Full wwPDB EM Validation Report

Jan 3, 2023 – 02:11 PM EST

PDB ID	:	8F49
EMDB ID	:	EMD-32695
Title	:	1.8 angstrom structure of apoferritin embedded in crystalline ice
Authors	:	Shi, H.; Wu, C.; Zhang, X.
Deposited on	:	2022-11-10
Resolution	:	1.80 Å(reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB/EMDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
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:

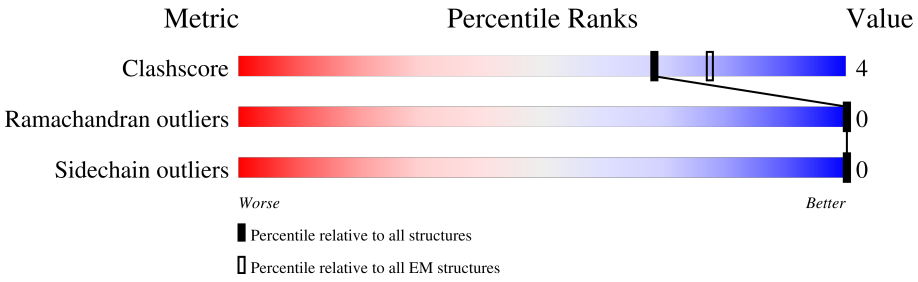
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 1.80 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 <=5%

Mol	Chain	Length	Quality of chain
1	A	172	90% 10%
1	B	172	93% 7%
1	C	172	92% 8%
1	D	172	92% 8%
1	E	172	92% 8%
1	F	172	92% 8%
1	G	172	92% 8%
1	H	172	94% 6%
1	I	172	92% 8%

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Mol	Chain	Length	Quality of chain
1	J	172	92% 8%
1	K	172	92% 8%
1	L	172	92% 8%
1	M	172	93% 7%
1	N	172	94% 6%
1	O	172	94% 6%
1	P	172	92% 8%
1	Q	172	92% 8%
1	R	172	92% 8%
1	S	172	93% 7%
1	T	172	92% 8%
1	U	172	91% 9%
1	V	172	93% 7%
1	W	172	91% 9%
1	X	172	92% 8%

2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 33216 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Ferritin heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	U	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	A	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	B	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	C	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	D	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	E	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	F	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	G	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	H	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	I	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	J	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	K	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	L	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	M	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	N	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	O	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	P	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		

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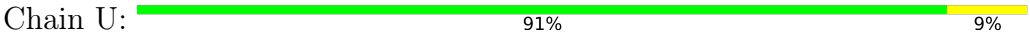
Mol	Chain	Residues	Atoms					AltConf	Trace
1	Q	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	R	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	S	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	T	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	V	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	W	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		
1	X	172	Total	C	N	O	S	0	0
			1384	871	242	264	7		

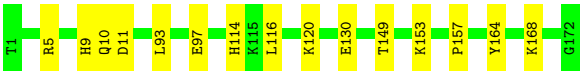
3 Residue-property plots (i)

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. 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. 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: Ferritin heavy chain

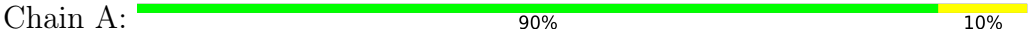
Chain U:





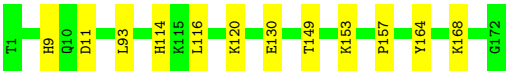
• Molecule 1: Ferritin heavy chain

Chain A:



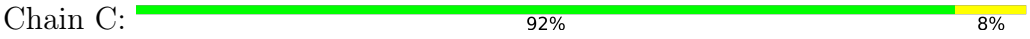
• Molecule 1: Ferritin heavy chain

Chain B:



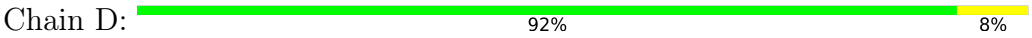
• Molecule 1: Ferritin heavy chain

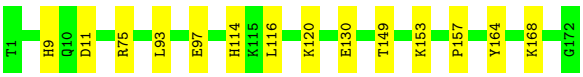
Chain C:



• Molecule 1: Ferritin heavy chain

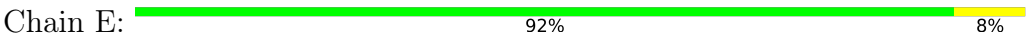
Chain D:

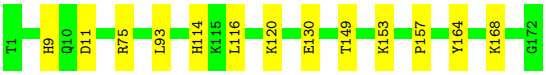




• Molecule 1: Ferritin heavy chain

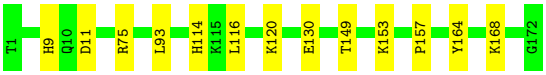
Chain E:





• Molecule 1: Ferritin heavy chain

Chain F:

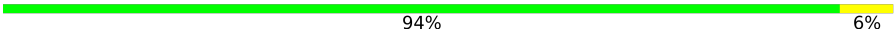


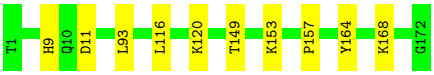
• Molecule 1: Ferritin heavy chain

Chain G:

• Molecule 1: Ferritin heavy chain

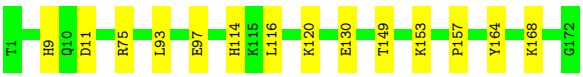
Chain H:





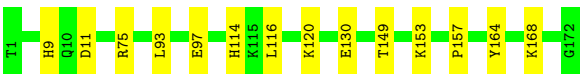
• Molecule 1: Ferritin heavy chain

Chain I:



• Molecule 1: Ferritin heavy chain

Chain J:

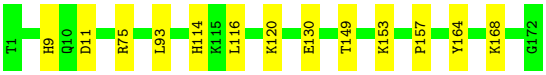


• Molecule 1: Ferritin heavy chain

Chain K:

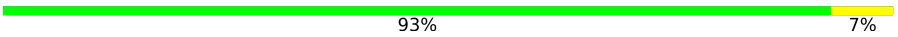
• Molecule 1: Ferritin heavy chain

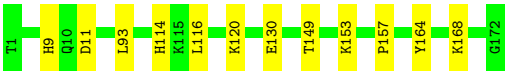
Chain L:



• Molecule 1: Ferritin heavy chain

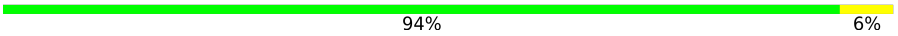
Chain M:





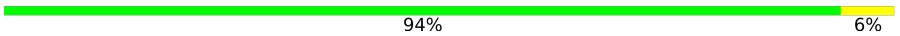
• Molecule 1: Ferritin heavy chain

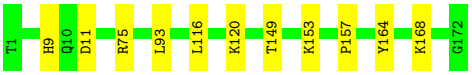
Chain N:



• Molecule 1: Ferritin heavy chain

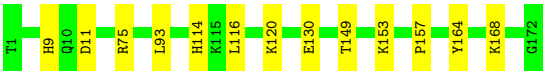
Chain O:





• Molecule 1: Ferritin heavy chain

Chain P:

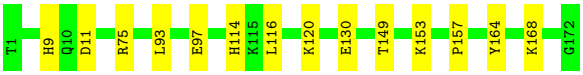


• Molecule 1: Ferritin heavy chain

Chain Q:

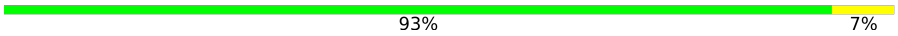
• Molecule 1: Ferritin heavy chain

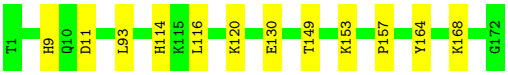
Chain R:



• Molecule 1: Ferritin heavy chain

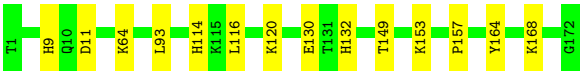
Chain S:





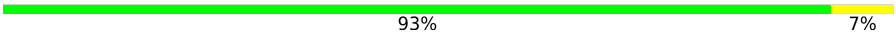
• Molecule 1: Ferritin heavy chain

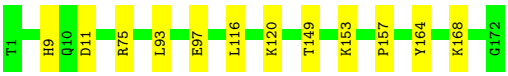
Chain T:



• Molecule 1: Ferritin heavy chain

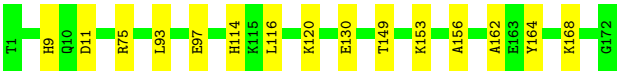
Chain V:





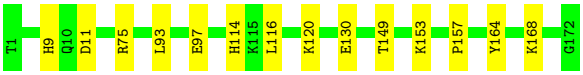
• Molecule 1: Ferritin heavy chain

Chain W:



• Molecule 1: Ferritin heavy chain

Chain X:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	94792	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	60	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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	0.26	0/1413	0.45	0/1908
1	B	0.26	0/1413	0.44	0/1908
1	C	0.26	0/1413	0.45	0/1908
1	D	0.26	0/1413	0.44	0/1908
1	E	0.26	0/1413	0.45	0/1908
1	F	0.26	0/1413	0.45	0/1908
1	G	0.26	0/1413	0.45	0/1908
1	H	0.26	0/1413	0.45	0/1908
1	I	0.26	0/1413	0.45	0/1908
1	J	0.26	0/1413	0.45	0/1908
1	K	0.27	0/1413	0.45	0/1908
1	L	0.26	0/1413	0.45	0/1908
1	M	0.26	0/1413	0.45	0/1908
1	N	0.26	0/1413	0.45	0/1908
1	O	0.26	0/1413	0.45	0/1908
1	P	0.26	0/1413	0.45	0/1908
1	Q	0.26	0/1413	0.45	0/1908
1	R	0.26	0/1413	0.45	0/1908
1	S	0.26	0/1413	0.45	0/1908
1	T	0.26	0/1413	0.45	0/1908
1	U	0.26	0/1413	0.45	0/1908
1	V	0.26	0/1413	0.45	0/1908
1	W	0.26	0/1413	0.45	0/1908
1	X	0.26	0/1413	0.44	0/1908
All	All	0.26	0/33912	0.45	0/45792

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (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	1384	0	1310	12	0
1	B	1384	0	1310	9	0
1	C	1384	0	1310	10	0
1	D	1384	0	1310	11	0
1	E	1384	0	1310	10	0
1	F	1384	0	1310	10	0
1	G	1384	0	1310	10	0
1	H	1384	0	1310	8	0
1	I	1384	0	1310	12	0
1	J	1384	0	1310	12	0
1	K	1384	0	1310	12	0
1	L	1384	0	1310	10	0
1	M	1384	0	1310	9	0
1	N	1384	0	1310	10	0
1	O	1384	0	1310	9	0
1	P	1384	0	1310	10	0
1	Q	1384	0	1310	10	0
1	R	1384	0	1310	11	0
1	S	1384	0	1310	9	0
1	T	1384	0	1310	10	0
1	U	1384	0	1310	11	0
1	V	1384	0	1310	10	0
1	W	1384	0	1310	11	0
1	X	1384	0	1310	11	0
All	All	33216	0	31440	247	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 (247) 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:E:9:HIS:CE1	1:E:11:ASP:OD2	2.51	0.64
1:U:93:LEU:HD23	1:U:157:PRO:HG3	1.80	0.64
1:C:9:HIS:CE1	1:C:11:ASP:OD2	2.51	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:W:9:HIS:CE1	1:W:11:ASP:OD2	2.51	0.64
1:Q:9:HIS:CE1	1:Q:11:ASP:OD2	2.51	0.64
1:R:9:HIS:CE1	1:R:11:ASP:OD2	2.51	0.64
1:V:9:HIS:CE1	1:V:11:ASP:OD2	2.51	0.64
1:U:9:HIS:CE1	1:U:11:ASP:OD2	2.51	0.63
1:T:9:HIS:CE1	1:T:11:ASP:OD2	2.51	0.63
1:P:9:HIS:CE1	1:P:11:ASP:OD1	2.52	0.63
1:F:9:HIS:CE1	1:F:11:ASP:OD2	2.51	0.63
1:M:9:HIS:CE1	1:M:11:ASP:OD1	2.52	0.63
1:S:9:HIS:CE1	1:S:11:ASP:OD2	2.51	0.63
1:I:9:HIS:CE1	1:I:11:ASP:OD2	2.52	0.63
1:J:9:HIS:CE1	1:J:11:ASP:OD2	2.52	0.63
1:G:9:HIS:CE1	1:G:11:ASP:OD2	2.52	0.63
1:L:9:HIS:CE1	1:L:11:ASP:OD2	2.51	0.63
1:O:9:HIS:CE1	1:O:11:ASP:OD2	2.51	0.63
1:D:9:HIS:CE1	1:D:11:ASP:OD2	2.51	0.63
1:A:9:HIS:CE1	1:A:11:ASP:OD1	2.52	0.63
1:H:9:HIS:CE1	1:H:11:ASP:OD2	2.51	0.62
1:X:93:LEU:HD23	1:X:157:PRO:HG3	1.81	0.62
1:D:93:LEU:HD23	1:D:157:PRO:HG3	1.80	0.62
1:B:9:HIS:CE1	1:B:11:ASP:OD1	2.52	0.62
1:N:9:HIS:CE1	1:N:11:ASP:OD2	2.51	0.62
1:E:93:LEU:HD23	1:E:157:PRO:HG3	1.80	0.62
1:J:149:THR:O	1:J:153:LYS:HG2	1.99	0.62
1:T:149:THR:O	1:T:153:LYS:HG2	2.00	0.62
1:A:149:THR:O	1:A:153:LYS:HG2	2.00	0.62
1:L:149:THR:O	1:L:153:LYS:HG2	2.00	0.62
1:H:93:LEU:HD23	1:H:157:PRO:HG3	1.81	0.62
1:K:9:HIS:CE1	1:K:11:ASP:OD1	2.53	0.62
1:X:149:THR:O	1:X:153:LYS:HG2	2.00	0.62
1:S:93:LEU:HD23	1:S:157:PRO:HG3	1.81	0.62
1:D:149:THR:O	1:D:153:LYS:HG2	2.00	0.62
1:E:149:THR:O	1:E:153:LYS:HG2	2.00	0.62
1:O:93:LEU:HD23	1:O:157:PRO:HG3	1.81	0.62
1:W:149:THR:O	1:W:153:LYS:HG2	2.00	0.62
1:A:93:LEU:HD23	1:A:157:PRO:HG3	1.82	0.61
1:I:149:THR:O	1:I:153:LYS:HG2	2.00	0.61
1:P:149:THR:O	1:P:153:LYS:HG2	2.00	0.61
1:Q:93:LEU:HD23	1:Q:157:PRO:HG3	1.82	0.61
1:T:93:LEU:HD23	1:T:157:PRO:HG3	1.81	0.61
1:X:9:HIS:CE1	1:X:11:ASP:OD1	2.52	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:R:149:THR:O	1:R:153:LYS:HG2	2.00	0.61
1:V:93:LEU:HD23	1:V:157:PRO:HG3	1.82	0.61
1:U:149:THR:O	1:U:153:LYS:HG2	2.00	0.61
1:B:93:LEU:HD23	1:B:157:PRO:HG3	1.82	0.61
1:C:149:THR:O	1:C:153:LYS:HG2	2.00	0.61
1:M:149:THR:O	1:M:153:LYS:HG2	2.00	0.61
1:R:93:LEU:HD23	1:R:157:PRO:HG3	1.82	0.61
1:Q:149:THR:O	1:Q:153:LYS:HG2	2.00	0.61
1:F:93:LEU:HD23	1:F:157:PRO:HG3	1.82	0.61
1:N:93:LEU:HD23	1:N:157:PRO:HG3	1.82	0.61
1:M:93:LEU:HD23	1:M:157:PRO:HG3	1.82	0.61
1:P:93:LEU:HD23	1:P:157:PRO:HG3	1.82	0.61
1:B:149:THR:O	1:B:153:LYS:HG2	2.00	0.61
1:F:149:THR:O	1:F:153:LYS:HG2	2.00	0.61
1:K:149:THR:O	1:K:153:LYS:HG2	1.99	0.61
1:L:93:LEU:HD23	1:L:157:PRO:HG3	1.81	0.61
1:C:93:LEU:HD23	1:C:157:PRO:HG3	1.82	0.60
1:S:149:THR:O	1:S:153:LYS:HG2	2.00	0.60
1:V:149:THR:O	1:V:153:LYS:HG2	2.00	0.60
1:G:93:LEU:HD23	1:G:157:PRO:HG3	1.82	0.60
1:I:93:LEU:HD23	1:I:157:PRO:HG3	1.83	0.60
1:J:93:LEU:HD23	1:J:157:PRO:HG3	1.82	0.60
1:A:127:ASP:O	1:A:131:THR:HG23	2.02	0.60
1:K:93:LEU:HD23	1:K:157:PRO:HG3	1.83	0.60
1:O:149:THR:O	1:O:153:LYS:HG2	2.04	0.58
1:G:149:THR:O	1:G:153:LYS:HG2	2.04	0.58
1:N:149:THR:O	1:N:153:LYS:HG2	2.04	0.58
1:H:149:THR:O	1:H:153:LYS:HG2	2.04	0.58
1:T:64:LYS:HE3	1:T:132:HIS:HB3	1.87	0.56
1:A:9:HIS:CE1	1:A:11:ASP:CG	2.83	0.52
1:R:9:HIS:CE1	1:R:11:ASP:CG	2.84	0.52
1:B:9:HIS:CE1	1:B:11:ASP:CG	2.84	0.51
1:C:9:HIS:HE1	1:C:11:ASP:OD2	1.94	0.51
1:S:9:HIS:HE1	1:S:11:ASP:OD2	1.93	0.51
1:S:9:HIS:CE1	1:S:11:ASP:CG	2.84	0.51
1:T:9:HIS:CE1	1:T:11:ASP:CG	2.84	0.51
1:H:9:HIS:CE1	1:H:11:ASP:CG	2.84	0.51
1:M:9:HIS:CE1	1:M:11:ASP:CG	2.84	0.51
1:T:9:HIS:HE1	1:T:11:ASP:OD2	1.93	0.51
1:W:9:HIS:CE1	1:W:11:ASP:CG	2.84	0.51
1:U:9:HIS:CE1	1:U:11:ASP:CG	2.84	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Q:9:HIS:CE1	1:Q:11:ASP:CG	2.84	0.51
1:Q:9:HIS:HE1	1:Q:11:ASP:OD2	1.94	0.51
1:V:9:HIS:CE1	1:V:11:ASP:CG	2.84	0.51
1:C:9:HIS:CE1	1:C:11:ASP:CG	2.84	0.51
1:X:9:HIS:CE1	1:X:11:ASP:CG	2.84	0.51
1:N:9:HIS:CE1	1:N:11:ASP:CG	2.84	0.51
1:P:9:HIS:CE1	1:P:11:ASP:CG	2.84	0.51
1:E:9:HIS:CE1	1:E:11:ASP:CG	2.84	0.51
1:F:9:HIS:HE1	1:F:11:ASP:OD2	1.94	0.51
1:G:9:HIS:CE1	1:G:11:ASP:CG	2.84	0.51
1:O:9:HIS:CE1	1:O:11:ASP:CG	2.84	0.51
1:O:9:HIS:HE1	1:O:11:ASP:OD2	1.93	0.51
1:U:9:HIS:HE1	1:U:11:ASP:OD2	1.94	0.51
1:H:9:HIS:HE1	1:H:11:ASP:OD2	1.93	0.51
1:I:9:HIS:CE1	1:I:11:ASP:CG	2.84	0.51
1:J:9:HIS:CE1	1:J:11:ASP:CG	2.84	0.51
1:B:9:HIS:HE1	1:B:11:ASP:OD1	1.94	0.50
1:D:9:HIS:CE1	1:D:11:ASP:CG	2.84	0.50
1:F:9:HIS:CE1	1:F:11:ASP:CG	2.84	0.50
1:K:9:HIS:CE1	1:K:11:ASP:CG	2.84	0.50
1:M:9:HIS:HE1	1:M:11:ASP:OD1	1.95	0.50
1:A:116:LEU:O	1:A:120:LYS:HG2	2.12	0.50
1:L:9:HIS:CE1	1:L:11:ASP:CG	2.84	0.50
1:X:116:LEU:O	1:X:120:LYS:HG2	2.12	0.50
1:O:116:LEU:O	1:O:120:LYS:HG2	2.12	0.50
1:R:116:LEU:O	1:R:120:LYS:HG2	2.12	0.50
1:D:116:LEU:O	1:D:120:LYS:HG2	2.12	0.50
1:W:114:HIS:NE2	1:W:130:GLU:OE2	2.34	0.50
1:W:116:LEU:O	1:W:120:LYS:HG2	2.12	0.50
1:B:116:LEU:O	1:B:120:LYS:HG2	2.12	0.50
1:K:114:HIS:NE2	1:K:130:GLU:OE2	2.34	0.50
1:Q:116:LEU:O	1:Q:120:LYS:HG2	2.12	0.50
1:A:64:LYS:HE3	1:A:132:HIS:HB3	1.94	0.50
1:L:116:LEU:O	1:L:120:LYS:HG2	2.12	0.50
1:S:116:LEU:O	1:S:120:LYS:HG2	2.12	0.50
1:J:114:HIS:NE2	1:J:130:GLU:OE2	2.34	0.49
1:N:9:HIS:HE1	1:N:11:ASP:OD2	1.94	0.49
1:V:116:LEU:O	1:V:120:LYS:HG2	2.12	0.49
1:X:9:HIS:HE1	1:X:11:ASP:OD1	1.95	0.49
1:T:116:LEU:O	1:T:120:LYS:HG2	2.12	0.49
1:K:9:HIS:HE1	1:K:11:ASP:OD1	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:116:LEU:O	1:F:120:LYS:HG2	2.12	0.49
1:R:9:HIS:HE1	1:R:11:ASP:OD2	1.94	0.49
1:M:116:LEU:O	1:M:120:LYS:HG2	2.12	0.49
1:W:9:HIS:HE1	1:W:11:ASP:OD2	1.93	0.49
1:C:116:LEU:O	1:C:120:LYS:HG2	2.12	0.49
1:E:9:HIS:HE1	1:E:11:ASP:OD2	1.93	0.49
1:H:116:LEU:O	1:H:120:LYS:HG2	2.12	0.49
1:S:114:HIS:NE2	1:S:130:GLU:OE1	2.34	0.49
1:E:116:LEU:O	1:E:120:LYS:HG2	2.12	0.48
1:I:114:HIS:NE2	1:I:130:GLU:OE2	2.34	0.48
1:P:116:LEU:O	1:P:120:LYS:HG2	2.12	0.48
1:A:9:HIS:HE1	1:A:11:ASP:OD1	1.95	0.48
1:L:9:HIS:HE1	1:L:11:ASP:OD2	1.93	0.48
1:P:9:HIS:HE1	1:P:11:ASP:OD1	1.94	0.48
1:V:9:HIS:HE1	1:V:11:ASP:OD2	1.94	0.48
1:D:9:HIS:HE1	1:D:11:ASP:OD2	1.94	0.48
1:B:114:HIS:NE2	1:B:130:GLU:OE2	2.33	0.47
1:J:9:HIS:HE1	1:J:11:ASP:OD2	1.95	0.47
1:I:9:HIS:HE1	1:I:11:ASP:OD2	1.95	0.47
1:A:9:HIS:HE1	1:A:11:ASP:CG	2.18	0.47
1:E:114:HIS:NE2	1:E:130:GLU:OE1	2.34	0.47
1:H:164:TYR:O	1:H:168:LYS:HG2	2.15	0.47
1:W:93:LEU:O	1:W:97:GLU:HG3	2.15	0.47
1:K:164:TYR:O	1:K:168:LYS:HG2	2.15	0.47
1:S:164:TYR:O	1:S:168:LYS:HG2	2.15	0.47
1:V:164:TYR:O	1:V:168:LYS:HG2	2.15	0.47
1:C:164:TYR:O	1:C:168:LYS:HG2	2.16	0.46
1:D:164:TYR:O	1:D:168:LYS:HG2	2.16	0.46
1:E:164:TYR:O	1:E:168:LYS:HG2	2.16	0.46
1:I:164:TYR:O	1:I:168:LYS:HG2	2.16	0.46
1:L:164:TYR:O	1:L:168:LYS:HG2	2.16	0.46
1:N:164:TYR:O	1:N:168:LYS:HG2	2.16	0.46
1:R:164:TYR:O	1:R:168:LYS:HG2	2.16	0.46
1:A:164:TYR:O	1:A:168:LYS:HG2	2.16	0.46
1:M:164:TYR:O	1:M:168:LYS:HG2	2.16	0.46
1:P:164:TYR:O	1:P:168:LYS:HG2	2.16	0.46
1:R:9:HIS:HE1	1:R:11:ASP:CG	2.19	0.46
1:B:164:TYR:O	1:B:168:LYS:HG2	2.16	0.46
1:F:164:TYR:O	1:F:168:LYS:HG2	2.16	0.46
1:Q:9:HIS:HE1	1:Q:11:ASP:CG	2.19	0.46
1:S:9:HIS:HE1	1:S:11:ASP:CG	2.19	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:9:HIS:HE1	1:H:11:ASP:CG	2.19	0.46
1:V:9:HIS:HE1	1:V:11:ASP:CG	2.19	0.46
1:B:9:HIS:HE1	1:B:11:ASP:CG	2.19	0.46
1:W:9:HIS:HE1	1:W:11:ASP:CG	2.19	0.46
1:U:9:HIS:HE1	1:U:11:ASP:CG	2.19	0.46
1:C:9:HIS:HE1	1:C:11:ASP:CG	2.19	0.46
1:J:164:TYR:O	1:J:168:LYS:HG2	2.15	0.46
1:M:9:HIS:HE1	1:M:11:ASP:CG	2.19	0.46
1:U:164:TYR:O	1:U:168:LYS:HG2	2.15	0.46
1:O:164:TYR:O	1:O:168:LYS:HG2	2.15	0.46
1:P:9:HIS:HE1	1:P:11:ASP:CG	2.19	0.46
1:Q:164:TYR:O	1:Q:168:LYS:HG2	2.16	0.46
1:E:9:HIS:HE1	1:E:11:ASP:CG	2.19	0.45
1:F:114:HIS:NE2	1:F:130:GLU:OE1	2.34	0.45
1:M:114:HIS:NE2	1:M:130:GLU:OE1	2.34	0.45
1:N:9:HIS:HE1	1:N:11:ASP:CG	2.20	0.45
1:W:164:TYR:O	1:W:168:LYS:HG2	2.16	0.45
1:G:164:TYR:O	1:G:168:LYS:HG2	2.15	0.45
1:I:9:HIS:HE1	1:I:11:ASP:CG	2.20	0.45
1:P:114:HIS:NE2	1:P:130:GLU:OE2	2.34	0.45
1:X:9:HIS:HE1	1:X:11:ASP:CG	2.19	0.45
1:X:164:TYR:O	1:X:168:LYS:HG2	2.15	0.45
1:L:9:HIS:HE1	1:L:11:ASP:CG	2.19	0.45
1:O:9:HIS:HE1	1:O:11:ASP:CG	2.19	0.45
1:D:9:HIS:HE1	1:D:11:ASP:CG	2.19	0.45
1:T:9:HIS:HE1	1:T:11:ASP:CG	2.19	0.45
1:I:120:LYS:HA	1:I:120:LYS:HD2	1.90	0.45
1:J:9:HIS:HE1	1:J:11:ASP:CG	2.20	0.45
1:G:9:HIS:HE1	1:G:11:ASP:OD2	1.95	0.45
1:F:9:HIS:HE1	1:F:11:ASP:CG	2.19	0.45
1:U:93:LEU:O	1:U:97:GLU:HG3	2.17	0.45
1:C:114:HIS:NE2	1:C:130:GLU:OE2	2.34	0.45
1:U:5:ARG:NH2	1:U:10:GLN:OE1	2.50	0.44
1:K:9:HIS:HE1	1:K:11:ASP:CG	2.19	0.44
1:T:164:TYR:O	1:T:168:LYS:HG2	2.16	0.44
1:G:9:HIS:HE1	1:G:11:ASP:CG	2.20	0.44
1:D:114:HIS:NE2	1:D:130:GLU:OE1	2.34	0.44
1:W:156:ALA:HA	1:W:162:ALA:HB3	2.00	0.44
1:Q:93:LEU:O	1:Q:97:GLU:HG3	2.18	0.43
1:G:93:LEU:O	1:G:97:GLU:HG3	2.18	0.43
1:J:116:LEU:O	1:J:120:LYS:HG2	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:R:114:HIS:NE2	1:R:130:GLU:OE1	2.34	0.43
1:U:116:LEU:O	1:U:120:LYS:HG2	2.18	0.43
1:W:75:ARG:HA	1:W:75:ARG:HD3	1.86	0.43
1:C:93:LEU:O	1:C:97:GLU:HG3	2.18	0.43
1:L:114:HIS:NE2	1:L:130:GLU:OE1	2.34	0.43
1:N:93:LEU:O	1:N:97:GLU:HG3	2.18	0.43
1:Q:114:HIS:NE2	1:Q:130:GLU:OE2	2.34	0.43
1:U:114:HIS:NE2	1:U:130:GLU:OE2	2.33	0.43
1:J:120:LYS:HA	1:J:120:LYS:HD2	1.90	0.43
1:K:93:LEU:O	1:K:97:GLU:HG3	2.18	0.43
1:K:116:LEU:O	1:K:120:LYS:HG2	2.18	0.43
1:P:75:ARG:HA	1:P:75:ARG:HD3	1.78	0.43
1:A:75:ARG:HD3	1:A:75:ARG:HA	1.86	0.43
1:X:93:LEU:O	1:X:97:GLU:HG3	2.18	0.43
1:J:93:LEU:O	1:J:97:GLU:HG3	2.18	0.43
1:D:93:LEU:O	1:D:97:GLU:HG3	2.18	0.43
1:N:116:LEU:O	1:N:120:LYS:HG2	2.18	0.43
1:V:93:LEU:O	1:V:97:GLU:HG3	2.18	0.43
1:A:5:ARG:NH2	1:A:10:GLN:OE1	2.51	0.42
1:I:93:LEU:O	1:I:97:GLU:HG3	2.18	0.42
1:K:120:LYS:HA	1:K:120:LYS:HD2	1.89	0.42
1:R:75:ARG:HD3	1:R:75:ARG:HA	1.86	0.42
1:F:75:ARG:HA	1:F:75:ARG:HD3	1.86	0.42
1:T:114:HIS:NE2	1:T:130:GLU:OE1	2.34	0.42
1:G:116:LEU:O	1:G:120:LYS:HG2	2.18	0.42
1:K:75:ARG:HA	1:K:75:ARG:HD3	1.86	0.42
1:X:75:ARG:HD3	1:X:75:ARG:HA	1.86	0.42
1:R:93:LEU:O	1:R:97:GLU:HG3	2.18	0.42
1:D:75:ARG:HD3	1:D:75:ARG:HA	1.86	0.42
1:I:116:LEU:O	1:I:120:LYS:HG2	2.18	0.42
1:E:75:ARG:HD3	1:E:75:ARG:HA	1.86	0.42
1:L:75:ARG:HD3	1:L:75:ARG:HA	1.86	0.42
1:N:120:LYS:HA	1:N:120:LYS:HD2	1.90	0.42
1:O:75:ARG:HD3	1:O:75:ARG:HA	1.86	0.42
1:G:114:HIS:NE2	1:G:130:GLU:OE2	2.34	0.41
1:V:75:ARG:HA	1:V:75:ARG:HD3	1.86	0.41
1:I:75:ARG:HA	1:I:75:ARG:HD3	1.86	0.40
1:J:75:ARG:HA	1:J:75:ARG:HD3	1.86	0.40
1:X:114:HIS:NE2	1:X:130:GLU:OE2	2.34	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 PDB entries followed by that with respect to all EM entries.

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	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	B	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	C	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	D	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	E	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	F	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	G	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	H	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	I	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	J	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	K	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	L	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	M	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	N	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	O	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	P	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	Q	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	R	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	S	170/172 (99%)	167 (98%)	3 (2%)	0	100	100
1	T	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	U	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	V	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	W	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
1	X	170/172 (99%)	168 (99%)	2 (1%)	0	100	100
All	All	4080/4128 (99%)	4031 (99%)	49 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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	145/153 (95%)	145 (100%)	0	100	100
1	B	145/153 (95%)	145 (100%)	0	100	100
1	C	145/153 (95%)	145 (100%)	0	100	100
1	D	145/153 (95%)	145 (100%)	0	100	100
1	E	145/153 (95%)	145 (100%)	0	100	100
1	F	145/153 (95%)	145 (100%)	0	100	100
1	G	145/153 (95%)	145 (100%)	0	100	100
1	H	145/153 (95%)	145 (100%)	0	100	100
1	I	145/153 (95%)	145 (100%)	0	100	100
1	J	145/153 (95%)	145 (100%)	0	100	100
1	K	145/153 (95%)	145 (100%)	0	100	100
1	L	145/153 (95%)	145 (100%)	0	100	100
1	M	145/153 (95%)	145 (100%)	0	100	100
1	N	145/153 (95%)	145 (100%)	0	100	100
1	O	145/153 (95%)	145 (100%)	0	100	100
1	P	145/153 (95%)	145 (100%)	0	100	100
1	Q	145/153 (95%)	145 (100%)	0	100	100
1	R	145/153 (95%)	145 (100%)	0	100	100
1	S	145/153 (95%)	145 (100%)	0	100	100
1	T	145/153 (95%)	145 (100%)	0	100	100
1	U	145/153 (95%)	145 (100%)	0	100	100
1	V	145/153 (95%)	145 (100%)	0	100	100
1	W	145/153 (95%)	145 (100%)	0	100	100
1	X	145/153 (95%)	145 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	3480/3672 (95%)	3480 (100%)	0	100 100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.