



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 05:52 PM GMT

PDB ID : 4JSK
Title : Structure of bovine endothelial nitric oxide synthase heme domain in complex with 6,6'-(pentane-1,5-diyl)bis(4-methylpyridin-2-amine)
Authors : Li, H.; Poulos, T.L.
Deposited on : 2013-03-22
Resolution : 2.28 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
A user guide is available at
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

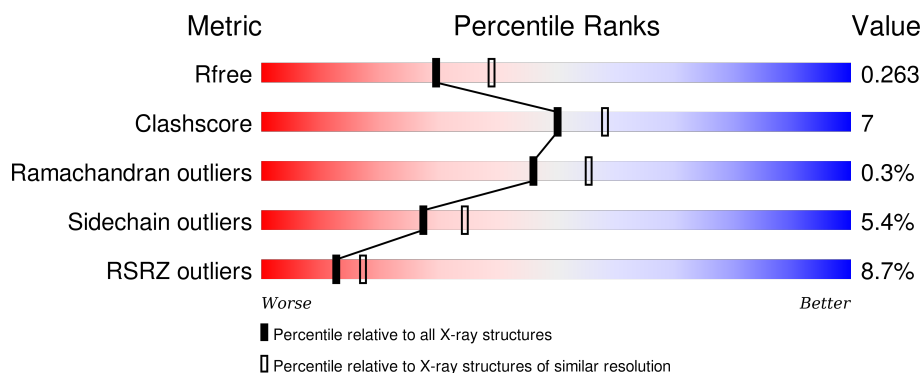
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.28 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	5193 (2.30-2.26)
Clashscore	102246	5929 (2.30-2.26)
Ramachandran outliers	100387	5851 (2.30-2.26)
Sidechain outliers	100360	5850 (2.30-2.26)
RSRZ outliers	91569	5204 (2.30-2.26)

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 ≥ 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	443	<div> <div>8%</div> <div>79%</div> <div>11%</div> <div>9%</div> </div>
1	B	443	<div> <div>7%</div> <div>75%</div> <div>14%</div> <div>9%</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
5	ACT	A	504	-	-	-	X
5	ACT	A	505	-	-	-	X
5	ACT	B	504	-	-	-	X
6	GOL	A	506	-	-	-	X
6	GOL	B	506	-	-	-	X

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 6769 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, endothelial.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	404	Total	As	C	N	O	S	0	0	0
			3212	1	2043	564	588	16			
1	B	404	Total	As	C	N	O	S	0	0	0
			3221	1	2048	568	588	16			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	100	ARG	CYS	CONFLICT	UNP P29473
B	100	ARG	CYS	CONFLICT	UNP P29473

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



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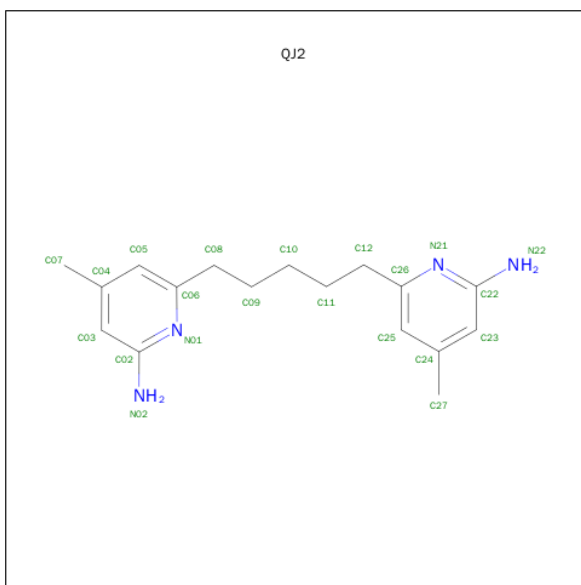
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- 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 6,6'-PENTANE-1,5-DIYLBIS(4-METHYLPYRIDIN-2-AMINE) (three-letter code: QJ2) (formula: $C_{17}H_{24}N_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	N	0	0
			21	17	4		
4	B	1	Total	C	N	0	0
			21	17	4		

- 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	A	1	Total	C	O	0	0
			4	2	2		

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

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			6	3	3		
6	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 7 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

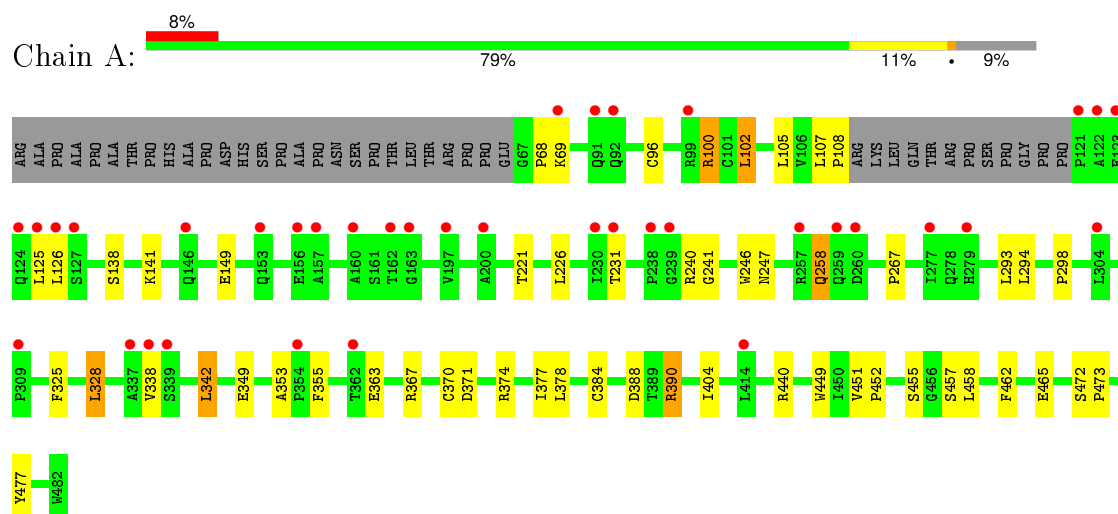
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	65	Total	O	0	0
			65	65		
8	B	80	Total	O	0	0
			80	80		

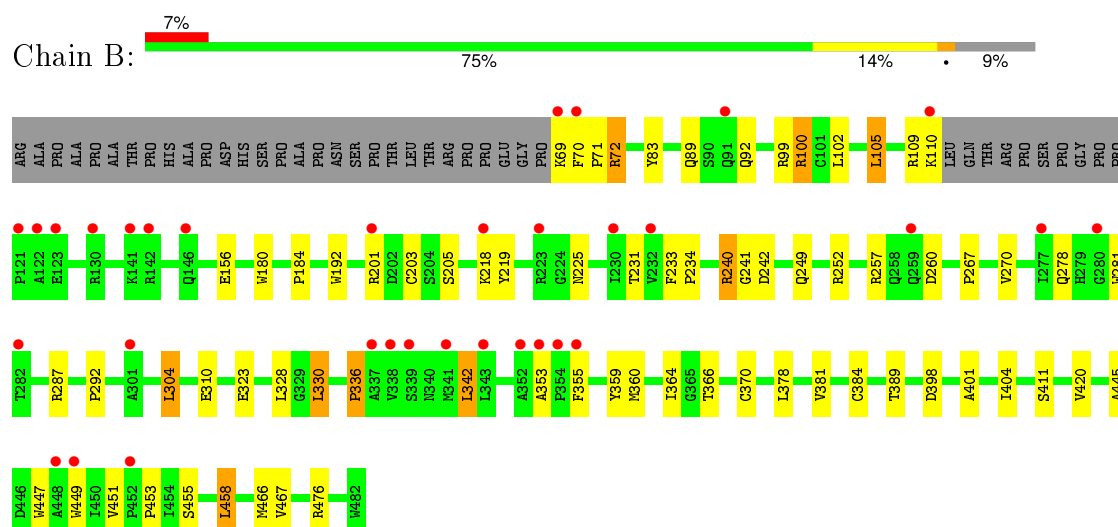
3 Residue-property plots

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, endothelial



- Molecule 1: Nitric oxide synthase, endothelial



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	58.43Å 106.57Å 156.97Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.90 – 2.28 42.90 – 2.28	Depositor EDS
% Data completeness (in resolution range)	98.7 (42.90-2.28) 98.7 (42.90-2.28)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	0.05	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.33 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.205 , 0.258 0.217 , 0.263	Depositor DCC
R_{free} test set	2254 reflections (5.27%)	DCC
Wilson B-factor (Å ²)	49.1	Xtriage
Anisotropy	0.744	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 42.5	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 45135 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6769	wwPDB-VP
Average B, all atoms (Å ²)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.75% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, ZN, H4B, CAS, ACT, HEM, QJ2

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	0.72	0/3292	0.75	1/4483 (0.0%)
1	B	0.76	1/3300 (0.0%)	0.78	1/4491 (0.0%)
All	All	0.74	1/6592 (0.0%)	0.76	2/8974 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	203	CYS	CB-SG	-5.31	1.73	1.81

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	242	ASP	CB-CG-OD1	5.94	123.64	118.30
1	A	440	ARG	NE-CZ-NH2	5.29	122.94	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	3212	0	3114	37	0
1	B	3221	0	3130	50	0
2	A	43	0	30	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	43	0	30	6	0
3	A	17	0	15	2	0
3	B	17	0	15	1	0
4	A	21	0	24	2	0
4	B	21	0	24	1	0
5	A	8	0	6	0	0
5	B	8	0	6	0	0
6	A	6	0	8	0	0
6	B	6	0	8	0	0
7	A	1	0	0	0	0
8	A	65	0	0	2	0
8	B	80	0	0	7	0
All	All	6769	0	6410	91	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 (91) 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:B:384:CAS:AS	1:B:384:CAS:SG	2.58	1.22
1:A:384:CAS:AS	1:A:384:CAS:SG	2.62	1.17
2:B:501:HEM:HMC1	2:B:501:HEM:HBC2	1.62	0.82
2:B:501:HEM:HBC2	2:B:501:HEM:CMC	2.13	0.77
1:B:72:ARG:HG3	1:B:83:TYR:CE2	2.25	0.71
1:A:246:TRP:HB2	1:A:294:LEU:HB3	1.77	0.67
1:A:388:ASP:OD1	1:A:390:ARG:HG3	1.95	0.67
1:B:330:LEU:HB2	8:B:609:HOH:O	1.98	0.63
1:B:366:THR:O	1:B:370:CYS:HB2	2.00	0.61
2:A:501:HEM:HBB2	2:A:501:HEM:HHC	1.82	0.61
1:A:240:ARG:HD3	1:A:298:PRO:HB3	1.81	0.61
1:B:449:TRP:HA	3:B:502:H4B:N1	2.16	0.60
1:A:231:THR:O	1:A:353:ALA:HA	2.02	0.60
1:B:453:PRO:HG3	8:B:652:HOH:O	2.03	0.59
2:B:501:HEM:HBB2	2:B:501:HEM:HHC	1.85	0.59
1:B:72:ARG:HG3	1:B:83:TYR:HE2	1.68	0.58
1:B:455:SER:HB3	1:B:458:LEU:HD22	1.85	0.58
2:B:501:HEM:HMC1	2:B:501:HEM:CBC	2.31	0.58
2:B:501:HEM:C1C	4:B:503:QJ2:H24	2.39	0.58
1:B:359:TYR:CD2	1:B:364:ILE:HD11	2.41	0.55
1:A:363:GLU:OE1	4:A:503:QJ2:N01	2.40	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:342:LEU:HD11	1:A:349:GLU:HB3	1.87	0.55
1:B:281:TRP:HB2	1:B:304:LEU:HD11	1.89	0.55
1:A:258:GLN:HA	1:A:258:GLN:HE21	1.72	0.55
1:A:457:SER:HA	1:A:462:PHE:CG	2.43	0.54
1:A:68:PRO:O	1:B:109:ARG:NH2	2.40	0.54
1:A:378:LEU:HB2	8:A:602:HOH:O	2.07	0.53
1:A:370:CYS:SG	1:A:378:LEU:HD13	2.50	0.52
1:B:267:PRO:O	1:B:270:VAL:HG23	2.08	0.52
1:A:240:ARG:HD3	1:A:241:GLY:O	2.10	0.52
8:A:644:HOH:O	1:B:109:ARG:HG2	2.10	0.52
1:A:465:GLU:HB3	1:B:105:LEU:HD22	1.91	0.51
1:B:240:ARG:HD2	1:B:241:GLY:O	2.11	0.51
1:A:458:LEU:HD21	1:B:401:ALA:CB	2.41	0.51
1:B:233:PHE:HB3	1:B:234:PRO:CD	2.41	0.50
1:A:258:GLN:HA	1:A:258:GLN:NE2	2.27	0.50
1:A:267:PRO:HD2	1:A:374:ARG:HA	1.93	0.50
1:A:458:LEU:HD21	1:B:401:ALA:HB2	1.94	0.49
1:B:304:LEU:C	1:B:304:LEU:HD23	2.32	0.49
1:B:360:MET:HA	1:B:420:VAL:O	2.12	0.49
2:A:501:HEM:O1A	3:A:502:H4B:N3	2.43	0.48
1:B:72:ARG:HB3	1:B:72:ARG:HH11	1.77	0.48
1:B:342:LEU:HD23	1:B:342:LEU:C	2.34	0.48
1:B:72:ARG:CG	1:B:83:TYR:CE2	2.96	0.47
1:B:72:ARG:CB	1:B:72:ARG:HH11	2.27	0.47
1:A:451:VAL:HA	1:A:452:PRO:HD3	1.81	0.47
1:B:72:ARG:NH1	1:B:72:ARG:HB3	2.30	0.47
1:B:384:CAS:AS	1:B:384:CAS:CB	3.22	0.46
1:B:355:PHE:CD1	2:B:501:HEM:CAC	2.98	0.46
1:B:455:SER:HB3	1:B:458:LEU:CD2	2.45	0.46
1:B:384:CAS:CE2	1:B:384:CAS:SG	3.04	0.46
1:B:70:PHE:HA	1:B:71:PRO:HD2	1.67	0.46
1:A:102:LEU:CD1	1:B:467:VAL:HG13	2.45	0.46
1:B:447:TRP:CZ2	1:B:451:VAL:HG21	2.51	0.46
1:A:377:ILE:HD11	1:A:404:ILE:HD13	1.98	0.46
1:A:477:TYR:OH	2:A:501:HEM:O1D	2.28	0.45
1:B:447:TRP:CE2	1:B:451:VAL:HG21	2.51	0.45
1:A:325:PHE:HA	1:A:328:LEU:HD22	1.97	0.45
1:B:231:THR:O	1:B:353:ALA:HA	2.16	0.45
1:B:184:PRO:HD2	8:B:602:HOH:O	2.15	0.45
1:B:445:ALA:HB3	1:B:466:MET:HB3	1.97	0.45
1:A:107:LEU:HA	1:A:108:PRO:HD2	1.84	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:310:GLU:OE1	1:B:310:GLU:N	2.50	0.44
1:B:455:SER:N	8:B:672:HOH:O	2.50	0.44
1:A:367:ARG:NH2	1:A:371:ASP:OD2	2.46	0.44
1:A:472:SER:HA	1:A:473:PRO:C	2.38	0.44
1:A:100:ARG:NH1	1:A:102:LEU:HD22	2.33	0.44
1:A:221:THR:O	1:A:226:LEU:HD12	2.18	0.44
1:A:258:GLN:HE21	1:A:258:GLN:CA	2.31	0.43
1:B:381:VAL:HG21	1:B:404:ILE:HD11	2.00	0.43
2:A:501:HEM:CBB	2:A:501:HEM:HHC	2.46	0.43
1:A:388:ASP:OD1	1:A:390:ARG:CG	2.64	0.43
1:B:370:CYS:SG	1:B:378:LEU:HD13	2.59	0.43
2:A:501:HEM:C1C	4:A:503:QJ2:H24	2.54	0.43
1:B:336:PRO:HB3	1:B:359:TYR:CZ	2.54	0.42
1:B:281:TRP:CE2	1:B:292:PRO:HD3	2.55	0.42
1:A:138:SER:O	1:A:141:LYS:HD3	2.20	0.42
1:A:449:TRP:HA	3:A:502:H4B:N1	2.35	0.42
1:A:355:PHE:CD1	2:A:501:HEM:HAC	2.55	0.42
1:B:99:ARG:HG2	1:B:100:ARG:HD2	2.01	0.42
1:B:219:TYR:CD2	1:B:219:TYR:C	2.93	0.42
1:A:96:CYS:HB2	8:B:610:HOH:O	2.19	0.41
1:B:328:LEU:O	1:B:330:LEU:HD13	2.19	0.41
1:A:338:VAL:HB	1:A:355:PHE:CZ	2.55	0.41
1:A:455:SER:O	1:A:458:LEU:HB2	2.20	0.41
1:B:180:TRP:CE3	1:B:192:TRP:HA	2.56	0.41
1:B:205:SER:HB2	8:B:603:HOH:O	2.20	0.41
1:B:233:PHE:HB3	1:B:234:PRO:HD2	2.03	0.41
1:B:201:ARG:HB3	8:B:660:HOH:O	2.21	0.41
1:B:249:GLN:HB2	1:B:252:ARG:HD2	2.03	0.40
1:A:240:ARG:CD	1:A:241:GLY:O	2.69	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	399/443 (90%)	383 (96%)	16 (4%)	0	100	100
1	B	399/443 (90%)	372 (93%)	25 (6%)	2 (0%)	34	39
All	All	798/886 (90%)	755 (95%)	41 (5%)	2 (0%)	46	55

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	260	ASP
1	B	336	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	342/375 (91%)	329 (96%)	13 (4%)	40	53
1	B	343/375 (92%)	319 (93%)	24 (7%)	19	22
All	All	685/750 (91%)	648 (95%)	37 (5%)	27	34

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	69	LYS
1	A	100	ARG
1	A	102	LEU
1	A	105	LEU
1	A	125	LEU
1	A	126	LEU
1	A	149	GLU
1	A	247	ASN
1	A	258	GLN
1	A	293	LEU
1	A	328	LEU
1	A	342	LEU
1	A	390	ARG
1	B	69	LYS

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Mol	Chain	Res	Type
1	B	72	ARG
1	B	89	GLN
1	B	92	GLN
1	B	100	ARG
1	B	102	LEU
1	B	105	LEU
1	B	110	LYS
1	B	156	GLU
1	B	218	LYS
1	B	225	ASN
1	B	240	ARG
1	B	257	ARG
1	B	278	GLN
1	B	287	ARG
1	B	304	LEU
1	B	323	GLU
1	B	330	LEU
1	B	342	LEU
1	B	389	THR
1	B	398	ASP
1	B	411	SER
1	B	458	LEU
1	B	476	ARG

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	146	GLN
1	A	166	HIS
1	A	191	GLN
1	A	258	GLN
1	A	376	ASN
1	A	468	ASN
1	B	92	GLN
1	B	178	GLN
1	B	191	GLN
1	B	222	ASN
1	B	225	ASN
1	B	259	GLN
1	B	376	ASN
1	B	405	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	CAS	A	384	1	5,8,9	1.15	0	2,9,11	1.31	0
1	CAS	B	384	1	5,8,9	1.13	0	2,9,11	1.46	1 (50%)

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
1	CAS	A	384	1	-	0/0/7/9	0/0/0/0
1	CAS	B	384	1	-	0/0/7/9	0/0/0/0

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	384	CAS	O-C-CA	-2.07	120.10	125.49

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	384	CAS	1	0
1	B	384	CAS	3	0

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 1 is monoatomic - leaving 12 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	501	1	30,50,50	1.83	7 (23%)	24,82,82	2.60	10 (41%)
3	H4B	A	502	-	13,18,18	0.86	0	11,26,26	2.56	6 (54%)
4	QJ2	A	503	-	22,22,22	0.92	1 (4%)	29,29,29	2.30	9 (31%)
5	ACT	A	504	-	1,3,3	0.69	0	0,3,3	0.00	-
5	ACT	A	505	-	1,3,3	1.95	0	0,3,3	0.00	-
6	GOL	A	506	-	5,5,5	0.36	0	5,5,5	0.47	0
2	HEM	B	501	1	30,50,50	2.01	8 (26%)	24,82,82	2.59	12 (50%)
3	H4B	B	502	-	13,18,18	0.79	0	11,26,26	2.43	5 (45%)
4	QJ2	B	503	-	22,22,22	0.68	0	29,29,29	1.66	7 (24%)
5	ACT	B	504	-	1,3,3	0.75	0	0,3,3	0.00	-
5	ACT	B	505	-	1,3,3	1.41	0	0,3,3	0.00	-
6	GOL	B	506	-	5,5,5	0.33	0	5,5,5	0.49	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	501	1	-	0/10/54/54	0/0/8/8

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	H4B	A	502	-	-	0/8/17/17	0/2/2/2
4	QJ2	A	503	-	-	0/8/8/8	0/2/2/2
5	ACT	A	504	-	-	0/0/0/0	0/0/0/0
5	ACT	A	505	-	-	0/0/0/0	0/0/0/0
6	GOL	A	506	-	-	0/4/4/4	0/0/0/0
2	HEM	B	501	1	-	0/10/54/54	0/0/8/8
3	H4B	B	502	-	-	0/8/17/17	0/2/2/2
4	QJ2	B	503	-	-	0/8/8/8	0/2/2/2
5	ACT	B	504	-	-	0/0/0/0	0/0/0/0
5	ACT	B	505	-	-	0/0/0/0	0/0/0/0
6	GOL	B	506	-	-	0/4/4/4	0/0/0/0

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	HEM	C3B-C4B	-5.78	1.46	1.51
2	B	501	HEM	C3D-C4D	-5.06	1.45	1.51
2	B	501	HEM	C3B-C4B	-4.76	1.47	1.51
2	B	501	HEM	C2C-C1C	-4.31	1.44	1.52
2	A	501	HEM	C2C-C1C	-3.29	1.46	1.52
2	A	501	HEM	C3D-C4D	-2.86	1.47	1.51
2	A	501	HEM	C2B-C1B	-2.49	1.43	1.51
2	B	501	HEM	CMA-C3A	2.02	1.55	1.51
2	B	501	HEM	CAA-C2A	2.12	1.55	1.52
2	B	501	HEM	FE-NC	2.15	2.04	1.95
2	A	501	HEM	C1C-NC	2.15	1.38	1.36
2	A	501	HEM	CAA-C2A	2.23	1.55	1.52
2	A	501	HEM	C3C-CAC	2.34	1.55	1.51
2	B	501	HEM	C1C-NC	2.37	1.38	1.36
4	A	503	QJ2	C03-C04	2.42	1.43	1.38
2	B	501	HEM	C3B-CAB	2.72	1.56	1.51

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	HEM	CBA-CAA-C2A	-4.61	104.26	112.53
2	B	501	HEM	C3C-CAC-CBC	-4.59	117.41	124.46
2	B	501	HEM	CBA-CAA-C2A	-4.59	104.31	112.53
3	A	502	H4B	N3-C2-N1	-4.06	118.88	125.53
3	B	502	H4B	N3-C2-N1	-3.83	119.25	125.53
2	A	501	HEM	C3B-CAB-CBB	-3.50	119.08	124.46
4	A	503	QJ2	C07-C04-C05	-3.23	116.05	120.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	503	QJ2	C05-C06-N01	-3.21	119.33	122.96
2	B	501	HEM	CBD-CAD-C3D	-2.97	104.92	113.55
4	A	503	QJ2	C24-C25-C26	-2.77	118.54	120.28
4	A	503	QJ2	C25-C26-N21	-2.52	120.12	122.96
4	B	503	QJ2	C25-C26-N21	-2.36	120.30	122.96
4	A	503	QJ2	C10-C09-C08	-2.36	103.94	113.90
4	B	503	QJ2	C10-C09-C08	-2.34	104.02	113.90
4	A	503	QJ2	C11-C12-C26	-2.13	105.30	112.79
2	B	501	HEM	C4B-CHC-C1C	-2.10	122.31	125.82
3	A	502	H4B	N2-C2-N1	2.16	120.78	117.20
2	A	501	HEM	C3B-C4B-CHC	2.18	126.24	123.16
2	A	501	HEM	C2D-C3D-C4D	2.19	105.22	101.50
4	B	503	QJ2	C08-C06-C05	2.20	124.21	121.13
3	B	502	H4B	C2-N1-C8A	2.21	119.50	114.54
4	B	503	QJ2	C12-C26-N21	2.29	119.07	115.69
3	B	502	H4B	N2-C2-N1	2.48	121.30	117.20
4	B	503	QJ2	C09-C08-C06	2.55	121.75	112.79
3	A	502	H4B	C4A-C8A-N8	2.57	121.46	118.43
4	B	503	QJ2	C02-N01-C06	2.60	120.07	118.23
2	B	501	HEM	C2C-C1C-CHC	2.60	127.63	123.68
2	A	501	HEM	CMD-C2D-C3D	2.62	125.95	114.35
2	B	501	HEM	CMD-C2D-C3D	2.64	126.02	114.35
3	A	502	H4B	C4-C4A-C8A	2.78	117.08	114.56
2	B	501	HEM	CAA-CBA-CGA	2.80	117.88	112.75
4	A	503	QJ2	C09-C08-C06	2.86	122.86	112.79
3	A	502	H4B	C2-N1-C8A	3.05	121.39	114.54
2	A	501	HEM	C2C-C1C-CHC	3.07	128.35	123.68
3	B	502	H4B	C4-C4A-C8A	3.24	117.50	114.56
2	B	501	HEM	CMC-C2C-C3C	3.36	124.92	116.53
2	B	501	HEM	C2D-C3D-C4D	3.52	107.47	101.50
2	B	501	HEM	CAD-C3D-C2D	3.64	123.69	113.22
2	B	501	HEM	CMB-C2B-C3B	3.72	125.81	116.53
2	A	501	HEM	CMC-C2C-C3C	4.04	126.61	116.53
2	A	501	HEM	CAD-C3D-C4D	4.11	126.96	112.47
3	A	502	H4B	C4-N3-C2	4.60	122.33	115.94
2	B	501	HEM	CAD-C3D-C4D	4.64	128.82	112.47
3	B	502	H4B	C4-N3-C2	4.69	122.44	115.94
4	B	503	QJ2	C22-N21-C26	4.79	121.63	118.23
2	A	501	HEM	CAD-C3D-C2D	5.08	127.82	113.22
2	A	501	HEM	CMB-C2B-C3B	5.36	129.91	116.53
4	A	503	QJ2	C22-N21-C26	5.85	122.39	118.23
4	A	503	QJ2	C02-N01-C06	6.75	123.03	118.23

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

6 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	HEM	6	0
3	A	502	H4B	2	0
4	A	503	QJ2	2	0
2	B	501	HEM	6	0
3	B	502	H4B	1	0
4	B	503	QJ2	1	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, 95th 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 ²)	Q<0.9
1	A	403/443 (90%)	0.39	37 (9%) 11 15	35, 55, 81, 99	0
1	B	403/443 (90%)	0.38	33 (8%) 14 19	37, 56, 85, 103	0
All	All	806/886 (90%)	0.38	70 (8%) 13 17	35, 56, 83, 103	0

All (70) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	259	GLN	6.5
1	B	121	PRO	5.8
1	A	239	GLY	5.8
1	A	126	LEU	4.3
1	B	122	ALA	4.2
1	A	160	ALA	4.1
1	A	122	ALA	3.9
1	A	91	GLN	3.7
1	B	259	GLN	3.7
1	A	127	SER	3.6
1	A	338	VAL	3.6
1	B	277	ILE	3.5
1	A	123	GLU	3.4
1	A	163	GLY	3.2
1	B	280	GLY	3.2
1	B	123	GLU	3.1
1	B	338	VAL	3.1
1	A	157	ALA	3.0
1	B	339	SER	3.0
1	A	92	GLN	2.9
1	B	352	ALA	2.8
1	B	353	ALA	2.8
1	A	354	PRO	2.8
1	B	146	GLN	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	69	LYS	2.8
1	A	304	LEU	2.7
1	A	156	GLU	2.7
1	A	146	GLN	2.7
1	B	341	MET	2.6
1	B	301	ALA	2.6
1	A	197	VAL	2.6
1	A	337	ALA	2.5
1	B	337	ALA	2.5
1	A	238	PRO	2.4
1	A	124	GLN	2.4
1	B	201	ARG	2.4
1	A	99	ARG	2.4
1	A	121	PRO	2.4
1	B	141	LYS	2.4
1	B	232	VAL	2.3
1	A	153	GLN	2.3
1	A	231	THR	2.3
1	A	309	PRO	2.3
1	A	230	ILE	2.3
1	A	162	THR	2.3
1	B	110	LYS	2.3
1	A	414	LEU	2.3
1	B	69	LYS	2.3
1	B	223	ARG	2.3
1	A	257	ARG	2.3
1	B	452	PRO	2.2
1	B	282	THR	2.2
1	A	362	THR	2.2
1	A	339	SER	2.2
1	B	448	ALA	2.2
1	B	142	ARG	2.2
1	B	354	PRO	2.2
1	A	125	LEU	2.2
1	B	130	ARG	2.1
1	B	230	ILE	2.1
1	A	200	ALA	2.1
1	A	279	HIS	2.1
1	B	91	GLN	2.1
1	B	355	PHE	2.1
1	B	343	LEU	2.1
1	A	260	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	218	LYS	2.1
1	B	449	TRP	2.0
1	A	277	ILE	2.0
1	B	70	PHE	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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, 95th 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 ²)	Q<0.9
1	CAS	A	384	9/10	0.96	0.09	-	59,60,93,94	0
1	CAS	B	384	9/10	0.96	0.11	-	70,72,98,98	0

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, 95th 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 ²)	Q<0.9
5	ACT	A	504	4/4	0.98	0.25	8.40	60,62,62,64	0
5	ACT	A	505	4/4	0.96	0.28	4.23	51,56,56,56	0
6	GOL	A	506	6/6	0.86	0.31	4.02	80,82,82,84	0
5	ACT	B	504	4/4	0.95	0.17	3.22	61,61,62,62	0
6	GOL	B	506	6/6	0.91	0.28	2.56	68,70,71,72	0
4	QJ2	A	503	21/21	0.91	0.28	1.97	37,52,77,78	0
5	ACT	B	505	4/4	0.98	0.23	1.60	48,49,50,50	0
4	QJ2	B	503	21/21	0.90	0.27	1.18	40,49,62,63	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
3	H4B	B	502	17/17	0.97	0.20	0.61	39,44,47,49	0
2	HEM	A	501	43/43	0.97	0.18	0.38	33,42,53,60	0
3	H4B	A	502	17/17	0.97	0.17	0.37	43,47,50,53	0
2	HEM	B	501	43/43	0.98	0.18	0.36	36,43,53,56	0
7	ZN	A	507	1/1	0.99	0.09	-1.13	48,48,48,48	0

6.5 Other polymers [i](#)

There are no such residues in this entry.