARG	2.9
1	A	346	HIS	2.9
1	A	681	TRP	2.8
1	B	570	PRO	2.8
1	A	576	LEU	2.7
1	B	709	PHE	2.7
1	A	420	CYS	2.7
1	B	394	ASP	2.7
1	A	358	GLN	2.7
1	B	356	LYS	2.7
1	B	396	THR	2.7
1	B	516	LYS	2.7
1	A	683	TRP	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	474	LYS	2.6
1	B	494	ASP	2.6
1	B	397	SER	2.6
1	A	345	GLN	2.6
1	B	345	GLN	2.6
1	B	496	SER	2.5
1	A	387	GLU	2.5
1	B	575	MET	2.5
1	A	577	LEU	2.5
1	A	686	PRO	2.5
1	A	356	LYS	2.4
1	A	391	LYS	2.4
1	B	510	CYS	2.4
1	A	620	ASN	2.4
1	B	320	THR	2.4
1	B	348	ARG	2.4
1	B	557	GLU	2.4
1	A	709	PHE	2.4
1	B	512	GLN	2.4
1	B	472	ASP	2.4
1	B	511	ILE	2.3
1	A	394	ASP	2.3
1	A	688	MET	2.3
1	A	598	ILE	2.2
1	B	374	ILE	2.2
1	B	719	HIS	2.2
1	A	690	GLY	2.2
1	B	617	LYS	2.2
1	A	390	ASN	2.2
1	A	397	SER	2.2
1	B	491	LYS	2.2
1	A	692	ILE	2.2
1	B	686	PRO	2.1
1	B	576	LEU	2.1
1	B	492	GLN	2.1
1	B	358	GLN	2.1
1	A	303	PRO	2.1
1	B	577	LEU	2.1
1	B	684	ILE	2.1
1	A	414	TRP	2.0
1	B	672	ARG	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 monosaccharides in this entry.

6.4 Ligands (i)

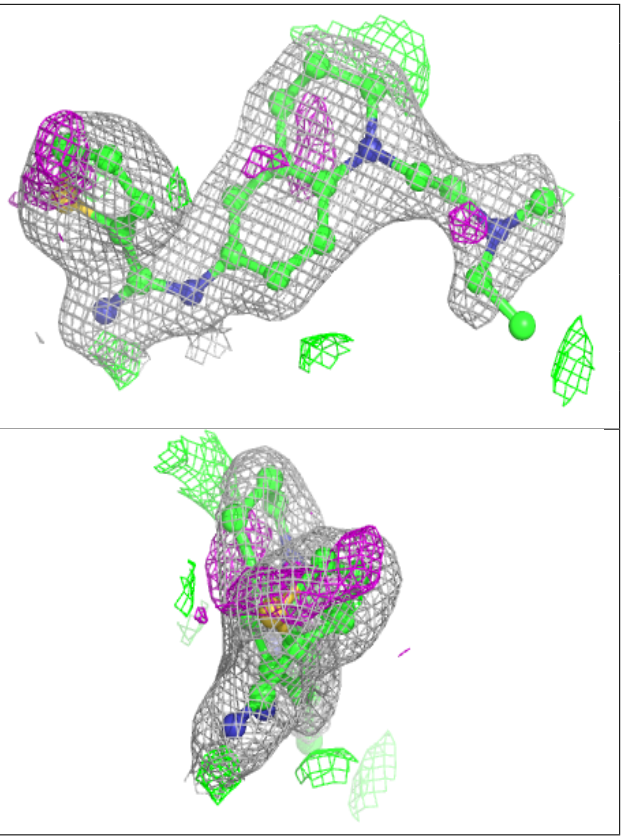
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
5	GOL	A	804	6/6	0.66	0.21	64,69,74,76	0
5	GOL	B	804	6/6	0.74	0.27	72,80,86,94	0
4	7R2	A	803	24/24	0.94	0.15	30,39,60,73	0
4	7R2	B	803	24/24	0.94	0.19	30,40,68,75	0
3	H4B	B	802	17/17	0.96	0.14	29,31,34,35	0
3	H4B	A	802	17/17	0.97	0.12	28,32,36,36	0
2	HEM	A	801	43/43	0.98	0.17	22,30,37,48	0
2	HEM	B	801	43/43	0.98	0.18	26,32,42,43	0
6	ZN	A	805	1/1	0.99	0.07	35,35,35,35	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.

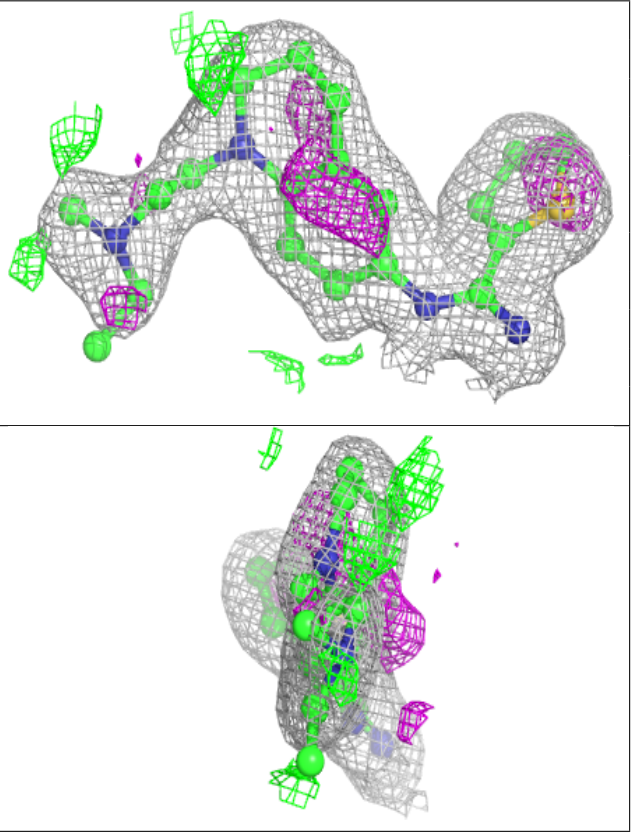
Electron density around 7R2 A 803:

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



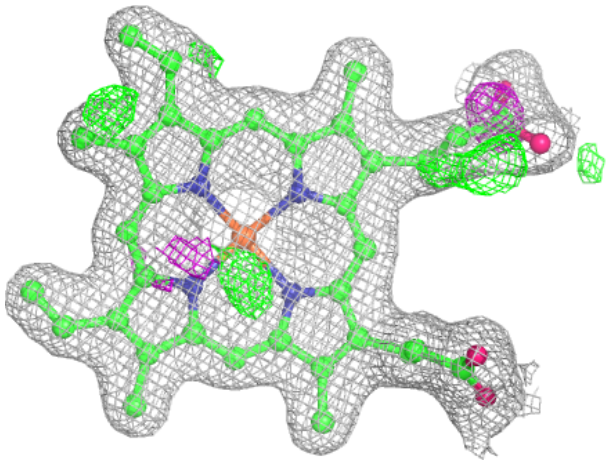
Electron density around 7R2 B 803:

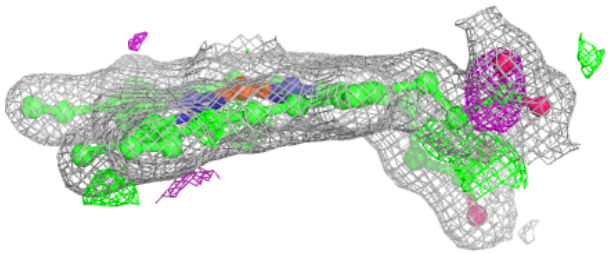
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

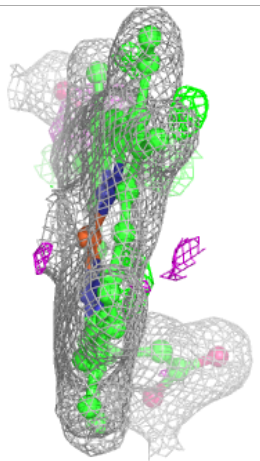


Electron density around HEM A 801:

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

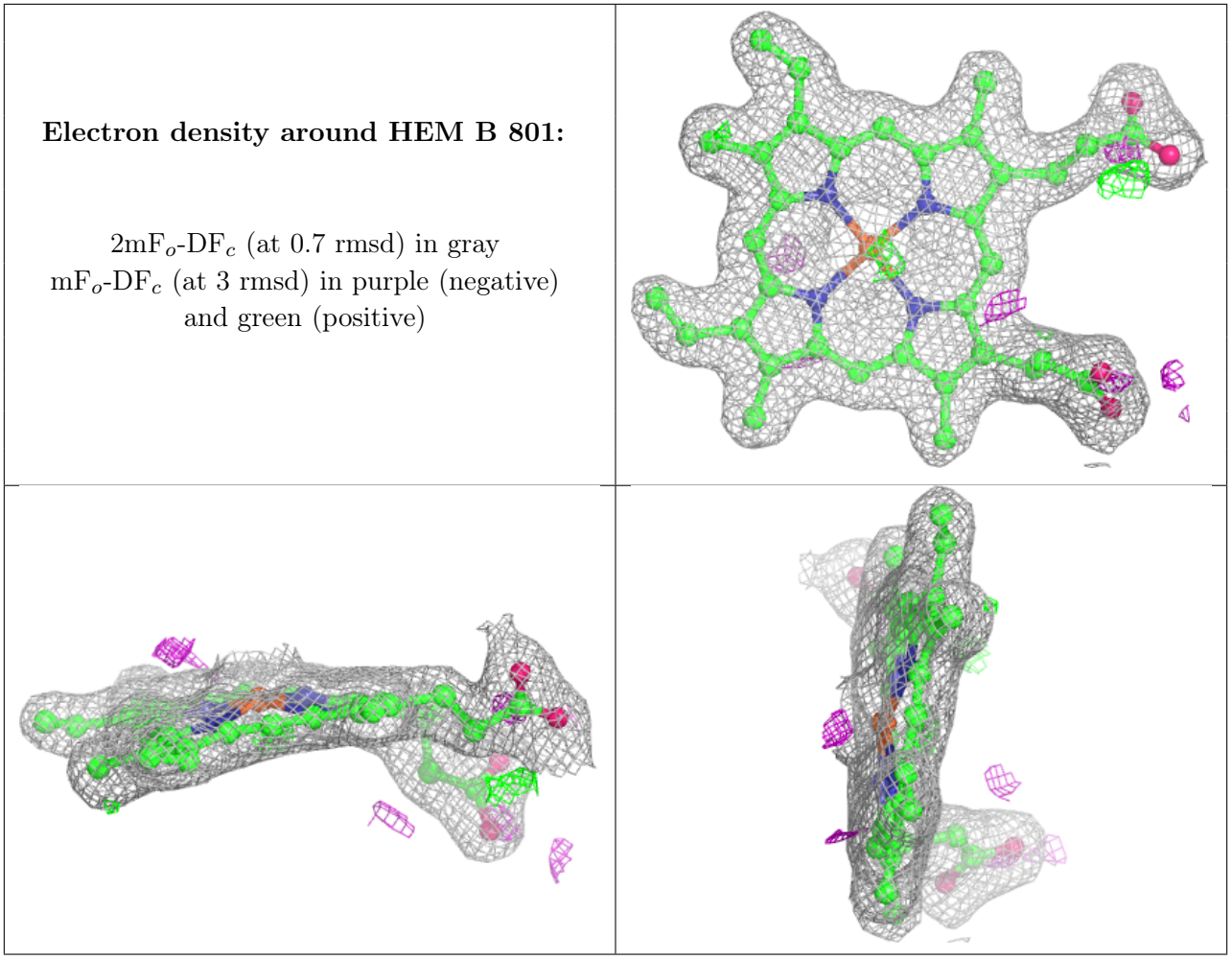






Electron density around HEM B 801:

$2mF_o$-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.