



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 01:06 PM GMT

PDB ID : 3SVQ  
Title : Structure of rat neuronal nitric oxide synthase heme domain in complex with 6-(((3R,4R)-4-(2-((2,2-Difluoro-2-(2,3-difluorophenyl)ethyl)amino)ethoxy)pyrrolidin-3-yl)methyl)-4-methylpyridin-2-amine  
Authors : Li, H.; Poulos, T.L.  
Deposited on : 2011-07-12  
Resolution : 2.18 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

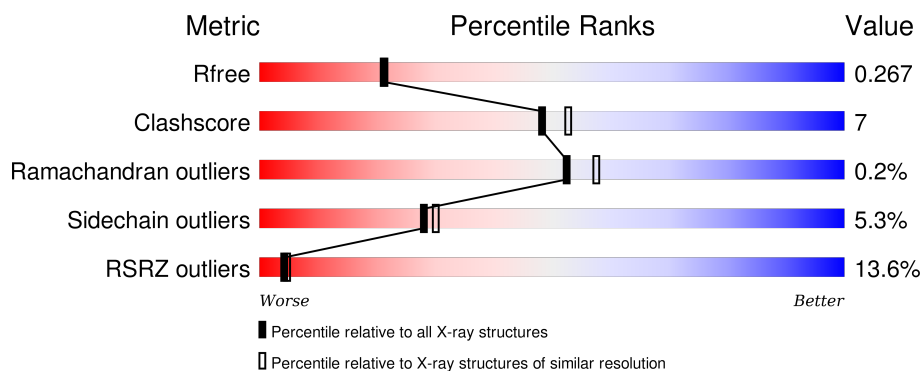
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.18 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	5130 (2.20-2.16)
Clashscore	102246	5965 (2.20-2.16)
Ramachandran outliers	100387	5863 (2.20-2.16)
Sidechain outliers	100360	5864 (2.20-2.16)
RSRZ outliers	91569	5142 (2.20-2.16)

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	422	
1	B	422	

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	JK4	A	800	-	-	-	X
4	JK4	B	800	-	-	-	X

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 6979 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 Nitric oxide synthase, brain.

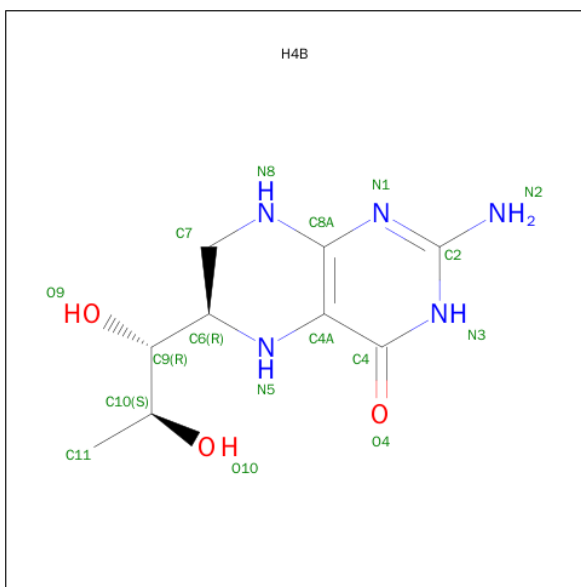
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	407	Total	C	N	O	S	0	2	0
			3324	2128	567	608	21			
1	B	411	Total	C	N	O	S	0	2	0
			3351	2144	574	611	22			

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



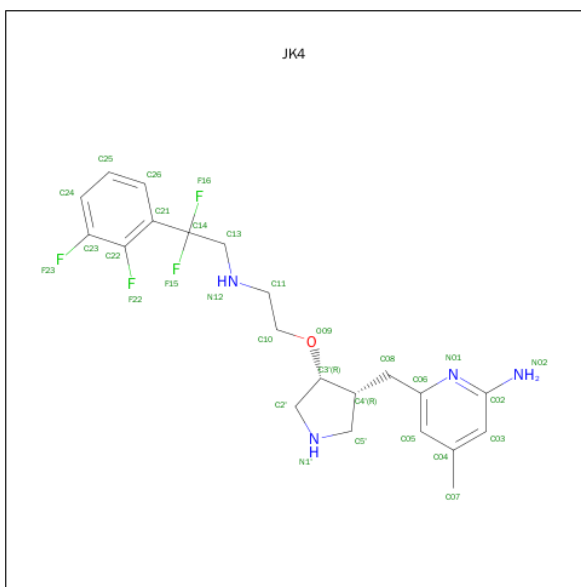
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 3 is 5,6,7,8-TETRAHYDROBIOPTERIN (three-letter code: H4B) (formula:  $C_9H_{15}N_5O_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			17	9	5	3		
3	B	1	Total	C	N	O	0	0
			17	9	5	3		

- Molecule 4 is 6-[[[(3R,4R)-4-(2-{[2-(2,3-DIFLUOROPHENYL)-2,2-DIFLUOROETHYL]AMINO}ETHOXY)PYRROLIDIN-3-YL]METHYL]-4-METHYLPYRIDIN-2-AMINE (three-letter code: JK4) (formula: C<sub>21</sub>H<sub>26</sub>F<sub>4</sub>N<sub>4</sub>O).



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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	F	N	O	0	0
			30	21	4	4	1		

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula:  $C_2H_3O_2$ ).



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

- Molecule 6 is ZINC ION (three-letter code: ZN) (formula:  $Zn$ ).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Zn	0	0
			1	1		

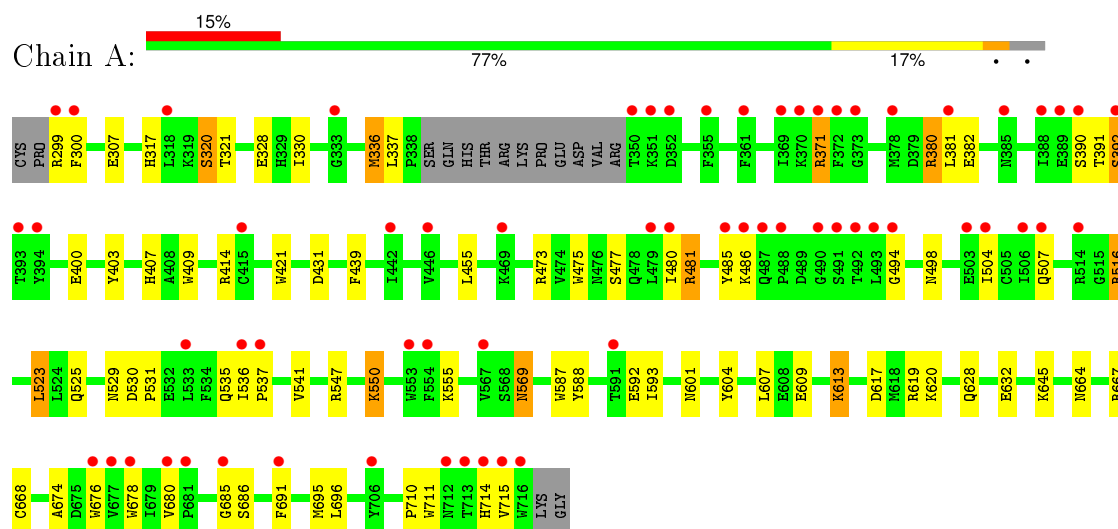
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	51	Total	O	0	0
			51	51		
7	B	64	Total	O	0	0
			64	64		

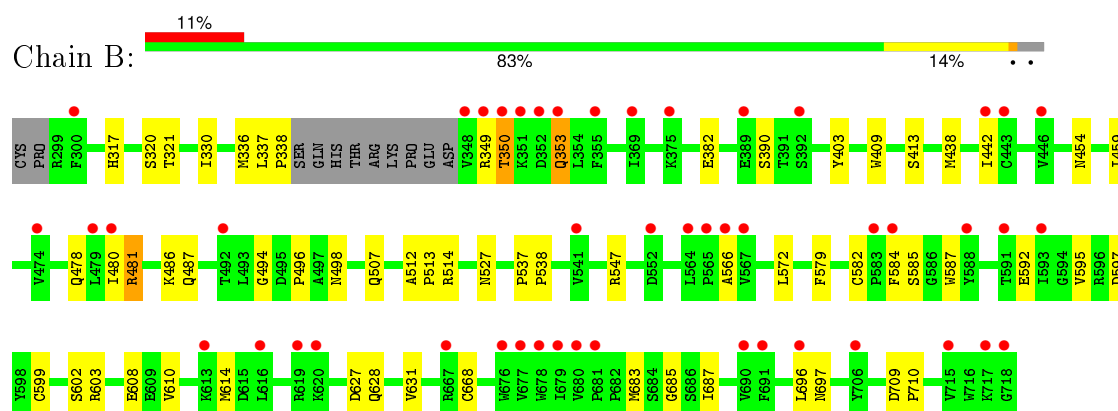
### 3 Residue-property plots

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: Nitric oxide synthase, brain



- Molecule 1: Nitric oxide synthase, brain



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	51.75Å 111.13Å 164.71Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.82 – 2.18 43.82 – 2.18	Depositor EDS
% Data completeness (in resolution range)	97.2 (43.82-2.18) 97.2 (43.82-2.18)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.23 (at 2.18Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.209 , 0.262 0.214 , 0.267	Depositor DCC
$R_{free}$ test set	2460 reflections (5.31%)	DCC
Wilson B-factor (Å <sup>2</sup> )	49.7	Xtriage
Anisotropy	0.182	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 47.8	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 48789 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6979	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.64% 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: JK4, HEM, ZN, H4B, ACT

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	0.73	0/3423	0.74	0/4644
1	B	0.81	0/3450	0.77	0/4677
All	All	0.77	0/6873	0.75	0/9321

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	3324	0	3233	56	0
1	B	3351	0	3269	42	0
2	A	43	0	30	3	0
2	B	43	0	30	8	0
3	A	17	0	15	0	0
3	B	17	0	15	1	0
4	A	30	0	26	5	0
4	B	30	0	26	5	0
5	A	4	0	3	0	0
5	B	4	0	3	0	0
6	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	51	0	0	1	0
7	B	64	0	0	2	0
All	All	6979	0	6650	98	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 7.

All (98) 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:B:750:HEM:HBA2	4:B:800:JK4:F15	1.53	0.99
1:B:592:GLU:OE1	4:B:800:JK4:H26	1.71	0.90
1:B:587:TRP:H	2:B:750:HEM:HAB	1.37	0.89
1:A:523:LEU:HD22	1:A:531:PRO:HB2	1.60	0.83
2:A:750:HEM:HMC2	2:A:750:HEM:HBC2	1.66	0.77
1:A:592:GLU:OE1	4:A:800:JK4:H26	1.88	0.73
1:A:317:HIS:O	1:A:320:SER:HB3	1.89	0.73
1:A:371:ARG:CG	1:A:371:ARG:HH21	2.06	0.67
1:A:380:ARG:HD3	1:A:400:GLU:OE1	1.95	0.67
2:A:750:HEM:CMC	2:A:750:HEM:HBC2	2.25	0.66
1:A:337:LEU:HD21	4:A:800:JK4:H03	1.77	0.66
1:A:371:ARG:HH21	1:A:371:ARG:HG2	1.64	0.62
1:B:481:ARG:HD3	1:B:498:ASN:ND2	2.14	0.62
1:B:494:GLY:O	1:B:496:PRO:HD3	2.00	0.60
2:A:750:HEM:HBA1	4:A:800:JK4:F15	1.90	0.60
1:A:371:ARG:HG2	1:A:371:ARG:NH2	2.15	0.59
1:A:391:THR:O	1:A:392:SER:OG	2.19	0.59
1:A:592:GLU:CD	4:A:800:JK4:H26	2.25	0.57
1:B:592:GLU:CD	4:B:800:JK4:H26	2.26	0.56
1:B:595:VAL:O	1:B:599:CYS:HB2	2.05	0.56
1:A:481:ARG:HD3	1:A:498:ASN:HD21	1.71	0.56
1:B:481:ARG:HD3	1:B:498:ASN:HD21	1.71	0.55
1:A:307[B]:GLU:OE2	1:B:602[B]:SER:OG	2.20	0.55
1:A:569:ASN:C	1:A:569:ASN:HD22	2.10	0.55
1:A:632:GLU:OE2	1:B:628:GLN:NE2	2.40	0.54
1:B:566:ALA:HB2	1:B:585:SER:HB3	1.89	0.53
1:B:566:ALA:CB	1:B:585:SER:HB3	2.38	0.53
1:A:473:ARG:NH2	1:A:710:PRO:HD3	2.23	0.53
1:A:439:PHE:HZ	1:A:537:PRO:HD3	1.72	0.53
1:B:349:ARG:HG2	1:B:353:GLN:HG3	1.91	0.52
2:B:750:HEM:O1A	3:B:760:H4B:N3	2.35	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:504:ILE:HG23	1:A:507:GLN:NE2	2.25	0.51
1:A:391:THR:O	1:A:392:SER:CB	2.59	0.51
1:A:480:ILE:HD13	1:A:541:VAL:HG13	1.93	0.50
1:B:350:THR:O	1:B:353:GLN:HG2	2.12	0.50
1:A:336:MET:CE	1:A:678:TRP:HZ2	2.24	0.50
1:B:478:GLN:HA	1:B:566:ALA:O	2.11	0.49
1:A:592:GLU:OE2	4:A:800:JK4:H26	2.13	0.49
1:B:608:GLU:HG3	7:B:24:HOH:O	2.13	0.48
1:A:710:PRO:O	1:A:714:HIS:N	2.45	0.48
1:B:480:ILE:HA	7:B:28:HOH:O	2.13	0.48
1:A:617:ASP:OD2	1:A:619:ARG:HB2	2.13	0.48
1:B:631:VAL:HG22	1:B:683:MET:HE1	1.95	0.48
1:A:455:LEU:HD12	1:A:587:TRP:CB	2.45	0.46
1:A:525:GLN:HG3	1:A:529:ASN:O	2.15	0.46
1:A:504:ILE:HG23	1:A:507:GLN:HE22	1.81	0.46
1:A:414:ARG:HD3	1:A:678:TRP:CD2	2.50	0.46
1:B:336:MET:HG2	4:B:800:JK4:H07B	1.96	0.46
1:A:664:ASN:O	1:A:668:CYS:HB2	2.16	0.46
1:B:487:GLN:HE22	1:B:514:ARG:NH2	2.12	0.46
1:A:607:LEU:HD11	1:B:687:ILE:HG21	1.97	0.46
1:B:587:TRP:O	2:B:750:HEM:HMB3	2.16	0.46
1:B:587:TRP:N	2:B:750:HEM:HAB	2.18	0.46
1:B:438:MET:O	1:B:442:ILE:HG13	2.16	0.45
1:A:330:ILE:HD11	1:B:696:LEU:HB3	1.98	0.45
1:A:588:TYR:CD1	1:A:593:ILE:HD11	2.50	0.45
2:B:750:HEM:HBC2	2:B:750:HEM:CMC	2.46	0.45
1:A:676:TRP:CE2	1:A:680:VAL:HG21	2.52	0.45
1:A:481:ARG:HD3	1:A:498:ASN:ND2	2.31	0.44
1:B:409:TRP:CZ3	2:B:750:HEM:HMC3	2.52	0.44
1:A:475:TRP:HB2	1:A:523:LEU:HB3	2.00	0.44
1:B:459:ILE:HD11	1:B:582:CYS:HB2	1.99	0.44
1:A:685:GLY:O	1:A:691:PHE:HB2	2.18	0.44
1:A:336:MET:HB3	1:A:336:MET:HE2	1.90	0.44
1:A:409:TRP:CE3	1:A:421:TRP:HA	2.53	0.44
1:A:516:ARG:NH1	1:A:604:TYR:HD2	2.16	0.43
1:B:413:SER:OG	1:B:697:ASN:ND2	2.51	0.43
1:A:686:SER:HA	1:A:691:PHE:CG	2.52	0.43
1:B:317:HIS:O	1:B:320:SER:HB2	2.18	0.43
1:A:330:ILE:HG23	1:A:330:ILE:O	2.17	0.43
1:A:477:SER:HA	1:A:569:ASN:HB3	2.01	0.43
1:B:481:ARG:CD	1:B:498:ASN:HD21	2.32	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:537:PRO:HA	1:B:538:PRO:HD3	1.76	0.42
1:A:431:ASP:OD2	1:A:431:ASP:C	2.57	0.42
1:A:550:LYS:HB2	1:A:550:LYS:HE3	1.75	0.42
1:A:536:ILE:O	1:A:537:PRO:C	2.57	0.42
1:A:494:GLY:HA2	1:A:516:ARG:HG3	2.01	0.42
1:A:628:GLN:HG2	1:B:631:VAL:HG11	2.02	0.42
1:A:516:ARG:N	7:A:79:HOH:O	2.52	0.42
1:B:597:ASP:OD1	1:B:603:ARG:NH1	2.52	0.42
1:B:610:VAL:O	1:B:614:MET:HG3	2.19	0.42
1:B:512:ALA:HA	1:B:513:PRO:HD3	1.96	0.42
1:B:337:LEU:HA	1:B:338:PRO:HD2	1.94	0.41
1:B:403:TYR:C	1:B:403:TYR:CD2	2.92	0.41
1:A:299:ARG:O	1:A:299:ARG:HG3	2.19	0.41
1:B:478:GLN:NE2	4:B:800:JK4:H11A	2.36	0.41
1:B:584:PHE:CD1	2:B:750:HEM:CAC	3.04	0.41
1:A:696:LEU:HB3	1:B:330:ILE:HD11	2.02	0.41
1:A:475:TRP:CZ3	1:A:711:TRP:HB3	2.55	0.41
1:A:676:TRP:CZ2	1:A:680:VAL:HG21	2.56	0.41
1:A:609:GLU:O	1:A:613:LYS:HG2	2.21	0.41
1:A:530:ASP:HA	1:A:531:PRO:HD3	1.90	0.40
1:B:572:LEU:HB3	1:B:579:PHE:HB2	2.03	0.40
1:A:674:ALA:HB3	1:A:695:MET:HB3	2.03	0.40
1:B:709:ASP:HA	1:B:710:PRO:HD3	1.87	0.40
1:A:403:TYR:CE1	1:A:407:HIS:CE1	3.10	0.40
1:A:455:LEU:HD12	1:A:587:TRP:HB3	2.03	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	405/422 (96%)	388 (96%)	16 (4%)	1 (0%)	52 57

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	409/422 (97%)	395 (97%)	13 (3%)	1 (0%)	52	57
All	All	814/844 (96%)	783 (96%)	29 (4%)	2 (0%)	52	57

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	685	GLY
1	A	392	SER

### 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	365/377 (97%)	338 (93%)	27 (7%)	17	16
1	B	368/377 (98%)	354 (96%)	14 (4%)	40	46
All	All	733/754 (97%)	692 (94%)	41 (6%)	28	27

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	300	PHE
1	A	320	SER
1	A	321	THR
1	A	328	GLU
1	A	336	MET
1	A	371	ARG
1	A	380	ARG
1	A	381	LEU
1	A	382	GLU
1	A	390	SER
1	A	481	ARG
1	A	485	TYR
1	A	486	LYS
1	A	516	ARG

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Mol	Chain	Res	Type
1	A	523	LEU
1	A	535	GLN
1	A	547	ARG
1	A	550	LYS
1	A	555	LYS
1	A	569	ASN
1	A	601[A]	ASN
1	A	601[B]	ASN
1	A	613	LYS
1	A	620	LYS
1	A	645	LYS
1	A	667	ARG
1	A	715	VAL
1	B	321	THR
1	B	350	THR
1	B	353	GLN
1	B	382	GLU
1	B	390	SER
1	B	454	ASN
1	B	481	ARG
1	B	486	LYS
1	B	507	GLN
1	B	527	ASN
1	B	547	ARG
1	B	627	ASP
1	B	668[A]	CYS
1	B	668[B]	CYS

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	353	GLN
1	A	454	ASN
1	A	507	GLN
1	A	527	ASN
1	A	569	ASN
1	A	605	ASN
1	A	642	GLN
1	A	697	ASN
1	B	454	ASN
1	B	601	ASN
1	B	605	ASN

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Mol	Chain	Res	Type
1	B	628	GLN
1	B	642	GLN
1	B	697	ASN

### 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, 1 is monoatomic - leaving 8 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	750	1	30,50,50	2.37	7 (23%)	24,82,82	2.85	9 (37%)
3	H4B	A	760	-	13,18,18	0.96	0	11,26,26	2.86	7 (63%)
4	JK4	A	800	-	28,32,32	2.33	2 (7%)	31,45,45	2.14	10 (32%)
5	ACT	A	860	-	1,3,3	0.74	0	0,3,3	0.00	-
2	HEM	B	750	1	30,50,50	2.24	9 (30%)	24,82,82	3.23	12 (50%)
3	H4B	B	760	-	13,18,18	1.20	1 (7%)	11,26,26	2.81	5 (45%)
4	JK4	B	800	-	28,32,32	1.91	2 (7%)	31,45,45	2.50	10 (32%)
5	ACT	B	860	-	1,3,3	0.88	0	0,3,3	0.00	-

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	750	1	-	0/10/54/54	0/0/8/8
3	H4B	A	760	-	-	0/8/17/17	0/2/2/2
4	JK4	A	800	-	-	0/17/29/29	0/3/3/3
5	ACT	A	860	-	-	0/0/0/0	0/0/0/0
2	HEM	B	750	1	-	0/10/54/54	0/0/8/8
3	H4B	B	760	-	-	0/8/17/17	0/2/2/2
4	JK4	B	800	-	-	0/17/29/29	0/3/3/3
5	ACT	B	860	-	-	0/0/0/0	0/0/0/0

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	800	JK4	F15-C14	-8.87	1.31	1.37
4	A	800	JK4	F16-C14	-7.62	1.32	1.37
2	A	750	HEM	C3B-C4B	-7.52	1.45	1.51
2	B	750	HEM	C3B-C4B	-7.04	1.45	1.51
4	B	800	JK4	F15-C14	-6.81	1.32	1.37
4	B	800	JK4	F16-C14	-6.16	1.33	1.37
2	A	750	HEM	C3D-C4D	-6.08	1.43	1.51
2	B	750	HEM	C3D-C4D	-4.77	1.45	1.51
2	B	750	HEM	C2C-C1C	-4.75	1.43	1.52
2	A	750	HEM	C2C-C1C	-3.62	1.45	1.52
2	B	750	HEM	C2B-C1B	-2.51	1.43	1.51
2	A	750	HEM	C2D-C1D	-2.37	1.44	1.51
2	B	750	HEM	C2D-C1D	-2.01	1.45	1.51
2	A	750	HEM	CMC-C2C	2.10	1.58	1.53
2	B	750	HEM	CAA-C2A	2.15	1.55	1.52
2	B	750	HEM	CMA-C3A	2.31	1.56	1.51
2	B	750	HEM	C1C-NC	2.34	1.38	1.36
3	B	760	H4B	C7-N8	2.65	1.49	1.46
2	A	750	HEM	C1C-NC	2.95	1.39	1.36
2	B	750	HEM	FE-NC	3.16	2.08	1.95
2	A	750	HEM	FE-NC	3.34	2.09	1.95

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	750	HEM	C3B-CAB-CBB	-7.57	112.85	124.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	750	HEM	CBA-CAA-C2A	-6.91	100.14	112.53
2	B	750	HEM	C3C-CAC-CBC	-5.64	115.81	124.46
3	A	760	H4B	N3-C2-N1	-4.92	117.47	125.53
2	B	750	HEM	CBA-CAA-C2A	-4.82	103.90	112.53
4	B	800	JK4	F23-C23-C22	-4.48	112.24	118.33
2	A	750	HEM	C3C-CAC-CBC	-4.00	118.32	124.46
2	B	750	HEM	CAA-C2A-C1A	-3.61	123.09	127.01
4	A	800	JK4	F23-C23-C22	-3.47	113.60	118.33
4	B	800	JK4	C04-C05-C06	-3.46	118.11	120.28
2	A	750	HEM	CAA-C2A-C1A	-3.28	123.45	127.01
4	B	800	JK4	F22-C22-C23	-3.20	112.15	118.86
2	B	750	HEM	CBD-CAD-C3D	-3.15	104.38	113.55
3	B	760	H4B	N3-C2-N1	-3.11	120.44	125.53
4	A	800	JK4	C05-C06-N01	-3.07	119.49	122.96
4	B	800	JK4	C05-C06-N01	-2.55	120.08	122.96
2	B	750	HEM	C3B-C4B-NB	-2.49	106.87	111.63
4	B	800	JK4	C26-C25-C24	-2.17	117.14	120.24
4	A	800	JK4	F22-C22-C23	-2.04	114.57	118.86
3	A	760	H4B	N2-C2-N1	2.09	120.66	117.20
4	A	800	JK4	C26-C21-C22	2.10	118.24	116.03
4	A	800	JK4	F15-C14-C13	2.22	111.43	108.69
2	B	750	HEM	C2C-C1C-CHC	2.27	127.13	123.68
3	A	760	H4B	C4-C4A-C8A	2.34	116.69	114.56
3	B	760	H4B	C4A-C8A-N8	2.36	121.21	118.43
4	B	800	JK4	C10-C11-N12	2.63	118.53	111.60
2	B	750	HEM	CMD-C2D-C3D	2.65	126.06	114.35
2	A	750	HEM	CMD-C2D-C3D	2.66	126.13	114.35
3	B	760	H4B	C2-N1-C8A	2.68	120.56	114.54
4	B	800	JK4	C11-N12-C13	2.73	119.26	113.39
3	A	760	H4B	N2-C2-N3	2.82	121.87	117.20
4	A	800	JK4	F16-C14-C21	2.82	113.34	110.23
4	A	800	JK4	C11-N12-C13	3.13	120.12	113.39
2	A	750	HEM	C3B-C4B-CHC	3.19	127.66	123.16
4	A	800	JK4	F22-C22-C21	3.32	123.19	118.84
2	A	750	HEM	CMB-C2B-C3B	3.38	124.96	116.53
4	B	800	JK4	F23-C23-C24	3.50	126.44	118.47
4	A	800	JK4	F23-C23-C24	3.59	126.62	118.47
3	A	760	H4B	C4-N3-C2	3.66	121.01	115.94
3	A	760	H4B	C4A-C8A-N8	3.67	122.75	118.43
2	A	750	HEM	CAD-C3D-C4D	3.82	125.94	112.47
2	B	750	HEM	CMC-C2C-C3C	4.10	126.76	116.53
2	B	750	HEM	CAD-C3D-C4D	4.19	127.25	112.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	760	H4B	C4-N3-C2	4.32	121.94	115.94
3	A	760	H4B	C2-N1-C8A	4.35	124.33	114.54
2	B	750	HEM	CMB-C2B-C3B	4.59	127.98	116.53
2	B	750	HEM	CAD-C3D-C2D	5.10	127.88	113.22
2	A	750	HEM	CMC-C2C-C3C	5.17	129.45	116.53
4	B	800	JK4	F22-C22-C21	5.43	125.95	118.84
2	A	750	HEM	CAD-C3D-C2D	5.68	129.54	113.22
3	B	760	H4B	C4-C4A-C8A	6.29	120.26	114.56
4	A	800	JK4	C02-N01-C06	6.67	122.97	118.23
4	B	800	JK4	C02-N01-C06	7.64	123.66	118.23

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5 monomers are involved in 19 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	750	HEM	3	0
4	A	800	JK4	5	0
2	B	750	HEM	8	0
3	B	760	H4B	1	0
4	B	800	JK4	5	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	407/422 (96%)	0.90	63 (15%) 3 3	36, 65, 105, 134	0
1	B	411/422 (97%)	0.67	48 (11%) 6 7	33, 55, 83, 111	0
All	All	818/844 (96%)	0.79	111 (13%) 4 5	33, 59, 100, 134	0

All (111) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	488	PRO	9.6
1	B	300	PHE	6.6
1	A	715	VAL	6.1
1	B	351	LYS	6.0
1	A	351	LYS	5.9
1	B	350	THR	5.9
1	B	348	VAL	5.9
1	A	716	TRP	5.6
1	A	373	GLY	5.3
1	B	352	ASP	5.2
1	A	350	THR	4.6
1	B	619	ARG	4.3
1	A	300	PHE	4.3
1	B	718	GLY	4.3
1	A	713	THR	4.1
1	A	318	LEU	4.1
1	B	353	GLN	3.7
1	A	486	LYS	3.7
1	A	554	PHE	3.7
1	A	493	LEU	3.5
1	A	370	LYS	3.5
1	A	485	TYR	3.4
1	A	299	ARG	3.4
1	A	487	GLN	3.4

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Mol	Chain	Res	Type	RSRZ
1	B	677	VAL	3.3
1	B	680	VAL	3.3
1	A	385	ASN	3.3
1	A	355	PHE	3.3
1	A	494	GLY	3.2
1	A	352	ASP	3.1
1	B	479	LEU	3.1
1	A	469	LYS	3.1
1	A	381	LEU	3.0
1	A	389	GLU	3.0
1	A	714	HIS	3.0
1	A	676	TRP	3.0
1	B	591	THR	3.0
1	B	620	LYS	3.0
1	B	593	ILE	2.9
1	B	717	LYS	2.9
1	A	507	GLN	2.9
1	A	553	TRP	2.8
1	B	392	SER	2.8
1	A	706	TYR	2.8
1	A	415	CYS	2.8
1	A	503	GLU	2.8
1	A	536	ILE	2.8
1	B	349	ARG	2.7
1	A	678	TRP	2.7
1	B	442	ILE	2.7
1	B	480	ILE	2.7
1	B	567	VAL	2.7
1	A	388	ILE	2.7
1	A	479	LEU	2.7
1	B	443	CYS	2.7
1	A	712	ASN	2.6
1	B	446	VAL	2.6
1	A	504	ILE	2.6
1	B	564	LEU	2.5
1	A	677	VAL	2.5
1	B	541	VAL	2.5
1	A	480	ILE	2.5
1	A	680	VAL	2.5
1	B	552	ASP	2.4
1	A	533	LEU	2.4
1	A	492	THR	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	375	LYS	2.4
1	A	394	TYR	2.4
1	B	584	PHE	2.4
1	B	676	TRP	2.4
1	A	514	ARG	2.3
1	A	681	PRO	2.3
1	B	678	TRP	2.3
1	B	681	PRO	2.3
1	B	369	ILE	2.3
1	A	361	PHE	2.3
1	A	567	VAL	2.3
1	A	506	ILE	2.3
1	B	667	ARG	2.3
1	B	355	PHE	2.2
1	A	490	GLY	2.2
1	B	696	LEU	2.2
1	A	691	PHE	2.2
1	A	369	ILE	2.2
1	B	583	PRO	2.2
1	A	393	THR	2.2
1	A	390	SER	2.2
1	A	378	MET	2.2
1	B	616	LEU	2.2
1	B	492	THR	2.2
1	A	392	SER	2.2
1	A	446	VAL	2.2
1	B	690	VAL	2.2
1	B	474	VAL	2.1
1	B	566	ALA	2.1
1	B	691	PHE	2.1
1	A	491	SER	2.1
1	B	679	ILE	2.1
1	B	588	TYR	2.1
1	A	371	ARG	2.1
1	A	537	PRO	2.1
1	B	565	PRO	2.1
1	A	333	GLY	2.1
1	A	685	GLY	2.1
1	A	372	PHE	2.1
1	B	389	GLU	2.0
1	A	442	ILE	2.0
1	A	591	THR	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	613	LYS	2.0
1	B	706	TYR	2.0
1	B	715	VAL	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
4	JK4	A	800	30/30	0.75	0.31	3.62	73,90,96,96	0
4	JK4	B	800	30/30	0.72	0.28	2.98	61,68,73,78	0
2	HEM	A	750	43/43	0.97	0.21	1.68	37,45,59,67	0
2	HEM	B	750	43/43	0.98	0.20	0.92	38,45,55,59	0
3	H4B	B	760	17/17	0.93	0.21	0.44	39,44,51,54	0
3	H4B	A	760	17/17	0.91	0.18	0.18	45,52,58,58	0
5	ACT	B	860	4/4	0.95	0.12	-0.29	67,68,68,69	0
6	ZN	A	900	1/1	0.99	0.12	-0.74	56,56,56,56	0
5	ACT	A	860	4/4	0.96	0.12	-1.04	67,67,68,68	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.