



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 6, 2023 – 01:46 AM EDT

PDB ID : 8FGA  
Title : Structure of rat neuronal nitric oxide synthase heme domain in complex with 6-(5-(2-(dimethylamino)ethyl)-2,3-difluorophenethyl)-4-methylpyridin-2-amine  
Authors : Li, H.; Poulos, T.L.  
Deposited on : 2022-12-12  
Resolution : 1.89 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

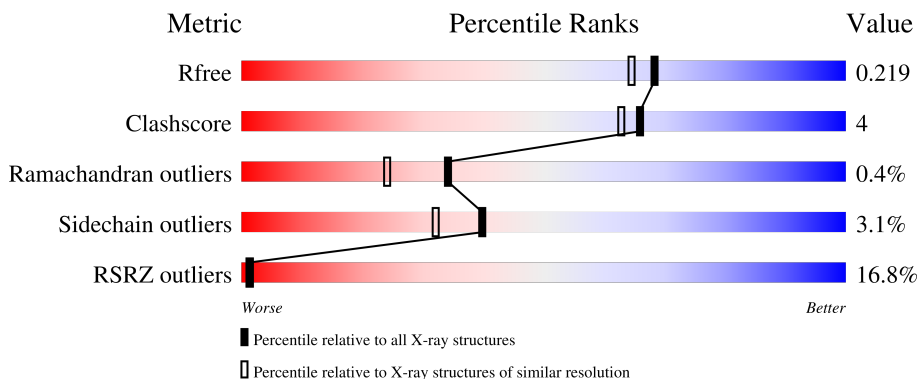
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.89 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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  $\geq 3$ , 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% 83% 13% ••
1	B	422	 11% 90% 8% •

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 7252 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 3349	C 2142	N 574	O 611	S 22	0	2	0
1	B	416	Total 3396	C 2169	N 585	O 620	S 22	0	3	0

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



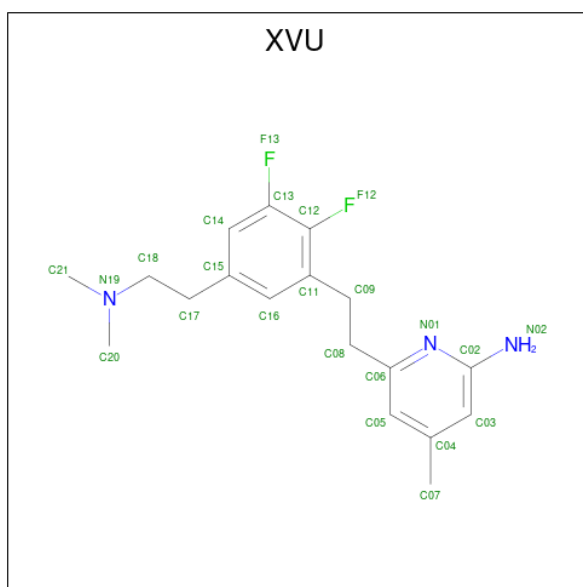
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	Fe	N	O		
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

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

- Molecule 4 is 6-(2-{5-[2-(dimethylamino)ethyl]-2,3-difluorophenyl}ethyl)-4-methylpyridin-2-amine (three-letter code: XVU) (formula:  $C_{18}H_{23}F_2N_3$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	F	N	0	0
			23	18	2	3		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	F	N		
4	B	1	23	18	2	3	0	0

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula:  $C_2H_3O_2$ ).



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

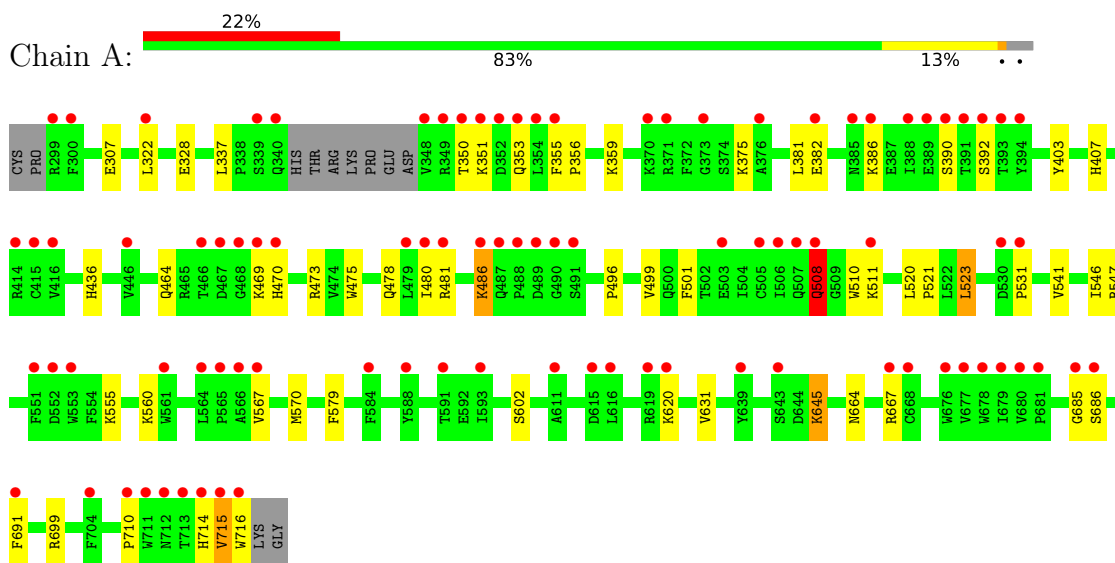
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	132	132	132	0	0
7	B	200	200	200	0	0

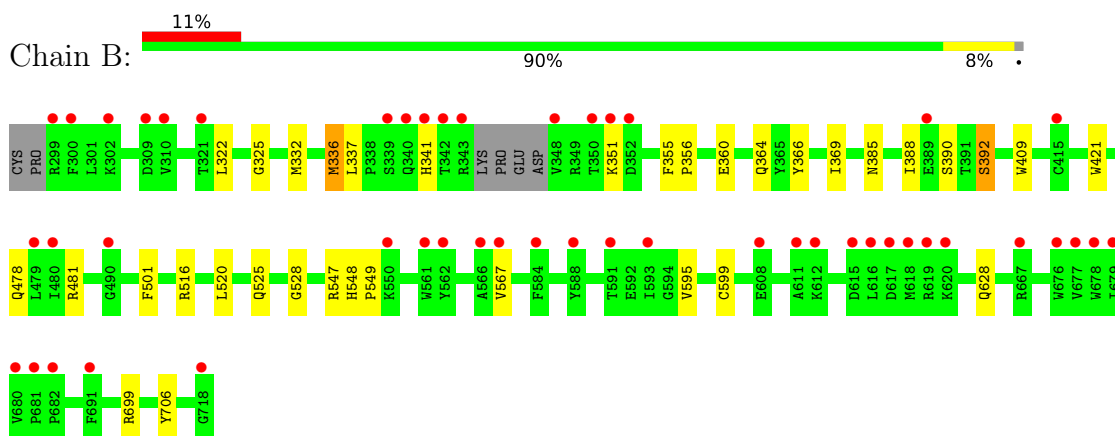
### 3 Residue-property plots [i](#)

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, $\alpha$ , $\beta$ , $\gamma$	51.98Å 111.16Å 164.70Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.07 – 1.89 39.06 – 1.89	Depositor EDS
% Data completeness (in resolution range)	95.5 (39.07-1.89) 96.1 (39.06-1.89)	Depositor EDS
$R_{merge}$	0.20	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.36 (at 1.89Å)	Xtrriage
Refinement program	PHENIX 1.11.1-2575_1496	Depositor
R, $R_{free}$	0.183 , 0.220 0.182 , 0.219	Depositor DCC
$R_{free}$ test set	3638 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	33.0	Xtrriage
Anisotropy	1.017	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 54.8	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	7252	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	59.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.70% 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: ACT, XVU, H4B, 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	0/3445	0.49	0/4673
1	B	0.38	0/3500	0.51	0/4744
All	All	0.37	0/6945	0.50	0/9417

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	3349	0	3261	31	0
1	B	3396	0	3310	19	0
2	A	43	0	30	3	0
2	B	43	0	30	3	0
3	A	17	0	15	0	0
3	B	17	0	15	1	0
4	A	23	0	0	2	0
4	B	23	0	0	1	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	132	0	0	1	0
7	B	200	0	0	2	0
All	All	7252	0	6667	54	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 (54) 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	1.68	0.75
2:B:801:HEM:HBB2	2:B:801:HEM:HHC	1.70	0.73
1:A:351:LYS:HE2	1:A:392:SER:HB3	1.71	0.70
2:A:801:HEM:HBB2	2:A:801:HEM:HHC	1.74	0.70
1:B:478:GLN:HB2	1:B:481:ARG:HG3	1.74	0.70
2:B:801:HEM:HMC2	2:B:801:HEM:HBC2	1.76	0.68
2:A:801:HEM:HMC2	2:A:801:HEM:HBC2	1.78	0.66
1:B:364:GLN:OE1	7:B:901:HOH:O	2.14	0.65
1:A:478:GLN:HB2	1:A:481:ARG:HG3	1.81	0.63
1:A:436:HIS:ND1	7:A:901:HOH:O	2.32	0.60
1:A:480:ILE:HD13	1:A:541:VAL:HG13	1.87	0.56
1:A:322:LEU:HB3	1:A:699:ARG:HH21	1.73	0.54
1:A:631:VAL:HG11	1:B:628:GLN:HG3	1.91	0.52
1:B:706:TYR:OH	2:B:801:HEM:O2D	2.20	0.52
1:B:567:VAL:HG21	4:B:803:XVU:C12	2.41	0.50
1:A:475:TRP:HB2	1:A:523:LEU:HB3	1.94	0.48
1:A:567:VAL:HG21	4:A:803:XVU:C12	2.43	0.48
1:A:620:LYS:HB2	1:A:620:LYS:NZ	2.30	0.47
1:B:336:MET:HE1	3:B:802:H4B:H9	1.96	0.47
1:A:570:MET:SD	4:A:803:XVU:F13	2.63	0.47
1:A:664:ASN:OD1	1:A:667:ARG:NH2	2.48	0.47
1:B:322:LEU:HB2	1:B:699:ARG:HB2	1.97	0.46
1:A:546:ILE:HG12	1:A:560:LYS:HA	1.98	0.46
1:B:366:TYR:HA	1:B:369:ILE:HG12	1.97	0.46
1:B:325:GLY:O	1:B:332:MET:HG3	2.16	0.45
1:B:409:TRP:CE3	1:B:421:TRP:HA	2.52	0.44
1:A:508:GLN:O	1:A:508:GLN:NE2	2.42	0.44
1:B:336:MET:HB2	1:B:336:MET:HE2	1.54	0.44
1:A:473:ARG:NH2	1:A:710:PRO:HD3	2.31	0.44
1:A:486:LYS:H	1:A:486:LYS:HG3	1.62	0.44
1:A:510:TRP:CE2	1:A:521:PRO:HD3	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:359:LYS:HZ3	1:A:381:LEU:HD21	1.82	0.43
1:B:355:PHE:CE1	1:B:385:ASN:HB2	2.53	0.43
1:A:355:PHE:N	1:A:356:PRO:HD2	2.34	0.43
2:A:801:HEM:HHA	2:A:801:HEM:HAD2	1.89	0.43
1:B:388:ILE:O	1:B:392:SER:N	2.41	0.43
1:A:403:TYR:CE1	1:A:407:HIS:CE1	3.07	0.43
1:A:496:PRO:HA	1:A:499:VAL:HG23	2.00	0.43
1:A:382:GLU:OE2	1:A:386:LYS:HE3	2.19	0.43
1:A:714:HIS:HD1	1:A:716:TRP:HE3	1.67	0.43
1:A:501:PHE:HD2	1:A:520:LEU:HD13	1.84	0.42
1:B:525:GLN:HE21	1:B:528:GLY:HA2	1.85	0.42
1:A:307:GLU:HG3	7:B:1038:HOH:O	2.19	0.42
1:A:464:GLN:HB3	1:A:579:PHE:CE2	2.55	0.41
1:A:645:LYS:HA	1:A:645:LYS:HD3	1.85	0.41
1:B:355:PHE:N	1:B:356:PRO:HD2	2.34	0.41
1:B:501:PHE:CD2	1:B:520:LEU:HD13	2.55	0.41
1:A:685:GLY:O	1:A:691:PHE:HB2	2.20	0.41
1:B:501:PHE:HD2	1:B:520:LEU:HD13	1.85	0.41
1:A:350:THR:N	1:A:353:GLN:OE1	2.53	0.41
1:B:548:HIS:CG	1:B:549:PRO:HD2	2.56	0.41
1:B:595:VAL:O	1:B:599:CYS:HB2	2.21	0.40
1:A:478:GLN:HB2	1:A:481:ARG:CG	2.51	0.40
1:A:686:SER:HA	1:A:691:PHE:CG	2.56	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%)	391 (96%)	14 (3%)	3 (1%)	22	12
1	B	415/422 (98%)	407 (98%)	8 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	823/844 (98%)	798 (97%)	22 (3%)	3 (0%)	34 24

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	375	LYS
1	A	508	GLN
1	A	715	VAL

### 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%)	354 (96%)	14 (4%)	33 24
1	B	374/377 (99%)	365 (98%)	9 (2%)	49 43
All	All	742/754 (98%)	719 (97%)	23 (3%)	40 32

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

Mol	Chain	Res	Type
1	A	328	GLU
1	A	337	LEU
1	A	390	SER
1	A	469	LYS
1	A	470	HIS
1	A	486	LYS
1	A	508	GLN
1	A	511	LYS
1	A	523	LEU
1	A	547	ARG
1	A	555	LYS
1	A	602	SER
1	A	645	LYS
1	A	715	VAL
1	B	336	MET

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Mol	Chain	Res	Type
1	B	337	LEU
1	B	341	HIS
1	B	351	LYS
1	B	360	GLU
1	B	390	SER
1	B	392	SER
1	B	516	ARG
1	B	547	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	B	801	1	41,50,50	1.55	6 (14%)	45,82,82	1.51	7 (15%)
2	HEM	A	801	1	41,50,50	1.47	4 (9%)	45,82,82	1.66	10 (22%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	ACT	B	804	-	3,3,3	0.76	0	3,3,3	0.71	0
4	XVU	A	803	-	24,24,24	0.42	0	32,33,33	1.42	6 (18%)
4	XVU	B	803	-	24,24,24	0.48	0	32,33,33	1.51	6 (18%)
3	H4B	A	802	-	16,18,18	0.88	1 (6%)	11,26,26	2.63	4 (36%)
5	ACT	A	804	-	3,3,3	0.72	0	3,3,3	0.81	0
3	H4B	B	802	-	16,18,18	0.90	0	11,26,26	2.57	5 (45%)

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	B	801	1	-	2/12/54/54	-
2	HEM	A	801	1	-	8/12/54/54	-
4	XVU	A	803	-	-	2/10/10/10	0/2/2/2
4	XVU	B	803	-	-	3/10/10/10	0/2/2/2
3	H4B	A	802	-	-	0/8/17/17	0/2/2/2
3	H4B	B	802	-	-	0/8/17/17	0/2/2/2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	801	HEM	C3C-C2C	-3.77	1.35	1.40
2	B	801	HEM	C3C-CAC	3.61	1.55	1.47
2	A	801	HEM	C3C-C2C	-3.48	1.35	1.40
2	A	801	HEM	C3C-CAC	3.40	1.54	1.47
2	A	801	HEM	CAB-C3B	2.99	1.55	1.47
2	B	801	HEM	CMD-C2D	2.71	1.56	1.50
2	B	801	HEM	CAB-C3B	2.62	1.54	1.47
3	A	802	H4B	C4A-C4	-2.28	1.38	1.41
2	B	801	HEM	CAA-C2A	2.15	1.55	1.52
2	A	801	HEM	CMD-C2D	2.12	1.55	1.50
2	B	801	HEM	CMB-C2B	2.06	1.55	1.50

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	802	H4B	C8A-C4A-C4	5.56	119.51	114.57
3	B	802	H4B	C8A-C4A-C4	5.29	119.27	114.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	801	HEM	CAD-CBD-CGD	-4.11	104.77	113.60
2	A	801	HEM	C4B-CHC-C1C	4.07	127.93	122.56
3	A	802	H4B	C2-N3-C4	3.95	122.20	115.93
2	B	801	HEM	C4B-CHC-C1C	3.89	127.69	122.56
3	B	802	H4B	C2-N3-C4	3.75	121.89	115.93
4	B	803	XVU	C16-C11-C12	3.74	120.19	116.76
4	B	803	XVU	C02-N01-C06	3.60	120.83	118.10
2	A	801	HEM	CAD-CBD-CGD	-3.53	106.01	113.60
4	A	803	XVU	C16-C11-C12	3.44	119.91	116.76
4	A	803	XVU	C09-C08-C06	-3.38	105.41	112.99
3	A	802	H4B	N1-C2-N3	-3.30	120.24	125.42
4	B	803	XVU	C09-C08-C06	-3.28	105.63	112.99
3	B	802	H4B	N1-C2-N3	-3.06	120.62	125.42
4	A	803	XVU	C02-N01-C06	2.95	120.34	118.10
2	A	801	HEM	CHA-C4D-ND	2.87	127.93	124.38
4	B	803	XVU	F12-C12-C11	2.79	120.80	117.85
2	A	801	HEM	CMC-C2C-C3C	2.64	129.62	124.68
4	B	803	XVU	C08-C06-N01	2.60	119.82	115.95
4	A	803	XVU	C08-C06-N01	2.47	119.63	115.95
2	B	801	HEM	CBD-CAD-C3D	2.44	119.41	112.63
2	B	801	HEM	CHD-C1D-ND	2.33	126.96	124.43
2	A	801	HEM	C1B-NB-C4B	2.30	107.45	105.07
3	A	802	H4B	C2-N1-C8A	2.28	119.65	114.54
3	B	802	H4B	N2-C2-N1	2.28	120.80	117.25
2	A	801	HEM	C3B-C2B-C1B	2.28	108.17	106.49
4	A	803	XVU	F12-C12-C11	2.26	120.24	117.85
2	A	801	HEM	CAD-C3D-C4D	-2.25	120.72	124.66
4	A	803	XVU	C05-C06-N01	-2.23	120.53	122.90
2	A	801	HEM	CBD-CAD-C3D	2.21	118.77	112.63
2	B	801	HEM	CMA-C3A-C4A	-2.17	125.13	128.46
3	B	802	H4B	C2-N1-C8A	2.16	119.38	114.54
2	A	801	HEM	C4D-ND-C1D	2.16	107.30	105.07
2	B	801	HEM	C1B-NB-C4B	2.14	107.28	105.07
2	A	801	HEM	C4C-CHD-C1D	2.12	125.36	122.56
2	B	801	HEM	C4C-CHD-C1D	2.10	125.33	122.56
4	B	803	XVU	C05-C06-N01	-2.02	120.76	122.90

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	HEM	C1A-C2A-CAA-CBA

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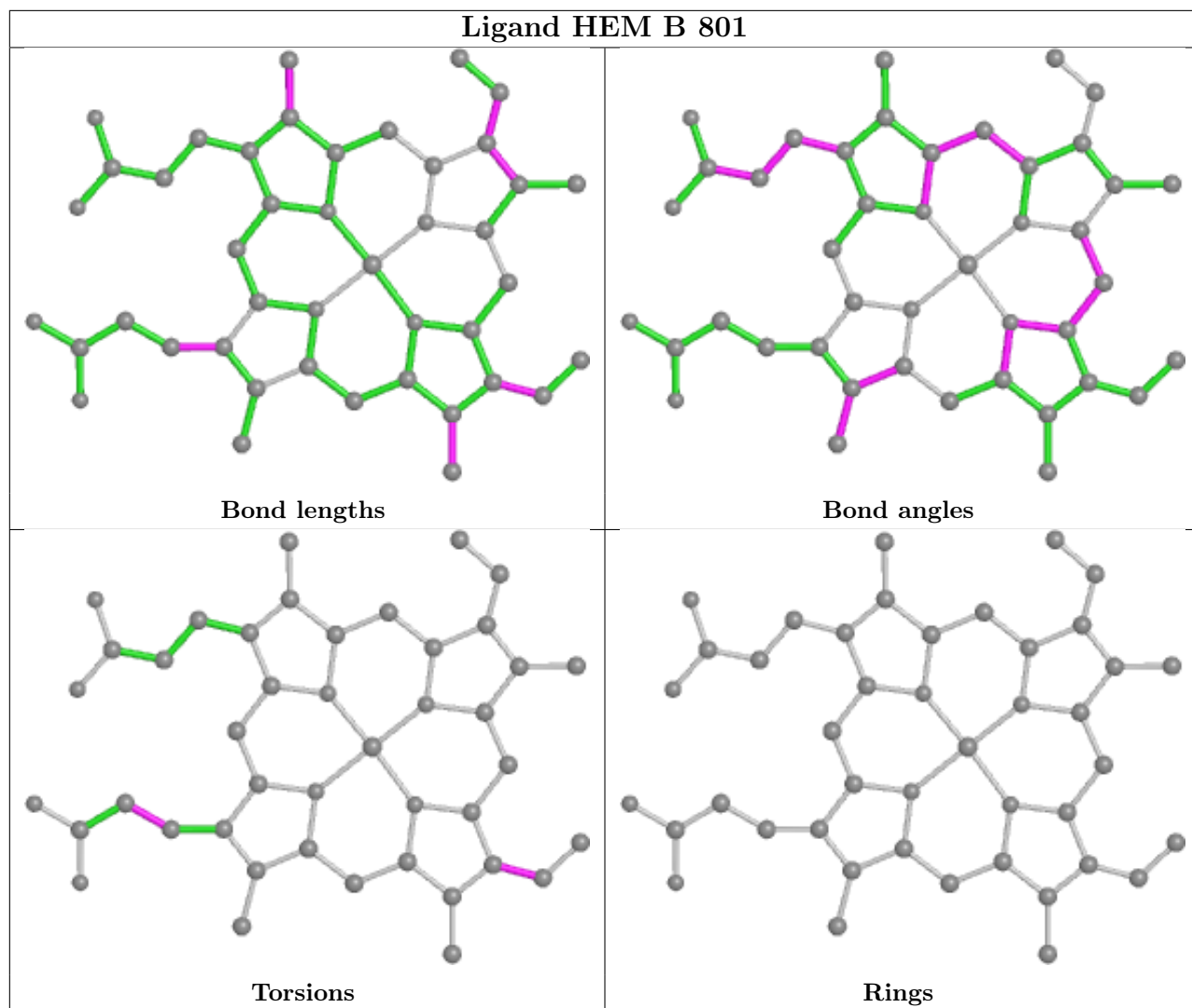
Mol	Chain	Res	Type	Atoms
2	A	801	HEM	C3A-C2A-CAA-CBA
2	A	801	HEM	C2A-CAA-CBA-CGA
2	B	801	HEM	C2A-CAA-CBA-CGA
4	A	803	XVU	C06-C08-C09-C11
4	B	803	XVU	C06-C08-C09-C11
4	B	803	XVU	C17-C18-N19-C20
4	B	803	XVU	C17-C18-N19-C21
2	A	801	HEM	C4D-C3D-CAD-CBD
2	A	801	HEM	C2D-C3D-CAD-CBD
2	A	801	HEM	C4B-C3B-CAB-CBB
2	B	801	HEM	C4B-C3B-CAB-CBB
4	A	803	XVU	C15-C17-C18-N19
2	A	801	HEM	CAD-CBD-CGD-O2D
2	A	801	HEM	CAD-CBD-CGD-O1D

There are no ring outliers.

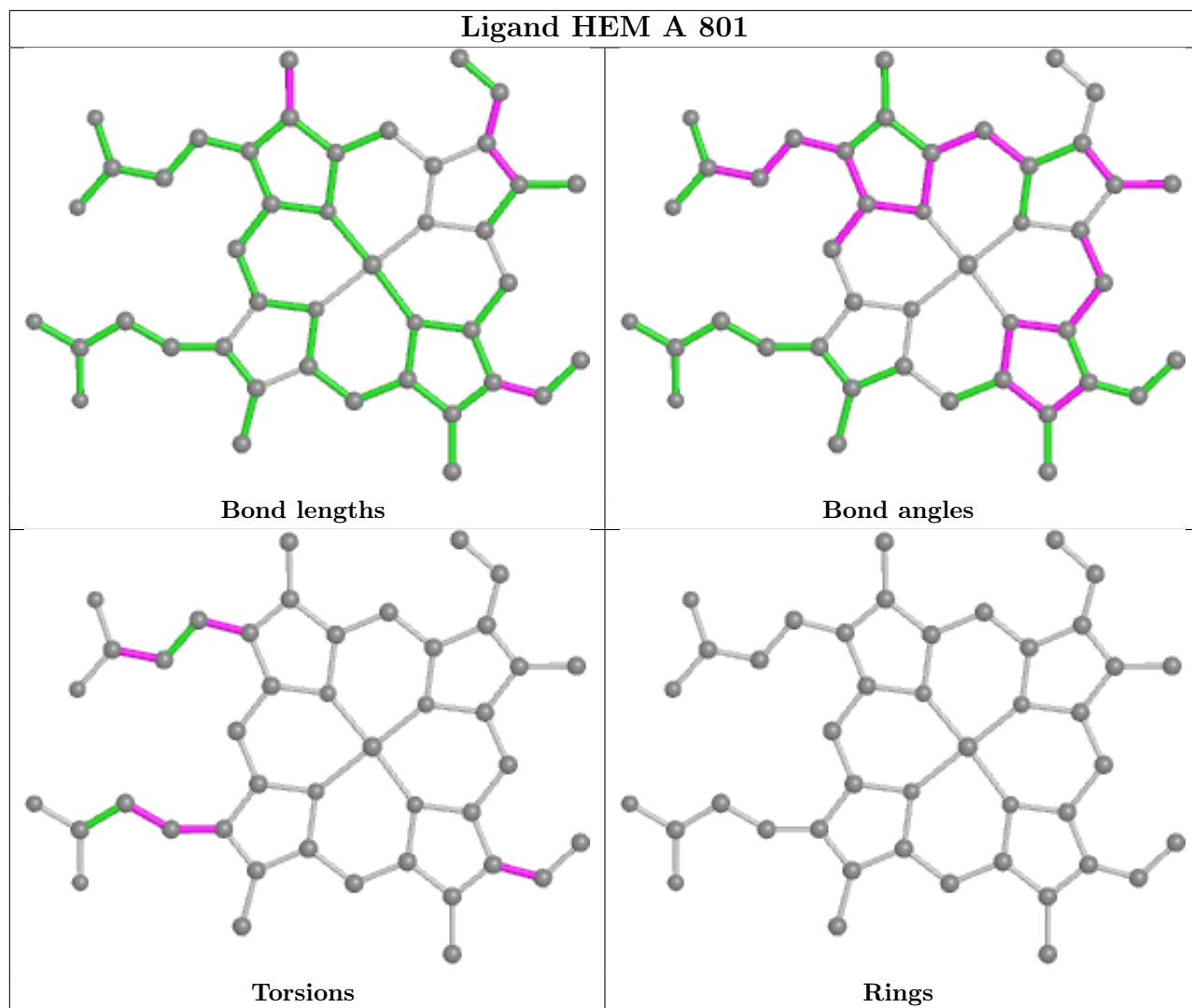
5 monomers are involved in 10 short contacts:

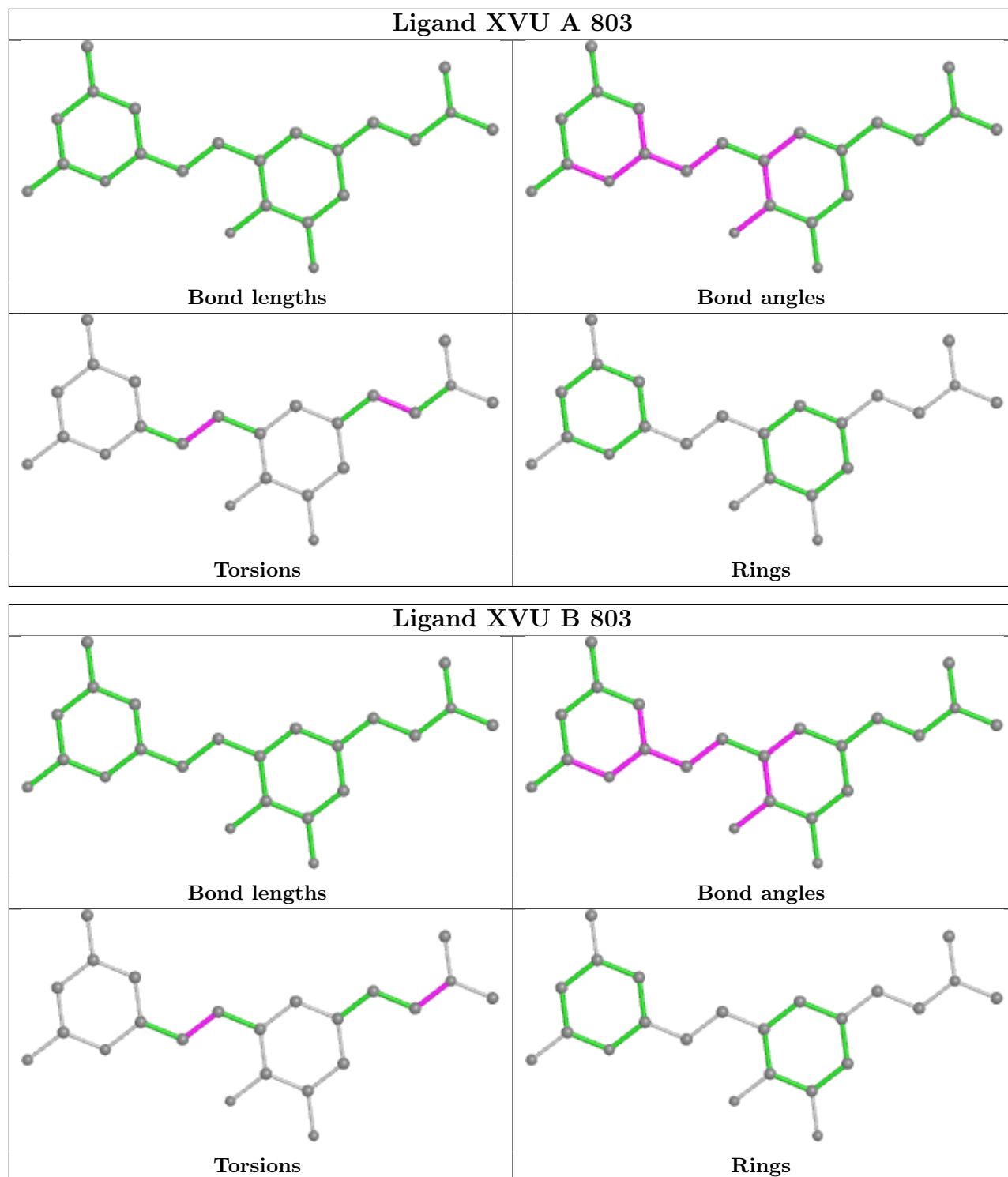
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	801	HEM	3	0
2	A	801	HEM	3	0
4	A	803	XVU	2	0
4	B	803	XVU	1	0
3	B	802	H4B	1	0

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 [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%)	1.13	91 (22%) 0 0	33, 61, 114, 145	0
1	B	416/422 (98%)	0.59	48 (11%) 4 5	32, 49, 90, 124	0
All	All	827/844 (97%)	0.86	139 (16%) 1 1	32, 54, 106, 145	0

All (139) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	715	VAL	11.4
1	B	350	THR	9.2
1	B	300	PHE	7.6
1	A	488	PRO	7.2
1	A	716	TRP	7.2
1	B	348	VAL	6.9
1	A	348	VAL	6.8
1	A	355	PHE	6.4
1	A	507	GLN	5.9
1	A	339	SER	5.8
1	A	352	ASP	5.6
1	A	713	THR	5.5
1	A	340	GLN	5.4
1	B	342	THR	5.3
1	B	718	GLY	5.2
1	B	677	VAL	5.1
1	A	350	THR	5.1
1	A	388	ILE	4.9
1	A	392	SER	4.8
1	A	391	THR	4.7
1	A	351	LYS	4.7
1	A	676	TRP	4.5
1	A	677	VAL	4.4
1	A	678	TRP	4.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	503	GLU	4.4
1	A	322	LEU	4.4
1	A	299	ARG	4.3
1	A	679	ILE	4.3
1	B	299	ARG	4.2
1	A	466	THR	4.2
1	A	711	TRP	4.2
1	A	349	ARG	4.2
1	A	389	GLU	4.1
1	A	506	ILE	4.1
1	A	567	VAL	4.0
1	A	489	ASP	4.0
1	A	393	THR	3.9
1	A	390	SER	3.9
1	A	385	ASN	3.9
1	A	480	ILE	3.8
1	B	340	GLN	3.8
1	A	714	HIS	3.8
1	B	310	VAL	3.8
1	B	678	TRP	3.8
1	A	386	LYS	3.7
1	B	352	ASP	3.7
1	B	341	HIS	3.6
1	B	343	ARG	3.6
1	B	680	VAL	3.6
1	A	551	PHE	3.5
1	A	566	ALA	3.5
1	B	309	ASP	3.5
1	A	643	SER	3.5
1	A	691	PHE	3.4
1	B	339	SER	3.3
1	A	486	LYS	3.3
1	A	490	GLY	3.3
1	B	676	TRP	3.3
1	B	617	ASP	3.3
1	B	566	ALA	3.3
1	A	584	PHE	3.2
1	B	679	ILE	3.2
1	B	691	PHE	3.2
1	A	469	LYS	3.2
1	B	562	TYR	3.1
1	B	611	ALA	3.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	487	GLN	3.1
1	A	681	PRO	3.1
1	A	470	HIS	3.1
1	B	616	LEU	3.0
1	A	373	GLY	3.0
1	B	619	ARG	3.0
1	A	416	VAL	3.0
1	A	680	VAL	3.0
1	A	667	ARG	3.0
1	A	553	TRP	3.0
1	A	712	ASN	3.0
1	A	370	LYS	3.0
1	B	567	VAL	3.0
1	A	619	ARG	2.9
1	A	382	GLU	2.9
1	B	682	PRO	2.9
1	A	479	LEU	2.9
1	A	552	ASP	2.9
1	A	353	GLN	2.8
1	A	467	ASP	2.8
1	A	531	PRO	2.8
1	A	588	TYR	2.8
1	A	491	SER	2.8
1	B	490	GLY	2.8
1	B	620	LYS	2.7
1	B	681	PRO	2.6
1	A	415	CYS	2.6
1	B	667	ARG	2.6
1	A	354	LEU	2.6
1	A	300	PHE	2.5
1	B	615	ASP	2.5
1	B	351	LYS	2.5
1	A	668[A]	CYS	2.5
1	A	511	LYS	2.4
1	B	561	TRP	2.4
1	A	591	THR	2.4
1	B	302	LYS	2.4
1	A	508	GLN	2.4
1	B	593	ILE	2.4
1	B	591	THR	2.3
1	A	593	ILE	2.3
1	A	611	ALA	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	414	ARG	2.3
1	A	446	VAL	2.3
1	A	561	TRP	2.3
1	B	612	LYS	2.3
1	B	550	LYS	2.2
1	B	389	GLU	2.2
1	A	371	ARG	2.2
1	A	394	TYR	2.2
1	A	565	PRO	2.2
1	A	639	TYR	2.2
1	B	618	MET	2.2
1	B	584	PHE	2.2
1	A	686	SER	2.2
1	A	505	CYS	2.2
1	A	530	ASP	2.2
1	A	704	PHE	2.2
1	A	620	LYS	2.2
1	B	321	THR	2.1
1	A	685	GLY	2.1
1	B	415	CYS	2.1
1	A	481	ARG	2.1
1	B	480	ILE	2.1
1	A	616	LEU	2.1
1	B	588	TYR	2.0
1	A	376	ALA	2.0
1	A	710	PRO	2.0
1	A	468	GLY	2.0
1	B	479	LEU	2.0
1	A	615	ASP	2.0
1	B	608	GLU	2.0
1	A	564	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](#)

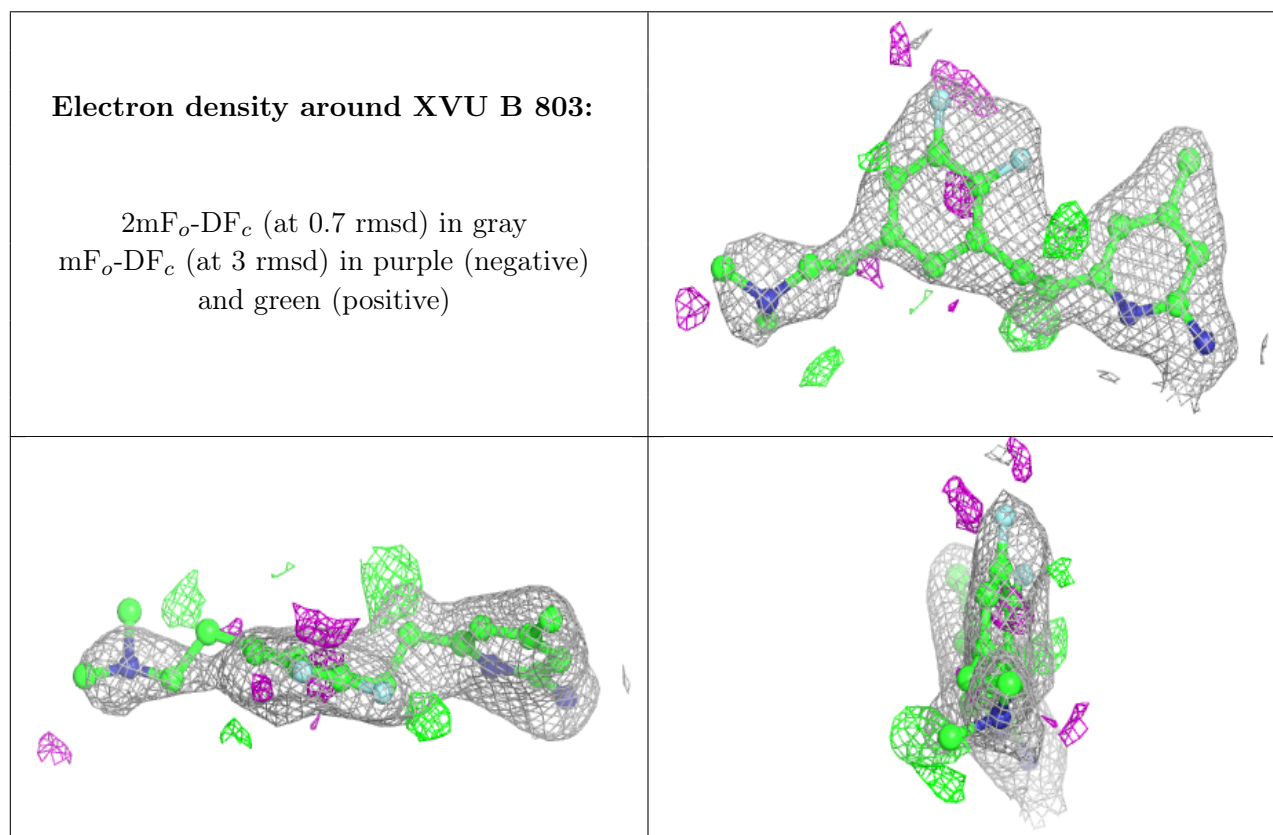
There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

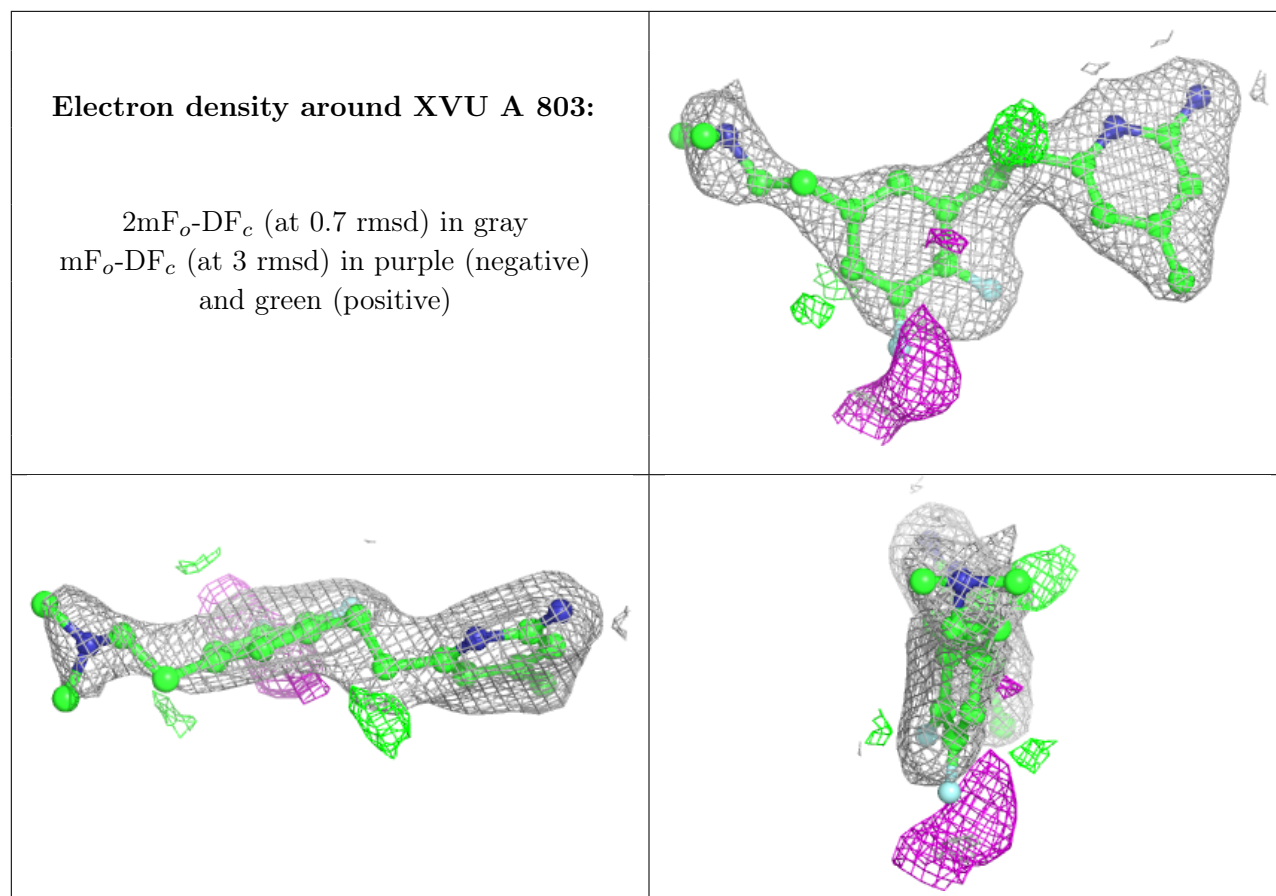
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

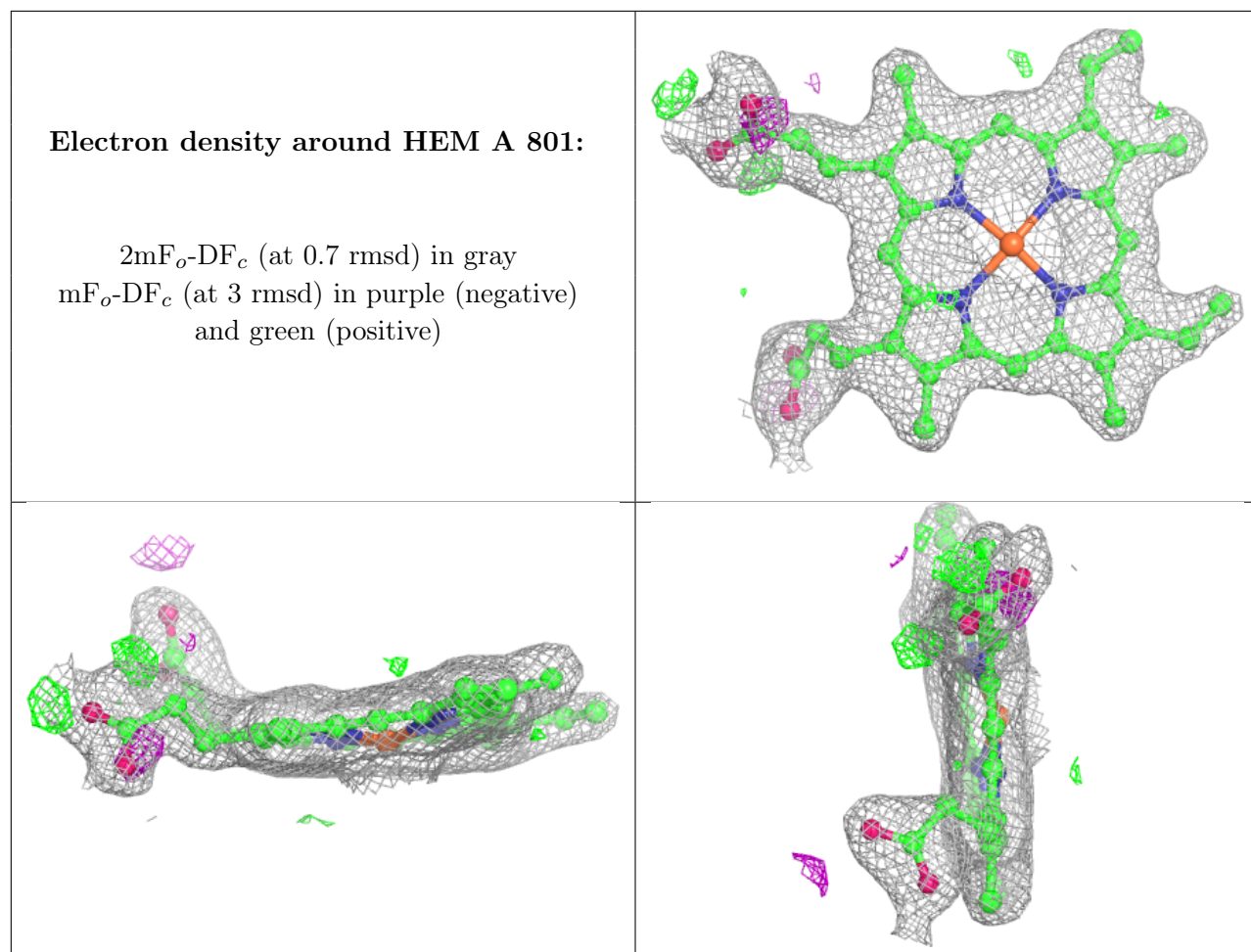
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	XVU	B	803	23/23	0.90	0.26	38,62,86,90	0
4	XVU	A	803	23/23	0.93	0.28	36,61,83,97	0
3	H4B	A	802	17/17	0.94	0.19	33,39,42,45	0
5	ACT	B	804	4/4	0.94	0.15	69,71,76,81	0
5	ACT	A	804	4/4	0.95	0.16	61,62,64,67	0
3	H4B	B	802	17/17	0.96	0.22	34,36,44,45	0
2	HEM	A	801	43/43	0.97	0.21	29,40,57,68	0
2	HEM	B	801	43/43	0.97	0.21	28,40,59,61	0
6	ZN	A	805	1/1	0.99	0.09	41,41,41,41	0

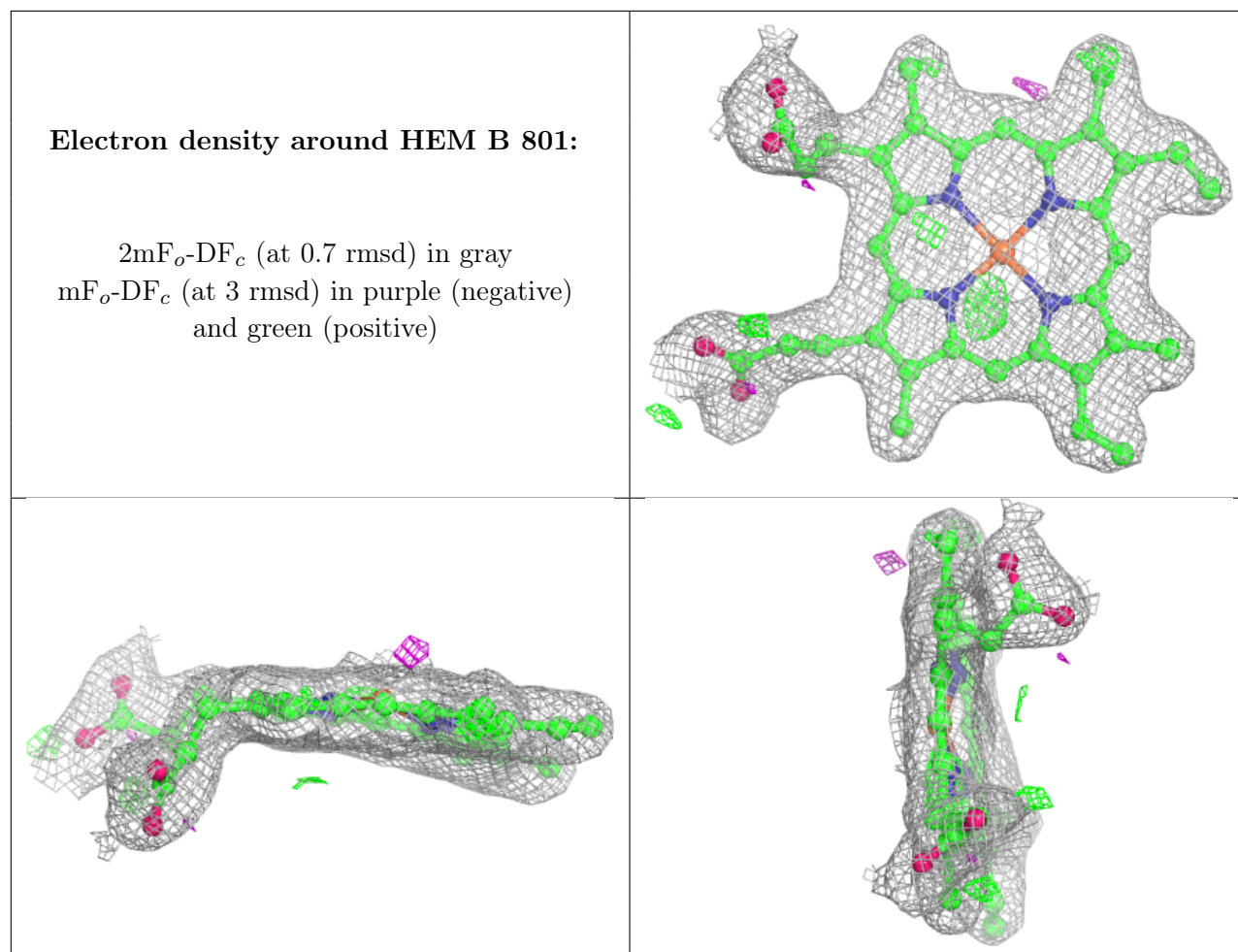
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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











## 6.5 Other polymers [i](#)

There are no such residues in this entry.