Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 07:53 AM GMT

PDB ID	:	3CIU
Title	:	Site-Selective Glycosylation of Cysteine-93 beta on the Surface of Bovine Hemoglobin and its Application as a Novel Oxygen Therapeutic
Authors	:	Bhatt, V.S.; Zhang, Y.; Sun, G.; Wang, P.G.; Palmer, A.F.
Deposited on	:	2008-03-11
Resolution	:	3.50 Å(reported)

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

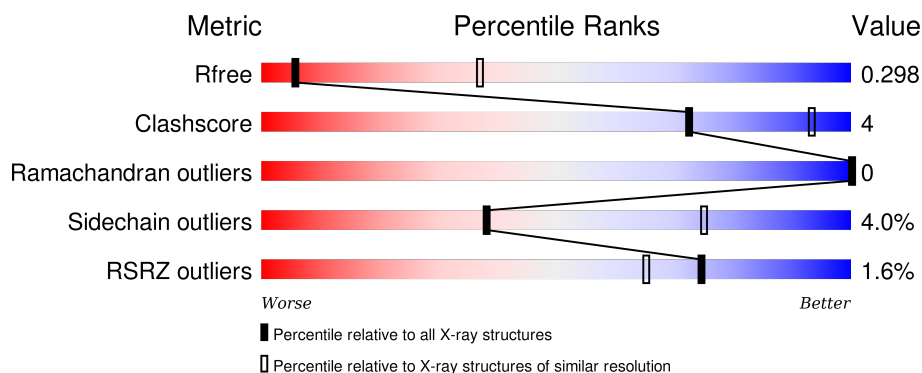|		
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20026688
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

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 3.50 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		0.298
Clashscore		4
Ramachandran outliers		0
Sidechain outliers		4.0%
RSRZ outliers		1.6%

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$_{free}$	91344	1051 (3.60-3.40)
Clashscore	102246	1157 (3.60-3.40)
Ramachandran outliers	100387	1120 (3.60-3.40)
Sidechain outliers	100360	1121 (3.60-3.40)
RSRZ outliers	91569	1058 (3.60-3.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for >=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 <=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	141	87% 12% •
1	C	141	85% 15%
2	B	145	88% 11% •
2	D	145	5% 83% 16% •

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 4579 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 Hemoglobin subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	140	Total 1049	C 673	N 180	O 195	S 1	0	0	0
1	C	141	Total 1065	C 683	N 185	O 196	S 1	0	0	0

- Molecule 2 is a protein called Hemoglobin subunit beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	145	Total 1114	C 720	N 191	O 199	S 4	0	0	0
2	D	145	Total 1122	C 725	N 193	O 200	S 4	0	0	0

- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).

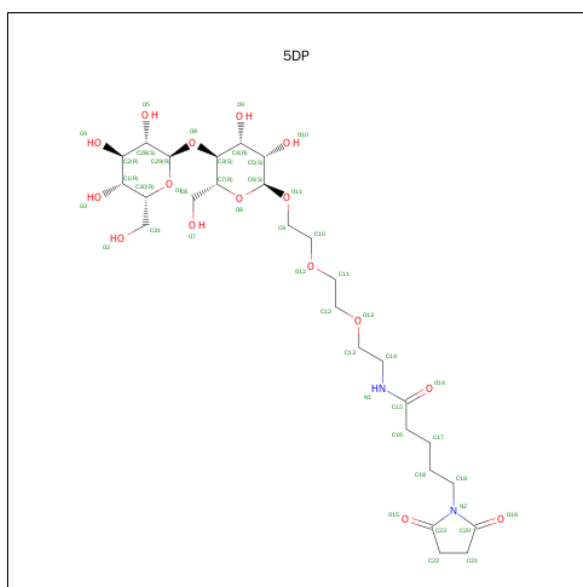| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	C	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	D	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 4 is OXYGEN ATOM (three-letter code: O) (formula: O).

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

- Molecule 5 is 5-(2,5-DIOXOPYRROLIDIN-1-YL)-N-[2-(2-{2-[(4-O-ALPHA-D-IDOPYRAN OSYL-ALPHA-D-MANNOPYRANOSYL)OXY]ETHOXY}ETHOXY)ETHYL]PENTANA MIDE (three-letter code: 5DP) (formula: $C_{27}H_{46}N_2O_{16}$).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	N	O	0	0
			45	27	2	16		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total 1	O 1	0	0
6	B	3	Total 3	O 3	0	0
6	C	2	Total 2	O 2	0	0
6	D	2	Total 2	O 2	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.
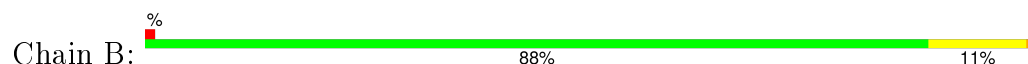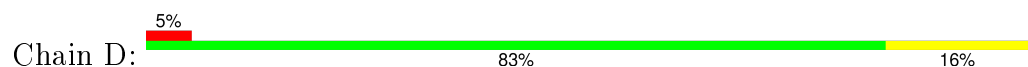
- Molecule 1: Hemoglobin subunit alpha
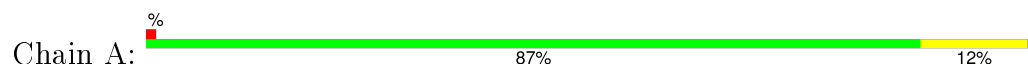
Chain A:

- Molecule 1: Hemoglobin subunit alpha

Chain C:

- Molecule 2: Hemoglobin subunit beta

Chain B:

- Molecule 2: Hemoglobin subunit beta

Chain D:
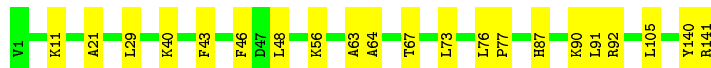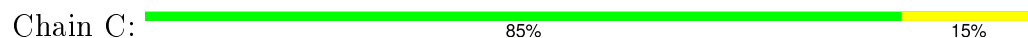
4   Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	62.60Å 73.98Å 129.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.50 – 3.50 24.50 – 3.50	Depositor EDS
% Data completeness (in resolution range)	96.0 (24.50-3.50) 96.4 (24.50-3.50)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.32 (at 3.54Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.268 , 0.332 0.254 , 0.298	Depositor DCC
R_{free} test set	356 reflections (4.84%)	DCC
Wilson B-factor (Å^2)	83.4	Xtriage
Anisotropy	0.825	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.27 , 41.9	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning[2]	$< |L| > = 0.45, < L^2 > = 0.27$	Xtriage
Outliers	1 of 7710 reflections (0.013%)	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	4579	wwPDB-VP
Average B, all atoms (Å^2)	91.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.27% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: HEM, 5DP, 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	0.31	0/1075	0.46	0/1459
1	C	0.31	0/1091	0.46	0/1480
2	B	0.34	0/1139	0.46	0/1540
2	D	0.34	0/1147	0.46	0/1550
All	All	0.32	0/4452	0.46	0/6029

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1049	0	1043	10	0
1	C	1065	0	1067	9	0
2	B	1114	0	1111	8	0
2	D	1122	0	1125	14	0
3	A	43	0	30	1	0
3	B	43	0	30	0	0
3	C	43	0	30	0	0
3	D	43	0	30	0	0
4	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	B	45	0	44	0	0
6	A	1	0	0	1	0
6	B	3	0	0	0	0
6	C	2	0	0	0	0
6	D	2	0	0	0	0
All	All	4579	0	4510	38	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 4.

All (38) 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:62:VAL:HG22	6:A:144:HOH:O	1.49	1.09
1:A:105:LEU:HD12	1:A:129:LEU:HD11	1.82	0.61
1:A:43:PHE:HB3	1:A:46:PHE:HB2	1.85	0.59
2:D:19:LYS:NZ	2:D:21:ASP:HB2	2.20	0.56
2:D:19:LYS:HZ2	2:D:21:ASP:HB2	1.70	0.56
1:A:3:SER:HB3	1:C:140:TYR:HA	1.88	0.55
1:C:43:PHE:HB3	1:C:46:PHE:HB2	1.88	0.55
2:B:2:MET:HG3	2:B:3:LEU:H	1.70	0.55
2:D:19:LYS:HD2	2:D:22:GLU:H	1.73	0.53
1:A:101:LEU:HD23	3:A:142:HEM:HAB	1.92	0.51
2:D:28:LEU:O	2:D:28:LEU:HD22	2.11	0.50
2:B:4:THR:O	2:B:8:LYS:HB2	2.11	0.50
1:C:40:LYS:HG2	1:C:48:LEU:HD13	1.94	0.50
1:C:11:LYS:HE3	1:C:73:LEU:HD12	1.94	0.49
1:A:98:PHE:HE1	1:A:136:LEU:HD12	1.77	0.48
2:B:31:LEU:HD22	2:B:106:LEU:HD13	1.97	0.46
2:D:92:HIS:HA	2:D:96:LEU:HD12	1.97	0.46
1:C:21:ALA:HB1	1:C:63:ALA:HB1	1.98	0.45
2:B:28:LEU:HD11	2:B:63:HIS:HD2	1.82	0.45
1:C:76:LEU:N	1:C:77:PRO:CD	2.80	0.44
2:D:23:VAL:HG22	2:D:117:ASN:HD22	1.82	0.44
2:D:31:LEU:HD22	2:D:106:LEU:HD13	1.99	0.44
2:D:3:LEU:HD12	2:D:7:GLU:HB3	1.99	0.44
2:D:122:PHE:HA	2:D:126:LEU:HD23	1.99	0.44
2:D:21:ASP:OD1	2:D:21:ASP:N	2.50	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:73:ASN:O	2:D:77:HIS:HD2	2.02	0.42
2:B:105:LEU:O	2:B:109:VAL:HG23	2.20	0.42
1:C:87:HIS:HA	1:C:91:LEU:HD12	2.02	0.42
2:D:57:ASN:HA	2:D:58:PRO:HD3	1.86	0.41
1:A:21:ALA:HB1	1:A:63:ALA:HB1	2.01	0.41
1:A:123:ALA:HA	2:B:34:VAL:HG13	2.01	0.41
1:A:11:LYS:HE3	1:A:73:LEU:HD12	2.01	0.41
2:B:30:ARG:O	2:B:34:VAL:HG23	2.20	0.41
2:D:23:VAL:HG22	2:D:117:ASN:ND2	2.35	0.41
1:A:76:LEU:N	1:A:77:PRO:CD	2.84	0.41
1:C:64:ALA:O	1:C:67:THR:HG22	2.20	0.40
2:D:123:THR:HB	2:D:124:PRO:HD2	2.04	0.40
2:B:40:ARG:HB2	1:C:92:ARG:HB2	2.03	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	138/141 (98%)	131 (95%)	7 (5%)	0	100	100
1	C	139/141 (99%)	134 (96%)	5 (4%)	0	100	100
2	B	143/145 (99%)	139 (97%)	4 (3%)	0	100	100
2	D	143/145 (99%)	140 (98%)	3 (2%)	0	100	100
All	All	563/572 (98%)	544 (97%)	19 (3%)	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	109/112 (97%)	108 (99%)	1 (1%)	84	94
1	C	112/112 (100%)	107 (96%)	5 (4%)	34	73
2	B	115/118 (98%)	110 (96%)	5 (4%)	35	74
2	D	117/118 (99%)	110 (94%)	7 (6%)	24	64
All	All	453/460 (98%)	435 (96%)	18 (4%)	38	75

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	131	ASN
2	B	19	LYS
2	B	28	LEU
2	B	71	PHE
2	B	104	LYS
2	B	108	ASN
1	C	29	LEU
1	C	56	LYS
1	C	90	LYS
1	C	105	LEU
1	C	141	ARG
2	D	21	ASP
2	D	28	LEU
2	D	43	GLU
2	D	68	LEU
2	D	71	PHE
2	D	93	CYS
2	D	110	LEU

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

Mol	Chain	Res	Type
1	A	97	ASN

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Mol	Chain	Res	Type
1	A	122	HIS
1	A	131	ASN
2	B	77	HIS
2	B	108	ASN
2	D	77	HIS

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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

Of 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 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	$\#|Z| > 2$
3	HEM	A	142	1	30,50,50	2.16	9 (30%)	24,82,82	2.29	10 (41%)
5	5DP	B	1	2	47,47,47	1.48	8 (17%)	63,63,63	3.49	11 (17%)
3	HEM	B	147	2	30,50,50	2.21	10 (33%)	24,82,82	2.30	10 (41%)
3	HEM	C	142	1	30,50,50	2.19	9 (30%)	24,82,82	2.33	9 (37%)
3	HEM	D	147	2	30,50,50	2.26	10 (33%)	24,82,82	2.27	9 (37%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral

centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	HEM	A	142	1	-	0/10/54/54	0/0/8/8
5	5DP	B	1	2	-	0/28/81/81	0/3/3/3
3	HEM	B	147	2	-	0/10/54/54	0/0/8/8
3	HEM	C	142	1	-	0/10/54/54	0/0/8/8
3	HEM	D	147	2	-	0/10/54/54	0/0/8/8

All (46) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	147	HEM	C3B-C4B	-7.12	1.45	1.51
3	B	147	HEM	C3B-C4B	-7.11	1.45	1.51
3	C	142	HEM	C3B-C4B	-7.09	1.45	1.51
3	A	142	HEM	C3B-C4B	-6.76	1.45	1.51
5	B	1	5DP	C21-C22	-5.16	1.39	1.52
3	D	147	HEM	C3D-C4D	-4.90	1.45	1.51
3	A	142	HEM	C3D-C4D	-4.83	1.45	1.51
3	B	147	HEM	C3D-C4D	-4.76	1.45	1.51
3	C	142	HEM	C3D-C4D	-4.59	1.45	1.51
5	B	1	5DP	C21-C20	-4.07	1.39	1.51
3	B	147	HEM	C2C-C1C	-3.97	1.45	1.52
5	B	1	5DP	C22-C23	-3.96	1.39	1.51
3	A	142	HEM	C2C-C1C	-3.77	1.45	1.52
3	D	147	HEM	C2C-C1C	-3.72	1.45	1.52
3	C	142	HEM	C2C-C1C	-3.68	1.45	1.52
5	B	1	5DP	C20-N2	-2.70	1.34	1.38
5	B	1	5DP	C23-N2	-2.58	1.34	1.38
3	B	147	HEM	C2D-C1D	-2.04	1.45	1.51
5	B	1	5DP	O11-C6	2.02	1.43	1.40
3	B	147	HEM	C4C-NC	2.03	1.38	1.36
3	A	142	HEM	C3C-CAC	2.05	1.55	1.51
3	A	142	HEM	FE-ND	2.05	2.08	1.97
3	D	147	HEM	C3C-CAC	2.07	1.55	1.51
3	B	147	HEM	C1C-NC	2.10	1.38	1.36
3	D	147	HEM	C4C-NC	2.10	1.38	1.36
3	C	142	HEM	C3B-CAB	2.13	1.55	1.51
3	D	147	HEM	C1C-NC	2.13	1.38	1.36
3	A	142	HEM	C1C-NC	2.16	1.38	1.36
3	D	147	HEM	C3B-CAB	2.18	1.55	1.51
3	B	147	HEM	C3B-CAB	2.19	1.55	1.51
3	B	147	HEM	C3C-CAC	2.23	1.55	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	142	HEM	C3B-CAB	2.26	1.55	1.51
3	C	142	HEM	FE-ND	2.27	2.09	1.97
3	C	142	HEM	C4C-NC	2.27	1.38	1.36
3	C	142	HEM	C1C-NC	2.32	1.38	1.36
3	D	147	HEM	FE-ND	2.44	2.10	1.97
3	A	142	HEM	FE-NB	2.45	2.10	1.97
3	D	147	HEM	FE-NB	2.47	2.10	1.97
3	C	142	HEM	FE-NB	2.51	2.10	1.97
3	B	147	HEM	FE-NC	2.56	2.05	1.95
5	B	1	5DP	O16-C20	2.57	1.28	1.23
5	B	1	5DP	O15-C23	2.73	1.29	1.23
3	A	142	HEM	FE-NC	2.77	2.06	1.95
3	B	147	HEM	FE-NB	2.89	2.12	1.97
3	C	142	HEM	FE-NC	3.02	2.07	1.95
3	D	147	HEM	FE-NC	3.57	2.09	1.95

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	B	1	5DP	C20-N2-C23	-23.94	101.13	112.97
3	C	142	HEM	C3C-CAC-CBC	-3.34	119.33	124.46
3	D	147	HEM	C3C-CAC-CBC	-2.80	120.17	124.46
3	A	142	HEM	C3C-CAC-CBC	-2.77	120.21	124.46
3	B	147	HEM	CBA-CAA-C2A	-2.60	107.86	112.53
3	C	142	HEM	CAA-CBA-CGA	-2.44	108.27	112.75
3	A	142	HEM	CBA-CAA-C2A	-2.18	108.62	112.53
3	B	147	HEM	C3C-CAC-CBC	-2.16	121.14	124.46
3	B	147	HEM	C3B-CAB-CBB	-2.07	121.28	124.46
3	D	147	HEM	CBA-CAA-C2A	-2.03	108.88	112.53
5	B	1	5DP	O16-C20-C21	-2.02	121.91	127.09
3	C	142	HEM	C2D-C3D-C4D	2.07	105.01	101.50
3	A	142	HEM	C2D-C3D-C4D	2.09	105.05	101.50
3	B	147	HEM	C2D-C3D-C4D	2.12	105.10	101.50
3	A	142	HEM	C2C-C1C-CHC	2.14	126.93	123.68
3	D	147	HEM	C2D-C3D-C4D	2.21	105.25	101.50
3	B	147	HEM	C3B-C4B-CHC	2.22	126.28	123.16
5	B	1	5DP	C29-C28-C2	2.26	114.42	109.97
5	B	1	5DP	O1-C30-C1	2.28	113.95	109.68
3	C	142	HEM	C3B-C4B-CHC	2.32	126.43	123.16
3	D	147	HEM	C3B-C4B-CHC	2.37	126.50	123.16
5	B	1	5DP	C14-N1-C15	2.47	127.65	122.79
3	A	142	HEM	C3B-C4B-CHC	2.69	126.95	123.16

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	147	HEM	CMD-C2D-C3D	2.77	126.61	114.35
3	C	142	HEM	CMD-C2D-C3D	2.83	126.86	114.35
3	A	142	HEM	CMD-C2D-C3D	2.88	127.09	114.35
3	B	147	HEM	CMD-C2D-C3D	2.96	127.44	114.35
5	B	1	5DP	C19-N2-C20	2.96	129.02	122.76
5	B	1	5DP	C19-N2-C23	3.36	129.85	122.76
5	B	1	5DP	C28-C2-C1	3.58	117.47	110.79
3	A	142	HEM	CMC-C2C-C3C	3.76	125.91	116.53
3	C	142	HEM	CMC-C2C-C3C	3.79	125.98	116.53
3	D	147	HEM	CMC-C2C-C3C	3.92	126.31	116.53
3	B	147	HEM	CMB-C2B-C3B	3.98	126.48	116.53
3	A	142	HEM	CMB-C2B-C3B	4.02	126.56	116.53
3	B	147	HEM	CMC-C2C-C3C	4.09	126.73	116.53
3	C	142	HEM	CMB-C2B-C3B	4.17	126.94	116.53
5	B	1	5DP	C2-C1-C30	4.18	117.48	110.20
3	B	147	HEM	CAD-C3D-C4D	4.21	127.32	112.47
3	D	147	HEM	CAD-C3D-C4D	4.26	127.50	112.47
3	A	142	HEM	CAD-C3D-C4D	4.27	127.54	112.47
3	D	147	HEM	CMB-C2B-C3B	4.29	127.23	116.53
3	C	142	HEM	CAD-C3D-C4D	4.44	128.12	112.47
3	C	142	HEM	CAD-C3D-C2D	4.75	126.86	113.22
3	D	147	HEM	CAD-C3D-C2D	4.88	127.24	113.22
3	A	142	HEM	CAD-C3D-C2D	4.93	127.40	113.22
3	B	147	HEM	CAD-C3D-C2D	5.00	127.58	113.22
5	B	1	5DP	C22-C23-N2	6.76	115.19	107.93
5	B	1	5DP	C21-C20-N2	7.02	115.46	107.93

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	142	HEM	1	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 (i)

6.1 Protein, DNA and RNA chains (i)

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(Å²)	Q<0.9
1	A	140/141 (99%)	-0.30	1 (0%)	89	82	72, 83, 92, 93	0
1	C	141/141 (100%)	-0.32	0	100	100	78, 90, 98, 101	0
2	B	145/145 (100%)	-0.12	1 (0%)	89	82	78, 97, 106, 111	0
2	D	145/145 (100%)	0.06	7 (4%)	34	27	76, 97, 121, 126	0
All	All	571/572 (99%)	-0.17	9 (1%)	74	65	72, 91, 109, 126	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	146	HIS	6.8
2	B	146	HIS	5.8
2	D	145	TYR	3.6
2	D	89	SER	3.3
2	D	2	MET	3.0
2	D	143	HIS	2.7
2	D	142	ALA	2.5
2	D	144	ARG	2.1
1	A	49	SER	2.1

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, 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	LLDF	B-factors(Å^2)	Q<0.9
3	HEM	A	142	43/43	0.93	0.24	0.45	85,86,86,87	0
3	HEM	C	142	43/43	0.94	0.23	0.28	76,77,79,80	0
3	HEM	D	147	43/43	0.91	0.25	0.10	110,111,113,114	0
3	HEM	B	147	43/43	0.94	0.19	-1.23	79,80,84,85	0
5	5DP	B	1	45/45	0.48	0.58	-	108,118,119,119	0
4	O	D	148	1/1	0.97	0.70	-	96,96,96,96	0
4	O	C	143	1/1	0.97	0.43	-	101,101,101,101	0
4	O	A	143	1/1	0.98	0.41	-	94,94,94,94	0
4	O	B	148	1/1	0.99	0.18	-	70,70,70,70	0

6.5 Other polymers (i)

There are no such residues in this entry.