



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 08:25 AM GMT

PDB ID : 3EJD  
Title : Crystal Structure of P450BioI in complex with hexadec-9Z-enoic acid ligated  
Acyl Carrier Protein  
Authors : Cryle, M.J.; Schlichting, I.  
Deposited on : 2008-09-18  
Resolution : 2.10 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

---

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

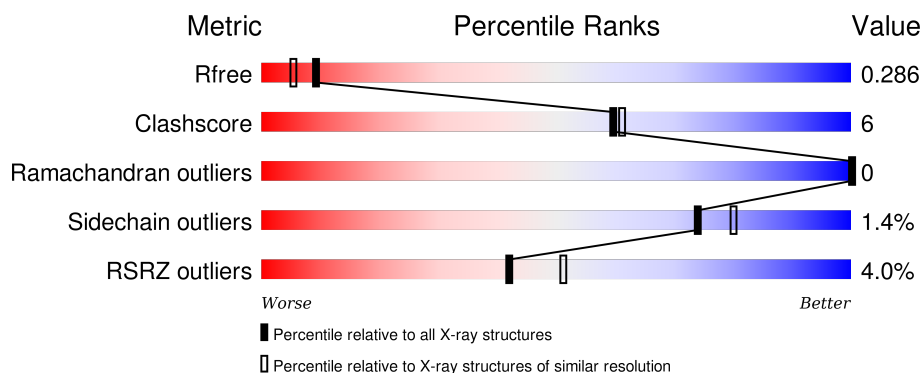
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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))
$R_{free}$	91344	3939 (2.10-2.10)
Clashscore	102246	4460 (2.10-2.10)
Ramachandran outliers	100387	4413 (2.10-2.10)
Sidechain outliers	100360	4414 (2.10-2.10)
RSRZ outliers	91569	3948 (2.10-2.10)

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  $\geq 3$ , 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	97	<div> <div>3%</div> <div> <div></div> <div>75%</div> <div>5%</div> <div>20%</div> </div> </div>
1	C	97	<div> <div>8%</div> <div> <div></div> <div>76%</div> <div>•</div> <div>21%</div> </div> </div>
1	E	97	<div> <div>4%</div> <div> <div></div> <div>77%</div> <div>•</div> <div>20%</div> </div> </div>
1	G	97	<div> <div>2%</div> <div> <div></div> <div>75%</div> <div>•</div> <div>21%</div> </div> </div>
2	B	404	<div> <div>2%</div> <div> <div></div> <div>83%</div> <div>11%</div> <div>5%</div> </div> </div>

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
2	D	404	 5% 80% 14% 5%
2	F	404	 % 81% 14% 6%
2	H	404	 5% 82% 12% 5%

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
4	HTG	F	417	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 16057 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 Acyl carrier protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	78	Total	C	N	O	S	0	0	0
			606	374	95	135	2			
1	C	77	Total	C	N	O	S	0	0	0
			596	368	92	134	2			
1	E	78	Total	C	N	O	S	0	0	0
			606	374	95	135	2			
1	G	77	Total	C	N	O	S	0	0	0
			596	368	92	134	2			

There are 76 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	EXPRESSION TAG	UNP P0A6A8
A	2	SER	-	EXPRESSION TAG	UNP P0A6A8
A	3	SER	-	EXPRESSION TAG	UNP P0A6A8
A	4	HIS	-	EXPRESSION TAG	UNP P0A6A8
A	5	HIS	-	EXPRESSION TAG	UNP P0A6A8
A	6	HIS	-	EXPRESSION TAG	UNP P0A6A8
A	7	HIS	-	EXPRESSION TAG	UNP P0A6A8
A	8	HIS	-	EXPRESSION TAG	UNP P0A6A8
A	9	HIS	-	EXPRESSION TAG	UNP P0A6A8
A	10	SER	-	EXPRESSION TAG	UNP P0A6A8
A	11	SER	-	EXPRESSION TAG	UNP P0A6A8
A	12	GLY	-	EXPRESSION TAG	UNP P0A6A8
A	13	LEU	-	EXPRESSION TAG	UNP P0A6A8
A	14	VAL	-	EXPRESSION TAG	UNP P0A6A8
A	15	PRO	-	EXPRESSION TAG	UNP P0A6A8
A	16	ARG	-	EXPRESSION TAG	UNP P0A6A8
A	17	GLY	-	EXPRESSION TAG	UNP P0A6A8
A	18	SER	-	EXPRESSION TAG	UNP P0A6A8
A	19	HIS	-	EXPRESSION TAG	UNP P0A6A8
C	1	GLY	-	EXPRESSION TAG	UNP P0A6A8
C	2	SER	-	EXPRESSION TAG	UNP P0A6A8

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
C	3	SER	-	EXPRESSION TAG	UNP P0A6A8
C	4	HIS	-	EXPRESSION TAG	UNP P0A6A8
C	5	HIS	-	EXPRESSION TAG	UNP P0A6A8
C	6	HIS	-	EXPRESSION TAG	UNP P0A6A8
C	7	HIS	-	EXPRESSION TAG	UNP P0A6A8
C	8	HIS	-	EXPRESSION TAG	UNP P0A6A8
C	9	HIS	-	EXPRESSION TAG	UNP P0A6A8
C	10	SER	-	EXPRESSION TAG	UNP P0A6A8
C	11	SER	-	EXPRESSION TAG	UNP P0A6A8
C	12	GLY	-	EXPRESSION TAG	UNP P0A6A8
C	13	LEU	-	EXPRESSION TAG	UNP P0A6A8
C	14	VAL	-	EXPRESSION TAG	UNP P0A6A8
C	15	PRO	-	EXPRESSION TAG	UNP P0A6A8
C	16	ARG	-	EXPRESSION TAG	UNP P0A6A8
C	17	GLY	-	EXPRESSION TAG	UNP P0A6A8
C	18	SER	-	EXPRESSION TAG	UNP P0A6A8
C	19	HIS	-	EXPRESSION TAG	UNP P0A6A8
E	1	GLY	-	EXPRESSION TAG	UNP P0A6A8
E	2	SER	-	EXPRESSION TAG	UNP P0A6A8
E	3	SER	-	EXPRESSION TAG	UNP P0A6A8
E	4	HIS	-	EXPRESSION TAG	UNP P0A6A8
E	5	HIS	-	EXPRESSION TAG	UNP P0A6A8
E	6	HIS	-	EXPRESSION TAG	UNP P0A6A8
E	7	HIS	-	EXPRESSION TAG	UNP P0A6A8
E	8	HIS	-	EXPRESSION TAG	UNP P0A6A8
E	9	HIS	-	EXPRESSION TAG	UNP P0A6A8
E	10	SER	-	EXPRESSION TAG	UNP P0A6A8
E	11	SER	-	EXPRESSION TAG	UNP P0A6A8
E	12	GLY	-	EXPRESSION TAG	UNP P0A6A8
E	13	LEU	-	EXPRESSION TAG	UNP P0A6A8
E	14	VAL	-	EXPRESSION TAG	UNP P0A6A8
E	15	PRO	-	EXPRESSION TAG	UNP P0A6A8
E	16	ARG	-	EXPRESSION TAG	UNP P0A6A8
E	17	GLY	-	EXPRESSION TAG	UNP P0A6A8
E	18	SER	-	EXPRESSION TAG	UNP P0A6A8
E	19	HIS	-	EXPRESSION TAG	UNP P0A6A8
G	1	GLY	-	EXPRESSION TAG	UNP P0A6A8
G	2	SER	-	EXPRESSION TAG	UNP P0A6A8
G	3	SER	-	EXPRESSION TAG	UNP P0A6A8
G	4	HIS	-	EXPRESSION TAG	UNP P0A6A8
G	5	HIS	-	EXPRESSION TAG	UNP P0A6A8
G	6	HIS	-	EXPRESSION TAG	UNP P0A6A8

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
G	7	HIS	-	EXPRESSION TAG	UNP P0A6A8
G	8	HIS	-	EXPRESSION TAG	UNP P0A6A8
G	9	HIS	-	EXPRESSION TAG	UNP P0A6A8
G	10	SER	-	EXPRESSION TAG	UNP P0A6A8
G	11	SER	-	EXPRESSION TAG	UNP P0A6A8
G	12	GLY	-	EXPRESSION TAG	UNP P0A6A8
G	13	LEU	-	EXPRESSION TAG	UNP P0A6A8
G	14	VAL	-	EXPRESSION TAG	UNP P0A6A8
G	15	PRO	-	EXPRESSION TAG	UNP P0A6A8
G	16	ARG	-	EXPRESSION TAG	UNP P0A6A8
G	17	GLY	-	EXPRESSION TAG	UNP P0A6A8
G	18	SER	-	EXPRESSION TAG	UNP P0A6A8
G	19	HIS	-	EXPRESSION TAG	UNP P0A6A8

- Molecule 2 is a protein called Biotin biosynthesis cytochrome P450-like enzyme.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	382	Total	C	N	O	S	0	0	0
			3056	1945	529	568	14			
2	D	385	Total	C	N	O	S	0	0	0
			3080	1958	535	573	14			
2	F	381	Total	C	N	O	S	0	0	0
			3053	1943	531	565	14			
2	H	382	Total	C	N	O	S	0	0	0
			3052	1942	529	567	14			

There are 40 discrepancies between the modelled and reference sequences:

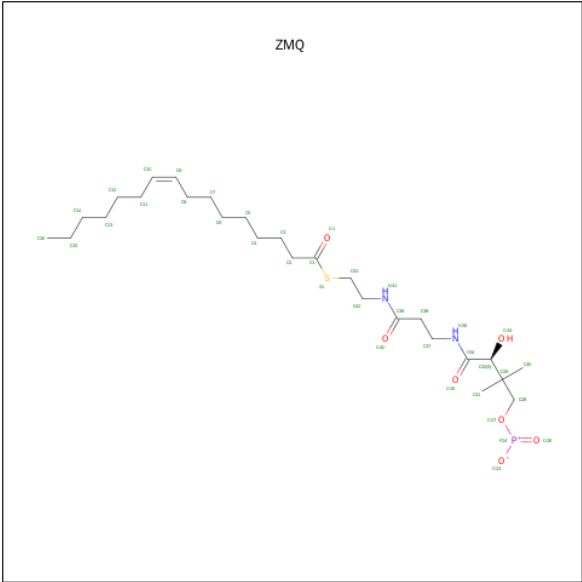
Chain	Residue	Modelled	Actual	Comment	Reference
B	395	ALA	-	EXPRESSION TAG	UNP P53554
B	396	SER	-	EXPRESSION TAG	UNP P53554
B	397	TRP	-	EXPRESSION TAG	UNP P53554
B	398	SER	-	EXPRESSION TAG	UNP P53554
B	399	HIS	-	EXPRESSION TAG	UNP P53554
B	400	PRO	-	EXPRESSION TAG	UNP P53554
B	401	GLN	-	EXPRESSION TAG	UNP P53554
B	402	PHE	-	EXPRESSION TAG	UNP P53554
B	403	GLU	-	EXPRESSION TAG	UNP P53554
B	404	LYS	-	EXPRESSION TAG	UNP P53554
D	395	ALA	-	EXPRESSION TAG	UNP P53554
D	396	SER	-	EXPRESSION TAG	UNP P53554
D	397	TRP	-	EXPRESSION TAG	UNP P53554

*Continued on next page...*

*Continued from previous page...*

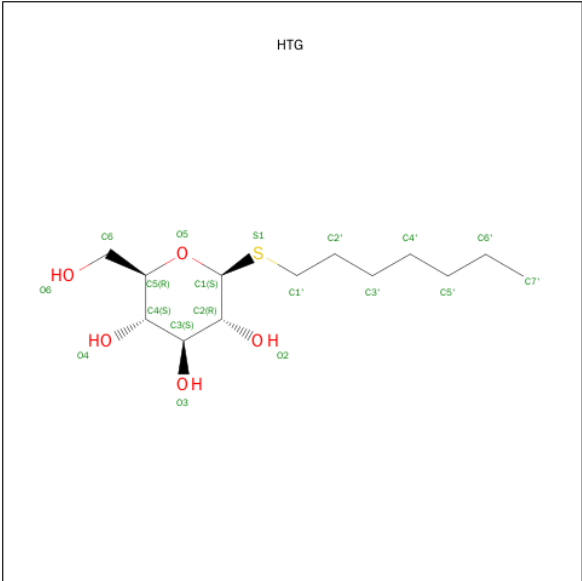
Chain	Residue	Modelled	Actual	Comment	Reference
D	398	SER	-	EXPRESSION TAG	UNP P53554
D	399	HIS	-	EXPRESSION TAG	UNP P53554
D	400	PRO	-	EXPRESSION TAG	UNP P53554
D	401	GLN	-	EXPRESSION TAG	UNP P53554
D	402	PHE	-	EXPRESSION TAG	UNP P53554
D	403	GLU	-	EXPRESSION TAG	UNP P53554
D	404	LYS	-	EXPRESSION TAG	UNP P53554
F	395	ALA	-	EXPRESSION TAG	UNP P53554
F	396	SER	-	EXPRESSION TAG	UNP P53554
F	397	TRP	-	EXPRESSION TAG	UNP P53554
F	398	SER	-	EXPRESSION TAG	UNP P53554
F	399	HIS	-	EXPRESSION TAG	UNP P53554
F	400	PRO	-	EXPRESSION TAG	UNP P53554
F	401	GLN	-	EXPRESSION TAG	UNP P53554
F	402	PHE	-	EXPRESSION TAG	UNP P53554
F	403	GLU	-	EXPRESSION TAG	UNP P53554
F	404	LYS	-	EXPRESSION TAG	UNP P53554
H	395	ALA	-	EXPRESSION TAG	UNP P53554
H	396	SER	-	EXPRESSION TAG	UNP P53554
H	397	TRP	-	EXPRESSION TAG	UNP P53554
H	398	SER	-	EXPRESSION TAG	UNP P53554
H	399	HIS	-	EXPRESSION TAG	UNP P53554
H	400	PRO	-	EXPRESSION TAG	UNP P53554
H	401	GLN	-	EXPRESSION TAG	UNP P53554
H	402	PHE	-	EXPRESSION TAG	UNP P53554
H	403	GLU	-	EXPRESSION TAG	UNP P53554
H	404	LYS	-	EXPRESSION TAG	UNP P53554

- Molecule 3 is {[ (3S)-4-{[3-({2-[(9Z)-HEXADEC-9-ENOYLSULFANYL]ETHYL}AMINO)-3-OXOPROPYL]AMINO}-3-HYDROXY-2,2-DIMETHYL-4-OXOBUTYL]OXY}(OXO)PHOSPHONIUMOLATE (three-letter code: ZMQ) (formula: C<sub>27</sub>H<sub>49</sub>N<sub>2</sub>O<sub>7</sub>PS).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	S	0	0
			38	27	2	7	1	1		
3	C	1	Total	C	N	O	P	S	0	0
			38	27	2	7	1	1		
3	E	1	Total	C	N	O	P	S	0	0
			38	27	2	7	1	1		
3	G	1	Total	C	N	O	P	S	0	0
			38	27	2	7	1	1		

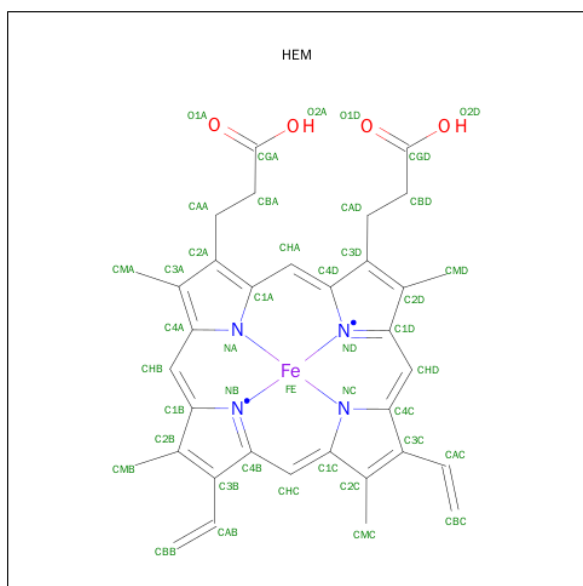
- Molecule 4 is HEPTYL 1-THIOHEXOPYRANOSIDE (three-letter code: HTG) (formula:  $C_{13}H_{26}O_5S$ ).





Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O S 15 9 5 1	0	0
4	A	1	Total C 7 7	0	0
4	C	1	Total C O S 12 6 5 1	0	0
4	D	1	Total C 5 5	0	0
4	E	1	Total C O S 12 6 5 1	0	0
4	F	1	Total C 6 6	0	0
4	G	1	Total C O S 12 6 5 1	0	0
4	H	1	Total C S 7 6 1	0	0

- Molecule 5 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula:  $C_{34}H_{32}FeN_4O_4$ ).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total C Fe N O 43 34 1 4 4	0	0
5	D	1	Total C Fe N O 43 34 1 4 4	0	0
5	F	1	Total C Fe N O 43 34 1 4 4	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	H	1	Total	C	Fe	N	O	
			43	34	1	4	4	
							0	0

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	1	Total	Cl		
			1	1	0	0
6	F	1	Total	Cl		
			1	1	0	0

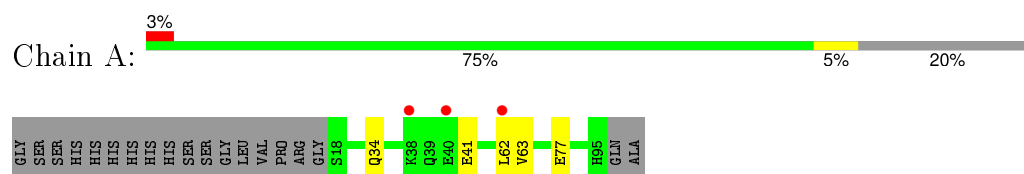
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	53	Total	O		
			53	53	0	0
7	B	219	Total	O		
			219	219	0	0
7	C	45	Total	O		
			45	45	0	0
7	D	189	Total	O		
			189	189	0	0
7	E	71	Total	O		
			71	71	0	0
7	F	223	Total	O		
			223	223	0	0
7	G	51	Total	O		
			51	51	0	0
7	H	159	Total	O		
			159	159	0	0

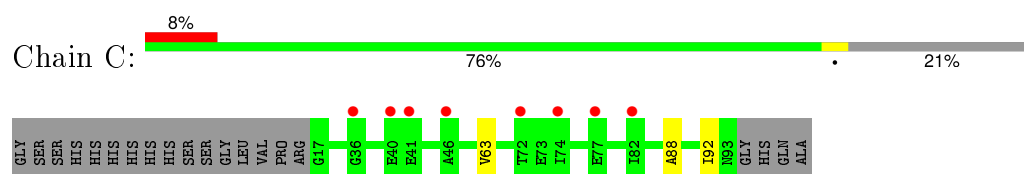
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of 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.

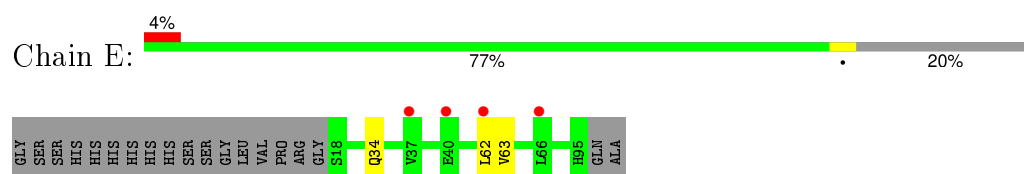
- Molecule 1: Acyl carrier protein



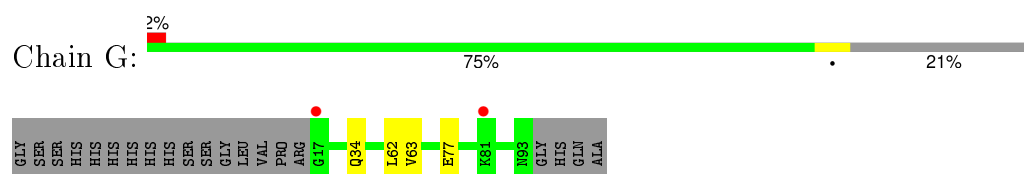
- Molecule 1: Acyl carrier protein



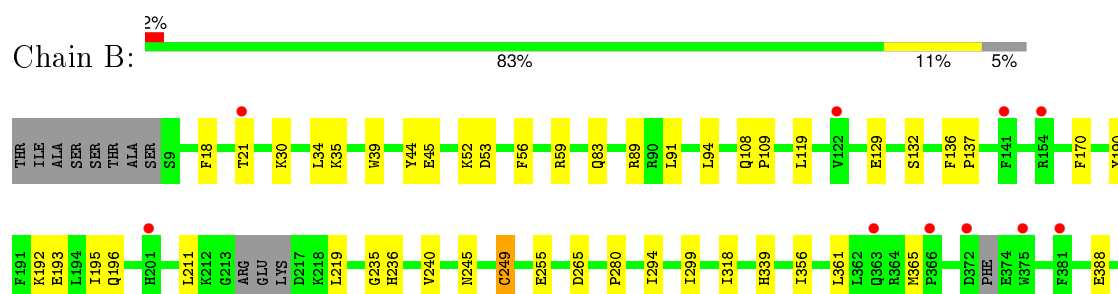
- Molecule 1: Acyl carrier protein



- Molecule 1: Acyl carrier protein




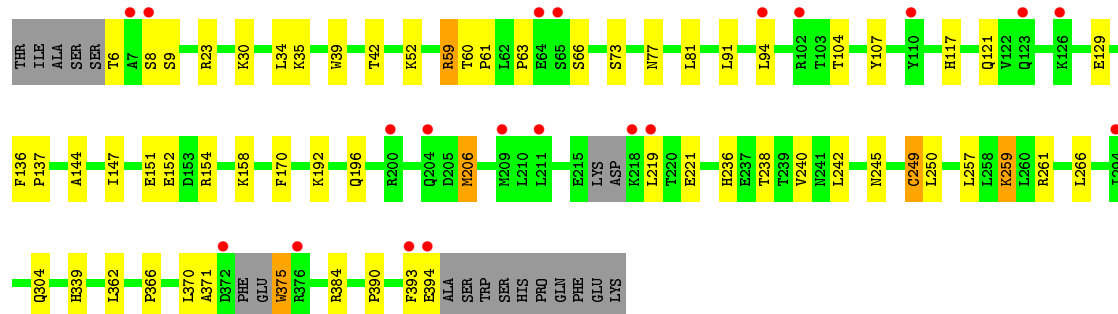
- Molecule 2: Biotin biosynthesis cytochrome P450-like enzyme




E394  
ALA  
SER  
TRP  
SER  
HIS  
PRO  
GLN  
GLU  
LYS

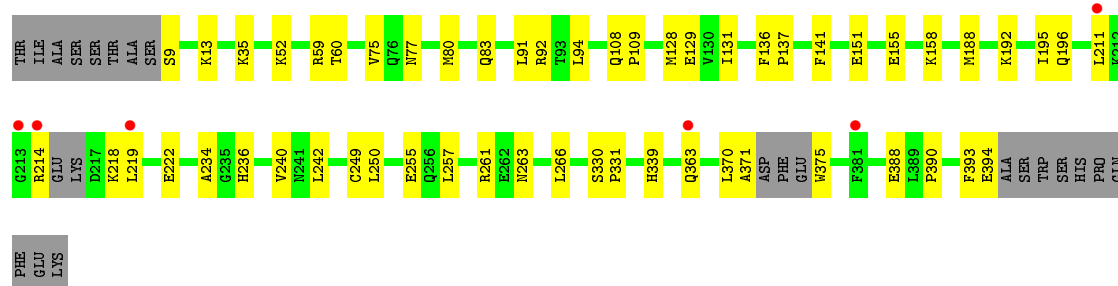
- Molecule 2: Biotin biosynthesis cytochrome P450-like enzyme

Chain D: 




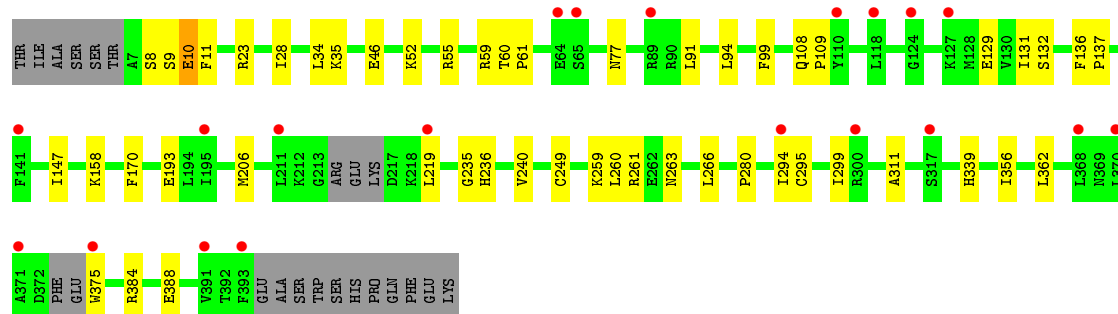
- Molecule 2: Biotin biosynthesis cytochrome P450-like enzyme

Chain F: 



- Molecule 2: Biotin biosynthesis cytochrome P450-like enzyme

Chain H: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	61.30Å 92.10Å 107.70Å 109.00° 89.20° 90.10°	Depositor
Resolution (Å)	20.00 – 2.10 20.00 – 2.10	Depositor EDS
% Data completeness (in resolution range)	96.8 (20.00-2.10) 83.8 (20.00-2.10)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.09	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.21 (at 2.09Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, $R_{free}$	0.241 , 0.285 0.242 , 0.286	Depositor DCC
$R_{free}$ test set	6319 reflections (5.29%)	DCC
Wilson B-factor (Å <sup>2</sup> )	30.2	Xtriage
Anisotropy	0.043	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 26.1	EDS
Estimated twinning fraction	0.267 for h,-k,-l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	0 of 125760 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	16057	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.79% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: HTG, HEM, ZMQ, CL

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	0.24	0/611	0.37	0/826
1	C	0.25	0/600	0.35	0/811
1	E	0.23	0/611	0.37	0/826
1	G	0.24	0/600	0.36	0/811
2	B	0.26	0/3122	0.39	0/4231
2	D	0.24	0/3146	0.38	0/4263
2	F	0.24	0/3119	0.38	0/4226
2	H	0.25	0/3118	0.39	1/4226 (0.0%)
All	All	0.25	0/14927	0.38	1/20220 (0.0%)

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
2	H	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	260	LEU	N-CA-C	-5.21	96.92	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	H	259	LYS	Peptide

## 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	606	0	578	4	0
1	C	596	0	571	2	0
1	E	606	0	578	2	0
1	G	596	0	571	2	0
2	B	3056	0	3049	32	0
2	D	3080	0	3077	44	0
2	F	3053	0	3054	42	0
2	H	3052	0	3049	40	0
3	A	38	0	47	3	0
3	C	38	0	47	5	0
3	E	38	0	48	4	0
3	G	38	0	47	2	0
4	A	22	0	28	2	0
4	C	12	0	11	0	0
4	D	5	0	9	1	0
4	E	12	0	11	0	0
4	F	6	0	11	0	0
4	G	12	0	11	0	0
4	H	7	0	10	1	0
5	B	43	0	30	2	0
5	D	43	0	30	1	0
5	F	43	0	30	4	0
5	H	43	0	30	2	0
6	B	1	0	0	1	0
6	F	1	0	0	1	0
7	A	53	0	0	1	0
7	B	219	0	0	1	0
7	C	45	0	0	0	0
7	D	189	0	0	2	0
7	E	71	0	0	0	0
7	F	223	0	0	4	0
7	G	51	0	0	0	0
7	H	159	0	0	1	0
All	All	16057	0	14927	171	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 6.

All (171) 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:H:8:SER:HA	2:H:10:GLU:H	1.27	0.99
2:D:60:THR:HG21	2:D:77:ASN:OD1	1.66	0.95
2:D:94:LEU:HD13	2:D:219:LEU:HD13	1.49	0.94
2:F:9:SER:O	2:F:13:LYS:HG2	1.76	0.85
2:F:393:PHE:HD1	2:F:394:GLU:HG2	1.44	0.83
2:F:255:GLU:HB2	6:F:418:CL:CL	2.23	0.76
3:E:99:ZMQ:H37	3:E:99:ZMQ:O33	1.87	0.75
3:E:99:ZMQ:H9	2:F:234:ALA:HB2	1.67	0.74
3:E:99:ZMQ:C37	3:E:99:ZMQ:O33	2.37	0.73
2:H:8:SER:HA	2:H:10:GLU:N	2.02	0.72
3:G:99:ZMQ:O35	3:G:99:ZMQ:H30A	1.88	0.71
2:H:23:ARG:NH2	2:H:311:ALA:O	2.23	0.71
2:F:60:THR:OG1	7:F:502:HOH:O	2.09	0.71
2:B:192:LYS:O	2:B:196:GLN:HG2	1.91	0.71
2:H:8:SER:CA	2:H:10:GLU:H	2.04	0.70
2:D:94:LEU:CD1	2:D:219:LEU:HD13	2.22	0.68
2:H:129:GLU:OE1	2:H:388:GLU:HB2	1.92	0.68
2:D:192:LYS:O	2:D:196:GLN:HG2	1.93	0.68
2:F:257:LEU:HD21	2:F:261:ARG:HH21	1.59	0.67
2:F:94:LEU:HD13	2:F:219:LEU:HG	1.77	0.67
3:A:99:ZMQ:C37	3:A:99:ZMQ:O33	2.42	0.67
2:H:94:LEU:HD13	2:H:219:LEU:HG	1.76	0.66
2:D:34:LEU:HD12	2:D:170:PHE:HB3	1.80	0.63
2:H:91:LEU:HD23	2:H:219:LEU:HD21	1.81	0.63
2:F:263:ASN:OD1	2:F:266:LEU:HG	2.00	0.61
2:D:6:THR:HG23	2:D:9:SER:H	1.66	0.61
2:B:236:HIS:O	2:B:240:VAL:HG23	2.00	0.61
2:F:75:VAL:HG22	2:F:188:MET:HE3	1.82	0.61
2:D:23:ARG:NH1	2:D:42:THR:O	2.34	0.61
2:F:131:ILE:HD12	2:F:388:GLU:HA	1.81	0.60
2:F:242:LEU:HD22	5:F:405:HEM:HBB1	1.84	0.59
2:F:363:GLN:HB3	7:F:486:HOH:O	2.01	0.59
2:F:80:MET:HE1	2:F:92:ARG:HG3	1.84	0.59
2:B:34:LEU:HD12	2:B:170:PHE:HB3	1.83	0.59
2:H:8:SER:HA	2:H:9:SER:HB3	1.84	0.59
2:D:136:PHE:CZ	2:D:158:LYS:HG3	2.37	0.59
2:D:52:LYS:HG3	2:D:339:HIS:CD2	2.38	0.58
2:D:370:LEU:HD13	2:D:375:TRP:CH2	2.38	0.58
2:H:52:LYS:HE3	2:H:339:HIS:NE2	2.19	0.58
2:B:91:LEU:HD23	2:B:219:LEU:CD2	2.34	0.57

*Continued on next page...*



*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:137:PRO:O	2:F:141:PHE:HD2	1.86	0.57
2:H:129:GLU:HG2	2:H:132:SER:HB2	1.87	0.57
2:H:136:PHE:CZ	2:H:158:LYS:HG3	2.39	0.57
2:F:151:GLU:HG2	7:F:619:HOH:O	2.05	0.57
1:C:63:VAL:HG11	2:D:35:LYS:HE2	1.87	0.57
1:E:34:GLN:HG2	1:E:62:LEU:HG	1.87	0.56
2:D:370:LEU:HD13	2:D:375:TRP:CZ3	2.40	0.56
2:H:8:SER:CA	2:H:9:SER:HB3	2.36	0.56
2:H:60:THR:HG21	2:H:77:ASN:CG	2.26	0.56
1:G:34:GLN:HG2	1:G:62:LEU:HG	1.86	0.56
2:B:94:LEU:HD13	2:B:219:LEU:HG	1.89	0.55
1:A:41:GLU:HA	7:A:151:HOH:O	2.04	0.55
2:H:236:HIS:O	2:H:240:VAL:HG23	2.07	0.54
2:B:52:LYS:HE2	2:B:339:HIS:NE2	2.22	0.54
2:F:91:LEU:HD23	2:F:219:LEU:CD2	2.38	0.54
3:G:99:ZMQ:C30	3:G:99:ZMQ:O35	2.56	0.54
2:F:80:MET:HE2	5:F:405:HEM:HBD2	1.88	0.54
2:B:18:PHE:O	2:B:21:THR:HG22	2.07	0.54
2:H:99:PHE:CE2	2:H:206:MET:HE1	2.42	0.54
1:A:77:GLU:HG2	4:A:101:HTG:H7'1	1.88	0.54
2:B:235:GLY:HA2	5:B:405:HEM:CBB	2.38	0.54
2:B:89:ARG:HD2	7:B:555:HOH:O	2.08	0.53
2:F:236:HIS:O	2:F:240:VAL:HG23	2.08	0.53
2:F:192:LYS:HE2	2:F:222:GLU:HG2	1.90	0.53
2:F:91:LEU:HD23	2:F:219:LEU:HD21	1.91	0.53
2:D:236:HIS:O	2:D:240:VAL:HG23	2.08	0.53
2:F:192:LYS:O	2:F:196:GLN:HG2	2.09	0.52
2:B:265:ASP:OD2	2:D:259:LYS:HE3	2.09	0.52
2:F:80:MET:HE2	5:F:405:HEM:CBD	2.39	0.52
3:C:99:ZMQ:O40	2:D:59:ARG:NH2	2.40	0.52
1:E:63:VAL:HG11	2:F:35:LYS:HE2	1.90	0.52
2:H:91:LEU:HD23	2:H:219:LEU:CD2	2.39	0.52
2:H:261:ARG:NH1	2:H:362:LEU:O	2.43	0.52
2:F:370:LEU:HD22	2:F:375:TRP:CH2	2.45	0.52
2:D:393:PHE:HD1	2:D:394:GLU:HB2	1.75	0.51
2:F:393:PHE:CD1	2:F:394:GLU:HG2	2.35	0.51
2:H:34:LEU:HD22	2:H:170:PHE:HB3	1.93	0.50
2:D:261:ARG:NH1	2:D:362:LEU:O	2.44	0.50
2:B:255:GLU:HB2	6:B:416:CL:CL	2.49	0.50
2:B:190:TYR:O	2:B:193:GLU:HG2	2.11	0.50
2:D:250:LEU:HB3	2:D:257:LEU:HD13	1.93	0.50

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:8:SER:HA	4:D:417:HTG:H4'2	1.94	0.50
2:F:94:LEU:CD2	2:F:214:ARG:H	2.24	0.49
3:C:99:ZMQ:H31	3:C:99:ZMQ:O35	2.12	0.49
2:D:242:LEU:HD22	5:D:405:HEM:HBB1	1.95	0.49
2:F:136:PHE:HB3	2:F:137:PRO:HD3	1.95	0.48
2:F:94:LEU:HD23	2:F:214:ARG:H	1.77	0.48
3:C:99:ZMQ:H9	2:D:238:THR:HG21	1.95	0.48
1:G:63:VAL:HG11	2:H:35:LYS:HE2	1.95	0.48
2:F:195:ILE:HG23	2:F:211:LEU:HD21	1.96	0.47
2:B:129:GLU:OE1	2:B:388:GLU:HB2	2.14	0.47
2:H:147:ILE:HA	2:H:206:MET:HB3	1.96	0.47
2:H:263:ASN:OD1	2:H:266:LEU:HG	2.14	0.47
2:F:257:LEU:HD21	2:F:261:ARG:NH2	2.26	0.47
2:D:91:LEU:HD23	2:D:219:LEU:HD11	1.96	0.46
2:F:371:ALA:HB3	2:F:390:PRO:HB2	1.98	0.46
2:D:375:TRP:HA	7:D:590:HOH:O	2.16	0.45
2:D:59:ARG:NH1	2:D:304:GLN:OE1	2.50	0.45
2:B:136:PHE:HB3	2:B:137:PRO:HD3	1.97	0.45
3:C:99:ZMQ:C31	3:C:99:ZMQ:O35	2.63	0.45
2:B:129:GLU:HG3	2:B:132:SER:OG	2.16	0.45
2:D:73:SER:O	2:D:77:ASN:ND2	2.49	0.45
2:B:91:LEU:HD23	2:B:219:LEU:HD22	1.99	0.45
2:H:11:PHE:CE2	4:H:417:HTG:H3'1	2.51	0.45
2:F:218:LYS:HA	7:F:605:HOH:O	2.17	0.45
2:B:52:LYS:NZ	2:D:52:LYS:HD3	2.32	0.45
2:D:52:LYS:HE3	7:D:470:HOH:O	2.16	0.45
2:H:52:LYS:HG3	2:H:339:HIS:CD2	2.52	0.45
2:F:370:LEU:HB3	2:F:375:TRP:HH2	1.81	0.45
2:H:294:ILE:HD11	2:H:299:ILE:HD12	1.99	0.45
2:D:151:GLU:HG2	2:D:154:ARG:NH2	2.33	0.44
2:B:195:ILE:HG23	2:B:211:LEU:HD21	1.99	0.44
2:D:245:ASN:O	2:D:249:CYS:HB2	2.17	0.44
2:H:129:GLU:HG3	2:H:129:GLU:O	2.18	0.44
2:B:30:LYS:HB2	2:B:39:TRP:CZ3	2.53	0.44
2:H:108:GLN:HB3	2:H:109:PRO:HD3	2.00	0.44
2:D:144:ALA:HB3	2:D:154:ARG:HD3	2.00	0.43
2:B:294:ILE:HD11	2:B:299:ILE:HD12	2.00	0.43
2:H:280:PRO:HD2	5:H:405:HEM:HBC1	1.99	0.43
2:D:371:ALA:HB3	2:D:390:PRO:HB2	2.00	0.43
2:F:330:SER:HA	2:F:331:PRO:HA	1.83	0.43
2:B:44:TYR:CG	2:B:318:ILE:HG13	2.54	0.43

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:250:LEU:HB3	2:F:257:LEU:HD12	2.00	0.43
2:F:80:MET:HE2	5:F:405:HEM:CGD	2.49	0.43
2:B:34:LEU:O	2:B:35:LYS:HB2	2.18	0.43
2:D:104:THR:HA	2:D:107:TYR:CD2	2.54	0.43
2:H:55:ARG:NH2	7:H:545:HOH:O	2.52	0.43
2:B:119:LEU:HD22	2:B:365:MET:CE	2.49	0.42
2:F:52:LYS:HG3	2:F:339:HIS:CD2	2.54	0.42
2:H:8:SER:N	2:H:9:SER:HB3	2.34	0.42
2:F:137:PRO:O	2:F:141:PHE:CD2	2.71	0.42
2:D:147:ILE:HA	2:D:206:MET:HB3	2.02	0.42
3:E:99:ZMQ:H9	2:F:234:ALA:CB	2.42	0.42
2:H:129:GLU:CG	2:H:132:SER:HB2	2.49	0.42
2:F:77:ASN:O	2:F:83:GLN:NE2	2.43	0.42
2:D:144:ALA:CB	2:D:154:ARG:HD3	2.49	0.42
2:F:108:GLN:HB3	2:F:109:PRO:HD3	2.02	0.42
2:D:60:THR:HA	2:D:61:PRO:HD3	1.88	0.42
2:B:53:ASP:HB3	2:B:56:PHE:HD2	1.85	0.42
2:H:8:SER:CA	2:H:9:SER:CB	2.98	0.42
3:A:99:ZMQ:H37A	3:A:99:ZMQ:O33	2.19	0.42
2:D:261:ARG:NH1	2:D:366:PRO:HA	2.35	0.41
2:H:131:ILE:HD12	2:H:388:GLU:HA	2.03	0.41
2:B:45:GLU:OE1	2:B:45:GLU:HA	2.20	0.41
2:H:129:GLU:HG3	2:H:132:SER:H	1.85	0.41
2:D:196:GLN:NE2	2:D:221:GLU:OE1	2.52	0.41
2:H:235:GLY:HA2	5:H:405:HEM:HAB	2.02	0.41
2:B:108:GLN:HB3	2:B:109:PRO:HD3	2.03	0.41
2:B:361:LEU:O	2:B:365:MET:HG2	2.20	0.41
4:A:100:HTG:H1	4:A:100:HTG:H2'1	1.87	0.41
2:B:265:ASP:HB3	2:D:266:LEU:HD21	2.03	0.41
2:D:151:GLU:H	2:D:151:GLU:HG3	1.64	0.41
2:D:30:LYS:HB2	2:D:39:TRP:CZ3	2.56	0.41
1:A:63:VAL:HG11	2:B:35:LYS:HE2	2.03	0.41
2:H:60:THR:HA	2:H:61:PRO:HD3	1.87	0.41
3:A:99:ZMQ:H37	3:A:99:ZMQ:O33	2.18	0.41
2:B:280:PRO:HD2	5:B:405:HEM:HBC1	2.01	0.41
1:C:88:ALA:O	1:C:92:ILE:HG12	2.20	0.41
2:D:117:HIS:O	2:D:121:GLN:HG2	2.21	0.41
2:B:108:GLN:HG3	2:B:356:ILE:HD11	2.03	0.41
2:D:63:PRO:HB2	2:D:66:SER:HB2	2.02	0.41
2:H:99:PHE:HE2	2:H:206:MET:HE1	1.86	0.40
2:F:155:GLU:HA	2:F:158:LYS:HD2	2.02	0.40

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:34:GLN:HG2	1:A:62:LEU:HG	2.02	0.40
2:H:28:ILE:HD12	2:H:295:CYS:HB3	2.03	0.40
2:D:136:PHE:HB3	2:D:137:PRO:HD3	2.02	0.40
3:C:99:ZMQ:H3A	2:D:81:LEU:HD21	2.04	0.40
2:H:136:PHE:HB3	2:H:137:PRO:HD3	2.03	0.40
2:H:46:GLU:N	2:H:46:GLU:OE1	2.43	0.40
2:B:245:ASN:O	2:B:249:CYS:HB2	2.21	0.40
2:H:108:GLN:HG3	2:H:356:ILE:HD11	2.02	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	76/97 (78%)	76 (100%)	0	0	100	100
1	C	75/97 (77%)	75 (100%)	0	0	100	100
1	E	76/97 (78%)	76 (100%)	0	0	100	100
1	G	75/97 (77%)	75 (100%)	0	0	100	100
2	B	376/404 (93%)	368 (98%)	8 (2%)	0	100	100
2	D	379/404 (94%)	370 (98%)	9 (2%)	0	100	100
2	F	375/404 (93%)	367 (98%)	8 (2%)	0	100	100
2	H	376/404 (93%)	363 (96%)	13 (4%)	0	100	100
All	All	1808/2004 (90%)	1770 (98%)	38 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	68/83 (82%)	68 (100%)	0	100	100
1	C	67/83 (81%)	67 (100%)	0	100	100
1	E	68/83 (82%)	68 (100%)	0	100	100
1	G	67/83 (81%)	66 (98%)	1 (2%)	72	78
2	B	335/355 (94%)	332 (99%)	3 (1%)	84	89
2	D	338/355 (95%)	330 (98%)	8 (2%)	57	61
2	F	335/355 (94%)	331 (99%)	4 (1%)	78	84
2	H	335/355 (94%)	329 (98%)	6 (2%)	66	72
All	All	1613/1752 (92%)	1591 (99%)	22 (1%)	74	80

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	59	ARG
2	B	83	GLN
2	B	249	CYS
2	D	59	ARG
2	D	129	GLU
2	D	152	GLU
2	D	206	MET
2	D	249	CYS
2	D	259	LYS
2	D	375	TRP
2	D	384	ARG
2	F	59	ARG
2	F	128	MET
2	F	129	GLU
2	F	249	CYS
1	G	77	GLU
2	H	10	GLU
2	H	59	ARG
2	H	193	GLU

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
2	H	249	CYS
2	H	375	TRP
2	H	384	ARG

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

Mol	Chain	Res	Type
1	G	39	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](#)

Of 18 ligands modelled in this entry, 2 are monoatomic - leaving 16 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	$\# Z  > 2$
4	HTG	A	100	-	15,15,19	3.50	2 (13%)	18,20,24	1.59	1 (5%)
4	HTG	A	101	-	6,6,19	0.52	0	5,5,24	0.63	0
3	ZMQ	A	99	1	30,37,37	2.13	6 (20%)	36,44,44	2.29	10 (27%)
5	HEM	B	405	2	30,50,50	2.18	8 (26%)	24,82,82	2.30	9 (37%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	HTG	C	100	-	11,12,19	0.30	0	15,17,24	0.74	0
3	ZMQ	C	99	1	30,37,37	2.14	5 (16%)	36,44,44	2.16	8 (22%)
5	HEM	D	405	2	30,50,50	2.24	8 (26%)	24,82,82	2.29	8 (33%)
4	HTG	D	417	-	4,4,19	0.45	0	3,3,24	0.55	0
4	HTG	E	100	-	11,12,19	0.31	0	15,17,24	0.72	0
3	ZMQ	E	99	1	30,37,37	2.12	5 (16%)	36,44,44	2.10	4 (11%)
5	HEM	F	405	2	30,50,50	2.25	8 (26%)	24,82,82	2.35	9 (37%)
4	HTG	F	417	-	5,5,19	0.50	0	4,4,24	0.54	0
4	HTG	G	100	-	11,12,19	0.29	0	15,17,24	0.84	0
3	ZMQ	G	99	1	30,37,37	2.16	5 (16%)	36,44,44	2.35	8 (22%)
5	HEM	H	405	2	30,50,50	2.21	7 (23%)	24,82,82	2.31	10 (41%)
4	HTG	H	417	-	6,6,19	1.74	1 (16%)	4,5,24	0.63	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	HTG	A	100	-	-	0/6/26/30	0/1/1/1
4	HTG	A	101	-	-	0/4/4/30	0/0/0/1
3	ZMQ	A	99	1	-	1/42/44/44	0/0/0/0
5	HEM	B	405	2	-	0/10/54/54	0/0/8/8
4	HTG	C	100	-	-	0/2/22/30	0/1/1/1
3	ZMQ	C	99	1	-	0/42/44/44	0/0/0/0
5	HEM	D	405	2	-	0/10/54/54	0/0/8/8
4	HTG	D	417	-	-	0/2/2/30	0/0/0/1
4	HTG	E	100	-	-	0/2/22/30	0/1/1/1
3	ZMQ	E	99	1	-	1/42/44/44	0/0/0/0
5	HEM	F	405	2	-	0/10/54/54	0/0/8/8
4	HTG	F	417	-	-	0/3/3/30	0/0/0/1
4	HTG	G	100	-	-	0/2/22/30	0/1/1/1
3	ZMQ	G	99	1	-	0/42/44/44	0/0/0/0
5	HEM	H	405	2	-	0/10/54/54	0/0/8/8
4	HTG	H	417	-	-	0/4/4/30	0/0/0/1

All (55) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	100	HTG	C1'-S1	-10.72	1.66	1.81
4	A	100	HTG	C1-S1	-8.18	1.67	1.80

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	F	405	HEM	C3B-C4B	-7.44	1.45	1.51
5	D	405	HEM	C3B-C4B	-7.28	1.45	1.51
5	B	405	HEM	C3B-C4B	-7.22	1.45	1.51
5	H	405	HEM	C3B-C4B	-7.06	1.45	1.51
5	H	405	HEM	C3D-C4D	-5.14	1.45	1.51
5	F	405	HEM	C3D-C4D	-5.05	1.45	1.51
5	B	405	HEM	C3D-C4D	-5.05	1.45	1.51
5	D	405	HEM	C3D-C4D	-5.02	1.45	1.51
4	H	417	HTG	C1'-S1	-4.07	1.66	1.80
5	F	405	HEM	C2C-C1C	-3.67	1.45	1.52
5	H	405	HEM	C2C-C1C	-3.67	1.45	1.52
5	D	405	HEM	C2C-C1C	-3.63	1.45	1.52
5	B	405	HEM	C2C-C1C	-3.60	1.45	1.52
3	G	99	ZMQ	C34-N36	-3.41	1.26	1.33
3	C	99	ZMQ	C34-N36	-3.30	1.26	1.33
3	A	99	ZMQ	C34-N36	-3.00	1.27	1.33
3	E	99	ZMQ	C34-N36	-2.97	1.27	1.33
3	G	99	ZMQ	C39-N41	-2.87	1.26	1.33
3	C	99	ZMQ	C39-N41	-2.86	1.26	1.33
3	A	99	ZMQ	C39-N41	-2.68	1.26	1.33
3	E	99	ZMQ	C39-N41	-2.61	1.27	1.33
5	D	405	HEM	C2D-C1D	-2.19	1.44	1.51
5	F	405	HEM	C2D-C1D	-2.12	1.44	1.51
5	B	405	HEM	C2D-C1D	-2.11	1.44	1.51
5	B	405	HEM	C2B-C1B	-2.02	1.45	1.51
5	B	405	HEM	C3C-CAC	2.02	1.55	1.51
5	F	405	HEM	C3B-CAB	2.02	1.55	1.51
5	D	405	HEM	C1C-NC	2.09	1.38	1.36
3	A	99	ZMQ	C2-C1	2.09	1.53	1.50
5	D	405	HEM	C3B-CAB	2.10	1.55	1.51
5	F	405	HEM	C1C-NC	2.15	1.38	1.36
5	H	405	HEM	C1C-NC	2.15	1.38	1.36
5	F	405	HEM	FE-ND	2.19	2.09	1.97
5	B	405	HEM	FE-ND	2.31	2.09	1.97
5	H	405	HEM	FE-NC	2.32	2.04	1.95
5	H	405	HEM	C4C-NC	2.34	1.38	1.36
5	D	405	HEM	FE-ND	2.37	2.10	1.97
5	B	405	HEM	FE-NC	2.89	2.07	1.95
5	H	405	HEM	FE-ND	3.31	2.15	1.97
5	F	405	HEM	FE-NC	3.44	2.09	1.95
5	D	405	HEM	FE-NC	4.00	2.11	1.95
3	E	99	ZMQ	O40-C39	4.75	1.33	1.23

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	99	ZMQ	O40-C39	4.81	1.33	1.23
3	A	99	ZMQ	O40-C39	4.81	1.33	1.23
3	G	99	ZMQ	O40-C39	4.91	1.33	1.23
3	C	99	ZMQ	O35-C34	5.21	1.33	1.23
3	G	99	ZMQ	O35-C34	5.25	1.33	1.23
3	A	99	ZMQ	O35-C34	5.25	1.33	1.23
3	E	99	ZMQ	O35-C34	5.29	1.33	1.23
3	G	99	ZMQ	O1-C1	7.75	1.33	1.21
3	A	99	ZMQ	O1-C1	7.75	1.33	1.21
3	E	99	ZMQ	O1-C1	7.78	1.33	1.21
3	C	99	ZMQ	O1-C1	7.79	1.33	1.21

All (67) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	99	ZMQ	O1-C1-C2	-7.86	118.53	123.94
3	A	99	ZMQ	O1-C1-C2	-7.75	118.61	123.94
3	C	99	ZMQ	O1-C1-S1	-6.32	117.81	122.83
3	E	99	ZMQ	O1-C1-C2	-6.19	119.68	123.94
3	C	99	ZMQ	O1-C1-C2	-6.05	119.78	123.94
3	G	99	ZMQ	O1-C1-S1	-5.11	118.78	122.83
3	E	99	ZMQ	O1-C1-S1	-4.95	118.91	122.83
3	A	99	ZMQ	O1-C1-S1	-4.80	119.02	122.83
3	C	99	ZMQ	C43-C42-N41	-4.20	103.95	112.36
3	G	99	ZMQ	C43-C42-N41	-3.68	104.99	112.36
5	F	405	HEM	C3C-CAC-CBC	-3.39	119.26	124.46
5	H	405	HEM	C3B-CAB-CBB	-3.22	119.52	124.46
3	G	99	ZMQ	C38-C37-N36	-3.19	104.88	111.88
3	A	99	ZMQ	C43-C42-N41	-2.96	106.44	112.36
5	H	405	HEM	C3C-CAC-CBC	-2.59	120.49	124.46
3	C	99	ZMQ	C38-C37-N36	-2.53	106.34	111.88
5	D	405	HEM	C3C-CAC-CBC	-2.48	120.65	124.46
5	F	405	HEM	C3B-CAB-CBB	-2.41	120.75	124.46
5	B	405	HEM	C3C-CAC-CBC	-2.24	121.02	124.46
5	F	405	HEM	CBD-CAD-C3D	-2.20	107.14	113.55
3	A	99	ZMQ	C38-C37-N36	-2.16	107.15	111.88
5	H	405	HEM	C3B-C4B-NB	-2.09	107.62	111.63
5	B	405	HEM	CMA-C3A-C4A	-2.06	124.96	128.36
5	D	405	HEM	C2C-C1C-CHC	2.04	126.78	123.68
3	C	99	ZMQ	C43-S1-C1	2.04	109.37	102.09
3	G	99	ZMQ	C42-N41-C39	2.05	126.82	122.79
3	A	99	ZMQ	C32-C34-N36	2.07	121.05	116.47

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	99	ZMQ	C38-C39-N41	2.09	120.09	116.46
5	H	405	HEM	C2D-C3D-C4D	2.18	105.19	101.50
3	G	99	ZMQ	C43-S1-C1	2.18	109.86	102.09
5	B	405	HEM	C2C-C1C-CHC	2.24	127.08	123.68
5	H	405	HEM	C3B-C4B-CHC	2.41	126.56	123.16
3	C	99	ZMQ	C42-N41-C39	2.42	127.55	122.79
5	D	405	HEM	C2D-C3D-C4D	2.48	105.70	101.50
3	A	99	ZMQ	C43-S1-C1	2.52	111.06	102.09
5	B	405	HEM	C2D-C3D-C4D	2.53	105.79	101.50
5	F	405	HEM	C2D-C3D-C4D	2.57	105.86	101.50
3	A	99	ZMQ	C37-N36-C34	2.67	127.83	122.53
3	A	99	ZMQ	C42-N41-C39	2.69	128.08	122.79
5	H	405	HEM	CMD-C2D-C3D	2.85	126.97	114.35
5	B	405	HEM	CMD-C2D-C3D	2.88	127.09	114.35
5	D	405	HEM	CMD-C2D-C3D	2.95	127.41	114.35
5	F	405	HEM	CMD-C2D-C3D	2.98	127.53	114.35
3	C	99	ZMQ	C37-N36-C34	3.17	128.81	122.53
3	G	99	ZMQ	C37-N36-C34	3.28	129.02	122.53
3	E	99	ZMQ	C42-N41-C39	3.44	129.55	122.79
5	F	405	HEM	CMC-C2C-C3C	3.79	125.98	116.53
5	H	405	HEM	CMB-C2B-C3B	3.81	126.03	116.53
5	H	405	HEM	CMC-C2C-C3C	3.81	126.05	116.53
5	B	405	HEM	CMC-C2C-C3C	4.04	126.61	116.53
5	D	405	HEM	CMC-C2C-C3C	4.04	126.62	116.53
5	D	405	HEM	CMB-C2B-C3B	4.08	126.72	116.53
5	F	405	HEM	CMB-C2B-C3B	4.09	126.74	116.53
5	F	405	HEM	CAD-C3D-C4D	4.15	127.11	112.47
5	B	405	HEM	CMB-C2B-C3B	4.16	126.92	116.53
5	H	405	HEM	CAD-C3D-C4D	4.22	127.36	112.47
5	B	405	HEM	CAD-C3D-C4D	4.26	127.49	112.47
5	D	405	HEM	CAD-C3D-C4D	4.37	127.90	112.47
5	D	405	HEM	CAD-C3D-C2D	4.59	126.41	113.22
5	B	405	HEM	CAD-C3D-C2D	4.70	126.72	113.22
5	F	405	HEM	CAD-C3D-C2D	4.80	127.01	113.22
5	H	405	HEM	CAD-C3D-C2D	4.95	127.45	113.22
3	C	99	ZMQ	C2-C1-S1	5.30	118.12	113.36
4	A	100	HTG	C1'-S1-C1	6.22	108.88	100.30
3	G	99	ZMQ	C2-C1-S1	6.72	119.40	113.36
3	A	99	ZMQ	C2-C1-S1	7.15	119.78	113.36
3	E	99	ZMQ	C2-C1-S1	7.37	119.98	113.36

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	E	99	ZMQ	C32-C34-N36-C37
3	A	99	ZMQ	C32-C34-N36-C37

There are no ring outliers.

12 monomers are involved in 27 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	100	HTG	1	0
4	A	101	HTG	1	0
3	A	99	ZMQ	3	0
5	B	405	HEM	2	0
3	C	99	ZMQ	5	0
5	D	405	HEM	1	0
4	D	417	HTG	1	0
3	E	99	ZMQ	4	0
5	F	405	HEM	4	0
3	G	99	ZMQ	2	0
5	H	405	HEM	2	0
4	H	417	HTG	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 ⓘ

### 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	78/97 (80%)	0.53	3 (3%) 44 53	26, 39, 56, 60	0
1	C	77/97 (79%)	0.72	8 (10%) 8 12	27, 39, 56, 60	0
1	E	78/97 (80%)	0.55	4 (5%) 32 40	26, 39, 56, 60	0
1	G	77/97 (79%)	0.39	2 (2%) 59 66	26, 38, 56, 60	0
2	B	382/404 (94%)	0.41	10 (2%) 59 66	19, 32, 48, 56	0
2	D	385/404 (95%)	0.37	20 (5%) 31 39	19, 32, 48, 58	0
2	F	381/404 (94%)	0.35	6 (1%) 74 79	19, 32, 48, 58	0
2	H	382/404 (94%)	0.46	20 (5%) 31 39	19, 32, 48, 56	0
All	All	1840/2004 (91%)	0.42	73 (3%) 42 51	19, 33, 49, 60	0

All (73) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	F	214	ARG	7.3
1	G	17	GLY	5.4
2	D	65	SER	4.7
2	D	123	GLN	4.4
2	B	372	ASP	4.2
1	C	46	ALA	4.0
1	A	38	LYS	4.0
1	C	41	GLU	3.9
2	H	118	LEU	3.7
2	H	65	SER	3.6
2	B	366	PRO	3.5
2	H	294	ILE	3.5
2	H	375	TRP	3.4
2	D	211	LEU	3.3
2	D	204	GLN	3.2
2	D	64	GLU	3.1

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
2	F	381	PHE	3.1
1	A	40	GLU	3.0
1	E	40	GLU	3.0
2	H	393	PHE	3.0
2	D	393	PHE	2.9
2	D	218	LYS	2.9
2	H	195	ILE	2.9
2	D	294	ILE	2.8
2	H	368	LEU	2.8
2	H	317	SER	2.8
2	H	141	PHE	2.8
2	F	213	GLY	2.8
2	H	211	LEU	2.7
2	H	64	GLU	2.7
2	D	8	SER	2.7
1	C	72	THR	2.6
2	B	381	PHE	2.6
2	H	124	GLY	2.6
2	D	110	TYR	2.5
2	H	391	VAL	2.5
2	H	127	LYS	2.4
2	B	363	GLN	2.4
1	C	40	GLU	2.4
2	F	219	LEU	2.3
2	D	7	ALA	2.3
2	H	300	ARG	2.3
2	D	219	LEU	2.3
1	C	36	GLY	2.3
2	D	102	ARG	2.3
1	E	66	LEU	2.3
1	G	81	LYS	2.2
1	C	74	ILE	2.2
2	B	375	TRP	2.2
1	A	62	LEU	2.2
1	C	82	ILE	2.2
2	B	122	VAL	2.2
2	H	370	LEU	2.2
2	B	141	PHE	2.2
2	D	394	GLU	2.2
2	D	126	LYS	2.2
2	H	219	LEU	2.2
2	D	376	ARG	2.2

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	E	37	VAL	2.2
2	B	154	ARG	2.1
2	F	363	GLN	2.1
2	B	21	THR	2.1
2	H	371	ALA	2.1
2	D	209	MET	2.1
2	D	94	LEU	2.1
2	B	201	HIS	2.1
1	C	77	GLU	2.0
1	E	62	LEU	2.0
2	F	211	LEU	2.0
2	D	372	ASP	2.0
2	D	200	ARG	2.0
2	H	89	ARG	2.0
2	H	110	TYR	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
4	HTG	F	417	6/19	0.83	0.25	2.91	48,49,49,49	0
4	HTG	H	417	7/19	0.81	0.20	1.70	51,51,51,51	0
3	ZMQ	E	99	38/38	0.89	0.16	1.35	26,31,37,39	0
5	HEM	D	405	43/43	0.96	0.13	0.76	15,16,19,20	0
3	ZMQ	A	99	38/38	0.92	0.15	0.67	26,32,39,39	0
3	ZMQ	C	99	38/38	0.91	0.15	0.41	30,34,40,41	0

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
3	ZMQ	G	99	38/38	0.90	0.15	0.40	32,35,40,40	0
5	HEM	H	405	43/43	0.96	0.13	0.30	16,17,20,22	0
4	HTG	A	101	7/19	0.76	0.18	0.09	36,37,37,38	0
5	HEM	F	405	43/43	0.97	0.12	-0.03	16,20,22,25	0
4	HTG	A	100	15/19	0.91	0.16	-0.14	35,39,40,40	0
4	HTG	C	100	12/19	0.85	0.16	-0.16	49,50,51,51	0
4	HTG	G	100	12/19	0.91	0.13	-0.37	37,40,40,41	0
5	HEM	B	405	43/43	0.97	0.12	-0.61	13,15,16,19	0
4	HTG	D	417	5/19	0.84	0.16	-0.66	33,33,34,34	0
4	HTG	E	100	12/19	0.87	0.13	-0.77	34,36,37,37	0
6	CL	F	418	1/1	0.90	0.05	-	45,45,45,45	0
6	CL	B	416	1/1	0.53	0.17	-	60,60,60,60	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.