

Full wwPDB/EMDatabank EM Map/Model Validation Report ⓘ

Jan 10, 2018 – 07:06 PM EST

PDB ID : 6BDF
EMDB ID: : EMD-6287
Title : 2.8 Å resolution reconstruction of the Thermoplasma acidophilum 20S proteasome using cryo-electron microscopy
Authors : Campbell, M.G.; Veesler, D.; Cheng, A.; Potter, C.S.; Carragher, B.
Deposited on : 2017-10-23
Resolution : 2.80 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org
A user guide is available at
<http://wwpdb.org/validation/2016/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

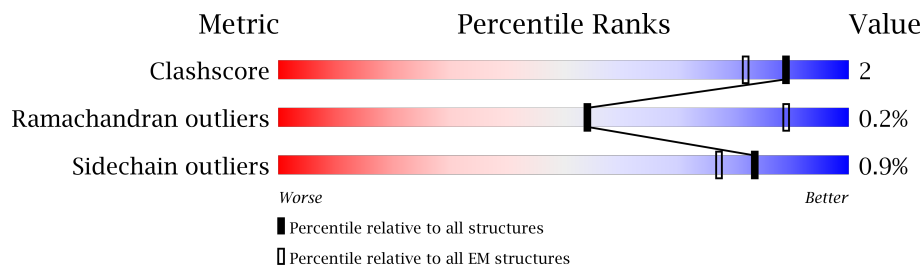
MolProbity : 4.02b-467
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20030736

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 2.80 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	125131	1336
Ramachandran outliers	121729	1120
Sidechain outliers	121581	1026

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	0	233	91% 5%
1	A	233	91% 5%
1	C	233	91% 5%
1	E	233	91% 5%
1	G	233	91% 5%
1	I	233	90% 5% 5%
1	K	233	91% 5%
1	M	233	91% 5%
1	O	233	91% 5%

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Mol	Chain	Length	Quality of chain
1	Q	233	 91% 5%
1	S	233	 91% 5%
1	U	233	 90% 5% 5%
1	W	233	 91% 5%
1	Y	233	 91% 5%
2	1	211	 88% 7% 5%
2	B	211	 88% 7% 5%
2	D	211	 90% 5% 5%
2	F	211	 89% 6% 5%
2	H	211	 89% 6% 5%
2	J	211	 88% 7% 5%
2	L	211	 87% 8% 5%
2	N	211	 88% 7% 5%
2	P	211	 88% 7% 5%
2	R	211	 88% 7% 5%
2	T	211	 87% 8% 5%
2	V	211	 88% 7% 5%
2	X	211	 89% 6% 5%
2	Z	211	 89% 6% 5%

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 46382 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 Proteasome subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	C	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	E	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	G	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	I	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	K	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	M	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	O	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	Q	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	S	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	U	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	W	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	Y	221	Total 1720	C 1092	N 290	O 335	S 3	0	0
1	0	221	Total 1720	C 1092	N 290	O 335	S 3	0	0

- Molecule 2 is a protein called Proteasome subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	201	Total 1541	C 973	N 262	O 295	S 11	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	D	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	F	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	H	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	J	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	L	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	N	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	P	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	R	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	T	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	V	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	X	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	Z	201	Total 1541	C 973	N 262	O 295	S 11	0	0
2	1	201	Total 1541	C 973	N 262	O 295	S 11	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		AltConf
3	A	21	Total 21	O 21	0
3	B	31	Total 31	O 31	0
3	C	21	Total 21	O 21	0
3	D	31	Total 31	O 31	0
3	E	21	Total 21	O 21	0
3	F	31	Total 31	O 31	0

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Mol	Chain	Residues	Atoms		AltConf
3	G	21	Total 21	O 21	0
3	H	31	Total 31	O 31	0
3	I	21	Total 21	O 21	0
3	J	31	Total 31	O 31	0
3	K	21	Total 21	O 21	0
3	L	31	Total 31	O 31	0
3	M	21	Total 21	O 21	0
3	N	31	Total 31	O 31	0
3	O	21	Total 21	O 21	0
3	P	31	Total 31	O 31	0
3	Q	21	Total 21	O 21	0
3	R	31	Total 31	O 31	0
3	S	21	Total 21	O 21	0
3	T	31	Total 31	O 31	0
3	U	21	Total 21	O 21	0
3	V	31	Total 31	O 31	0
3	W	21	Total 21	O 21	0
3	X	31	Total 31	O 31	0
3	Y	21	Total 21	O 21	0
3	Z	31	Total 31	O 31	0
3	0	21	Total 21	O 21	0

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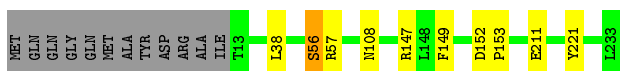
Mol	Chain	Residues	Atoms		AltConf
3	1	31	Total	O	0
			31	31	

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. 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.

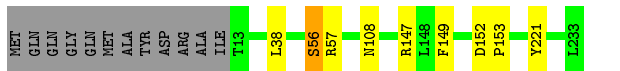
- Molecule 1: Proteasome subunit alpha

Chain A:  91% 5%



- Molecule 1: Proteasome subunit alpha

Chain C:  91% 5%



- Molecule 1: Proteasome subunit alpha

Chain E:  91% 5%




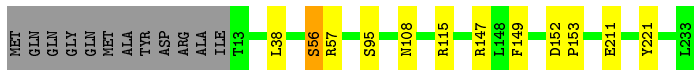
- Molecule 1: Proteasome subunit alpha

Chain G:  91% 5%



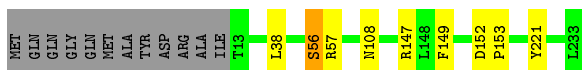
- Molecule 1: Proteasome subunit alpha

Chain I:  90% 5% 5%



- Molecule 1: Proteasome subunit alpha

Chain K:  91% 5%



- Molecule 1: Proteasome subunit alpha

Chain M: 91% 5%



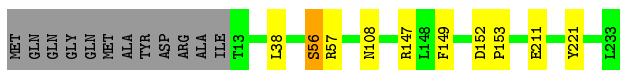
- Molecule 1: Proteasome subunit alpha

Chain O: 91% 5%



- Molecule 1: Proteasome subunit alpha

Chain Q: 91% 5%



- Molecule 1: Proteasome subunit alpha

Chain S: 91% 5%



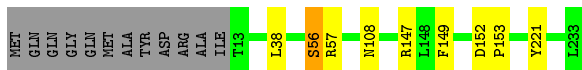
- Molecule 1: Proteasome subunit alpha

Chain U: 90% 5% 5%



- Molecule 1: Proteasome subunit alpha

Chain W: 91% 5%



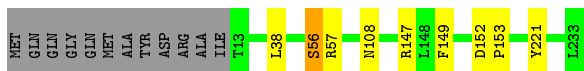
- Molecule 1: Proteasome subunit alpha

Chain Y: 91% 5%




- Molecule 1: Proteasome subunit alpha

Chain 0:  91% 5%




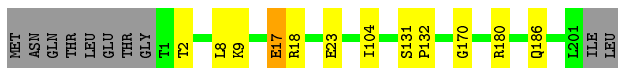
- Molecule 2: Proteasome subunit beta

Chain B:  88% 7% 5%




- Molecule 2: Proteasome subunit beta

Chain D:  90% 5% 5%




- Molecule 2: Proteasome subunit beta

Chain F:  89% 6% 5%




- Molecule 2: Proteasome subunit beta

Chain H:  89% 6% 5%




- Molecule 2: Proteasome subunit beta

Chain J:  88% 7% 5%



- Molecule 2: Proteasome subunit beta

Chain L:  87% 8% 5%

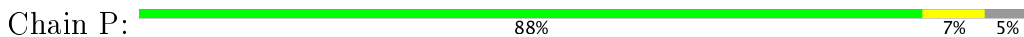


- Molecule 2: Proteasome subunit beta

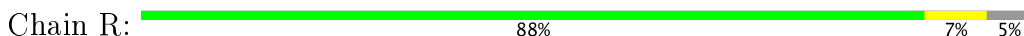
Chain N:  88% 7% 5%



• Molecule 2: Proteasome subunit beta



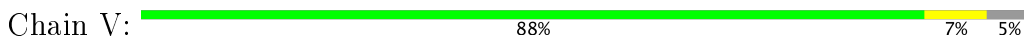
• Molecule 2: Proteasome subunit beta



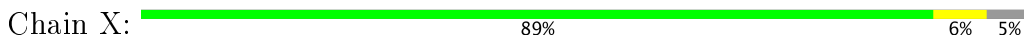
• Molecule 2: Proteasome subunit beta



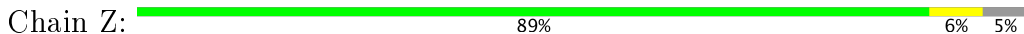
• Molecule 2: Proteasome subunit beta



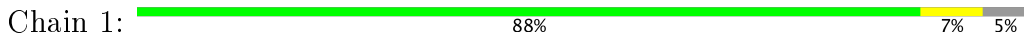
• Molecule 2: Proteasome subunit beta



• Molecule 2: Proteasome subunit beta



• Molecule 2: Proteasome subunit beta



4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, D7	Depositor
Number of particles used	49954	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 ($e^-/\text{\AA}^2$)	53	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	Not provided	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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 >2	RMSZ	# Z >2
1	0	0.98	1/1743 (0.1%)	0.56	0/2348
1	A	0.98	2/1743 (0.1%)	0.56	0/2348
1	C	0.98	1/1743 (0.1%)	0.56	0/2348
1	E	0.98	2/1743 (0.1%)	0.56	0/2348
1	G	0.98	1/1743 (0.1%)	0.56	0/2348
1	I	0.98	2/1743 (0.1%)	0.56	0/2348
1	K	0.98	1/1743 (0.1%)	0.56	0/2348
1	M	0.98	2/1743 (0.1%)	0.56	0/2348
1	O	0.98	2/1743 (0.1%)	0.56	0/2348
1	Q	0.98	2/1743 (0.1%)	0.56	0/2348
1	S	0.98	2/1743 (0.1%)	0.56	0/2348
1	U	0.98	2/1743 (0.1%)	0.56	0/2348
1	W	0.98	1/1743 (0.1%)	0.56	0/2348
1	Y	0.98	2/1743 (0.1%)	0.56	0/2348
2	1	0.92	1/1560 (0.1%)	0.59	0/2107
2	B	0.92	1/1560 (0.1%)	0.59	0/2107
2	D	0.92	1/1560 (0.1%)	0.59	0/2107
2	F	0.92	1/1560 (0.1%)	0.59	0/2107
2	H	0.92	1/1560 (0.1%)	0.59	0/2107
2	J	0.92	1/1560 (0.1%)	0.59	0/2107
2	L	0.92	1/1560 (0.1%)	0.59	0/2107
2	N	0.92	1/1560 (0.1%)	0.59	0/2107
2	P	0.92	1/1560 (0.1%)	0.59	0/2107
2	R	0.92	1/1560 (0.1%)	0.59	0/2107
2	T	0.92	1/1560 (0.1%)	0.59	0/2107
2	V	0.92	1/1560 (0.1%)	0.59	0/2107
2	X	0.92	1/1560 (0.1%)	0.59	0/2107
2	Z	0.92	1/1560 (0.1%)	0.59	0/2107
All	All	0.95	37/46242 (0.1%)	0.58	0/62370

All (37) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	23	GLU	CD-OE2	-5.34	1.19	1.25
2	Z	23	GLU	CD-OE2	-5.33	1.19	1.25
2	J	23	GLU	CD-OE2	-5.29	1.19	1.25
2	L	23	GLU	CD-OE2	-5.28	1.19	1.25
2	N	23	GLU	CD-OE2	-5.28	1.19	1.25
2	B	23	GLU	CD-OE2	-5.27	1.19	1.25
2	H	23	GLU	CD-OE2	-5.26	1.19	1.25
2	X	23	GLU	CD-OE2	-5.26	1.19	1.25
2	1	23	GLU	CD-OE2	-5.26	1.19	1.25
2	F	23	GLU	CD-OE2	-5.24	1.19	1.25
2	P	23	GLU	CD-OE2	-5.24	1.19	1.25
1	M	149	PHE	CB-CG	-5.23	1.42	1.51
2	T	23	GLU	CD-OE2	-5.23	1.19	1.25
1	I	149	PHE	CB-CG	-5.22	1.42	1.51
1	G	149	PHE	CB-CG	-5.21	1.42	1.51
1	K	149	PHE	CB-CG	-5.21	1.42	1.51
1	S	149	PHE	CB-CG	-5.21	1.42	1.51
2	R	23	GLU	CD-OE2	-5.21	1.20	1.25
1	U	149	PHE	CB-CG	-5.21	1.42	1.51
2	V	23	GLU	CD-OE2	-5.20	1.20	1.25
1	A	149	PHE	CB-CG	-5.20	1.42	1.51
1	C	149	PHE	CB-CG	-5.20	1.42	1.51
1	E	149	PHE	CB-CG	-5.19	1.42	1.51
1	Y	149	PHE	CB-CG	-5.19	1.42	1.51
1	Q	149	PHE	CB-CG	-5.19	1.42	1.51
1	W	149	PHE	CB-CG	-5.18	1.42	1.51
1	O	149	PHE	CB-CG	-5.15	1.42	1.51
1	0	149	PHE	CB-CG	-5.15	1.42	1.51
1	Q	211	GLU	CD-OE1	-5.07	1.20	1.25
1	M	211	GLU	CD-OE1	-5.04	1.20	1.25
1	I	211	GLU	CD-OE1	-5.04	1.20	1.25
1	U	211	GLU	CD-OE1	-5.04	1.20	1.25
1	S	211	GLU	CD-OE1	-5.04	1.20	1.25
1	A	211	GLU	CD-OE1	-5.02	1.20	1.25
1	O	211	GLU	CD-OE1	-5.02	1.20	1.25
1	E	211	GLU	CD-OE1	-5.01	1.20	1.25
1	Y	211	GLU	CD-OE1	-5.01	1.20	1.25

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	0	1720	0	1753	3	0
1	A	1720	0	1753	4	0
1	C	1720	0	1753	4	0
1	E	1720	0	1753	3	0
1	G	1720	0	1753	4	0
1	I	1720	0	1753	5	0
1	K	1720	0	1753	4	0
1	M	1720	0	1753	4	0
1	O	1720	0	1753	4	0
1	Q	1720	0	1753	4	0
1	S	1720	0	1753	4	0
1	U	1720	0	1753	5	0
1	W	1720	0	1753	4	0
1	Y	1720	0	1753	3	0
2	1	1541	0	1587	10	0
2	B	1541	0	1587	11	0
2	D	1541	0	1587	8	0
2	F	1541	0	1587	9	0
2	H	1541	0	1587	9	0
2	J	1541	0	1587	10	0
2	L	1541	0	1587	11	0
2	N	1541	0	1587	10	0
2	P	1541	0	1587	10	0
2	R	1541	0	1587	10	0
2	T	1541	0	1587	11	0
2	V	1541	0	1587	10	0
2	X	1541	0	1587	9	0
2	Z	1541	0	1587	9	0
3	0	21	0	0	0	0
3	1	31	0	0	1	0
3	A	21	0	0	0	0
3	B	31	0	0	1	0
3	C	21	0	0	0	0
3	D	31	0	0	1	0
3	E	21	0	0	0	0
3	F	31	0	0	1	0
3	G	21	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	H	31	0	0	1	0
3	I	21	0	0	0	0
3	J	31	0	0	1	0
3	K	21	0	0	0	0
3	L	31	0	0	1	0
3	M	21	0	0	0	0
3	N	31	0	0	1	0
3	O	21	0	0	0	0
3	P	31	0	0	1	0
3	Q	21	0	0	0	0
3	R	31	0	0	1	0
3	S	21	0	0	0	0
3	T	31	0	0	1	0
3	U	21	0	0	0	0
3	V	31	0	0	1	0
3	W	21	0	0	0	0
3	X	31	0	0	1	0
3	Y	21	0	0	0	0
3	Z	31	0	0	1	0
All	All	46382	0	46760	192	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 2.

All (192) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:P:17:GLU:HG3	2:P:170:GLY:H	1.44	0.83
2:B:17:GLU:HG3	2:B:170:GLY:H	1.44	0.83
2:J:17:GLU:HG3	2:J:170:GLY:H	1.44	0.82
2:T:17:GLU:HG3	2:T:170:GLY:H	1.44	0.82
2:L:17:GLU:HG3	2:L:170:GLY:H	1.44	0.82
2:V:17:GLU:HG3	2:V:170:GLY:H	1.44	0.82
2:N:17:GLU:HG3	2:N:170:GLY:H	1.44	0.81
2:R:17:GLU:HG3	2:R:170:GLY:H	1.44	0.81
2:F:17:GLU:HG3	2:F:170:GLY:H	1.44	0.81
2:H:17:GLU:HG3	2:H:170:GLY:H	1.44	0.81
2:X:17:GLU:HG3	2:X:170:GLY:H	1.44	0.81
2:Z:17:GLU:HG3	2:Z:170:GLY:H	1.44	0.81
2:1:17:GLU:HG3	2:1:170:GLY:H	1.44	0.80
2:D:17:GLU:HG3	2:D:170:GLY:H	1.44	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:186:GLN:OE1	3:D:301:HOH:O	2.05	0.74
2:I:186:GLN:OE1	3:I:301:HOH:O	2.05	0.74
2:B:186:GLN:OE1	3:B:301:HOH:O	2.05	0.74
2:P:186:GLN:OE1	3:P:301:HOH:O	2.06	0.74
2:F:186:GLN:OE1	3:F:301:HOH:O	2.05	0.74
2:Z:186:GLN:OE1	3:Z:301:HOH:O	2.05	0.74
2:N:186:GLN:OE1	3:N:301:HOH:O	2.05	0.74
2:R:186:GLN:OE1	3:R:301:HOH:O	2.05	0.74
2:X:186:GLN:OE1	3:X:301:HOH:O	2.05	0.73
2:H:186:GLN:OE1	3:H:301:HOH:O	2.05	0.73
2:L:186:GLN:OE1	3:L:301:HOH:O	2.05	0.72
2:T:186:GLN:OE1	3:T:301:HOH:O	2.05	0.72
2:J:186:GLN:OE1	3:J:301:HOH:O	2.05	0.72
2:V:186:GLN:OE1	3:V:301:HOH:O	2.05	0.72
2:J:3:THR:HG1	2:J:127:THR:HG1	1.46	0.64
2:V:3:THR:HG1	2:V:127:THR:HG1	1.48	0.62
2:J:2:THR:N	2:J:17:GLU:OE2	2.33	0.61
2:V:2:THR:N	2:V:17:GLU:OE2	2.33	0.61
2:P:2:THR:N	2:P:17:GLU:OE2	2.33	0.61
2:H:2:THR:N	2:H:17:GLU:OE2	2.33	0.61
2:X:2:THR:N	2:X:17:GLU:OE2	2.33	0.61
2:B:2:THR:N	2:B:17:GLU:OE2	2.33	0.60
2:F:2:THR:N	2:F:17:GLU:OE2	2.33	0.60
2:D:2:THR:N	2:D:17:GLU:OE2	2.33	0.60
2:Z:2:THR:N	2:Z:17:GLU:OE2	2.33	0.60
2:I:2:THR:N	2:I:17:GLU:OE2	2.33	0.60
2:R:3:THR:HG1	2:R:127:THR:HG1	1.49	0.60
2:N:3:THR:HG1	2:N:127:THR:HG1	1.49	0.59
2:Z:3:THR:HG1	2:Z:127:THR:HG1	1.48	0.59
2:F:3:THR:HG1	2:F:127:THR:HG1	1.48	0.59
2:N:2:THR:N	2:N:17:GLU:OE2	2.33	0.56
2:R:2:THR:N	2:R:17:GLU:OE2	2.33	0.56
2:T:3:THR:HG1	2:T:127:THR:HG1	1.45	0.55
2:L:2:THR:N	2:L:17:GLU:OE2	2.33	0.55
2:I:131:SER:N	2:I:132:PRO:CD	2.70	0.55
2:D:131:SER:N	2:D:132:PRO:CD	2.70	0.55
2:T:2:THR:N	2:T:17:GLU:OE2	2.33	0.55
2:H:104:ILE:HG22	2:H:180:ARG:HD3	1.88	0.55
2:H:131:SER:N	2:H:132:PRO:CD	2.70	0.55
2:V:104:ILE:HG22	2:V:180:ARG:HD3	1.88	0.55
2:X:104:ILE:HG22	2:X:180:ARG:HD3	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:Z:104:ILE:HG22	2:Z:180:ARG:HD3	1.88	0.55
2:J:104:ILE:HG22	2:J:180:ARG:HD3	1.88	0.55
2:X:131:SER:N	2:X:132:PRO:CD	2.70	0.55
2:F:104:ILE:HG22	2:F:180:ARG:HD3	1.88	0.55
2:N:104:ILE:HG22	2:N:180:ARG:HD3	1.88	0.55
2:P:131:SER:N	2:P:132:PRO:CD	2.70	0.55
2:Z:131:SER:N	2:Z:132:PRO:CD	2.70	0.55
2:B:131:SER:N	2:B:132:PRO:CD	2.70	0.54
2:F:131:SER:N	2:F:132:PRO:CD	2.70	0.54
2:J:131:SER:N	2:J:132:PRO:CD	2.70	0.54
2:L:104:ILE:HG22	2:L:180:ARG:HD3	1.88	0.54
2:T:104:ILE:HG22	2:T:180:ARG:HD3	1.88	0.54
2:V:131:SER:N	2:V:132:PRO:CD	2.70	0.54
2:1:104:ILE:HG22	2:1:180:ARG:HD3	1.88	0.54
2:D:104:ILE:HG22	2:D:180:ARG:HD3	1.88	0.54
2:L:3:THR:HG1	2:L:127:THR:HG1	1.46	0.54
2:R:104:ILE:HG22	2:R:180:ARG:HD3	1.88	0.54
2:B:104:ILE:HG22	2:B:180:ARG:HD3	1.88	0.54
2:N:131:SER:N	2:N:132:PRO:CD	2.70	0.54
2:R:131:SER:N	2:R:132:PRO:CD	2.70	0.54
2:P:104:ILE:HG22	2:P:180:ARG:HD3	1.88	0.54
2:L:131:SER:N	2:L:132:PRO:CD	2.70	0.54
2:T:131:SER:N	2:T:132:PRO:CD	2.70	0.54
1:E:152:ASP:HB2	1:E:153:PRO:HD2	1.91	0.53
1:Y:152:ASP:HB2	1:Y:153:PRO:HD2	1.91	0.53
1:W:152:ASP:HB2	1:W:153:PRO:HD2	1.91	0.53
1:G:152:ASP:HB2	1:G:153:PRO:HD2	1.91	0.53
1:O:152:ASP:HB2	1:O:153:PRO:HD2	1.91	0.53
1:C:152:ASP:HB2	1:C:153:PRO:HD2	1.91	0.53
1:I:152:ASP:HB2	1:I:153:PRO:HD2	1.91	0.52
1:U:152:ASP:HB2	1:U:153:PRO:HD2	1.91	0.52
1:A:152:ASP:HB2	1:A:153:PRO:HD2	1.91	0.52
1:O:152:ASP:HB2	1:O:153:PRO:HD2	1.91	0.52
1:I:95:SER:HG	1:I:115:ARG:HE	1.59	0.51
1:K:152:ASP:HB2	1:K:153:PRO:HD2	1.91	0.51
1:S:152:ASP:HB2	1:S:153:PRO:HD2	1.91	0.51
1:M:152:ASP:HB2	1:M:153:PRO:HD2	1.91	0.51
1:Q:152:ASP:HB2	1:Q:153:PRO:HD2	1.91	0.51
2:P:3:THR:HG1	2:P:127:THR:HG1	1.47	0.49
2:B:3:THR:HG1	2:B:127:THR:HG1	1.48	0.48
1:M:108:ASN:OD1	1:M:147:ARG:NH1	2.47	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Q:108:ASN:OD1	1:Q:147:ARG:NH1	2.48	0.47
1:U:108:ASN:OD1	1:U:147:ARG:NH1	2.48	0.47
1:I:108:ASN:OD1	1:I:147:ARG:NH1	2.48	0.47
1:K:108:ASN:OD1	1:K:147:ARG:NH1	2.48	0.47
1:O:108:ASN:OD1	1:O:147:ARG:NH1	2.48	0.47
1:C:108:ASN:OD1	1:C:147:ARG:NH1	2.48	0.47
1:E:108:ASN:OD1	1:E:147:ARG:NH1	2.48	0.47
1:S:108:ASN:OD1	1:S:147:ARG:NH1	2.48	0.47
1:G:108:ASN:OD1	1:G:147:ARG:NH1	2.48	0.47
1:W:108:ASN:OD1	1:W:147:ARG:NH1	2.48	0.47
1:Y:108:ASN:OD1	1:Y:147:ARG:NH1	2.48	0.47
1:A:108:ASN:OD1	1:A:147:ARG:NH1	2.48	0.47
1:O:108:ASN:OD1	1:O:147:ARG:NH1	2.48	0.47
2:B:17:GLU:HG2	2:B:18:ARG:N	2.30	0.46
2:J:17:GLU:HG2	2:J:18:ARG:N	2.30	0.46
2:V:17:GLU:HG2	2:V:18:ARG:N	2.30	0.46
2:P:17:GLU:HG2	2:P:18:ARG:N	2.30	0.46
2:H:17:GLU:HG2	2:H:18:ARG:N	2.30	0.46
2:X:17:GLU:HG2	2:X:18:ARG:N	2.30	0.46
2:D:17:GLU:HG2	2:D:18:ARG:N	2.30	0.46
2:R:17:GLU:HG2	2:R:18:ARG:N	2.30	0.46
2:N:17:GLU:HG2	2:N:18:ARG:N	2.30	0.46
2:1:17:GLU:HG2	2:1:18:ARG:N	2.30	0.45
2:F:17:GLU:HG2	2:F:18:ARG:N	2.30	0.45
2:Z:17:GLU:HG2	2:Z:18:ARG:N	2.30	0.45
2:L:17:GLU:HG2	2:L:18:ARG:N	2.30	0.45
2:T:17:GLU:HG2	2:T:18:ARG:N	2.30	0.45
2:P:104:ILE:CG2	2:P:180:ARG:HD3	2.48	0.44
2:B:104:ILE:CG2	2:B:180:ARG:HD3	2.48	0.44
2:H:104:ILE:CG2	2:H:180:ARG:HD3	2.48	0.44
2:N:104:ILE:CG2	2:N:180:ARG:HD3	2.48	0.44
2:X:104:ILE:CG2	2:X:180:ARG:HD3	2.48	0.44
2:F:104:ILE:CG2	2:F:180:ARG:HD3	2.48	0.44
2:R:104:ILE:CG2	2:R:180:ARG:HD3	2.48	0.44
2:Z:104:ILE:CG2	2:Z:180:ARG:HD3	2.48	0.44
1:A:56:SER:OG	1:A:57:ARG:N	2.51	0.44
1:G:56:SER:OG	1:G:57:ARG:N	2.51	0.44
1:O:56:SER:OG	1:O:57:ARG:N	2.51	0.44
1:M:56:SER:OG	1:M:57:ARG:N	2.51	0.43
1:Q:56:SER:OG	1:Q:57:ARG:N	2.51	0.43
1:W:56:SER:OG	1:W:57:ARG:N	2.51	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:56:SER:OG	1:I:57:ARG:N	2.51	0.43
2:L:104:ILE:CG2	2:L:180:ARG:HD3	2.48	0.43
2:T:104:ILE:CG2	2:T:180:ARG:HD3	2.48	0.43
1:U:56:SER:OG	1:U:57:ARG:N	2.51	0.43
2:V:104:ILE:CG2	2:V:180:ARG:HD3	2.48	0.43
2:J:104:ILE:CG2	2:J:180:ARG:HD3	2.48	0.43
1:O:56:SER:OG	1:O:57:ARG:N	2.51	0.43
1:E:56:SER:OG	1:E:57:ARG:N	2.51	0.43
1:C:56:SER:OG	1:C:57:ARG:N	2.51	0.43
2:1:104:ILE:CG2	2:1:180:ARG:HD3	2.48	0.43
1:Y:56:SER:OG	1:Y:57:ARG:N	2.51	0.43
2:D:104:ILE:CG2	2:D:180:ARG:HD3	2.48	0.43
1:K:56:SER:OG	1:K:57:ARG:N	2.51	0.42
1:S:56:SER:OG	1:S:57:ARG:N	2.51	0.42
2:L:187:LEU:HA	2:L:188:PRO:HD3	1.92	0.42
2:B:8:LEU:O	2:B:9:LYS:C	2.58	0.42
2:J:8:LEU:O	2:J:9:LYS:C	2.58	0.42
2:P:8:LEU:O	2:P:9:LYS:C	2.58	0.42
2:1:8:LEU:O	2:1:9:LYS:C	2.58	0.41
2:D:8:LEU:O	2:D:9:LYS:C	2.58	0.41
2:L:8:LEU:O	2:L:9:LYS:C	2.58	0.41
2:V:8:LEU:O	2:V:9:LYS:C	2.58	0.41
2:H:8:LEU:O	2:H:9:LYS:C	2.58	0.41
2:T:187:LEU:HA	2:T:188:PRO:HD3	1.92	0.41
2:T:8:LEU:O	2:T:9:LYS:C	2.58	0.41
2:1:187:LEU:HA	2:1:188:PRO:HD3	1.92	0.41
1:K:152:ASP:HB2	1:K:153:PRO:CD	2.51	0.41
2:X:8:LEU:O	2:X:9:LYS:C	2.58	0.41
1:M:152:ASP:HB2	1:M:153:PRO:CD	2.51	0.41
2:N:8:LEU:O	2:N:9:LYS:C	2.58	0.41
1:Q:152:ASP:HB2	1:Q:153:PRO:CD	2.51	0.41
2:R:8:LEU:O	2:R:9:LYS:C	2.58	0.41
1:S:152:ASP:HB2	1:S:153:PRO:CD	2.51	0.41
2:1:3:THR:OG1	2:1:127:THR:OG1	2.25	0.41
2:B:187:LEU:HA	2:B:188:PRO:HD3	1.92	0.41
1:I:152:ASP:HB2	1:I:153:PRO:CD	2.51	0.41
1:U:152:ASP:HB2	1:U:153:PRO:CD	2.51	0.41
1:A:152:ASP:HB2	1:A:153:PRO:CD	2.51	0.41
2:B:3:THR:OG1	2:B:127:THR:OG1	2.25	0.41
2:N:187:LEU:HA	2:N:188:PRO:HD3	1.92	0.41
1:O:152:ASP:HB2	1:O:153:PRO:CD	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:U:95:SER:HG	1:U:115:ARG:HE	1.69	0.41
2:F:8:LEU:O	2:F:9:LYS:C	2.58	0.40
2:P:187:LEU:HA	2:P:188:PRO:HD3	1.92	0.40
2:Z:8:LEU:O	2:Z:9:LYS:C	2.58	0.40
2:R:187:LEU:HA	2:R:188:PRO:HD3	1.92	0.40
2:V:114:ASP:OD1	2:V:114:ASP:C	2.60	0.40
2:J:114:ASP:OD1	2:J:114:ASP:C	2.60	0.40
1:W:152:ASP:HB2	1:W:153:PRO:CD	2.51	0.40
2:H:114:ASP:OD1	2:H:114:ASP:C	2.60	0.40
2:X:114:ASP:OD1	2:X:114:ASP:C	2.60	0.40
1:C:152:ASP:HB2	1:C:153:PRO:CD	2.51	0.40
1:G:152:ASP:HB2	1:G:153:PRO:CD	2.51	0.40
2:L:114:ASP:OD1	2:L:114:ASP:C	2.60	0.40
2:T:114:ASP:OD1	2:T:114:ASP:C	2.60	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	0	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	A	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	C	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	E	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	G	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	I	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	K	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	M	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	O	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	Q	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	S	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	U	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	W	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
1	Y	219/233 (94%)	216 (99%)	2 (1%)	1 (0%)	32	67
2	1	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	B	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	D	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	F	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	H	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	J	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	L	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	N	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	P	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	R	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	T	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	V	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	X	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
2	Z	199/211 (94%)	195 (98%)	4 (2%)	0	100	100
All	All	5852/6216 (94%)	5754 (98%)	84 (1%)	14 (0%)	54	83

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	56	SER
1	C	56	SER
1	E	56	SER
1	G	56	SER
1	I	56	SER
1	K	56	SER
1	M	56	SER
1	O	56	SER
1	Q	56	SER
1	S	56	SER
1	U	56	SER

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Mol	Chain	Res	Type
1	W	56	SER
1	Y	56	SER
1	0	56	SER

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	0	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	A	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	C	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	E	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	G	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	I	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	K	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	M	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	O	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	Q	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	S	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	U	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	W	184/193 (95%)	182 (99%)	2 (1%)	78 94
1	Y	184/193 (95%)	182 (99%)	2 (1%)	78 94
2	1	168/177 (95%)	167 (99%)	1 (1%)	89 97
2	B	168/177 (95%)	167 (99%)	1 (1%)	89 97
2	D	168/177 (95%)	167 (99%)	1 (1%)	89 97
2	F	168/177 (95%)	167 (99%)	1 (1%)	89 97
2	H	168/177 (95%)	167 (99%)	1 (1%)	89 97
2	J	168/177 (95%)	167 (99%)	1 (1%)	89 97
2	L	168/177 (95%)	167 (99%)	1 (1%)	89 97

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	N	168/177 (95%)	167 (99%)	1 (1%)	89	97
2	P	168/177 (95%)	167 (99%)	1 (1%)	89	97
2	R	168/177 (95%)	167 (99%)	1 (1%)	89	97
2	T	168/177 (95%)	167 (99%)	1 (1%)	89	97
2	V	168/177 (95%)	167 (99%)	1 (1%)	89	97
2	X	168/177 (95%)	167 (99%)	1 (1%)	89	97
2	Z	168/177 (95%)	167 (99%)	1 (1%)	89	97
All	All	4928/5180 (95%)	4886 (99%)	42 (1%)	83	95

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	38	LEU
1	A	221	TYR
2	B	17	GLU
1	C	38	LEU
1	C	221	TYR
2	D	17	GLU
1	E	38	LEU
1	E	221	TYR
2	F	17	GLU
1	G	38	LEU
1	G	221	TYR
2	H	17	GLU
1	I	38	LEU
1	I	221	TYR
2	J	17	GLU
1	K	38	LEU
1	K	221	TYR
2	L	17	GLU
1	M	38	LEU
1	M	221	TYR
2	N	17	GLU
1	O	38	LEU
1	O	221	TYR
2	P	17	GLU
1	Q	38	LEU
1	Q	221	TYR
2	R	17	GLU
1	S	38	LEU

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Mol	Chain	Res	Type
1	S	221	TYR
2	T	17	GLU
1	U	38	LEU
1	U	221	TYR
2	V	17	GLU
1	W	38	LEU
1	W	221	TYR
2	X	17	GLU
1	Y	38	LEU
1	Y	221	TYR
2	Z	17	GLU
1	0	38	LEU
1	0	221	TYR
2	1	17	GLU

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

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.