



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 29, 2023 – 04:13 AM EDT

PDB ID : 3MDV  
Title : Clotrimazole complex of Cytochrome P450 46A1  
Authors : Mast, N.; Charvet, C.; Pikuleva, I.; Stout, C.D.  
Deposited on : 2010-03-30  
Resolution : 2.40 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)  
Xtriage (Phenix) : 1.13  
EDS : 2.35  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35

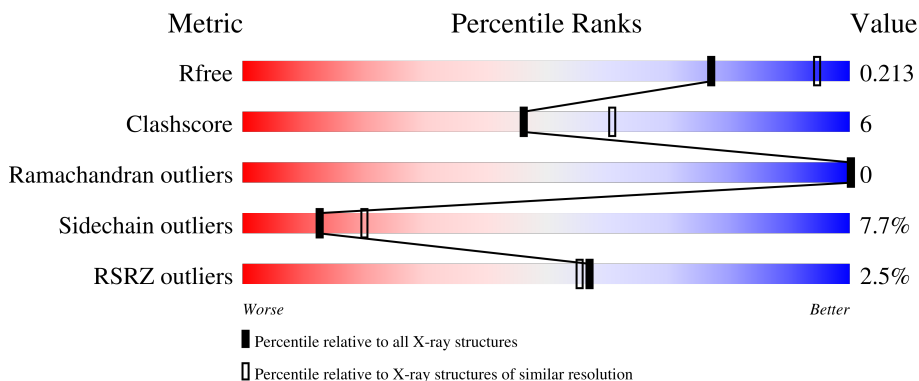
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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	456	
1	B	456	

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7456 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 Cholesterol 24-hydroxylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	424	3418	2181	598	622	17	0	0	0
1	B	424	3418	2181	598	622	17	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	49	MET	-	expression tag	UNP Q9Y6A2
A	50	ALA	-	expression tag	UNP Q9Y6A2
A	501	HIS	-	expression tag	UNP Q9Y6A2
A	502	HIS	-	expression tag	UNP Q9Y6A2
A	503	HIS	-	expression tag	UNP Q9Y6A2
A	504	HIS	-	expression tag	UNP Q9Y6A2
B	49	MET	-	expression tag	UNP Q9Y6A2
B	50	ALA	-	expression tag	UNP Q9Y6A2
B	501	HIS	-	expression tag	UNP Q9Y6A2
B	502	HIS	-	expression tag	UNP Q9Y6A2
B	503	HIS	-	expression tag	UNP Q9Y6A2
B	504	HIS	-	expression tag	UNP Q9Y6A2

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



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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	Cl	N		
3	B	1	25	22	1	2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	263	Total 263	O 263	0	0
4	B	221	Total 221	O 221	0	0



## 4 Data and refinement statistics i

Property	Value	Source
Space group	I 41	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	121.61Å 121.61Å 144.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.40 28.90 – 2.40	Depositor EDS
% Data completeness (in resolution range)	93.0 (30.00-2.40) 94.0 (28.90-2.40)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	0.10	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.38 (at 2.39Å)	Xtrriage
Refinement program	REFMAC 5.5.0072	Depositor
R, $R_{free}$	0.209 , 0.228 0.199 , 0.213	Depositor DCC
$R_{free}$ test set	1929 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	32.6	Xtrriage
Anisotropy	0.068	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 53.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.52$ , $\langle L^2 \rangle = 0.36$	Xtrriage
Estimated twinning fraction	0.297 for -h,k,-l	Xtrriage
Reported twinning fraction	0.459 for H, K, L 0.541 for -H, K, -L	Depositor
Outliers	1 of 38566 reflections (0.003%)	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	7456	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.56% 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: HEM, CL6

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	0.60	0/3485	0.79	14/4700 (0.3%)
1	B	0.59	0/3485	0.78	12/4700 (0.3%)
All	All	0.59	0/6970	0.78	26/9400 (0.3%)

There are no bond length outliers.

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	248	ARG	NE-CZ-NH2	11.24	125.92	120.30
1	A	461	ARG	NE-CZ-NH2	-9.81	115.40	120.30
1	B	248	ARG	NE-CZ-NH1	9.06	124.83	120.30
1	A	461	ARG	NE-CZ-NH1	9.01	124.80	120.30
1	B	487	ARG	NE-CZ-NH2	8.73	124.66	120.30
1	B	139	ARG	NE-CZ-NH1	8.60	124.60	120.30
1	B	248	ARG	NE-CZ-NH2	-8.55	116.03	120.30
1	A	267	ARG	NE-CZ-NH1	8.38	124.49	120.30
1	B	147	ARG	NE-CZ-NH1	8.29	124.44	120.30
1	B	147	ARG	NE-CZ-NH2	-8.05	116.28	120.30
1	B	487	ARG	NE-CZ-NH1	-7.99	116.31	120.30
1	A	248	ARG	NE-CZ-NH1	-7.97	116.31	120.30
1	A	487	ARG	NE-CZ-NH1	7.97	124.28	120.30
1	A	267	ARG	NE-CZ-NH2	-7.77	116.42	120.30
1	A	487	ARG	NE-CZ-NH2	-7.09	116.75	120.30
1	A	147	ARG	NE-CZ-NH2	6.99	123.80	120.30
1	B	139	ARG	NE-CZ-NH2	-6.99	116.80	120.30
1	B	461	ARG	NE-CZ-NH1	-6.67	116.96	120.30
1	B	461	ARG	NE-CZ-NH2	6.38	123.49	120.30
1	B	327	ARG	NE-CZ-NH2	5.97	123.28	120.30
1	A	248	ARG	CD-NE-CZ	5.77	131.68	123.60
1	A	139	ARG	NE-CZ-NH2	5.73	123.16	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	147	ARG	NE-CZ-NH1	-5.67	117.47	120.30
1	B	248	ARG	CD-NE-CZ	5.42	131.19	123.60
1	A	327	ARG	NE-CZ-NH2	5.26	122.93	120.30
1	A	139	ARG	NE-CZ-NH1	-5.19	117.71	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	3418	0	3466	39	0
1	B	3418	0	3466	44	0
2	A	43	0	30	1	0
2	B	43	0	30	2	0
3	A	25	0	17	5	0
3	B	25	0	17	3	0
4	A	263	0	0	4	0
4	B	221	0	0	8	0
All	All	7456	0	7026	88	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 6.

All (88) 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:B:147:ARG:NH2	4:B:1062:HOH:O	1.59	1.22
1:A:327:ARG:NH1	1:A:352:TYR:CE2	2.37	0.92
1:A:135:HIS:CE1	1:A:139:ARG:NH2	2.42	0.88
1:A:135:HIS:NE2	1:A:139:ARG:NH2	2.26	0.84
1:B:135:HIS:NE2	1:B:139:ARG:NH2	2.30	0.80
1:B:471:GLN:HE21	1:B:479:LEU:HA	1.55	0.71
1:A:471:GLN:HE21	1:A:479:LEU:HA	1.56	0.71
1:B:327:ARG:NH1	1:B:352:TYR:CE2	2.61	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:135:HIS:CE1	1:B:139:ARG:NH2	2.62	0.67
1:A:135:HIS:CE1	1:A:139:ARG:HH22	2.13	0.66
1:A:403:THR:HG22	4:A:668:HOH:O	1.97	0.64
1:A:135:HIS:CE1	1:A:139:ARG:HH21	2.14	0.63
3:A:506:CL6:CAA	3:A:506:CL6:HAM	2.28	0.63
1:B:113:GLN:HG2	1:B:122:GLY:O	1.98	0.63
1:B:189:MET:HE1	1:B:304:HIS:CE1	2.34	0.62
3:B:506:CL6:CAE	3:B:506:CL6:HAM	2.30	0.61
1:B:135:HIS:CE1	1:B:139:ARG:HH21	2.17	0.60
1:B:139:ARG:NH2	4:B:804:HOH:O	2.02	0.60
1:B:440:GLN:HG2	1:B:444:GLN:OE1	2.03	0.59
1:A:87:VAL:CG1	1:A:92:SER:HB3	2.33	0.58
1:B:147:ARG:O	1:B:151:VAL:HG23	2.04	0.58
1:A:147:ARG:O	1:A:151:VAL:HG23	2.04	0.57
1:B:473:GLN:HB3	4:B:692:HOH:O	2.06	0.56
1:A:113:GLN:HG2	1:A:122:GLY:O	2.05	0.56
1:A:189:MET:HG2	1:A:203:MET:SD	2.46	0.55
1:A:189:MET:CE	1:A:304:HIS:CE1	2.92	0.52
1:A:125:LEU:HD23	2:A:505:HEM:HMD1	1.92	0.52
1:B:100:THR:HA	1:B:434:HIS:CE1	2.45	0.51
1:A:100:THR:HA	1:A:434:HIS:CE1	2.45	0.51
1:B:223:THR:OG1	1:B:473:GLN:HG3	2.11	0.51
1:A:440:GLN:HG2	1:A:444:GLN:OE1	2.11	0.51
1:A:112:LEU:HD22	3:A:506:CL6:CLAY	2.49	0.50
1:B:189:MET:HG2	1:B:203:MET:SD	2.51	0.50
1:B:125:LEU:HD23	2:B:505:HEM:HMD1	1.93	0.50
1:B:135:HIS:CE1	4:B:804:HOH:O	2.65	0.49
1:A:104:LYS:HD3	1:A:109:TYR:CZ	2.47	0.49
1:B:87:VAL:CG1	1:B:92:SER:HB3	2.41	0.49
1:B:93:VAL:HG13	1:B:97:LEU:HD12	1.94	0.49
1:B:305:GLU:HG2	3:B:506:CL6:HAT	1.94	0.49
1:A:486:LEU:HD12	1:A:486:LEU:N	2.27	0.49
3:B:506:CL6:CAE	3:B:506:CL6:CAM	2.91	0.48
1:A:456:GLN:HB3	1:A:457:ARG:HG2	1.94	0.48
1:A:93:VAL:HG13	1:A:97:LEU:HD12	1.95	0.48
1:A:223:THR:OG1	1:A:473:GLN:HG3	2.14	0.48
1:B:456:GLN:HB3	1:B:457:ARG:HG2	1.95	0.48
1:A:343:ASP:HB2	1:A:346:ASP:OD2	2.14	0.47
1:B:104:LYS:HD3	1:B:109:TYR:CZ	2.49	0.47
1:A:245:GLU:HA	1:A:248:ARG:NH2	2.30	0.47
3:A:506:CL6:CAA	3:A:506:CL6:CAM	2.92	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:84:SER:HB2	1:B:390:PRO:O	2.15	0.47
1:B:486:LEU:HD12	1:B:486:LEU:N	2.30	0.47
1:A:442:PHE:CD2	1:A:442:PHE:C	2.89	0.46
1:B:61:GLN:HB3	1:B:396:TYR:CD1	2.50	0.46
1:B:272:PRO:HG3	4:B:703:HOH:O	2.15	0.46
1:B:377:GLU:HA	1:B:385:VAL:O	2.15	0.46
1:B:246:SER:HA	4:B:618:HOH:O	2.16	0.45
1:A:388:ASN:ND2	4:A:721:HOH:O	2.50	0.45
1:A:377:GLU:HA	1:A:385:VAL:O	2.17	0.45
1:B:240:LEU:O	1:B:244:ARG:HG3	2.17	0.45
1:B:189:MET:CE	1:B:304:HIS:CE1	3.00	0.44
1:A:189:MET:CE	1:A:304:HIS:NE2	2.81	0.44
3:A:506:CL6:CAK	3:A:506:CL6:HAE	2.46	0.44
1:B:245:GLU:HA	1:B:248:ARG:HH21	1.83	0.44
1:A:61:GLN:HB3	1:A:396:TYR:CD1	2.52	0.43
1:A:310:HIS:CE1	1:A:361:LEU:HG	2.53	0.43
1:B:440:GLN:CG	1:B:444:GLN:OE1	2.65	0.43
1:B:310:HIS:CE1	1:B:361:LEU:HG	2.54	0.43
1:B:327:ARG:NH1	1:B:352:TYR:CZ	2.86	0.43
1:A:84:SER:HB2	1:A:390:PRO:O	2.19	0.42
1:B:343:ASP:HB2	1:B:346:ASP:OD2	2.19	0.42
1:B:218:MET:SD	1:B:218:MET:C	2.97	0.42
1:B:442:PHE:CD2	1:B:442:PHE:C	2.93	0.42
1:B:289:ASP:O	1:B:293:LEU:HG	2.20	0.42
1:A:289:ASP:O	1:A:293:LEU:HG	2.19	0.41
1:A:413:PRO:HD2	4:A:624:HOH:O	2.20	0.41
1:B:303:GLY:HA2	2:B:505:HEM:C3C	2.55	0.41
1:A:112:LEU:HD13	3:A:506:CL6:HAE	2.01	0.41
1:A:259:GLN:O	1:A:263:GLU:HB2	2.20	0.41
1:A:139:ARG:HD2	1:A:139:ARG:HA	1.91	0.41
1:A:189:MET:HE2	1:A:304:HIS:CE1	2.54	0.41
1:A:389:THR:HA	1:A:390:PRO:HD3	1.94	0.41
1:B:226:ARG:NH2	4:B:600:HOH:O	2.53	0.41
1:B:487:ARG:HD2	1:B:488:PRO:HD2	2.02	0.41
1:A:139:ARG:CZ	4:A:702:HOH:O	2.68	0.41
1:B:70:LYS:HB2	1:B:70:LYS:HE2	1.72	0.41
1:B:358:LYS:HG2	4:B:661:HOH:O	2.21	0.41
1:B:121:PHE:CE1	1:B:297:VAL:HG12	2.55	0.40
1:A:328:LEU:HD11	1:A:356:VAL:HG21	2.04	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	420/456 (92%)	405 (96%)	15 (4%)	0	100	100
1	B	420/456 (92%)	403 (96%)	17 (4%)	0	100	100
All	All	840/912 (92%)	808 (96%)	32 (4%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	372/397 (94%)	338 (91%)	34 (9%)	9	14
1	B	372/397 (94%)	349 (94%)	23 (6%)	18	29
All	All	744/794 (94%)	687 (92%)	57 (8%)	13	20

All (57) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	82	LYS
1	A	101	LYS
1	A	106	SER
1	A	107	LYS
1	A	139	ARG
1	A	147	ARG
1	A	155	GLU
1	A	160	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	175	GLN
1	A	210	PRO
1	A	213	GLN
1	A	218	MET
1	A	226	ARG
1	A	237	ARG
1	A	238	LYS
1	A	240	LEU
1	A	242	GLU
1	A	248	ARG
1	A	250	LEU
1	A	260	ARG
1	A	263	GLU
1	A	267	ARG
1	A	270	GLU
1	A	287	GLN
1	A	327	ARG
1	A	332	VAL
1	A	335	VAL
1	A	354	SER
1	A	403	THR
1	A	442	PHE
1	A	453	LYS
1	A	473	GLN
1	A	486	LEU
1	A	487	ARG
1	B	82	LYS
1	B	101	LYS
1	B	147	ARG
1	B	155	GLU
1	B	213	GLN
1	B	218	MET
1	B	226	ARG
1	B	237	ARG
1	B	238	LYS
1	B	240	LEU
1	B	242	GLU
1	B	250	LEU
1	B	260	ARG
1	B	270	GLU
1	B	287	GLN
1	B	332	VAL

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Mol	Chain	Res	Type
1	B	335	VAL
1	B	354	SER
1	B	376	GLU
1	B	403	THR
1	B	442	PHE
1	B	473	GLN
1	B	486	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	213	GLN
1	A	471	GLN
1	A	473	GLN
1	B	213	GLN
1	B	471	GLN
1	B	473	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](#)

4 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$
3	CL6	A	506	-	26,28,28	0.88	1 (3%)	35,39,39	4.23	5 (14%)
2	HEM	A	505	1	41,50,50	1.66	9 (21%)	45,82,82	1.72	12 (26%)
3	CL6	B	506	-	26,28,28	0.92	1 (3%)	35,39,39	4.14	5 (14%)
2	HEM	B	505	1	41,50,50	1.57	7 (17%)	45,82,82	1.72	11 (24%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	CL6	A	506	-	-	0/18/24/24	0/4/4/4
2	HEM	A	505	1	-	2/12/54/54	-
3	CL6	B	506	-	-	0/18/24/24	0/4/4/4
2	HEM	B	505	1	-	5/12/54/54	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	505	HEM	C3D-C2D	4.74	1.46	1.36
2	A	505	HEM	C3D-C2D	4.24	1.45	1.36
2	B	505	HEM	C3C-CAC	3.35	1.54	1.47
2	A	505	HEM	C3C-CAC	3.34	1.54	1.47
2	B	505	HEM	CHB-C1B	2.96	1.42	1.35
2	A	505	HEM	CAA-C2A	2.87	1.56	1.52
2	A	505	HEM	CHB-C1B	2.83	1.42	1.35
3	B	506	CL6	CAP-NAO	-2.82	1.36	1.38
3	A	506	CL6	CAP-NAO	-2.73	1.36	1.38
2	A	505	HEM	CMB-C2B	2.58	1.56	1.50
2	B	505	HEM	CBB-CAB	2.54	1.42	1.30
2	A	505	HEM	CHC-C4B	-2.54	1.33	1.41
2	B	505	HEM	CHD-C1D	-2.35	1.34	1.41
2	A	505	HEM	C1A-NA	2.16	1.40	1.36
2	B	505	HEM	C1A-NA	2.14	1.40	1.36
2	A	505	HEM	CBB-CAB	2.12	1.40	1.30
2	B	505	HEM	CMB-C2B	2.08	1.55	1.50
2	A	505	HEM	CHD-C1D	-2.08	1.35	1.41

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	506	CL6	CAR-CAW-CAX	15.97	132.76	122.65
3	B	506	CL6	CAR-CAW-CAX	14.99	132.14	122.65
3	A	506	CL6	CAU-CAW-CAR	-14.88	110.30	121.05
3	B	506	CL6	CAU-CAW-CAR	-14.07	110.89	121.05
3	B	506	CL6	CAC-CAR-CAW	-10.33	98.24	112.00
3	A	506	CL6	CAC-CAR-CAW	-9.78	98.97	112.00
3	B	506	CL6	CAW-CAR-NAO	5.81	114.97	106.11
2	A	505	HEM	CBA-CAA-C2A	-4.73	104.56	112.62
3	A	506	CL6	CAW-CAR-NAO	4.43	112.88	106.11
2	B	505	HEM	C4D-ND-C1D	4.36	109.58	105.07
2	B	505	HEM	CBD-CAD-C3D	-3.80	102.06	112.63
2	A	505	HEM	C4D-ND-C1D	3.49	108.67	105.07
2	B	505	HEM	CHD-C1D-ND	3.38	128.10	124.43
3	B	506	CL6	CAL-CAR-CAW	3.14	116.18	112.00
3	A	506	CL6	CAL-CAR-CAW	3.10	116.13	112.00
2	A	505	HEM	CBD-CAD-C3D	-3.08	104.06	112.63
2	B	505	HEM	C4B-C3B-C2B	-3.03	104.71	107.11
2	B	505	HEM	C1B-NB-C4B	2.76	107.93	105.07
2	B	505	HEM	CBA-CAA-C2A	-2.76	107.92	112.62
2	B	505	HEM	CHC-C4B-NB	2.75	127.42	124.43
2	B	505	HEM	CHA-C4D-ND	2.63	127.62	124.38
2	A	505	HEM	CMC-C2C-C3C	2.62	129.59	124.68
2	A	505	HEM	CHD-C1D-ND	2.62	127.28	124.43
2	B	505	HEM	C4B-CHC-C1C	2.61	126.00	122.56
2	A	505	HEM	C4C-CHD-C1D	2.50	125.86	122.56
2	A	505	HEM	C4B-C3B-C2B	-2.38	105.23	107.11
2	A	505	HEM	CMA-C3A-C4A	-2.31	124.92	128.46
2	A	505	HEM	CHC-C4B-NB	2.22	126.84	124.43
2	A	505	HEM	CHA-C4D-ND	2.18	127.08	124.38
2	A	505	HEM	C4A-C3A-C2A	2.11	108.46	107.00
2	B	505	HEM	C2C-C3C-C4C	-2.10	105.43	106.90
2	B	505	HEM	O2A-CGA-CBA	2.07	120.67	114.03
2	A	505	HEM	C4B-CHC-C1C	2.04	125.25	122.56

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	505	HEM	C2B-C3B-CAB-CBB
2	A	505	HEM	CAD-CBD-CGD-O1D
2	A	505	HEM	CAD-CBD-CGD-O2D

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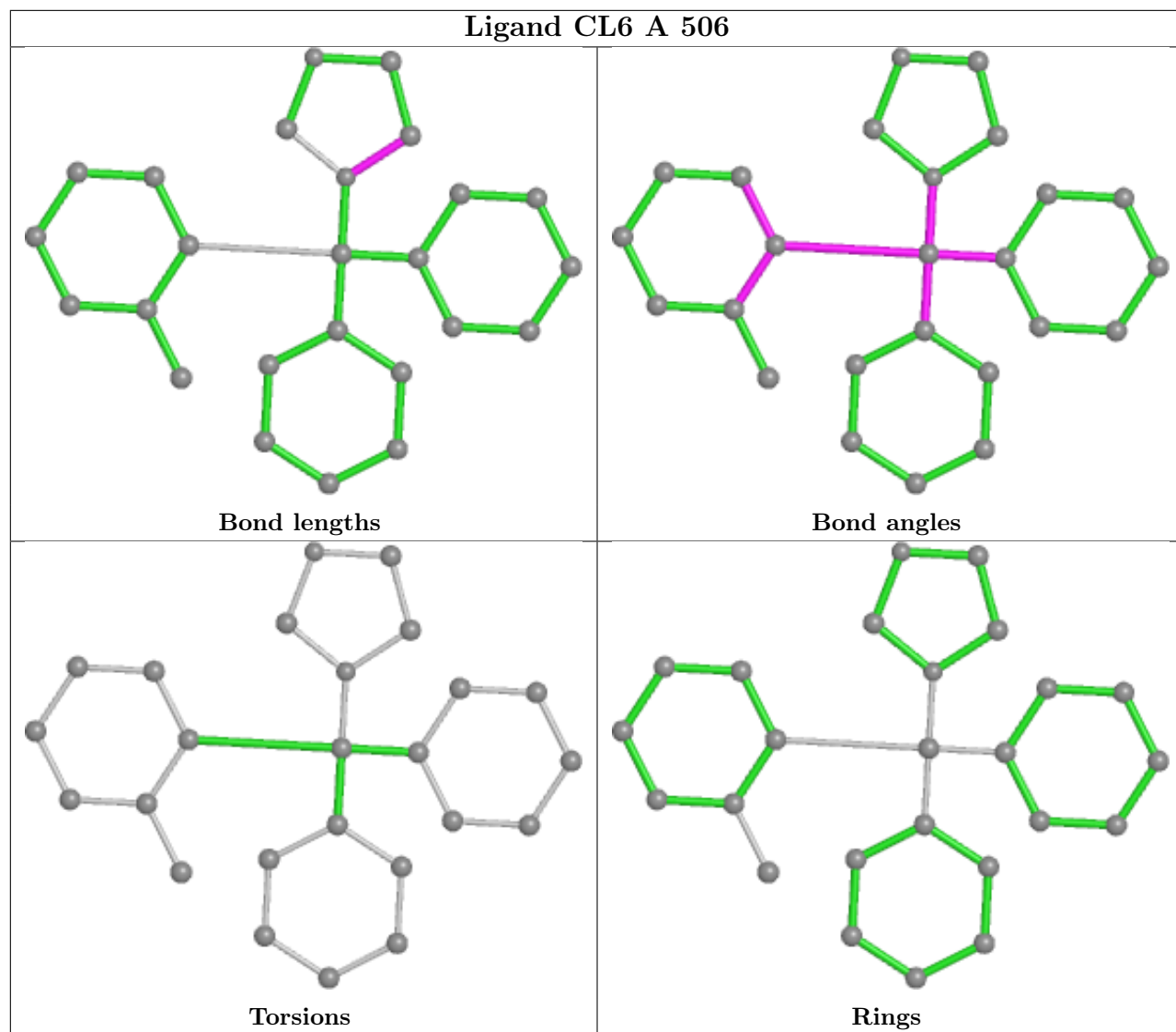
Mol	Chain	Res	Type	Atoms
2	B	505	HEM	CAA-CBA-CGA-O2A
2	B	505	HEM	CAA-CBA-CGA-O1A
2	B	505	HEM	CAD-CBD-CGD-O2D
2	B	505	HEM	CAD-CBD-CGD-O1D

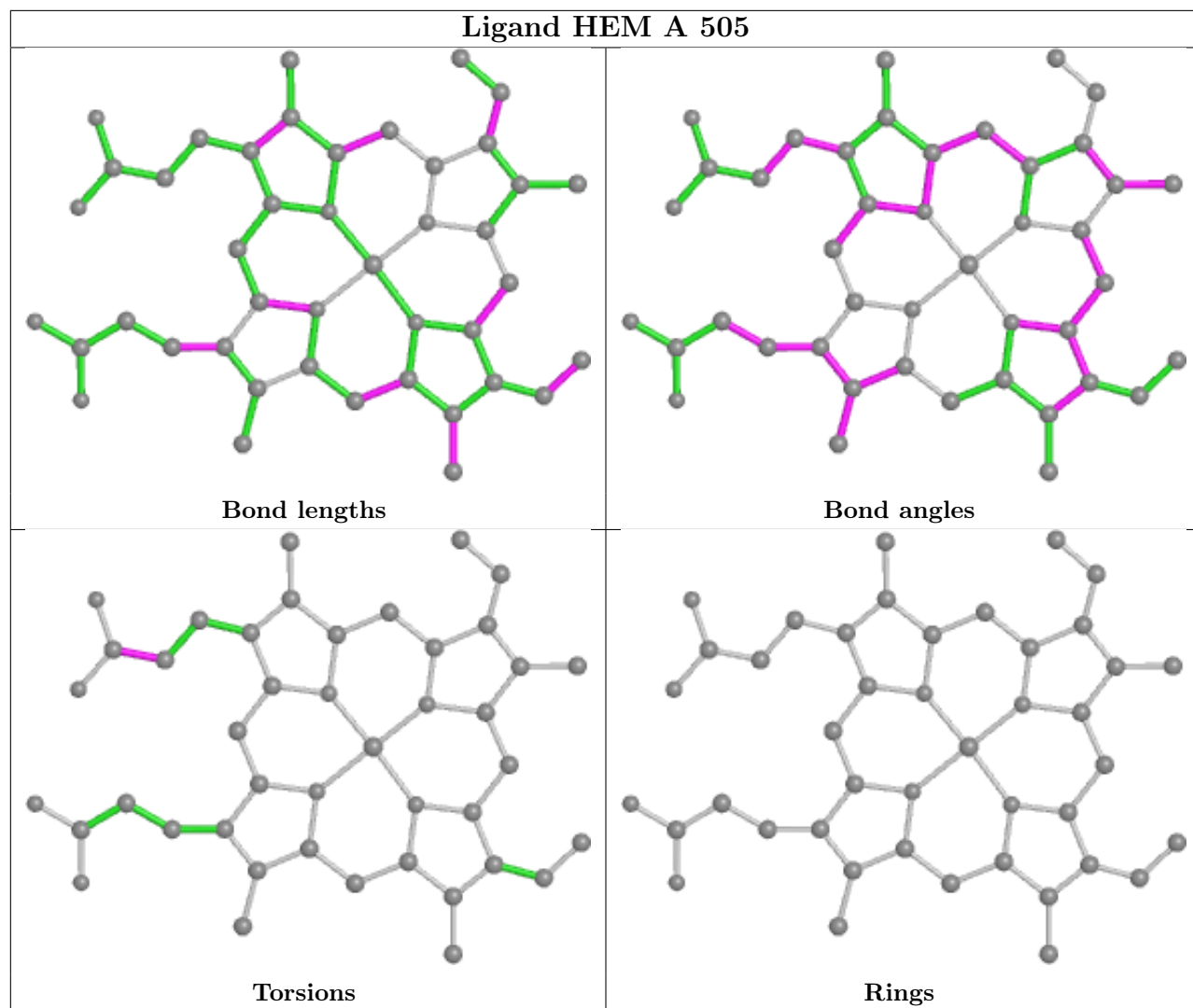
There are no ring outliers.

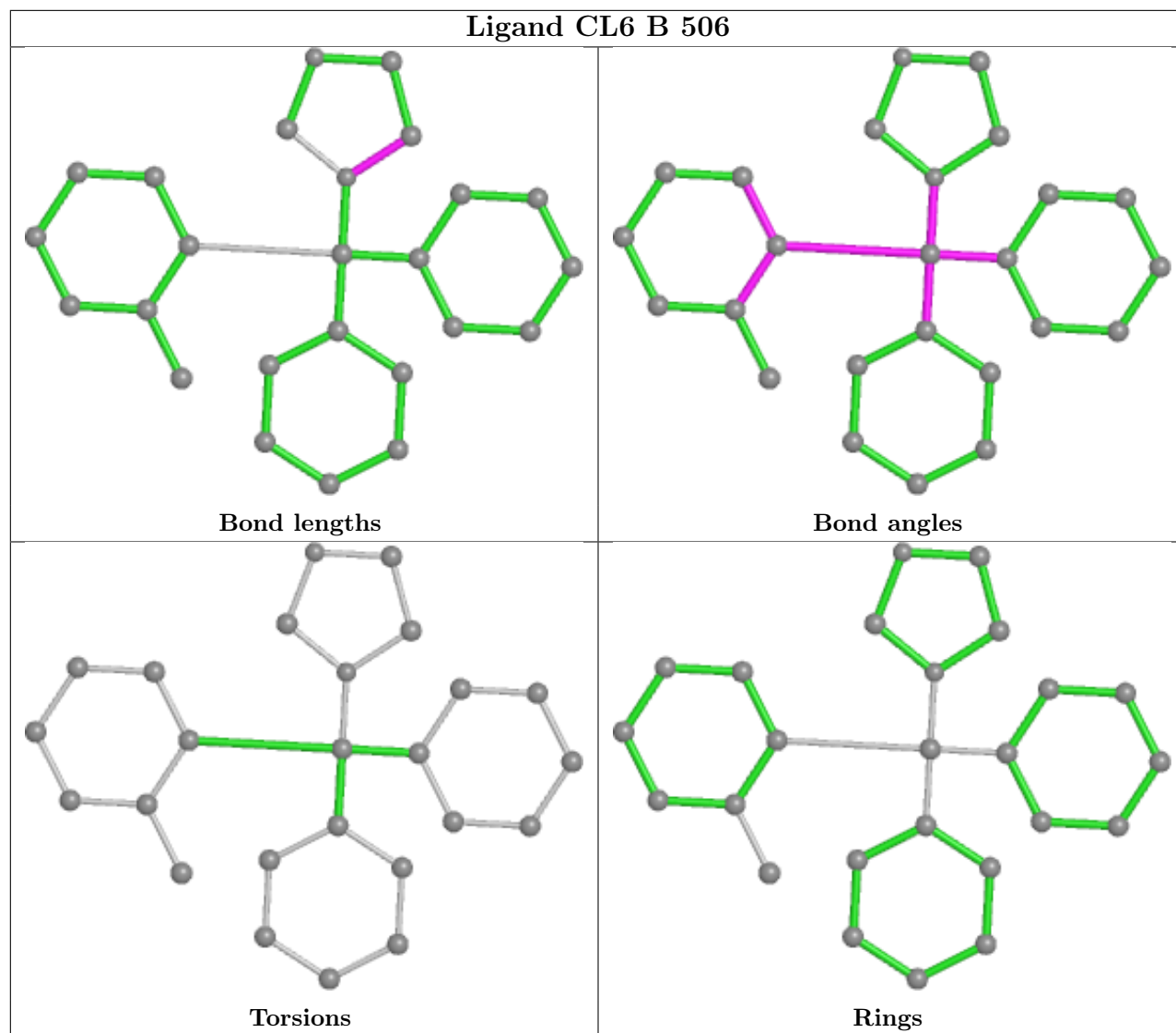
4 monomers are involved in 11 short contacts:

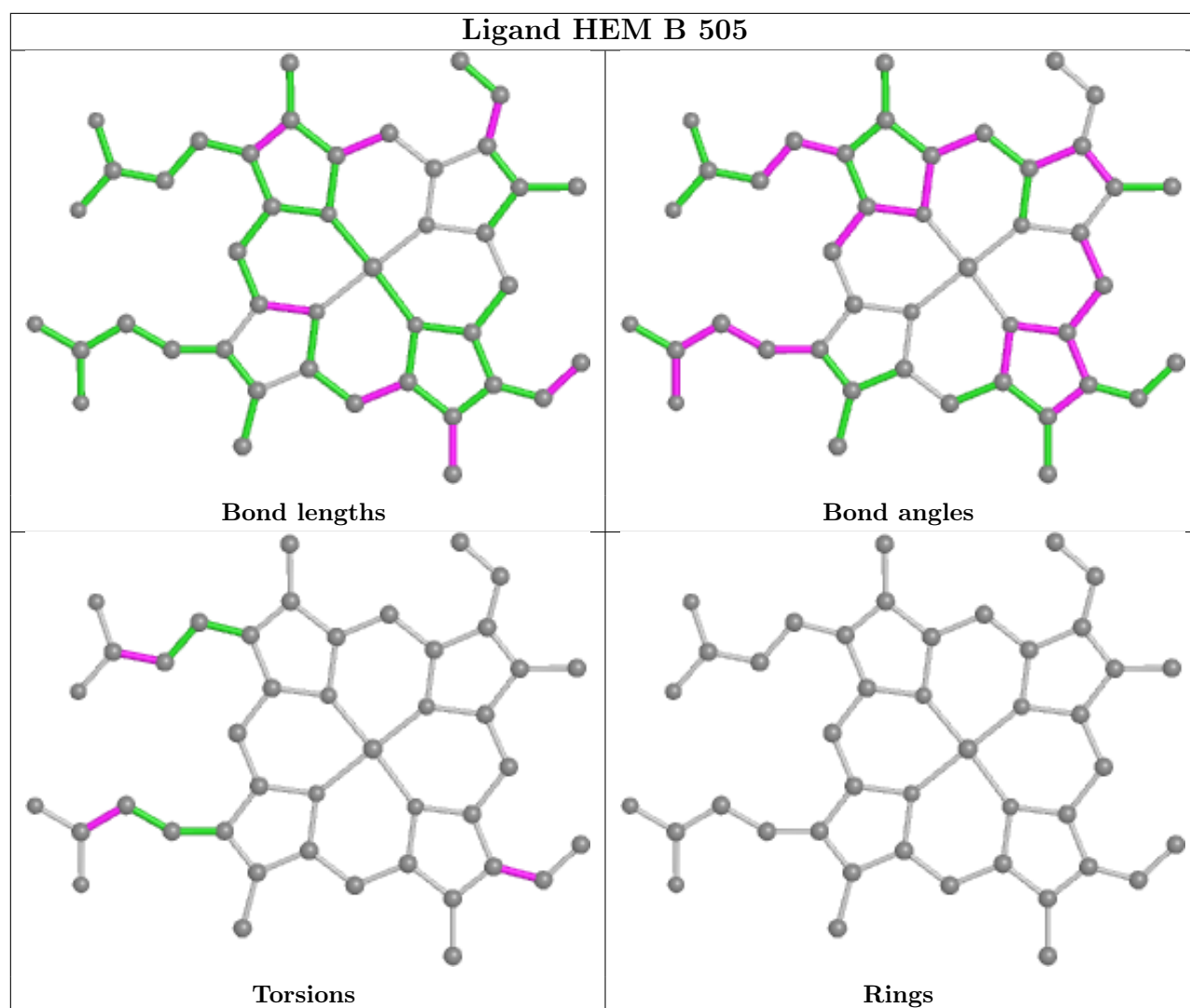
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	506	CL6	5	0
2	A	505	HEM	1	0
3	B	506	CL6	3	0
2	B	505	HEM	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.









## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	424/456 (92%)	-0.02	12 (2%) 53 51	14, 32, 49, 68	0
1	B	424/456 (92%)	-0.02	9 (2%) 63 61	14, 32, 49, 68	0
All	All	848/912 (92%)	-0.02	21 (2%) 57 55	14, 32, 50, 68	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	237	ARG	5.3
1	B	237	ARG	4.4
1	B	227	ASN	3.5
1	A	238	LYS	3.5
1	A	228	THR	3.1
1	A	239	GLN	3.0
1	A	147	ARG	2.9
1	B	238	LYS	2.8
1	A	236	LYS	2.6
1	B	267	ARG	2.5
1	A	227	ASN	2.4
1	B	419	GLY	2.3
1	B	268	GLY	2.3
1	A	465	GLY	2.3
1	A	267	ARG	2.2
1	B	188	ALA	2.2
1	A	263	GLU	2.2
1	B	241	ARG	2.1
1	A	139	ARG	2.1
1	B	263	GLU	2.1
1	A	272	PRO	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](#)

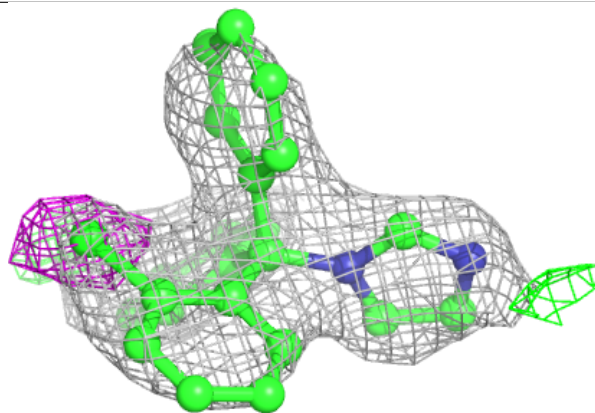
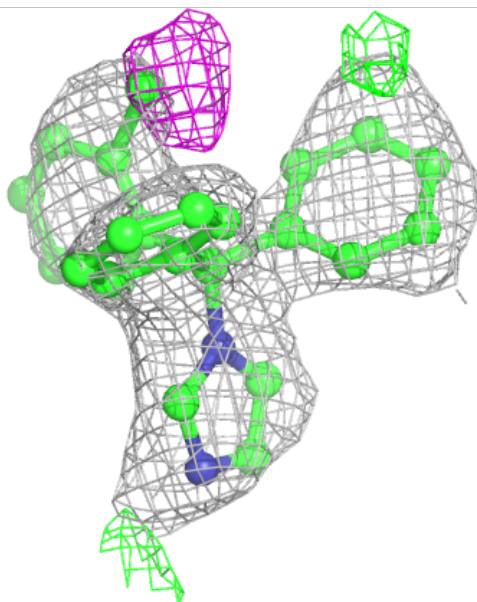
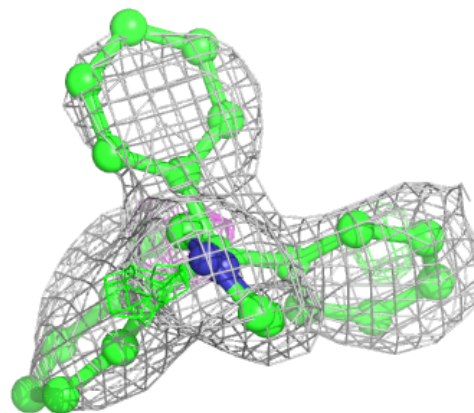
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
3	CL6	A	506	25/25	0.82	0.27	53,55,57,61	0
3	CL6	B	506	25/25	0.89	0.21	51,53,55,57	0
2	HEM	A	505	43/43	0.96	0.17	9,19,29,34	0
2	HEM	B	505	43/43	0.98	0.16	13,17,24,26	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 CL6 A 506:**

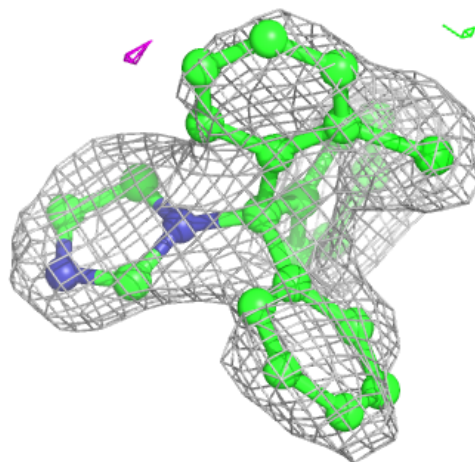
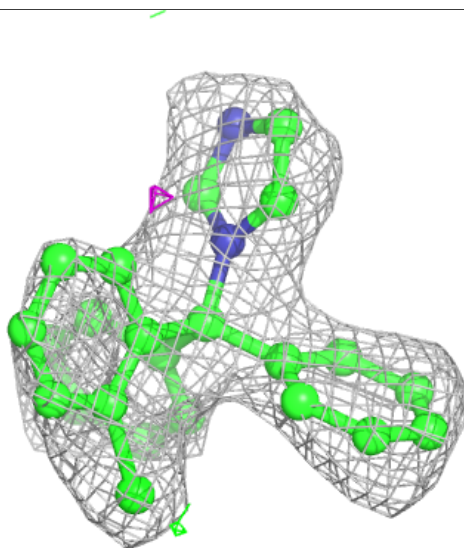
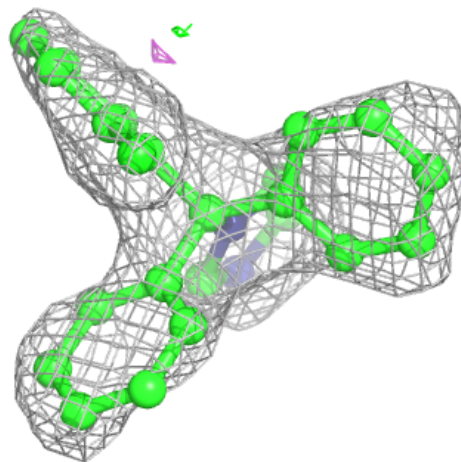
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





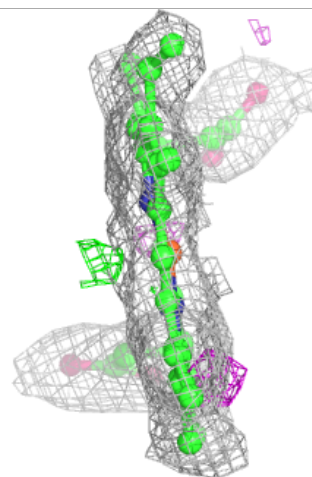
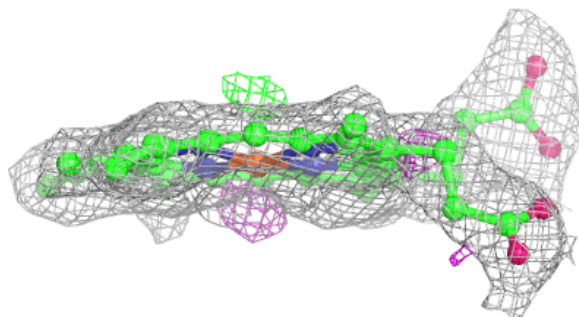
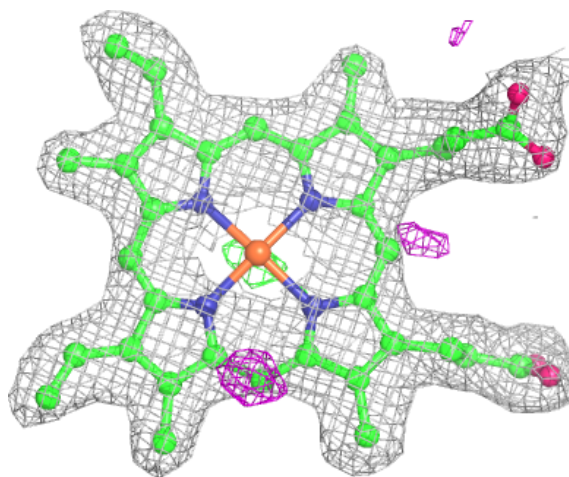
**Electron density around CL6 B 506:**

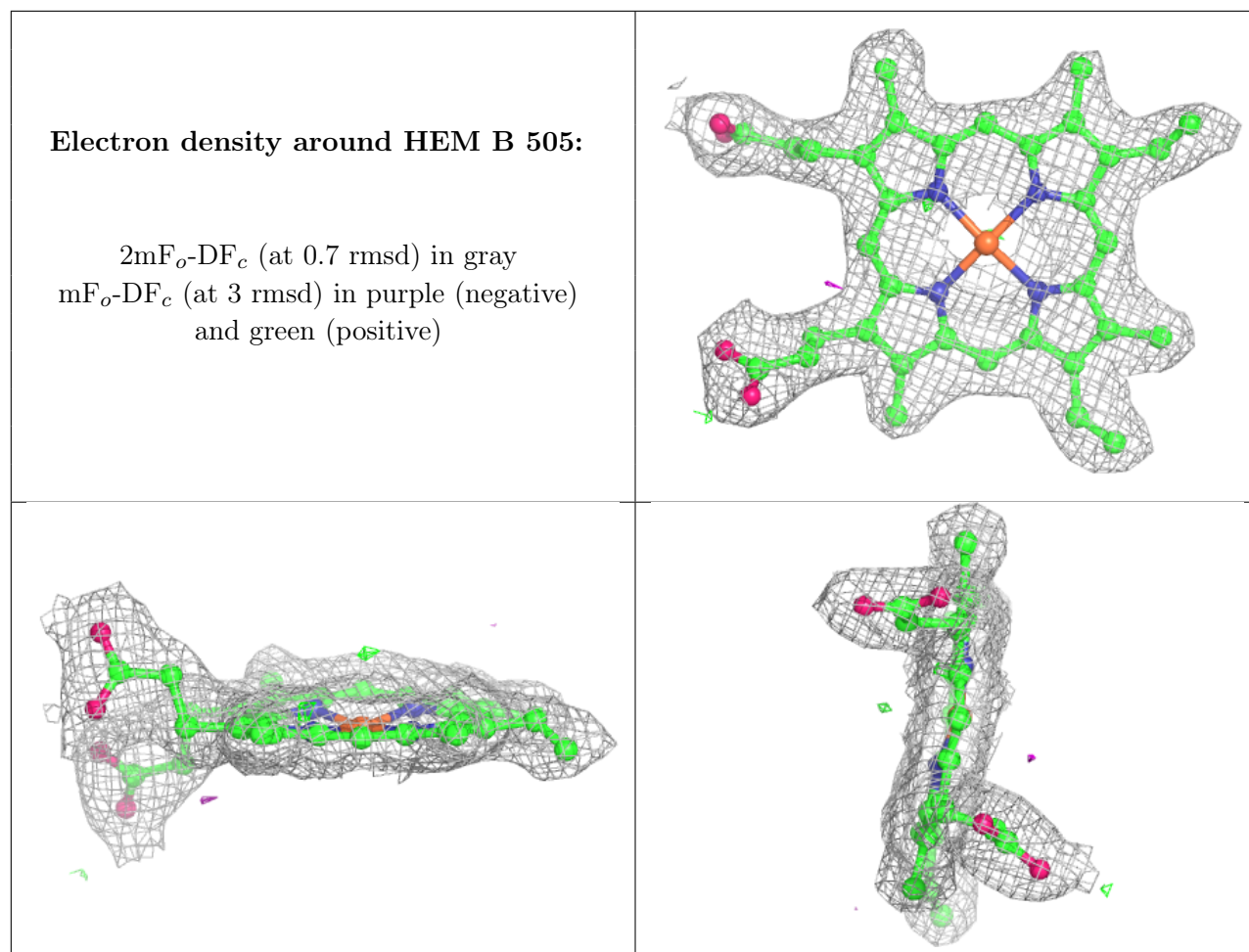
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around HEM A 505:**

$2mF_o-DF_c$  (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.