



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 6, 2023 – 02:03 AM EDT

PDB ID : 8FGC  
Title : Structure of rat neuronal nitric oxide synthase heme domain in complex with  
6-(5-(2-aminoethyl)-2,3-difluorophenethyl)-4-methylpyridin-2-amine  
Authors : Li, H.; Poulos, T.L.  
Deposited on : 2022-12-12  
Resolution : 1.78 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

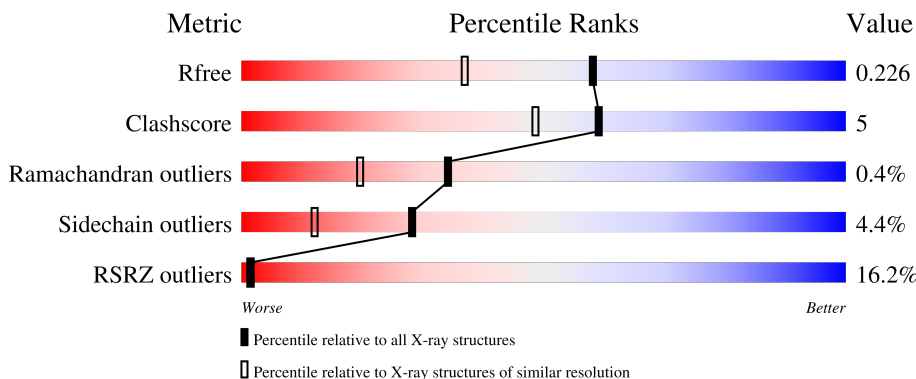
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.78 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	9185 (1.80-1.76)
Clashscore	141614	10184 (1.80-1.76)
Ramachandran outliers	138981	10051 (1.80-1.76)
Sidechain outliers	138945	10050 (1.80-1.76)
RSRZ outliers	127900	9032 (1.80-1.76)

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	 22% 82% 14% ..
1	B	422	 9% 89% 7% ..

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 7295 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 3343	C 2139	N 572	O 610	S 22	0	2	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:  $C_{34}H_{32}FeN_4O_4$ ).



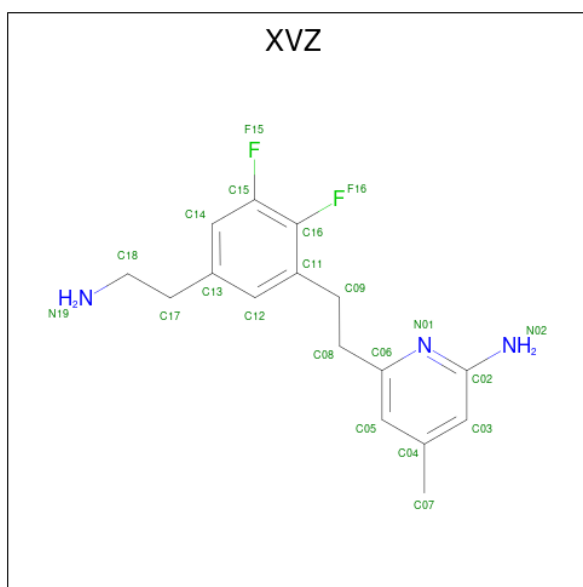
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Fe	N			O
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- 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 6-{2-[5-(2-aminoethyl)-2,3-difluorophenyl]ethyl}-4-methylpyridin-2-amine (three-letter code: XVZ) (formula: C<sub>16</sub>H<sub>19</sub>F<sub>2</sub>N<sub>3</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	F	N		
4	A	1	21	16	2	3	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	F	N		
4	B	1	21	16	2	3	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	3	2	1	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

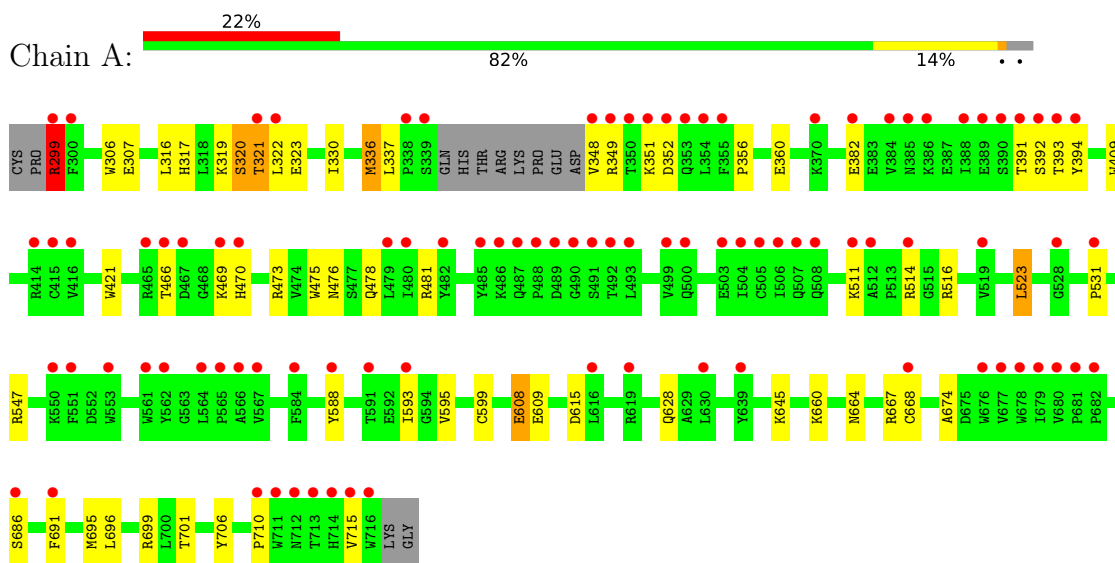
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	164	164	164	0	0
7	B	265	265	265	0	0

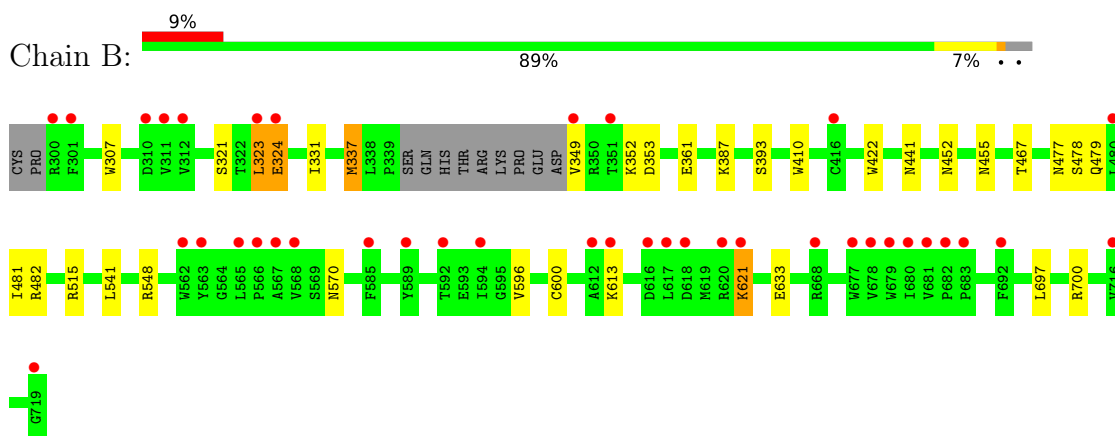
### 3 Residue-property plots [i](#)

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, $\alpha$ , $\beta$ , $\gamma$	52.10Å 111.36Å 164.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.06 – 1.78 39.06 – 1.78	Depositor EDS
% Data completeness (in resolution range)	98.9 (39.06-1.78) 99.6 (39.06-1.78)	Depositor EDS
$R_{merge}$	0.17	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.08 (at 1.78Å)	Xtrriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, $R_{free}$	0.190 , 0.226 0.190 , 0.226	Depositor DCC
$R_{free}$ test set	4606 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	34.6	Xtrriage
Anisotropy	0.877	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 57.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	7295	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	62.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.97% 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: XVZ, H4B, ACT, HEM, 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	0.36	0/3442	0.53	1/4669 (0.0%)
1	B	0.36	0/3456	0.53	0/4685
All	All	0.36	0/6898	0.53	1/9354 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	299	ARG	NE-CZ-NH1	5.20	122.90	120.30

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	3343	0	3258	40	0
1	B	3353	0	3270	25	0
2	A	43	0	30	3	0
2	B	43	0	30	3	0
3	A	17	0	15	1	0
3	B	17	0	15	1	0
4	A	21	0	0	1	0
4	B	21	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	3	0	3	0	0
5	B	4	0	3	1	0
6	A	1	0	0	0	0
7	A	164	0	0	4	0
7	B	265	0	0	4	0
All	All	7295	0	6624	64	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 5.

All (64) 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:322:LEU:HB2	1:A:699:ARG:HD2	1.53	0.91
1:A:523:LEU:HD22	1:A:531:PRO:HB2	1.60	0.83
2:B:801:HEM:HMC2	2:B:801:HEM:HBC2	1.72	0.71
2:A:801:HEM:HMC2	2:A:801:HEM:HBC2	1.74	0.68
1:B:621:LYS:NZ	7:B:902:HOH:O	2.32	0.62
1:B:323:LEU:HG	1:B:324:GLU:H	1.65	0.60
5:B:804:ACT:O	7:B:901:HOH:O	2.15	0.60
1:A:478:GLN:OE1	1:A:481:ARG:HD2	2.03	0.59
1:A:352:ASP:O	1:A:356:PRO:HD2	2.02	0.58
1:B:323:LEU:HB3	1:B:700:ARG:HD3	1.84	0.58
1:A:628:GLN:NE2	1:B:633:GLU:OE2	2.36	0.58
1:A:660:LYS:HE2	1:A:664:ASN:HD21	1.69	0.57
1:A:299:ARG:HH11	1:A:299:ARG:HG3	1.70	0.57
2:B:801:HEM:HBB2	2:B:801:HEM:HHC	1.85	0.57
1:A:351:LYS:HE2	1:A:392:SER:HB3	1.88	0.55
1:A:330:ILE:HD11	1:B:697:LEU:HB3	1.89	0.54
1:B:323:LEU:HB2	1:B:700:ARG:HH11	1.72	0.54
1:A:321:THR:HG23	1:A:322:LEU:H	1.73	0.53
1:A:701:THR:HG22	7:A:1001:HOH:O	2.08	0.53
1:A:306:TRP:CE2	1:B:337:MET:HE3	2.44	0.53
1:A:299:ARG:HH11	1:A:299:ARG:CG	2.23	0.52
1:A:706:TYR:OH	2:A:801:HEM:O1D	2.21	0.52
1:B:479:GLN:HG2	4:B:803:XVZ:C16	2.39	0.52
1:B:479:GLN:OE1	1:B:482:ARG:HD2	2.10	0.51
1:B:596:VAL:O	1:B:600:CYS:HB2	2.10	0.51
1:A:475:TRP:HB2	1:A:523:LEU:HB3	1.92	0.51
1:A:316:LEU:HD12	1:A:319:LYS:HE2	1.93	0.51
1:A:306:TRP:NE1	1:B:337:MET:HE3	2.25	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:801:HEM:HBB2	2:A:801:HEM:HHC	1.93	0.50
1:A:478:GLN:HG2	4:A:803:XVZ:C16	2.42	0.50
1:A:348:VAL:HG21	1:A:466:THR:O	2.13	0.48
1:A:307:GLU:HG3	7:B:1042:HOH:O	2.14	0.48
1:A:516:ARG:NH1	7:A:903:HOH:O	2.45	0.47
1:A:696:LEU:HB3	1:B:331:ILE:HD11	1.97	0.47
1:A:336:MET:HE2	1:A:336:MET:HB2	1.88	0.47
1:A:336:MET:HE3	1:B:307:TRP:CE2	2.51	0.46
1:B:387:LYS:HB3	1:B:387:LYS:HE2	1.65	0.46
1:B:323:LEU:HB2	1:B:700:ARG:NH1	2.30	0.45
1:A:608:GLU:H	1:A:608:GLU:HG2	1.40	0.45
1:A:478:GLN:HB2	1:A:481:ARG:HG3	1.99	0.45
1:B:478:SER:HA	1:B:570:ASN:HB3	1.99	0.45
1:B:613:LYS:HB3	1:B:613:LYS:HE2	1.76	0.44
1:A:473:ARG:NH2	1:A:710:PRO:HD3	2.32	0.44
1:A:317:HIS:O	1:A:320:SER:HB3	2.18	0.44
1:A:595:VAL:O	1:A:599:CYS:HB2	2.18	0.43
1:B:452:ASN:HB3	1:B:455:ASN:O	2.18	0.43
1:A:336:MET:HE2	3:A:802:H4B:H9	2.00	0.43
1:B:323:LEU:CB	1:B:700:ARG:HD3	2.49	0.42
1:A:588:TYR:CD1	1:A:593:ILE:HD11	2.53	0.42
1:A:391:THR:O	1:A:392:SER:OG	2.32	0.42
1:A:667:ARG:NH1	1:A:668[A]:CYS:SG	2.93	0.42
1:B:349:VAL:HG21	1:B:467:THR:O	2.19	0.42
1:A:701:THR:HG21	7:A:901:HOH:O	2.20	0.41
1:A:668[B]:CYS:HB2	7:A:1052:HOH:O	2.20	0.41
1:B:337:MET:HE2	3:B:802:H4B:H9	2.01	0.41
1:A:409:TRP:CE3	1:A:421:TRP:HA	2.56	0.41
1:B:410:TRP:CE3	1:B:422:TRP:HA	2.56	0.41
1:B:441:ASN:ND2	7:B:911:HOH:O	2.50	0.41
1:A:306:TRP:CD1	1:B:337:MET:HE3	2.57	0.40
1:A:393:THR:OG1	1:A:394:TYR:N	2.55	0.40
1:A:674:ALA:HB3	1:A:695:MET:HB3	2.03	0.40
1:A:686:SER:HA	1:A:691:PHE:CG	2.56	0.40
1:B:479:GLN:HB2	1:B:482:ARG:HG3	2.03	0.40
2:B:801:HEM:HBB2	2:B:801:HEM:CHC	2.50	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%)	392 (96%)	15 (4%)	1 (0%)	47	32
1	B	410/422 (97%)	401 (98%)	7 (2%)	2 (0%)	29	14
All	All	818/844 (97%)	793 (97%)	22 (3%)	3 (0%)	34	19

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	514	ARG
1	B	323	LEU
1	B	353	ASP

### 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%)	348 (95%)	20 (5%)	22	8
1	B	369/377 (98%)	357 (97%)	12 (3%)	38	21
All	All	737/754 (98%)	705 (96%)	32 (4%)	28	12

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	299	ARG
1	A	320	SER
1	A	321	THR

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Mol	Chain	Res	Type
1	A	323	GLU
1	A	336	MET
1	A	337	LEU
1	A	349	ARG
1	A	360	GLU
1	A	382	GLU
1	A	469	LYS
1	A	470	HIS
1	A	476	ASN
1	A	511	LYS
1	A	523	LEU
1	A	547	ARG
1	A	608	GLU
1	A	609	GLU
1	A	615	ASP
1	A	645	LYS
1	A	715	VAL
1	B	321	SER
1	B	324	GLU
1	B	337	MET
1	B	352	LYS
1	B	361	GLU
1	B	393	SER
1	B	477	ASN
1	B	481	ILE
1	B	515	ARG
1	B	541	LEU
1	B	548	ARG
1	B	621	LYS

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
3	H4B	B	802	-	16,18,18	0.72	0	11,26,26	2.51	6 (54%)
3	H4B	A	802	-	16,18,18	0.72	0	11,26,26	2.45	5 (45%)
2	HEM	A	801	1	41,50,50	1.50	4 (9%)	45,82,82	1.64	9 (20%)
5	ACT	B	804	-	3,3,3	0.70	0	3,3,3	1.00	0
4	XVZ	A	803	-	21,22,22	0.52	0	28,30,30	2.11	9 (32%)
4	XVZ	B	803	-	21,22,22	0.51	0	28,30,30	2.09	9 (32%)
5	ACT	A	804	-	1,2,3	1.28	0	1,1,3	0.69	0
2	HEM	B	801	1	41,50,50	1.41	6 (14%)	45,82,82	1.43	6 (13%)

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	B	802	-	-	0/8/17/17	0/2/2/2
3	H4B	A	802	-	-	0/8/17/17	0/2/2/2
2	HEM	A	801	1	-	1/12/54/54	-
4	XVZ	A	803	-	-	3/8/8/8	0/2/2/2
4	XVZ	B	803	-	-	1/8/8/8	0/2/2/2
2	HEM	B	801	1	-	0/12/54/54	-

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	801	HEM	C3C-CAC	3.61	1.55	1.47
2	A	801	HEM	C3C-C2C	-3.58	1.35	1.40
2	B	801	HEM	C3C-C2C	-3.53	1.35	1.40
2	B	801	HEM	C3C-CAC	3.49	1.55	1.47
2	A	801	HEM	FE-NB	2.86	2.11	1.96
2	A	801	HEM	CAB-C3B	2.82	1.55	1.47
2	B	801	HEM	CAB-C3B	2.75	1.54	1.47
2	B	801	HEM	CMB-C2B	2.08	1.55	1.50
2	B	801	HEM	CMD-C2D	2.06	1.55	1.50
2	B	801	HEM	FE-NB	2.02	2.06	1.96

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	HEM	CBA-CAA-C2A	-5.17	103.79	112.62
4	B	803	XVZ	C02-N01-C06	5.09	121.95	118.10
3	B	802	H4B	C8A-C4A-C4	4.90	118.92	114.57
4	A	803	XVZ	C09-C08-C06	-4.67	102.53	112.99
4	A	803	XVZ	C09-C11-C16	-4.48	117.13	120.73
3	A	802	H4B	C8A-C4A-C4	4.46	118.53	114.57
4	A	803	XVZ	C02-N01-C06	4.31	121.37	118.10
4	B	803	XVZ	C09-C08-C06	-4.18	103.62	112.99
2	B	801	HEM	CBA-CAA-C2A	-4.03	105.75	112.62
4	A	803	XVZ	C08-C09-C11	3.86	119.06	112.81
2	A	801	HEM	C4B-CHC-C1C	3.62	127.33	122.56
4	B	803	XVZ	C05-C06-N01	-3.53	119.16	122.90
3	B	802	H4B	C2-N3-C4	3.51	121.50	115.93
4	B	803	XVZ	C08-C09-C11	3.39	118.29	112.81
3	A	802	H4B	C4-C4A-N5	3.27	121.87	119.12
4	A	803	XVZ	C05-C06-N01	-3.26	119.44	122.90
2	A	801	HEM	CMC-C2C-C3C	3.13	130.53	124.68
2	B	801	HEM	C4B-CHC-C1C	3.11	126.66	122.56
4	B	803	XVZ	C08-C06-N01	3.09	120.56	115.95
4	B	803	XVZ	F16-C16-C11	3.09	121.11	117.85
3	A	802	H4B	N1-C2-N3	-3.07	120.61	125.42
3	B	802	H4B	N1-C2-N3	-3.06	120.62	125.42
2	A	801	HEM	CBD-CAD-C3D	-3.04	104.17	112.63
4	B	803	XVZ	C09-C11-C16	-2.96	118.35	120.73
3	A	802	H4B	C2-N3-C4	2.90	120.54	115.93
4	A	803	XVZ	C12-C11-C16	2.81	119.33	116.76
2	B	801	HEM	CMA-C3A-C4A	-2.80	124.17	128.46
2	A	801	HEM	CHC-C4B-C3B	2.75	128.78	124.57
3	A	802	H4B	C2-N1-C8A	2.74	120.69	114.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	803	XVZ	C12-C11-C16	2.64	119.18	116.76
4	A	803	XVZ	C08-C06-N01	2.56	119.76	115.95
4	B	803	XVZ	N02-C02-N01	2.49	120.42	116.49
2	B	801	HEM	CBD-CAD-C3D	-2.46	105.80	112.63
3	B	802	H4B	C4-C4A-N5	2.44	121.17	119.12
3	B	802	H4B	C2-N1-C8A	2.40	119.91	114.54
2	B	801	HEM	CMC-C2C-C3C	2.39	129.16	124.68
2	A	801	HEM	C4D-ND-C1D	2.20	107.35	105.07
2	A	801	HEM	C3C-C4C-NC	-2.18	106.83	110.94
3	B	802	H4B	N2-C2-N1	2.18	120.64	117.25
4	A	803	XVZ	F16-C16-C11	2.17	120.14	117.85
2	A	801	HEM	C1B-NB-C4B	2.06	107.20	105.07
4	A	803	XVZ	C09-C11-C12	2.05	123.54	119.41
2	B	801	HEM	C3C-C4C-NC	-2.04	107.08	110.94
2	A	801	HEM	C3B-C2B-C1B	2.00	107.97	106.49

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	HEM	C4B-C3B-CAB-CBB
4	A	803	XVZ	C12-C13-C17-C18
4	A	803	XVZ	C14-C13-C17-C18
4	A	803	XVZ	C08-C09-C11-C16
4	B	803	XVZ	C08-C09-C11-C16

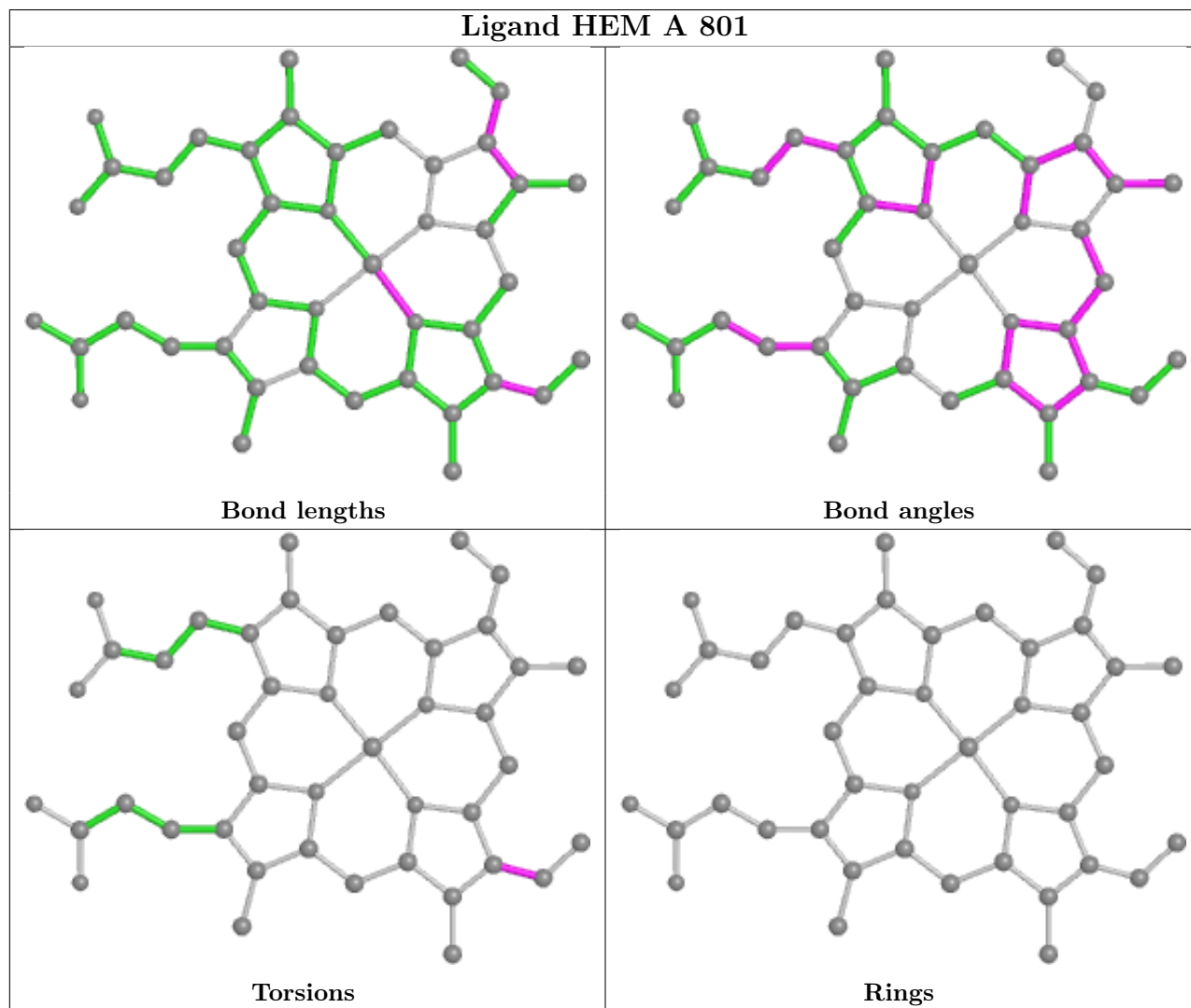
There are no ring outliers.

7 monomers are involved in 11 short contacts:

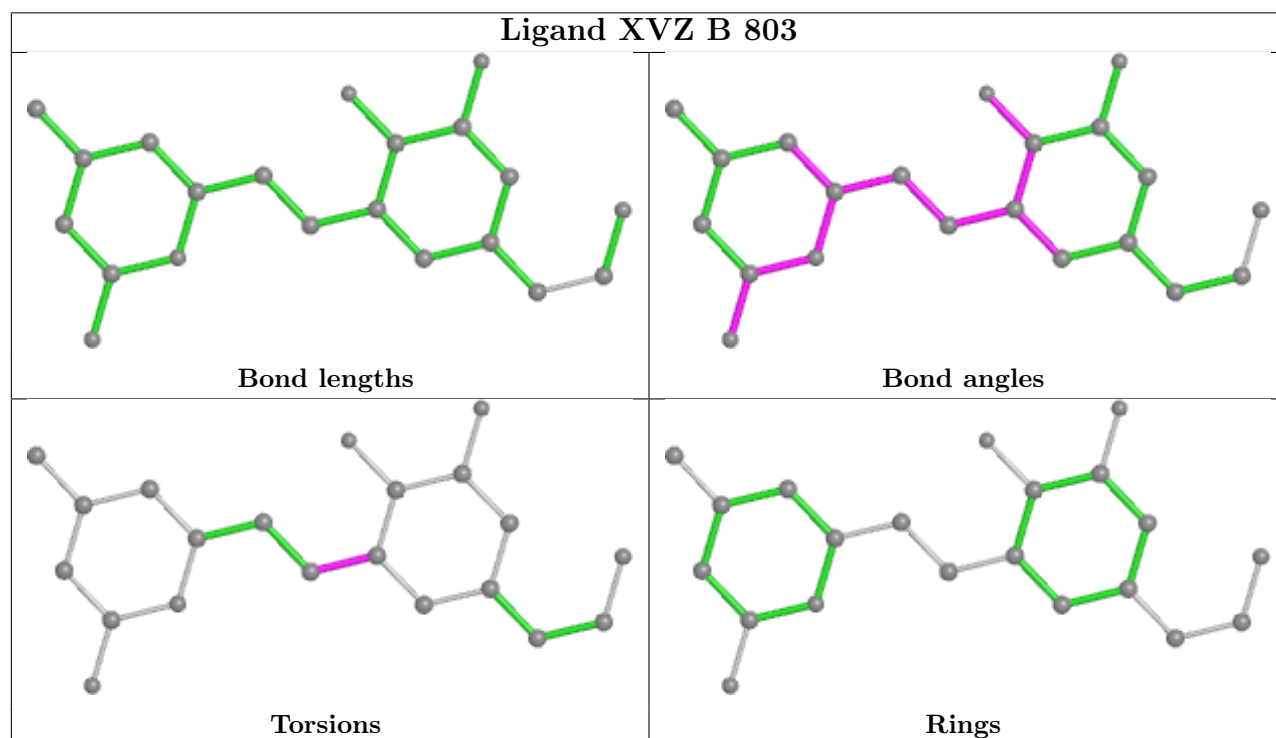
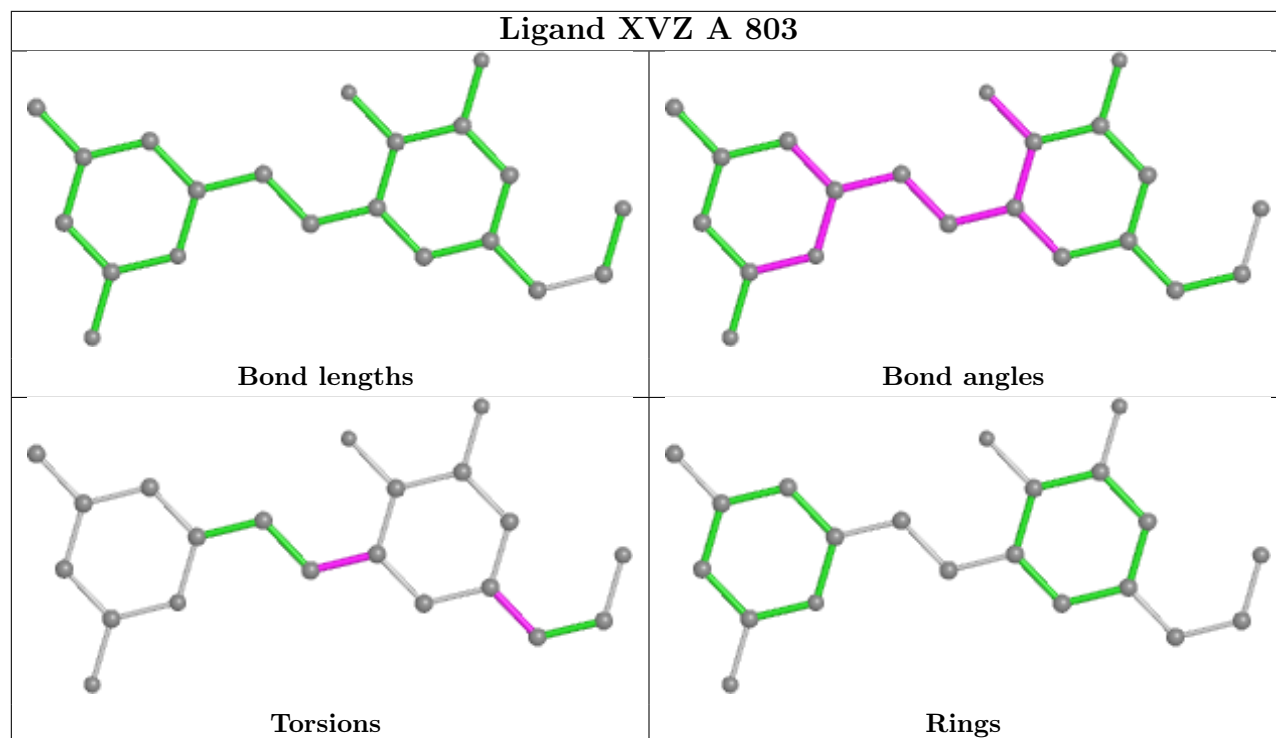
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	802	H4B	1	0
3	A	802	H4B	1	0
2	A	801	HEM	3	0
5	B	804	ACT	1	0
4	A	803	XVZ	1	0
4	B	803	XVZ	1	0
2	B	801	HEM	3	0

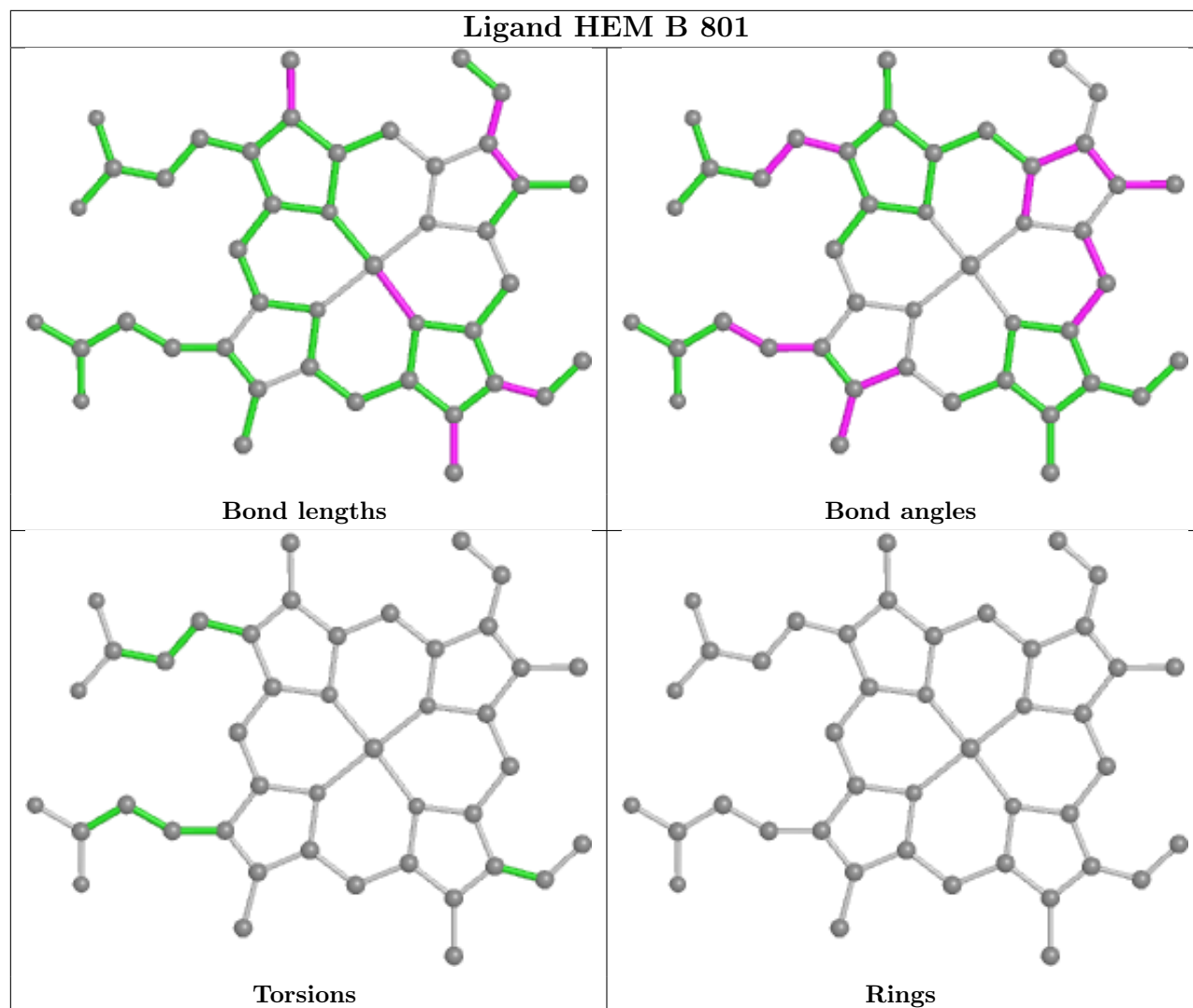
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

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	410/422 (97%)	1.20	94 (22%) 0 0	37, 64, 115, 152	0
1	B	411/422 (97%)	0.56	39 (9%) 8 8	36, 52, 90, 116	0
All	All	821/844 (97%)	0.88	133 (16%) 1 1	36, 57, 108, 152	0

All (133) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	715	VAL	11.4
1	B	301	PHE	11.1
1	A	716	TRP	8.4
1	A	348	VAL	8.0
1	A	488	PRO	7.7
1	A	300	PHE	6.6
1	A	349	ARG	6.4
1	A	388	ILE	6.3
1	A	355	PHE	6.2
1	B	351	THR	6.2
1	B	349	VAL	6.0
1	A	352	ASP	5.8
1	A	713	THR	5.7
1	B	719	GLY	5.6
1	B	678	VAL	5.5
1	A	679	ILE	5.2
1	A	299	ARG	5.1
1	B	617	LEU	5.1
1	A	619	ARG	5.1
1	A	567	VAL	5.0
1	A	508	GLN	5.0
1	A	678	TRP	5.0
1	A	677	VAL	4.9
1	A	489	ASP	4.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	507	GLN	4.5
1	A	351	LYS	4.4
1	A	391	THR	4.4
1	A	322	LEU	4.3
1	A	676	TRP	4.2
1	B	323	LEU	4.2
1	B	300	ARG	4.2
1	A	680	VAL	4.2
1	A	350	THR	4.2
1	A	321	THR	4.1
1	B	567	ALA	4.1
1	A	393	THR	4.0
1	A	339	SER	4.0
1	A	480	ILE	4.0
1	B	681	VAL	4.0
1	B	679	TRP	3.9
1	B	621	LYS	3.9
1	A	710	PRO	3.9
1	B	620	ARG	3.8
1	B	680	ILE	3.8
1	A	469	LYS	3.8
1	A	479	LEU	3.8
1	A	714	HIS	3.8
1	A	584	PHE	3.7
1	A	486	LYS	3.7
1	A	386	LYS	3.7
1	B	612	ALA	3.7
1	B	692	PHE	3.7
1	A	385	ASN	3.6
1	A	712	ASN	3.6
1	B	616	ASP	3.6
1	B	618	ASP	3.6
1	A	503	GLU	3.5
1	B	716	VAL	3.5
1	A	551	PHE	3.4
1	A	487	GLN	3.4
1	A	338	PRO	3.4
1	B	677	TRP	3.4
1	B	568	VAL	3.3
1	A	490	GLY	3.3
1	A	389	GLU	3.3
1	A	491	SER	3.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	553	TRP	3.3
1	A	506	ILE	3.2
1	A	691	PHE	3.2
1	A	561	TRP	3.2
1	A	588	TYR	3.2
1	A	390	SER	3.2
1	A	566	ALA	3.1
1	A	681	PRO	3.1
1	B	613	LYS	3.1
1	A	392	SER	3.1
1	A	593	ILE	3.1
1	A	467	ASP	3.1
1	A	711	TRP	3.1
1	A	470	HIS	3.0
1	B	562	TRP	3.0
1	B	563	TYR	3.0
1	A	500	GLN	3.0
1	A	353	GLN	3.0
1	A	504	ILE	3.0
1	A	416	VAL	2.8
1	A	354	LEU	2.8
1	A	528	GLY	2.8
1	A	415	CYS	2.8
1	A	531	PRO	2.8
1	A	565	PRO	2.7
1	A	562	TYR	2.7
1	B	312	VAL	2.7
1	A	682	PRO	2.7
1	A	591	THR	2.7
1	A	514	ARG	2.6
1	A	630	LEU	2.6
1	A	394	TYR	2.6
1	A	505	CYS	2.6
1	A	499	VAL	2.5
1	A	512	ALA	2.5
1	A	466	THR	2.5
1	A	482	TYR	2.5
1	A	382	GLU	2.5
1	A	492	THR	2.5
1	B	683	PRO	2.4
1	B	594	ILE	2.4
1	A	564	LEU	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	310	ASP	2.4
1	A	384	VAL	2.4
1	B	668	ARG	2.4
1	B	589	TYR	2.4
1	A	465	ARG	2.4
1	B	585	PHE	2.4
1	A	370	LYS	2.4
1	B	682	PRO	2.3
1	B	324	GLU	2.3
1	B	592	THR	2.3
1	A	493	LEU	2.3
1	A	485	TYR	2.3
1	A	519	VAL	2.2
1	A	668[A]	CYS	2.2
1	A	616	LEU	2.2
1	A	639	TYR	2.2
1	B	416	CYS	2.2
1	A	414	ARG	2.1
1	B	311	VAL	2.1
1	A	511	LYS	2.1
1	A	550	LYS	2.0
1	B	566	PRO	2.0
1	A	686	SER	2.0
1	B	480	LEU	2.0
1	B	565	LEU	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](#)

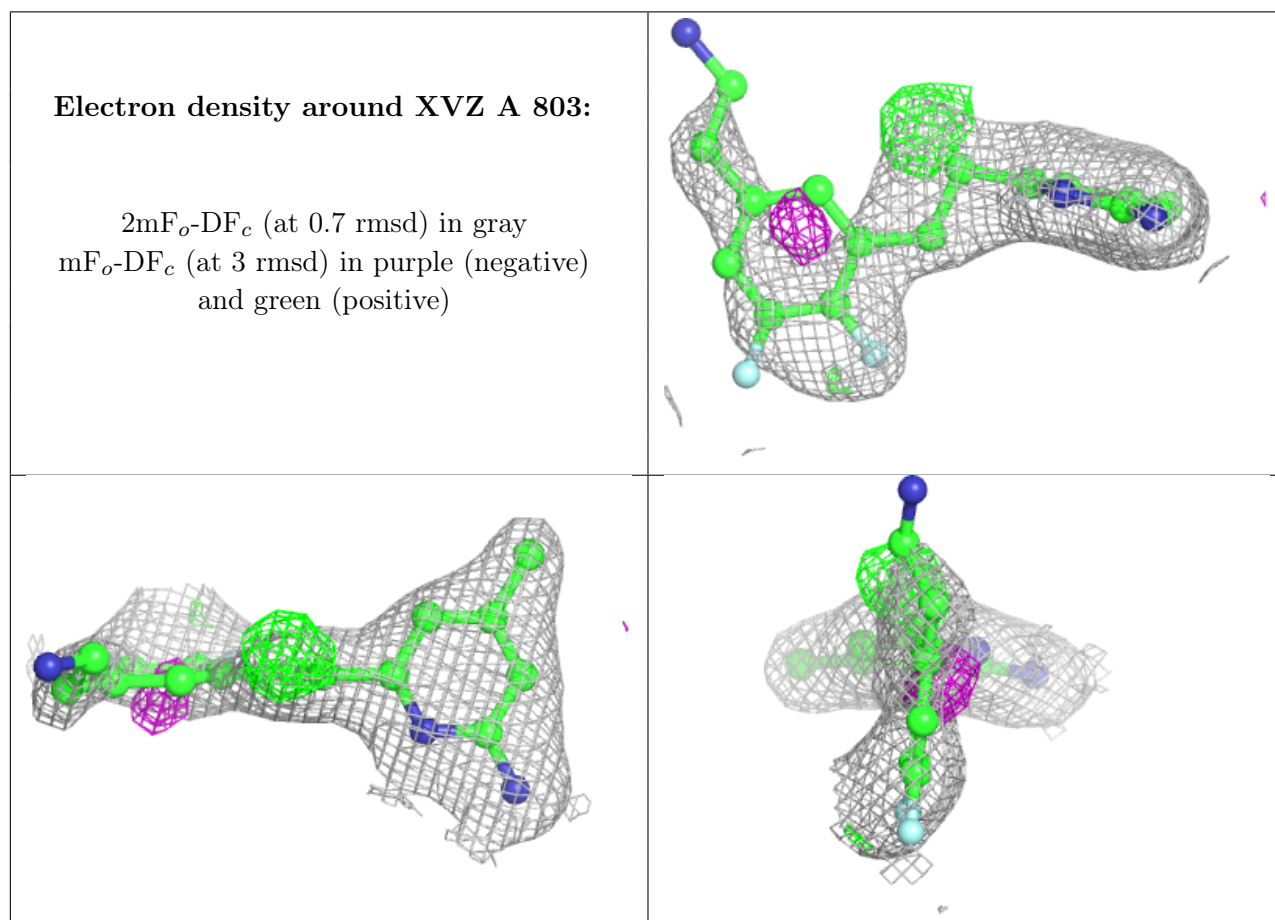
There are no monosaccharides in this entry.

## 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.

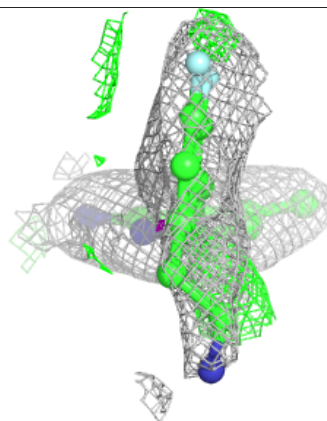
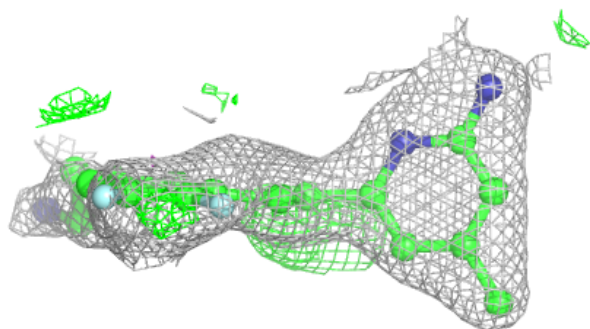
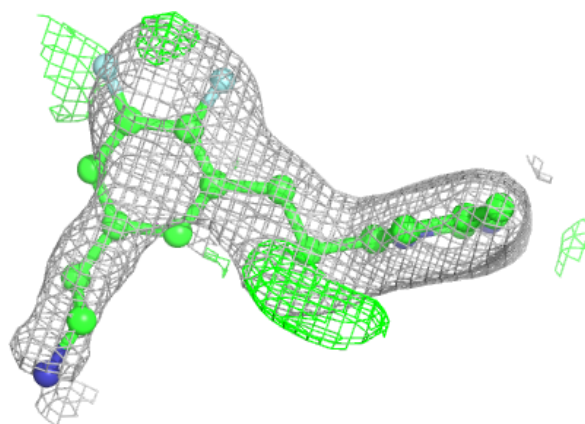
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	ACT	A	804	3/4	0.74	0.27	79,79,80,83	0
5	ACT	B	804	4/4	0.86	0.18	67,75,77,83	0
4	XVZ	A	803	21/21	0.90	0.39	39,81,109,110	0
3	H4B	A	802	17/17	0.92	0.19	40,44,52,53	0
4	XVZ	B	803	21/21	0.92	0.29	37,74,106,108	0
3	H4B	B	802	17/17	0.96	0.21	39,44,50,52	0
2	HEM	B	801	43/43	0.97	0.18	32,44,52,61	0
2	HEM	A	801	43/43	0.98	0.22	32,45,55,59	0
6	ZN	A	805	1/1	0.99	0.07	46,46,46,46	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 XVZ B 803:**

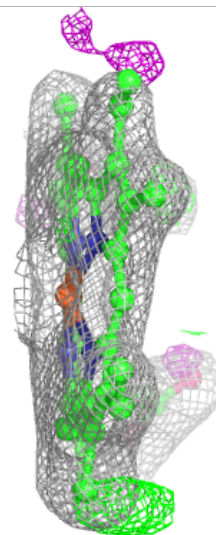
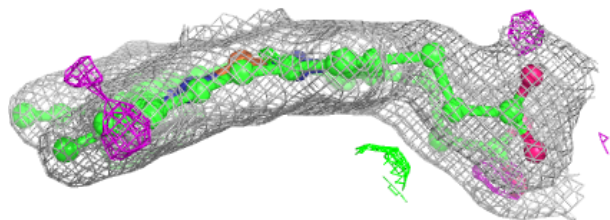
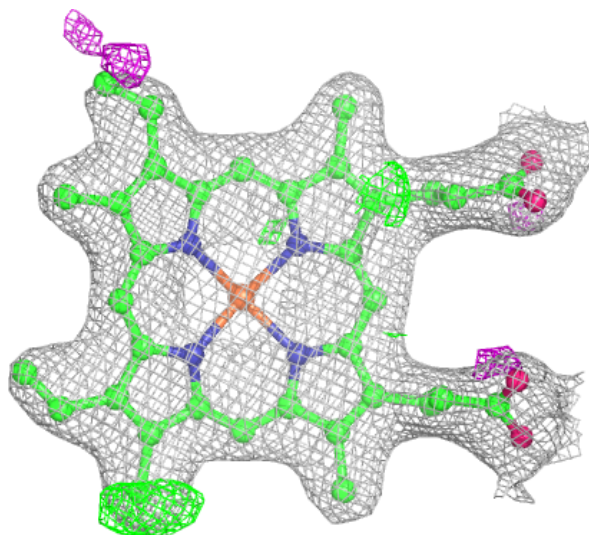
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

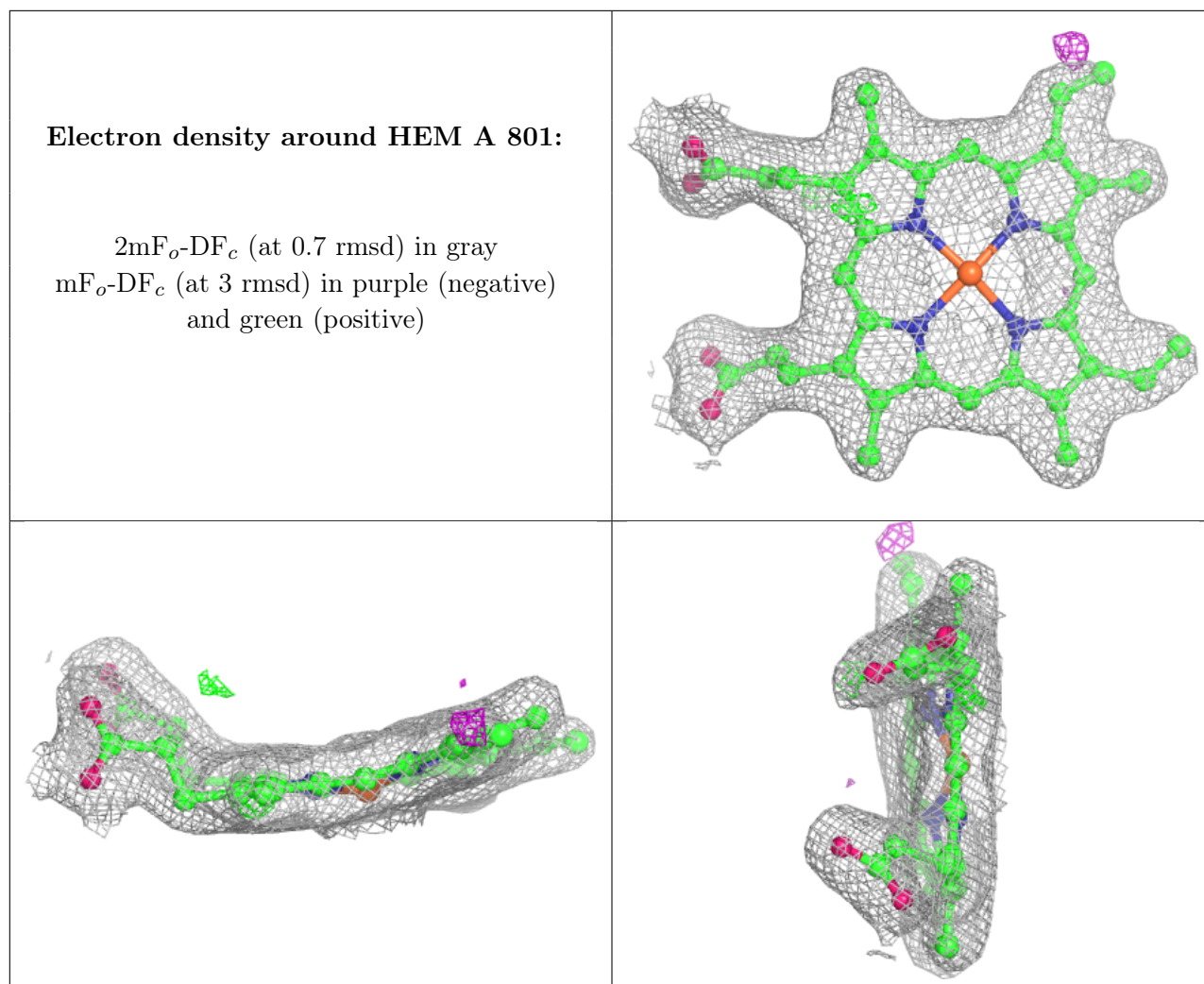




**Electron density around HEM B 801:**

$2mF_o-DF_c$  (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.