Full wwPDB X-ray Structure Validation Report (i)

Aug 29, 2023 – 05:18 AM EDT

PDB ID	:	3OZU
Title	:	The Crystal Structure of flavohemoglobin from R. eutrophus in complex with miconazole
Authors	:	El Hammi, E.; Warkentin, E.; Demmer, U.; Ermler, U.; Baciou, L.
Deposited on	:	2010-09-27
Resolution	:	2.00 Å(reported)

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

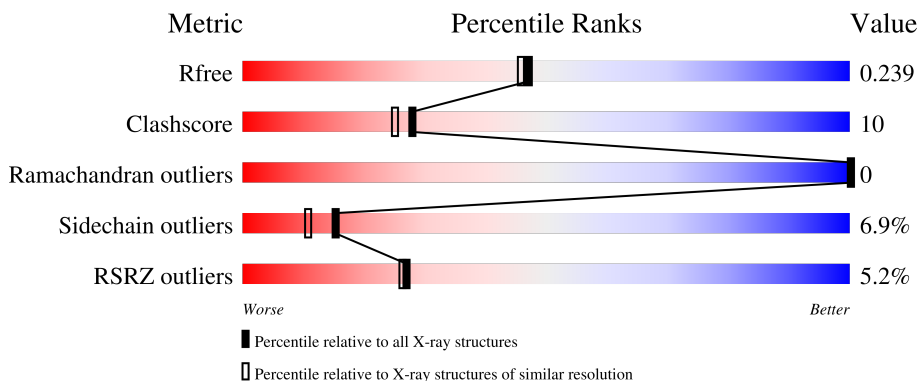|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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:
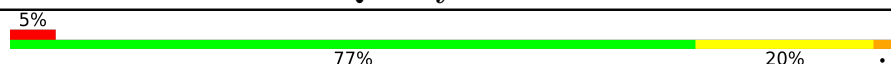*X-RAY DIFFRACTION*

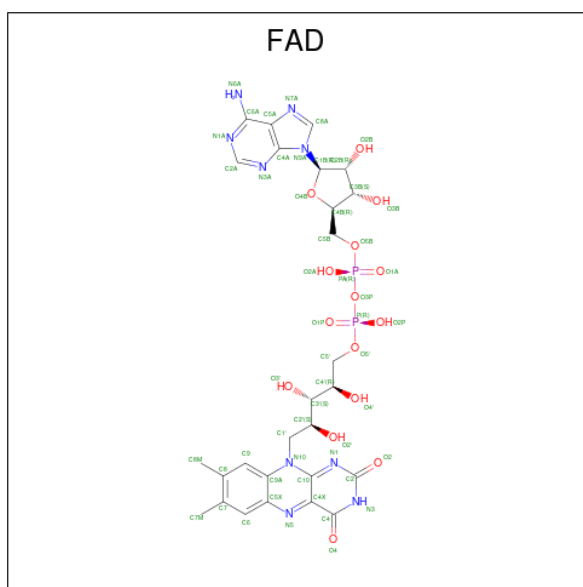The reported resolution of this entry is 2.00 Å.

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	Percentile Ranks	Value
Rfree		0.239
Clashscore		10
Ramachandran outliers		0
Sidechain outliers		6.9%
RSRZ outliers		5.2%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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 <=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	403	5% / 77% / 20% / ·

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 3666 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 Flavohemoprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	403	Total 3204	C 2044	N 552	O 593	S 15	0	6	0

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

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

- Molecule 3 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).

FAD

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 4 is 1-[(2R)-2-[(2,4-dichlorobenzyl)oxy]-2-(2,4-dichlorophenyl)ethyl]-1H-imidazole (three-letter code: X89) (formula: $C_{18}H_{14}Cl_4N_2O$).

X89

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	O	0	0
			25	18	4	2	1		

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).

PO4

O3

O⁻

O2 O⁻ — P ══ O O1

P

O⁻

O4

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

• Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	336	Total 336	O 336	0	0

3 Residue-property plots ⓘ

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: Flavohemoprotein

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	121.34Å 105.28Å 46.45Å 90.00° 101.90° 90.00°	Depositor
Resolution (Å)	30.00 – 2.00 29.68 – 2.00	Depositor EDS
% Data completeness (in resolution range)	98.2 (30.00-2.00) 98.2 (29.68-2.00)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.56 (at 2.01Å)	Xtriage
Refinement program	REFMAC 5.6.0046	Depositor
R, R_{free}	0.185 , 0.233 0.199 , 0.239	Depositor DCC
R_{free} test set	1892 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å²)	25.3	Xtriage
Anisotropy	0.056	Xtriage
Bulk solvent k_{sol}(e/Å³), B_{sol}(Å²)	0.38 , 55.2	EDS
L-test for twinning[2]	$< |L| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	3666	wwPDB-VP
Average B, all atoms (Å²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.86% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: FAD, X89, HEM, PO4

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	1.09	6/3294 (0.2%)	0.94	3/4472 (0.1%)

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	139	GLU	CB-CG	-6.79	1.39	1.52
1	A	89	GLY	N-CA	5.81	1.54	1.46
1	A	61	VAL	CB-CG2	5.74	1.65	1.52
1	A	137	GLU	CD-OE2	5.73	1.31	1.25
1	A	256	TYR	CD2-CE2	5.59	1.47	1.39
1	A	93	GLU	CD-OE1	5.08	1.31	1.25

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	91	LYS	CD-CE-NZ	-8.97	91.07	111.70
1	A	178	ASP	CB-CG-OD1	6.01	123.71	118.30
1	A	155	ARG	NE-CZ-NH1	5.12	122.86	120.30

There are no chirality outliers.

There are no planarity outliers.

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.

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wwPDB
PROTEIN DATA BANK

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3204	0	3173	64	0
2	A	43	0	30	1	0
3	A	53	0	31	2	0
4	A	25	0	14	3	0
5	A	5	0	0	1	0
6	A	336	0	0	11	0
All	All	3666	0	3248	65	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 10.

All (65) 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:356:LYS:HD2	6:A:729:HOH:O	1.49	1.10
1:A:25[A]:ILE:HD12	4:A:411:X89:CL2A	1.93	1.06
1:A:25[A]:ILE:CD1	4:A:411:X89:CL2A	2.56	0.91
2:A:404:HEM:HMB1	5:A:406:PO4:O3	1.84	0.78
1:A:341:ARG:HG2	1:A:342:ASP:OD1	1.86	0.75
1:A:21:GLY:H	1:A:54[A]:GLN:HE22	1.39	0.70
1:A:18:ALA:O	1:A:54[A]:GLN:NE2	2.26	0.69
1:A:44:ASN:ND2	1:A:46:ALA:H	1.91	0.68
1:A:25[A]:ILE:HD11	1:A:57:LEU:HD22	1.74	0.68
1:A:217[A]:ARG:NH1	6:A:545:HOH:O	2.29	0.65
1:A:47:HIS:HB3	6:A:668:HOH:O	1.97	0.64
1:A:110:LEU:HB3	1:A:114:ALA:HB2	1.81	0.61
1:A:47:HIS:CB	6:A:668:HOH:O	2.49	0.60
1:A:364:ASP:OD1	1:A:390[B]:ARG:HD3	2.02	0.60
1:A:356:LYS:HD3	1:A:357:SER:H	1.69	0.57
1:A:44:ASN:HD22	1:A:44:ASN:C	2.08	0.56
1:A:44:ASN:HD22	1:A:46:ALA:H	1.53	0.54
1:A:79:LYS:HB3	1:A:136:MET:HE1	1.88	0.54
1:A:79:LYS:HA	1:A:136:MET:HE2	1.89	0.53
1:A:25[B]:ILE:HD13	1:A:53:GLN:HB3	1.92	0.52
1:A:21:GLY:N	1:A:54[A]:GLN:HE22	2.06	0.51
1:A:171:SER:OG	1:A:220:ARG:NH2	2.41	0.50
1:A:269:ILE:HD11	1:A:294:ARG:CZ	2.41	0.50
1:A:110:LEU:CB	1:A:114:ALA:HB2	2.41	0.50
1:A:138:SER:O	1:A:142:GLU:HG3	2.11	0.49
1:A:348:LEU:O	1:A:349:VAL:C	2.51	0.48
1:A:377:GLN:NE2	1:A:377:GLN:HA	2.29	0.48
1:A:331:ASP:HA	1:A:347:GLY:H	1.78	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:359:LEU:CD1	1:A:386:ILE:HD11	2.43	0.48
1:A:304:ASN:HA	1:A:330:TYR:CD2	2.49	0.48
1:A:13:THR:HG21	1:A:118:ILE:HG12	1.97	0.47
1:A:184:ASN:HD22	1:A:214:PRO:HB2	1.79	0.47
1:A:79:LYS:CB	1:A:136:MET:HE1	2.45	0.47
1:A:359:LEU:HD13	1:A:386:ILE:HD11	1.96	0.47
1:A:48:GLN:HB3	6:A:589:HOH:O	2.16	0.46
1:A:223:VAL:O	1:A:241:HIS:HE1	1.98	0.46
1:A:355:GLU:HG3	6:A:615:HOH:O	2.16	0.46
1:A:275:GLY:HA2	1:A:403:GLU:O	2.15	0.46
1:A:78:LEU:HD13	1:A:132:VAL:HG11	1.98	0.45
1:A:48:GLN:CB	6:A:589:HOH:O	2.65	0.44
1:A:262:ASP:HA	6:A:590:HOH:O	2.16	0.44
1:A:303:ARG:HE	1:A:332:GLN:HG2	1.82	0.44
1:A:232:PRO:O	3:A:405:FAD:H8A	2.18	0.44
1:A:21:GLY:O	1:A:25[A]:ILE:HG12	2.17	0.44
1:A:390[B]:ARG:NH2	6:A:731:HOH:O	2.40	0.44
1:A:184:ASN:ND2	1:A:214:PRO:HB2	2.32	0.44
1:A:5:LYS:HB3	1:A:5:LYS:HE3	1.24	0.44
1:A:74:LEU:O	1:A:77:VAL:HG22	2.18	0.43
1:A:307:VAL:HG12	1:A:403:GLU:HG3	1.99	0.43
1:A:27:CYS:SG	1:A:108:GLU:OE2	2.76	0.43
1:A:271:LEU:HD23	1:A:366:TYR:HB2	2.00	0.43
1:A:91:LYS:NZ	1:A:93:GLU:OE2	2.52	0.43
1:A:145:ALA:HB2	1:A:152:LYS:HG3	2.01	0.43
1:A:217[A]:ARG:CZ	6:A:545:HOH:O	2.65	0.42
1:A:106:ILE:O	1:A:110:LEU:HB2	2.19	0.42
1:A:79:LYS:HA	1:A:136:MET:CE	2.50	0.42
1:A:272:ILE:O	1:A:367:ILE:HA	2.20	0.42
1:A:278:LEU:HD21	1:A:313:ARG:HB2	2.02	0.41
1:A:231:GLN:HE21	1:A:231:GLN:HB3	1.68	0.41
1:A:232:PRO:HG2	3:A:405:FAD:N7A	2.36	0.41
1:A:331:ASP:HA	1:A:347:GLY:CA	2.51	0.41
1:A:47:HIS:HB2	6:A:668:HOH:O	2.18	0.41
1:A:2:LEU:HD12	1:A:2:LEU:N	2.36	0.41
1:A:102:LEU:HD21	4:A:411:X89:C1B	2.52	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	407/403 (101%)	395 (97%)	12 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	340/334 (102%)	316 (93%)	24 (7%)	14	10

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	LYS
1	A	44	ASN
1	A	49	GLU
1	A	84	LYS
1	A	91	LYS
1	A	143	ARG
1	A	161	GLU
1	A	163	ARG
1	A	165	GLU
1	A	198	PRO
1	A	211	SER
1	A	217[A]	ARG
1	A	217[B]	ARG

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Mol	Chain	Res	Type
1	A	273	SER
1	A	278	LEU
1	A	285	LEU
1	A	316	GLU
1	A	319	LYS
1	A	331	ASP
1	A	341	ARG
1	A	342	ASP
1	A	352	LYS
1	A	356	LYS
1	A	360	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	44	ASN
1	A	48	GLN
1	A	52	GLN
1	A	55	GLN
1	A	184	ASN
1	A	231	GLN
1	A	241	HIS
1	A	249	GLN
1	A	290	GLN
1	A	377	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

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	#$|Z| > 2$
4	X89	A	411	2	25,27,27	1.62	3 (12%)	34,37,37	1.83	10 (29%)
3	FAD	A	405	-	53,58,58	1.39	7 (13%)	68,89,89	1.55	10 (14%)
2	HEM	A	404	4,1	41,50,50	1.97	8 (19%)	45,82,82	2.44	16 (35%)
5	PO4	A	406	-	4,4,4	1.37	0	6,6,6	1.58	2 (33%)

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
4	X89	A	411	2	-	2/13/13/13	0/3/3/3
3	FAD	A	405	-	-	1/30/50/50	0/6/6/6
2	HEM	A	404	4,1	-	1/12/54/54	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	404	HEM	C3D-C2D	7.35	1.52	1.36
4	A	411	X89	C1-N1	5.53	1.53	1.48
3	A	405	FAD	C2A-N3A	4.48	1.39	1.32
2	A	404	HEM	C3C-C2C	-4.05	1.34	1.40
2	A	404	HEM	CMD-C2D	3.61	1.58	1.50
4	A	411	X89	C2B-CL2B	3.41	1.81	1.73
2	A	404	HEM	CAB-C3B	3.39	1.56	1.47
3	A	405	FAD	C4X-N5	3.19	1.36	1.30
3	A	405	FAD	C1'-C2'	2.90	1.56	1.52
3	A	405	FAD	C2A-N1A	2.88	1.39	1.33
4	A	411	X89	C4A-CL4A	2.70	1.80	1.74
2	A	404	HEM	CAD-C3D	2.58	1.58	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	404	HEM	FE-ND	2.48	2.09	1.96
2	A	404	HEM	C1B-NB	-2.35	1.36	1.40
3	A	405	FAD	C1'-N10	2.12	1.53	1.48
3	A	405	FAD	C5X-N5	2.11	1.43	1.39
2	A	404	HEM	CBA-CGA	2.08	1.55	1.50
3	A	405	FAD	C10-N1	2.06	1.37	1.33

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	405	FAD	N3A-C2A-N1A	-7.12	117.56	128.68
2	A	404	HEM	C4D-ND-C1D	6.43	111.72	105.07
2	A	404	HEM	CBA-CAA-C2A	-6.24	101.97	112.62
2	A	404	HEM	C4B-CHC-C1C	5.54	129.87	122.56
2	A	404	HEM	C3B-C2B-C1B	4.55	109.86	106.49
2	A	404	HEM	CMB-C2B-C1B	-4.38	118.37	125.04
4	A	411	X89	C3B-C2B-C1B	-4.37	118.54	122.42
3	A	405	FAD	C4X-C10-N10	4.07	122.43	116.48
4	A	411	X89	O-CBA-C1A	-3.96	106.09	112.08
2	A	404	HEM	C1B-NB-C4B	3.96	109.16	105.07
2	A	404	HEM	C4C-CHD-C1D	3.70	127.45	122.56
4	A	411	X89	C2A-C1A-CBA	-3.26	118.91	122.16
4	A	411	X89	C6A-C1A-C2A	3.19	119.98	116.81
2	A	404	HEM	C3C-C4C-NC	-3.00	105.28	110.94
3	A	405	FAD	C5A-C6A-N6A	-2.99	115.80	120.35
2	A	404	HEM	CMA-C3A-C4A	-2.97	123.90	128.46
2	A	404	HEM	C2C-C3C-C4C	2.96	108.96	106.90
3	A	405	FAD	C10-C4X-N5	-2.58	119.38	124.86
2	A	404	HEM	O2D-CGD-CBD	2.55	122.23	114.03
3	A	405	FAD	C1B-N9A-C4A	-2.54	122.18	126.64
4	A	411	X89	CBB-C1B-C2B	-2.52	117.52	121.47
5	A	406	PO4	O4-P-O3	-2.48	100.01	107.97
3	A	405	FAD	C4-C4X-C10	2.48	120.95	116.79
4	A	411	X89	C3B-C4B-CL4B	-2.43	116.11	119.15
4	A	411	X89	C2A-C3A-C4A	-2.35	116.08	118.71
4	A	411	X89	C6B-C1B-C2B	2.35	120.77	116.91
4	A	411	X89	O-CBA-C1	2.31	110.93	106.33
5	A	406	PO4	O3-P-O2	2.29	115.33	107.97
3	A	405	FAD	C6-C5X-C9A	2.28	122.16	118.94
3	A	405	FAD	C9A-C5X-N5	-2.28	119.96	122.43
2	A	404	HEM	CHB-C1B-NB	2.23	127.14	124.38
2	A	404	HEM	O2D-CGD-O1D	-2.21	117.79	123.30

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	404	HEM	O2A-CGA-CBA	2.13	120.87	114.03
3	A	405	FAD	C1'-N10-C9A	2.11	124.03	120.51
2	A	404	HEM	C2B-C1B-NB	-2.05	107.41	109.84
2	A	404	HEM	CMA-C3A-C2A	2.03	128.78	124.94
3	A	405	FAD	C4X-C10-N1	-2.03	120.02	124.73
4	A	411	X89	C1A-C2A-CL2A	-2.01	118.34	120.41

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	411	X89	N1-C1-CBA-C1A
2	A	404	HEM	C3D-CAD-CBD-CGD
4	A	411	X89	N1-C1-CBA-O
3	A	405	FAD	PA-O3P-P-O2P

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	411	X89	3	0
3	A	405	FAD	2	0
2	A	404	HEM	1	0
5	A	406	PO4	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 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 X89 A 411

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD A 405

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM A 404

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

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	403/403 (100%)	0.09	21 (5%)	27	26	11, 29, 61, 88	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	228	GLY	8.9
1	A	345	TYR	4.6
1	A	230	PRO	4.5
1	A	229	GLY	4.5
1	A	227	GLY	3.8
1	A	335	PRO	3.7
1	A	47	HIS	3.4
1	A	111	GLY	3.2
1	A	49	GLU	3.2
1	A	231	GLN	3.2
1	A	352	LYS	3.1
1	A	50	GLN	3.1
1	A	341	ARG	3.1
1	A	342	ASP	2.7
1	A	303	ARG	2.7
1	A	338	VAL	2.4
1	A	52	GLN	2.3
1	A	112	ASN	2.2
1	A	306	ALA	2.2
1	A	264	ASP	2.1
1	A	348	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

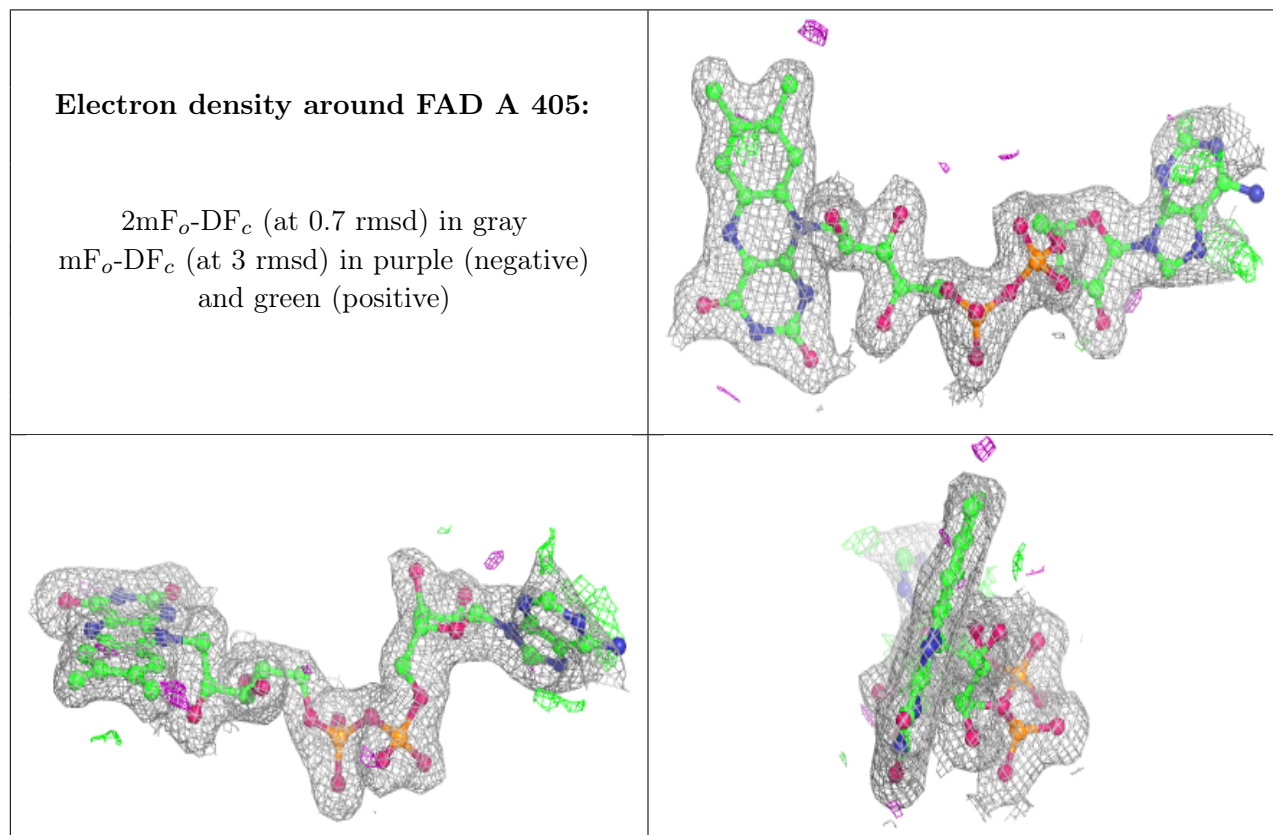There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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.
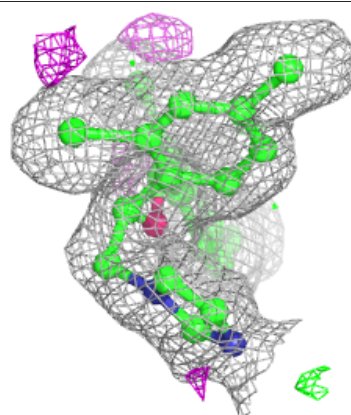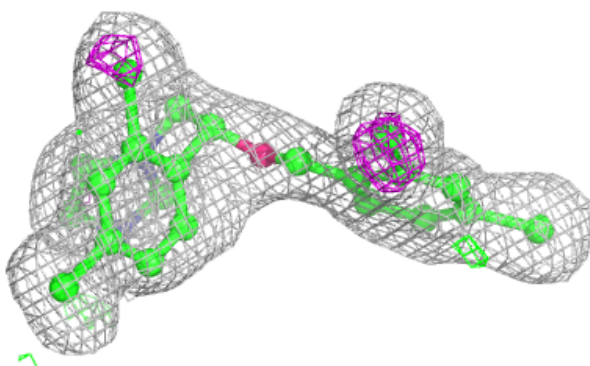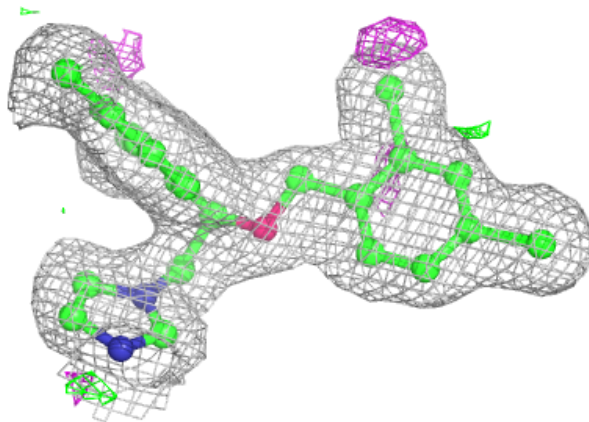
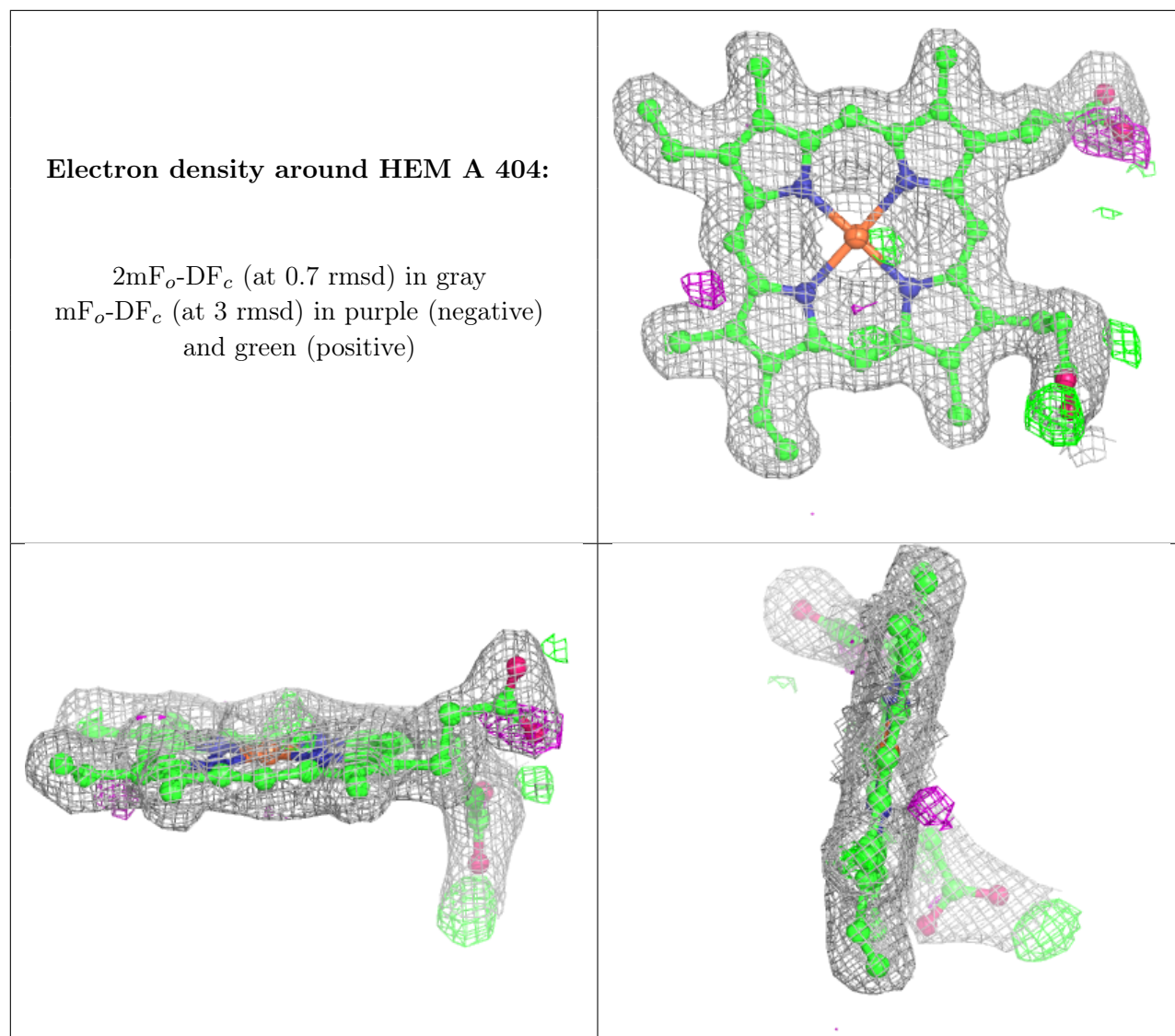| Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	FAD	A	405	53/53	0.94	0.13	15,22,74,81	0
4	X89	A	411	25/25	0.94	0.15	26,33,41,55	0
5	PO4	A	406	5/5	0.96	0.11	46,47,52,57	0
2	HEM	A	404	43/43	0.97	0.17	17,18,34,44	0

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 FAD A 405:

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

Electron density around X89 A 411:

$2mF_o$-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 404:

$2mF_o$-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.