



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 04:57 PM UTC

PDB ID : 3UFR / pdb_00003ufr
Title : Structure of rat nitric oxide synthase heme domain in complex with 6-(((3R,4R)-4-(((E)-5-(3-fluorophenyl)pent-4-en-1-yl)oxy)pyrrolidin-3-yl)methyl)-4-methylpyridin-2-amine
Authors : Li, H.; Poulos, T.L.
Deposited on : 2011-11-01
Resolution : 2.10 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	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
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)	:	2.49

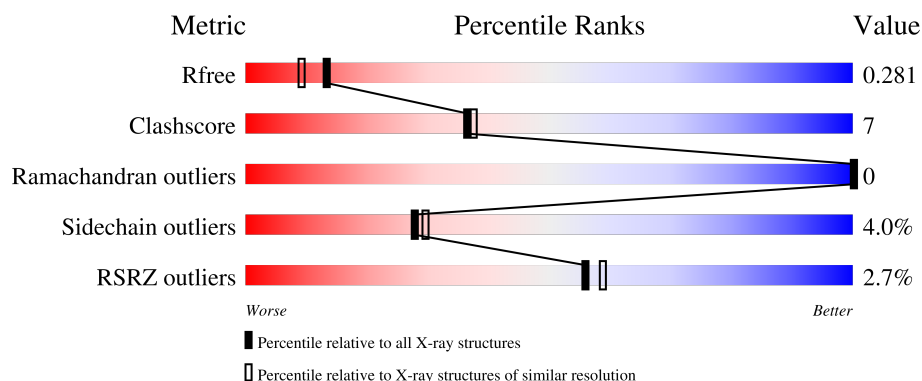
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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}	180053	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

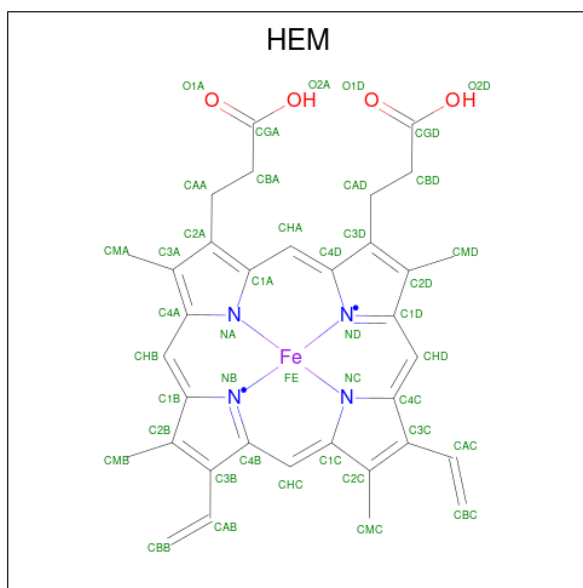
The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. 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 $\leq 5\%$. 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	
1	B	422	

i

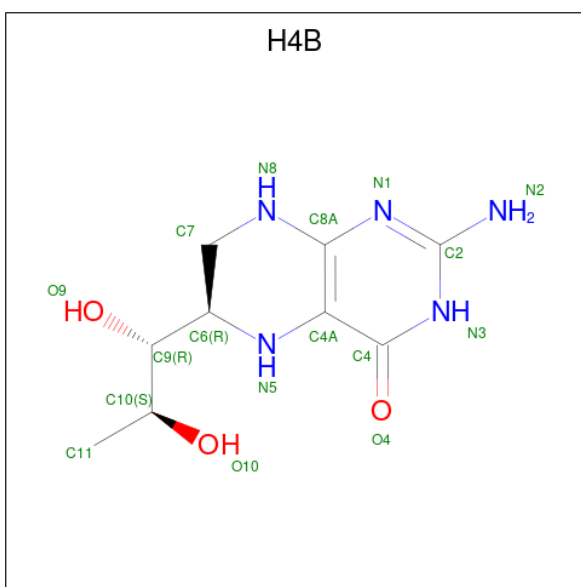
In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

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



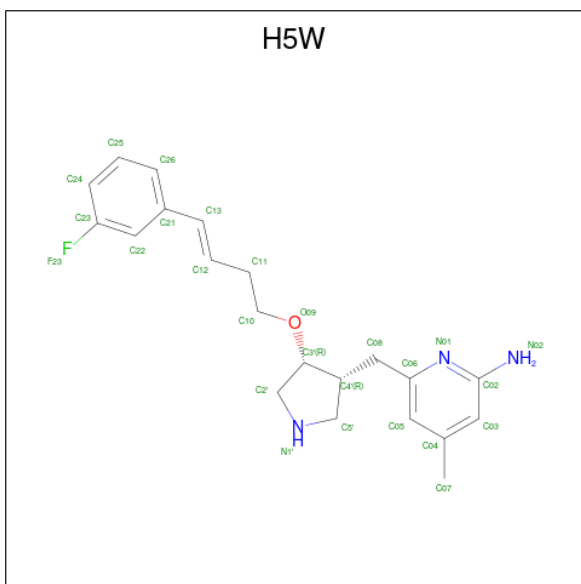
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- 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	0	0
			17	9	5	3		
3	B	1	Total	C	N	O	0	0
			17	9	5	3		

- Molecule 4 is 6-[[[(3R,4R)-4-[[[(3E)-4-(3-fluorophenyl)but-3-en-1-yl]oxy]pyrrolidin-3-yl]methyl]-4-methylpyridin-2-amine (CCD ID: H5W) (formula: C₂₁H₂₆FN₃O).



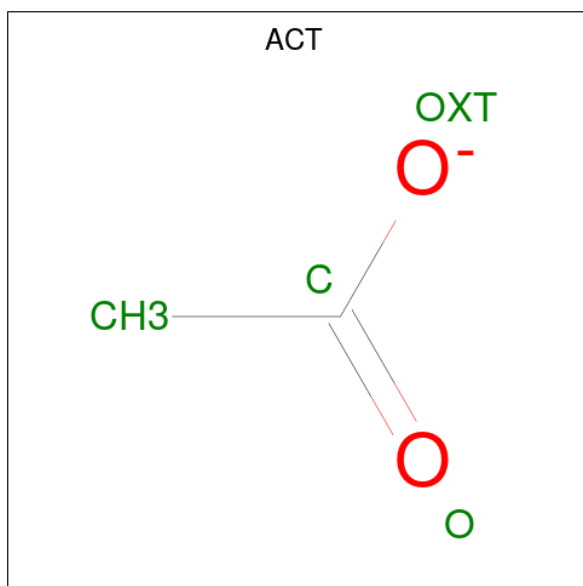
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	F	N	O	0	0
			26	21	1	3	1		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	F	N	O	0	1
			52	42	2	6	2		

- 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	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

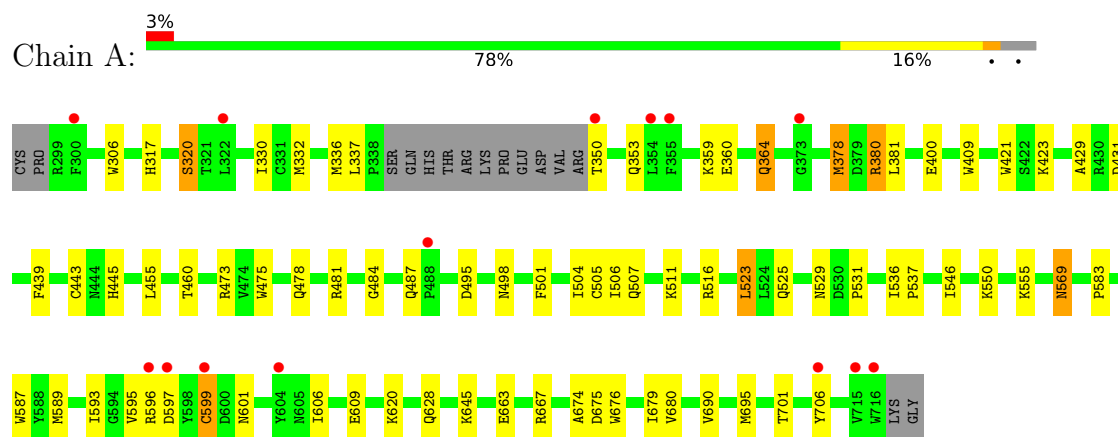
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	84	Total	O	0	0
			84	84		
7	B	136	Total	O	0	0
			136	136		

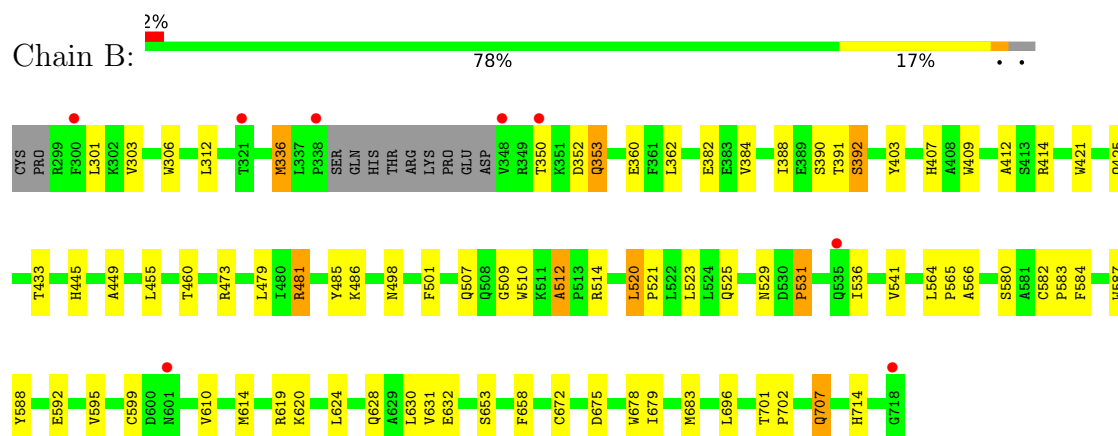
3 Residue-property plots [i](#)

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



- Molecule 1: Nitric oxide synthase, brain



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	51.87Å 111.34Å 164.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.10 – 2.10 46.10 – 2.10	Depositor EDS
% Data completeness (in resolution range)	96.8 (46.10-2.10) 96.7 (46.10-2.10)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.31 (at 2.10Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.199 , 0.249 0.234 , 0.281	Depositor DCC
R_{free} test set	2704 reflections (4.76%)	wwPDB-VP
Wilson B-factor (Å ²)	39.9	Xtriage
Anisotropy	0.417	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 46.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7097	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 5.62% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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: HEM, H5W, H4B, ZN, 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	0.88	1/3406 (0.0%)	1.02	5/4621 (0.1%)
1	B	1.02	4/3457 (0.1%)	1.09	20/4687 (0.4%)
All	All	0.95	5/6863 (0.1%)	1.05	25/9308 (0.3%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	531	PRO	C-O	6.40	1.31	1.23
1	B	412	ALA	CA-CB	-6.38	1.44	1.52
1	B	433	THR	CA-CB	5.60	1.62	1.54
1	A	429	ALA	N-CA	-5.43	1.39	1.46
1	B	479	LEU	C-O	-5.18	1.17	1.24

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	512	ALA	CA-C-N	8.40	127.71	118.97
1	B	512	ALA	C-N-CA	8.40	127.71	118.97
1	B	707	GLN	CA-C-N	-6.66	113.13	119.85
1	B	707	GLN	C-N-CA	-6.66	113.13	119.85
1	B	536	ILE	CA-C-N	-5.81	114.39	120.38
1	B	536	ILE	C-N-CA	-5.81	114.39	120.38
1	A	589	MET	N-CA-C	-5.80	100.25	109.76
1	A	546	ILE	N-CA-C	5.52	115.74	107.51
1	A	487	GLN	N-CA-C	5.50	118.26	110.40
1	B	425	GLN	CA-C-N	-5.47	115.89	122.90
1	B	425	GLN	C-N-CA	-5.47	115.89	122.90
1	A	701	THR	CB-CA-C	5.34	116.90	108.84
1	B	564	LEU	CA-C-N	-5.31	113.20	119.84
1	B	564	LEU	C-N-CA	-5.31	113.20	119.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	509	GLY	N-CA-C	5.29	121.04	114.37
1	A	599	CYS	N-CA-C	5.23	121.05	114.31
1	B	520	LEU	CA-C-N	5.18	125.63	120.14
1	B	520	LEU	C-N-CA	5.18	125.63	120.14
1	B	714	HIS	N-CA-C	5.17	117.71	109.96
1	B	541	VAL	N-CA-C	5.16	114.63	106.32
1	B	582	CYS	CA-C-N	-5.13	114.29	119.83
1	B	582	CYS	C-N-CA	-5.13	114.29	119.83
1	B	672	CYS	CA-C-N	-5.12	114.64	119.76
1	B	672	CYS	C-N-CA	-5.12	114.64	119.76
1	B	658	PHE	N-CA-C	5.02	116.76	111.28

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	3313	0	3221	49	0
1	B	3357	0	3273	50	0
2	A	43	0	30	3	0
2	B	43	0	30	5	0
3	A	17	0	15	1	0
3	B	17	0	15	2	0
4	A	26	0	26	2	0
4	B	52	0	52	2	0
5	A	4	0	3	0	0
5	B	4	0	3	0	0
6	A	1	0	0	0	0
7	A	84	0	0	3	0
7	B	136	0	0	0	0
All	All	7097	0	6668	98	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

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

magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:592:GLU:OE1	4:B:800[B]:H5W:H3	1.57	1.04
1:B:481:ARG:HD3	1:B:498:ASN:HD21	1.26	0.99
2:A:750:HEM:HMC2	2:A:750:HEM:HBC2	1.55	0.89
1:A:523:LEU:HD22	1:A:531:PRO:HB2	1.58	0.85
1:B:353:GLN:HE21	1:B:353:GLN:H	1.30	0.76
1:B:481:ARG:HD3	1:B:498:ASN:ND2	2.02	0.71
1:A:317:HIS:O	1:A:320:SER:HB3	1.89	0.70
1:B:584:PHE:CD1	2:B:750:HEM:HAC	2.32	0.64
1:B:350:THR:HB	1:B:353:GLN:HE22	1.63	0.63
1:B:587:TRP:H	2:B:750:HEM:HAB	1.64	0.63
1:A:596:ARG:HH22	3:A:760:H4B:C4	2.11	0.62
1:A:525:GLN:HG3	1:A:529:ASN:O	2.00	0.62
1:A:380:ARG:HD3	1:A:400:GLU:OE1	2.02	0.59
1:A:706:TYR:CE2	4:A:800:H5W:H3	2.38	0.58
1:A:478:GLN:HB2	1:A:481:ARG:HG3	1.86	0.57
1:B:350:THR:HB	1:B:353:GLN:NE2	2.20	0.56
1:B:481:ARG:NH1	1:B:498:ASN:OD1	2.37	0.56
1:B:595:VAL:O	1:B:599:CYS:HB2	2.06	0.56
1:A:596:ARG:NH1	1:A:596:ARG:HG3	2.21	0.56
1:B:350:THR:HG22	1:B:352:ASP:H	1.71	0.56
1:A:507:GLN:O	1:A:507:GLN:HG2	2.07	0.55
1:B:460:THR:O	1:B:583:PRO:HD2	2.05	0.55
1:B:631:VAL:HG22	1:B:683:MET:HE1	1.88	0.55
1:B:584:PHE:CD1	2:B:750:HEM:CAC	2.89	0.55
1:B:336:MET:HE2	3:B:760:H4B:H9	1.88	0.55
1:A:330:ILE:HD11	1:B:696:LEU:HB3	1.88	0.55
2:A:750:HEM:HBC2	2:A:750:HEM:CMC	2.34	0.54
1:B:353:GLN:HE21	1:B:353:GLN:N	2.02	0.54
1:A:569:ASN:HD22	1:A:569:ASN:H	1.55	0.54
1:A:674:ALA:HB3	1:A:695:MET:HB3	1.91	0.52
1:B:445:HIS:C	1:B:445:HIS:CD2	2.88	0.52
1:A:475:TRP:CZ2	1:A:531:PRO:HG3	2.46	0.51
1:A:336:MET:HG3	1:B:306:TRP:CE2	2.45	0.51
1:A:460:THR:O	1:A:583:PRO:HD2	2.12	0.50
2:B:750:HEM:O2D	4:B:800[B]:H5W:N01	2.45	0.49
1:A:501:PHE:HA	1:A:504:ILE:HD12	1.95	0.49
1:A:595:VAL:O	1:A:599:CYS:HB2	2.13	0.49
1:A:445:HIS:C	1:A:445:HIS:CD2	2.90	0.49
1:A:536:ILE:O	1:A:537:PRO:C	2.55	0.48
4:A:800:H5W:H12	4:A:800:H5W:H7	1.95	0.48
1:B:565:PRO:HB3	1:B:588:TYR:CZ	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:473:ARG:HD2	1:B:580:SER:O	2.13	0.48
1:B:388:ILE:O	1:B:392:SER:HA	2.14	0.47
1:A:706:TYR:OH	2:A:750:HEM:O1D	2.31	0.47
1:B:675:ASP:O	1:B:679:ILE:HG12	2.15	0.47
1:A:431:ASP:OD2	1:A:431:ASP:C	2.56	0.47
1:B:523:LEU:CD1	1:B:531:PRO:HB2	2.45	0.47
1:B:701:THR:HA	1:B:702:PRO:C	2.40	0.47
1:A:628:GLN:NE2	1:B:632:GLU:OE2	2.47	0.46
1:A:596:ARG:HG3	1:A:596:ARG:HH11	1.80	0.46
1:A:378:MET:HA	1:A:378:MET:CE	2.45	0.46
1:B:391:THR:O	1:B:392:SER:HB2	2.14	0.46
1:B:353:GLN:H	1:B:353:GLN:NE2	2.08	0.46
1:B:409:TRP:CE3	1:B:421:TRP:HA	2.51	0.46
1:A:596:ARG:NH2	7:A:87:HOH:O	2.48	0.45
1:B:619:ARG:HB2	1:B:619:ARG:CZ	2.46	0.45
2:B:750:HEM:O1A	3:B:760:H4B:N2	2.41	0.45
1:A:378:MET:HA	1:A:378:MET:HE2	1.98	0.45
1:A:439:PHE:CZ	1:A:443:CYS:SG	3.10	0.45
1:B:485:TYR:CE1	1:B:514:ARG:HA	2.51	0.45
1:A:593:ILE:HA	1:A:597:ASP:HB2	1.99	0.44
1:B:303:VAL:HG22	1:B:312:LEU:HB2	1.98	0.44
1:A:439:PHE:CE2	1:A:443:CYS:SG	3.11	0.44
1:B:455:LEU:CD1	1:B:455:LEU:N	2.80	0.44
1:B:403:TYR:CE1	1:B:407:HIS:CE1	3.06	0.44
1:A:667:ARG:HD3	7:A:136:HOH:O	2.17	0.44
1:B:624:LEU:O	1:B:628:GLN:HG3	2.18	0.44
1:B:388:ILE:O	1:B:392:SER:N	2.51	0.43
1:A:332:MET:HE2	1:B:696:LEU:CD2	2.48	0.43
1:B:362:LEU:HD11	1:B:384:VAL:HG21	2.00	0.43
1:B:414:ARG:HD3	1:B:678:TRP:CD2	2.53	0.43
1:B:595:VAL:HG22	1:B:630:LEU:HD11	2.00	0.43
1:A:455:LEU:HD12	1:A:587:TRP:HB3	2.01	0.43
1:B:501:PHE:HD2	1:B:520:LEU:HD13	1.84	0.43
1:B:610:VAL:O	1:B:614:MET:HG3	2.19	0.42
1:A:505:CYS:O	1:A:506:ILE:C	2.62	0.42
1:A:676:TRP:CE2	1:A:680:VAL:HG21	2.54	0.42
1:B:525:GLN:HG3	1:B:529:ASN:O	2.19	0.42
1:B:566:ALA:HA	1:B:584:PHE:O	2.19	0.42
1:A:455:LEU:HD12	1:A:587:TRP:CB	2.49	0.42
1:A:550:LYS:HB2	1:A:550:LYS:HE3	1.96	0.42
1:A:359:LYS:HZ3	1:A:381:LEU:HD21	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:409:TRP:CE3	1:A:421:TRP:HA	2.55	0.41
1:A:484:GLY:HA3	1:A:495:ASP:O	2.20	0.41
1:A:306:TRP:CE2	1:B:336:MET:HE3	2.55	0.41
1:A:569:ASN:HD22	1:A:569:ASN:N	2.17	0.41
1:A:473:ARG:NH2	7:A:72:HOH:O	2.54	0.41
1:A:606:ILE:HA	1:A:609:GLU:OE1	2.20	0.41
1:A:475:TRP:HB2	1:A:523:LEU:HB3	2.03	0.41
1:B:391:THR:O	1:B:392:SER:CB	2.68	0.41
1:B:485:TYR:OH	1:B:512:ALA:HB1	2.21	0.41
1:A:675:ASP:O	1:A:679:ILE:HG12	2.21	0.41
1:A:680:VAL:HG22	1:A:690:VAL:HG23	2.03	0.41
1:B:449:ALA:O	1:B:455:LEU:HA	2.21	0.41
1:A:332:MET:CE	1:B:301:LEU:HD13	2.51	0.40
1:A:360:GLU:O	1:A:364:GLN:HG2	2.21	0.40
1:A:481:ARG:HD3	1:A:498:ASN:HD21	1.86	0.40
1:B:510:TRP:CE2	1:B:521:PRO:HD3	2.57	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	403/422 (96%)	386 (96%)	17 (4%)	0	100	100
1	B	409/422 (97%)	391 (96%)	18 (4%)	0	100	100
All	All	812/844 (96%)	777 (96%)	35 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	363/377 (96%)	346 (95%)	17 (5%)	23	24
1	B	368/377 (98%)	356 (97%)	12 (3%)	33	37
All	All	731/754 (97%)	702 (96%)	29 (4%)	28	29

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	320	SER
1	A	337	LEU
1	A	350	THR
1	A	353	GLN
1	A	364	GLN
1	A	378	MET
1	A	380	ARG
1	A	423	LYS
1	A	511	LYS
1	A	516	ARG
1	A	523	LEU
1	A	555	LYS
1	A	569	ASN
1	A	601	ASN
1	A	620	LYS
1	A	645	LYS
1	A	663	GLU
1	B	336	MET
1	B	353	GLN
1	B	360	GLU
1	B	382	GLU
1	B	390	SER
1	B	392	SER
1	B	481	ARG
1	B	486	LYS
1	B	507	GLN
1	B	620	LYS

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Mol	Chain	Res	Type
1	B	653	SER
1	B	707	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	317	HIS
1	A	353	GLN
1	A	385	ASN
1	A	420	GLN
1	A	436	HIS
1	A	440	ASN
1	A	454	ASN
1	A	569	ASN
1	A	697	ASN
1	B	353	GLN
1	B	385	ASN
1	B	395	GLN
1	B	425	GLN
1	B	454	ASN
1	B	507	GLN
1	B	535	GLN
1	B	601	ASN
1	B	605	ASN
1	B	642	GLN
1	B	697	ASN

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 oligosaccharides 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
3	H4B	A	760	-	17,18,18	1.03	1 (5%)	14,26,26	1.86	6 (42%)
5	ACT	A	860	-	3,3,3	0.88	0	3,3,3	0.74	0
3	H4B	B	760	-	17,18,18	1.34	3 (17%)	14,26,26	1.84	5 (35%)
5	ACT	B	860	-	3,3,3	0.86	0	3,3,3	0.48	0
2	HEM	A	750	1	50,50,50	1.93	11 (22%)	67,82,82	1.67	10 (14%)
4	H5W	B	800[B]	-	27,28,28	0.60	0	28,37,37	1.93	7 (25%)
4	H5W	B	800[A]	-	27,28,28	0.89	1 (3%)	28,37,37	2.15	9 (32%)
2	HEM	B	750	1	50,50,50	1.81	11 (22%)	67,82,82	1.34	11 (16%)
4	H5W	A	800	-	27,28,28	0.95	2 (7%)	28,37,37	1.93	8 (28%)

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	A	760	-	-	0/8/17/17	0/2/2/2
3	H4B	B	760	-	-	2/8/17/17	0/2/2/2
2	HEM	A	750	1	-	2/14/54/54	-
4	H5W	B	800[B]	-	-	4/12/22/22	0/3/3/3
4	H5W	B	800[A]	-	-	6/12/22/22	0/3/3/3
2	HEM	B	750	1	-	6/14/54/54	-
4	H5W	A	800	-	-	4/12/22/22	0/3/3/3

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	750	HEM	C3D-C2D	7.05	1.52	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	750	HEM	C3D-C2D	6.62	1.51	1.36
2	A	750	HEM	FE-NA	5.61	2.13	1.95
2	B	750	HEM	FE-ND	4.39	2.08	1.94
2	A	750	HEM	FE-NB	3.88	2.06	1.94
2	B	750	HEM	FE-NA	3.32	2.06	1.95
3	B	760	H4B	C4-N3	-3.27	1.32	1.38
2	A	750	HEM	FE-NC	3.21	2.05	1.95
2	B	750	HEM	CMA-C3A	3.18	1.57	1.50
2	A	750	HEM	CMC-C2C	3.14	1.57	1.50
2	B	750	HEM	FE-NC	3.14	2.05	1.95
2	A	750	HEM	CAB-C3B	2.89	1.55	1.47
3	A	760	H4B	C4-N3	-2.84	1.33	1.38
2	A	750	HEM	CMD-C2D	2.78	1.56	1.50
2	B	750	HEM	CAC-C3C	2.78	1.54	1.47
2	B	750	HEM	CMD-C2D	2.77	1.56	1.50
2	B	750	HEM	CMB-C2B	2.61	1.56	1.50
3	B	760	H4B	C7-N8	2.37	1.48	1.46
2	A	750	HEM	CAC-C3C	2.34	1.53	1.47
2	B	750	HEM	CAB-C3B	2.33	1.53	1.47
2	A	750	HEM	CMA-C3A	2.26	1.55	1.50
2	B	750	HEM	C3C-C2C	-2.23	1.32	1.37
4	A	800	H5W	C24-C23	2.20	1.41	1.37
3	B	760	H4B	O4-C4	2.18	1.27	1.23
2	A	750	HEM	CMB-C2B	2.18	1.55	1.50
4	A	800	H5W	C22-C23	2.15	1.41	1.37
2	B	750	HEM	CMC-C2C	2.10	1.55	1.50
2	A	750	HEM	FE-ND	2.04	2.01	1.94
4	B	800[A]	H5W	C06-N01	2.01	1.38	1.34

All (56) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	800	H5W	C08-C06-N01	6.25	124.22	116.57
4	B	800[B]	H5W	C02-N01-C06	6.11	122.64	118.07
4	B	800[A]	H5W	C08-C06-N01	5.68	123.52	116.57
2	A	750	HEM	CHA-C4D-ND	5.02	130.58	124.37
4	B	800[A]	H5W	C02-N01-C06	4.80	121.66	118.07
2	A	750	HEM	CMD-C2D-C1D	4.63	132.26	125.03
2	A	750	HEM	C4D-ND-C1D	4.44	110.46	105.21
4	B	800[A]	H5W	C05-C06-N01	-4.05	118.12	122.73
4	B	800[A]	H5W	N02-C02-N01	3.82	122.73	116.59
4	B	800[B]	H5W	C05-C06-N01	-3.62	118.61	122.73

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	760	H4B	C2-N1-C8A	3.50	119.53	113.36
2	A	750	HEM	CBA-CAA-C2A	-3.50	102.86	112.53
2	A	750	HEM	C4C-C3C-C2C	3.31	109.68	106.81
4	B	800[B]	H5W	C5'-N1'-C2'	3.30	113.66	105.45
4	A	800	H5W	C05-C06-N01	-3.27	119.00	122.73
2	B	750	HEM	CMD-C2D-C1D	3.25	130.11	125.03
2	B	750	HEM	C4C-C3C-C2C	3.22	109.61	106.81
3	B	760	H4B	C2-N1-C8A	3.22	119.04	113.36
4	A	800	H5W	C02-N01-C06	3.20	120.46	118.07
3	B	760	H4B	C11-C10-C9	-3.06	108.37	112.11
2	A	750	HEM	CBD-CAD-C3D	-2.95	104.37	112.53
4	B	800[B]	H5W	C11-C12-C13	-2.95	118.95	125.48
4	B	800[B]	H5W	C08-C06-N01	2.75	119.94	116.57
4	B	800[A]	H5W	C11-C12-C13	-2.72	119.45	125.48
4	A	800	H5W	C5'-N1'-C2'	2.71	112.18	105.45
4	B	800[A]	H5W	C5'-N1'-C2'	2.70	112.17	105.45
3	A	760	H4B	C11-C10-C9	-2.70	108.81	112.11
2	B	750	HEM	C4D-ND-C1D	2.64	108.34	105.21
2	A	750	HEM	CAD-CBD-CGD	-2.58	106.81	113.67
2	B	750	HEM	CBD-CAD-C3D	-2.49	105.65	112.53
4	B	800[B]	H5W	C2'-C3'-C4'	2.47	106.85	103.22
3	A	760	H4B	C4-C4A-N5	2.47	123.00	116.27
3	B	760	H4B	O9-C9-C10	2.42	113.76	109.14
4	B	800[B]	H5W	N02-C02-N01	2.41	120.46	116.59
4	A	800	H5W	C11-C12-C13	-2.39	120.17	125.48
4	B	800[A]	H5W	C03-C02-N02	-2.30	116.86	121.81
3	A	760	H4B	C4A-C4-N3	2.24	118.29	112.13
4	B	800[A]	H5W	C2'-C3'-C4'	2.24	106.52	103.22
2	B	750	HEM	CBC-CAC-C3C	-2.22	116.44	127.53
2	B	750	HEM	CHC-C4B-NB	2.21	126.80	124.42
3	B	760	H4B	C4A-C4-N3	2.16	118.05	112.13
2	A	750	HEM	CHA-C4D-C3D	-2.15	121.26	125.23
4	A	800	H5W	C24-C23-C22	-2.15	120.40	123.23
2	B	750	HEM	CHA-C1A-NA	2.14	127.73	123.86
3	B	760	H4B	C4-C4A-N5	2.13	122.07	116.27
2	B	750	HEM	CAD-C3D-C4D	2.13	128.40	124.70
3	A	760	H4B	C2-N3-C4	-2.12	121.26	125.11
3	A	760	H4B	O10-C10-C9	2.11	113.27	109.77
2	A	750	HEM	C2A-C1A-NA	-2.11	107.81	110.15
2	A	750	HEM	CAA-CBA-CGA	-2.11	108.08	113.67
4	A	800	H5W	C08-C06-C05	-2.11	116.73	121.06
4	A	800	H5W	C2'-C3'-C4'	-2.09	100.15	103.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	750	HEM	C3B-C4B-NB	-2.05	107.99	109.47
4	B	800[A]	H5W	C24-C23-C22	-2.05	120.52	123.23
2	B	750	HEM	CHA-C4D-ND	2.01	126.85	124.37
2	B	750	HEM	CHD-C4C-NC	2.00	126.63	124.45

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	800	H5W	C10-C11-C12-C13
4	A	800	H5W	C11-C10-O09-C3'
4	A	800	H5W	C2'-C3'-O09-C10
4	B	800[A]	H5W	C11-C12-C13-C21
4	B	800[A]	H5W	C06-C08-C4'-C5'
4	B	800[B]	H5W	C11-C12-C13-C21
4	B	800[B]	H5W	C2'-C3'-O09-C10
4	B	800[B]	H5W	C06-C08-C4'-C5'
2	B	750	HEM	C2B-C3B-CAB-CBB
4	B	800[A]	H5W	C10-C11-C12-C13
4	B	800[A]	H5W	C2'-C3'-O09-C10
2	B	750	HEM	C2C-C3C-CAC-CBC
4	B	800[A]	H5W	C4'-C3'-O09-C10
4	B	800[B]	H5W	N01-C06-C08-C4'
2	B	750	HEM	C4B-C3B-CAB-CBB
4	B	800[A]	H5W	C11-C10-O09-C3'
3	B	760	H4B	C7-C6-C9-O9
2	B	750	HEM	CAA-CBA-CGA-O2A
2	A	750	HEM	CAA-CBA-CGA-O2A
2	A	750	HEM	CAA-CBA-CGA-O1A
2	B	750	HEM	C4C-C3C-CAC-CBC
2	B	750	HEM	CAA-CBA-CGA-O1A
3	B	760	H4B	N5-C6-C9-O9
4	A	800	H5W	C4'-C3'-O09-C10

There are no ring outliers.

6 monomers are involved in 13 short contacts:

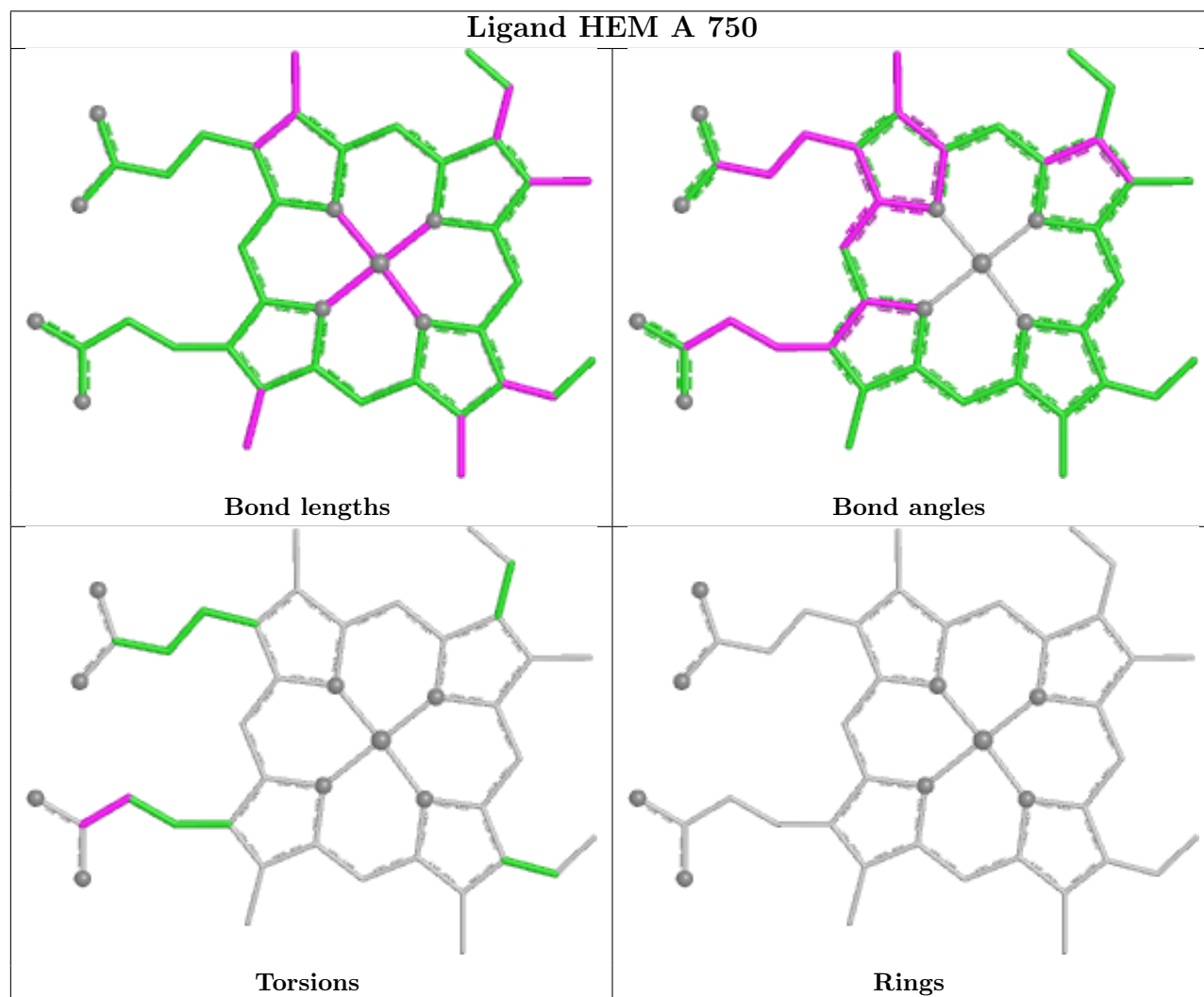
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	760	H4B	1	0
3	B	760	H4B	2	0
2	A	750	HEM	3	0

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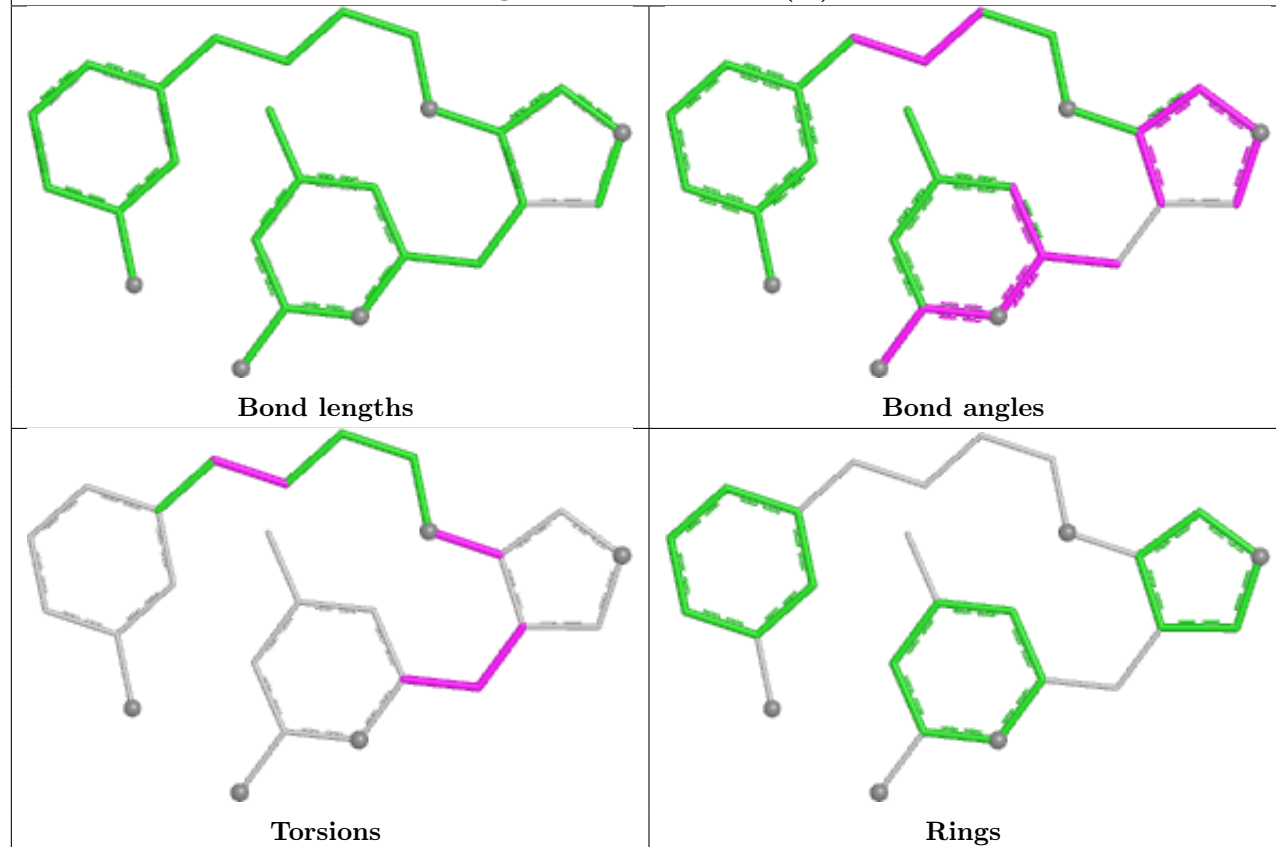
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	800[B]	H5W	2	0
2	B	750	HEM	5	0
4	A	800	H5W	2	0

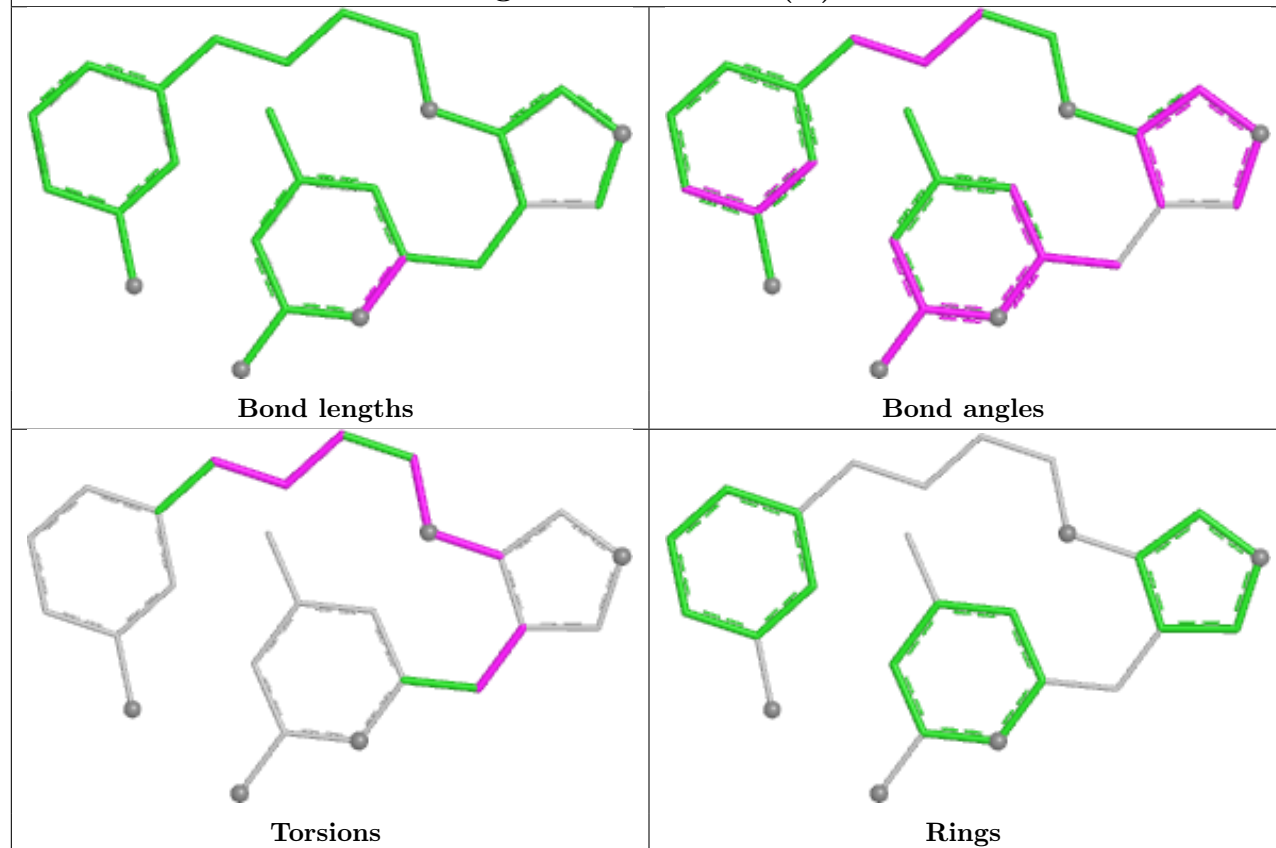
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 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.

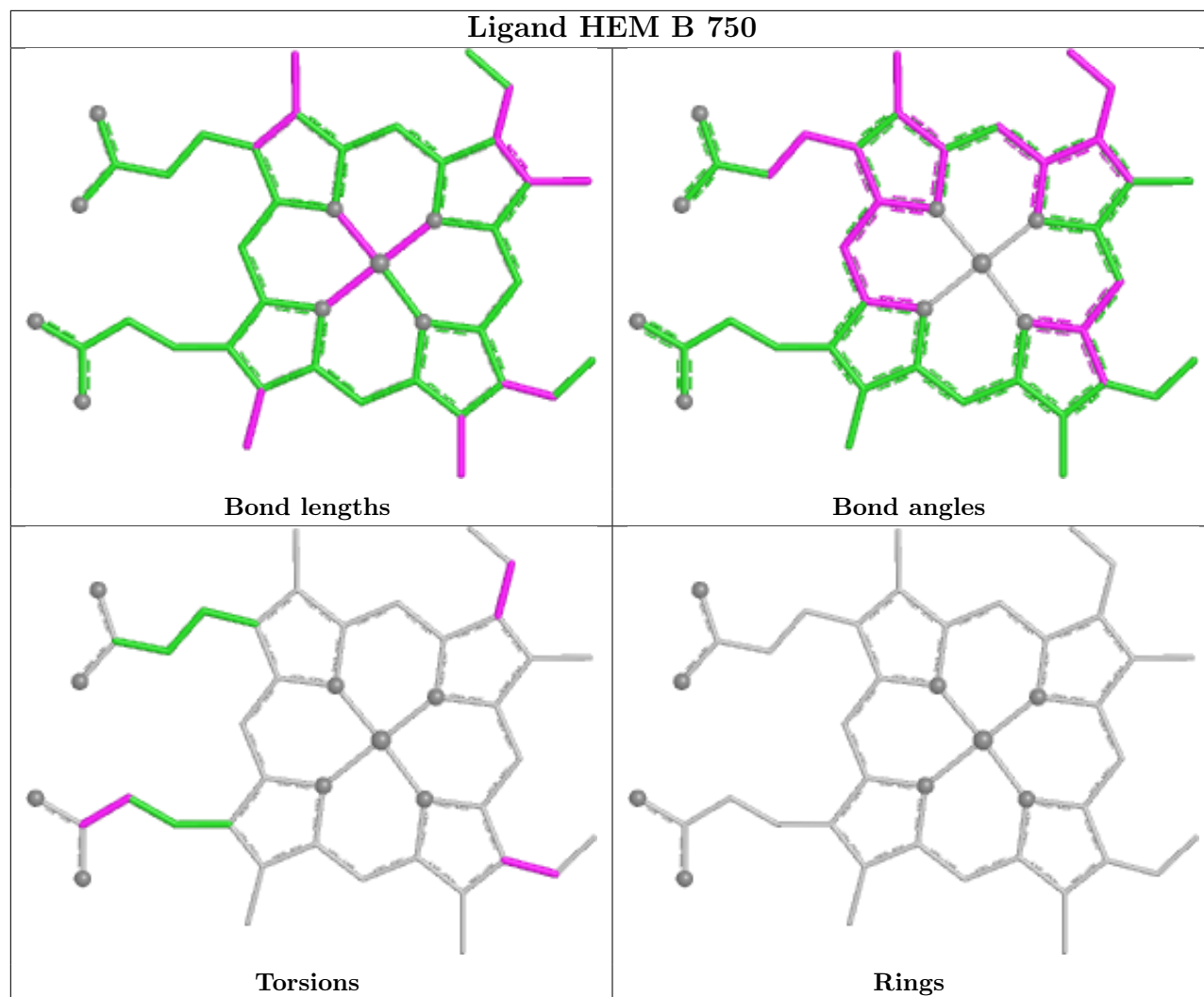


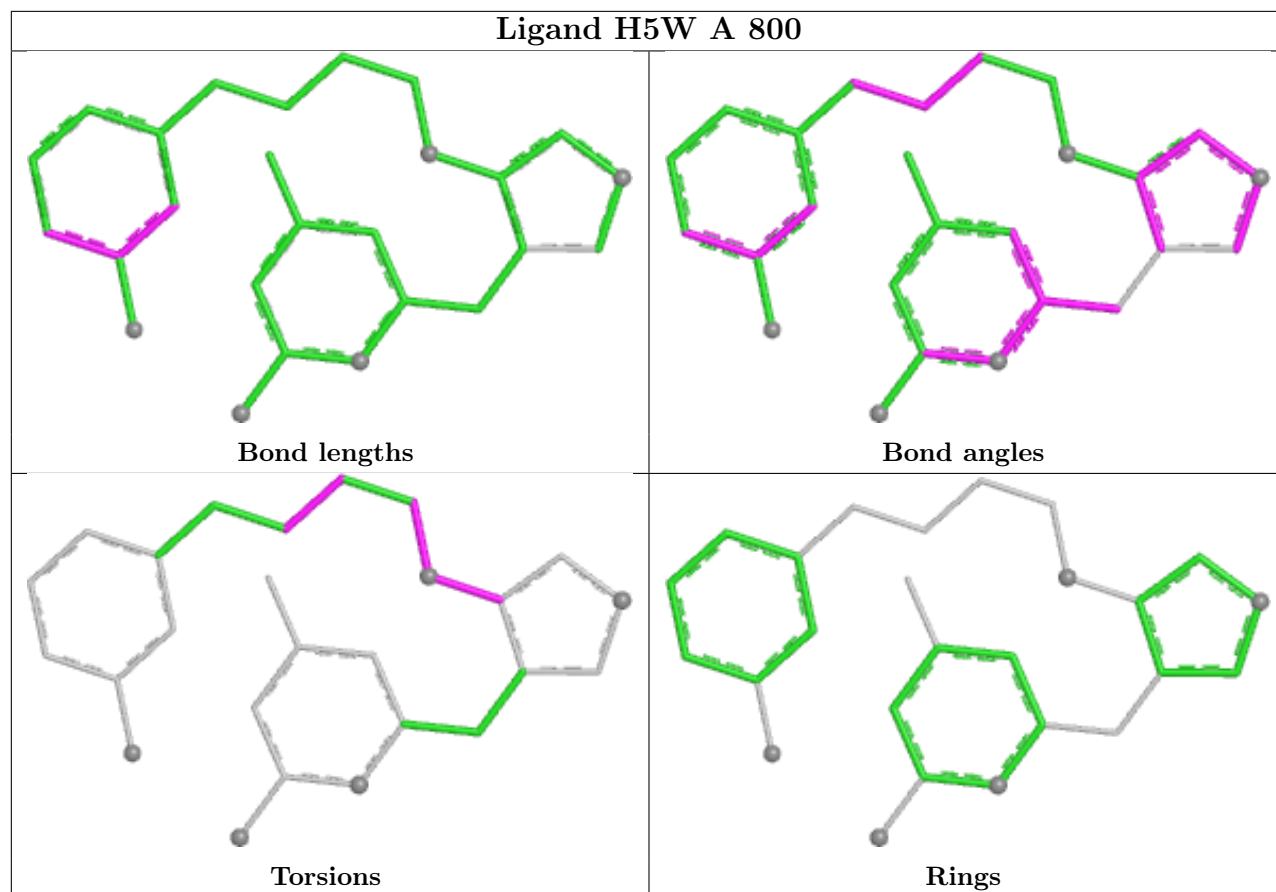
Ligand H5W B 800 (B)



Ligand H5W B 800 (A)







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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	407/422 (96%)	0.50	14 (3%) 48 50	28, 57, 98, 131	0
1	B	411/422 (97%)	0.22	8 (1%) 66 69	27, 46, 69, 95	2 (0%)
All	All	818/844 (96%)	0.36	22 (2%) 56 59	27, 51, 93, 131	2 (0%)

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	716	TRP	4.9
1	B	350	THR	3.3
1	A	373	GLY	3.3
1	A	488	PRO	3.1
1	A	715	VAL	3.1
1	A	706	TYR	2.9
1	B	338	PRO	2.9
1	B	321	THR	2.8
1	A	604	TYR	2.6
1	A	599	CYS	2.6
1	A	350	THR	2.5
1	B	348	VAL	2.4
1	B	718	GLY	2.4
1	B	300	PHE	2.3
1	A	354	LEU	2.3
1	A	300	PHE	2.2
1	A	355	PHE	2.1
1	A	322	LEU	2.1
1	A	596	ARG	2.1
1	A	597	ASP	2.0
1	B	601	ASN	2.0
1	B	535	GLN	2.0

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

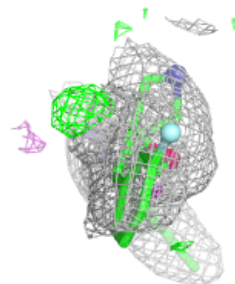
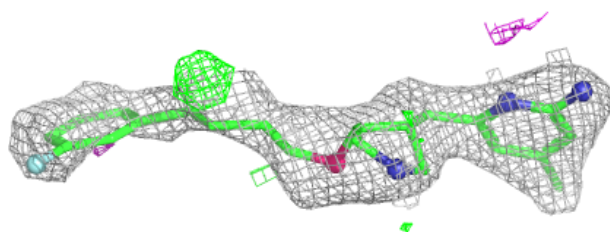
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	H5W	A	800	26/26	0.85	0.13	39,69,96,97	0
3	H4B	A	760	17/17	0.87	0.10	44,47,55,56	0
4	H5W	B	800[A]	26/26	0.87	0.14	41,66,86,88	26
4	H5W	B	800[B]	26/26	0.87	0.14	47,56,64,66	26
3	H4B	B	760	17/17	0.91	0.08	34,40,46,48	0
5	ACT	A	860	4/4	0.94	0.13	59,60,60,60	0
5	ACT	B	860	4/4	0.94	0.11	49,49,52,52	0
2	HEM	B	750	43/43	0.97	0.08	25,35,47,58	0
2	HEM	A	750	43/43	0.97	0.07	31,37,50,57	0
6	ZN	A	900	1/1	0.99	0.02	40,40,40,40	0

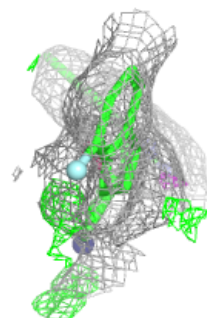
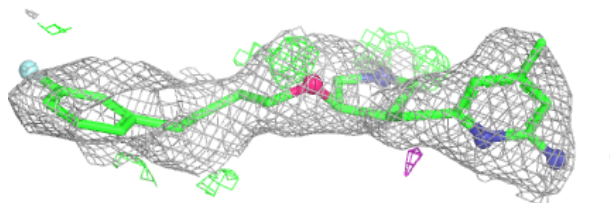
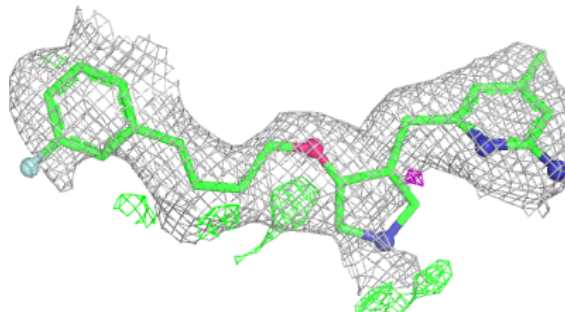
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around H5W A 800:

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

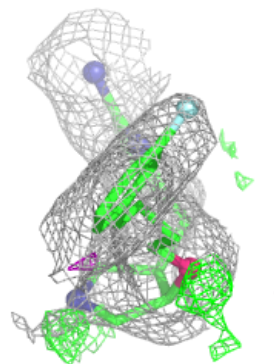
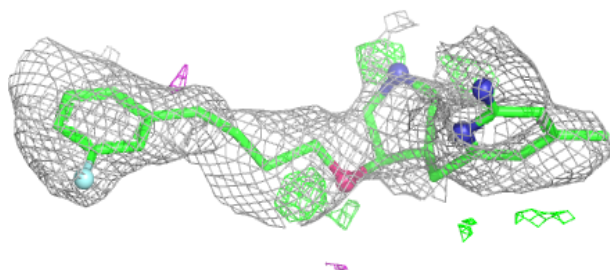
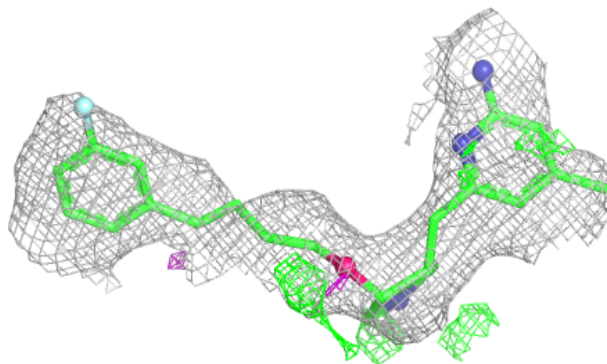
**Electron density around H5W B 800 (A):**

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



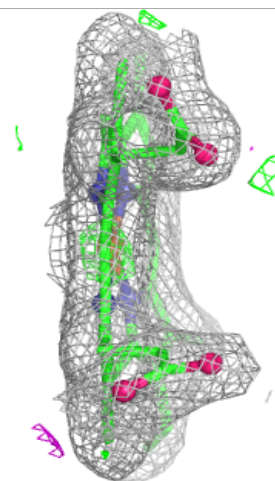
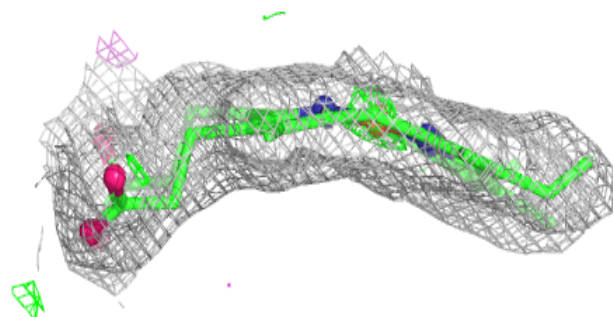
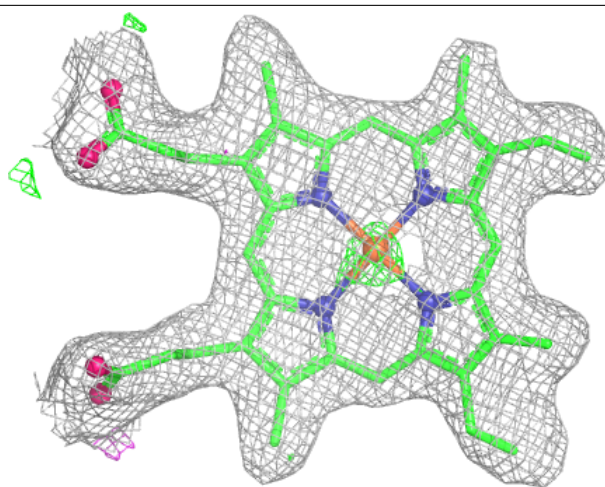
Electron density around H5W B 800 (B):

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



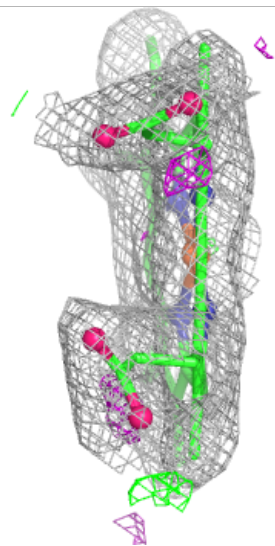
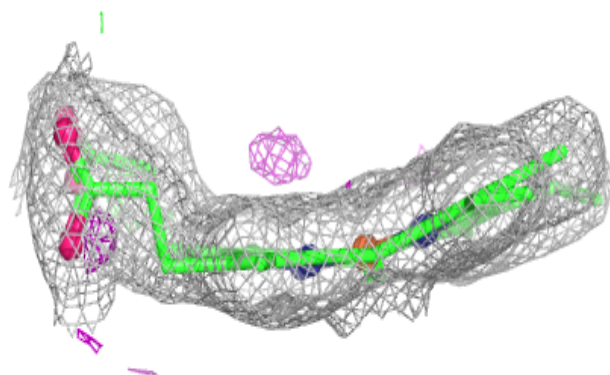
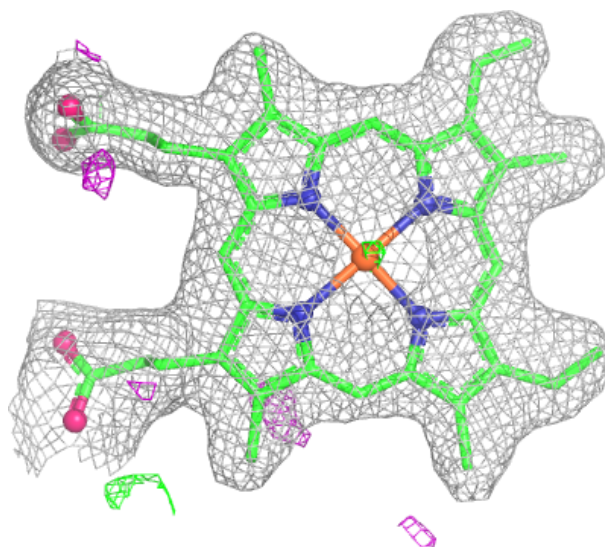
Electron density around HEM B 750:

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



Electron density around HEM A 750:

$2mF_o-DF_c$ (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.