



Full wwPDB EM Validation Report ⓘ

May 20, 2025 – 10:59 AM EDT

PDB ID : 9CZ2 / pdb_00009cz2
EMDB ID : EMD-46057
Title : Cryo-EM structure of a nautilus-like HflK/C assembly in complex with FtsH AAA protease
Authors : Ghanbarpour, A.; Sauer, R.T.; Davis, J.H.
Deposited on : 2024-08-03
Resolution : 4.40 Å(reported)

This is a Full wwPDB EM 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/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:

EMDB validation analysis : 0.0.1.dev118
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.43.1

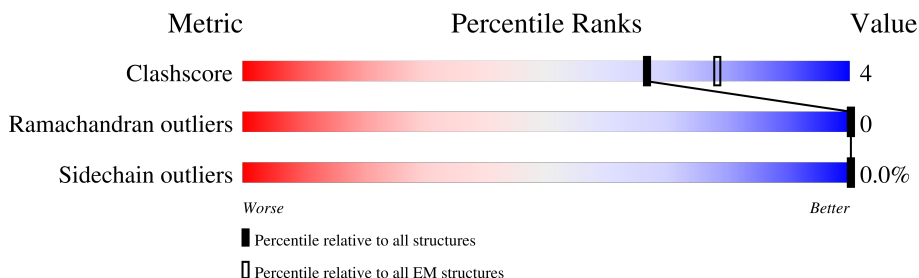
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY


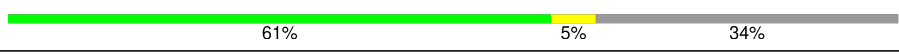

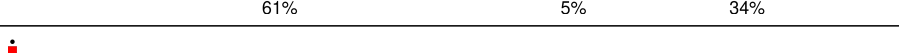




The reported resolution of this entry is 4.40 Å.

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.





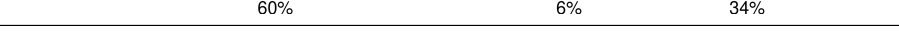
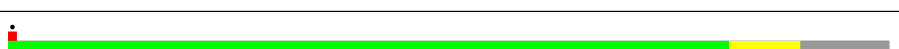



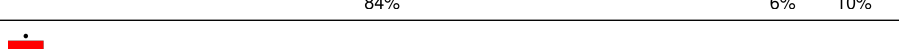



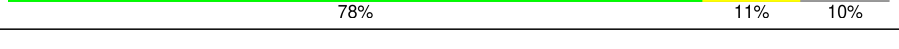




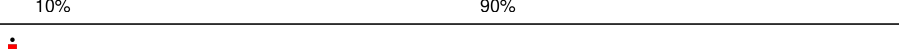







Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	XA	419	
1	XC	419	
1	XE	419	
1	XG	419	
1	XI	419	
1	XK	419	
1	XM	419	
1	XO	419	




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Mol	Chain	Length	Quality of chain
1	XQ	419	
1	XS	419	
1	XU	419	
1	XW	419	
2	XB	334	
2	XD	334	
2	XF	334	
2	XH	334	
2	XJ	334	
2	XL	334	
2	XN	334	
2	XP	334	
2	XR	334	
2	XT	334	
2	XV	334	
2	XX	334	
3	A	644	
3	B	644	
3	C	644	
3	D	644	
3	E	644	
3	F	644	
3	G	644	
3	H	644	
3	I	644	

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Mol	Chain	Length	Quality of chain
3	J	644	 9% 90%
3	K	644	 10% 90%
3	L	644	 5% 9% 90%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 114310 atoms, of which 57401 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 Modulator of FtsH protease HflK.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	XA	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XC	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XE	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XG	277	Total	C	H	N	O	S	0	0
			4396	1379	2204	386	421	6		
1	XI	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XK	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XM	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XO	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XQ	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XS	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XU	277	Total	C	H	N	O	S	0	0
			4404	1379	2212	386	421	6		
1	XW	87	Total	C	H	N	O	S	0	0
			1402	434	712	124	130	2		

- Molecule 2 is a protein called Modulator of FtsH protease HflC.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	XB	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XD	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XF	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		

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Mol	Chain	Residues	Atoms						AltConf	Trace
2	XH	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XJ	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XL	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XN	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XP	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XR	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XT	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XX	105	Total	C	H	N	O	S	0	0
			1645	517	802	160	161	5		
2	XV	97	Total	C	H	N	O	S	0	0
			1515	480	737	142	152	4		

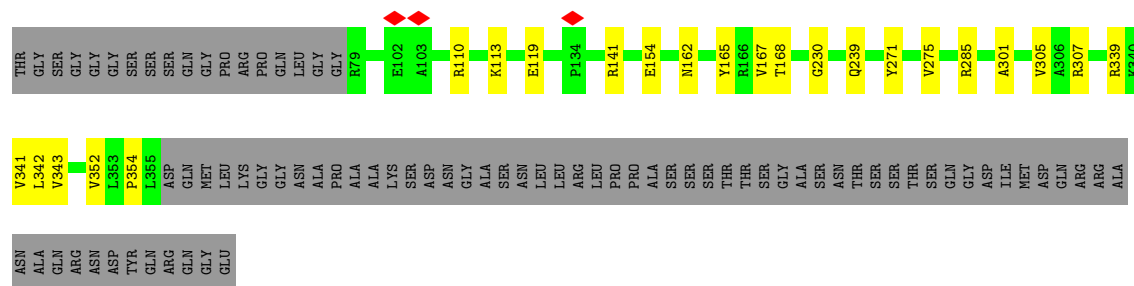
- Molecule 3 is a protein called ATP-dependent zinc metalloprotease FtsH.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	A	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	B	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	C	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	D	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	E	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	F	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	G	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	H	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	I	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	J	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		

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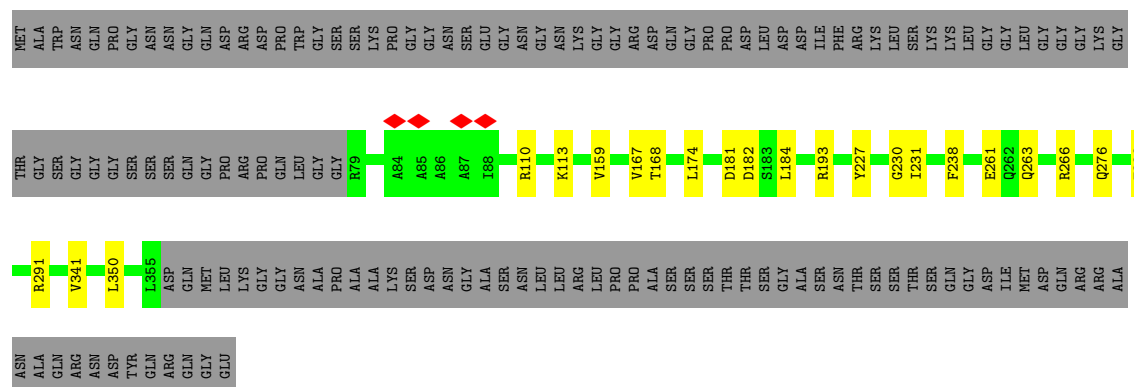
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Mol	Chain	Residues	Atoms					AltConf	Trace
3	K	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	L	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		



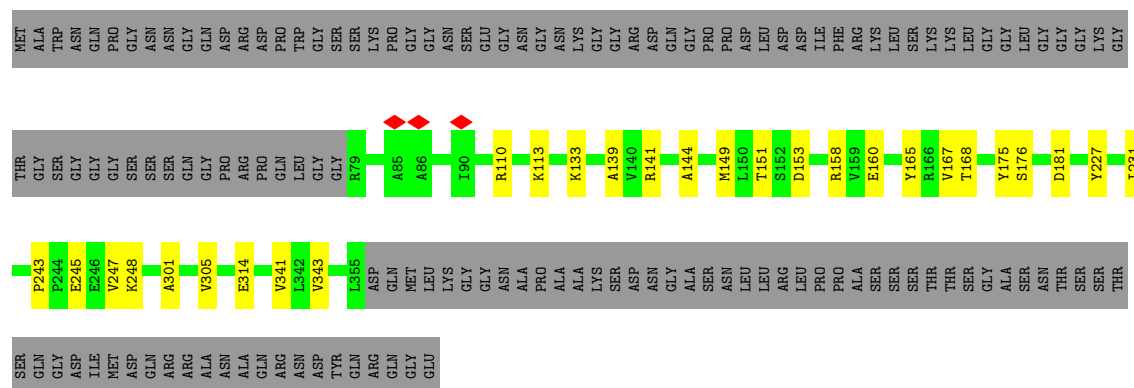
- Molecule 1: Modulator of FtsH protease HflK

Chain XG: 61% 5% 34%



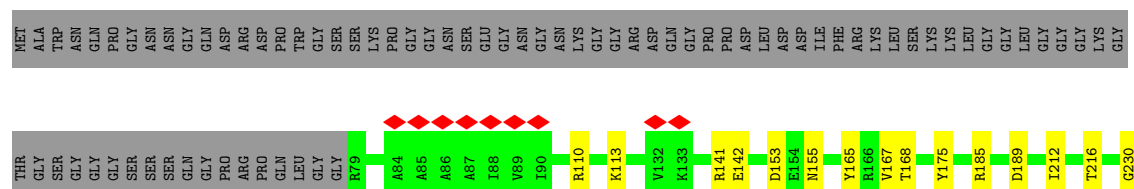
- Molecule 1: Modulator of FtsH protease HflK

Chain XI: 59% 7% 34%

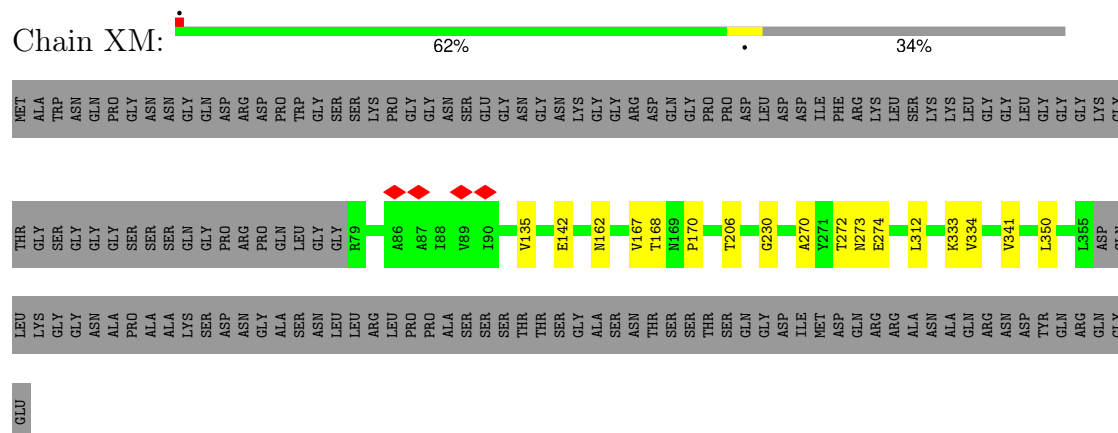


- Molecule 1: Modulator of FtsH protease HflK

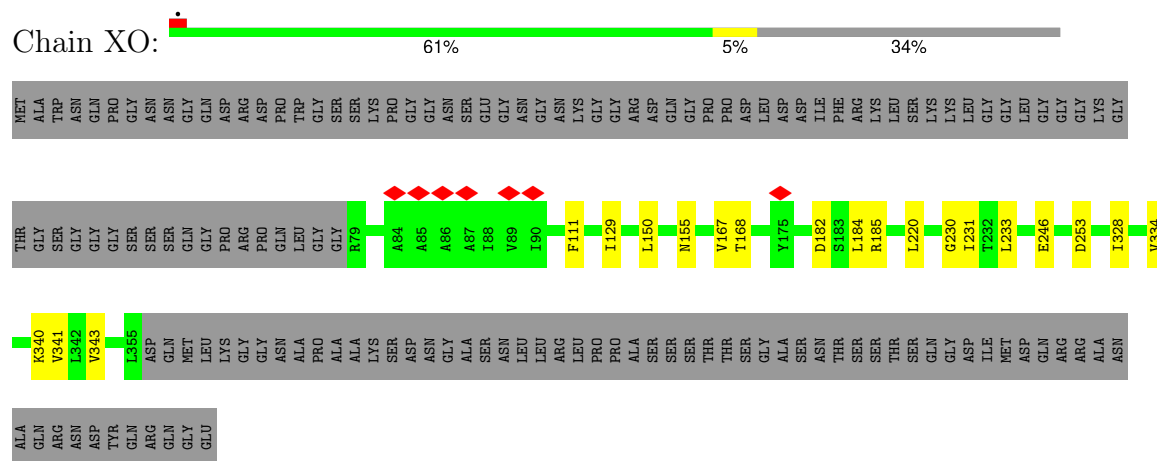
Chain XK: 59% 7% 34%



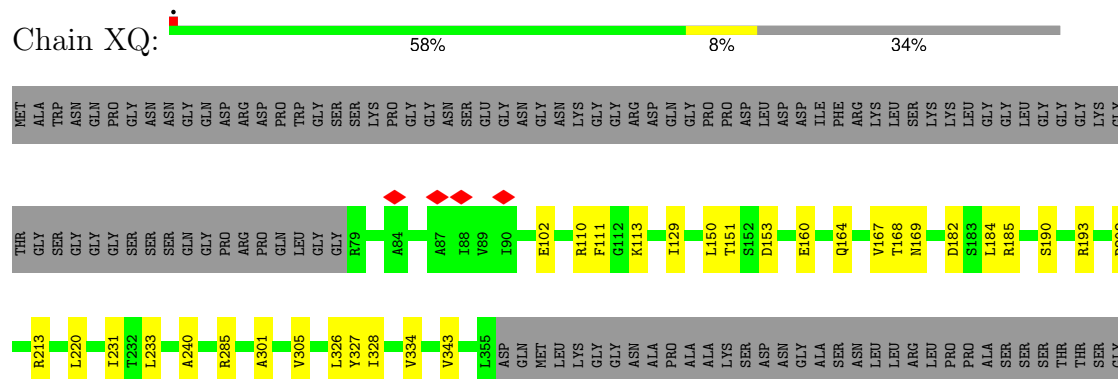
- Molecule 1: Modulator of FtsH protease HflK



- Molecule 1: Modulator of FtsH protease HflK




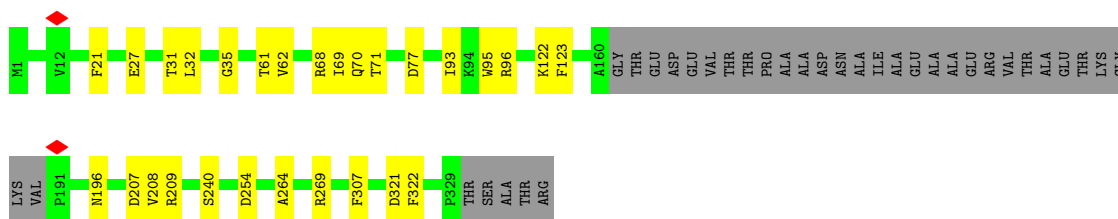
- Molecule 1: Modulator of FtsH protease HflK




ALA
LYS
SER
ASP
ASN
GLY
ALA
SER
ASN
LEU
LEU
ARG
LEU
PRO
PRO
ALA
SER
SER
SER
THR
THR
SER
GLY
ALA
SER
ASN
THR
SER
SER
GLN
GLY
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GLN
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ASP
TYR
GLN
ARG
GLY
GLY

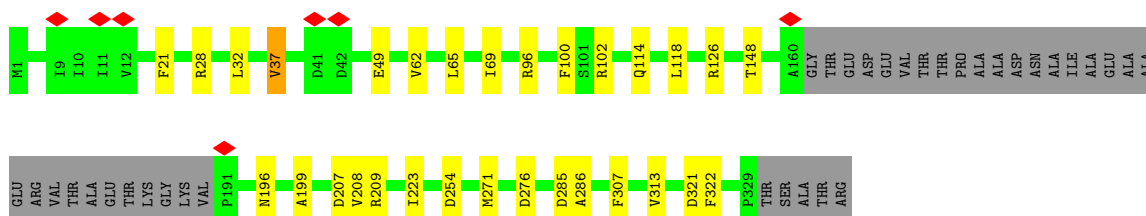
• Molecule 2: Modulator of FtsH protease HflC

Chain XB:  81% 8% 10%




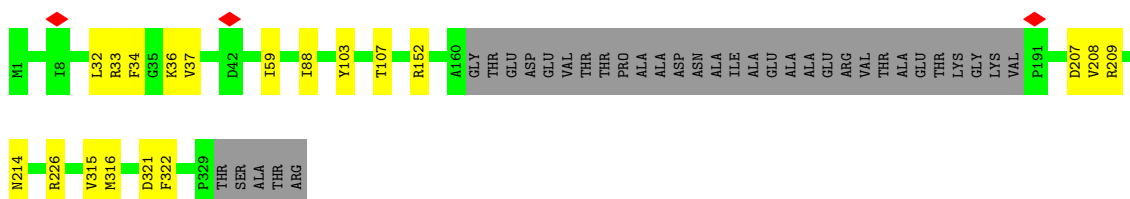
• Molecule 2: Modulator of FtsH protease HflC

Chain XD:  81% 9% 10%




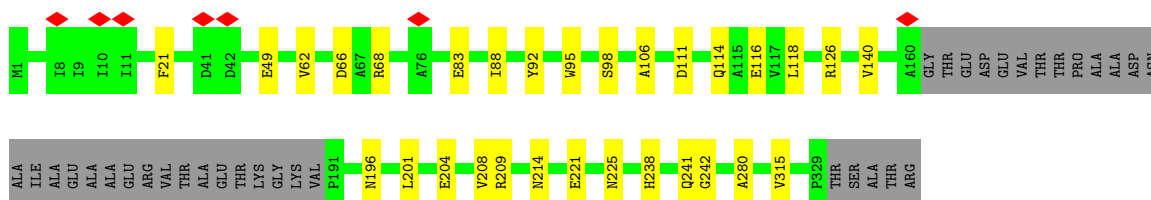
• Molecule 2: Modulator of FtsH protease HflC

Chain XF:  84% 6% 10%




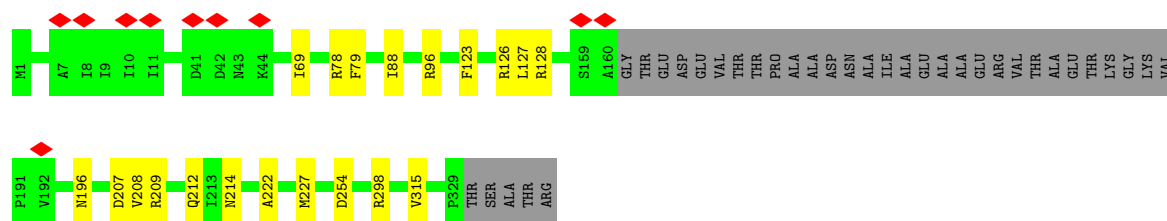
• Molecule 2: Modulator of FtsH protease HflC

Chain XH:  81% 9% 10%



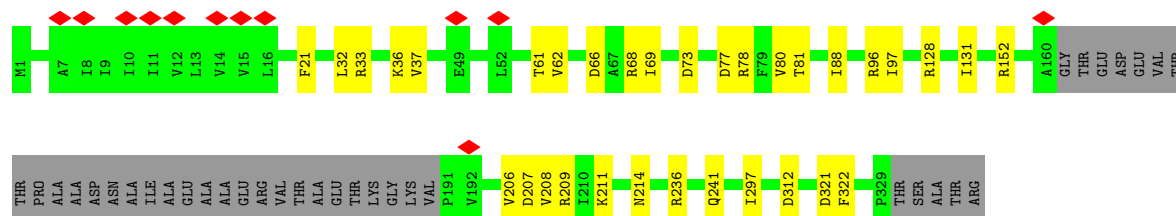
• Molecule 2: Modulator of FtsH protease HflC

Chain XJ:  84% 6% 10%



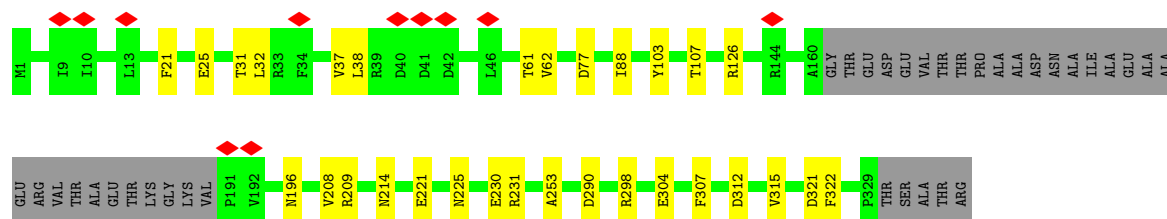
- Molecule 2: Modulator of FtsH protease HflC

Chain XL: 80% 10% 10%



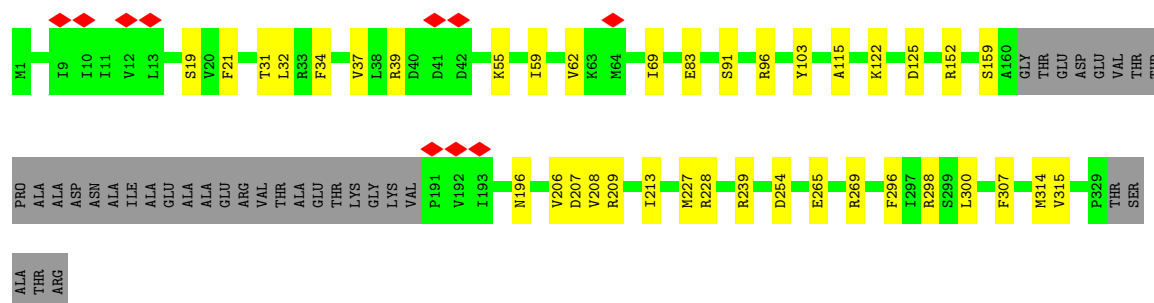
- Molecule 2: Modulator of FtsH protease HflC

Chain XN: 81% 9% 10%



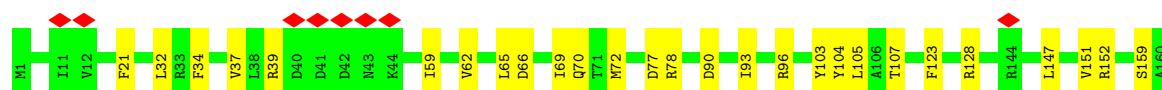
- Molecule 2: Modulator of FtsH protease HflC

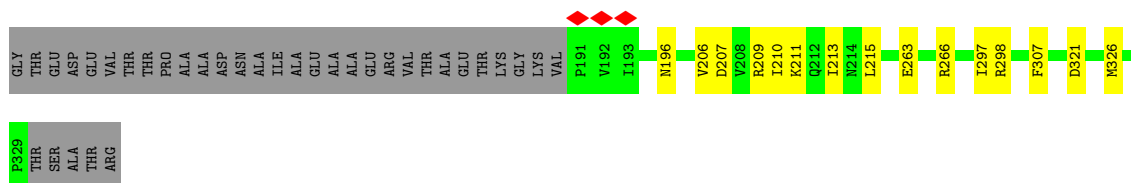
Chain XP: 78% 11% 10%



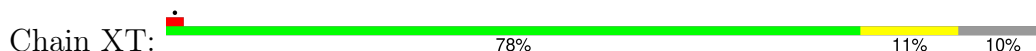
- Molecule 2: Modulator of FtsH protease HflC

Chain XR: 77% 13% 10%

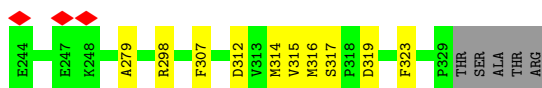
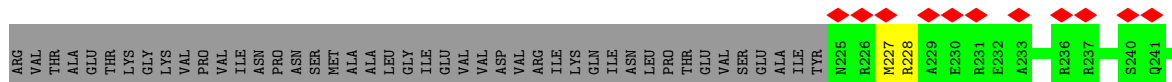
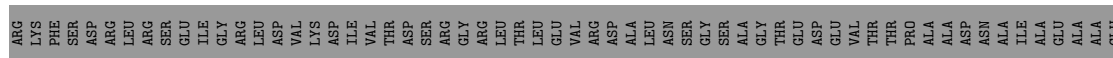
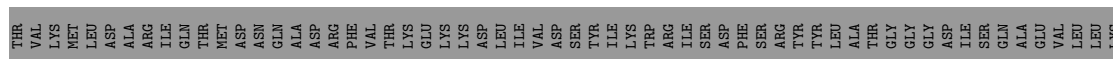
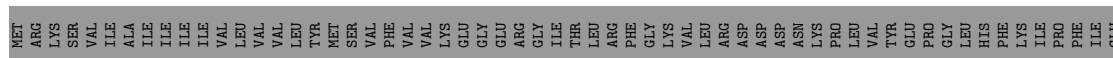




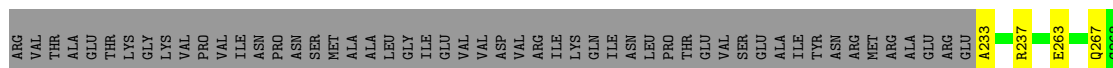
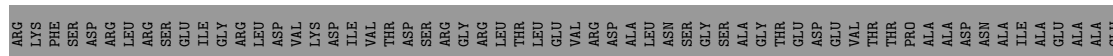
- Molecule 2: Modulator of FtsH protease HflC



- Molecule 2: Modulator of FtsH protease HflC



- Molecule 2: Modulator of FtsH protease HflC

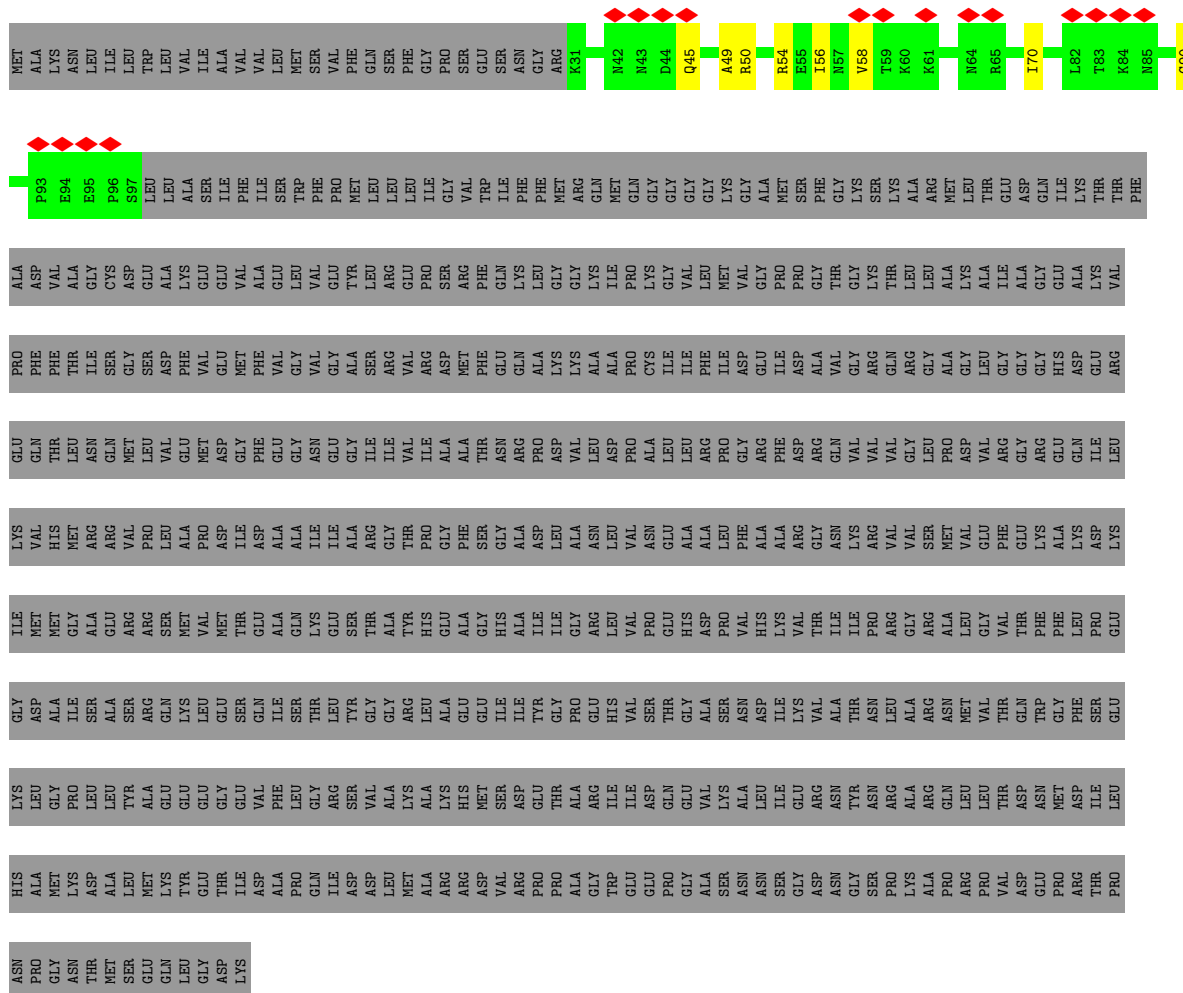


Chain D:  10% 90%

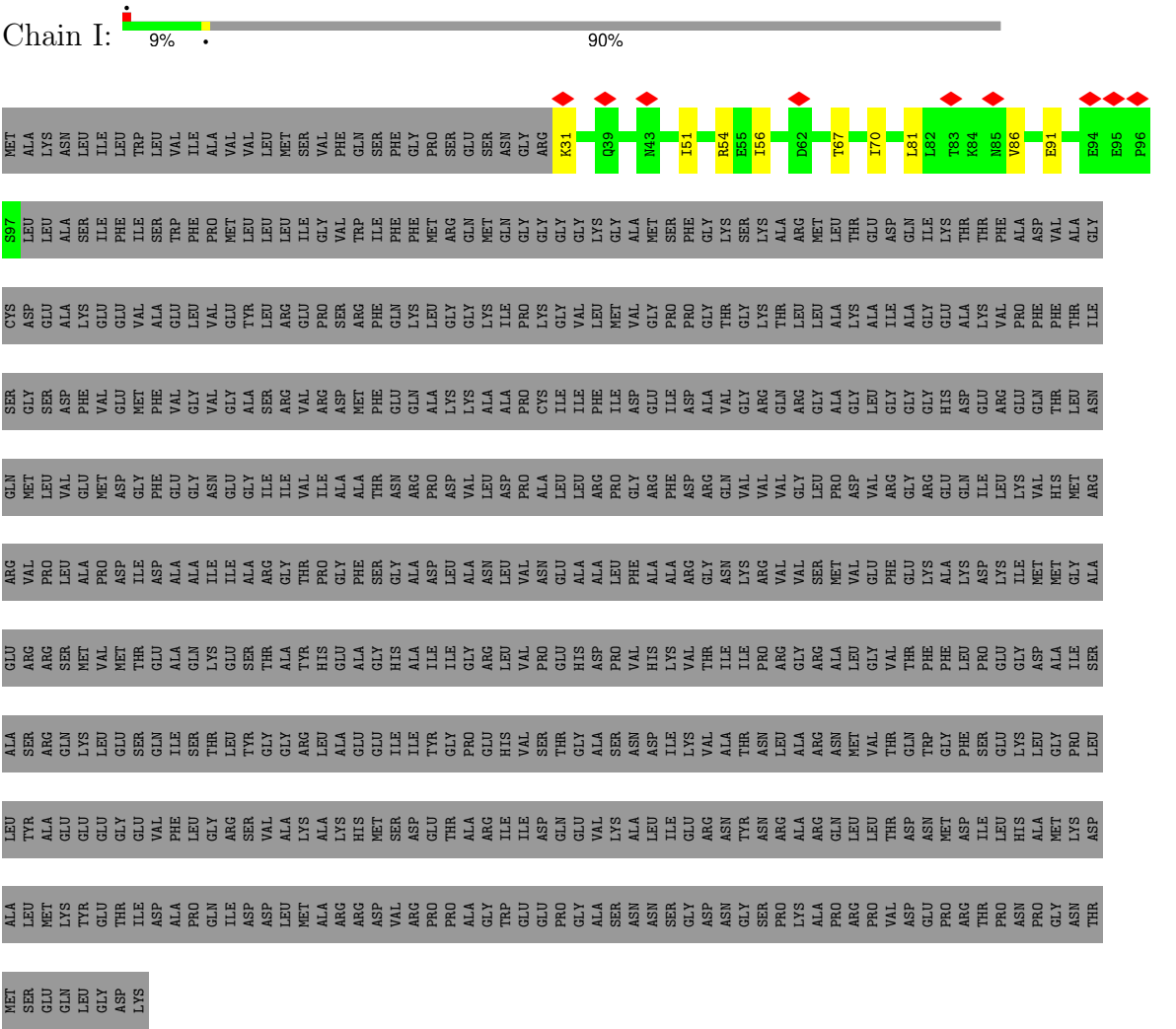
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- Molecule 3: ATP-dependent zinc metalloprotease FtsH

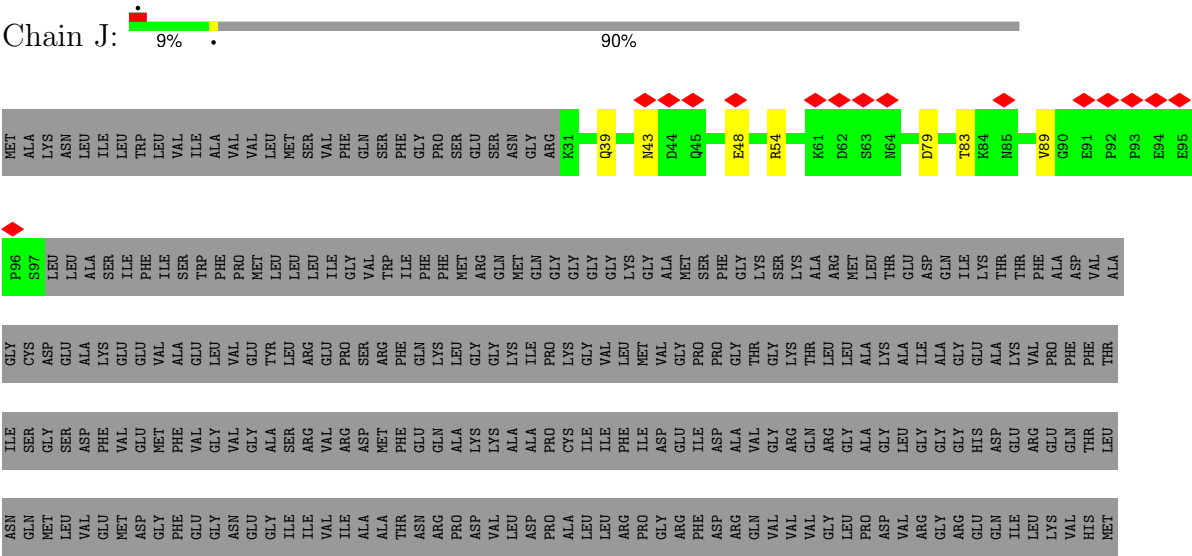
Chain H:  9% 90%



● Molecule 3: ATP-dependent zinc metalloprotease FtsH

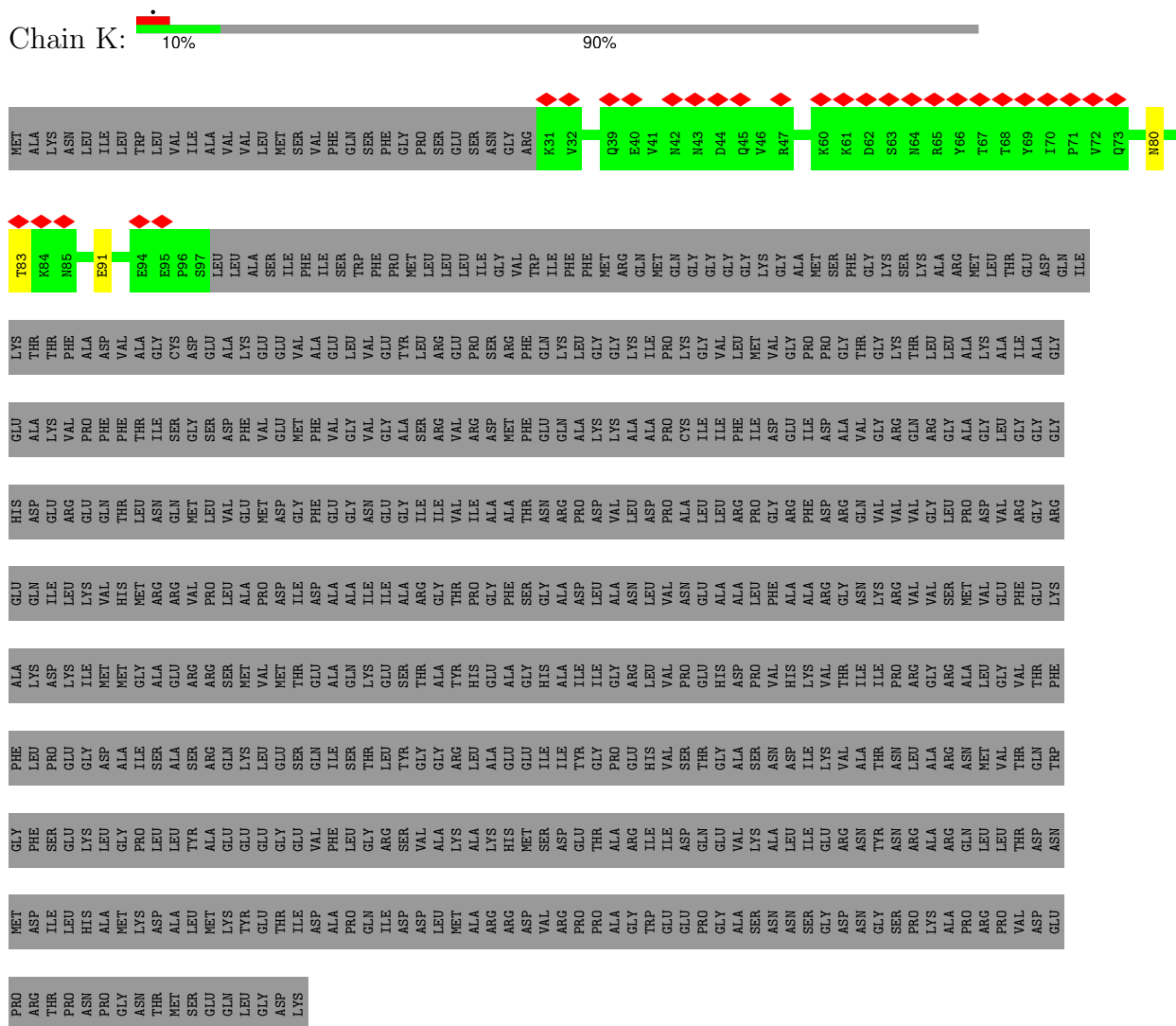


● Molecule 3: ATP-dependent zinc metalloprotease FtsH



THR	ASP	LEU	SER	ALA	ARG	ALA	ARG
MET	ALA	TYR	SER	ALA	GLU	ARG	ARG
SER	LEU	TYR	SER	VAL	ARG	VAL	ARG
GLU	MET	ALA	ARG	MET	ARG	ARG	PRO
GLN	LYS	GLU	GLN	GLN	SER	LEU	LEU
LEU	TYR	GLU	LYS	LYS	MET	ALA	ALA
GLY	GLU	GLU	LEU	LEU	VAL	PRO	ASP
ASP	THR	GLY	GLU	GLU	MET	ASP	ASP
LYS	ILE	GLU	GLN	ILE	THR	GLU	ASP
	ALA	PHE	ILE	ALA	ALA	ALA	ALA
	PRO	LEU	SER	SER	GLN	ALA	ALA
	GLN	GLY	THR	THR	LYS	ILE	ILE
	ASP	ARG	LEU	LEU	GLU	ILE	ILE
	ILE	ARG	TYR	SER	SER	THR	THR
	ASP	VAL	GLY	GLY	THR	ARG	ARG
	LEU	ALA	GLY	GLY	ALA	GLY	GLY
	MET	LYS	ARG	ARG	TYR	THR	THR
	ALA	ALA	LEU	LEU	HIS	PRO	PRO
	ARG	LYS	ALA	ALA	GLY	GLY	GLY
	ASP	HIS	GLU	GLU	ALA	PHE	PHE
	ARG	ASP	MET	GLU	GLY	SER	SER
	VAL	SER	ILE	ILE	HIS	GLY	GLY
	ARG	ASP	ILE	ILE	HIS	VAL	VAL
	PRO	GLU	TYR	ILE	LEU	VAL	VAL
	PRO	THR	PRO	GLY	LEU	ASN	ASN
	ALA	ALA	ALA	PRO	GLY	HIS	ALA
	GLY	GLU	GLY	GLY	ALA	ALA	ALA
	ALA	VAL	ALA	ALA	ASP	PRO	LEU
	SER	LYS	SER	SER	VAL	PHE	PHE
	ASN	ALA	ASN	ASP	HIS	ALA	ALA
	SER	ILE	ILE	ILE	LYS	ARG	ALA
	GLY	GLU	LYS	LYS	VAL	VAL	ARG
	ASN	ARG	VAL	VAL	THR	GLY	GLY
	ASN	ASN	ALA	ALA	ILE	ASN	ASN
	GLY	TYR	THR	THR	ILE	LYS	LYS
	SER	ASN	ASN	ASN	PRO	ARG	ARG
	PRO	ARG	LEU	LEU	ARG	VAL	VAL
	LYS	ALA	ALA	ALA	GLY	VAL	VAL
	ALA	ARG	ARG	ARG	SER	SER	SER
	PRO	GLN	ASN	ASN	ALA	MET	MET
	ARG	LEU	MET	MET	LEU	VAL	VAL
	PRO	LEU	VAL	VAL	GLY	GLY	GLY
	VAL	THR	THR	THR	VAL	PHE	PHE
	ASP	ASP	GLN	GLN	THR	THR	THR
	GLU	ASN	GLY	GLY	THR	GLY	GLY
	PRO	MET	PHE	PHE	LEU	LYS	LYS
	ARG	ASP	THR	THR	LEU	PRO	PRO
	THR	ILE	SER	SER	PRO	ASP	ASP
	PRO	LEU	GLU	GLU	GLY	ILE	ILE
	ASN	HIS	LYS	LYS	ASP	MET	MET
	GLY	ALA	LEU	LEU	GLY	TYR	TYR
	ASN	TYR	PRO	PRO	ALA	ILE	ILE

- Molecule 3: ATP-dependent zinc metalloprotease FtsH



- Molecule 3: ATP-dependent zinc metalloprotease FtsH



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	184019	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE; Patch CTF estimation, cryoSPARC	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	46.1	Depositor
Minimum defocus (nm)	50	Depositor
Maximum defocus (nm)	1700	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.673	Depositor
Minimum map value	-0.212	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.017	Depositor
Recommended contour level	0.053	Depositor
Map size (\AA)	588.6, 588.6, 588.6	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.635, 1.635, 1.635	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 >5	RMSZ	# Z >5
1	XA	0.20	0/2226	0.43	0/3018
1	XC	0.20	0/2226	0.44	0/3018
1	XE	0.19	0/2226	0.43	0/3018
1	XG	0.18	0/2226	0.41	0/3018
1	XI	0.19	0/2226	0.42	0/3018
1	XK	0.19	0/2226	0.43	0/3018
1	XM	0.19	0/2226	0.43	0/3018
1	XO	0.20	0/2226	0.43	0/3018
1	XQ	0.19	0/2226	0.43	0/3018
1	XS	0.19	0/2226	0.44	0/3018
1	XU	0.19	0/2226	0.46	0/3018
1	XW	0.19	0/698	0.41	0/941
2	XB	0.18	0/2432	0.43	0/3268
2	XD	0.18	0/2432	0.42	0/3268
2	XF	0.18	0/2432	0.40	0/3268
2	XH	0.18	0/2432	0.41	0/3268
2	XJ	0.19	0/2432	0.42	0/3268
2	XL	0.19	0/2432	0.43	0/3268
2	XN	0.18	0/2432	0.42	0/3268
2	XP	0.19	0/2432	0.41	0/3268
2	XR	0.18	0/2432	0.42	0/3268
2	XT	0.19	0/2432	0.45	0/3268
2	XV	0.17	0/792	0.42	0/1061
2	XX	0.19	0/857	0.45	0/1146
3	A	0.21	0/551	0.46	0/748
3	B	0.22	0/551	0.47	0/748
3	C	0.22	0/551	0.49	0/748
3	D	0.19	0/551	0.47	0/748
3	E	0.20	0/551	0.43	0/748
3	F	0.20	0/551	0.40	0/748
3	G	0.21	0/551	0.50	0/748
3	H	0.23	0/551	0.53	0/748
3	I	0.22	0/551	0.50	0/748
3	J	0.20	0/551	0.48	0/748

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
3	K	0.20	0/551	0.42	0/748
3	L	0.21	0/551	0.43	0/748
All	All	0.19	0/57765	0.43	0/78002

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 ⓘ

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	XA	2192	2212	2212	15	0
1	XC	2192	2212	2212	17	0
1	XE	2192	2212	2212	20	0
1	XG	2192	2204	2212	22	0
1	XI	2192	2212	2212	18	0
1	XK	2192	2212	2212	22	0
1	XM	2192	2212	2212	13	0
1	XO	2192	2212	2212	15	0
1	XQ	2192	2212	2212	24	0
1	XS	2192	2212	2212	14	0
1	XU	2192	2212	2212	20	0
1	XW	690	712	712	10	0
2	XB	2397	2431	2431	20	0
2	XD	2397	2431	2431	21	0
2	XF	2397	2431	2431	14	0
2	XH	2397	2431	2431	26	0
2	XJ	2397	2431	2431	15	0
2	XL	2397	2431	2431	21	0
2	XN	2397	2431	2431	21	0
2	XP	2397	2431	2431	29	0
2	XR	2397	2431	2431	29	0
2	XT	2397	2431	2431	25	0
2	XV	778	737	737	11	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	XX	843	802	802	10	0
3	A	543	543	543	9	0
3	B	543	543	543	2	0
3	C	543	543	543	5	0
3	D	543	543	543	1	0
3	E	543	543	543	3	0
3	F	543	543	543	5	0
3	G	543	543	543	3	0
3	H	543	543	543	5	0
3	I	543	543	543	6	0
3	J	543	543	543	4	0
3	K	543	543	543	2	0
3	L	543	543	543	5	0
All	All	56909	57401	57409	396	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 (396) 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:XG:261:GLU:HG3	2:XH:242:GLY:HA3	1.36	1.04
1:XQ:150:LEU:HD22	2:XR:215:LEU:HD12	1.57	0.84
1:XG:261:GLU:HG3	2:XH:242:GLY:CA	2.11	0.81
1:XQ:190:SER:OG	2:XR:210:ILE:O	2.03	0.76
1:XG:261:GLU:CD	2:XH:238:HIS:O	2.31	0.73
3:H:50:ARG:NH1	3:H:90:GLY:O	2.22	0.72
2:XL:208:VAL:O	2:XL:209:ARG:NH1	2.23	0.72
1:XG:261:GLU:CG	2:XH:242:GLY:HA3	2.17	0.71
2:XF:208:VAL:O	2:XF:209:ARG:NH1	2.23	0.71
2:XD:208:VAL:O	2:XD:209:ARG:NH1	2.25	0.70
2:XJ:315:VAL:HG21	1:XK:343:VAL:HG22	1.73	0.70
2:XH:208:VAL:O	2:XH:209:ARG:NH1	2.24	0.70
2:XN:208:VAL:O	2:XN:209:ARG:NH1	2.25	0.70
2:XJ:208:VAL:O	2:XJ:209:ARG:NH1	2.25	0.69
2:XR:32:LEU:HD22	2:XR:37:VAL:HG12	1.74	0.69
1:XI:149:MET:SD	2:XJ:212:GLN:NE2	2.67	0.68
2:XP:122:LYS:NZ	1:XQ:164:GLN:OE1	2.27	0.68
1:XG:288:GLU:OE1	1:XG:291:ARG:NH1	2.28	0.67
2:XB:27:GLU:OE2	2:XB:68:ARG:NH1	2.27	0.67
2:XP:39:ARG:NH2	1:XQ:102:GLU:OE1	2.28	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:XH:98:SER:OG	2:XH:204:GLU:OE1	2.13	0.67
1:XK:168:THR:OG1	1:XK:230:GLY:O	2.11	0.66
2:XL:32:LEU:HD22	2:XL:37:VAL:HG12	1.77	0.66
2:XF:32:LEU:HD22	2:XF:37:VAL:HG12	1.77	0.66
1:XG:227:TYR:HH	2:XH:92:TYR:HH	1.44	0.65
1:XK:185:ARG:NH1	1:XK:189:ASP:OD1	2.29	0.65
3:J:39:GLN:O	3:J:43:ASN:ND2	2.29	0.65
2:XP:91:SER:OG	2:XP:209:ARG:O	2.09	0.65
3:L:50:ARG:NH2	3:L:57:ASN:OD1	2.29	0.65
1:XO:246:GLU:O	2:XP:228:ARG:NH2	2.28	0.65
2:XN:126:ARG:NH2	2:XN:196:ASN:OD1	2.29	0.65
1:XG:174:LEU:O	2:XH:68:ARG:NH1	2.29	0.65
3:D:39:GLN:O	3:D:43:ASN:ND2	2.30	0.65
1:XG:261:GLU:OE2	2:XH:242:GLY:N	2.30	0.65
1:XI:139:ALA:O	1:XI:141:ARG:NH1	2.30	0.64
3:C:54:ARG:NH1	3:C:70:ILE:O	2.30	0.64
1:XC:182:ASP:OD1	1:XC:185:ARG:NH2	2.31	0.64
2:XD:276:ASP:OD2	1:XE:307:ARG:NH2	2.30	0.64
2:XP:254:ASP:OD2	1:XQ:285:ARG:NH1	2.29	0.64
1:XO:182:ASP:OD1	1:XO:185:ARG:NH2	2.30	0.64
3:I:51:ILE:HD12	3:I:56:ILE:HD11	1.80	0.63
1:XQ:111:PHE:CZ	1:XQ:129:ILE:HG23	2.35	0.62
3:H:54:ARG:NH2	3:I:91:GLU:O	2.33	0.62
2:XF:103:TYR:O	2:XF:107:THR:OG1	2.15	0.62
2:XN:32:LEU:HD22	2:XN:37:VAL:HG12	1.80	0.62
2:XP:103:TYR:HE1	2:XP:115:ALA:HB2	1.64	0.62
2:XF:152:ARG:NH1	2:XF:207:ASP:OD1	2.32	0.62
2:XV:276:ASP:OD2	1:XW:307:ARG:NH2	2.31	0.62
2:XL:73:ASP:OD1	2:XL:211:LYS:NZ	2.33	0.61
2:XD:28:ARG:NH1	2:XD:49:GLU:OE1	2.34	0.61
2:XP:32:LEU:HD22	2:XP:37:VAL:HG12	1.82	0.61
1:XA:220:LEU:HD23	1:XA:233:LEU:HD21	1.82	0.60
1:XG:168:THR:OG1	1:XG:230:GLY:O	2.17	0.60
2:XN:315:VAL:HG21	1:XO:343:VAL:HG22	1.83	0.60
1:XQ:182:ASP:OD1	1:XQ:185:ARG:NH2	2.33	0.60
3:I:54:ARG:NH1	3:I:70:ILE:O	2.34	0.60
1:XS:206:THR:OG1	1:XS:207:GLU:OE1	2.19	0.60
2:XP:315:VAL:HG21	1:XQ:343:VAL:HG22	1.84	0.59
2:XJ:78:ARG:O	2:XJ:128:ARG:NH2	2.35	0.59
2:XR:103:TYR:O	2:XR:107:THR:OG1	2.15	0.59
2:XP:21:PHE:CE2	2:XP:62:VAL:HG11	2.37	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:XQ:150:LEU:HD22	2:XR:215:LEU:CD1	2.30	0.59
2:XT:71:THR:OG1	2:XT:94:LYS:NZ	2.36	0.59
1:XC:168:THR:OG1	1:XC:230:GLY:O	2.14	0.59
1:XU:184:LEU:HD11	1:XU:233:LEU:HD11	1.84	0.59
2:XB:208:VAL:O	2:XB:209:ARG:NH1	2.36	0.59
2:XT:93:ILE:HD11	2:XT:123:PHE:CG	2.38	0.59
1:XS:220:LEU:HD23	1:XS:233:LEU:HD21	1.83	0.59
1:XU:168:THR:OG1	1:XU:230:GLY:O	2.13	0.59
2:XH:221:GLU:OE2	2:XH:225:ASN:ND2	2.36	0.59
2:XT:78:ARG:NH1	2:XT:86:ASP:OD2	2.36	0.58
1:XI:165:TYR:OH	1:XI:181:ASP:OD1	2.16	0.58
2:XN:21:PHE:CE2	2:XN:62:VAL:HG11	2.38	0.58
2:XD:126:ARG:NH2	2:XD:196:ASN:OD1	2.36	0.58
3:C:74:ASP:OD2	3:C:77:LEU:N	2.37	0.58
1:XG:193:ARG:NH1	2:XH:140:VAL:O	2.38	0.57
2:XT:237:ARG:NH1	1:XU:273:ASN:O	2.37	0.57
1:XM:333:LYS:NZ	2:XN:304:GLU:O	2.37	0.57
1:XI:133:LYS:NZ	1:XI:175:TYR:OH	2.38	0.56
1:XC:294:LYS:NZ	2:XD:271:MET:O	2.39	0.56
2:XL:21:PHE:CE2	2:XL:62:VAL:HG11	2.40	0.56
1:XM:168:THR:OG1	1:XM:230:GLY:O	2.23	0.56
2:XL:69:ILE:HD11	2:XL:96:ARG:NH2	2.20	0.56
2:XD:69:ILE:HD11	2:XD:96:ARG:NH2	2.20	0.56
1:XQ:327:TYR:OH	2:XR:321:ASP:OD1	2.24	0.56
1:XO:253:ASP:OD2	2:XP:239:ARG:NH2	2.39	0.56
2:XT:105:LEU:HD13	1:XU:103:ALA:HB3	1.88	0.56
3:F:56:ILE:HD11	3:F:70:ILE:HD11	1.86	0.56
2:XJ:69:ILE:HD11	2:XJ:96:ARG:NH2	2.21	0.55
1:XO:168:THR:OG1	1:XO:230:GLY:O	2.19	0.55
1:XG:110:ARG:N	1:XG:113:LYS:O	2.39	0.55
3:A:54:ARG:NH2	3:A:70:ILE:O	2.39	0.55
2:XB:70:GLN:OE1	2:XB:95:TRP:NE1	2.40	0.55
2:XX:227:MET:SD	2:XX:228:ARG:N	2.80	0.55
1:XG:261:GLU:CG	2:XH:242:GLY:CA	2.80	0.55
2:XD:148:THR:OG1	2:XD:209:ARG:NH1	2.40	0.55
3:I:31:LYS:N	3:I:67:THR:O	2.39	0.55
1:XA:110:ARG:N	1:XA:113:LYS:O	2.40	0.55
2:XP:34:PHE:CZ	2:XP:59:ILE:HG23	2.42	0.55
2:XN:230:GLU:OE1	2:XN:231:ARG:NH2	2.40	0.54
3:K:80:ASN:O	3:K:83:THR:OG1	2.23	0.54
1:XG:263:GLN:OE1	1:XG:266:ARG:NH1	2.40	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:XQ:184:LEU:HD13	1:XQ:231:ILE:HG21	1.89	0.54
1:XC:245:GLU:N	1:XC:245:GLU:OE1	2.41	0.54
2:XL:236:ARG:NH1	1:XM:273:ASN:O	2.41	0.54
2:XN:221:GLU:OE2	2:XN:225:ASN:ND2	2.40	0.54
3:H:56:ILE:HD11	3:H:70:ILE:HG12	1.89	0.54
2:XR:93:ILE:HD11	2:XR:123:PHE:CG	2.43	0.54
1:XA:354:PRO:HB3	2:XD:313:VAL:HG11	1.89	0.54
2:XB:269:ARG:NH1	1:XC:300:GLU:OE1	2.41	0.54
1:XE:341:VAL:HG12	1:XE:343:VAL:HG13	1.89	0.53
2:XJ:88:ILE:O	2:XJ:214:ASN:N	2.42	0.53
3:L:54:ARG:NH1	3:L:70:ILE:O	2.41	0.53
3:A:56:ILE:N	3:A:68:THR:O	2.40	0.53
1:XQ:110:ARG:N	1:XQ:113:LYS:O	2.41	0.53
1:XS:276:GLN:NE2	1:XS:280:ASN:OD1	2.40	0.53
2:XD:102:ARG:NH1	2:XD:199:ALA:O	2.42	0.53
2:XV:263:GLU:OE2	2:XV:267:GLN:NE2	2.41	0.53
2:XB:93:ILE:HD11	2:XB:123:PHE:CG	2.44	0.52
2:XR:77:ASP:OD1	2:XR:77:ASP:N	2.40	0.52
2:XH:118:LEU:HD13	2:XH:201:LEU:HD13	1.92	0.52
2:XH:95:TRP:NE1	2:XH:116:GLU:OE2	2.43	0.52
1:XI:167:VAL:HG22	1:XI:168:THR:H	1.74	0.52
1:XS:244:PRO:HG2	1:XS:247:VAL:HG22	1.92	0.52
1:XI:167:VAL:HG23	1:XI:231:ILE:HD13	1.90	0.52
2:XN:25:GLU:OE1	2:XN:25:GLU:N	2.43	0.52
2:XP:69:ILE:HD11	2:XP:96:ARG:NH2	2.25	0.52
2:XP:125:ASP:OD2	1:XQ:213:ARG:NH1	2.43	0.52
1:XQ:220:LEU:HD23	1:XQ:233:LEU:HD21	1.91	0.52
2:XR:39:ARG:NH2	1:XS:102:GLU:OE1	2.42	0.52
2:XD:21:PHE:CE2	2:XD:62:VAL:HG11	2.45	0.51
1:XO:220:LEU:HD23	1:XO:233:LEU:HD21	1.91	0.51
2:XR:78:ARG:O	2:XR:128:ARG:NH1	2.43	0.51
1:XE:352:VAL:HG13	1:XE:354:PRO:HD3	1.91	0.51
2:XL:78:ARG:O	2:XL:128:ARG:NH2	2.43	0.51
2:XT:126:ARG:NH2	2:XT:196:ASN:O	2.44	0.51
3:A:56:ILE:HD11	3:A:70:ILE:CG2	2.40	0.51
1:XI:151:THR:OG1	1:XI:153:ASP:OD1	2.21	0.51
2:XR:90:ASP:O	2:XR:211:LYS:N	2.43	0.51
2:XX:279:ALA:HB2	1:XW:297:THR:HG22	1.92	0.51
1:XE:341:VAL:HB	2:XF:315:VAL:HG13	1.93	0.51
1:XI:243:PRO:O	1:XI:248:LYS:NZ	2.31	0.51
1:XM:142:GLU:OE2	1:XM:162:ASN:ND2	2.42	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:XO:184:LEU:HD13	1:XO:231:ILE:HG21	1.92	0.51
3:B:47:ARG:NH2	3:B:61:LYS:O	2.44	0.51
1:XE:110:ARG:N	1:XE:113:LYS:O	2.44	0.51
2:XH:126:ARG:NH2	2:XH:196:ASN:OD1	2.42	0.51
2:XJ:222:ALA:HB2	1:XK:259:GLU:HG2	1.93	0.51
1:XK:261:GLU:OE2	2:XL:241:GLN:NE2	2.44	0.51
2:XP:31:THR:HA	2:XP:62:VAL:HG12	1.93	0.51
2:XT:304:GLU:O	2:XT:308:SER:OG	2.26	0.51
2:XT:298:ARG:HG3	1:XU:328:ILE:HG21	1.92	0.51
2:XR:21:PHE:CE2	2:XR:62:VAL:HG11	2.46	0.50
3:A:81:LEU:O	3:A:86:VAL:HG22	2.12	0.50
1:XA:184:LEU:HD13	1:XA:231:ILE:HG21	1.93	0.50
1:XQ:151:THR:OG1	1:XQ:153:ASP:OD1	2.26	0.50
1:XQ:168:THR:HG22	1:XQ:169:ASN:H	1.77	0.50
1:XA:168:THR:HG22	1:XA:169:ASN:H	1.77	0.50
3:C:31:LYS:N	3:C:67:THR:O	2.44	0.50
1:XE:168:THR:OG1	1:XE:230:GLY:O	2.17	0.50
1:XU:206:THR:OG1	1:XU:207:GLU:OE1	2.28	0.50
2:XR:263:GLU:OE2	2:XR:266:ARG:NH2	2.45	0.50
1:XE:154:GLU:O	2:XF:226:ARG:NH2	2.44	0.50
2:XJ:126:ARG:NH2	2:XJ:196:ASN:OD1	2.43	0.50
1:XG:341:VAL:HG21	2:XH:315:VAL:HG22	1.93	0.50
1:XC:334:VAL:HG23	2:XD:307:PHE:HB2	1.94	0.49
2:XL:81:THR:HA	2:XL:131:ILE:HG22	1.93	0.49
2:XL:88:ILE:O	2:XL:214:ASN:N	2.45	0.49
1:XG:350:LEU:HD11	1:XI:343:VAL:HG21	1.92	0.49
2:XR:147:LEU:O	2:XR:151:VAL:HG23	2.12	0.49
2:XB:32:LEU:N	2:XB:61:THR:O	2.44	0.49
3:F:74:ASP:OD2	3:F:77:LEU:N	2.45	0.49
1:XA:259:GLU:OE2	1:XA:266:ARG:NH1	2.46	0.49
2:XP:265:GLU:OE2	2:XP:269:ARG:NH2	2.46	0.49
2:XT:39:ARG:NH1	2:XT:43:ASN:OD1	2.45	0.49
2:XT:137:LYS:O	2:XT:141:THR:OG1	2.17	0.49
1:XG:184:LEU:HD13	1:XG:231:ILE:HG21	1.94	0.49
2:XB:31:THR:HA	2:XB:62:VAL:HG12	1.93	0.49
1:XS:352:VAL:HG13	1:XS:354:PRO:HD3	1.93	0.49
1:XW:352:VAL:HG13	1:XW:354:PRO:HD3	1.93	0.49
3:A:56:ILE:HD11	3:A:70:ILE:HG23	1.95	0.49
2:XR:34:PHE:CZ	2:XR:59:ILE:HG23	2.47	0.49
1:XG:261:GLU:OE2	2:XH:241:GLN:HB3	2.13	0.48
2:XR:152:ARG:NH1	2:XR:206:VAL:O	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:XE:341:VAL:HG21	2:XF:315:VAL:HG22	1.95	0.48
2:XH:111:ASP:OD2	2:XH:114:GLN:NE2	2.45	0.48
1:XK:257:ALA:O	1:XK:261:GLU:N	2.46	0.48
2:XT:208:VAL:O	2:XT:209:ARG:NH1	2.47	0.48
1:XE:301:ALA:O	1:XE:305:VAL:HG23	2.14	0.48
1:XK:212:ILE:O	1:XK:216:THR:OG1	2.17	0.48
1:XK:334:VAL:O	1:XK:338:THR:HG22	2.14	0.48
1:XS:167:VAL:HG22	1:XS:168:THR:H	1.78	0.48
1:XK:110:ARG:N	1:XK:113:LYS:O	2.45	0.48
1:XS:110:ARG:N	1:XS:113:LYS:O	2.46	0.48
2:XV:269:ARG:NH1	1:XW:300:GLU:O	2.47	0.48
1:XI:245:GLU:OE1	1:XI:245:GLU:N	2.46	0.48
1:XC:167:VAL:HG22	1:XC:168:THR:H	1.79	0.47
1:XO:111:PHE:CZ	1:XO:129:ILE:HG23	2.49	0.47
3:J:79:ASP:O	3:J:83:THR:OG1	2.23	0.47
1:XK:326:LEU:HD13	2:XL:297:ILE:HD11	1.96	0.47
1:XO:150:LEU:HD22	2:XP:213:ILE:O	2.15	0.47
1:XU:167:VAL:HG22	1:XU:168:THR:H	1.78	0.47
1:XA:283:ALA:HB1	2:XB:264:ALA:HB2	1.95	0.47
2:XB:69:ILE:HD11	2:XB:96:ARG:HH22	1.79	0.47
2:XF:88:ILE:O	2:XF:214:ASN:N	2.48	0.47
1:XK:341:VAL:HG12	1:XK:343:VAL:HG23	1.96	0.47
2:XB:240:SER:OG	1:XC:274:GLU:O	2.29	0.47
1:XE:141:ARG:NH2	3:C:63:SER:OG	2.47	0.47
1:XE:141:ARG:NH1	3:C:61:LYS:O	2.43	0.47
1:XM:167:VAL:HG22	1:XM:168:THR:H	1.80	0.47
2:XX:317:SER:OG	2:XX:319:ASP:OD1	2.32	0.47
2:XJ:254:ASP:OD2	1:XK:285:ARG:NH2	2.47	0.47
1:XK:142:GLU:OE1	3:H:45:GLN:NE2	2.46	0.47
1:XU:247:VAL:HA	1:XU:250:ALA:HB3	1.97	0.47
2:XB:69:ILE:HD11	2:XB:96:ARG:NH2	2.29	0.47
2:XL:152:ARG:NH1	2:XL:206:VAL:O	2.46	0.47
2:XV:233:ALA:O	2:XV:237:ARG:NE	2.41	0.46
3:F:56:ILE:HD11	3:F:70:ILE:CD1	2.45	0.46
3:I:51:ILE:CD1	3:I:56:ILE:HD11	2.43	0.46
1:XA:167:VAL:HG22	1:XA:168:THR:H	1.78	0.46
1:XE:167:VAL:HG22	1:XE:168:THR:H	1.79	0.46
2:XP:152:ARG:NH1	2:XP:206:VAL:O	2.46	0.46
2:XT:210:ILE:HG21	2:XT:213:ILE:HG12	1.97	0.46
2:XD:321:ASP:OD1	2:XD:322:PHE:N	2.49	0.46
1:XC:110:ARG:N	1:XC:113:LYS:O	2.48	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:XC:205:LEU:O	1:XC:209:ARG:NH2	2.48	0.46
2:XN:321:ASP:OD1	2:XN:322:PHE:N	2.45	0.46
1:XU:143:LEU:HD21	1:XU:185:ARG:HA	1.96	0.46
1:XE:341:VAL:CB	2:XF:315:VAL:HG13	2.45	0.46
1:XI:301:ALA:O	1:XI:305:VAL:HG23	2.15	0.46
1:XK:315:TYR:OH	1:XK:323:ARG:NE	2.49	0.46
2:XT:86:ASP:OD1	2:XT:86:ASP:N	2.47	0.46
3:E:46:VAL:HG13	3:E:58:VAL:HG13	1.97	0.46
2:XJ:222:ALA:HB2	1:XK:259:GLU:CG	2.45	0.46
2:XR:298:ARG:HG3	1:XS:328:ILE:HG21	1.98	0.46
3:H:49:ALA:HB2	3:H:58:VAL:HG23	1.97	0.46
1:XG:261:GLU:OE1	2:XH:238:HIS:O	2.34	0.46
2:XP:208:VAL:O	2:XP:209:ARG:NH1	2.48	0.46
2:XT:90:ASP:O	2:XT:211:LYS:N	2.45	0.46
1:XQ:167:VAL:HG22	1:XQ:168:THR:H	1.80	0.46
2:XR:93:ILE:HD11	2:XR:123:PHE:CD1	2.51	0.46
2:XT:314:MET:HE1	2:XV:326:MET:SD	2.56	0.46
2:XJ:79:PHE:CZ	2:XJ:127:LEU:HD23	2.51	0.46
1:XK:352:VAL:HB	1:XM:350:LEU:HD22	1.97	0.46
1:XS:206:THR:HG1	1:XS:207:GLU:CD	2.23	0.46
2:XN:77:ASP:OD1	2:XN:77:ASP:N	2.48	0.45
2:XR:72:MET:CE	2:XR:93:ILE:HD12	2.45	0.45
1:XU:159:VAL:HG22	1:XU:241:ALA:HA	1.98	0.45
2:XB:77:ASP:OD1	2:XB:77:ASP:N	2.48	0.45
2:XR:65:LEU:HD11	2:XR:104:TYR:HB2	1.97	0.45
2:XB:35:GLY:N	1:XC:99:THR:OG1	2.49	0.45
2:XH:21:PHE:CE2	2:XH:62:VAL:HG11	2.51	0.45
2:XR:207:ASP:OD1	2:XR:209:ARG:NH1	2.50	0.45
1:XK:338:THR:OG1	2:XL:312:ASP:O	2.35	0.45
3:L:56:ILE:HD11	3:L:70:ILE:CD1	2.47	0.45
1:XQ:301:ALA:O	1:XQ:305:VAL:HG23	2.16	0.45
1:XC:339:ARG:HD2	2:XD:313:VAL:HG12	1.99	0.45
2:XJ:207:ASP:OD1	2:XJ:208:VAL:N	2.50	0.45
1:XU:110:ARG:N	1:XU:113:LYS:O	2.50	0.45
1:XU:145:ALA:O	1:XU:161:MET:N	2.45	0.45
1:XU:224:ILE:HD11	1:XU:233:LEU:HD13	1.97	0.45
2:XB:21:PHE:CE2	2:XB:62:VAL:HG11	2.51	0.45
2:XD:285:ASP:OD1	2:XD:286:ALA:N	2.49	0.45
1:XK:167:VAL:HG22	1:XK:168:THR:H	1.81	0.45
2:XR:69:ILE:HD11	2:XR:96:ARG:HH22	1.82	0.45
2:XN:298:ARG:HG3	1:XO:328:ILE:HG21	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:XT:315:VAL:HG21	1:XU:343:VAL:HG23	1.99	0.45
1:XE:342:LEU:HD22	2:XF:316:MET:HE2	1.98	0.45
2:XT:149:LEU:HD23	2:XT:153:ASP:OD1	2.16	0.45
2:XF:316:MET:SD	2:XF:316:MET:N	2.90	0.44
2:XF:321:ASP:OD1	2:XF:322:PHE:N	2.50	0.44
2:XH:106:ALA:HB1	2:XH:201:LEU:HD22	1.98	0.44
2:XL:77:ASP:OD1	2:XL:78:ARG:N	2.50	0.44
1:XO:341:VAL:HG12	1:XO:343:VAL:HG23	1.99	0.44
1:XS:188:THR:HA	1:XS:220:LEU:HD13	1.98	0.44
1:XE:119:GLU:N	1:XE:119:GLU:OE1	2.49	0.44
2:XL:321:ASP:OD1	2:XL:322:PHE:N	2.49	0.44
1:XO:167:VAL:HG22	1:XO:168:THR:H	1.83	0.44
2:XH:49:GLU:OE1	2:XH:49:GLU:N	2.49	0.44
1:XS:339:ARG:HB2	2:XT:313:VAL:HG13	1.98	0.44
1:XI:110:ARG:N	1:XI:113:LYS:O	2.50	0.44
1:XI:176:SER:OG	1:XI:227:TYR:O	2.34	0.44
2:XP:298:ARG:HG3	1:XQ:328:ILE:HG21	1.99	0.44
2:XP:69:ILE:HD11	2:XP:96:ARG:HH22	1.82	0.44
1:XG:167:VAL:HG22	1:XG:168:THR:H	1.83	0.44
2:XH:280:ALA:HB3	1:XI:314:GLU:HG2	2.00	0.44
2:XT:139:ILE:O	2:XT:213:ILE:HD13	2.18	0.44
2:XD:254:ASP:OD2	1:XE:285:ARG:NH1	2.51	0.44
1:XI:247:VAL:HG11	2:XJ:227:MET:HE3	2.00	0.44
2:XB:70:GLN:NE2	2:XB:71:THR:O	2.50	0.44
2:XJ:298:ARG:HG3	1:XK:328:ILE:HG21	1.99	0.44
3:E:74:ASP:OD2	3:E:77:LEU:N	2.51	0.44
2:XD:207:ASP:OD1	2:XD:208:VAL:N	2.51	0.43
3:F:81:LEU:HD12	3:F:86:VAL:HG21	2.00	0.43
3:J:54:ARG:NH2	3:K:91:GLU:O	2.48	0.43
3:L:33:ASP:HB2	3:L:36:THR:HG22	2.00	0.43
2:XP:159:SER:O	2:XP:196:ASN:ND2	2.51	0.43
2:XX:307:PHE:CB	1:XW:334:VAL:HG23	2.48	0.43
1:XG:276:GLN:NE2	1:XG:276:GLN:O	2.51	0.43
2:XB:254:ASP:OD2	1:XC:285:ARG:NH1	2.52	0.43
1:XQ:326:LEU:HD13	2:XR:297:ILE:HD11	2.00	0.43
1:XC:334:VAL:HG23	2:XD:307:PHE:CB	2.49	0.43
2:XF:33:ARG:N	2:XF:36:LYS:O	2.51	0.43
2:XP:19:SER:OG	2:XP:55:LYS:O	2.34	0.43
2:XL:80:VAL:HG11	1:XM:206:THR:HG22	2.00	0.43
2:XR:159:SER:O	2:XR:196:ASN:ND2	2.51	0.43
1:XE:141:ARG:N	1:XE:165:TYR:O	2.49	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:XH:66:ASP:OD1	2:XH:68:ARG:N	2.49	0.43
2:XJ:123:PHE:CZ	2:XJ:127:LEU:HD22	2.54	0.43
2:XN:31:THR:HG23	2:XN:38:LEU:HD13	2.01	0.43
1:XW:334:VAL:O	1:XW:338:THR:HG22	2.19	0.43
1:XA:137:VAL:HG12	1:XA:137:VAL:O	2.19	0.43
1:XA:334:VAL:HG23	2:XB:307:PHE:HB2	2.01	0.43
1:XQ:202:ASP:OD2	1:XQ:203:ARG:N	2.52	0.43
2:XL:66:ASP:O	2:XL:97:ILE:HD12	2.19	0.42
2:XH:88:ILE:O	2:XH:214:ASN:N	2.53	0.42
1:XI:158:ARG:NH1	1:XI:160:GLU:OE2	2.51	0.42
2:XN:103:TYR:O	2:XN:107:THR:OG1	2.28	0.42
2:XP:103:TYR:CE1	2:XP:115:ALA:HB2	2.50	0.42
3:J:48:GLU:OE2	3:J:89:VAL:N	2.53	0.42
2:XD:114:GLN:HE22	2:XD:118:LEU:HD11	1.85	0.42
2:XL:207:ASP:OD1	2:XL:208:VAL:N	2.52	0.42
2:XN:312:ASP:OD2	1:XO:340:LYS:NZ	2.50	0.42
1:XO:155:ASN:ND2	2:XP:227:MET:SD	2.92	0.42
2:XP:314:MET:HE3	2:XR:326:MET:CE	2.50	0.42
2:XR:66:ASP:OD1	2:XR:70:GLN:NE2	2.53	0.42
1:XU:206:THR:HG1	1:XU:207:GLU:CD	2.27	0.42
3:G:81:LEU:O	3:G:86:VAL:HG22	2.19	0.42
1:XK:141:ARG:N	1:XK:165:TYR:O	2.51	0.42
3:G:56:ILE:N	3:G:68:THR:O	2.52	0.42
2:XT:69:ILE:HD11	2:XT:96:ARG:HH22	1.84	0.42
2:XT:105:LEU:HD13	1:XU:103:ALA:CB	2.49	0.42
2:XX:316:MET:HE1	1:XW:335:LEU:HD22	2.01	0.42
2:XB:122:LYS:NZ	2:XB:196:ASN:O	2.49	0.42
2:XB:321:ASP:OD1	2:XB:322:PHE:N	2.50	0.42
1:XM:341:VAL:HG21	2:XN:315:VAL:HG22	2.01	0.42
2:XP:207:ASP:OD1	2:XP:208:VAL:N	2.52	0.42
1:XU:159:VAL:HG11	1:XU:196:ILE:HD11	2.02	0.42
1:XC:355:LEU:O	1:XE:339:ARG:NH1	2.53	0.42
1:XQ:160:GLU:OE2	1:XQ:240:ALA:HB3	2.20	0.42
1:XU:342:LEU:HD11	2:XV:323:PHE:CE2	2.54	0.42
3:B:54:ARG:HA	3:B:70:ILE:HD12	2.01	0.42
1:XM:135:VAL:HG21	1:XM:170:PRO:HB3	2.00	0.42
3:A:34:TYR:CE2	3:A:38:LEU:HD11	2.55	0.42
3:A:37:PHE:HE2	3:A:56:ILE:HG21	1.85	0.42
1:XM:270:ALA:O	1:XM:274:GLU:N	2.53	0.42
1:XU:339:ARG:HB2	2:XV:313:VAL:HG13	2.01	0.42
2:XD:65:LEU:HD22	2:XD:100:PHE:HB3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:XG:159:VAL:HG13	1:XG:238:PHE:CZ	2.55	0.41
2:XL:33:ARG:N	2:XL:36:LYS:O	2.51	0.41
2:XP:296:PHE:CZ	2:XP:300:LEU:HD11	2.55	0.41
2:XV:298:ARG:HG3	1:XW:328:ILE:HG21	2.03	0.41
1:XM:272:THR:HG22	2:XN:253:ALA:HB2	2.03	0.41
2:XP:83:GLU:N	2:XP:83:GLU:OE1	2.54	0.41
1:XQ:193:ARG:NH1	2:XR:213:ILE:HD12	2.35	0.41
2:XT:207:ASP:OD1	2:XT:208:VAL:N	2.53	0.41
2:XX:314:MET:HG2	1:XW:338:THR:HG21	2.02	0.41
2:XV:285:ASP:O	2:XV:288:SER:OG	2.30	0.41
2:XV:321:ASP:OD1	2:XV:321:ASP:N	2.53	0.41
3:E:56:ILE:HD11	3:E:70:ILE:HD12	2.03	0.41
1:XC:156:VAL:HG23	2:XD:223:ILE:HG21	2.02	0.41
1:XK:175:TYR:O	2:XL:68:ARG:NH2	2.54	0.41
2:XX:323:PHE:CE2	1:XW:342:LEU:HD11	2.55	0.41
3:A:81:LEU:HD22	3:A:86:VAL:HG21	2.02	0.41
1:XA:345:ASP:OD2	1:XC:344:ASN:ND2	2.52	0.41
1:XA:352:VAL:HG13	1:XA:354:PRO:HD3	2.02	0.41
1:XI:341:VAL:HG12	1:XI:343:VAL:HG23	2.01	0.41
2:XN:32:LEU:N	2:XN:61:THR:O	2.48	0.41
3:A:35:SER:OG	3:A:36:THR:N	2.53	0.41
1:XE:271:TYR:O	1:XE:275:VAL:HG12	2.21	0.41
1:XO:334:VAL:HG23	2:XP:307:PHE:CG	2.55	0.41
2:XT:32:LEU:HD22	2:XT:37:VAL:HG12	2.02	0.41
2:XV:304:GLU:O	2:XV:308:SER:OG	2.37	0.41
2:XN:88:ILE:O	2:XN:214:ASN:N	2.54	0.41
3:L:59:THR:HG22	3:L:65:ARG:CD	2.50	0.41
1:XA:328:ILE:HG21	2:XX:298:ARG:HG3	2.03	0.41
1:XA:343:VAL:HG22	2:XX:315:VAL:HB	2.02	0.41
1:XA:340:LYS:N	2:XX:312:ASP:OD1	2.53	0.41
1:XM:312:LEU:HD13	2:XN:290:ASP:HB2	2.02	0.41
1:XQ:334:VAL:HG23	2:XR:307:PHE:CG	2.55	0.41
1:XU:244:PRO:HG2	1:XU:247:VAL:HG22	2.02	0.41
3:F:81:LEU:O	3:F:86:VAL:HG22	2.20	0.41
3:I:81:LEU:HD22	3:I:86:VAL:HG11	2.02	0.41
2:XD:32:LEU:HD22	2:XD:37:VAL:HG12	2.03	0.41
2:XF:34:PHE:CZ	2:XF:59:ILE:HG23	2.57	0.41
1:XM:334:VAL:HG23	2:XN:307:PHE:HB3	2.02	0.41
1:XE:162:ASN:OD1	1:XE:239:GLN:NE2	2.55	0.40
2:XH:83:GLU:N	2:XH:83:GLU:OE1	2.53	0.40
1:XK:153:ASP:OD2	1:XK:155:ASN:ND2	2.54	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:XS:154:GLU:HG2	2:XT:223:ILE:HG21	2.03	0.40
2:XB:207:ASP:OD1	2:XB:208:VAL:N	2.52	0.40
2:XR:105:LEU:HD22	1:XS:103:ALA:HB2	2.03	0.40
1:XG:181:ASP:OD1	1:XG:182:ASP:N	2.52	0.40
2:XT:103:TYR:HE1	2:XT:115:ALA:HB2	1.85	0.40
1:XI:144:ALA:HB3	3:G:61:LYS:NZ	2.35	0.40
2:XL:32:LEU:N	2:XL:61:THR:O	2.48	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	XA	275/419 (66%)	275 (100%)	0	0	100	100
1	XC	275/419 (66%)	275 (100%)	0	0	100	100
1	XE	275/419 (66%)	275 (100%)	0	0	100	100
1	XG	275/419 (66%)	275 (100%)	0	0	100	100
1	XI	275/419 (66%)	275 (100%)	0	0	100	100
1	XK	275/419 (66%)	275 (100%)	0	0	100	100
1	XM	275/419 (66%)	274 (100%)	1 (0%)	0	100	100
1	XO	275/419 (66%)	275 (100%)	0	0	100	100
1	XQ	275/419 (66%)	275 (100%)	0	0	100	100
1	XS	275/419 (66%)	275 (100%)	0	0	100	100
1	XU	275/419 (66%)	275 (100%)	0	0	100	100
1	XW	85/419 (20%)	85 (100%)	0	0	100	100
2	XB	295/334 (88%)	295 (100%)	0	0	100	100
2	XD	295/334 (88%)	295 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	XF	295/334 (88%)	295 (100%)	0	0	100	100
2	XH	295/334 (88%)	295 (100%)	0	0	100	100
2	XJ	295/334 (88%)	295 (100%)	0	0	100	100
2	XL	295/334 (88%)	295 (100%)	0	0	100	100
2	XN	295/334 (88%)	295 (100%)	0	0	100	100
2	XP	295/334 (88%)	294 (100%)	1 (0%)	0	100	100
2	XR	295/334 (88%)	295 (100%)	0	0	100	100
2	XT	295/334 (88%)	295 (100%)	0	0	100	100
2	XV	95/334 (28%)	95 (100%)	0	0	100	100
2	XX	103/334 (31%)	103 (100%)	0	0	100	100
3	A	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	B	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	C	65/644 (10%)	65 (100%)	0	0	100	100
3	D	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	E	65/644 (10%)	65 (100%)	0	0	100	100
3	F	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	G	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	H	65/644 (10%)	65 (100%)	0	0	100	100
3	I	65/644 (10%)	65 (100%)	0	0	100	100
3	J	65/644 (10%)	65 (100%)	0	0	100	100
3	K	65/644 (10%)	65 (100%)	0	0	100	100
3	L	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
All	All	7038/16764 (42%)	7030 (100%)	8 (0%)	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 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	XA	232/336 (69%)	232 (100%)	0	100	100
1	XC	232/336 (69%)	232 (100%)	0	100	100
1	XE	232/336 (69%)	232 (100%)	0	100	100
1	XG	232/336 (69%)	232 (100%)	0	100	100
1	XI	232/336 (69%)	232 (100%)	0	100	100
1	XK	232/336 (69%)	232 (100%)	0	100	100
1	XM	232/336 (69%)	232 (100%)	0	100	100
1	XO	232/336 (69%)	232 (100%)	0	100	100
1	XQ	232/336 (69%)	232 (100%)	0	100	100
1	XS	232/336 (69%)	232 (100%)	0	100	100
1	XU	232/336 (69%)	232 (100%)	0	100	100
1	XW	71/336 (21%)	71 (100%)	0	100	100
2	XB	258/283 (91%)	258 (100%)	0	100	100
2	XD	258/283 (91%)	257 (100%)	1 (0%)	89	91
2	XF	258/283 (91%)	258 (100%)	0	100	100
2	XH	258/283 (91%)	258 (100%)	0	100	100
2	XJ	258/283 (91%)	258 (100%)	0	100	100
2	XL	258/283 (91%)	258 (100%)	0	100	100
2	XN	258/283 (91%)	258 (100%)	0	100	100
2	XP	258/283 (91%)	258 (100%)	0	100	100
2	XR	258/283 (91%)	258 (100%)	0	100	100
2	XT	258/283 (91%)	258 (100%)	0	100	100
2	XV	78/283 (28%)	78 (100%)	0	100	100
2	XX	83/283 (29%)	83 (100%)	0	100	100
3	A	64/527 (12%)	64 (100%)	0	100	100
3	B	64/527 (12%)	64 (100%)	0	100	100
3	C	64/527 (12%)	64 (100%)	0	100	100
3	D	64/527 (12%)	64 (100%)	0	100	100
3	E	64/527 (12%)	64 (100%)	0	100	100
3	F	64/527 (12%)	64 (100%)	0	100	100
3	G	64/527 (12%)	64 (100%)	0	100	100
3	H	64/527 (12%)	64 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	I	64/527 (12%)	64 (100%)	0	100	100
3	J	64/527 (12%)	64 (100%)	0	100	100
3	K	64/527 (12%)	64 (100%)	0	100	100
3	L	64/527 (12%)	64 (100%)	0	100	100
All	All	6132/13752 (45%)	6131 (100%)	1 (0%)	100	100

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	XD	37	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
2	XB	311	GLN
1	XC	123	ASN
2	XD	194	ASN
2	XD	305	ASN
1	XE	123	ASN
1	XE	263	GLN
1	XG	284	GLN
2	XJ	74	ASN
1	XK	123	ASN
2	XL	311	GLN
1	XM	123	ASN
1	XM	136	ASN
1	XM	302	GLN
1	XO	349	ASN
2	XP	74	ASN
2	XR	311	GLN
1	XS	123	ASN
2	XT	305	ASN
1	XU	284	GLN
3	A	43	ASN
3	F	64	ASN
3	H	43	ASN

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](#)

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 [i](#)

There are no chain breaks in this entry.

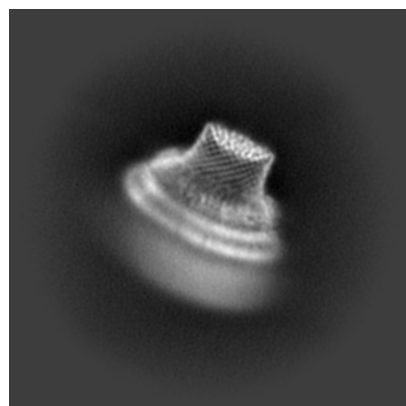
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-46057. These allow visual inspection of the internal detail of the map and identification of artifacts.

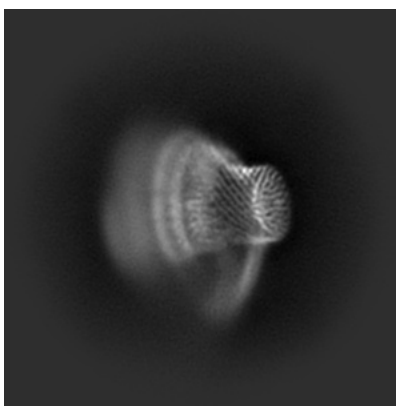
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

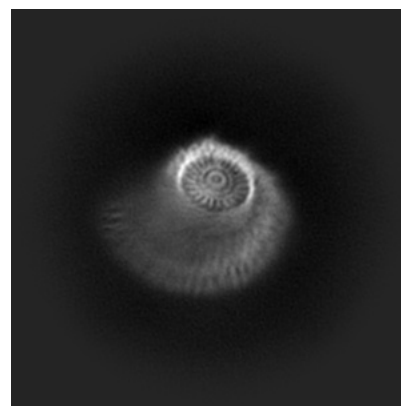
6.1.1 Primary map



X

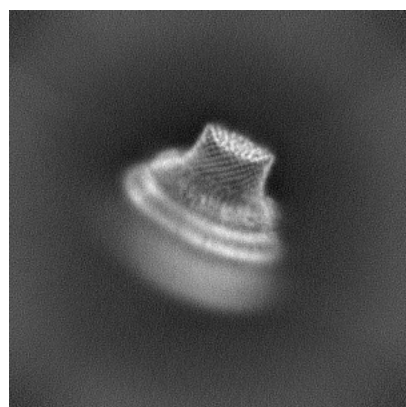


Y

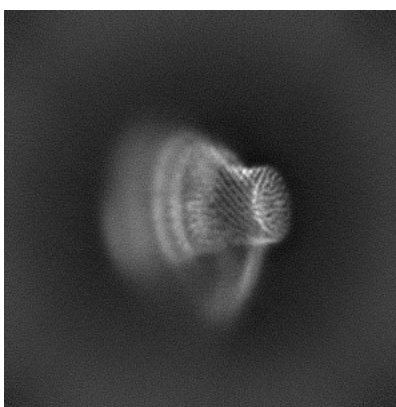


Z

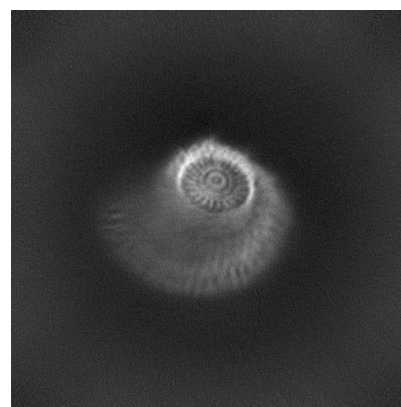
6.1.2 Raw map



X



Y

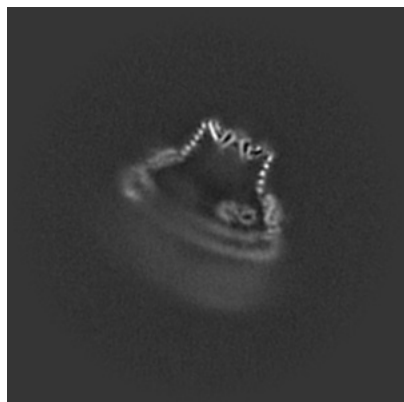


Z

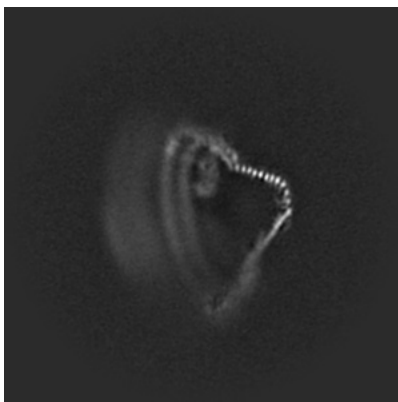
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

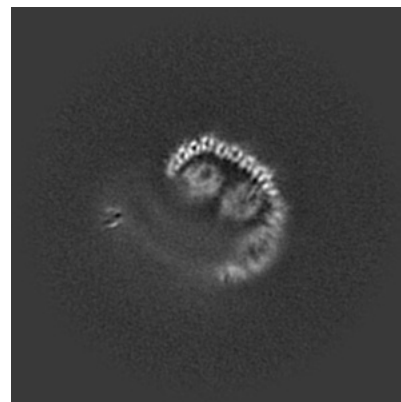
6.2.1 Primary map



X Index: 180

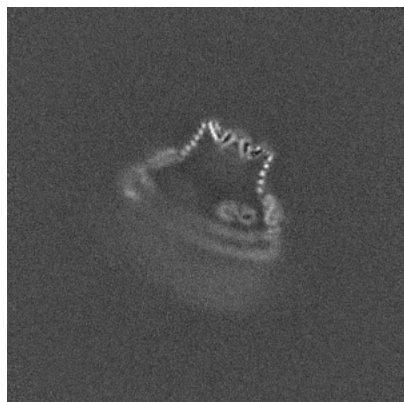


Y Index: 180

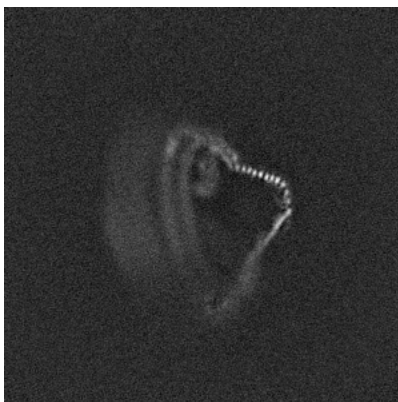


Z Index: 180

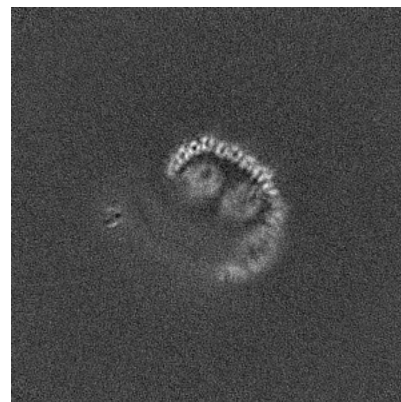
6.2.2 Raw map



X Index: 180



Y Index: 180

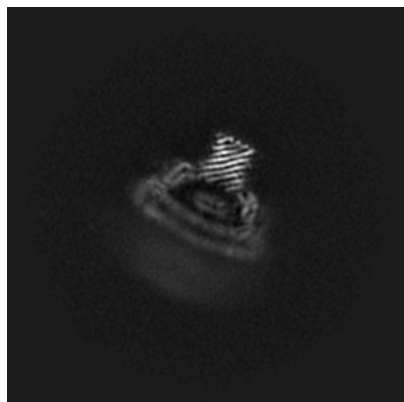


Z Index: 180

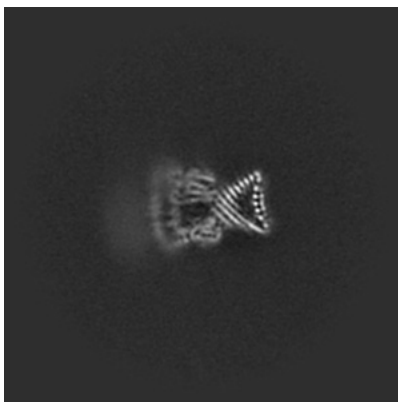
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

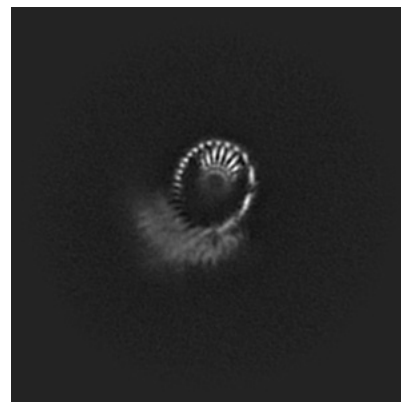
6.3.1 Primary map



X Index: 215

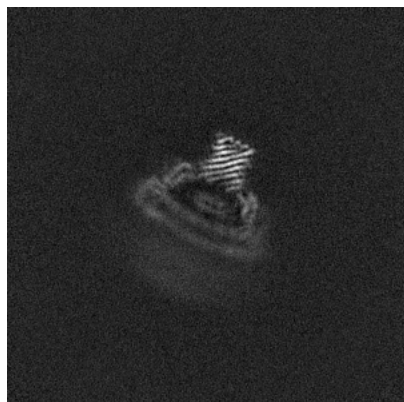


Y Index: 227

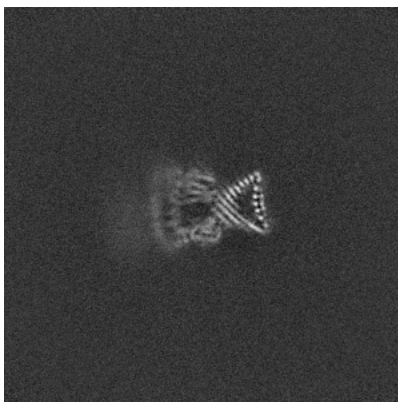


Z Index: 226

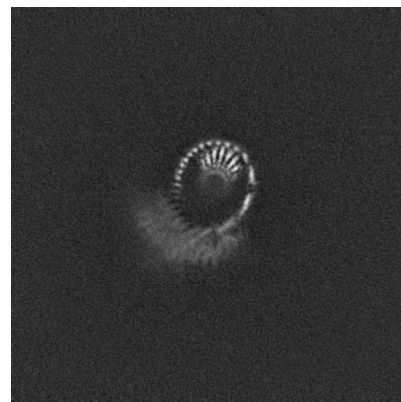
6.3.2 Raw map



X Index: 215



Y Index: 227

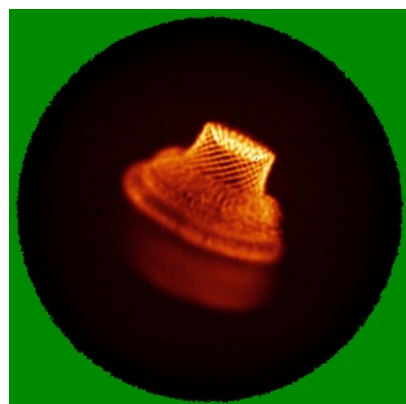


Z Index: 226

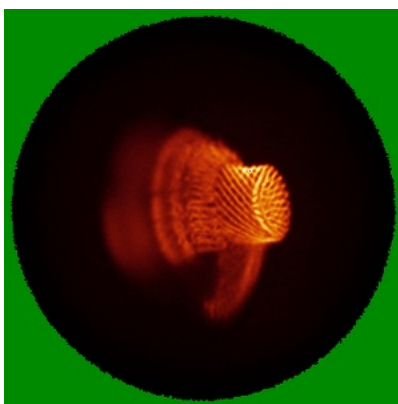
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

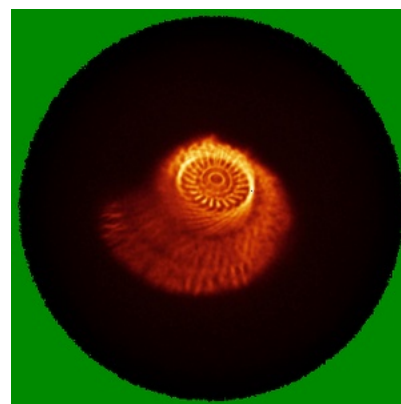
6.4.1 Primary map



X

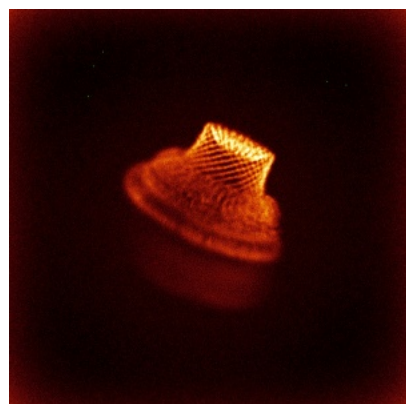


Y

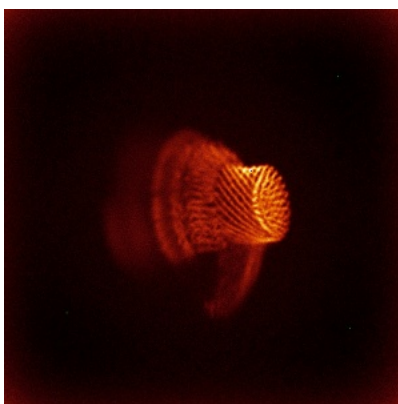


Z

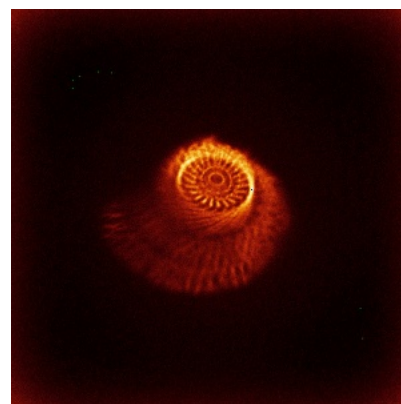
6.4.2 Raw map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



X



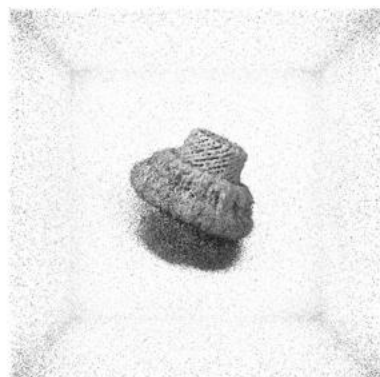
Y



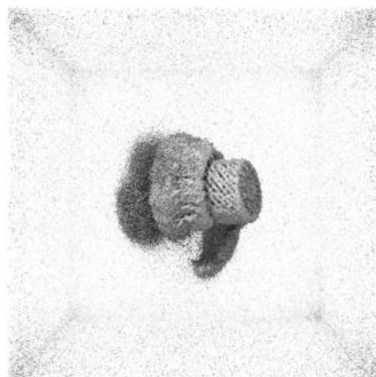
Z

The images above show the 3D surface view of the map at the recommended contour level 0.053. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

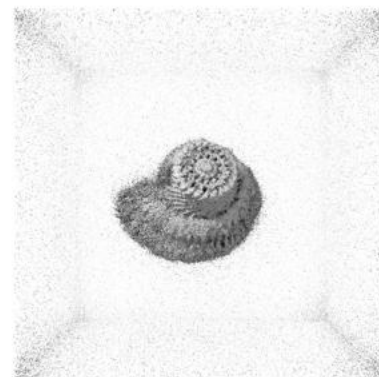
6.5.2 Raw map



X



Y



Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

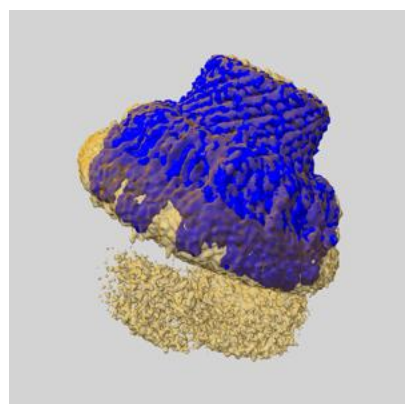
6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

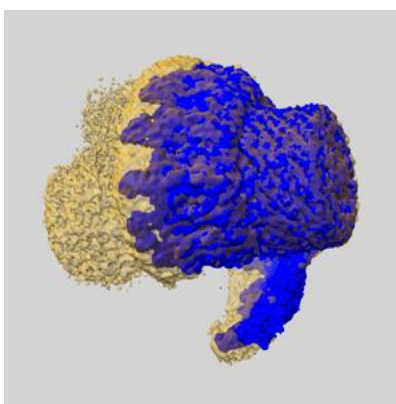
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

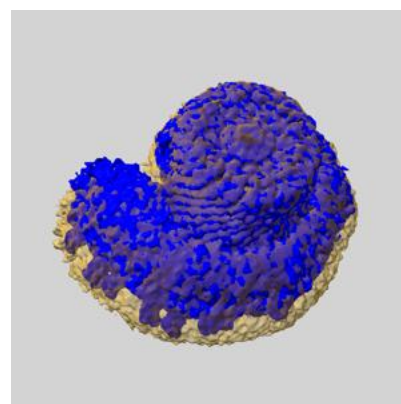
6.6.1 emd_46057_msk_1.map [i](#)



X



Y

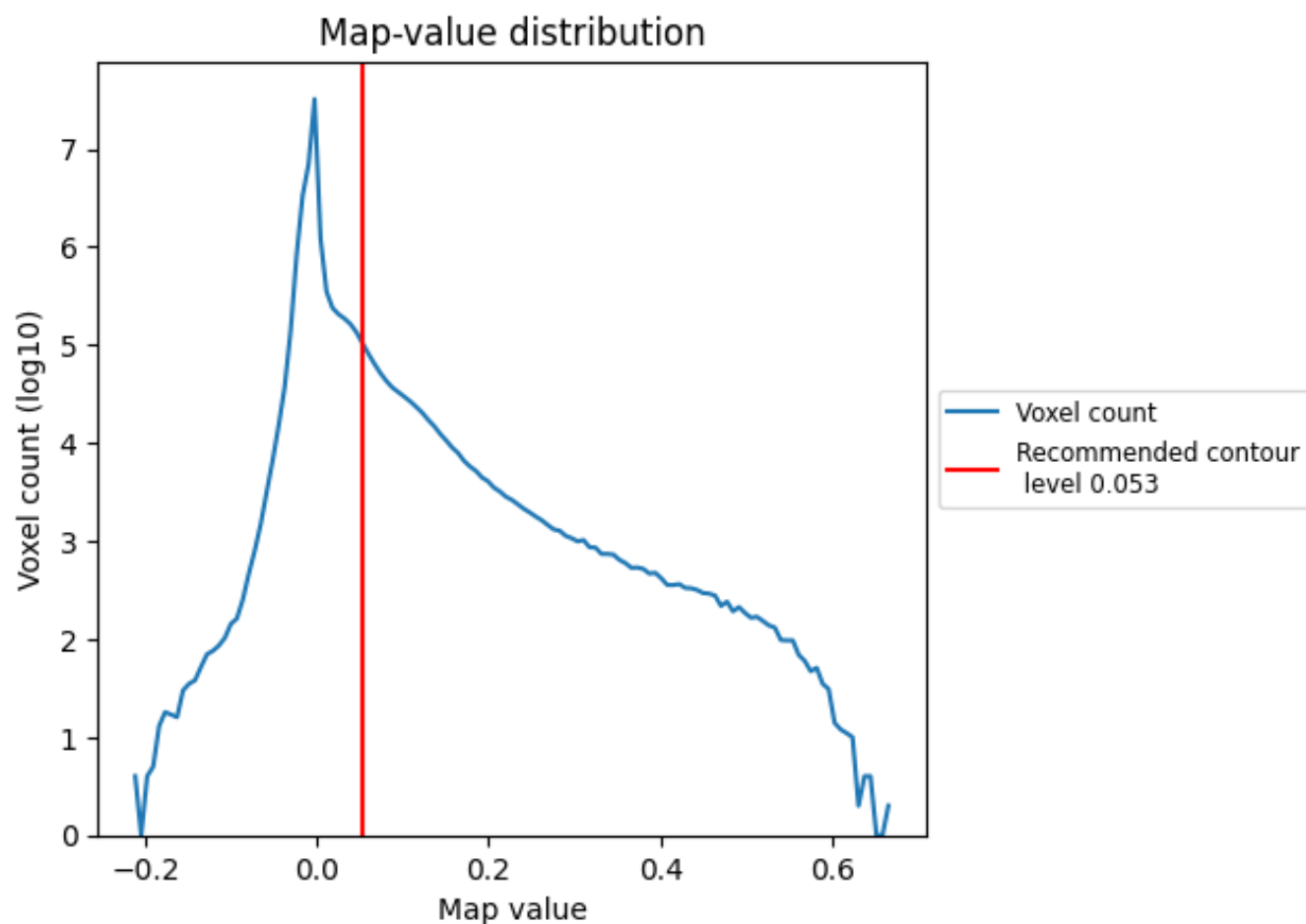


Z

7 Map analysis [i](#)

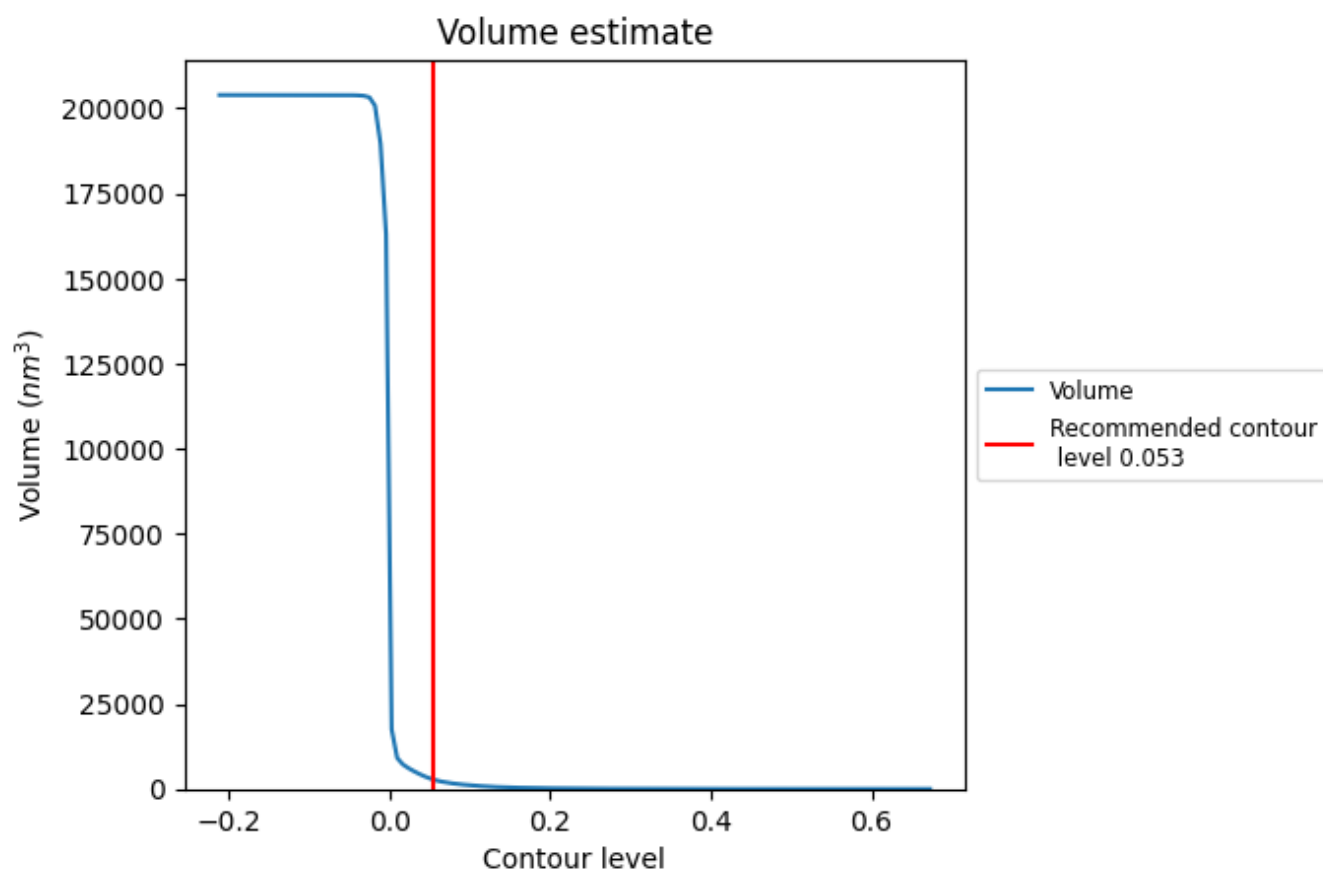
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

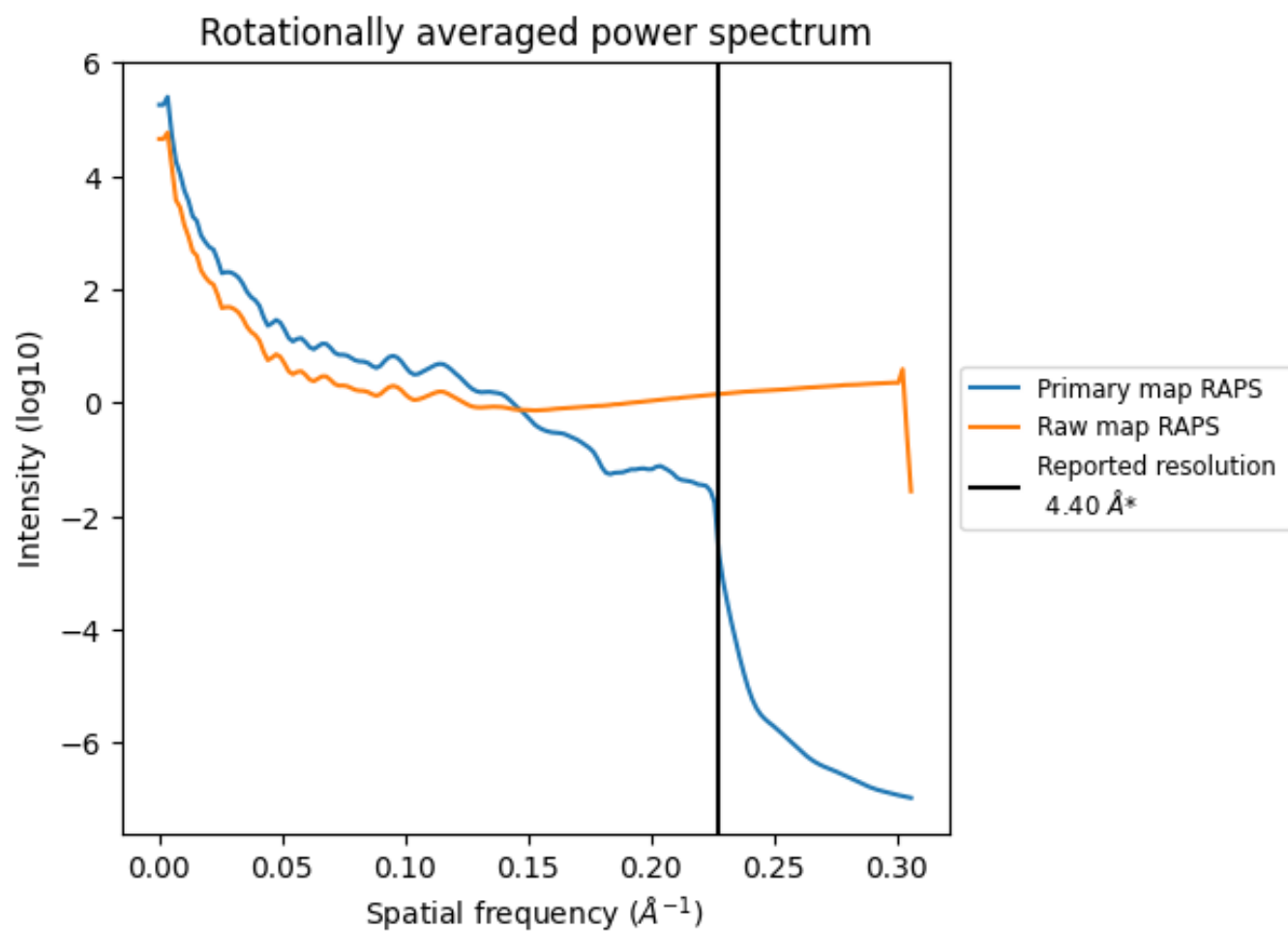
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 2877 nm^3 ; this corresponds to an approximate mass of 2599 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ

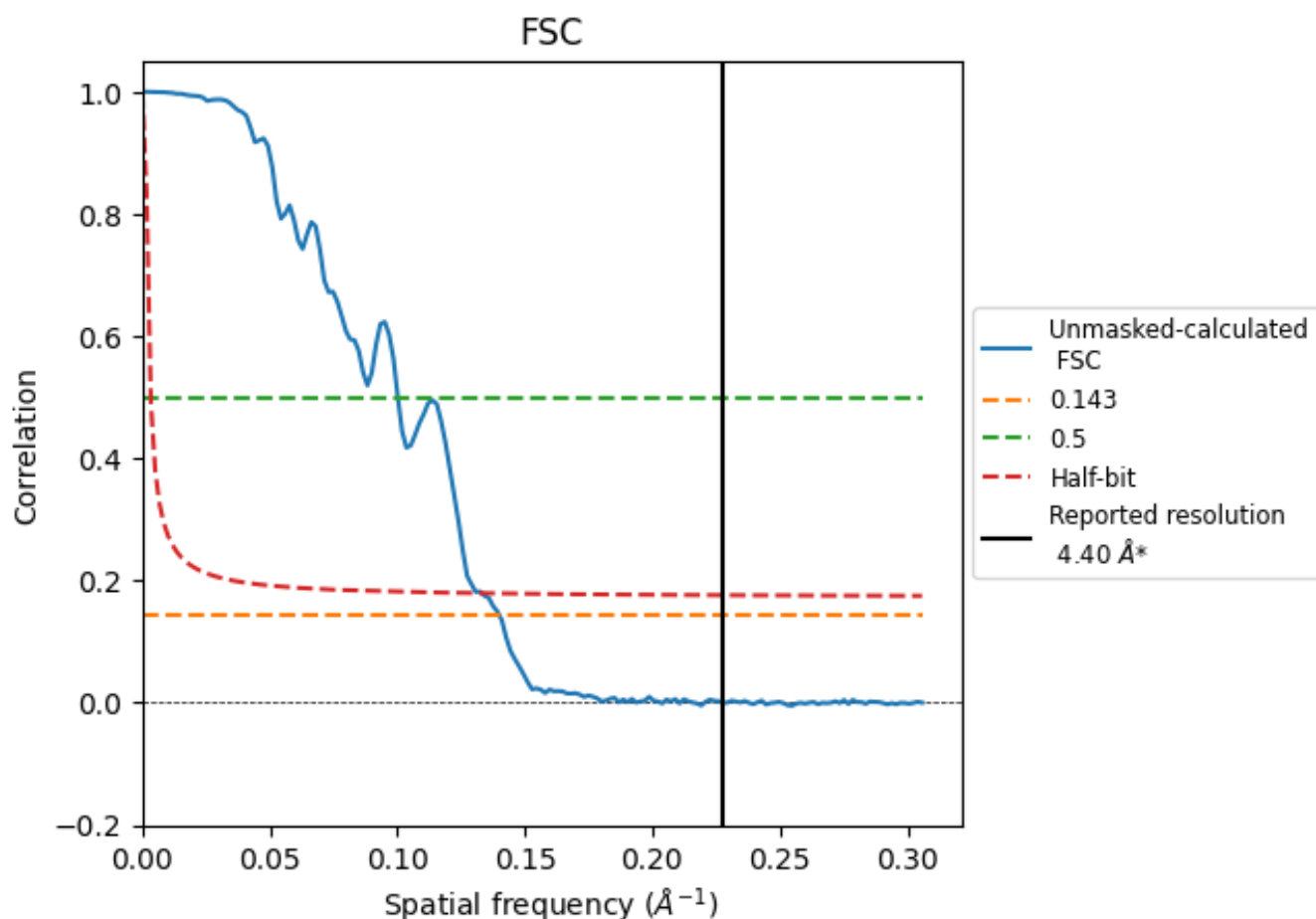


*Reported resolution corresponds to spatial frequency of 0.227 Å⁻¹

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.227 Å⁻¹

8.2 Resolution estimates [i](#)

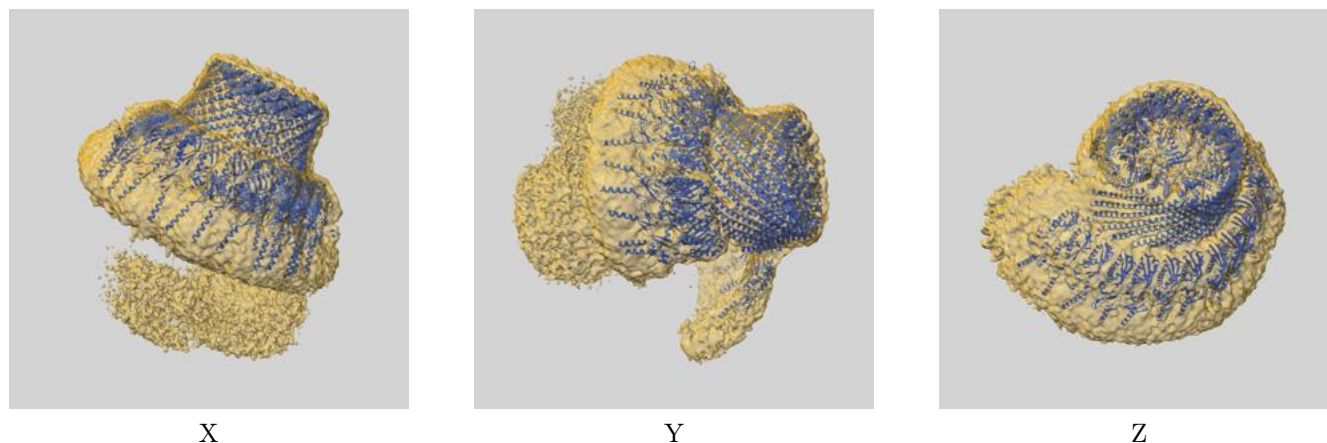
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.40	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.14	9.97	7.51

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 7.14 differs from the reported value 4.4 by more than 10 %

9 Map-model fit [i](#)

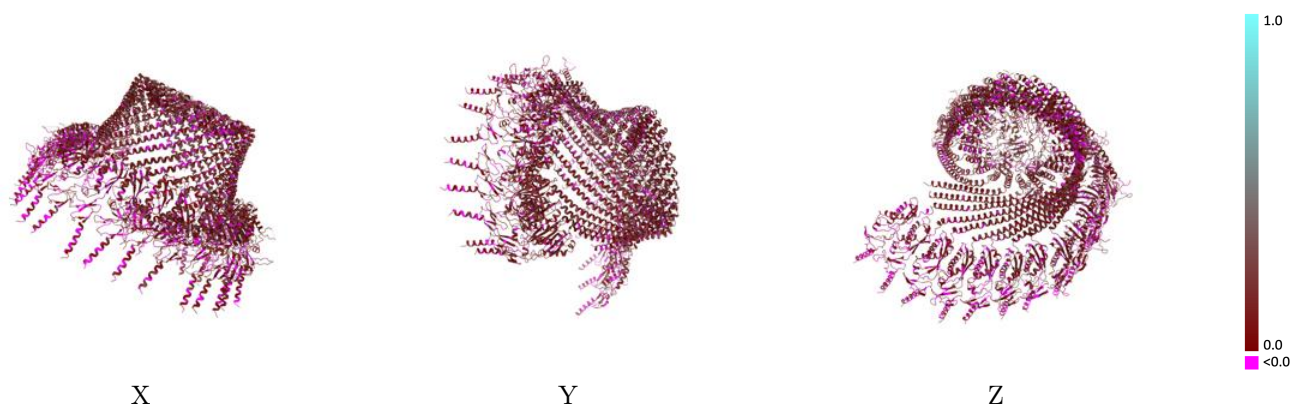
This section contains information regarding the fit between EMDB map EMD-46057 and PDB model 9CZ2. Per-residue inclusion information can be found in section [3](#) on page [8](#).

9.1 Map-model overlay [i](#)



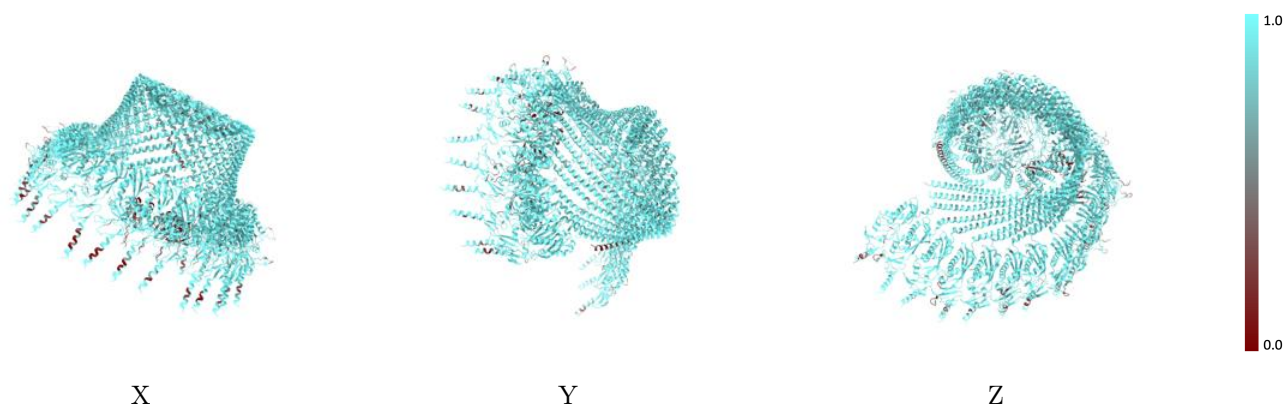
The images above show the 3D surface view of the map at the recommended contour level 0.053 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



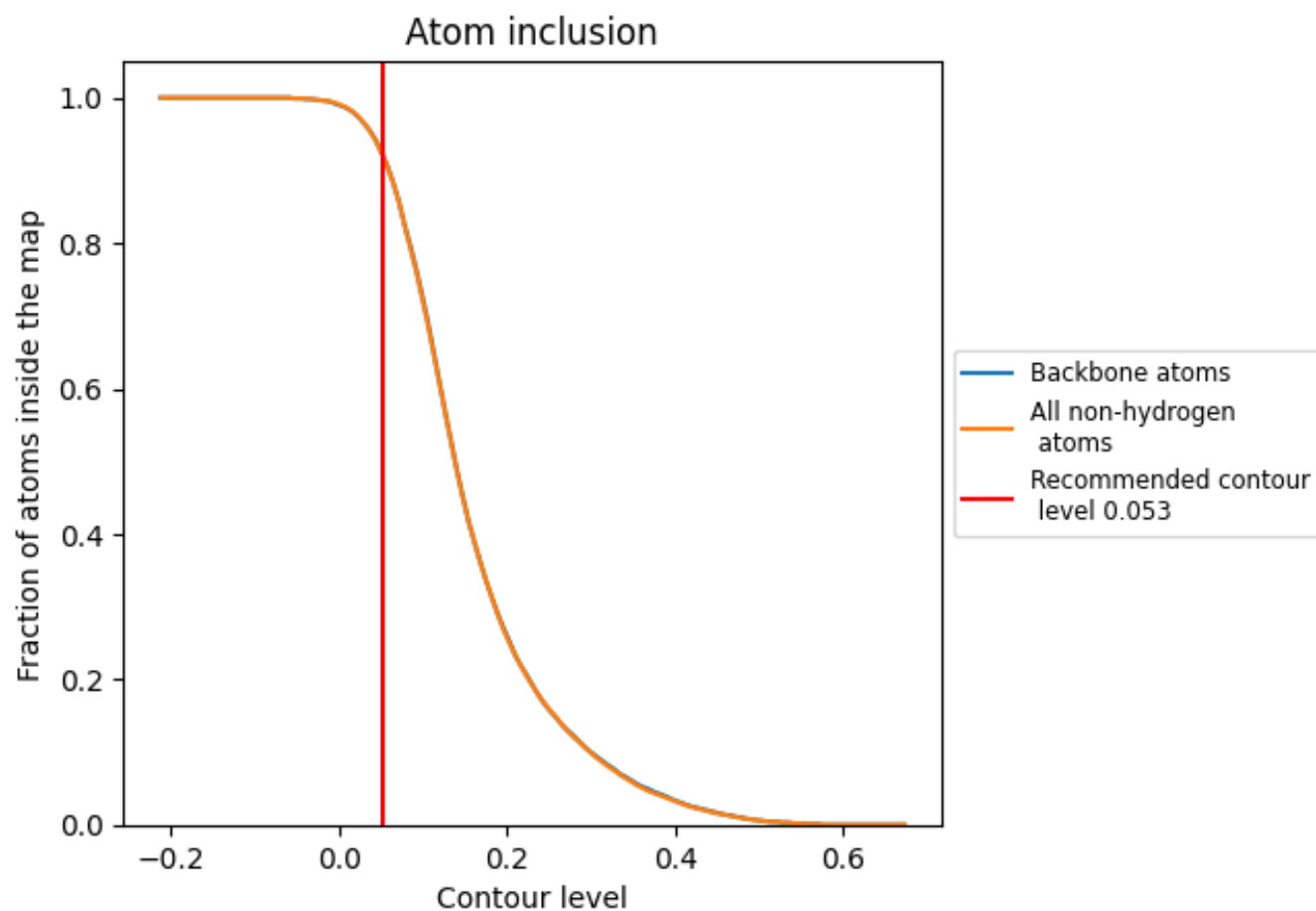
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.053).







































































9.4 Atom inclusion ⓘ



At the recommended contour level, 92% of all backbone atoms, 92% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ


The table lists the average atom inclusion at the recommended contour level (0.053) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9180	 0.1190
A	 0.8820	 0.1300
B	 0.8040	 0.1070
C	 0.8480	 0.1380
D	 0.8740	 0.1250
E	 0.8950	 0.1100
F	 0.9320	 0.1030
G	 0.6770	 0.1020
H	 0.6650	 0.0800
I	 0.8010	 0.1040
J	 0.7460	 0.0810
K	 0.5000	 0.0640
L	 0.5300	 0.1000
XA	 0.9500	 0.1380
XB	 0.9540	 0.1360
XC	 0.9540	 0.1420
XD	 0.9450	 0.1430
XE	 0.9360	 0.1240
XF	 0.9480	 0.1370
XG	 0.9500	 0.1340
XH	 0.9480	 0.1320
XI	 0.9480	 0.1230
XJ	 0.9210	 0.1350
XK	 0.9370	 0.1150
XL	 0.9240	 0.1020
XM	 0.9360	 0.1140
XN	 0.9220	 0.1180
XO	 0.9470	 0.0960
XP	 0.9410	 0.1200
XQ	 0.9530	 0.0970
XR	 0.9430	 0.1050
XS	 0.9680	 0.0890
XT	 0.9420	 0.1070
XU	 0.9520	 0.0900
XV	 0.9520	 0.1860



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Chain	Atom inclusion	Q-score
XW	 0.9380	 0.1600
XX	 0.7950	 0.1430