



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 9, 2017 – 06:36 PM EDT

PDB ID : 2ISA
Title : Crystal Structure of Vibrio salmonicida catalase
Authors : Riise, E.K.; Lorentzen, M.S.; Helland, R.; Smalas, A.O.; Leiros, H.K.S.; Willassen, N.P.
Deposited on : unknown
Resolution : 1.97 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 : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20030345
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) : rb-20030345

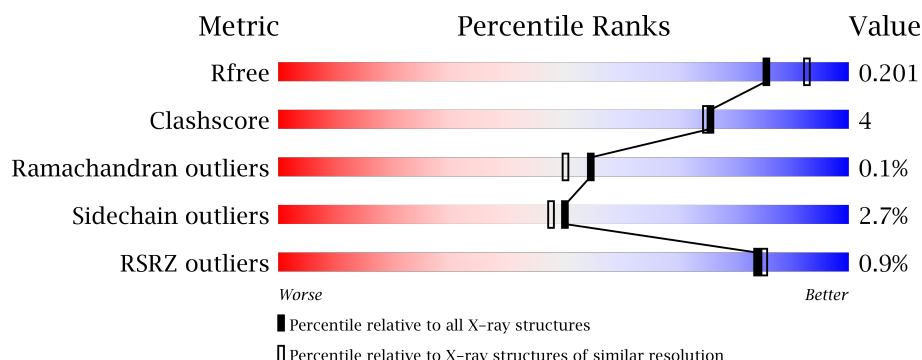
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.97 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.




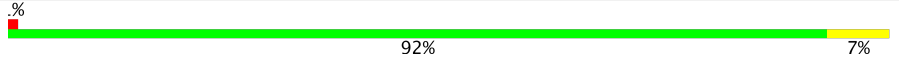
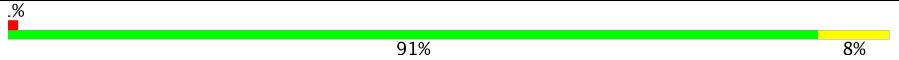
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	100719	9293 (2.00-1.96)
Clashscore	112137	10621 (2.00-1.96)
Ramachandran outliers	110173	10502 (2.00-1.96)
Sidechain outliers	110143	10501 (2.00-1.96)
RSRZ outliers	101464	9395 (2.00-1.96)

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	483	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 1%, green 98%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> 92% 8% </div> </div>
1	B	483	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 1%, green 98%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> 91% 9% </div> </div>
1	C	483	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 1%, green 98%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> 90% 9% </div> </div>
1	D	483	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 1%, green 98%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> 89% 10% </div> </div>
1	E	483	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 1%, green 98%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> 93% 6% </div> </div>

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Mol	Chain	Length	Quality of chain
1	F	483	
1	G	483	
1	H	483	

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	GOL	A	5489	-	-	-	X
3	GOL	B	5490	-	-	-	X
3	GOL	C	5487	-	-	-	X
3	GOL	D	5488	-	-	-	X
3	GOL	E	5493	-	-	-	X
3	GOL	G	5491	-	-	-	X
3	GOL	H	5492	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 35944 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 Catalase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	482	Total	C	N	O	S	0	3	0
			3871	2443	688	728	12			
1	B	482	Total	C	N	O	S	3	3	0
			3869	2442	688	727	12			
1	C	482	Total	C	N	O	S	3	3	0
			3869	2442	688	727	12			
1	D	482	Total	C	N	O	S	11	3	0
			3869	2442	688	727	12			
1	E	482	Total	C	N	O	S	6	2	0
			3868	2442	688	726	12			
1	F	482	Total	C	N	O	S	11	3	0
			3869	2442	688	727	12			
1	G	482	Total	C	N	O	S	7	2	0
			3868	2442	688	726	12			
1	H	482	Total	C	N	O	S	7	3	0
			3871	2443	688	728	12			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	53	OMT	MET	MODIFIED RESIDUE	UNP Q3LSM1
B	53	OMT	MET	MODIFIED RESIDUE	UNP Q3LSM1
C	53	OMT	MET	MODIFIED RESIDUE	UNP Q3LSM1
D	53	OMT	MET	MODIFIED RESIDUE	UNP Q3LSM1
E	53	OMT	MET	MODIFIED RESIDUE	UNP Q3LSM1
F	53	OMT	MET	MODIFIED RESIDUE	UNP Q3LSM1
G	53	OMT	MET	MODIFIED RESIDUE	UNP Q3LSM1
H	53	OMT	MET	MODIFIED RESIDUE	UNP Q3LSM1

- 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 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
2	C	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	D	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	E	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	F	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	G	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	H	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	D	1	Total	C	O	0	0
			6	3	3		
3	E	1	Total	C	O	0	0
			6	3	3		
3	F	1	Total	C	O	0	0
			6	3	3		
3	G	1	Total	C	O	0	0
			6	3	3		
3	H	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	H	1	Total	Cl	0	0
			1	1		
4	B	1	Total	Cl	0	0
			1	1		
4	D	1	Total	Cl	0	0
			1	1		
4	F	1	Total	Cl	0	0
			1	1		

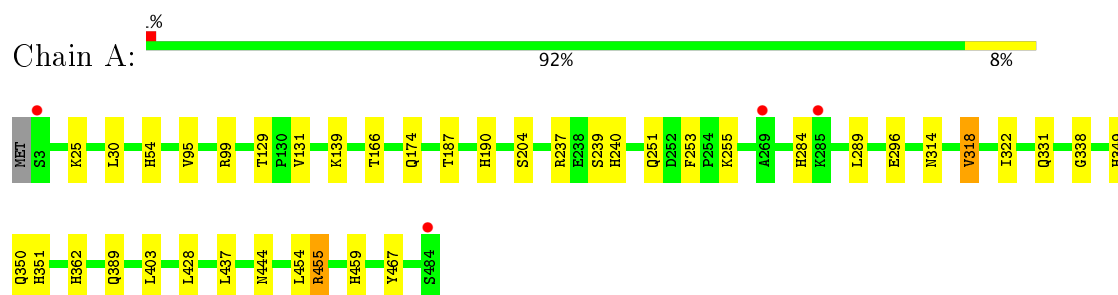
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	578	Total O 578 578	0	0
5	B	611	Total O 611 611	0	0
5	C	588	Total O 588 588	0	0
5	D	609	Total O 609 609	0	0
5	E	541	Total O 541 541	0	0
5	F	543	Total O 543 543	0	0
5	G	556	Total O 556 556	0	0
5	H	568	Total O 568 568	0	0

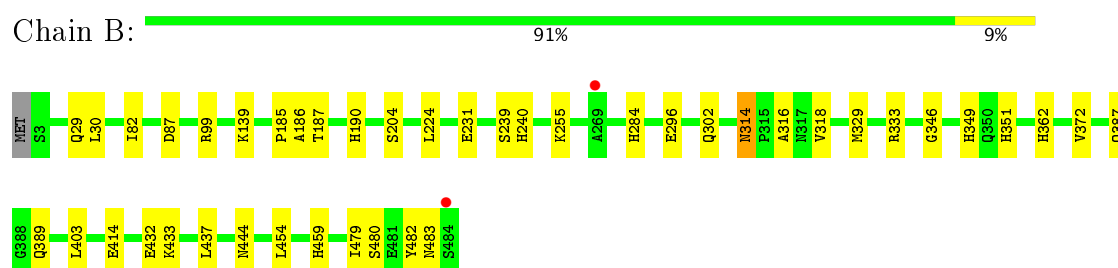
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes 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.

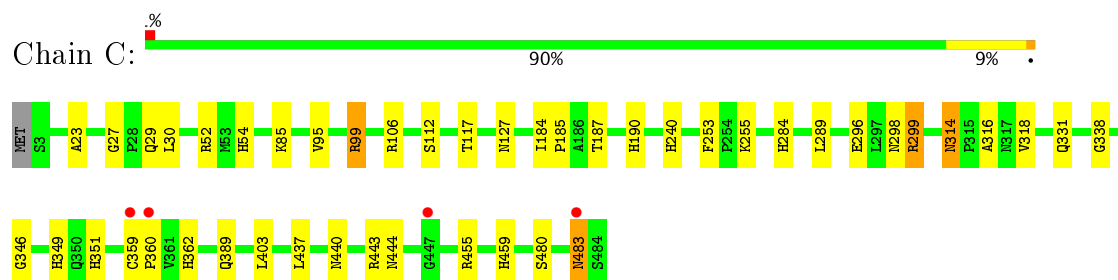
• Molecule 1: Catalase



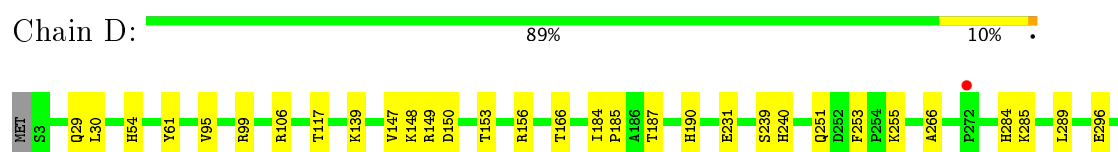
• Molecule 1: Catalase

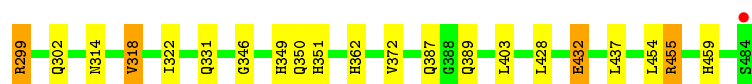


• Molecule 1: Catalase

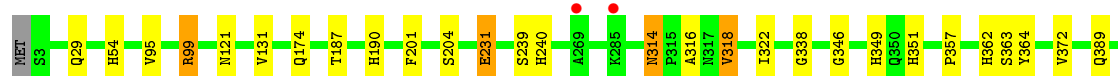


• Molecule 1: Catalase

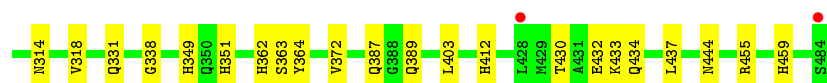
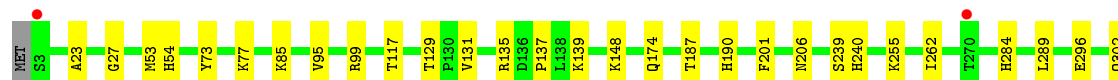
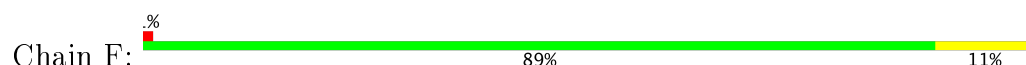




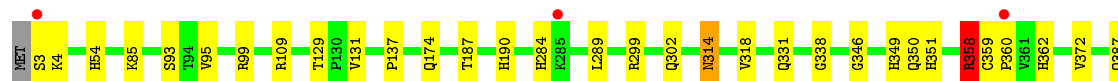
• Molecule 1: Catalase



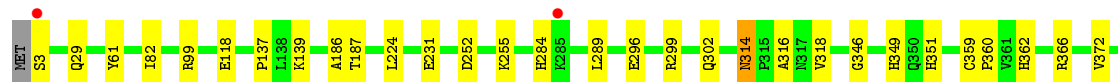
• Molecule 1: Catalase



• Molecule 1: Catalase



• Molecule 1: Catalase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	98.15Å 217.76Å 99.28Å 90.00° 110.48° 90.00°	Depositor
Resolution (Å)	20.00 – 1.97 19.93 – 1.97	Depositor EDS
% Data completeness (in resolution range)	96.5 (20.00-1.97) 96.5 (19.93-1.97)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.05 (at 1.96Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.148 , 0.200 0.148 , 0.201	Depositor DCC
R_{free} test set	13379 reflections (5.30%)	DCC
Wilson B-factor (Å ²)	13.4	Xtriage
Anisotropy	0.049	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.42 , 71.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.027 for l,-k,h	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	35944	wwPDB-VP
Average B, all atoms (Å ²)	14.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.79% 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, 0.333 respectively for untwinned datasets, and 0.375, 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: GOL, CL, HEM, OMT

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	0.52	0/3989	0.63	2/5411 (0.0%)
1	B	0.54	1/3987 (0.0%)	0.61	0/5408
1	C	0.65	1/3987 (0.0%)	1.09	5/5408 (0.1%)
1	D	0.52	1/3987 (0.0%)	0.63	3/5408 (0.1%)
1	E	0.71	1/3981 (0.0%)	0.68	3/5400 (0.1%)
1	F	0.50	1/3987 (0.0%)	0.63	3/5408 (0.1%)
1	G	1.30	4/3981 (0.1%)	0.80	9/5400 (0.2%)
1	H	0.55	1/3989 (0.0%)	0.66	4/5411 (0.1%)
All	All	0.71	10/31888 (0.0%)	0.73	29/43254 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1
1	E	0	1
1	G	0	1
All	All	0	3

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	358	ARG	CZ-NH1	67.58	2.21	1.33
1	E	231	GLU	CD-OE1	31.67	1.60	1.25
1	C	299	ARG	NE-CZ	-24.75	1.00	1.33
1	G	358	ARG	NE-CZ	24.29	1.64	1.33
1	G	358	ARG	CZ-NH2	21.48	1.60	1.33
1	H	231	GLU	CG-CD	11.56	1.69	1.51
1	G	302	GLN	CG-CD	-7.61	1.33	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	231	GLU	CG-CD	7.31	1.62	1.51
1	F	302	GLN	CG-CD	-6.54	1.35	1.51
1	D	231	GLU	CG-CD	5.42	1.60	1.51

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	299	ARG	NE-CZ-NH1	-48.48	96.06	120.30
1	C	299	ARG	NE-CZ-NH2	41.48	141.04	120.30
1	E	231	GLU	OE1-CD-OE2	-23.53	95.07	123.30
1	G	358	ARG	NH1-CZ-NH2	-23.48	93.57	119.40
1	C	299	ARG	CD-NE-CZ	17.39	147.94	123.60
1	G	358	ARG	NE-CZ-NH1	17.04	128.82	120.30
1	G	358	ARG	NE-CZ-NH2	15.77	128.19	120.30
1	F	302	GLN	CG-CD-OE1	-11.00	99.61	121.60
1	F	302	GLN	CB-CG-CD	10.48	138.86	111.60
1	G	302	GLN	CB-CG-CD	10.48	138.84	111.60
1	G	302	GLN	CG-CD-OE1	-10.17	101.25	121.60
1	H	99[A]	ARG	C-N-CA	-9.72	101.88	122.30
1	H	99[B]	ARG	C-N-CA	-9.72	101.88	122.30
1	F	302	GLN	CG-CD-NE2	8.76	137.72	116.70
1	G	358	ARG	CD-NE-CZ	8.46	135.45	123.60
1	G	302	GLN	CG-CD-NE2	8.20	136.39	116.70
1	H	302	GLN	CG-CD-OE1	8.15	137.91	121.60
1	H	302	GLN	CG-CD-NE2	-7.11	99.63	116.70
1	D	302	GLN	CG-CD-OE1	6.38	134.37	121.60
1	E	99[A]	ARG	N-CA-C	6.14	127.59	111.00
1	E	99[B]	ARG	N-CA-C	6.14	127.59	111.00
1	D	302	GLN	CG-CD-NE2	-5.96	102.41	116.70
1	A	99[A]	ARG	N-CA-C	5.86	126.83	111.00
1	A	99[B]	ARG	N-CA-C	5.86	126.83	111.00
1	C	99[A]	ARG	N-CA-C	5.78	126.61	111.00
1	C	99[B]	ARG	N-CA-C	5.78	126.61	111.00
1	G	99[A]	ARG	N-CA-C	5.57	126.04	111.00
1	G	99[B]	ARG	N-CA-C	5.57	126.04	111.00
1	D	299	ARG	CB-CG-CD	5.22	125.17	111.60

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	299	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	E	231	GLU	Sidechain
1	G	358	ARG	Sidechain

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	3871	0	3646	25	0
1	B	3869	0	3647	34	0
1	C	3869	0	3647	26	0
1	D	3869	0	3647	30	0
1	E	3868	0	3646	20	0
1	F	3869	0	3647	26	0
1	G	3868	0	3646	29	0
1	H	3871	0	3645	27	0
2	A	43	0	30	2	0
2	B	43	0	30	2	0
2	C	43	0	30	3	0
2	D	43	0	30	1	0
2	E	43	0	30	2	0
2	F	43	0	30	2	0
2	G	43	0	30	2	0
2	H	43	0	30	1	0
3	A	6	0	8	1	0
3	B	6	0	8	0	0
3	C	6	0	8	1	0
3	D	6	0	8	0	0
3	E	6	0	8	1	0
3	F	6	0	8	1	0
3	G	6	0	8	1	0
3	H	6	0	8	0	0
4	B	1	0	0	0	0
4	D	1	0	0	0	0
4	F	1	0	0	0	0
4	H	1	0	0	0	0
5	A	578	0	0	7	0
5	B	611	0	0	19	0
5	C	588	0	0	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	D	609	0	0	10	0
5	E	541	0	0	9	0
5	F	543	0	0	9	0
5	G	556	0	0	13	0
5	H	568	0	0	7	0
All	All	35944	0	29475	217	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 4.

All (217) 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:F:387:GLN:HG2	5:F:8755:HOH:O	1.46	1.10
1:B:432:GLU:HG2	5:B:6655:HOH:O	1.73	0.88
1:B:387:GLN:HG2	5:B:6834:HOH:O	1.76	0.84
1:C:362:HIS:HE1	1:C:389:GLN:OE1	1.63	0.81
1:A:362:HIS:HE1	1:A:389:GLN:OE1	1.65	0.78
1:D:387:GLN:HG2	5:D:5647:HOH:O	1.83	0.77
1:D:387:GLN:HG2	5:D:5568:HOH:O	1.84	0.77
1:G:362:HIS:HE1	1:G:389:GLN:OE1	1.70	0.74
1:D:255:LYS:HG2	1:D:296:GLU:HB3	1.70	0.72
2:B:486:HEM:HBB2	2:B:486:HEM:HMB1	1.72	0.71
1:A:318:VAL:HG13	1:A:322:ILE:O	1.91	0.70
1:B:362:HIS:HD2	5:B:6699:HOH:O	1.75	0.68
1:F:362:HIS:HE1	1:F:389:GLN:OE1	1.77	0.68
1:A:362:HIS:HD2	5:A:5565:HOH:O	1.77	0.68
1:B:82:ILE:HD13	5:B:6929:HOH:O	1.93	0.68
1:B:349:HIS:HE1	5:B:6527:HOH:O	1.78	0.67
1:B:362:HIS:HE1	1:B:389:GLN:OE1	1.77	0.67
1:H:362:HIS:HD2	5:H:7540:HOH:O	1.78	0.66
1:A:349:HIS:HE1	5:A:5532:HOH:O	1.78	0.66
1:A:318:VAL:CG1	1:A:322:ILE:O	2.44	0.66
1:C:85:LYS:HE2	5:C:5970:HOH:O	1.96	0.66
1:E:362:HIS:HE1	1:E:389:GLN:OE1	1.80	0.65
1:E:99[A]:ARG:O	5:E:5729:HOH:O	2.15	0.65
1:C:187:THR:OG1	1:C:190:HIS:HD2	1.80	0.64
1:B:433:LYS:HE2	5:B:6634:HOH:O	1.96	0.64
1:C:480:SER:HA	1:C:483:ASN:HB2	1.79	0.64
1:B:255:LYS:HG2	1:B:296:GLU:HB3	1.80	0.63
1:H:346:GLY:O	1:H:349:HIS:HD2	1.82	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:187:THR:OG1	1:B:190:HIS:HD2	1.81	0.63
1:B:87:ASP:HB3	5:B:6999:HOH:O	2.00	0.62
1:G:459:HIS:HD2	5:G:5609:HOH:O	1.82	0.62
1:B:351:HIS:HD2	5:B:6490:HOH:O	1.81	0.62
1:F:351:HIS:HD2	5:F:8538:HOH:O	1.80	0.62
1:D:362:HIS:HE1	1:D:389:GLN:OE1	1.83	0.61
2:D:485:HEM:HBB2	2:D:485:HEM:HMB2	1.83	0.61
1:G:359:CYS:HB2	1:G:360:PRO:HD2	1.83	0.61
1:B:459:HIS:HD2	5:B:6513:HOH:O	1.84	0.61
2:C:485:HEM:HBB2	2:C:485:HEM:HMB2	1.83	0.61
1:A:351:HIS:HD2	5:A:5581:HOH:O	1.84	0.60
1:C:351:HIS:HD2	5:C:5507:HOH:O	1.85	0.59
1:H:362:HIS:HE1	1:H:389:GLN:OE1	1.85	0.59
1:G:3:SER:O	5:G:6047:HOH:O	2.17	0.59
2:B:486:HEM:HBB2	2:B:486:HEM:CMB	2.32	0.58
1:E:349:HIS:HE1	5:E:5520:HOH:O	1.84	0.58
1:H:349:HIS:HE1	5:H:7546:HOH:O	1.85	0.58
1:D:187:THR:OG1	1:D:190:HIS:HD2	1.86	0.58
1:E:187:THR:OG1	1:E:190:HIS:HD2	1.86	0.58
1:H:139:LYS:HA	1:H:139:LYS:HE2	1.85	0.58
1:F:73:TYR:CD2	1:F:262:ILE:HD13	2.39	0.58
1:G:351:HIS:HD2	5:G:5536:HOH:O	1.86	0.58
1:C:359:CYS:HB2	1:C:360:PRO:HD2	1.86	0.57
2:A:486:HEM:HMB1	2:A:486:HEM:HBB2	1.86	0.57
1:A:331:GLN:NE2	1:B:29:GLN:H	2.02	0.56
1:F:139:LYS:HA	1:F:139:LYS:HE2	1.87	0.56
1:G:349:HIS:HE1	5:G:5511:HOH:O	1.88	0.56
1:H:433:LYS:HD2	5:H:7639:HOH:O	2.05	0.56
2:E:486:HEM:HBB2	2:E:486:HEM:HMB2	1.88	0.56
1:D:139:LYS:HE2	1:D:139:LYS:HA	1.87	0.56
1:G:137:PRO:HB3	2:G:485:HEM:HBB1	1.89	0.55
1:H:255:LYS:HG2	1:H:296:GLU:HB3	1.88	0.55
1:A:331:GLN:HE21	1:B:29:GLN:H	1.55	0.55
1:C:29:GLN:H	1:D:331:GLN:NE2	2.05	0.54
5:B:6692:HOH:O	1:H:82:ILE:HD13	2.07	0.54
1:B:139:LYS:HE2	1:B:139:LYS:HA	1.90	0.54
1:C:29:GLN:H	1:D:331:GLN:HE21	1.56	0.53
1:H:255:LYS:HG2	1:H:296:GLU:CB	2.39	0.53
1:F:187:THR:OG1	1:F:190:HIS:HD2	1.91	0.53
1:E:459:HIS:HD2	5:E:5717:HOH:O	1.92	0.53
1:B:433:LYS:HD2	5:B:6602:HOH:O	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:137:PRO:HB3	2:H:485:HEM:HBB1	1.89	0.53
1:D:349:HIS:HE1	5:D:5518:HOH:O	1.93	0.52
1:E:351:HIS:HD2	5:E:5497:HOH:O	1.93	0.52
1:F:372:VAL:HG21	1:H:372:VAL:HG21	1.92	0.52
1:B:346:GLY:O	1:B:349:HIS:HD2	1.93	0.52
1:B:480:SER:HA	1:B:483:ASN:HD22	1.75	0.51
1:D:54:HIS:CE1	1:D:95:VAL:HG22	2.46	0.51
1:C:314:ASN:ND2	1:C:316:ALA:H	2.09	0.51
1:D:106:ARG:HA	1:D:184:ILE:HG12	1.93	0.51
1:F:53:OMT:CE	1:F:148:LYS:HE2	2.40	0.50
1:C:359:CYS:HB2	1:C:360:PRO:CD	2.41	0.50
1:A:338:GLY:HA3	3:A:5489:GOL:H2	1.93	0.50
1:G:131:VAL:HG23	1:G:174:GLN:HE21	1.76	0.50
1:A:239:SER:OG	1:A:240:HIS:HD2	1.95	0.50
1:G:54:HIS:CE1	1:G:95:VAL:HG22	2.47	0.50
1:A:139:LYS:HA	1:A:139:LYS:HE2	1.94	0.49
1:A:255:LYS:HG2	1:A:296:GLU:HB3	1.95	0.49
1:C:185:PRO:O	1:C:240:HIS:HE1	1.95	0.49
1:B:387:GLN:HG2	5:B:6735:HOH:O	2.11	0.49
1:A:54:HIS:CE1	1:A:95:VAL:HG22	2.48	0.49
5:E:6001:HOH:O	1:G:350:GLN:HB3	2.11	0.49
1:B:351:HIS:HE1	5:B:7022:HOH:O	1.96	0.49
1:C:255:LYS:HG2	1:C:296:GLU:HB3	1.95	0.49
1:B:372:VAL:HG21	1:D:372:VAL:HG21	1.93	0.49
5:D:5963:HOH:O	1:H:82:ILE:HD11	2.12	0.49
1:C:346:GLY:O	1:C:349:HIS:HD2	1.96	0.48
1:B:351:HIS:CD2	5:B:6490:HOH:O	2.61	0.48
1:D:346:GLY:O	1:D:349:HIS:HD2	1.96	0.48
1:E:362:HIS:HD2	5:E:5598:HOH:O	1.96	0.48
1:F:77:LYS:HE2	5:F:8884:HOH:O	2.12	0.48
1:A:131:VAL:HG23	1:A:174:GLN:HE21	1.77	0.48
1:D:185:PRO:O	1:D:240:HIS:HE1	1.96	0.48
1:G:187:THR:OG1	1:G:190:HIS:HD2	1.97	0.48
1:F:137:PRO:HB3	2:F:486:HEM:HBB1	1.96	0.48
1:G:85:LYS:HE2	5:G:5872:HOH:O	2.14	0.48
1:F:459:HIS:HD2	5:F:8594:HOH:O	1.96	0.48
1:F:349:HIS:HE1	5:F:8604:HOH:O	1.96	0.48
1:H:346:GLY:O	1:H:349:HIS:CD2	2.66	0.48
1:C:349:HIS:HE1	5:C:5647:HOH:O	1.97	0.47
1:G:331:GLN:NE2	1:H:29:GLN:H	2.12	0.47
1:D:266:ALA:HB3	5:D:6037:HOH:O	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:54:HIS:CE1	1:E:95:VAL:HG22	2.50	0.47
1:A:350:GLN:HG2	5:A:5892:HOH:O	2.14	0.47
1:D:351:HIS:HD2	5:D:5515:HOH:O	1.97	0.47
5:E:5915:HOH:O	1:G:4:LYS:HE2	2.15	0.47
1:G:351:HIS:CD2	5:G:5536:HOH:O	2.62	0.47
1:G:4:LYS:HA	5:G:6047:HOH:O	2.15	0.47
2:A:486:HEM:CMB	2:A:486:HEM:HBB2	2.45	0.47
1:C:187:THR:OG1	1:C:190:HIS:CD2	2.65	0.47
1:E:131:VAL:HG23	1:E:174:GLN:HE21	1.79	0.47
1:F:338:GLY:HA3	3:F:5494:GOL:H2	1.97	0.47
1:G:314:ASN:ND2	5:G:5580:HOH:O	2.48	0.47
1:C:331:GLN:NE2	1:D:29:GLN:H	2.14	0.46
1:F:85:LYS:NZ	5:F:8905:HOH:O	2.43	0.46
1:F:433:LYS:HE2	5:F:8746:HOH:O	2.15	0.46
1:G:359:CYS:HB2	1:G:360:PRO:CD	2.45	0.46
1:A:351:HIS:CD2	5:A:5581:HOH:O	2.64	0.46
1:F:255:LYS:HG2	1:F:296:GLU:HB3	1.98	0.46
1:H:351:HIS:HD2	5:H:7488:HOH:O	1.99	0.46
1:D:459:HIS:HE1	5:D:5750:HOH:O	1.99	0.46
1:A:459:HIS:HD2	5:A:5578:HOH:O	1.97	0.45
1:C:459:HIS:HD2	5:C:5534:HOH:O	1.99	0.45
1:F:430:THR:O	1:F:434:GLN:HG3	2.15	0.45
1:H:359:CYS:HB2	1:H:360:PRO:HD2	1.97	0.45
1:F:363:SER:O	1:F:364:TYR:HB3	2.16	0.45
1:B:82:ILE:CD1	5:B:6929:HOH:O	2.57	0.45
1:D:239:SER:OG	1:D:240:HIS:HD2	1.99	0.45
1:A:187:THR:OG1	1:A:190:HIS:HD2	1.99	0.45
5:B:6717:HOH:O	1:D:350:GLN:HB3	2.16	0.45
1:B:302:GLN:NE2	5:B:6797:HOH:O	2.50	0.45
2:C:485:HEM:HBB2	2:C:485:HEM:CMB	2.46	0.45
1:C:52:ARG:HE	1:C:52:ARG:HA	1.82	0.45
1:F:239:SER:OG	1:F:240:HIS:HD2	1.99	0.45
1:F:54:HIS:CE1	1:F:95:VAL:HG22	2.52	0.45
1:A:30:LEU:HD23	1:D:30:LEU:HD23	1.98	0.45
1:D:318:VAL:HG13	1:D:322:ILE:O	2.16	0.44
2:F:486:HEM:HMB2	2:F:486:HEM:HBB2	1.98	0.44
1:D:432:GLU:HB3	5:D:5571:HOH:O	2.16	0.44
1:E:29:GLN:H	1:F:331:GLN:NE2	2.15	0.44
1:C:23:ALA:O	1:C:27:GLY:HA3	2.17	0.44
1:A:25:LYS:HD3	1:B:414:GLU:OE2	2.18	0.44
1:B:479:ILE:HA	1:B:482:TYR:CZ	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:346:GLY:O	1:E:349:HIS:HD2	2.00	0.44
1:F:351:HIS:CD2	5:F:8538:HOH:O	2.61	0.44
1:H:314:ASN:ND2	1:H:316:ALA:H	2.16	0.44
1:C:106:ARG:HA	1:C:184:ILE:HG12	1.98	0.43
1:G:358:ARG:NH2	5:G:5918:HOH:O	2.51	0.43
1:H:387:GLN:NE2	5:H:7794:HOH:O	2.51	0.43
1:C:54:HIS:CE1	1:C:95:VAL:HG22	2.52	0.43
1:G:187:THR:OG1	1:G:190:HIS:CD2	2.71	0.43
1:H:480:SER:HA	1:H:483:ASN:HD22	1.84	0.43
1:A:318:VAL:HG11	1:A:322:ILE:O	2.18	0.43
1:G:346:GLY:O	1:G:349:HIS:HD2	2.01	0.43
1:G:331:GLN:HE21	1:H:29:GLN:H	1.65	0.43
1:B:186:ALA:HA	1:B:224:LEU:HG	2.01	0.43
1:B:239:SER:OG	1:B:240:HIS:HD2	2.02	0.43
1:E:372:VAL:HG21	1:G:372:VAL:HG21	2.01	0.42
1:G:362:HIS:HD2	5:G:5828:HOH:O	2.01	0.42
1:B:329:MET:O	1:B:333:ARG:HG3	2.20	0.42
1:D:150:ASP:HB3	1:D:153:THR:OG1	2.20	0.42
1:F:362:HIS:HD2	5:F:8617:HOH:O	2.03	0.42
1:B:314:ASN:ND2	1:B:316:ALA:H	2.17	0.42
1:C:127:ASN:CG	2:C:485:HEM:HAC	2.39	0.42
1:C:338:GLY:HA3	3:C:5487:GOL:H2	2.01	0.42
2:G:485:HEM:CMB	2:G:485:HEM:HBB2	2.50	0.42
1:H:366:ARG:HA	1:H:366:ARG:HD2	1.90	0.42
1:A:251:GLN:HA	1:A:253:PHE:CE2	2.55	0.42
2:E:486:HEM:HBB2	2:E:486:HEM:CMB	2.48	0.42
1:H:440:ASN:HD22	1:H:443:ARG:NH2	2.18	0.42
1:E:187:THR:OG1	1:E:190:HIS:CD2	2.69	0.42
1:G:387:GLN:NE2	5:G:5724:HOH:O	2.52	0.42
1:F:131:VAL:HG23	1:F:174:GLN:HE21	1.84	0.42
1:H:483:ASN:ND2	5:H:7874:HOH:O	2.53	0.41
1:A:166:THR:HB	1:A:455:ARG:HB3	2.02	0.41
1:H:118:GLU:HB2	5:H:7748:HOH:O	2.20	0.41
1:G:299:ARG:HD3	5:G:5873:HOH:O	2.20	0.41
1:H:61:TYR:HB2	1:H:299:ARG:HB3	2.01	0.41
1:B:30:LEU:HD23	1:C:30:LEU:HD23	2.03	0.41
1:D:61:TYR:HB2	1:D:299:ARG:HB3	2.03	0.41
1:F:23:ALA:O	1:F:27:GLY:HA3	2.21	0.41
1:G:93:SER:O	1:G:109:ARG:HA	2.20	0.41
1:C:253:PHE:CD2	1:C:298:ASN:HA	2.55	0.41
1:D:147:VAL:O	1:D:156:ARG:HD3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:166:THR:HB	1:D:455:ARG:HB3	2.02	0.41
1:E:121:ASN:HD21	1:E:357:PRO:HA	1.86	0.41
1:E:314:ASN:ND2	1:E:316:ALA:H	2.19	0.41
1:F:135:ARG:HD2	1:F:412:HIS:ND1	2.35	0.41
1:H:186:ALA:HA	1:H:224:LEU:HG	2.02	0.41
1:E:318:VAL:HG13	1:E:322:ILE:O	2.20	0.41
1:E:338:GLY:HA3	3:E:5493:GOL:H2	2.02	0.41
1:B:483:ASN:CG	5:B:6994:HOH:O	2.60	0.41
1:D:148:LYS:HB3	1:D:149:ARG:H	1.79	0.41
1:D:387:GLN:CG	5:D:5647:HOH:O	2.54	0.41
1:A:255:LYS:HG2	1:A:296:GLU:CB	2.50	0.40
1:B:187:THR:OG1	1:B:190:HIS:CD2	2.67	0.40
1:C:440:ASN:HD22	1:C:443:ARG:NH2	2.19	0.40
1:E:459:HIS:HE1	5:E:5742:HOH:O	2.04	0.40
5:D:5719:HOH:O	1:H:252:ASP:HB2	2.21	0.40
1:A:459:HIS:HE1	5:A:5883:HOH:O	2.03	0.40
1:E:239:SER:OG	1:E:240:HIS:HD2	2.04	0.40
1:G:338:GLY:HA3	3:G:5491:GOL:H2	2.03	0.40
1:B:185:PRO:O	1:B:240:HIS:HE1	2.05	0.40
1:E:363:SER:O	1:E:364:TYR:HB3	2.22	0.40
1:D:251:GLN:HA	1:D:253:PHE:CE2	2.56	0.40
1:G:3:SER:HA	5:G:5810:HOH: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	482/483 (100%)	466 (97%)	16 (3%)	0	100	100
1	B	482/483 (100%)	463 (96%)	17 (4%)	2 (0%)	38	30
1	C	482/483 (100%)	462 (96%)	20 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	482/483 (100%)	465 (96%)	15 (3%)	2 (0%)	38	30
1	E	481/483 (100%)	463 (96%)	18 (4%)	0	100	100
1	F	482/483 (100%)	462 (96%)	18 (4%)	2 (0%)	38	30
1	G	481/483 (100%)	465 (97%)	16 (3%)	0	100	100
1	H	482/483 (100%)	465 (96%)	17 (4%)	0	100	100
All	All	3854/3864 (100%)	3711 (96%)	137 (4%)	6 (0%)	55	46

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	99[A]	ARG
1	F	99[B]	ARG
1	B	99[A]	ARG
1	B	99[B]	ARG
1	D	99[A]	ARG
1	D	99[B]	ARG

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	407/406 (100%)	393 (97%)	14 (3%)	42	37
1	B	407/406 (100%)	399 (98%)	8 (2%)	60	61
1	C	407/406 (100%)	394 (97%)	13 (3%)	44	40
1	D	407/406 (100%)	395 (97%)	12 (3%)	48	44
1	E	406/406 (100%)	399 (98%)	7 (2%)	66	67
1	F	407/406 (100%)	394 (97%)	13 (3%)	44	40
1	G	406/406 (100%)	397 (98%)	9 (2%)	57	57
1	H	407/406 (100%)	396 (97%)	11 (3%)	50	48
All	All	3254/3248 (100%)	3167 (97%)	87 (3%)	50	48

All (87) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	129	THR
1	A	204	SER
1	A	237	ARG
1	A	284	HIS
1	A	289	LEU
1	A	314	ASN
1	A	318	VAL
1	A	403	LEU
1	A	428	LEU
1	A	437	LEU
1	A	444	ASN
1	A	454	LEU
1	A	455	ARG
1	A	467	TYR
1	B	204	SER
1	B	284	HIS
1	B	314	ASN
1	B	318	VAL
1	B	403	LEU
1	B	437	LEU
1	B	444	ASN
1	B	454	LEU
1	C	99[A]	ARG
1	C	99[B]	ARG
1	C	112	SER
1	C	117	THR
1	C	284	HIS
1	C	289	LEU
1	C	314	ASN
1	C	318	VAL
1	C	403	LEU
1	C	437	LEU
1	C	444	ASN
1	C	455	ARG
1	C	483	ASN
1	D	117	THR
1	D	284	HIS
1	D	285	LYS
1	D	289	LEU
1	D	314	ASN
1	D	318	VAL
1	D	403	LEU

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Mol	Chain	Res	Type
1	D	428	LEU
1	D	432	GLU
1	D	437	LEU
1	D	454	LEU
1	D	455	ARG
1	E	201	PHE
1	E	204	SER
1	E	314	ASN
1	E	318	VAL
1	E	403	LEU
1	E	437	LEU
1	E	454	LEU
1	F	117	THR
1	F	129	THR
1	F	201	PHE
1	F	206	ASN
1	F	284	HIS
1	F	289	LEU
1	F	314	ASN
1	F	318	VAL
1	F	403	LEU
1	F	432	GLU
1	F	437	LEU
1	F	444	ASN
1	F	455	ARG
1	G	129	THR
1	G	284	HIS
1	G	289	LEU
1	G	314	ASN
1	G	318	VAL
1	G	358	ARG
1	G	403	LEU
1	G	437	LEU
1	G	455	ARG
1	H	3	SER
1	H	187	THR
1	H	284	HIS
1	H	289	LEU
1	H	314	ASN
1	H	318	VAL
1	H	403	LEU
1	H	432	GLU

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Mol	Chain	Res	Type
1	H	437	LEU
1	H	454	LEU
1	H	455	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (145) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	32	GLN
1	A	121	ASN
1	A	160	ASN
1	A	174	GLN
1	A	190	HIS
1	A	240	HIS
1	A	250	ASN
1	A	284	HIS
1	A	300	ASN
1	A	314	ASN
1	A	317	ASN
1	A	331	GLN
1	A	349	HIS
1	A	351	HIS
1	A	362	HIS
1	A	402	ASN
1	A	440	ASN
1	A	459	HIS
1	B	32	GLN
1	B	121	ASN
1	B	160	ASN
1	B	174	GLN
1	B	190	HIS
1	B	235	ASN
1	B	240	HIS
1	B	250	ASN
1	B	300	ASN
1	B	314	ASN
1	B	317	ASN
1	B	331	GLN
1	B	349	HIS
1	B	351	HIS
1	B	362	HIS
1	B	402	ASN
1	B	440	ASN

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Mol	Chain	Res	Type
1	B	459	HIS
1	B	483	ASN
1	C	32	GLN
1	C	121	ASN
1	C	160	ASN
1	C	174	GLN
1	C	190	HIS
1	C	240	HIS
1	C	284	HIS
1	C	300	ASN
1	C	314	ASN
1	C	317	ASN
1	C	331	GLN
1	C	349	HIS
1	C	351	HIS
1	C	362	HIS
1	C	402	ASN
1	C	440	ASN
1	C	459	HIS
1	D	32	GLN
1	D	121	ASN
1	D	160	ASN
1	D	174	GLN
1	D	190	HIS
1	D	235	ASN
1	D	240	HIS
1	D	250	ASN
1	D	284	HIS
1	D	300	ASN
1	D	314	ASN
1	D	317	ASN
1	D	331	GLN
1	D	349	HIS
1	D	351	HIS
1	D	362	HIS
1	D	402	ASN
1	D	440	ASN
1	D	459	HIS
1	E	32	GLN
1	E	121	ASN
1	E	160	ASN
1	E	174	GLN

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Mol	Chain	Res	Type
1	E	190	HIS
1	E	240	HIS
1	E	250	ASN
1	E	300	ASN
1	E	314	ASN
1	E	317	ASN
1	E	331	GLN
1	E	349	HIS
1	E	351	HIS
1	E	362	HIS
1	E	402	ASN
1	E	440	ASN
1	E	459	HIS
1	F	32	GLN
1	F	121	ASN
1	F	160	ASN
1	F	174	GLN
1	F	190	HIS
1	F	235	ASN
1	F	240	HIS
1	F	250	ASN
1	F	284	HIS
1	F	300	ASN
1	F	314	ASN
1	F	317	ASN
1	F	331	GLN
1	F	349	HIS
1	F	351	HIS
1	F	362	HIS
1	F	402	ASN
1	F	440	ASN
1	F	459	HIS
1	G	32	GLN
1	G	121	ASN
1	G	174	GLN
1	G	190	HIS
1	G	240	HIS
1	G	300	ASN
1	G	314	ASN
1	G	317	ASN
1	G	331	GLN
1	G	349	HIS

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Mol	Chain	Res	Type
1	G	350	GLN
1	G	351	HIS
1	G	362	HIS
1	G	402	ASN
1	G	440	ASN
1	G	459	HIS
1	H	32	GLN
1	H	121	ASN
1	H	160	ASN
1	H	174	GLN
1	H	190	HIS
1	H	240	HIS
1	H	250	ASN
1	H	251	GLN
1	H	284	HIS
1	H	300	ASN
1	H	314	ASN
1	H	317	ASN
1	H	331	GLN
1	H	349	HIS
1	H	351	HIS
1	H	362	HIS
1	H	402	ASN
1	H	440	ASN
1	H	459	HIS
1	H	483	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

8 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	OMT	A	53	1	9,9,10	2.94	3 (33%)	8,12,14	2.28	3 (37%)
1	OMT	B	53	1	9,9,10	2.52	2 (22%)	8,12,14	2.02	3 (37%)
1	OMT	C	53	1	9,9,10	2.59	2 (22%)	8,12,14	2.50	4 (50%)
1	OMT	D	53	1	9,9,10	2.67	1 (11%)	8,12,14	2.55	4 (50%)
1	OMT	E	53	1	9,9,10	2.91	1 (11%)	8,12,14	1.94	3 (37%)
1	OMT	F	53	1	9,9,10	2.56	2 (22%)	8,12,14	1.95	2 (25%)
1	OMT	G	53	1	9,9,10	2.70	1 (11%)	8,12,14	1.83	2 (25%)
1	OMT	H	53	1	9,9,10	2.65	1 (11%)	8,12,14	1.76	4 (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	OMT	A	53	1	-	0/6/8/10	0/0/0/0
1	OMT	B	53	1	-	0/6/8/10	0/0/0/0
1	OMT	C	53	1	-	0/6/8/10	0/0/0/0
1	OMT	D	53	1	-	0/6/8/10	0/0/0/0
1	OMT	E	53	1	-	0/6/8/10	0/0/0/0
1	OMT	F	53	1	-	0/6/8/10	0/0/0/0
1	OMT	G	53	1	-	0/6/8/10	0/0/0/0
1	OMT	H	53	1	-	0/6/8/10	0/0/0/0

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	53	OMT	CG-SD	-8.28	1.67	1.78
1	A	53	OMT	CG-SD	-8.02	1.67	1.78
1	G	53	OMT	CG-SD	-7.63	1.68	1.78
1	D	53	OMT	CG-SD	-7.50	1.68	1.78
1	H	53	OMT	CG-SD	-7.46	1.68	1.78
1	F	53	OMT	CG-SD	-7.24	1.68	1.78
1	C	53	OMT	CG-SD	-7.14	1.68	1.78
1	B	53	OMT	CG-SD	-6.99	1.68	1.78
1	B	53	OMT	CE-SD	-2.26	1.65	1.75
1	F	53	OMT	CE-SD	-2.23	1.65	1.75
1	A	53	OMT	CE-SD	-2.02	1.66	1.75
1	C	53	OMT	CB-CG	2.11	1.54	1.52
1	A	53	OMT	CB-CG	2.13	1.54	1.52

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	53	OMT	OD2-SD-OD1	-3.73	107.94	116.93
1	A	53	OMT	OD2-SD-OD1	-3.66	108.10	116.93
1	B	53	OMT	OD2-SD-OD1	-3.49	108.51	116.93
1	G	53	OMT	OD2-SD-OD1	-3.47	108.56	116.93
1	F	53	OMT	OD2-SD-OD1	-3.40	108.72	116.93
1	E	53	OMT	OD2-SD-OD1	-3.30	108.97	116.93
1	C	53	OMT	OD2-SD-OD1	-3.28	109.01	116.93
1	H	53	OMT	OD2-SD-OD1	-2.44	111.03	116.93
1	H	53	OMT	OD1-SD-CE	-2.31	106.49	108.93
1	H	53	OMT	O-C-CA	-2.20	118.94	125.02
1	B	53	OMT	O-C-CA	-2.12	119.17	125.02
1	C	53	OMT	OD1-SD-CE	-2.09	106.72	108.93
1	H	53	OMT	CB-CA-C	-2.05	108.27	111.65
1	D	53	OMT	O-C-CA	-2.00	119.49	125.02
1	E	53	OMT	OD2-SD-CG	2.11	109.83	108.36
1	E	53	OMT	OD1-SD-CG	2.12	109.83	108.36
1	F	53	OMT	OD1-SD-CE	2.78	111.87	108.93
1	A	53	OMT	OD2-SD-CG	2.81	110.31	108.36
1	G	53	OMT	OD1-SD-CG	2.86	110.35	108.36
1	A	53	OMT	OD1-SD-CG	2.93	110.39	108.36
1	C	53	OMT	OD2-SD-CG	3.17	110.56	108.36
1	D	53	OMT	OD1-SD-CG	3.21	110.59	108.36
1	B	53	OMT	OD2-SD-CG	3.66	110.91	108.36
1	C	53	OMT	OD1-SD-CG	4.42	111.43	108.36
1	D	53	OMT	OD2-SD-CG	4.73	111.65	108.36

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	F	53	OMT	1	0

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry

Of 20 ligands modelled in this entry, 4 are monoatomic - leaving 16 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	486	1	28,50,50	2.11	6 (21%)	17,82,82	2.06	5 (29%)
3	GOL	A	5489	-	5,5,5	0.22	0	5,5,5	0.49	0
2	HEM	B	486	1	28,50,50	2.16	8 (28%)	17,82,82	1.94	4 (23%)
3	GOL	B	5490	-	5,5,5	0.26	0	5,5,5	0.61	0
2	HEM	C	485	1	28,50,50	2.19	11 (39%)	17,82,82	2.10	5 (29%)
3	GOL	C	5487	-	5,5,5	0.21	0	5,5,5	0.38	0
2	HEM	D	485	1	28,50,50	2.09	7 (25%)	17,82,82	1.84	3 (17%)
3	GOL	D	5488	-	5,5,5	0.27	0	5,5,5	0.47	0
2	HEM	E	486	1	28,50,50	2.17	8 (28%)	17,82,82	2.06	3 (17%)
3	GOL	E	5493	-	5,5,5	0.20	0	5,5,5	0.45	0
2	HEM	F	486	1	28,50,50	2.07	6 (21%)	17,82,82	2.12	6 (35%)
3	GOL	F	5494	-	5,5,5	0.28	0	5,5,5	0.51	0
2	HEM	G	485	1	28,50,50	2.23	7 (25%)	17,82,82	1.98	5 (29%)
3	GOL	G	5491	-	5,5,5	0.16	0	5,5,5	0.50	0
2	HEM	H	485	1	28,50,50	2.12	7 (25%)	17,82,82	2.20	4 (23%)
3	GOL	H	5492	-	5,5,5	0.25	0	5,5,5	0.47	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	486	1	-	0/6/54/54	0/0/8/8
3	GOL	A	5489	-	-	0/4/4/4	0/0/0/0
2	HEM	B	486	1	-	0/6/54/54	0/0/8/8
3	GOL	B	5490	-	-	0/4/4/4	0/0/0/0
2	HEM	C	485	1	-	0/6/54/54	0/0/8/8
3	GOL	C	5487	-	-	0/4/4/4	0/0/0/0
2	HEM	D	485	1	-	0/6/54/54	0/0/8/8

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	D	5488	-	-	0/4/4/4	0/0/0/0
2	HEM	E	486	1	-	0/6/54/54	0/0/8/8
3	GOL	E	5493	-	-	0/4/4/4	0/0/0/0
2	HEM	F	486	1	-	0/6/54/54	0/0/8/8
3	GOL	F	5494	-	-	0/4/4/4	0/0/0/0
2	HEM	G	485	1	-	0/6/54/54	0/0/8/8
3	GOL	G	5491	-	-	0/4/4/4	0/0/0/0
2	HEM	H	485	1	-	0/6/54/54	0/0/8/8
3	GOL	H	5492	-	-	0/4/4/4	0/0/0/0

All (60) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	485	HEM	C3C-C2C	-4.46	1.34	1.40
2	G	485	HEM	C3B-C2B	-4.45	1.34	1.40
2	B	486	HEM	C3C-C2C	-4.26	1.34	1.40
2	E	486	HEM	C3C-C2C	-4.14	1.34	1.40
2	C	485	HEM	C3C-C2C	-4.08	1.35	1.40
2	A	486	HEM	C3C-C2C	-3.97	1.35	1.40
2	H	485	HEM	C3C-C2C	-3.92	1.35	1.40
2	F	486	HEM	C3C-C2C	-3.85	1.35	1.40
2	H	485	HEM	C3B-C2B	-3.84	1.35	1.40
2	B	486	HEM	C3B-C2B	-3.78	1.35	1.40
2	D	485	HEM	C3B-C2B	-3.68	1.35	1.40
2	C	485	HEM	C3B-C2B	-3.67	1.35	1.40
2	D	485	HEM	C3C-C2C	-3.63	1.35	1.40
2	F	486	HEM	C3B-C2B	-3.63	1.35	1.40
2	A	486	HEM	C3B-C2B	-3.61	1.35	1.40
2	E	486	HEM	C3B-C2B	-3.08	1.36	1.40
2	C	485	HEM	C1B-NB	2.03	1.39	1.36
2	D	485	HEM	C1B-NB	2.05	1.39	1.36
2	C	485	HEM	CMC-C2C	2.07	1.56	1.51
2	C	485	HEM	C4C-NC	2.07	1.39	1.36
2	G	485	HEM	CMC-C2C	2.09	1.56	1.51
2	H	485	HEM	C1D-ND	2.10	1.40	1.36
2	C	485	HEM	C4D-ND	2.15	1.39	1.36
2	E	486	HEM	CMC-C2C	2.15	1.56	1.51
2	B	486	HEM	CMA-C3A	2.17	1.56	1.51
2	C	485	HEM	CAA-C2A	2.17	1.55	1.52
2	C	485	HEM	C1C-NC	2.24	1.39	1.36
2	E	486	HEM	C4D-ND	2.28	1.39	1.36
2	B	486	HEM	C4D-ND	2.36	1.39	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	485	HEM	C4D-ND	2.37	1.39	1.36
2	E	486	HEM	C1B-NB	2.37	1.39	1.36
2	A	486	HEM	C4D-ND	2.40	1.39	1.36
2	H	485	HEM	C4D-ND	2.63	1.39	1.36
2	F	486	HEM	C4D-ND	2.66	1.39	1.36
2	B	486	HEM	C1B-NB	2.67	1.39	1.36
2	G	485	HEM	C4D-ND	2.68	1.39	1.36
2	F	486	HEM	C3B-CAB	3.59	1.55	1.47
2	F	486	HEM	C3C-CAC	3.59	1.54	1.47
2	H	485	HEM	C3C-CAC	3.65	1.55	1.47
2	A	486	HEM	C3C-CAC	3.68	1.55	1.47
2	B	486	HEM	C3C-CAC	3.70	1.55	1.47
2	A	486	HEM	C3B-CAB	3.70	1.55	1.47
2	C	485	HEM	C3C-CAC	3.72	1.55	1.47
2	D	485	HEM	C3B-CAB	3.76	1.55	1.47
2	D	485	HEM	C3C-CAC	3.80	1.55	1.47
2	B	486	HEM	C3B-CAB	3.81	1.55	1.47
2	G	485	HEM	C3B-CAB	3.86	1.55	1.47
2	E	486	HEM	C3B-CAB	3.93	1.55	1.47
2	G	485	HEM	C3C-CAC	4.02	1.55	1.47
2	C	485	HEM	C3B-CAB	4.05	1.55	1.47
2	H	485	HEM	C3B-CAB	4.08	1.56	1.47
2	E	486	HEM	C3C-CAC	4.12	1.55	1.47
2	H	485	HEM	C3D-C2D	5.01	1.52	1.37
2	B	486	HEM	C3D-C2D	5.17	1.53	1.37
2	F	486	HEM	C3D-C2D	5.18	1.53	1.37
2	C	485	HEM	C3D-C2D	5.20	1.53	1.37
2	D	485	HEM	C3D-C2D	5.24	1.53	1.37
2	E	486	HEM	C3D-C2D	5.29	1.53	1.37
2	G	485	HEM	C3D-C2D	5.44	1.53	1.37
2	A	486	HEM	C3D-C2D	5.86	1.55	1.37

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	485	HEM	CBA-CAA-C2A	-5.42	102.13	112.48
2	G	485	HEM	CBA-CAA-C2A	-5.33	102.30	112.48
2	B	486	HEM	CBA-CAA-C2A	-5.21	102.52	112.48
2	A	486	HEM	CBA-CAA-C2A	-4.82	103.27	112.48
2	E	486	HEM	CBA-CAA-C2A	-4.81	103.28	112.48
2	D	485	HEM	CBA-CAA-C2A	-4.61	103.67	112.48
2	C	485	HEM	CBA-CAA-C2A	-4.58	103.74	112.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	486	HEM	CAD-CBD-CGD	-4.50	104.98	112.66
2	F	486	HEM	CBA-CAA-C2A	-4.24	104.38	112.48
2	E	486	HEM	CAD-CBD-CGD	-4.17	105.53	112.66
2	C	485	HEM	CAD-CBD-CGD	-4.15	105.57	112.66
2	H	485	HEM	CAD-CBD-CGD	-4.14	105.59	112.66
2	E	486	HEM	C1D-C2D-C3D	-3.49	104.57	107.00
2	A	486	HEM	CAD-CBD-CGD	-3.34	106.96	112.66
2	D	485	HEM	CAD-CBD-CGD	-3.24	107.12	112.66
2	G	485	HEM	CAD-CBD-CGD	-3.06	107.42	112.66
2	B	486	HEM	CAD-CBD-CGD	-3.05	107.46	112.66
2	F	486	HEM	CMA-C3A-C4A	-3.01	123.84	128.46
2	C	485	HEM	CMA-C3A-C4A	-2.75	124.23	128.46
2	H	485	HEM	CMA-C3A-C4A	-2.73	124.27	128.46
2	A	486	HEM	CMA-C3A-C4A	-2.59	124.48	128.46
2	C	485	HEM	C1D-C2D-C3D	-2.39	105.33	107.00
2	A	486	HEM	CBD-CAD-C3D	-2.39	107.92	112.47
2	H	485	HEM	CBD-CAD-C3D	-2.25	108.18	112.47
2	G	485	HEM	C1D-C2D-C3D	-2.23	105.44	107.00
2	B	486	HEM	C1D-C2D-C3D	-2.21	105.46	107.00
2	G	485	HEM	CMA-C3A-C4A	-2.21	125.07	128.46
2	D	485	HEM	C1D-C2D-C3D	-2.06	105.56	107.00
2	F	486	HEM	CMA-C3A-C2A	2.07	128.85	124.94
2	F	486	HEM	CMC-C2C-C3C	2.10	128.78	124.89
2	C	485	HEM	C4C-C3C-C2C	2.16	108.41	106.90
2	F	486	HEM	C4C-C3C-C2C	2.17	108.41	106.90
2	G	485	HEM	C4C-C3C-C2C	2.23	108.45	106.90
2	A	486	HEM	CMB-C2B-C3B	2.31	129.18	124.89
2	B	486	HEM	CMC-C2C-C3C	2.32	129.21	124.89

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

13 monomers are involved in 20 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	486	HEM	2	0
3	A	5489	GOL	1	0
2	B	486	HEM	2	0
2	C	485	HEM	3	0
3	C	5487	GOL	1	0
2	D	485	HEM	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	486	HEM	2	0
3	E	5493	GOL	1	0
2	F	486	HEM	2	0
3	F	5494	GOL	1	0
2	G	485	HEM	2	0
3	G	5491	GOL	1	0
2	H	485	HEM	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	481/483 (99%)	-0.60	4 (0%) 86 87	5, 10, 20, 29	0
1	B	481/483 (99%)	-0.57	2 (0%) 92 93	5, 11, 19, 30	1 (0%)
1	C	481/483 (99%)	-0.65	4 (0%) 86 87	4, 9, 20, 32	1 (0%)
1	D	481/483 (99%)	-0.54	2 (0%) 92 93	4, 11, 21, 28	3 (0%)
1	E	481/483 (99%)	-0.45	7 (1%) 74 76	5, 13, 26, 36	2 (0%)
1	F	481/483 (99%)	-0.42	4 (0%) 86 87	8, 14, 24, 32	3 (0%)
1	G	481/483 (99%)	-0.51	4 (0%) 86 87	6, 11, 24, 31	2 (0%)
1	H	481/483 (99%)	-0.50	6 (1%) 79 80	6, 12, 22, 32	3 (0%)
All	All	3848/3864 (99%)	-0.53	33 (0%) 84 85	4, 11, 22, 36	15 (0%)

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	3	SER	6.3
1	H	428	LEU	3.1
1	G	360	PRO	3.0
1	E	428	LEU	3.0
1	E	269	ALA	2.9
1	A	285	LYS	2.9
1	C	483	ASN	2.9
1	F	3	SER	2.9
1	F	428	LEU	2.7
1	E	432	GLU	2.7
1	G	285	LYS	2.6
1	A	269	ALA	2.6
1	H	285	LYS	2.5
1	C	447	GLY	2.5
1	E	483	ASN	2.4
1	A	3	SER	2.4

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Mol	Chain	Res	Type	RSRZ
1	D	484	SER	2.3
1	F	484	SER	2.3
1	C	360	PRO	2.3
1	E	478	ASP	2.3
1	H	3	SER	2.3
1	B	269	ALA	2.2
1	C	359	CYS	2.2
1	H	484	SER	2.2
1	A	484	SER	2.2
1	E	484	SER	2.1
1	H	447	GLY	2.1
1	B	484	SER	2.1
1	G	428	LEU	2.1
1	E	285	LYS	2.1
1	D	272	PRO	2.0
1	H	483	ASN	2.0
1	F	270	THR	2.0

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

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	OMT	F	53	10/11	0.97	0.07	-	10,11,18,20	0
1	OMT	D	53	10/11	0.98	0.06	-	6,6,12,13	0
1	OMT	B	53	10/11	0.98	0.06	-	6,7,16,17	0
1	OMT	C	53	10/11	0.98	0.06	-	6,7,14,14	0
1	OMT	A	53	10/11	0.98	0.06	-	5,6,12,12	0
1	OMT	G	53	10/11	0.98	0.07	-	8,9,13,15	0
1	OMT	E	53	10/11	0.99	0.05	-	8,8,16,18	0
1	OMT	H	53	10/11	0.99	0.05	-	8,8,12,12	0

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, 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
3	GOL	E	5493	6/6	0.87	0.14	10.88	18,21,22,22	0
3	GOL	A	5489	6/6	0.94	0.11	10.35	10,17,18,18	0
3	GOL	G	5491	6/6	0.90	0.13	6.41	15,20,21,22	0
3	GOL	H	5492	6/6	0.89	0.11	5.92	18,21,22,25	0
3	GOL	D	5488	6/6	0.93	0.10	4.69	12,16,17,18	0
3	GOL	C	5487	6/6	0.95	0.09	4.17	7,11,12,13	0
3	GOL	B	5490	6/6	0.94	0.10	4.12	13,17,17,20	0
2	HEM	F	486	43/43	0.98	0.08	1.20	8,11,13,13	0
3	GOL	F	5494	6/6	0.95	0.09	1.11	12,16,17,18	0
2	HEM	H	485	43/43	0.98	0.08	0.66	6,10,12,13	0
2	HEM	A	486	43/43	0.98	0.07	0.56	5,7,9,10	0
2	HEM	G	485	43/43	0.98	0.08	0.39	7,10,12,14	0
2	HEM	D	485	43/43	0.98	0.07	0.35	3,10,11,12	0
2	HEM	E	486	43/43	0.98	0.07	0.14	8,10,12,13	0
2	HEM	C	485	43/43	0.98	0.07	0.05	4,7,9,10	0
2	HEM	B	486	43/43	0.98	0.07	0.02	6,7,8,10	0
4	CL	H	7485	1/1	0.98	0.04	-2.78	17,17,17,17	0
4	CL	D	5485	1/1	0.99	0.04	-3.95	14,14,14,14	0
4	CL	F	8485	1/1	0.99	0.03	-4.34	16,16,16,16	0
4	CL	B	6485	1/1	0.99	0.04	-4.35	13,13,13,13	0

6.5 Other polymers

There are no such residues in this entry.