



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2018 – 03:04 PM EST

PDB ID : 6F8A  
Title : Crystal structure of cytochrome P450 CYP260A1 (S276I) bound with histidine  
Authors : Jozwik, I.K.; Thunnissen, A.M.W.H.  
Deposited on : 2017-12-12  
Resolution : 1.35 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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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 : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20030736  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20030736

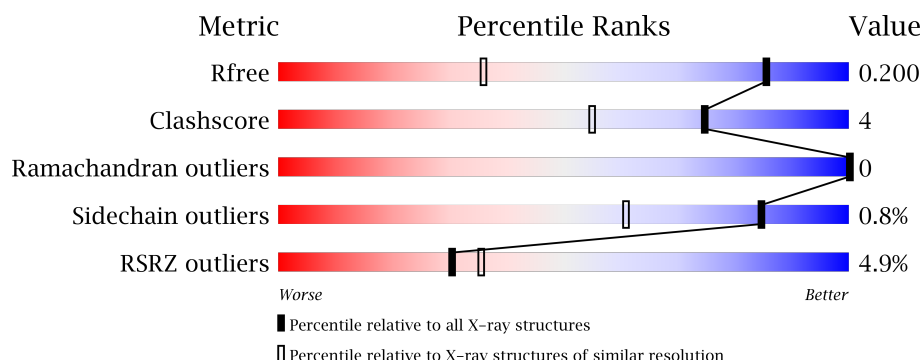
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.35 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))
$R_{free}$	100719	1024 (1.38-1.34)
Clashscore	112137	1063 (1.38-1.34)
Ramachandran outliers	110173	1048 (1.38-1.34)
Sidechain outliers	110143	1048 (1.38-1.34)
RSRZ outliers	101464	1025 (1.38-1.34)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	400	<div> <div>7%</div> <div> <div></div> <div>91%</div> <div>8%</div> <div>.</div> </div> </div>
1	B	400	<div> <div>3%</div> <div> <div></div> <div>91%</div> <div>7%</div> <div>.</div> </div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	HIS	B	502	-	-	-	X

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7192 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 Cytochrome P450 CYP260A1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	394	Total	C	N	O	S	0	13	0
			3138	1988	557	574	19			
1	B	394	Total	C	N	O	S	0	6	0
			3097	1962	554	563	18			

There are 14 discrepancies between the modelled and reference sequences:

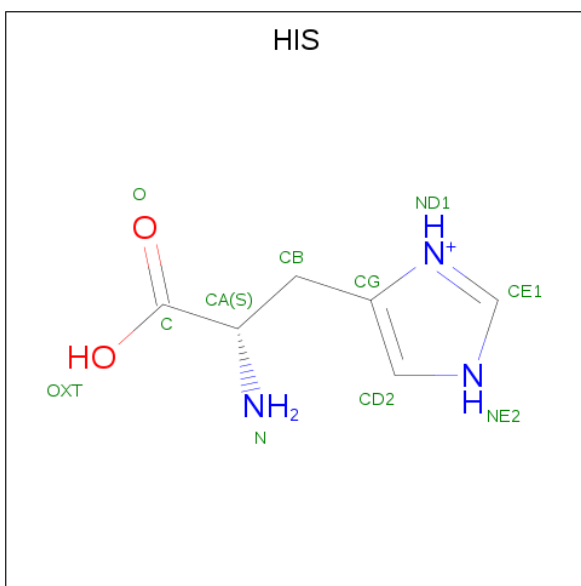
Chain	Residue	Modelled	Actual	Comment	Reference
A	276	ILE	SER	engineered mutation	UNP A9FDB7
A	395	HIS	-	expression tag	UNP A9FDB7
A	396	HIS	-	expression tag	UNP A9FDB7
A	397	HIS	-	expression tag	UNP A9FDB7
A	398	HIS	-	expression tag	UNP A9FDB7
A	399	HIS	-	expression tag	UNP A9FDB7
A	400	HIS	-	expression tag	UNP A9FDB7
B	276	ILE	SER	engineered mutation	UNP A9FDB7
B	395	HIS	-	expression tag	UNP A9FDB7
B	396	HIS	-	expression tag	UNP A9FDB7
B	397	HIS	-	expression tag	UNP A9FDB7
B	398	HIS	-	expression tag	UNP A9FDB7
B	399	HIS	-	expression tag	UNP A9FDB7
B	400	HIS	-	expression tag	UNP A9FDB7

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: C<sub>34</sub>H<sub>32</sub>FeN<sub>4</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 86	C 68	Fe 2	N 8	O 8	0	1
2	B	1	Total 86	C 68	Fe 2	N 8	O 8	0	1

- Molecule 3 is HISTIDINE (three-letter code: HIS) (formula:  $\text{C}_6\text{H}_{10}\text{N}_3\text{O}_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total 11	C 6	N 3	O 2	0	0
3	B	1	Total 11	C 6	N 3	O 2	0	0

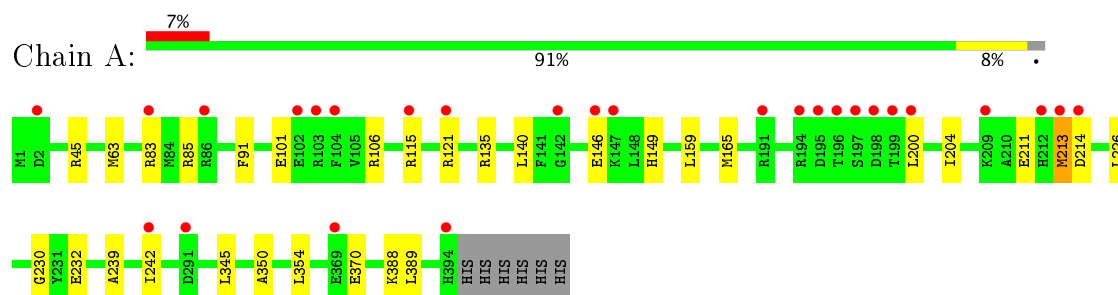
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	371	Total 371	O 371	0	0
4	B	392	Total 392	O 392	0	0

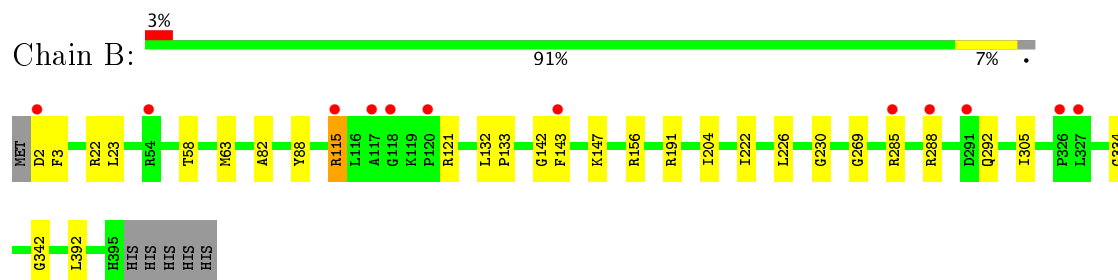
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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 ( $\text{RSRZ} > 2$ ). 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: Cytochrome P450 CYP260A1



#### • Molecule 1: Cytochrome P450 CYP260A1



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	101.22Å 65.15Å 128.53Å 90.00° 112.81° 90.00°	Depositor
Resolution (Å)	46.65 – 1.35 46.65 – 1.35	Depositor EDS
% Data completeness (in resolution range)	99.4 (46.65-1.35) 99.5 (46.65-1.35)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.76 (at 1.35Å)	Xtriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.178 , 0.194 0.184 , 0.200	Depositor DCC
$R_{free}$ test set	8566 reflections (5.10%)	DCC
Wilson B-factor (Å <sup>2</sup> )	13.1	Xtriage
Anisotropy	0.429	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 41.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.011 for h,-k,-h-l	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	7192	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.15% 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

### 5.1 Standard geometry

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

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.48	0/3233	0.70	3/4381 (0.1%)
1	B	0.49	1/3178 (0.0%)	0.71	4/4308 (0.1%)
All	All	0.49	1/6411 (0.0%)	0.71	7/8689 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	269	GLY	C-O	-6.08	1.14	1.23

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	115	ARG	NE-CZ-NH2	-7.19	116.70	120.30
1	A	85	ARG	NE-CZ-NH2	-6.94	116.83	120.30
1	B	22	ARG	NE-CZ-NH1	6.48	123.54	120.30
1	A	45	ARG	NE-CZ-NH1	6.18	123.39	120.30
1	B	156	ARG	NE-CZ-NH1	6.11	123.36	120.30
1	A	83	ARG	NE-CZ-NH1	5.15	122.88	120.30
1	B	156	ARG	NE-CZ-NH2	-5.12	117.74	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.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3138	0	3161	24	1
1	B	3097	0	3111	21	2
2	A	86	0	60	4	0
2	B	86	0	60	9	0
3	A	11	0	6	0	0
3	B	11	0	6	0	0
4	A	371	0	0	3	0
4	B	392	0	0	0	0
All	All	7192	0	6404	47	2

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (47) 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:121:ARG:NH2	1:A:370:GLU:OE1	1.74	1.20
1:A:121:ARG:NH2	1:A:370:GLU:CD	2.49	0.65
1:A:239:ALA:O	1:A:242:ILE:HG22	2.03	0.59
1:A:230:GLY:HA2	2:A:501[B]:HEM:HMC2	1.85	0.58
1:A:121:ARG:HH22	1:A:370:GLU:CD	2.07	0.56
1:A:214:ASP:HB2	4:A:819:HOH:O	2.06	0.56
1:B:230:GLY:HA2	2:B:501[A]:HEM:CAB	2.37	0.55
1:A:239:ALA:O	1:A:242:ILE:CG2	2.56	0.54
1:A:101:GLU:OE2	1:A:106:ARG:NH1	2.41	0.54
1:B:204:ILE:HG21	1:B:222:ILE:HD13	1.91	0.53
1:A:350:ALA:O	1:A:354[B]:LEU:HD13	2.08	0.53
1:B:121:ARG:HB3	1:B:392:LEU:HD23	1.90	0.52
1:B:2:ASP:OD2	1:B:3:PHE:CE2	2.64	0.51
1:B:230:GLY:HA2	2:B:501[B]:HEM:HMC2	1.93	0.49
1:A:115:ARG:HD2	1:A:135:ARG:HH22	1.76	0.49
2:B:501[A]:HEM:HBC2	2:B:501[A]:HEM:HMC1	1.93	0.49
1:A:226:LEU:HD23	2:A:501[B]:HEM:HBC1	1.94	0.49
1:B:2:ASP:OD1	1:B:3:PHE:N	2.47	0.48
1:A:214:ASP:HA	4:A:621:HOH:O	2.13	0.47
1:B:226:LEU:HD23	2:B:501[B]:HEM:HBC1	1.96	0.47
1:B:342:GLY:HA3	2:B:501[B]:HEM:C3C	2.50	0.47
1:B:2:ASP:OD1	1:B:3:PHE:CD2	2.68	0.46
1:B:23:LEU:HD13	1:B:305[B]:ILE:HG12	1.97	0.46
1:A:242:ILE:CG2	1:A:389:LEU:HD13	2.46	0.46
1:B:288:ARG:HA	1:B:292:GLN:O	2.16	0.46
1:A:230:GLY:HA2	2:A:501[A]:HEM:CAB	2.47	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:242:ILE:HG23	1:A:389:LEU:HD13	1.99	0.45
1:A:345:LEU:HD23	2:A:501[A]:HEM:HBB1	1.98	0.45
1:B:88:TYR:CZ	1:B:222:ILE:HD12	2.52	0.44
1:A:214:ASP:CA	4:A:621:HOH:O	2.65	0.44
1:A:370:GLU:HG3	1:A:388:LYS:NZ	2.32	0.44
2:B:501[B]:HEM:HMB2	2:B:501[B]:HEM:HBB2	2.01	0.43
1:B:58:THR:OG1	1:B:285:ARG:NH1	2.51	0.43
1:B:143:PHE:CD1	1:B:147:LYS:HE3	2.54	0.42
1:B:226:LEU:CD2	2:B:501[B]:HEM:HBC1	2.49	0.42
1:B:58:THR:OG1	1:B:285:ARG:CZ	2.67	0.42
1:B:132:LEU:HB3	1:B:133:PRO:HD3	2.01	0.42
1:A:370:GLU:CG	1:A:388:LYS:NZ	2.83	0.42
1:B:142:GLY:O	1:B:191:ARG:NH2	2.47	0.42
1:A:140:LEU:HD22	1:A:200:LEU:HD23	2.02	0.41
1:B:143:PHE:HB3	1:B:147:LYS:HE3	2.01	0.41
1:A:159:LEU:CD1	1:A:232:GLU:HG2	2.50	0.41
1:A:211:GLU:O	1:A:213:MET:HG2	2.20	0.41
1:A:370:GLU:HG3	1:A:388:LYS:HZ3	1.86	0.41
1:A:91:PHE:CZ	1:A:204:ILE:HG23	2.57	0.40
1:B:334:GLY:HA3	2:B:501[A]:HEM:HBD1	2.04	0.40
1:B:226:LEU:HD23	2:B:501[B]:HEM:CBC	2.51	0.40

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:115:ARG:CZ	1:B:115:ARG:NH2[2_758]	1.30	0.90
1:A:146:GLU:OE1	1:B:82:ALA:CB[1_545]	2.07	0.13

## 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	405/400 (101%)	395 (98%)	10 (2%)	0	100	100
1	B	398/400 (100%)	391 (98%)	7 (2%)	0	100	100
All	All	803/800 (100%)	786 (98%)	17 (2%)	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	332/325 (102%)	328 (99%)	4 (1%)	75	44
1	B	325/325 (100%)	324 (100%)	1 (0%)	94	84
All	All	657/650 (101%)	652 (99%)	5 (1%)	85	61

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	63	MET
1	A	149	HIS
1	A	165	MET
1	A	213	MET
1	B	63	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

6 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
2	HEM	A	501[A]	1,3	28,50,50	1.79	4 (14%)	17,82,82	1.72	5 (29%)
2	HEM	A	501[B]	1,3	28,50,50	1.70	4 (14%)	17,82,82	2.04	8 (47%)
3	HIS	A	502	2	3,11,11	0.64	0	3,14,14	0.88	0
2	HEM	B	501[A]	1,3	28,50,50	1.77	4 (14%)	17,82,82	1.68	6 (35%)
2	HEM	B	501[B]	1,3	28,50,50	1.75	5 (17%)	17,82,82	1.82	4 (23%)
3	HIS	B	502	2	3,11,11	0.57	0	3,14,14	1.30	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	HEM	A	501[A]	1,3	-	0/6/54/54	0/0/8/8
2	HEM	A	501[B]	1,3	-	0/6/54/54	0/0/8/8
3	HIS	A	502	2	-	0/4/8/8	0/1/1/1
2	HEM	B	501[A]	1,3	-	0/6/54/54	0/0/8/8
2	HEM	B	501[B]	1,3	-	0/6/54/54	0/0/8/8
3	HIS	B	502	2	-	0/4/8/8	0/1/1/1

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501[A]	HEM	C3B-C2B	-5.18	1.33	1.40
2	B	501[A]	HEM	C3C-C2C	-4.67	1.34	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501[B]	HEM	C3C-C2C	-4.34	1.34	1.40
2	B	501[B]	HEM	C3B-C2B	-4.28	1.34	1.40
2	A	501[A]	HEM	C3C-C2C	-4.06	1.35	1.40
2	B	501[A]	HEM	C3B-C2B	-3.93	1.35	1.40
2	A	501[B]	HEM	C3B-C2B	-3.67	1.35	1.40
2	B	501[B]	HEM	C3C-C2C	-3.51	1.35	1.40
2	A	501[A]	HEM	C3B-CAB	2.01	1.51	1.47
2	B	501[B]	HEM	CAA-C2A	2.22	1.55	1.52
2	B	501[B]	HEM	C3B-CAB	3.17	1.54	1.47
2	A	501[B]	HEM	C3C-CAC	3.21	1.54	1.47
2	B	501[B]	HEM	C3C-CAC	3.22	1.54	1.47
2	A	501[B]	HEM	C3B-CAB	3.30	1.54	1.47
2	B	501[A]	HEM	C3C-CAC	3.34	1.54	1.47
2	B	501[A]	HEM	C3B-CAB	3.35	1.54	1.47
2	A	501[A]	HEM	C3C-CAC	3.61	1.54	1.47

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501[A]	HEM	CBA-CAA-C2A	-3.19	106.38	112.48
2	A	501[B]	HEM	CBD-CAD-C3D	-2.95	106.85	112.47
2	A	501[B]	HEM	CBA-CAA-C2A	-2.86	107.01	112.48
2	A	501[A]	HEM	CMD-C2D-C1D	-2.74	124.25	128.46
2	B	501[A]	HEM	CMA-C3A-C4A	-2.70	124.31	128.46
2	B	501[B]	HEM	CMD-C2D-C1D	-2.67	124.36	128.46
2	B	501[A]	HEM	CMD-C2D-C1D	-2.61	124.44	128.46
2	A	501[B]	HEM	CMD-C2D-C1D	-2.41	124.77	128.46
2	A	501[A]	HEM	CMA-C3A-C4A	-2.33	124.89	128.46
2	B	501[A]	HEM	CBA-CAA-C2A	-2.32	108.04	112.48
2	A	501[B]	HEM	CMA-C3A-C4A	-2.22	125.05	128.46
2	A	501[B]	HEM	C4C-C3C-C2C	2.05	108.33	106.90
2	B	501[A]	HEM	C4A-C3A-C2A	2.25	108.56	107.00
2	B	501[A]	HEM	C1D-C2D-C3D	2.29	108.59	107.00
2	A	501[B]	HEM	C1D-C2D-C3D	2.36	108.64	107.00
2	B	501[A]	HEM	CMB-C2B-C3B	2.37	129.29	124.89
2	A	501[A]	HEM	C4A-C3A-C2A	2.37	108.65	107.00
2	A	501[A]	HEM	CMC-C2C-C3C	2.40	129.34	124.89
2	B	501[B]	HEM	C1D-C2D-C3D	2.48	108.72	107.00
2	B	501[B]	HEM	CMB-C2B-C3B	3.03	130.52	124.89
2	A	501[B]	HEM	CMB-C2B-C3B	3.20	130.83	124.89
2	B	501[B]	HEM	CMC-C2C-C3C	3.59	131.55	124.89
2	A	501[B]	HEM	CMC-C2C-C3C	3.81	131.96	124.89

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501[A]	HEM	2	0
2	A	501[B]	HEM	2	0
2	B	501[A]	HEM	3	0
2	B	501[B]	HEM	6	0

## 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	394/400 (98%)	0.36	27 (6%) 18 22	9, 15, 35, 45	0
1	B	394/400 (98%)	0.17	12 (3%) 51 59	10, 15, 28, 40	0
All	All	788/800 (98%)	0.27	39 (4%) 30 35	9, 15, 33, 45	0

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	196	THR	6.9
1	B	2	ASP	6.2
1	A	212	HIS	5.1
1	A	146	GLU	4.8
1	B	291	ASP	4.7
1	A	104	PHE	4.4
1	A	194	ARG	4.3
1	A	195	ASP	4.0
1	A	214	ASP	3.9
1	A	200	LEU	3.9
1	B	54	ARG	3.8
1	A	103	ARG	3.7
1	A	198	ASP	3.7
1	A	142	GLY	3.2
1	A	394	HIS	3.2
1	B	326	PRO	3.2
1	B	115	ARG	3.2
1	B	117	ALA	3.2
1	B	118	GLY	3.1
1	A	369	GLU	2.9
1	A	191	ARG	2.7
1	A	121	ARG	2.6
1	A	147	LYS	2.6
1	A	213	MET	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	86	ARG	2.5
1	A	209	LYS	2.4
1	A	242	ILE	2.4
1	B	327	LEU	2.4
1	B	285	ARG	2.3
1	A	197	SER	2.3
1	A	2	ASP	2.2
1	B	120	PRO	2.2
1	A	199	THR	2.2
1	A	115	ARG	2.2
1	B	288	ARG	2.2
1	B	143	PHE	2.1
1	A	102	GLU	2.0
1	A	291[A]	ASP	2.0
1	A	83	ARG	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
3	HIS	B	502	11/11	0.88	0.12	4.21	14,16,20,23	0
2	HEM	B	501[B]	43/43	0.99	0.08	0.76	7,10,14,23	43
2	HEM	B	501[A]	43/43	0.99	0.08	0.76	8,10,15,19	43
2	HEM	A	501[A]	43/43	0.99	0.09	0.40	7,9,15,18	43
2	HEM	A	501[B]	43/43	0.99	0.09	0.40	5,10,16,20	43
3	HIS	A	502	11/11	0.94	0.08	-0.25	14,14,17,19	0

## 6.5 Other polymers

There are no such residues in this entry.