



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2018 – 12:44 am GMT

PDB ID : 1LFZ
Title : OXY HEMOGLOBIN (25% METHANOL)
Authors : Biswal, B.K.; Vijayan, M.
Deposited on : 2002-04-12
Resolution : 3.10 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.7.3 (157068), CSD as539be (2018)
Xtrriage (Phenix) : 1.13
EDS : trunk30967
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac : 5.8.0158
CCP4 : 7.0 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk30967

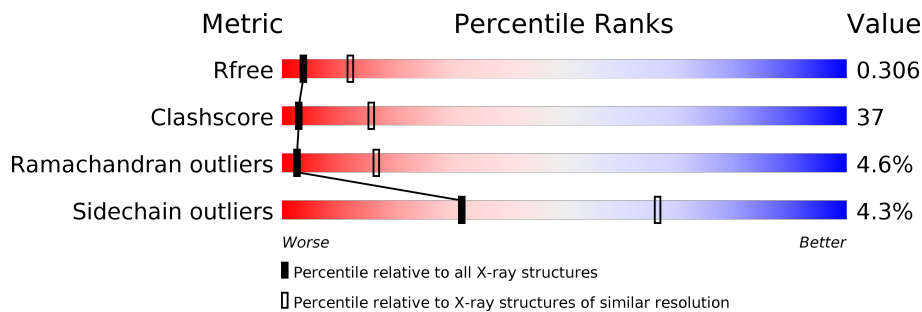
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

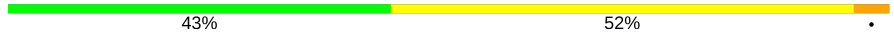

The reported resolution of this entry is 3.10 Å.

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}	111664	1115 (3.12-3.08)
Clashscore	122126	1042 (3.10-3.10)
Ramachandran outliers	120053	1010 (3.10-3.10)
Sidechain outliers	120020	1010 (3.10-3.10)

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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	141	
2	B	146	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 2307 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.

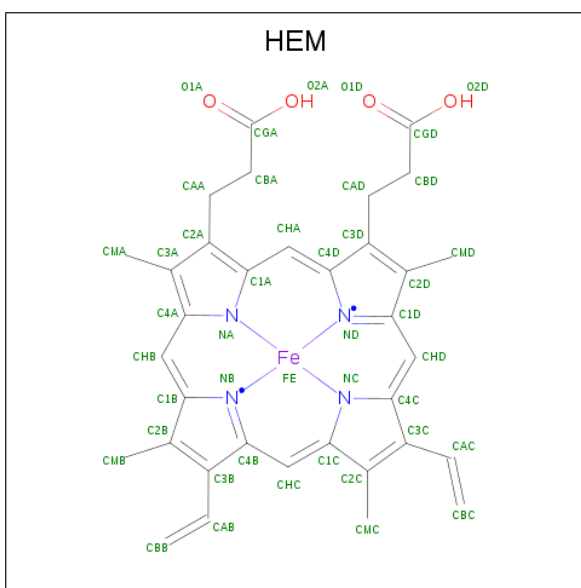
- Molecule 1 is a protein called Hemoglobin alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	141	1069	685	187	194	3	0	0	0

- Molecule 2 is a protein called Hemoglobin beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	146	1123	724	195	201	3	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
			Total	C	Fe	N	O		
3	A	1	43	34	1	4	4	0	0
3	B	1	43	34	1	4	4	0	0

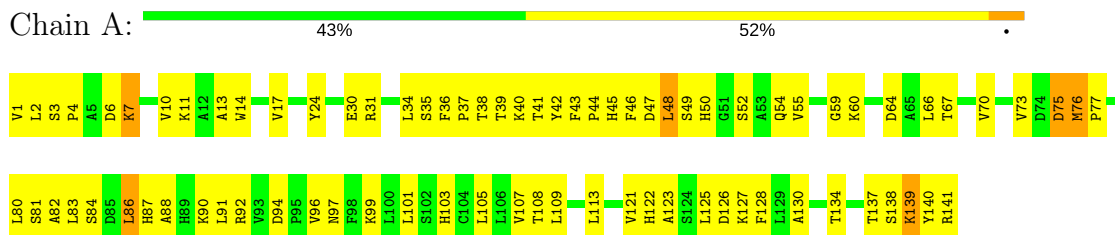
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	11	Total 11	O 11	0	0
4	B	18	Total 18	O 18	0	0

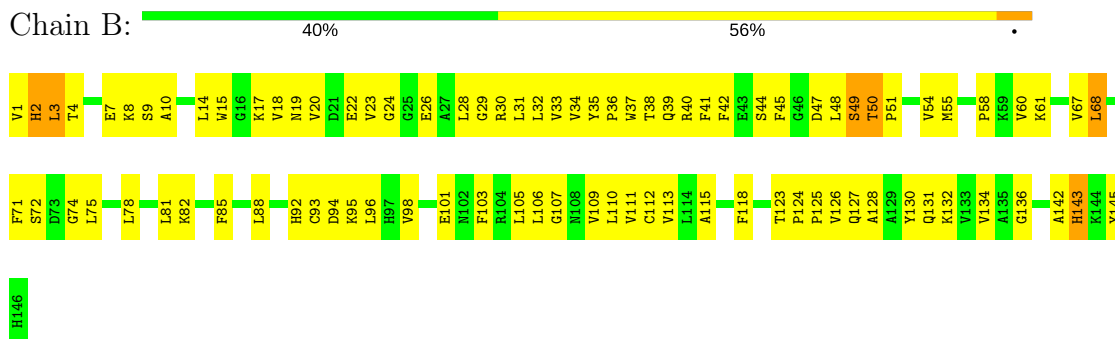
3 Residue-property plots [i](#)

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. 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. 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 alpha chain



- Molecule 2: Hemoglobin beta chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	52.80Å 52.80Å 192.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.10 19.03 – 3.17	Depositor EDS
% Data completeness (in resolution range)	83.8 (20.00-3.10) 94.2 (19.03-3.17)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.23 (at 3.15Å)	Xtrriage
Refinement program	CNS 0.4	Depositor
R, R_{free}	0.200 , 0.268 0.247 , 0.306	Depositor DCC
R_{free} test set	497 reflections (10.36%)	wwPDB-VP
Wilson B-factor (Å ²)	53.5	Xtrriage
Anisotropy	0.009	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 41.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	2307	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.29% 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

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	0.40	0/1097	0.62	0/1491
2	B	0.40	0/1153	0.62	0/1566
All	All	0.40	0/2250	0.62	0/3057

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

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	1069	0	1073	77	0
2	B	1123	0	1118	95	0
3	A	43	0	30	2	0
3	B	43	0	30	4	0
4	A	11	0	0	0	0
4	B	18	0	0	0	0
All	All	2307	0	2251	166	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 37.

All (166) 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)
2:B:82:LYS:H	2:B:82:LYS:HD2	1.17	1.07
2:B:1:VAL:HG11	2:B:78:LEU:HB3	1.38	1.05
1:A:1:VAL:HG13	1:A:2:LEU:H	1.23	0.98
2:B:107:GLY:HA3	2:B:134:VAL:HG13	1.47	0.96
2:B:123:THR:HG22	2:B:125:PRO:HD2	1.47	0.92
1:A:76:MET:N	1:A:77:PRO:HD2	1.86	0.88
1:A:52:SER:HB3	1:A:55:VAL:HG23	1.55	0.85
2:B:3:LEU:HB2	2:B:8:LYS:HZ3	1.42	0.84
2:B:3:LEU:HB2	2:B:8:LYS:NZ	1.93	0.83
2:B:28:LEU:HD12	2:B:60:VAL:HG13	1.61	0.83
2:B:78:LEU:HA	2:B:81:LEU:HD13	1.61	0.81
2:B:82:LYS:H	2:B:82:LYS:CD	1.95	0.80
1:A:4:PRO:HA	1:A:7:LYS:HD3	1.62	0.80
1:A:1:VAL:HG13	1:A:2:LEU:N	2.00	0.76
2:B:82:LYS:N	2:B:82:LYS:HD2	1.99	0.75
2:B:40:ARG:HH11	2:B:40:ARG:HG2	1.49	0.75
1:A:92:ARG:HH11	1:A:92:ARG:HG3	1.52	0.75
1:A:76:MET:H	1:A:77:PRO:HD2	1.50	0.74
2:B:124:PRO:HB2	2:B:125:PRO:HD3	1.70	0.74
1:A:137:THR:O	1:A:140:TYR:HB2	1.89	0.73
1:A:4:PRO:HA	1:A:7:LYS:CD	2.17	0.72
2:B:123:THR:HG22	2:B:124:PRO:HD2	1.72	0.71
1:A:66:LEU:HD11	1:A:105:LEU:HD21	1.73	0.70
2:B:10:ALA:HB1	2:B:126:VAL:HG22	1.75	0.69
2:B:3:LEU:HB2	2:B:8:LYS:CE	2.23	0.69
1:A:107:VAL:HG13	2:B:115:ALA:HB2	1.75	0.69
2:B:123:THR:CG2	2:B:125:PRO:HD2	2.23	0.68
1:A:3:SER:HB2	1:A:4:PRO:HD2	1.77	0.66
1:A:52:SER:C	1:A:54:GLN:H	1.98	0.65
2:B:3:LEU:HA	2:B:7:GLU:OE2	1.97	0.65
1:A:139:LYS:HA	1:A:139:LYS:HE2	1.78	0.64
2:B:30:ARG:O	2:B:34:VAL:HG23	1.98	0.64
2:B:29:GLY:HA3	2:B:55:MET:HE1	1.80	0.64
1:A:97:ASN:HB3	3:A:142:HEM:HBC2	1.79	0.63
1:A:86:LEU:HD22	1:A:91:LEU:HD12	1.79	0.63
2:B:107:GLY:HA3	2:B:134:VAL:CG1	2.25	0.63
1:A:14:TRP:HE1	1:A:67:THR:HG1	1.46	0.62
1:A:76:MET:N	1:A:77:PRO:CD	2.58	0.62
2:B:81:LEU:HD23	2:B:136:GLY:O	2.00	0.61
2:B:50:THR:O	2:B:54:VAL:HG23	2.00	0.61
3:B:147:HEM:HBB2	3:B:147:HEM:HMB2	1.81	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:LEU:O	1:A:83:LEU:N	2.34	0.60
2:B:31:LEU:HD12	2:B:35:TYR:HD2	1.65	0.60
2:B:32:LEU:O	2:B:39:GLN:NE2	2.35	0.60
1:A:81:SER:HA	1:A:84:SER:HB2	1.84	0.59
2:B:23:VAL:HG13	2:B:113:VAL:HG11	1.85	0.59
1:A:7:LYS:O	1:A:11:LYS:HG3	2.03	0.59
2:B:24:GLY:H	2:B:68:LEU:HD12	1.69	0.58
1:A:92:ARG:NH1	1:A:92:ARG:HG3	2.19	0.58
2:B:40:ARG:HG2	2:B:40:ARG:NH1	2.18	0.58
2:B:107:GLY:O	2:B:111:VAL:HG23	2.05	0.57
1:A:121:VAL:HG12	1:A:125:LEU:HD22	1.84	0.57
2:B:88:LEU:HD11	3:B:147:HEM:HMA1	1.87	0.57
2:B:14:LEU:HD13	2:B:14:LEU:O	2.05	0.57
2:B:67:VAL:HG11	2:B:106:LEU:HD21	1.87	0.56
1:A:141:ARG:HH11	1:A:141:ARG:HG2	1.70	0.56
2:B:98:VAL:O	2:B:145:TYR:OH	2.17	0.56
2:B:123:THR:HG22	2:B:125:PRO:CD	2.29	0.55
1:A:6:ASP:OD1	1:A:127:LYS:HD2	2.05	0.55
1:A:80:LEU:C	1:A:82:ALA:N	2.59	0.55
2:B:92:HIS:HB3	2:B:103:PHE:HZ	1.72	0.55
1:A:47:ASP:C	1:A:49:SER:H	2.09	0.55
2:B:3:LEU:O	2:B:8:LYS:HE2	2.07	0.55
1:A:127:LYS:O	1:A:130:ALA:HB3	2.06	0.54
1:A:52:SER:C	1:A:54:GLN:N	2.60	0.54
2:B:24:GLY:N	2:B:68:LEU:HD12	2.22	0.54
1:A:13:ALA:O	1:A:17:VAL:HG23	2.08	0.54
2:B:1:VAL:HG23	2:B:2:HIS:N	2.23	0.54
2:B:1:VAL:CG1	2:B:78:LEU:HB3	2.25	0.54
2:B:1:VAL:HG11	2:B:78:LEU:CB	2.25	0.54
2:B:28:LEU:C	2:B:28:LEU:HD13	2.27	0.54
2:B:74:GLY:O	2:B:81:LEU:HD11	2.09	0.53
2:B:123:THR:CG2	2:B:124:PRO:HD2	2.38	0.53
1:A:6:ASP:O	1:A:10:VAL:HG23	2.08	0.53
2:B:124:PRO:CB	2:B:125:PRO:HD3	2.38	0.53
2:B:44:SER:O	2:B:45:PHE:HD2	1.91	0.53
1:A:1:VAL:CG1	1:A:2:LEU:H	2.06	0.52
1:A:47:ASP:O	1:A:49:SER:N	2.42	0.52
2:B:85:PHE:HD2	2:B:88:LEU:HD12	1.74	0.52
1:A:47:ASP:OD1	1:A:49:SER:HB3	2.09	0.51
1:A:73:VAL:C	1:A:75:ASP:H	2.12	0.51
2:B:71:PHE:O	2:B:72:SER:C	2.48	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:107:VAL:HG13	2:B:115:ALA:CB	2.39	0.51
1:A:31:ARG:HB3	2:B:127:GLN:OE1	2.10	0.51
2:B:29:GLY:HA3	2:B:55:MET:CE	2.41	0.51
2:B:111:VAL:CG2	2:B:134:VAL:HG21	2.41	0.51
2:B:14:LEU:HD11	2:B:118:PHE:CD1	2.45	0.51
1:A:17:VAL:HG22	1:A:113:LEU:HD11	1.92	0.50
1:A:35:SER:OG	2:B:127:GLN:HG2	2.12	0.50
1:A:1:VAL:O	1:A:2:LEU:HB2	2.11	0.49
1:A:31:ARG:HD2	1:A:108:THR:OG1	2.12	0.49
1:A:107:VAL:HG11	2:B:127:GLN:NE2	2.27	0.49
2:B:35:TYR:CD2	2:B:105:LEU:HD12	2.48	0.49
1:A:43:PHE:HB3	1:A:46:PHE:HB2	1.94	0.49
2:B:3:LEU:CD2	2:B:132:LYS:HD3	2.44	0.48
2:B:67:VAL:CG1	2:B:106:LEU:HD21	2.43	0.48
2:B:9:SER:OG	2:B:10:ALA:N	2.46	0.48
2:B:14:LEU:HD21	2:B:118:PHE:CG	2.48	0.48
2:B:123:THR:HG22	2:B:124:PRO:CD	2.43	0.48
1:A:87:HIS:HE1	3:A:142:HEM:NA	2.12	0.48
2:B:58:PRO:HA	2:B:61:LYS:HG2	1.96	0.48
1:A:109:LEU:HD23	1:A:125:LEU:HD21	1.95	0.48
1:A:121:VAL:CG1	1:A:125:LEU:HD22	2.43	0.48
2:B:131:GLN:NE2	2:B:131:GLN:HA	2.29	0.47
2:B:107:GLY:CA	2:B:134:VAL:HG13	2.32	0.47
2:B:41:PHE:CD1	3:B:147:HEM:HBC1	2.50	0.47
1:A:66:LEU:O	1:A:70:VAL:HG23	2.15	0.46
2:B:109:VAL:O	2:B:112:CYS:HB2	2.16	0.46
2:B:19:ASN:O	2:B:22:GLU:N	2.47	0.46
2:B:105:LEU:O	2:B:109:VAL:HG22	2.15	0.46
2:B:85:PHE:CD2	2:B:88:LEU:HD12	2.51	0.46
2:B:15:TRP:HB2	2:B:130:TYR:OH	2.16	0.46
2:B:28:LEU:O	2:B:28:LEU:HD13	2.15	0.46
1:A:86:LEU:HD22	1:A:91:LEU:CD1	2.45	0.45
2:B:101:GLU:O	2:B:105:LEU:HD23	2.16	0.45
1:A:52:SER:OG	1:A:54:GLN:HB2	2.17	0.45
2:B:124:PRO:N	2:B:125:PRO:CD	2.80	0.45
1:A:123:ALA:HA	2:B:34:VAL:HG13	1.99	0.45
1:A:7:LYS:HB2	1:A:7:LYS:NZ	2.32	0.45
2:B:35:TYR:CE2	2:B:105:LEU:HD12	2.51	0.45
2:B:88:LEU:CD1	3:B:147:HEM:HMA1	2.47	0.45
1:A:40:LYS:C	1:A:42:TYR:H	2.20	0.44
2:B:60:VAL:HG12	2:B:61:LYS:N	2.33	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:125:LEU:O	1:A:128:PHE:HB3	2.18	0.44
2:B:92:HIS:HA	2:B:96:LEU:HB2	2.00	0.44
2:B:42:PHE:O	2:B:48:LEU:HD11	2.18	0.44
1:A:44:PRO:HG2	1:A:45:HIS:H	1.84	0.43
1:A:4:PRO:HA	1:A:7:LYS:CG	2.49	0.43
1:A:80:LEU:O	1:A:82:ALA:N	2.51	0.43
1:A:86:LEU:HD23	1:A:90:LYS:HB3	2.00	0.43
2:B:28:LEU:O	2:B:32:LEU:HG	2.18	0.43
2:B:47:ASP:OD2	2:B:49:SER:OG	2.36	0.43
2:B:33:VAL:HG22	2:B:54:VAL:HG21	1.99	0.43
2:B:4:THR:O	2:B:7:GLU:HB2	2.18	0.43
2:B:128:ALA:O	2:B:132:LYS:HG3	2.18	0.43
2:B:36:PRO:O	2:B:38:THR:N	2.52	0.43
2:B:3:LEU:O	2:B:4:THR:C	2.57	0.43
1:A:49:SER:OG	1:A:50:HIS:N	2.51	0.43
2:B:74:GLY:O	2:B:78:LEU:HD23	2.19	0.43
1:A:59:GLY:O	1:A:60:LYS:C	2.57	0.43
2:B:58:PRO:HA	2:B:61:LYS:HE2	2.01	0.43
1:A:17:VAL:HG13	1:A:24:TYR:CE1	2.54	0.43
1:A:38:THR:HG23	1:A:39:THR:N	2.34	0.43
2:B:124:PRO:O	2:B:127:GLN:HB3	2.18	0.43
1:A:138:SER:C	1:A:140:TYR:H	2.22	0.42
1:A:47:ASP:O	1:A:52:SER:HB2	2.18	0.42
2:B:142:ALA:O	2:B:143:HIS:C	2.58	0.42
2:B:51:PRO:HA	2:B:54:VAL:HG23	2.01	0.42
1:A:134:THR:O	1:A:138:SER:N	2.53	0.42
2:B:75:LEU:HA	2:B:75:LEU:HD12	1.89	0.42
1:A:40:LYS:HD2	1:A:48:LEU:HD23	2.01	0.42
1:A:36:PHE:HA	1:A:37:PRO:HD2	1.79	0.41
1:A:80:LEU:C	1:A:82:ALA:H	2.22	0.41
1:A:103:HIS:HE1	2:B:131:GLN:OE1	2.04	0.41
1:A:101:LEU:O	1:A:103:HIS:N	2.53	0.41
1:A:134:THR:HA	1:A:141:ARG:HH21	1.86	0.41
1:A:50:HIS:ND1	1:A:50:HIS:O	2.53	0.41
2:B:111:VAL:HG23	2:B:134:VAL:HG21	2.02	0.41
1:A:101:LEU:C	1:A:103:HIS:N	2.74	0.41
1:A:96:VAL:O	1:A:99:LYS:HB2	2.21	0.41
1:A:121:VAL:O	1:A:122:HIS:C	2.59	0.41
1:A:30:GLU:O	1:A:34:LEU:HD13	2.21	0.41
2:B:29:GLY:C	2:B:55:MET:HE3	2.42	0.40
1:A:94:ASP:OD1	1:A:96:VAL:HG12	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:36:PHE:O	1:A:39:THR:OG1	2.34	0.40
2:B:93:CYS:O	2:B:95:LYS:N	2.55	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	139/141 (99%)	108 (78%)	27 (19%)	4 (3%)	5 27
2	B	144/146 (99%)	108 (75%)	27 (19%)	9 (6%)	1 9
All	All	283/287 (99%)	216 (76%)	54 (19%)	13 (5%)	2 17

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	3	LEU
2	B	17	LYS
2	B	49	SER
1	A	48	LEU
1	A	75	ASP
2	B	2	HIS
2	B	20	VAL
2	B	94	ASP
2	B	143	HIS
1	A	88	ALA
2	B	18	VAL
1	A	41	THR
2	B	37	TRP

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	113/113 (100%)	107 (95%)	6 (5%)	25	59
2	B	118/118 (100%)	114 (97%)	4 (3%)	40	73
All	All	231/231 (100%)	221 (96%)	10 (4%)	32	66

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

Mol	Chain	Res	Type
1	A	7	LYS
1	A	64	ASP
1	A	76	MET
1	A	86	LEU
1	A	126	ASP
1	A	139	LYS
2	B	26	GLU
2	B	50	THR
2	B	68	LEU
2	B	110	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	9	ASN
1	A	58	HIS
1	A	97	ASN
1	A	103	HIS
2	B	102	ASN
2	B	108	ASN
2	B	131	GLN

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

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
3	HEM	A	142	1	27,50,50	1.79	8 (29%)	17,82,82	1.82	5 (29%)
3	HEM	B	147	2	27,50,50	1.61	4 (14%)	17,82,82	1.68	4 (23%)

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	-	0/6/54/54	0/0/8/8
3	HEM	B	147	2	-	0/6/54/54	0/0/8/8

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	147	HEM	C3C-CAC	-4.56	1.38	1.47
3	A	142	HEM	C3C-CAC	-4.39	1.38	1.47
3	A	142	HEM	C3B-CAB	-3.12	1.41	1.47
3	B	147	HEM	C3B-CAB	-2.93	1.42	1.47
3	A	142	HEM	C3D-C2D	-2.86	1.29	1.37
3	B	147	HEM	C3C-C2C	-2.67	1.36	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	147	HEM	C3B-C2B	-2.30	1.37	1.40
3	A	142	HEM	CAD-C3D	-2.28	1.48	1.52
3	A	142	HEM	C1C-C2C	2.09	1.47	1.42
3	A	142	HEM	C4A-NA	2.11	1.40	1.36
3	A	142	HEM	C4B-NB	2.42	1.41	1.36
3	A	142	HEM	C1A-NA	2.90	1.42	1.36

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	147	HEM	CAD-C3D-C2D	-4.07	117.39	129.00
3	A	142	HEM	C4C-C3C-C2C	-3.75	104.28	106.90
3	A	142	HEM	CBA-CAA-C2A	-2.74	107.25	112.48
3	A	142	HEM	CAD-C3D-C2D	-2.28	122.50	129.00
3	B	147	HEM	CBA-CAA-C2A	-2.20	108.28	112.48
3	B	147	HEM	C3B-C4B-NB	2.19	112.05	109.21
3	A	142	HEM	CMC-C2C-C3C	2.39	129.23	124.88
3	A	142	HEM	C4A-C3A-C2A	3.76	109.61	107.00
3	B	147	HEM	CBD-CAD-C3D	3.84	119.79	112.47

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	142	HEM	2	0
3	B	147	HEM	4	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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.