



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2023 – 12:49 AM EST

PDB ID : 1THB  
Title : REFINEMENT OF A PARTIALLY OXYGENATED T STATE  
HAEMOGLOBIN AT 1.5 ANGSTROMS RESOLUTION  
Authors : Waller, D.A.; Liddington, R.C.  
Deposited on : 1990-01-23  
Resolution : 1.50 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.32.1  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.32.1

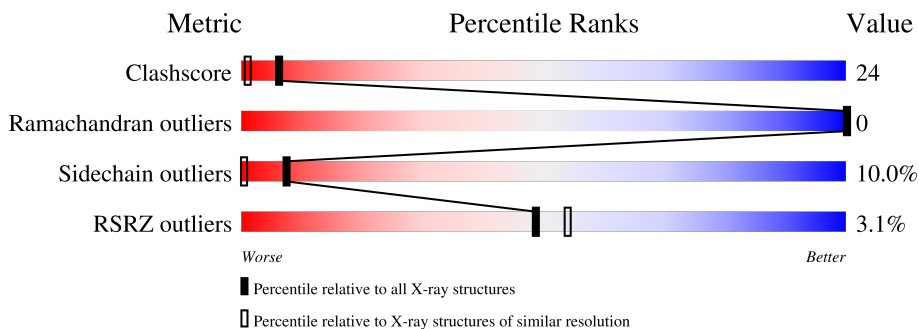
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.50 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	3144 (1.50-1.50)
Ramachandran outliers	138981	3066 (1.50-1.50)
Sidechain outliers	138945	3064 (1.50-1.50)
RSRZ outliers	127900	2884 (1.50-1.50)

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 of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. 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	 5% 55% 34% 10% .
1	C	141	 5% 43% 38% 15% 5%
2	B	146	 5% 44% 42% 12% .
2	D	146	 5% 36% 37% 23% .

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	IHP	B	315	-	-	-	X

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 4910 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.

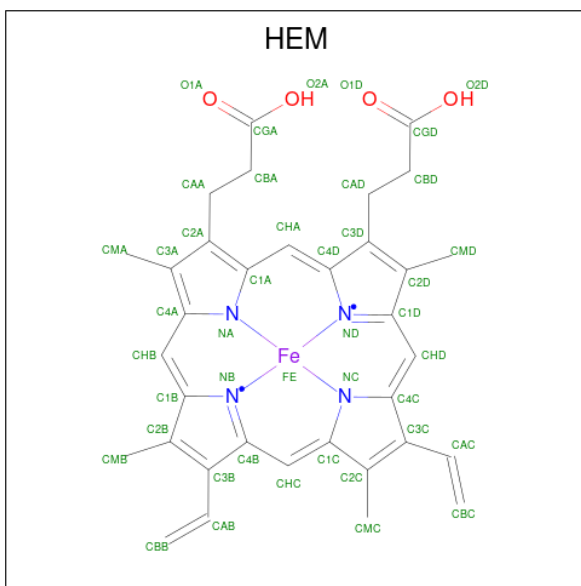
- Molecule 1 is a protein called HEMOGLOBIN A (OXY) (ALPHA CHAIN).

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

- Molecule 2 is a protein called HEMOGLOBIN A (DEOXY) (BETA CHAIN).

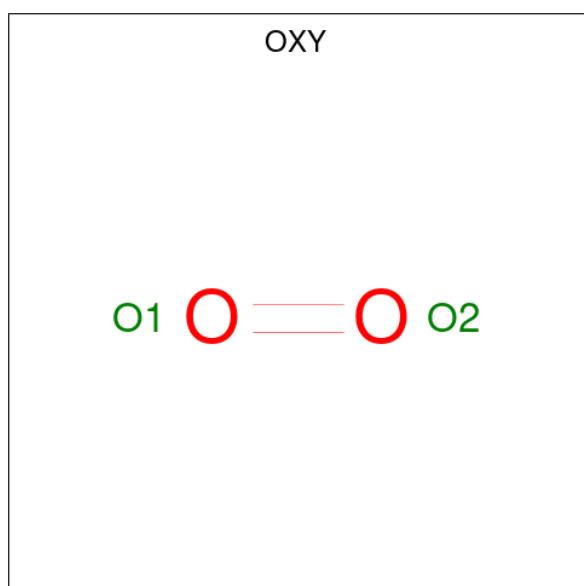
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	146	1123	724	195	201	3	0	0	0
2	D	146	1123	724	195	201	3	0	0	0

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



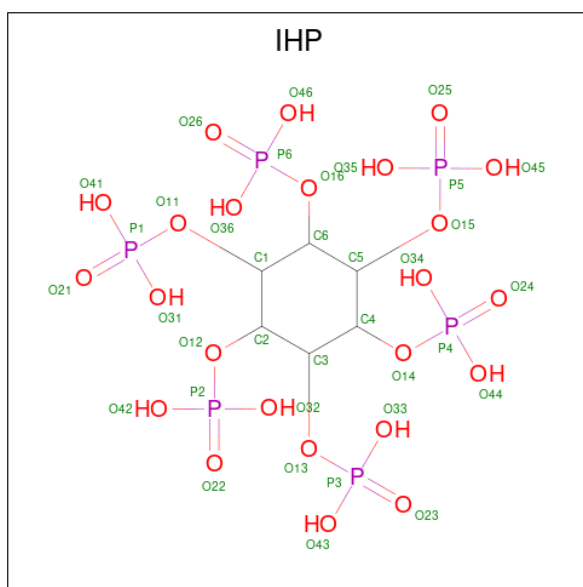
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
3	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	C	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
3	D	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 4 is OXYGEN MOLECULE (three-letter code: OXY) (formula: O<sub>2</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	O	0	0
			2	2		
4	C	1	Total	O	0	0
			2	2		

- Molecule 5 is INOSITOL HEXAKISPHOSPHATE (three-letter code: IHP) (formula: C<sub>6</sub>H<sub>18</sub>O<sub>24</sub>P<sub>6</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
5	B	1	36	6	24	6	0	0

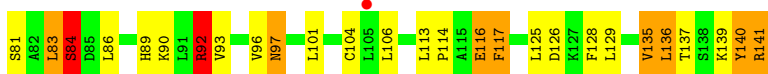
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	91	Total	O	0	0
			91	91		
6	B	91	Total	O	0	0
			91	91		
6	C	76	Total	O	0	0
			76	76		
6	D	56	Total	O	0	0
			56	56		

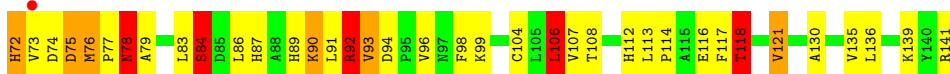
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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.

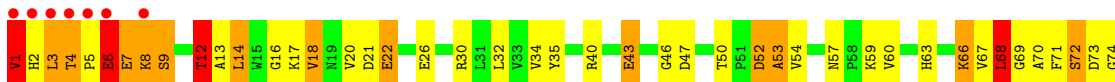
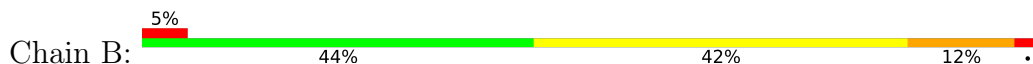
- Molecule 1: HEMOGLOBIN A (OXY) (ALPHA CHAIN)



- Molecule 1: HEMOGLOBIN A (OXY) (ALPHA CHAIN)

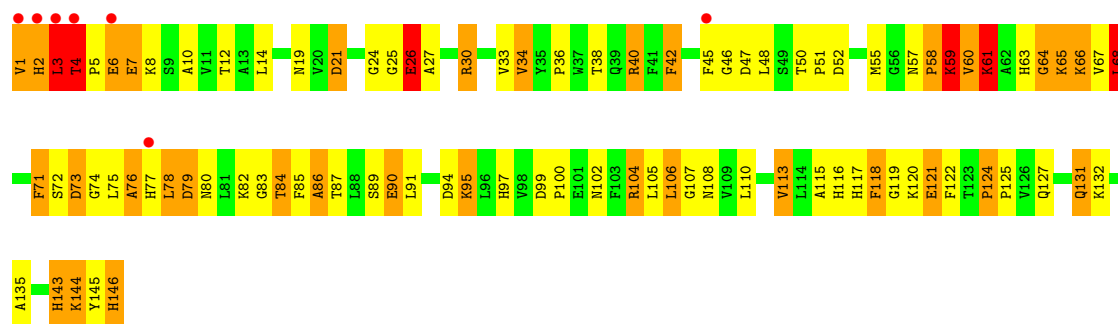


- Molecule 2: HEMOGLOBIN A (DEOXY) (BETA CHAIN)



- Molecule 2: HEMOGLOBIN A (DEOXY) (BETA CHAIN)







## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	95.80Å 97.80Å 65.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 1.50 27.54 – 1.50	Depositor EDS
% Data completeness (in resolution range)	(Not available) (10.00-1.50) 81.3 (27.54-1.50)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.15 (at 1.50Å)	Xtrriage
Refinement program	PROLSQ	Depositor
R, $R_{free}$	0.196 , (Not available) 0.203 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	21.5	Xtrriage
Anisotropy	0.203	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 69.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.011 for k,h,-l	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	4910	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.02% 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: IHP, OXY, HEM

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	1.34	3/1097 (0.3%)	2.40	66/1491 (4.4%)
1	C	1.22	0/1097	2.93	97/1491 (6.5%)
2	B	1.38	4/1153 (0.3%)	2.66	100/1566 (6.4%)
2	D	1.23	0/1153	2.82	99/1566 (6.3%)
All	All	1.29	7/4500 (0.2%)	2.71	362/6114 (5.9%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	C	0	1
2	B	0	1
2	D	1	2
All	All	1	5

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	6	GLU	CD-OE2	6.27	1.32	1.25
2	B	100	PRO	N-CD	6.14	1.56	1.47
2	B	35	TYR	CG-CD1	5.59	1.46	1.39
2	B	69	GLY	N-CA	5.44	1.54	1.46
1	A	23	GLU	CD-OE2	5.24	1.31	1.25
1	A	74	ASP	CB-CG	5.15	1.62	1.51
1	A	31	ARG	CZ-NH2	5.10	1.39	1.33

All (362) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	92	ARG	NE-CZ-NH2	27.82	134.21	120.30
2	D	2	HIS	CB-CA-C	23.96	158.31	110.40
1	C	30	GLU	OE1-CD-OE2	20.59	148.01	123.30
2	D	2	HIS	CA-CB-CG	18.75	145.48	113.60
1	C	141	ARG	NE-CZ-NH2	-18.66	110.97	120.30
1	C	141	ARG	NE-CZ-NH1	18.60	129.60	120.30
1	A	23	GLU	OE1-CD-OE2	15.44	141.83	123.30
2	B	104	ARG	NE-CZ-NH2	-15.26	112.67	120.30
1	A	30	GLU	OE1-CD-OE2	15.04	141.35	123.30
2	D	26	GLU	OE1-CD-OE2	14.38	140.55	123.30
1	A	141	ARG	NE-CZ-NH2	-14.25	113.17	120.30
2	D	104	ARG	NE-CZ-NH1	-14.20	113.20	120.30
1	C	116	GLU	OE1-CD-OE2	13.59	139.60	123.30
1	C	64	ASP	CB-CG-OD1	-13.33	106.30	118.30
1	C	24	TYR	CB-CG-CD1	-13.26	113.04	121.00
1	C	31	ARG	NE-CZ-NH1	13.07	126.83	120.30
2	D	78	LEU	C-N-CA	12.66	153.35	121.70
2	D	79	ASP	CB-CG-OD2	12.66	129.69	118.30
2	B	30	ARG	NE-CZ-NH1	12.65	126.62	120.30
2	D	40	ARG	CD-NE-CZ	12.59	141.23	123.60
1	C	94	ASP	CB-CG-OD2	12.49	129.54	118.30
1	C	47	ASP	CB-CG-OD2	-12.40	107.14	118.30
1	C	6	ASP	CB-CG-OD2	-12.25	107.27	118.30
1	A	126	ASP	CB-CG-OD2	-12.22	107.30	118.30
1	A	74	ASP	CB-CG-OD1	-12.13	107.38	118.30
2	D	79	ASP	CA-CB-CG	12.12	140.06	113.40
2	D	2	HIS	O-C-N	12.08	142.03	122.70
1	C	75	ASP	CB-CG-OD2	-12.05	107.45	118.30
2	D	30	ARG	NE-CZ-NH2	12.01	126.31	120.30
2	B	73	ASP	CB-CG-OD2	11.78	128.91	118.30
2	D	90	GLU	OE1-CD-OE2	11.74	137.39	123.30
2	B	145	TYR	CB-CG-CD1	-11.34	114.20	121.00
1	C	47	ASP	CB-CG-OD1	11.28	128.45	118.30
2	D	30	ARG	CD-NE-CZ	10.97	138.95	123.60
2	B	52	ASP	CB-CG-OD2	-10.86	108.53	118.30
1	C	116	GLU	CA-CB-CG	10.85	137.27	113.40
2	B	79	ASP	CB-CG-OD2	10.84	128.06	118.30
1	A	140	TYR	CB-CG-CD1	-10.77	114.53	121.00
2	D	2	HIS	N-CA-CB	-10.73	91.29	110.60
1	C	23	GLU	OE1-CD-OE2	10.62	136.04	123.30
2	B	145	TYR	CG-CD1-CE1	-10.35	113.02	121.30
1	C	118	THR	N-CA-CB	-10.27	90.78	110.30
1	C	92	ARG	NE-CZ-NH1	-10.26	115.17	120.30

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	60	VAL	CG1-CB-CG2	10.22	127.25	110.90
2	B	101	GLU	OE1-CD-OE2	10.05	135.36	123.30
2	D	104	ARG	NH1-CZ-NH2	10.05	130.45	119.40
2	D	99	ASP	CB-CG-OD1	-9.92	109.37	118.30
2	B	145	TYR	CD1-CG-CD2	9.86	128.75	117.90
2	D	7	GLU	OE1-CD-OE2	9.72	134.97	123.30
1	C	42	TYR	CG-CD2-CE2	9.62	129.00	121.30
1	C	11	LYS	CA-CB-CG	9.61	134.55	113.40
2	B	83	GLY	O-C-N	9.47	137.84	122.70
1	C	116	GLU	CG-CD-OE2	-9.31	99.68	118.30
2	B	40	ARG	CD-NE-CZ	9.26	136.56	123.60
2	B	12	THR	OG1-CB-CG2	9.22	131.21	110.00
1	C	9	ASN	O-C-N	9.21	137.44	122.70
2	B	26	GLU	CA-CB-CG	9.16	133.55	113.40
2	B	43	GLU	OE1-CD-OE2	9.12	134.25	123.30
2	B	7	GLU	OE1-CD-OE2	8.92	134.00	123.30
1	C	24	TYR	CG-CD2-CE2	-8.89	114.19	121.30
2	B	67	VAL	O-C-N	-8.78	108.66	122.70
2	B	52	ASP	CB-CG-OD1	8.77	126.19	118.30
2	B	30	ARG	CD-NE-CZ	8.68	135.76	123.60
2	B	73	ASP	CB-CG-OD1	-8.61	110.55	118.30
2	B	3	LEU	CA-CB-CG	8.53	134.91	115.30
1	C	74	ASP	CB-CG-OD2	-8.47	110.67	118.30
2	D	10	ALA	O-C-N	8.45	136.21	122.70
1	A	72	HIS	O-C-N	8.39	136.12	122.70
1	A	20	HIS	O-C-N	8.36	136.08	122.70
2	D	97	HIS	CA-CB-CG	-8.35	99.41	113.60
2	B	40	ARG	NE-CZ-NH2	8.32	124.46	120.30
2	D	145	TYR	CB-CG-CD1	-8.29	116.03	121.00
1	A	116	GLU	CG-CD-OE2	-8.29	101.73	118.30
1	C	84	SER	N-CA-CB	8.25	122.87	110.50
1	A	23	GLU	CG-CD-OE2	-8.21	101.88	118.30
1	A	32	MET	CA-CB-CG	-8.21	99.34	113.30
2	D	3	LEU	C-N-CA	8.15	142.07	121.70
2	D	1	VAL	CA-C-N	-8.13	99.31	117.20
1	C	42	TYR	CB-CG-CD2	8.12	125.87	121.00
1	A	76	MET	O-C-N	8.10	136.50	121.10
2	B	60	VAL	CA-CB-CG2	-8.06	98.81	110.90
1	C	24	TYR	CD1-CG-CD2	8.03	126.73	117.90
1	A	116	GLU	CG-CD-OE1	8.02	134.34	118.30
1	C	92	ARG	NH1-CZ-NH2	-7.99	110.61	119.40
2	B	12	THR	N-CA-CB	-7.99	95.12	110.30

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	66	LYS	CA-CB-CG	7.98	130.96	113.40
2	D	104	ARG	NE-CZ-NH2	-7.94	116.33	120.30
2	B	18	VAL	CG1-CB-CG2	7.89	123.53	110.90
2	D	73	ASP	CB-CG-OD1	7.89	125.40	118.30
2	D	26	GLU	CG-CD-OE2	-7.83	102.64	118.30
2	B	66	LYS	N-CA-CB	7.78	124.61	110.60
1	C	94	ASP	OD1-CG-OD2	-7.73	108.62	123.30
2	D	59	LYS	O-C-N	7.71	135.03	122.70
2	B	4	THR	CA-CB-OG1	-7.70	92.83	109.00
2	B	66	LYS	CB-CG-CD	-7.69	91.61	111.60
2	B	94	ASP	CB-CG-OD1	-7.67	111.39	118.30
1	A	72	HIS	CA-CB-CG	-7.64	100.61	113.60
1	C	49	SER	CA-C-O	7.54	135.94	120.10
2	D	118	PHE	CB-CG-CD1	7.52	126.06	120.80
1	A	30	GLU	CG-CD-OE1	-7.52	103.27	118.30
1	C	30	GLU	CG-CD-OE1	-7.48	103.34	118.30
1	A	101	LEU	CB-CG-CD2	-7.48	98.29	111.00
1	C	50	HIS	CA-CB-CG	-7.43	100.97	113.60
2	B	1	VAL	CA-C-N	-7.42	100.88	117.20
1	A	140	TYR	CB-CG-CD2	7.41	125.45	121.00
2	B	30	ARG	NE-CZ-NH2	-7.40	116.60	120.30
1	A	46	PHE	CB-CG-CD1	-7.37	115.64	120.80
1	A	92	ARG	CA-CB-CG	-7.37	97.19	113.40
1	A	24	TYR	CG-CD2-CE2	-7.29	115.46	121.30
2	D	2	HIS	CA-C-N	-7.28	101.19	117.20
1	C	78	ASN	OD1-CG-ND2	7.23	138.53	121.90
2	B	14	LEU	O-C-N	7.22	134.25	122.70
2	B	68	LEU	CA-CB-CG	7.17	131.80	115.30
2	D	83	GLY	O-C-N	7.17	134.17	122.70
1	C	72	HIS	CA-CB-CG	-7.15	101.44	113.60
2	B	90	GLU	N-CA-CB	-7.15	97.74	110.60
2	D	119	GLY	CA-C-O	7.14	133.45	120.60
1	C	21	ALA	CB-CA-C	7.08	120.72	110.10
2	B	108	ASN	O-C-N	7.06	133.99	122.70
1	C	1	VAL	CA-CB-CG1	7.01	121.42	110.90
1	A	64	ASP	CB-CG-OD1	6.98	124.58	118.30
2	D	122	PHE	CB-CG-CD1	-6.96	115.93	120.80
2	B	131	GLN	CG-CD-NE2	6.95	133.39	116.70
2	D	131	GLN	CG-CD-OE1	-6.93	107.73	121.60
2	B	131	GLN	CG-CD-OE1	-6.92	107.76	121.60
2	D	86	ALA	CB-CA-C	6.91	120.47	110.10
1	A	7	LYS	CD-CE-NZ	-6.90	95.84	111.70

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	42	TYR	CZ-CE2-CD2	-6.90	113.59	119.80
2	B	6	GLU	CG-CD-OE2	-6.89	104.51	118.30
2	D	106	LEU	CB-CG-CD2	-6.88	99.30	111.00
2	B	46	GLY	O-C-N	6.80	133.58	122.70
1	C	69	ALA	CB-CA-C	6.76	120.24	110.10
2	B	40	ARG	NH1-CZ-NH2	-6.75	111.97	119.40
2	B	52	ASP	O-C-N	6.75	133.50	122.70
1	C	20	HIS	CB-CA-C	-6.74	96.91	110.40
1	C	112	HIS	CA-C-N	6.72	131.97	117.20
1	A	129	LEU	O-C-N	6.71	133.44	122.70
1	A	20	HIS	CA-CB-CG	-6.71	102.19	113.60
1	C	108	THR	CA-CB-OG1	-6.70	94.93	109.00
1	A	53	ALA	N-CA-CB	6.70	119.47	110.10
2	D	115	ALA	N-CA-CB	-6.70	100.72	110.10
2	D	21	ASP	CA-C-N	-6.67	102.52	117.20
1	C	61	LYS	CB-CA-C	-6.67	97.06	110.40
1	C	92	ARG	CA-CB-CG	-6.67	98.73	113.40
2	D	108	ASN	O-C-N	6.66	133.36	122.70
2	B	145	TYR	CB-CG-CD2	-6.65	117.01	121.00
1	C	20	HIS	O-C-N	6.62	133.29	122.70
2	D	3	LEU	CB-CA-C	6.60	122.74	110.20
2	D	58	PRO	C-N-CA	-6.60	105.20	121.70
2	B	90	GLU	CB-CG-CD	-6.58	96.44	114.20
1	A	136	LEU	O-C-N	6.56	133.20	122.70
2	B	145	TYR	CE1-CZ-CE2	6.56	130.29	119.80
1	C	49	SER	CA-C-N	-6.56	102.77	117.20
2	B	94	ASP	C-N-CA	-6.56	105.30	121.70
1	C	86	LEU	CB-CG-CD2	6.55	122.13	111.00
2	D	34	VAL	O-C-N	6.54	133.16	122.70
2	D	107	GLY	O-C-N	-6.53	112.25	122.70
1	C	16	LYS	CD-CE-NZ	6.52	126.70	111.70
1	C	75	ASP	OD1-CG-OD2	6.50	135.64	123.30
2	B	40	ARG	NE-CZ-NH1	6.49	123.55	120.30
2	D	131	GLN	CG-CD-NE2	6.49	132.27	116.70
2	D	60	VAL	CA-C-O	6.46	133.67	120.10
1	A	75	ASP	CB-CG-OD2	-6.46	112.48	118.30
1	A	96	VAL	O-C-N	6.45	133.02	122.70
1	C	13	ALA	N-CA-CB	-6.43	101.10	110.10
2	B	78	LEU	C-N-CA	6.41	137.73	121.70
1	C	20	HIS	CA-CB-CG	-6.36	102.78	113.60
2	D	119	GLY	CA-C-N	-6.35	103.24	117.20
1	A	29	LEU	CB-CG-CD1	-6.34	100.21	111.00

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	98	PHE	CG-CD2-CE2	-6.34	113.83	120.80
2	B	91	LEU	O-C-N	6.33	132.82	122.70
1	A	84	SER	N-CA-CB	6.29	119.94	110.50
2	B	121	GLU	OE1-CD-OE2	6.27	130.83	123.30
2	D	21	ASP	O-C-N	6.26	132.72	122.70
2	B	7	GLU	CA-CB-CG	-6.26	99.63	113.40
2	B	119	GLY	CA-C-O	6.24	131.83	120.60
2	B	79	ASP	OD1-CG-OD2	-6.24	111.45	123.30
1	C	121	VAL	O-C-N	6.22	132.65	122.70
2	B	96	LEU	CB-CG-CD2	-6.21	100.44	111.00
2	D	40	ARG	NE-CZ-NH1	6.21	123.40	120.30
2	B	77	HIS	CA-CB-CG	-6.20	103.06	113.60
2	B	68	LEU	C-N-CA	-6.20	109.29	122.30
1	A	117	PHE	CB-CG-CD1	-6.18	116.47	120.80
2	D	42	PHE	CB-CG-CD1	-6.17	116.48	120.80
1	C	93	VAL	CG1-CB-CG2	6.15	120.75	110.90
2	D	40	ARG	NE-CZ-NH2	6.15	123.38	120.30
2	B	20	VAL	CG1-CB-CG2	6.13	120.71	110.90
2	D	27	ALA	N-CA-CB	6.12	118.67	110.10
2	B	90	GLU	OE1-CD-OE2	6.11	130.63	123.30
1	C	76	MET	CA-CB-CG	-6.09	102.95	113.30
1	C	98	PHE	CB-CG-CD2	-6.08	116.55	120.80
2	D	61	LYS	CA-CB-CG	-6.08	100.03	113.40
2	D	76	ALA	C-N-CA	6.07	136.87	121.70
2	D	67	VAL	CG1-CB-CG2	6.06	120.60	110.90
2	B	145	TYR	CZ-CE2-CD2	-6.05	114.35	119.80
1	C	78	ASN	O-C-N	6.05	132.37	122.70
1	A	97	ASN	CA-CB-CG	-6.02	100.16	113.40
2	D	4	THR	CA-CB-CG2	6.01	120.82	112.40
1	A	53	ALA	CB-CA-C	-6.00	101.10	110.10
2	D	121	GLU	N-CA-CB	-6.00	99.80	110.60
2	D	3	LEU	N-CA-C	-5.99	94.83	111.00
1	C	78	ASN	CA-CB-CG	-5.99	100.23	113.40
1	C	32	MET	CG-SD-CE	5.98	109.77	100.20
2	D	84	THR	N-CA-CB	5.96	121.63	110.30
2	B	32	LEU	O-C-N	5.96	132.23	122.70
1	C	130	ALA	N-CA-CB	5.95	118.43	110.10
1	C	141	ARG	CA-C-O	-5.95	107.60	120.10
1	C	74	ASP	OD1-CG-OD2	5.94	134.59	123.30
2	B	66	LYS	O-C-N	5.93	132.19	122.70
2	D	73	ASP	CB-CG-OD2	-5.92	112.97	118.30
2	D	34	VAL	CG1-CB-CG2	5.92	120.37	110.90

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	96	VAL	CA-C-O	-5.92	107.68	120.10
2	B	52	ASP	CA-C-O	-5.91	107.69	120.10
2	D	14	LEU	O-C-N	5.91	132.16	122.70
1	C	136	LEU	O-C-N	5.90	132.14	122.70
1	C	104	CYS	CA-CB-SG	-5.90	103.38	114.00
2	B	145	TYR	CG-CD2-CE2	-5.90	116.58	121.30
2	D	71	PHE	N-CA-CB	-5.88	100.02	110.60
1	C	84	SER	CA-CB-OG	-5.88	95.33	111.20
1	C	94	ASP	CA-CB-CG	-5.87	100.49	113.40
2	B	47	ASP	CB-CG-OD2	-5.86	113.03	118.30
1	A	126	ASP	OD1-CG-OD2	5.85	134.42	123.30
1	C	60	LYS	CA-CB-CG	-5.85	100.53	113.40
2	B	43	GLU	N-CA-CB	-5.85	100.08	110.60
2	D	85	PHE	N-CA-CB	-5.84	100.08	110.60
1	A	66	LEU	O-C-N	5.82	132.01	122.70
2	D	86	ALA	N-CA-CB	-5.80	101.97	110.10
2	B	54	VAL	CG1-CB-CG2	5.78	120.15	110.90
1	C	21	ALA	CA-C-N	5.78	127.76	116.20
1	A	106	LEU	CB-CG-CD2	-5.77	101.19	111.00
1	C	117	PHE	CB-CG-CD2	-5.76	116.77	120.80
1	A	76	MET	CA-C-O	-5.76	108.01	120.10
2	D	117	HIS	N-CA-CB	5.75	120.95	110.60
1	C	1	VAL	CB-CA-C	5.74	122.31	111.40
2	B	85	PHE	CB-CG-CD2	-5.74	116.79	120.80
2	D	135	ALA	N-CA-CB	-5.73	102.08	110.10
2	D	108	ASN	CB-CG-ND2	-5.72	102.96	116.70
2	B	1	VAL	O-C-N	5.72	131.86	122.70
2	B	17	LYS	CD-CE-NZ	-5.71	98.57	111.70
1	C	45	HIS	CB-CA-C	-5.71	98.98	110.40
1	C	117	PHE	CA-C-O	5.71	132.08	120.10
2	D	40	ARG	NH1-CZ-NH2	-5.70	113.13	119.40
1	A	135	VAL	CA-CB-CG2	-5.68	102.38	110.90
1	C	33	PHE	CB-CG-CD1	-5.68	116.83	120.80
2	D	121	GLU	CA-CB-CG	5.67	125.89	113.40
1	C	141	ARG	CD-NE-CZ	-5.66	115.67	123.60
2	D	47	ASP	CB-CG-OD1	-5.66	113.20	118.30
1	C	46	PHE	CB-CA-C	-5.66	99.08	110.40
1	A	48	LEU	O-C-N	5.66	131.76	122.70
1	A	125	LEU	CB-CG-CD1	-5.66	101.38	111.00
2	D	68	LEU	CB-CA-C	5.66	120.95	110.20
2	D	107	GLY	CA-C-O	5.66	130.78	120.60
1	A	7	LYS	CB-CG-CD	-5.65	96.91	111.60

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	105	LEU	CB-CG-CD2	-5.64	101.41	111.00
2	B	21	ASP	O-C-N	5.64	131.72	122.70
2	B	126	VAL	CA-CB-CG2	-5.63	102.45	110.90
1	A	10	VAL	CG1-CB-CG2	5.63	119.91	110.90
1	C	4	PRO	O-C-N	5.63	131.70	122.70
2	D	6	GLU	O-C-N	5.62	131.69	122.70
2	D	91	LEU	CB-CG-CD1	-5.60	101.48	111.00
2	D	52	ASP	O-C-N	5.58	131.63	122.70
1	A	47	ASP	O-C-N	5.58	131.63	122.70
2	D	122	PHE	CG-CD2-CE2	-5.57	114.67	120.80
2	B	67	VAL	CA-C-O	5.56	131.78	120.10
1	C	9	ASN	CA-C-O	-5.56	108.42	120.10
1	A	141	ARG	CG-CD-NE	-5.56	100.12	111.80
1	C	117	PHE	CD1-CG-CD2	5.56	125.53	118.30
2	B	81	LEU	C-N-CA	-5.56	107.81	121.70
2	D	46	GLY	CA-C-N	-5.55	104.98	117.20
1	C	83	LEU	CA-C-O	-5.55	108.45	120.10
2	B	71	PHE	CB-CG-CD1	-5.55	116.92	120.80
1	A	3	SER	N-CA-CB	-5.53	102.20	110.50
2	D	117	HIS	O-C-N	5.53	131.55	122.70
2	D	12	THR	CA-CB-CG2	5.52	120.13	112.40
2	B	6	GLU	CG-CD-OE1	5.52	129.34	118.30
2	B	22	GLU	CG-CD-OE2	-5.52	107.27	118.30
2	B	108	ASN	CB-CG-ND2	-5.51	103.47	116.70
1	C	9	ASN	C-N-CA	-5.51	107.93	121.70
2	D	144	LYS	CB-CG-CD	-5.50	97.29	111.60
1	A	136	LEU	CB-CG-CD2	-5.50	101.65	111.00
2	B	94	ASP	O-C-N	5.49	131.49	122.70
1	C	75	ASP	N-CA-CB	-5.48	100.73	110.60
2	B	46	GLY	CA-C-N	-5.46	105.19	117.20
1	A	97	ASN	CB-CG-OD1	-5.46	110.68	121.60
2	D	113	VAL	CA-CB-CG2	-5.46	102.71	110.90
2	D	80	ASN	OD1-CG-ND2	5.44	134.42	121.90
2	B	90	GLU	CG-CD-OE2	-5.44	107.42	118.30
2	D	1	VAL	N-CA-CB	5.43	123.46	111.50
1	C	36	PHE	CD1-CG-CD2	5.42	125.35	118.30
2	B	139	ASN	O-C-N	5.42	131.37	122.70
1	C	139	LYS	N-CA-CB	-5.42	100.85	110.60
1	C	21	ALA	O-C-N	-5.41	114.00	123.20
1	A	36	PHE	CB-CG-CD2	5.40	124.58	120.80
2	B	4	THR	OG1-CB-CG2	5.38	122.38	110.00
2	D	146	HIS	CA-CB-CG	-5.37	104.47	113.60

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	89	SER	O-C-N	-5.36	114.12	122.70
1	A	47	ASP	N-CA-C	-5.36	96.54	111.00
2	B	122	PHE	CB-CA-C	5.35	121.11	110.40
1	A	104	CYS	CA-CB-SG	-5.34	104.39	114.00
1	C	72	HIS	CB-CA-C	-5.32	99.75	110.40
2	B	99	ASP	N-CA-CB	-5.32	101.03	110.60
2	D	3	LEU	CB-CG-CD1	-5.31	101.97	111.00
2	B	53	ALA	N-CA-CB	5.30	117.52	110.10
2	B	34	VAL	CA-C-O	-5.30	108.97	120.10
1	A	68	ASN	CA-CB-CG	-5.29	101.75	113.40
1	A	140	TYR	O-C-N	5.29	131.17	122.70
1	C	42	TYR	CB-CG-CD1	-5.28	117.83	121.00
1	A	92	ARG	NE-CZ-NH1	-5.28	117.66	120.30
1	C	64	ASP	OD1-CG-OD2	5.28	133.33	123.30
2	B	43	GLU	CG-CD-OE2	-5.27	107.76	118.30
2	D	26	GLU	CB-CG-CD	-5.27	99.97	114.20
1	C	46	PHE	CZ-CE2-CD2	-5.26	113.78	120.10
2	B	70	ALA	O-C-N	-5.26	114.28	122.70
1	A	54	GLN	OE1-CD-NE2	5.25	133.98	121.90
2	D	60	VAL	CA-C-N	-5.25	105.65	117.20
2	B	71	PHE	CZ-CE2-CD2	-5.25	113.81	120.10
2	B	104	ARG	NH1-CZ-NH2	5.24	125.16	119.40
1	C	90	LYS	CB-CG-CD	5.24	125.23	111.60
2	D	59	LYS	CB-CG-CD	-5.24	97.99	111.60
1	C	54	GLN	O-C-N	5.23	131.06	122.70
2	D	42	PHE	CE1-CZ-CE2	5.22	129.40	120.00
2	D	64	GLY	O-C-N	-5.22	114.35	122.70
1	A	74	ASP	OD1-CG-OD2	5.21	133.21	123.30
1	C	107	VAL	CG1-CB-CG2	5.20	119.22	110.90
1	C	98	PHE	CD1-CG-CD2	5.19	125.05	118.30
2	D	6	GLU	OE1-CD-OE2	-5.19	117.07	123.30
1	A	50	HIS	CA-CB-CG	5.18	122.41	113.60
1	C	16	LYS	N-CA-CB	-5.18	101.28	110.60
2	D	42	PHE	CD1-CG-CD2	5.18	125.03	118.30
1	A	89	HIS	CA-CB-CG	-5.17	104.81	113.60
2	D	104	ARG	CD-NE-CZ	-5.17	116.37	123.60
2	D	117	HIS	CA-CB-CG	-5.17	104.82	113.60
1	A	81	SER	CA-CB-OG	-5.16	97.26	111.20
1	A	116	GLU	O-C-N	5.15	130.94	122.70
2	B	126	VAL	CG1-CB-CG2	5.14	119.13	110.90
1	A	83	LEU	CB-CG-CD2	-5.14	102.26	111.00
2	D	100	PRO	N-CA-CB	5.13	109.45	103.30

*Continued on next page...*

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	63	HIS	O-C-N	-5.11	114.51	123.20
1	A	60	LYS	CA-CB-CG	5.10	124.62	113.40
2	D	73	ASP	N-CA-CB	5.10	119.78	110.60
1	C	106	LEU	CB-CG-CD2	-5.10	102.33	111.00
1	C	117	PHE	CG-CD2-CE2	-5.10	115.19	120.80
2	D	1	VAL	O-C-N	5.10	130.85	122.70
1	A	7	LYS	N-CA-CB	-5.08	101.45	110.60
1	C	17	VAL	CA-C-N	-5.08	106.05	116.20
1	A	128	PHE	CB-CG-CD2	-5.07	117.25	120.80
1	C	46	PHE	CB-CG-CD1	-5.07	117.25	120.80
1	A	92	ARG	CG-CD-NE	-5.06	101.18	111.80
2	B	21	ASP	CB-CG-OD2	-5.05	113.75	118.30
2	D	118	PHE	CB-CG-CD2	-5.05	117.26	120.80
2	D	42	PHE	CZ-CE2-CD2	-5.05	114.04	120.10
2	B	47	ASP	CA-C-N	-5.05	106.09	117.20
2	D	110	LEU	CB-CA-C	5.05	119.79	110.20
1	C	47	ASP	O-C-N	5.04	130.76	122.70
2	B	68	LEU	O-C-N	5.03	131.76	123.20
1	C	36	PHE	CB-CG-CD2	-5.03	117.28	120.80
2	B	50	THR	OG1-CB-CG2	-5.03	98.44	110.00
2	B	128	ALA	O-C-N	-5.02	114.67	122.70
1	A	128	PHE	CG-CD1-CE1	-5.02	115.28	120.80
2	B	93	CYS	CA-CB-SG	-5.02	104.97	114.00
2	D	80	ASN	N-CA-CB	-5.01	101.58	110.60
2	B	83	GLY	CA-C-N	-5.01	106.18	117.20

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	D	2	HIS	CA

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	92	ARG	Sidechain
2	B	104	ARG	Sidechain
1	C	92	ARG	Sidechain
2	D	104	ARG	Sidechain
2	D	40	ARG	Sidechain

## 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	1069	0	1073	35	0
1	C	1069	0	1073	48	0
2	B	1123	0	1118	37	0
2	D	1123	0	1116	110	0
3	A	43	0	30	3	0
3	B	43	0	30	1	0
3	C	43	0	30	0	0
3	D	43	0	30	8	0
4	A	2	0	0	0	0
4	C	2	0	0	0	0
5	B	36	0	6	2	0
6	A	91	0	0	1	1
6	B	91	0	0	1	0
6	C	76	0	0	2	0
6	D	56	0	0	7	0
All	All	4910	0	4506	222	1

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 24.

All (222) 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:D:1:VAL:CG2	2:D:3:LEU:HD12	1.57	1.33
2:D:60:VAL:HG12	6:D:191:HOH:O	0.95	1.12
2:D:4:THR:HG23	2:D:6:GLU:OE2	1.52	1.08
2:D:3:LEU:HD23	2:D:7:GLU:HB3	1.40	1.04
2:D:1:VAL:HG21	2:D:3:LEU:HD12	1.03	1.02
2:D:4:THR:CG2	2:D:6:GLU:HG2	1.88	1.01
3:D:147:HEM:HHC	3:D:147:HEM:HBB2	1.43	1.01
2:D:1:VAL:HG21	2:D:3:LEU:CD1	1.94	0.95
2:D:3:LEU:HD23	2:D:7:GLU:CB	1.99	0.93
2:B:1:VAL:CG1	2:B:3:LEU:HD13	1.99	0.92
2:B:5:PRO:HA	2:B:8:LYS:HD2	1.51	0.92
2:B:8:LYS:O	2:B:12:THR:HB	1.70	0.91

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:114:PRO:O	2:B:116:HIS:HE1	1.51	0.90
2:B:1:VAL:HG13	2:B:3:LEU:HD13	1.53	0.90
1:A:84:SER:HB2	1:A:139:LYS:HD2	1.55	0.89
2:D:1:VAL:CG2	2:D:3:LEU:CD1	2.50	0.88
2:D:5:PRO:HD2	2:D:6:GLU:OE2	1.75	0.87
2:D:124:PRO:HB2	2:D:125:PRO:HD3	1.57	0.87
2:D:3:LEU:CD2	2:D:7:GLU:HB3	2.04	0.86
2:B:9:SER:O	2:B:12:THR:HG22	1.76	0.85
1:A:16:LYS:HE2	1:A:16:LYS:HA	1.59	0.84
2:D:1:VAL:HG23	2:D:3:LEU:HD12	1.62	0.82
2:D:95:LYS:HD3	2:D:95:LYS:N	1.95	0.81
1:C:118:THR:HG22	1:C:121:VAL:H	1.46	0.81
1:C:7:LYS:O	1:C:11:LYS:HG2	1.81	0.80
1:A:114:PRO:HA	2:B:116:HIS:CE1	2.16	0.80
2:D:1:VAL:HG23	2:D:3:LEU:HB2	1.64	0.80
2:D:106:LEU:HD23	3:D:147:HEM:CBB	2.14	0.77
2:D:73:ASP:HB3	6:D:203:HOH:O	1.86	0.74
1:C:17:VAL:HG12	1:C:21:ALA:HB2	1.68	0.74
2:D:73:ASP:O	2:D:77:HIS:CD2	2.40	0.74
2:D:4:THR:O	2:D:8:LYS:HG2	1.87	0.74
2:D:4:THR:HB	2:D:7:GLU:HG3	1.70	0.73
2:D:86:ALA:HB1	2:D:144:LYS:HE2	1.71	0.71
2:D:4:THR:HG22	2:D:6:GLU:HG2	1.72	0.70
1:C:4:PRO:O	1:C:8:THR:HG23	1.93	0.69
1:C:114:PRO:HB3	6:D:178:HOH:O	1.91	0.69
2:D:4:THR:HB	2:D:7:GLU:CG	2.22	0.69
2:B:5:PRO:HA	2:B:8:LYS:CD	2.24	0.68
1:A:114:PRO:O	2:B:116:HIS:CE1	2.42	0.67
2:D:4:THR:CG2	2:D:7:GLU:HG3	2.26	0.66
2:B:4:THR:HG23	2:B:5:PRO:HD2	1.78	0.65
2:D:73:ASP:O	2:D:77:HIS:HD2	1.77	0.65
2:D:106:LEU:HD23	3:D:147:HEM:HBB2	1.78	0.65
2:D:51:PRO:O	2:D:55:MET:HG2	1.96	0.65
2:B:1:VAL:CG2	2:B:136:GLY:HA3	2.27	0.65
2:D:60:VAL:CG1	6:D:191:HOH:O	1.77	0.65
2:D:4:THR:CG2	2:D:6:GLU:CG	2.71	0.65
2:D:3:LEU:O	2:D:8:LYS:HE3	1.96	0.64
1:C:17:VAL:CG1	1:C:21:ALA:HB2	2.27	0.64
2:D:4:THR:HG21	2:D:6:GLU:HG2	1.76	0.64
2:D:124:PRO:N	2:D:125:PRO:CD	2.61	0.64
2:D:1:VAL:O	2:D:3:LEU:N	2.23	0.64

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:68:LEU:O	2:D:72:SER:HB2	1.97	0.64
1:C:114:PRO:HA	2:D:116:HIS:CD2	2.33	0.63
1:C:76:MET:N	1:C:77:PRO:CD	2.61	0.63
2:B:1:VAL:HG13	2:B:3:LEU:CD1	2.25	0.63
2:D:3:LEU:HB3	2:D:8:LYS:HD3	1.81	0.63
1:C:6:ASP:O	1:C:10:VAL:HG13	1.98	0.63
2:B:5:PRO:HG2	2:B:6:GLU:N	2.14	0.62
2:D:1:VAL:C	2:D:3:LEU:H	2.03	0.62
1:C:56:LYS:NZ	1:C:56:LYS:CB	2.63	0.62
1:A:47:ASP:N	1:A:54:GLN:OE1	2.28	0.62
2:D:57:ASN:OD1	2:D:59:LYS:HG2	2.00	0.62
2:D:124:PRO:CB	2:D:125:PRO:HD3	2.25	0.61
1:C:24:TYR:N	1:C:24:TYR:CD2	2.69	0.61
2:D:26:GLU:HG2	2:D:113:VAL:CG1	2.32	0.60
2:D:4:THR:HG22	2:D:7:GLU:H	1.66	0.60
1:A:16:LYS:HZ3	1:A:16:LYS:HB3	1.66	0.60
2:D:89:SER:HB3	2:D:144:LYS:HG3	1.84	0.59
1:A:16:LYS:HE2	1:A:16:LYS:CA	2.32	0.59
1:C:3:SER:O	1:C:7:LYS:HG3	2.03	0.59
1:C:76:MET:HB2	1:C:77:PRO:HD3	1.85	0.59
2:D:4:THR:O	2:D:8:LYS:CG	2.50	0.58
1:C:31:ARG:HD3	2:D:127:GLN:OE1	2.03	0.58
2:D:45:PHE:HD2	2:D:45:PHE:N	2.00	0.58
1:C:113:LEU:N	1:C:114:PRO:CD	2.66	0.58
2:D:3:LEU:HD23	2:D:7:GLU:HB2	1.84	0.58
2:D:45:PHE:N	2:D:45:PHE:CD2	2.72	0.57
1:A:16:LYS:HA	1:A:16:LYS:CE	2.25	0.57
1:C:56:LYS:NZ	1:C:56:LYS:HB3	2.19	0.57
2:D:38:THR:HG22	2:D:102:ASN:ND2	2.20	0.57
1:C:66:LEU:O	1:C:70:VAL:HG23	2.04	0.57
2:D:4:THR:HG23	2:D:6:GLU:CD	2.22	0.57
2:D:6:GLU:CD	2:D:6:GLU:H	2.06	0.57
5:B:315:IHP:O36	2:D:82:LYS:NZ	2.38	0.56
2:D:45:PHE:CG	2:D:59:LYS:HG3	2.40	0.56
1:C:53:ALA:HA	1:C:56:LYS:HD3	1.87	0.56
2:D:21:ASP:HA	2:D:65:LYS:HG3	1.88	0.56
1:C:99:LYS:HG2	6:C:198:HOH:O	2.06	0.55
2:D:1:VAL:C	2:D:3:LEU:N	2.59	0.55
2:D:30:ARG:O	2:D:34:VAL:HG23	2.06	0.55
2:D:2:HIS:O	2:D:132:LYS:NZ	2.37	0.55
1:A:43:PHE:N	1:A:44:PRO:CD	2.69	0.55

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:49:SER:O	1:C:52:SER:HB3	2.06	0.55
2:D:73:ASP:CB	6:D:203:HOH:O	2.51	0.54
2:D:45:PHE:O	2:D:59:LYS:HE3	2.08	0.54
1:A:16:LYS:HB3	1:A:16:LYS:NZ	2.22	0.54
2:B:1:VAL:HG21	2:B:136:GLY:HA3	1.89	0.54
2:B:1:VAL:HG23	2:B:136:GLY:HA3	1.89	0.54
1:C:40:LYS:HG2	1:C:48:LEU:HD13	1.90	0.54
1:C:89:HIS:C	1:C:92:ARG:HD2	2.28	0.53
2:D:124:PRO:HD2	2:D:125:PRO:HD3	1.90	0.53
2:B:53:ALA:O	2:B:57:ASN:HB2	2.07	0.53
2:B:124:PRO:HB2	2:B:125:PRO:HD3	1.90	0.53
2:B:5:PRO:CA	2:B:8:LYS:HD2	2.34	0.52
2:D:1:VAL:CG2	2:D:3:LEU:HB2	2.39	0.52
2:D:124:PRO:CD	2:D:125:PRO:HD3	2.39	0.52
2:B:5:PRO:CG	2:B:6:GLU:N	2.72	0.52
2:D:124:PRO:HB2	2:D:125:PRO:CD	2.36	0.52
2:D:4:THR:O	2:D:7:GLU:HB2	2.10	0.51
1:A:20:HIS:HB3	1:A:24:TYR:CE2	2.46	0.51
1:A:43:PHE:N	1:A:44:PRO:HD3	2.25	0.51
1:A:114:PRO:HA	2:B:116:HIS:HE1	1.71	0.51
2:D:1:VAL:HG23	2:D:3:LEU:CB	2.38	0.51
2:D:26:GLU:HG2	2:D:113:VAL:HG13	1.91	0.51
2:B:12:THR:HG22	2:B:13:ALA:N	2.26	0.51
2:D:19:ASN:OD1	2:D:21:ASP:HB2	2.11	0.51
5:B:315:IHP:O21	2:D:2:HIS:NE2	2.44	0.50
2:D:4:THR:CB	2:D:7:GLU:HG3	2.38	0.50
2:B:68:LEU:O	2:B:72:SER:HB2	2.10	0.50
1:C:75:ASP:OD1	1:C:78:ASN:HB2	2.12	0.50
2:D:63:HIS:HE1	3:D:147:HEM:CHA	2.25	0.50
1:A:39:THR:HG22	1:A:97:ASN:HD22	1.77	0.49
1:C:16:LYS:NZ	1:C:16:LYS:HB3	2.27	0.49
2:D:89:SER:HB3	2:D:144:LYS:CG	2.41	0.49
2:D:63:HIS:CE1	3:D:147:HEM:C4D	3.01	0.49
1:C:43:PHE:N	1:C:44:PRO:CD	2.75	0.49
2:D:82:LYS:HB2	6:D:168:HOH:O	2.12	0.49
2:B:43:GLU:HG3	6:B:351:HOH:O	2.13	0.49
2:D:74:GLY:HA2	2:D:84:THR:HG21	1.94	0.49
1:C:56:LYS:HB3	1:C:56:LYS:HZ3	1.77	0.49
2:D:86:ALA:O	2:D:90:GLU:HG3	2.12	0.49
2:D:94:ASP:C	2:D:95:LYS:HD3	2.33	0.49
1:C:56:LYS:CB	1:C:56:LYS:HZ2	2.26	0.48

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:24:GLY:HA2	2:D:68:LEU:HG	1.95	0.48
2:D:50:THR:HB	6:D:181:HOH:O	2.13	0.48
2:D:143:HIS:CE1	2:D:144:LYS:HD3	2.49	0.48
2:D:66:LYS:HD3	3:D:147:HEM:HAA2	1.95	0.48
1:A:16:LYS:CA	1:A:16:LYS:CE	2.87	0.48
1:C:72:HIS:CB	1:C:79:ALA:HB2	2.43	0.48
1:C:17:VAL:HG23	1:C:113:LEU:HD11	1.96	0.48
2:D:71:PHE:CE2	2:D:75:LEU:HD11	2.49	0.48
1:A:33:PHE:CD1	1:A:40:LYS:HG2	2.48	0.48
2:D:63:HIS:HE1	3:D:147:HEM:C4D	2.32	0.47
1:A:86:LEU:HD21	3:A:142:HEM:HBA2	1.96	0.47
1:C:87:HIS:HA	1:C:91:LEU:HB2	1.97	0.47
1:C:84:SER:HB3	1:C:135:VAL:O	2.15	0.47
1:C:76:MET:N	1:C:77:PRO:HD2	2.28	0.47
2:B:74:GLY:HA2	2:B:84:THR:HG21	1.97	0.46
1:A:42:TYR:CE1	1:A:93:VAL:HA	2.50	0.46
1:C:3:SER:HB2	1:C:4:PRO:HD2	1.98	0.46
2:D:34:VAL:C	2:D:36:PRO:HD3	2.36	0.46
2:D:60:VAL:O	2:D:64:GLY:N	2.40	0.46
1:C:114:PRO:HA	2:D:116:HIS:NE2	2.31	0.46
2:D:82:LYS:HD3	2:D:143:HIS:CG	2.51	0.46
1:A:113:LEU:HB3	1:A:116:GLU:HB2	1.97	0.45
1:C:3:SER:CB	1:C:4:PRO:CD	2.94	0.45
2:B:102:ASN:HB3	3:B:147:HEM:HMC1	1.98	0.45
1:A:42:TYR:C	1:A:44:PRO:HD3	2.37	0.45
2:B:5:PRO:CD	2:B:6:GLU:H	2.28	0.45
2:B:94:ASP:OD2	2:B:146:HIS:NE2	2.45	0.45
1:C:106:LEU:HA	1:C:106:LEU:HD12	1.62	0.45
1:C:76:MET:CB	1:C:77:PRO:HD3	2.46	0.45
1:A:92:ARG:HD2	6:A:186:HOH:O	2.17	0.45
2:D:82:LYS:HD3	2:D:143:HIS:CD2	2.52	0.45
2:D:57:ASN:HA	2:D:58:PRO:HD2	1.67	0.44
2:D:4:THR:CG2	2:D:6:GLU:OE2	2.44	0.44
1:C:96:VAL:HG12	6:C:190:HOH:O	2.17	0.44
1:A:137:THR:HA	1:A:140:TYR:CD2	2.52	0.44
2:B:4:THR:CG2	2:B:5:PRO:HD2	2.45	0.44
2:B:12:THR:CG2	2:B:13:ALA:N	2.80	0.44
2:D:25:GLY:HA3	2:D:61:LYS:HG3	1.99	0.44
2:B:88:LEU:HD23	2:B:88:LEU:HA	1.88	0.43
2:D:38:THR:HG22	2:D:102:ASN:HD21	1.83	0.43
1:A:113:LEU:N	1:A:114:PRO:CD	2.81	0.43

*Continued on next page...*



*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:45:PHE:O	2:D:57:ASN:ND2	2.43	0.43
1:C:3:SER:HB2	1:C:4:PRO:CD	2.48	0.43
1:C:20:HIS:HB3	1:C:24:TYR:CE2	2.54	0.43
2:D:124:PRO:CD	2:D:125:PRO:CD	2.96	0.43
1:A:16:LYS:NZ	1:A:16:LYS:CB	2.77	0.43
1:A:33:PHE:HD1	1:A:33:PHE:HA	1.63	0.42
2:D:4:THR:HG22	2:D:7:GLU:N	2.34	0.42
2:D:77:HIS:CD2	2:D:77:HIS:N	2.84	0.42
1:A:113:LEU:O	1:A:117:PHE:N	2.52	0.42
1:A:141:ARG:HB3	2:D:36:PRO:HG2	2.01	0.42
2:B:3:LEU:HG	2:B:7:GLU:HB3	2.01	0.42
1:C:42:TYR:CE1	1:C:93:VAL:HA	2.55	0.42
2:D:76:ALA:HB3	2:D:77:HIS:NE2	2.34	0.42
2:D:146:HIS:CD2	2:D:146:HIS:N	2.87	0.42
1:A:80:LEU:HB2	1:A:135:VAL:HG11	2.02	0.42
2:B:143:HIS:ND1	2:B:144:LYS:NZ	2.58	0.42
2:D:4:THR:HB	2:D:7:GLU:OE2	2.19	0.42
1:A:136:LEU:HD12	3:A:142:HEM:HBB2	2.00	0.42
1:C:2:LEU:HD22	1:C:6:ASP:HB3	2.02	0.41
1:C:20:HIS:O	1:C:23:GLU:HB2	2.20	0.41
2:D:42:PHE:O	2:D:48:LEU:HD11	2.20	0.41
2:D:71:PHE:HE2	2:D:75:LEU:HD11	1.85	0.41
2:D:77:HIS:CB	2:D:84:THR:OG1	2.68	0.41
2:B:5:PRO:CG	2:B:6:GLU:H	2.34	0.41
1:A:35:SER:HB3	2:B:131:GLN:HG3	2.01	0.41
2:D:3:LEU:HA	2:D:7:GLU:OE2	2.20	0.41
1:C:35:SER:HB3	2:D:131:GLN:HG3	2.03	0.41
1:C:66:LEU:HD23	1:C:66:LEU:HA	1.82	0.41
2:D:118:PHE:O	2:D:121:GLU:HB3	2.21	0.41
1:A:83:LEU:HD21	3:A:142:HEM:HHB	2.02	0.41
2:B:14:LEU:C	2:B:16:GLY:N	2.73	0.41
1:C:37:PRO:HA	1:C:40:LYS:HD3	2.03	0.41
2:D:33:VAL:HG22	2:D:51:PRO:HA	2.03	0.41
2:D:50:THR:HA	2:D:51:PRO:HD3	1.93	0.41
1:A:14:TRP:CG	1:A:70:VAL:HG21	2.56	0.41
1:A:76:MET:N	1:A:77:PRO:CD	2.84	0.41
2:B:8:LYS:HE2	2:B:8:LYS:HB3	1.40	0.41
1:C:24:TYR:N	1:C:24:TYR:HD2	2.19	0.41
1:A:92:ARG:HE	1:A:92:ARG:HB2	1.53	0.40
1:C:33:PHE:CD1	1:C:40:LYS:HG3	2.56	0.40
3:D:147:HEM:HHC	3:D:147:HEM:CBB	2.29	0.40

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:114:LEU:HD23	2:B:114:LEU:HA	1.91	0.40
2:D:30:ARG:HD2	2:D:113:VAL:CG2	2.51	0.40
2:D:66:LYS:HB2	2:D:66:LYS:HE3	1.15	0.40
2:D:68:LEU:HA	2:D:68:LEU:HD22	1.70	0.40
2:D:4:THR:HG23	2:D:6:GLU:CG	2.48	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:234:HOH:O	6:A:234:HOH:O[2_665]	1.76	0.44

## 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%)	136 (98%)	3 (2%)	0	100	100
1	C	139/141 (99%)	133 (96%)	6 (4%)	0	100	100
2	B	144/146 (99%)	141 (98%)	3 (2%)	0	100	100
2	D	144/146 (99%)	140 (97%)	4 (3%)	0	100	100
All	All	566/574 (99%)	550 (97%)	16 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	113/113 (100%)	110 (97%)	3 (3%)	44	15
1	C	113/113 (100%)	101 (89%)	12 (11%)	6	0
2	B	118/118 (100%)	102 (86%)	16 (14%)	3	0
2	D	118/118 (100%)	103 (87%)	15 (13%)	4	0
All	All	462/462 (100%)	416 (90%)	46 (10%)	7	0

All (46) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	23	GLU
1	A	84	SER
1	A	90	LYS
2	B	1	VAL
2	B	2	HIS
2	B	6	GLU
2	B	8	LYS
2	B	9	SER
2	B	12	THR
2	B	18	VAL
2	B	22	GLU
2	B	52	ASP
2	B	59	LYS
2	B	66	LYS
2	B	68	LEU
2	B	72	SER
2	B	78	LEU
2	B	82	LYS
2	B	120	LYS
1	C	8	THR
1	C	10	VAL
1	C	11	LYS
1	C	16	LYS
1	C	52	SER
1	C	56	LYS
1	C	73	VAL
1	C	78	ASN
1	C	84	SER
1	C	90	LYS
1	C	106	LEU

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	C	118	THR
2	D	3	LEU
2	D	4	THR
2	D	26	GLU
2	D	59	LYS
2	D	61	LYS
2	D	65	LYS
2	D	66	LYS
2	D	68	LEU
2	D	78	LEU
2	D	79	ASP
2	D	87	THR
2	D	95	LYS
2	D	120	LYS
2	D	124	PRO
2	D	143	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	78	ASN
1	A	97	ASN
2	B	80	ASN
2	B	102	ASN
2	B	116	HIS
1	C	97	ASN
2	D	63	HIS
2	D	77	HIS
2	D	80	ASN
2	D	102	ASN

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

7 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
4	OXY	C	143	3	1,1,1	0.54	0	-		
3	HEM	A	142	1,4	41,50,50	1.87	9 (21%)	45,82,82	2.31	25 (55%)
5	IHP	B	315	-	36,36,36	1.25	5 (13%)	54,60,60	1.08	2 (3%)
4	OXY	A	143	3	1,1,1	0.39	0	-		
3	HEM	B	147	2	41,50,50	1.54	9 (21%)	45,82,82	2.83	16 (35%)
3	HEM	D	147	2	41,50,50	1.57	8 (19%)	45,82,82	2.94	19 (42%)
3	HEM	C	142	1,4	41,50,50	1.49	9 (21%)	45,82,82	2.36	16 (35%)

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	1,4	-	6/12/54/54	-
5	IHP	B	315	-	-	3/30/54/54	0/1/1/1
3	HEM	B	147	2	-	2/12/54/54	-
3	HEM	D	147	2	-	5/12/54/54	-
3	HEM	C	142	1,4	-	6/12/54/54	-

All (40) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	142	HEM	C3C-C2C	-5.06	1.33	1.40

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	142	HEM	C3C-CAC	4.95	1.58	1.47
3	D	147	HEM	C3C-CAC	4.55	1.57	1.47
3	B	147	HEM	C2C-C1C	4.00	1.51	1.42
3	A	142	HEM	CAB-C3B	3.67	1.57	1.47
3	D	147	HEM	CAB-C3B	3.35	1.56	1.47
3	B	147	HEM	C3C-CAC	3.30	1.54	1.47
3	C	142	HEM	C3C-C2C	-3.23	1.35	1.40
3	B	147	HEM	CAB-C3B	3.23	1.56	1.47
3	A	142	HEM	CMB-C2B	3.13	1.57	1.50
3	D	147	HEM	CMB-C2B	3.12	1.57	1.50
5	B	315	IHP	P4-O14	3.12	1.65	1.59
3	C	142	HEM	CAB-C3B	2.97	1.55	1.47
3	B	147	HEM	CHA-C4D	2.81	1.42	1.35
5	B	315	IHP	C6-C1	2.76	1.58	1.52
3	C	142	HEM	CMB-C2B	2.74	1.56	1.50
3	A	142	HEM	CAA-C2A	2.64	1.55	1.52
3	C	142	HEM	C1B-NB	-2.63	1.35	1.40
3	A	142	HEM	CMD-C2D	2.62	1.56	1.50
3	D	147	HEM	CAA-C2A	2.58	1.55	1.52
3	B	147	HEM	C3C-C2C	-2.54	1.36	1.40
3	A	142	HEM	FE-ND	2.40	2.08	1.96
5	B	315	IHP	P2-O12	2.35	1.63	1.59
3	C	142	HEM	C3C-CAC	2.34	1.52	1.47
3	C	142	HEM	CMD-C2D	2.34	1.55	1.50
3	B	147	HEM	CMB-C2B	2.30	1.55	1.50
3	D	147	HEM	C4A-CHB	-2.30	1.34	1.41
3	B	147	HEM	O2A-CGA	-2.26	1.23	1.30
3	D	147	HEM	CBD-CAD	2.22	1.59	1.52
5	B	315	IHP	P3-O13	2.20	1.63	1.59
3	D	147	HEM	C2A-C3A	-2.16	1.31	1.37
3	C	142	HEM	FE-NB	2.14	2.07	1.96
3	A	142	HEM	C4D-ND	-2.05	1.36	1.40
3	B	147	HEM	C4A-CHB	-2.05	1.35	1.41
3	C	142	HEM	C4A-CHB	-2.04	1.35	1.41
3	A	142	HEM	CBA-CGA	2.03	1.55	1.50
3	C	142	HEM	CAA-C2A	2.02	1.55	1.52
3	B	147	HEM	CAD-C3D	2.02	1.56	1.51
5	B	315	IHP	P5-O15	2.01	1.63	1.59
3	D	147	HEM	CBD-CGD	2.01	1.55	1.50

All (78) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	147	HEM	C1B-NB-C4B	-7.95	96.86	105.07
3	D	147	HEM	CBA-CAA-C2A	-7.62	99.61	112.62
3	D	147	HEM	CMA-C3A-C4A	-6.79	118.03	128.46
3	B	147	HEM	CHC-C4B-NB	-6.53	117.33	124.43
3	B	147	HEM	C4B-CHC-C1C	6.46	131.08	122.56
3	D	147	HEM	CHB-C1B-NB	6.00	131.79	124.38
3	D	147	HEM	CMA-C3A-C2A	5.79	135.85	124.94
3	B	147	HEM	C2B-C1B-NB	5.61	116.49	109.84
3	B	147	HEM	C2C-C3C-C4C	5.39	110.66	106.90
3	C	142	HEM	O2D-CGD-O1D	5.08	135.96	123.30
3	C	142	HEM	CMB-C2B-C1B	-4.93	117.53	125.04
3	D	147	HEM	CAD-CBD-CGD	-4.90	103.06	113.60
3	D	147	HEM	O2D-CGD-O1D	4.85	135.39	123.30
3	C	142	HEM	C3B-C2B-C1B	4.69	109.96	106.49
3	B	147	HEM	CMC-C2C-C3C	4.67	133.42	124.68
3	D	147	HEM	O1D-CGD-CBD	-4.67	108.08	123.08
3	C	142	HEM	C1B-NB-C4B	4.66	109.89	105.07
3	A	142	HEM	CAD-C3D-C4D	-4.63	116.58	124.66
3	D	147	HEM	O2A-CGA-O1A	4.59	134.75	123.30
3	C	142	HEM	CHB-C1B-NB	4.54	129.99	124.38
3	C	142	HEM	C4C-CHD-C1D	4.46	128.45	122.56
3	A	142	HEM	CHB-C1B-NB	4.40	129.81	124.38
3	B	147	HEM	C4B-C3B-C2B	-4.22	103.77	107.11
3	D	147	HEM	CAA-CBA-CGA	-3.99	102.56	113.76
3	A	142	HEM	C4D-C3D-C2D	3.97	112.68	106.90
3	A	142	HEM	O1D-CGD-CBD	-3.94	110.43	123.08
3	B	147	HEM	CBA-CAA-C2A	-3.92	105.92	112.62
3	C	142	HEM	CHC-C4B-NB	3.86	128.62	124.43
3	B	147	HEM	O2A-CGA-CBA	3.74	126.05	114.03
3	A	142	HEM	CAA-CBA-CGA	-3.64	103.55	113.76
3	A	142	HEM	C3D-C4D-ND	-3.58	106.18	110.17
3	A	142	HEM	C1B-NB-C4B	3.55	108.74	105.07
3	A	142	HEM	CHC-C4B-NB	3.46	128.19	124.43
3	D	147	HEM	CMD-C2D-C1D	-3.43	119.81	125.04
3	D	147	HEM	C3D-C4D-ND	-3.41	106.37	110.17
3	D	147	HEM	CHB-C1B-C2B	-3.35	117.46	126.72
3	C	142	HEM	CBA-CAA-C2A	-3.08	107.37	112.62
3	A	142	HEM	C4C-CHD-C1D	3.05	126.58	122.56
3	D	147	HEM	CMD-C2D-C3D	3.03	134.35	126.12
3	B	147	HEM	CHD-C1D-C2D	-2.99	120.31	124.98
3	C	142	HEM	CMC-C2C-C3C	2.98	130.25	124.68
3	D	147	HEM	C4D-C3D-C2D	2.98	111.23	106.90
3	A	142	HEM	C1D-C2D-C3D	-2.96	103.84	106.96

*Continued on next page...*

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	142	HEM	O1D-CGD-CBD	-2.93	113.65	123.08
3	D	147	HEM	C4C-CHD-C1D	2.91	126.40	122.56
3	B	147	HEM	C3C-C4C-NC	-2.90	105.48	110.94
5	B	315	IHP	C5-C4-C3	2.89	116.75	110.41
3	C	142	HEM	C2C-C3C-C4C	2.87	108.90	106.90
3	B	147	HEM	C2D-C1D-ND	2.77	113.20	109.88
3	A	142	HEM	CAD-CBD-CGD	-2.73	107.73	113.60
3	A	142	HEM	CBA-CAA-C2A	-2.73	107.97	112.62
3	B	147	HEM	C4D-ND-C1D	-2.67	102.31	105.07
3	C	142	HEM	CHA-C4D-C3D	2.66	130.32	125.33
3	A	142	HEM	CMB-C2B-C1B	-2.65	121.01	125.04
3	C	142	HEM	CHA-C4D-ND	-2.61	121.15	124.38
3	D	147	HEM	CBD-CAD-C3D	-2.56	105.52	112.63
3	C	142	HEM	C2B-C1B-NB	-2.53	106.84	109.84
3	A	142	HEM	C4B-C3B-C2B	2.47	109.07	107.11
3	A	142	HEM	C2C-C3C-C4C	2.46	108.61	106.90
3	D	147	HEM	O1A-CGA-CBA	-2.43	115.26	123.08
3	D	147	HEM	CHA-C4D-C3D	2.41	129.84	125.33
3	A	142	HEM	O2D-CGD-O1D	2.38	129.24	123.30
3	A	142	HEM	CMA-C3A-C2A	2.30	129.27	124.94
3	B	147	HEM	C4C-CHD-C1D	-2.28	119.55	122.56
3	A	142	HEM	CBD-CAD-C3D	-2.28	106.29	112.63
3	B	147	HEM	O1A-CGA-CBA	-2.23	115.92	123.08
3	A	142	HEM	CMA-C3A-C4A	-2.16	125.14	128.46
3	C	142	HEM	C4D-ND-C1D	2.15	107.30	105.07
5	B	315	IHP	C3-C2-C1	2.15	115.11	110.41
3	A	142	HEM	CHB-C1B-C2B	-2.13	120.84	126.72
3	B	147	HEM	O2A-CGA-O1A	-2.13	118.00	123.30
3	A	142	HEM	CMD-C2D-C3D	2.12	131.87	126.12
3	A	142	HEM	C4D-ND-C1D	2.11	107.25	105.07
3	A	142	HEM	O2A-CGA-O1A	2.11	128.55	123.30
3	A	142	HEM	C4A-C3A-C2A	-2.06	105.56	107.00
3	A	142	HEM	CHA-C4D-ND	2.05	126.92	124.38
3	D	147	HEM	C4D-ND-C1D	2.04	107.18	105.07
3	C	142	HEM	CBD-CAD-C3D	-2.02	107.00	112.63

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	142	HEM	C2B-C3B-CAB-CBB
5	B	315	IHP	C1-O11-P1-O21

Continued on next page...



*Continued from previous page...*

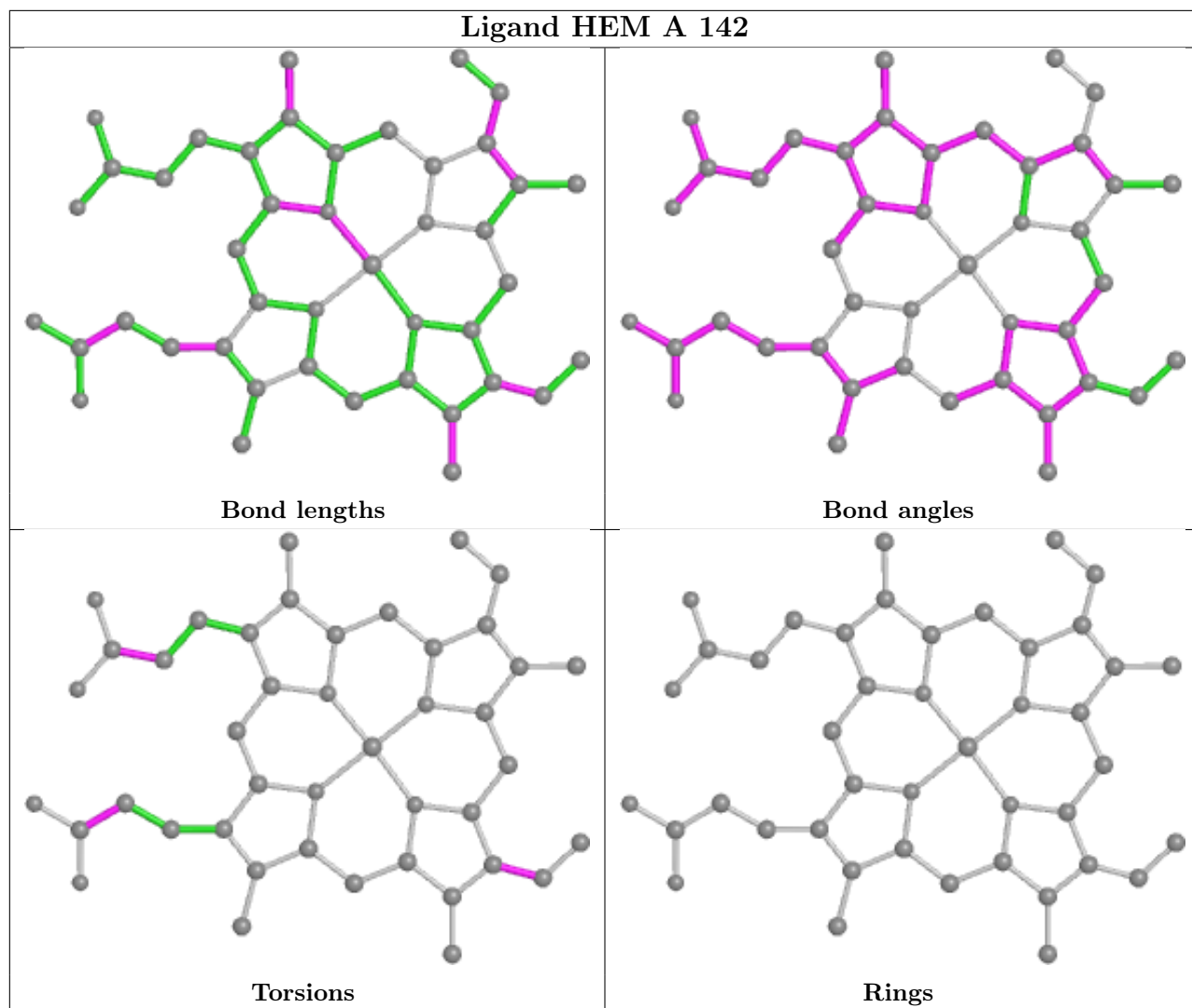
Mol	Chain	Res	Type	Atoms
3	C	142	HEM	C4B-C3B-CAB-CBB
3	A	142	HEM	C2B-C3B-CAB-CBB
3	D	147	HEM	C4B-C3B-CAB-CBB
5	B	315	IHP	C6-O16-P6-O46
3	D	147	HEM	CAD-CBD-CGD-O1D
3	C	142	HEM	CAD-CBD-CGD-O1D
3	A	142	HEM	CAD-CBD-CGD-O1D
3	D	147	HEM	CAA-CBA-CGA-O1A
3	A	142	HEM	CAD-CBD-CGD-O2D
3	C	142	HEM	CAD-CBD-CGD-O2D
3	A	142	HEM	CAA-CBA-CGA-O1A
3	C	142	HEM	CAA-CBA-CGA-O1A
3	C	142	HEM	CAA-CBA-CGA-O2A
3	A	142	HEM	CAA-CBA-CGA-O2A
3	D	147	HEM	CAA-CBA-CGA-O2A
3	D	147	HEM	CAD-CBD-CGD-O2D
3	B	147	HEM	CAD-CBD-CGD-O1D
3	B	147	HEM	CAD-CBD-CGD-O2D
3	A	142	HEM	C4B-C3B-CAB-CBB
5	B	315	IHP	C5-O15-P5-O35

There are no ring outliers.

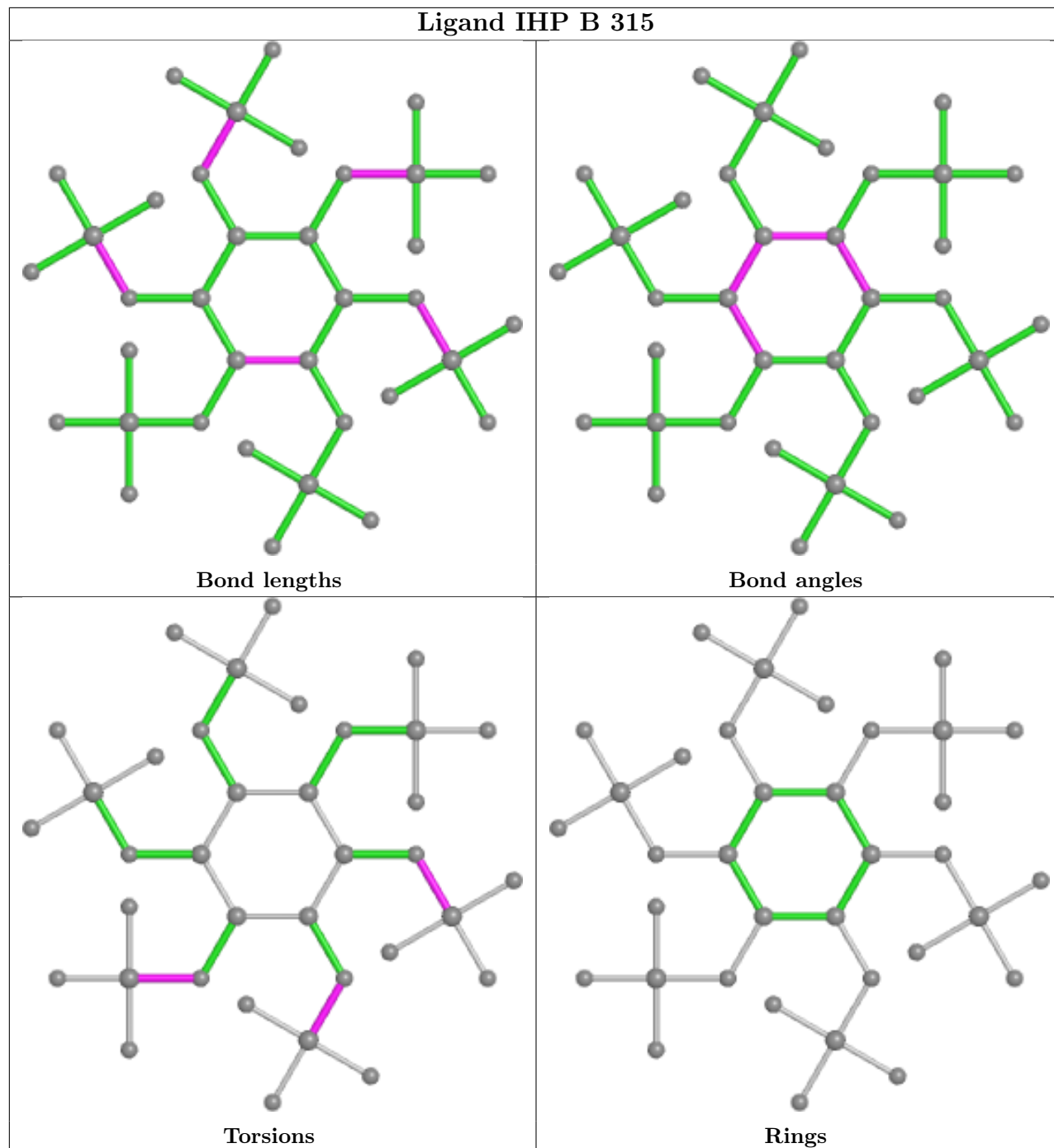
4 monomers are involved in 14 short contacts:

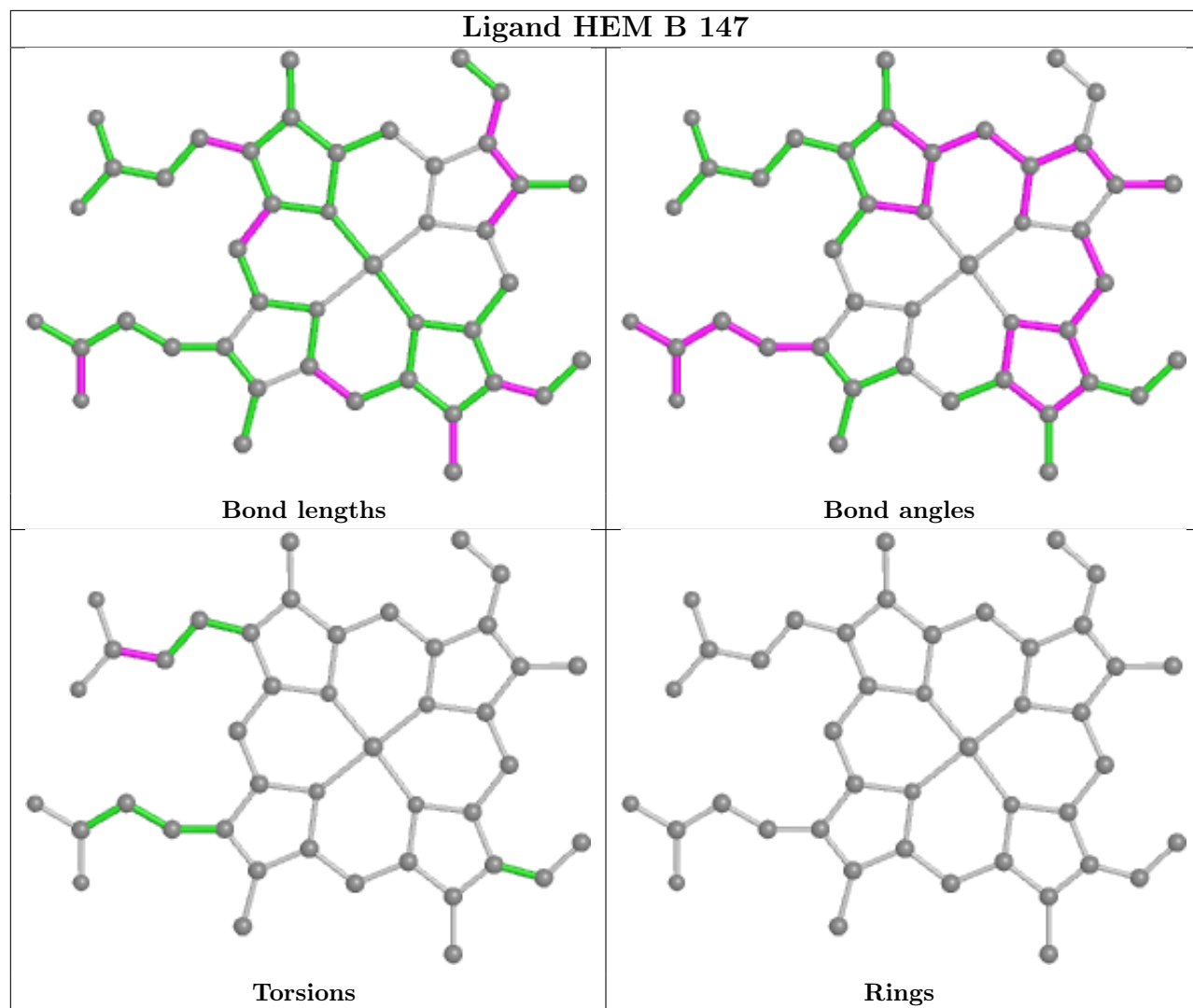
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	142	HEM	3	0
5	B	315	IHP	2	0
3	B	147	HEM	1	0
3	D	147	HEM	8	0

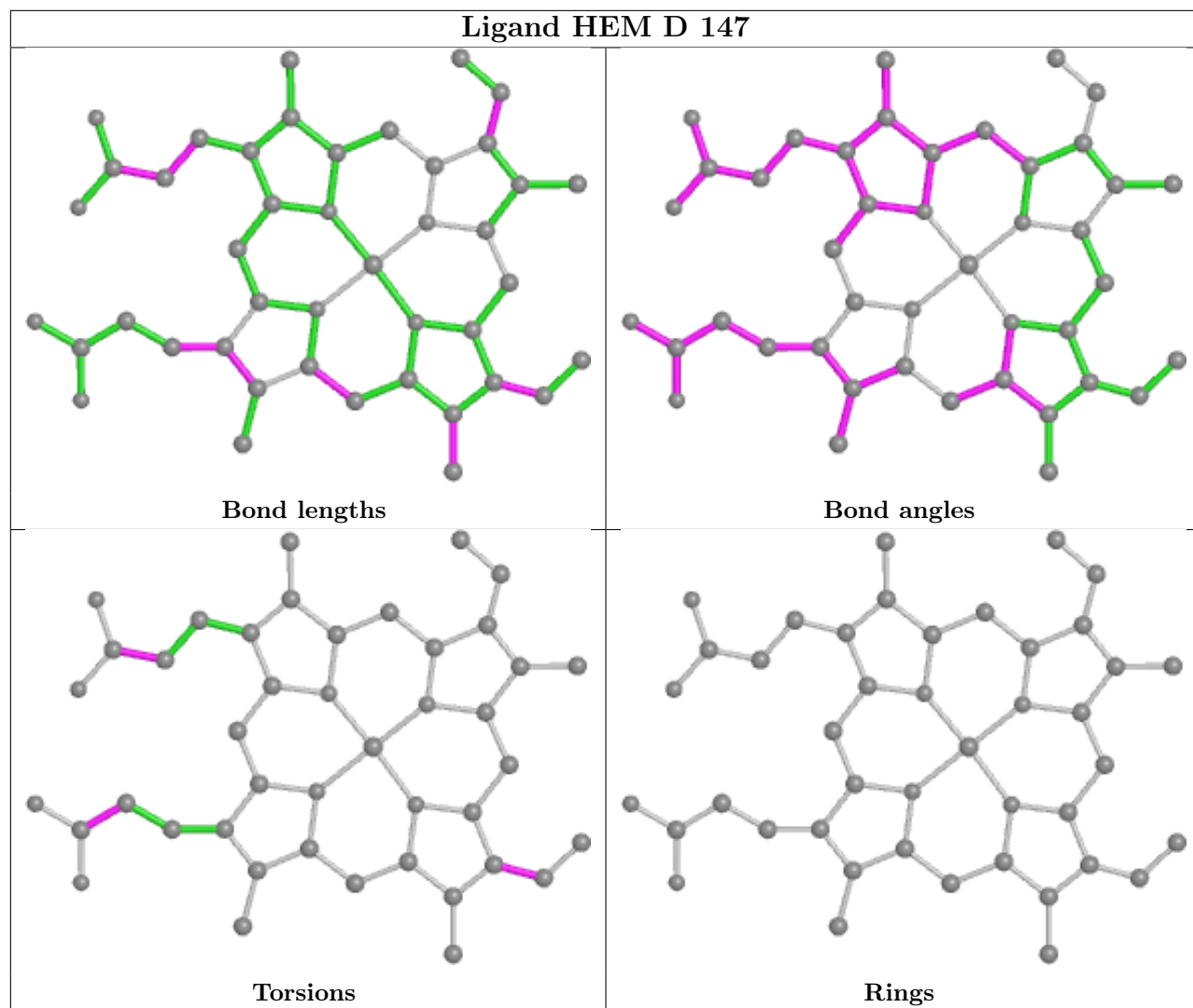
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

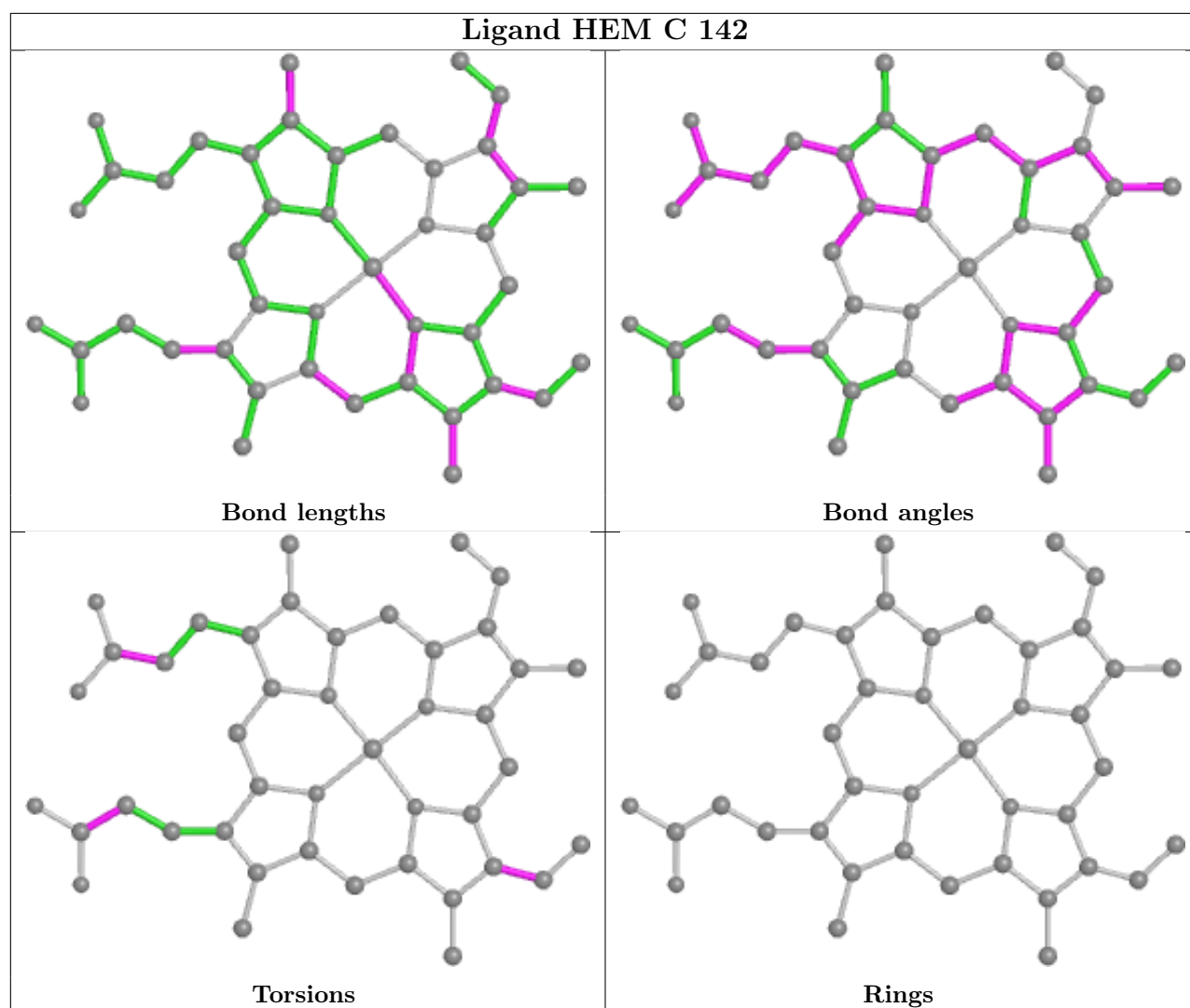


## Ligand IHP B 315









## 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	141/141 (100%)	-0.15	2 (1%) 75 79	15, 23, 46, 70	0
1	C	141/141 (100%)	0.07	2 (1%) 75 79	16, 29, 51, 72	0
2	B	146/146 (100%)	0.07	7 (4%) 30 33	14, 23, 53, 75	0
2	D	146/146 (100%)	0.33	7 (4%) 30 33	18, 32, 61, 75	0
All	All	574/574 (100%)	0.08	18 (3%) 49 54	14, 27, 54, 75	0

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	1	VAL	12.3
2	B	1	VAL	10.9
2	D	2	HIS	5.1
2	B	4	THR	4.5
2	D	3	LEU	3.1
2	B	2	HIS	3.0
2	B	3	LEU	3.0
2	B	6	GLU	2.9
2	D	45	PHE	2.7
1	A	23	GLU	2.7
2	D	77	HIS	2.7
2	B	5	PRO	2.6
1	C	1	VAL	2.3
2	D	6	GLU	2.2
2	D	4	THR	2.2
1	A	105	LEU	2.1
2	B	8	LYS	2.1
1	C	73	VAL	2.1

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides 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.

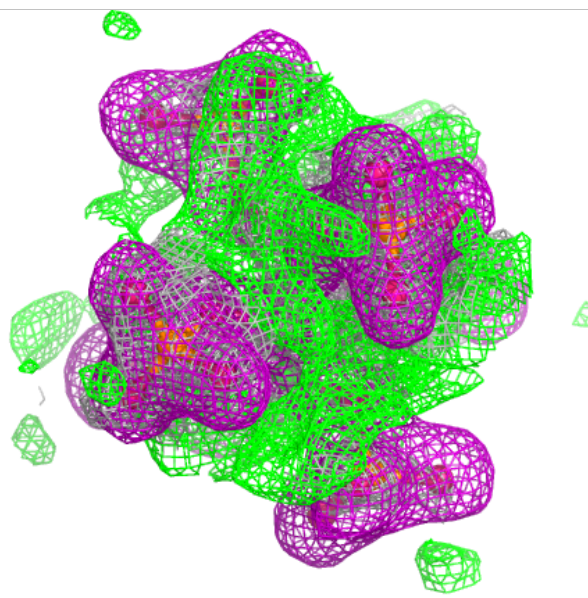
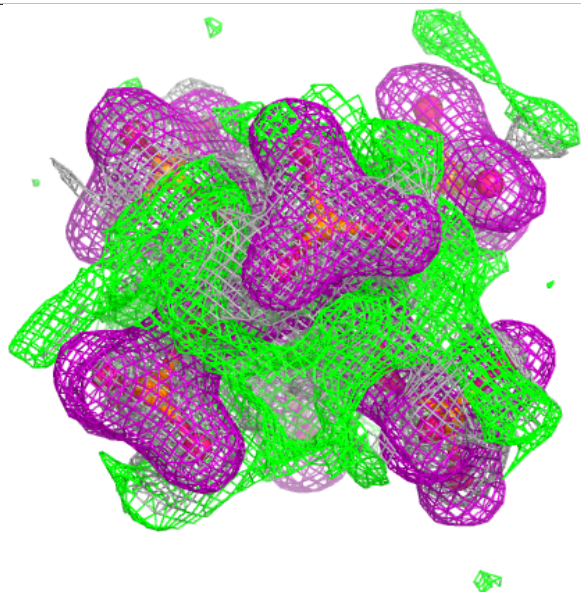
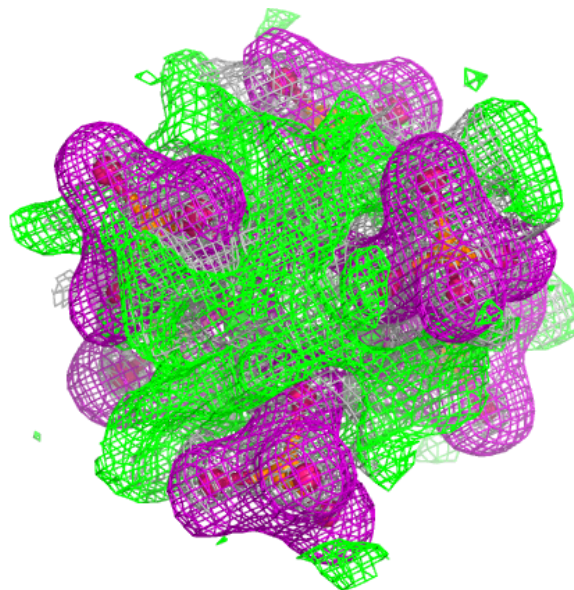
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
5	IHP	B	315	36/36	0.66	0.68	20,20,20,20	0
4	OXY	C	143	2/2	0.94	0.12	21,21,21,32	1
4	OXY	A	143	2/2	0.96	0.18	25,25,25,36	1
3	HEM	D	147	43/43	0.97	0.08	17,27,76,77	0
3	HEM	A	142	43/43	0.97	0.08	17,23,49,77	0
3	HEM	B	147	43/43	0.98	0.09	11,16,33,53	0
3	HEM	C	142	43/43	0.98	0.09	15,20,41,71	0

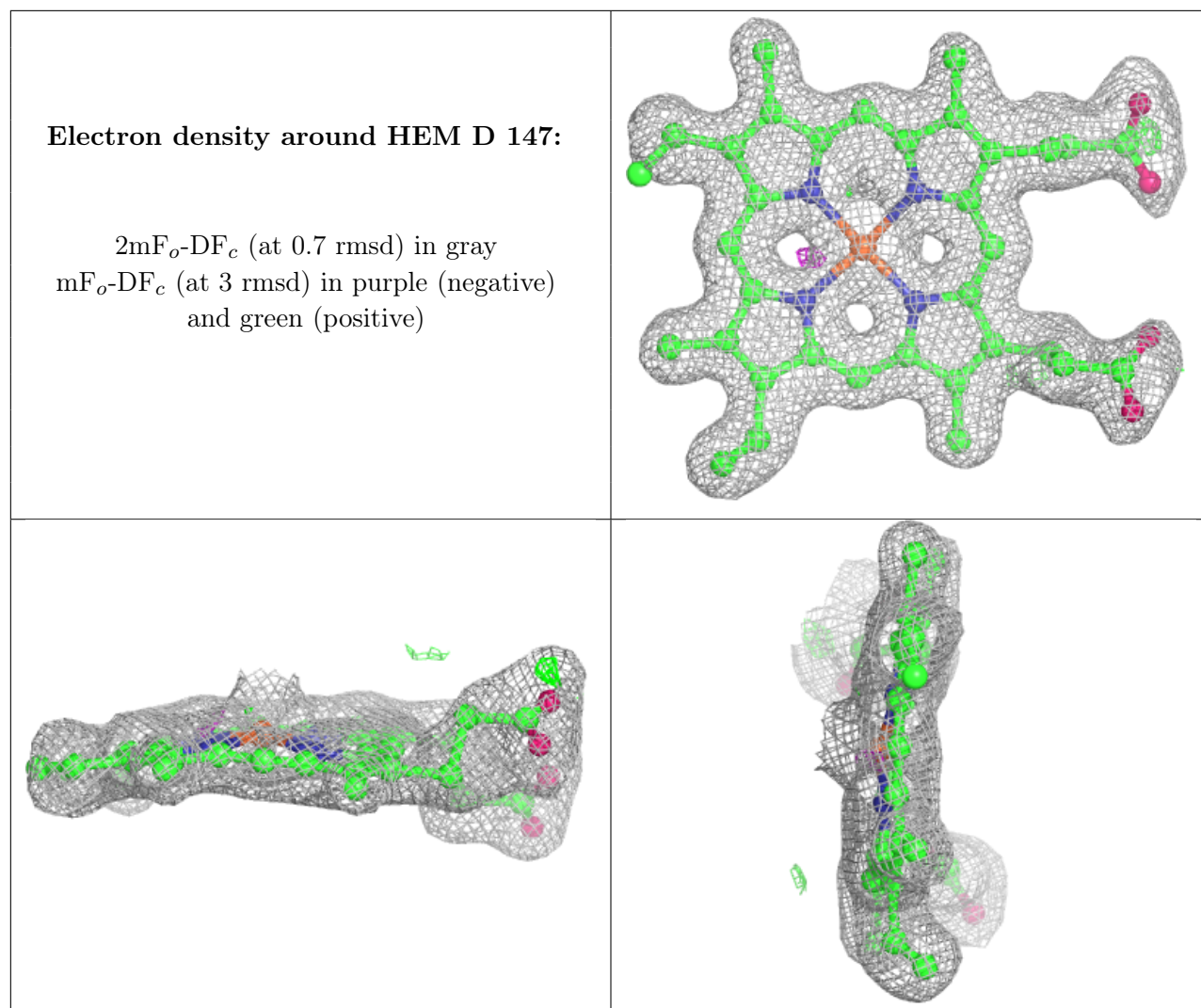
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



**Electron density around IHP B 315:**

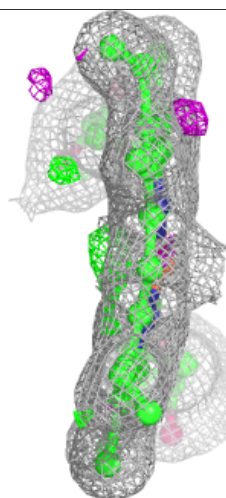
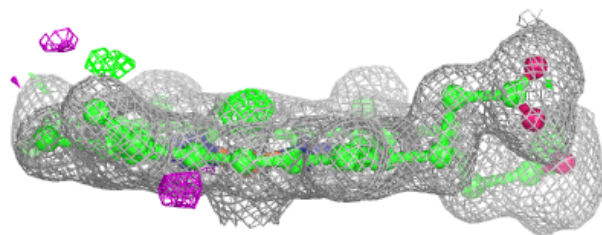
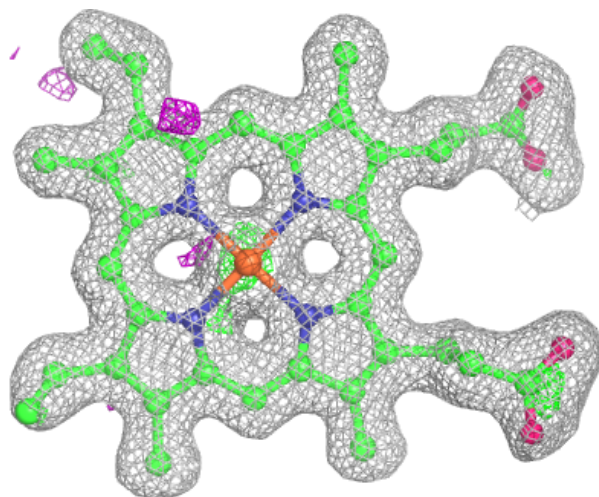
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





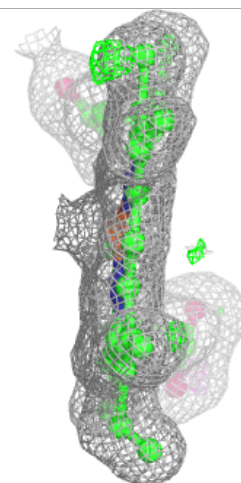
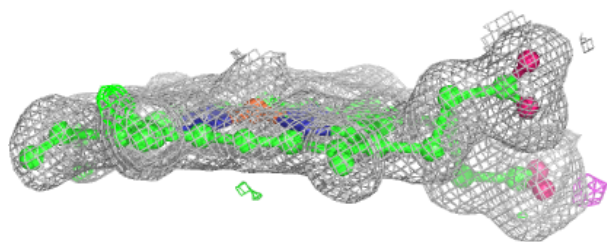
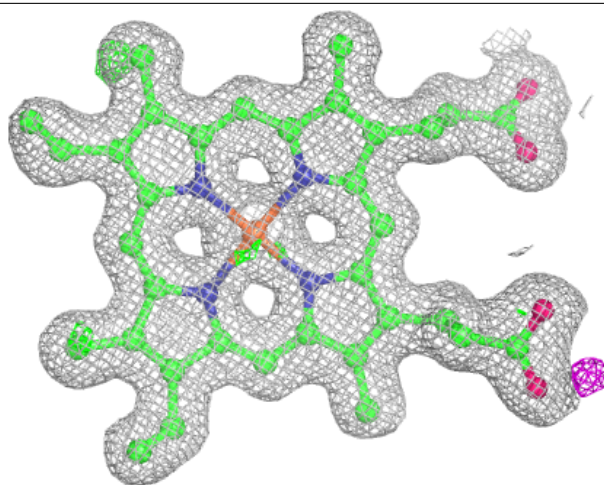
**Electron density around HEM A 142:**

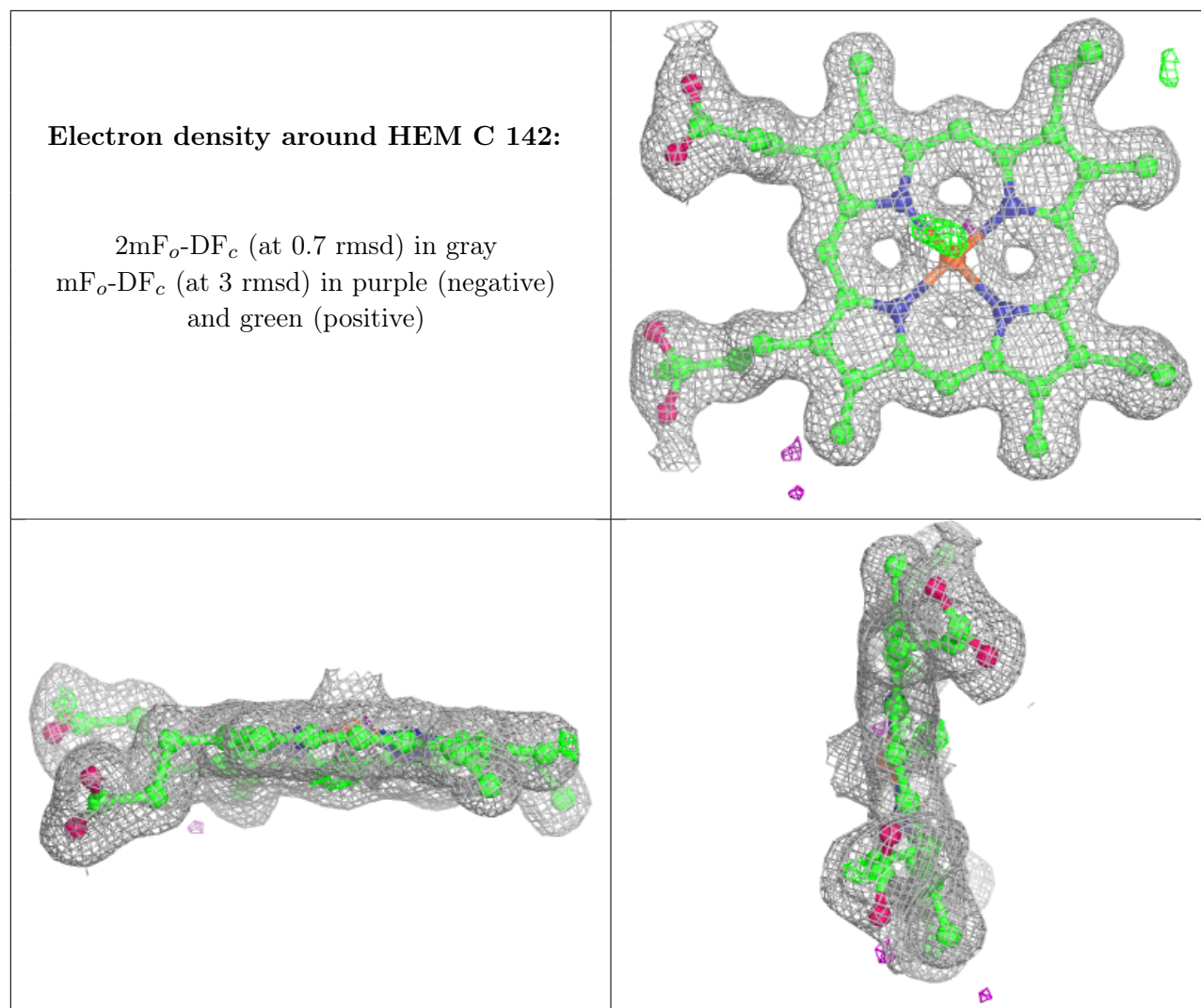
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around HEM B 147:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





## 6.5 Other polymers [i](#)

There are no such residues in this entry.