Full wwPDB X-ray Structure Validation Report ⓘ

Oct 6, 2023 – 01:54 AM EDT

PDB ID	:	8FGV
Title	:	Structure of rat neuronal nitric oxide synthase H692F mutant heme domain in complex with 6-(5-(2-(dimethylamino)ethyl)-2,3-difluorophenethyl)-4-methoxypyridin-2-amine
Authors	:	Li, H.; Poulos, T.L.
Deposited on	:	2022-12-12
Resolution	:	1.85 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:

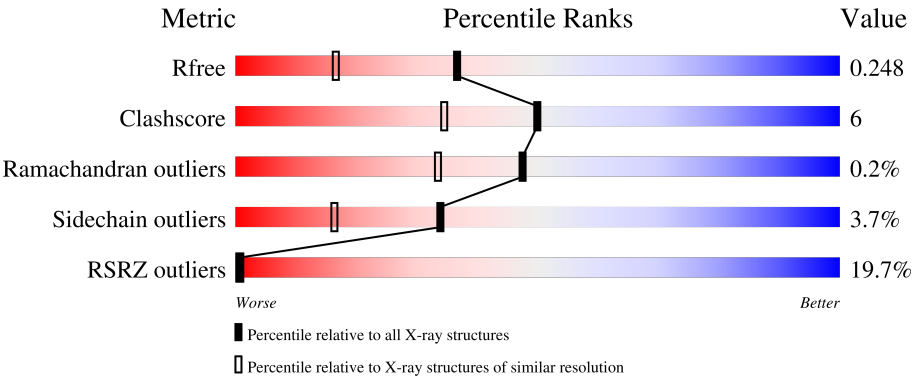
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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 1.85 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	4003 (1.86-1.82)
Clashscore	141614	4233 (1.86-1.82)
Ramachandran outliers	138981	4185 (1.86-1.82)
Sidechain outliers	138945	4186 (1.86-1.82)
RSRZ outliers	127900	3957 (1.86-1.82)

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	422	25% 78% 18%
1	B	422	13% 85% 12%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 7202 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.

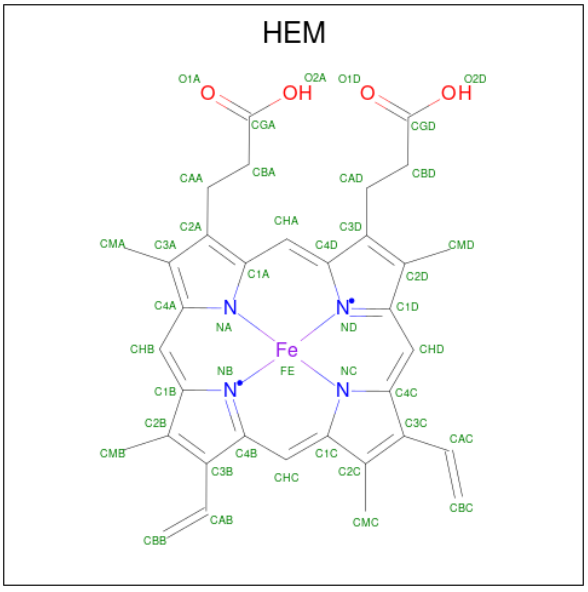
- Molecule 1 is a protein called Nitric oxide synthase, brain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	410	Total	C	N	O	S	0	2	0
			3344	2142	570	610	22			
1	B	411	Total	C	N	O	S	0	3	0
			3355	2149	572	613	21			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	692	PHE	HIS	engineered mutation	UNP P29476
B	692	PHE	HIS	engineered mutation	UNP P29476

- 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		

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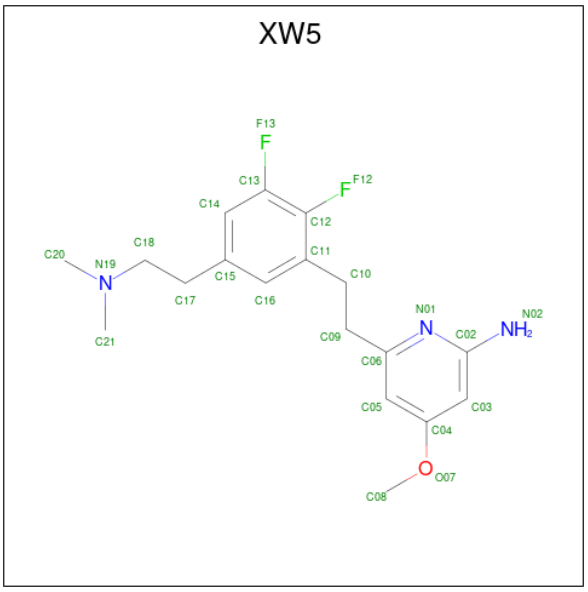
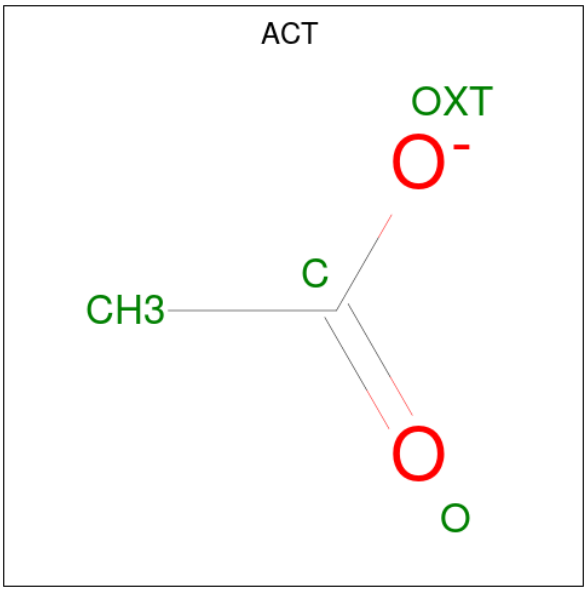
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 3 is 6-(2-{5-[2-(dimethylamino)ethyl]-2,3-difluorophenyl}ethyl)-4-methoxypyridin-2-amine (three-letter code: XW5) (formula: $C_{18}H_{23}F_2N_3O$) (labeled as "Ligand of Interest" by depositor).



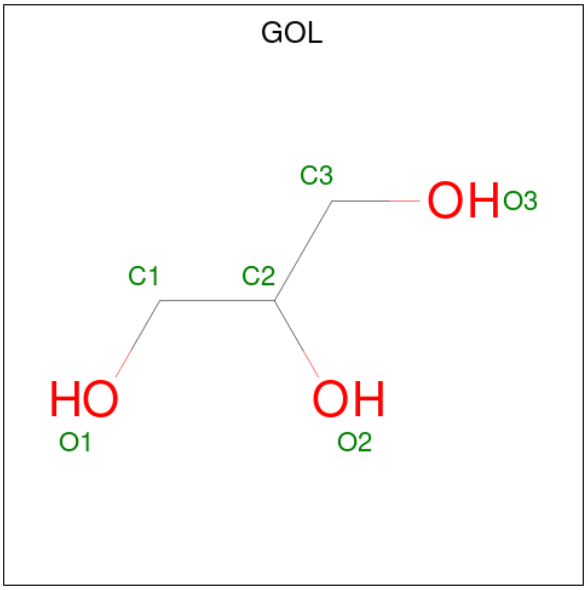
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	F	N	O	0	0
			24	18	2	3	1		
3	B	1	Total	C	F	N	O	0	0
			24	18	2	3	1		

- Molecule 4 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



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

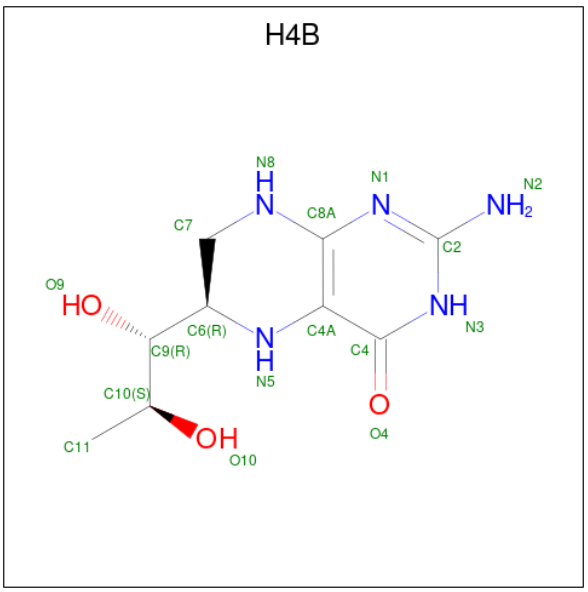
- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 6 is 5,6,7,8-TETRAHYDROBIOPTERIN (three-letter code: H4B) (formula:

$C_9H_{15}N_5O_3$).



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

- Molecule 7 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

- Molecule 8 is water.

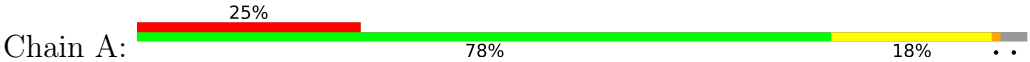
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	129	Total O 129 129	0	0
8	B	191	Total O 191 191	0	0

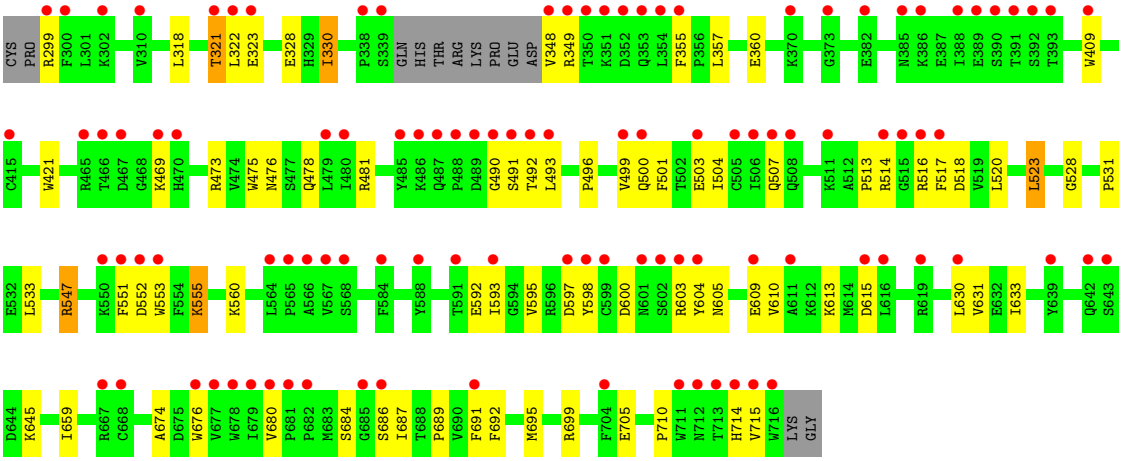
3 Residue-property plots (i)

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

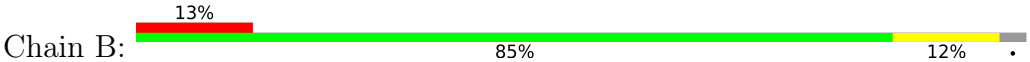
Chain A:

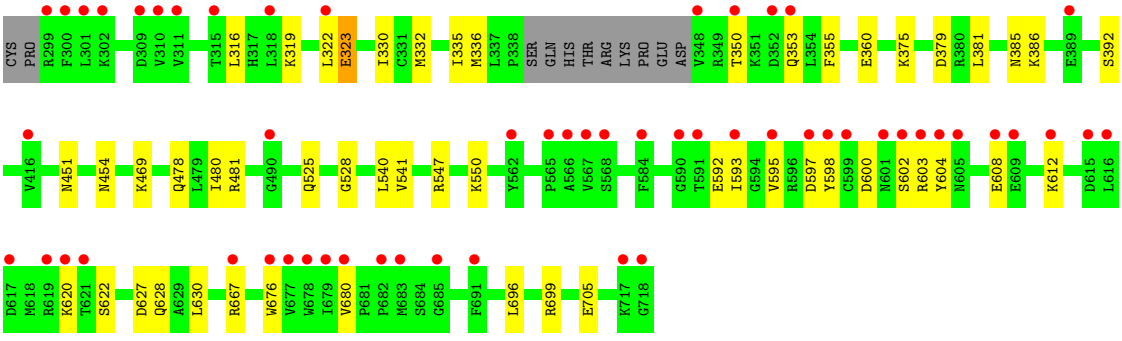




• Molecule 1: Nitric oxide synthase, brain

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	52.14Å 112.41Å 164.71Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.66 – 1.85 38.67 – 1.85	Depositor EDS
% Data completeness (in resolution range)	98.3 (38.66-1.85) 99.2 (38.67-1.85)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.94 (at 1.84Å)	Xtriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, R_{free}	0.201 , 0.246 0.202 , 0.248	Depositor DCC
R_{free} test set	4106 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å^2)	35.9	Xtriage
Anisotropy	0.953	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 58.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	7202	wwPDB-VP
Average B, all atoms (Å^2)	68.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.61% 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: H4B, HEM, GOL, ZN, XW5, ACT

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	0.38	0/3443	0.51	0/4670
1	B	0.40	0/3457	0.53	0/4686
All	All	0.39	0/6900	0.52	0/9356

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	3344	0	3260	48	0
1	B	3355	0	3276	28	0
2	A	43	0	30	2	0
2	B	43	0	30	3	0
3	A	24	0	0	1	0
3	B	24	0	0	1	0
4	A	4	0	3	0	0
4	B	4	0	3	0	0
5	A	6	0	8	0	0
6	A	17	0	15	1	0
6	B	17	0	15	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	1	0	0	0	0
8	A	129	0	0	1	0
8	B	191	0	0	2	0
All	All	7202	0	6640	78	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (78) 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:523:LEU:HD22	1:A:531:PRO:HB2	1.58	0.85
2:B:802:HEM:HHC	2:B:802:HEM:HBB2	1.74	0.69
1:A:610:VAL:HG21	1:A:633:ILE:HD11	1.76	0.68
1:B:699:ARG:NH1	1:B:705:GLU:OE2	2.28	0.67
2:A:801:HEM:HMC2	2:A:801:HEM:HBC2	1.77	0.66
1:B:322:LEU:HG	1:B:323:GLU:H	1.61	0.65
1:A:598:TYR:HA	1:A:604:TYR:HB2	1.78	0.65
1:B:322:LEU:HB3	1:B:699:ARG:HD3	1.80	0.64
1:A:552:ASP:HA	1:A:555:LYS:HE3	1.79	0.64
1:A:592:GLU:OE2	3:A:802:XW5:N02	2.31	0.64
2:B:802:HEM:HMC2	2:B:802:HEM:HBC2	1.80	0.63
1:B:602[B]:SER:OG	8:B:901:HOH:O	2.15	0.63
1:A:699:ARG:NH2	1:A:705:GLU:OE1	2.31	0.62
2:A:801:HEM:HBB2	2:A:801:HEM:HHC	1.83	0.60
1:A:496:PRO:HA	1:A:499:VAL:HG23	1.82	0.60
1:A:330:ILE:HD11	1:B:696:LEU:HD22	1.85	0.59
1:B:350:THR:OG1	1:B:353:GLN:OE1	2.19	0.58
1:B:595:VAL:HA	1:B:630:LEU:HD11	1.87	0.56
1:B:322:LEU:HG	1:B:323:GLU:N	2.21	0.56
1:B:478:GLN:HB2	1:B:481:ARG:HG3	1.88	0.56
1:A:684:SER:HB3	1:A:687:ILE:HD11	1.87	0.55
1:A:593:ILE:O	1:A:597:ASP:HB2	2.07	0.55
1:A:478:GLN:HB2	1:A:481:ARG:HG3	1.89	0.55
1:A:551:PHE:HB3	1:A:553:TRP:CE2	2.42	0.54
1:A:328:GLU:HB2	1:B:323:GLU:HG2	1.88	0.54
1:B:469:LYS:NZ	8:B:907:HOH:O	2.40	0.53
1:B:525:GLN:HE21	1:B:528:GLY:HA2	1.75	0.52
1:A:513:PRO:HG2	1:A:518:ASP:CG	2.31	0.51
1:A:322:LEU:HB2	1:A:699:ARG:HD3	1.94	0.50
1:B:593:ILE:O	1:B:597:ASP:HB2	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:598:TYR:HA	1:B:604:TYR:HB2	1.94	0.49
1:A:595:VAL:HA	1:A:630:LEU:HD11	1.94	0.49
1:A:492:THR:HG21	1:A:496:PRO:HG3	1.95	0.49
1:A:517:PHE:HE1	1:A:560:LYS:H	1.59	0.49
1:B:592:GLU:OE2	3:B:803:XW5:N02	2.46	0.48
1:A:676:TRP:CZ2	1:A:680:VAL:HG21	2.49	0.48
1:A:631:VAL:HG11	1:B:628:GLN:HG2	1.96	0.47
1:A:493:LEU:HD11	1:A:516:ARG:HG2	1.96	0.47
1:A:547:ARG:HB2	1:A:555:LYS:HE2	1.97	0.47
1:B:322:LEU:HB3	1:B:699:ARG:CD	2.44	0.47
1:B:550:LYS:HA	1:B:550:LYS:HD2	1.73	0.47
1:B:593:ILE:HA	1:B:597:ASP:HB2	1.97	0.47
1:B:355:PHE:HD1	1:B:385:ASN:HD22	1.63	0.47
1:A:321:THR:HG23	1:A:322:LEU:H	1.80	0.46
1:A:299:ARG:HG3	1:A:318:LEU:HD11	1.98	0.46
1:A:659:ILE:HG13	1:A:689:PRO:HB2	1.97	0.46
1:A:348:VAL:HG22	1:A:349:ARG:H	1.81	0.46
1:A:523:LEU:HD23	1:A:533:LEU:HD23	1.99	0.44
1:A:598:TYR:O	1:A:605:ASN:N	2.51	0.44
1:B:316:LEU:HD12	1:B:319:LYS:HG3	2.00	0.44
1:A:475:TRP:HB2	1:A:523:LEU:HB3	2.00	0.44
1:A:500:GLN:HG2	1:A:504:ILE:HD11	2.00	0.44
1:B:620:LYS:HG3	1:B:622:SER:H	1.82	0.44
1:A:500:GLN:O	1:A:504:ILE:HG13	2.18	0.43
1:A:676:TRP:CE2	1:A:680:VAL:HG21	2.53	0.43
1:A:409:TRP:CE3	1:A:421:TRP:HA	2.54	0.43
1:A:473:ARG:NH2	1:A:710:PRO:HD3	2.33	0.43
1:A:517:PHE:HE2	1:A:604:TYR:HE2	1.66	0.43
1:B:600:ASP:HB2	1:B:603:ARG:HG2	2.00	0.43
1:A:504:ILE:HA	1:A:507:GLN:HB2	2.00	0.43
1:B:480:ILE:HD13	1:B:541:VAL:HG13	2.01	0.43
1:B:451:ASN:HB3	1:B:454:ASN:O	2.19	0.42
1:A:501:PHE:HA	1:A:504:ILE:HD12	2.01	0.42
1:B:375:LYS:NZ	1:B:379:ASP:OD2	2.51	0.42
1:A:501:PHE:HD2	1:A:520:LEU:HD13	1.85	0.41
2:B:802:HEM:HBB2	2:B:802:HEM:CHC	2.46	0.41
1:B:332:MET:HB3	1:B:335:ILE:HG13	2.02	0.41
1:B:676:TRP:CZ2	1:B:680:VAL:HG21	2.55	0.41
1:A:528:GLY:O	1:A:714:HIS:HE1	2.03	0.41
1:A:692:PHE:HA	6:A:805:H4B:O9	2.20	0.41
1:A:597:ASP:OD1	1:A:603:ARG:NH2	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:674:ALA:HB3	1:A:695:MET:HB3	2.03	0.41
1:A:323:GLU:O	1:A:699:ARG:HD2	2.21	0.40
1:A:349:ARG:HD3	1:A:357:LEU:CD1	2.51	0.40
1:A:469:LYS:HB3	1:A:469:LYS:HE3	1.95	0.40
1:A:686:SER:HA	1:A:691:PHE:CG	2.55	0.40
1:A:553:TRP:CE3	1:A:613:LYS:HD2	2.55	0.40
1:A:355:PHE:HB2	8:A:902:HOH:O	2.21	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	408/422 (97%)	388 (95%)	18 (4%)	2 (0%)	29 15
1	B	410/422 (97%)	397 (97%)	13 (3%)	0	100 100
All	All	818/844 (97%)	785 (96%)	31 (4%)	2 (0%)	47 33

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	491	SER
1	A	490	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	368/377 (98%)	354 (96%)	14 (4%)	33	15
1	B	369/377 (98%)	356 (96%)	13 (4%)	36	18
All	All	737/754 (98%)	710 (96%)	27 (4%)	34	16

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	321	THR
1	A	330	ILE
1	A	360	GLU
1	A	476	ASN
1	A	503	GLU
1	A	514	ARG
1	A	523	LEU
1	A	547	ARG
1	A	555	LYS
1	A	600	ASP
1	A	609	GLU
1	A	615	ASP
1	A	645	LYS
1	A	715	VAL
1	B	323	GLU
1	B	330	ILE
1	B	336	MET
1	B	360	GLU
1	B	381	LEU
1	B	386	LYS
1	B	392	SER
1	B	540	LEU
1	B	547	ARG
1	B	608	GLU
1	B	612	LYS
1	B	627	ASP
1	B	667	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	714	HIS

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 10 ligands modelled in this entry, 1 is monoatomic - leaving 9 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	$\#\|Z\| > 2$
5	GOL	A	804	-	5,5,5	0.43	0	5,5,5	0.42	0
2	HEM	B	802	1	41,50,50	1.55	10 (24%)	45,82,82	1.75	13 (28%)
4	ACT	B	804	-	3,3,3	0.74	0	3,3,3	0.81	0
6	H4B	B	801	-	16,18,18	0.87	0	11,26,26	2.48	6 (54%)
2	HEM	A	801	1	41,50,50	1.43	8 (19%)	45,82,82	1.34	6 (13%)
3	XW5	B	803	-	25,25,25	0.50	0	32,34,34	1.62	4 (12%)
3	XW5	A	802	-	25,25,25	0.53	0	32,34,34	1.53	6 (18%)
6	H4B	A	805	-	16,18,18	0.82	0	11,26,26	2.39	5 (45%)
4	ACT	A	803	-	3,3,3	0.74	0	3,3,3	0.78	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
5	GOL	A	804	-	-	2/4/4/4	-
2	HEM	B	802	1	-	3/12/54/54	-
6	H4B	B	801	-	-	0/8/17/17	0/2/2/2
2	HEM	A	801	1	-	4/12/54/54	-
3	XW5	B	803	-	-	2/12/12/12	0/2/2/2
3	XW5	A	802	-	-	5/12/12/12	0/2/2/2
6	H4B	A	805	-	-	1/8/17/17	0/2/2/2

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	802	HEM	C3C-CAC	3.38	1.54	1.47
2	A	801	HEM	C3C-CAC	3.31	1.54	1.47
2	B	802	HEM	C3C-C2C	-3.24	1.35	1.40
2	A	801	HEM	C3C-C2C	-3.20	1.35	1.40
2	B	802	HEM	CAB-C3B	3.08	1.55	1.47
2	A	801	HEM	CAB-C3B	2.99	1.55	1.47
2	B	802	HEM	C2C-C1C	2.58	1.48	1.42
2	A	801	HEM	CAA-C2A	2.25	1.55	1.52
2	B	802	HEM	CHA-C4D	2.23	1.40	1.35
2	A	801	HEM	CMC-C2C	2.21	1.56	1.51
2	B	802	HEM	CMC-C2C	2.15	1.56	1.51
2	A	801	HEM	FE-NB	2.15	2.07	1.96
2	B	802	HEM	CAA-C2A	2.12	1.55	1.52
2	B	802	HEM	FE-NB	2.12	2.07	1.96
2	A	801	HEM	CMD-C2D	2.11	1.55	1.50
2	B	802	HEM	C3B-C2B	-2.07	1.33	1.37
2	A	801	HEM	CMB-C2B	2.06	1.55	1.50
2	B	802	HEM	CMA-C3A	2.06	1.55	1.51

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	802	HEM	C4B-CHC-C1C	5.66	130.03	122.56
3	B	803	XW5	C02-N01-C06	5.57	122.32	118.10
6	B	801	H4B	C8A-C4A-C4	4.92	118.94	114.57
6	A	805	H4B	C8A-C4A-C4	4.91	118.93	114.57
3	A	802	XW5	C02-N01-C06	4.30	121.36	118.10
3	B	803	XW5	C05-C06-N01	-4.08	118.58	122.90
2	A	801	HEM	C4C-CHD-C1D	3.59	127.30	122.56
6	B	801	H4B	N1-C2-N3	-3.11	120.54	125.42
6	B	801	H4B	C2-N3-C4	3.06	120.78	115.93

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	802	XW5	N02-C02-N01	3.02	121.26	116.49
6	A	805	H4B	N1-C2-N3	-2.94	120.80	125.42
6	A	805	H4B	C2-N3-C4	2.91	120.55	115.93
3	A	802	XW5	C05-C06-N01	-2.89	119.84	122.90
3	A	802	XW5	C16-C11-C12	2.88	119.40	116.76
2	A	801	HEM	CMC-C2C-C3C	2.69	129.72	124.68
2	B	802	HEM	C3B-C2B-C1B	2.69	108.48	106.49
3	B	803	XW5	C16-C11-C12	2.67	119.20	116.76
2	B	802	HEM	C4D-ND-C1D	2.66	107.82	105.07
6	A	805	H4B	C4-C4A-N5	2.65	121.35	119.12
3	A	802	XW5	C09-C06-N01	2.64	119.89	115.95
2	A	801	HEM	CBA-CAA-C2A	-2.62	108.15	112.62
6	B	801	H4B	C2-N1-C8A	2.60	120.36	114.54
6	A	805	H4B	C2-N1-C8A	2.56	120.28	114.54
2	B	802	HEM	CAD-C3D-C2D	-2.56	123.11	127.88
2	B	802	HEM	C3D-C4D-ND	-2.55	107.32	110.17
2	B	802	HEM	CHD-C1D-ND	2.52	127.17	124.43
2	B	802	HEM	CMB-C2B-C1B	2.50	128.85	125.04
6	B	801	H4B	C4-C4A-N5	2.50	121.22	119.12
2	B	802	HEM	CBA-CAA-C2A	-2.49	108.38	112.62
6	B	801	H4B	N2-C2-N3	2.46	121.08	117.25
3	B	803	XW5	N02-C02-N01	2.43	120.32	116.49
2	B	802	HEM	CMB-C2B-C3B	-2.30	122.66	128.30
2	B	802	HEM	C1B-NB-C4B	2.27	107.42	105.07
2	B	802	HEM	CMC-C2C-C3C	2.17	128.74	124.68
2	B	802	HEM	CAD-C3D-C4D	2.14	128.40	124.66
3	A	802	XW5	C10-C09-C06	-2.11	108.26	112.99
2	B	802	HEM	C4A-C3A-C2A	2.10	108.46	107.00
2	A	801	HEM	C3B-C2B-C1B	2.09	108.04	106.49
2	A	801	HEM	C4B-CHC-C1C	2.07	125.30	122.56
2	A	801	HEM	C3C-C4C-NC	-2.02	107.14	110.94

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	HEM	C1A-C2A-CAA-CBA
2	A	801	HEM	C3A-C2A-CAA-CBA
3	A	802	XW5	C09-C10-C11-C12
5	A	804	GOL	O1-C1-C2-C3
2	A	801	HEM	C2A-CAA-CBA-CGA
2	B	802	HEM	C2A-CAA-CBA-CGA

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Mol	Chain	Res	Type	Atoms
3	B	803	XW5	C15-C17-C18-N19
5	A	804	GOL	O1-C1-C2-O2
3	A	802	XW5	C14-C15-C17-C18
3	A	802	XW5	C16-C15-C17-C18
2	A	801	HEM	C4B-C3B-CAB-CBB
2	B	802	HEM	C4B-C3B-CAB-CBB
2	B	802	HEM	C4D-C3D-CAD-CBD
3	A	802	XW5	C09-C10-C11-C16
6	A	805	H4B	C7-C6-C9-C10
3	A	802	XW5	C06-C09-C10-C11
3	B	803	XW5	C14-C15-C17-C18

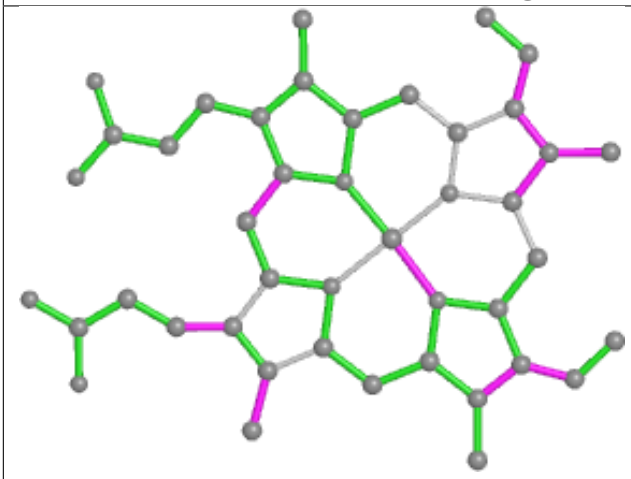
There are no ring outliers.

5 monomers are involved in 8 short contacts:

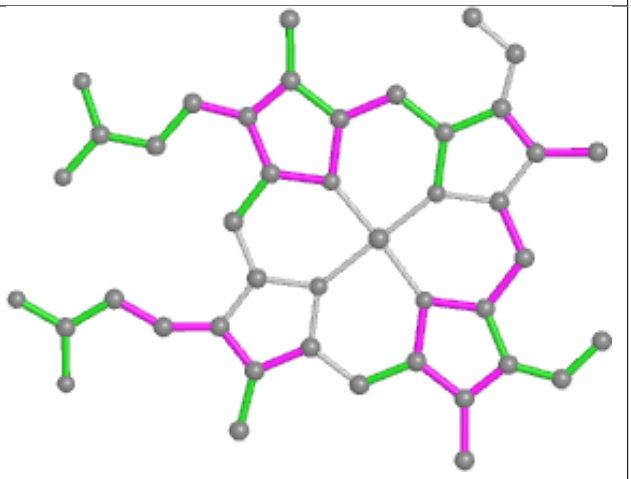
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	802	HEM	3	0
2	A	801	HEM	2	0
3	B	803	XW5	1	0
3	A	802	XW5	1	0
6	A	805	H4B	1	0

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.

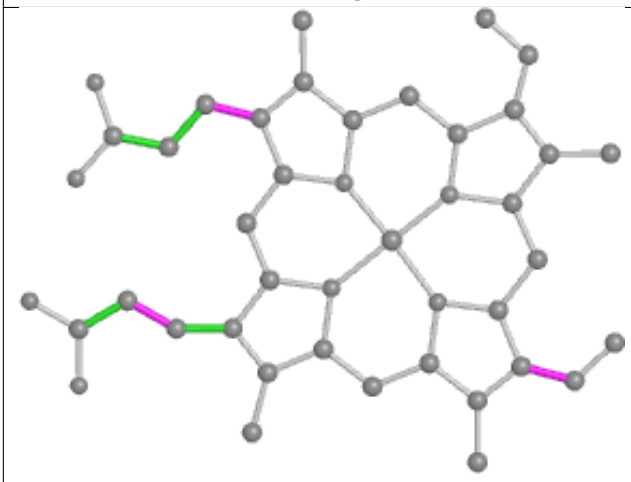
Ligand HEM B 802



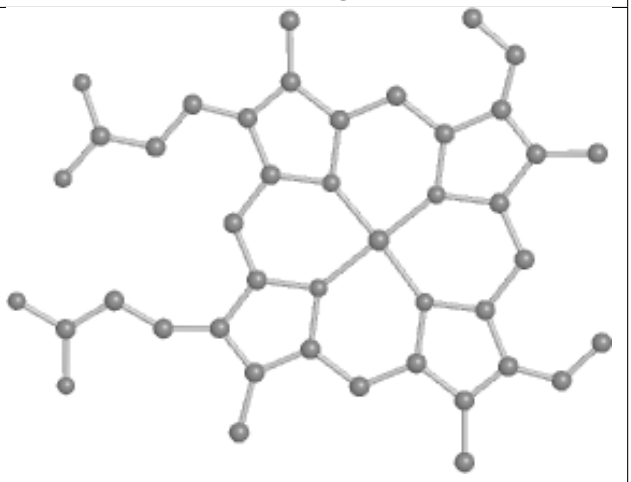
Bond lengths



Bond angles

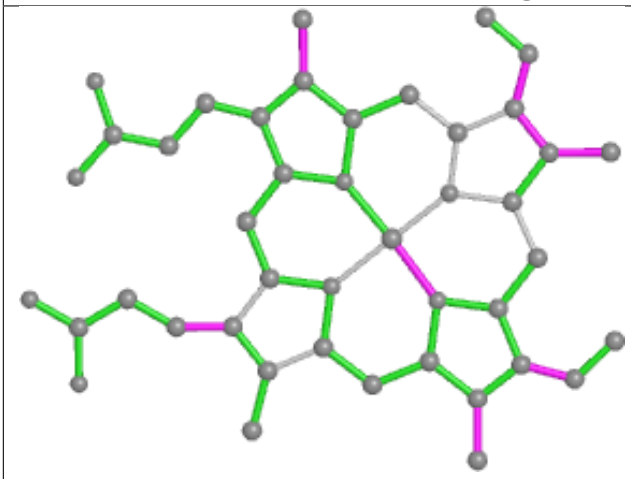


Torsions

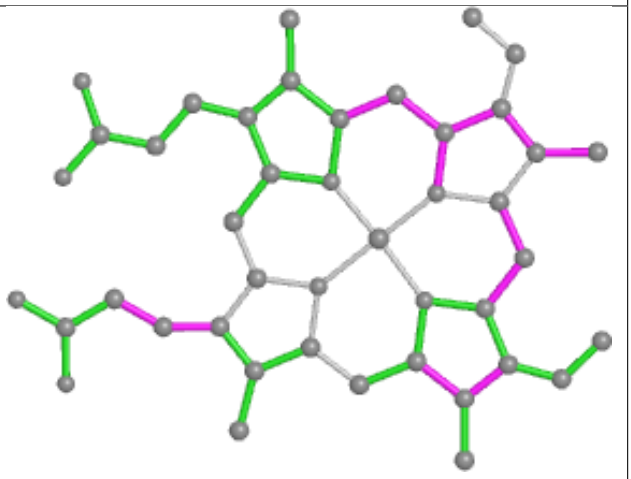


Rings

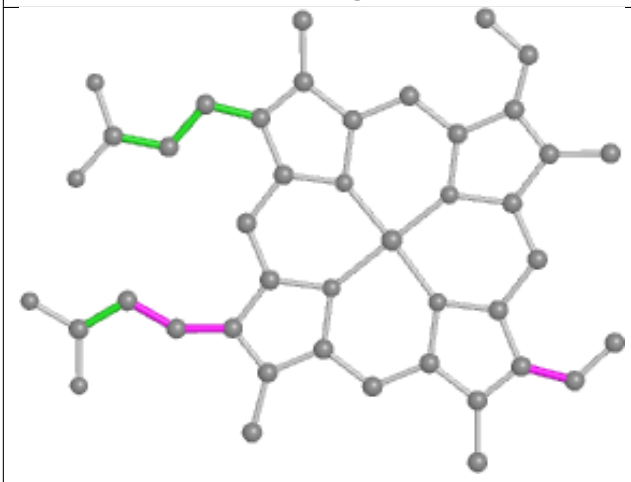
Ligand HEM A 801



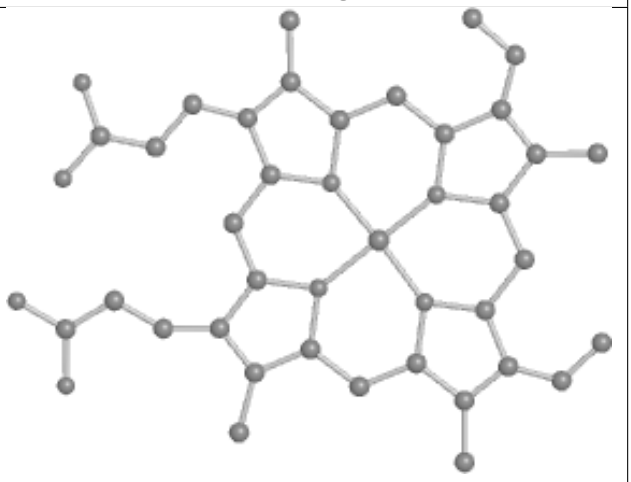
Bond lengths



Bond angles

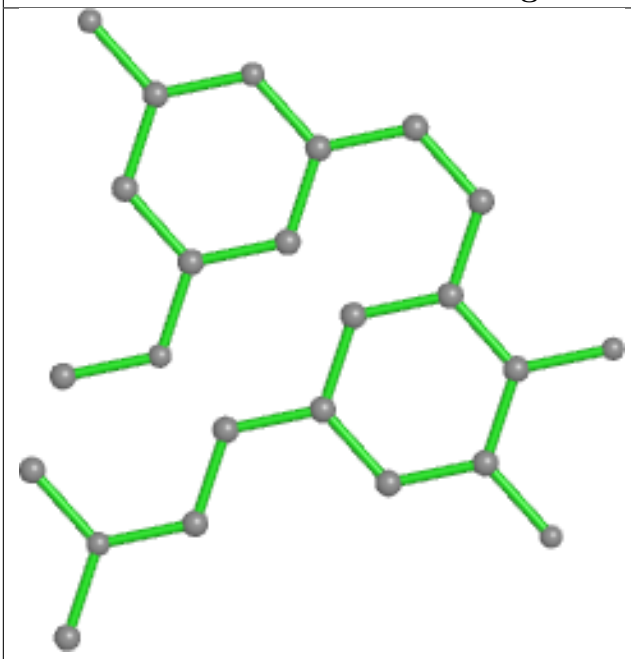


Torsions

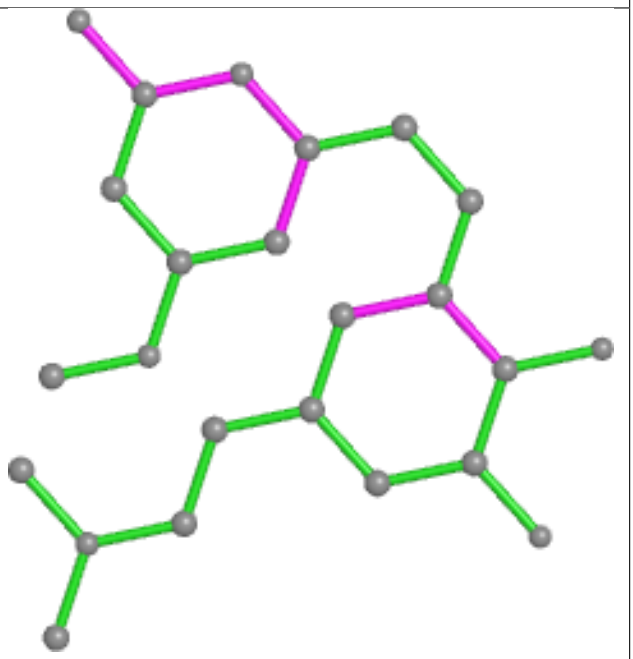


Rings

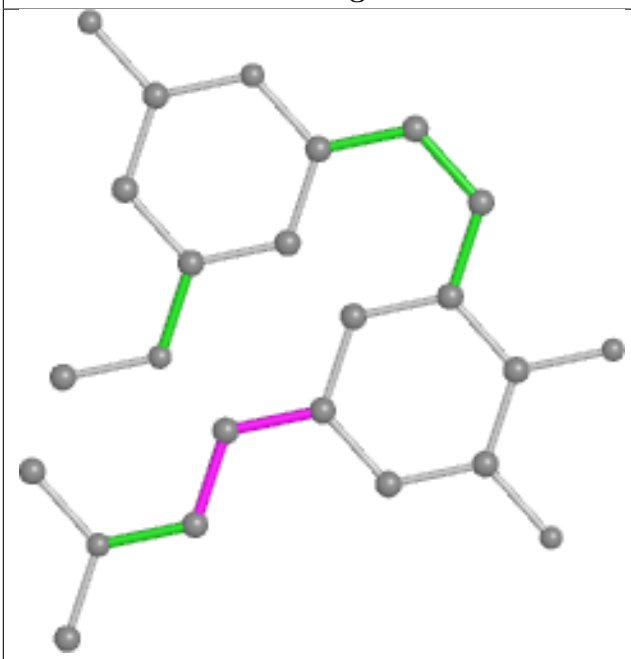
Ligand XW5 B 803



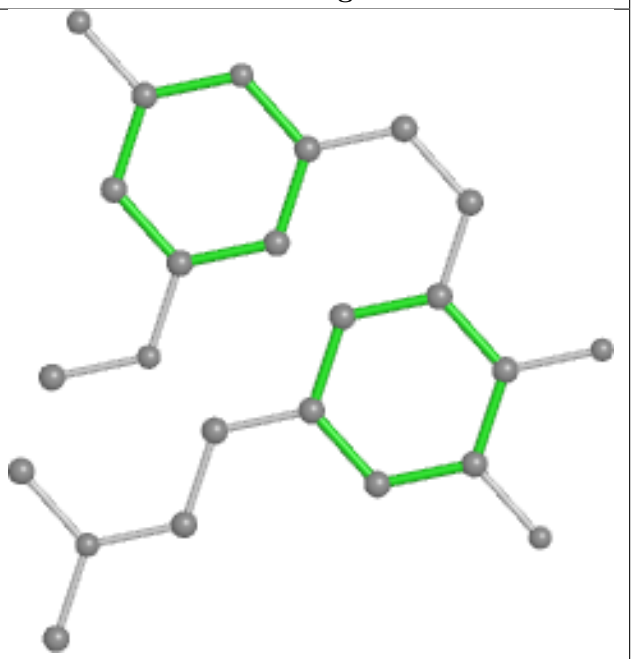
Bond lengths



Bond angles

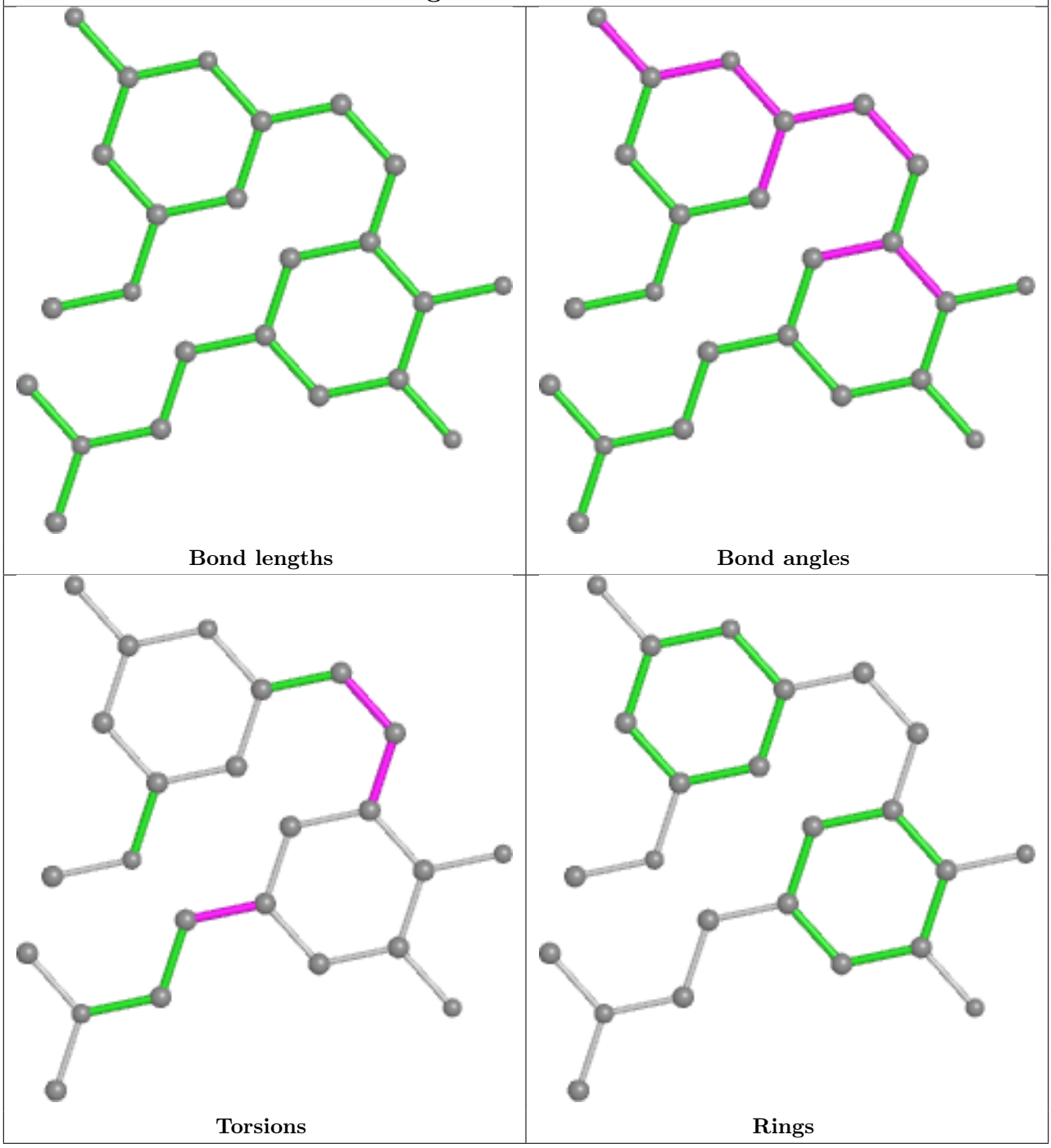


Torsions



Rings

Ligand XW5 A 802



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	410/422 (97%)	1.27	106 (25%)	0	0	35, 71, 123, 172	0
1	B	411/422 (97%)	0.64	56 (13%)	3	2	35, 57, 95, 126	0
All	All	821/844 (97%)	0.95	162 (19%)	1	0	35, 63, 115, 172	0

All (162) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	488	PRO	9.7
1	B	300	PHE	7.6
1	A	352	ASP	6.8
1	A	322	LEU	6.8
1	A	348	VAL	6.4
1	A	506	ILE	6.0
1	A	716	TRP	5.9
1	A	551	PHE	5.9
1	A	388	ILE	5.5
1	A	355	PHE	5.5
1	A	490	GLY	5.4
1	B	299	ARG	5.3
1	A	715	VAL	5.3
1	A	349	ARG	5.0
1	A	489	ASP	4.7
1	A	553	TRP	4.7
1	A	508	GLN	4.6
1	A	505	CYS	4.5
1	A	393	THR	4.5
1	A	567	VAL	4.4
1	B	348	VAL	4.4
1	B	350	THR	4.4
1	A	321	THR	4.4
1	B	619	ARG	4.4

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Mol	Chain	Res	Type	RSRZ
1	A	619	ARG	4.3
1	A	339	SER	4.2
1	B	680	VAL	4.2
1	A	389	GLU	4.1
1	A	486	LYS	4.1
1	A	678	TRP	4.1
1	B	718	GLY	4.1
1	A	593	ILE	4.0
1	A	601	ASN	4.0
1	A	679	ILE	4.0
1	B	599	CYS	4.0
1	B	310	VAL	4.0
1	A	351	LYS	3.9
1	A	507	GLN	3.9
1	A	390	SER	3.9
1	A	677	VAL	3.9
1	A	300	PHE	3.9
1	A	385	ASN	3.8
1	A	713	THR	3.8
1	B	617	ASP	3.8
1	A	492	THR	3.8
1	A	584	PHE	3.8
1	A	681	PRO	3.7
1	A	469	LYS	3.7
1	A	604	TYR	3.7
1	A	299	ARG	3.7
1	A	598	TYR	3.7
1	A	643	SER	3.7
1	B	677	VAL	3.7
1	A	491	SER	3.6
1	B	601	ASN	3.6
1	A	566	ALA	3.5
1	A	487	GLN	3.5
1	B	616	LEU	3.4
1	B	597	ASP	3.4
1	A	603	ARG	3.3
1	A	611	ALA	3.3
1	A	470	HIS	3.3
1	A	711	TRP	3.3
1	B	566	ALA	3.3
1	B	602[A]	SER	3.3
1	A	503	GLU	3.2

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Mol	Chain	Res	Type	RSRZ
1	A	350	THR	3.2
1	A	391	THR	3.2
1	B	309	ASP	3.2
1	A	676	TRP	3.2
1	A	353	GLN	3.2
1	B	593	ILE	3.2
1	A	597	ASP	3.1
1	A	493	LEU	3.1
1	B	567	VAL	3.1
1	A	480	ILE	3.1
1	A	386	LYS	3.1
1	B	678	TRP	3.0
1	A	568	SER	3.0
1	B	612	LYS	2.9
1	A	609	GLU	2.9
1	B	620	LYS	2.9
1	A	338	PRO	2.9
1	A	591	THR	2.9
1	A	479	LEU	2.9
1	B	301	LEU	2.9
1	A	680	VAL	2.9
1	A	499	VAL	2.8
1	A	615	ASP	2.8
1	B	302	LYS	2.8
1	B	679	ILE	2.8
1	A	467	ASP	2.8
1	A	667	ARG	2.8
1	A	704	PHE	2.8
1	A	714	HIS	2.7
1	A	691	PHE	2.7
1	A	392	SER	2.7
1	A	685	GLY	2.7
1	A	485	TYR	2.7
1	B	598	TYR	2.7
1	A	515	GLY	2.7
1	B	615	ASP	2.6
1	A	511	LYS	2.6
1	B	322	LEU	2.6
1	A	466	THR	2.6
1	A	599	CYS	2.6
1	A	565	PRO	2.6
1	A	686	SER	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	311	VAL	2.6
1	B	691	PHE	2.6
1	B	603	ARG	2.5
1	B	676	TRP	2.5
1	B	591	THR	2.5
1	A	630	LEU	2.5
1	A	712	ASN	2.5
1	B	562	TYR	2.5
1	A	642	GLN	2.5
1	B	605	ASN	2.5
1	B	595	VAL	2.5
1	A	616	LEU	2.5
1	B	315	THR	2.5
1	A	415	CYS	2.5
1	A	409	TRP	2.4
1	B	621	THR	2.4
1	B	318	LEU	2.4
1	B	667	ARG	2.4
1	A	500	GLN	2.4
1	A	552	ASP	2.4
1	A	514	ARG	2.4
1	B	565	PRO	2.3
1	A	302	LYS	2.3
1	A	323	GLU	2.3
1	A	602	SER	2.3
1	B	584	PHE	2.3
1	A	370	LYS	2.3
1	A	516	ARG	2.3
1	A	354	LEU	2.2
1	A	588	TYR	2.2
1	B	604	TYR	2.2
1	B	490	GLY	2.2
1	B	568	SER	2.2
1	A	465	ARG	2.2
1	B	389	GLU	2.2
1	A	564	LEU	2.1
1	A	639	TYR	2.1
1	B	682	PRO	2.1
1	A	517	PHE	2.1
1	A	550	LYS	2.1
1	A	310	VAL	2.1
1	B	352	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	608	GLU	2.1
1	B	609	GLU	2.1
1	B	416	VAL	2.1
1	A	373	GLY	2.1
1	B	683	MET	2.1
1	A	382	GLU	2.1
1	A	682	PRO	2.1
1	B	590	GLY	2.1
1	B	685	GLY	2.1
1	B	353	GLN	2.0
1	B	717	LYS	2.0
1	A	668[A]	CYS	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)

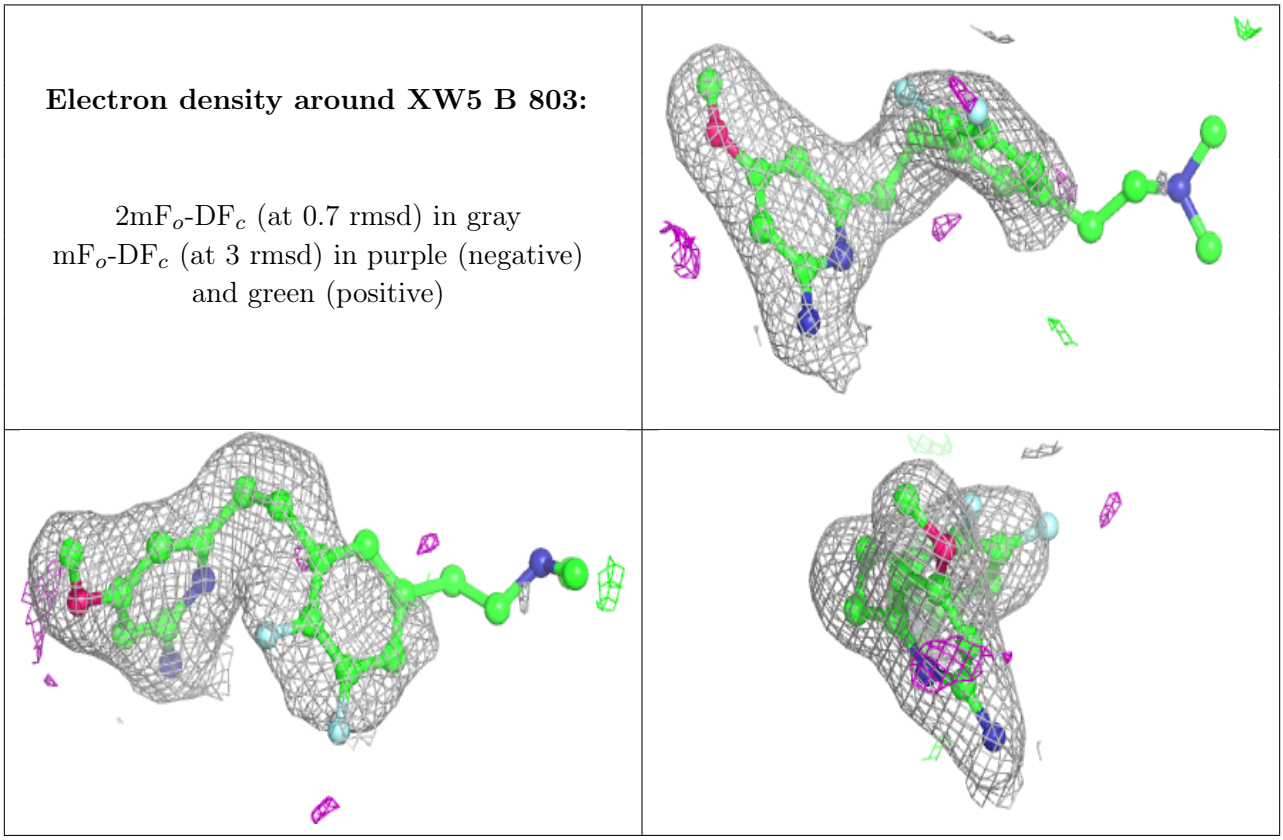
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	0.75	0.22	78,89,94,99	0
4	ACT	B	804	4/4	0.85	0.19	102,103,104,107	0
6	H4B	A	805	17/17	0.86	0.26	74,82,89,95	0
6	H4B	B	801	17/17	0.86	0.24	59,76,93,93	0
4	ACT	A	803	4/4	0.90	0.23	83,88,89,91	0
3	XW5	B	803	24/24	0.93	0.30	42,98,129,132	0
3	XW5	A	802	24/24	0.93	0.35	39,102,118,124	0
2	HEM	B	802	43/43	0.97	0.21	31,41,66,81	0
2	HEM	A	801	43/43	0.97	0.25	33,46,70,76	0
7	ZN	A	806	1/1	0.99	0.05	44,44,44,44	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.

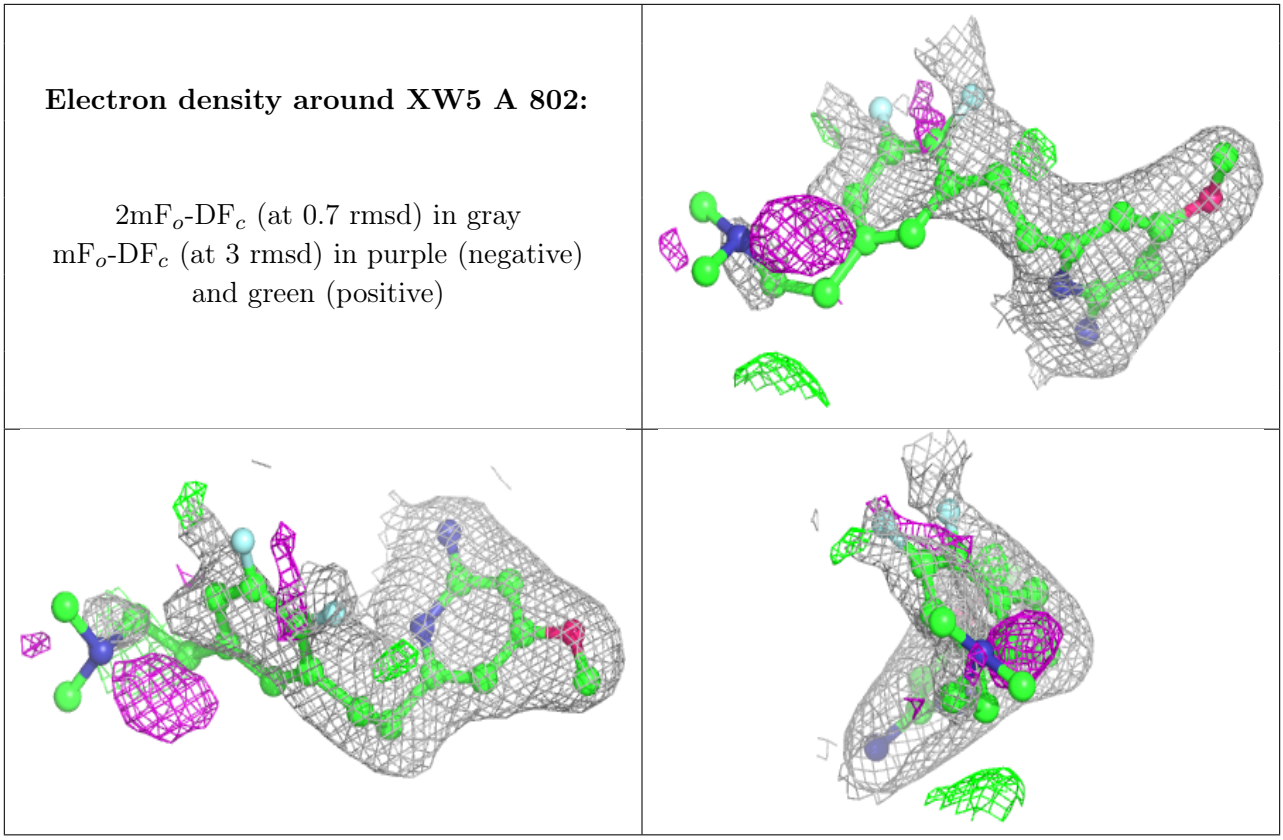
Electron density around XW5 B 803:

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



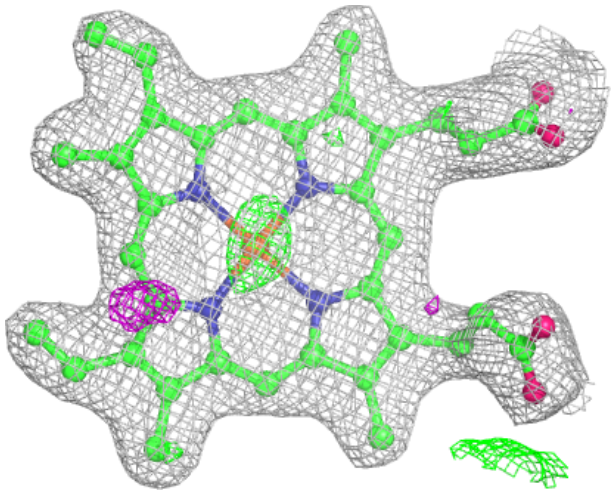
Electron density around XW5 A 802:

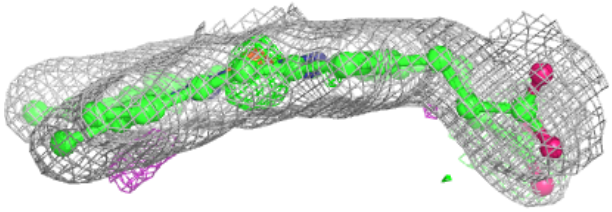
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

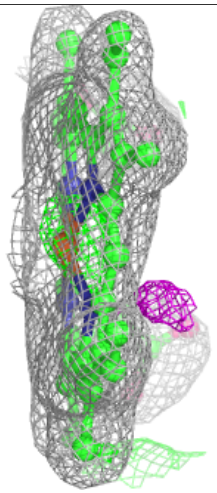


Electron density around HEM B 802:

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

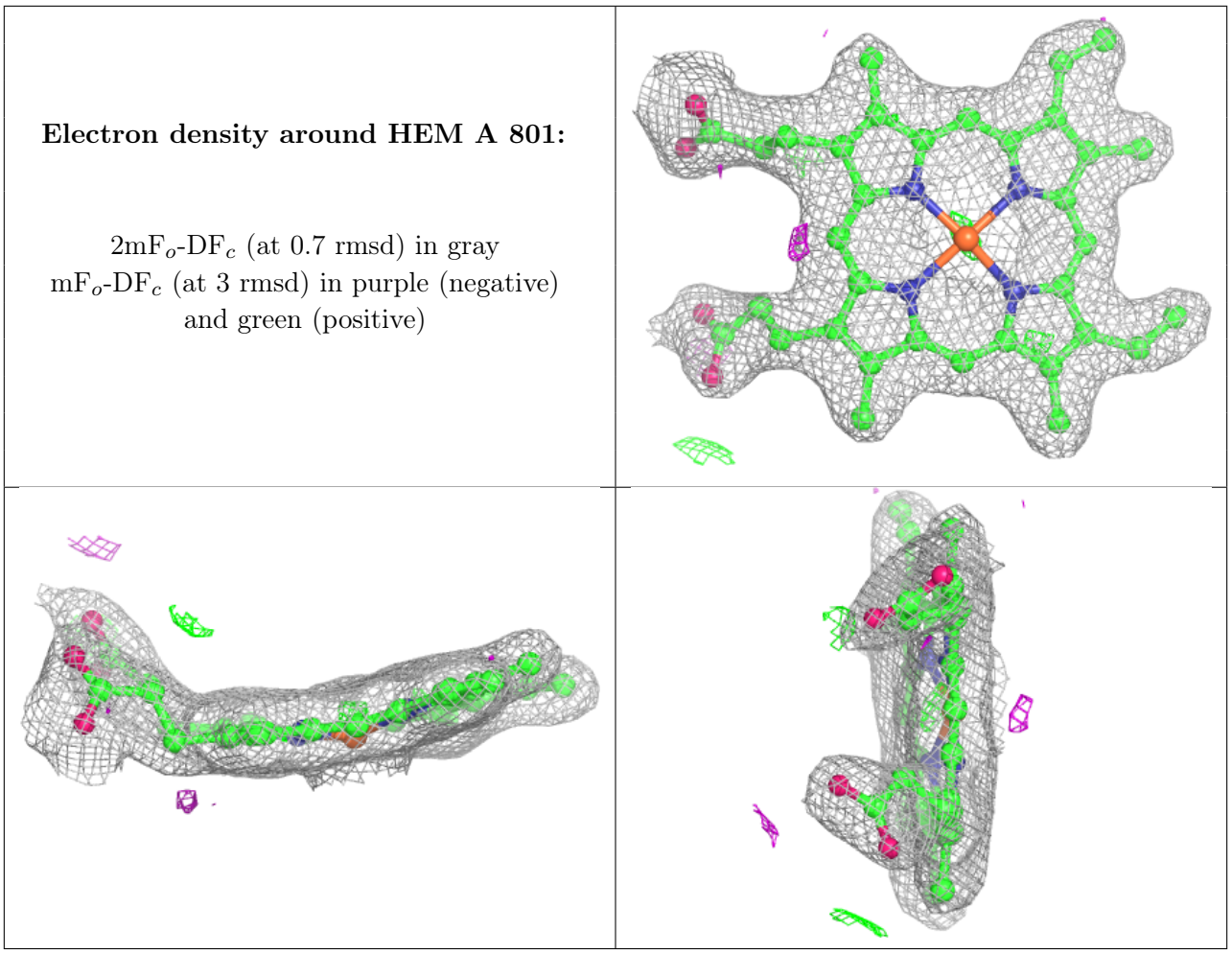






Electron density around HEM A 801:

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



6.5 Other polymers

There are no such residues in this entry.