



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 14, 2017 – 06:28 am GMT

PDB ID : 4UMZ  
Title : PikC D50N mutant in complex with the engineered substrate mimic bearing a 2-dimethylaminomethylbenzoate group  
Authors : Podust, L.M.; Vieira, D.F.  
Deposited on : 2014-05-22  
Resolution : 2.32 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 : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : 1.9-1692  
EDS : trunk28620  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
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) : recalc28949

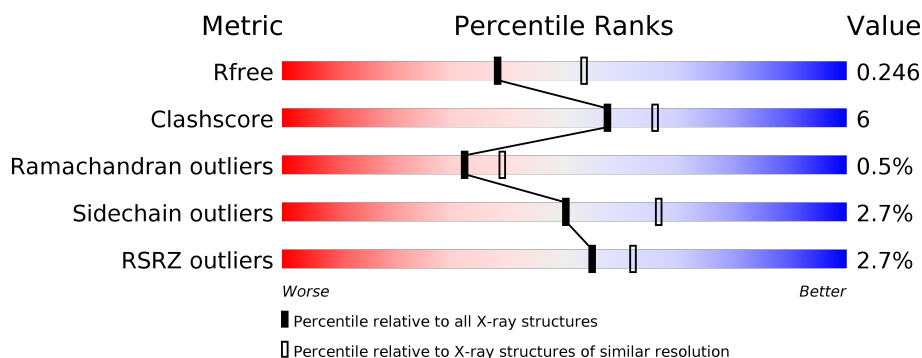
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.32 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))
$R_{free}$	100719	4787 (2.34-2.30)
Clashscore	112137	5439 (2.34-2.30)
Ramachandran outliers	110173	5386 (2.34-2.30)
Sidechain outliers	110143	5385 (2.34-2.30)
RSRZ outliers	101464	4814 (2.34-2.30)

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	436	<div> <div>3%</div> <div> <div></div> <div>80%</div> <div>10%</div> <div>9%</div> </div> </div>
1	B	436	<div> <div>2%</div> <div> <div></div> <div>81%</div> <div>9%</div> <div>9%</div> </div> </div>

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6716 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 HYDROXYLASE PIKC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	396	Total	C	N	O	S	0	1	0
			3068	1938	555	562	13			
1	B	395	Total	C	N	O	S	0	1	0
			3047	1922	544	568	13			

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	EXPRESSION TAG	UNP O87605
A	-18	GLY	-	EXPRESSION TAG	UNP O87605
A	-17	SER	-	EXPRESSION TAG	UNP O87605
A	-16	SER	-	EXPRESSION TAG	UNP O87605
A	-15	HIS	-	EXPRESSION TAG	UNP O87605
A	-14	HIS	-	EXPRESSION TAG	UNP O87605
A	-13	HIS	-	EXPRESSION TAG	UNP O87605
A	-12	HIS	-	EXPRESSION TAG	UNP O87605
A	-11	HIS	-	EXPRESSION TAG	UNP O87605
A	-10	HIS	-	EXPRESSION TAG	UNP O87605
A	-9	SER	-	EXPRESSION TAG	UNP O87605
A	-8	SER	-	EXPRESSION TAG	UNP O87605
A	-7	GLY	-	EXPRESSION TAG	UNP O87605
A	-6	LEU	-	EXPRESSION TAG	UNP O87605
A	-5	VAL	-	EXPRESSION TAG	UNP O87605
A	-4	PRO	-	EXPRESSION TAG	UNP O87605
A	-3	ARG	-	EXPRESSION TAG	UNP O87605
A	-2	GLY	-	EXPRESSION TAG	UNP O87605
A	-1	SER	-	EXPRESSION TAG	UNP O87605
A	0	HIS	-	EXPRESSION TAG	UNP O87605
A	50	ASN	ASP	ENGINEERED MUTATION	UNP O87605
B	-19	MET	-	EXPRESSION TAG	UNP O87605
B	-18	GLY	-	EXPRESSION TAG	UNP O87605
B	-17	SER	-	EXPRESSION TAG	UNP O87605
B	-16	SER	-	EXPRESSION TAG	UNP O87605

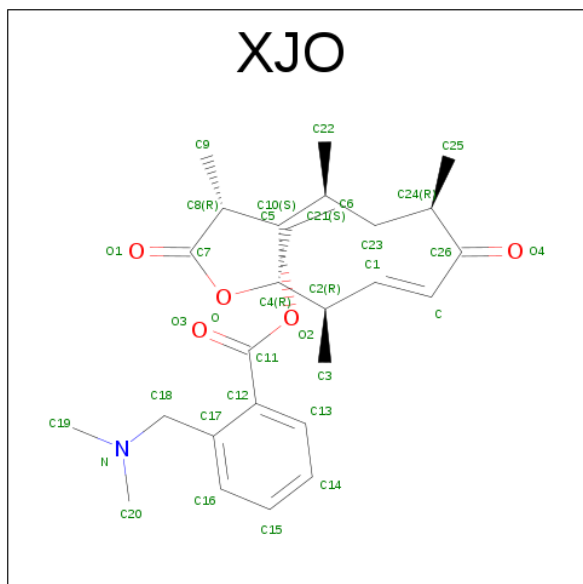
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-15	HIS	-	EXPRESSION TAG	UNP O87605
B	-14	HIS	-	EXPRESSION TAG	UNP O87605
B	-13	HIS	-	EXPRESSION TAG	UNP O87605
B	-12	HIS	-	EXPRESSION TAG	UNP O87605
B	-11	HIS	-	EXPRESSION TAG	UNP O87605
B	-10	HIS	-	EXPRESSION TAG	UNP O87605
B	-9	SER	-	EXPRESSION TAG	UNP O87605
B	-8	SER	-	EXPRESSION TAG	UNP O87605
B	-7	GLY	-	EXPRESSION TAG	UNP O87605
B	-6	LEU	-	EXPRESSION TAG	UNP O87605
B	-5	VAL	-	EXPRESSION TAG	UNP O87605
B	-4	PRO	-	EXPRESSION TAG	UNP O87605
B	-3	ARG	-	EXPRESSION TAG	UNP O87605
B	-2	GLY	-	EXPRESSION TAG	UNP O87605
B	-1	SER	-	EXPRESSION TAG	UNP O87605
B	0	HIS	-	EXPRESSION TAG	UNP O87605
B	50	ASN	ASP	ENGINEERED MUTATION	UNP O87605

- # HEM

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

- Molecule 3 is (3R,4S,5S,7R,9E,11R,12R)-12-ETHYL-3,5,7,11-TETRAMETHYL-2,8-DIOXOOXACYCLODODEC-9-EN-4-YL 2-[(DIMETHYLAMINO)METHYL]BENZOATE (three-letter code: XJO) (formula: C<sub>27</sub>H<sub>39</sub>NO<sub>5</sub>).



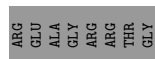
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			33	27	1	5		
3	B	1	Total	C	N	O	0	0
			33	27	1	5		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	235	Total	O	0	0
			235	235		
4	B	214	Total	O	0	0
			214	214		



- Molecule 1: CYTOCHROME P450 HYDROXYLASE PIKC



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	59.06Å 110.70Å 151.63Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	62.63 – 2.32 62.55 – 2.32	Depositor EDS
% Data completeness (in resolution range)	93.1 (62.63-2.32) 93.1 (62.55-2.32)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.62 (at 2.32Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.190 , 0.245 0.194 , 0.246	Depositor DCC
$R_{free}$ test set	2069 reflections (5.33%)	DCC
Wilson B-factor (Å <sup>2</sup> )	31.6	Xtriage
Anisotropy	0.159	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 37.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6716	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.83% 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: HEM, XJO

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.75	1/3140 (0.0%)	0.88	2/4285 (0.0%)
1	B	0.73	0/3118	0.86	2/4259 (0.0%)
All	All	0.74	1/6258 (0.0%)	0.87	4/8544 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	150	TRP	CB-CG	-6.79	1.38	1.50

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	154	ILE	CB-CA-C	-5.94	99.73	111.60
1	B	219	ARG	NE-CZ-NH1	5.82	123.21	120.30
1	A	227	ARG	NE-CZ-NH2	-5.41	117.59	120.30
1	B	115	ARG	NE-CZ-NH2	-5.26	117.67	120.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3068	0	3035	31	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	3047	0	2987	24	0
2	A	43	0	30	2	0
2	B	43	0	30	5	0
3	A	33	0	39	7	0
3	B	33	0	39	7	0
4	A	235	0	0	3	0
4	B	214	0	0	3	0
All	All	6716	0	6160	70	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (70) 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:90:HIS:ND1	4:A:2067:HOH:O	1.98	0.95
3:B:1408:XJO:H253	3:B:1408:XJO:H222	1.62	0.80
3:A:1408:XJO:H32C	3:A:1408:XJO:H62C	1.61	0.80
1:B:150:TRP:CZ2	1:B:172:ARG:HA	2.19	0.77
1:B:89:ASN:HB2	3:B:1408:XJO:H201	1.65	0.76
2:A:1407:HEM:HMB2	2:A:1407:HEM:HBB2	1.74	0.69
2:B:1407:HEM:HBC2	2:B:1407:HEM:HHD	1.74	0.67
3:B:1408:XJO:C25	3:B:1408:XJO:H222	2.27	0.64
1:A:150:TRP:CE2	1:A:172:ARG:HG3	2.34	0.63
1:B:382:VAL:HG21	1:B:386:GLU:CB	2.31	0.61
2:B:1407:HEM:HMB2	2:B:1407:HEM:HBB2	1.83	0.61
1:B:344:HIS:HD2	1:B:346:ALA:H	1.50	0.59
3:B:1408:XJO:H253	3:B:1408:XJO:C22	2.33	0.58
1:B:392:ASN:HD22	1:B:393:PRO:HD2	1.69	0.56
1:B:89:ASN:CB	3:B:1408:XJO:H201	2.35	0.56
1:B:130:LEU:O	4:B:2105:HOH:O	2.18	0.56
3:A:1408:XJO:C25	3:A:1408:XJO:H222	2.36	0.56
1:A:406:ARG:O	1:A:407:ARG:HB2	2.08	0.54
1:B:281:GLU:OE1	1:B:344:HIS:HE1	1.90	0.54
1:B:110:GLU:HG3	1:B:213:LEU:HD13	1.91	0.53
2:B:1407:HEM:HBC2	2:B:1407:HEM:CHD	2.40	0.52
1:A:150:TRP:CZ2	1:A:172:ARG:HG3	2.45	0.52
1:A:245:HIS:O	1:A:249:VAL:HG23	2.10	0.52
1:B:17:LEU:HB2	1:B:47:PRO:HD3	1.91	0.52
1:B:150:TRP:HZ2	1:B:172:ARG:HA	1.71	0.51
3:A:1408:XJO:H251	3:A:1408:XJO:H222	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:151:PRO:HA	1:B:154:ILE:HG22	1.93	0.50
1:B:154:ILE:HD13	1:B:245:HIS:CE1	2.47	0.50
1:A:281:GLU:HA	1:A:284:LEU:HD12	1.95	0.49
1:B:244:GLY:HA3	2:B:1407:HEM:C2C	2.46	0.49
2:B:1407:HEM:CMB	2:B:1407:HEM:HBB2	2.41	0.49
1:B:382:VAL:HG22	1:B:383:SER:H	1.78	0.49
1:A:165:GLU:HB3	1:A:166:PRO:HD3	1.95	0.48
1:B:389:TRP:CZ2	1:B:398:LEU:HD21	2.49	0.47
1:A:150:TRP:CZ2	1:A:172:ARG:HB2	2.50	0.47
1:B:152:LEU:O	1:B:156:VAL:HG23	2.15	0.47
1:A:344:HIS:HD2	1:A:346:ALA:H	1.63	0.47
3:A:1408:XJO:C25	3:A:1408:XJO:C22	2.93	0.46
1:A:29:TYR:HE1	1:A:320:ALA:HB1	1.80	0.46
3:B:1408:XJO:C22	3:B:1408:XJO:C25	2.93	0.46
1:A:150:TRP:CZ2	1:A:172:ARG:CB	2.98	0.46
1:A:352:HIS:O	1:A:353:PHE:C	2.54	0.46
1:A:346:ALA:O	2:A:1407:HEM:HMA1	2.17	0.45
1:B:382:VAL:HG22	1:B:383:SER:N	2.31	0.45
3:A:1408:XJO:H13	3:A:1408:XJO:H221	1.99	0.44
1:A:89:ASN:CB	3:A:1408:XJO:H201	2.47	0.44
1:B:61:ALA:HB1	1:B:317:VAL:CG1	2.47	0.44
1:B:175:THR:CG2	1:B:246:GLU:HG2	2.47	0.44
1:A:152:LEU:HB3	1:A:153:PRO:HD3	2.00	0.44
1:A:146:GLU:OE2	1:A:172:ARG:NH2	2.50	0.44
1:B:89:ASN:HA	3:B:1408:XJO:H191	1.98	0.44
1:A:161:LEU:HD11	1:A:213:LEU:HD23	2.00	0.43
1:A:154:ILE:CD1	1:A:245:HIS:CD2	3.01	0.43
1:B:89:ASN:ND2	4:B:2044:HOH:O	2.53	0.42
1:A:40:PRO:O	1:A:55:VAL:HA	2.19	0.42
1:A:390:TYR:HA	1:A:391:PRO:HD3	1.88	0.42
1:B:172:ARG:HB3	4:B:2119:HOH:O	2.18	0.42
1:A:318:VAL:HG12	1:A:321:ASP:H	1.85	0.41
1:A:179:VAL:HG11	4:A:2178:HOH:O	2.20	0.41
1:A:29:TYR:CE1	1:A:320:ALA:HB1	2.56	0.41
3:A:1408:XJO:C6	3:A:1408:XJO:H32C	2.43	0.41
1:A:16:ASP:OD2	1:A:45:ARG:HD3	2.21	0.41
1:A:90:HIS:CD2	4:A:2068:HOH:O	2.74	0.41
1:A:150:TRP:CZ2	1:A:172:ARG:CG	3.04	0.40
1:A:303:ASP:O	1:A:304:LEU:HD23	2.21	0.40
1:A:58:TYR:HA	1:A:322:ALA:HB1	2.03	0.40
1:A:76:ASN:O	1:A:312:GLY:HA2	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:145:MET:HA	1:B:149:ALA:HB3	2.02	0.40
1:A:189:THR:O	1:A:193:GLU:HG3	2.21	0.40
1:A:319:LEU:HD13	1:A:345:LEU:O	2.21	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	395/436 (91%)	374 (95%)	20 (5%)	1 (0%)	44	54
1	B	394/436 (90%)	373 (95%)	18 (5%)	3 (1%)	22	26
All	All	789/872 (90%)	747 (95%)	38 (5%)	4 (0%)	32	39

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	136	ALA
1	B	382	VAL
1	A	179	VAL
1	B	384	PRO

### 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	317/355 (89%)	311 (98%)	6 (2%)	62	78
1	B	315/355 (89%)	304 (96%)	11 (4%)	41	55
All	All	632/710 (89%)	615 (97%)	17 (3%)	50	67

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	154	ILE
1	A	172	ARG
1	A	186	GLN
1	A	245	HIS
1	A	380	LEU
1	A	388	VAL
1	B	20	LEU
1	B	43	ARG
1	B	89	ASN
1	B	113	MET
1	B	115	ARG
1	B	141	ARG
1	B	231	GLU
1	B	234	LEU
1	B	339	ARG
1	B	392	ASN
1	B	394	MET

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

Mol	Chain	Res	Type
1	A	90	HIS
1	A	188	GLN
1	A	208	GLN
1	A	245	HIS
1	A	265	GLN
1	A	333	HIS
1	A	344	HIS
1	B	89	ASN
1	B	90	HIS
1	B	188	GLN
1	B	208	GLN
1	B	265	GLN
1	B	344	HIS

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Mol	Chain	Res	Type
1	B	392	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 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	$\# Z  > 2$
2	HEM	A	1407	1	28,50,50	1.88	5 (17%)	17,82,82	1.67	4 (23%)
3	XJO	A	1408	-	33,34,34	1.84	4 (12%)	39,47,47	1.65	6 (15%)
2	HEM	B	1407	1	28,50,50	1.05	2 (7%)	17,82,82	1.82	4 (23%)
3	XJO	B	1408	-	33,34,34	1.81	4 (12%)	39,47,47	1.72	7 (17%)

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
2	HEM	A	1407	1	-	0/6/54/54	0/0/8/8
3	XJO	A	1408	-	-	0/47/47/47	0/1/2/2
2	HEM	B	1407	1	-	0/6/54/54	0/0/8/8
3	XJO	B	1408	-	-	0/47/47/47	0/1/2/2

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1407	HEM	C1C-NC	-5.24	1.30	1.36
2	A	1407	HEM	C1B-NB	-5.12	1.30	1.36
2	A	1407	HEM	C3B-C2B	-3.65	1.35	1.40
3	B	1408	XJO	O2-C10	-3.47	1.39	1.44
2	B	1407	HEM	C3B-C2B	-2.90	1.36	1.40
2	A	1407	HEM	C4B-NB	-2.57	1.30	1.36
2	A	1407	HEM	C4C-NC	-2.29	1.34	1.36
2	B	1407	HEM	C3C-C2C	-2.26	1.37	1.40
3	A	1408	XJO	O2-C10	-2.22	1.41	1.44
3	B	1408	XJO	O2-C11	4.10	1.43	1.34
3	A	1408	XJO	O2-C11	4.60	1.44	1.34
3	B	1408	XJO	O-C7	5.23	1.46	1.34
3	A	1408	XJO	O-C7	5.49	1.47	1.34
3	B	1408	XJO	C12-C17	6.19	1.48	1.40
3	A	1408	XJO	C12-C17	6.64	1.49	1.40

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1408	XJO	O2-C10-C21	-3.69	102.58	108.11
2	B	1407	HEM	C3C-C4C-NC	-3.04	105.20	110.94
3	A	1408	XJO	O2-C11-O3	-2.89	118.59	123.51
2	A	1407	HEM	CMD-C2D-C1D	-2.32	124.89	128.46
2	B	1407	HEM	CMA-C3A-C4A	-2.30	124.93	128.46
2	A	1407	HEM	C3C-C4C-NC	-2.13	106.92	110.94
3	B	1408	XJO	C25-C24-C23	2.09	116.07	111.60
3	B	1408	XJO	O3-C11-C12	2.19	128.93	121.57
3	B	1408	XJO	C10-C8-C7	2.23	114.64	110.07
2	B	1407	HEM	C4A-C3A-C2A	2.39	108.66	107.00
3	A	1408	XJO	C4-O-C7	2.43	121.53	117.92
3	A	1408	XJO	C10-C8-C7	2.60	115.40	110.07
2	A	1407	HEM	C4C-C3C-C2C	2.80	108.85	106.90
3	B	1408	XJO	C10-O2-C11	3.00	122.14	117.24
2	A	1407	HEM	CMC-C2C-C3C	3.46	131.32	124.89
3	A	1408	XJO	C22-C21-C23	4.03	116.94	110.70

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Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
3	A	1408	XJO	C10-O2-C11	4.14	124.00	117.24
2	B	1407	HEM	C4C-C3C-C2C	4.79	110.24	106.90
3	B	1408	XJO	C22-C21-C23	4.83	118.19	110.70
3	A	1408	XJO	C25-C24-C23	5.01	122.33	111.60
3	B	1408	XJO	C4-O-C7	5.77	126.49	117.92

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1407	HEM	2	0
3	A	1408	XJO	7	0
2	B	1407	HEM	5	0
3	B	1408	XJO	7	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	396/436 (90%)	-0.03	11 (2%) 53 60	13, 28, 64, 112	0
1	B	395/436 (90%)	-0.02	10 (2%) 58 65	14, 31, 70, 95	0
All	All	791/872 (90%)	-0.02	21 (2%) 55 62	13, 30, 69, 112	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	180	PHE	5.7
1	B	179	VAL	4.4
1	A	182	ASP	4.3
1	A	177	ALA	4.0
1	A	179	VAL	4.0
1	A	178	PHE	3.8
1	A	175	THR	3.6
1	B	383	SER	3.5
1	B	181	PRO	3.3
1	A	181	PRO	3.3
1	B	150	TRP	2.9
1	B	22	GLN	2.7
1	B	182	ASP	2.5
1	A	150	TRP	2.5
1	B	141	ARG	2.4
1	A	14	VAL	2.4
1	B	180	PHE	2.4
1	B	390	TYR	2.2
1	B	135	LEU	2.1
1	A	18	GLY	2.1
1	A	183	ASP	2.0



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

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

## 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
3	XJO	B	1408	33/33	0.81	0.23	1.54	48,59,84,103	0
3	XJO	A	1408	33/33	0.81	0.24	1.30	47,70,89,101	0
2	HEM	B	1407	43/43	0.96	0.13	0.23	15,19,22,26	0
2	HEM	A	1407	43/43	0.97	0.12	-0.49	11,14,17,20	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.