



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 7, 2023 – 01:53 AM EDT

PDB ID : 4FW0
Title : Structure of rat nNOS heme domain in complex with N(delta)-methyl- N(omega)-hydroxy-L-arginine
Authors : Li, H.; Poulos, T.L.
Deposited on : 2012-06-29
Resolution : 1.95 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
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

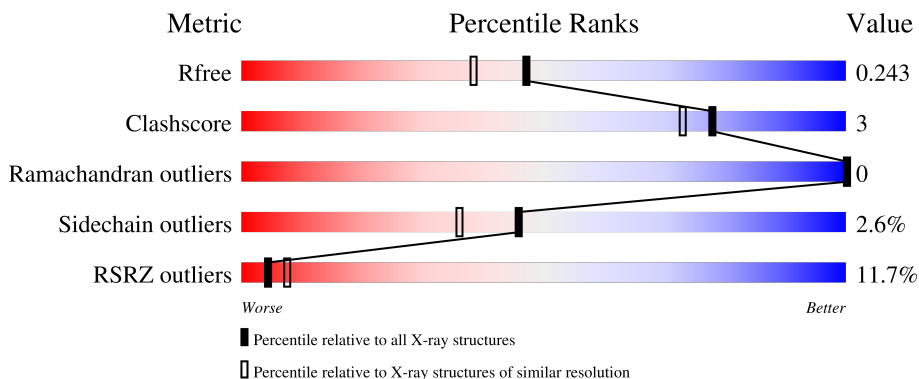
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.95 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	2580 (1.96-1.96)
Clashscore	141614	2705 (1.96-1.96)
Ramachandran outliers	138981	2678 (1.96-1.96)
Sidechain outliers	138945	2678 (1.96-1.96)
RSRZ outliers	127900	2539 (1.96-1.96)

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	 15% 86% 10% . .
1	B	422	 7% 90% 7% .

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 7143 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	407	Total 3313	C 2121	N 566	O 605	S 21	0	0	0
1	B	411	Total 3351	C 2144	N 574	O 611	S 22	0	2	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: $C_9H_{15}N_5O_3$).



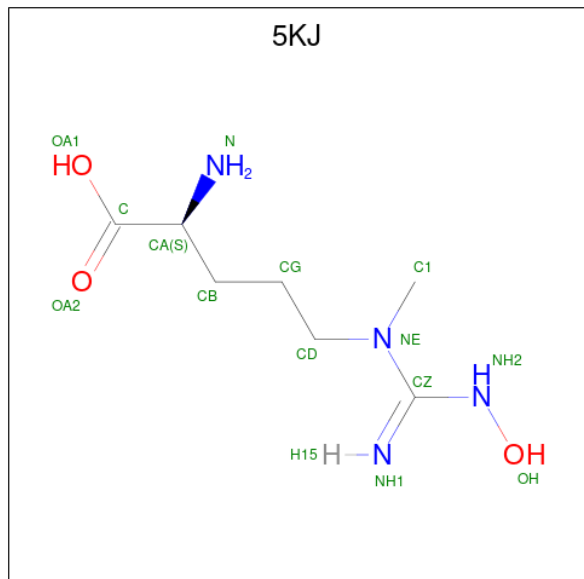
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	N			O
3	A	1	17	9	5	3	0	0
3	B	1	17	9	5	3	0	0

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



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

- Molecule 5 is N 5 -(N-hydroxycarbamimidoyl)-N 5 -methyl-L-ornithine (three-letter code: 5KJ) (formula: C₇H₁₆N₄O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	14	7	4	3	0	0
5	B	1	14	7	4	3	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

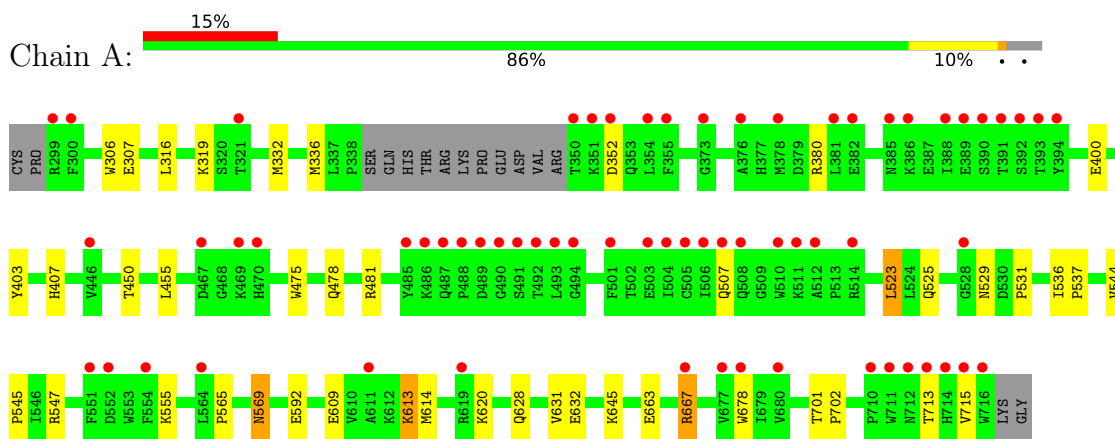
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	125	125	125	0	0
7	B	197	197	197	0	0

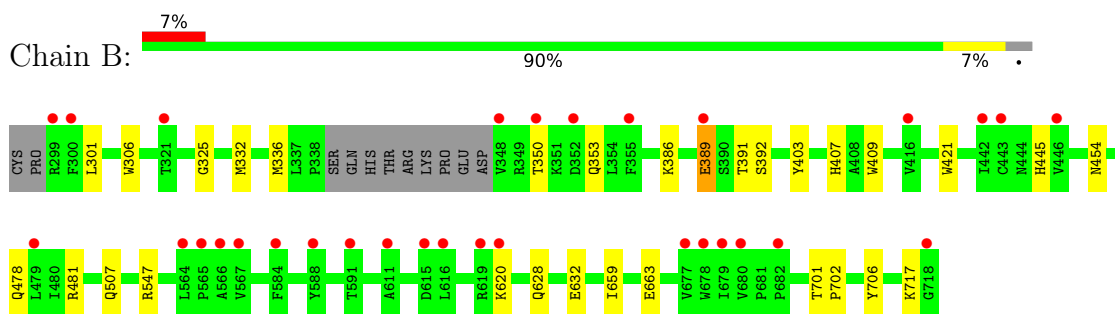
3 Residue-property plots [i](#)

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



- 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	52.12Å 111.33Å 164.13Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.36 – 1.95 46.07 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.4 (47.36-1.95) 99.4 (46.07-1.95)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.26 (at 1.95Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.194 , 0.232 0.204 , 0.243	Depositor DCC
R_{free} test set	3491 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	31.3	Xtrriage
Anisotropy	0.692	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 42.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7143	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.08% 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: ZN, ACT, HEM, 5KJ, H4B

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.59	0/3406	0.65	0/4621
1	B	0.65	0/3450	0.65	0/4677
All	All	0.62	0/6856	0.65	0/9298

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	3313	0	3221	25	0
1	B	3351	0	3269	16	0
2	A	43	0	30	2	0
2	B	43	0	30	2	0
3	A	17	0	15	0	0
3	B	17	0	15	0	0
4	A	4	0	3	0	0
4	B	4	0	3	0	0
5	A	14	0	14	2	0
5	B	14	0	14	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	125	0	0	1	0
7	B	197	0	0	2	0
All	All	7143	0	6614	39	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 3.

All (39) 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	1.70	0.73
1:A:663:GLU:O	1:A:667:ARG:HG2	1.87	0.73
1:A:307:GLU:HG3	7:B:901:HOH:O	1.96	0.64
1:B:717:LYS:NZ	7:B:1024:HOH:O	2.34	0.59
1:A:380:ARG:HD3	1:A:400:GLU:OE1	2.04	0.57
1:A:478:GLN:HB2	1:A:481:ARG:HG3	1.86	0.57
2:B:801:HEM:HBB2	2:B:801:HEM:HHC	1.87	0.56
1:A:306:TRP:CD2	1:B:336:MET:HE3	2.41	0.55
1:A:565:PRO:HB2	5:A:804:5KJ:H11	1.87	0.55
1:B:706:TYR:OH	2:B:801:HEM:O1D	2.15	0.53
1:A:569:ASN:HD22	1:A:569:ASN:H	1.58	0.50
1:A:525:GLN:HG3	1:A:529:ASN:O	2.11	0.49
1:B:325:GLY:O	1:B:332:MET:HG3	2.12	0.49
2:A:801:HEM:CMC	2:A:801:HEM:HBC2	2.43	0.49
1:A:592:GLU:HB3	5:A:804:5KJ:OA1	2.12	0.48
1:A:536:ILE:O	1:A:537:PRO:C	2.50	0.48
1:A:631:VAL:HG11	1:B:628:GLN:HG3	1.96	0.47
1:B:478:GLN:HB2	1:B:481:ARG:HG3	1.95	0.47
1:A:403:TYR:CE1	1:A:407:HIS:CE1	3.03	0.47
1:A:475:TRP:HB2	1:A:523:LEU:HB3	1.97	0.47
1:A:609:GLU:HG3	7:A:932:HOH:O	2.15	0.47
1:B:386:LYS:O	1:B:389:GLU:HG3	2.17	0.45
1:B:445:HIS:C	1:B:445:HIS:CD2	2.90	0.45
1:A:336:MET:CE	1:A:678:TRP:HZ2	2.29	0.44
1:A:450:THR:HA	1:A:455:LEU:HD22	1.98	0.44
1:A:609:GLU:O	1:A:613:LYS:HG2	2.17	0.44
1:A:336:MET:HG3	1:B:306:TRP:NE1	2.33	0.44
1:B:403:TYR:CE1	1:B:407:HIS:CE1	3.06	0.43
1:B:659:ILE:O	1:B:663:GLU:HG3	2.19	0.42
1:A:544:VAL:HA	1:A:545:PRO:HD2	1.93	0.42
1:B:391:THR:O	1:B:392:SER:HB2	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:316:LEU:HD12	1:A:319:LYS:HD2	2.02	0.41
1:A:628:GLN:NE2	1:B:632:GLU:OE2	2.54	0.41
1:A:701:THR:HA	1:A:702:PRO:C	2.41	0.41
1:A:332:MET:CE	1:B:301:LEU:HD22	2.51	0.40
1:A:614:MET:CE	1:A:632:GLU:HG3	2.51	0.40
1:B:409:TRP:CE3	1:B:421:TRP:HA	2.56	0.40
1:B:701:THR:HA	1:B:702:PRO:C	2.42	0.40
2:A:801:HEM:HBC2	2:A:801:HEM:HMC1	2.02	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	403/422 (96%)	387 (96%)	16 (4%)	0	100	100
1	B	409/422 (97%)	403 (98%)	6 (2%)	0	100	100
All	All	812/844 (96%)	790 (97%)	22 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	363/377 (96%)	351 (97%)	12 (3%)	38	26

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	368/377 (98%)	361 (98%)	7 (2%)	57	50
All	All	731/754 (97%)	712 (97%)	19 (3%)	46	36

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	352	ASP
1	A	507	GLN
1	A	523	LEU
1	A	547	ARG
1	A	555	LYS
1	A	569	ASN
1	A	613	LYS
1	A	620	LYS
1	A	645	LYS
1	A	667	ARG
1	A	713	THR
1	A	715	VAL
1	B	350	THR
1	B	353	GLN
1	B	389	GLU
1	B	454	ASN
1	B	507	GLN
1	B	547	ARG
1	B	620	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	353	GLN
1	A	454	ASN
1	A	527	ASN
1	A	569	ASN
1	A	601	ASN
1	A	605	ASN
1	A	642	GLN
1	A	697	ASN
1	B	385	ASN
1	B	454	ASN
1	B	507	GLN
1	B	508	GLN

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Mol	Chain	Res	Type
1	B	601	ASN
1	B	605	ASN
1	B	642	GLN
1	B	697	ASN

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
4	ACT	B	803	-	3,3,3	0.85	0	3,3,3	0.42	0
5	5KJ	B	804	-	11,13,13	0.66	0	10,16,16	2.00	4 (40%)
5	5KJ	A	804	-	11,13,13	0.70	0	10,16,16	1.43	1 (10%)
4	ACT	A	803	-	3,3,3	0.76	0	3,3,3	0.73	0
2	HEM	A	801	1	41,50,50	1.89	6 (14%)	45,82,82	1.79	11 (24%)
3	H4B	A	802	-	16,18,18	0.90	0	11,26,26	2.84	6 (54%)
3	H4B	B	802	-	16,18,18	1.43	3 (18%)	11,26,26	2.49	4 (36%)
2	HEM	B	801	1	41,50,50	1.98	10 (24%)	45,82,82	1.72	11 (24%)

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	5KJ	B	804	-	-	4/13/16/16	-
5	5KJ	A	804	-	-	5/13/16/16	-
2	HEM	A	801	1	-	0/12/54/54	-
3	H4B	A	802	-	-	0/8/17/17	0/2/2/2
3	H4B	B	802	-	-	0/8/17/17	0/2/2/2
2	HEM	B	801	1	-	0/12/54/54	-

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	801	HEM	C3D-C2D	7.28	1.52	1.36
2	B	801	HEM	C3D-C2D	6.88	1.51	1.36
2	B	801	HEM	C3C-C2C	-4.57	1.34	1.40
2	A	801	HEM	C3C-CAC	3.84	1.55	1.47
3	B	802	H4B	C7-C6	3.83	1.55	1.52
2	B	801	HEM	C3C-CAC	3.81	1.55	1.47
2	A	801	HEM	C3C-C2C	-3.52	1.35	1.40
2	B	801	HEM	CMB-C2B	2.73	1.56	1.50
2	A	801	HEM	CMD-C2D	2.70	1.56	1.50
2	A	801	HEM	CAB-C3B	2.67	1.54	1.47
2	B	801	HEM	CMD-C2D	2.61	1.56	1.50
2	A	801	HEM	CMB-C2B	2.59	1.56	1.50
2	B	801	HEM	CAB-C3B	2.46	1.54	1.47
2	B	801	HEM	CMC-C2C	2.14	1.56	1.51
2	B	801	HEM	CAA-C2A	2.11	1.55	1.52
3	B	802	H4B	C4-N3	2.11	1.36	1.33
2	B	801	HEM	C1A-NA	2.10	1.40	1.36
3	B	802	H4B	C7-N8	2.07	1.48	1.44
2	B	801	HEM	CAD-C3D	2.02	1.56	1.51

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	HEM	C4D-ND-C1D	5.41	110.66	105.07
3	B	802	H4B	C8A-C4A-C4	5.40	119.37	114.57
3	A	802	H4B	C8A-C4A-C4	5.08	119.08	114.57
2	B	801	HEM	C4D-ND-C1D	4.20	109.41	105.07
2	A	801	HEM	CBA-CAA-C2A	-4.18	105.49	112.62

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	801	HEM	C4B-CHC-C1C	4.04	127.90	122.56
5	B	804	5KJ	C1-NE-CD	-4.02	107.72	115.89
3	A	802	H4B	C2-N3-C4	3.62	121.67	115.93
2	B	801	HEM	CBA-CAA-C2A	-3.57	106.53	112.62
3	A	802	H4B	N1-C2-N3	-3.52	119.89	125.42
3	B	802	H4B	C2-N3-C4	3.46	121.43	115.93
3	A	802	H4B	C4-C4A-N5	3.39	121.97	119.12
5	A	804	5KJ	C1-NE-CD	-3.36	109.07	115.89
3	A	802	H4B	C2-N1-C8A	3.22	121.75	114.54
2	A	801	HEM	CMC-C2C-C3C	3.16	130.60	124.68
2	A	801	HEM	CMD-C2D-C1D	3.08	129.73	125.04
2	A	801	HEM	CHA-C4D-ND	2.92	127.99	124.38
5	B	804	5KJ	OA1-C-OA2	-2.91	117.47	124.09
2	A	801	HEM	C4B-CHC-C1C	2.89	126.38	122.56
2	B	801	HEM	CHC-C4B-NB	2.87	127.55	124.43
2	A	801	HEM	CBD-CAD-C3D	-2.79	104.87	112.63
5	B	804	5KJ	OA1-C-CA	2.78	122.86	113.38
2	B	801	HEM	CAD-C3D-C4D	2.74	129.45	124.66
3	B	802	H4B	N1-C2-N3	-2.66	121.25	125.42
2	B	801	HEM	C4B-C3B-C2B	2.56	109.15	107.11
2	B	801	HEM	CMA-C3A-C4A	-2.55	124.55	128.46
2	B	801	HEM	CBD-CAD-C3D	-2.50	105.69	112.63
5	B	804	5KJ	CB-CG-CD	-2.47	105.62	113.28
2	B	801	HEM	CMD-C2D-C1D	2.43	128.74	125.04
3	A	802	H4B	N2-C2-N3	2.31	120.84	117.25
3	B	802	H4B	C2-N1-C8A	2.24	119.56	114.54
2	B	801	HEM	CAD-CBD-CGD	-2.18	108.90	113.60
2	A	801	HEM	CAD-CBD-CGD	-2.18	108.91	113.60
2	A	801	HEM	C1D-C2D-C3D	-2.12	104.72	106.96
2	B	801	HEM	C1B-NB-C4B	2.10	107.24	105.07
2	A	801	HEM	CMB-C2B-C1B	2.09	128.23	125.04
2	A	801	HEM	C4C-CHD-C1D	2.02	125.22	122.56

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	804	5KJ	NH2-CZ-NE-CD
5	A	804	5KJ	NH1-CZ-NE-C1
5	B	804	5KJ	CG-CD-NE-CZ
5	B	804	5KJ	NH2-CZ-NE-CD
5	A	804	5KJ	NE-CD-CG-CB

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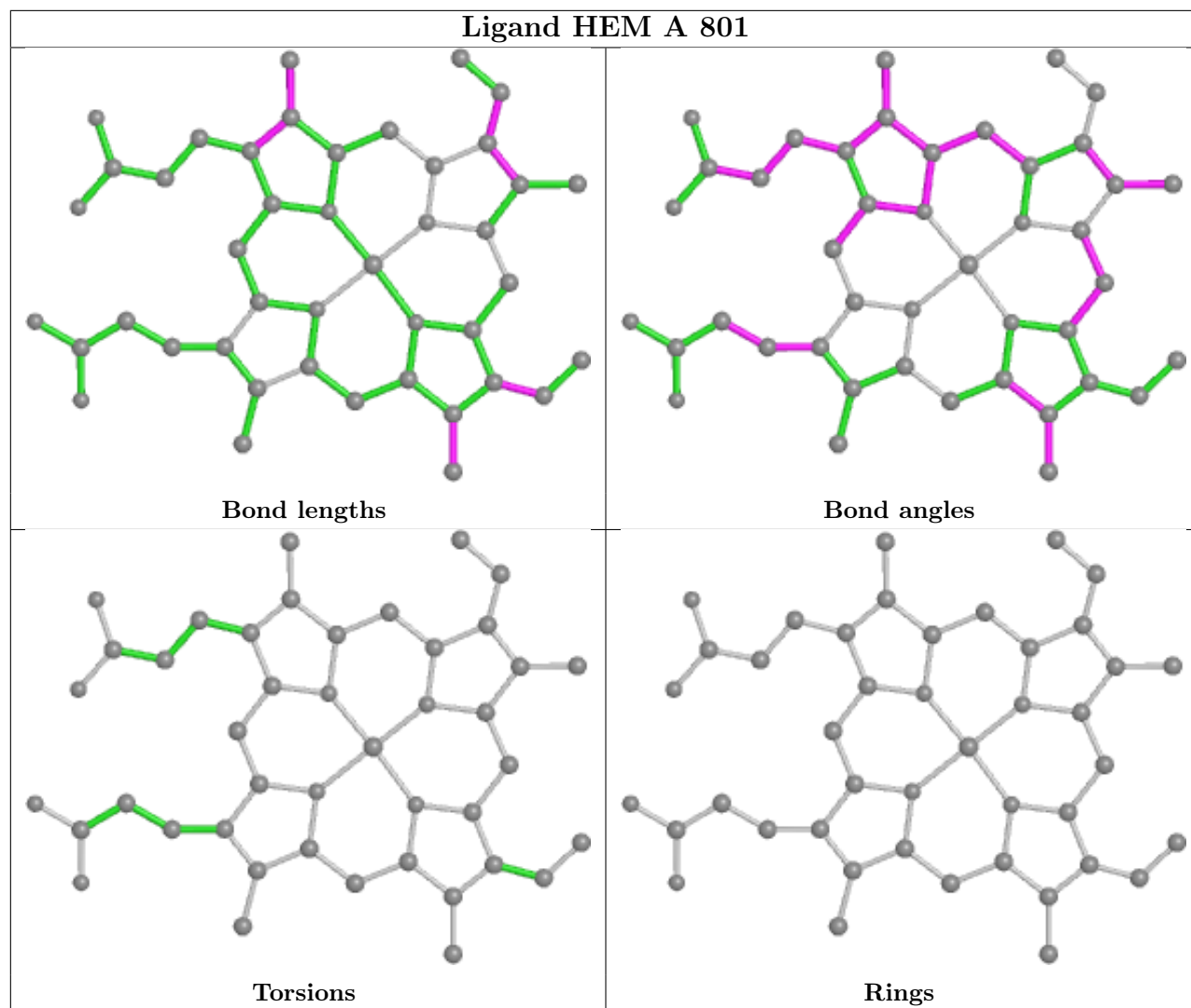
Mol	Chain	Res	Type	Atoms
5	B	804	5KJ	NE-CD-CG-CB
5	A	804	5KJ	CG-CD-NE-CZ
5	B	804	5KJ	NH1-CZ-NE-C1
5	A	804	5KJ	N-CA-CB-CG

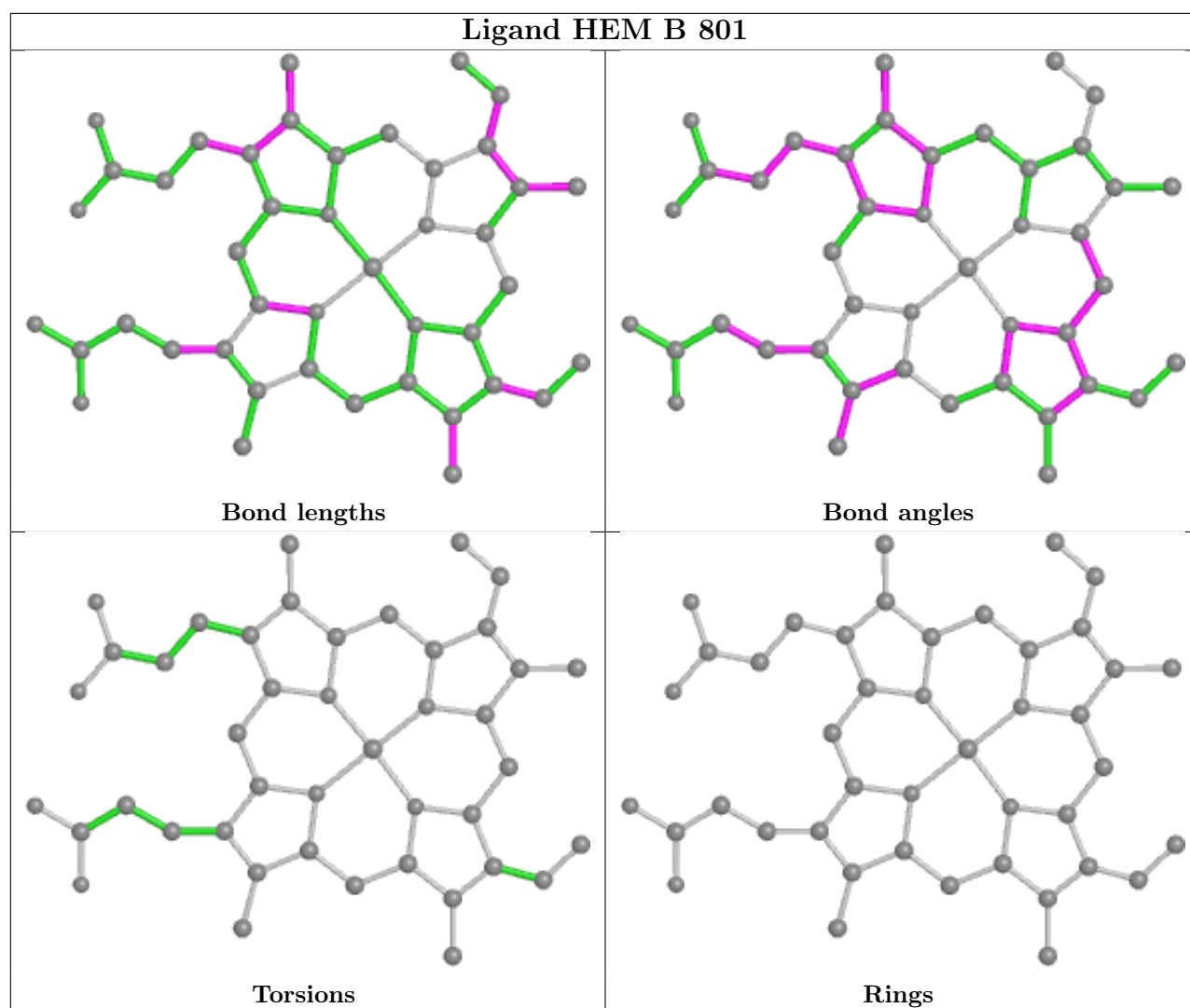
There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	804	5KJ	2	0
2	A	801	HEM	2	0
2	B	801	HEM	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

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%)	0.97	65 (15%) 1 2	24, 45, 78, 100	0
1	B	411/422 (97%)	0.55	31 (7%) 14 22	24, 37, 60, 76	0
All	All	818/844 (96%)	0.76	96 (11%) 4 7	24, 41, 73, 100	0

All (96) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	355	PHE	8.4
1	B	300	PHE	7.8
1	A	715	VAL	6.0
1	A	373	GLY	5.7
1	A	321	THR	5.5
1	A	716	TRP	5.3
1	A	488	PRO	5.2
1	B	355	PHE	4.9
1	A	300	PHE	4.9
1	A	388	ILE	4.6
1	B	611	ALA	4.2
1	A	713	THR	3.9
1	B	718	GLY	3.8
1	A	491	SER	3.8
1	B	350	THR	3.7
1	A	503	GLU	3.7
1	A	352	ASP	3.6
1	B	619	ARG	3.6
1	A	486	LYS	3.6
1	A	485	TYR	3.6
1	A	507	GLN	3.6
1	B	352	ASP	3.4
1	A	299	ARG	3.4
1	A	389	GLU	3.4

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Mol	Chain	Res	Type	RSRZ
1	A	490	GLY	3.3
1	A	554	PHE	3.3
1	A	493	LEU	3.3
1	A	511	LYS	3.2
1	B	567	VAL	3.2
1	A	351	LYS	3.1
1	A	504	ILE	3.1
1	A	392	SER	3.1
1	A	470	HIS	3.1
1	A	385	ASN	3.0
1	A	506	ILE	3.0
1	A	514	ARG	3.0
1	A	552	ASP	3.0
1	A	386	LYS	2.9
1	A	714	HIS	2.9
1	B	564	LEU	2.9
1	B	677	VAL	2.9
1	A	378	MET	2.9
1	A	501	PHE	2.9
1	B	616	LEU	2.8
1	A	390	SER	2.8
1	A	494	GLY	2.8
1	A	551	PHE	2.8
1	A	393	THR	2.8
1	B	566	ALA	2.7
1	B	446	VAL	2.7
1	A	487	GLN	2.7
1	A	677	VAL	2.7
1	A	712	ASN	2.6
1	A	710	PRO	2.6
1	A	446	VAL	2.6
1	A	382	GLU	2.6
1	B	348	VAL	2.5
1	A	512	ALA	2.5
1	A	381	LEU	2.5
1	B	615	ASP	2.5
1	B	588	TYR	2.5
1	B	443	CYS	2.5
1	A	508	GLN	2.4
1	B	591	THR	2.4
1	A	469	LYS	2.4
1	A	711	TRP	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	489	ASP	2.4
1	A	528	GLY	2.4
1	A	667	ARG	2.4
1	B	321	THR	2.4
1	A	611	ALA	2.4
1	B	679	ILE	2.4
1	B	584	PHE	2.3
1	B	682	PRO	2.3
1	B	680	VAL	2.3
1	A	564	LEU	2.3
1	A	391	THR	2.3
1	A	467	ASP	2.3
1	B	299	ARG	2.3
1	B	565	PRO	2.3
1	A	394	TYR	2.2
1	A	492	THR	2.2
1	A	376	ALA	2.2
1	A	510	TRP	2.2
1	A	505	CYS	2.2
1	A	680	VAL	2.2
1	B	416	VAL	2.1
1	B	442	ILE	2.1
1	B	479	LEU	2.1
1	B	678	TRP	2.1
1	A	619	ARG	2.1
1	B	389	GLU	2.1
1	A	350	THR	2.1
1	B	620	LYS	2.1
1	A	354	LEU	2.1
1	A	678	TRP	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

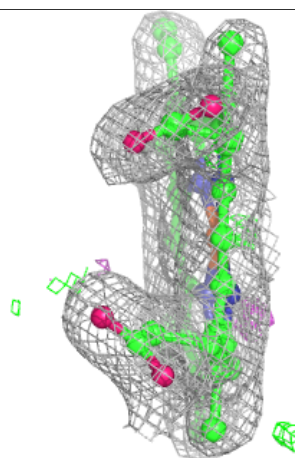
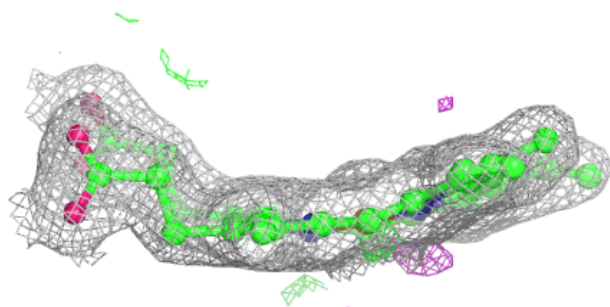
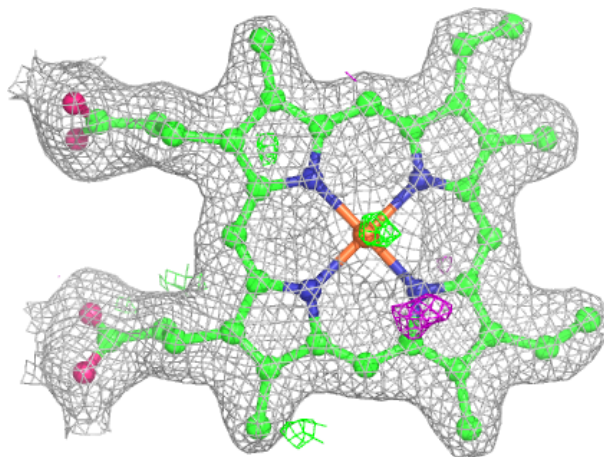
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

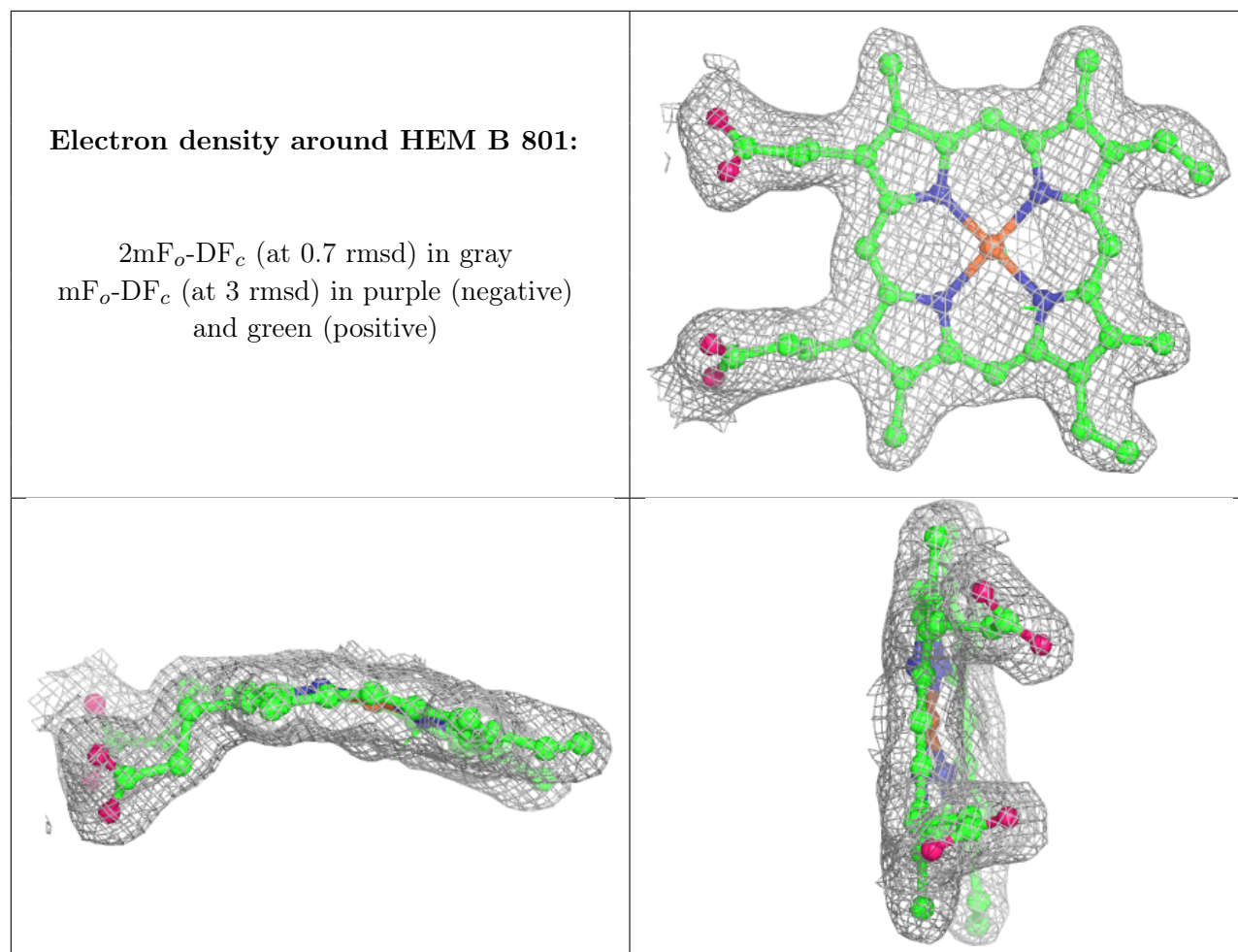
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	5KJ	B	804	14/14	0.77	0.23	39,41,48,48	0
5	5KJ	A	804	14/14	0.79	0.22	41,44,50,50	0
4	ACT	A	803	4/4	0.95	0.16	51,52,53,54	0
3	H4B	A	802	17/17	0.96	0.15	25,27,31,32	0
3	H4B	B	802	17/17	0.97	0.18	24,26,31,31	0
4	ACT	B	803	4/4	0.97	0.12	43,44,45,45	0
2	HEM	A	801	43/43	0.98	0.17	25,29,33,37	0
2	HEM	B	801	43/43	0.98	0.20	24,26,34,37	0
6	ZN	A	805	1/1	1.00	0.10	33,33,33,33	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 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 [i](#)

There are no such residues in this entry.