



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 6, 2023 – 01:08 AM EDT

PDB ID : 8FGB
Title : Structure of rat neuronal nitric oxide synthase heme domain in complex with 4-(5-(2-(dimethylamino)ethyl)-2,3-difluorophenethyl)-6-methylpyrimidin-2-amine
Authors : Li, H.; Poulos, T.L.
Deposited on : 2022-12-12
Resolution : 1.91 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)
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

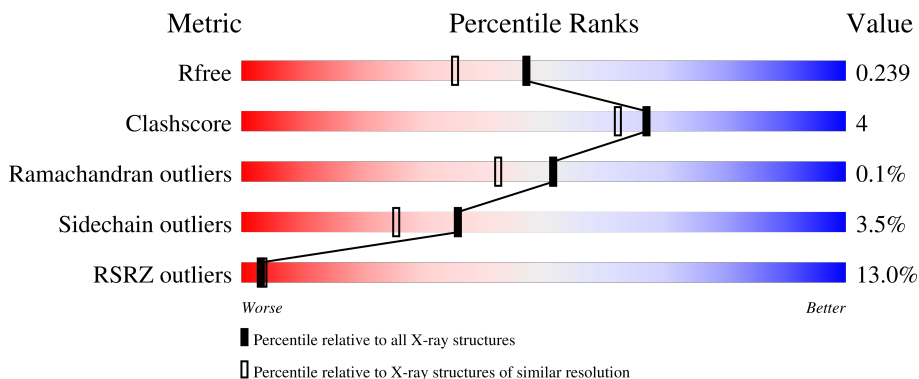
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.91 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	7937 (1.94-1.90)
Clashscore	141614	8644 (1.94-1.90)
Ramachandran outliers	138981	8530 (1.94-1.90)
Sidechain outliers	138945	8530 (1.94-1.90)
RSRZ outliers	127900	7793 (1.94-1.90)

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	 17% 83% 13% . .
1	B	422	 8% 89% 9% .

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 7222 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	410	Total	C	N	O	S	0	2	0
			3343	2139	572	610	22			
1	B	416	Total	C	N	O	S	0	3	0
			3396	2169	585	620	22			

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



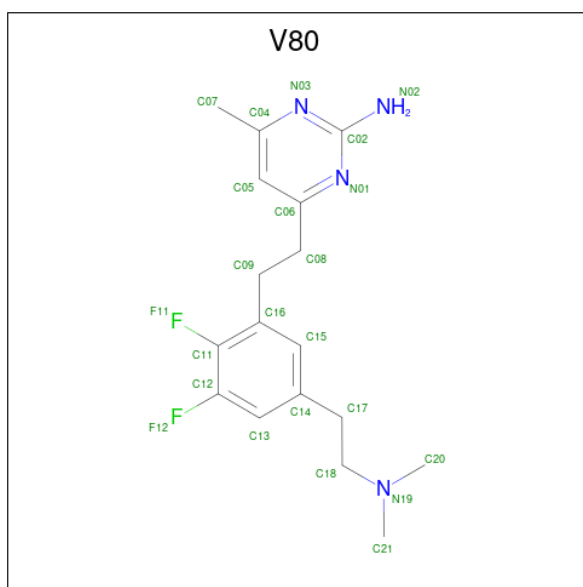
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Fe	N			O
2	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			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 4-(2-{5-[2-(dimethylamino)ethyl]-2,3-difluorophenyl}ethyl)-6-methylpyrimidin-2-amine (three-letter code: V80) (formula: $C_{17}H_{22}F_2N_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	F	N		
4	A	1	23	17	2	4	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	F	N		
4	B	1	23	17	2	4	0	0

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



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	B	1	1	1	0	0

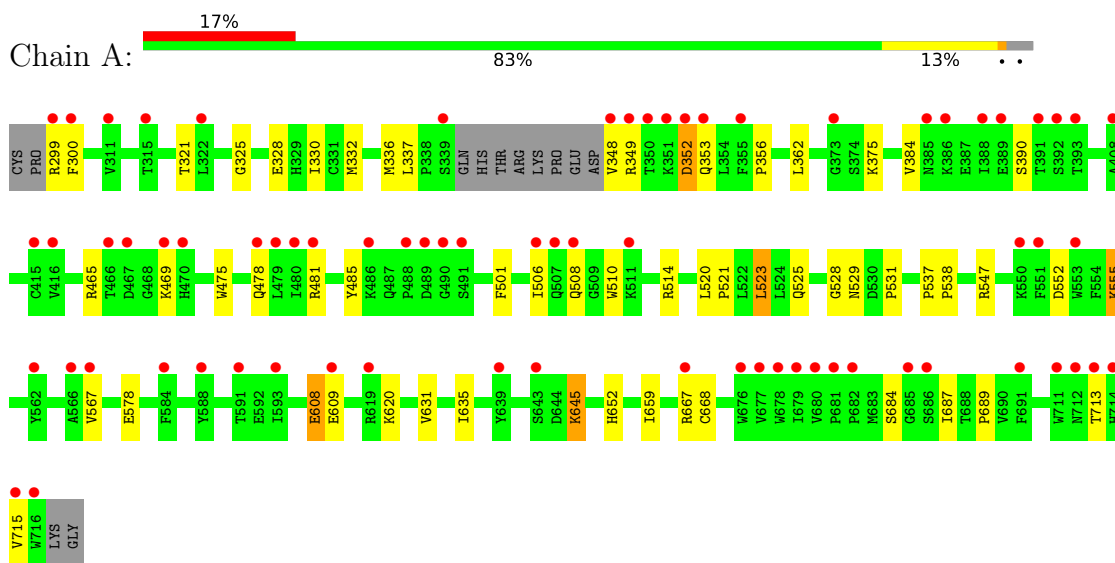
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	132	132	132	0	0
7	B	176	176	176	0	0

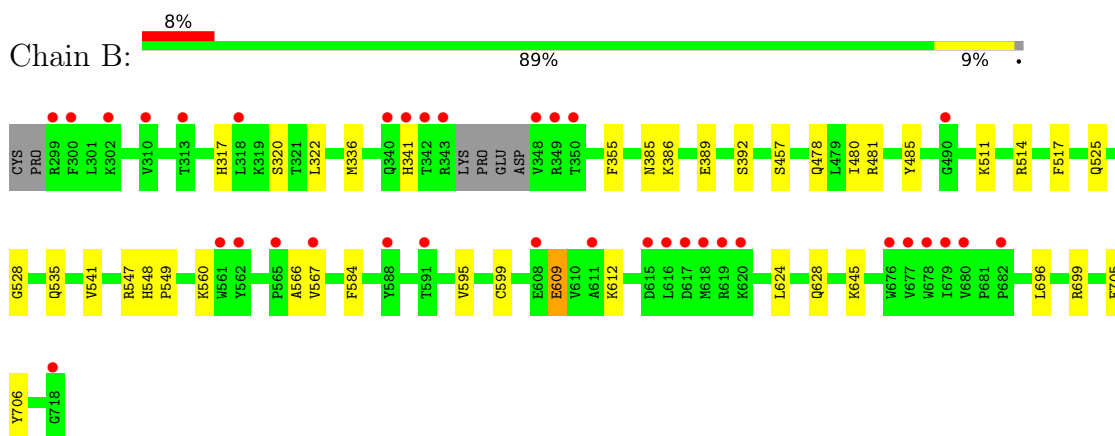
3 Residue-property plots i

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	52.13Å 111.84Å 165.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.22 – 1.91 39.21 – 1.91	Depositor EDS
% Data completeness (in resolution range)	98.5 (39.22-1.91) 99.3 (39.21-1.91)	Depositor EDS
R_{merge}	0.24	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.40 (at 1.91Å)	Xtrriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, R_{free}	0.202 , 0.241 0.202 , 0.239	Depositor DCC
R_{free} test set	3727 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	35.6	Xtrriage
Anisotropy	1.038	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 56.3	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	0.97	EDS
Total number of atoms	7222	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.83% 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, ACT, V80, ZN, 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	0.37	0/3442	0.51	0/4669
1	B	0.40	0/3500	0.53	0/4744
All	All	0.39	0/6942	0.52	0/9413

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	3343	0	3258	31	0
1	B	3396	0	3310	21	0
2	A	43	0	30	3	0
2	B	43	0	30	2	0
3	A	17	0	15	0	0
3	B	17	0	15	0	0
4	A	23	0	0	1	0
4	B	23	0	0	2	0
5	A	4	0	3	0	0
5	B	4	0	3	0	0
6	B	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	132	0	0	1	0
7	B	176	0	0	0	0
All	All	7222	0	6664	53	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (53) 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	1.61	0.82
2:A:801:HEM:HMC2	2:A:801:HEM:HBC2	1.68	0.75
1:B:480:ILE:HD13	1:B:541:VAL:HG13	1.74	0.70
1:B:609:GLU:HA	1:B:612:LYS:HE3	1.75	0.68
2:A:801:HEM:HBB2	2:A:801:HEM:HHC	1.81	0.62
2:B:801:HEM:HMC2	2:B:801:HEM:HBC2	1.81	0.62
1:B:478:GLN:HB2	1:B:481:ARG:HG3	1.83	0.60
1:B:699:ARG:NH2	1:B:705:GLU:OE2	2.34	0.60
1:A:631:VAL:HG11	1:B:628:GLN:HG3	1.86	0.58
1:A:330:ILE:HD11	1:B:696:LEU:HD22	1.84	0.58
1:A:299:ARG:HH21	1:A:300:PHE:HE1	1.53	0.57
1:A:465:ARG:NH1	1:A:578:GLU:OE1	2.39	0.56
1:B:706:TYR:OH	2:B:801:HEM:O2D	2.12	0.56
1:A:349:ARG:NH1	1:A:578:GLU:OE2	2.40	0.55
1:A:348:VAL:HG22	1:A:349:ARG:H	1.72	0.55
1:B:567:VAL:HG21	4:B:803:V80:C11	2.39	0.52
1:A:567:VAL:HG21	4:A:803:V80:C11	2.39	0.52
1:A:478:GLN:HB2	1:A:481:ARG:HG3	1.92	0.52
1:B:517:PHE:HB2	1:B:560:LYS:HE3	1.92	0.52
1:A:475:TRP:HB2	1:A:523:LEU:HB3	1.92	0.50
1:B:525:GLN:HE21	1:B:528:GLY:HA2	1.76	0.50
1:A:510:TRP:CE2	1:A:521:PRO:HD3	2.48	0.49
1:A:652:HIS:ND1	7:A:902:HOH:O	2.35	0.48
1:B:322:LEU:HB3	1:B:699:ARG:NH1	2.29	0.48
1:A:684:SER:HB3	1:A:687:ILE:HD11	1.95	0.48
1:A:635:ILE:HG12	1:B:624:LEU:HB2	1.97	0.47
1:A:485:TYR:CE1	1:A:514:ARG:HA	2.50	0.47
1:B:548:HIS:CG	1:B:549:PRO:HD2	2.50	0.47
1:B:317:HIS:O	1:B:320:SER:HB3	2.15	0.47
1:A:501:PHE:CD2	1:A:520:LEU:HD13	2.52	0.45
1:A:659:ILE:HG13	1:A:689:PRO:HB2	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:325:GLY:O	1:A:332:MET:HG3	2.18	0.43
1:A:299:ARG:HE	1:A:299:ARG:HB3	1.67	0.43
1:A:485:TYR:CZ	1:A:514:ARG:HA	2.52	0.43
1:A:501:PHE:HD2	1:A:520:LEU:HD13	1.84	0.43
1:A:362:LEU:HD11	1:A:384:VAL:HG21	2.01	0.42
1:A:645:LYS:HA	1:A:645:LYS:HD3	1.84	0.42
1:A:608:GLU:H	1:A:608:GLU:HG2	1.58	0.42
1:B:485:TYR:CZ	1:B:514:ARG:HA	2.54	0.42
1:A:537:PRO:HA	1:A:538:PRO:HD3	1.97	0.42
1:A:506:ILE:C	1:A:508:GLN:H	2.23	0.42
1:A:352:ASP:O	1:A:356:PRO:HD2	2.20	0.41
2:A:801:HEM:HBC2	2:A:801:HEM:CMC	2.44	0.41
1:B:355:PHE:CE1	1:B:385:ASN:HB2	2.55	0.41
1:B:567:VAL:HG21	4:B:803:V80:F11	2.10	0.41
1:A:667:ARG:NH1	1:A:668[A]:CYS:SG	2.93	0.41
1:B:386:LYS:HA	1:B:389:GLU:HG2	2.03	0.41
1:A:525:GLN:HG3	1:A:529:ASN:O	2.21	0.41
1:A:525:GLN:HE21	1:A:528:GLY:HA2	1.86	0.41
1:B:511:LYS:HD2	1:B:511:LYS:HA	1.87	0.41
1:A:555:LYS:H	1:A:555:LYS:HG3	1.59	0.40
1:B:566:ALA:HA	1:B:584:PHE:O	2.22	0.40
1:B:595:VAL:O	1:B:599:CYS:HB2	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%)	396 (97%)	11 (3%)	1 (0%)	47 38
1	B	415/422 (98%)	402 (97%)	13 (3%)	0	100 100
All	All	823/844 (98%)	798 (97%)	24 (3%)	1 (0%)	51 42

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	375	LYS

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%)	350 (95%)	18 (5%)	25	14
1	B	374/377 (99%)	366 (98%)	8 (2%)	53	46
All	All	742/754 (98%)	716 (96%)	26 (4%)	36	25

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	321	THR
1	A	328	GLU
1	A	336	MET
1	A	337	LEU
1	A	352	ASP
1	A	353	GLN
1	A	390	SER
1	A	469	LYS
1	A	523	LEU
1	A	547	ARG
1	A	552	ASP
1	A	555	LYS
1	A	608	GLU
1	A	609	GLU
1	A	620	LYS
1	A	645	LYS
1	A	713	THR
1	A	715	VAL
1	B	336	MET
1	B	341	HIS
1	B	392	SER
1	B	457	SER

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Mol	Chain	Res	Type
1	B	535	GLN
1	B	547	ARG
1	B	609	GLU
1	B	645	LYS

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	364	GLN

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	1.55	8 (19%)	45,82,82	1.57	12 (26%)
3	H4B	B	802	-	16,18,18	0.80	0	11,26,26	2.60	5 (45%)
2	HEM	B	801	1	41,50,50	1.65	7 (17%)	45,82,82	1.34	6 (13%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	H4B	A	802	-	16,18,18	0.85	0	11,26,26	2.46	5 (45%)
4	V80	A	803	-	24,24,24	0.65	0	32,33,33	2.07	10 (31%)
5	ACT	A	804	-	3,3,3	0.75	0	3,3,3	0.75	0
5	ACT	B	804	-	3,3,3	0.80	0	3,3,3	0.76	0
4	V80	B	803	-	24,24,24	0.71	0	32,33,33	2.18	9 (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
2	HEM	A	801	1	-	7/12/54/54	-
3	H4B	B	802	-	-	0/8/17/17	0/2/2/2
2	HEM	B	801	1	-	1/12/54/54	-
3	H4B	A	802	-	-	0/8/17/17	0/2/2/2
4	V80	A	803	-	-	4/10/10/10	0/2/2/2
4	V80	B	803	-	-	5/10/10/10	0/2/2/2

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	801	HEM	C3C-C2C	-5.28	1.33	1.40
2	A	801	HEM	C3C-CAC	3.90	1.55	1.47
2	A	801	HEM	C3C-C2C	-3.78	1.35	1.40
2	B	801	HEM	C3C-CAC	3.67	1.55	1.47
2	A	801	HEM	CAB-C3B	3.04	1.55	1.47
2	A	801	HEM	FE-NB	2.61	2.09	1.96
2	B	801	HEM	CAB-C3B	2.56	1.54	1.47
2	B	801	HEM	CMC-C2C	2.37	1.57	1.51
2	B	801	HEM	CMD-C2D	2.34	1.55	1.50
2	A	801	HEM	CMC-C2C	2.19	1.56	1.51
2	A	801	HEM	CMB-C2B	2.18	1.55	1.50
2	B	801	HEM	CMB-C2B	2.18	1.55	1.50
2	B	801	HEM	C3B-C2B	-2.13	1.33	1.37
2	A	801	HEM	CMD-C2D	2.10	1.55	1.50
2	A	801	HEM	CAA-C2A	2.02	1.55	1.52

All (47) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	803	V80	C02-N01-C06	5.94	122.22	117.07
4	B	803	V80	F11-C11-C16	5.50	123.66	117.85
3	B	802	H4B	C8A-C4A-C4	5.42	119.39	114.57
4	A	803	V80	F11-C11-C16	5.21	123.35	117.85
4	A	803	V80	C02-N01-C06	4.93	121.33	117.07
4	A	803	V80	C02-N03-C04	4.85	121.23	117.11
3	A	802	H4B	C8A-C4A-C4	4.80	118.83	114.57
4	B	803	V80	C05-C06-N01	-4.16	118.49	122.90
2	A	801	HEM	C4B-CHC-C1C	4.03	127.88	122.56
3	B	802	H4B	C4-C4A-N5	3.89	122.39	119.12
4	B	803	V80	N02-C02-N03	3.57	122.81	117.25
4	A	803	V80	N03-C02-N01	-3.57	119.82	125.42
3	A	802	H4B	N1-C2-N3	-3.32	120.21	125.42
4	B	803	V80	C09-C16-C11	3.22	123.32	120.73
4	A	803	V80	C05-C06-N01	-3.21	119.50	122.90
4	B	803	V80	N03-C02-N01	-3.19	120.42	125.42
4	B	803	V80	C02-N03-C04	3.17	119.81	117.11
3	A	802	H4B	C2-N3-C4	3.16	120.95	115.93
3	B	802	H4B	C2-N3-C4	2.85	120.45	115.93
2	B	801	HEM	CBA-CAA-C2A	-2.81	107.83	112.62
2	B	801	HEM	CAD-CBD-CGD	-2.73	107.74	113.60
2	A	801	HEM	CBD-CAD-C3D	2.71	120.15	112.63
3	B	802	H4B	N1-C2-N3	-2.70	121.19	125.42
2	B	801	HEM	C3B-C2B-C1B	2.69	108.48	106.49
4	A	803	V80	N02-C02-N03	2.66	121.39	117.25
3	A	802	H4B	C2-N1-C8A	2.66	120.49	114.54
2	A	801	HEM	C3B-C2B-C1B	2.58	108.40	106.49
3	B	802	H4B	C2-N1-C8A	2.54	120.24	114.54
2	A	801	HEM	CHA-C4D-ND	2.54	127.52	124.38
4	A	803	V80	C15-C16-C11	2.52	119.06	116.76
4	B	803	V80	C07-C04-N03	2.46	120.49	116.56
2	A	801	HEM	C4C-CHD-C1D	2.46	125.80	122.56
2	A	801	HEM	CAD-C3D-C4D	-2.37	120.52	124.66
3	A	802	H4B	C4-C4A-N5	2.36	121.10	119.12
4	A	803	V80	C07-C04-N03	2.25	120.15	116.56
4	A	803	V80	C09-C16-C11	2.19	122.49	120.73
2	A	801	HEM	CMC-C2C-C3C	2.18	128.76	124.68
2	A	801	HEM	CAD-CBD-CGD	-2.14	109.00	113.60
2	A	801	HEM	CAD-C3D-C2D	2.13	131.84	127.88
4	B	803	V80	C15-C16-C11	2.10	118.68	116.76
2	B	801	HEM	C4C-CHD-C1D	2.06	125.28	122.56
2	B	801	HEM	CHB-C1B-NB	2.05	126.92	124.38
2	A	801	HEM	C4D-ND-C1D	2.04	107.18	105.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	HEM	CMA-C3A-C4A	-2.01	125.37	128.46
2	B	801	HEM	CAD-C3D-C2D	-2.01	124.13	127.88
2	A	801	HEM	C2C-C3C-C4C	2.01	108.30	106.90
4	A	803	V80	C08-C06-N01	2.00	118.94	115.95

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	HEM	C2D-C3D-CAD-CBD
2	A	801	HEM	C4D-C3D-CAD-CBD
4	A	803	V80	C06-C08-C09-C16
4	A	803	V80	C08-C09-C16-C11
4	B	803	V80	C06-C08-C09-C16
4	B	803	V80	C08-C09-C16-C11
4	B	803	V80	C08-C09-C16-C15
4	A	803	V80	C08-C09-C16-C15
4	B	803	V80	C17-C18-N19-C21
2	A	801	HEM	C2A-CAA-CBA-CGA
2	B	801	HEM	C2A-CAA-CBA-CGA
4	A	803	V80	C17-C18-N19-C20
4	B	803	V80	C17-C18-N19-C20
2	A	801	HEM	C4B-C3B-CAB-CBB
2	A	801	HEM	C1A-C2A-CAA-CBA
2	A	801	HEM	CAD-CBD-CGD-O2D
2	A	801	HEM	CAD-CBD-CGD-O1D

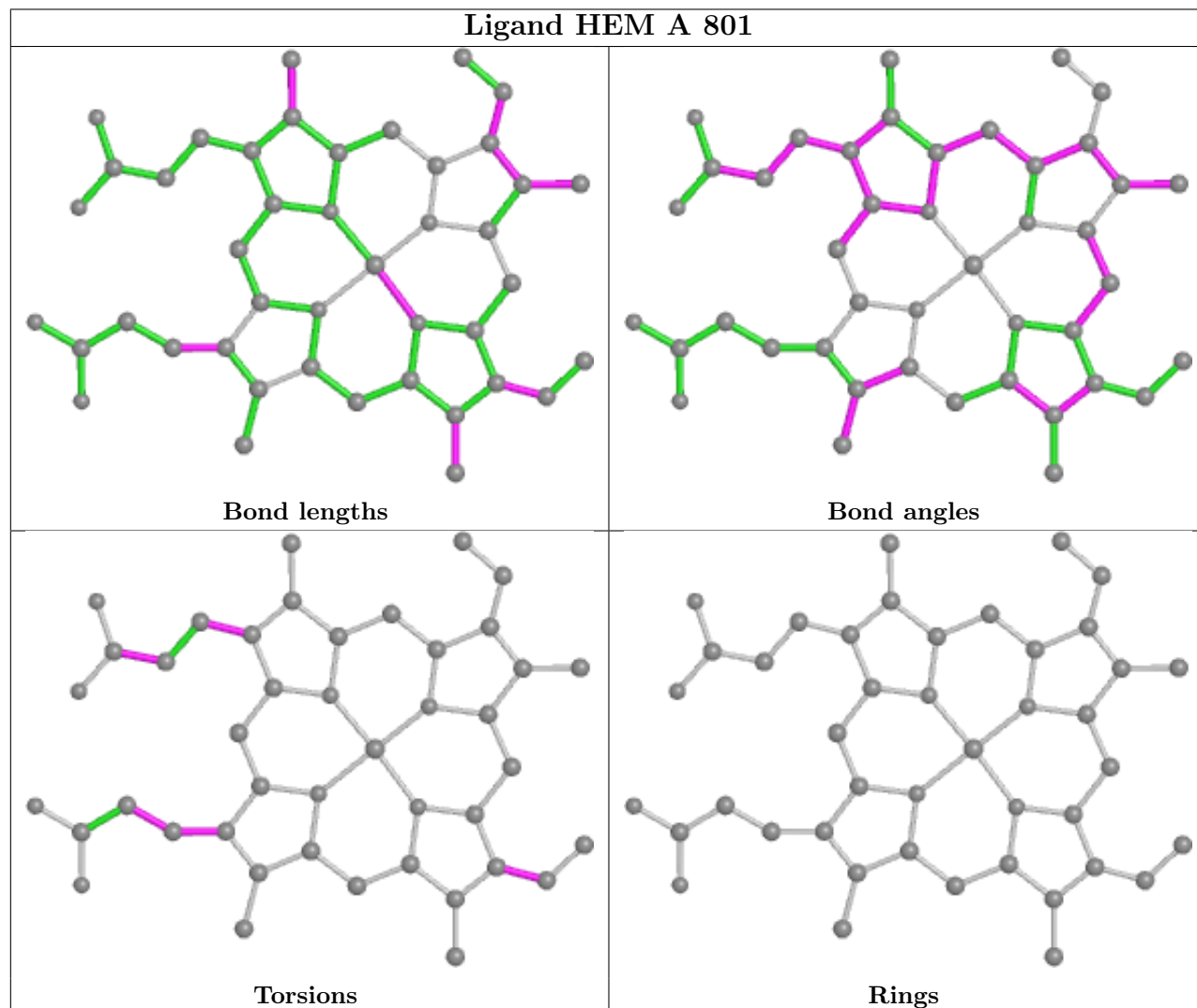
There are no ring outliers.

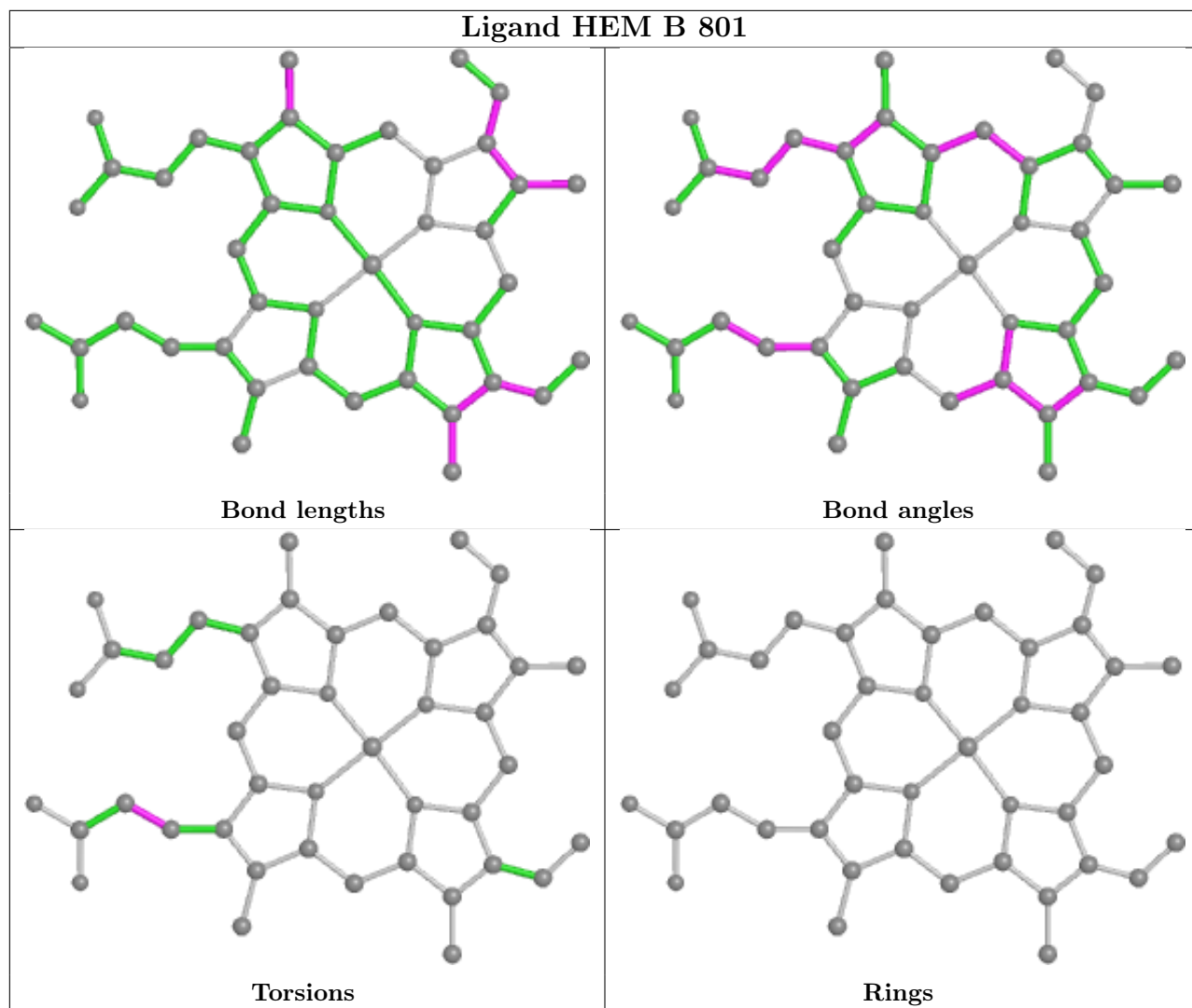
4 monomers are involved in 8 short contacts:

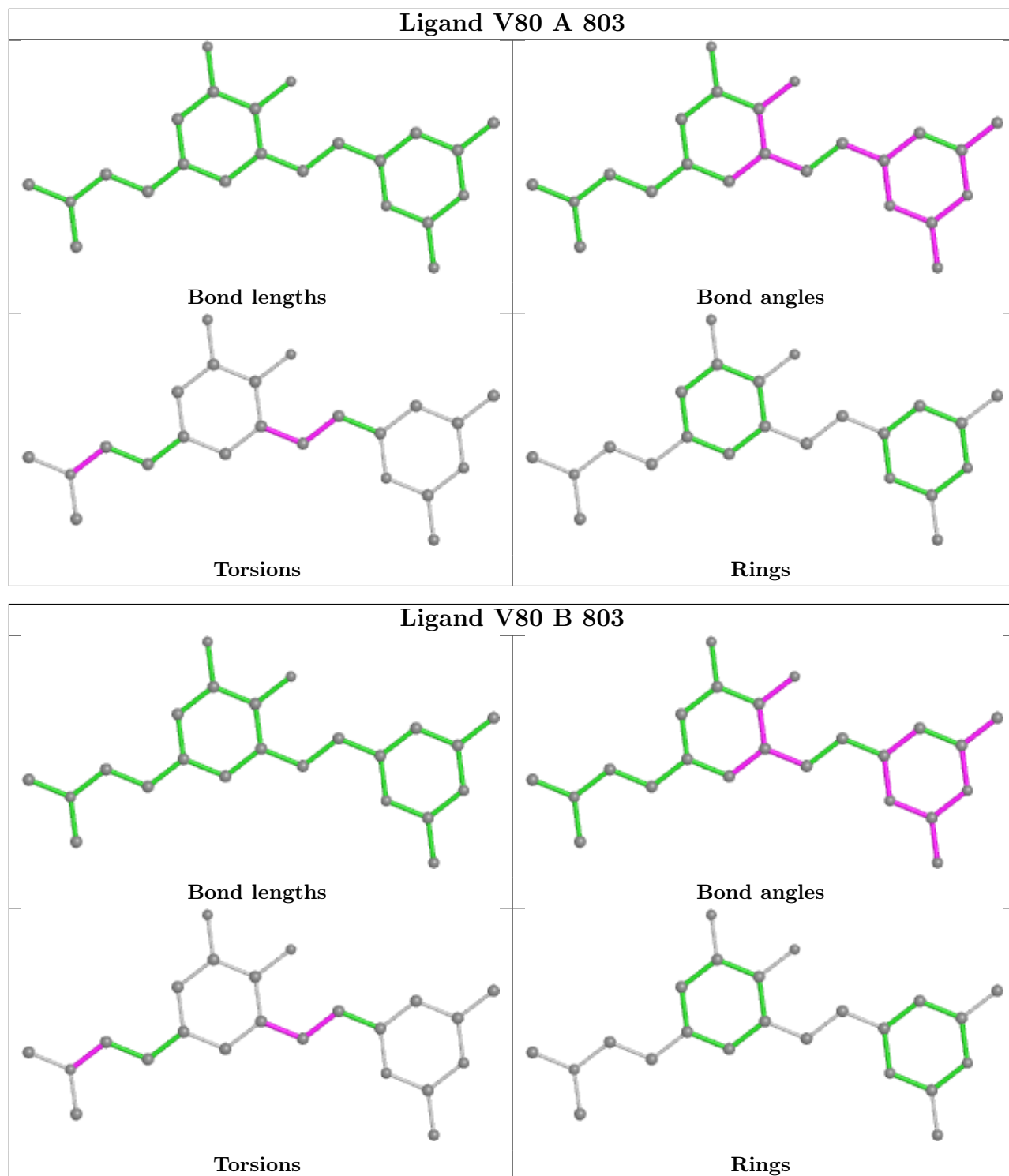
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	801	HEM	3	0
2	B	801	HEM	2	0
4	A	803	V80	1	0
4	B	803	V80	2	0

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

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	410/422 (97%)	0.88	72 (17%) 1 1	38, 64, 112, 138	0
1	B	416/422 (98%)	0.43	35 (8%) 11 13	34, 55, 95, 126	0
All	All	826/844 (97%)	0.65	107 (12%) 3 3	34, 59, 107, 138	0

All (107) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	348	VAL	10.4
1	B	300	PHE	7.9
1	B	342	THR	7.7
1	A	349	ARG	7.3
1	A	715	VAL	6.8
1	A	716	TRP	6.4
1	B	341	HIS	5.7
1	B	677	VAL	5.3
1	A	677	VAL	5.3
1	B	343	ARG	4.9
1	B	348	VAL	4.8
1	B	350	THR	4.7
1	A	506	ILE	4.5
1	B	718	GLY	4.4
1	A	678	TRP	4.3
1	A	350	THR	4.3
1	A	300	PHE	4.2
1	A	469	LYS	4.2
1	A	711	TRP	4.1
1	B	619	ARG	4.0
1	B	299	ARG	3.8
1	A	488	PRO	3.8
1	A	713	THR	3.8
1	A	352	ASP	3.7

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Mol	Chain	Res	Type	RSRZ
1	B	620	LYS	3.7
1	A	712	ASN	3.6
1	A	685	GLY	3.5
1	A	566	ALA	3.5
1	A	679	ILE	3.5
1	B	676	TRP	3.5
1	A	593	ILE	3.5
1	A	355	PHE	3.5
1	A	584	PHE	3.5
1	B	617	ASP	3.4
1	A	676	TRP	3.4
1	A	351	LYS	3.4
1	B	680	VAL	3.3
1	A	393	THR	3.3
1	A	643	SER	3.3
1	A	551	PHE	3.3
1	B	340	GLN	3.2
1	A	490	GLY	3.1
1	A	619	ARG	3.1
1	A	470	HIS	3.1
1	A	489	ASP	3.1
1	A	353	GLN	3.1
1	A	466	THR	3.0
1	A	392	SER	3.0
1	A	479	LEU	3.0
1	B	615	ASP	2.9
1	A	511	LYS	2.9
1	A	299	ARG	2.9
1	B	608	GLU	2.9
1	A	415	CYS	2.9
1	A	491	SER	2.8
1	A	667	ARG	2.8
1	A	339	SER	2.8
1	B	679	ILE	2.8
1	A	507	GLN	2.7
1	A	480	ILE	2.7
1	A	567	VAL	2.7
1	A	588	TYR	2.7
1	B	310	VAL	2.7
1	A	680	VAL	2.6
1	A	373	GLY	2.6
1	A	388	ILE	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	311	VAL	2.6
1	A	389	GLU	2.5
1	B	588	TYR	2.5
1	A	467	ASP	2.5
1	A	416	VAL	2.5
1	A	639	TYR	2.5
1	A	681	PRO	2.4
1	A	682	PRO	2.4
1	A	686	SER	2.4
1	B	567	VAL	2.4
1	A	609	GLU	2.3
1	A	714	HIS	2.3
1	B	591	THR	2.3
1	A	481	ARG	2.3
1	B	561	TRP	2.3
1	B	678	TRP	2.3
1	A	591	THR	2.3
1	B	349	ARG	2.3
1	A	391	THR	2.2
1	A	408	ALA	2.2
1	A	550	LYS	2.2
1	B	611	ALA	2.2
1	B	618	MET	2.2
1	B	302	LYS	2.2
1	B	562	TYR	2.2
1	B	490	GLY	2.2
1	B	565	PRO	2.1
1	A	322	LEU	2.1
1	A	508	GLN	2.1
1	A	691	PHE	2.1
1	A	486	LYS	2.1
1	B	616	LEU	2.1
1	A	478	GLN	2.1
1	B	313	THR	2.1
1	B	318	LEU	2.1
1	B	682	PRO	2.1
1	A	562	TYR	2.1
1	A	386	LYS	2.1
1	A	385	ASN	2.1
1	A	315	THR	2.0
1	A	553	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 [i](#)

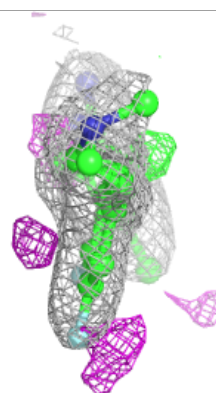
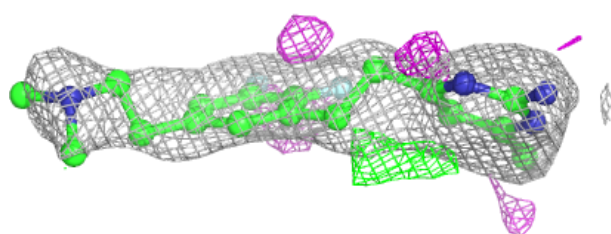
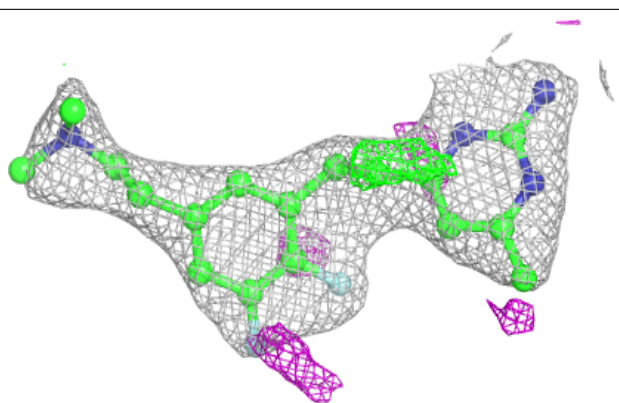
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	V80	A	803	23/23	0.91	0.26	39,71,84,86	0
5	ACT	A	804	4/4	0.91	0.20	77,77,78,80	0
4	V80	B	803	23/23	0.92	0.23	39,70,93,94	0
3	H4B	A	802	17/17	0.95	0.20	38,47,52,55	0
3	H4B	B	802	17/17	0.96	0.20	42,46,53,54	0
2	HEM	B	801	43/43	0.98	0.19	33,46,64,75	0
2	HEM	A	801	43/43	0.98	0.22	37,47,61,64	0
5	ACT	B	804	4/4	0.98	0.19	65,73,80,90	0
6	ZN	B	805	1/1	1.00	0.09	49,49,49,49	0

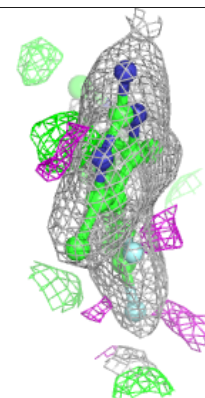
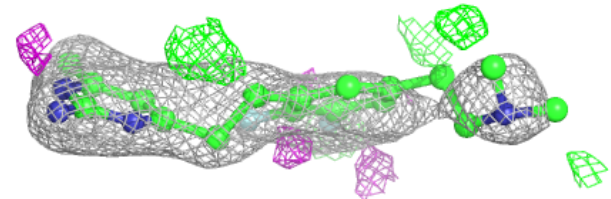
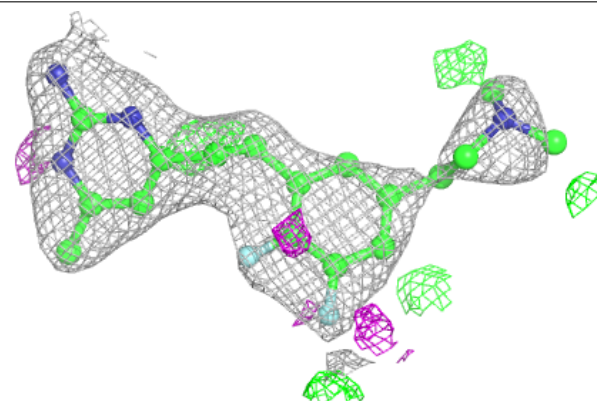
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around V80 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)

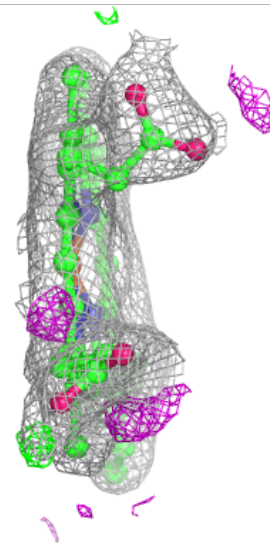
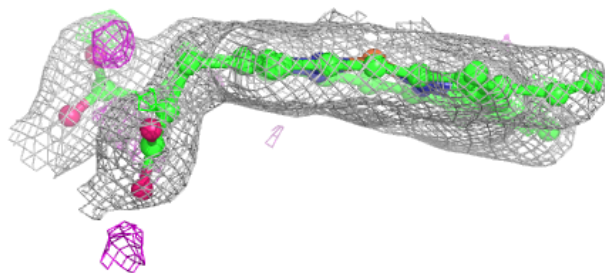
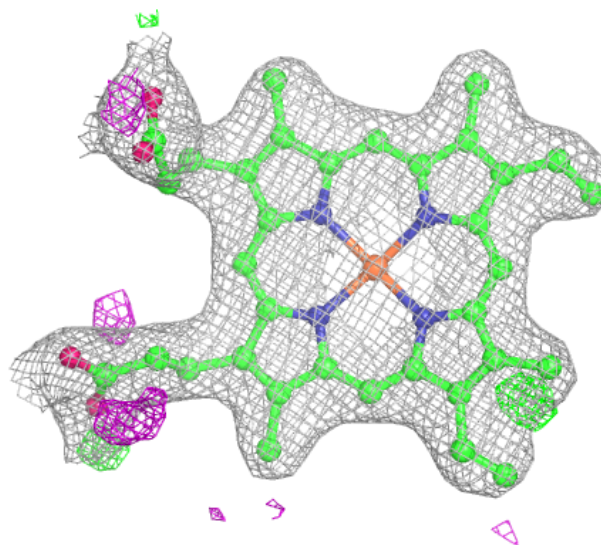
**Electron density around V80 B 803:**

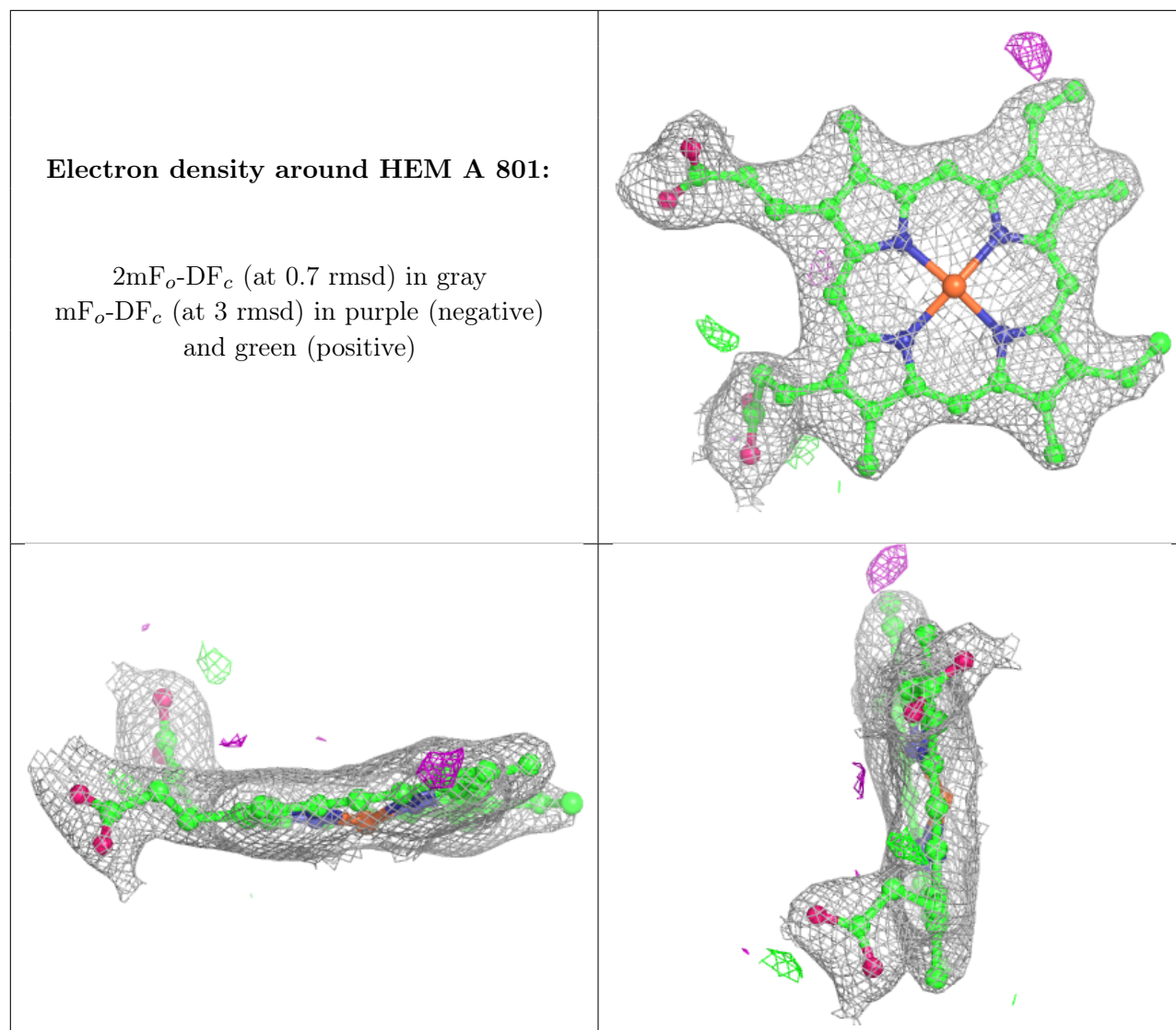
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM B 801:

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





6.5 Other polymers [i](#)

There are no such residues in this entry.