



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 6, 2024 – 11:14 pm GMT

PDB ID : 6H1S  
Title : Structure of the BM3 heme domain in complex with fluconazole  
Authors : Jeffreys, L.N.; Munro, A.W.M.; Leys, D.  
Deposited on : 2018-07-12  
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](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 : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

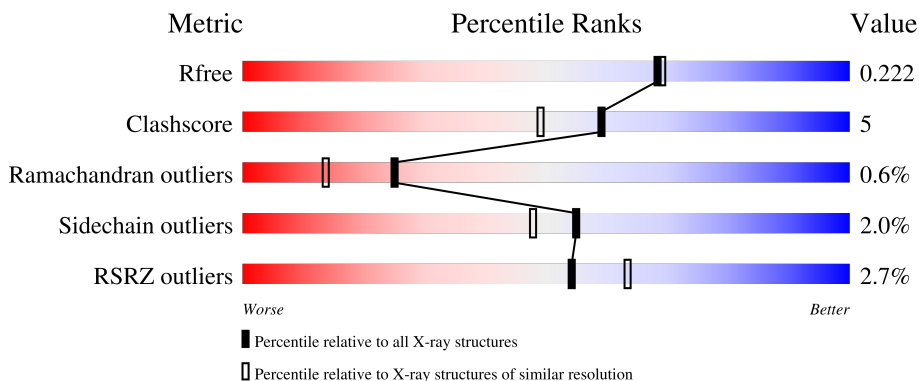
# 1 Overall quality at a glance

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  $\geq 3$ , 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	457	 4% 89% 8% ..
1	B	457	 2% 89% 8% .

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 8025 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.

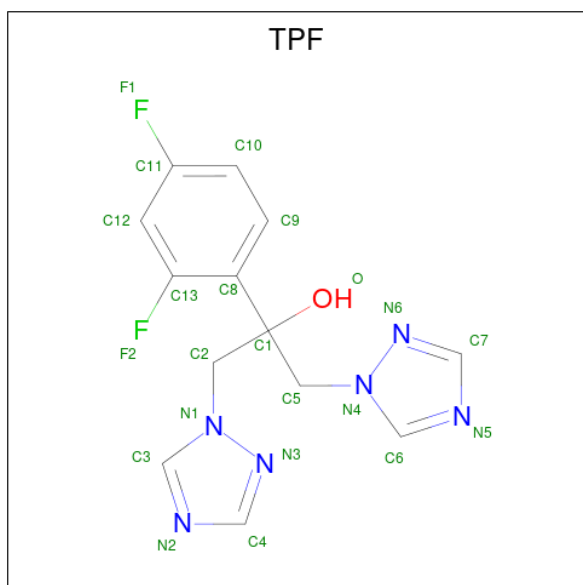
- Molecule 1 is a protein called Bifunctional cytochrome P450/NADPH-P450 reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	453	Total 3659	C 2337	N 621	O 683	S 18	0	2	0
1	B	443	Total 3592	C 2302	N 608	O 665	S 17	0	4	0

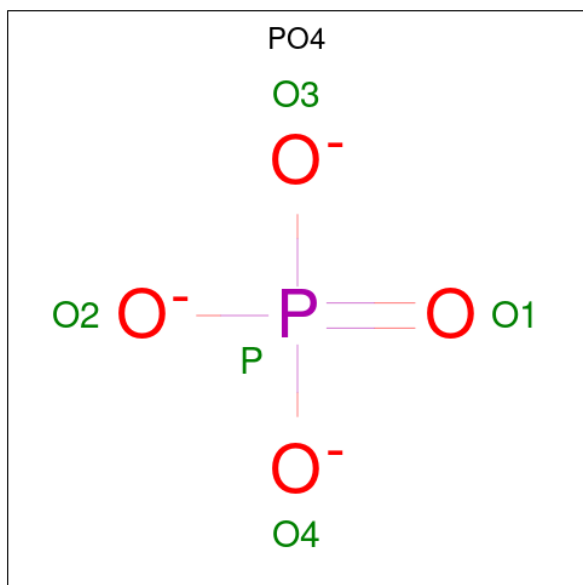
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	82	PHE	ALA	engineered mutation	UNP P14779
A	87	VAL	PHE	engineered mutation	UNP P14779
B	82	PHE	ALA	engineered mutation	UNP P14779
B	87	VAL	PHE	engineered mutation	UNP P14779

- Molecule 2 is 2-(2,4-DIFLUOROPHENYL)-1,3-DI(1H-1,2,4-TRIAZOL-1-YL)PROPAN-2-OL (three-letter code: TPF) (formula: C<sub>13</sub>H<sub>12</sub>F<sub>2</sub>N<sub>6</sub>O) (labeled as "Ligand of Interest" by depositor).

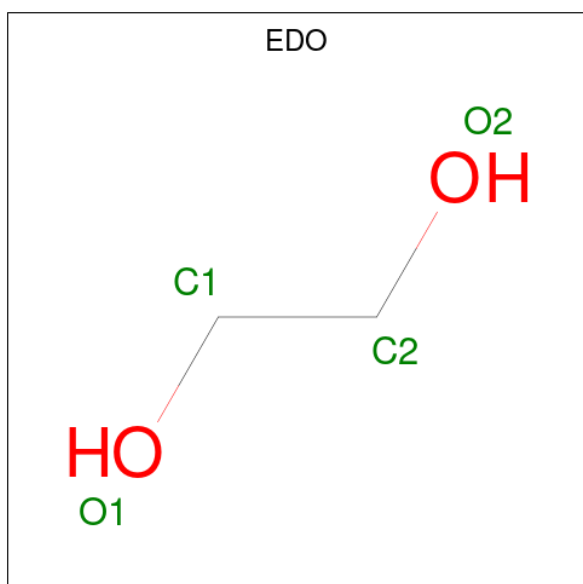






Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O P 5 4 1	0	0
4	A	1	Total O P 5 4 1	0	0
4	A	1	Total O P 5 4 1	0	0
4	A	1	Total O P 5 4 1	0	0
4	B	1	Total O P 5 4 1	0	0

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	284	Total O 284 284	0	0
6	B	277	Total O 277 277	0	0



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	60.94Å 119.29Å 146.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	73.35 – 1.95 73.25 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.9 (73.35-1.95) 99.9 (73.25-1.95)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.22 (at 1.95Å)	Xtrriage
Refinement program	REFMAC 5.7.0029	Depositor
R, $R_{free}$	0.175 , 0.214 0.184 , 0.222	Depositor DCC
$R_{free}$ test set	3825 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	31.7	Xtrriage
Anisotropy	0.062	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 47.1	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	0.96	EDS
Total number of atoms	8025	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.52% 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: PO4, TPF, EDO, HEM

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	0.91	0/3747	0.93	11/5064 (0.2%)
1	B	0.97	1/3677 (0.0%)	0.98	12/4967 (0.2%)
All	All	0.94	1/7424 (0.0%)	0.96	23/10031 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	68	ASP	CG-OD1	6.78	1.41	1.25

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	68	ASP	CB-CG-OD2	-12.34	107.19	118.30
1	B	66	ARG	NE-CZ-NH2	-8.62	115.99	120.30
1	B	66	ARG	NE-CZ-NH1	7.72	124.16	120.30
1	B	68	ASP	CB-CG-OD1	7.57	125.11	118.30
1	B	161	ARG	NE-CZ-NH1	7.30	123.95	120.30
1	A	56	ARG	NE-CZ-NH1	7.03	123.82	120.30
1	B	242	ASP	CB-CG-OD1	6.91	124.52	118.30
1	B	161	ARG	NE-CZ-NH2	-6.78	116.91	120.30
1	A	375	ARG	NE-CZ-NH1	6.76	123.68	120.30
1	A	296	ARG	NE-CZ-NH2	-6.75	116.92	120.30
1	A	50	ARG	NE-CZ-NH2	-6.74	116.93	120.30
1	A	63	ASP	CB-CG-OD1	6.31	123.98	118.30
1	A	296	ARG	NE-CZ-NH1	6.28	123.44	120.30
1	A	242	ASP	CB-CG-OD1	6.07	123.76	118.30
1	A	79	ARG	NE-CZ-NH1	6.07	123.33	120.30
1	B	121	ASP	CB-CG-OD1	5.94	123.64	118.30
1	A	161	ARG	NE-CZ-NH1	5.71	123.15	120.30
1	A	378	ARG	CB-CA-C	-5.52	99.36	110.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	267	GLU	OE1-CD-OE2	5.41	129.79	123.30
1	B	147	ARG	NE-CZ-NH2	-5.38	117.61	120.30
1	B	84	ASP	CB-CG-OD2	-5.31	113.52	118.30
1	B	84	ASP	CB-CG-OD1	5.08	122.87	118.30
1	B	50	ARG	NE-CZ-NH2	-5.08	117.76	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	3659	0	3628	30	0
1	B	3592	0	3570	32	0
2	A	22	0	12	0	0
2	B	44	0	24	8	0
3	A	43	0	30	1	0
3	B	43	0	30	0	0
4	A	20	0	0	0	0
4	B	5	0	0	0	0
5	A	16	0	24	3	0
5	B	20	0	30	0	0
6	A	284	0	0	9	3
6	B	277	0	0	7	3
All	All	8025	0	7348	69	3

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 (69) 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:118[B]:MET:HE1	6:A:816:HOH:O	1.44	1.14
1:B:118:MET:HE1	6:B:717:HOH:O	1.68	0.93
1:B:47:ARG:NH1	6:B:601:HOH:O	2.12	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:177:MET:HG2	1:B:212:MET:HE3	1.69	0.75
1:B:78:VAL:CG1	1:B:82:PHE:CD2	2.71	0.73
1:B:47:ARG:NH2	6:B:601:HOH:O	2.18	0.69
1:B:87:VAL:HG11	2:B:501[B]:TPF:HC9	1.77	0.67
1:B:221:ALA:HA	1:B:224:LYS:CE	2.24	0.66
1:B:87:VAL:HG11	2:B:501[A]:TPF:HC9	1.79	0.63
1:B:177:MET:SD	1:B:212:MET:CE	2.87	0.62
1:B:221:ALA:HA	1:B:224:LYS:HE3	1.83	0.61
2:B:501[A]:TPF:F2	2:B:501[A]:TPF:HC52	1.90	0.60
1:B:78:VAL:HG13	1:B:82:PHE:CD2	2.37	0.59
1:B:177:MET:CG	1:B:212:MET:HE3	2.33	0.58
1:A:128:GLN:NE2	6:A:606:HOH:O	2.39	0.56
1:B:221:ALA:HA	1:B:224:LYS:HE2	1.88	0.55
1:B:170:PRO:HB2	1:B:175:THR:HG23	1.88	0.55
2:B:501[B]:TPF:F2	2:B:501[B]:TPF:HC52	1.97	0.54
1:A:118[B]:MET:CE	6:A:816:HOH:O	2.23	0.54
1:B:78:VAL:HG13	1:B:82:PHE:CE2	2.43	0.53
1:A:195:ASP:HB3	1:A:196:PRO:HD2	1.91	0.53
5:A:507:EDO:C2	6:A:833:HOH:O	2.56	0.52
1:A:195:ASP:HB2	1:A:198:TYR:CE2	2.44	0.52
5:A:507:EDO:H21	6:A:833:HOH:O	2.08	0.52
1:B:82:PHE:CE1	1:B:259:ILE:HG22	2.45	0.51
1:A:200:GLU:OE2	1:A:200:GLU:HA	2.10	0.51
1:A:367:TRP:HB2	1:A:371:VAL:HG12	1.93	0.51
1:B:177:MET:SD	1:B:212:MET:HE1	2.50	0.51
1:A:179:ARG:HE	1:A:204:GLN:HE21	1.57	0.50
1:B:41:LYS:NZ	6:B:602:HOH:O	2.37	0.50
1:B:173:PHE:CD1	1:B:215:LEU:HD23	2.46	0.49
1:B:78:VAL:CG1	1:B:82:PHE:CE2	2.96	0.49
1:A:271:GLY:HA2	1:A:440:LYS:HG3	1.95	0.49
1:B:47:ARG:NH1	6:B:611:HOH:O	2.45	0.48
1:A:98:LYS:HE3	1:A:247:GLU:HB2	1.96	0.47
1:A:79:ARG:HG3	1:A:83:GLY:O	2.14	0.47
1:A:186:ASN:O	1:A:189:GLN:HG3	2.15	0.47
1:A:77:PHE:HE2	1:A:187:LYS:HB2	1.81	0.46
1:B:177:MET:HG2	1:B:212:MET:CE	2.44	0.46
1:B:82:PHE:HE1	1:B:259:ILE:HG22	1.80	0.46
1:B:77[A]:PHE:HZ	1:B:184:ALA:C	2.20	0.46
1:B:9:LYS:HD3	6:B:819:HOH:O	2.16	0.45
1:A:195:ASP:HB2	1:A:198:TYR:CD2	2.50	0.45
1:A:187:LYS:NZ	1:A:188:LEU:HD23	2.32	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:190:ARG:C	1:A:192:ASN:N	2.69	0.45
1:A:148:LEU:HD21	1:A:413:VAL:HG21	1.98	0.45
1:B:82:PHE:CE2	2:B:501[B]:TPF:F1	2.60	0.44
1:B:82:PHE:CE2	2:B:501[A]:TPF:F1	2.61	0.44
1:A:47:ARG:CZ	1:A:73:GLN:HG3	2.47	0.44
1:A:187:LYS:HZ1	1:A:188:LEU:HD23	1.83	0.44
2:B:501[A]:TPF:HC4	6:B:775:HOH:O	2.18	0.43
1:A:9:LYS:HD3	6:A:871:HOH:O	2.19	0.43
5:A:507:EDO:H22	6:A:833:HOH:O	2.18	0.43
1:A:118[B]:MET:CE	6:A:649:HOH:O	2.66	0.43
3:A:502:HEM:HBC2	3:A:502:HEM:HMC2	2.00	0.43
1:A:104:LEU:N	1:A:105:PRO:CD	2.82	0.42
1:A:9:LYS:HE2	1:A:9:LYS:HB2	1.90	0.42
1:B:9:LYS:HB2	1:B:9:LYS:HE2	1.83	0.42
1:B:148:LEU:HD21	1:B:413:VAL:HG21	2.02	0.42
1:A:17:LEU:HD11	1:A:187:LYS:HE2	2.02	0.42
1:B:330:ALA:O	2:B:501[A]:TPF:N2	2.53	0.41
1:B:98:LYS:HE3	1:B:247:GLU:HB2	2.02	0.41
1:A:77:PHE:CE2	1:A:187:LYS:HB2	2.56	0.41
1:A:195:ASP:CB	1:A:196:PRO:CD	2.99	0.41
1:A:306:LYS:HE2	6:A:635:HOH:O	2.20	0.41
1:A:17:LEU:N	1:A:18:PRO:CD	2.84	0.40
1:A:195:ASP:HB3	1:A:196:PRO:CD	2.51	0.40
1:A:118[B]:MET:HB2	1:A:118[B]:MET:HE3	1.86	0.40
1:B:173:PHE:CD1	1:B:215:LEU:CD2	3.05	0.40

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:844:HOH:O	6:B:714:HOH:O[2_655]	1.69	0.51
6:A:606:HOH:O	6:B:832:HOH:O[2_655]	1.81	0.39
6:A:712:HOH:O	6:B:714:HOH:O[2_655]	2.16	0.04

## 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	453/457 (99%)	435 (96%)	13 (3%)	5 (1%)	14	5
1	B	443/457 (97%)	435 (98%)	8 (2%)	0	100	100
All	All	896/914 (98%)	870 (97%)	21 (2%)	5 (1%)	25	14

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	191	ALA
1	A	190	ARG
1	A	186	ASN
1	A	196	PRO
1	A	195	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	398/400 (100%)	390 (98%)	8 (2%)	55	48
1	B	390/400 (98%)	382 (98%)	8 (2%)	53	46
All	All	788/800 (98%)	772 (98%)	16 (2%)	55	48

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	148	LEU
1	A	187	LYS
1	A	195	ASP
1	A	201	ASN
1	A	203	ARG
1	A	267	GLU
1	A	306	LYS

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Mol	Chain	Res	Type
1	A	371	VAL
1	B	68	ASP
1	B	73	GLN
1	B	148	LEU
1	B	179	ARG
1	B	183	GLU
1	B	185	MET
1	B	209	ILE
1	B	370	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	204	GLN
1	B	206	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](#)

19 ligands are modelled in this entry.

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
5	EDO	B	506	-	3,3,3	0.47	0	2,2,2	0.24	0
5	EDO	A	507	-	3,3,3	0.61	0	2,2,2	0.32	0
3	HEM	A	502	2,1	41,50,50	1.59	10 (24%)	45,82,82	1.81	9 (20%)
4	PO4	A	504	-	4,4,4	0.94	0	6,6,6	0.76	0
4	PO4	A	503	-	4,4,4	1.07	0	6,6,6	0.76	0
2	TPF	A	501	3	18,24,24	2.23	5 (27%)	24,34,34	2.57	11 (45%)
2	TPF	B	501[A]	3	18,24,24	2.08	3 (16%)	24,34,34	2.60	9 (37%)
3	HEM	B	502	2,1	41,50,50	1.92	11 (26%)	45,82,82	2.37	11 (24%)
5	EDO	A	509	-	3,3,3	0.20	0	2,2,2	1.43	0
4	PO4	A	505	-	4,4,4	0.96	0	6,6,6	1.45	1 (16%)
5	EDO	B	508	-	3,3,3	0.23	0	2,2,2	0.69	0
5	EDO	A	510	-	3,3,3	0.62	0	2,2,2	0.62	0
2	TPF	B	501[B]	3	18,24,24	2.14	3 (16%)	24,34,34	2.78	12 (50%)
5	EDO	B	505	-	3,3,3	0.31	0	2,2,2	0.72	0
4	PO4	B	503	-	4,4,4	1.13	0	6,6,6	0.70	0
4	PO4	A	506	-	4,4,4	1.01	0	6,6,6	0.69	0
5	EDO	A	508	-	3,3,3	0.43	0	2,2,2	0.33	0
5	EDO	B	507	-	3,3,3	1.30	0	2,2,2	1.13	0
5	EDO	B	504	-	3,3,3	0.57	0	2,2,2	0.65	0

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	HEM	B	502	2,1	-	2/12/54/54	-
5	EDO	A	509	-	-	0/1/1/1	-
2	TPF	B	501[B]	3	-	1/16/16/16	0/3/3/3
5	EDO	A	507	-	-	1/1/1/1	-
5	EDO	B	504	-	-	1/1/1/1	-
5	EDO	B	506	-	-	1/1/1/1	-
3	HEM	A	502	2,1	-	2/12/54/54	-
5	EDO	B	505	-	-	0/1/1/1	-
5	EDO	A	508	-	-	0/1/1/1	-
5	EDO	B	507	-	-	1/1/1/1	-
5	EDO	B	508	-	-	1/1/1/1	-
2	TPF	A	501	3	-	7/16/16/16	0/3/3/3
2	TPF	B	501[A]	3	-	3/16/16/16	0/3/3/3
5	EDO	A	510	-	-	1/1/1/1	-

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501[B]	TPF	C8-C13	6.13	1.47	1.38
2	B	501[A]	TPF	C8-C13	5.91	1.47	1.38
2	A	501	TPF	C8-C13	5.79	1.47	1.38
3	B	502	HEM	C1B-NB	-5.36	1.31	1.40
2	A	501	TPF	C3-N1	4.56	1.38	1.33
2	B	501[B]	TPF	C1-C8	-4.44	1.48	1.53
3	B	502	HEM	C1D-C2D	4.31	1.52	1.44
3	B	502	HEM	C4D-C3D	4.08	1.52	1.45
3	B	502	HEM	C4D-ND	-3.98	1.33	1.40
2	B	501[B]	TPF	N3-N1	3.81	1.40	1.35
3	B	502	HEM	C4B-NB	-3.76	1.31	1.38
2	B	501[A]	TPF	C1-C8	-3.72	1.49	1.53
2	B	501[A]	TPF	N3-N1	3.71	1.40	1.35
2	A	501	TPF	N3-N1	3.61	1.40	1.35
3	A	502	HEM	C4D-ND	-3.56	1.34	1.40
3	A	502	HEM	CHB-C1B	3.27	1.43	1.35
3	A	502	HEM	C1B-NB	-3.18	1.34	1.40
3	B	502	HEM	C3B-C4B	3.05	1.51	1.44
3	A	502	HEM	C3B-C4B	2.80	1.50	1.44
3	A	502	HEM	C4B-NB	-2.74	1.33	1.38
3	A	502	HEM	C1A-NA	2.65	1.41	1.36
3	B	502	HEM	FE-NB	2.50	2.09	1.96
3	A	502	HEM	FE-NB	2.35	2.08	1.96
2	A	501	TPF	C9-C8	2.19	1.42	1.39
3	B	502	HEM	CHB-C1B	2.15	1.40	1.35
3	B	502	HEM	C1D-ND	-2.13	1.34	1.38
3	A	502	HEM	CHA-C4D	2.13	1.40	1.35
3	B	502	HEM	C1A-NA	2.11	1.40	1.36
2	A	501	TPF	C1-C8	-2.07	1.50	1.53
3	A	502	HEM	C2C-C1C	-2.06	1.37	1.42
3	A	502	HEM	C3C-C2C	-2.06	1.37	1.40
3	B	502	HEM	CBA-CGA	2.03	1.55	1.50

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	502	HEM	C1B-NB-C4B	7.95	113.28	105.07
2	B	501[A]	TPF	C3-N2-C4	7.52	110.81	102.34
2	B	501[B]	TPF	C3-N2-C4	7.14	110.38	102.34
3	B	502	HEM	CHC-C4B-NB	6.83	131.86	124.43
3	B	502	HEM	CHD-C1D-ND	5.77	130.70	124.43
2	B	501[A]	TPF	N2-C3-N1	-5.47	105.63	112.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501[B]	TPF	N2-C3-N1	-5.31	105.82	112.24
2	B	501[B]	TPF	C12-C13-C8	-4.94	118.64	124.00
2	A	501	TPF	F2-C13-C8	4.84	124.81	118.98
3	A	502	HEM	CHD-C1D-ND	4.77	129.61	124.43
3	A	502	HEM	C1B-NB-C4B	4.70	109.93	105.07
2	A	501	TPF	C3-N2-C4	4.56	107.48	102.34
3	A	502	HEM	CHD-C1D-C2D	-4.21	118.40	124.98
3	B	502	HEM	CHD-C1D-C2D	-4.20	118.42	124.98
2	A	501	TPF	C12-C13-C8	-4.10	119.55	124.00
2	A	501	TPF	C13-C12-C11	4.08	120.90	116.62
2	B	501[A]	TPF	C12-C13-C8	-3.86	119.82	124.00
2	B	501[B]	TPF	C6-N5-C7	3.84	106.66	102.34
2	A	501	TPF	C1-C8-C13	-3.80	119.71	122.84
2	A	501	TPF	F1-C11-C10	3.67	124.77	118.54
2	B	501[A]	TPF	C6-N5-C7	3.58	106.38	102.34
3	A	502	HEM	CHC-C4B-NB	3.54	128.28	124.43
2	B	501[B]	TPF	C13-C12-C11	3.41	120.20	116.62
3	B	502	HEM	C4D-ND-C1D	3.19	108.37	105.07
3	B	502	HEM	CBD-CAD-C3D	-3.03	104.20	112.63
2	A	501	TPF	N5-C6-N4	-3.03	108.58	112.24
2	A	501	TPF	F1-C11-C12	-2.98	114.00	118.25
4	A	505	PO4	O4-P-O2	2.95	117.45	107.97
3	A	502	HEM	CHA-C4D-ND	2.92	127.98	124.38
3	B	502	HEM	CHA-C4D-ND	2.91	127.97	124.38
2	B	501[B]	TPF	N5-C6-N4	-2.83	108.81	112.24
2	B	501[A]	TPF	C13-C12-C11	2.82	119.59	116.62
2	B	501[B]	TPF	C5-C1-C8	-2.76	103.98	110.87
2	B	501[A]	TPF	N5-C6-N4	-2.75	108.91	112.24
3	B	502	HEM	C1D-C2D-C3D	-2.72	104.09	106.96
2	B	501[B]	TPF	O-C1-C2	2.69	114.32	108.31
2	B	501[A]	TPF	C9-C10-C11	2.68	121.13	118.36
2	B	501[B]	TPF	F1-C11-C12	2.66	122.05	118.25
3	A	502	HEM	CHB-C1B-NB	2.62	127.61	124.38
3	A	502	HEM	CBA-CAA-C2A	-2.61	108.17	112.62
3	B	502	HEM	O2D-CGD-CBD	2.55	122.23	114.03
2	B	501[A]	TPF	C5-C1-C8	-2.45	104.76	110.87
2	A	501	TPF	N2-C3-N1	-2.45	109.28	112.24
3	B	502	HEM	CHB-C1B-NB	2.40	127.34	124.38
3	A	502	HEM	CHA-C4D-C3D	-2.38	120.86	125.33
2	B	501[B]	TPF	C9-C10-C11	2.36	120.80	118.36
3	B	502	HEM	C2C-C3C-C4C	2.35	108.54	106.90
2	A	501	TPF	C6-N4-N6	2.25	112.41	109.01

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501[A]	TPF	C10-C11-C12	-2.18	120.46	123.29
3	A	502	HEM	CMA-C3A-C4A	-2.16	125.15	128.46
2	B	501[B]	TPF	C10-C11-C12	-2.15	120.50	123.29
2	B	501[B]	TPF	C9-C8-C13	2.07	118.68	116.10
2	A	501	TPF	C5-C1-C8	2.04	115.95	110.87

There are no chirality outliers.

All (21) torsion outliers are listed below:

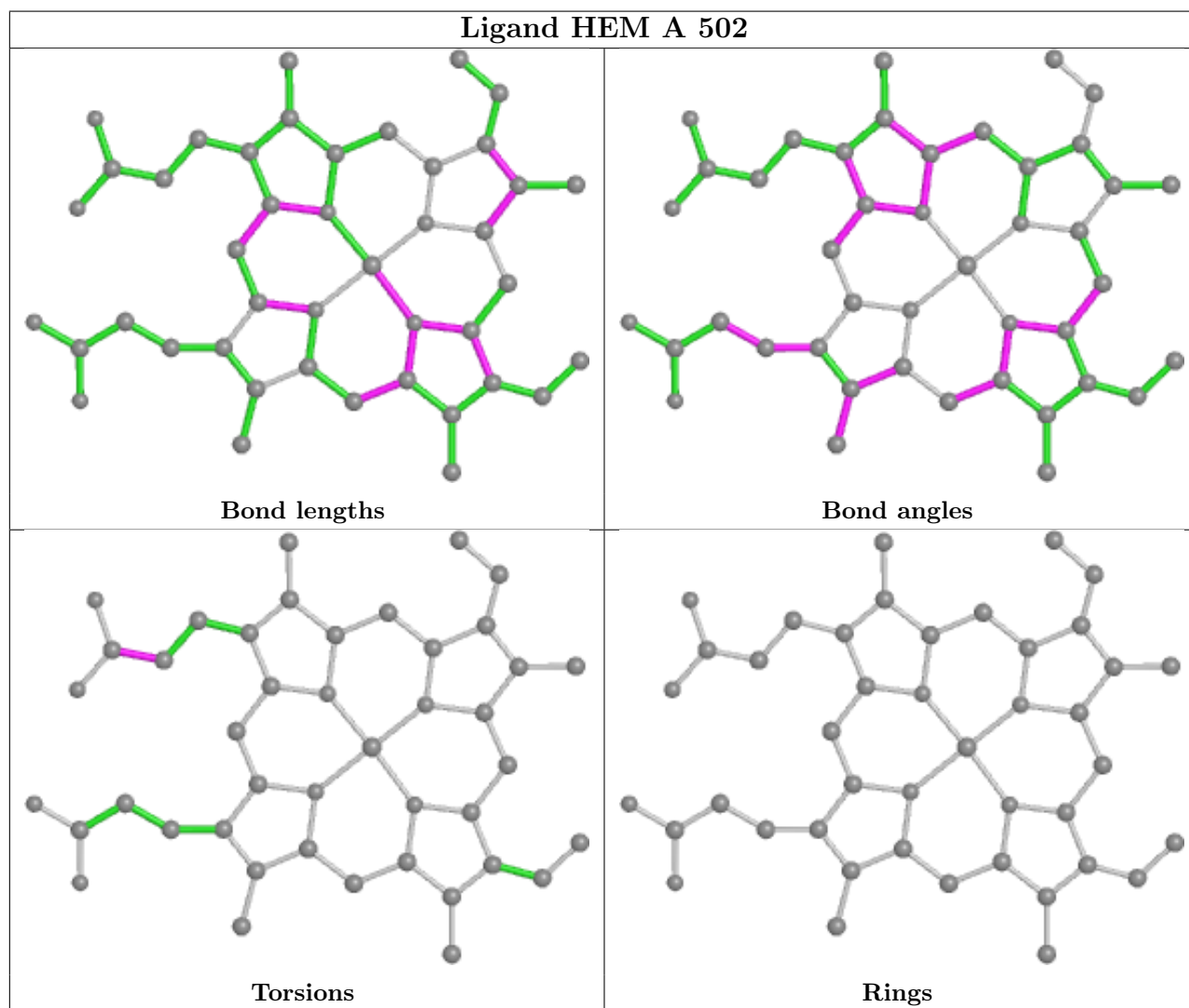
Mol	Chain	Res	Type	Atoms
2	A	501	TPF	O-C1-C8-C9
2	A	501	TPF	O-C1-C8-C13
2	A	501	TPF	C2-C1-C8-C13
2	A	501	TPF	C5-C1-C8-C9
2	A	501	TPF	C5-C1-C8-C13
2	B	501[A]	TPF	C1-C2-N1-C3
2	B	501[A]	TPF	C1-C5-N4-C6
2	B	501[B]	TPF	C1-C5-N4-C6
2	A	501	TPF	C2-C1-C8-C9
2	A	501	TPF	O-C1-C2-N1
5	A	510	EDO	O1-C1-C2-O2
5	B	506	EDO	O1-C1-C2-O2
5	A	507	EDO	O1-C1-C2-O2
2	B	501[A]	TPF	C1-C2-N1-N3
5	B	507	EDO	O1-C1-C2-O2
5	B	504	EDO	O1-C1-C2-O2
5	B	508	EDO	O1-C1-C2-O2
3	A	502	HEM	CAD-CBD-CGD-O1D
3	A	502	HEM	CAD-CBD-CGD-O2D
3	B	502	HEM	CAD-CBD-CGD-O2D
3	B	502	HEM	CAD-CBD-CGD-O1D

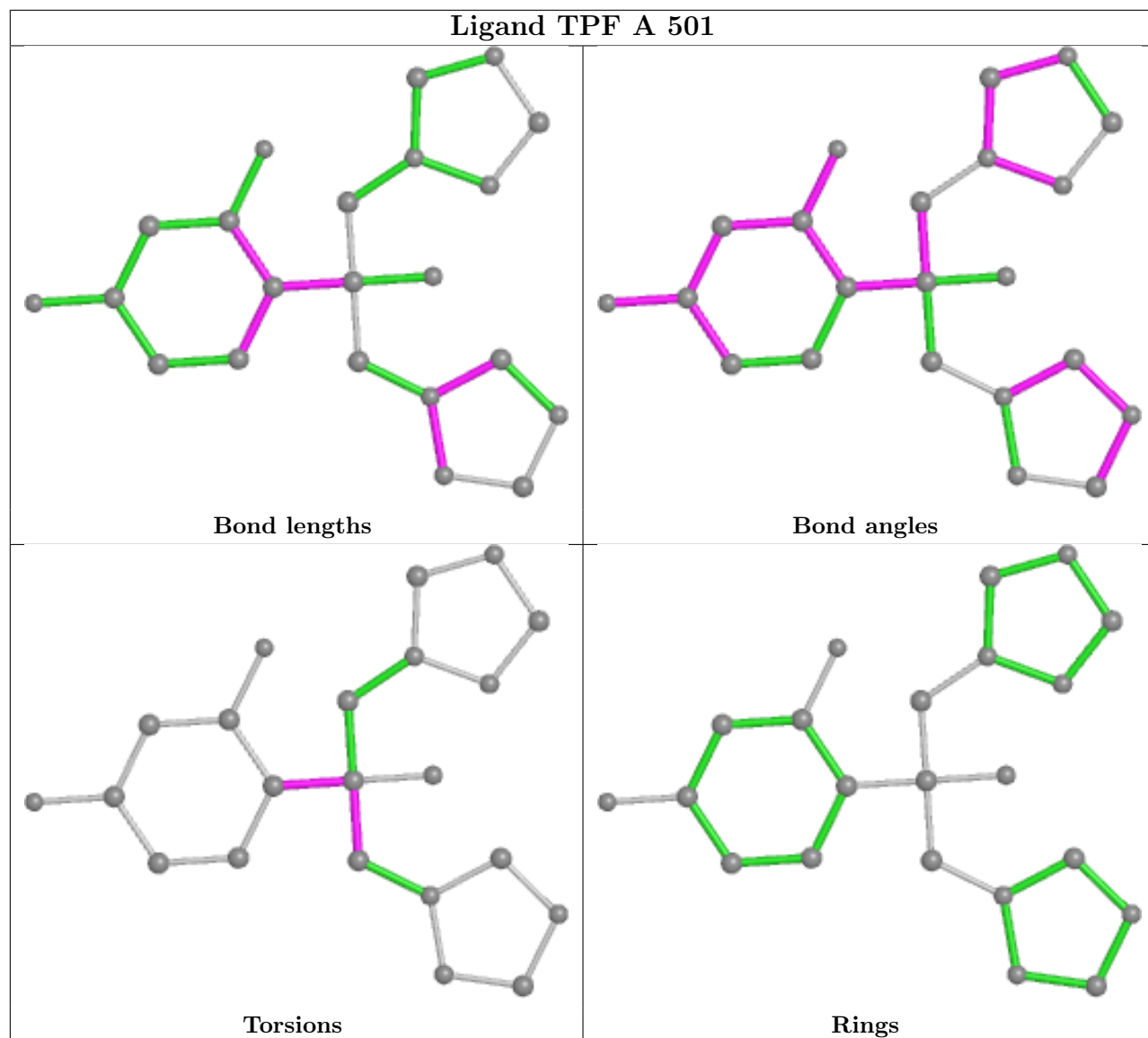
There are no ring outliers.

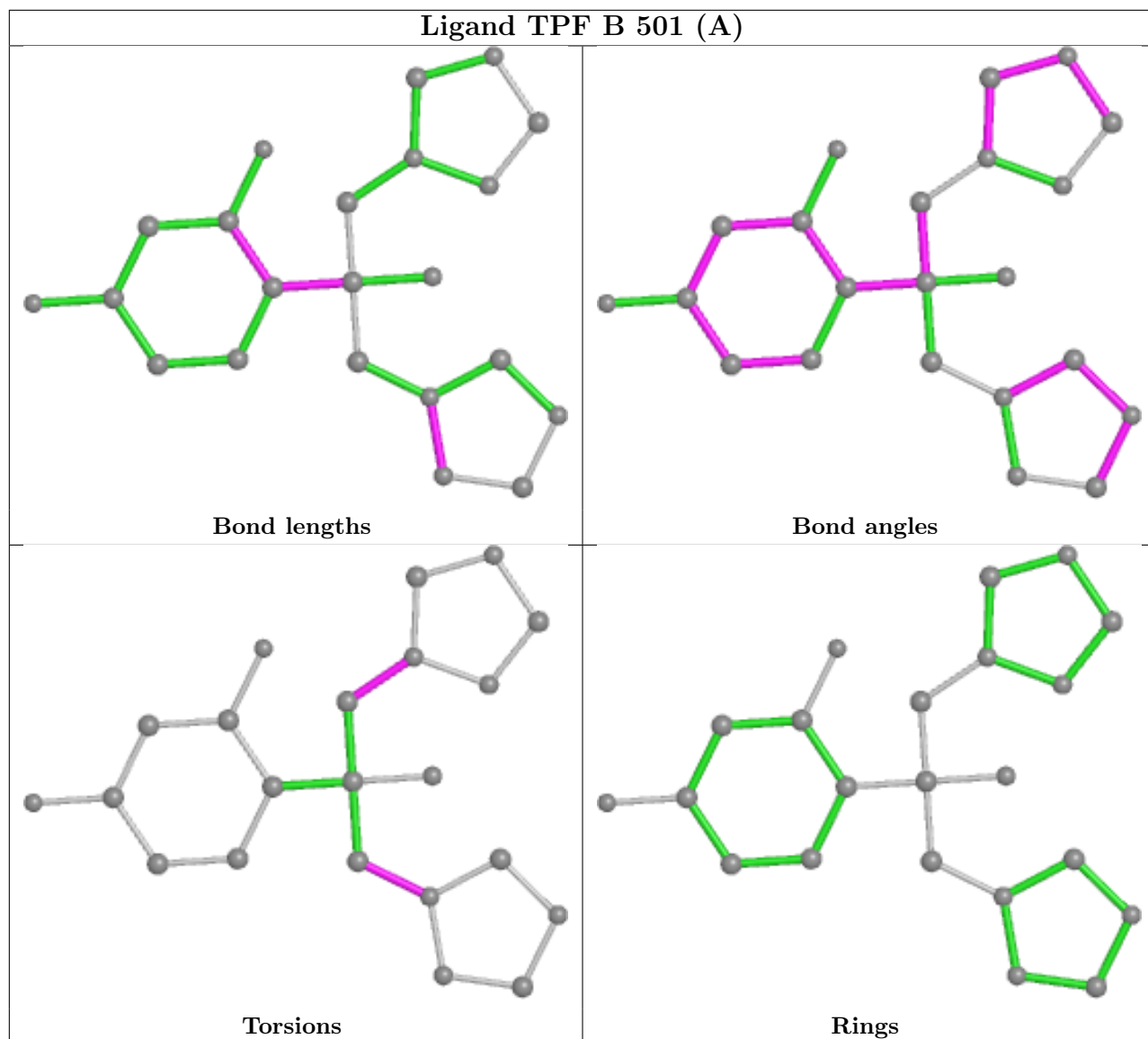
4 monomers are involved in 12 short contacts:

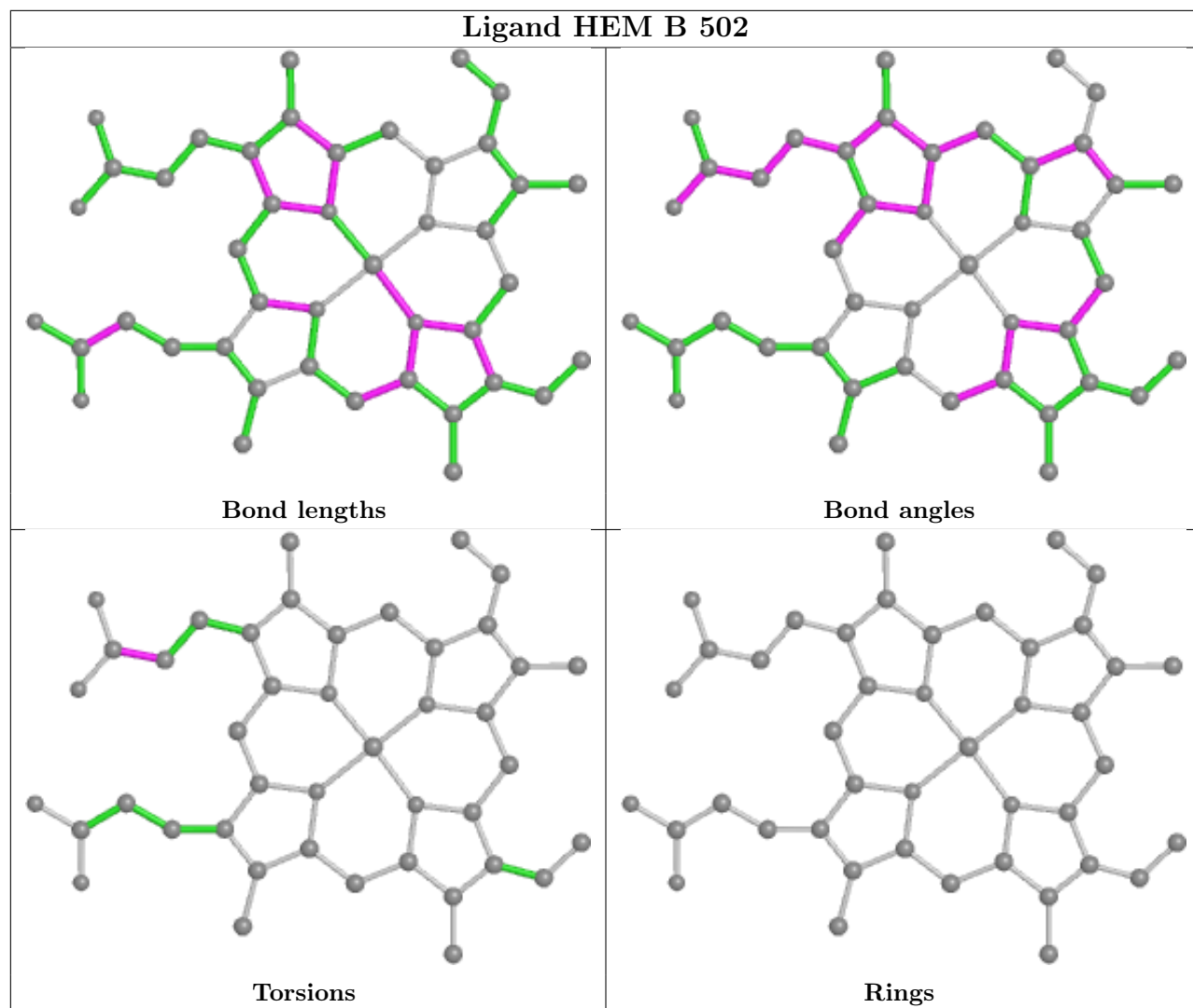
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	507	EDO	3	0
3	A	502	HEM	1	0
2	B	501[A]	TPF	5	0
2	B	501[B]	TPF	3	0

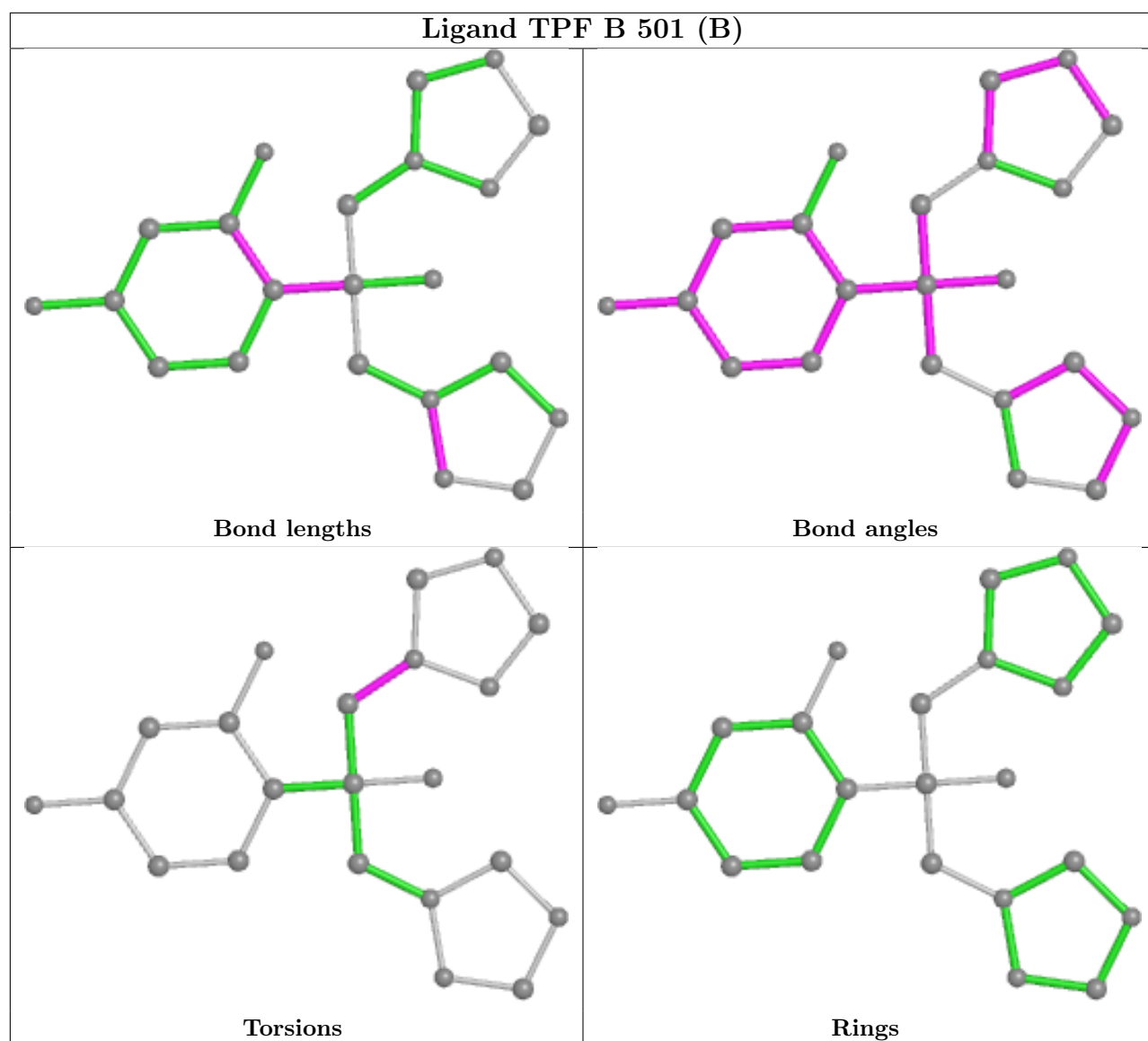
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

### 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, 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	453/457 (99%)	0.03	17 (3%) 40 50	20, 32, 67, 116	0
1	B	443/457 (96%)	-0.06	7 (1%) 72 79	20, 31, 65, 100	0
All	All	896/914 (98%)	-0.02	24 (2%) 54 63	20, 32, 66, 116	0

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	189	GLN	6.7
1	A	191	ALA	5.8
1	B	186	ASN	5.4
1	A	187	LYS	4.4
1	A	192	ASN	4.3
1	A	197	ALA	3.9
1	A	77	PHE	3.7
1	A	193	PRO	3.4
1	A	190	ARG	3.3
1	A	243	PRO	3.2
1	A	245	THR	3.2
1	B	2	ILE	2.9
1	B	77[A]	PHE	2.9
1	B	228	GLU	2.9
1	B	188	LEU	2.9
1	A	188	LEU	2.7
1	B	227	GLY	2.7
1	A	202	LYS	2.6
1	A	457	GLY	2.6
1	B	185	MET	2.5
1	A	185	MET	2.3
1	A	11	PHE	2.2
1	A	247	GLU	2.1
1	A	199	ASP	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](#)

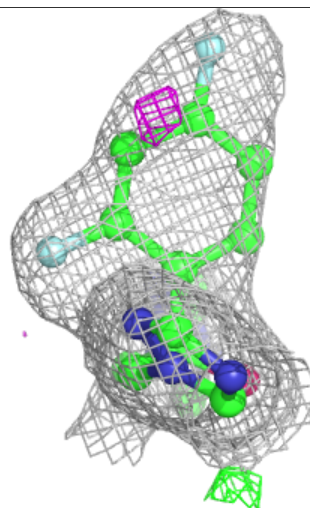
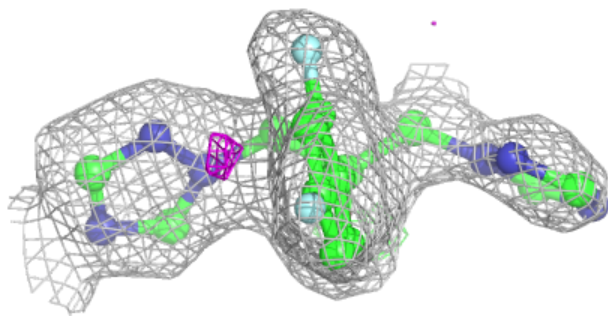
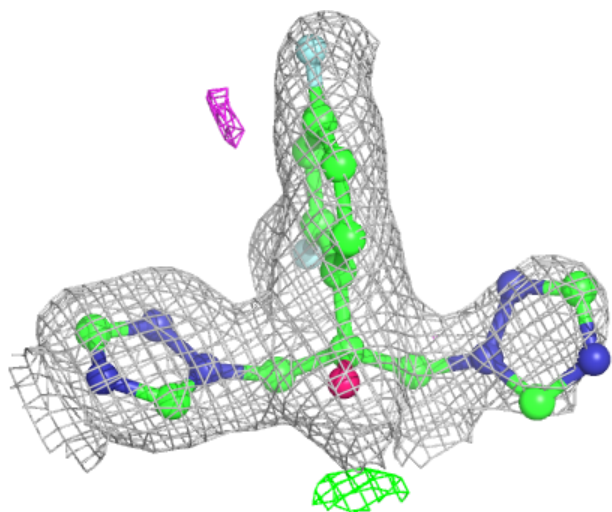
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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	EDO	A	510	4/4	0.72	0.26	46,52,54,58	0
5	EDO	B	507	4/4	0.72	0.31	38,44,49,52	0
5	EDO	A	507	4/4	0.83	0.19	59,62,65,70	0
5	EDO	A	509	4/4	0.84	0.21	43,44,45,57	0
5	EDO	B	505	4/4	0.87	0.15	59,61,63,72	0
5	EDO	B	504	4/4	0.93	0.14	31,40,46,48	0
4	PO4	A	505	5/5	0.93	0.17	62,65,68,73	0
5	EDO	B	506	4/4	0.93	0.19	45,53,54,54	0
5	EDO	A	508	4/4	0.93	0.14	50,55,60,68	0
2	TPF	B	501[B]	22/22	0.94	0.15	23,40,54,56	22
4	PO4	A	503	5/5	0.94	0.19	35,53,61,66	0
4	PO4	A	504	5/5	0.94	0.18	44,60,62,70	0
2	TPF	B	501[A]	22/22	0.94	0.15	24,45,56,63	22
5	EDO	B	508	4/4	0.94	0.17	41,49,57,67	0
4	PO4	A	506	5/5	0.95	0.24	48,62,64,77	0
4	PO4	B	503	5/5	0.96	0.16	30,49,59,65	0
2	TPF	A	501	22/22	0.97	0.12	24,31,38,45	0
3	HEM	A	502	43/43	0.98	0.10	16,21,24,25	0
3	HEM	B	502	43/43	0.98	0.09	17,20,23,24	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.

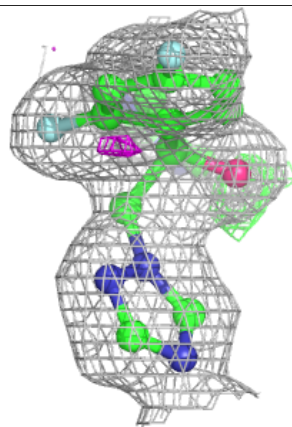
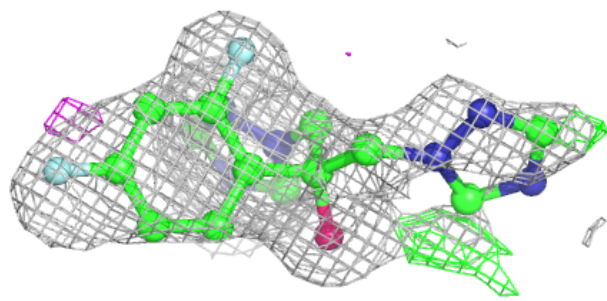
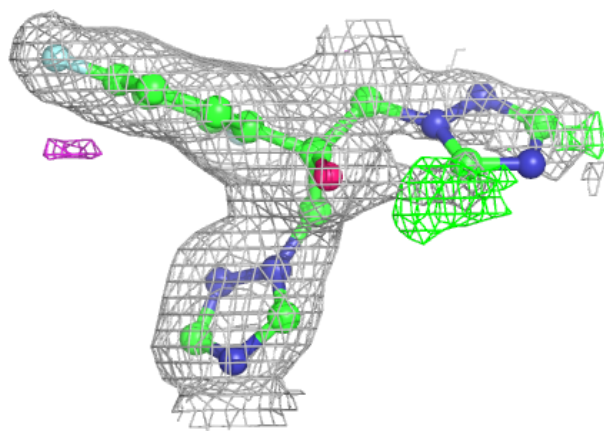
**Electron density around TPF B 501 (B):**

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

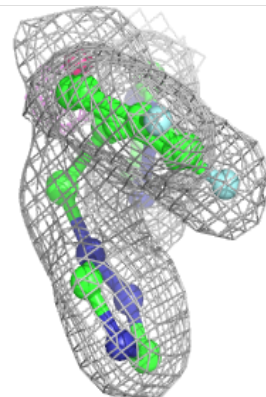
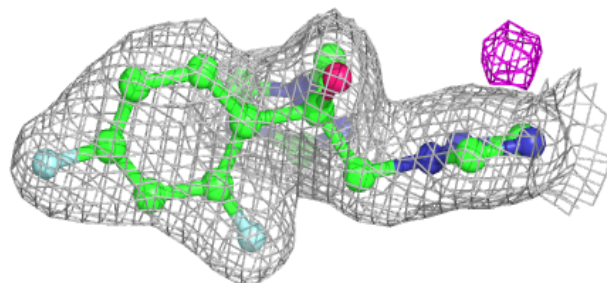
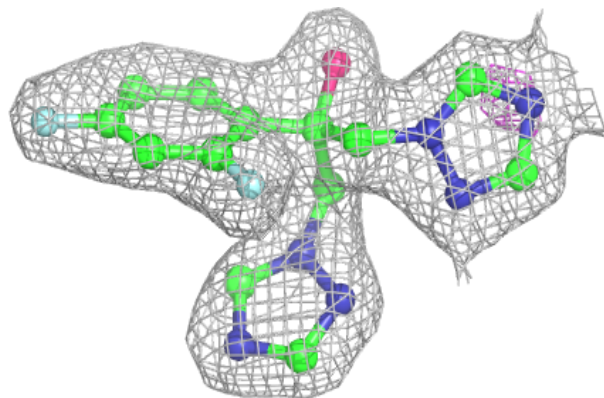


**Electron density around TPF B 501 (A):**

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

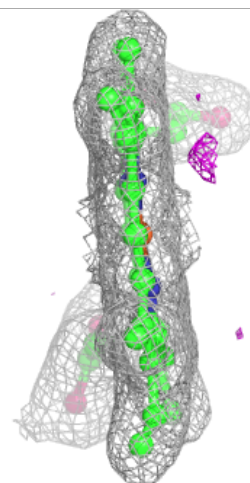
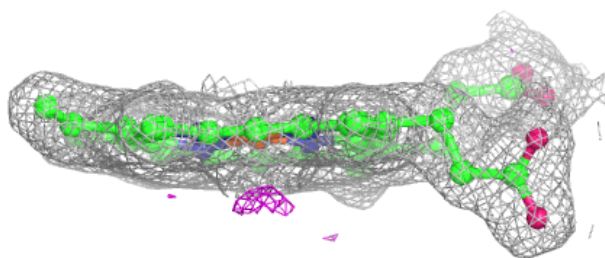
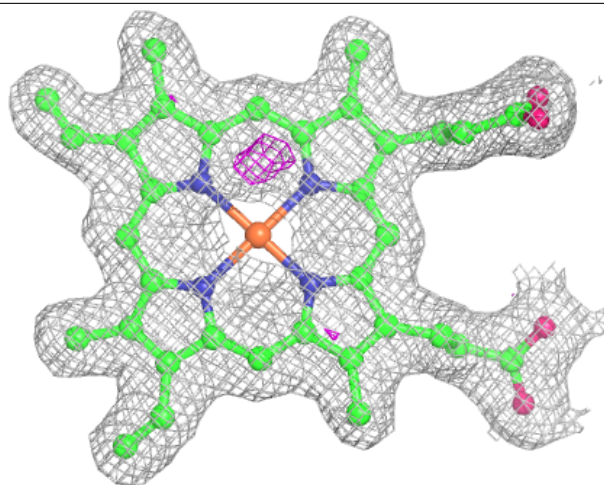
**Electron density around TPF A 501:**

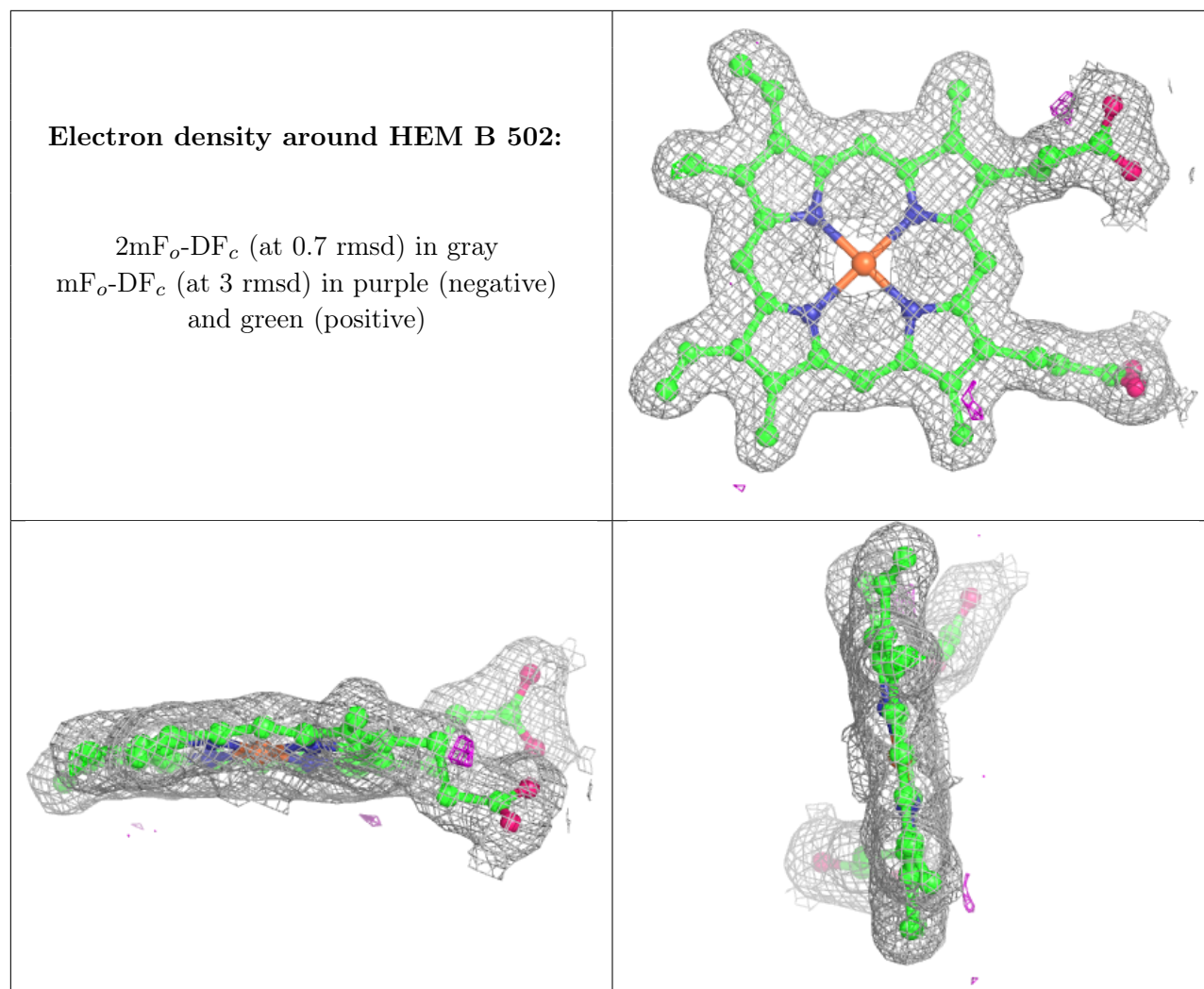
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around HEM A 502:**

$2mF_o-DF_c$  (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.