



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 10:00 PM GMT

PDB ID : 4WNW  
Title : Human Cytochrome P450 2D6 Thioridazine Complex  
Authors : Wang, A.; Stout, C.D.; Johnson, E.F.  
Deposited on : 2014-10-14  
Resolution : 3.30 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

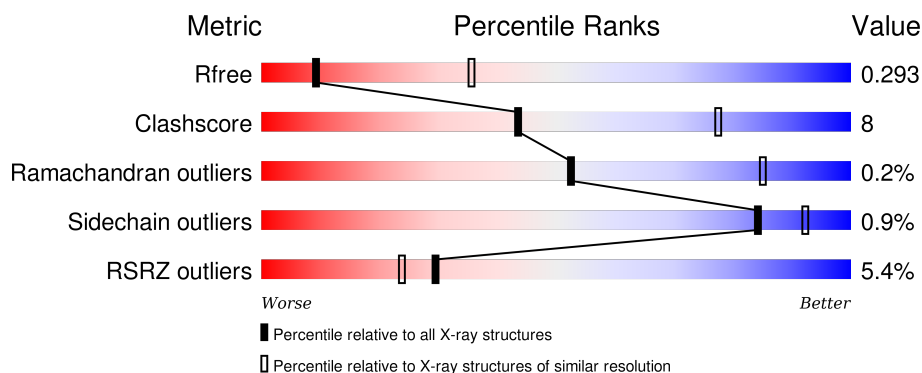
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 3.30 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	2060 (3.40-3.20)
Clashscore	102246	1058 (3.38-3.22)
Ramachandran outliers	100387	1038 (3.38-3.22)
Sidechain outliers	100360	1037 (3.38-3.22)
RSRZ outliers	91569	2070 (3.40-3.20)

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	479	<div> <div>5%</div> <div>80%</div> <div>16%</div> <div>.</div> </div>
1	B	479	<div> <div>5%</div> <div>74%</div> <div>20%</div> <div>6%</div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	NA	B	603	-	-	-	X

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7425 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 2D6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	461	Total	C	N	O	S	0	0	0
			3652	2343	646	649	14			
1	B	452	Total	C	N	O	S	0	0	0
			3584	2296	634	640	14			

There are 30 discrepancies between the modelled and reference sequences:

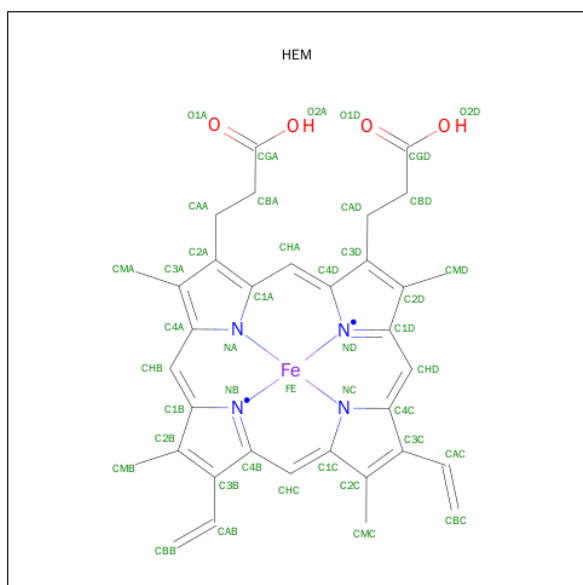
Chain	Residue	Modelled	Actual	Comment	Reference
A	23	MET	-	initiating methionine	UNP P10635
A	24	ALA	-	expression tag	UNP P10635
A	25	LYS	-	expression tag	UNP P10635
A	26	LYS	-	expression tag	UNP P10635
A	27	THR	-	expression tag	UNP P10635
A	28	SER	-	expression tag	UNP P10635
A	29	SER	-	expression tag	UNP P10635
A	30	LYS	-	expression tag	UNP P10635
A	31	GLY	-	expression tag	UNP P10635
A	32	LYS	-	expression tag	UNP P10635
A	33	LEU	-	expression tag	UNP P10635
A	498	HIS	-	expression tag	UNP P10635
A	499	HIS	-	expression tag	UNP P10635
A	500	HIS	-	expression tag	UNP P10635
A	501	HIS	-	expression tag	UNP P10635
B	23	MET	-	initiating methionine	UNP P10635
B	24	ALA	-	expression tag	UNP P10635
B	25	LYS	-	expression tag	UNP P10635
B	26	LYS	-	expression tag	UNP P10635
B	27	THR	-	expression tag	UNP P10635
B	28	SER	-	expression tag	UNP P10635
B	29	SER	-	expression tag	UNP P10635
B	30	LYS	-	expression tag	UNP P10635
B	31	GLY	-	expression tag	UNP P10635
B	32	LYS	-	expression tag	UNP P10635

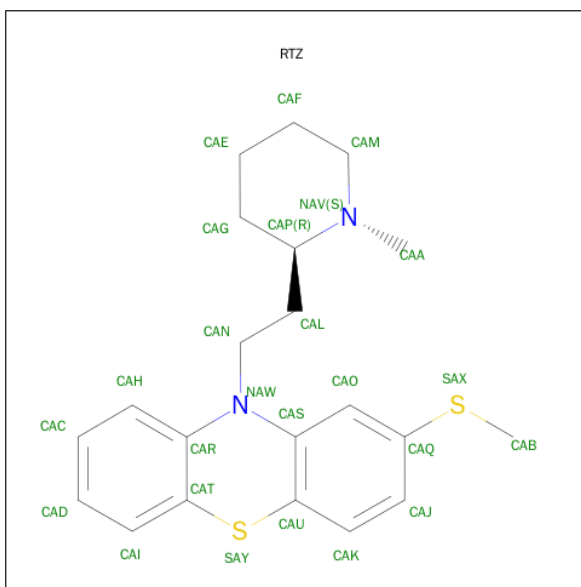
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Chain	Residue	Modelled	Actual	Comment	Reference
B	33	LEU	-	expression tag	UNP P10635
B	498	HIS	-	expression tag	UNP P10635
B	499	HIS	-	expression tag	UNP P10635
B	500	HIS	-	expression tag	UNP P10635
B	501	HIS	-	expression tag	UNP P10635

- 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
3	A	1	Total	C	N	S	0	1
			50	42	4	4		
3	B	1	Total	C	N	S	0	1
			50	42	4	4		

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Na	0	0
			1	1		
4	A	1	Total	Na	0	0
			1	1		

- Molecule 5 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	1	Total	Ni	0	0
			1	1		



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	194.19 Å   55.35 Å   145.22 Å 90.00°   134.19°   90.00°	Depositor
Resolution (Å)	32.98 – 3.30 32.98 – 3.30	Depositor EDS
% Data completeness (in resolution range)	99.4 (32.98-3.30) 99.5 (32.98-3.30)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.11	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.63 (at 3.32 Å)	Xtriage
Refinement program	phenix	Depositor
R, $R_{free}$	0.242 , 0.287 0.246 , 0.293	Depositor DCC
$R_{free}$ test set	866 reflections (5.38%)	DCC
Wilson B-factor (Å <sup>2</sup> )	75.8	Xtriage
Anisotropy	0.478	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 47.1	EDS
Estimated twinning fraction	0.013 for h,-k,-h-l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	0 of 16992 reflections	Xtriage
$F_o, F_c$ correlation	0.89	EDS
Total number of atoms	7425	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.84% 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: HEM, NA, NI, RTZ

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	0.22	0/3751	0.46	0/5104
1	B	0.22	0/3680	0.46	0/5005
All	All	0.22	0/7431	0.46	0/10109

There are no bond length outliers.

There are no bond angle outliers.

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	3652	0	3632	55	0
1	B	3584	0	3550	64	0
2	A	43	0	30	4	0
2	B	43	0	30	3	0
3	A	50	0	52	2	0
3	B	50	0	52	5	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	B	1	0	0	0	0
All	All	7425	0	7346	119	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 8.

All (119) 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:224:LEU:HD12	1:A:240:VAL:HG11	1.75	0.69
1:A:228:PRO:HB3	1:B:50:ASP:HB3	1.75	0.69
2:B:601:HEM:HBC2	2:B:601:HEM:HHD	1.76	0.68
1:A:273:GLU:HA	1:A:276:LEU:HD12	1.75	0.68
1:A:101:ARG:NH2	1:A:120:PHE:O	2.31	0.62
1:B:308:VAL:HG23	1:B:309:THR:HG23	1.80	0.62
1:B:343:ARG:O	1:B:462:GLN:NE2	2.34	0.61
1:B:110:LEU:HD22	1:B:248:LEU:HD12	1.83	0.61
1:A:244:GLN:HG2	3:A:602[A]:RTZ:HAC	1.84	0.59
1:B:416:HIS:HB3	1:B:419:HIS:CD2	2.38	0.58
2:A:601:HEM:HBC2	2:A:601:HEM:HMC2	1.87	0.56
1:B:149:LEU:HD13	1:B:189:LEU:HD21	1.88	0.56
2:B:601:HEM:HBB2	2:B:601:HEM:HMB1	1.88	0.55
2:A:601:HEM:HMB2	2:A:601:HEM:HBB2	1.88	0.55
1:A:41:PRO:HB3	1:B:41:PRO:HG2	1.88	0.55
1:A:101:ARG:HH11	1:A:441:ARG:HB3	1.72	0.54
1:B:411:LYS:H	1:B:419:HIS:CE1	2.26	0.54
1:B:242:ARG:HG3	1:B:243:PHE:HD1	1.72	0.53
1:B:266:GLN:OE1	1:B:267:PRO:HD2	2.08	0.53
1:A:490:TYR:HE1	1:A:492:LEU:HD23	1.74	0.52
1:A:75:TRP:CD1	1:B:48:HIS:HB3	2.45	0.52
1:B:273:GLU:HA	1:B:276:LEU:HD12	1.90	0.52
1:B:119:VAL:HG11	1:B:444:LEU:HD21	1.92	0.52
1:B:182:VAL:HG11	1:B:310:THR:HB	1.91	0.51
1:A:215:GLU:HG2	1:A:241:LEU:H	1.75	0.51
1:A:183:SER:OG	1:A:307:MET:HG3	2.10	0.51
1:A:228:PRO:HB3	1:B:50:ASP:CB	2.41	0.51
1:A:75:TRP:HB3	1:B:48:HIS:ND1	2.25	0.51
1:A:232:HIS:O	1:A:233:ILE:HD13	2.11	0.51
1:B:359:VAL:O	1:B:363:VAL:HG23	2.12	0.50
1:B:409:TRP:HB3	1:B:419:HIS:CE1	2.48	0.49
1:A:91:LEU:HD11	1:A:397:THR:HG21	1.94	0.49
1:A:305:ALA:HA	3:A:602[B]:RTZ:SAY	2.53	0.49
1:A:437:SER:OG	1:A:438:ALA:N	2.45	0.48
1:A:321:MET:O	1:A:328:GLN:NE2	2.46	0.48
1:B:242:ARG:HG3	1:B:243:PHE:CD1	2.48	0.48
1:A:150:GLU:OE2	1:A:347:MET:N	2.46	0.48
1:A:110:LEU:HD13	1:A:241:LEU:HD23	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:101:ARG:NH1	2:A:601:HEM:O1A	2.47	0.47
1:B:308:VAL:HG21	3:B:602[B]:RTZ:HAK	1.95	0.47
1:B:45:ASN:HD22	1:B:48:HIS:CE1	2.33	0.47
1:B:460:LEU:O	1:B:464:PHE:HB2	2.14	0.47
1:A:319:LEU:O	1:A:322:ILE:HG12	2.15	0.47
1:B:118:GLY:O	1:B:122:ALA:HB2	2.14	0.47
1:A:336:ASP:OD2	1:A:497:ARG:NH2	2.48	0.47
1:A:84:LEU:HD13	1:A:432:ALA:HA	1.96	0.46
1:A:37:PRO:HG3	1:A:65:PHE:CE2	2.50	0.46
1:B:316:TRP:CD2	1:B:487:PRO:HG3	2.50	0.46
1:B:339:ILE:HA	1:B:343:ARG:HH21	1.81	0.46
1:A:214:LYS:HG2	1:A:482:ALA:HB1	1.96	0.46
1:B:104:VAL:HG12	1:B:106:ILE:HG12	1.98	0.46
1:B:224:LEU:HD13	1:B:240:VAL:HG21	1.98	0.46
1:B:100:ASP:HA	1:B:124:TYR:HB2	1.98	0.46
3:B:602[A]:RTZ:HAL	3:B:602[A]:RTZ:HAH	1.98	0.45
1:B:97:ASP:OD2	1:B:380:ARG:HB2	2.16	0.45
1:B:132:ARG:NH1	2:B:601:HEM:O1D	2.45	0.45
3:B:602[A]:RTZ:HAN	3:B:602[A]:RTZ:HAGA	1.56	0.45
1:B:112:PHE:HZ	3:B:602[A]:RTZ:HAMA	1.81	0.45
1:A:255:LEU:O	1:A:259:ARG:N	2.40	0.45
1:A:224:LEU:HD22	1:A:230:LEU:HB3	1.97	0.45
1:B:495:VAL:HA	1:B:496:PRO:HD3	1.85	0.44
1:B:51:PHE:CE1	1:B:222:GLU:HG3	2.52	0.44
1:B:100:ASP:OD1	1:B:101:ARG:N	2.43	0.44
1:B:174:PRO:HD3	1:B:492:LEU:HD22	1.99	0.44
1:B:77:PRO:HG2	1:B:393:THR:HA	1.99	0.44
1:A:428:VAL:O	1:A:430:PRO:HD3	2.18	0.44
1:B:33:LEU:N	1:B:388:ARG:O	2.51	0.44
1:A:440:ARG:HG3	1:A:440:ARG:HH21	1.82	0.44
1:A:325:PRO:HA	1:A:328:GLN:HB3	1.99	0.43
1:A:210:GLN:O	1:A:214:LYS:HG3	2.18	0.43
1:A:344:ARG:HA	1:A:345:PRO:HD3	1.91	0.43
1:B:437:SER:OG	1:B:438:ALA:N	2.49	0.43
1:A:149:LEU:HD13	1:A:189:LEU:HD21	1.99	0.43
1:B:446:GLU:O	1:B:450:ARG:HG2	2.18	0.43
1:B:205:LEU:HA	1:B:205:LEU:HD12	1.84	0.43
1:A:224:LEU:O	1:A:230:LEU:HD23	2.19	0.43
1:B:45:ASN:HA	1:B:48:HIS:CE1	2.54	0.43
1:B:59:ASP:HA	1:B:62:ARG:HG2	2.00	0.43
1:A:67:ASP:O	1:A:82:ASN:HB2	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:227:VAL:CG2	1:A:228:PRO:HD2	2.48	0.42
1:B:91:LEU:HD11	1:B:397:THR:HG21	2.00	0.42
1:B:319:LEU:O	1:B:322:ILE:HG12	2.18	0.42
1:A:323:LEU:HD21	1:A:475:PRO:HG2	2.01	0.42
1:B:279:MET:HG2	1:B:290:PHE:O	2.20	0.42
1:B:339:ILE:HA	1:B:343:ARG:NH2	2.34	0.42
1:B:84:LEU:HD22	1:B:432:ALA:HB2	2.01	0.42
1:A:240:VAL:O	1:A:241:LEU:HB2	2.19	0.42
1:A:100:ASP:HA	1:A:124:TYR:HB2	2.01	0.42
1:B:185:VAL:O	1:B:188:SER:OG	2.30	0.42
1:B:320:LEU:O	1:B:324:HIS:HB2	2.18	0.42
1:B:106:ILE:HG22	1:B:224:LEU:HD22	2.01	0.42
1:A:213:LEU:HD21	1:A:484:LEU:HD21	2.02	0.42
1:A:448:LEU:HD23	2:A:601:HEM:HBC2	2.02	0.41
1:B:305:ALA:HA	3:B:602[B]:RTZ:SAY	2.59	0.41
1:B:428:VAL:O	1:B:430:PRO:HD3	2.20	0.41
1:B:132:ARG:O	1:B:136:VAL:HG12	2.19	0.41
1:A:131:GLN:NE2	1:A:289:SER:OG	2.46	0.41
1:A:230:LEU:HD12	1:A:231:LEU:N	2.35	0.41
1:A:100:ASP:OD1	1:A:101:ARG:N	2.50	0.41
1:B:420:PHE:O	1:B:421:LEU:HD23	2.20	0.41
1:B:206:LEU:O	1:B:210:GLN:HG2	2.20	0.41
1:B:279:MET:HE1	1:B:295:LEU:HD22	2.01	0.41
1:A:460:LEU:O	1:A:464:PHE:HB2	2.21	0.41
1:A:227:VAL:HG23	1:A:228:PRO:HD2	2.01	0.41
1:B:173:ARG:NH1	1:B:489:PRO:HA	2.36	0.41
1:B:276:LEU:HA	1:B:279:MET:HE3	2.02	0.41
1:A:267:PRO:HA	1:A:268:PRO:HD3	1.93	0.41
1:A:54:THR:N	1:A:55:PRO:HD2	2.36	0.41
1:B:285:ASN:HA	1:B:286:PRO:HD2	1.93	0.41
1:A:416:HIS:HB3	1:A:419:HIS:CE1	2.56	0.41
1:B:454:PHE:HD1	1:B:455:LEU:HD23	1.86	0.41
1:A:224:LEU:HD23	1:A:224:LEU:HA	1.82	0.40
1:A:227:VAL:HG13	1:A:229:VAL:HG22	2.02	0.40
1:B:48:HIS:N	1:B:48:HIS:CD2	2.88	0.40
1:B:325:PRO:HA	1:B:328:GLN:HB3	2.04	0.40
1:A:266:GLN:HA	1:A:267:PRO:HD2	1.94	0.40
1:A:472:GLN:HA	1:A:473:PRO:HD3	1.90	0.40
1:A:115:ARG:HE	1:B:414:ARG:NH2	2.19	0.40
1:B:324:HIS:CD2	1:B:415:PHE:HD2	2.39	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	457/479 (95%)	428 (94%)	29 (6%)	0	100	100
1	B	446/479 (93%)	409 (92%)	35 (8%)	2 (0%)	39	76
All	All	903/958 (94%)	837 (93%)	64 (7%)	2 (0%)	52	85

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	68	VAL
1	B	106	ILE

### 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	395/409 (97%)	391 (99%)	4 (1%)	82	91
1	B	388/409 (95%)	385 (99%)	3 (1%)	86	93
All	All	783/818 (96%)	776 (99%)	7 (1%)	84	92

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	120	PHE
1	A	164	PHE
1	A	215	GLU
1	A	252	ASP

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Mol	Chain	Res	Type
1	B	48	HIS
1	B	120	PHE
1	B	193	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	332	GLN
1	A	416	HIS
1	B	48	HIS
1	B	416	HIS
1	B	419	HIS
1	B	463	HIS

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 9 ligands modelled in this entry, 3 are monoatomic - leaving 6 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	HEM	A	601	1	30,50,50	2.44	10 (33%)	24,82,82	2.31	7 (29%)
3	RTZ	A	602[A]	-	27,28,28	0.11	0	36,39,39	0.59	1 (2%)
3	RTZ	A	602[B]	-	27,28,28	0.14	0	36,39,39	0.57	1 (2%)
2	HEM	B	601	1	30,50,50	2.51	8 (26%)	24,82,82	2.20	6 (25%)
3	RTZ	B	602[A]	-	27,28,28	0.11	0	36,39,39	0.57	1 (2%)
3	RTZ	B	602[B]	-	27,28,28	0.11	0	36,39,39	0.45	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	HEM	A	601	1	-	0/10/54/54	0/0/8/8
3	RTZ	A	602[A]	-	-	0/7/30/30	0/4/4/4
3	RTZ	A	602[B]	-	-	0/7/30/30	0/4/4/4
2	HEM	B	601	1	-	0/10/54/54	0/0/8/8
3	RTZ	B	602[A]	-	-	0/7/30/30	0/4/4/4
3	RTZ	B	602[B]	-	-	0/7/30/30	0/4/4/4

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	HEM	C3B-C4B	-7.29	1.45	1.51
2	B	601	HEM	C2D-C3D	-7.01	1.33	1.54
2	A	601	HEM	C2D-C3D	-6.99	1.33	1.54
2	A	601	HEM	C3B-C4B	-6.81	1.45	1.51
2	B	601	HEM	C3D-C4D	-4.90	1.45	1.51
2	A	601	HEM	C3D-C4D	-4.76	1.45	1.51
2	B	601	HEM	C2C-C1C	-4.07	1.44	1.52
2	A	601	HEM	C2C-C1C	-3.78	1.45	1.52
2	A	601	HEM	C2D-C1D	-2.02	1.45	1.51
2	A	601	HEM	C4C-NC	2.06	1.38	1.36
2	A	601	HEM	C1C-NC	2.08	1.38	1.36
2	A	601	HEM	FE-NC	2.18	2.04	1.95
2	B	601	HEM	C4C-NC	2.19	1.38	1.36
2	B	601	HEM	C1C-NC	2.20	1.38	1.36
2	A	601	HEM	C3C-CAC	2.29	1.55	1.51
2	B	601	HEM	C3B-CAB	2.31	1.55	1.51
2	A	601	HEM	C3B-CAB	2.38	1.55	1.51
2	B	601	HEM	FE-NC	2.39	2.05	1.95

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	602[A]	RTZ	CAL-CAP-CAG	-2.63	108.61	112.45
3	B	602[A]	RTZ	CAL-CAP-CAG	-2.59	108.66	112.45
3	A	602[B]	RTZ	CAL-CAP-CAG	-2.32	109.05	112.45
2	A	601	HEM	C3B-C4B-CHC	2.13	126.17	123.16
2	B	601	HEM	CMD-C2D-C3D	2.40	124.95	114.35
2	A	601	HEM	CMD-C2D-C3D	2.51	125.47	114.35
2	B	601	HEM	CMC-C2C-C3C	3.62	125.56	116.53
2	A	601	HEM	C2D-C3D-C4D	3.81	107.97	101.50
2	A	601	HEM	CAD-C3D-C4D	3.89	126.17	112.47
2	B	601	HEM	C2D-C3D-C4D	3.93	108.15	101.50
2	B	601	HEM	CAD-C3D-C4D	3.93	126.34	112.47
2	B	601	HEM	CAD-C3D-C2D	4.27	125.50	113.22
2	A	601	HEM	CAD-C3D-C2D	4.40	125.86	113.22
2	A	601	HEM	CMC-C2C-C3C	4.92	128.82	116.53
2	B	601	HEM	CMB-C2B-C3B	4.98	128.96	116.53
2	A	601	HEM	CMB-C2B-C3B	5.02	129.05	116.53

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

6 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	601	HEM	4	0
3	A	602[A]	RTZ	1	0
3	A	602[B]	RTZ	1	0
2	B	601	HEM	3	0
3	B	602[A]	RTZ	3	0
3	B	602[B]	RTZ	2	0

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.



## 6 Fit of model and data

### 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	461/479 (96%)	0.39	25 (5%) 29 24	34, 66, 93, 114	0
1	B	452/479 (94%)	0.27	24 (5%) 30 24	37, 60, 88, 105	0
All	All	913/958 (95%)	0.33	49 (5%) 29 24	34, 63, 91, 114	0

All (49) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	232	HIS	4.7
1	A	234	PRO	4.0
1	B	472	GLN	3.6
1	A	474	ARG	3.5
1	B	97	ASP	3.4
1	A	168	SER	3.3
1	A	473	PRO	3.2
1	A	165	ALA	3.1
1	A	472	GLN	3.0
1	A	63	ARG	3.0
1	B	352	HIS	2.9
1	A	60	GLN	2.9
1	A	469	PRO	2.9
1	B	424	GLN	2.8
1	B	381	ASP	2.8
1	B	423	ALA	2.8
1	A	66	GLY	2.8
1	B	309	THR	2.7
1	B	112	PHE	2.7
1	A	169	GLY	2.7
1	B	341	GLN	2.7
1	B	388	ARG	2.6
1	A	478	HIS	2.6
1	B	155	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	411	LYS	2.5
1	A	311	SER	2.5
1	B	305	ALA	2.5
1	A	282	ALA	2.4
1	A	35	PRO	2.4
1	A	170	ARG	2.4
1	A	147	LYS	2.3
1	B	242	ARG	2.3
1	A	471	GLY	2.3
1	A	65	PHE	2.3
1	B	407	ALA	2.2
1	B	33	LEU	2.2
1	B	471	GLY	2.2
1	A	312	THR	2.2
1	B	379	SER	2.2
1	A	64	ARG	2.2
1	A	424	GLN	2.1
1	B	426	HIS	2.1
1	B	268	PRO	2.1
1	B	440	ARG	2.1
1	A	386	GLY	2.1
1	A	310	THR	2.0
1	B	470	THR	2.0
1	B	220	LEU	2.0
1	B	386	GLY	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 6.4 Ligands ⓘ

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
4	NA	B	603	1/1	0.93	0.57	4.47	71,71,71,71	0
2	HEM	A	601	43/43	0.97	0.27	0.13	30,36,42,48	0
3	RTZ	B	602[A]	25/25	0.87	0.28	-0.04	56,63,67,68	25
3	RTZ	B	602[B]	25/25	0.87	0.28	-0.07	58,62,66,68	25
3	RTZ	A	602[B]	25/25	0.93	0.25	-0.10	48,52,55,58	25
3	RTZ	A	602[A]	25/25	0.93	0.25	-0.22	48,53,55,64	25
2	HEM	B	601	43/43	0.97	0.23	-0.55	40,46,51,56	0
5	NI	B	604	1/1	0.98	0.04	-2.73	58,58,58,58	0
4	NA	A	603	1/1	0.92	0.61	-	49,49,49,49	0

## 6.5 Other polymers

There are no such residues in this entry.