



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 13, 2018 – 04:40 pm GMT

PDB ID : 5X2S  
Title : Direct Observation of Conformational Population Shifts in Hemoglobin: Crystal Structure of Half-Liganded Hemoglobin after Adding 4 mM bezafibrate pH 6.5.  
Authors : Ohki, M.; Park, S.-Y.  
Deposited on : 2017-02-02  
Resolution : 2.39 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

<https://www.wwpdb.org/validation/2017/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 : 1.7.3 (157068), CSD as539be (2018)  
Xtriage (Phenix) : 1.13  
EDS : trunk31020  
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) : trunk31020

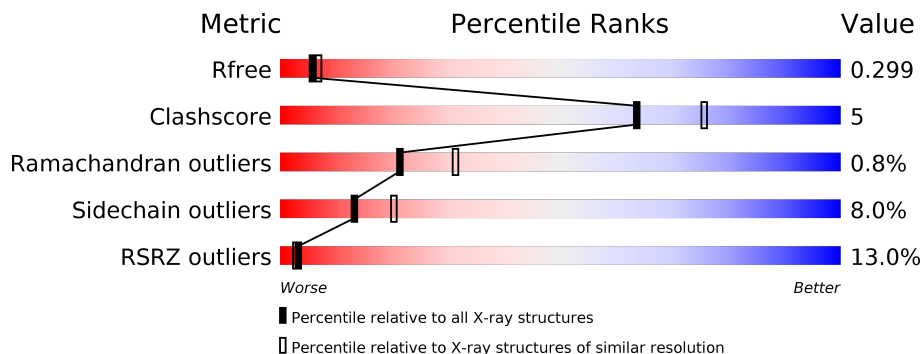
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.39 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	3481 (2.40-2.40)
Clashscore	122126	3956 (2.40-2.40)
Ramachandran outliers	120053	3897 (2.40-2.40)
Sidechain outliers	120020	3898 (2.40-2.40)
RSRZ outliers	108989	3386 (2.40-2.40)

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  $\geq 3$ , 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	141	20% (Poor fit) 85% (0-1 outliers) 13% (2-3 outliers) ... (Not modelled)
1	C	141	33% (Poor fit) 87% (0-1 outliers) 11% (2-3 outliers) .. (Not modelled)
1	E	141	15% (Poor fit) 85% (0-1 outliers) 11% (2-3 outliers) ... (Not modelled)
1	G	141	12% (Poor fit) 87% (0-1 outliers) 12% (2-3 outliers) .. (Not modelled)
1	I	141	10% (Poor fit) 77% (0-1 outliers) 18% (2-3 outliers) .. (Not modelled)
1	K	141	2% (Poor fit) 82% (0-1 outliers) 17% (2-3 outliers) . (Not modelled)

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Mol	Chain	Length	Quality of chain
2	B	146	
2	D	146	
2	F	146	
2	H	146	
2	J	146	
2	L	146	

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
5	PEM	I	202	-	-	-	X

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 13609 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.

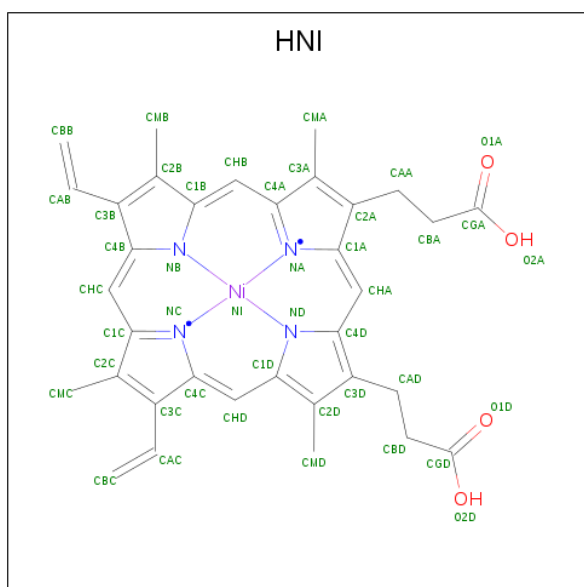
- Molecule 1 is a protein called Hemoglobin subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	140	1062	680	186	193	3	0	0	0
1	C	140	1062	680	186	193	3	0	0	0
1	E	140	1062	680	186	193	3	0	0	0
1	G	140	1062	680	186	193	3	0	0	0
1	I	140	1062	680	186	193	3	0	0	0
1	K	140	1062	680	186	193	3	0	0	0

- Molecule 2 is a protein called Hemoglobin subunit beta.

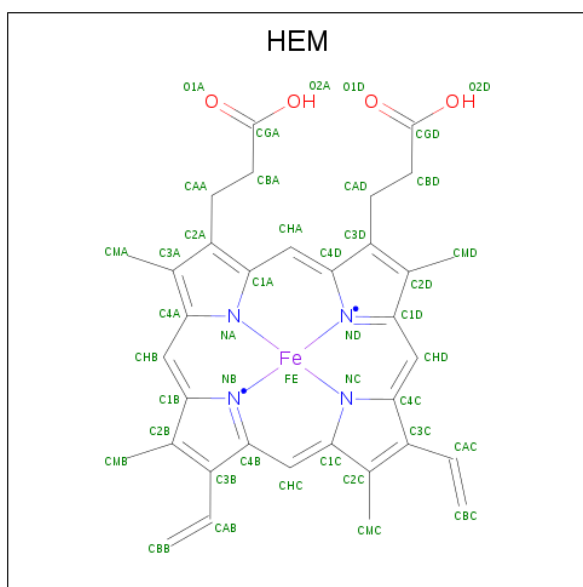
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	145	1110	715	192	200	3	0	0	0
2	D	145	1110	715	192	200	3	0	0	0
2	F	145	1110	715	192	200	3	0	0	0
2	H	145	1110	715	192	200	3	0	0	0
2	J	145	1110	715	192	200	3	0	0	0
2	L	145	1110	715	192	200	3	0	0	0

- Molecule 3 is PROTOPORPHYRIN IX CONTAINING NI(II) (three-letter code: HNI) (formula: C<sub>34</sub>H<sub>32</sub>N<sub>4</sub>NiO<sub>4</sub>).



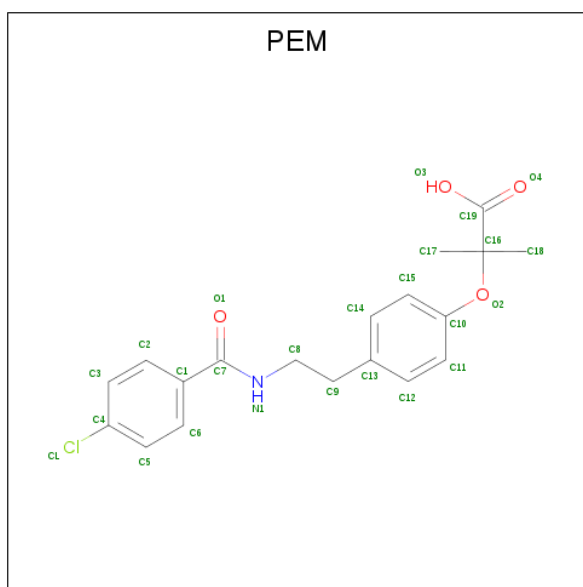
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	Ni			O
3	A	1	43	34	4	1	4	0	0
3	D	1	43	34	4	1	4	0	0
3	E	1	43	34	4	1	4	0	0
3	H	1	43	34	4	1	4	0	0
3	I	1	43	34	4	1	4	0	0
3	L	1	43	34	4	1	4	0	0

- Molecule 4 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
4	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	C	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	F	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	G	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	J	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	K	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 5 is 2-[P-[2-P-CHLOROBENZAMIDO)ETHYL]PHENOXY]-2-METHYLPROPIONIC ACID (three-letter code: PEM) (formula: C<sub>19</sub>H<sub>20</sub>ClNO<sub>4</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Cl	N			O
5	I	1	25	19	1	1	4	0	0

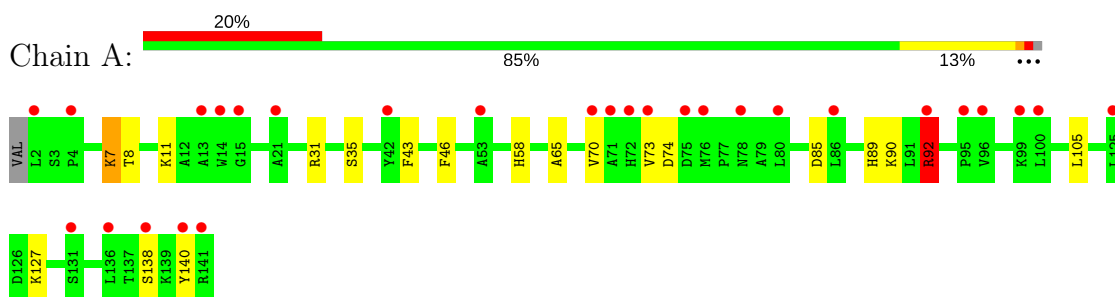
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	2	Total	O	0	0
			2	2		
6	B	2	Total	O	0	0
			2	2		
6	D	3	Total	O	0	0
			3	3		
6	E	3	Total	O	0	0
			3	3		
6	F	2	Total	O	0	0
			2	2		
6	G	3	Total	O	0	0
			3	3		
6	H	3	Total	O	0	0
			3	3		
6	I	4	Total	O	0	0
			4	4		
6	J	5	Total	O	0	0
			5	5		
6	K	5	Total	O	0	0
			5	5		
6	L	4	Total	O	0	0
			4	4		

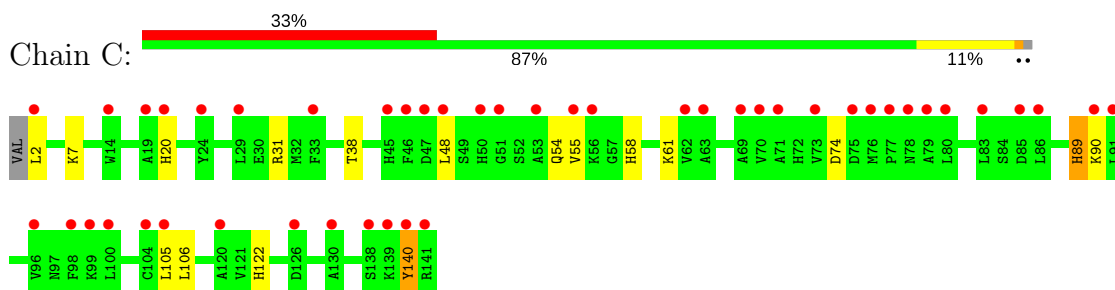
### 3 Residue-property plots [i](#)

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 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.

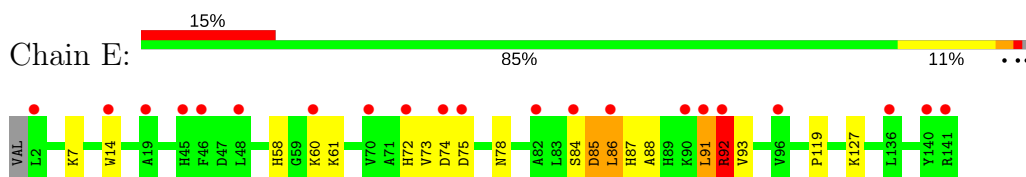
- Molecule 1: Hemoglobin subunit alpha



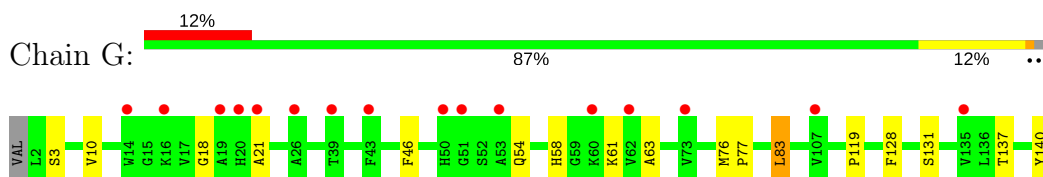
- Molecule 1: Hemoglobin subunit alpha



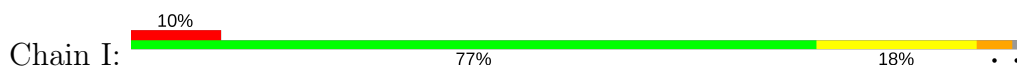
- Molecule 1: Hemoglobin subunit alpha



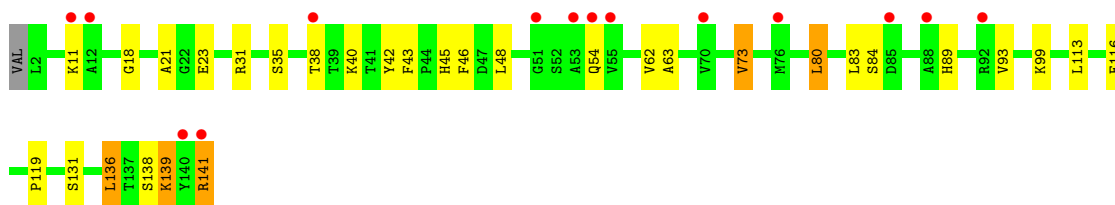
- Molecule 1: Hemoglobin subunit alpha



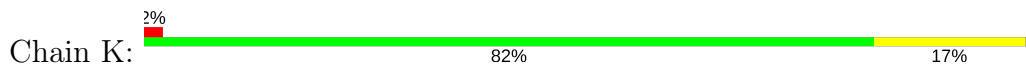
- Molecule 1: Hemoglobin subunit alpha



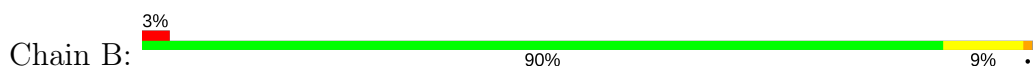




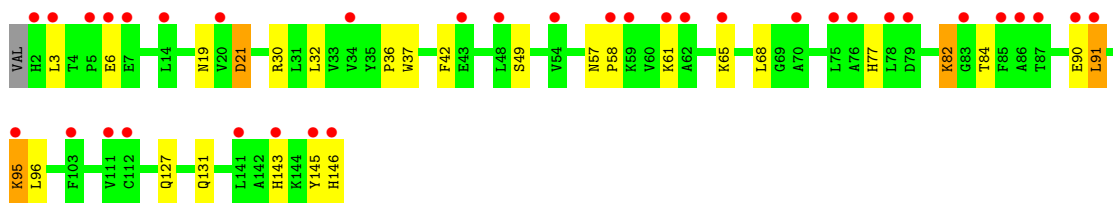
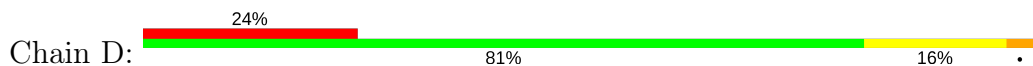
- Molecule 1: Hemoglobin subunit alpha



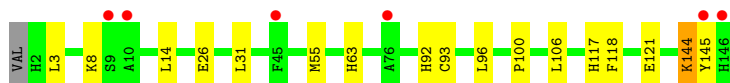
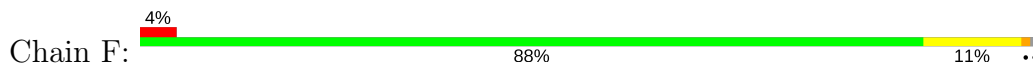
- Molecule 2: Hemoglobin subunit beta



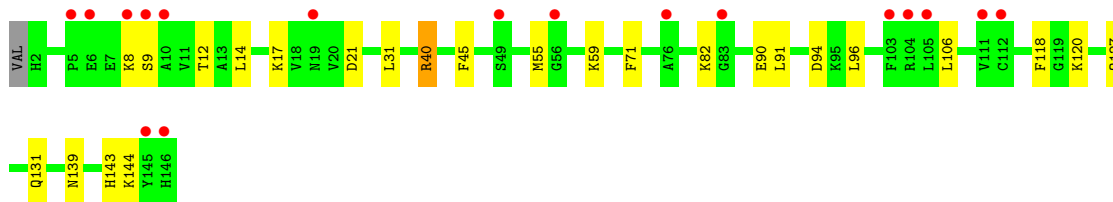
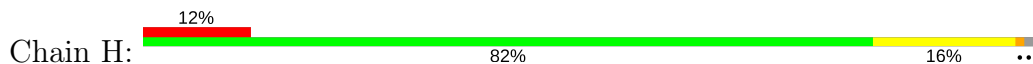
- Molecule 2: Hemoglobin subunit beta




- Molecule 2: Hemoglobin subunit beta

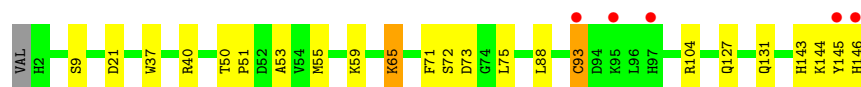


- Molecule 2: Hemoglobin subunit beta




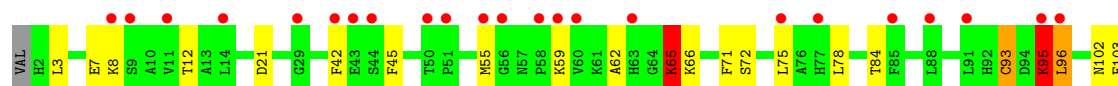
- Molecule 2: Hemoglobin subunit beta

Chain J:  3% 84% 14% ..



• Molecule 2: Hemoglobin subunit beta

Chain L:  18% 79% 16% ..



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	228.60Å 54.60Å 138.44Å 90.00° 103.18° 90.00°	Depositor
Resolution (Å)	34.99 – 2.39 40.62 – 2.39	Depositor EDS
% Data completeness (in resolution range)	97.8 (34.99-2.39) 98.2 (40.62-2.39)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.50 (at 2.39Å)	Xtrriage
Refinement program	BUSTER 2.10.2	Depositor
R, $R_{free}$	0.245 , 0.288 0.252 , 0.299	Depositor DCC
$R_{free}$ test set	3220 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	56.8	Xtrriage
Anisotropy	0.466	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 57.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	13609	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	78.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.05% 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 [i](#)

### 5.1 Standard geometry [i](#)

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

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	0.45	0/1090	0.62	0/1481
1	C	0.44	0/1090	0.63	0/1481
1	E	0.45	0/1090	0.65	1/1481 (0.1%)
1	G	0.46	0/1090	0.61	0/1481
1	I	0.47	0/1090	0.65	0/1481
1	K	0.49	0/1090	0.64	0/1481
2	B	0.49	0/1139	0.59	0/1546
2	D	0.48	0/1139	0.66	0/1546
2	F	0.47	0/1139	0.59	0/1546
2	H	0.48	0/1139	0.61	0/1546
2	J	0.50	0/1139	0.63	0/1546
2	L	0.46	0/1139	0.69	1/1546 (0.1%)
All	All	0.47	0/13374	0.63	2/18162 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	L	95	LYS	C-N-CA	6.17	137.11	121.70
1	E	86	LEU	N-CA-C	-5.12	97.18	111.00

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	1062	0	1061	13	0
1	C	1062	0	1061	8	0
1	E	1062	0	1061	11	0
1	G	1062	0	1061	8	0
1	I	1062	0	1061	18	0
1	K	1062	0	1061	11	0
2	B	1110	0	1100	6	0
2	D	1110	0	1100	16	0
2	F	1110	0	1100	8	0
2	H	1110	0	1100	9	0
2	J	1110	0	1100	13	0
2	L	1110	0	1100	16	0
3	A	43	0	32	4	0
3	D	43	0	30	3	0
3	E	43	0	30	3	0
3	H	43	0	31	2	0
3	I	43	0	30	2	0
3	L	43	0	30	5	0
4	B	43	0	30	1	0
4	C	43	0	30	1	0
4	F	43	0	30	3	0
4	G	43	0	30	3	0
4	J	43	0	30	1	0
4	K	43	0	30	1	0
5	I	25	0	19	0	0
6	A	2	0	0	0	0
6	B	2	0	0	0	0
6	D	3	0	0	0	0
6	E	3	0	0	0	0
6	F	2	0	0	0	0
6	G	3	0	0	0	0
6	H	3	0	0	0	0
6	I	4	0	0	0	0
6	J	5	0	0	0	0
6	K	5	0	0	1	0
6	L	4	0	0	0	0
All	All	13609	0	13348	125	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 5.

All (125) 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:J:93:CYS:HB3	6:K:305:HOH:O	1.59	1.00
2:L:93:CYS:SG	2:L:144:LYS:HG2	2.14	0.86
2:L:65:LYS:HD3	2:L:66:LYS:H	1.44	0.83
1:C:48:LEU:HD11	1:C:54:GLN:HB2	1.63	0.79
1:I:139:LYS:HD3	1:I:139:LYS:H	1.50	0.77
2:L:62:ALA:O	2:L:65:LYS:HG3	1.85	0.77
2:D:96:LEU:HD21	3:D:201:HNI:HBD2	1.71	0.72
1:E:7:LYS:HG2	1:E:73:VAL:HG11	1.71	0.70
2:B:36:PRO:HB2	1:C:140:TYR:HB2	1.73	0.69
2:L:65:LYS:CD	2:L:66:LYS:H	2.06	0.68
2:L:143:HIS:HA	2:L:145:TYR:HB3	1.77	0.64
1:K:37:PRO:O	1:K:40:LYS:HG3	1.98	0.63
2:J:40:ARG:HD3	1:K:92:ARG:HB2	1.82	0.62
2:D:95:LYS:N	2:D:95:LYS:HE2	2.14	0.61
2:L:65:LYS:HD3	2:L:66:LYS:HG2	1.81	0.61
4:F:201:HEM:HBB2	4:F:201:HEM:HHC	1.81	0.61
1:E:61:LYS:HG2	3:E:201:HNI:HAA2	1.82	0.61
2:L:96:LEU:HD21	3:L:201:HNI:HBD2	1.82	0.60
1:C:122:HIS:HD2	2:D:30:ARG:HD3	1.67	0.59
1:E:92:ARG:HG3	2:H:40:ARG:HD2	1.83	0.59
1:E:84:SER:HA	1:E:85:ASP:HB3	1.85	0.58
2:H:127:GLN:HE21	2:H:131:GLN:HE21	1.50	0.58
1:A:7:LYS:HD3	1:A:73:VAL:HG11	1.86	0.58
1:G:83:LEU:HD11	4:G:201:HEM:HMA1	1.86	0.57
1:A:65:ALA:HB2	3:A:201:HNI:HMA1	1.87	0.57
1:G:137:THR:HA	1:G:140:TYR:CE1	2.39	0.57
1:I:35:SER:HB3	2:J:131:GLN:HG3	1.87	0.57
2:J:50:THR:HG23	2:J:53:ALA:H	1.68	0.57
1:A:92:ARG:HB2	2:D:37:TRP:HA	1.86	0.56
2:D:61:LYS:O	2:D:65:LYS:HG2	2.05	0.56
2:D:19:ASN:C	2:D:21:ASP:HB3	2.25	0.56
1:K:113:LEU:HB3	1:K:116:GLU:HB2	1.88	0.56
1:E:72:HIS:HB3	1:E:75:ASP:HB3	1.88	0.55
1:A:58:HIS:CE1	3:A:201:HNI:HBD2	2.42	0.55
1:I:84:SER:HB3	1:I:139:LYS:HD2	1.89	0.55
1:I:43:PHE:HB3	1:I:46:PHE:HB2	1.89	0.54
2:L:95:LYS:HB3	2:L:96:LEU:HB2	1.90	0.53
2:D:19:ASN:HD22	2:D:21:ASP:HA	1.73	0.53
1:K:58:HIS:HE1	4:K:201:HEM:CHA	2.22	0.52
1:E:85:ASP:HB2	1:E:88:ALA:H	1.74	0.52
1:I:113:LEU:HB3	1:I:116:GLU:HB2	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:35:SER:HB3	2:B:131:GLN:HG3	1.93	0.51
2:L:118:PHE:HB3	2:L:121:GLU:HB3	1.91	0.51
1:K:119:PRO:HG2	2:L:55:MET:HG3	1.92	0.51
1:A:138:SER:HG	1:C:2:LEU:N	2.09	0.51
1:I:119:PRO:HG2	2:J:55:MET:HG3	1.93	0.51
4:F:201:HEM:HBC2	4:F:201:HEM:HMC2	1.94	0.50
2:D:77:HIS:HB2	2:D:84:THR:HG21	1.94	0.50
2:J:37:TRP:HB2	1:K:92:ARG:HB3	1.93	0.50
1:E:61:LYS:HG2	3:E:201:HNI:HMA3	1.93	0.50
1:C:61:LYS:HE3	4:C:201:HEM:HAA2	1.94	0.49
1:I:40:LYS:HG2	1:I:48:LEU:HD13	1.94	0.49
2:L:103:PHE:CD1	3:L:201:HNI:HBB1	2.47	0.49
2:L:102:ASN:HB3	3:L:201:HNI:HMC1	1.95	0.49
1:A:140:TYR:HB3	2:D:36:PRO:HG2	1.93	0.49
4:B:201:HEM:HHA	4:B:201:HEM:HBD1	1.93	0.49
1:K:35:SER:HB3	2:L:131:GLN:HG3	1.94	0.49
3:A:201:HNI:HBB1	3:A:201:HNI:HMB1	1.93	0.49
2:F:63:HIS:CE1	4:F:201:HEM:HBD2	2.48	0.48
1:I:89:HIS:CD2	1:I:141:ARG:HE	2.31	0.48
2:J:21:ASP:HA	2:J:65:LYS:HG3	1.96	0.48
2:D:91:LEU:HD21	3:D:201:HNI:HBA2	1.95	0.48
2:B:100:PRO:HD3	2:B:145:TYR:CE2	2.49	0.48
1:C:31:ARG:HB3	2:D:127:GLN:HE22	1.77	0.47
2:D:58:PRO:HA	2:D:61:LYS:HG2	1.96	0.47
1:K:16:LYS:HD3	1:K:116:GLU:HG2	1.96	0.47
2:F:31:LEU:HD22	2:F:106:LEU:HD13	1.95	0.47
2:B:22:GLU:O	2:B:26:GLU:HG2	2.14	0.47
1:I:45:HIS:CD2	1:I:46:PHE:HD1	2.33	0.47
1:I:83:LEU:HB3	1:I:136:LEU:HD11	1.98	0.46
1:I:80:LEU:HG	1:I:83:LEU:HB2	1.98	0.46
1:I:42:TYR:CE1	1:I:93:VAL:HA	2.51	0.46
2:J:51:PRO:O	2:J:55:MET:HG2	2.15	0.46
2:F:118:PHE:HB3	2:F:121:GLU:HB2	1.98	0.46
1:A:11:LYS:HG2	1:A:70:VAL:HG22	1.98	0.45
3:D:201:HNI:HHC	3:D:201:HNI:HBB1	1.98	0.45
2:H:9:SER:HA	2:H:12:THR:HG22	1.99	0.45
1:I:21:ALA:HB1	1:I:63:ALA:HB1	1.99	0.45
1:A:43:PHE:HB3	1:A:46:PHE:HB2	1.99	0.44
2:D:19:ASN:O	2:D:21:ASP:HB3	2.17	0.44
2:J:88:LEU:HD21	4:J:201:HEM:HMA3	2.00	0.44
1:K:22:GLY:HA2	1:K:60:LYS:HA	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:82:LYS:HZ1	2:D:143:HIS:HB2	1.82	0.44
2:H:31:LEU:HD22	2:H:106:LEU:HD13	1.99	0.43
1:G:58:HIS:HE1	4:G:201:HEM:CHA	2.31	0.43
1:C:106:LEU:HD13	1:C:122:HIS:HE1	1.83	0.43
2:L:42:PHE:HB3	2:L:45:PHE:CG	2.54	0.43
1:E:87:HIS:HA	1:E:91:LEU:HB2	1.99	0.43
2:H:45:PHE:HA	2:H:59:LYS:HD2	2.00	0.43
1:E:58:HIS:HE1	3:E:201:HNI:CHA	2.32	0.43
2:H:96:LEU:HD21	3:H:201:HNI:HBD2	2.00	0.43
2:D:95:LYS:HE2	2:D:95:LYS:H	1.83	0.43
2:F:92:HIS:HA	2:F:96:LEU:HD12	2.01	0.43
3:H:201:HNI:HBC1	3:H:201:HNI:HMC1	1.99	0.42
1:G:119:PRO:HG2	2:H:55:MET:HG3	2.01	0.42
2:H:17:LYS:HD2	2:H:118:PHE:HE1	1.85	0.42
1:I:99:LYS:HE3	2:J:104:ARG:HH22	1.84	0.42
2:L:72:SER:O	2:L:75:LEU:HG	2.19	0.42
2:L:3:LEU:HD12	2:L:7:GLU:HG3	2.00	0.42
1:E:84:SER:HA	1:E:85:ASP:CB	2.42	0.42
2:D:32:LEU:HD21	2:D:42:PHE:CD2	2.55	0.42
1:I:83:LEU:HD21	3:I:201:HNI:C3A	2.49	0.42
1:A:31:ARG:HD3	2:B:127:GLN:OE1	2.19	0.42
3:L:201:HNI:HBD1	3:L:201:HNI:HHA	2.00	0.42
2:F:93:CYS:CB	2:F:144:LYS:HG2	2.50	0.41
2:H:120:LYS:HA	2:H:120:LYS:HD2	1.87	0.41
1:K:137:THR:HA	1:K:140:TYR:CE1	2.55	0.41
1:A:85:ASP:O	1:A:89:HIS:HB2	2.20	0.41
1:I:62:VAL:HG12	3:I:201:HNI:CHB	2.51	0.41
1:G:83:LEU:HD21	4:G:201:HEM:C3A	2.55	0.41
3:L:201:HNI:HHC	3:L:201:HNI:HBB1	2.01	0.41
1:G:10:VAL:HG21	1:G:128:PHE:HB2	2.02	0.41
1:E:119:PRO:HG2	2:F:55:MET:HG3	2.02	0.41
1:I:31:ARG:HD3	2:J:127:GLN:OE1	2.20	0.41
2:J:127:GLN:O	2:J:131:GLN:HG2	2.21	0.41
1:G:21:ALA:HB1	1:G:63:ALA:HB1	2.03	0.41
1:I:45:HIS:HD2	1:I:46:PHE:HD1	1.68	0.41
1:K:43:PHE:HB3	1:K:46:PHE:HB2	2.03	0.40
1:A:7:LYS:H	1:A:7:LYS:HG2	1.77	0.40
2:B:97:HIS:HB3	1:C:38:THR:HG22	2.03	0.40
2:F:93:CYS:HB3	2:F:144:LYS:HG2	2.02	0.40
2:J:72:SER:HA	2:J:75:LEU:HD12	2.04	0.40
1:A:43:PHE:CE2	3:A:201:HNI:HMD3	2.57	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:100:PRO:HD3	2:F:145:TYR:CE2	2.57	0.40
1:G:76:MET:N	1:G:77:PRO:CD	2.84	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%)	6 (4%)	1 (1%)	24	35
1	C	138/141 (98%)	121 (88%)	16 (12%)	1 (1%)	24	35
1	E	138/141 (98%)	127 (92%)	8 (6%)	3 (2%)	7	8
1	G	138/141 (98%)	132 (96%)	5 (4%)	1 (1%)	24	35
1	I	138/141 (98%)	127 (92%)	9 (6%)	2 (1%)	12	17
1	K	138/141 (98%)	135 (98%)	3 (2%)	0	100	100
2	B	143/146 (98%)	139 (97%)	4 (3%)	0	100	100
2	D	143/146 (98%)	133 (93%)	8 (6%)	2 (1%)	12	17
2	F	143/146 (98%)	138 (96%)	5 (4%)	0	100	100
2	H	143/146 (98%)	132 (92%)	11 (8%)	0	100	100
2	J	143/146 (98%)	139 (97%)	3 (2%)	1 (1%)	24	35
2	L	143/146 (98%)	126 (88%)	15 (10%)	2 (1%)	12	17
All	All	1686/1722 (98%)	1580 (94%)	93 (6%)	13 (1%)	21	31

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	49	SER
2	D	21	ASP

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Mol	Chain	Res	Type
1	E	93	VAL
1	I	18	GLY
2	J	143	HIS
2	L	95	LYS
1	C	89	HIS
1	G	18	GLY
2	L	65	LYS
1	A	92	ARG
1	E	91	LEU
1	E	92	ARG
1	I	73	VAL

### 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	112/113 (99%)	105 (94%)	7 (6%)	20	31
1	C	112/113 (99%)	103 (92%)	9 (8%)	13	20
1	E	112/113 (99%)	104 (93%)	8 (7%)	16	25
1	G	112/113 (99%)	105 (94%)	7 (6%)	20	31
1	I	112/113 (99%)	101 (90%)	11 (10%)	9	13
1	K	112/113 (99%)	103 (92%)	9 (8%)	13	20
2	B	116/118 (98%)	109 (94%)	7 (6%)	21	33
2	D	116/118 (98%)	105 (90%)	11 (10%)	9	14
2	F	116/118 (98%)	110 (95%)	6 (5%)	25	41
2	H	116/118 (98%)	104 (90%)	12 (10%)	8	11
2	J	116/118 (98%)	107 (92%)	9 (8%)	14	21
2	L	116/118 (98%)	102 (88%)	14 (12%)	5	7
All	All	1368/1386 (99%)	1258 (92%)	110 (8%)	13	20

All (110) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	LYS
1	A	8	THR
1	A	74	ASP
1	A	90	LYS
1	A	92	ARG
1	A	105	LEU
1	A	127	LYS
2	B	6	GLU
2	B	26	GLU
2	B	66	LYS
2	B	91	LEU
2	B	120	LYS
2	B	139	ASN
2	B	144	LYS
1	C	7	LYS
1	C	20	HIS
1	C	55	VAL
1	C	58	HIS
1	C	74	ASP
1	C	89	HIS
1	C	90	LYS
1	C	105	LEU
1	C	140	TYR
2	D	3	LEU
2	D	6	GLU
2	D	57	ASN
2	D	68	LEU
2	D	82	LYS
2	D	90	GLU
2	D	91	LEU
2	D	95	LYS
2	D	131	GLN
2	D	145	TYR
2	D	146	HIS
1	E	14	TRP
1	E	60	LYS
1	E	74	ASP
1	E	78	ASN
1	E	85	ASP
1	E	86	LEU
1	E	92	ARG
1	E	127	LYS
2	F	3	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	F	8	LYS
2	F	14	LEU
2	F	26	GLU
2	F	117	HIS
2	F	144	LYS
1	G	3	SER
1	G	46	PHE
1	G	54	GLN
1	G	61	LYS
1	G	83	LEU
1	G	131	SER
1	G	141	ARG
2	H	8	LYS
2	H	14	LEU
2	H	21	ASP
2	H	40	ARG
2	H	71	PHE
2	H	82	LYS
2	H	90	GLU
2	H	91	LEU
2	H	94	ASP
2	H	139	ASN
2	H	143	HIS
2	H	144	LYS
1	I	11	LYS
1	I	23	GLU
1	I	38	THR
1	I	54	GLN
1	I	73	VAL
1	I	80	LEU
1	I	131	SER
1	I	136	LEU
1	I	138	SER
1	I	139	LYS
1	I	141	ARG
2	J	9	SER
2	J	59	LYS
2	J	65	LYS
2	J	71	PHE
2	J	73	ASP
2	J	93	CYS
2	J	144	LYS

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Mol	Chain	Res	Type
2	J	145	TYR
2	J	146	HIS
1	K	11	LYS
1	K	14	TRP
1	K	64	ASP
1	K	73	VAL
1	K	75	ASP
1	K	86	LEU
1	K	127	LYS
1	K	139	LYS
1	K	141	ARG
2	L	8	LYS
2	L	12	THR
2	L	21	ASP
2	L	59	LYS
2	L	65	LYS
2	L	71	PHE
2	L	78	LEU
2	L	84	THR
2	L	93	CYS
2	L	96	LEU
2	L	104	ARG
2	L	139	ASN
2	L	143	HIS
2	L	144	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	139	ASN
1	C	122	HIS
2	D	19	ASN
2	D	127	GLN
1	E	58	HIS
1	G	58	HIS
2	H	63	HIS
2	H	131	GLN
1	I	45	HIS
1	I	87	HIS
1	I	89	HIS
1	K	58	HIS
1	K	89	HIS

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Mol	Chain	Res	Type
2	L	92	HIS

### 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](#)

13 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	HNI	A	201	1	28,50,50	4.70	13 (46%)	22,82,82	5.40	13 (59%)
4	HEM	B	201	2	27,50,50	1.25	4 (14%)	17,82,82	1.74	5 (29%)
4	HEM	C	201	1	27,50,50	1.39	2 (7%)	17,82,82	1.59	3 (17%)
3	HNI	D	201	2	28,50,50	4.46	14 (50%)	22,82,82	5.54	13 (59%)
3	HNI	E	201	-	28,50,50	4.42	14 (50%)	22,82,82	5.43	12 (54%)
4	HEM	F	201	2	27,50,50	1.42	3 (11%)	17,82,82	1.98	5 (29%)
4	HEM	G	201	1	27,50,50	1.19	1 (3%)	17,82,82	1.19	2 (11%)
3	HNI	H	201	2	28,50,50	4.40	14 (50%)	22,82,82	5.59	12 (54%)
3	HNI	I	201	-	28,50,50	4.25	13 (46%)	22,82,82	5.34	14 (63%)
5	PEM	I	202	-	23,26,26	0.97	1 (4%)	30,36,36	1.05	1 (3%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	HEM	J	201	2	27,50,50	1.35	4 (14%)	17,82,82	2.02	6 (35%)
4	HEM	K	201	-	27,50,50	1.23	1 (3%)	17,82,82	1.57	3 (17%)
3	HNI	L	201	2	28,50,50	4.42	14 (50%)	22,82,82	5.35	14 (63%)

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	HNI	A	201	1	-	0/8/94/94	0/0/8/8
4	HEM	B	201	2	-	0/6/54/54	0/0/8/8
4	HEM	C	201	1	-	0/6/54/54	0/0/8/8
3	HNI	D	201	2	-	0/8/94/94	0/0/8/8
3	HNI	E	201	-	-	0/8/94/94	0/0/8/8
4	HEM	F	201	2	-	0/6/54/54	0/0/8/8
4	HEM	G	201	1	-	0/6/54/54	0/0/8/8
3	HNI	H	201	2	-	0/8/94/94	0/0/8/8
3	HNI	I	201	-	-	0/8/94/94	0/0/8/8
5	PEM	I	202	-	-	0/15/21/21	0/2/2/2
4	HEM	J	201	2	-	0/6/54/54	0/0/8/8
4	HEM	K	201	-	-	0/6/54/54	0/0/8/8
3	HNI	L	201	2	-	0/8/94/94	0/0/8/8

All (98) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	201	HNI	CHA-C1A	-10.71	1.32	1.53
3	D	201	HNI	CHC-C1C	-9.68	1.34	1.53
3	L	201	HNI	CHD-C4C	-9.38	1.35	1.53
3	I	201	HNI	CHC-C1C	-9.35	1.35	1.53
3	A	201	HNI	CHC-C1C	-9.23	1.35	1.53
3	E	201	HNI	CHA-C1A	-9.18	1.35	1.53
3	H	201	HNI	CHB-C4A	-9.04	1.36	1.53
3	L	201	HNI	CHB-C4A	-8.99	1.36	1.53
3	D	201	HNI	CHD-C4C	-8.83	1.36	1.53
3	A	201	HNI	CHD-C4C	-8.73	1.36	1.53
3	E	201	HNI	CHC-C1C	-8.69	1.36	1.53
3	I	201	HNI	CHD-C4C	-8.68	1.36	1.53
3	D	201	HNI	CHA-C1A	-8.56	1.37	1.53
3	I	201	HNI	CHA-C1A	-8.39	1.37	1.53
3	L	201	HNI	CHA-C1A	-8.31	1.37	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	201	HNI	CHB-C4A	-8.23	1.37	1.53
3	H	201	HNI	CHA-C1A	-8.22	1.37	1.53
3	I	201	HNI	CHB-C4A	-8.03	1.38	1.53
3	E	201	HNI	CHD-C4C	-8.03	1.38	1.53
3	L	201	HNI	CHC-C1C	-7.93	1.38	1.53
3	H	201	HNI	CHC-C1C	-7.71	1.38	1.53
3	D	201	HNI	CHB-C4A	-7.71	1.38	1.53
3	A	201	HNI	CHB-C4A	-7.61	1.38	1.53
3	H	201	HNI	CHD-C4C	-7.47	1.39	1.53
3	E	201	HNI	CHA-C4D	-6.19	1.35	1.51
3	D	201	HNI	CHC-C4B	-6.06	1.36	1.51
3	A	201	HNI	CHC-C4B	-5.93	1.36	1.51
3	A	201	HNI	CHA-C4D	-5.63	1.37	1.51
3	D	201	HNI	CHA-C4D	-5.31	1.37	1.51
3	E	201	HNI	CHC-C4B	-5.21	1.38	1.51
3	H	201	HNI	CHA-C4D	-5.18	1.38	1.51
3	L	201	HNI	CHA-C4D	-5.12	1.38	1.51
3	A	201	HNI	CHD-C1D	-5.02	1.38	1.51
3	H	201	HNI	CHD-C1D	-4.95	1.38	1.51
3	D	201	HNI	CHD-C1D	-4.90	1.38	1.51
3	L	201	HNI	C4C-C3C	-4.90	1.43	1.51
3	I	201	HNI	CHC-C4B	-4.83	1.39	1.51
3	L	201	HNI	CHD-C1D	-4.75	1.39	1.51
4	F	201	HEM	C3B-C2B	-4.67	1.33	1.40
3	H	201	HNI	CHC-C4B	-4.66	1.39	1.51
3	L	201	HNI	CHC-C4B	-4.56	1.39	1.51
3	E	201	HNI	CHD-C1D	-4.51	1.39	1.51
3	E	201	HNI	CHB-C1B	-4.44	1.40	1.51
3	E	201	HNI	C4C-C3C	-4.40	1.44	1.51
3	I	201	HNI	CHA-C4D	-4.38	1.40	1.51
3	H	201	HNI	CHB-C1B	-4.37	1.40	1.51
3	A	201	HNI	C4C-C3C	-4.37	1.44	1.51
3	D	201	HNI	CHB-C1B	-4.33	1.40	1.51
4	C	201	HEM	C3B-C2B	-4.31	1.34	1.40
3	I	201	HNI	CHB-C1B	-4.28	1.40	1.51
3	L	201	HNI	CHB-C1B	-4.27	1.40	1.51
3	I	201	HNI	CHD-C1D	-4.24	1.40	1.51
3	H	201	HNI	C4C-C3C	-4.15	1.44	1.51
3	D	201	HNI	C4C-C3C	-4.06	1.44	1.51
3	I	201	HNI	C4C-C3C	-4.03	1.44	1.51
4	K	201	HEM	C3B-C2B	-4.02	1.34	1.40
4	G	201	HEM	C3B-C2B	-3.79	1.35	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	J	201	HEM	C3B-C2B	-3.47	1.35	1.40
3	H	201	HNI	C3B-C2B	-3.45	1.35	1.40
3	A	201	HNI	CHB-C1B	-3.42	1.42	1.51
3	D	201	HNI	C3B-C2B	-3.40	1.35	1.40
3	L	201	HNI	C3B-C2B	-3.32	1.35	1.40
4	B	201	HEM	C3C-C2C	-2.47	1.36	1.40
3	E	201	HNI	C3B-C2B	-2.45	1.37	1.40
4	C	201	HEM	C1D-ND	-2.43	1.31	1.36
4	J	201	HEM	C1D-CHD	-2.35	1.33	1.40
4	B	201	HEM	C3B-C2B	-2.34	1.37	1.40
4	F	201	HEM	C1A-CHA	-2.05	1.34	1.40
4	J	201	HEM	C3B-CAB	2.02	1.51	1.47
4	B	201	HEM	CAA-C2A	2.04	1.55	1.52
3	I	201	HNI	C2C-C3C	2.05	1.40	1.35
4	F	201	HEM	C1A-NA	2.11	1.40	1.36
3	D	201	HNI	C2C-C3C	2.18	1.41	1.35
3	A	201	HNI	C2C-C3C	2.34	1.41	1.35
4	J	201	HEM	C4D-C3D	2.42	1.48	1.42
5	I	202	PEM	C4-CL	2.44	1.79	1.74
3	L	201	HNI	C2C-C3C	2.57	1.42	1.35
3	E	201	HNI	C2C-C3C	2.81	1.42	1.35
3	H	201	HNI	C2C-C3C	3.00	1.43	1.35
4	B	201	HEM	C4D-C3D	3.14	1.49	1.42
3	H	201	HNI	C1B-C2B	3.74	1.43	1.38
3	I	201	HNI	C1B-C2B	3.92	1.43	1.38
3	L	201	HNI	C1B-C2B	3.97	1.43	1.38
3	E	201	HNI	C1B-C2B	4.47	1.44	1.38
3	D	201	HNI	C1B-C2B	4.58	1.44	1.38
3	E	201	HNI	C4D-C3D	5.46	1.45	1.38
3	A	201	HNI	C1B-C2B	5.52	1.45	1.38
3	I	201	HNI	C4D-C3D	5.94	1.46	1.38
3	A	201	HNI	C4D-C3D	6.07	1.46	1.38
3	L	201	HNI	C1D-C2D	6.19	1.46	1.38
3	D	201	HNI	C1D-C2D	6.37	1.46	1.38
3	D	201	HNI	C4D-C3D	6.72	1.47	1.38
3	I	201	HNI	C1D-C2D	7.15	1.47	1.38
3	L	201	HNI	C4D-C3D	7.66	1.48	1.38
3	E	201	HNI	C1D-C2D	7.89	1.48	1.38
3	H	201	HNI	C1D-C2D	7.96	1.49	1.38
3	H	201	HNI	C4D-C3D	8.09	1.49	1.38
3	A	201	HNI	C1D-C2D	8.91	1.50	1.38

All (103) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	201	HNI	CHB-C1B-C2B	-6.13	118.83	129.45
3	L	201	HNI	CHB-C1B-C2B	-5.70	119.58	129.45
3	A	201	HNI	CHC-C4B-C3B	-5.46	122.20	129.55
3	E	201	HNI	CHB-C1B-C2B	-5.31	120.26	129.45
3	D	201	HNI	CHB-C1B-C2B	-5.16	120.52	129.45
3	D	201	HNI	CHD-C1D-C2D	-5.16	120.53	129.45
3	I	201	HNI	CHC-C4B-C3B	-5.01	122.82	129.55
3	L	201	HNI	CHD-C1D-C2D	-5.00	120.80	129.45
3	A	201	HNI	CHD-C1D-C2D	-4.97	120.84	129.45
4	F	201	HEM	C4C-C3C-C2C	-4.91	103.47	106.90
3	E	201	HNI	CHC-C4B-C3B	-4.78	123.13	129.55
3	I	201	HNI	CBA-CAA-C2A	-4.74	105.83	114.28
3	E	201	HNI	CBA-CAA-C2A	-4.71	105.89	114.28
3	L	201	HNI	CHC-C4B-C3B	-4.62	123.34	129.55
3	H	201	HNI	CHD-C1D-C2D	-4.61	121.47	129.45
3	I	201	HNI	CHB-C1B-C2B	-4.58	121.53	129.45
3	D	201	HNI	CBA-CAA-C2A	-4.57	106.13	114.28
3	H	201	HNI	CBA-CAA-C2A	-4.53	106.21	114.28
3	I	201	HNI	CHD-C1D-C2D	-4.50	121.66	129.45
3	E	201	HNI	CHD-C1D-C2D	-4.21	122.17	129.45
3	A	201	HNI	CHB-C1B-C2B	-4.16	122.26	129.45
4	J	201	HEM	C1D-C2D-C3D	-4.14	104.11	107.00
4	C	201	HEM	C4C-C3C-C2C	-3.82	104.23	106.90
4	F	201	HEM	C1D-C2D-C3D	-3.75	104.38	107.00
4	K	201	HEM	C1D-C2D-C3D	-3.54	104.53	107.00
4	J	201	HEM	C4C-C3C-C2C	-3.32	104.58	106.90
3	H	201	HNI	CAA-CBA-CGA	-3.31	107.00	112.66
3	D	201	HNI	CHC-C4B-C3B	-3.31	125.10	129.55
4	J	201	HEM	CBD-CAD-C3D	-3.25	106.27	112.47
4	B	201	HEM	C4C-C3C-C2C	-3.24	104.63	106.90
4	J	201	HEM	CBA-CAA-C2A	-3.14	106.48	112.48
3	H	201	HNI	CHC-C4B-C3B	-3.11	125.36	129.55
3	A	201	HNI	CAD-C3D-C4D	-3.11	125.11	127.30
3	I	201	HNI	CAD-CBD-CGD	-3.11	107.35	112.66
3	L	201	HNI	CAD-CBD-CGD	-2.89	107.73	112.66
4	K	201	HEM	CBA-CAA-C2A	-2.83	107.07	112.48
3	I	201	HNI	CBD-CAD-C3D	-2.83	107.08	112.48
4	B	201	HEM	CAD-CBD-CGD	-2.78	107.91	112.66
4	C	201	HEM	C1D-C2D-C3D	-2.75	105.08	107.00
4	B	201	HEM	C1D-C2D-C3D	-2.58	105.20	107.00
4	F	201	HEM	CBA-CAA-C2A	-2.53	107.64	112.48
3	E	201	HNI	CAD-CBD-CGD	-2.45	108.47	112.66
4	G	201	HEM	CAD-CBD-CGD	-2.43	108.50	112.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	201	HNI	CAD-C3D-C4D	-2.42	125.60	127.30
4	J	201	HEM	CAD-CBD-CGD	-2.34	108.65	112.66
3	A	201	HNI	CAA-CBA-CGA	-2.24	108.83	112.66
3	D	201	HNI	CAA-CBA-CGA	-2.23	108.85	112.66
4	G	201	HEM	CMA-C3A-C4A	-2.13	125.19	128.46
3	L	201	HNI	CAA-C2A-C1A	2.01	126.51	122.48
3	L	201	HNI	CMD-C2D-C3D	2.02	128.74	124.94
3	H	201	HNI	CMB-C2B-C3B	2.05	128.62	124.88
3	L	201	HNI	CMA-C3A-C4A	2.07	126.28	120.24
4	F	201	HEM	CMD-C2D-C3D	2.12	128.95	124.94
3	I	201	HNI	CMC-C2C-C1C	2.14	126.49	120.24
4	J	201	HEM	C3B-C4B-NB	2.14	111.98	109.21
3	I	201	HNI	CMD-C2D-C3D	2.15	129.00	124.94
4	B	201	HEM	C3B-C4B-NB	2.30	112.18	109.21
4	K	201	HEM	CMD-C2D-C3D	2.34	129.35	124.94
3	I	201	HNI	CMB-C2B-C3B	2.36	129.18	124.88
4	B	201	HEM	CMB-C2B-C3B	2.39	129.23	124.88
3	L	201	HNI	CBD-CAD-C3D	2.44	117.16	112.48
3	E	201	HNI	CMA-C3A-C4A	2.49	127.53	120.24
3	I	201	HNI	C3B-C4B-NB	2.55	110.69	107.17
4	C	201	HEM	CMB-C2B-C3B	2.61	129.63	124.88
3	A	201	HNI	CAA-C2A-C1A	2.66	127.79	122.48
4	F	201	HEM	CMC-C2C-C3C	2.67	129.74	124.88
3	A	201	HNI	CMA-C3A-C4A	2.70	128.13	120.24
3	A	201	HNI	CMB-C2B-C3B	2.76	129.90	124.88
3	L	201	HNI	C3B-C4B-NB	2.81	111.04	107.17
3	H	201	HNI	CMD-C2D-C3D	2.88	130.37	124.94
3	D	201	HNI	CMD-C2D-C3D	2.90	130.41	124.94
3	H	201	HNI	CMA-C3A-C4A	2.94	128.82	120.24
3	E	201	HNI	C3B-C4B-NB	2.95	111.23	107.17
3	D	201	HNI	CMA-C3A-C4A	2.96	128.89	120.24
3	D	201	HNI	C3B-C4B-NB	3.14	111.50	107.17
3	E	201	HNI	CMB-C2B-C3B	3.18	130.66	124.88
3	A	201	HNI	C3B-C4B-NB	3.28	111.70	107.17
3	L	201	HNI	CAD-C3D-C4D	3.66	129.87	127.30
5	I	202	PEM	C16-O2-C10	4.13	128.74	121.10
3	I	201	HNI	CHB-C4A-NA	10.35	123.12	110.03
3	L	201	HNI	CHB-C4A-NA	10.49	123.30	110.03
3	I	201	HNI	CHA-C1A-NA	10.50	123.32	110.03
3	H	201	HNI	CHB-C4A-NA	10.55	123.38	110.03
3	E	201	HNI	CHA-C1A-NA	10.59	123.43	110.03
3	A	201	HNI	CHB-C4A-NA	10.61	123.46	110.03

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	201	HNI	CHB-C4A-NA	10.77	123.66	110.03
3	A	201	HNI	CHA-C1A-NA	10.88	123.79	110.03
3	A	201	HNI	CHC-C1C-NC	11.03	123.98	110.03
3	D	201	HNI	CHB-C4A-NA	11.05	124.01	110.03
3	L	201	HNI	CHD-C4C-NC	11.14	124.12	110.03
3	L	201	HNI	CHA-C1A-NA	11.20	124.20	110.03
3	E	201	HNI	CHC-C1C-NC	11.26	124.27	110.03
3	D	201	HNI	CHC-C1C-NC	11.27	124.29	110.03
3	L	201	HNI	CHC-C1C-NC	11.59	124.69	110.03
3	I	201	HNI	CHD-C4C-NC	11.62	124.73	110.03
3	I	201	HNI	CHC-C1C-NC	11.62	124.74	110.03
3	H	201	HNI	CHC-C1C-NC	11.88	125.06	110.03
3	H	201	HNI	CHA-C1A-NA	11.96	125.16	110.03
3	D	201	HNI	CHA-C1A-NA	12.05	125.27	110.03
3	D	201	HNI	CHD-C4C-NC	12.24	125.52	110.03
3	H	201	HNI	CHD-C4C-NC	12.46	125.80	110.03
3	A	201	HNI	CHD-C4C-NC	12.49	125.84	110.03
3	E	201	HNI	CHD-C4C-NC	12.65	126.04	110.03

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

12 monomers are involved in 29 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	201	HNI	4	0
4	B	201	HEM	1	0
4	C	201	HEM	1	0
3	D	201	HNI	3	0
3	E	201	HNI	3	0
4	F	201	HEM	3	0
4	G	201	HEM	3	0
3	H	201	HNI	2	0
3	I	201	HNI	2	0
4	J	201	HEM	1	0
4	K	201	HEM	1	0
3	L	201	HNI	5	0

## 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 [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, 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	140/141 (99%)	1.20	28 (20%) 1 0	46, 84, 129, 148	0
1	C	140/141 (99%)	1.73	46 (32%) 0 0	54, 96, 131, 145	0
1	E	140/141 (99%)	0.94	21 (15%) 2 1	48, 80, 111, 137	0
1	G	140/141 (99%)	0.98	17 (12%) 4 3	54, 78, 102, 124	0
1	I	140/141 (99%)	0.63	14 (10%) 7 6	41, 74, 108, 137	0
1	K	140/141 (99%)	0.41	3 (2%) 63 60	46, 68, 89, 122	0
2	B	145/146 (99%)	0.50	4 (2%) 53 50	41, 66, 99, 111	0
2	D	145/146 (99%)	1.48	35 (24%) 0 0	53, 92, 128, 145	0
2	F	145/146 (99%)	0.59	6 (4%) 37 36	49, 69, 93, 123	0
2	H	145/146 (99%)	0.82	17 (11%) 4 4	54, 76, 109, 131	0
2	J	145/146 (99%)	0.38	5 (3%) 45 43	39, 60, 83, 115	0
2	L	145/146 (99%)	1.04	26 (17%) 1 1	57, 83, 111, 128	0
All	All	1710/1722 (99%)	0.89	222 (12%) 3 3	39, 76, 116, 148	0

All (222) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	J	145	TYR	11.0
2	D	20	VAL	9.3
1	C	70	VAL	8.2
1	I	141	ARG	7.7
2	D	86	ALA	7.6
1	E	14	TRP	7.5
1	C	45	HIS	7.3
2	L	44	SER	7.1
1	G	14	TRP	7.0
2	J	146	HIS	6.6
1	A	140	TYR	6.6

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	71	ALA	6.5
1	C	140	TYR	6.4
2	H	146	HIS	6.3
2	D	87	THR	6.2
1	G	141	ARG	5.9
2	L	42	PHE	5.5
2	D	14	LEU	5.5
2	D	3	LEU	5.2
2	L	146	HIS	5.0
1	A	4	PRO	5.0
2	D	5	PRO	4.9
1	I	51	GLY	4.8
1	C	80	LEU	4.7
1	K	141	ARG	4.6
1	A	75	ASP	4.6
2	D	79	ASP	4.5
2	L	88	LEU	4.5
1	A	86	LEU	4.5
2	L	96	LEU	4.4
2	L	145	TYR	4.3
1	E	92	ARG	4.3
1	C	73	VAL	4.3
1	A	15	GLY	4.3
1	E	141	ARG	4.2
2	H	145	TYR	4.2
2	B	3	LEU	4.1
1	C	83	LEU	4.0
2	D	59	LYS	4.0
1	A	2	LEU	4.0
2	D	78	LEU	4.0
2	L	60	VAL	3.9
2	D	43	GLU	3.9
2	F	146	HIS	3.9
1	C	76	MET	3.9
1	E	75	ASP	3.9
1	C	2	LEU	3.9
1	A	141	ARG	3.8
1	C	55	VAL	3.8
2	D	103	PHE	3.8
1	E	45	HIS	3.8
1	C	75	ASP	3.7
2	L	95	LYS	3.7

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	C	24	TYR	3.7
1	I	92	ARG	3.7
1	C	77	PRO	3.7
1	G	21	ALA	3.7
2	D	62	ALA	3.7
2	J	93	CYS	3.6
1	I	76	MET	3.5
1	E	60	LYS	3.5
1	A	70	VAL	3.5
1	C	139	LYS	3.5
1	C	69	ALA	3.5
2	H	49	SER	3.5
1	C	90	LYS	3.4
1	I	140	TYR	3.4
1	G	20	HIS	3.4
1	E	96	VAL	3.3
2	H	56	GLY	3.3
2	D	141	LEU	3.3
1	C	50	HIS	3.3
1	C	46	PHE	3.3
1	A	76	MET	3.3
2	D	70	ALA	3.3
2	D	85	PHE	3.3
1	E	70	VAL	3.3
1	C	100	LEU	3.2
2	D	65	LYS	3.2
2	D	143	HIS	3.2
2	L	43	GLU	3.2
1	K	4	PRO	3.2
2	D	2	HIS	3.2
2	F	9	SER	3.2
1	G	50	HIS	3.1
1	C	91	LEU	3.1
2	L	50	THR	3.1
1	C	51	GLY	3.1
1	C	120	ALA	3.1
1	C	20	HIS	3.0
1	C	105	LEU	3.0
1	C	62	VAL	3.0
1	C	141	ARG	3.0
1	A	95	PRO	3.0
1	G	51	GLY	2.9

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	L	56	GLY	2.9
1	G	53	ALA	2.9
2	D	83	GLY	2.9
2	D	58	PRO	2.9
2	D	91	LEU	2.9
2	H	83	GLY	2.9
1	C	71	ALA	2.9
2	L	8	LYS	2.9
2	D	90	GLU	2.9
1	C	48	LEU	2.9
2	L	14	LEU	2.9
2	L	144	LYS	2.9
1	A	96	VAL	2.8
2	D	7	GLU	2.8
1	E	90	LYS	2.8
1	I	38	THR	2.8
1	I	11	LYS	2.8
1	C	19	ALA	2.8
1	E	84	SER	2.7
2	L	55	MET	2.7
1	C	86	LEU	2.7
1	A	73	VAL	2.7
1	I	55	VAL	2.7
2	F	45	PHE	2.7
2	L	63	HIS	2.7
2	L	58	PRO	2.7
2	H	5	PRO	2.6
2	L	59	LYS	2.6
1	C	79	ALA	2.6
1	G	60	LYS	2.6
1	E	2	LEU	2.5
1	E	91	LEU	2.5
1	E	46	PHE	2.5
1	A	100	LEU	2.5
2	J	95	LYS	2.5
1	E	86	LEU	2.5
1	A	53	ALA	2.5
2	H	8	LYS	2.5
1	C	78	ASN	2.5
2	H	19	ASN	2.5
1	G	62	VAL	2.5
2	L	29	GLY	2.5

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	G	19	ALA	2.4
1	I	53	ALA	2.4
1	C	47	ASP	2.4
2	D	111	VAL	2.4
2	L	51	PRO	2.4
2	H	104	ARG	2.4
2	H	9	SER	2.4
1	A	99	LYS	2.4
2	F	10	ALA	2.4
2	L	85	PHE	2.4
2	H	103	PHE	2.4
1	G	16	LYS	2.3
1	E	72	HIS	2.3
2	D	76	ALA	2.3
2	D	54	VAL	2.3
1	A	72	HIS	2.3
2	J	97	HIS	2.3
1	C	63	ALA	2.3
1	E	48	LEU	2.3
2	D	48	LEU	2.3
2	L	75	LEU	2.3
1	A	136	LEU	2.3
1	C	85	ASP	2.3
1	C	14	TRP	2.3
1	A	92	ARG	2.3
1	C	130	ALA	2.3
1	E	140	TYR	2.3
2	H	105	LEU	2.3
1	E	82	ALA	2.3
2	D	75	LEU	2.3
1	A	42	TYR	2.3
1	C	96	VAL	2.3
1	G	43	PHE	2.3
1	I	85	ASP	2.3
2	H	10	ALA	2.3
2	D	61	LYS	2.2
1	C	126	ASP	2.2
2	F	76	ALA	2.2
2	D	145	TYR	2.2
1	G	107	VAL	2.2
1	A	21	ALA	2.2
1	C	53	ALA	2.2

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	80	LEU	2.2
2	B	32	LEU	2.2
1	C	98	PHE	2.2
1	K	121	VAL	2.2
1	I	88	ALA	2.2
1	A	78	ASN	2.1
2	L	11	VAL	2.1
2	H	6	GLU	2.1
2	H	76	ALA	2.1
1	C	56	LYS	2.1
2	L	91	LEU	2.1
2	D	112	CYS	2.1
2	D	6	GLU	2.1
2	D	95	LYS	2.1
1	C	99	LYS	2.1
1	I	54	GLN	2.1
1	A	13	ALA	2.1
1	G	39	THR	2.1
1	G	73	VAL	2.1
1	I	12	ALA	2.1
2	B	144	LYS	2.1
2	D	146	HIS	2.1
1	E	74	ASP	2.1
2	B	101	GLU	2.1
1	G	26	ALA	2.1
1	A	138	SER	2.1
2	F	145	TYR	2.1
1	A	131	SER	2.0
1	C	138	SER	2.0
2	H	111	VAL	2.0
1	C	104	CYS	2.0
1	E	136	LEU	2.0
1	G	135	VAL	2.0
1	I	70	VAL	2.0
2	D	34	VAL	2.0
2	L	77	HIS	2.0
1	A	14	TRP	2.0
1	C	33	PHE	2.0
2	H	112	CYS	2.0
1	A	125	LEU	2.0
1	C	29	LEU	2.0
2	L	9	SER	2.0

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Mol	Chain	Res	Type	RSRZ
1	E	19	ALA	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. 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	B-factors(Å <sup>2</sup> )	Q<0.9
5	PEM	I	202	25/25	0.51	0.45	125,132,137,137	0
4	HEM	C	201	43/43	0.91	0.25	77,79,88,89	0
4	HEM	G	201	43/43	0.93	0.21	64,70,81,83	0
4	HEM	B	201	43/43	0.94	0.18	62,68,78,80	0
3	HNI	L	201	43/43	0.94	0.18	81,85,97,99	0
3	HNI	E	201	43/43	0.94	0.17	67,70,80,82	0
3	HNI	H	201	43/43	0.94	0.16	66,70,80,81	0
3	HNI	A	201	43/43	0.95	0.15	69,71,79,80	0
3	HNI	D	201	43/43	0.95	0.18	74,78,90,92	0
4	HEM	F	201	43/43	0.96	0.17	55,58,67,70	0
3	HNI	I	201	43/43	0.96	0.18	74,77,86,88	0
4	HEM	J	201	43/43	0.97	0.14	44,52,65,69	0
4	HEM	K	201	43/43	0.97	0.15	59,62,73,74	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.