



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 10:02 AM GMT

PDB ID : 3KOH  
Title : Cytochrome P450 2E1 with omega-imidazolyl octanoic acid  
Authors : Scott, E.E.; Porubsky, P.R.  
Deposited on : 2009-11-13  
Resolution : 2.90 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.

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

MolProbity : 4.02b-467  
Mogul : 1.7 (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

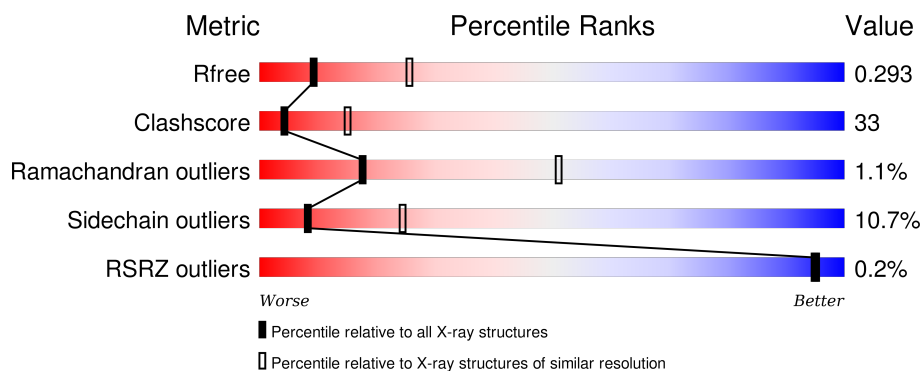
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*



The reported resolution of this entry is 2.90 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	1451 (2.90-2.90)
Clashscore	102246	1668 (2.90-2.90)
Ramachandran outliers	100387	1630 (2.90-2.90)
Sidechain outliers	100360	1632 (2.90-2.90)
RSRZ outliers	91569	1456 (2.90-2.90)

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	476	 49% 41% 7% .
1	B	476	 45% 45% 7% . .

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
3	OIO	A	1	-	-	X	X
3	OIO	B	1	-	-	X	X

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7681 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 Cytochrome P450 2E1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	463	Total	C	N	O	S	0	0	0
			3777	2444	648	667	18			
1	B	463	Total	C	N	O	S	0	0	0
			3777	2444	648	667	18			

There are 28 discrepancies between the modelled and reference sequences:

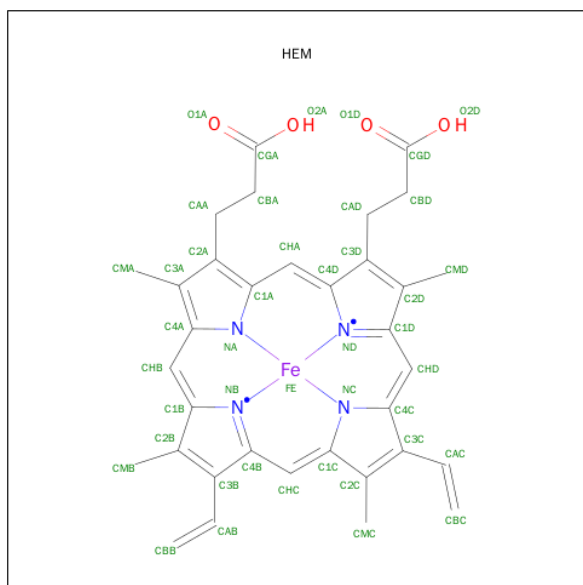
Chain	Residue	Modelled	Actual	Comment	Reference
A	22	MET	-	EXPRESSION TAG	UNP P05181
A	23	ALA	-	EXPRESSION TAG	UNP P05181
A	24	LYS	-	EXPRESSION TAG	UNP P05181
A	25	LYS	-	EXPRESSION TAG	UNP P05181
A	26	THR	-	EXPRESSION TAG	UNP P05181
A	27	SER	-	EXPRESSION TAG	UNP P05181
A	28	SER	-	EXPRESSION TAG	UNP P05181
A	29	LYS	-	EXPRESSION TAG	UNP P05181
A	30	GLY	-	EXPRESSION TAG	UNP P05181
A	31	LYS	-	EXPRESSION TAG	UNP P05181
A	494	HIS	-	EXPRESSION TAG	UNP P05181
A	495	HIS	-	EXPRESSION TAG	UNP P05181
A	496	HIS	-	EXPRESSION TAG	UNP P05181
A	497	HIS	-	EXPRESSION TAG	UNP P05181
B	22	MET	-	EXPRESSION TAG	UNP P05181
B	23	ALA	-	EXPRESSION TAG	UNP P05181
B	24	LYS	-	EXPRESSION TAG	UNP P05181
B	25	LYS	-	EXPRESSION TAG	UNP P05181
B	26	THR	-	EXPRESSION TAG	UNP P05181
B	27	SER	-	EXPRESSION TAG	UNP P05181
B	28	SER	-	EXPRESSION TAG	UNP P05181
B	29	LYS	-	EXPRESSION TAG	UNP P05181
B	30	GLY	-	EXPRESSION TAG	UNP P05181
B	31	LYS	-	EXPRESSION TAG	UNP P05181
B	494	HIS	-	EXPRESSION TAG	UNP P05181

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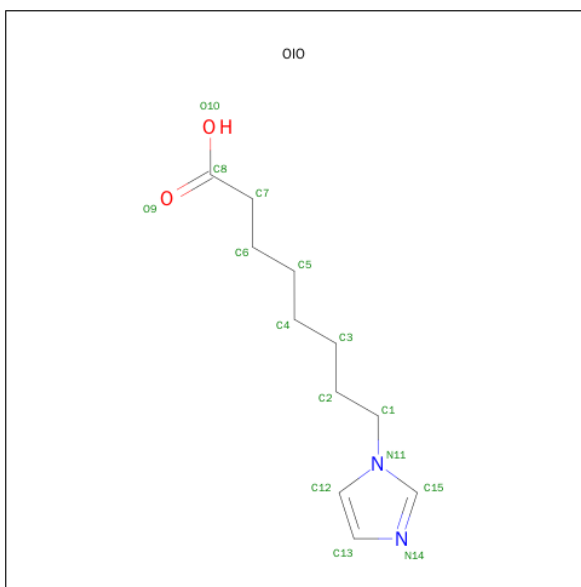
Chain	Residue	Modelled	Actual	Comment	Reference
B	495	HIS	-	EXPRESSION TAG	UNP P05181
B	496	HIS	-	EXPRESSION TAG	UNP P05181
B	497	HIS	-	EXPRESSION TAG	UNP P05181

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula:  $C_{34}H_{32}FeN_4O_4$ ).



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

- Molecule 3 is 8-(1H-IMIDAZOL-1-YL)OCTANOIC ACID (three-letter code: OIO) (formula:  $C_{11}H_{18}N_2O_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			15	11	2	2		
3	B	1	Total	C	N	O	0	0
			15	11	2	2		

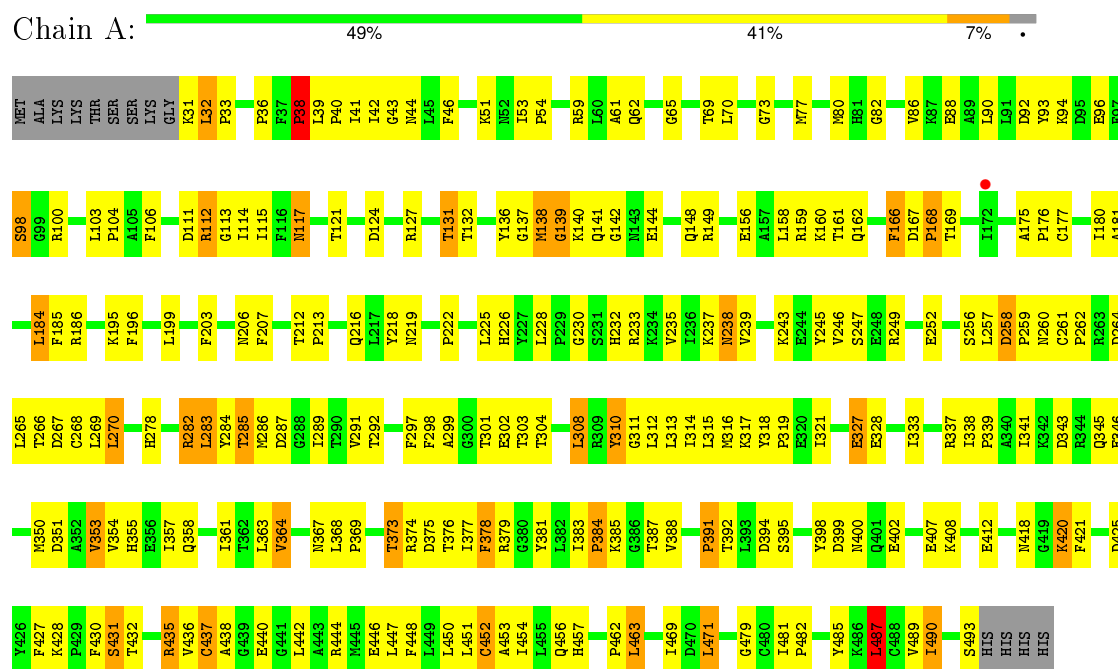
- Molecule 4 is water.

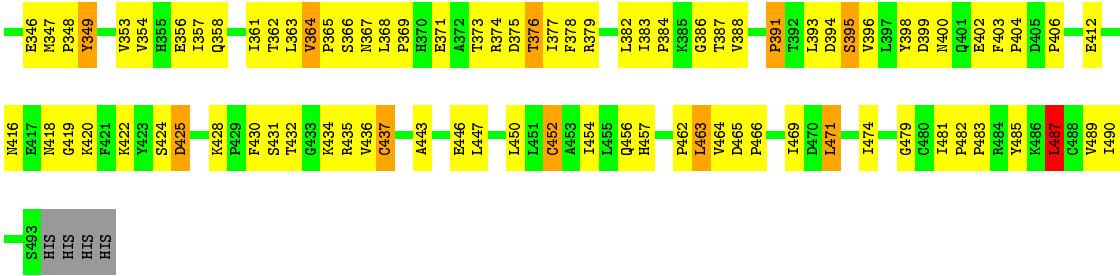
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	6	Total	O	0	0
			6	6		
4	B	5	Total	O	0	0
			5	5		

### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

#### • Molecule 1: Cytochrome P450 2E1







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	71.19 Å 71.19 Å 224.86 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	35.59 – 2.90 35.59 – 2.90	Depositor EDS
% Data completeness (in resolution range)	98.1 (35.59-2.90) 98.1 (35.59-2.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.50 (at 2.90 Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, $R_{free}$	0.206 , 0.292 0.221 , 0.293	Depositor DCC
$R_{free}$ test set	1217 reflections (5.29%)	DCC
Wilson B-factor (Å <sup>2</sup> )	56.8	Xtriage
Anisotropy	0.112	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 29.7	EDS
Estimated twinning fraction	0.459 for h,-k,-l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 24217 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	7681	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.99% 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: OIO, 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	1.64	4/3882 (0.1%)	0.93	9/5257 (0.2%)
1	B	1.62	5/3882 (0.1%)	0.90	8/5257 (0.2%)
All	All	1.63	9/7764 (0.1%)	0.92	17/10514 (0.2%)

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	168	PRO	N-CD	-5.86	1.39	1.47
1	B	261	CYS	CB-SG	-5.52	1.72	1.81
1	B	452	CYS	CB-SG	-5.41	1.73	1.81
1	B	177	CYS	CB-SG	-5.13	1.73	1.81
1	A	218	TYR	CD1-CE1	-5.11	1.31	1.39
1	A	485	TYR	CD2-CE2	-5.10	1.31	1.39
1	B	349	TYR	CE1-CZ	-5.09	1.31	1.38
1	B	201	TYR	CD2-CE2	-5.02	1.31	1.39
1	A	378	PHE	CD1-CE1	-5.01	1.29	1.39

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	38	PRO	CA-N-CD	-8.58	99.49	111.50
1	A	384	PRO	CA-N-CD	-8.18	100.05	111.50
1	B	38	PRO	CA-N-CD	-8.03	100.26	111.50
1	A	435	ARG	O-C-N	7.95	135.41	122.70
1	B	142	GLY	N-CA-C	-7.17	95.18	113.10
1	B	271	VAL	O-C-N	-6.45	112.37	122.70
1	B	139	GLY	N-CA-C	-5.96	98.20	113.10
1	A	435	ARG	CA-C-N	-5.90	104.21	117.20
1	A	487	LEU	CB-CG-CD1	-5.86	101.04	111.00
1	A	139	GLY	N-CA-C	5.49	126.83	113.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	141	GLN	N-CA-C	-5.39	96.44	111.00
1	B	73	GLY	N-CA-C	-5.31	99.84	113.10
1	B	487	LEU	CB-CG-CD1	-5.29	102.00	111.00
1	A	73	GLY	N-CA-C	-5.09	100.36	113.10
1	A	70	LEU	CA-CB-CG	5.09	127.00	115.30
1	A	435	ARG	C-N-CA	-5.09	108.98	121.70
1	B	183	ILE	CB-CA-C	-5.03	101.53	111.60

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3777	0	3780	263	0
1	B	3777	0	3781	248	0
2	A	43	0	30	10	0
2	B	43	0	30	4	0
3	A	15	0	17	7	0
3	B	15	0	17	10	0
4	A	6	0	0	0	0
4	B	5	0	0	0	0
All	All	7681	0	7655	511	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 33.

All (511) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:303:THR:CG2	3:A:1:OIO:H15	1.48	1.42
1:B:257:LEU:HD12	1:B:258:ASP:N	1.36	1.34
1:B:265:LEU:HD23	1:B:265:LEU:C	1.50	1.25
1:B:265:LEU:HD23	1:B:265:LEU:O	1.37	1.24
1:A:265:LEU:HD23	1:A:265:LEU:O	1.35	1.23

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:206:ASN:ND2	3:B:1:OIO:O9	1.72	1.22
1:A:420:LYS:HD2	1:A:421:PHE:N	1.59	1.17
1:B:303:THR:HG21	3:B:1:OIO:H15	1.18	1.14
1:A:265:LEU:HD23	1:A:265:LEU:C	1.54	1.12
1:B:487:LEU:N	1:B:487:LEU:HD12	1.46	1.11
1:A:487:LEU:N	1:A:487:LEU:HD12	1.62	1.11
1:B:463:LEU:N	1:B:463:LEU:HD23	1.50	1.10
1:B:303:THR:CG2	3:B:1:OIO:H15	1.83	1.07
1:B:289:ILE:O	1:B:293:VAL:HG23	1.51	1.07
1:A:303:THR:HG21	3:A:1:OIO:H15	1.09	1.06
1:A:487:LEU:C	1:A:487:LEU:HD13	1.75	1.05
1:A:420:LYS:HD2	1:A:421:PHE:H	0.88	1.05
1:A:138:MET:HG3	1:A:139:GLY:N	1.71	1.04
1:A:136:TYR:OH	1:A:264:ASP:HA	1.58	1.04
1:A:384:PRO:HD2	1:A:387:THR:OG1	1.55	1.03
1:A:463:LEU:N	1:A:463:LEU:HD23	1.69	1.03
1:B:487:LEU:HD13	1:B:487:LEU:C	1.75	1.01
1:B:328:GLU:OE1	1:B:348:PRO:HD2	1.60	1.01
1:A:384:PRO:CD	1:A:387:THR:OG1	2.09	1.01
1:B:343:ASP:O	1:B:347:MET:HG3	1.59	1.00
1:A:487:LEU:H	1:A:487:LEU:HD12	1.17	0.99
1:A:177:CYS:O	1:A:180:ILE:HG22	1.63	0.99
1:B:303:THR:HG21	3:B:1:OIO:C15	1.93	0.98
1:B:265:LEU:C	1:B:265:LEU:CD2	2.30	0.96
1:A:265:LEU:CD2	1:A:265:LEU:C	2.33	0.96
1:B:262:PRO:HA	1:B:267:ASP:OD2	1.66	0.96
1:A:303:THR:HG21	3:A:1:OIO:C15	1.94	0.96
1:B:487:LEU:CD1	1:B:487:LEU:C	2.34	0.96
1:A:487:LEU:CD1	1:A:487:LEU:C	2.33	0.95
1:A:448:PHE:O	1:A:452:CYS:HB2	1.66	0.95
1:B:462:PRO:C	1:B:463:LEU:HD23	1.86	0.95
1:B:257:LEU:CD1	1:B:258:ASP:N	2.28	0.94
1:B:463:LEU:N	1:B:463:LEU:CD2	2.30	0.93
1:A:463:LEU:N	1:A:463:LEU:CD2	2.30	0.93
1:B:487:LEU:HD12	1:B:487:LEU:H	1.01	0.91
1:B:94:LYS:O	1:B:98:SER:HB3	1.70	0.91
1:B:261:CYS:SG	1:B:261:CYS:O	2.29	0.90
1:B:257:LEU:HD12	1:B:258:ASP:H	1.15	0.90
1:A:327:GLU:HG3	1:A:328:GLU:N	1.85	0.90
1:B:487:LEU:HD13	1:B:487:LEU:O	1.71	0.90
1:A:456:GLN:HB3	1:A:457:HIS:ND1	1.88	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:364:VAL:O	1:B:364:VAL:HG22	1.71	0.88
1:A:303:THR:HB	2:A:500:HEM:HBB2	1.56	0.88
1:A:140:LYS:O	1:A:141:GLN:HB2	1.71	0.88
1:B:283:LEU:HD23	1:B:284:TYR:HE2	1.37	0.88
1:B:186:ARG:HG2	1:B:186:ARG:O	1.70	0.88
1:A:303:THR:CG2	3:A:1:OIO:C15	2.45	0.87
1:A:420:LYS:CD	1:A:421:PHE:H	1.82	0.87
1:A:303:THR:HG22	3:A:1:OIO:H15	1.56	0.87
1:A:487:LEU:HD13	1:A:487:LEU:O	1.74	0.86
1:A:407:GLU:HG2	1:A:408:LYS:HD3	1.57	0.86
1:A:350:MET:HE2	1:A:451:LEU:HD23	1.56	0.86
1:B:206:ASN:HD22	3:B:1:OIO:C8	1.89	0.85
1:B:387:THR:HG22	1:B:388:VAL:N	1.89	0.85
1:A:282:ARG:NE	1:A:282:ARG:HA	1.92	0.85
1:A:137:GLY:O	1:A:142:GLY:HA2	1.77	0.85
1:B:283:LEU:HD23	1:B:284:TYR:CE2	2.12	0.84
1:A:427:PHE:C	1:A:428:LYS:HD3	1.98	0.84
1:B:450:LEU:O	1:B:454:ILE:HG13	1.78	0.83
1:B:50:LEU:HD11	1:B:217:LEU:HD13	1.59	0.83
1:A:136:TYR:OH	1:A:264:ASP:CA	2.26	0.83
1:A:318:TYR:CB	1:A:321:ILE:HD12	2.09	0.83
1:A:269:LEU:HD13	1:A:289:ILE:HG23	1.62	0.82
1:A:177:CYS:O	1:A:180:ILE:CG2	2.28	0.81
1:A:364:VAL:HG22	1:A:364:VAL:O	1.79	0.81
1:B:456:GLN:OE1	1:B:457:HIS:NE2	2.14	0.81
1:A:206:ASN:ND2	3:A:1:OIO:O9	2.13	0.81
1:A:138:MET:CG	1:A:139:GLY:N	2.44	0.80
1:A:32:LEU:CD2	1:A:32:LEU:N	2.45	0.80
1:A:487:LEU:CD1	1:A:487:LEU:O	2.30	0.80
1:A:82:GLY:O	1:A:86:VAL:HG23	1.81	0.80
1:A:442:LEU:O	1:A:446:GLU:HG3	1.80	0.80
1:B:425:ASP:O	1:B:428:LYS:NZ	2.14	0.80
1:B:487:LEU:CD1	1:B:487:LEU:O	2.30	0.80
1:A:437:CYS:HB2	2:A:500:HEM:NA	1.99	0.78
1:B:257:LEU:C	1:B:257:LEU:HD12	2.02	0.78
1:A:462:PRO:C	1:A:463:LEU:HD23	2.02	0.78
1:A:318:TYR:HB3	1:A:321:ILE:HD12	1.64	0.78
1:A:317:LYS:O	1:A:319:PRO:HD3	1.83	0.78
1:A:350:MET:CE	1:A:451:LEU:HD23	2.13	0.78
1:A:302:GLU:OE2	1:A:302:GLU:HA	1.82	0.78
1:B:262:PRO:CA	1:B:267:ASP:OD2	2.32	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:357:ILE:O	1:A:361:ILE:HG12	1.83	0.77
1:B:364:VAL:O	1:B:364:VAL:CG2	2.30	0.77
1:B:187:LYS:HG2	1:B:188:HIS:N	2.00	0.77
1:A:137:GLY:O	1:A:142:GLY:CA	2.33	0.77
1:A:144:GLU:O	1:A:148:GLN:HG3	1.83	0.77
1:A:121:THR:HG22	1:A:283:LEU:HD12	1.65	0.77
1:A:427:PHE:O	1:A:428:LYS:HD3	1.83	0.77
1:A:490:ILE:HG22	1:A:490:ILE:O	1.85	0.77
1:B:463:LEU:O	1:B:464:VAL:CG1	2.33	0.76
1:B:456:GLN:HB3	1:B:457:HIS:CD2	2.21	0.76
1:A:40:PRO:O	1:A:41:ILE:HB	1.86	0.75
1:B:302:GLU:OE2	1:B:302:GLU:HA	1.86	0.75
1:A:364:VAL:CG2	1:A:364:VAL:O	2.30	0.75
1:A:93:TYR:HA	1:A:96:GLU:OE1	1.85	0.75
1:B:281:GLU:O	1:B:281:GLU:HG2	1.87	0.75
1:B:463:LEU:C	1:B:464:VAL:HG13	2.08	0.74
1:A:124:ASP:OD1	1:A:127:ARG:NH2	2.20	0.74
1:A:32:LEU:HD23	1:A:32:LEU:N	2.02	0.74
1:B:310:TYR:O	1:B:314:ILE:HG13	1.88	0.73
1:B:184:LEU:O	1:B:266:THR:OG1	2.07	0.73
1:A:446:GLU:O	1:A:450:LEU:HB2	1.89	0.73
1:A:303:THR:CB	2:A:500:HEM:HBB2	2.17	0.73
1:A:156:GLU:HG2	1:A:160:LYS:HE3	1.72	0.72
1:A:317:LYS:HD3	1:A:471:LEU:HD21	1.72	0.72
1:A:111:ASP:HA	1:A:117:ASN:HB3	1.70	0.72
1:B:400:ASN:HB3	1:B:406:PRO:HG3	1.71	0.72
1:B:303:THR:HG23	3:B:1:OIO:H2A	1.72	0.72
1:A:282:ARG:HE	1:A:282:ARG:HA	1.52	0.72
1:A:100:ARG:HH12	1:A:368:LEU:HB3	1.55	0.72
1:A:140:LYS:O	1:A:141:GLN:CB	2.37	0.71
1:B:235:VAL:O	1:B:239:VAL:HG23	1.91	0.71
1:A:378:PHE:O	1:A:379:ARG:HB2	1.91	0.70
1:B:341:ILE:C	1:B:343:ASP:H	1.94	0.70
1:A:384:PRO:CG	1:A:387:THR:OG1	2.40	0.70
1:A:282:ARG:NH2	1:A:283:LEU:H	1.88	0.70
1:B:387:THR:CG2	1:B:388:VAL:N	2.54	0.70
1:A:400:ASN:C	1:A:400:ASN:OD1	2.30	0.70
1:A:235:VAL:O	1:A:239:VAL:HG23	1.92	0.70
1:B:264:ASP:C	1:B:264:ASP:OD1	2.30	0.69
1:A:317:LYS:HD3	1:A:471:LEU:CD2	2.22	0.69
1:A:258:ASP:C	1:A:258:ASP:OD1	2.30	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:258:ASP:C	1:B:258:ASP:OD2	2.29	0.69
1:B:141:GLN:OE1	1:B:141:GLN:HA	1.93	0.69
1:A:100:ARG:HD3	1:A:369:PRO:O	1.92	0.69
1:A:270:LEU:HD13	1:A:270:LEU:N	2.07	0.69
1:A:98:SER:O	1:A:435:ARG:NH2	2.24	0.69
1:B:144:GLU:OE2	1:B:341:ILE:HG12	1.92	0.69
1:A:384:PRO:HD2	1:A:387:THR:CB	2.23	0.69
1:A:462:PRO:C	1:A:463:LEU:CD2	2.61	0.69
1:B:341:ILE:O	1:B:343:ASP:N	2.26	0.69
1:A:121:THR:HG22	1:A:283:LEU:CD1	2.22	0.69
1:B:435:ARG:O	2:B:500:HEM:HBA2	1.94	0.68
1:A:450:LEU:O	1:A:454:ILE:HG13	1.92	0.68
1:B:38:PRO:O	1:B:38:PRO:HD2	1.93	0.68
1:B:262:PRO:HB2	1:B:267:ASP:HB3	1.75	0.68
1:B:387:THR:HG22	1:B:388:VAL:H	1.56	0.67
1:A:269:LEU:CD1	1:A:289:ILE:HG23	2.24	0.67
1:B:266:THR:O	1:B:270:LEU:HD22	1.93	0.67
1:B:33:PRO:HB3	1:B:67:VAL:HG12	1.76	0.67
1:B:418:ASN:O	1:B:420:LYS:N	2.23	0.67
1:B:136:TYR:OH	1:B:264:ASP:C	2.32	0.67
1:A:77:MET:HB3	1:A:388:VAL:HB	1.76	0.67
1:A:177:CYS:C	1:A:180:ILE:HG22	2.14	0.67
1:A:310:TYR:O	1:A:314:ILE:HG13	1.95	0.67
1:A:333:ILE:O	1:A:333:ILE:HG22	1.94	0.67
1:A:297:PHE:O	1:A:301:THR:OG1	2.06	0.67
1:A:367:ASN:HB2	1:A:391:PRO:O	1.94	0.67
1:A:339:PRO:HD3	1:A:456:GLN:OE1	1.95	0.66
1:B:283:LEU:HB3	1:B:284:TYR:HD2	1.60	0.66
1:A:93:TYR:CA	1:A:96:GLU:OE1	2.43	0.65
1:A:394:ASP:OD1	1:A:395:SER:N	2.29	0.65
1:B:283:LEU:HB3	1:B:284:TYR:CD2	2.30	0.65
1:B:285:THR:HG23	1:B:288:GLY:H	1.60	0.65
1:B:431:SER:OG	1:B:432:THR:N	2.29	0.65
1:A:88:GLU:O	1:A:92:ASP:HB2	1.97	0.65
1:A:384:PRO:HG2	1:A:387:THR:OG1	1.95	0.65
1:B:222:PRO:O	1:B:226:HIS:HB2	1.97	0.65
1:B:175:ALA:HB3	1:B:176:PRO:CD	2.27	0.65
1:A:345:GLN:HG3	1:A:346:GLU:HG2	1.78	0.65
1:B:281:GLU:N	1:B:281:GLU:OE1	2.30	0.64
1:B:463:LEU:O	1:B:464:VAL:HG13	1.95	0.64
1:A:437:CYS:HA	2:A:500:HEM:CHA	2.28	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:141:GLN:C	1:B:142:GLY:O	2.29	0.64
1:A:308:LEU:HD22	1:A:447:LEU:HD23	1.79	0.64
1:B:251:LYS:O	1:B:252:GLU:C	2.36	0.64
1:B:387:THR:CG2	1:B:388:VAL:H	2.08	0.64
1:A:38:PRO:O	1:A:38:PRO:HD2	1.97	0.64
1:B:394:ASP:OD1	1:B:395:SER:N	2.31	0.63
1:A:283:LEU:O	1:A:284:TYR:CD2	2.52	0.63
1:B:32:LEU:H	1:B:32:LEU:HD12	1.62	0.63
1:B:374:ARG:O	1:B:376:THR:HG22	2.00	0.62
1:B:300:GLY:CA	2:B:500:HEM:HBC2	2.29	0.62
1:B:309:ARG:O	1:B:485:TYR:OH	2.14	0.62
1:A:112:ARG:NH1	1:A:287:ASP:OD2	2.32	0.62
1:A:313:LEU:HA	1:A:316:MET:HE3	1.81	0.61
1:B:378:PHE:HB3	1:B:383:ILE:HD11	1.83	0.61
1:A:100:ARG:NH1	1:A:368:LEU:HB3	2.15	0.61
1:B:357:ILE:O	1:B:361:ILE:HG12	2.00	0.61
1:A:206:ASN:HD22	3:A:1:OIO:C8	2.13	0.61
1:A:430:PHE:O	1:A:431:SER:HB3	2.00	0.60
1:B:139:GLY:C	1:B:141:GLN:H	2.04	0.60
1:A:203:PHE:CE1	1:A:298:PHE:HB3	2.36	0.60
1:A:437:CYS:HA	2:A:500:HEM:C4D	2.35	0.60
1:A:265:LEU:CD2	1:A:265:LEU:O	2.30	0.60
1:B:263:ARG:N	1:B:267:ASP:OD2	2.33	0.60
1:B:466:PRO:HA	1:B:469:ILE:HD12	1.83	0.60
1:A:243:LYS:O	1:A:247:SER:N	2.35	0.60
1:B:73:GLY:HA2	1:B:221:PHE:CE1	2.37	0.60
1:A:267:ASP:HA	1:A:270:LEU:HD22	1.82	0.60
1:B:446:GLU:O	1:B:450:LEU:HB2	2.01	0.60
1:B:104:PRO:C	1:B:106:PHE:H	2.02	0.60
1:A:140:LYS:C	1:A:142:GLY:H	2.04	0.60
1:A:184:LEU:O	1:A:266:THR:OG1	2.11	0.60
1:B:341:ILE:C	1:B:343:ASP:N	2.56	0.59
1:A:425:ASP:O	1:A:428:LYS:HE3	2.03	0.59
1:A:282:ARG:NE	1:A:282:ARG:CA	2.60	0.59
1:B:226:HIS:O	1:B:226:HIS:ND1	2.32	0.59
1:B:284:TYR:N	1:B:284:TYR:CD2	2.70	0.59
1:B:463:LEU:O	1:B:464:VAL:HG12	2.03	0.59
1:B:141:GLN:OE1	1:B:141:GLN:CA	2.50	0.59
1:B:186:ARG:CG	1:B:186:ARG:O	2.44	0.59
1:B:328:GLU:O	1:B:332:VAL:HG23	2.02	0.59
1:B:136:TYR:OH	1:B:264:ASP:CA	2.51	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:349:TYR:O	1:B:353:VAL:HG23	2.03	0.58
1:B:299:ALA:O	1:B:303:THR:OG1	2.20	0.58
1:B:96:GLU:OE1	1:B:96:GLU:N	2.30	0.58
1:A:318:TYR:HB2	1:A:321:ILE:HD12	1.84	0.58
1:A:111:ASP:HA	1:A:117:ASN:CB	2.33	0.58
1:B:363:LEU:O	1:B:479:GLY:HA2	2.04	0.58
1:B:436:VAL:O	1:B:436:VAL:HG13	2.03	0.58
1:B:436:VAL:O	1:B:437:CYS:C	2.43	0.58
1:A:185:PHE:O	1:A:186:ARG:C	2.38	0.58
1:B:318:TYR:HB3	1:B:321:ILE:HG13	1.85	0.57
1:A:337:ARG:O	1:A:456:GLN:NE2	2.33	0.57
1:A:407:GLU:HG2	1:A:408:LYS:N	2.19	0.57
1:A:177:CYS:HG	1:A:196:PHE:HE1	1.52	0.57
1:A:267:ASP:O	1:A:270:LEU:N	2.38	0.57
1:A:131:THR:HG22	1:A:132:THR:N	2.17	0.57
1:A:230:GLY:HA3	1:A:232:HIS:CE1	2.40	0.57
1:B:312:LEU:O	1:B:316:MET:HG3	2.05	0.57
1:B:104:PRO:C	1:B:106:PHE:N	2.57	0.56
1:A:222:PRO:O	1:A:226:HIS:HB2	2.05	0.56
1:A:32:LEU:H	1:A:32:LEU:HD23	1.67	0.56
1:A:245:TYR:CD2	1:A:245:TYR:C	2.79	0.56
1:A:258:ASP:OD1	1:A:261:CYS:N	2.26	0.56
1:A:177:CYS:HB2	1:A:301:THR:HG23	1.88	0.56
1:B:71:TYR:CD1	1:B:76:ARG:HB2	2.40	0.56
1:A:436:VAL:O	1:A:437:CYS:C	2.44	0.56
1:A:384:PRO:O	1:A:384:PRO:HD2	2.04	0.56
1:B:95:ASP:OD2	1:B:434:LYS:HE3	2.06	0.56
1:B:71:TYR:CE1	1:B:76:ARG:HB2	2.41	0.56
1:B:463:LEU:C	1:B:464:VAL:CG1	2.69	0.56
1:B:230:GLY:HA3	1:B:232:HIS:CE1	2.40	0.56
1:B:32:LEU:N	1:B:32:LEU:HD12	2.20	0.55
1:B:53:ILE:HB	1:B:54:PRO:HD3	1.89	0.55
1:A:39:LEU:HD23	1:A:39:LEU:N	2.19	0.55
1:A:32:LEU:HD22	1:A:32:LEU:N	2.21	0.55
1:B:117:ASN:HB3	1:B:122:TRP:HB2	1.87	0.55
1:A:113:GLY:HA2	1:A:292:THR:OG1	2.07	0.55
1:B:142:GLY:HA2	1:B:146:ARG:H	1.72	0.55
1:B:180:ILE:HG13	1:B:184:LEU:HD22	1.89	0.55
1:A:333:ILE:O	1:A:333:ILE:CG2	2.54	0.55
1:A:166:PHE:CD2	1:A:487:LEU:O	2.59	0.55
1:A:420:LYS:CD	1:A:421:PHE:N	2.52	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:42:ILE:HG13	1:B:43:GLY:N	2.22	0.54
1:B:322:GLU:HG2	1:B:326:HIS:CD2	2.42	0.54
1:A:489:VAL:HG23	1:A:489:VAL:O	2.05	0.54
1:B:377:ILE:HG22	1:B:377:ILE:O	2.06	0.54
1:A:180:ILE:HG23	1:A:181:ALA:N	2.22	0.54
1:A:338:ILE:HG23	1:A:339:PRO:O	2.08	0.54
1:B:289:ILE:O	1:B:293:VAL:CG2	2.41	0.54
1:B:180:ILE:O	1:B:184:LEU:HB2	2.08	0.53
1:B:400:ASN:CB	1:B:406:PRO:HG3	2.37	0.53
1:A:285:THR:OG1	1:A:286:MET:N	2.42	0.53
1:B:430:PHE:O	1:B:431:SER:HB3	2.08	0.53
1:B:39:LEU:HD12	1:B:42:ILE:HD11	1.90	0.53
1:B:142:GLY:HA2	1:B:143:ASN:C	2.29	0.53
1:B:262:PRO:CB	1:B:267:ASP:HB3	2.37	0.53
1:B:228:LEU:HB3	1:B:229:PRO:CD	2.39	0.53
1:B:303:THR:HG23	3:B:1:OIO:H15	1.84	0.53
1:A:96:GLU:OE1	1:A:96:GLU:N	2.30	0.53
1:B:113:GLY:HA3	1:B:291:VAL:HG12	1.91	0.53
1:B:38:PRO:CD	1:B:38:PRO:O	2.56	0.52
1:A:136:TYR:CZ	1:A:264:ASP:HA	2.43	0.52
1:B:124:ASP:HB3	1:B:283:LEU:HD21	1.92	0.52
1:A:61:ALA:O	1:A:65:GLY:N	2.40	0.52
1:B:251:LYS:O	1:B:254:HIS:N	2.42	0.52
1:A:230:GLY:HA3	1:A:232:HIS:ND1	2.23	0.52
1:A:440:GLU:OE1	1:A:444:ARG:NH1	2.42	0.52
1:A:438:ALA:O	2:A:500:HEM:HBC2	2.09	0.52
1:A:166:PHE:CD2	1:A:166:PHE:N	2.77	0.52
1:B:317:LYS:O	1:B:319:PRO:HD3	2.08	0.52
1:B:333:ILE:O	1:B:333:ILE:HG22	2.09	0.52
1:B:93:TYR:HB3	1:B:96:GLU:HB2	1.91	0.52
1:A:226:HIS:ND1	1:A:226:HIS:O	2.38	0.52
1:A:351:ASP:O	1:A:355:HIS:ND1	2.43	0.52
1:A:437:CYS:HB2	2:A:500:HEM:C4A	2.44	0.52
1:A:376:THR:HG22	1:A:377:ILE:N	2.25	0.52
1:B:100:ARG:HD3	1:B:369:PRO:O	2.10	0.51
1:B:186:ARG:HD2	1:B:263:ARG:HB3	1.93	0.51
1:B:195:LYS:O	1:B:199:LEU:HD22	2.10	0.51
1:A:435:ARG:O	2:A:500:HEM:HBA2	2.11	0.51
1:B:203:PHE:HA	3:B:1:OIO:H7A	1.91	0.51
1:B:285:THR:HG23	1:B:288:GLY:N	2.25	0.51
1:B:376:THR:OG1	1:B:377:ILE:N	2.42	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:238:ASN:N	1:A:238:ASN:OD1	2.42	0.51
1:A:93:TYR:HB3	1:A:96:GLU:HB2	1.93	0.51
1:A:354:VAL:O	1:A:358:GLN:HG3	2.11	0.51
1:B:300:GLY:HA2	2:B:500:HEM:HBC2	1.93	0.51
1:B:416:ASN:HB3	1:B:422:LYS:HD3	1.92	0.51
1:B:317:LYS:HD3	1:B:471:LEU:CD2	2.41	0.51
1:B:249:ARG:HH11	1:B:249:ARG:N	2.09	0.50
1:A:427:PHE:O	1:A:428:LYS:CD	2.58	0.50
1:B:273:MET:CE	1:B:286:MET:HG2	2.41	0.50
1:B:150:GLU:O	1:B:151:ALA:C	2.45	0.50
1:B:400:ASN:C	1:B:400:ASN:OD1	2.49	0.50
1:A:82:GLY:O	1:A:86:VAL:CG2	2.55	0.50
1:A:270:LEU:N	1:A:270:LEU:CD1	2.68	0.50
1:B:88:GLU:O	1:B:92:ASP:HB2	2.11	0.50
1:B:141:GLN:O	1:B:142:GLY:O	2.30	0.50
1:B:218:TYR:O	1:B:219:ASN:C	2.44	0.50
1:B:142:GLY:C	1:B:144:GLU:N	2.64	0.50
1:A:367:ASN:HD22	1:A:391:PRO:HB2	1.77	0.50
1:B:285:THR:OG1	1:B:286:MET:N	2.43	0.50
1:B:264:ASP:O	1:B:267:ASP:HB2	2.12	0.50
1:B:86:VAL:CG1	1:B:86:VAL:O	2.59	0.50
1:B:303:THR:CG2	3:B:1:OIO:C15	2.67	0.49
1:A:430:PHE:O	1:A:431:SER:CB	2.59	0.49
1:B:248:GLU:HB2	1:B:249:ARG:HH12	1.75	0.49
1:B:317:LYS:HD3	1:B:471:LEU:HD21	1.94	0.49
1:A:159:ARG:CG	1:A:159:ARG:HH21	2.24	0.49
1:B:474:ILE:N	1:B:481:ILE:O	2.46	0.49
1:B:489:VAL:O	1:B:489:VAL:HG23	2.12	0.49
1:B:98:SER:HB2	1:B:434:LYS:HG2	1.93	0.49
1:A:96:GLU:O	1:A:373:THR:OG1	2.31	0.49
1:A:246:VAL:O	1:A:246:VAL:HG12	2.13	0.49
1:A:137:GLY:O	1:A:142:GLY:HA3	2.12	0.49
1:B:33:PRO:HD2	1:B:69:THR:OG1	2.13	0.49
1:A:113:GLY:HA3	1:A:291:VAL:HG12	1.95	0.49
1:B:362:THR:O	1:B:362:THR:OG1	2.29	0.48
1:B:124:ASP:OD1	1:B:127:ARG:NH2	2.47	0.48
1:B:75:GLN:HG3	1:B:76:ARG:N	2.27	0.48
1:A:38:PRO:CD	1:A:38:PRO:O	2.60	0.48
1:A:233:ARG:O	1:A:237:LYS:HG3	2.13	0.48
1:A:337:ARG:HD2	1:A:338:ILE:O	2.13	0.48
1:A:317:LYS:HD2	1:A:469:ILE:HB	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:96:GLU:H	1:A:96:GLU:CD	2.12	0.48
1:A:258:ASP:O	1:A:258:ASP:OD1	2.30	0.48
1:B:393:LEU:O	1:B:394:ASP:C	2.51	0.48
1:A:317:LYS:C	1:A:319:PRO:HD3	2.31	0.48
1:B:300:GLY:HA3	2:B:500:HEM:HBC2	1.94	0.48
1:B:284:TYR:N	1:B:284:TYR:HD2	2.11	0.48
1:B:450:LEU:HA	1:B:450:LEU:HD23	1.52	0.48
1:A:257:LEU:HD12	1:A:258:ASP:N	2.28	0.48
1:A:246:VAL:O	1:A:246:VAL:CG1	2.61	0.48
1:B:251:LYS:O	1:B:253:HIS:N	2.47	0.48
1:B:257:LEU:CD1	1:B:258:ASP:C	2.82	0.48
1:A:437:CYS:HB2	2:A:500:HEM:C1A	2.49	0.48
1:B:464:VAL:O	1:B:465:ASP:C	2.49	0.48
1:A:111:ASP:CA	1:A:117:ASN:HB3	2.40	0.48
1:B:402:GLU:OE1	1:B:424:SER:OG	2.28	0.48
1:B:257:LEU:HD11	1:B:258:ASP:C	2.33	0.48
1:A:363:LEU:O	1:A:479:GLY:HA2	2.13	0.48
1:A:51:LYS:HG2	1:A:213:PRO:HG3	1.94	0.48
1:B:158:LEU:HD23	1:B:158:LEU:HA	1.73	0.48
1:B:251:LYS:C	1:B:253:HIS:N	2.65	0.47
1:A:487:LEU:HD12	1:A:487:LEU:O	2.10	0.47
1:A:136:TYR:HH	1:A:264:ASP:HA	1.75	0.47
1:B:51:LYS:HB3	1:B:213:PRO:HG3	1.96	0.47
1:A:206:ASN:HD21	1:A:238:ASN:HB2	1.80	0.47
1:B:462:PRO:C	1:B:463:LEU:CD2	2.70	0.47
1:B:156:GLU:O	1:B:160:LYS:HG3	2.15	0.47
1:A:111:ASP:HA	1:A:117:ASN:HA	1.96	0.47
1:A:175:ALA:HB3	1:A:176:PRO:CD	2.44	0.47
1:B:98:SER:CB	1:B:434:LYS:HG2	2.45	0.47
1:B:273:MET:HE3	1:B:286:MET:HG2	1.96	0.47
1:A:298:PHE:O	1:A:299:ALA:C	2.44	0.47
1:B:338:ILE:HG23	1:B:339:PRO:N	2.25	0.47
1:B:393:LEU:O	1:B:396:VAL:N	2.48	0.47
1:A:167:ASP:OD2	1:A:169:THR:OG1	2.32	0.47
1:A:195:LYS:HE3	1:A:245:TYR:HD1	1.79	0.46
1:B:111:ASP:HA	1:B:117:ASN:HA	1.97	0.46
1:A:167:ASP:CG	1:A:169:THR:HG1	2.19	0.46
1:B:366:SER:O	1:B:367:ASN:CB	2.64	0.46
1:B:346:GLU:O	1:B:348:PRO:HD3	2.16	0.46
1:A:408:LYS:N	1:A:408:LYS:HD3	2.31	0.46
1:A:489:VAL:CG2	1:A:489:VAL:O	2.63	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:398:TYR:O	1:A:399:ASP:C	2.53	0.46
1:A:148:GLN:OE1	1:A:338:ILE:CG2	2.64	0.46
1:B:367:ASN:HB2	1:B:391:PRO:O	2.15	0.46
1:B:265:LEU:O	1:B:265:LEU:CD2	2.32	0.46
1:B:226:HIS:HD1	1:B:226:HIS:C	2.15	0.46
1:A:225:LEU:HA	1:A:228:LEU:HD12	1.96	0.46
1:A:384:PRO:O	1:A:384:PRO:CD	2.64	0.46
1:A:311:GLY:HA2	1:A:314:ILE:HG13	1.97	0.46
1:B:436:VAL:O	1:B:436:VAL:CG1	2.63	0.46
1:A:338:ILE:HG23	1:A:339:PRO:N	2.30	0.46
1:A:258:ASP:OD1	1:A:260:ASN:N	2.49	0.46
1:A:53:ILE:HB	1:A:54:PRO:HD3	1.98	0.46
1:B:142:GLY:CA	1:B:143:ASN:C	2.84	0.45
1:A:428:LYS:HD3	1:A:428:LYS:N	2.26	0.45
1:A:353:VAL:HG12	1:A:354:VAL:N	2.29	0.45
1:A:115:ILE:O	1:A:115:ILE:HG22	2.17	0.45
1:B:403:PHE:N	1:B:404:PRO:CD	2.80	0.45
1:A:62:GLN:H	1:A:62:GLN:HG2	1.38	0.45
1:A:156:GLU:O	1:A:160:LYS:HG3	2.17	0.45
1:B:318:TYR:CB	1:B:321:ILE:HG13	2.46	0.45
1:A:104:PRO:C	1:A:106:PHE:N	2.69	0.45
1:B:50:LEU:HD11	1:B:217:LEU:CD1	2.39	0.45
1:A:148:GLN:OE1	1:A:338:ILE:HG21	2.17	0.45
1:B:177:CYS:O	1:B:181:ALA:HB2	2.17	0.45
1:B:187:LYS:CG	1:B:188:HIS:N	2.72	0.44
1:A:167:ASP:HA	1:A:168:PRO:HD3	1.76	0.44
1:B:138:MET:C	1:B:140:LYS:H	2.15	0.44
1:B:487:LEU:HD12	1:B:487:LEU:O	2.13	0.44
1:A:138:MET:HG3	1:A:139:GLY:CA	2.44	0.44
1:B:249:ARG:HA	1:B:249:ARG:HD3	1.70	0.44
1:B:179:VAL:CG1	1:B:179:VAL:O	2.57	0.44
1:B:285:THR:OG1	1:B:287:ASP:N	2.50	0.44
1:A:377:ILE:HA	1:A:381:TYR:O	2.17	0.44
1:B:482:PRO:HA	1:B:483:PRO:HD3	1.77	0.44
1:A:316:MET:HB3	1:A:462:PRO:HG3	1.99	0.44
1:A:327:GLU:HG3	1:A:328:GLU:H	1.72	0.44
1:B:320:GLU:H	1:B:320:GLU:HG2	1.51	0.44
1:A:166:PHE:CE2	1:A:487:LEU:O	2.70	0.44
1:A:180:ILE:CG2	1:A:181:ALA:N	2.79	0.44
1:B:53:ILE:N	1:B:54:PRO:CD	2.80	0.44
1:B:249:ARG:NH1	1:B:249:ARG:HG2	2.31	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:350:MET:HE1	1:A:451:LEU:HD23	1.97	0.44
1:B:378:PHE:O	1:B:379:ARG:HB2	2.18	0.44
1:B:298:PHE:C	1:B:298:PHE:CD1	2.91	0.44
1:A:408:LYS:HD2	1:A:408:LYS:HA	1.49	0.44
1:A:442:LEU:O	1:A:446:GLU:CG	2.58	0.44
1:B:398:TYR:O	1:B:399:ASP:C	2.52	0.44
1:B:264:ASP:O	1:B:264:ASP:OD1	2.35	0.44
1:A:367:ASN:CB	1:A:391:PRO:O	2.66	0.44
1:B:490:ILE:HG23	1:B:490:ILE:HD12	1.70	0.44
1:B:436:VAL:O	1:B:437:CYS:O	2.36	0.43
1:B:150:GLU:O	1:B:153:PHE:N	2.51	0.43
1:A:270:LEU:HD12	1:A:270:LEU:HA	1.75	0.43
1:B:71:TYR:HA	1:B:76:ARG:HA	2.00	0.43
1:B:254:HIS:O	1:B:257:LEU:HB3	2.19	0.43
1:A:338:ILE:HG12	1:A:339:PRO:HD2	2.01	0.43
1:B:286:MET:HE2	1:B:286:MET:HB3	1.61	0.43
1:B:175:ALA:CB	1:B:176:PRO:CD	2.94	0.43
1:A:399:ASP:HB3	1:A:402:GLU:HB3	2.01	0.43
1:A:53:ILE:N	1:A:54:PRO:CD	2.79	0.43
1:B:209:LEU:HA	1:B:209:LEU:HD23	1.83	0.43
1:A:341:ILE:C	1:A:343:ASP:N	2.71	0.43
1:B:257:LEU:HD12	1:B:258:ASP:CA	2.37	0.43
1:A:258:ASP:HA	1:A:259:PRO:HD2	1.90	0.43
1:A:149:ARG:HD2	1:A:149:ARG:HA	1.86	0.43
1:A:212:THR:O	1:A:216:GLN:HG2	2.18	0.43
1:A:267:ASP:O	1:A:268:CYS:C	2.55	0.43
1:B:40:PRO:O	1:B:41:ILE:HB	2.17	0.43
1:B:356:GLU:OE1	1:B:356:GLU:HA	2.19	0.43
1:A:33:PRO:HB2	1:A:69:THR:OG1	2.19	0.43
1:B:354:VAL:O	1:B:358:GLN:HG3	2.18	0.43
1:A:115:ILE:HG23	2:A:500:HEM:HAD2	2.01	0.43
1:A:374:ARG:O	1:A:375:ASP:C	2.56	0.43
1:A:226:HIS:C	1:A:226:HIS:HD1	2.18	0.43
1:A:408:LYS:N	1:A:408:LYS:CD	2.79	0.42
1:B:256:SER:O	1:B:256:SER:OG	2.36	0.42
1:A:158:LEU:O	1:A:161:THR:OG1	2.31	0.42
1:B:341:ILE:HG12	1:B:341:ILE:H	1.48	0.42
1:A:456:GLN:CB	1:A:457:HIS:ND1	2.70	0.42
1:A:266:THR:O	1:A:270:LEU:HD22	2.18	0.42
1:A:431:SER:OG	1:A:432:THR:N	2.52	0.42
1:A:257:LEU:O	1:A:257:LEU:HG	2.10	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:456:GLN:CD	1:A:457:HIS:CE1	2.93	0.42
1:A:93:TYR:C	1:A:96:GLU:OE1	2.58	0.42
1:B:393:LEU:HG	1:B:393:LEU:H	1.47	0.42
1:B:193:ASP:C	1:B:193:ASP:OD1	2.57	0.42
1:B:187:LYS:HG2	1:B:188:HIS:H	1.83	0.42
1:A:373:THR:O	1:A:385:LYS:HG3	2.20	0.42
1:B:322:GLU:O	1:B:325:LEU:HB2	2.19	0.42
1:B:250:VAL:HG12	1:B:251:LYS:N	2.33	0.42
1:A:32:LEU:HA	1:A:32:LEU:HD22	1.82	0.42
1:A:156:GLU:O	1:A:159:ARG:HB2	2.20	0.42
1:A:377:ILE:N	1:A:377:ILE:HD12	2.35	0.42
1:B:264:ASP:OD1	1:B:267:ASP:N	2.33	0.42
1:B:175:ALA:HB3	1:B:176:PRO:HD2	1.97	0.42
1:B:185:PHE:O	1:B:186:ARG:C	2.57	0.42
1:B:257:LEU:HD11	1:B:258:ASP:O	2.20	0.42
1:A:53:ILE:HA	1:A:53:ILE:HD13	1.69	0.42
1:A:149:ARG:HG2	1:A:149:ARG:HH11	1.85	0.42
1:A:36:PRO:HB2	1:A:44:ASN:ND2	2.35	0.42
1:A:462:PRO:C	1:A:463:LEU:HD22	2.38	0.41
1:B:383:ILE:HA	1:B:384:PRO:HD2	1.71	0.41
1:A:481:ILE:HA	1:A:482:PRO:HD2	1.93	0.41
1:A:177:CYS:HA	1:A:180:ILE:HG22	2.03	0.41
1:A:140:LYS:C	1:A:141:GLN:HG3	2.40	0.41
1:A:195:LYS:O	1:A:199:LEU:CD2	2.68	0.41
1:B:361:ILE:HG21	1:B:361:ILE:HD13	1.80	0.41
1:A:383:ILE:N	1:A:383:ILE:HD12	2.34	0.41
1:B:298:PHE:HB2	3:B:1:OIO:H7	2.03	0.41
1:A:463:LEU:HD22	1:A:463:LEU:HA	1.57	0.41
1:B:302:GLU:OE2	1:B:302:GLU:CA	2.49	0.41
1:A:400:ASN:O	1:A:400:ASN:OD1	2.38	0.41
1:A:112:ARG:HG2	1:A:112:ARG:HH11	1.85	0.41
1:B:228:LEU:HB3	1:B:229:PRO:HD2	2.02	0.41
1:B:150:GLU:C	1:B:152:HIS:N	2.71	0.41
1:B:63:ARG:HB3	1:B:64:PHE:CE2	2.56	0.41
1:B:333:ILE:O	1:B:333:ILE:CG2	2.68	0.41
1:A:315:LEU:HD23	1:A:315:LEU:HA	1.78	0.41
1:A:453:ALA:O	1:A:454:ILE:C	2.56	0.41
1:B:378:PHE:HB3	1:B:383:ILE:CD1	2.50	0.41
1:B:205:GLU:OE1	1:B:238:ASN:ND2	2.37	0.41
1:A:195:LYS:O	1:A:199:LEU:HD23	2.20	0.41
1:A:103:LEU:HD23	1:A:219:ASN:OD1	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:175:ALA:HB3	1:B:176:PRO:HD3	2.02	0.41
1:A:42:ILE:HG13	1:A:43:GLY:N	2.35	0.41
1:B:298:PHE:O	1:B:299:ALA:C	2.56	0.41
1:A:249:ARG:NH1	1:A:252:GLU:OE2	2.53	0.41
1:B:364:VAL:HA	1:B:365:PRO:HD2	1.77	0.41
1:A:392:THR:O	1:A:395:SER:OG	2.35	0.40
1:B:112:ARG:CA	1:B:117:ASN:ND2	2.84	0.40
1:A:341:ILE:HG21	1:A:341:ILE:HD13	1.85	0.40
1:B:371:GLU:OE1	1:B:386:GLY:O	2.39	0.40
1:A:111:ASP:HA	1:A:117:ASN:CA	2.52	0.40
1:A:166:PHE:CE2	1:A:487:LEU:CD1	3.04	0.40
1:B:266:THR:O	1:B:269:LEU:HB2	2.21	0.40
1:B:443:ALA:O	1:B:447:LEU:HG	2.22	0.40
1:A:94:LYS:O	1:A:98:SER:OG	2.35	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	461/476 (97%)	444 (96%)	12 (3%)	5 (1%)	17	51
1	B	461/476 (97%)	445 (96%)	11 (2%)	5 (1%)	17	51
All	All	922/952 (97%)	889 (96%)	23 (2%)	10 (1%)	17	51

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	342	LYS
1	B	419	GLY
1	B	437	CYS
1	A	38	PRO

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Mol	Chain	Res	Type
1	A	437	CYS
1	A	431	SER
1	B	391	PRO
1	B	38	PRO
1	A	262	PRO
1	A	391	PRO

### 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	417/428 (97%)	376 (90%)	41 (10%)	10	30
1	B	417/428 (97%)	369 (88%)	48 (12%)	7	21
All	All	834/856 (97%)	745 (89%)	89 (11%)	8	24

All (89) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	LYS
1	A	32	LEU
1	A	46	PHE
1	A	59	ARG
1	A	80	MET
1	A	90	LEU
1	A	98	SER
1	A	112	ARG
1	A	114	ILE
1	A	117	ASN
1	A	131	THR
1	A	138	MET
1	A	162	GLN
1	A	166	PHE
1	A	184	LEU
1	A	207	PHE
1	A	238	ASN

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Mol	Chain	Res	Type
1	A	256	SER
1	A	258	ASP
1	A	270	LEU
1	A	278	HIS
1	A	282	ARG
1	A	283	LEU
1	A	285	THR
1	A	304	THR
1	A	308	LEU
1	A	310	TYR
1	A	312	LEU
1	A	327	GLU
1	A	353	VAL
1	A	364	VAL
1	A	373	THR
1	A	412	GLU
1	A	418	ASN
1	A	420	LYS
1	A	452	CYS
1	A	463	LEU
1	A	471	LEU
1	A	487	LEU
1	A	490	ILE
1	A	493	SER
1	B	37	PHE
1	B	46	PHE
1	B	47	GLN
1	B	51	LYS
1	B	62	GLN
1	B	70	LEU
1	B	90	LEU
1	B	95	ASP
1	B	112	ARG
1	B	114	ILE
1	B	121	THR
1	B	129	SER
1	B	130	LEU
1	B	138	MET
1	B	140	LYS
1	B	145	SER
1	B	159	ARG
1	B	184	LEU

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Mol	Chain	Res	Type
1	B	207	PHE
1	B	211	SER
1	B	225	LEU
1	B	236	ILE
1	B	250	VAL
1	B	251	LYS
1	B	253	HIS
1	B	255	GLN
1	B	258	ASP
1	B	261	CYS
1	B	267	ASP
1	B	278	HIS
1	B	285	THR
1	B	298	PHE
1	B	303	THR
1	B	310	TYR
1	B	341	ILE
1	B	364	VAL
1	B	368	LEU
1	B	373	THR
1	B	375	ASP
1	B	376	THR
1	B	382	LEU
1	B	395	SER
1	B	412	GLU
1	B	425	ASP
1	B	452	CYS
1	B	463	LEU
1	B	471	LEU
1	B	487	LEU

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

Mol	Chain	Res	Type
1	A	206	ASN

### 5.3.3 RNA ⓘ

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](#)

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
3	OIO	A	1	2	11,15,15	1.15	1 (9%)	12,17,17	0.94	1 (8%)
2	HEM	A	500	1,3	30,50,50	2.45	7 (23%)	24,82,82	2.18	9 (37%)
3	OIO	B	1	2	11,15,15	1.14	1 (9%)	12,17,17	0.93	1 (8%)
2	HEM	B	500	1,3	30,50,50	2.56	6 (20%)	24,82,82	2.27	7 (29%)

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	OIO	A	1	2	-	0/8/10/10	0/1/1/1
2	HEM	A	500	1,3	-	0/10/54/54	0/0/8/8
3	OIO	B	1	2	-	0/8/10/10	0/1/1/1
2	HEM	B	500	1,3	-	0/10/54/54	0/0/8/8

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	500	HEM	C3B-C4B	-10.10	1.42	1.51
2	A	500	HEM	C3B-C4B	-8.09	1.44	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	500	HEM	C3D-C4D	-5.66	1.44	1.51
2	B	500	HEM	C3D-C4D	-5.39	1.44	1.51
2	B	500	HEM	C2C-C1C	-4.80	1.43	1.52
2	A	500	HEM	C2C-C1C	-4.61	1.43	1.52
3	A	1	OIO	C12-N11	-3.49	1.31	1.37
3	B	1	OIO	C12-N11	-3.46	1.31	1.37
2	B	500	HEM	C2D-C1D	-2.06	1.45	1.51
2	B	500	HEM	C3B-CAB	2.07	1.55	1.51
2	A	500	HEM	CAA-C2A	2.37	1.56	1.52
2	B	500	HEM	FE-NC	2.44	2.05	1.95
2	A	500	HEM	C3C-CAC	2.45	1.55	1.51
2	A	500	HEM	FE-NB	2.46	2.10	1.97
2	A	500	HEM	FE-NC	3.83	2.10	1.95

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	500	HEM	C3C-CAC-CBC	-4.47	117.61	124.46
3	A	1	OIO	C2-C1-N11	-2.12	105.67	111.66
3	B	1	OIO	C2-C1-N11	-2.12	105.69	111.66
2	A	500	HEM	CAA-C2A-C3A	-2.02	123.24	129.00
2	A	500	HEM	CBA-CAA-C2A	2.01	116.14	112.53
2	A	500	HEM	CAA-C2A-C1A	2.39	129.60	127.01
2	A	500	HEM	C2D-C3D-C4D	2.41	105.58	101.50
2	A	500	HEM	CMD-C2D-C3D	2.47	125.28	114.35
2	B	500	HEM	C2D-C3D-C4D	2.59	105.90	101.50
2	B	500	HEM	CMD-C2D-C3D	2.83	126.86	114.35
2	A	500	HEM	CMB-C2B-C3B	3.74	125.86	116.53
2	B	500	HEM	CAD-C3D-C4D	4.04	126.71	112.47
2	B	500	HEM	CMB-C2B-C3B	4.04	126.63	116.53
2	A	500	HEM	CMC-C2C-C3C	4.06	126.66	116.53
2	A	500	HEM	CAD-C3D-C4D	4.36	127.83	112.47
2	B	500	HEM	CMC-C2C-C3C	4.44	127.60	116.53
2	A	500	HEM	CAD-C3D-C2D	4.65	126.58	113.22
2	B	500	HEM	CAD-C3D-C2D	4.93	127.38	113.22

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 31 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1	OIO	7	0
2	A	500	HEM	10	0
3	B	1	OIO	10	0
2	B	500	HEM	4	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled '#RSRZ > 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q < 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	463/476 (97%)	-0.10	1 (0%) 95 95	24, 48, 76, 92	0
1	B	463/476 (97%)	-0.11	1 (0%) 95 95	27, 48, 74, 91	0
All	All	926/952 (97%)	-0.11	2 (0%) 95 95	24, 48, 75, 92	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	278	HIS	2.6
1	A	172	ILE	2.1

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

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

### 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 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
3	OIO	B	1	15/15	0.87	0.49	7.34	56,61,62,63	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
3	OIO	A	1	15/15	0.87	0.41	5.00	56,61,62,63	0
2	HEM	B	500	43/43	0.97	0.25	1.76	37,41,44,44	0
2	HEM	A	500	43/43	0.98	0.21	0.52	25,30,37,41	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.