



# Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 03:48 AM GMT

PDB ID : 2CCY  
Title : STRUCTURE OF FERRICYTOCHROME C(PRIME) FROM RHO-  
DOSPIRILLUM MOLISCHIANUM AT 1.67 ANGSTROMS RESOLUTION  
Authors : Finzel, B.C.; Weber, P.C.; Hardman, K.D.; Salemme, F.R.  
Deposited on : 1985-08-27  
Resolution : 1.67 Å(reported)

This is a full wwPDB 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/ValidationPDFNotes.html>

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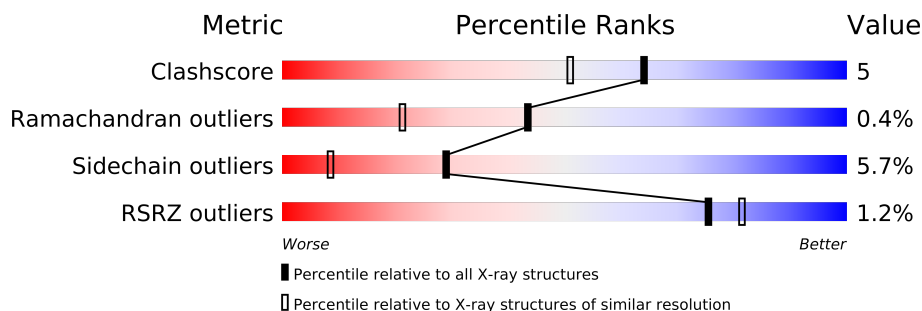
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 1.67 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))
Clashscore	79885	4225 (1.70-1.66)
Ramachandran outliers	78287	4144 (1.70-1.66)
Sidechain outliers	78261	4143 (1.70-1.66)
RSRZ outliers	66119	3587 (1.70-1.66)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	128	
1	B	128	

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 2146 atoms, of which 0 are hydrogen and 0 are deuterium.

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 C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	127	Total	C	N	O	S	0	1	0
			933	588	162	178	5			
1	B	127	Total	C	N	O	S	0	1	0
			933	588	162	178	5			

- 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	C	Fe	N	O	0	0
			43	34	1	4	4		
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 3 is water.

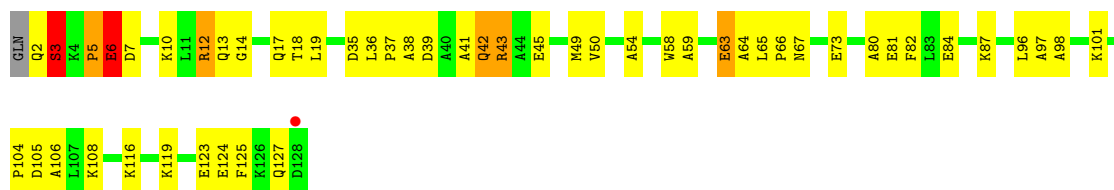
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	96	Total 96	O 96	0	0
3	B	98	Total 98	O 98	0	0

### 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 errors 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.

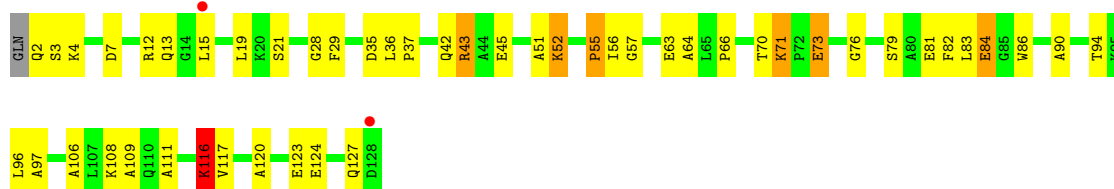
#### • Molecule 1: CYTOCHROME C

Chain A: 



#### • Molecule 1: CYTOCHROME C

Chain B: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	56.58Å 72.33Å 75.44Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	(Not available) – 1.67 38.37 – 1.51	Depositor EDS
% Data completeness (in resolution range)	(Not available) ((Not available)-1.67) 93.2 (38.37-1.51)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.62 (at 1.50Å)	Xtriage
Refinement program	PROLSQ	Depositor
R, $R_{free}$	(Not available) , (Not available) 0.228 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	DCC
Wilson B-factor (Å <sup>2</sup> )	12.2	Xtriage
Anisotropy	0.362	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 83.8	EDS
Estimated twinning fraction	0.015 for -h,l,k	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 46289 reflections	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	2146	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.96% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

## 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	1.41	3/955 (0.3%)	2.25	43/1286 (3.3%)
1	B	1.63	7/955 (0.7%)	2.29	52/1286 (4.0%)
All	All	1.52	10/1910 (0.5%)	2.27	95/2572 (3.7%)

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	3
1	B	0	4
All	All	0	7

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	57	GLY	N-CA	9.07	1.59	1.46
1	A	123	GLU	CD-OE2	7.70	1.34	1.25
1	B	86	TRP	CD2-CE2	-6.91	1.33	1.41
1	B	12	ARG	CZ-NH2	6.61	1.41	1.33
1	B	79	SER	CA-CB	6.56	1.62	1.52
1	A	98	ALA	N-CA	5.69	1.57	1.46
1	B	55	PRO	N-CD	5.51	1.55	1.47
1	B	28	GLY	N-CA	5.38	1.54	1.46
1	B	12	ARG	C-O	5.28	1.33	1.23
1	A	50	VAL	N-CA	5.10	1.56	1.46

All (95) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	39	ASP	CB-CG-OD1	14.13	131.02	118.30
1	B	35	ASP	CB-CG-OD2	-13.19	106.42	118.30
1	A	97	ALA	O-C-N	10.68	139.79	122.70
1	B	86	TRP	CZ3-CH2-CZ2	10.38	134.06	121.60
1	A	7	ASP	CB-CG-OD2	-10.16	109.16	118.30
1	A	43	ARG	NE-CZ-NH2	-10.14	115.23	120.30
1	A	7	ASP	CB-CG-OD1	9.44	126.79	118.30
1	B	94	THR	CA-CB-CG2	-9.38	99.28	112.40
1	B	86	TRP	CG-CD2-CE3	-9.10	125.71	133.90
1	A	124	GLU	CA-CB-CG	8.96	133.12	113.40
1	B	106	ALA	N-CA-CB	-8.39	98.36	110.10
1	A	116	LYS	CA-CB-CG	8.21	131.47	113.40
1	A	58	TRP	CE3-CZ3-CH2	7.97	129.97	121.20
1	A	19	LEU	CB-CG-CD1	-7.89	97.58	111.00
1	B	86	TRP	CH2-CZ2-CE2	-7.79	109.61	117.40
1	A	105	ASP	CB-CG-OD1	-7.73	111.35	118.30
1	A	82	PHE	CB-CG-CD2	-7.67	115.43	120.80
1	B	124	GLU	CA-CB-CG	7.54	129.99	113.40
1	B	13	GLN	C-N-CA	7.51	138.08	122.30
1	B	63	GLU	OE1-CD-OE2	-7.37	114.45	123.30
1	A	42[A]	GLN	O-C-N	7.20	134.23	122.70
1	A	42[B]	GLN	O-C-N	7.20	134.23	122.70
1	B	51	ALA	CB-CA-C	7.20	120.89	110.10
1	A	43	ARG	NE-CZ-NH1	7.14	123.87	120.30
1	B	79	SER	N-CA-CB	-7.11	99.83	110.50
1	B	86	TRP	CE2-CD2-CE3	6.98	127.08	118.70
1	A	45	GLU	O-C-N	6.93	133.79	122.70
1	B	73	GLU	CA-CB-CG	6.86	128.50	113.40
1	A	59	ALA	O-C-N	6.75	133.50	122.70
1	B	83	LEU	CB-CA-C	6.74	123.00	110.20
1	A	81	GLU	OE1-CD-OE2	-6.54	115.45	123.30
1	B	82	PHE	CB-CG-CD1	-6.49	116.25	120.80
1	A	106	ALA	O-C-N	6.48	133.06	122.70
1	B	117	VAL	CA-CB-CG1	-6.48	101.18	110.90
1	A	17	GLN	O-C-N	6.36	132.88	122.70
1	B	73	GLU	OE1-CD-OE2	-6.29	115.76	123.30
1	A	58	TRP	CD2-CE3-CZ3	-6.27	110.65	118.80
1	B	86	TRP	CE3-CZ3-CH2	-6.25	114.32	121.20
1	A	64	ALA	N-CA-CB	-6.17	101.47	110.10
1	B	35	ASP	OD1-CG-OD2	6.16	135.00	123.30
1	A	54	ALA	CB-CA-C	6.12	119.28	110.10
1	B	123	GLU	OE1-CD-OE2	6.06	130.57	123.30
1	B	56	ILE	C-N-CA	-6.05	109.60	122.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	96	LEU	O-C-N	-6.04	113.04	122.70
1	A	17	GLN	CA-C-O	-6.01	107.49	120.10
1	B	43	ARG	CD-NE-CZ	5.85	131.79	123.60
1	B	45	GLU	CG-CD-OE2	-5.80	106.70	118.30
1	B	70	THR	N-CA-CB	-5.79	99.30	110.30
1	B	13	GLN	O-C-N	-5.79	113.36	123.20
1	B	52	LYS	CA-CB-CG	-5.76	100.73	113.40
1	B	43	ARG	CA-CB-CG	-5.72	100.81	113.40
1	A	63	GLU	CB-CG-CD	5.69	129.57	114.20
1	B	15	LEU	O-C-N	-5.68	113.61	122.70
1	B	94	THR	CA-CB-OG1	-5.63	97.17	109.00
1	A	38	ALA	N-CA-CB	-5.63	102.21	110.10
1	B	111	ALA	O-C-N	-5.62	113.70	122.70
1	B	73	GLU	CB-CA-C	-5.62	99.17	110.40
1	A	124	GLU	CG-CD-OE1	5.58	129.47	118.30
1	B	86	TRP	N-CA-CB	5.57	120.62	110.60
1	A	14	GLY	CA-C-O	-5.54	110.62	120.60
1	A	18	THR	CA-CB-CG2	-5.54	104.64	112.40
1	A	41	ALA	N-CA-CB	5.53	117.85	110.10
1	A	12	ARG	NE-CZ-NH2	-5.52	117.54	120.30
1	A	39	ASP	OD1-CG-OD2	-5.50	112.85	123.30
1	B	86	TRP	NE1-CE2-CD2	5.50	112.80	107.30
1	A	124	GLU	CG-CD-OE2	-5.50	107.31	118.30
1	B	45	GLU	CA-CB-CG	-5.49	101.31	113.40
1	B	56	ILE	CA-CB-CG1	-5.49	100.58	111.00
1	A	63	GLU	N-CA-CB	5.47	120.44	110.60
1	A	35	ASP	O-C-N	5.42	131.37	122.70
1	B	97	ALA	N-CA-CB	5.41	117.68	110.10
1	A	63	GLU	CA-CB-CG	5.41	125.30	113.40
1	B	71	LYS	CA-CB-CG	-5.40	101.52	113.40
1	B	70	THR	CA-CB-CG2	-5.36	104.89	112.40
1	A	73	GLU	CG-CD-OE1	5.35	129.00	118.30
1	B	19	LEU	CB-CG-CD1	-5.27	102.04	111.00
1	B	84	GLU	CG-CD-OE2	-5.26	107.77	118.30
1	A	10	LYS	CG-CD-CE	5.26	127.68	111.90
1	B	90	ALA	CB-CA-C	5.25	117.97	110.10
1	B	124	GLU	CG-CD-OE1	5.24	128.77	118.30
1	A	80	ALA	CB-CA-C	5.23	117.94	110.10
1	B	21	SER	N-CA-CB	5.23	118.34	110.50
1	B	73	GLU	CG-CD-OE1	5.21	128.73	118.30
1	B	96	LEU	CB-CG-CD2	-5.21	102.15	111.00
1	A	49	MET	O-C-N	5.18	131.00	122.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	6	GLU	N-CA-CB	5.15	119.88	110.60
1	B	76	GLY	CA-C-O	-5.15	111.33	120.60
1	B	116	LYS	CA-CB-CG	5.13	124.69	113.40
1	B	81	GLU	O-C-N	5.11	130.87	122.70
1	B	84	GLU	CG-CD-OE1	5.10	128.50	118.30
1	A	125	PHE	CG-CD1-CE1	5.09	126.40	120.80
1	A	50	VAL	O-C-N	-5.09	114.55	122.70
1	B	109	ALA	N-CA-CB	-5.08	102.99	110.10
1	B	124	GLU	CG-CD-OE2	-5.03	108.25	118.30
1	B	84	GLU	CA-CB-CG	5.00	124.40	113.40

There are no chirality outliers.

All (7) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	12	ARG	Sidechain
1	A	13	GLN	Mainchain
1	A	43	ARG	Sidechain
1	B	116	LYS	Mainchain
1	B	120	ALA	Mainchain
1	B	43	ARG	Sidechain
1	B	55	PRO	Mainchain

## 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	933	0	941	10	0
1	B	933	0	941	9	0
2	A	43	0	30	0	0
2	B	43	0	30	2	0
3	A	96	0	0	3	0
3	B	98	0	0	3	0
All	All	2146	0	1942	21	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 5.

All (21) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:2:GLN:O	1:A:3:SER:HB2	1.82	0.78
1:A:127:GLN:O	3:A:232:HOH:O	2.04	0.73
1:A:66:PRO:O	1:A:67:ASN:HB2	1.98	0.63
1:B:71:LYS:HB3	1:B:73:GLU:OE2	2.05	0.57
1:B:52:LYS:NZ	3:B:519:HOH:O	2.40	0.55
1:A:5:PRO:HD2	1:A:6:GLU:OE1	2.09	0.52
1:B:64:ALA:N	3:B:317:HOH:O	2.44	0.49
1:B:29:PHE:CE2	1:B:108:LYS:HG3	2.50	0.47
1:B:2:GLN:O	1:B:3:SER:HB2	2.16	0.45
2:B:129:HEM:HMC2	2:B:129:HEM:HBC2	1.99	0.44
1:A:36:LEU:HA	1:A:37:PRO:HD3	1.87	0.44
1:A:101:LYS:NZ	3:A:227:HOH:O	2.50	0.44
1:B:36:LEU:HA	1:B:37:PRO:HD3	1.89	0.43
1:A:84:GLU:HG2	3:A:208:HOH:O	2.19	0.42
1:A:5:PRO:HB3	1:A:65:LEU:HD22	2.03	0.41
2:B:129:HEM:CMC	2:B:129:HEM:HBC2	2.51	0.40
1:B:64:ALA:HB3	3:B:317:HOH:O	2.21	0.40
1:B:4:LYS:O	1:B:7:ASP:HB2	2.21	0.40
1:A:104:PRO:O	1:A:108:LYS:HG3	2.22	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	126/128 (98%)	122 (97%)	3 (2%)	1 (1%)	27	7
1	B	126/128 (98%)	123 (98%)	3 (2%)	0	100	100
All	All	252/256 (98%)	245 (97%)	6 (2%)	1 (0%)	43	21

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3	SER

### 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	89/90 (99%)	83 (93%)	6 (7%)	23	5
1	B	89/90 (99%)	85 (96%)	4 (4%)	38	13
All	All	178/180 (99%)	168 (94%)	10 (6%)	29	9

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	SER
1	A	5	PRO
1	A	6	GLU
1	A	63	GLU
1	A	87	LYS
1	A	119	LYS
1	B	66	PRO
1	B	84	GLU
1	B	116	LYS
1	B	127	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	127	GLN

### 5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

2 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	129	1	49,50,50	4.69	23 (46%)	46,82,82	3.36	24 (52%)
2	HEM	B	129	1	49,50,50	7.07	24 (48%)	46,82,82	3.35	23 (50%)

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	129	1	-	0/14/114/114	0/0/8/8
2	HEM	B	129	1	-	0/14/114/114	0/0/8/8

All (47) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	129	HEM	C3D-C4D	-37.39	1.35	1.44
2	B	129	HEM	C2B-C1B	-24.40	1.38	1.44
2	A	129	HEM	C2D-C1D	24.39	1.50	1.44
2	A	129	HEM	C3D-C4D	10.61	1.47	1.44
2	B	129	HEM	C2D-C1D	-8.29	1.42	1.44
2	B	129	HEM	C3C-C2C	-8.03	1.29	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	129	HEM	C3D-C2D	-7.28	1.31	1.43
2	B	129	HEM	C4A-C3A	6.36	1.48	1.40
2	A	129	HEM	C3B-CAB	6.31	1.60	1.40
2	B	129	HEM	C3C-CAC	6.26	1.60	1.40
2	A	129	HEM	C3B-C2B	-5.75	1.33	1.43
2	A	129	HEM	C2B-C1B	5.73	1.46	1.44
2	A	129	HEM	CHB-C1B	5.46	1.43	1.35
2	B	129	HEM	C3B-C4B	-5.16	1.38	1.44
2	B	129	HEM	C3B-CAB	4.82	1.55	1.40
2	B	129	HEM	CHA-C4D	4.79	1.42	1.35
2	A	129	HEM	C3C-CAC	4.68	1.55	1.40
2	A	129	HEM	C1A-NA	4.47	1.45	1.36
2	B	129	HEM	CHB-C1B	4.31	1.42	1.35
2	B	129	HEM	CMC-C2C	4.28	1.60	1.47
2	A	129	HEM	CHD-C4C	3.99	1.43	1.36
2	B	129	HEM	C4B-NB	3.66	1.46	1.37
2	A	129	HEM	C3C-C2C	-3.21	1.38	1.43
2	A	129	HEM	CAA-C2A	3.14	1.57	1.52
2	B	129	HEM	C1A-C2A	3.12	1.48	1.43
2	B	129	HEM	FE-NA	3.10	2.05	1.92
2	B	129	HEM	C1D-ND	3.08	1.45	1.37
2	A	129	HEM	C3B-C4B	3.04	1.48	1.44
2	B	129	HEM	CBC-CAC	3.03	1.46	1.28
2	A	129	HEM	CMD-C2D	2.92	1.56	1.47
2	A	129	HEM	CMB-C2B	2.83	1.56	1.47
2	B	129	HEM	C3D-C2D	-2.77	1.38	1.43
2	B	129	HEM	CMA-C3A	2.76	1.57	1.51
2	B	129	HEM	C4D-ND	2.75	1.45	1.39
2	B	129	HEM	CMD-C2D	2.68	1.55	1.47
2	A	129	HEM	C4A-NA	2.53	1.41	1.36
2	B	129	HEM	C2A-C3A	-2.52	1.30	1.37
2	B	129	HEM	CBB-CAB	2.47	1.43	1.28
2	A	129	HEM	O1A-CGA	2.35	1.30	1.22
2	A	129	HEM	CMA-C3A	2.34	1.56	1.51
2	A	129	HEM	CHA-C4D	2.31	1.39	1.35
2	B	129	HEM	O2A-CGA	-2.25	1.22	1.30
2	A	129	HEM	C4B-NB	-2.24	1.32	1.37
2	A	129	HEM	CBC-CAC	2.25	1.41	1.28
2	A	129	HEM	CBB-CAB	2.22	1.41	1.28
2	B	129	HEM	FE-NC	2.21	2.06	1.97
2	A	129	HEM	O2A-CGA	-2.00	1.23	1.30

All (47) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	129	HEM	CHC-C1C-NC	9.76	133.22	124.73
2	B	129	HEM	CHD-C4C-NC	8.14	131.81	124.73
2	A	129	HEM	C3B-C4B-NB	-7.61	108.55	114.00
2	A	129	HEM	C2D-C1D-ND	-7.45	104.13	112.93
2	A	129	HEM	CHD-C1D-ND	7.30	130.65	124.58
2	A	129	HEM	CHC-C4B-NB	7.27	130.62	124.58
2	B	129	HEM	C4D-ND-C1D	-7.09	97.91	105.16
2	A	129	HEM	C4A-CHB-C1B	-7.05	118.19	127.47
2	A	129	HEM	C4D-ND-C1D	6.61	111.92	105.16
2	B	129	HEM	CMA-C3A-C4A	-6.14	119.18	128.62
2	B	129	HEM	C4C-NC-C1C	5.72	111.48	105.53
2	B	129	HEM	C1B-NB-C4B	-5.22	99.82	105.16
2	A	129	HEM	CHA-C4D-ND	4.95	131.11	124.31
2	B	129	HEM	C1A-CHA-C4D	-4.62	121.39	127.47
2	A	129	HEM	C4A-NA-C1A	-4.48	100.86	106.76
2	B	129	HEM	C3A-C4A-NA	-4.47	106.04	109.41
2	A	129	HEM	C3A-C4A-NA	4.22	112.60	109.41
2	A	129	HEM	CHB-C1B-NB	4.11	129.95	124.31
2	B	129	HEM	CHA-C1A-NA	3.88	131.06	124.58
2	B	129	HEM	CHB-C1B-NB	-3.68	119.25	124.31
2	A	129	HEM	O1A-CGA-CBA	-3.54	110.86	123.03
2	B	129	HEM	CAD-CBD-CGD	3.51	124.44	113.48
2	B	129	HEM	C4A-NA-C1A	3.33	111.15	106.76
2	A	129	HEM	O2A-CGA-CBA	3.32	125.97	114.22
2	A	129	HEM	C1D-CHD-C4C	-3.31	117.86	126.57
2	A	129	HEM	C1B-NB-C4B	3.22	108.46	105.16
2	B	129	HEM	C2A-C1A-NA	-3.17	105.33	109.73
2	B	129	HEM	CAD-C3D-C4D	3.13	130.16	124.53
2	B	129	HEM	C4B-CHC-C1C	-3.10	118.39	126.57
2	B	129	HEM	CHA-C4D-ND	-3.04	120.13	124.31
2	B	129	HEM	C1D-CHD-C4C	-3.00	118.67	126.57
2	A	129	HEM	CMD-C2D-C3D	2.93	132.23	125.60
2	B	129	HEM	CMA-C3A-C2A	2.90	130.42	124.94
2	B	129	HEM	CAD-C3D-C2D	-2.85	120.89	127.25
2	A	129	HEM	C4B-CHC-C1C	-2.85	119.06	126.57
2	A	129	HEM	CHC-C1C-NC	2.69	127.07	124.73
2	B	129	HEM	O1A-CGA-CBA	-2.59	114.13	123.03
2	A	129	HEM	C3A-C4A-CHB	-2.56	121.15	126.00
2	A	129	HEM	CHD-C4C-NC	2.38	126.80	124.73
2	A	129	HEM	CHA-C1A-NA	-2.28	120.77	124.58
2	A	129	HEM	CMB-C2B-C3B	2.27	131.52	126.16
2	A	129	HEM	C1A-CHA-C4D	-2.23	124.54	127.47
2	B	129	HEM	C3B-C4B-NB	-2.09	112.50	114.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	129	HEM	C4A-C3A-C2A	2.08	108.44	107.00
2	A	129	HEM	C4C-NC-C1C	-2.07	103.38	105.53
2	B	129	HEM	O1D-CGD-CBD	2.03	130.03	123.03
2	A	129	HEM	CMA-C3A-C4A	-2.03	125.50	128.62

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 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, 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	127/128 (99%)	-0.28	1 (0%) 83 88	15, 28, 51, 69	9 (7%)
1	B	127/128 (99%)	-0.45	2 (1%) 68 73	12, 21, 39, 74	8 (6%)
All	All	254/256 (99%)	-0.36	3 (1%) 75 81	12, 24, 49, 74	17 (6%)

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	128	ASP	3.8
1	B	15	LEU	2.5
1	B	128	ASP	2.5

### 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 carbohydrates 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. 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	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
2	HEM	B	129	43/43	0.06	-0.39	11,14,22,27	0
2	HEM	A	129	43/43	0.05	-1.19	16,19,24,27	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.