



wwPDB EM Validation Summary Report ⓘ

Mar 7, 2026 – 12:48 AM UTC

PDB ID : 7VBA / pdb_00007vba
EMDB ID : EMD-31876
Title : Structure of the pre state human RNA Polymerase I Elongation Complex
Authors : Zhao, D.; Liu, W.; Chen, K.; Yang, H.; Xu, Y.
Deposited on : 2021-08-31
Resolution : 2.89 Å(reported)

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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:

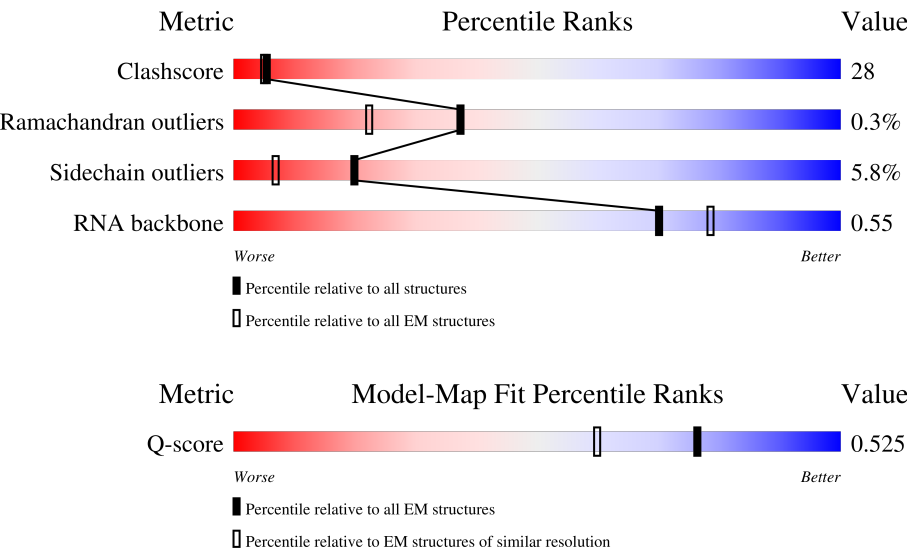
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance i

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

The reported resolution of this entry is 2.89 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.




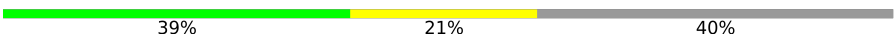



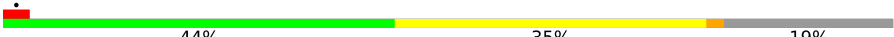
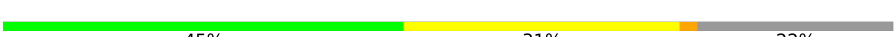




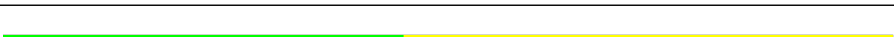
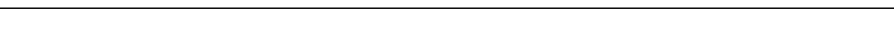
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	12148 (2.39 - 3.39)

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	A	1719	
2	B	1135	
3	C	346	

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Mol	Chain	Length	Quality of chain
4	E	210	
5	F	127	
6	H	150	
7	I	126	
8	J	67	
9	K	133	
10	L	58	
11	N	510	
12	G	338	
13	M	419	
14	R	8	
15	T	22	
16	U	13	

2 Entry composition

There are 19 unique types of molecules in this entry. The entry contains 33093 atoms, of which 14 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 DNA-directed RNA polymerase I subunit RPA1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1473	Total	C	N	O	S	0	0
			11749	7474	2063	2134	78		

- Molecule 2 is a protein called DNA-directed RNA polymerase I subunit RPA2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	1123	Total	C	N	O	S	0	0
			8912	5710	1517	1614	71		

- Molecule 3 is a protein called DNA-directed RNA polymerases I and III subunit RPAC1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	337	Total	C	N	O	S	0	0
			2697	1701	480	505	11		

- Molecule 4 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	199	Total	C	N	O	S	0	0
			1641	1042	286	305	8		

- Molecule 5 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	F	76	Total	C	N	O	S	0	0
			610	392	103	110	5		

- Molecule 6 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC3.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	H	146	Total	C	N	O	S	0	0
			1176	744	192	235	5		

- Molecule 7 is a protein called DNA-directed RNA polymerase I subunit RPA12.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	I	60	Total	C	N	O	S	0	0
			447	277	76	89	5		

- Molecule 8 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC5.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	J	64	Total	C	N	O	S	0	0
			507	328	86	87	6		

- Molecule 9 is a protein called DNA-directed RNA polymerases I and III subunit RPAC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	K	108	Total	C	N	O	S	0	0
			863	535	156	165	7		

- Molecule 10 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC4.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	L	45	Total	C	N	O	S	0	0
			379	236	73	64	6		

- Molecule 11 is a protein called DNA-directed RNA polymerase I subunit RPA34.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	N	151	Total	C	N	O	S	0	0
			1105	698	198	204	5		

- Molecule 12 is a protein called DNA-directed RNA polymerase I subunit RPA43.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	G	157	Total	C	N	O	S	0	0
			1229	775	215	232	7		

- Molecule 13 is a protein called DNA-directed RNA polymerase I subunit RPA49.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	110	Total	C	N	O	S	0	0
			867	539	159	163	6		

- Molecule 14 is a RNA chain called RNA (5'-R(P*UP*GP*CP*UP*GP*AP*CP*U)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
14	R	8	Total	C	N	O	P	0	0
			168	75	27	58	8		

- Molecule 15 is a DNA chain called DNA (5'-D(P*GP*CP*CP*AP*GP*AP*GP*AP*CP*AP*GP*CP*GP*AP*GP*TP*CP*AP*GP*CP*AP*A)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
15	T	22	Total	C	N	O	P	0	0
			456	214	95	125	22		

- Molecule 16 is a DNA chain called DNA (5'-D(P*A*CP*TP*GP*TP*CP*CP*TP*CP*TP*GP*GP*C)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
16	U	12	Total	C	N	O	P	0	0
			238	115	38	74	11		

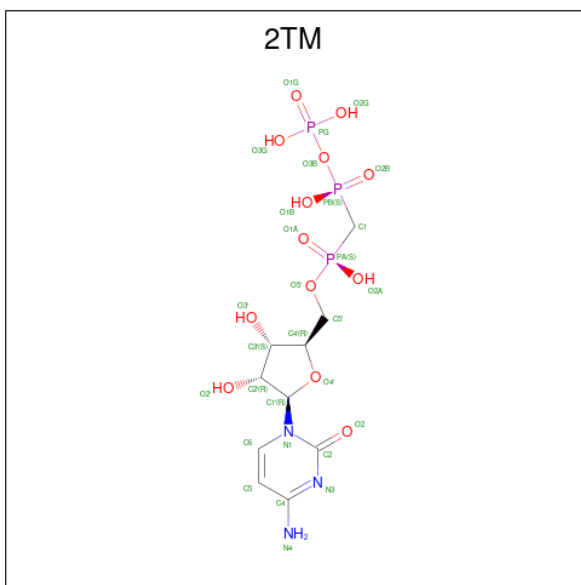
- Molecule 17 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
17	A	2	Total	Zn	0
			2	2	
17	B	1	Total	Zn	0
			1	1	
17	J	1	Total	Zn	0
			1	1	
17	L	1	Total	Zn	0
			1	1	

- Molecule 18 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
18	A	1	Total	Mg	0
			1	1	

- Molecule 19 is 5'-O-[(S)-hydroxy{[(S)-hydroxy(phosphonooxy)phosphoryl]methyl}phosphoryl]cytidine (CCD ID: 2TM) (formula: C₁₀H₁₈N₃O₁₃P₃).

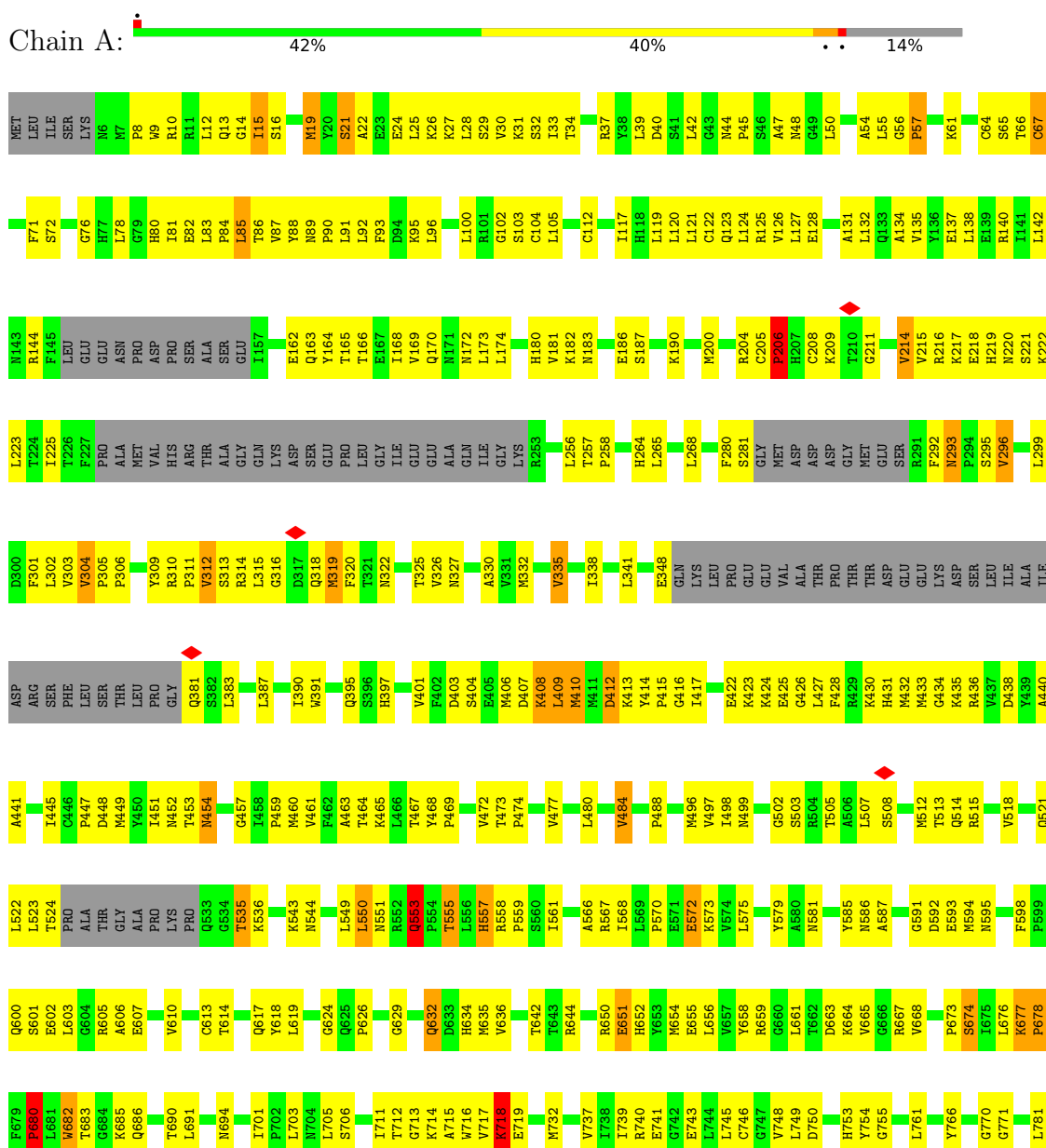


Mol	Chain	Residues	Atoms					AltConf	
19	A	1	Total	C	H	N	O	P	0
			43	10	14	3	13	3	

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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.

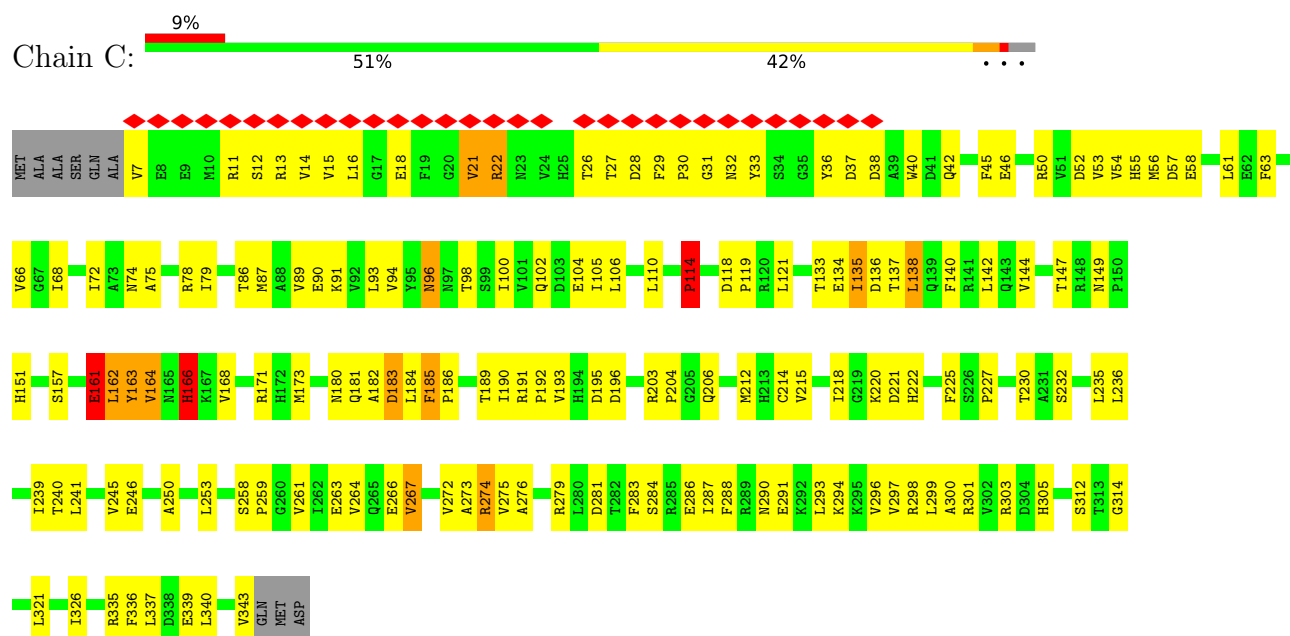
• Molecule 1: DNA-directed RNA polymerase I subunit RPA1



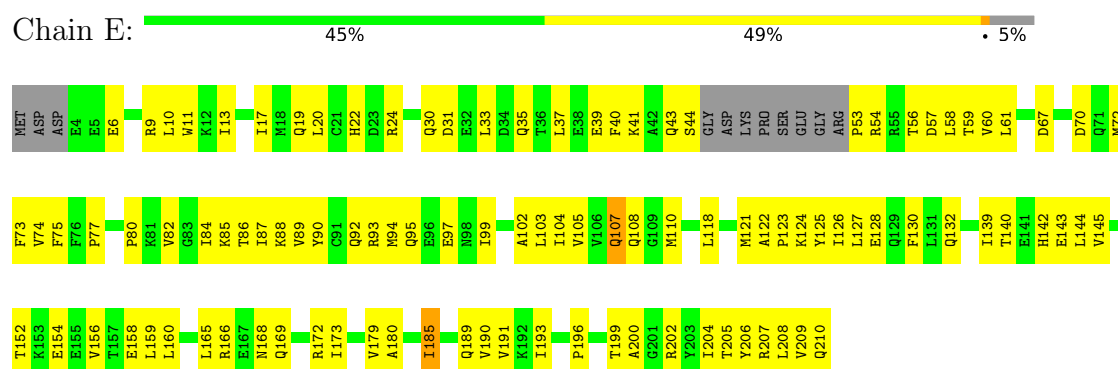




• Molecule 3: DNA-directed RNA polymerases I and III subunit RPAC1

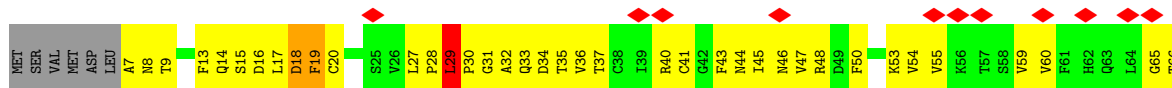


• Molecule 4: DNA-directed RNA polymerases I, II, and III subunit RPABC1

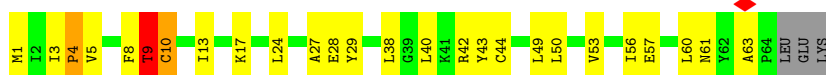




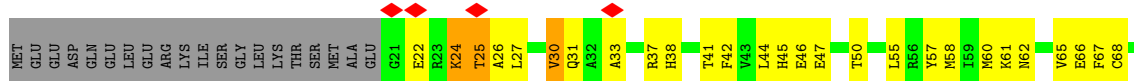
• Molecule 7: DNA-directed RNA polymerase I subunit RPA12



• Molecule 8: DNA-directed RNA polymerases I, II, and III subunit RPABC5



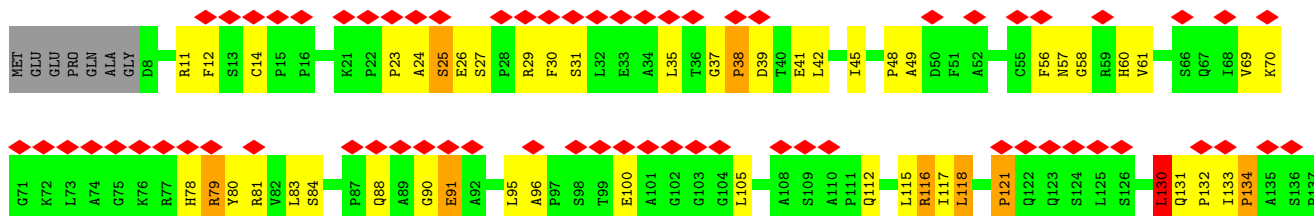
• Molecule 9: DNA-directed RNA polymerases I and III subunit RPAC2

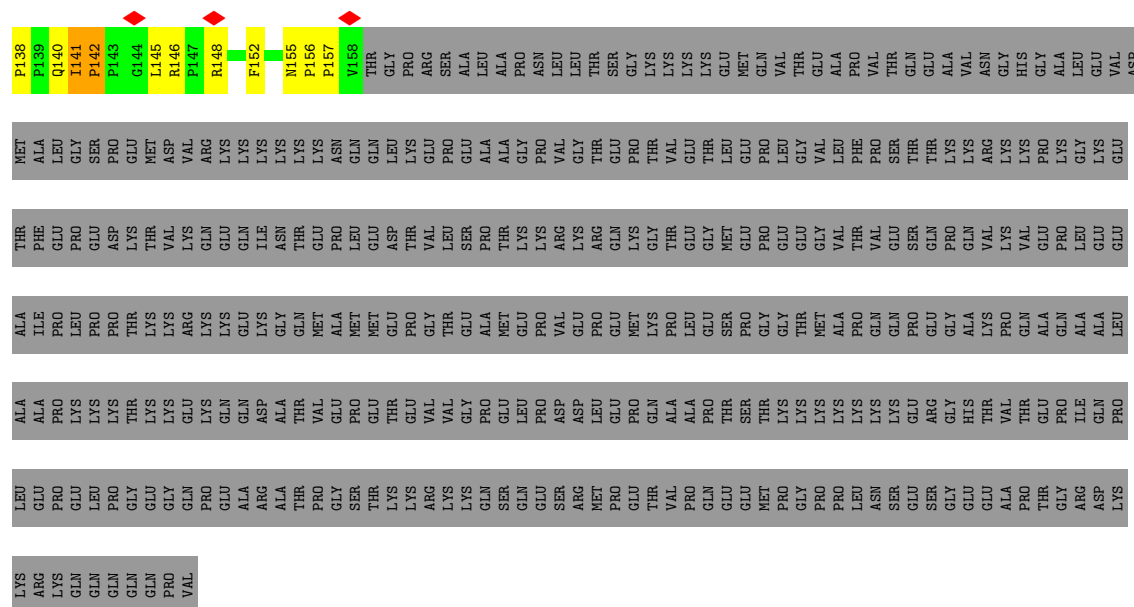


• Molecule 10: DNA-directed RNA polymerases I, II, and III subunit RPABC4

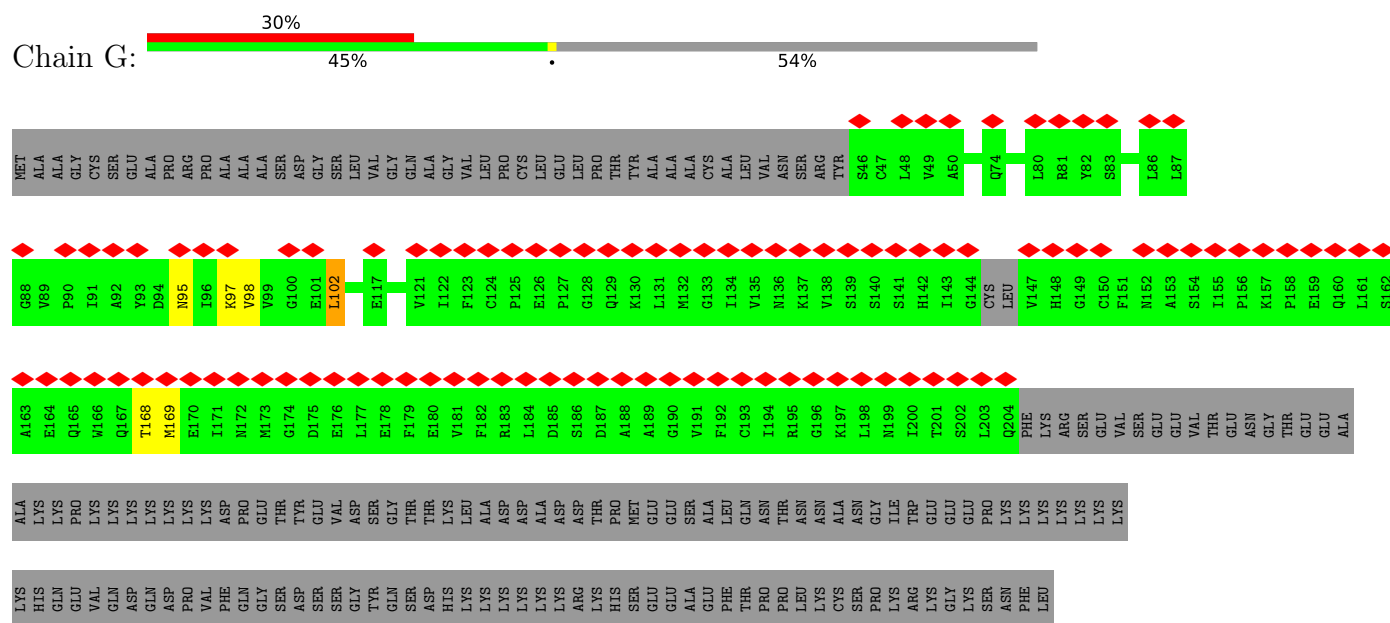


• Molecule 11: DNA-directed RNA polymerase I subunit RPA34

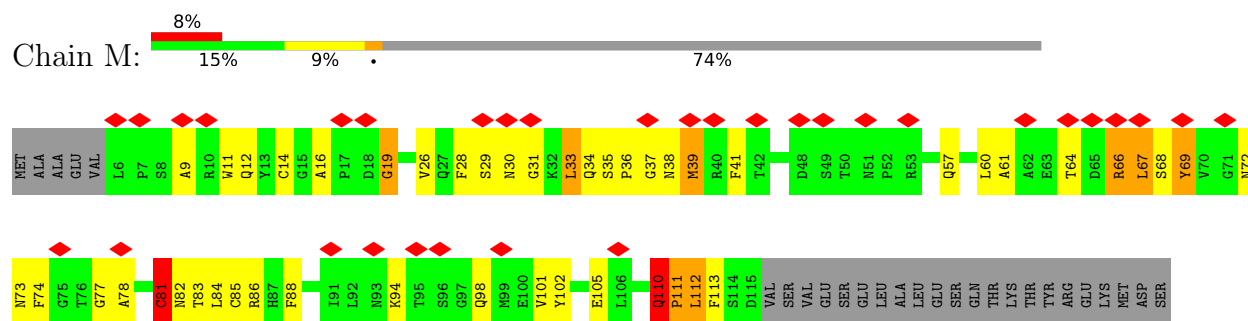




- Molecule 12: DNA-directed RNA polymerase I subunit RPA43



- Molecule 13: DNA-directed RNA polymerase I subunit RPA49



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

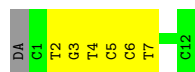
- Molecule 14: RNA (5'-R(P*UP*GP*CP*UP*GP*AP*CP*U)-3')



- Molecule 15: DNA (5'-D(P*GP*CP*CP*AP*GP*AP*GP*AP*CP*AP*GP*CP*GP*AP*GP*TP*CP*AP*GP*CP*AP*A)-3')



- Molecule 16: DNA (5'-D(P*A*CP*TP*GP*TP*CP*CP*TP*CP*TP*GP*GP*C)-3')



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	382890	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	5.648	Depositor
Minimum map value	-3.264	Depositor
Average map value	-0.002	Depositor
Map value standard deviation	0.151	Depositor
Recommended contour level	0.351	Depositor
Map size (\AA)	337.28, 337.28, 337.28	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.054, 1.054, 1.054	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ZN, 2TM

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	0.65	9/11988 (0.1%)	0.98	55/16184 (0.3%)
2	B	0.71	6/9127 (0.1%)	1.09	66/12350 (0.5%)
3	C	0.74	2/2751 (0.1%)	1.19	29/3729 (0.8%)
4	E	0.35	0/1669	0.58	1/2254 (0.0%)
5	F	0.29	0/620	0.46	0/839
6	H	0.47	0/1197	0.84	3/1614 (0.2%)
7	I	0.52	0/454	0.88	1/615 (0.2%)
8	J	0.70	1/516 (0.2%)	1.02	4/696 (0.6%)
9	K	0.39	0/878	0.82	1/1182 (0.1%)
10	L	0.35	0/385	0.66	0/511
11	N	1.10	9/1140 (0.8%)	1.43	22/1560 (1.4%)
12	G	0.38	0/1252	0.64	1/1691 (0.1%)
13	M	1.03	4/884 (0.5%)	1.29	13/1192 (1.1%)
14	R	0.20	0/186	0.35	0/287
15	T	0.24	0/514	0.36	0/791
16	U	0.23	0/264	0.49	0/405
All	All	0.66	31/33825 (0.1%)	1.00	196/45900 (0.4%)

The worst 5 of 31 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	M	66	ARG	C-N	-8.99	1.22	1.33
2	B	590	PRO	C-O	-8.23	1.18	1.25
13	M	61	ALA	C-N	-7.76	1.23	1.33
11	N	155	ASN	C-N	7.54	1.42	1.33
11	N	100	GLU	C-N	-7.52	1.24	1.33

The worst 5 of 196 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	164	VAL	N-CA-C	-16.03	98.66	112.12

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1507	GLU	N-CA-C	-10.97	99.33	111.07
9	K	25	THR	N-CA-C	-10.17	100.87	113.18
2	B	19	LEU	N-CA-C	-9.84	97.54	110.53
2	B	159	HIS	N-CA-C	-9.44	95.31	110.32

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	11749	0	11888	755	0
2	B	8912	0	8896	573	0
3	C	2697	0	2676	152	0
4	E	1641	0	1671	114	0
5	F	610	0	642	22	0
6	H	1176	0	1137	62	0
7	I	447	0	429	57	0
8	J	507	0	523	26	0
9	K	863	0	850	67	0
10	L	379	0	387	26	0
11	N	1105	0	1098	51	0
12	G	1229	0	1212	0	0
13	M	867	0	844	66	0
14	R	168	0	85	3	0
15	T	456	0	244	19	0
16	U	238	0	138	6	0
17	A	2	0	0	0	0
17	B	1	0	0	0	0
17	J	1	0	0	0	0
17	L	1	0	0	0	0
18	A	1	0	0	0	0
19	A	29	14	14	0	0
All	All	33079	14	32734	1761	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 28.

The worst 5 of 1761 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)
11:N:142:PRO:CG	11:N:145:LEU:HD21	1.50	1.42
11:N:142:PRO:HG2	11:N:145:LEU:CD2	1.54	1.35
7:I:16:ASP:O	13:M:67:LEU:CD2	1.76	1.33
1:A:408:LYS:NZ	1:A:409:LEU:HD22	1.46	1.29
1:A:407:ASP:OD2	1:A:410:MET:HG3	1.40	1.18

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	1455/1719 (85%)	1310 (90%)	138 (10%)	7 (0%)	24	54
2	B	1119/1135 (99%)	1019 (91%)	100 (9%)	0	100	100
3	C	335/346 (97%)	313 (93%)	22 (7%)	0	100	100
4	E	195/210 (93%)	185 (95%)	10 (5%)	0	100	100
5	F	74/127 (58%)	71 (96%)	3 (4%)	0	100	100
6	H	144/150 (96%)	130 (90%)	14 (10%)	0	100	100
7	I	58/126 (46%)	43 (74%)	13 (22%)	2 (3%)	3	12
8	J	62/67 (92%)	58 (94%)	4 (6%)	0	100	100
9	K	106/133 (80%)	96 (91%)	9 (8%)	1 (1%)	14	41
10	L	43/58 (74%)	37 (86%)	6 (14%)	0	100	100
11	N	149/510 (29%)	134 (90%)	13 (9%)	2 (1%)	9	32
12	G	153/338 (45%)	139 (91%)	13 (8%)	1 (1%)	18	48
13	M	108/419 (26%)	106 (98%)	1 (1%)	1 (1%)	14	41

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	4001/5338 (75%)	3641 (91%)	346 (9%)	14 (0%)	37	65

5 of 14 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	214	VAL
1	A	1605	ILE
11	N	156	PRO
13	M	37	GLY
12	G	102	LEU

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	A	1295/1503 (86%)	1220 (94%)	75 (6%)	18	49
2	B	982/992 (99%)	907 (92%)	75 (8%)	12	36
3	C	296/302 (98%)	274 (93%)	22 (7%)	13	38
4	E	183/192 (95%)	180 (98%)	3 (2%)	55	83
5	F	66/111 (60%)	66 (100%)	0	100	100
6	H	129/131 (98%)	125 (97%)	4 (3%)	35	69
7	I	53/111 (48%)	51 (96%)	2 (4%)	29	64
8	J	53/56 (95%)	50 (94%)	3 (6%)	18	49
9	K	96/119 (81%)	94 (98%)	2 (2%)	47	77
10	L	42/55 (76%)	41 (98%)	1 (2%)	43	75
11	N	119/427 (28%)	113 (95%)	6 (5%)	22	53
12	G	135/288 (47%)	130 (96%)	5 (4%)	30	64
13	M	94/366 (26%)	88 (94%)	6 (6%)	16	44
All	All	3543/4653 (76%)	3339 (94%)	204 (6%)	20	49

5 of 204 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	353	LEU
2	B	866	CYS
13	M	35	SER
2	B	430	PHE
2	B	659	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 99 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	150	ASN
2	B	846	ASN
2	B	223	ASN
2	B	523	GLN
3	C	48	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
14	R	7/8 (87%)	1 (14%)	0

All (1) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
14	R	-5	U

There are no RNA pucker outliers to report.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 6 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
19	2TM	A	2004	-	26,30,30	0.82	2 (7%)	39,47,47	0.70	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
19	2TM	A	2004	-	-	3/19/38/38	0/2/2/2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
19	A	2004	2TM	PA-O2A	-2.46	1.50	1.56
19	A	2004	2TM	PB-O1B	-2.34	1.50	1.56

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

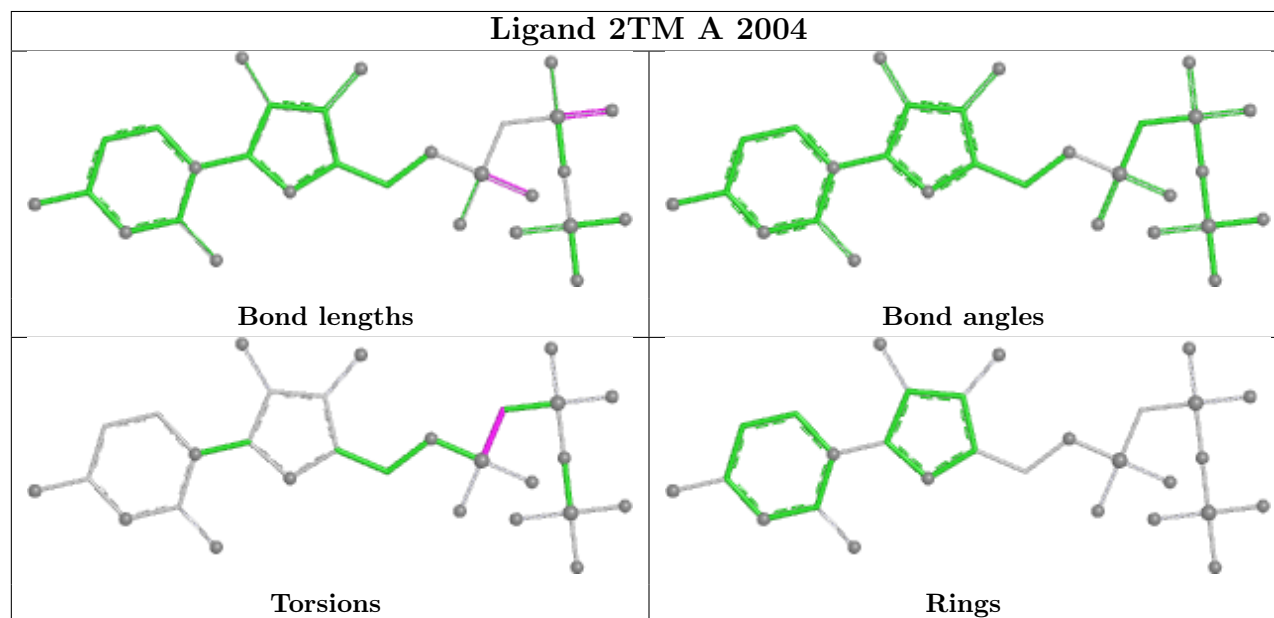
Mol	Chain	Res	Type	Atoms
19	A	2004	2TM	PB-C1-PA-O5'
19	A	2004	2TM	PB-C1-PA-O1A
19	A	2004	2TM	PB-C1-PA-O2A

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



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.

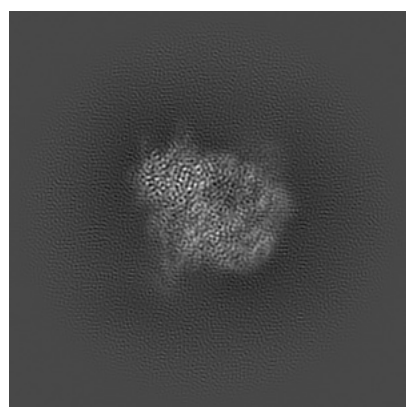
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-31876. These allow visual inspection of the internal detail of the map and identification of artifacts.

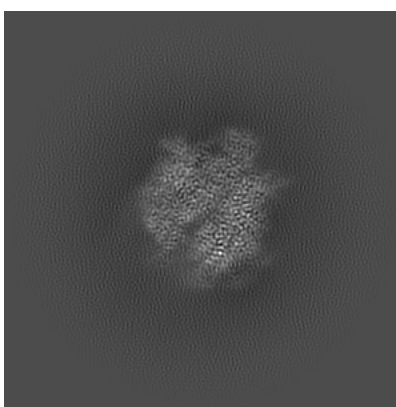
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

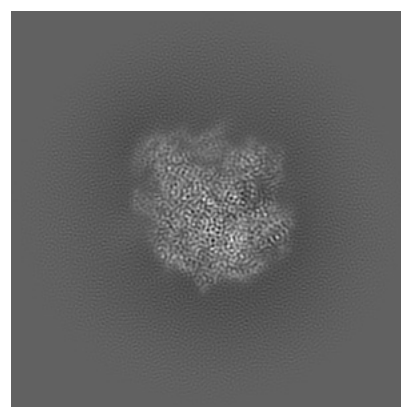
6.1.1 Primary map



X



Y

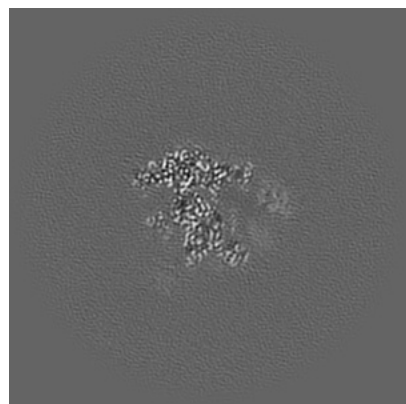


Z

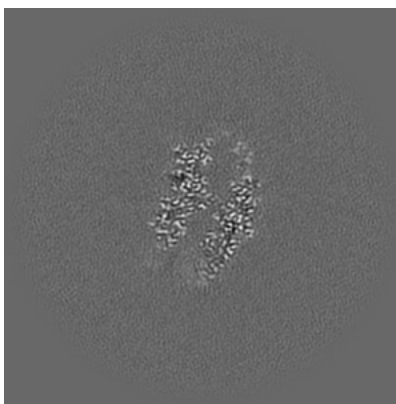
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

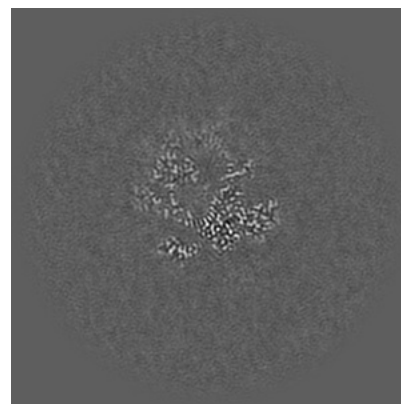
6.2.1 Primary map



X Index: 160



Y Index: 160

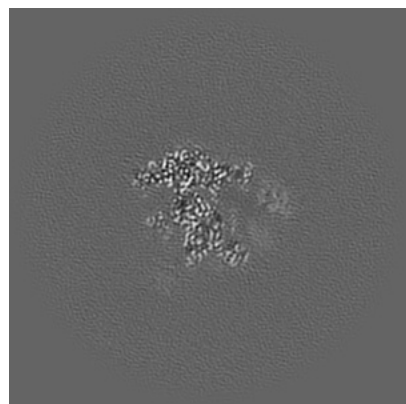


Z Index: 160

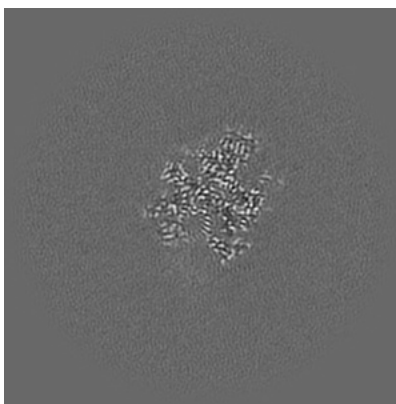
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

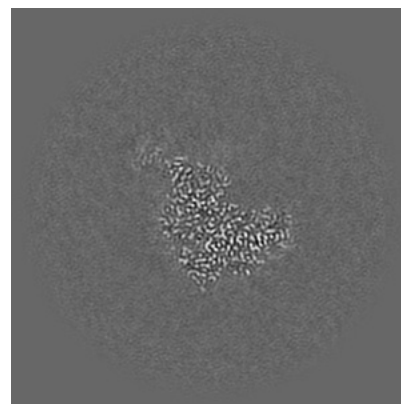
6.3.1 Primary map



X Index: 160



Y Index: 146

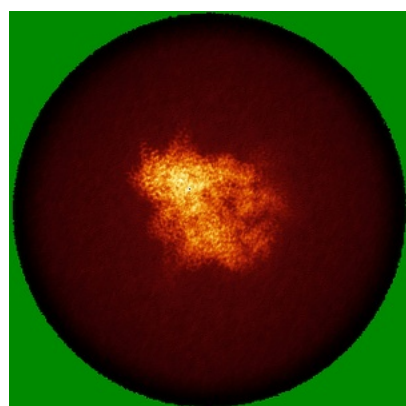


Z Index: 184

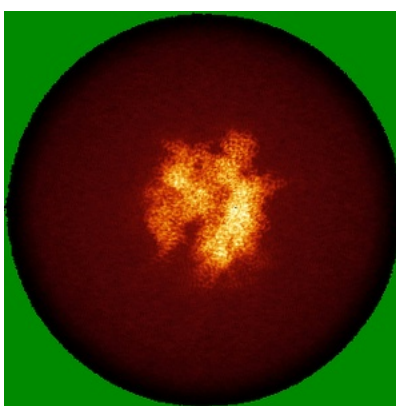
The images above show the largest variance slices of the map in three orthogonal directions.

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

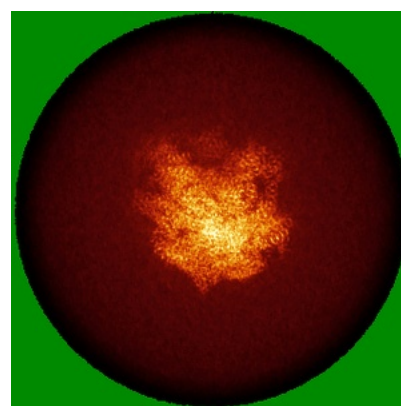
6.4.1 Primary map



X



Y

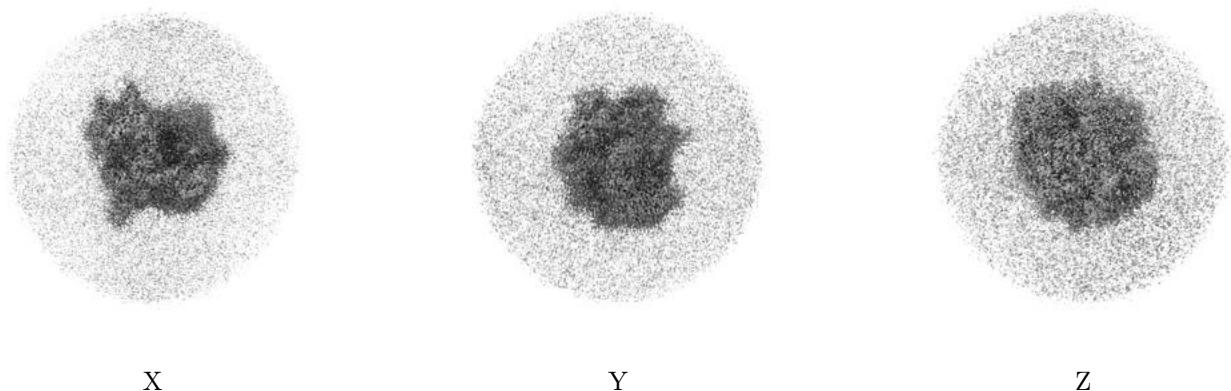


Z

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



The images above show the 3D surface view of the map at the recommended contour level 0.351. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

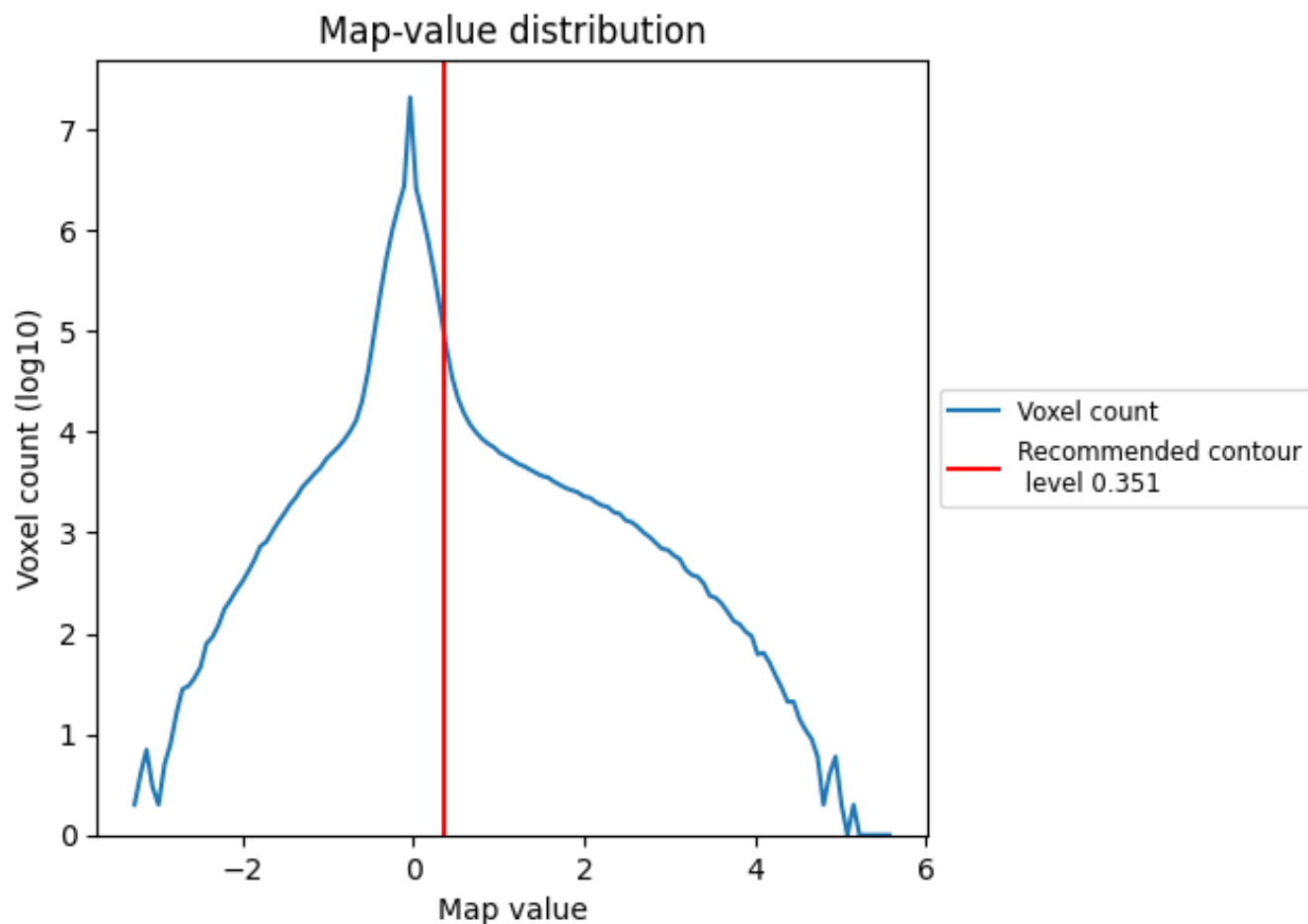
6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

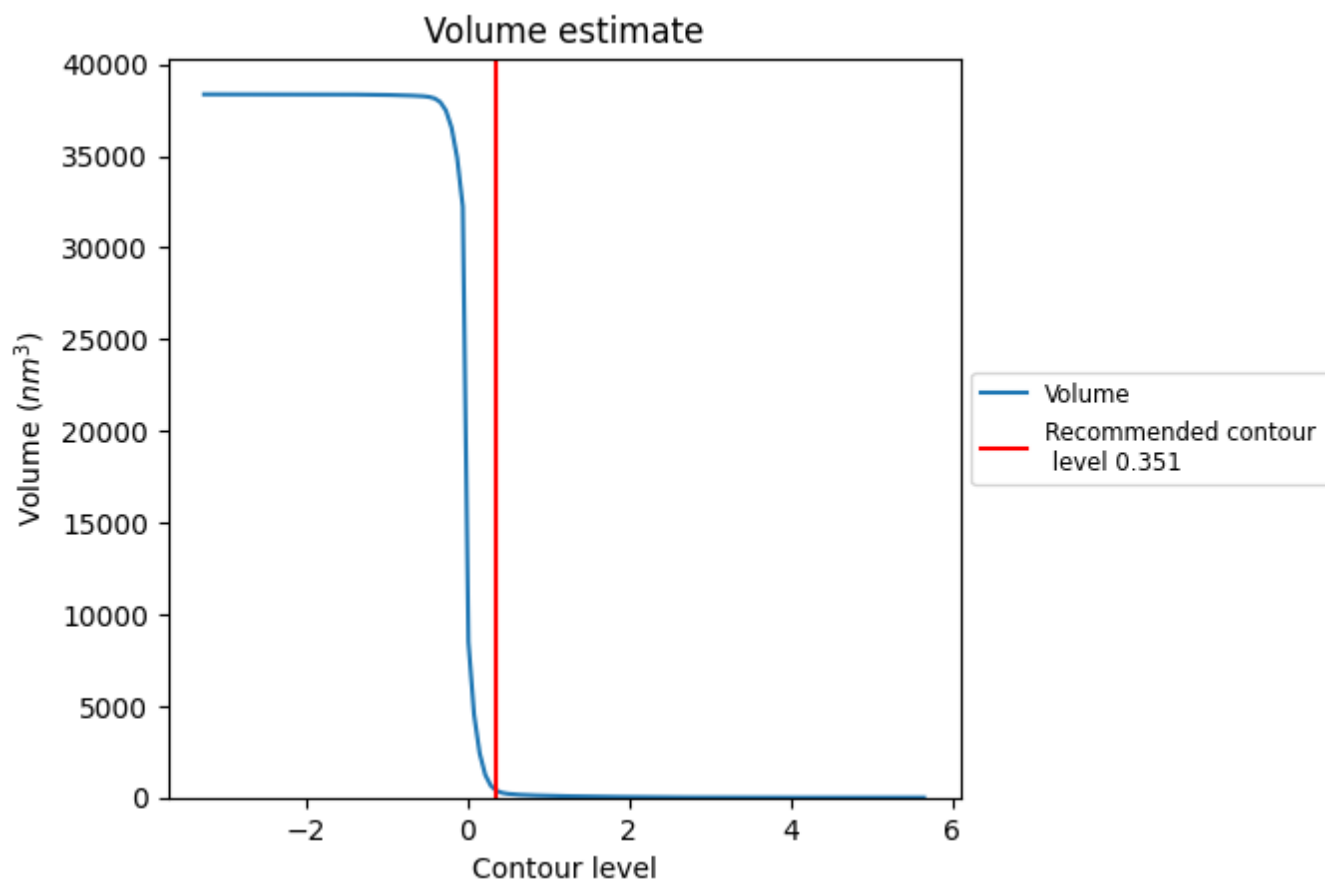
This section contains the results of statistical analysis of the map.

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.

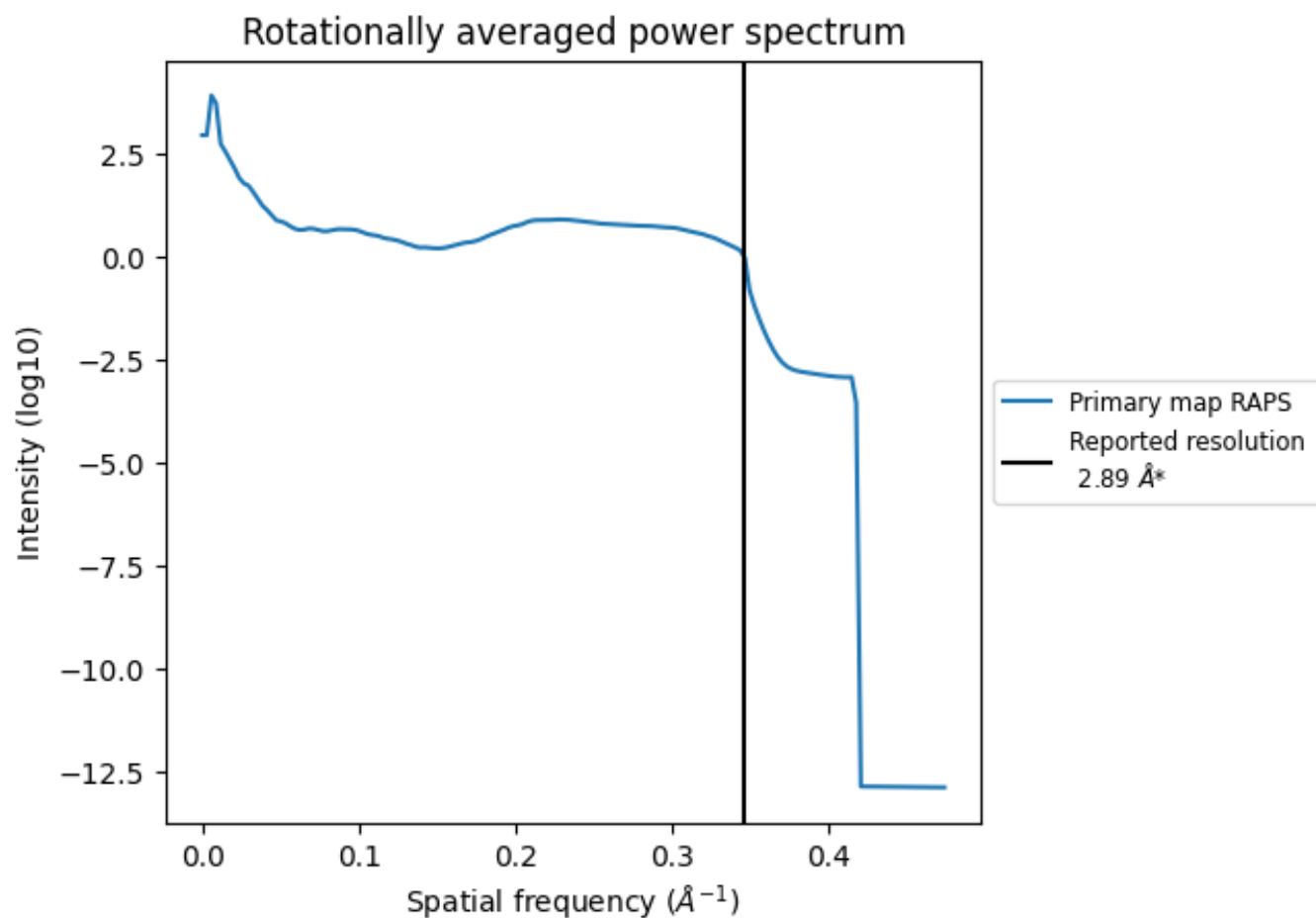
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 392 nm³; this corresponds to an approximate mass of 354 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 0.346 Å⁻¹

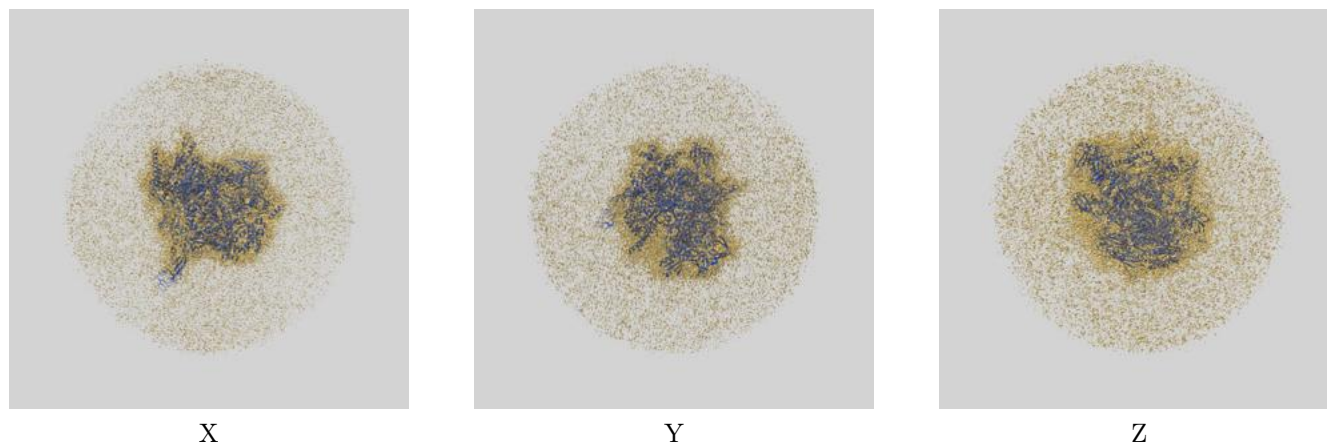
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

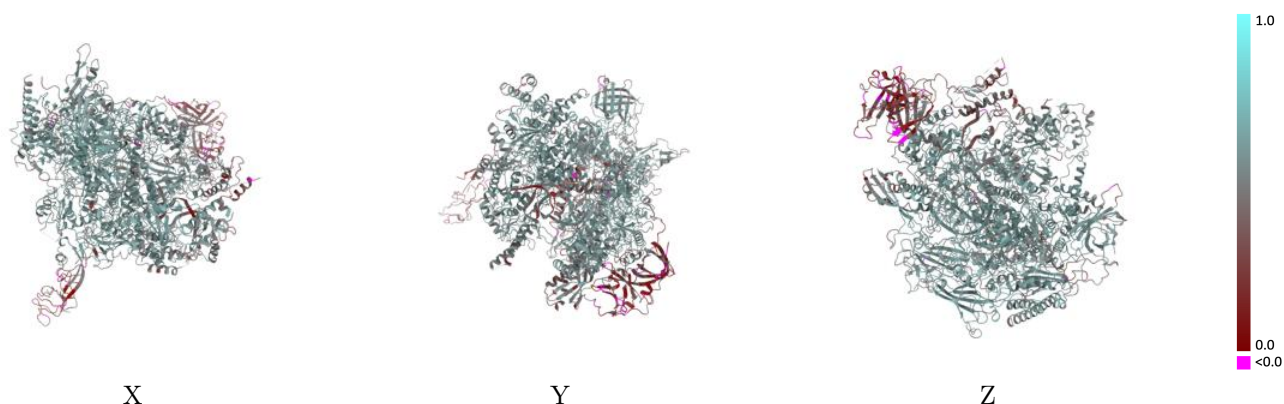
This section contains information regarding the fit between EMDB map EMD-31876 and PDB model 7VBA. Per-residue inclusion information can be found in [section 3](#) on [page 8](#).

9.1 Map-model overlay [i](#)



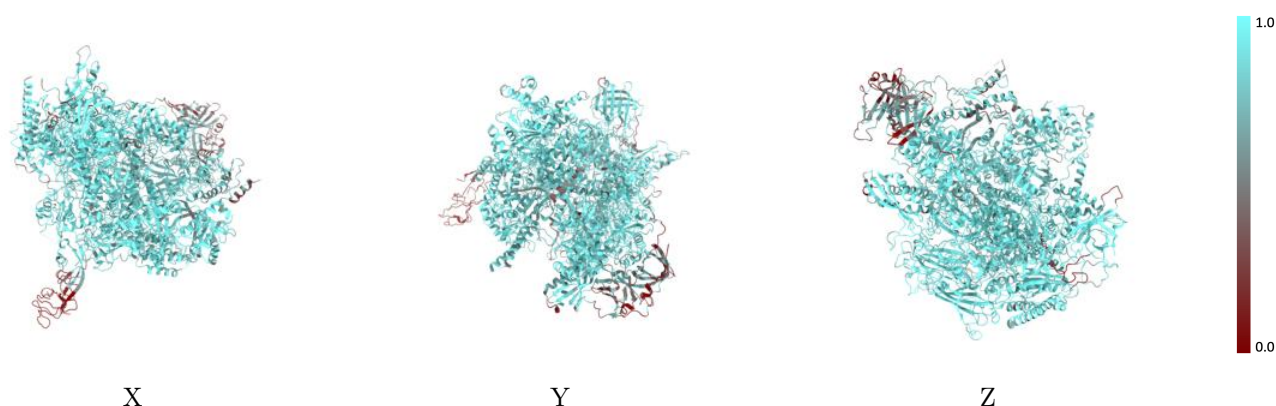
The images above show the 3D surface view of the map at the recommended contour level 0.351 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



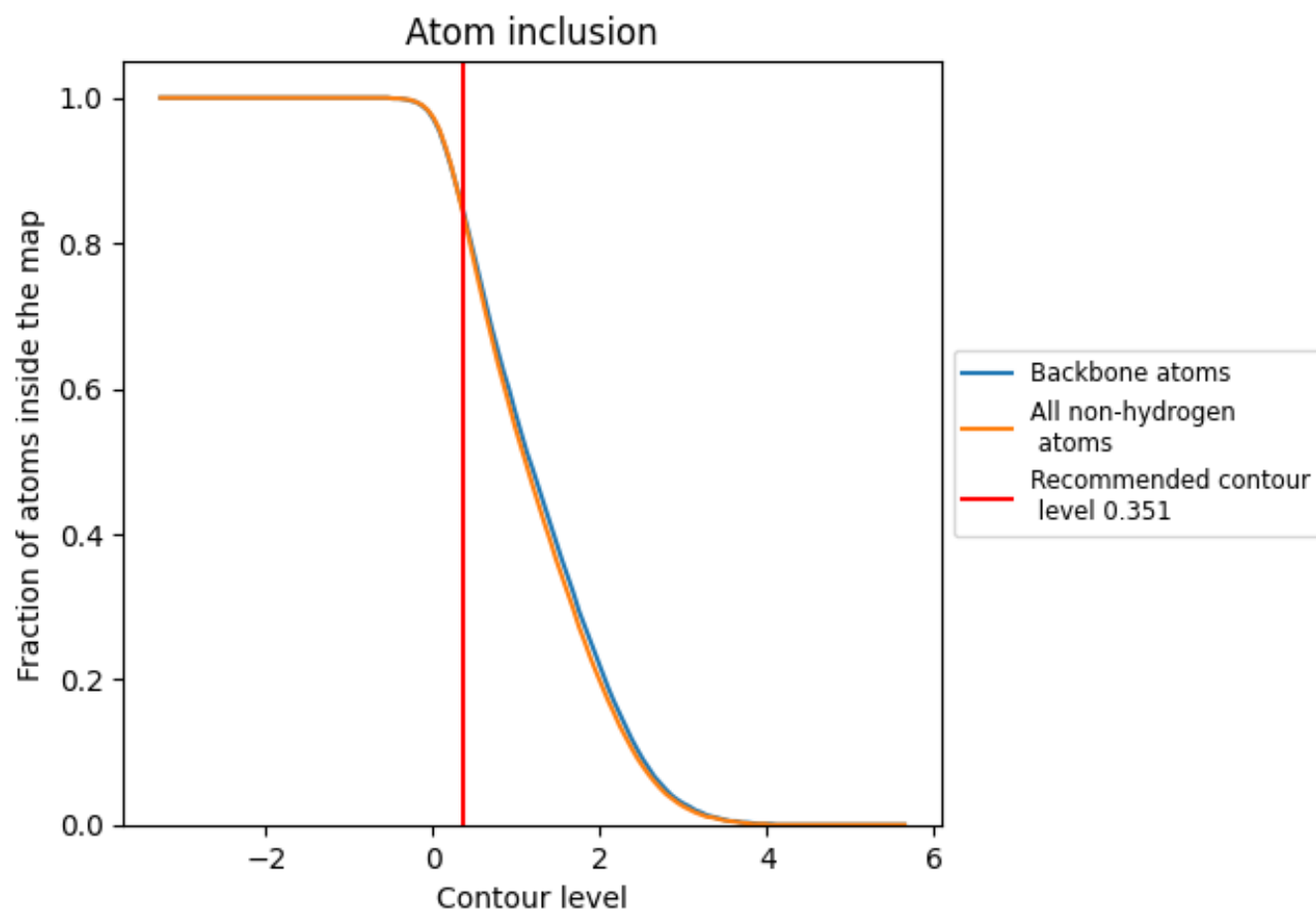
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.351).

9.4 Atom inclusion [i](#)



At the recommended contour level, 85% of all backbone atoms, 85% 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 (0.351) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.8460	<div></div> 0.5250
A	<div></div> 0.8910	<div></div> 0.5470
B	<div></div> 0.9240	<div></div> 0.5720
C	<div></div> 0.8410	<div></div> 0.5430
E	<div></div> 0.9060	<div></div> 0.5570
F	<div></div> 0.9360	<div></div> 0.5820
G	<div></div> 0.3230	<div></div> 0.3130
H	<div></div> 0.8740	<div></div> 0.5410
I	<div></div> 0.6300	<div></div> 0.3680
J	<div></div> 0.9500	<div></div> 0.6030
K	<div></div> 0.8840	<div></div> 0.5490
L	<div></div> 0.9150	<div></div> 0.5540
M	<div></div> 0.5340	<div></div> 0.2580
N	<div></div> 0.4430	<div></div> 0.2390
R	<div></div> 0.9170	<div></div> 0.5640
T	<div></div> 0.8600	<div></div> 0.4980
U	<div></div> 0.7560	<div></div> 0.3880

1.0

0.0

<0.0