



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 03:43 PM UTC

PDB ID : 4HNZ / pdb_00004hnz
Title : Crystal structure of eukaryotic HslV from Trypanosoma brucei
Authors : Sung, K.H.; Lee, S.Y.; Song, H.K.
Deposited on : 2012-10-22
Resolution : 2.39 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

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

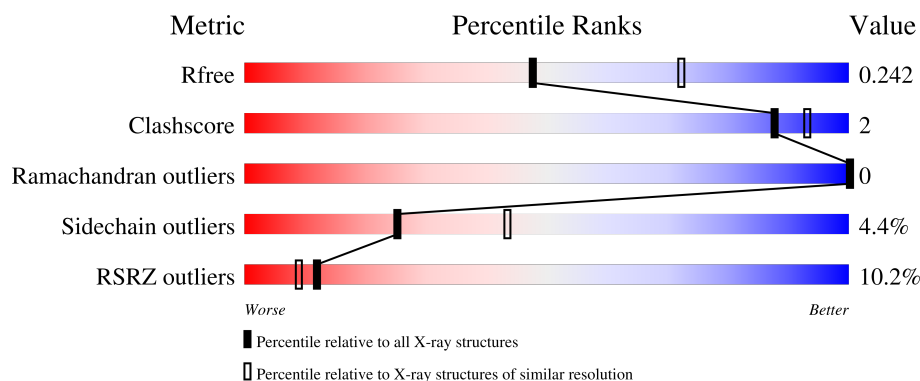
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.39 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}	180053	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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 of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. 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	179	9% 87% 9% ..
1	B	179	6% 88% 8% ...
1	C	179	11% 88% 8% ...
1	D	179	13% 87% 9% ...
1	E	179	13% 88% 8% ...

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Mol	Chain	Length	Quality of chain
1	F	179	9% 87% 9% ..
1	G	179	8% 87% 8% ..
1	H	179	12% 88% 9% ..
1	I	179	10% 88% 8% ..
1	J	179	11% 88% 8% ..
1	K	179	8% 87% 10% ..
1	L	179	9% 88% 8% ..

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 16550 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 HslVU complex proteolytic subunit, putative.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	B	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	C	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	D	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	E	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	F	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	G	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	H	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	I	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	J	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	K	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			
1	L	174	Total	C	N	O	S	0	0	0
			1322	821	236	261	4			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	173	GLU	LYS	conflict	UNP Q383Q5
A	174	HIS	-	expression tag	UNP Q383Q5
A	175	HIS	-	expression tag	UNP Q383Q5
A	176	HIS	-	expression tag	UNP Q383Q5
A	177	HIS	-	expression tag	UNP Q383Q5

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Chain	Residue	Modelled	Actual	Comment	Reference
A	178	HIS	-	expression tag	UNP Q383Q5
A	179	HIS	-	expression tag	UNP Q383Q5
B	173	GLU	LYS	conflict	UNP Q383Q5
B	174	HIS	-	expression tag	UNP Q383Q5
B	175	HIS	-	expression tag	UNP Q383Q5
B	176	HIS	-	expression tag	UNP Q383Q5
B	177	HIS	-	expression tag	UNP Q383Q5
B	178	HIS	-	expression tag	UNP Q383Q5
B	179	HIS	-	expression tag	UNP Q383Q5
C	173	GLU	LYS	conflict	UNP Q383Q5
C	174	HIS	-	expression tag	UNP Q383Q5
C	175	HIS	-	expression tag	UNP Q383Q5
C	176	HIS	-	expression tag	UNP Q383Q5
C	177	HIS	-	expression tag	UNP Q383Q5
C	178	HIS	-	expression tag	UNP Q383Q5
C	179	HIS	-	expression tag	UNP Q383Q5
D	173	GLU	LYS	conflict	UNP Q383Q5
D	174	HIS	-	expression tag	UNP Q383Q5
D	175	HIS	-	expression tag	UNP Q383Q5
D	176	HIS	-	expression tag	UNP Q383Q5
D	177	HIS	-	expression tag	UNP Q383Q5
D	178	HIS	-	expression tag	UNP Q383Q5
D	179	HIS	-	expression tag	UNP Q383Q5
E	173	GLU	LYS	conflict	UNP Q383Q5
E	174	HIS	-	expression tag	UNP Q383Q5
E	175	HIS	-	expression tag	UNP Q383Q5
E	176	HIS	-	expression tag	UNP Q383Q5
E	177	HIS	-	expression tag	UNP Q383Q5
E	178	HIS	-	expression tag	UNP Q383Q5
E	179	HIS	-	expression tag	UNP Q383Q5
F	173	GLU	LYS	conflict	UNP Q383Q5
F	174	HIS	-	expression tag	UNP Q383Q5
F	175	HIS	-	expression tag	UNP Q383Q5
F	176	HIS	-	expression tag	UNP Q383Q5
F	177	HIS	-	expression tag	UNP Q383Q5
F	178	HIS	-	expression tag	UNP Q383Q5
F	179	HIS	-	expression tag	UNP Q383Q5
G	173	GLU	LYS	conflict	UNP Q383Q5
G	174	HIS	-	expression tag	UNP Q383Q5
G	175	HIS	-	expression tag	UNP Q383Q5
G	176	HIS	-	expression tag	UNP Q383Q5
G	177	HIS	-	expression tag	UNP Q383Q5

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Chain	Residue	Modelled	Actual	Comment	Reference
G	178	HIS	-	expression tag	UNP Q383Q5
G	179	HIS	-	expression tag	UNP Q383Q5
H	173	GLU	LYS	conflict	UNP Q383Q5
H	174	HIS	-	expression tag	UNP Q383Q5
H	175	HIS	-	expression tag	UNP Q383Q5
H	176	HIS	-	expression tag	UNP Q383Q5
H	177	HIS	-	expression tag	UNP Q383Q5
H	178	HIS	-	expression tag	UNP Q383Q5
H	179	HIS	-	expression tag	UNP Q383Q5
I	173	GLU	LYS	conflict	UNP Q383Q5
I	174	HIS	-	expression tag	UNP Q383Q5
I	175	HIS	-	expression tag	UNP Q383Q5
I	176	HIS	-	expression tag	UNP Q383Q5
I	177	HIS	-	expression tag	UNP Q383Q5
I	178	HIS	-	expression tag	UNP Q383Q5
I	179	HIS	-	expression tag	UNP Q383Q5
J	173	GLU	LYS	conflict	UNP Q383Q5
J	174	HIS	-	expression tag	UNP Q383Q5
J	175	HIS	-	expression tag	UNP Q383Q5
J	176	HIS	-	expression tag	UNP Q383Q5
J	177	HIS	-	expression tag	UNP Q383Q5
J	178	HIS	-	expression tag	UNP Q383Q5
J	179	HIS	-	expression tag	UNP Q383Q5
K	173	GLU	LYS	conflict	UNP Q383Q5
K	174	HIS	-	expression tag	UNP Q383Q5
K	175	HIS	-	expression tag	UNP Q383Q5
K	176	HIS	-	expression tag	UNP Q383Q5
K	177	HIS	-	expression tag	UNP Q383Q5
K	178	HIS	-	expression tag	UNP Q383Q5
K	179	HIS	-	expression tag	UNP Q383Q5
L	173	GLU	LYS	conflict	UNP Q383Q5
L	174	HIS	-	expression tag	UNP Q383Q5
L	175	HIS	-	expression tag	UNP Q383Q5
L	176	HIS	-	expression tag	UNP Q383Q5
L	177	HIS	-	expression tag	UNP Q383Q5
L	178	HIS	-	expression tag	UNP Q383Q5
L	179	HIS	-	expression tag	UNP Q383Q5

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total 1	Mg 1	0	0
2	B	1	Total 1	Mg 1	0	0
2	C	1	Total 1	Mg 1	0	0
2	D	1	Total 1	Mg 1	0	0
2	E	1	Total 1	Mg 1	0	0
2	F	1	Total 1	Mg 1	0	0
2	G	1	Total 1	Mg 1	0	0
2	H	1	Total 1	Mg 1	0	0
2	I	1	Total 1	Mg 1	0	0
2	J	1	Total 1	Mg 1	0	0
2	K	1	Total 1	Mg 1	0	0
2	L	1	Total 1	Mg 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	54	Total 54	O 54	0	0
3	B	62	Total 62	O 62	0	0
3	C	64	Total 64	O 64	0	0
3	D	56	Total 56	O 56	0	0
3	E	52	Total 52	O 52	0	0
3	F	60	Total 60	O 60	0	0

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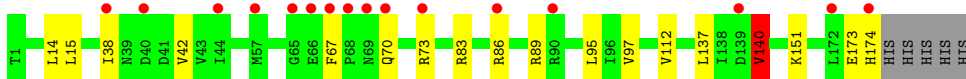
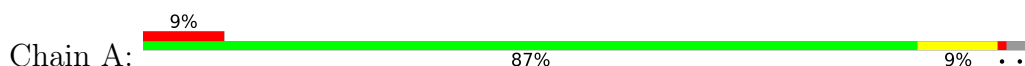
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	G	65	Total 65	O 65	0	0
3	H	43	Total 43	O 43	0	0
3	I	61	Total 61	O 61	0	0
3	J	44	Total 44	O 44	0	0
3	K	58	Total 58	O 58	0	0
3	L	55	Total 55	O 55	0	0

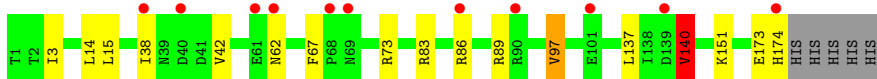
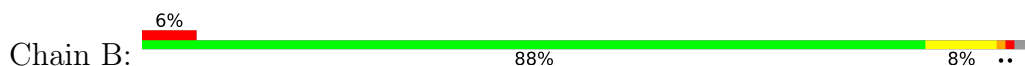
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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.

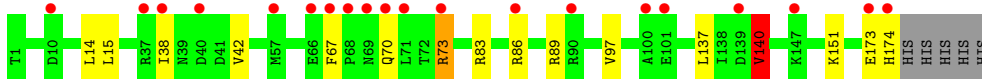
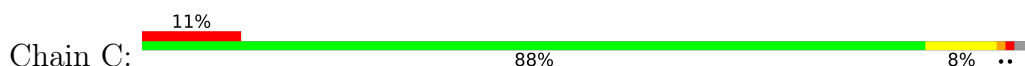
- Molecule 1: HslVU complex proteolytic subunit, putative



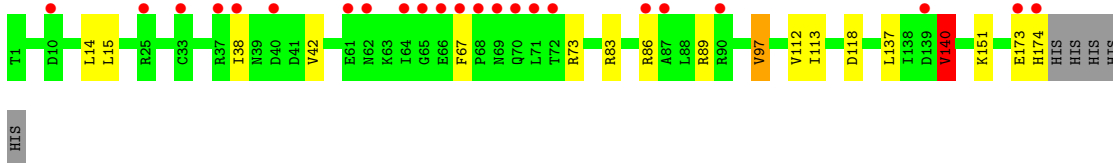
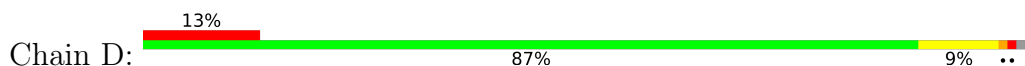
- Molecule 1: HslVU complex proteolytic subunit, putative



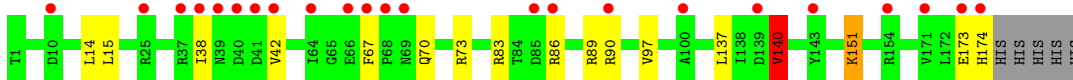
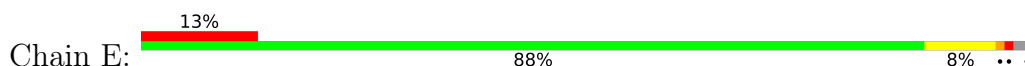
- Molecule 1: HslVU complex proteolytic subunit, putative



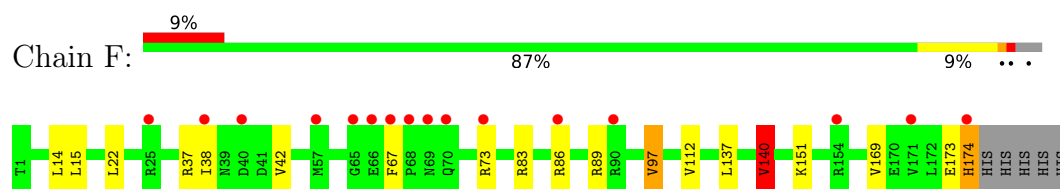
- Molecule 1: HslVU complex proteolytic subunit, putative



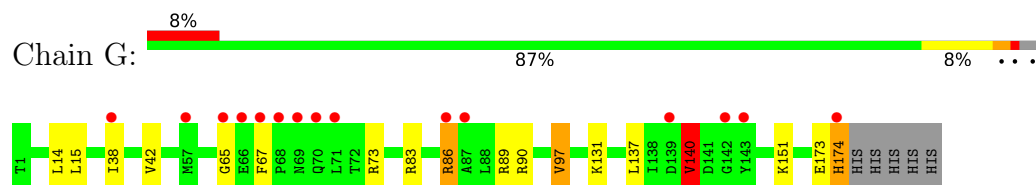
- Molecule 1: HslVU complex proteolytic subunit, putative



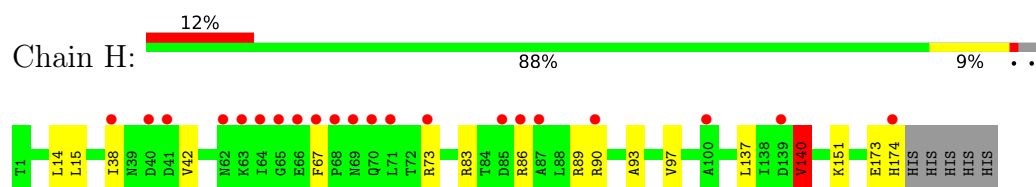
- Molecule 1: HslVU complex proteolytic subunit, putative



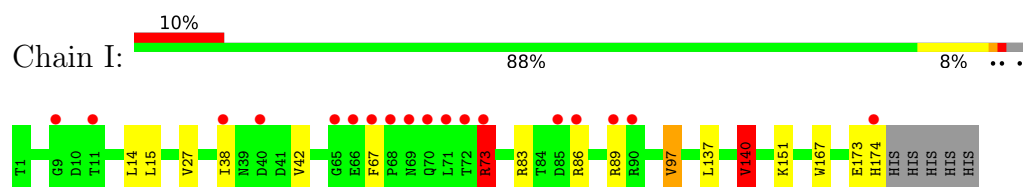
- Molecule 1: HslVU complex proteolytic subunit, putative



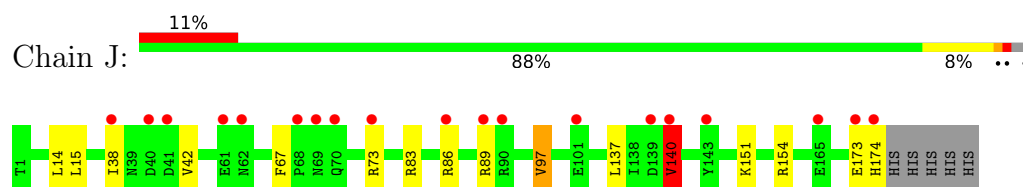
- Molecule 1: HslVU complex proteolytic subunit, putative



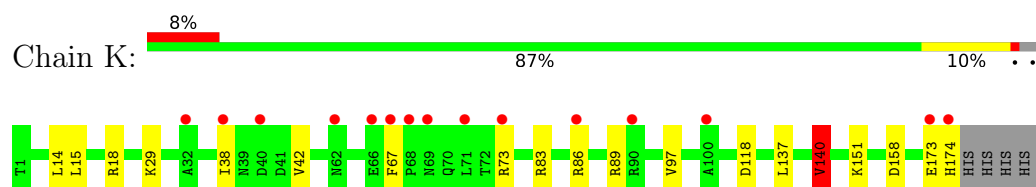
- Molecule 1: HslVU complex proteolytic subunit, putative



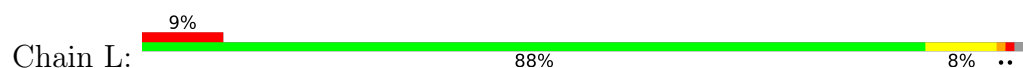
- Molecule 1: HslVU complex proteolytic subunit, putative

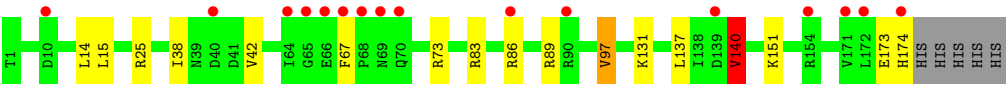


- Molecule 1: HslVU complex proteolytic subunit, putative



- Molecule 1: HslVU complex proteolytic subunit, putative





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	100.88Å 106.99Å 132.66Å 90.00° 104.24° 90.00°	Depositor
Resolution (Å)	41.13 – 2.39 41.13 – 2.39	Depositor EDS
% Data completeness (in resolution range)	98.4 (41.13-2.39) 98.4 (41.13-2.39)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.26 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.218 , 0.239 0.222 , 0.242	Depositor DCC
R_{free} test set	5382 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	22.1	Xtriage
Anisotropy	0.432	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 42.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	16550	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 55.93 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.9463e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG

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	1.15	2/1334 (0.1%)	1.01	4/1802 (0.2%)
1	B	1.16	1/1334 (0.1%)	1.07	5/1802 (0.3%)
1	C	1.17	1/1334 (0.1%)	1.06	5/1802 (0.3%)
1	D	1.15	2/1334 (0.1%)	1.03	5/1802 (0.3%)
1	E	1.08	0/1334	1.02	4/1802 (0.2%)
1	F	1.12	2/1334 (0.1%)	1.04	6/1802 (0.3%)
1	G	1.20	2/1334 (0.1%)	1.05	5/1802 (0.3%)
1	H	1.19	2/1334 (0.1%)	1.05	4/1802 (0.2%)
1	I	1.14	3/1334 (0.2%)	1.07	6/1802 (0.3%)
1	J	1.11	0/1334	1.06	6/1802 (0.3%)
1	K	1.11	1/1334 (0.1%)	1.01	4/1802 (0.2%)
1	L	1.15	3/1334 (0.2%)	1.04	5/1802 (0.3%)
All	All	1.14	19/16008 (0.1%)	1.04	59/21624 (0.3%)

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	112	VAL	C-O	-6.58	1.17	1.24
1	G	131	LYS	N-CA	-6.47	1.38	1.46
1	C	173	GLU	CA-C	6.12	1.57	1.52
1	H	173	GLU	CA-C	6.03	1.57	1.52
1	L	140	VAL	CA-CB	5.94	1.60	1.53
1	I	27	VAL	C-O	-5.92	1.18	1.24
1	I	173	GLU	CA-C	5.85	1.57	1.52
1	K	158	ASP	C-O	-5.54	1.17	1.24
1	I	167	TRP	C-O	-5.40	1.17	1.23
1	L	131	LYS	N-CA	-5.37	1.40	1.46
1	F	112	VAL	C-O	-5.34	1.18	1.24
1	F	174	HIS	N-CA	5.30	1.56	1.46
1	D	113	ILE	N-CA	-5.26	1.40	1.46
1	H	93	ALA	C-O	-5.20	1.17	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	174	HIS	N-CA	5.20	1.56	1.46
1	L	173	GLU	CA-C	5.19	1.57	1.52
1	B	3	ILE	N-CA	-5.11	1.40	1.46
1	A	95	LEU	CA-C	-5.05	1.46	1.52
1	D	112	VAL	C-O	-5.01	1.18	1.24

All (59) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	67	PHE	CA-C-N	7.37	129.05	119.84
1	B	67	PHE	C-N-CA	7.37	129.05	119.84
1	G	67	PHE	CA-C-N	7.26	128.91	119.84
1	G	67	PHE	C-N-CA	7.26	128.91	119.84
1	H	67	PHE	CA-C-N	6.95	128.53	119.84
1	H	67	PHE	C-N-CA	6.95	128.53	119.84
1	I	73	ARG	CG-CD-NE	-6.91	96.79	112.00
1	C	67	PHE	CA-C-N	6.90	128.47	119.84
1	C	67	PHE	C-N-CA	6.90	128.47	119.84
1	C	73	ARG	CG-CD-NE	-6.85	96.93	112.00
1	H	140	VAL	N-CA-C	6.77	118.80	108.71
1	F	67	PHE	CA-C-N	6.76	128.29	119.84
1	F	67	PHE	C-N-CA	6.76	128.29	119.84
1	J	67	PHE	CA-C-N	6.74	128.27	119.84
1	J	67	PHE	C-N-CA	6.74	128.27	119.84
1	I	67	PHE	CA-C-N	6.65	128.15	119.84
1	I	67	PHE	C-N-CA	6.65	128.15	119.84
1	D	67	PHE	CA-C-N	6.62	128.11	119.84
1	D	67	PHE	C-N-CA	6.62	128.11	119.84
1	E	67	PHE	CA-C-N	6.55	128.03	119.84
1	E	67	PHE	C-N-CA	6.55	128.03	119.84
1	K	140	VAL	CB-CA-C	6.55	119.57	111.25
1	L	67	PHE	CA-C-N	6.52	127.99	119.84
1	L	67	PHE	C-N-CA	6.52	127.99	119.84
1	E	173	GLU	N-CA-C	6.49	121.00	111.34
1	K	173	GLU	N-CA-C	6.46	120.96	111.34
1	I	97	VAL	CB-CA-C	-6.45	101.08	110.63
1	L	173	GLU	N-CA-C	6.44	120.94	111.34
1	A	67	PHE	CA-C-N	6.43	127.88	119.84
1	A	67	PHE	C-N-CA	6.43	127.88	119.84
1	J	140	VAL	N-CA-C	6.38	118.22	108.71
1	K	67	PHE	CA-C-N	6.37	127.80	119.84
1	K	67	PHE	C-N-CA	6.37	127.80	119.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	140	VAL	N-CA-C	6.28	118.06	108.71
1	D	173	GLU	N-CA-C	6.13	120.48	111.34
1	E	140	VAL	CB-CA-C	6.08	118.97	111.25
1	H	173	GLU	N-CA-C	6.07	120.38	111.34
1	G	173	GLU	N-CA-C	6.05	120.36	111.34
1	B	140	VAL	N-CA-C	5.99	117.64	108.71
1	D	140	VAL	CB-CA-C	5.95	118.81	111.25
1	G	140	VAL	CB-CA-C	5.95	118.80	111.25
1	B	173	GLU	N-CA-C	5.82	120.01	111.34
1	A	140	VAL	N-CA-C	5.70	117.20	108.71
1	L	140	VAL	CB-CA-C	5.69	118.48	111.25
1	J	173	GLU	N-CA-C	5.66	119.77	111.34
1	C	173	GLU	N-CA-C	5.65	119.76	111.34
1	L	97	VAL	CB-CA-C	-5.62	102.31	110.63
1	F	173	GLU	N-CA-C	5.62	119.71	111.34
1	J	97	VAL	CB-CA-C	-5.59	102.35	110.63
1	I	173	GLU	N-CA-C	5.57	119.63	111.34
1	F	140	VAL	CB-CA-C	5.50	118.24	111.25
1	I	140	VAL	N-CA-C	5.47	116.86	108.71
1	F	37	ARG	N-CA-C	-5.47	100.27	108.96
1	A	173	GLU	N-CA-C	5.41	119.40	111.34
1	J	154	ARG	N-CA-C	-5.40	105.39	111.28
1	F	97	VAL	CB-CA-C	-5.27	102.83	110.63
1	G	97	VAL	CB-CA-C	-5.26	102.84	110.63
1	D	97	VAL	CB-CA-C	-5.25	102.86	110.63
1	B	97	VAL	CB-CA-C	-5.18	102.96	110.63

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	1322	0	1345	5	0
1	B	1322	0	1345	5	0
1	C	1322	0	1345	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	1322	0	1345	5	0
1	E	1322	0	1345	8	0
1	F	1322	0	1345	6	0
1	G	1322	0	1345	6	1
1	H	1322	0	1345	5	0
1	I	1322	0	1345	4	1
1	J	1322	0	1345	4	0
1	K	1322	0	1345	7	0
1	L	1322	0	1345	5	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
2	I	1	0	0	0	0
2	J	1	0	0	0	0
2	K	1	0	0	0	0
2	L	1	0	0	0	0
3	A	54	0	0	1	0
3	B	62	0	0	1	0
3	C	64	0	0	1	0
3	D	56	0	0	2	0
3	E	52	0	0	4	0
3	F	60	0	0	0	0
3	G	65	0	0	1	0
3	H	43	0	0	1	0
3	I	61	0	0	0	0
3	J	44	0	0	1	0
3	K	58	0	0	2	0
3	L	55	0	0	2	0
All	All	16550	0	16140	65	1

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 2.

All (65) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:70:GLN:HB3	3:A:325:HOH:O	1.92	0.68
1:C:70:GLN:HB3	3:C:356:HOH:O	1.98	0.63
1:B:62:ASN:ND2	3:B:347:HOH:O	2.34	0.60
1:L:14:LEU:C	1:L:15:LEU:HD12	2.33	0.54
1:I:14:LEU:C	1:I:15:LEU:HD12	2.33	0.53
1:J:14:LEU:C	1:J:15:LEU:HD12	2.34	0.52
1:B:14:LEU:C	1:B:15:LEU:HD12	2.35	0.51
1:E:151:LYS:HD3	3:E:333:HOH:O	2.10	0.51
1:H:14:LEU:C	1:H:15:LEU:HD12	2.35	0.51
3:D:353:HOH:O	1:E:90:ARG:HD2	2.10	0.50
1:D:14:LEU:C	1:D:15:LEU:HD12	2.37	0.50
1:A:14:LEU:C	1:A:15:LEU:HD12	2.37	0.49
1:B:83:ARG:O	1:B:89:ARG:HD2	2.12	0.49
1:E:14:LEU:C	1:E:15:LEU:HD12	2.38	0.49
1:G:83:ARG:O	1:G:89:ARG:HD2	2.13	0.49
1:D:83:ARG:O	1:D:89:ARG:HD2	2.13	0.49
1:F:14:LEU:C	1:F:15:LEU:HD12	2.38	0.49
1:H:83:ARG:O	1:H:89:ARG:HD2	2.12	0.49
1:J:83:ARG:O	1:J:89:ARG:HD2	2.13	0.49
1:K:83:ARG:O	1:K:89:ARG:HD2	2.12	0.48
1:A:83:ARG:O	1:A:89:ARG:HD2	2.13	0.48
1:L:83:ARG:O	1:L:89:ARG:HD2	2.13	0.48
1:C:83:ARG:O	1:C:89:ARG:HD2	2.13	0.48
1:I:83:ARG:O	1:I:89:ARG:HD2	2.13	0.48
1:K:18:ARG:NH2	3:K:330:HOH:O	2.46	0.48
1:G:14:LEU:C	1:G:15:LEU:HD12	2.39	0.48
1:I:38:ILE:HD11	1:I:42:VAL:HG11	1.95	0.48
1:K:14:LEU:C	1:K:15:LEU:HD12	2.38	0.48
1:F:38:ILE:HD11	1:F:42:VAL:HG11	1.95	0.48
1:E:83:ARG:O	1:E:89:ARG:HD2	2.13	0.48
1:K:118:ASP:N	3:K:342:HOH:O	2.37	0.47
1:F:83:ARG:O	1:F:89:ARG:HD2	2.13	0.47
1:C:38:ILE:HD11	1:C:42:VAL:HG11	1.97	0.47
1:E:38:ILE:HD11	1:E:42:VAL:HG11	1.96	0.47
1:K:38:ILE:HD11	1:K:42:VAL:HG11	1.95	0.47
1:D:118:ASP:N	3:D:350:HOH:O	2.48	0.46
1:E:151:LYS:NZ	3:E:324:HOH:O	2.48	0.46
1:H:38:ILE:HD11	1:H:42:VAL:HG11	1.96	0.46
1:L:38:ILE:HD11	1:L:42:VAL:HG11	1.97	0.46
1:A:38:ILE:HD11	1:A:42:VAL:HG11	1.98	0.46
1:C:137:LEU:HA	1:C:140:VAL:HG13	1.98	0.46
1:A:137:LEU:HA	1:A:140:VAL:HG13	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:137:LEU:HA	1:J:140:VAL:HG13	1.98	0.46
1:B:137:LEU:HA	1:B:140:VAL:HG13	1.98	0.45
3:E:341:HOH:O	1:F:22:LEU:HD23	2.16	0.45
1:C:14:LEU:C	1:C:15:LEU:HD12	2.40	0.45
1:J:38:ILE:HD11	1:J:42:VAL:HG11	1.98	0.45
1:B:38:ILE:HD11	1:B:42:VAL:HG11	1.97	0.45
1:G:38:ILE:HD11	1:G:42:VAL:HG11	1.98	0.45
1:D:38:ILE:HD11	1:D:42:VAL:HG11	1.98	0.45
1:F:137:LEU:HA	1:F:140:VAL:HG13	1.99	0.45
3:J:325:HOH:O	1:K:29:LYS:HE2	2.17	0.44
1:E:90:ARG:HB2	3:E:335:HOH:O	2.17	0.44
1:L:137:LEU:HA	1:L:140:VAL:HG13	1.99	0.44
1:G:86:ARG:HD3	3:G:307:HOH:O	2.18	0.44
1:D:137:LEU:HA	1:D:140:VAL:HG13	2.00	0.44
1:H:137:LEU:HA	1:H:140:VAL:HG13	2.01	0.43
1:K:137:LEU:HA	1:K:140:VAL:HG13	2.00	0.43
1:G:137:LEU:HA	1:G:140:VAL:HG13	2.01	0.43
1:H:90:ARG:HG3	3:H:333:HOH:O	2.18	0.42
1:I:137:LEU:HA	1:I:140:VAL:HG13	2.01	0.42
1:F:15:LEU:HG	1:F:169:VAL:HG22	2.02	0.41
1:E:137:LEU:HA	1:E:140:VAL:HG13	2.01	0.41
1:L:25:ARG:NH1	3:L:336:HOH:O	2.49	0.41
1:G:90:ARG:HD2	3:L:312:HOH:O	2.21	0.41

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:65:GLY:O	1:I:73:ARG:NH1[2_646]	2.07	0.13

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	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
1	B	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
1	C	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
1	D	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
1	E	172/179 (96%)	169 (98%)	3 (2%)	0	100	100
1	F	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
1	G	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
1	H	172/179 (96%)	169 (98%)	3 (2%)	0	100	100
1	I	172/179 (96%)	169 (98%)	3 (2%)	0	100	100
1	J	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
1	K	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
1	L	172/179 (96%)	168 (98%)	4 (2%)	0	100	100
All	All	2064/2148 (96%)	2019 (98%)	45 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	B	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	C	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	D	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	E	139/144 (96%)	132 (95%)	7 (5%)	22	38
1	F	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	G	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	H	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	I	139/144 (96%)	133 (96%)	6 (4%)	26	44

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	J	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	K	139/144 (96%)	133 (96%)	6 (4%)	26	44
1	L	139/144 (96%)	133 (96%)	6 (4%)	26	44
All	All	1668/1728 (96%)	1595 (96%)	73 (4%)	25	43

All (73) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	73	ARG
1	A	86	ARG
1	A	97	VAL
1	A	140	VAL
1	A	151	LYS
1	A	174	HIS
1	B	73	ARG
1	B	86	ARG
1	B	97	VAL
1	B	140	VAL
1	B	151	LYS
1	B	174	HIS
1	C	73	ARG
1	C	86	ARG
1	C	97	VAL
1	C	140	VAL
1	C	151	LYS
1	C	174	HIS
1	D	73	ARG
1	D	86	ARG
1	D	97	VAL
1	D	140	VAL
1	D	151	LYS
1	D	174	HIS
1	E	70	GLN
1	E	73	ARG
1	E	86	ARG
1	E	97	VAL
1	E	140	VAL
1	E	151	LYS
1	E	174	HIS
1	F	73	ARG
1	F	86	ARG

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Mol	Chain	Res	Type
1	F	97	VAL
1	F	140	VAL
1	F	151	LYS
1	F	174	HIS
1	G	73	ARG
1	G	86	ARG
1	G	97	VAL
1	G	140	VAL
1	G	151	LYS
1	G	174	HIS
1	H	73	ARG
1	H	86	ARG
1	H	97	VAL
1	H	140	VAL
1	H	151	LYS
1	H	174	HIS
1	I	73	ARG
1	I	86	ARG
1	I	97	VAL
1	I	140	VAL
1	I	151	LYS
1	I	174	HIS
1	J	73	ARG
1	J	86	ARG
1	J	97	VAL
1	J	140	VAL
1	J	151	LYS
1	J	174	HIS
1	K	73	ARG
1	K	86	ARG
1	K	97	VAL
1	K	140	VAL
1	K	151	LYS
1	K	174	HIS
1	L	73	ARG
1	L	86	ARG
1	L	97	VAL
1	L	140	VAL
1	L	151	LYS
1	L	174	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	166	HIS
1	C	166	HIS
1	I	166	HIS
1	K	166	HIS
1	L	166	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 12 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	174/179 (97%)	0.61	16 (9%) 14 12	12, 22, 51, 72	0
1	B	174/179 (97%)	0.51	11 (6%) 26 22	12, 22, 47, 68	0
1	C	174/179 (97%)	0.53	20 (11%) 9 7	11, 22, 45, 73	0
1	D	174/179 (97%)	0.80	23 (13%) 7 5	13, 24, 55, 77	0
1	E	174/179 (97%)	0.75	23 (13%) 7 5	12, 24, 62, 78	0
1	F	174/179 (97%)	0.57	16 (9%) 14 12	10, 23, 56, 86	0
1	G	174/179 (97%)	0.67	15 (8%) 16 13	12, 23, 49, 68	0
1	H	174/179 (97%)	0.76	21 (12%) 8 6	11, 23, 60, 104	0
1	I	174/179 (97%)	0.72	18 (10%) 12 9	14, 23, 49, 85	0
1	J	174/179 (97%)	0.68	19 (10%) 10 8	12, 24, 52, 64	0
1	K	174/179 (97%)	0.54	15 (8%) 16 13	11, 24, 55, 85	0
1	L	174/179 (97%)	0.55	16 (9%) 14 12	10, 22, 49, 79	0
All	All	2088/2148 (97%)	0.64	213 (10%) 12 9	10, 23, 54, 104	0

All (213) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	69	ASN	7.7
1	K	174	HIS	6.7
1	E	174	HIS	6.7
1	L	174	HIS	6.4
1	F	174	HIS	6.4
1	I	70	GLN	6.3
1	A	174	HIS	6.2
1	B	174	HIS	6.0
1	G	174	HIS	6.0
1	C	174	HIS	5.9
1	D	174	HIS	5.8

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Mol	Chain	Res	Type	RSRZ
1	J	174	HIS	5.8
1	E	69	ASN	5.6
1	D	68	PRO	5.6
1	I	86	ARG	5.6
1	H	69	ASN	5.6
1	H	67	PHE	5.5
1	F	69	ASN	5.4
1	H	174	HIS	5.4
1	K	69	ASN	5.3
1	F	86	ARG	5.3
1	L	69	ASN	5.1
1	E	68	PRO	5.1
1	I	174	HIS	5.0
1	I	69	ASN	5.0
1	B	86	ARG	4.9
1	I	73	ARG	4.8
1	C	69	ASN	4.8
1	D	70	GLN	4.8
1	H	68	PRO	4.7
1	H	65	GLY	4.7
1	D	67	PHE	4.6
1	D	71	LEU	4.6
1	B	38	ILE	4.6
1	I	66	GLU	4.5
1	E	38	ILE	4.4
1	I	67	PHE	4.3
1	D	86	ARG	4.3
1	G	86	ARG	4.3
1	A	86	ARG	4.2
1	D	66	GLU	4.2
1	J	69	ASN	4.1
1	F	68	PRO	4.1
1	G	68	PRO	4.1
1	A	69	ASN	4.1
1	F	66	GLU	4.0
1	E	86	ARG	3.9
1	L	65	GLY	3.9
1	H	86	ARG	3.9
1	B	69	ASN	3.9
1	G	69	ASN	3.9
1	H	40	ASP	3.9
1	L	68	PRO	3.8

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Mol	Chain	Res	Type	RSRZ
1	H	70	GLN	3.8
1	D	65	GLY	3.8
1	C	73	ARG	3.7
1	H	38	ILE	3.7
1	F	65	GLY	3.7
1	G	65	GLY	3.7
1	E	40	ASP	3.6
1	E	100	ALA	3.6
1	H	64	ILE	3.5
1	F	38	ILE	3.4
1	I	38	ILE	3.4
1	E	139	ASP	3.4
1	G	66	GLU	3.4
1	H	66	GLU	3.4
1	A	139	ASP	3.4
1	K	68	PRO	3.3
1	H	62	ASN	3.3
1	J	139	ASP	3.3
1	C	38	ILE	3.2
1	I	71	LEU	3.2
1	K	67	PHE	3.2
1	A	73	ARG	3.2
1	E	90	ARG	3.2
1	C	139	ASP	3.2
1	K	38	ILE	3.2
1	G	139	ASP	3.1
1	A	66	GLU	3.1
1	A	40	ASP	3.1
1	J	143	TYR	3.0
1	B	40	ASP	3.0
1	E	143	TYR	3.0
1	K	86	ARG	3.0
1	C	67	PHE	3.0
1	F	67	PHE	3.0
1	I	68	PRO	3.0
1	D	38	ILE	3.0
1	L	64	ILE	3.0
1	L	70	GLN	2.9
1	L	86	ARG	2.9
1	K	62	ASN	2.9
1	J	38	ILE	2.9
1	K	66	GLU	2.9

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Mol	Chain	Res	Type	RSRZ
1	D	72	THR	2.9
1	E	173	GLU	2.8
1	E	41	ASP	2.8
1	H	41	ASP	2.8
1	H	71	LEU	2.8
1	D	64	ILE	2.8
1	B	62	ASN	2.8
1	C	10	ASP	2.8
1	H	63	LYS	2.8
1	D	37	ARG	2.8
1	G	142	GLY	2.7
1	E	25	ARG	2.7
1	J	86	ARG	2.7
1	I	72	THR	2.7
1	B	61	GLU	2.7
1	E	66	GLU	2.7
1	D	90	ARG	2.7
1	A	90	ARG	2.7
1	C	37	ARG	2.7
1	K	100	ALA	2.7
1	C	147	LYS	2.7
1	J	40	ASP	2.7
1	A	68	PRO	2.7
1	F	40	ASP	2.6
1	A	38	ILE	2.6
1	C	57	MET	2.6
1	H	87	ALA	2.6
1	H	73	ARG	2.6
1	G	87	ALA	2.6
1	D	40	ASP	2.6
1	E	85	ASP	2.6
1	J	62	ASN	2.6
1	C	90	ARG	2.6
1	E	10	ASP	2.6
1	K	40	ASP	2.6
1	L	10	ASP	2.6
1	G	143	TYR	2.6
1	J	90	ARG	2.5
1	E	171	VAL	2.5
1	E	64	ILE	2.5
1	G	38	ILE	2.5
1	J	61	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
1	J	73	ARG	2.5
1	C	68	PRO	2.5
1	L	67	PHE	2.5
1	F	70	GLN	2.5
1	C	66	GLU	2.5
1	F	57	MET	2.5
1	G	57	MET	2.5
1	E	154	ARG	2.5
1	K	173	GLU	2.5
1	A	57	MET	2.5
1	C	40	ASP	2.5
1	D	62	ASN	2.5
1	J	70	GLN	2.5
1	D	25	ARG	2.4
1	J	89	ARG	2.4
1	E	39	ASN	2.4
1	L	66	GLU	2.4
1	E	37	ARG	2.4
1	H	100	ALA	2.4
1	D	10	ASP	2.4
1	J	41	ASP	2.4
1	G	71	LEU	2.4
1	K	90	ARG	2.4
1	C	173	GLU	2.4
1	J	140	VAL	2.3
1	C	86	ARG	2.3
1	I	40	ASP	2.3
1	I	85	ASP	2.3
1	L	139	ASP	2.3
1	D	87	ALA	2.3
1	A	70	GLN	2.3
1	A	172	LEU	2.3
1	C	71	LEU	2.3
1	B	68	PRO	2.3
1	I	9	GLY	2.3
1	D	61	GLU	2.3
1	B	139	ASP	2.3
1	H	139	ASP	2.3
1	L	90	ARG	2.3
1	C	70	GLN	2.3
1	G	70	GLN	2.3
1	J	165	GLU	2.3

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Mol	Chain	Res	Type	RSRZ
1	J	173	GLU	2.3
1	I	90	ARG	2.2
1	A	67	PHE	2.2
1	F	90	ARG	2.2
1	L	172	LEU	2.2
1	F	171	VAL	2.2
1	H	90	ARG	2.2
1	E	42	VAL	2.2
1	B	101	GLU	2.2
1	C	101	GLU	2.1
1	D	173	GLU	2.1
1	I	65	GLY	2.1
1	I	11	THR	2.1
1	B	90	ARG	2.1
1	F	154	ARG	2.1
1	K	73	ARG	2.1
1	L	154	ARG	2.1
1	A	44	ILE	2.1
1	E	67	PHE	2.1
1	J	101	GLU	2.1
1	K	71	LEU	2.1
1	J	68	PRO	2.1
1	G	67	PHE	2.1
1	A	65	GLY	2.1
1	C	100	ALA	2.1
1	L	171	VAL	2.1
1	F	25	ARG	2.1
1	L	40	ASP	2.0
1	F	73	ARG	2.0
1	I	89	ARG	2.0
1	K	32	ALA	2.0
1	D	33	CYS	2.0
1	D	139	ASP	2.0
1	H	85	ASP	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides 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. 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	B-factors($\text{\AA}^2$)	Q<0.9
2	MG	G	200	1/1	0.89	0.07	18,18,18,18	0
2	MG	J	200	1/1	0.89	0.11	23,23,23,23	0
2	MG	E	200	1/1	0.90	0.09	16,16,16,16	0
2	MG	I	200	1/1	0.92	0.09	20,20,20,20	0
2	MG	H	200	1/1	0.93	0.09	9,9,9,9	0
2	MG	A	200	1/1	0.94	0.04	17,17,17,17	0
2	MG	F	200	1/1	0.94	0.10	13,13,13,13	0
2	MG	C	200	1/1	0.94	0.05	19,19,19,19	0
2	MG	B	200	1/1	0.95	0.14	17,17,17,17	0
2	MG	D	200	1/1	0.96	0.04	14,14,14,14	0
2	MG	K	200	1/1	0.96	0.05	19,19,19,19	0
2	MG	L	200	1/1	0.97	0.11	11,11,11,11	0

6.5 Other polymers [i](#)

There are no such residues in this entry.