



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 04:26 PM UTC

PDB ID : 9FBN / pdb_00009fbn
Title : Dye-decolourising peroxidase DtpB XRPP experiment (1000 kGy)
Authors : Lucic, M.; Worrall, J.A.R.; Hough, M.A.; Owen, R.L.; Maly, M.
Deposited on : 2024-05-14
Resolution : 1.80 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

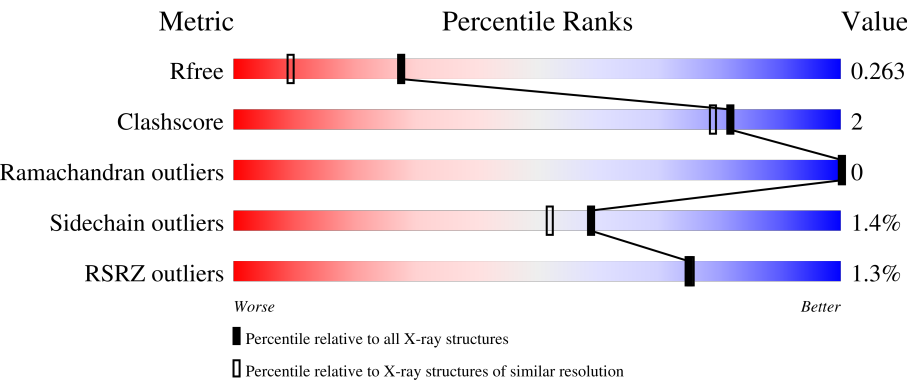
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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}	180053	7662 (1.80-1.80)
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)
RSRZ outliers	180081	7663 (1.80-1.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	313	% 87%10%..
1	B	313	2% 89%7%..
1	C	313	% 84%12%..
1	D	313	87%10%..
1	E	313	% 89%8%.

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Mol	Chain	Length	Quality of chain
1	F	313	3% 87% 8% ..

2 Entry composition [i](#)

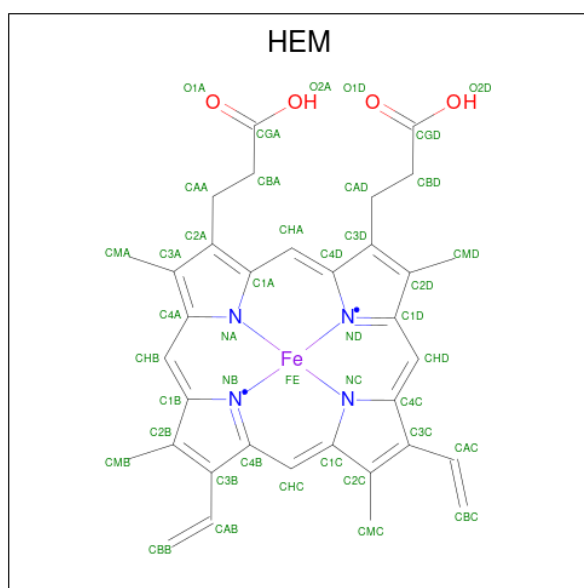
There are 5 unique types of molecules in this entry. The entry contains 15044 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Putative dye-decolorizing peroxidase (DyP), encapsulated subgroup.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	306	Total	C	N	O	S	0	2	0
			2351	1477	407	457	10			
1	B	306	Total	C	N	O	S	0	3	0
			2345	1475	404	457	9			
1	C	306	Total	C	N	O	S	0	5	0
			2367	1485	409	464	9			
1	D	304	Total	C	N	O	S	0	5	0
			2347	1473	404	461	9			
1	E	305	Total	C	N	O	S	0	3	0
			2340	1473	409	449	9			
1	F	306	Total	C	N	O	S	0	3	0
			2349	1476	406	457	10			

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (CCD ID: HEM) (formula: $C_{34}H_{32}FeN_4O_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
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
2	C	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	D	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	E	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	F	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Mg 1	0	0
3	C	1	Total 1	Mg 1	0	0

- Molecule 4 is OXYGEN ATOM (CCD ID: O) (formula: O) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total 1	O 1	0	0
4	B	1	Total 1	O 1	0	0
4	C	1	Total 1	O 1	0	0
4	D	1	Total 1	O 1	0	0
4	E	1	Total 1	O 1	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	126	Total 126	O 126	0	0
5	B	98	Total 98	O 98	0	1

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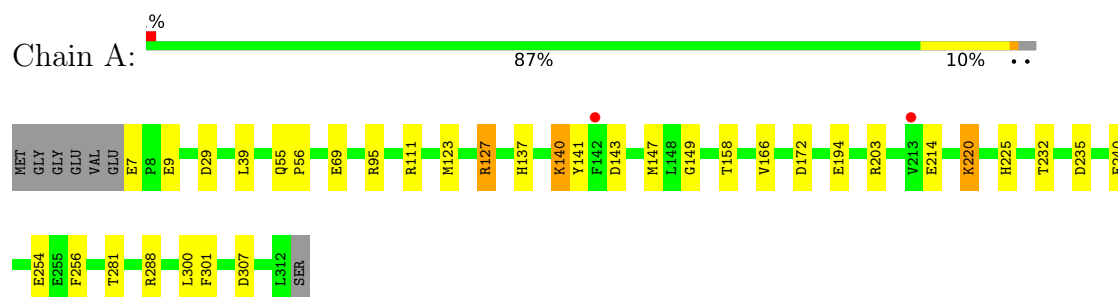
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	107	Total 107	O 107	0	0
5	D	126	Total 126	O 126	0	0
5	E	113	Total 113	O 113	0	0
5	F	110	Total 110	O 110	0	0

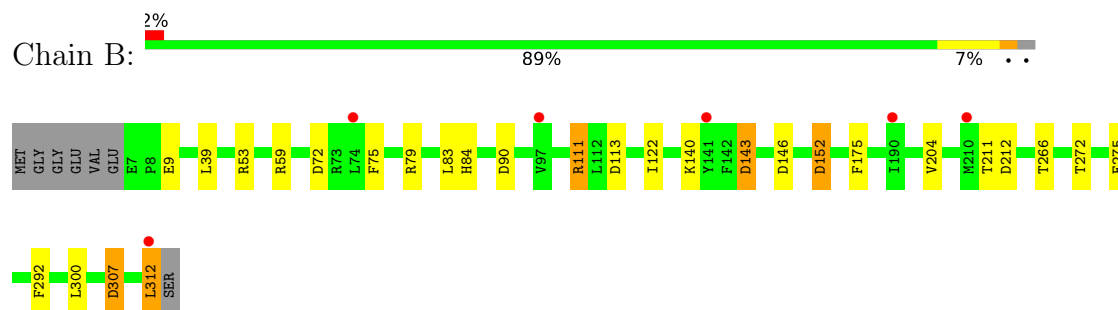
3 Residue-property plots [i](#)

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.

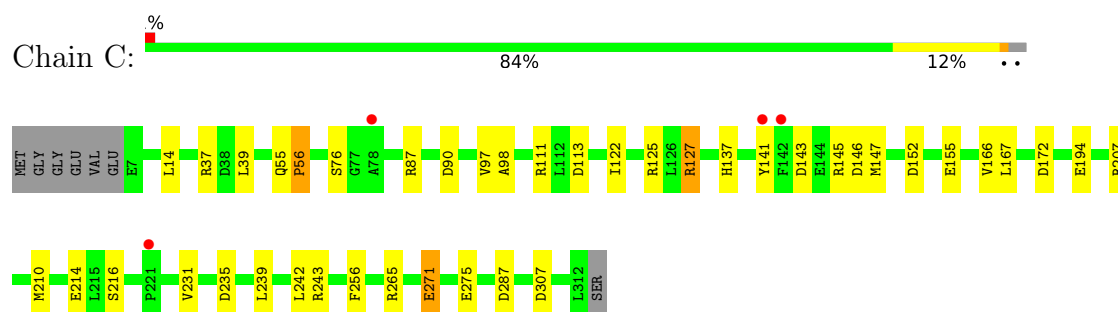
- Molecule 1: Putative dye-decolorizing peroxidase (DyP), encapsulated subgroup



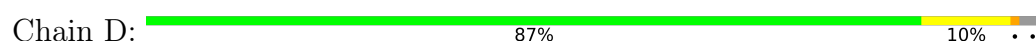
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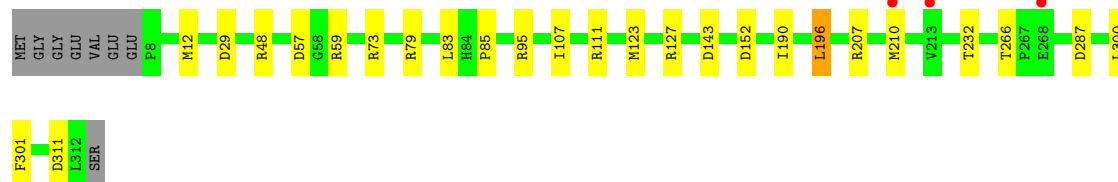
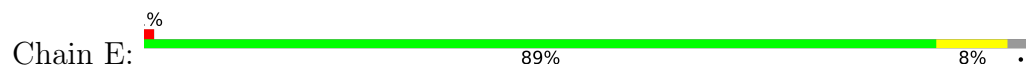


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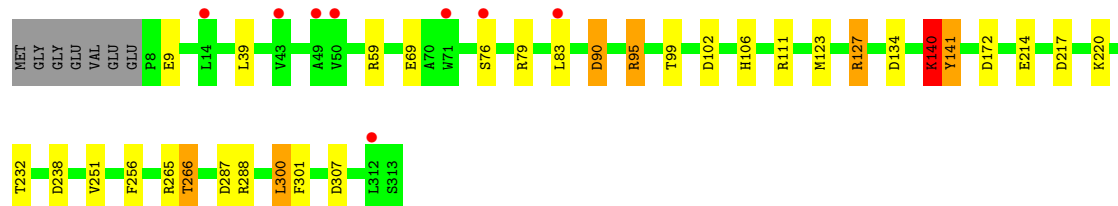
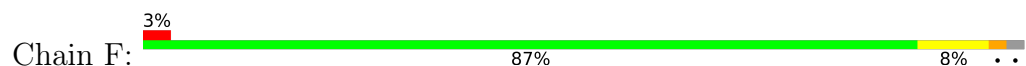




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- Molecule 1: Putative dye-decolorizing peroxidase (DyP), encapsulated subgroup



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	87.05Å 122.58Å 200.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.80 – 1.80 38.80 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.9 (38.80-1.80) 99.9 (38.80-1.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.66 (at 1.79Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.224 , 0.262 0.228 , 0.263	Depositor DCC
R_{free} test set	9969 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	23.2	Xtriage
Anisotropy	0.042	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.00 , 35.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	15044	wwPDB-VP
Average B, all atoms (Å ²)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.51% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: HEM, MG, O

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	1.04	1/2401 (0.0%)	1.47	16/3260 (0.5%)
1	B	0.94	0/2398	1.45	16/3259 (0.5%)
1	C	0.94	1/2417 (0.0%)	1.39	14/3285 (0.4%)
1	D	1.00	0/2400	1.43	10/3259 (0.3%)
1	E	0.97	2/2390 (0.1%)	1.38	10/3245 (0.3%)
1	F	0.98	1/2402 (0.0%)	1.46	17/3261 (0.5%)
All	All	0.98	5/14408 (0.0%)	1.43	83/19569 (0.4%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	4
1	B	0	1
1	C	0	4
1	D	0	5
1	E	0	4
1	F	0	3
All	All	0	21

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	106	HIS	CG-CD2	-6.28	1.28	1.35
1	E	107	ILE	C-O	-5.88	1.17	1.24
1	C	137	HIS	CG-CD2	5.51	1.42	1.35
1	A	225	HIS	CD2-NE2	5.24	1.43	1.37
1	E	85	PRO	CA-CB	5.00	1.60	1.53

All (83) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	93	VAL	N-CA-CB	-9.77	103.63	111.64
1	A	281	THR	CA-CB-OG1	-8.30	97.15	109.60
1	B	212	ASP	CA-CB-CG	8.21	120.81	112.60
1	B	307	ASP	CA-CB-CG	8.06	120.66	112.60
1	A	232	THR	CA-CB-OG1	-7.99	97.61	109.60
1	E	287	ASP	CA-CB-CG	7.69	120.29	112.60
1	A	29	ASP	CA-CB-CG	7.66	120.26	112.60
1	E	57	ASP	CA-CB-CG	7.08	119.68	112.60
1	C	287	ASP	CA-CB-CG	6.68	119.28	112.60
1	B	84	HIS	CB-CA-C	6.67	119.02	110.22
1	E	232	THR	CA-CB-OG1	-6.63	99.65	109.60
1	B	266	THR	CA-CB-OG1	-6.56	99.76	109.60
1	A	140	LYS	N-CA-CB	6.46	120.93	110.41
1	B	275	GLU	N-CA-CB	6.22	119.27	110.12
1	B	9	GLU	CB-CA-C	6.17	116.88	109.85
1	D	152	ASP	CA-CB-CG	6.13	118.73	112.60
1	B	211	THR	CA-CB-OG1	-6.04	100.54	109.60
1	D	172	ASP	CA-CB-CG	6.03	118.63	112.60
1	A	111	ARG	CB-CA-C	-5.99	97.58	110.45
1	D	223	ASP	CA-CB-CG	5.92	118.52	112.60
1	A	9	GLU	N-CA-CB	-5.90	102.68	110.17
1	B	143	ASP	CA-CB-CG	5.90	118.50	112.60
1	D	155	GLU	N-CA-CB	5.89	119.21	110.49
1	F	288	ARG	CD-NE-CZ	5.81	132.53	124.40
1	E	266	THR	OG1-CB-CG2	-5.79	97.72	109.30
1	E	111	ARG	CB-CA-C	-5.78	99.59	110.16
1	A	172	ASP	CA-CB-CG	5.76	118.36	112.60
1	C	113[A]	ASP	CA-CB-CG	5.74	118.34	112.60
1	C	113[B]	ASP	CA-CB-CG	5.74	118.34	112.60
1	F	90	ASP	CA-CB-CG	5.74	118.34	112.60
1	A	69	GLU	CB-CG-CD	-5.71	102.89	112.60
1	E	29	ASP	CA-CB-CG	5.67	118.27	112.60
1	B	111	ARG	CB-CA-C	-5.66	99.74	109.65
1	F	287	ASP	CA-CB-CG	5.66	118.26	112.60
1	C	90	ASP	CA-CB-CG	5.65	118.25	112.60
1	A	158	THR	CA-CB-OG1	-5.65	101.13	109.60
1	F	140	LYS	CB-CA-C	5.65	118.85	109.53
1	D	111	ARG	CB-CA-C	-5.63	97.95	109.94
1	B	140	LYS	N-CA-CB	-5.59	101.51	110.63
1	C	141	TYR	N-CA-CB	5.59	118.78	110.29
1	F	265	ARG	N-CA-CB	-5.45	101.83	110.28
1	A	55	GLN	CB-CA-C	5.45	117.28	109.11

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	39	LEU	N-CA-CB	5.43	117.89	110.01
1	D	11	GLN	N-CA-CB	5.42	117.81	110.38
1	C	194	GLU	CB-CG-CD	5.41	121.80	112.60
1	A	194	GLU	CB-CG-CD	5.40	121.79	112.60
1	A	137	HIS	CA-CB-CG	5.38	119.18	113.80
1	E	311	ASP	CA-CB-CG	5.38	117.98	112.60
1	F	134	ASP	CA-CB-CG	5.38	117.98	112.60
1	B	90	ASP	CA-CB-CG	5.36	117.96	112.60
1	B	292	PHE	N-CA-CB	-5.34	102.17	110.98
1	C	172	ASP	CA-CB-CG	5.32	117.92	112.60
1	F	256	PHE	CA-C-O	-5.31	114.61	120.24
1	A	7	GLU	CB-CA-C	5.28	120.12	110.10
1	F	141	TYR	N-CA-CB	5.24	117.86	110.36
1	B	152	ASP	CA-CB-CG	5.24	117.83	112.60
1	F	266	THR	OG1-CB-CG2	-5.24	98.83	109.30
1	A	220	LYS	CB-CA-C	5.23	118.45	109.82
1	E	152	ASP	CA-CB-CG	5.23	117.83	112.60
1	E	48	ARG	CD-NE-CZ	5.21	131.69	124.40
1	A	56	PRO	N-CA-CB	-5.19	96.89	102.60
1	D	99	THR	O-C-N	-5.19	117.34	121.80
1	B	272	THR	CA-CB-OG1	-5.16	101.86	109.60
1	F	99	THR	O-C-N	-5.15	116.97	121.35
1	F	251	VAL	N-CA-CB	5.14	118.29	110.58
1	C	210	MET	CG-SD-CE	-5.14	89.60	100.90
1	D	134	ASP	CA-CB-CG	5.09	117.69	112.60
1	C	265	ARG	N-CA-CB	-5.09	101.95	110.39
1	F	251	VAL	CA-C-N	5.08	125.72	120.03
1	F	251	VAL	C-N-CA	5.08	125.72	120.03
1	C	127	ARG	CA-C-N	-5.08	115.44	122.86
1	C	127	ARG	C-N-CA	-5.08	115.44	122.86
1	E	152	ASP	CB-CA-C	5.08	118.29	110.62
1	F	172	ASP	CB-CA-C	5.07	117.44	111.15
1	D	173	PRO	N-CA-C	5.06	121.15	113.81
1	B	204	VAL	N-CA-CB	5.06	117.05	110.57
1	F	69	GLU	CB-CG-CD	5.06	121.20	112.60
1	C	194	GLU	CB-CA-C	5.05	120.00	109.95
1	A	235	ASP	CB-CA-C	5.04	119.08	110.56
1	C	155	GLU	N-CA-CB	5.02	117.75	110.47
1	B	175	PHE	CA-CB-CG	-5.02	108.78	113.80
1	F	102	ASP	CA-CB-CG	5.02	117.62	112.60
1	C	271	GLU	CB-CA-C	5.00	119.09	110.79

There are no chirality outliers.

All (21) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	127	ARG	Sidechain
1	A	203	ARG	Sidechain
1	A	288	ARG	Sidechain
1	A	95	ARG	Sidechain
1	B	59	ARG	Sidechain
1	C	111	ARG	Sidechain
1	C	125	ARG	Sidechain
1	C	207	ARG	Sidechain
1	C	87	ARG	Sidechain
1	D	111	ARG	Sidechain
1	D	125[A]	ARG	Sidechain
1	D	164	ARG	Sidechain
1	D	207	ARG	Sidechain
1	D	59	ARG	Sidechain
1	E	207	ARG	Sidechain
1	E	59	ARG	Sidechain
1	E	73	ARG	Sidechain
1	E	95	ARG	Sidechain
1	F	127	ARG	Sidechain
1	F	59	ARG	Sidechain
1	F	95	ARG	Sidechain

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2351	0	2277	13	0
1	B	2345	0	2257	9	0
1	C	2367	0	2273	19	0
1	D	2347	0	2261	14	0
1	E	2340	0	2266	8	0
1	F	2349	0	2275	11	0
2	A	43	0	30	0	0
2	B	43	0	30	0	0
2	C	43	0	30	0	0
2	D	43	0	30	2	0
2	E	43	0	30	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	43	0	30	0	0
3	A	1	0	0	0	0
3	C	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	1	0
4	D	1	0	0	1	0
4	E	1	0	0	0	0
5	A	126	0	0	2	0
5	B	98	0	0	1	0
5	C	107	0	0	2	0
5	D	126	0	0	2	0
5	E	113	0	0	0	0
5	F	110	0	0	0	0
All	All	15044	0	13789	69	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 2.

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:240:GLU:OE1	5:A:501:HOH:O	1.92	0.87
1:C:214:GLU:OE1	5:C:501:HOH:O	1.95	0.84
1:C:37[B]:ARG:HB3	1:C:37[B]:ARG:NH1	1.93	0.83
1:E:123:MET:O	1:E:127:ARG:HG2	1.87	0.73
1:C:37[B]:ARG:HB3	1:C:37[B]:ARG:HH11	1.55	0.72
1:C:37[B]:ARG:HH11	1:C:37[B]:ARG:CB	2.03	0.71
1:D:144:GLU:OE2	5:D:501:HOH:O	2.13	0.67
1:B:79:ARG:NH2	1:B:83:LEU:O	2.31	0.63
1:F:140:LYS:HA	1:F:140:LYS:HE2	1.81	0.62
1:F:90:ASP:OD1	1:F:95:ARG:HD3	1.98	0.62
1:C:271:GLU:O	1:C:275:GLU:HG3	2.02	0.60
1:C:37[B]:ARG:NH1	1:C:37[B]:ARG:CB	2.63	0.60
1:C:55:GLN:HB3	1:C:56:PRO:HA	1.83	0.59
1:F:214:GLU:OE2	1:F:220:LYS:NZ	2.28	0.59
1:B:53:ARG:HB2	1:C:143[B]:ASP:OD1	2.04	0.57
1:D:231:VAL:HG23	1:D:239:LEU:HB2	1.87	0.57
1:F:140:LYS:HA	1:F:140:LYS:CE	2.35	0.56
1:A:123:MET:O	1:A:127:ARG:HG2	2.06	0.56
1:A:214:GLU:OE2	1:A:220:LYS:NZ	2.22	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:72:ASP:OD1	1:B:79:ARG:HD2	2.07	0.54
1:A:149:GLY:HA2	1:D:210:MET:HE1	1.88	0.54
1:F:300:LEU:HD23	1:F:301:PHE:N	2.24	0.52
1:B:111:ARG:HB3	1:B:113:ASP:OD1	2.10	0.51
1:A:300:LEU:C	1:A:300:LEU:HD23	2.37	0.50
1:D:139:PHE:O	1:D:247:PRO:HD2	2.10	0.50
1:F:140:LYS:HZ3	1:F:141:TYR:N	2.09	0.49
1:B:75:PHE:HE1	1:B:312:LEU:HD11	1.77	0.49
1:B:143:ASP:OD2	5:B:501:HOH:O	2.20	0.49
1:C:97:VAL:HG22	1:C:98:ALA:N	2.28	0.49
1:D:235:ASP:OD2	1:D:237:SER:OG	2.29	0.48
1:D:243:ARG:HD2	4:D:402:O:O	2.14	0.48
1:C:39:LEU:HD21	1:C:122:ILE:HG23	1.96	0.48
1:F:300:LEU:HD23	1:F:300:LEU:C	2.38	0.48
1:F:79:ARG:NH2	1:F:83:LEU:O	2.46	0.48
1:A:147:MET:HG2	1:A:256:PHE:HB3	1.95	0.48
1:C:166[B]:VAL:HG13	1:C:167:LEU:HG	1.97	0.47
1:C:127:ARG:O	5:C:502:HOH:O	2.21	0.47
1:D:300:LEU:HD23	1:D:301:PHE:N	2.30	0.47
1:D:186:TYR:CG	2:D:401:HEM:HBB1	2.49	0.47
1:D:12:MET:HG3	5:D:620:HOH:O	2.15	0.46
1:D:186:TYR:CD2	2:D:401:HEM:HBB1	2.51	0.46
1:B:300:LEU:C	1:B:300:LEU:HD23	2.41	0.46
1:C:231:VAL:HG23	1:C:239:LEU:HB2	1.98	0.46
1:D:251:VAL:HG12	1:F:123:MET:HG3	1.99	0.45
1:A:254:GLU:OE1	5:A:502:HOH:O	2.21	0.45
1:C:14:LEU:HD23	1:C:242:LEU:HD22	1.98	0.45
1:C:243:ARG:HD2	4:C:402:O:O	2.17	0.45
1:A:140:LYS:HD3	1:A:141:TYR:H	1.82	0.45
1:E:196:LEU:CD1	1:E:196:LEU:N	2.81	0.44
1:D:277:MET:HG2	1:D:287:ASP:OD2	2.17	0.44
1:E:79:ARG:NH2	1:E:83:LEU:O	2.50	0.44
1:B:39:LEU:HD21	1:B:122:ILE:HG23	2.00	0.43
1:C:147:MET:HG2	1:C:256:PHE:HB3	2.00	0.43
1:B:146:ASP:OD2	1:B:152:ASP:OD2	2.37	0.43
1:C:55:GLN:CB	1:C:56:PRO:HA	2.45	0.43
1:A:39:LEU:C	1:A:39:LEU:HD13	2.44	0.43
1:C:145:ARG:HD3	1:E:210:MET:HE1	2.01	0.42
1:F:140:LYS:NZ	1:F:141:TYR:H	2.17	0.42
1:A:143:ASP:N	1:A:143:ASP:OD1	2.52	0.42
1:A:140:LYS:HG3	1:A:141:TYR:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:149:GLY:CA	1:D:210:MET:HE1	2.48	0.42
1:E:12:MET:HB2	1:E:12:MET:HE2	1.82	0.42
1:F:232:THR:HG22	1:F:238:ASP:OD1	2.20	0.42
1:C:146:ASP:OD2	1:C:152:ASP:OD2	2.38	0.41
1:E:300:LEU:HD23	1:E:301:PHE:N	2.35	0.41
1:A:300:LEU:HD23	1:A:301:PHE:N	2.35	0.41
1:E:143:ASP:OD1	1:E:143:ASP:N	2.54	0.41
1:D:146:ASP:OD2	1:D:152:ASP:OD2	2.39	0.40
1:E:190:ILE:HD13	1:E:190:ILE:HA	1.85	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	306/313 (98%)	298 (97%)	8 (3%)	0	100	100
1	B	307/313 (98%)	301 (98%)	6 (2%)	0	100	100
1	C	309/313 (99%)	302 (98%)	7 (2%)	0	100	100
1	D	307/313 (98%)	302 (98%)	5 (2%)	0	100	100
1	E	306/313 (98%)	302 (99%)	4 (1%)	0	100	100
1	F	307/313 (98%)	301 (98%)	6 (2%)	0	100	100
All	All	1842/1878 (98%)	1806 (98%)	36 (2%)	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	247/250 (99%)	245 (99%)	2 (1%)	73	70
1	B	244/250 (98%)	242 (99%)	2 (1%)	73	70
1	C	248/250 (99%)	243 (98%)	5 (2%)	48	38
1	D	247/250 (99%)	245 (99%)	2 (1%)	73	70
1	E	242/250 (97%)	241 (100%)	1 (0%)	84	83
1	F	247/250 (99%)	238 (96%)	9 (4%)	31	18
All	All	1475/1500 (98%)	1454 (99%)	21 (1%)	59	52

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	166	VAL
1	A	307	ASP
1	B	307	ASP
1	B	312	LEU
1	C	56	PRO
1	C	76	SER
1	C	216	SER
1	C	235	ASP
1	C	307	ASP
1	D	268	GLU
1	D	307	ASP
1	E	196	LEU
1	F	9	GLU
1	F	76	SER
1	F	111	ARG
1	F	127	ARG
1	F	140	LYS
1	F	217	ASP
1	F	266	THR
1	F	300	LEU
1	F	307	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	184	GLN

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Mol	Chain	Res	Type
1	D	55	GLN
1	E	133	GLN
1	F	133	GLN
1	F	286	HIS

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 7 are monoatomic - leaving 6 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	D	401	1,4	50,50,50	1.90	14 (28%)	67,82,82	2.25	20 (29%)
2	HEM	A	401	1,4	50,50,50	2.14	19 (38%)	67,82,82	2.20	27 (40%)
2	HEM	C	401	1,4	50,50,50	2.04	14 (28%)	67,82,82	2.12	19 (28%)
2	HEM	E	401	1,4	50,50,50	2.03	14 (28%)	67,82,82	1.91	20 (29%)
2	HEM	F	401	1	50,50,50	1.98	14 (28%)	67,82,82	1.70	11 (16%)
2	HEM	B	401	1,4	50,50,50	1.97	13 (26%)	67,82,82	1.82	15 (22%)

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	D	401	1,4	-	4/14/54/54	-
2	HEM	A	401	1,4	-	6/14/54/54	-
2	HEM	C	401	1,4	-	5/14/54/54	-
2	HEM	E	401	1,4	-	5/14/54/54	-
2	HEM	F	401	1	-	5/14/54/54	-
2	HEM	B	401	1,4	-	5/14/54/54	-

All (88) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	401	HEM	C1B-NB	-6.56	1.28	1.40
2	C	401	HEM	C4B-NB	-5.97	1.27	1.38
2	F	401	HEM	FE-NB	5.91	2.13	1.94
2	F	401	HEM	FE-NC	4.92	2.11	1.95
2	B	401	HEM	C4D-C3D	4.64	1.52	1.45
2	A	401	HEM	C4D-ND	-4.54	1.32	1.40
2	D	401	HEM	C1A-NA	-4.48	1.31	1.39
2	F	401	HEM	C4B-NB	-4.47	1.30	1.38
2	E	401	HEM	C4A-NA	-4.34	1.31	1.39
2	E	401	HEM	C3D-C2D	-4.34	1.27	1.36
2	D	401	HEM	C4D-C3D	4.25	1.52	1.45
2	A	401	HEM	C1C-NC	-4.10	1.31	1.39
2	E	401	HEM	C4C-NC	-4.10	1.31	1.39
2	E	401	HEM	FE-NC	4.09	2.08	1.95
2	E	401	HEM	C4B-NB	-4.05	1.30	1.38
2	A	401	HEM	C1D-ND	-3.98	1.31	1.38
2	D	401	HEM	C1C-NC	-3.96	1.32	1.39
2	C	401	HEM	C4D-C3D	3.92	1.51	1.45
2	C	401	HEM	CMA-C3A	3.89	1.58	1.50
2	F	401	HEM	C3B-C4B	3.86	1.52	1.44
2	F	401	HEM	CBA-CGA	-3.80	1.41	1.50
2	B	401	HEM	C1D-ND	-3.80	1.31	1.38
2	A	401	HEM	CHD-C4C	-3.78	1.30	1.38
2	C	401	HEM	C4D-ND	-3.77	1.33	1.40
2	C	401	HEM	FE-NA	3.74	2.07	1.95
2	A	401	HEM	CAA-C2A	3.65	1.60	1.51
2	A	401	HEM	C1B-NB	-3.65	1.33	1.40
2	C	401	HEM	C4A-NA	-3.61	1.32	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	HEM	C1A-NA	-3.53	1.33	1.39
2	D	401	HEM	C1D-C2D	3.50	1.51	1.44
2	B	401	HEM	FE-NB	3.48	2.05	1.94
2	E	401	HEM	O2D-CGD	-3.45	1.19	1.30
2	D	401	HEM	C1B-NB	-3.41	1.34	1.40
2	A	401	HEM	FE-NC	3.41	2.06	1.95
2	F	401	HEM	C4D-ND	-3.39	1.34	1.40
2	A	401	HEM	C3D-C2D	-3.36	1.29	1.36
2	C	401	HEM	FE-NB	3.33	2.05	1.94
2	E	401	HEM	CHC-C1C	-3.29	1.31	1.38
2	C	401	HEM	FE-NC	3.27	2.05	1.95
2	C	401	HEM	CHA-C1A	-3.24	1.32	1.39
2	B	401	HEM	C1D-C2D	3.19	1.51	1.44
2	A	401	HEM	FE-NB	3.13	2.04	1.94
2	D	401	HEM	FE-NB	3.13	2.04	1.94
2	D	401	HEM	O2A-CGA	-3.09	1.20	1.30
2	A	401	HEM	O2D-CGD	-3.06	1.20	1.30
2	B	401	HEM	FE-NA	3.04	2.05	1.95
2	F	401	HEM	C4C-NC	-3.01	1.33	1.39
2	B	401	HEM	C1A-NA	-2.90	1.34	1.39
2	A	401	HEM	C4B-NB	-2.89	1.33	1.38
2	C	401	HEM	CAA-C2A	2.86	1.58	1.51
2	D	401	HEM	CHD-C1D	2.79	1.45	1.39
2	A	401	HEM	C4D-C3D	2.75	1.49	1.45
2	D	401	HEM	FE-NA	2.72	2.04	1.95
2	D	401	HEM	FE-NC	2.71	2.04	1.95
2	B	401	HEM	C4D-ND	-2.66	1.35	1.40
2	E	401	HEM	C1D-C2D	2.61	1.49	1.44
2	C	401	HEM	CBA-CAA	2.57	1.60	1.51
2	F	401	HEM	CHD-C4C	-2.57	1.33	1.38
2	E	401	HEM	C1B-NB	-2.53	1.35	1.40
2	A	401	HEM	C4A-NA	2.53	1.44	1.39
2	D	401	HEM	C3B-C4B	2.51	1.49	1.44
2	B	401	HEM	CHB-C1B	2.49	1.43	1.38
2	F	401	HEM	C1B-NB	-2.49	1.35	1.40
2	F	401	HEM	CHB-C1B	2.46	1.43	1.38
2	C	401	HEM	CAC-C3C	2.46	1.54	1.47
2	E	401	HEM	C3B-C2B	-2.42	1.32	1.37
2	F	401	HEM	C4A-NA	-2.42	1.35	1.39
2	E	401	HEM	FE-NB	2.40	2.02	1.94
2	E	401	HEM	C4D-ND	-2.37	1.36	1.40
2	A	401	HEM	CMB-C2B	2.36	1.55	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	401	HEM	C1C-C2C	-2.33	1.40	1.45
2	B	401	HEM	C3D-C2D	-2.32	1.31	1.36
2	F	401	HEM	CBA-CAA	2.31	1.59	1.51
2	A	401	HEM	C1D-C2D	2.27	1.49	1.44
2	A	401	HEM	CHD-C1D	2.25	1.44	1.39
2	D	401	HEM	CHB-C1B	2.25	1.43	1.38
2	C	401	HEM	O1A-CGA	-2.25	1.14	1.22
2	F	401	HEM	C1A-NA	-2.22	1.35	1.39
2	D	401	HEM	CAB-C3B	2.13	1.53	1.47
2	A	401	HEM	CHA-C4D	-2.09	1.34	1.38
2	B	401	HEM	C1A-C2A	-2.08	1.40	1.44
2	C	401	HEM	C4C-NC	-2.05	1.35	1.39
2	E	401	HEM	C4D-C3D	2.05	1.48	1.45
2	B	401	HEM	CBD-CGD	2.03	1.55	1.50
2	F	401	HEM	CMA-C3A	-2.03	1.46	1.50
2	B	401	HEM	CHA-C4D	2.02	1.42	1.38
2	A	401	HEM	O1A-CGA	2.01	1.28	1.22
2	E	401	HEM	CBD-CGD	-2.01	1.45	1.50

All (112) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	401	HEM	C3B-C2B-C1B	6.85	111.55	106.41
2	C	401	HEM	CAD-C3D-C4D	6.64	136.27	124.70
2	D	401	HEM	C4B-C3B-C2B	-6.64	101.18	107.28
2	D	401	HEM	CHD-C4C-NC	6.55	131.59	124.45
2	B	401	HEM	C4B-C3B-C2B	-5.97	101.79	107.28
2	C	401	HEM	CHD-C1D-ND	5.50	130.35	124.42
2	A	401	HEM	C1B-NB-C4B	5.50	111.72	105.21
2	C	401	HEM	CHD-C1D-C2D	-5.24	116.75	125.03
2	E	401	HEM	CHA-C1A-NA	4.88	132.71	123.86
2	A	401	HEM	CHD-C1D-ND	4.88	129.67	124.42
2	F	401	HEM	C3B-C4B-NB	-4.86	105.97	109.47
2	F	401	HEM	C1B-NB-C4B	4.81	110.90	105.21
2	A	401	HEM	CHA-C4D-C3D	-4.55	116.83	125.23
2	C	401	HEM	CAD-C3D-C2D	-4.43	119.57	127.87
2	B	401	HEM	CAB-C3B-C2B	4.41	142.76	128.43
2	B	401	HEM	CHC-C4B-NB	4.33	129.09	124.42
2	E	401	HEM	C4A-C3A-C2A	4.31	111.75	106.82
2	C	401	HEM	C1B-NB-C4B	4.28	110.27	105.21
2	A	401	HEM	C3B-C4B-NB	-4.21	106.44	109.47
2	D	401	HEM	C4D-ND-C1D	-4.20	100.23	105.21

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	401	HEM	CHD-C1D-ND	4.19	128.93	124.42
2	F	401	HEM	CBA-CAA-C2A	4.09	123.83	112.53
2	A	401	HEM	CHC-C4B-NB	4.00	128.72	124.42
2	B	401	HEM	C3B-C4B-NB	3.85	112.23	109.47
2	E	401	HEM	C4D-ND-C1D	-3.77	100.74	105.21
2	D	401	HEM	CAC-C3C-C4C	-3.73	115.90	124.82
2	A	401	HEM	C4D-C3D-C2D	-3.66	101.56	106.89
2	E	401	HEM	CHD-C1D-C2D	-3.66	119.25	125.03
2	B	401	HEM	C4C-C3C-C2C	-3.64	103.66	106.81
2	C	401	HEM	O2A-CGA-CBA	3.59	125.36	114.00
2	D	401	HEM	C2D-C1D-ND	3.58	114.04	109.90
2	E	401	HEM	C1A-CHA-C4D	-3.49	118.04	126.25
2	D	401	HEM	C3D-C4D-ND	3.48	113.99	110.17
2	B	401	HEM	CHC-C4B-C3B	-3.42	118.25	125.07
2	D	401	HEM	CHC-C4B-NB	3.42	128.10	124.42
2	D	401	HEM	C1B-NB-C4B	3.40	109.24	105.21
2	C	401	HEM	C3D-C4D-ND	3.38	113.87	110.17
2	E	401	HEM	C3D-C4D-ND	3.34	113.83	110.17
2	A	401	HEM	CHA-C4D-ND	3.33	128.49	124.37
2	A	401	HEM	C3D-C4D-ND	3.30	113.79	110.17
2	D	401	HEM	C4C-CHD-C1D	-3.28	119.04	126.02
2	A	401	HEM	CHD-C1D-C2D	-3.10	120.13	125.03
2	E	401	HEM	CBB-CAB-C3B	-3.08	112.15	127.53
2	B	401	HEM	CHA-C4D-ND	3.04	128.13	124.37
2	E	401	HEM	CHC-C1C-NC	3.03	127.75	124.45
2	C	401	HEM	C4C-C3C-C2C	3.01	109.43	106.81
2	E	401	HEM	CHD-C1D-ND	2.99	127.64	124.42
2	A	401	HEM	C3B-C2B-C1B	2.97	108.64	106.41
2	A	401	HEM	CHC-C1C-NC	-2.95	121.25	124.45
2	C	401	HEM	C1A-C2A-C3A	-2.91	102.36	106.87
2	A	401	HEM	O2D-CGD-CBD	2.88	123.10	114.00
2	C	401	HEM	C4C-CHD-C1D	-2.86	119.94	126.02
2	B	401	HEM	C3B-C2B-C1B	2.86	108.56	106.41
2	A	401	HEM	CMB-C2B-C3B	-2.85	121.54	128.43
2	E	401	HEM	CHA-C1A-C2A	-2.84	119.09	125.30
2	A	401	HEM	C2B-C1B-NB	-2.83	106.59	109.84
2	E	401	HEM	C4C-NC-C1C	2.83	110.43	105.82
2	A	401	HEM	C4C-C3C-C2C	-2.81	104.37	106.81
2	C	401	HEM	CBB-CAB-C3B	-2.77	113.67	127.53
2	A	401	HEM	O2D-CGD-O1D	-2.75	116.25	123.33
2	D	401	HEM	CAC-C3C-C2C	2.75	137.36	128.43
2	E	401	HEM	O2A-CGA-CBA	2.70	122.54	114.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	401	HEM	CMB-C2B-C3B	-2.67	121.97	128.43
2	E	401	HEM	CHB-C1B-NB	2.66	127.66	124.37
2	C	401	HEM	O1D-CGD-CBD	-2.65	114.68	123.09
2	F	401	HEM	CHD-C4C-NC	-2.63	121.58	124.45
2	A	401	HEM	C2A-C1A-NA	2.62	113.06	110.15
2	C	401	HEM	CHC-C4B-NB	2.62	127.24	124.42
2	E	401	HEM	C2D-C1D-ND	2.60	112.91	109.90
2	C	401	HEM	C3C-C2C-C1C	-2.59	104.60	107.05
2	A	401	HEM	C4C-CHD-C1D	-2.52	120.66	126.02
2	A	401	HEM	CAB-C3B-C2B	-2.51	120.26	128.43
2	C	401	HEM	O2A-CGA-O1A	-2.48	116.96	123.33
2	A	401	HEM	CBB-CAB-C3B	-2.47	115.17	127.53
2	D	401	HEM	CHD-C4C-C3C	-2.47	121.05	125.21
2	D	401	HEM	CHA-C4D-C3D	-2.44	120.73	125.23
2	A	401	HEM	C4B-C3B-C2B	-2.43	105.04	107.28
2	F	401	HEM	CHC-C4B-NB	2.43	127.04	124.42
2	E	401	HEM	CMA-C3A-C2A	-2.41	120.50	125.62
2	E	401	HEM	CMD-C2D-C1D	2.39	128.77	125.03
2	F	401	HEM	CAA-C2A-C1A	2.39	129.60	124.94
2	C	401	HEM	CAA-C2A-C3A	2.37	132.38	127.07
2	D	401	HEM	CHB-C4A-NA	2.36	128.13	123.86
2	E	401	HEM	O1A-CGA-CBA	-2.32	115.72	123.09
2	D	401	HEM	CMA-C3A-C2A	2.31	130.52	125.62
2	D	401	HEM	CHC-C1C-NC	-2.29	121.96	124.45
2	D	401	HEM	CHA-C1A-NA	2.29	128.01	123.86
2	B	401	HEM	CAB-C3B-C4B	-2.29	114.27	124.39
2	D	401	HEM	CAB-C3B-C4B	2.29	134.50	124.39
2	A	401	HEM	CMB-C2B-C1B	2.28	128.59	125.03
2	A	401	HEM	CHA-C1A-NA	-2.27	119.75	123.86
2	A	401	HEM	CAB-C3B-C4B	2.25	134.35	124.39
2	B	401	HEM	C2D-C1D-ND	2.25	112.51	109.90
2	E	401	HEM	CHC-C4B-NB	2.23	126.83	124.42
2	D	401	HEM	C2B-C1B-NB	-2.23	107.27	109.84
2	F	401	HEM	CAB-C3B-C2B	-2.23	121.17	128.43
2	B	401	HEM	O2A-CGA-O1A	-2.22	117.62	123.33
2	E	401	HEM	C2A-C1A-NA	-2.17	107.74	110.15
2	A	401	HEM	C1D-C2D-C3D	2.17	109.26	106.98
2	B	401	HEM	O2D-CGD-O1D	-2.13	117.85	123.33
2	E	401	HEM	CAA-C2A-C1A	2.12	129.08	124.94
2	F	401	HEM	O2A-CGA-CBA	2.11	120.67	114.00
2	A	401	HEM	CMA-C3A-C2A	2.11	130.09	125.62
2	F	401	HEM	CHA-C1A-C2A	-2.10	120.69	125.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	401	HEM	CMD-C2D-C1D	2.09	128.30	125.03
2	B	401	HEM	CHA-C4D-C3D	-2.08	121.39	125.23
2	B	401	HEM	CHD-C1D-C2D	-2.07	121.76	125.03
2	F	401	HEM	CAD-CBD-CGD	-2.06	108.19	113.67
2	B	401	HEM	CMC-C2C-C3C	-2.06	123.44	128.43
2	A	401	HEM	C3C-C2C-C1C	2.06	108.99	107.05
2	C	401	HEM	CAB-C3B-C2B	2.04	135.06	128.43
2	C	401	HEM	C4D-ND-C1D	-2.00	102.84	105.21

There are no chirality outliers.

All (30) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	HEM	C2B-C3B-CAB-CBB
2	E	401	HEM	C2B-C3B-CAB-CBB
2	F	401	HEM	C2B-C3B-CAB-CBB
2	A	401	HEM	C4B-C3B-CAB-CBB
2	B	401	HEM	C4B-C3B-CAB-CBB
2	C	401	HEM	C4B-C3B-CAB-CBB
2	B	401	HEM	CAD-CBD-CGD-O2D
2	C	401	HEM	CAD-CBD-CGD-O2D
2	E	401	HEM	CAD-CBD-CGD-O1D
2	E	401	HEM	CAD-CBD-CGD-O2D
2	F	401	HEM	CAA-CBA-CGA-O1A
2	D	401	HEM	CAA-CBA-CGA-O1A
2	D	401	HEM	CAA-CBA-CGA-O2A
2	F	401	HEM	CAD-CBD-CGD-O2D
2	A	401	HEM	CAD-CBD-CGD-O2D
2	D	401	HEM	CAD-CBD-CGD-O1D
2	F	401	HEM	CAD-CBD-CGD-O1D
2	C	401	HEM	CAA-CBA-CGA-O2A
2	B	401	HEM	CAA-CBA-CGA-O1A
2	C	401	HEM	CAD-CBD-CGD-O1D
2	B	401	HEM	CAA-CBA-CGA-O2A
2	D	401	HEM	CAD-CBD-CGD-O2D
2	A	401	HEM	CAD-CBD-CGD-O1D
2	B	401	HEM	CAD-CBD-CGD-O1D
2	E	401	HEM	CAA-CBA-CGA-O1A
2	A	401	HEM	CAA-CBA-CGA-O1A
2	E	401	HEM	CAA-CBA-CGA-O2A
2	C	401	HEM	CAA-CBA-CGA-O1A
2	F	401	HEM	CAA-CBA-CGA-O2A

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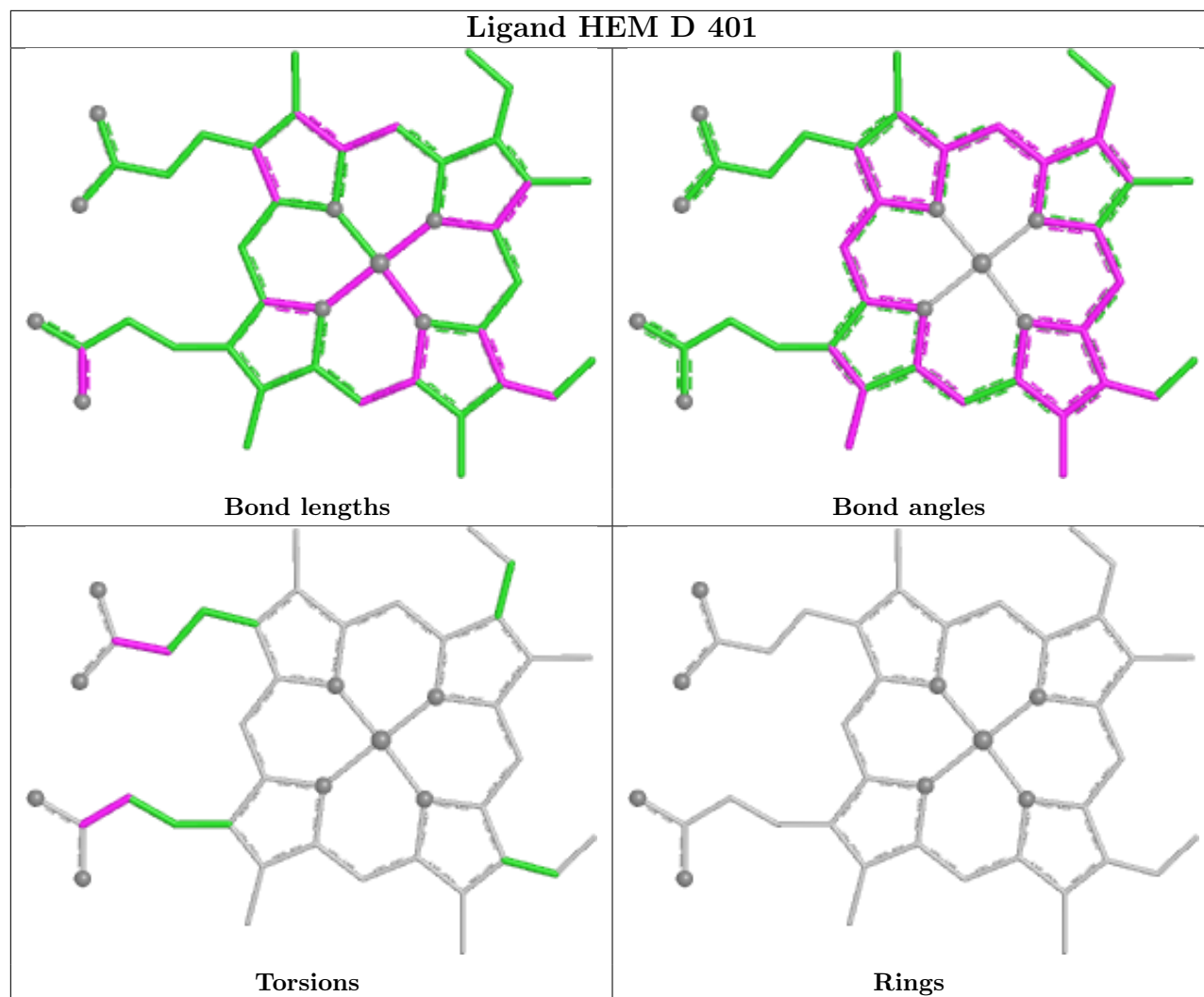
Mol	Chain	Res	Type	Atoms
2	A	401	HEM	CAA-CBA-CGA-O2A

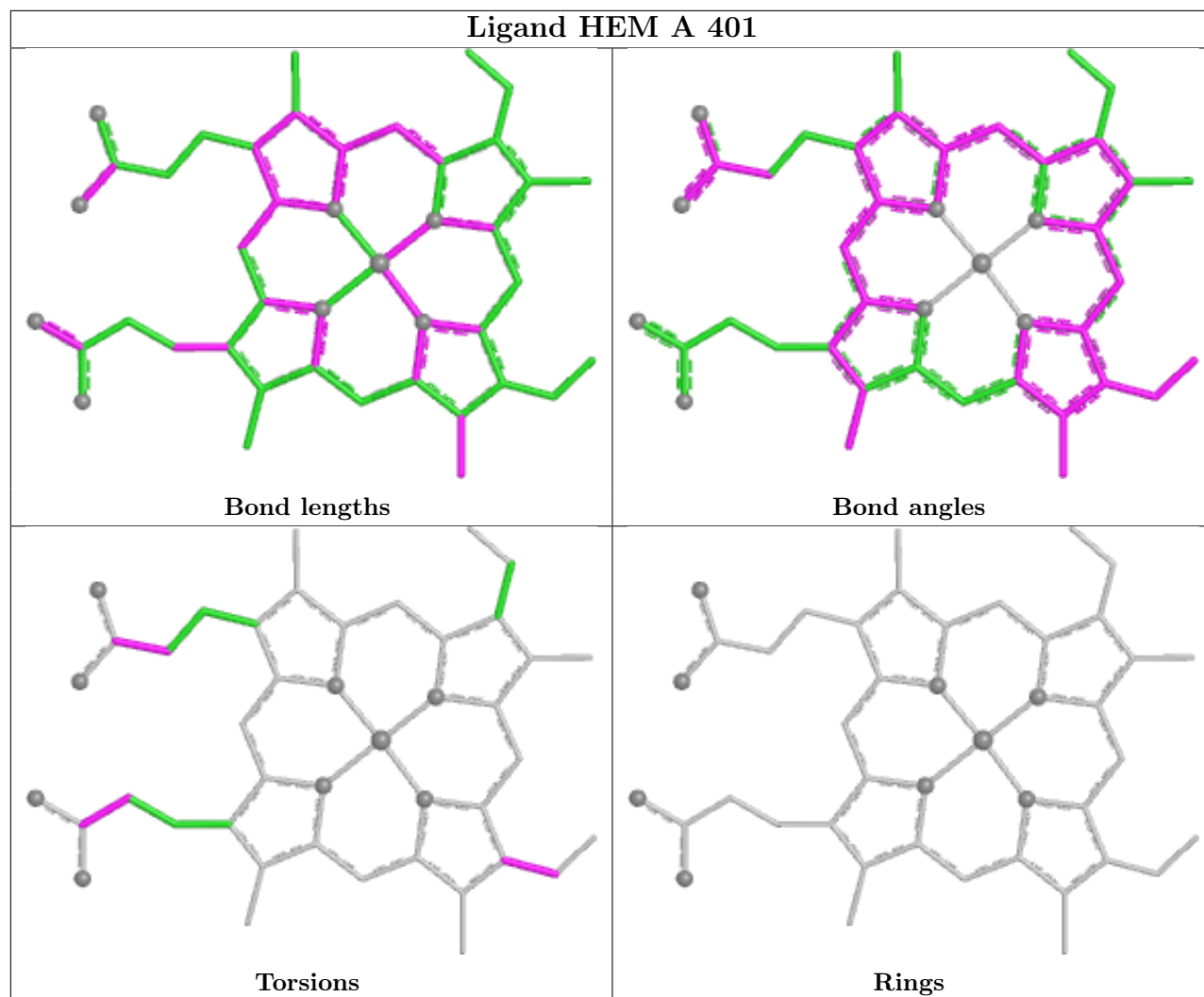
There are no ring outliers.

1 monomer is involved in 2 short contacts:

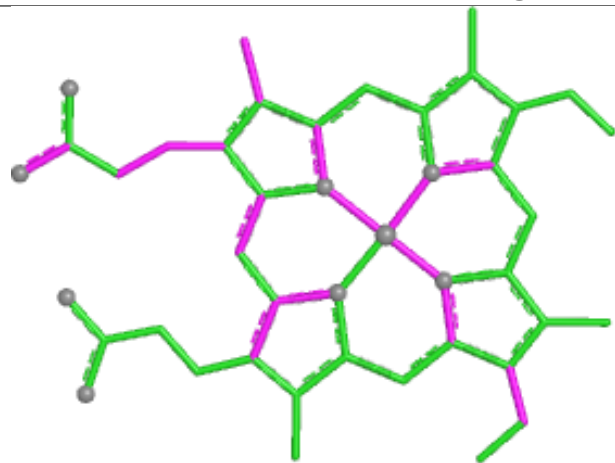
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	401	HEM	2	0

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.

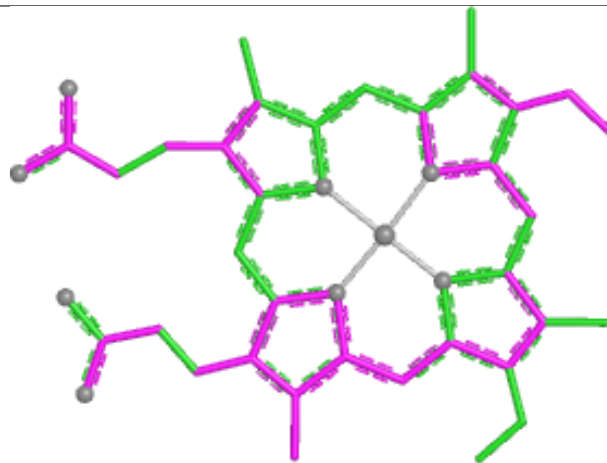




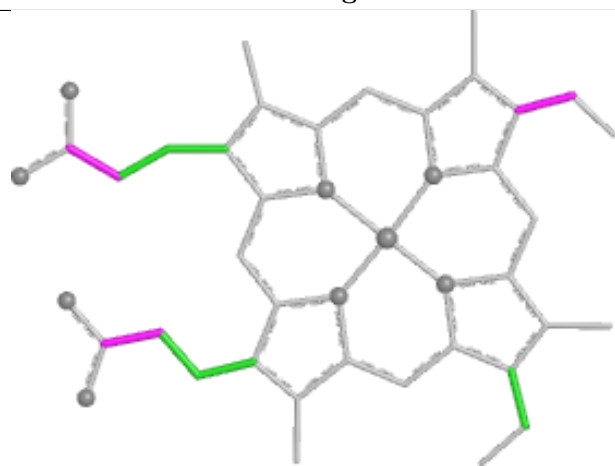
Ligand HEM C 401



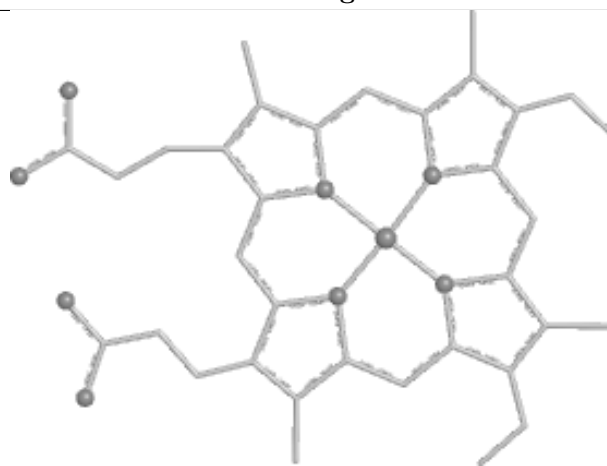
Bond lengths



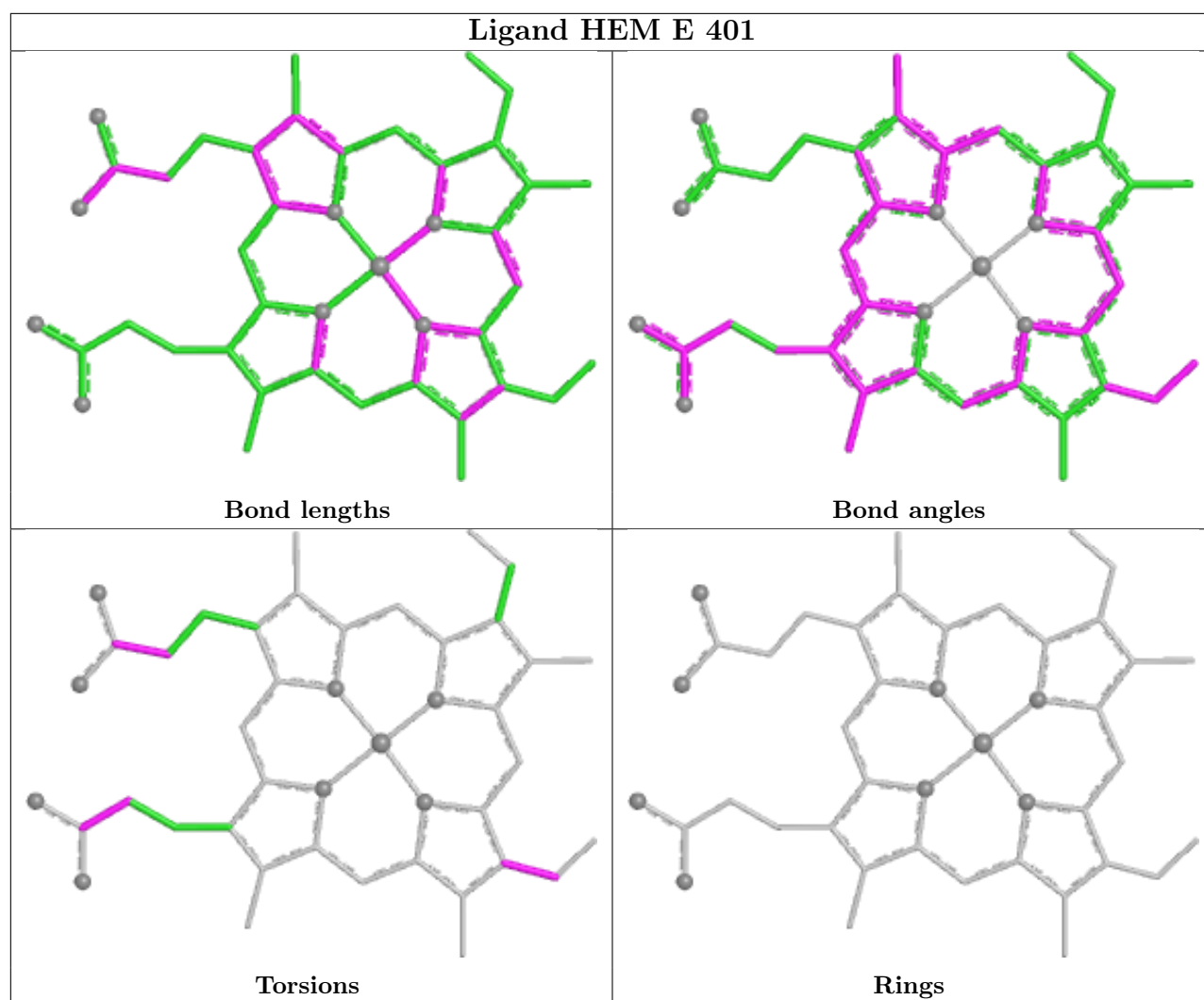
Bond angles

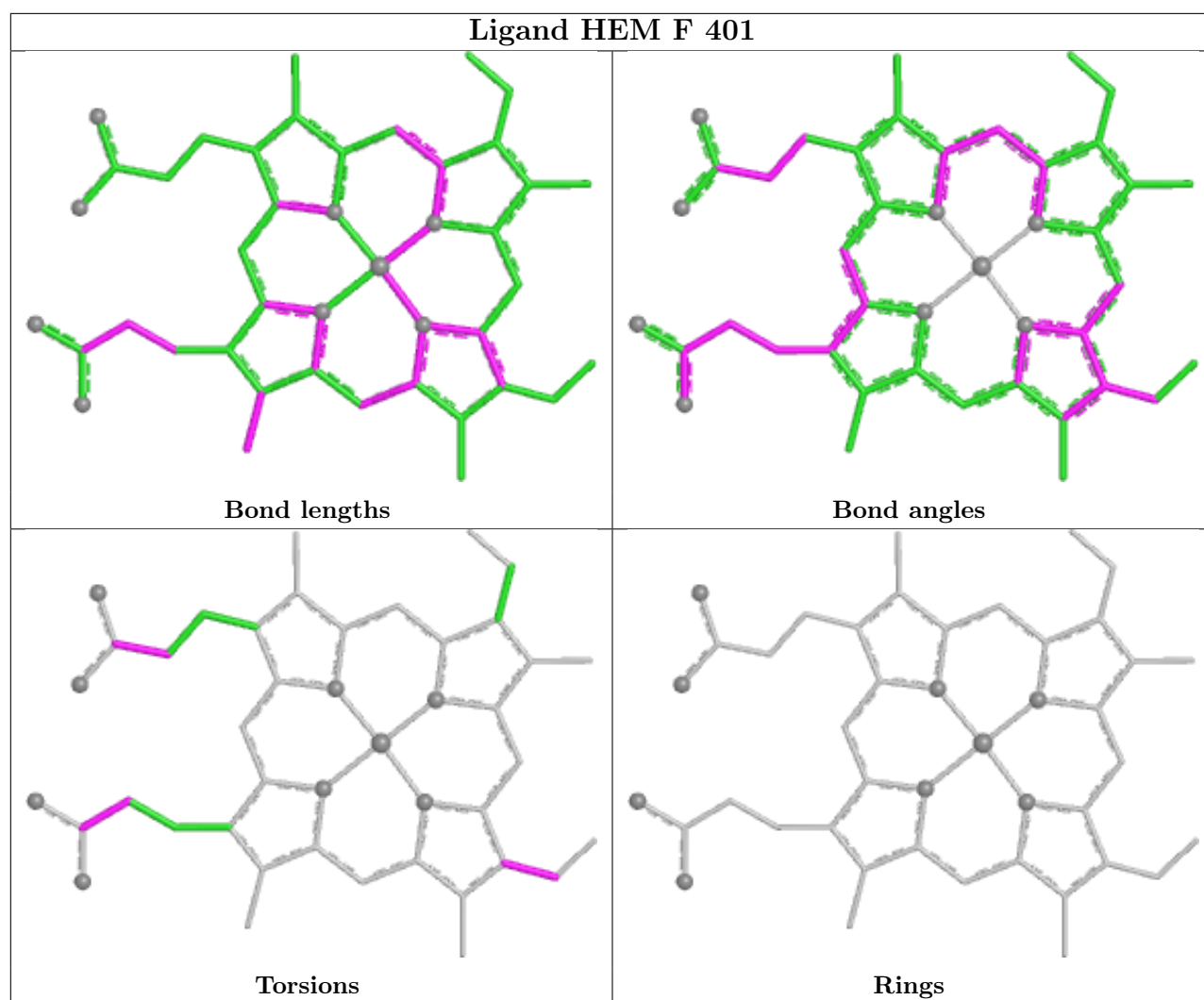


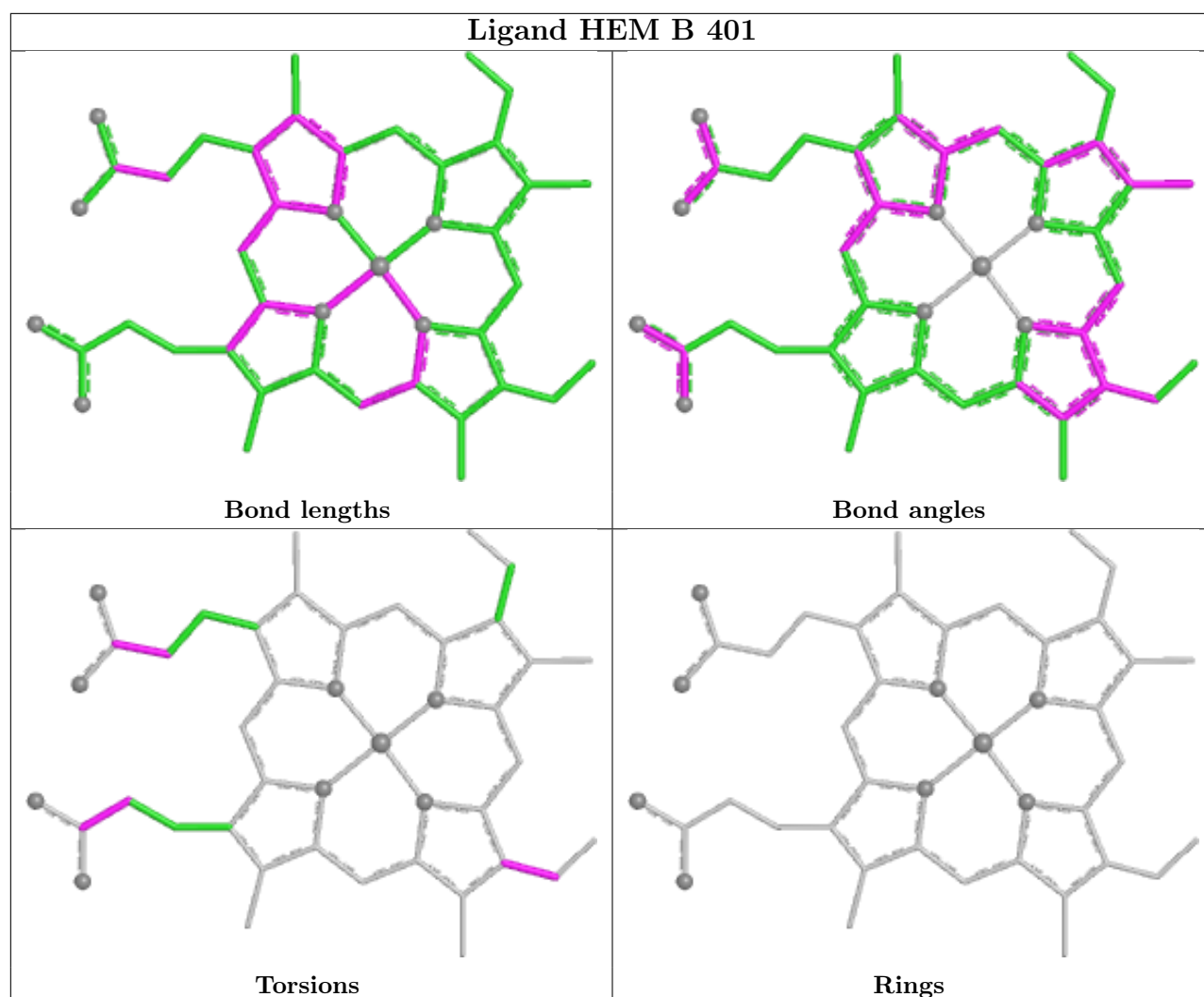
Torsions



Rings







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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	306/313 (97%)	-0.01	2 (0%) 84 85	11, 20, 44, 72	2 (0%)
1	B	306/313 (97%)	0.47	6 (1%) 65 65	14, 25, 50, 74	3 (0%)
1	C	306/313 (97%)	0.13	4 (1%) 75 75	9, 22, 47, 87	5 (1%)
1	D	304/313 (97%)	0.15	0 100 100	8, 21, 44, 70	5 (1%)
1	E	305/313 (97%)	0.21	3 (0%) 79 80	13, 22, 44, 80	3 (0%)
1	F	306/313 (97%)	0.41	8 (2%) 57 57	12, 22, 46, 80	3 (0%)
All	All	1833/1878 (97%)	0.23	23 (1%) 75 75	8, 22, 46, 87	21 (1%)

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	141	TYR	4.7
1	C	142	PHE	4.1
1	B	74	LEU	3.0
1	E	210	MET	2.9
1	B	312	LEU	2.8
1	F	76	SER	2.7
1	A	142	PHE	2.7
1	F	43	VAL	2.6
1	C	78	ALA	2.5
1	F	83	LEU	2.4
1	F	312	LEU	2.3
1	F	50	VAL	2.3
1	B	141	TYR	2.3
1	F	14	LEU	2.3
1	F	49	ALA	2.2
1	E	268	GLU	2.2
1	E	213	VAL	2.2
1	B	210	MET	2.1
1	B	97	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	F	71	TRP	2.1
1	B	190	ILE	2.0
1	C	221	PRO	2.0
1	A	213	VAL	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

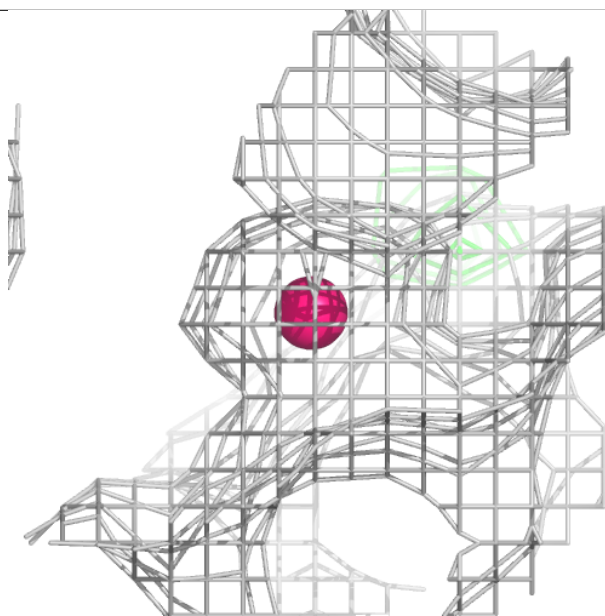
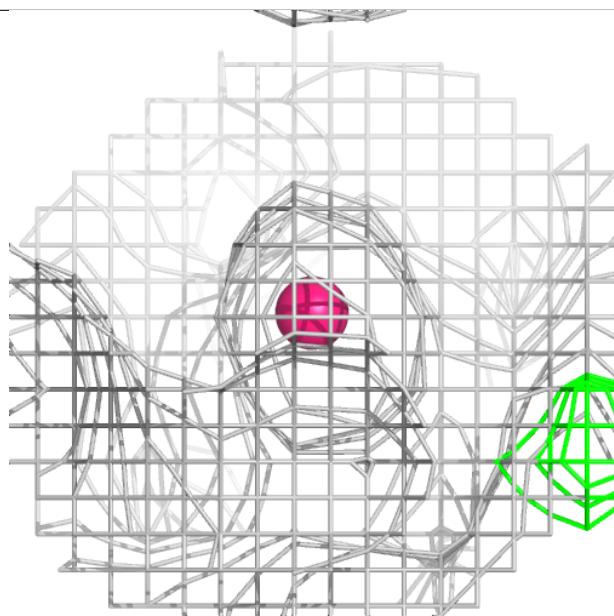
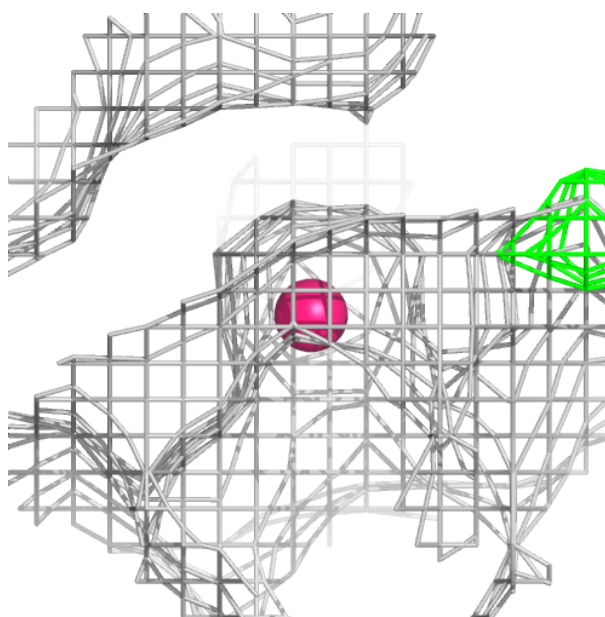
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	O	D	402	1/1	0.95	0.11	10,10,10,10	1
2	HEM	F	401	43/43	0.96	0.08	12,17,21,22	0
4	O	A	403	1/1	0.96	0.15	4,4,4,4	1
4	O	B	402	1/1	0.96	0.22	10,10,10,10	1
2	HEM	E	401	43/43	0.96	0.08	12,15,23,29	0
2	HEM	B	401	43/43	0.97	0.07	12,16,21,23	0
2	HEM	C	401	43/43	0.97	0.07	13,18,22,26	0
2	HEM	D	401	43/43	0.97	0.07	10,12,17,19	0
4	O	C	402	1/1	0.97	0.10	12,12,12,12	1
2	HEM	A	401	43/43	0.97	0.07	10,13,20,25	0
4	O	E	402	1/1	0.98	0.37	12,12,12,12	1
3	MG	C	403	1/1	0.99	0.08	30,30,30,30	0
3	MG	A	402	1/1	0.99	0.02	10,10,10,10	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.

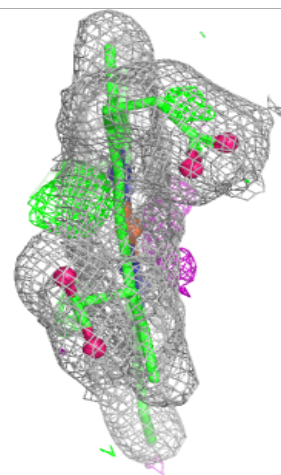
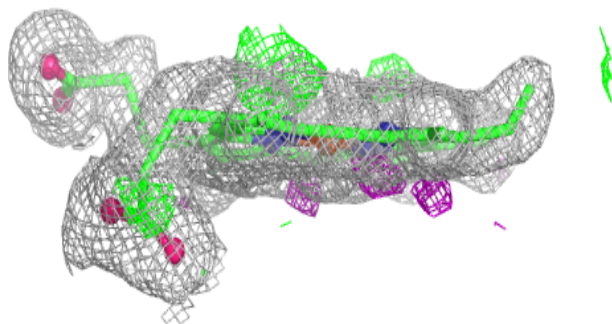
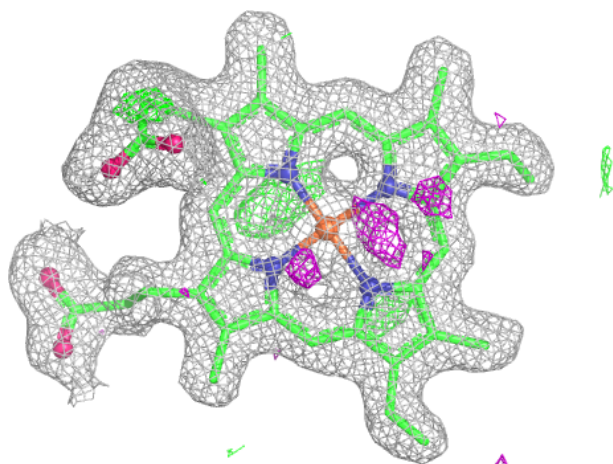
Electron density around O D 402:

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



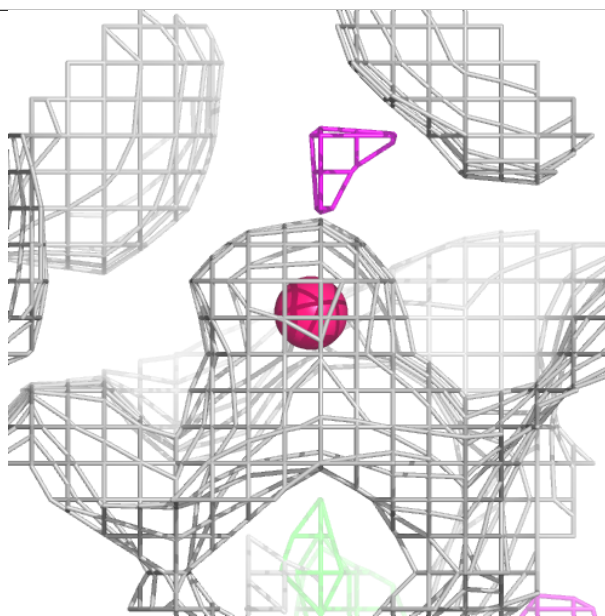
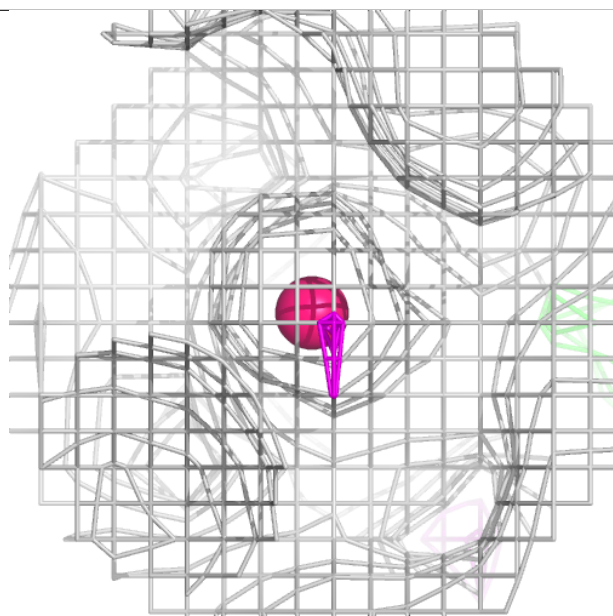
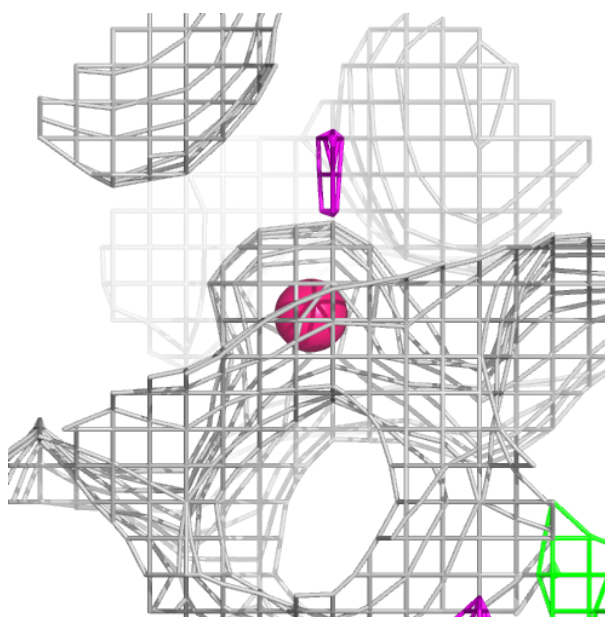
Electron density around HEM F 401:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



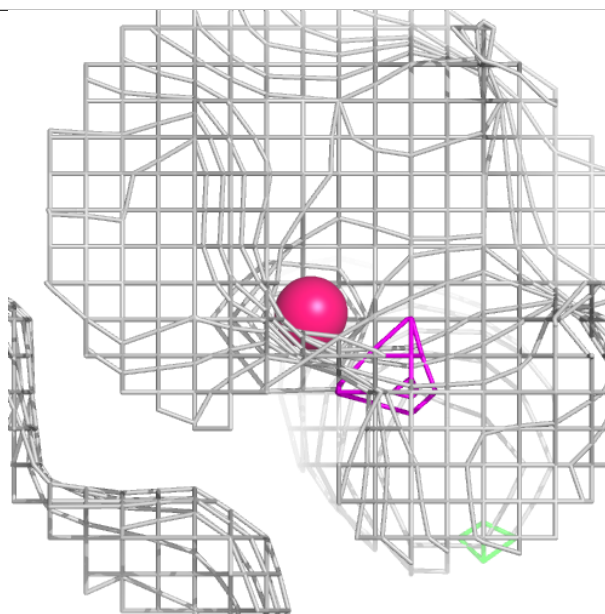
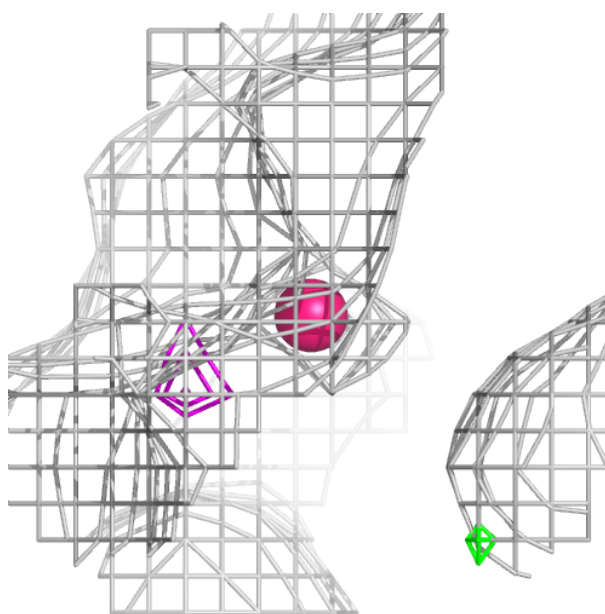
Electron density around O A 403:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



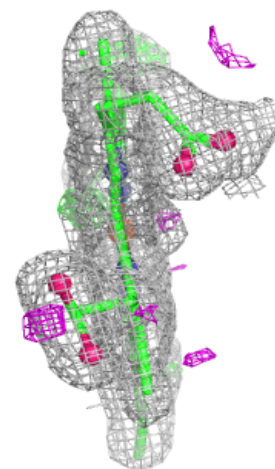
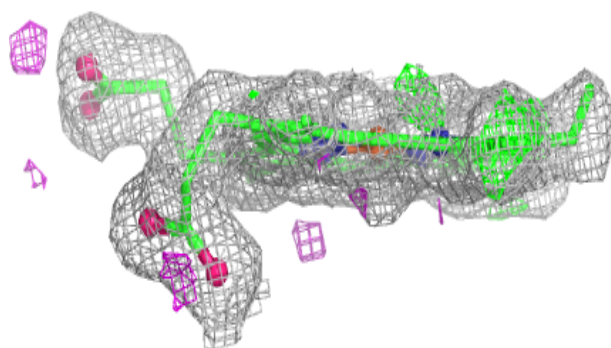
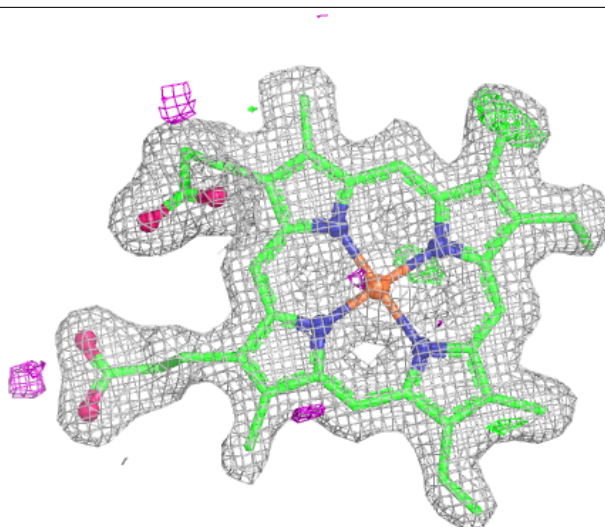
Electron density around O B 402:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



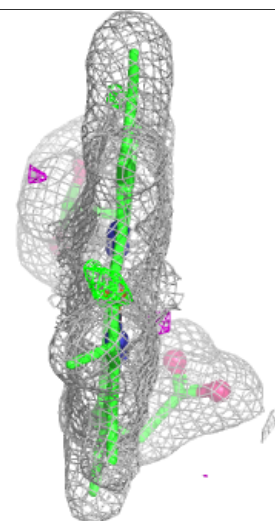
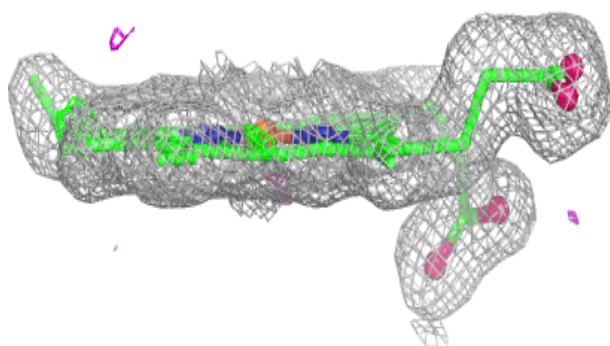
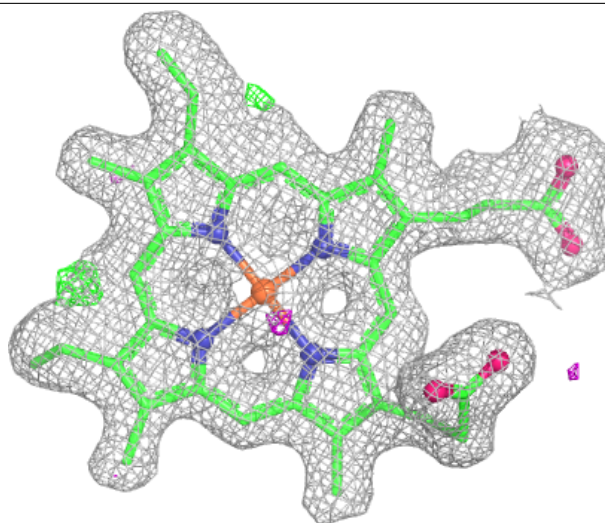
Electron density around HEM E 401:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



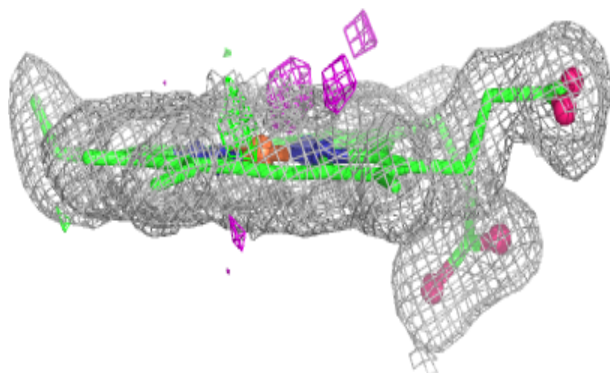
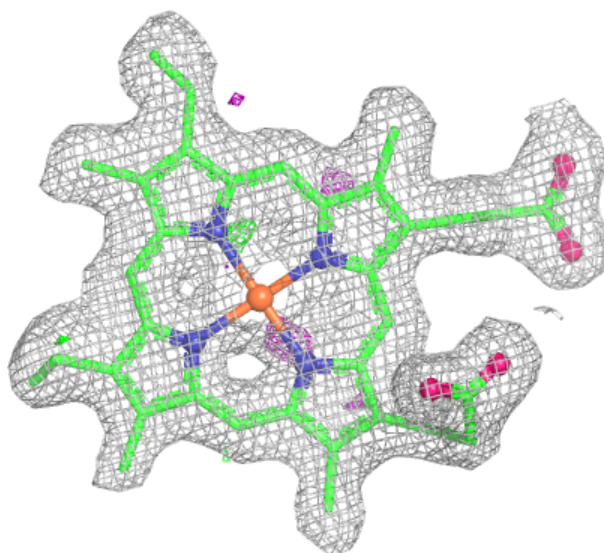
Electron density around HEM B 401:

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



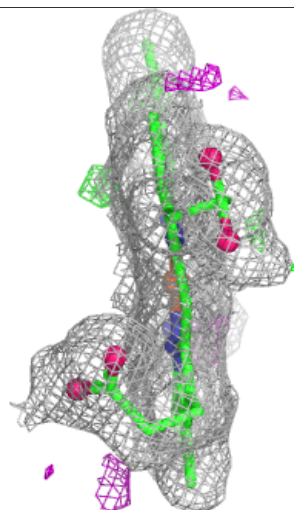
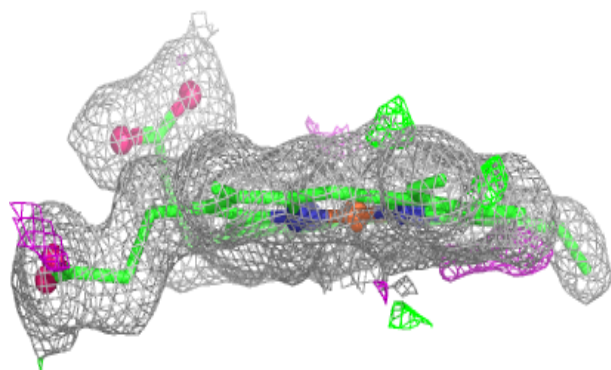
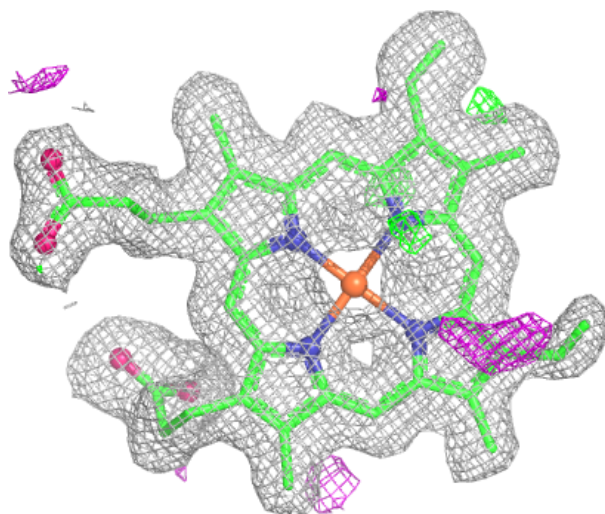
Electron density around HEM C 401:

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and green (positive)



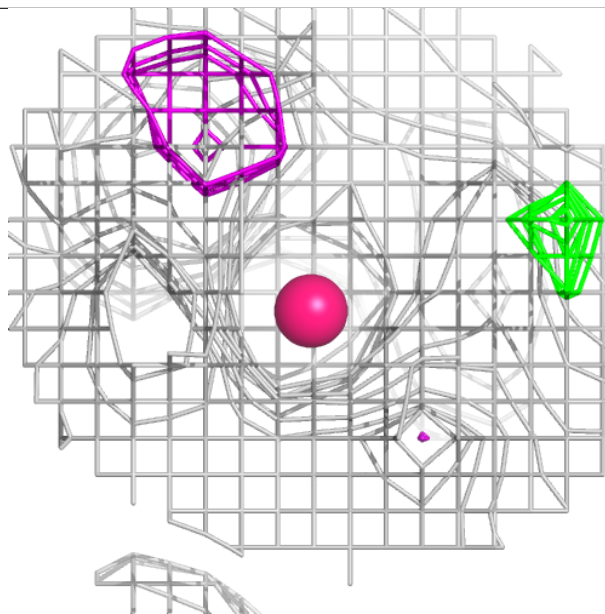
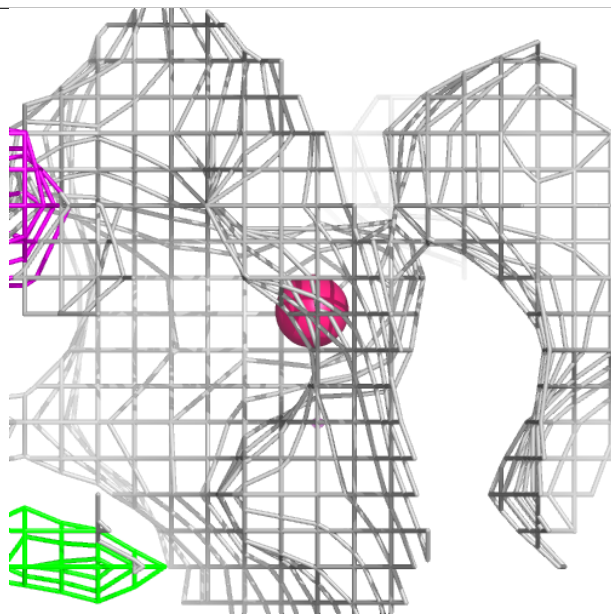
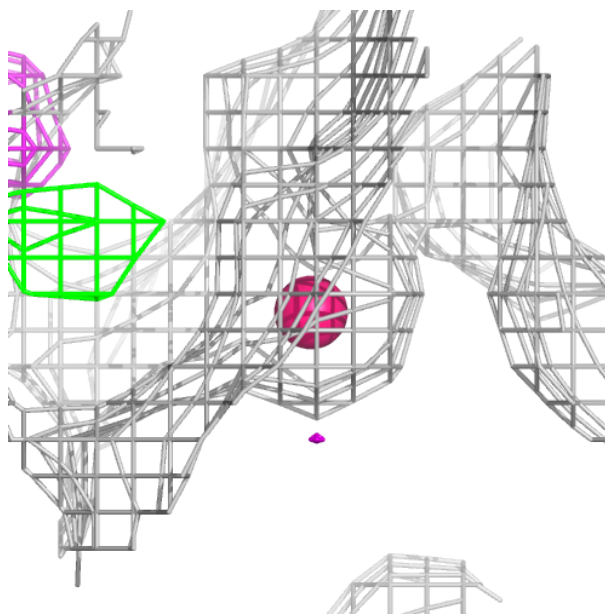
Electron density around HEM D 401:

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and green (positive)



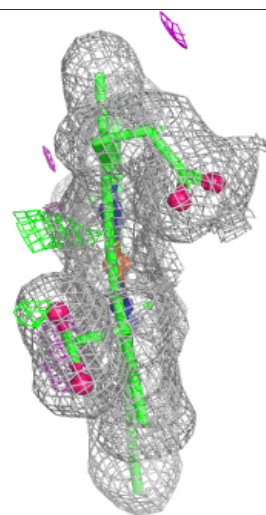
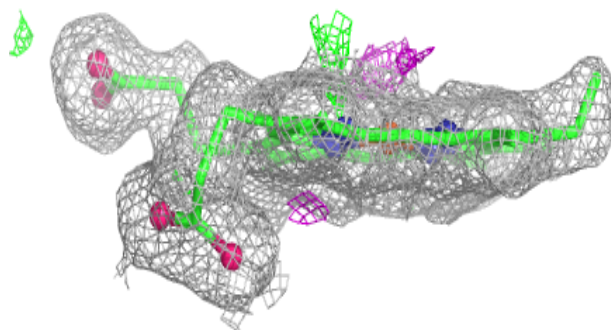
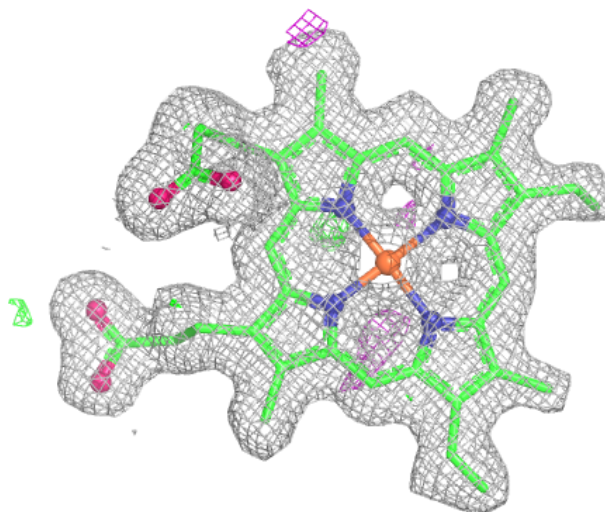
Electron density around O C 402:

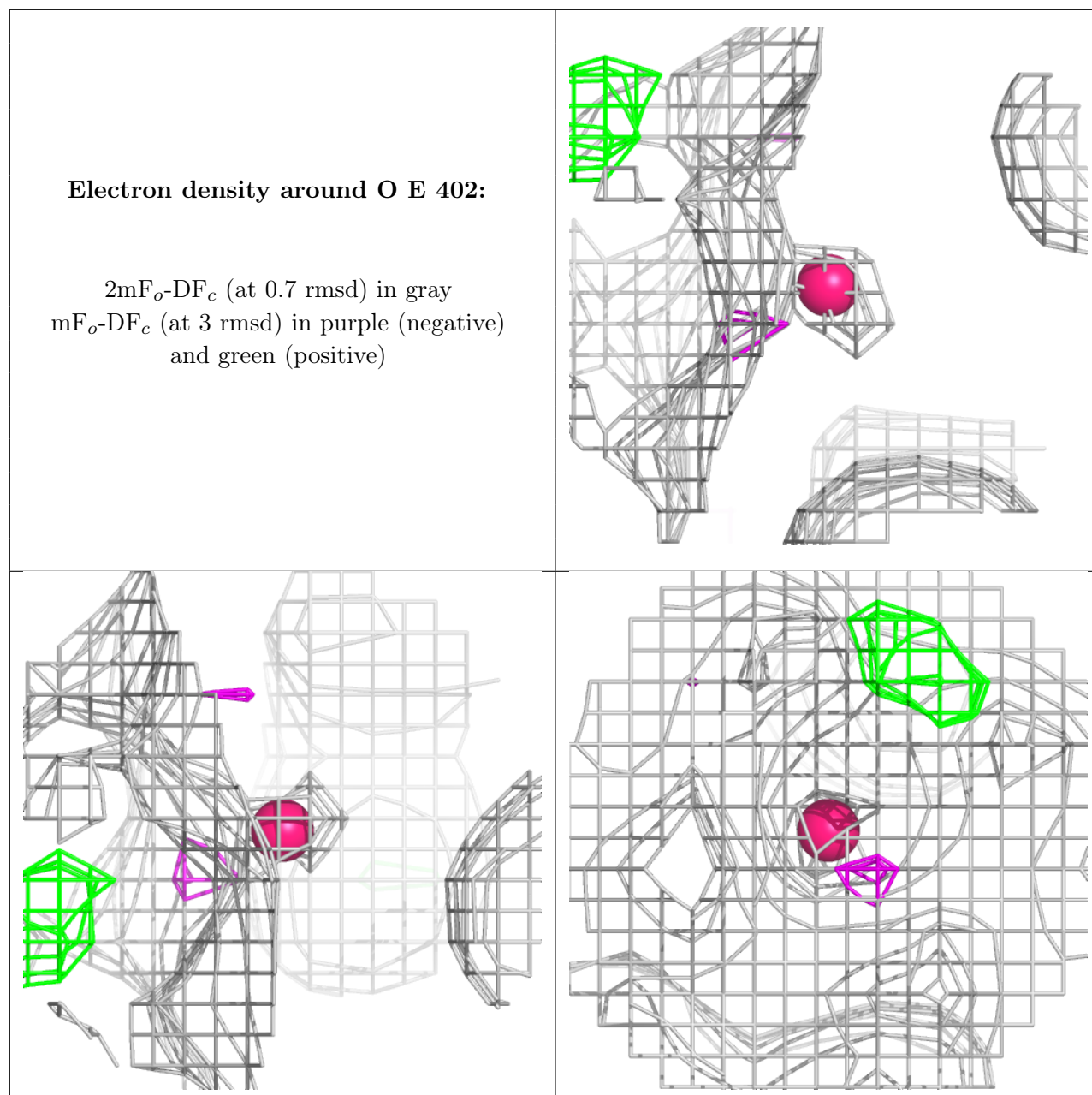
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM A 401:

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





6.5 Other polymers ⓘ

There are no such residues in this entry.