



# wwPDB EM Validation Summary Report ⓘ

Mar 5, 2024 – 01:00 pm GMT

PDB ID : 8RDJ  
EMDB ID : EMD-19023  
Title : Plastid-encoded RNA polymerase transcription elongation complex (Integrated model)  
Authors : Webster, M.W.; Pramanick, I.; Vergara-Cruces, A.  
Deposited on : 2023-12-08  
Resolution : 2.62 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

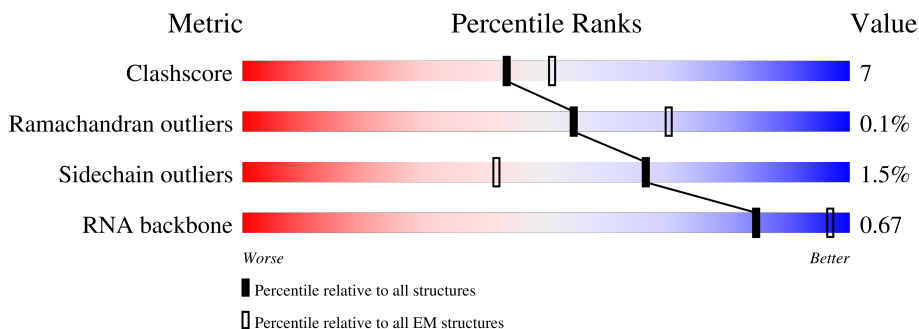
EMDB validation analysis : 0.0.1.dev70  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

# 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 2.62 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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  $\geq 3$ , 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	327	<div style="display: flex; justify-content: space-between;"> <span>22%</span> <span>80%</span> <span>11%</span> <span>8%</span> </div>
1	B	327	<div style="display: flex; justify-content: space-between;"> <span>28%</span> <span>78%</span> <span>8%</span> <span>13%</span> </div>
2	C	1072	<div style="display: flex; justify-content: space-between;"> <span>22%</span> <span>78%</span> <span>18%</span> <span>.</span> </div>
3	D	680	<div style="display: flex; justify-content: space-between;"> <span>11%</span> <span>74%</span> <span>15%</span> <span>10%</span> </div>
4	E	1373	<div style="display: flex; justify-content: space-between;"> <span>24%</span> <span>65%</span> <span>14%</span> <span>21%</span> </div>
5	F	911	<div style="display: flex; justify-content: space-between;"> <span>15%</span> <span>60%</span> <span>12%</span> <span>28%</span> </div>
6	G	862	<div style="display: flex; justify-content: space-between;"> <span>82%</span> <span>69%</span> <span>18%</span> <span>13%</span> </div>

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Mol	Chain	Length	Quality of chain
7	H	675	
8	I	263	
9	J	529	
10	K	460	
11	L	483	
12	M	334	
13	N	297	
14	O	185	
14	P	185	
15	Q	768	
16	R	162	
17	S	611	
18	T	140	
19	U	187	
20	X	81	
21	Y	81	
22	Z	40	

## 2 Entry composition i

There are 27 unique types of molecules in this entry. The entry contains 70206 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	301	Total	C	N	O	S	0	0
			2449	1571	422	446	10		
1	B	283	Total	C	N	O	S	0	0
			2292	1461	395	425	11		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	67	PHE	SER	conflict	UNP A0A6C0M610
B	67	PHE	SER	conflict	UNP A0A6C0M610

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	1040	Total	C	N	O	S	0	0
			8287	5278	1462	1517	30		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	113	PHE	SER	conflict	UNP A0A6C0M5W1
C	657	VAL	ILE	conflict	UNP A0A6C0M5W1

- Molecule 3 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	D	611	Total	C	N	O	S	0	0
			4983	3200	880	876	27		

- Molecule 4 is a protein called DNA-directed RNA polymerase subunit beta''.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	E	1091	8758	5612	1554	1561	31	0	0

- Molecule 5 is a protein called PAP1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	F	660	5307	3355	929	990	33	0	0

- Molecule 6 is a protein called PAP2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	G	748	5887	3723	994	1131	39	0	0

- Molecule 7 is a protein called PAP3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	H	549	4607	2937	799	854	17	0	0

- Molecule 8 is a protein called PAP4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	I	215	1771	1141	300	324	6	0	0

- Molecule 9 is a protein called PAP5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	J	234	1970	1247	350	363	10	0	0

- Molecule 10 is a protein called PAP6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	K	384	3103	1985	520	583	15	0	0

- Molecule 11 is a protein called PAP7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	L	416	3403	2183	580	620	20	0	0

- Molecule 12 is a protein called PAP8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	M	215	1803	1142	312	341	8	0	0

- Molecule 13 is a protein called PAP9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	N	224	1819	1168	309	338	4	0	0

- Molecule 14 is a protein called PAP10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	O	114	923	588	148	178	9	0	0
14	P	108	865	550	139	167	9	0	0

- Molecule 15 is a protein called PAP11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	Q	539	4148	2584	706	833	25	0	0

- Molecule 16 is a protein called PAP12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	R	128	1069	672	193	201	3	0	0

- Molecule 17 is a protein called FLN2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	S	386	3056	1941	516	578	21	0	0

- Molecule 18 is a protein called PTAC18.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	T	104	Total	C	N	O	S	0	0
			881	572	148	157	4		

- Molecule 19 is a protein called PRIN2.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	U	109	Total	C	N	O	S	0	0
			877	561	144	169	3		

- Molecule 20 is a DNA chain called DNA (81-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
20	X	31	Total	C	N	O	P	0	0
			638	304	122	182	30		

- Molecule 21 is a DNA chain called DNA (81-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
21	Y	40	Total	C	N	O	P	0	0
			813	386	145	242	40		

- Molecule 22 is a RNA chain called RNA (40-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
22	Z	10	Total	C	N	O	P	0	0
			215	95	40	70	10		

- Molecule 23 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
23	D	1	Total	Mg	0
			1	1	

- Molecule 24 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

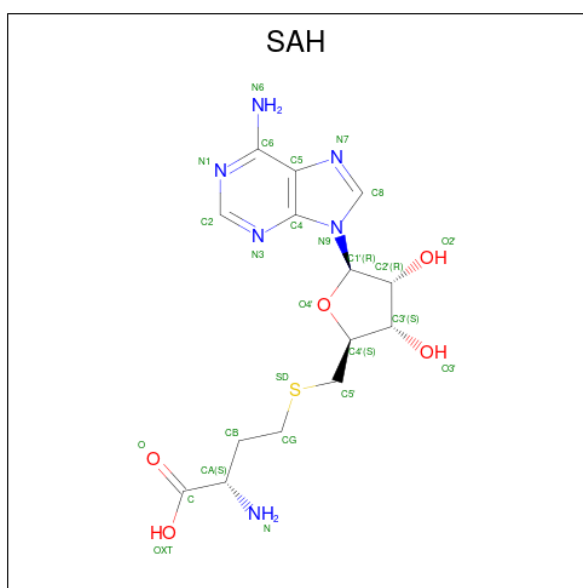
Mol	Chain	Residues	Atoms		AltConf
24	E	1	Total	Zn	0
			1	1	

- Molecule 25 is FE (III) ION (three-letter code: FE) (formula: Fe) (labeled as "Ligand of Interest" by depositor).

Interest" by depositor).

Mol	Chain	Residues	Atoms	AltConf
25	I	1	Total Fe 1 1	0
25	N	1	Total Fe 1 1	0

- Molecule 26 is S-ADENOSYL-L-HOMOCYSTEINE (three-letter code: SAH) (formula: C<sub>14</sub>H<sub>20</sub>N<sub>6</sub>O<sub>5</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
26	L	1	Total C N O S 26 14 6 5 1	0

- Molecule 27 is water.

Mol	Chain	Residues	Atoms	AltConf
27	A	17	Total O 17 17	0
27	B	12	Total O 12 12	0
27	C	54	Total O 54 54	0
27	D	17	Total O 17 17	0
27	E	24	Total O 24 24	0

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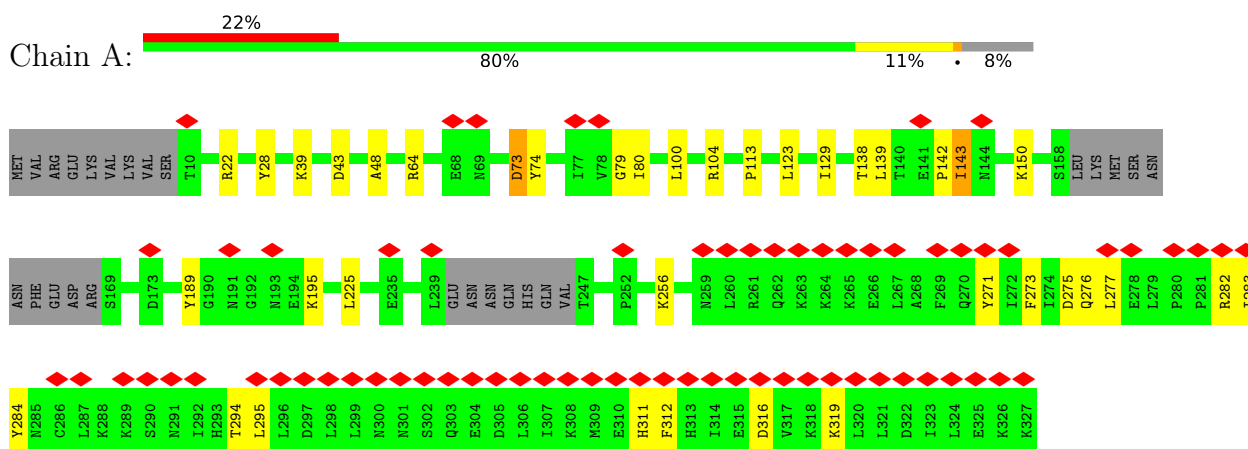
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Mol	Chain	Residues	Atoms		AltConf
27	F	2	Total 2	O 2	0
27	H	6	Total 6	O 6	0
27	I	3	Total 3	O 3	0
27	J	31	Total 31	O 31	0
27	K	17	Total 17	O 17	0
27	L	19	Total 19	O 19	0
27	M	16	Total 16	O 16	0
27	N	4	Total 4	O 4	0
27	O	2	Total 2	O 2	0
27	P	2	Total 2	O 2	0
27	R	3	Total 3	O 3	0
27	S	23	Total 23	O 23	0

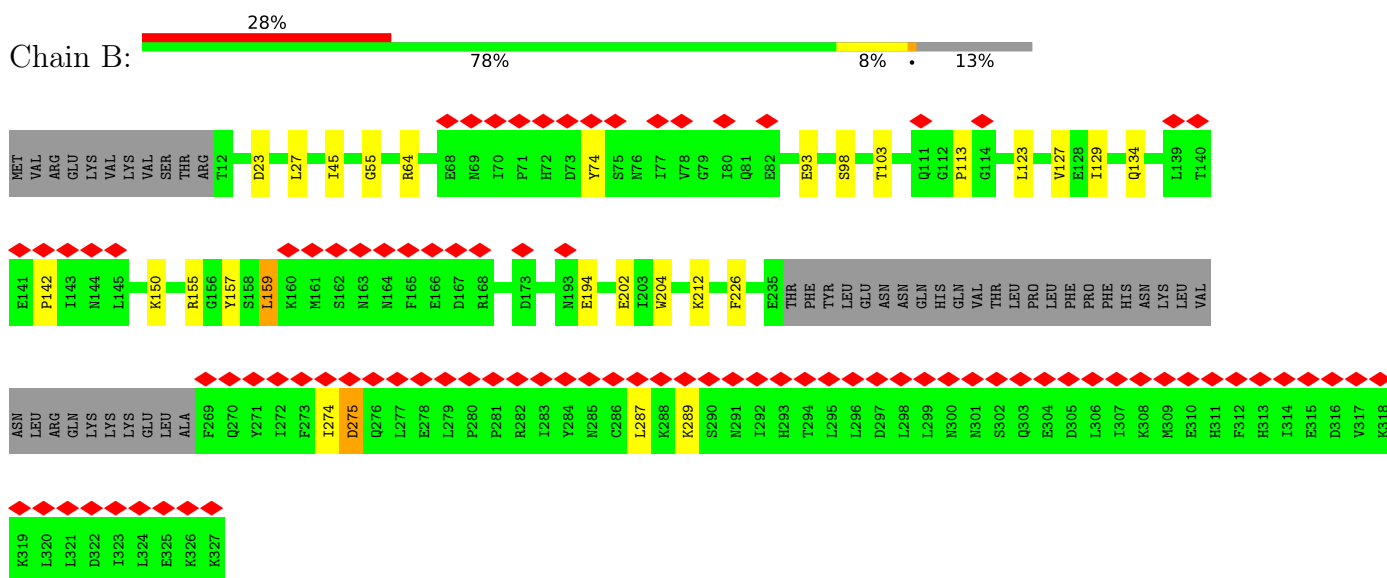
### 3 Residue-property plots

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.

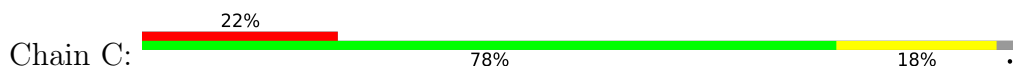
- Molecule 1: DNA-directed RNA polymerase subunit alpha

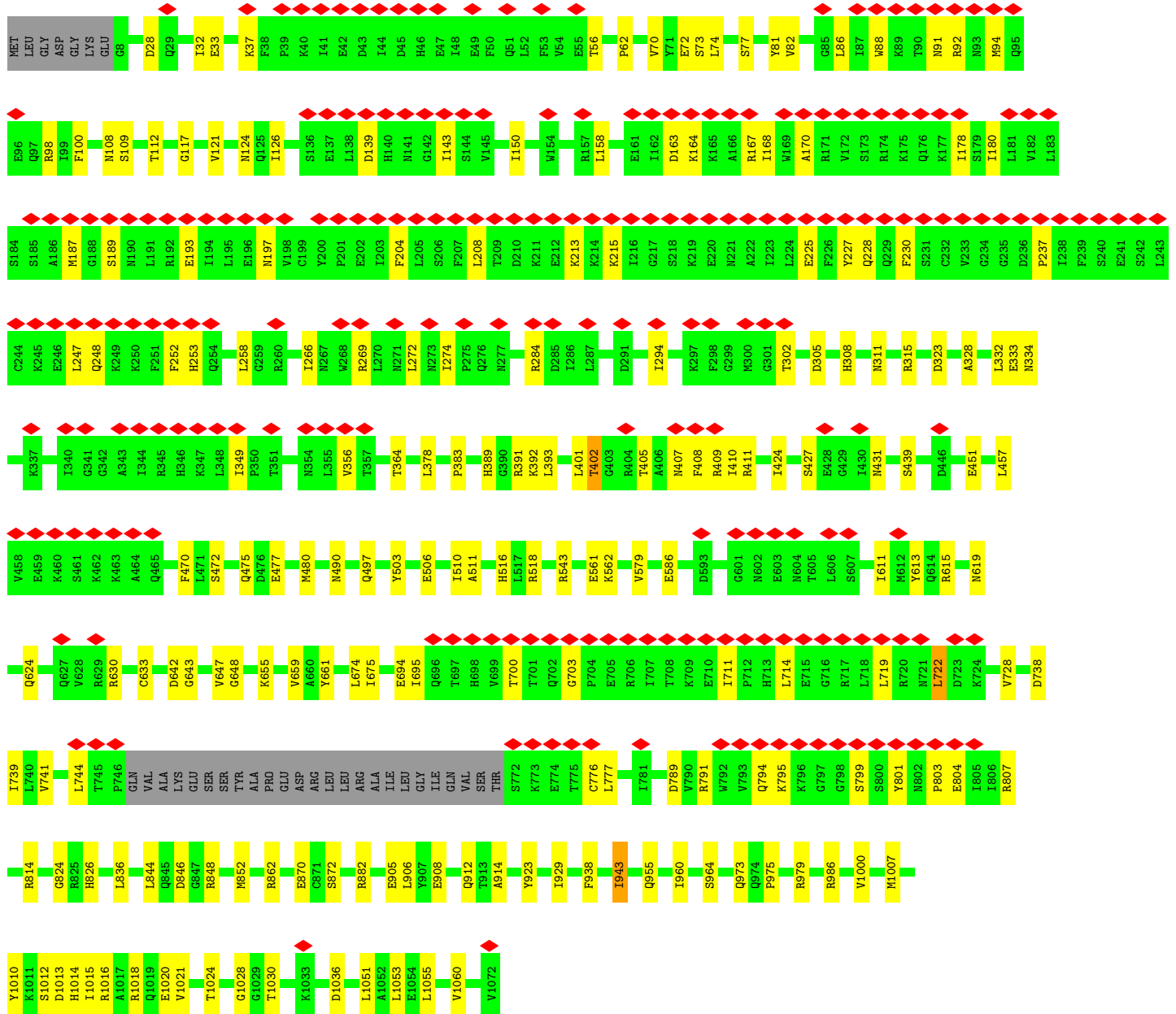


- Molecule 1: DNA-directed RNA polymerase subunit alpha

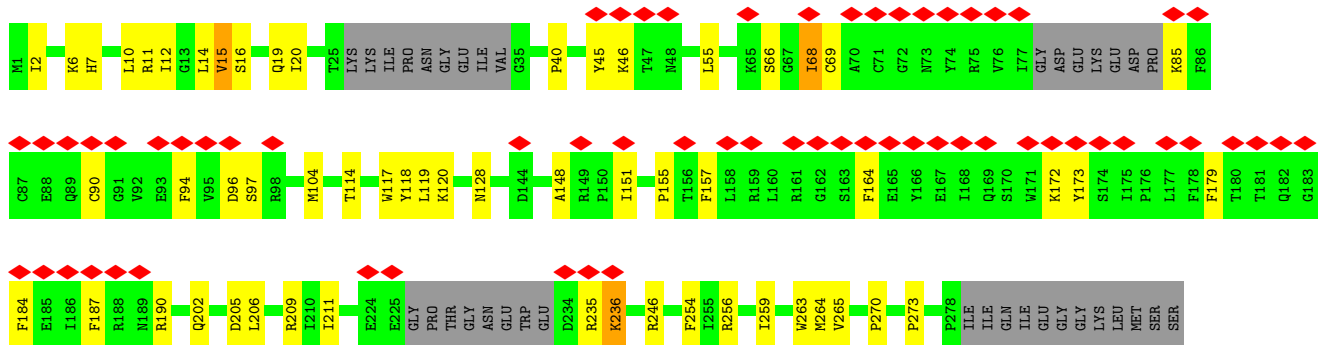
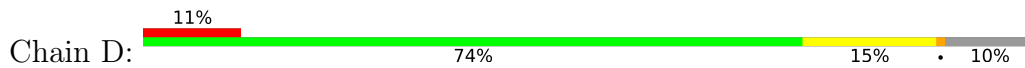


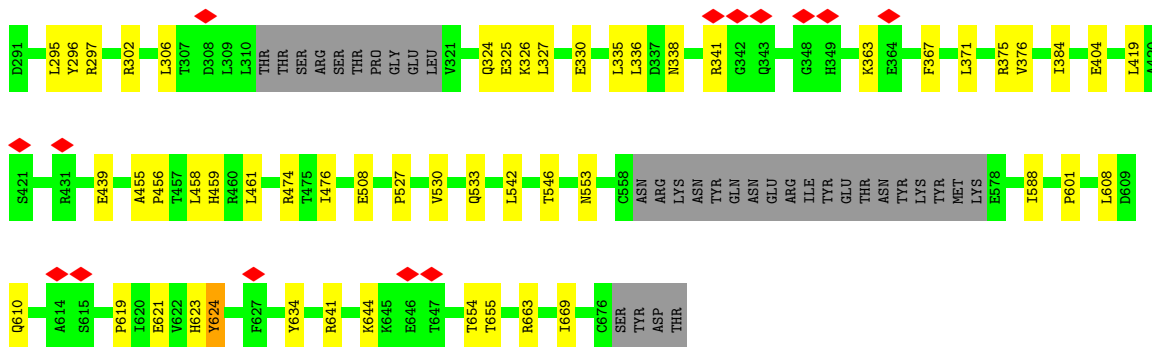
- Molecule 2: DNA-directed RNA polymerase subunit beta



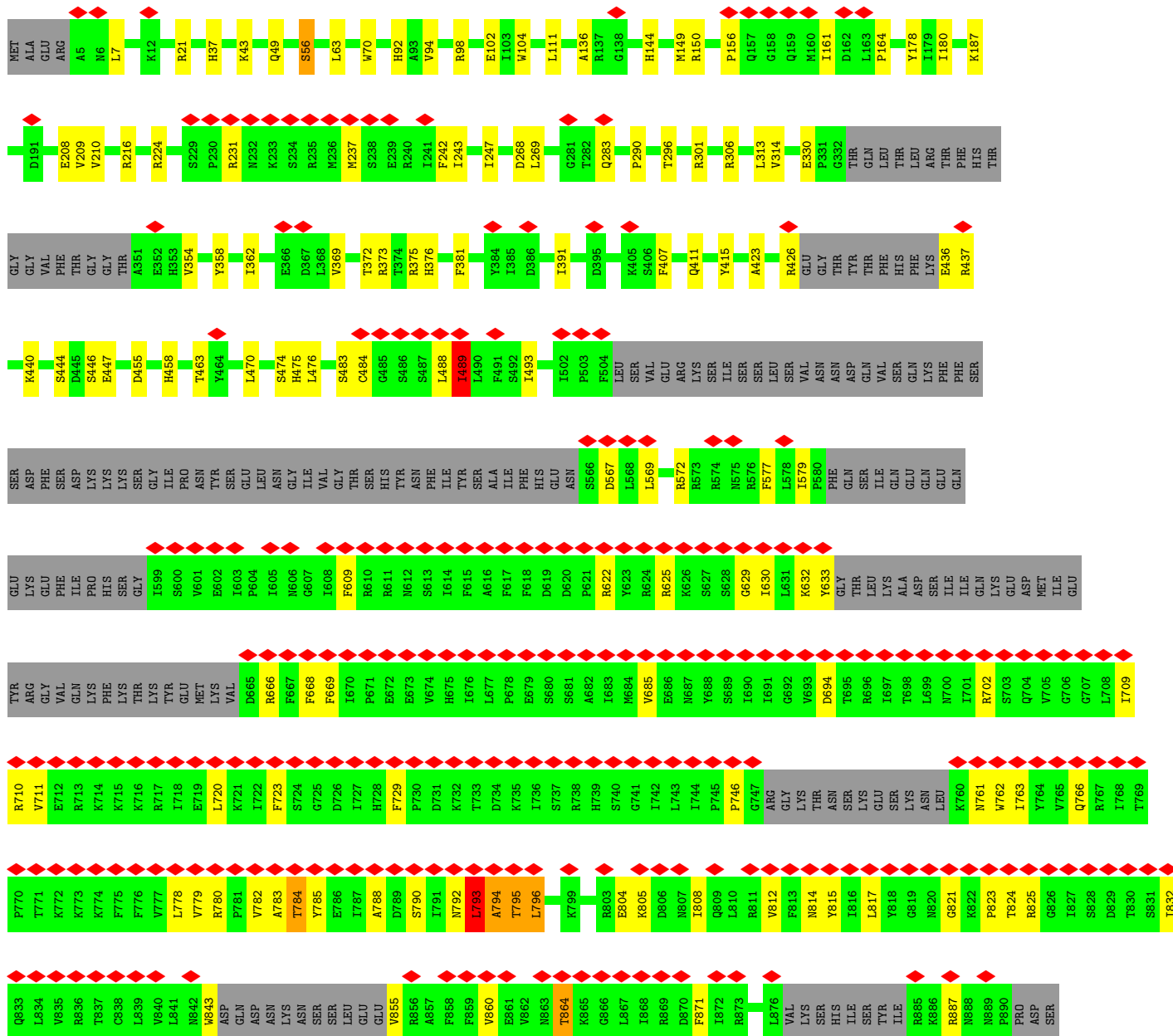


● Molecule 3: DNA-directed RNA polymerase subunit beta'

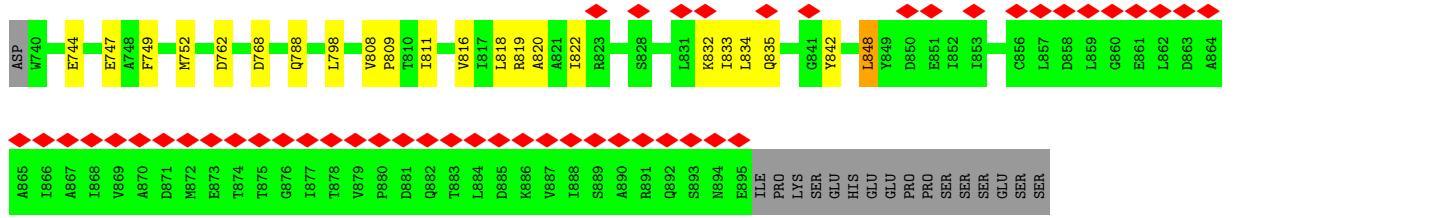




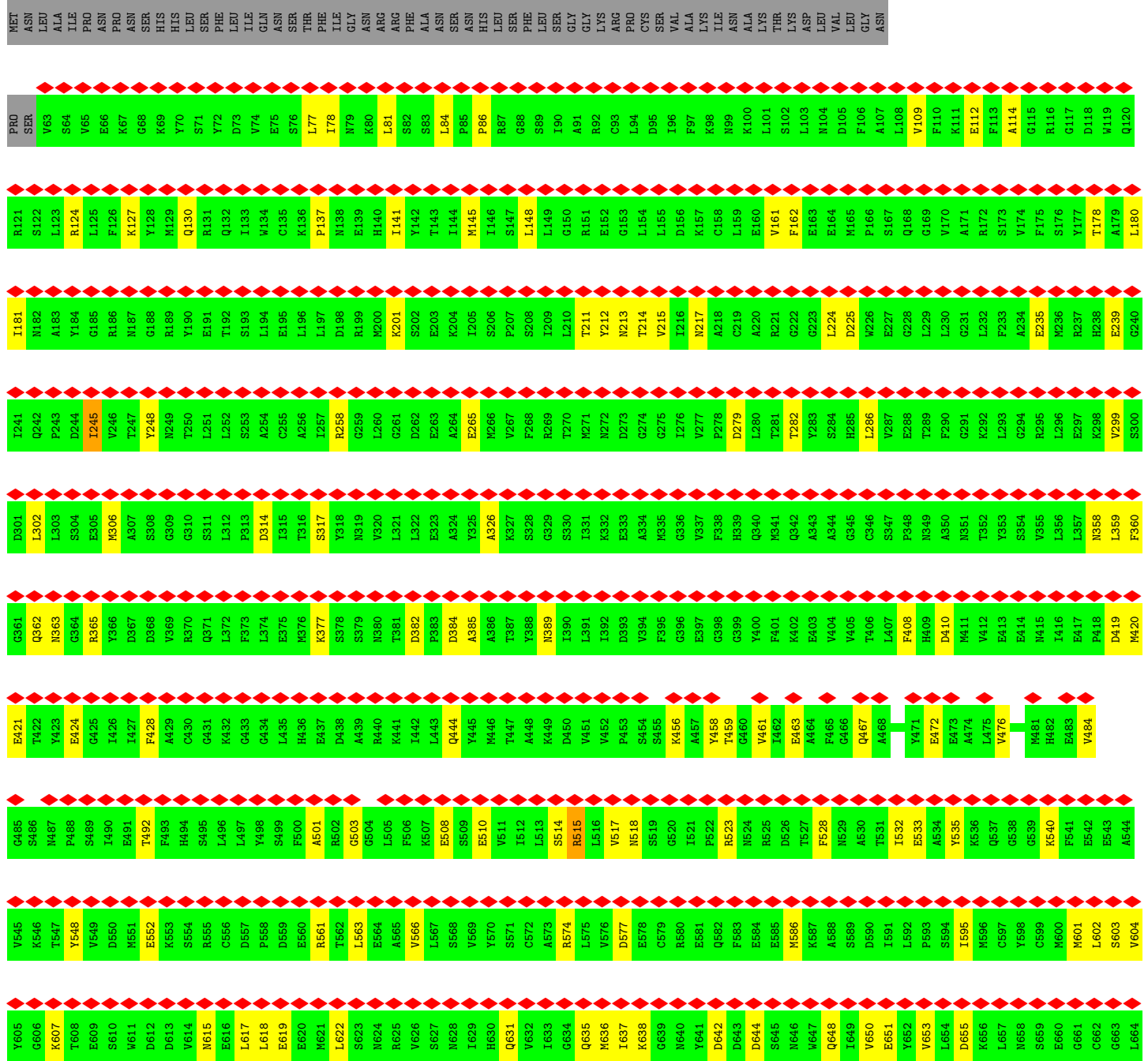
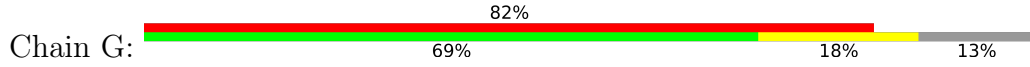
• Molecule 4: DNA-directed RNA polymerase subunit beta”

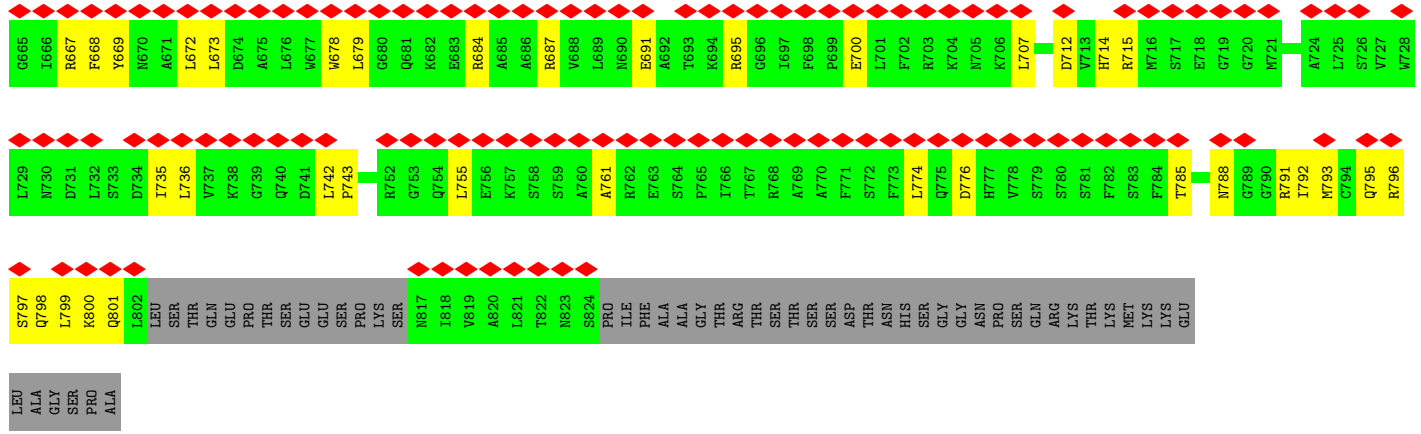




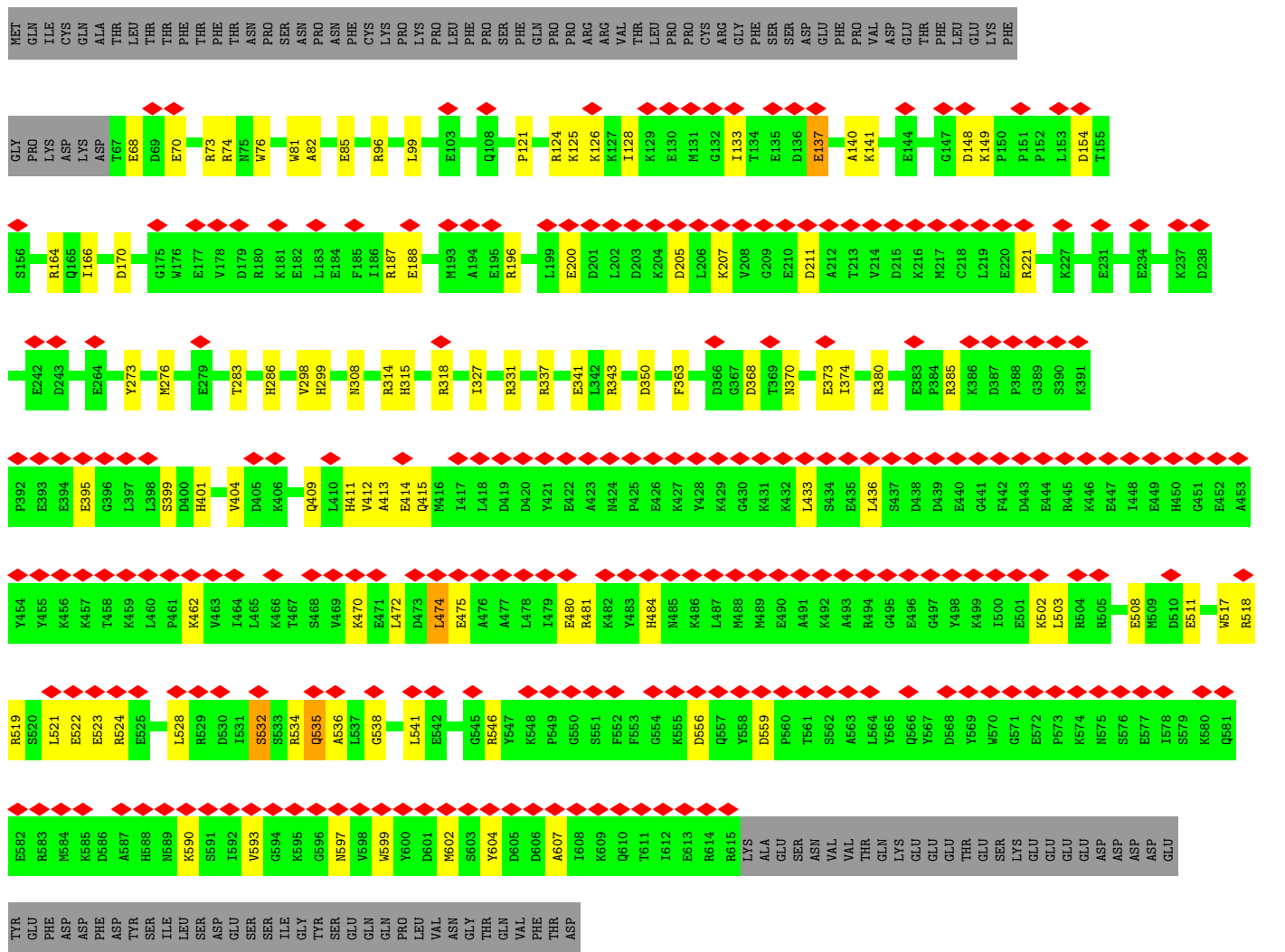


• Molecule 6: PAP2





• Molecule 7: PAP3



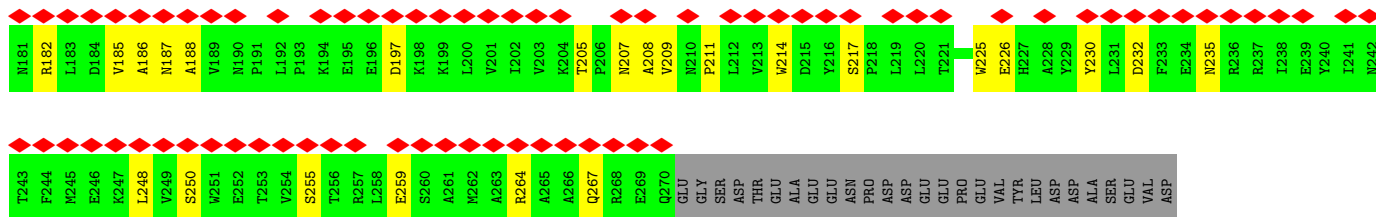
• Molecule 8: PAP4



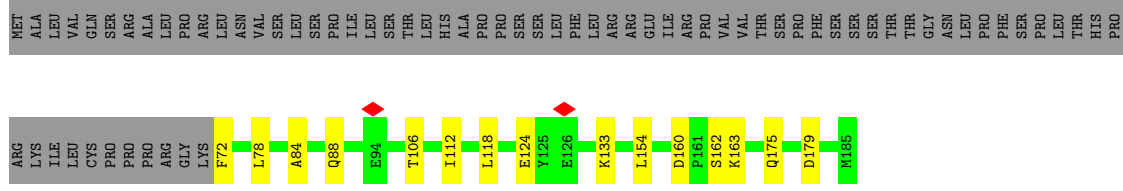




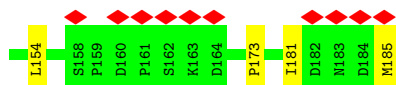
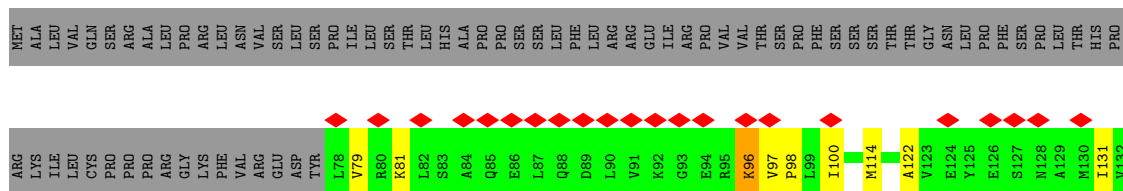




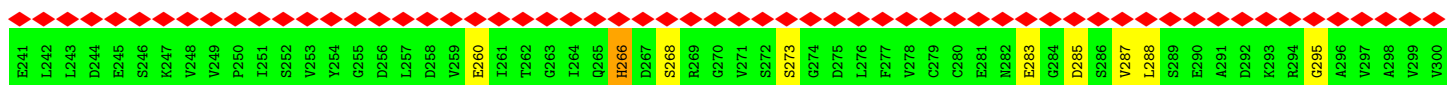
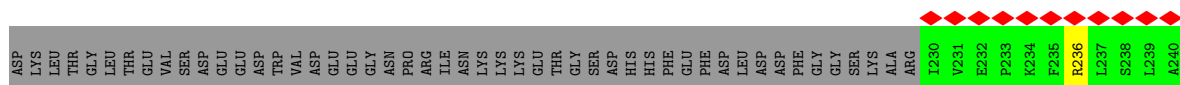
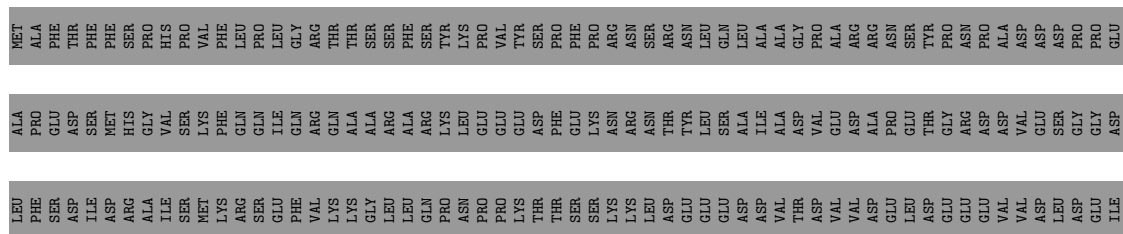
• Molecule 14: PAP10

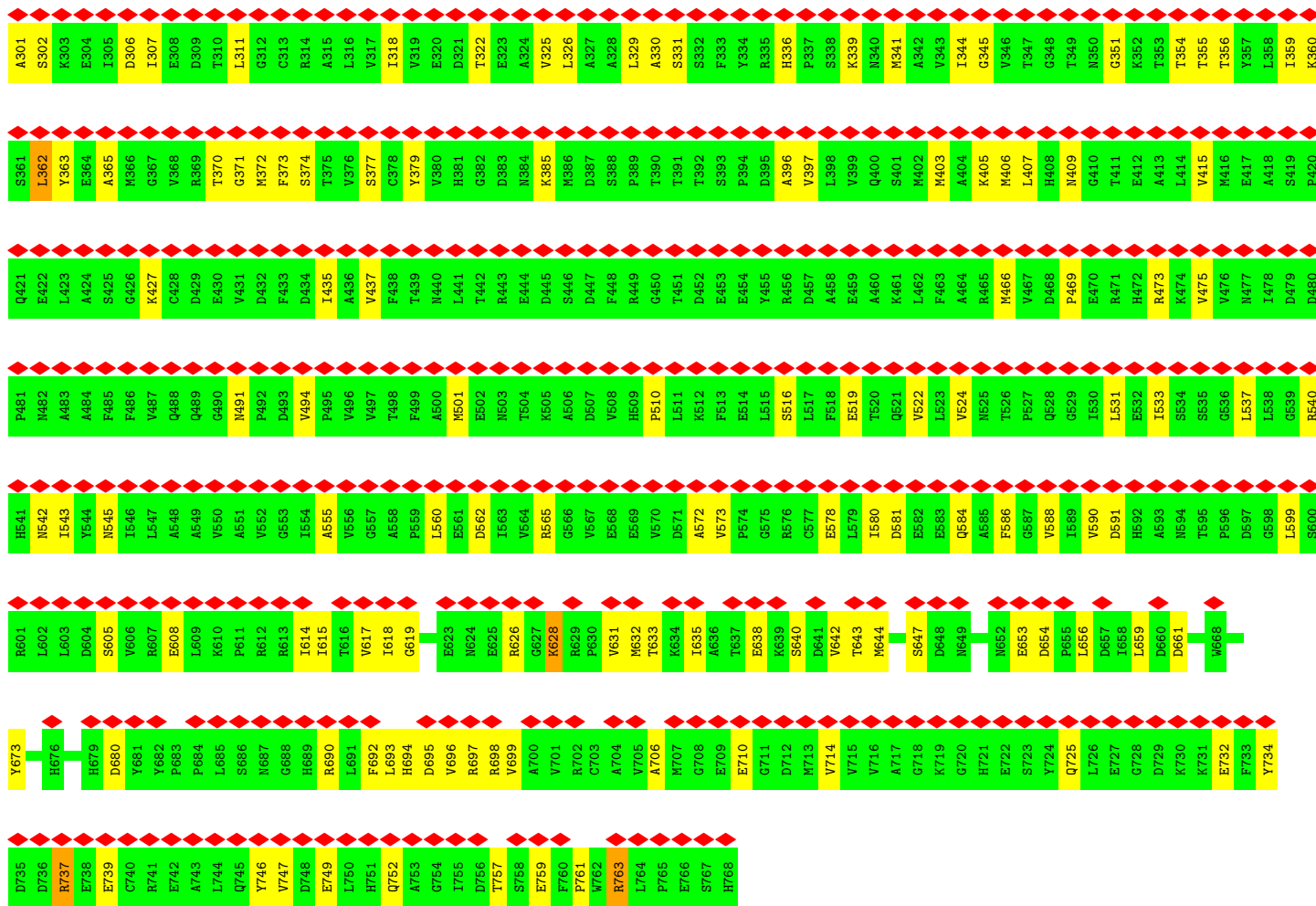


• Molecule 14: PAP10

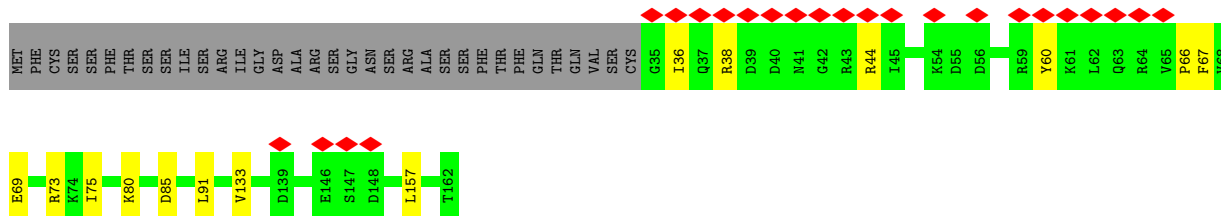


• Molecule 15: PAP11

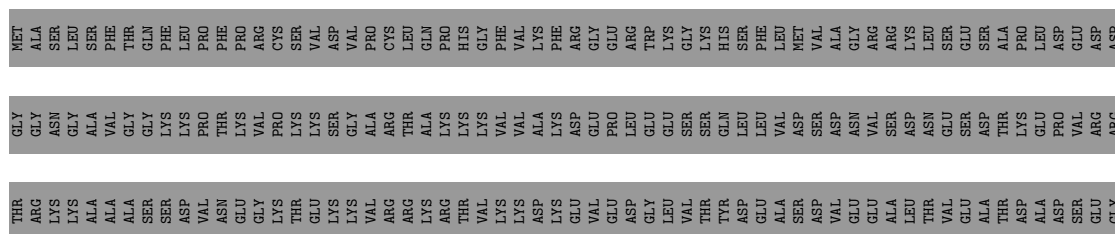


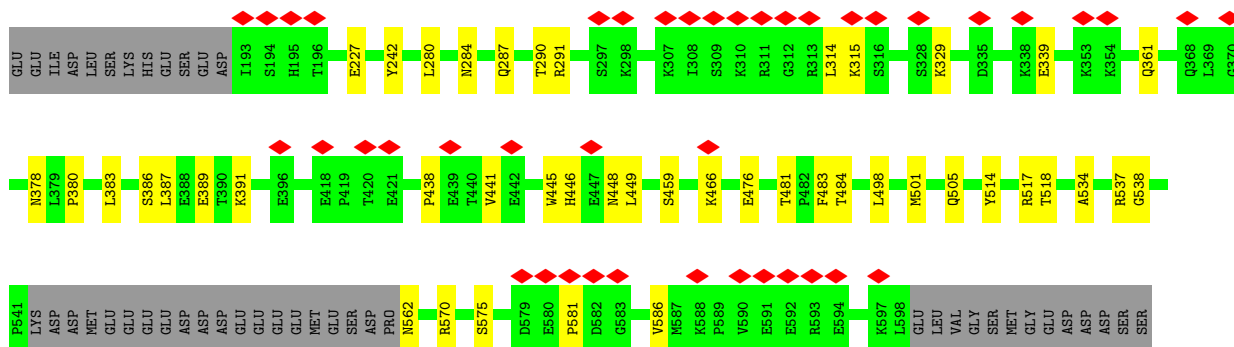


• Molecule 16: PAP12

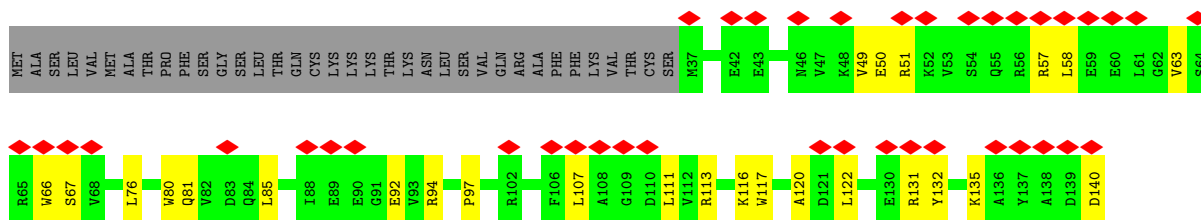


• Molecule 17: FLN2

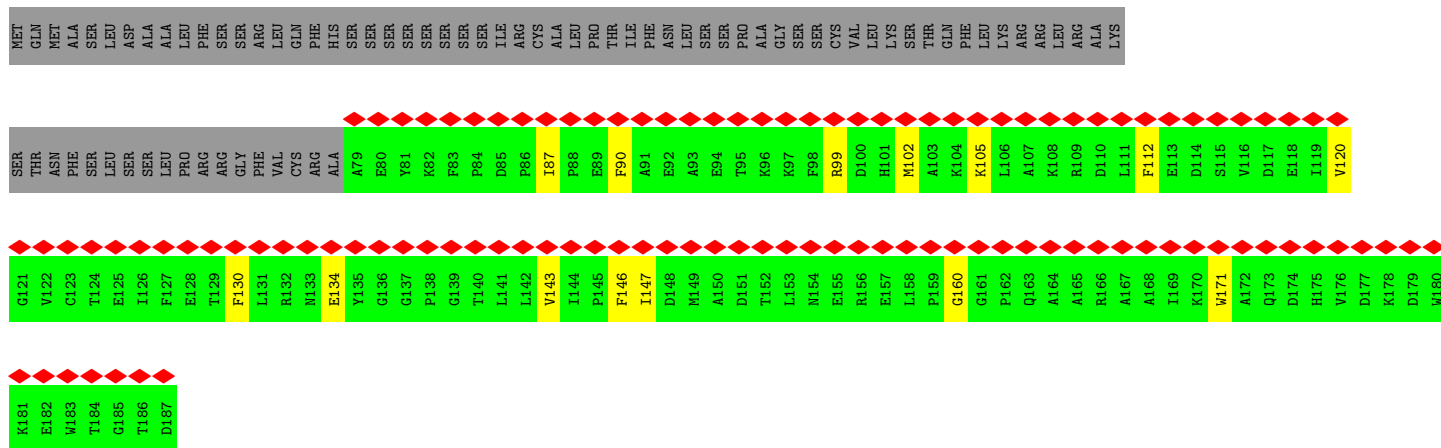




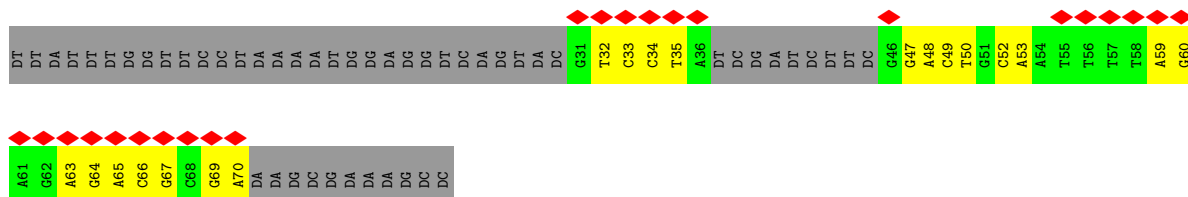
• Molecule 18: PTAC18



• Molecule 19: PRIN2



• Molecule 20: DNA (81-MER)





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	417374	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	40.48	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	5.127	Depositor
Minimum map value	-0.951	Depositor
Average map value	0.140	Depositor
Map value standard deviation	0.155	Depositor
Recommended contour level	0.8	Depositor
Map size ( $\text{\AA}$ )	300.0, 300.0, 300.0	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.5, 0.5, 0.5	Depositor

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.26	0/2498	0.47	0/3377
1	B	0.26	0/2336	0.48	0/3159
2	C	0.26	0/8458	0.48	0/11422
3	D	0.26	0/5093	0.49	0/6878
4	E	0.26	0/8932	0.49	0/12058
5	F	0.25	0/5410	0.47	0/7306
6	G	0.24	0/5997	0.44	0/8096
7	H	0.25	0/4736	0.47	0/6386
8	I	0.24	0/1825	0.45	0/2481
9	J	0.27	0/2021	0.47	0/2724
10	K	0.27	0/3184	0.47	0/4320
11	L	0.25	0/3492	0.46	0/4727
12	M	0.26	0/1848	0.50	0/2502
13	N	0.24	0/1873	0.45	0/2549
14	O	0.27	0/939	0.48	0/1268
14	P	0.24	0/879	0.46	0/1187
15	Q	0.24	0/4218	0.47	0/5720
16	R	0.27	0/1089	0.50	0/1462
17	S	0.26	0/3123	0.46	0/4226
18	T	0.26	0/906	0.49	0/1225
19	U	0.24	0/900	0.42	0/1219
20	X	0.50	0/716	0.88	0/1102
21	Y	0.53	0/909	0.91	0/1399
22	Z	0.25	0/239	0.88	0/371
All	All	0.26	0/71621	0.49	0/97164

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
4	E	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	E	1182	ILE	Peptide
4	E	794	ALA	Peptide

## 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2449	0	2490	25	0
1	B	2292	0	2311	23	0
2	C	8287	0	8381	122	0
3	D	4983	0	5052	89	0
4	E	8758	0	8895	157	0
5	F	5307	0	5267	76	0
6	G	5887	0	5803	99	0
7	H	4607	0	4464	84	0
8	I	1771	0	1696	40	0
9	J	1970	0	1923	24	0
10	K	3103	0	3026	30	0
11	L	3403	0	3348	37	0
12	M	1803	0	1756	29	0
13	N	1819	0	1746	42	0
14	O	923	0	917	12	0
14	P	865	0	867	11	0
15	Q	4148	0	4046	95	0
16	R	1069	0	1058	15	0
17	S	3056	0	3042	30	0
18	T	881	0	860	18	0
19	U	877	0	840	10	0
20	X	638	0	351	26	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
21	Y	813	0	450	33	0
22	Z	215	0	111	10	0
23	D	1	0	0	0	0
24	E	1	0	0	0	0
25	I	1	0	0	0	0
25	N	1	0	0	0	0
26	L	26	0	19	2	0
27	A	17	0	0	0	0
27	B	12	0	0	0	0
27	C	54	0	0	1	0
27	D	17	0	0	1	0
27	E	24	0	0	1	0
27	F	2	0	0	0	0
27	H	6	0	0	0	0
27	I	3	0	0	1	0
27	J	31	0	0	1	0
27	K	17	0	0	0	0
27	L	19	0	0	0	0
27	M	16	0	0	0	0
27	N	4	0	0	0	0
27	O	2	0	0	0	0
27	P	2	0	0	0	0
27	R	3	0	0	0	0
27	S	23	0	0	3	0
All	All	70206	0	68719	966	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 7.

The worst 5 of 966 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)
5:F:565:GLN:NE2	20:X:65:DA:OP1	1.65	1.27
4:E:729:PHE:HE1	19:U:147:ILE:HD11	1.42	0.84
3:D:45:TYR:CG	20:X:34:DC:H3'	2.15	0.82
21:Y:45:DG:H1	22:Z:32:C:H42	1.29	0.81
3:D:45:TYR:HD1	20:X:34:DC:H5'	1.45	0.81

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	295/327 (90%)	284 (96%)	11 (4%)	0	100	100
1	B	279/327 (85%)	273 (98%)	6 (2%)	0	100	100
2	C	1036/1072 (97%)	1016 (98%)	19 (2%)	1 (0%)	51	74
3	D	597/680 (88%)	571 (96%)	26 (4%)	0	100	100
4	E	1057/1373 (77%)	1011 (96%)	44 (4%)	2 (0%)	47	69
5	F	650/911 (71%)	631 (97%)	18 (3%)	1 (0%)	47	69
6	G	744/862 (86%)	730 (98%)	14 (2%)	0	100	100
7	H	547/675 (81%)	536 (98%)	11 (2%)	0	100	100
8	I	213/263 (81%)	204 (96%)	9 (4%)	0	100	100
9	J	230/529 (44%)	224 (97%)	6 (3%)	0	100	100
10	K	382/460 (83%)	370 (97%)	11 (3%)	1 (0%)	41	62
11	L	412/483 (85%)	400 (97%)	11 (3%)	1 (0%)	47	69
12	M	213/334 (64%)	210 (99%)	3 (1%)	0	100	100
13	N	222/297 (75%)	216 (97%)	6 (3%)	0	100	100
14	O	112/185 (60%)	110 (98%)	2 (2%)	0	100	100
14	P	106/185 (57%)	105 (99%)	1 (1%)	0	100	100
15	Q	537/768 (70%)	522 (97%)	15 (3%)	0	100	100
16	R	126/162 (78%)	121 (96%)	5 (4%)	0	100	100
17	S	382/611 (62%)	369 (97%)	13 (3%)	0	100	100
18	T	102/140 (73%)	96 (94%)	6 (6%)	0	100	100
19	U	107/187 (57%)	106 (99%)	1 (1%)	0	100	100
All	All	8349/10831 (77%)	8105 (97%)	238 (3%)	6 (0%)	54	74

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	E	489	ILE
4	E	793	LEU
11	L	405	ILE
2	C	1030	THR
5	F	553	ILE

### 5.3.2 Protein sidechains [i](#)

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

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	275/301 (91%)	270 (98%)	5 (2%)	59 79
1	B	258/301 (86%)	256 (99%)	2 (1%)	81 92
2	C	905/931 (97%)	895 (99%)	10 (1%)	73 88
3	D	546/608 (90%)	540 (99%)	6 (1%)	73 88
4	E	969/1230 (79%)	956 (99%)	13 (1%)	69 85
5	F	565/782 (72%)	554 (98%)	11 (2%)	57 78
6	G	642/740 (87%)	630 (98%)	12 (2%)	57 78
7	H	489/609 (80%)	483 (99%)	6 (1%)	71 86
8	I	187/230 (81%)	182 (97%)	5 (3%)	44 69
9	J	212/469 (45%)	210 (99%)	2 (1%)	78 90
10	K	338/401 (84%)	333 (98%)	5 (2%)	65 82
11	L	369/431 (86%)	363 (98%)	6 (2%)	62 81
12	M	205/299 (69%)	201 (98%)	4 (2%)	55 77
13	N	192/259 (74%)	189 (98%)	3 (2%)	62 81
14	O	103/169 (61%)	103 (100%)	0	100 100
14	P	97/169 (57%)	96 (99%)	1 (1%)	76 89
15	Q	458/661 (69%)	446 (97%)	12 (3%)	46 70
16	R	114/144 (79%)	114 (100%)	0	100 100
17	S	336/532 (63%)	333 (99%)	3 (1%)	78 90
18	T	93/126 (74%)	92 (99%)	1 (1%)	73 88

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
19	U	91/160 (57%)	90 (99%)	1 (1%)	73 88
All	All	7444/9552 (78%)	7336 (98%)	108 (2%)	66 82

5 of 108 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
6	G	636	MET
9	J	415	ASN
15	Q	737	ARG
7	H	137	GLU
8	I	94	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 91 such sidechains are listed below:

Mol	Chain	Res	Type
6	G	217	ASN
9	J	415	ASN
6	G	363	ASN
7	H	315	HIS
10	K	414	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
22	Z	10/40 (25%)	2 (20%)	1 (10%)

All (2) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
22	Z	32	C
22	Z	38	G

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
22	Z	31	C

## 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 5 ligands modelled in this entry, 4 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
26	SAH	L	8001	-	24,28,28	1.21	3 (12%)	25,40,40	1.80	5 (20%)

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
26	SAH	L	8001	-	-	3/11/31/31	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
26	L	8001	SAH	C2-N3	3.94	1.38	1.32
26	L	8001	SAH	C2-N1	2.36	1.38	1.33
26	L	8001	SAH	OXT-C	-2.19	1.23	1.30

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
26	L	8001	SAH	N3-C2-N1	-5.50	120.08	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
26	L	8001	SAH	C5'-SD-CG	-3.81	90.83	102.27
26	L	8001	SAH	C3'-C2'-C1'	3.29	105.94	100.98
26	L	8001	SAH	OXT-C-O	-2.73	117.89	124.09
26	L	8001	SAH	OXT-C-CA	2.30	121.23	113.38

There are no chirality outliers.

All (3) torsion outliers are listed below:

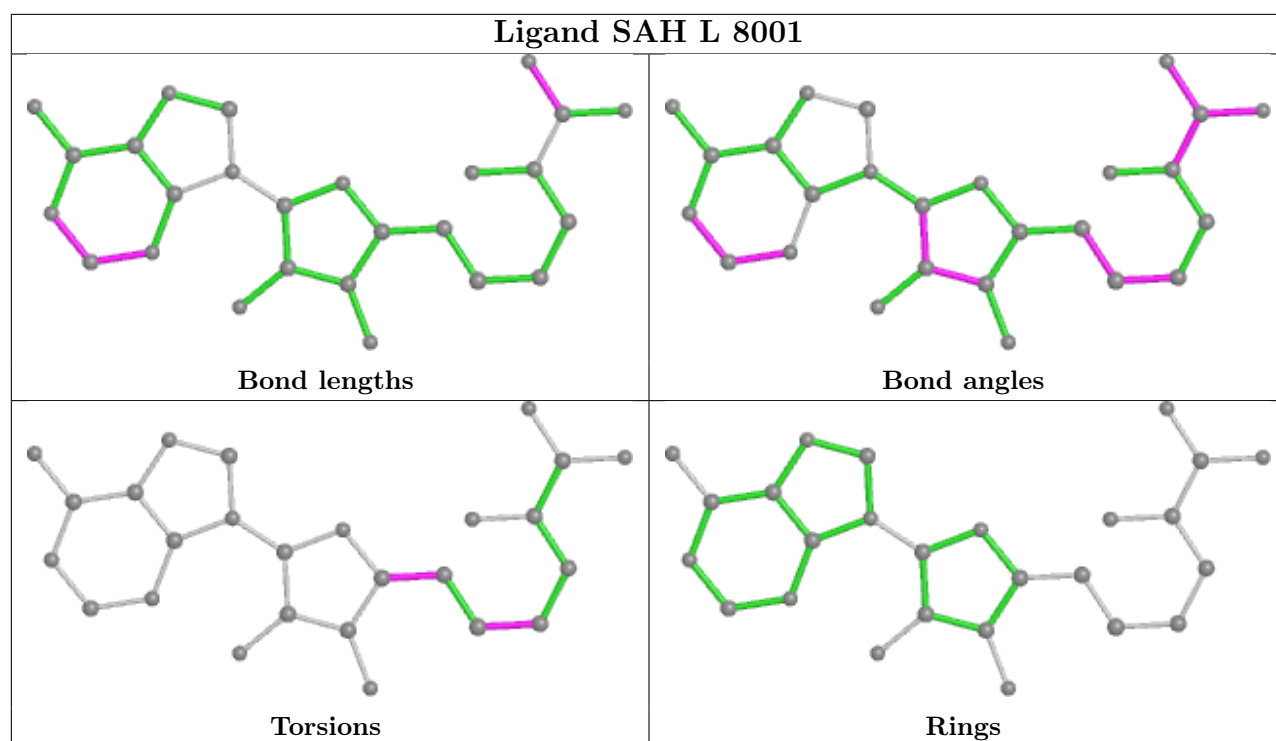
Mol	Chain	Res	Type	Atoms
26	L	8001	SAH	O4'-C4'-C5'-SD
26	L	8001	SAH	C3'-C4'-C5'-SD
26	L	8001	SAH	CB-CG-SD-C5'

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
26	L	8001	SAH	2	0

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.

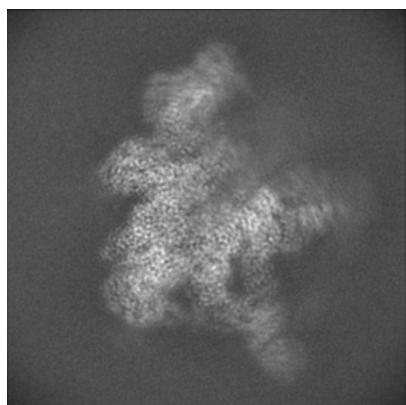
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-19023. These allow visual inspection of the internal detail of the map and identification of artifacts.

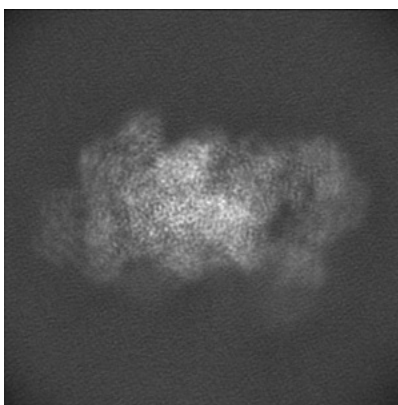
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

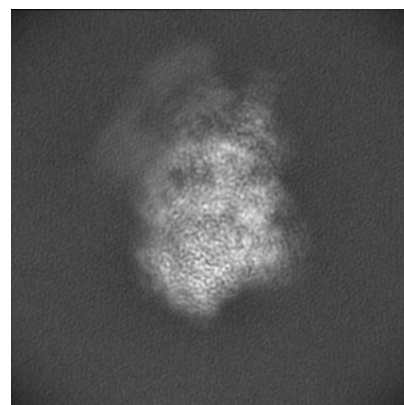
#### 6.1.1 Primary map



X



Y

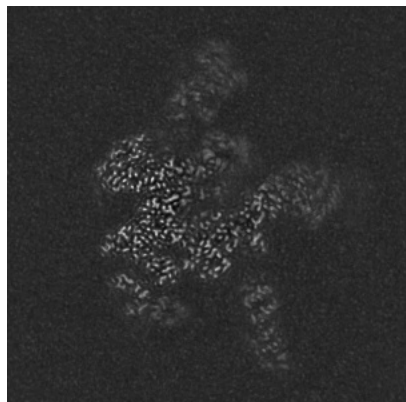


Z

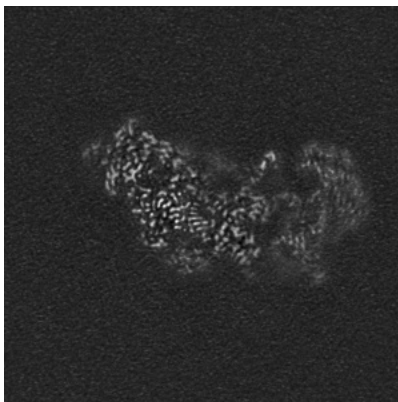
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

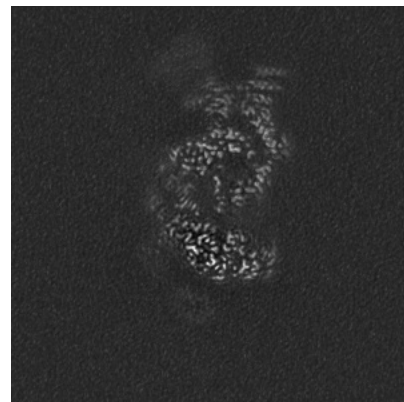
#### 6.2.1 Primary map



X Index: 300



Y Index: 300



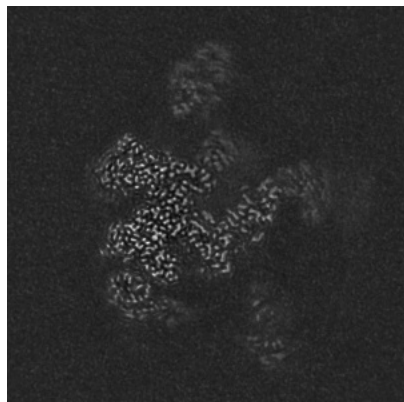
Z Index: 300



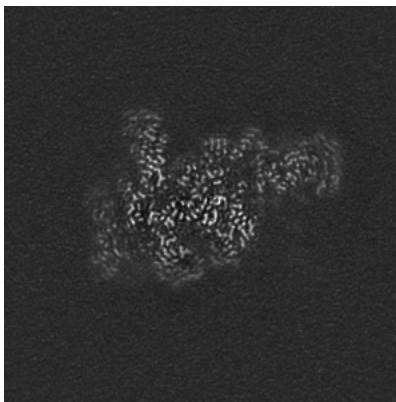
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

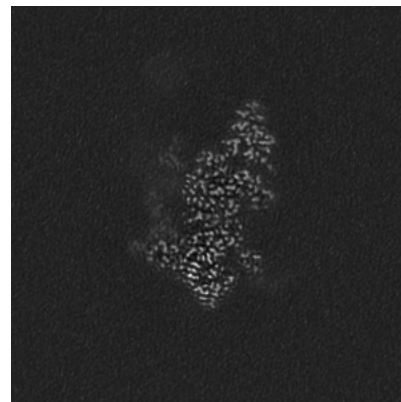
### 6.3.1 Primary map



X Index: 288



Y Index: 233

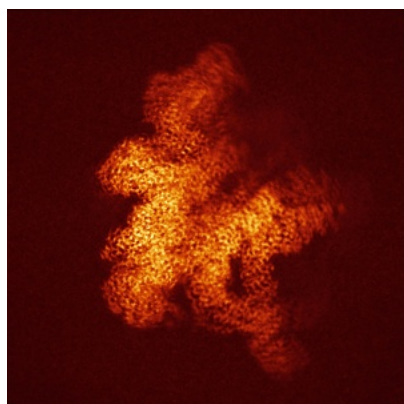


Z Index: 253

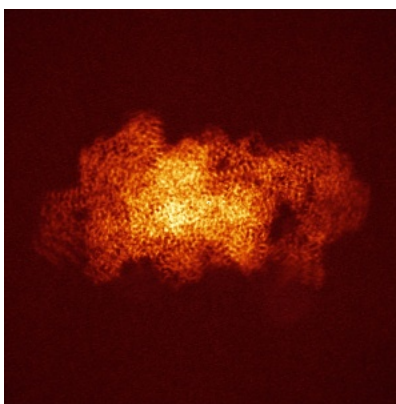
The images above show the largest variance slices of the map in three orthogonal directions.

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

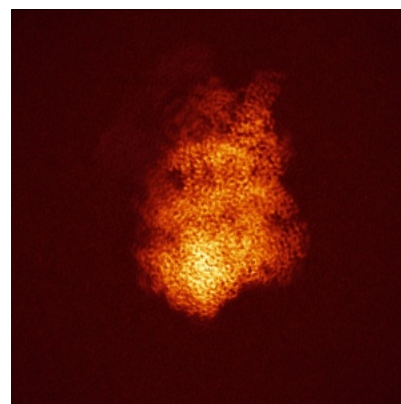
### 6.4.1 Primary map



X



Y

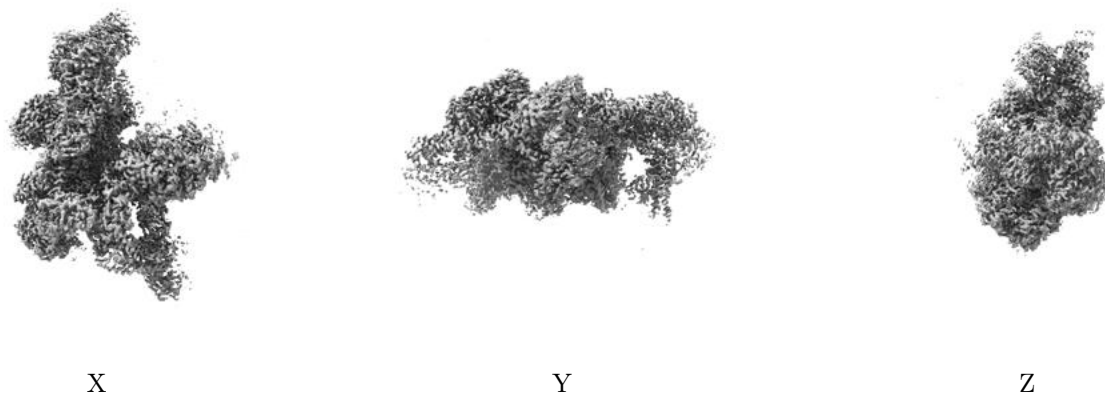


Z

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 0.8. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

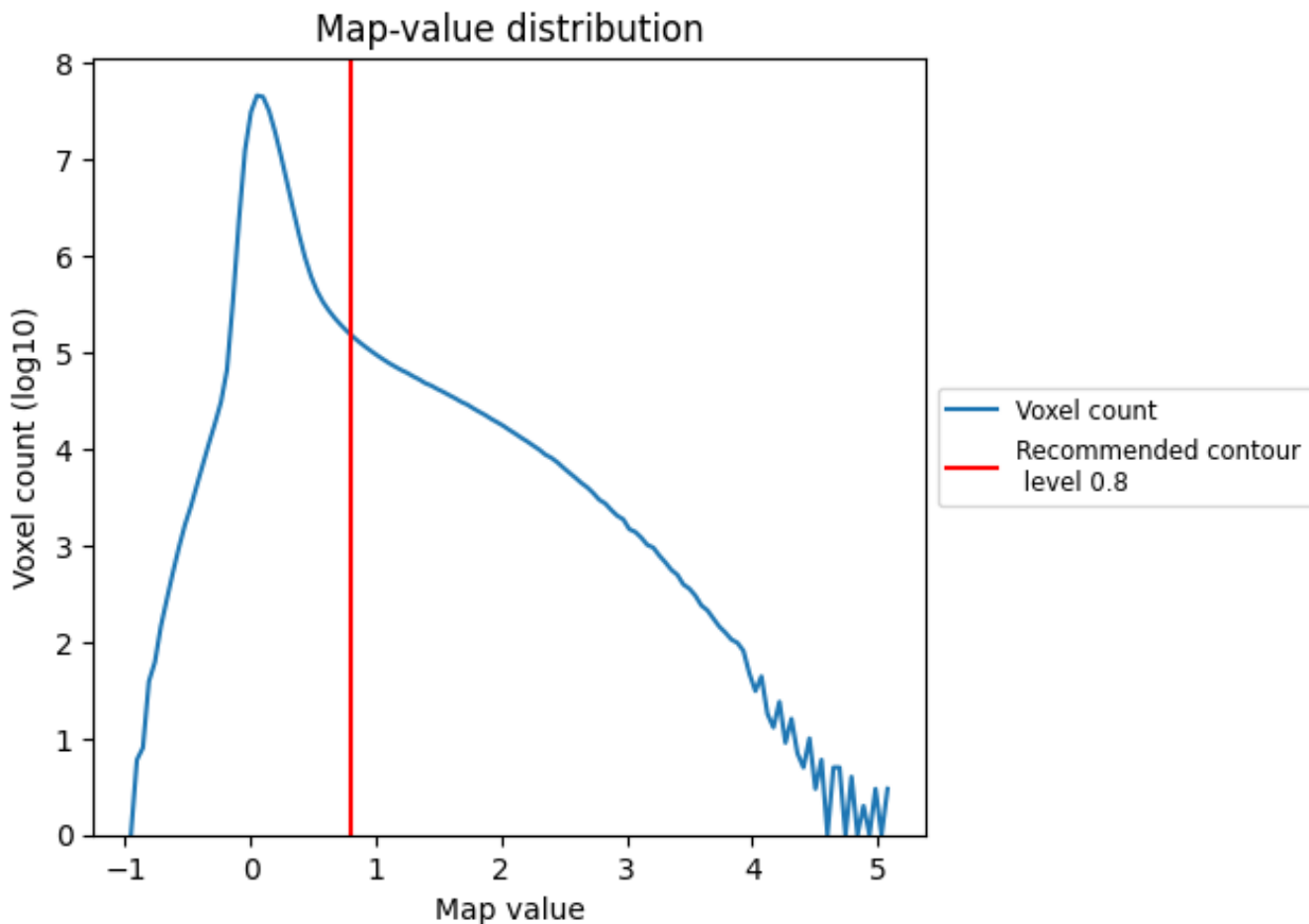
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

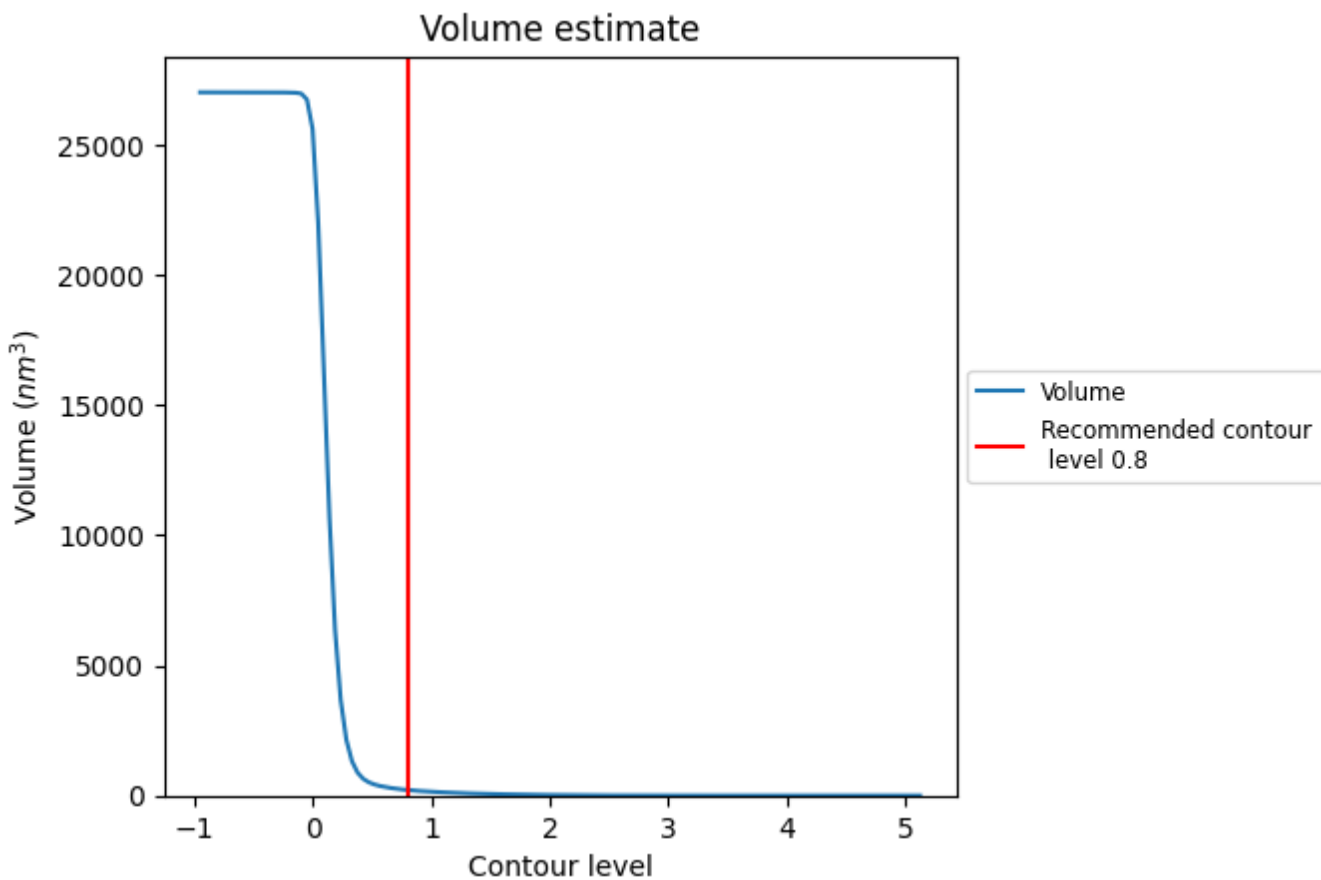
This section contains the results of statistical analysis of the map.

### 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.

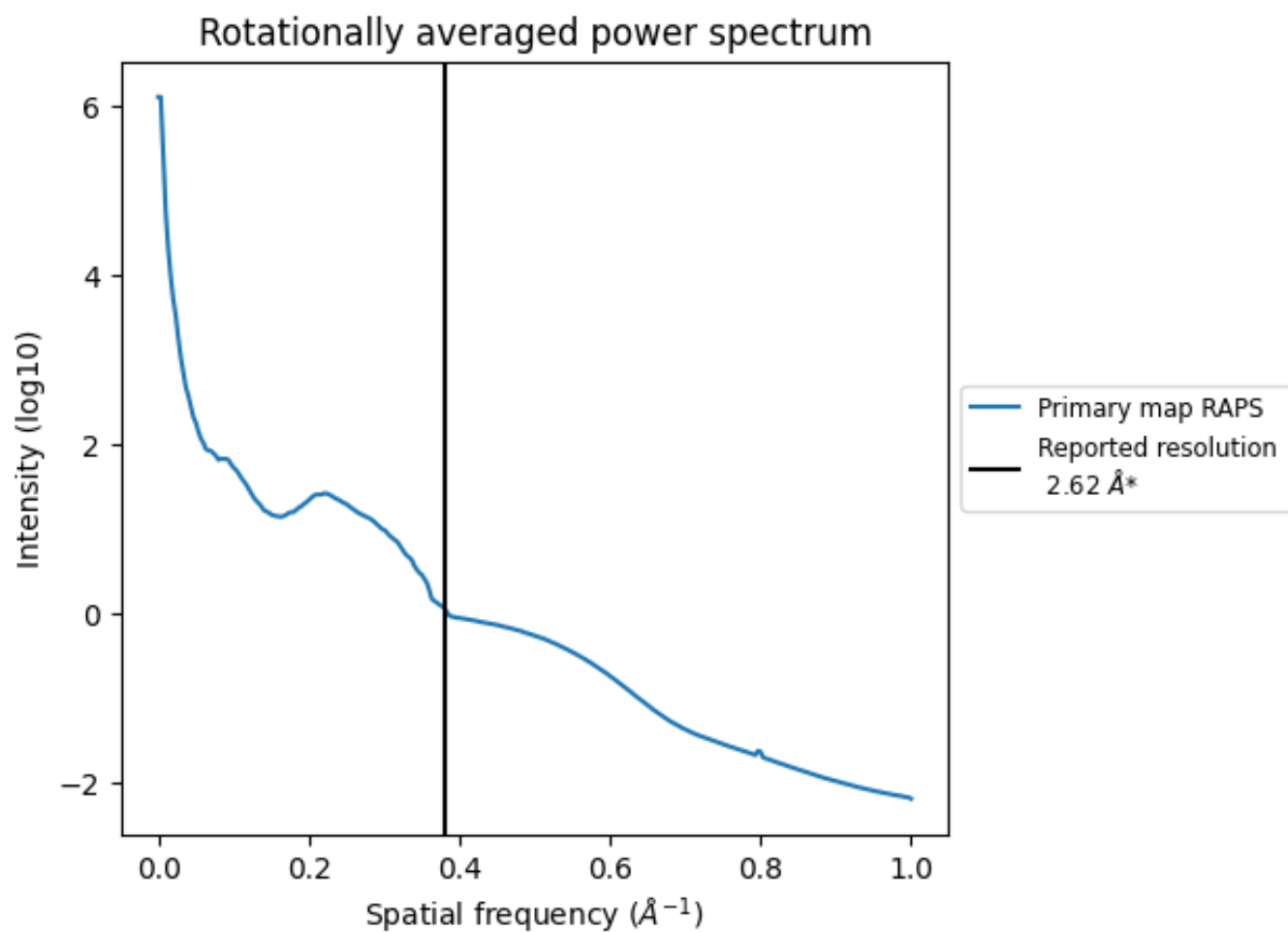
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 214  $\text{nm}^3$ ; this corresponds to an approximate mass of 193 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 [i](#)



\*Reported resolution corresponds to spatial frequency of 0.382 Å<sup>-1</sup>

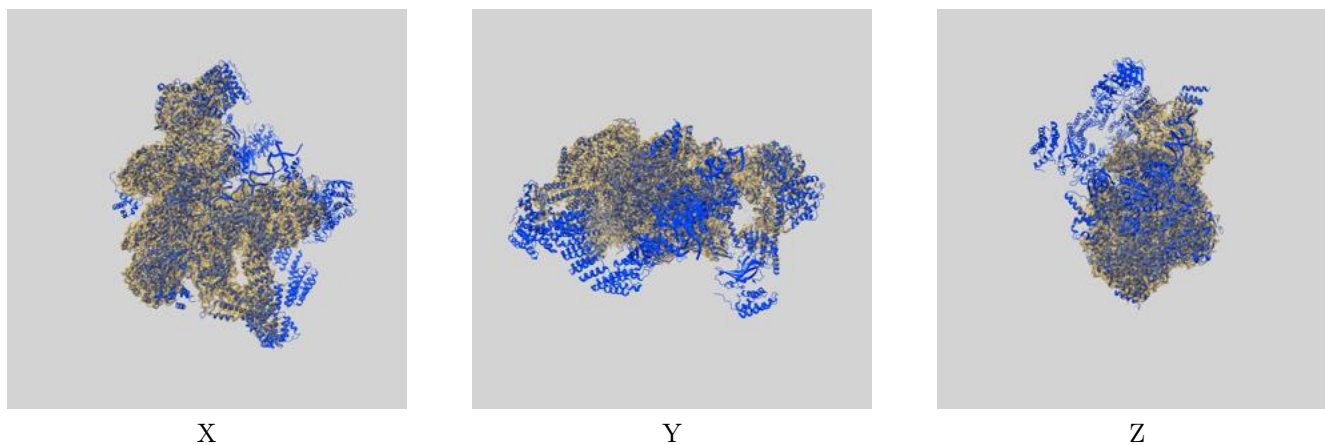
## 8 Fourier-Shell correlation

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

## 9 Map-model fit [i](#)

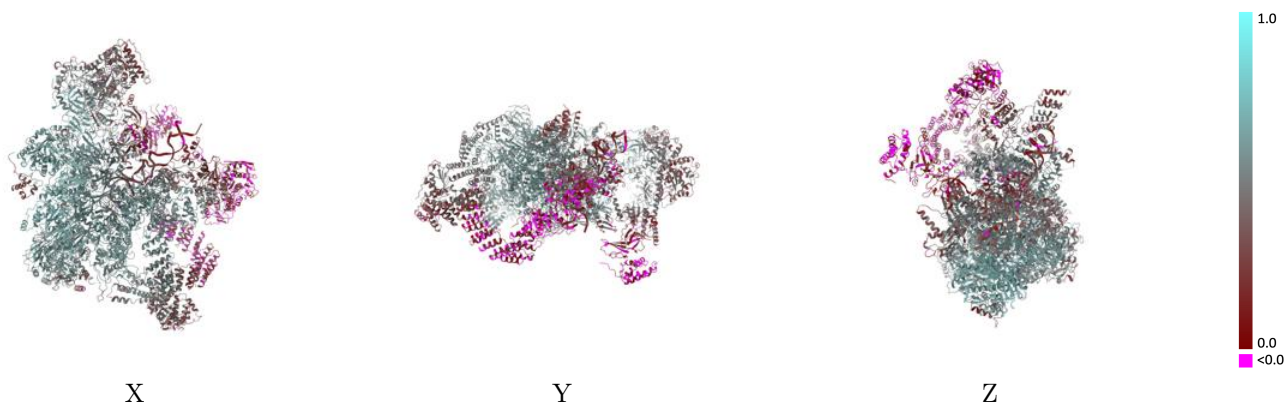
This section contains information regarding the fit between EMDB map EMD-19023 and PDB model 8RDJ. Per-residue inclusion information can be found in section 3 on page 10.

### 9.1 Map-model overlay [i](#)



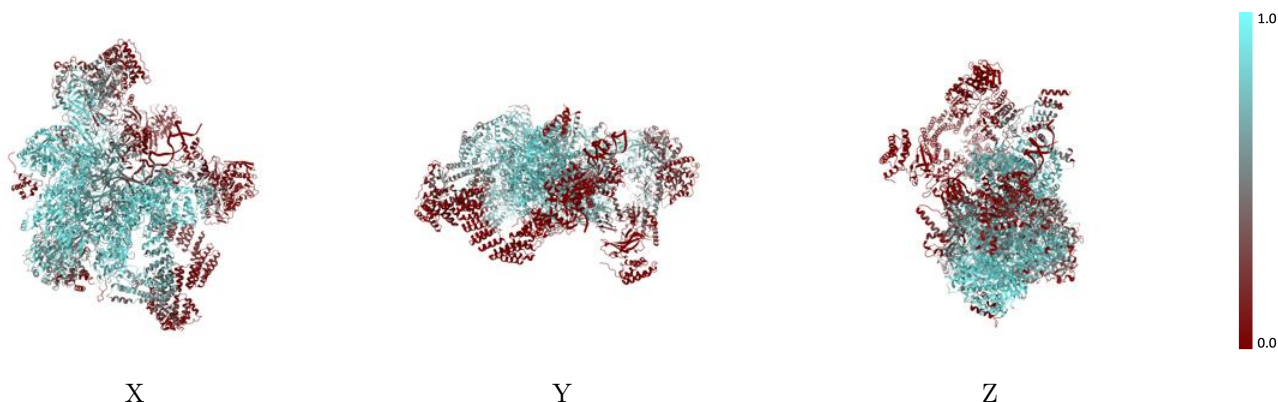
The images above show the 3D surface view of the map at the recommended contour level 0.8 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 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.

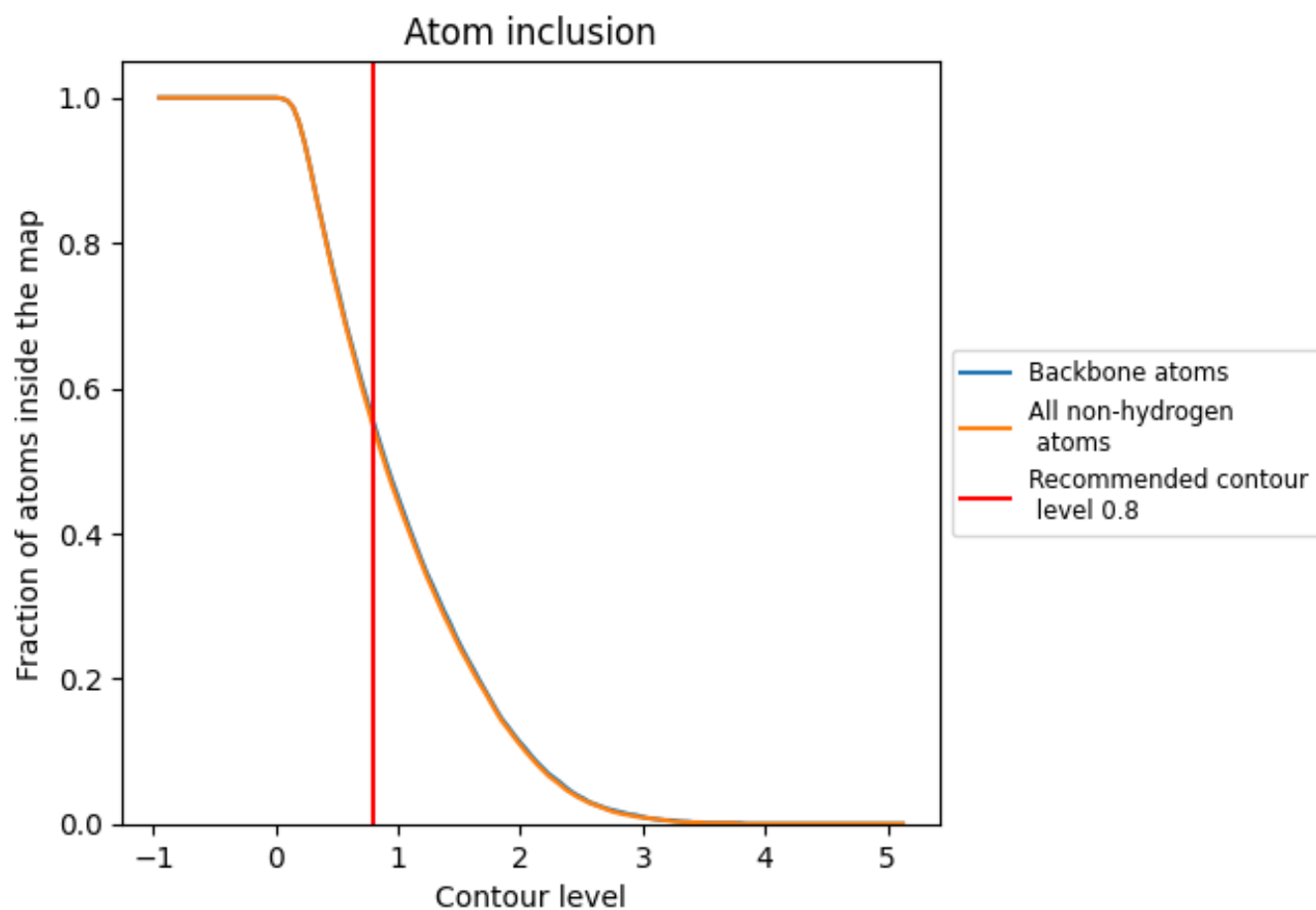
## 9.3 Atom inclusion mapped to coordinate model [i](#)



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 (0.8).





















































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 55% of all backbone atoms, 55% 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 (0.8) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.5450	 0.4680
A	 0.6670	 0.5700
B	 0.5780	 0.5310
C	 0.6660	 0.5220
D	 0.7640	 0.5570
E	 0.6020	 0.4940
F	 0.6710	 0.4890
G	 0.0740	 0.2470
H	 0.4830	 0.4760
I	 0.4460	 0.4440
J	 0.8670	 0.6370
K	 0.8720	 0.6330
L	 0.7370	 0.5480
M	 0.6850	 0.5660
N	 0.1470	 0.3720
O	 0.8620	 0.6180
P	 0.5520	 0.5450
Q	 0.0710	 0.1330
R	 0.7050	 0.5630
S	 0.7540	 0.5930
T	 0.4670	 0.4500
U	 0.0000	 -0.0200
X	 0.1470	 0.1820
Y	 0.3530	 0.3440
Z	 0.4650	 0.3220

