



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 4, 2023 – 07:00 AM EDT

PDB ID : 6PN8  
Title : Structure of rat neuronal nitric oxide synthase heme domain in complex with 7-(3-(Aminomethyl)-4-(oxazol-4-ylmethoxy)phenyl)-4-methylquinolin-2-amine  
Authors : Li, H.; Poulos, T.L.  
Deposited on : 2019-07-02  
Resolution : 1.84 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](mailto: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>.

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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)  
Xtrriage (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

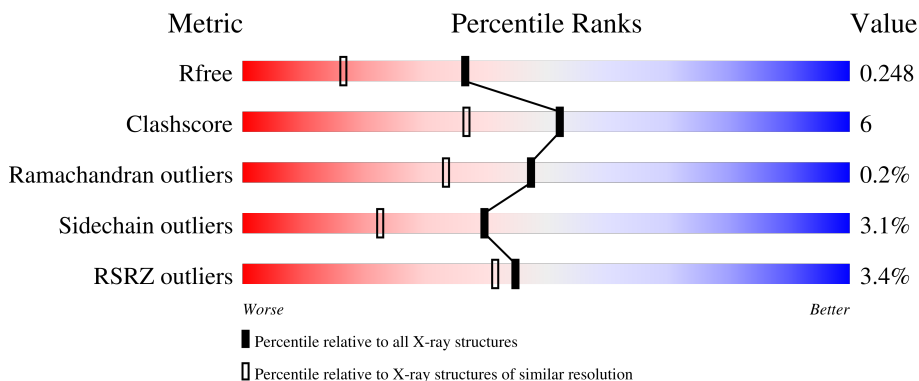
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.84 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  $\geq 3$ , 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	

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 7217 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
			Total	C	N	O	S			
1	A	411	Total 3363	C 2153	N 573	O 615	S 22	0	4	0
1	B	411	Total 3353	C 2145	N 574	O 612	S 22	0	3	0

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



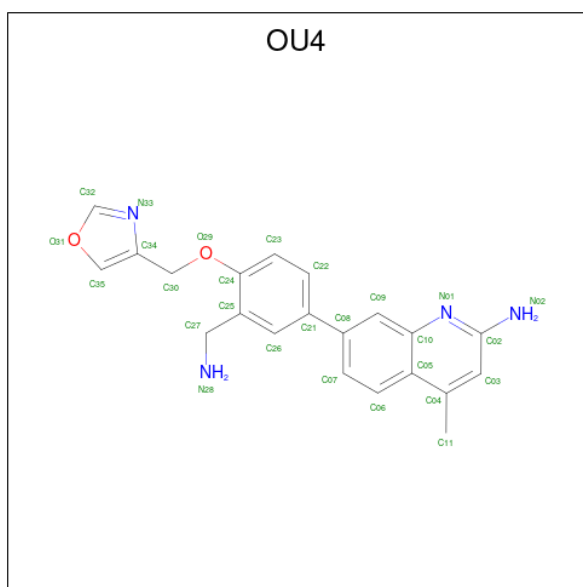
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	Fe	N	O		
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

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



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

- Molecule 4 is 7-{3-(aminomethyl)-4-[(1,3-oxazol-4-yl)methoxy]phenyl}-4-methylquinolin-2-amine (three-letter code: OU4) (formula:  $C_{21}H_{20}N_4O_2$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	A	1	27	21	4	2	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	B	1	27	21	4	2	0	0

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



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

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

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

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	129	129	129	0	0
7	B	189	189	189	0	0



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	51.67Å 111.28Å 164.41Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	66.12 – 1.84 66.12 – 1.84	Depositor EDS
% Data completeness (in resolution range)	99.0 (66.12-1.84) 99.7 (66.12-1.84)	Depositor EDS
$R_{merge}$	0.20	Depositor
$R_{sym}$	0.20	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.17 (at 1.84Å)	Xtrriage
Refinement program	PHENIX (1.11.1-2575_1496: ???)	Depositor
R, $R_{free}$	0.209 , 0.248 0.209 , 0.248	Depositor DCC
$R_{free}$ test set	4114 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	33.1	Xtrriage
Anisotropy	0.996	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 58.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	7217	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	63.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.64% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: H4B, HEM, OU4, ACT, ZN

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	0.37	0/3466	0.51	0/4702
1	B	0.38	0/3456	0.51	0/4685
All	All	0.38	0/6922	0.51	0/9387

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 [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3363	0	3272	46	0
1	B	3353	0	3270	28	0
2	A	43	0	30	5	0
2	B	43	0	30	3	0
3	A	17	0	15	0	0
3	B	17	0	15	0	0
4	A	27	0	0	1	0
4	B	27	0	0	2	0
5	A	4	0	3	0	0
5	B	4	0	3	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	129	0	0	2	0
7	B	189	0	0	3	0
All	All	7217	0	6638	75	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 (75) 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:706[A]:TYR:OH	2:A:801:HEM:O2D	1.97	0.82
1:A:523:LEU:HD22	1:A:531:PRO:HB2	1.67	0.77
2:A:801:HEM:HBB2	2:A:801:HEM:HHC	1.70	0.73
2:A:801:HEM:HMC2	2:A:801:HEM:HBC2	1.71	0.72
1:A:667:ARG:NH1	1:A:668[A]:CYS:SG	2.66	0.69
2:B:801:HEM:HBB2	2:B:801:HEM:HHC	1.76	0.68
2:B:801:HEM:HMC2	2:B:801:HEM:HBC2	1.78	0.66
1:B:364:GLN:OE1	7:B:901:HOH:O	2.13	0.65
1:A:631:VAL:HG11	1:B:628:GLN:HG3	1.80	0.63
1:A:478:GLN:HB2	1:A:481:ARG:HG3	1.83	0.60
1:A:610:VAL:HG21	1:A:633:ILE:HD11	1.82	0.60
2:B:801:HEM:HBD1	4:B:803:OU4:C22	2.31	0.59
1:A:496:PRO:HA	1:A:499:VAL:HG23	1.84	0.59
2:A:801:HEM:HBD2	2:A:801:HEM:HMD2	1.85	0.59
1:A:598:TYR:HA	1:A:604:TYR:HB2	1.85	0.57
1:A:414:ARG:NH1	1:A:706[A]:TYR:OH	2.40	0.55
1:B:478:GLN:HB2	1:B:481:ARG:HG3	1.88	0.55
1:A:593:ILE:HA	1:A:597:ASP:HB2	1.89	0.54
1:A:628:GLN:HG2	1:B:631:VAL:HG11	1.90	0.54
1:B:619:ARG:HH12	1:B:620:LYS:HE3	1.71	0.54
1:A:455:LEU:HD12	1:A:587:TRP:HB3	1.91	0.53
1:B:548:HIS:CG	1:B:549:PRO:HD2	2.44	0.52
1:A:475:TRP:HB2	1:A:523:LEU:HB3	1.90	0.52
1:A:684:SER:HB3	1:A:687:ILE:HD11	1.91	0.52
1:A:500:GLN:O	1:A:504:ILE:HG13	2.10	0.51
1:B:600:ASP:OD1	7:B:902:HOH:O	2.19	0.51
1:A:350:THR:N	1:A:353:GLN:OE1	2.45	0.50
1:B:409:TRP:CE3	1:B:421:TRP:HA	2.47	0.49
1:B:573:GLU:OE1	7:B:903:HOH:O	2.19	0.49
2:A:801:HEM:HBD2	2:A:801:HEM:CMD	2.43	0.49
1:A:633:ILE:O	1:A:637:VAL:HG23	2.12	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:606:ILE:HA	7:A:946:HOH:O	2.14	0.47
1:A:370:LYS:HB2	1:A:370:LYS:HE3	1.66	0.47
1:B:674:ALA:HB3	1:B:695:MET:HB3	1.95	0.47
1:B:595:VAL:HA	1:B:630:LEU:HD11	1.96	0.47
1:A:455:LEU:HD12	1:A:587:TRP:CB	2.44	0.47
1:A:531:PRO:HD2	1:A:716:TRP:CZ3	2.49	0.46
1:B:366:TYR:HA	1:B:369:ILE:HG12	1.96	0.46
1:B:355:PHE:N	1:B:356:PRO:HD2	2.30	0.46
1:A:620:LYS:HB2	1:A:620:LYS:NZ	2.31	0.46
1:A:597:ASP:OD1	1:A:603:ARG:NH2	2.49	0.46
1:B:510:TRP:CE2	1:B:521:PRO:HD3	2.51	0.46
1:B:607:LEU:HD13	1:B:626:LYS:HG2	1.96	0.46
1:B:302:LYS:HB2	1:B:302:LYS:HE3	1.74	0.46
1:A:462:PHE:HB2	1:A:581:ALA:HB3	1.97	0.45
1:B:525:GLN:HE21	1:B:528:GLY:HA2	1.80	0.45
1:B:567:VAL:HG21	4:B:803:OU4:C07	2.47	0.45
1:A:465:ARG:HH12	1:A:571:LEU:HD11	1.81	0.45
1:B:686:SER:HA	1:B:691:PHE:CG	2.52	0.45
1:A:686:SER:HA	1:A:691:PHE:CG	2.52	0.44
1:B:593:ILE:HA	1:B:597:ASP:HB2	2.00	0.44
1:B:511:LYS:HA	1:B:511:LYS:HD3	1.82	0.44
1:A:330:ILE:HD11	1:B:696:LEU:HD22	1.99	0.44
1:A:612:LYS:HG3	1:A:618:MET:SD	2.59	0.43
1:A:504:ILE:O	1:A:508:GLN:HB2	2.19	0.43
1:A:513:PRO:HG2	1:A:518:ASP:CG	2.38	0.42
1:A:545:PRO:HG2	1:A:547:ARG:NH2	2.34	0.42
1:A:515:GLY:N	1:A:518:ASP:OD2	2.50	0.42
1:A:360:GLU:OE2	1:A:364:GLN:NE2	2.52	0.42
1:A:525:GLN:HG3	1:A:529:ASN:O	2.20	0.42
1:A:332:MET:HE1	1:B:301:LEU:HD22	2.01	0.42
1:B:593:ILE:HA	1:B:597:ASP:OD2	2.20	0.42
1:A:336:MET:HE2	1:A:336:MET:HB2	2.00	0.42
1:A:676:TRP:CZ2	1:A:680:VAL:HG21	2.55	0.41
1:A:307:GLU:OE1	1:B:601:ASN:HB2	2.21	0.41
1:A:595:VAL:HA	1:A:630:LEU:HD11	2.02	0.41
1:B:517:PHE:HB2	1:B:560:LYS:HE3	2.01	0.41
1:A:409:TRP:CE3	1:A:421:TRP:HA	2.56	0.41
1:A:351:LYS:HE2	1:A:392:SER:HB3	2.01	0.41
1:A:706[A]:TYR:HE2	4:A:803:OU4:C30	2.34	0.41
1:B:407:HIS:CE1	1:B:410:ARG:HH11	2.39	0.41
1:A:332:MET:HB3	1:A:335:ILE:HG13	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:391:THR:O	1:A:392:SER:OG	2.30	0.40
1:A:330:ILE:HD11	1:B:696:LEU:HD13	2.03	0.40
1:A:420:GLN:HB3	7:A:966: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	410/422 (97%)	388 (95%)	20 (5%)	2 (0%)	29 15
1	B	410/422 (97%)	397 (97%)	13 (3%)	0	100 100
All	All	820/844 (97%)	785 (96%)	33 (4%)	2 (0%)	47 33

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	338	PRO
1	A	491	SER

### 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	370/377 (98%)	359 (97%)	11 (3%)	41 23

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	369/377 (98%)	357 (97%)	12 (3%)	38	20
All	All	739/754 (98%)	716 (97%)	23 (3%)	40	23

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	299	ARG
1	A	375	LYS
1	A	469	LYS
1	A	485	TYR
1	A	486	LYS
1	A	523	LEU
1	A	547	ARG
1	A	608	GLU
1	A	622	SER
1	A	645	LYS
1	A	715	VAL
1	B	332	MET
1	B	337	LEU
1	B	351	LYS
1	B	392	SER
1	B	540	LEU
1	B	547	ARG
1	B	573	GLU
1	B	608	GLU
1	B	612	LYS
1	B	620	LYS
1	B	645	LYS
1	B	699	ARG

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

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

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
2	HEM	A	801	1	41,50,50	1.54	8 (19%)	45,82,82	1.62	8 (17%)
2	HEM	B	801	1	41,50,50	1.49	6 (14%)	45,82,82	1.51	8 (17%)
5	ACT	A	804	-	3,3,3	0.75	0	3,3,3	0.74	0
3	H4B	A	802	-	16,18,18	0.95	0	11,26,26	2.65	6 (54%)
4	OU4	A	803	-	25,30,30	0.93	1 (4%)	35,42,42	1.61	6 (17%)
5	ACT	B	804	-	3,3,3	0.78	0	3,3,3	0.70	0
3	H4B	B	802	-	16,18,18	0.87	0	11,26,26	2.18	5 (45%)
4	OU4	B	803	-	25,30,30	0.89	1 (4%)	35,42,42	1.35	5 (14%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	HEM	A	801	1	-	6/12/54/54	-
2	HEM	B	801	1	-	6/12/54/54	-
3	H4B	A	802	-	-	3/8/17/17	0/2/2/2
4	OU4	A	803	-	-	2/9/11/11	0/4/4/4
3	H4B	B	802	-	-	1/8/17/17	0/2/2/2
4	OU4	B	803	-	-	3/9/11/11	0/4/4/4

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	801	HEM	C3C-C2C	-3.89	1.35	1.40
2	A	801	HEM	C3C-CAC	3.68	1.55	1.47
2	A	801	HEM	C3C-C2C	-3.36	1.35	1.40
2	B	801	HEM	C3C-CAC	3.15	1.54	1.47
2	A	801	HEM	CAB-C3B	3.12	1.55	1.47
2	B	801	HEM	CAB-C3B	2.86	1.55	1.47
4	A	803	OU4	C02-N01	2.65	1.36	1.33
2	A	801	HEM	FE-NB	2.47	2.09	1.96
2	A	801	HEM	CMC-C2C	2.43	1.57	1.51
2	B	801	HEM	CMD-C2D	2.39	1.55	1.50
2	B	801	HEM	CAA-C2A	2.26	1.55	1.52
2	A	801	HEM	CAA-C2A	2.15	1.55	1.52
4	B	803	OU4	C05-C10	-2.14	1.39	1.42
2	B	801	HEM	C2C-C1C	2.08	1.47	1.42
2	A	801	HEM	CMB-C2B	2.06	1.55	1.50
2	A	801	HEM	C2C-C1C	2.05	1.47	1.42

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	802	H4B	C8A-C4A-C4	4.10	118.21	114.57
2	B	801	HEM	C4B-CHC-C1C	3.99	127.82	122.56
4	B	803	OU4	O29-C24-C25	3.88	120.85	115.78
4	A	803	OU4	N02-C02-N01	3.69	121.31	118.26
3	A	802	H4B	C4-C4A-N5	3.68	122.21	119.12
3	B	802	H4B	C8A-C4A-C4	3.65	117.81	114.57
3	A	802	H4B	N1-C2-N3	-3.64	119.71	125.42
4	A	803	OU4	C04-C05-C10	3.54	119.93	118.01
2	A	801	HEM	C3B-C2B-C1B	3.53	109.10	106.49
3	A	802	H4B	C2-N3-C4	3.46	121.43	115.93
2	A	801	HEM	C4B-CHC-C1C	3.38	127.03	122.56
3	B	802	H4B	N1-C2-N3	-3.17	120.44	125.42
4	A	803	OU4	C30-C34-C35	-3.17	125.11	129.99
4	A	803	OU4	O29-C24-C25	3.17	119.92	115.78
2	B	801	HEM	CMA-C3A-C4A	-3.05	123.77	128.46
3	B	802	H4B	C2-N3-C4	3.05	120.78	115.93
4	B	803	OU4	C04-C05-C10	2.85	119.55	118.01
3	A	802	H4B	N2-C2-N3	2.84	121.66	117.25
4	A	803	OU4	C05-C10-N01	-2.82	119.82	122.81
4	B	803	OU4	C30-C34-C35	-2.79	125.69	129.99
2	A	801	HEM	CHA-C4D-ND	2.66	127.67	124.38
3	A	802	H4B	C2-N1-C8A	2.56	120.27	114.54
2	A	801	HEM	CAD-CBD-CGD	-2.51	108.19	113.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	HEM	CBA-CAA-C2A	-2.50	108.35	112.62
2	B	801	HEM	CMC-C2C-C3C	2.47	129.29	124.68
2	A	801	HEM	C1B-NB-C4B	2.44	107.59	105.07
4	B	803	OU4	C05-C10-N01	-2.41	120.26	122.81
3	B	802	H4B	C2-N1-C8A	2.36	119.83	114.54
2	B	801	HEM	CHD-C1D-ND	2.30	126.93	124.43
4	B	803	OU4	C26-C21-C08	-2.25	117.14	120.86
2	A	801	HEM	CAD-C3D-C4D	-2.24	120.75	124.66
2	B	801	HEM	CHA-C4D-ND	2.23	127.14	124.38
3	B	802	H4B	C4-C4A-N5	2.18	120.95	119.12
2	B	801	HEM	C4A-C3A-C2A	2.17	108.50	107.00
4	A	803	OU4	C06-C05-C04	-2.09	119.67	123.66
2	A	801	HEM	C4C-CHD-C1D	2.06	125.27	122.56
2	B	801	HEM	C4D-ND-C1D	2.06	107.20	105.07
2	B	801	HEM	CBA-CAA-C2A	-2.00	109.20	112.62

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	HEM	C2A-CAA-CBA-CGA
2	A	801	HEM	C2D-C3D-CAD-CBD
2	B	801	HEM	C2A-CAA-CBA-CGA
2	A	801	HEM	C4D-C3D-CAD-CBD
4	B	803	OU4	C24-C25-C27-N28
2	B	801	HEM	C4D-C3D-CAD-CBD
2	B	801	HEM	C4B-C3B-CAB-CBB
3	A	802	H4B	C7-C6-C9-C10
4	B	803	OU4	C23-C24-O29-C30
2	B	801	HEM	C2D-C3D-CAD-CBD
4	B	803	OU4	C25-C24-O29-C30
2	A	801	HEM	C4B-C3B-CAB-CBB
4	A	803	OU4	C23-C24-O29-C30
3	B	802	H4B	C7-C6-C9-C10
3	A	802	H4B	C7-C6-C9-O9
4	A	803	OU4	C25-C24-O29-C30
2	A	801	HEM	CAD-CBD-CGD-O2D
2	B	801	HEM	CAD-CBD-CGD-O2D
2	A	801	HEM	CAD-CBD-CGD-O1D
2	B	801	HEM	CAD-CBD-CGD-O1D
3	A	802	H4B	N5-C6-C9-O9

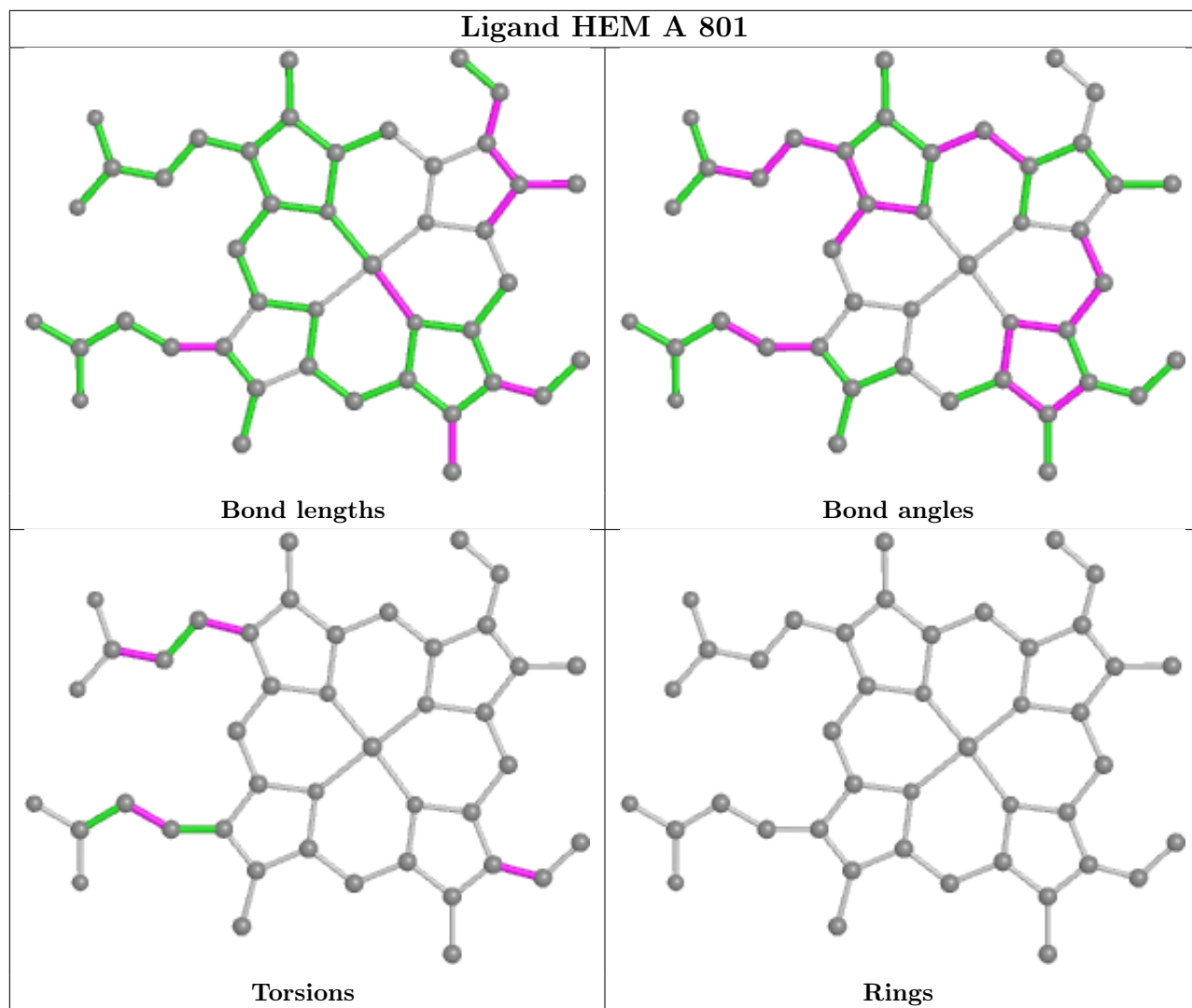
There are no ring outliers.

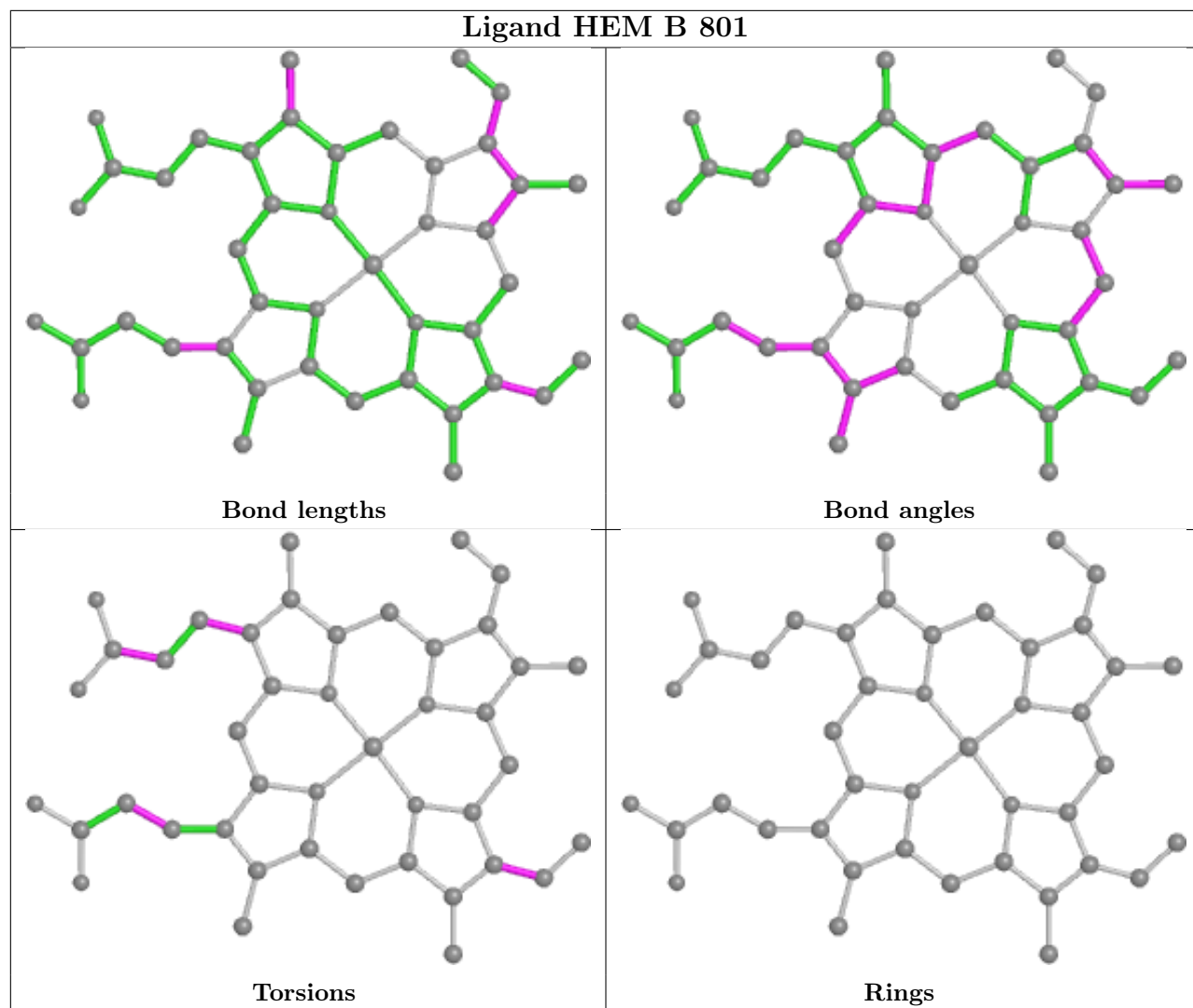
4 monomers are involved in 10 short contacts:

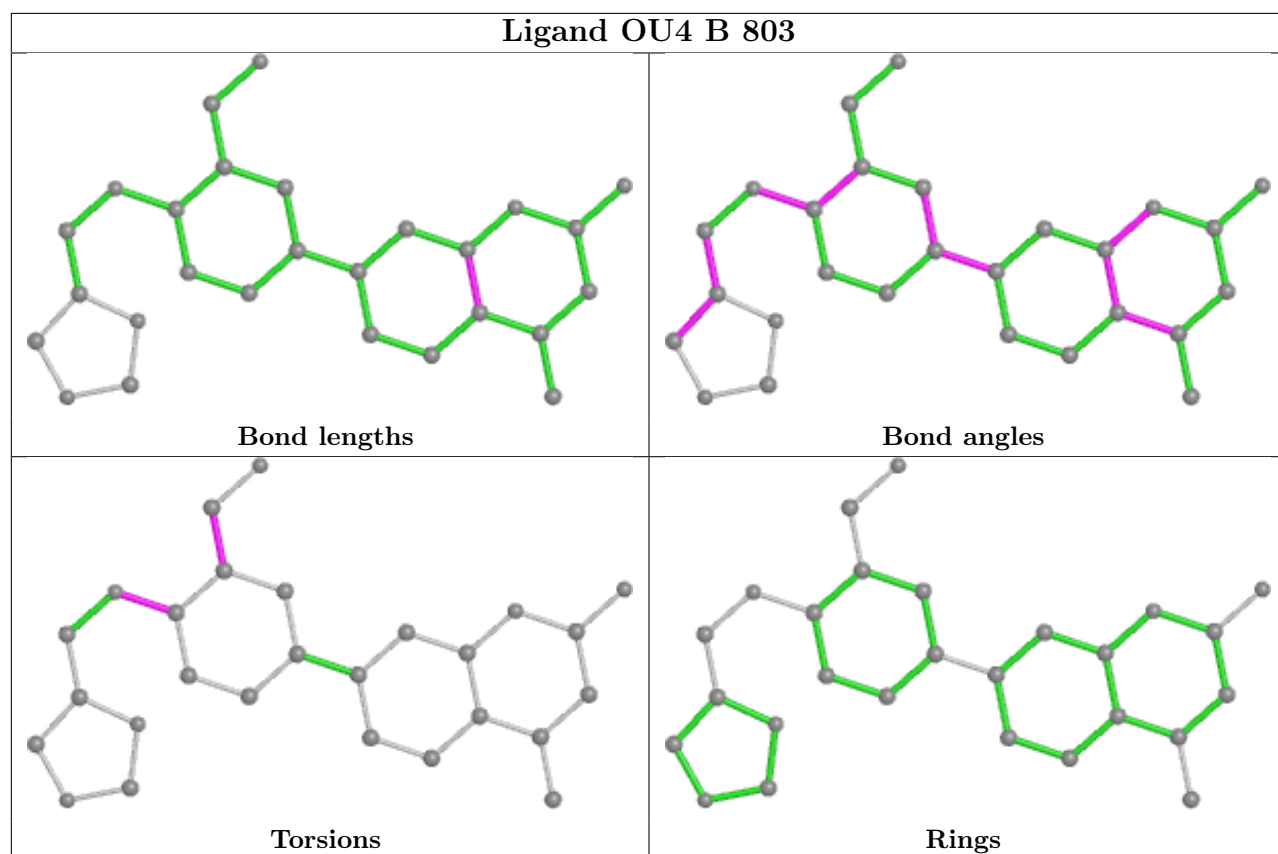
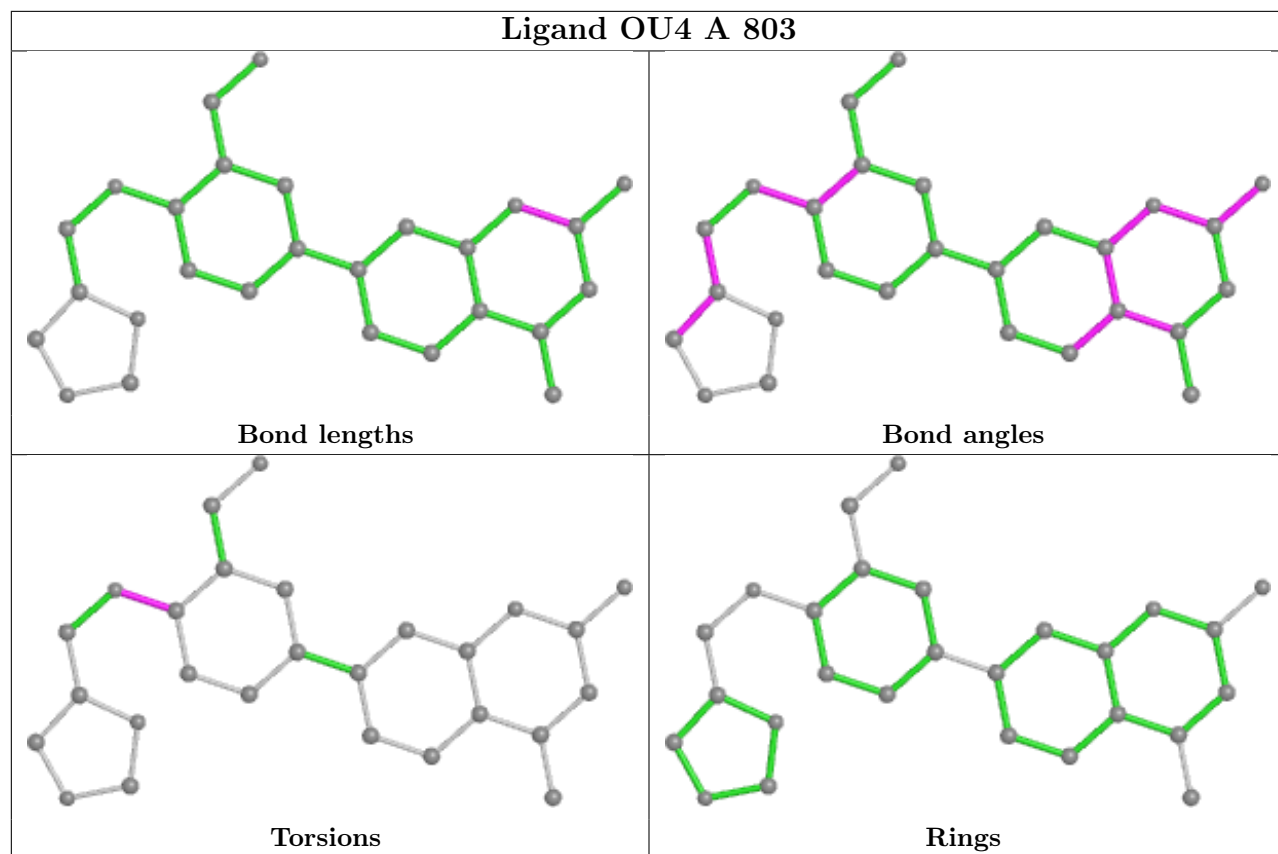
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	801	HEM	5	0
2	B	801	HEM	3	0
4	A	803	OU4	1	0
4	B	803	OU4	2	0

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.









## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	411/422 (97%)	0.37	21 (5%) 28 25	35, 63, 115, 153	0
1	B	411/422 (97%)	0.10	7 (1%) 70 69	33, 53, 91, 125	0
All	All	822/844 (97%)	0.24	28 (3%) 45 41	33, 58, 109, 153	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	373	GLY	4.3
1	A	348	VAL	4.1
1	A	339	SER	4.0
1	A	599	CYS	3.9
1	B	299	ARG	3.8
1	B	300	PHE	3.7
1	A	604	TYR	3.6
1	A	715	VAL	3.5
1	B	348	VAL	3.5
1	A	322	LEU	3.4
1	A	597	ASP	3.3
1	A	595	VAL	3.0
1	A	706[A]	TYR	2.9
1	B	594	GLY	2.9
1	A	516	ARG	2.8
1	A	347	ASP	2.7
1	A	716	TRP	2.7
1	A	300	PHE	2.7
1	A	553	TRP	2.7
1	B	350	THR	2.5
1	A	598	TYR	2.5
1	A	486	LYS	2.4
1	A	551	PHE	2.4
1	B	355	PHE	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	601	ASN	2.2
1	A	517	PHE	2.2
1	A	554	PHE	2.0
1	A	499	VAL	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](#)

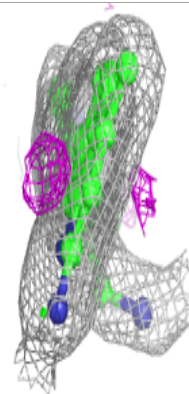
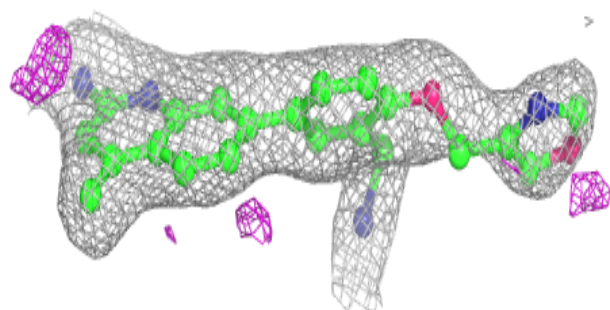
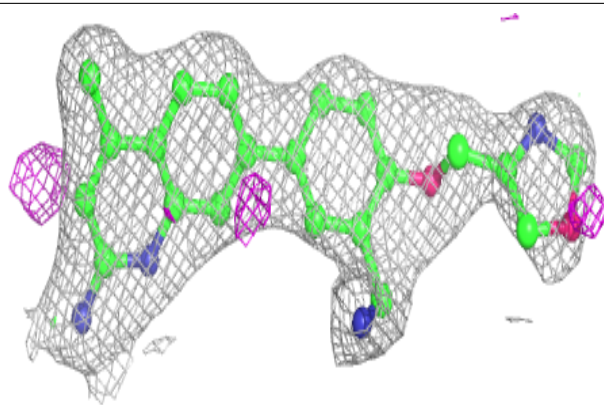
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	H4B	B	802	17/17	0.91	0.14	41,51,66,67	0
3	H4B	A	802	17/17	0.92	0.18	39,61,71,73	0
4	OU4	B	803	27/27	0.93	0.14	36,49,98,100	0
4	OU4	A	803	27/27	0.94	0.18	36,58,121,124	0
5	ACT	A	804	4/4	0.95	0.14	56,58,61,63	0
5	ACT	B	804	4/4	0.95	0.16	69,71,72,76	0
2	HEM	B	801	43/43	0.96	0.13	32,40,63,71	0
2	HEM	A	801	43/43	0.97	0.12	29,41,68,75	0
6	ZN	A	805	1/1	0.99	0.11	48,48,48,48	0

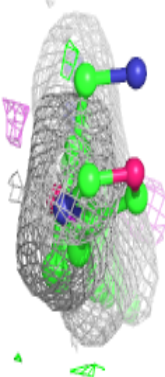
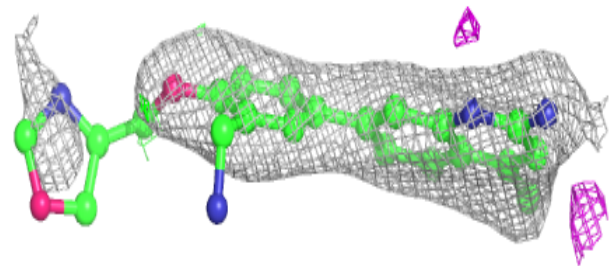
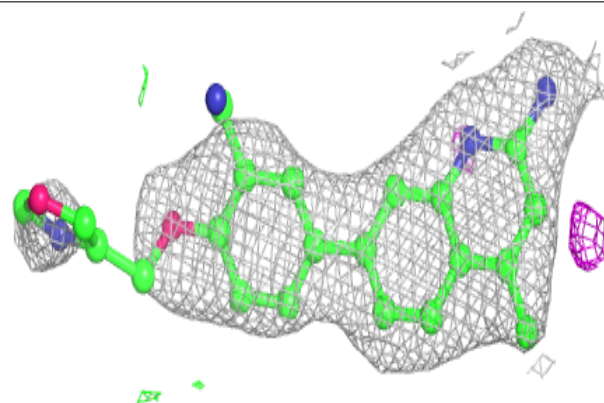
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around OU4 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)

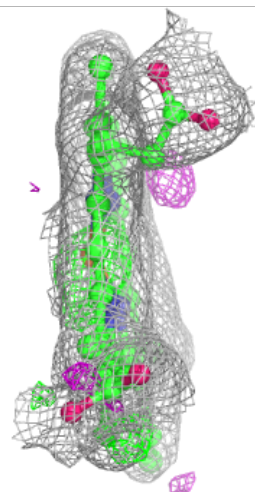
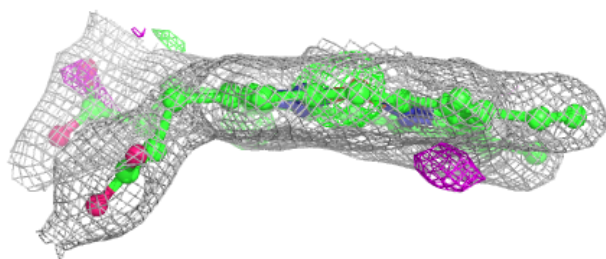
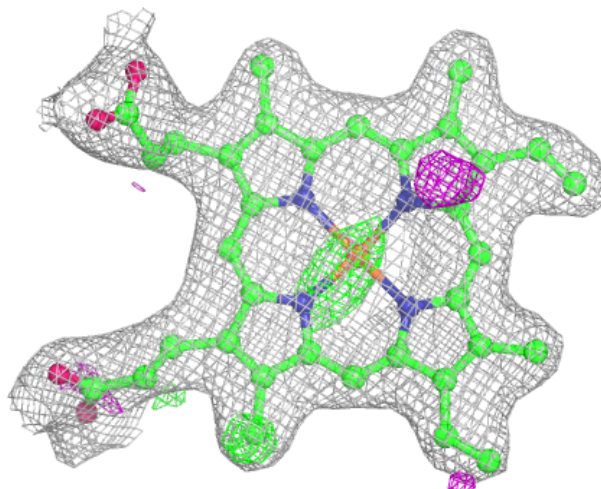
**Electron density around OU4 A 803:**

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

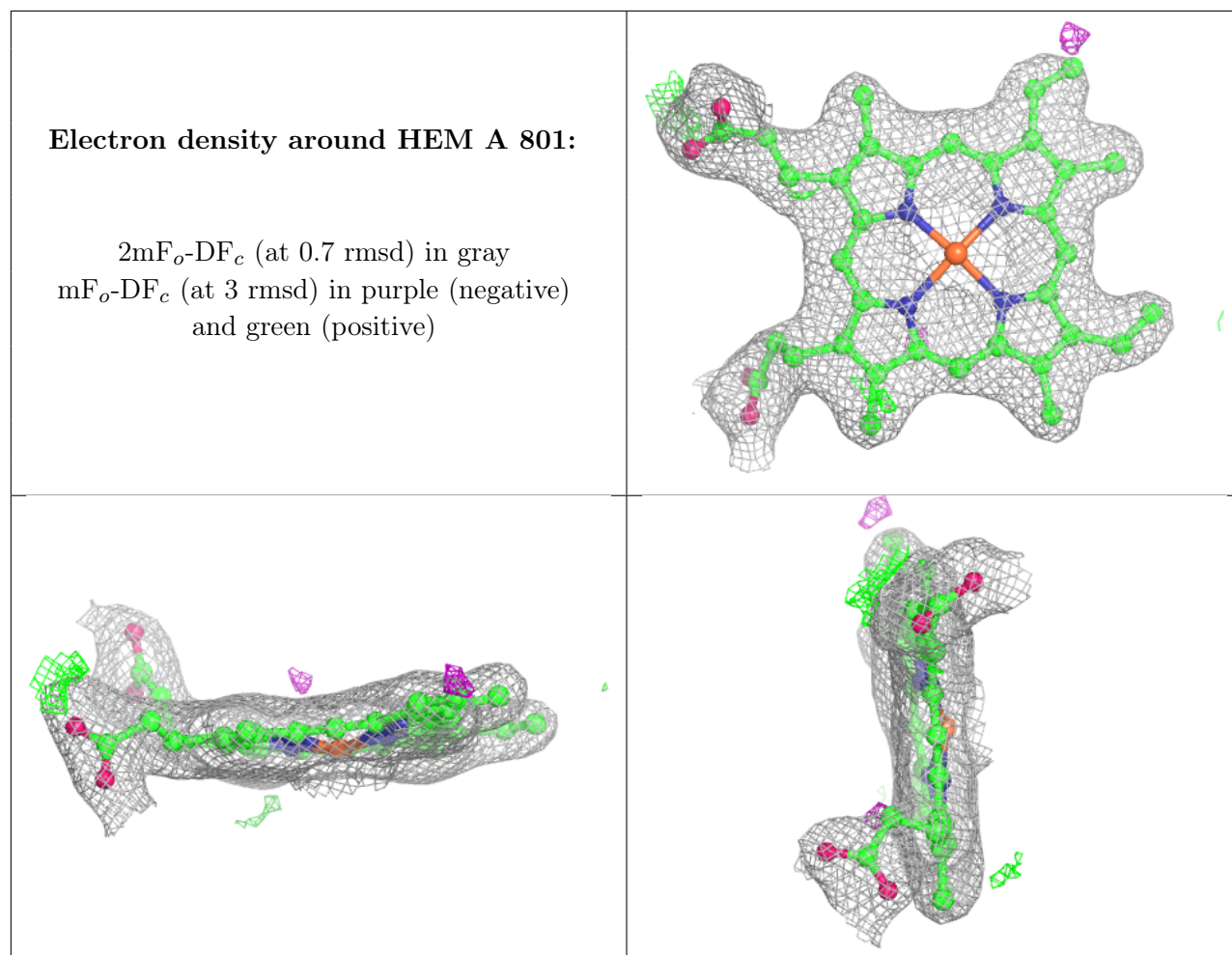


**Electron density around HEM B 801:**

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







## 6.5 Other polymers ⓘ

There are no such residues in this entry.