



## Full wwPDB EM Validation Report ⓘ

Jun 2, 2024 – 07:28 AM EDT

PDB ID : 7UVW  
EMDB ID : EMD-26818  
Title : A. baumannii ribosome: 70S with E-site tRNA  
Authors : Morgan, C.E.; Yu, E.W.  
Deposited on : 2022-05-02  
Resolution : 2.37 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](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:

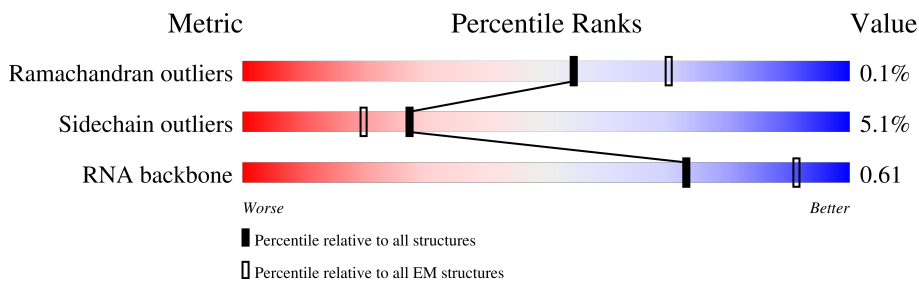
EMDB validation analysis : 0.0.1.dev92  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

# 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 2.37 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.



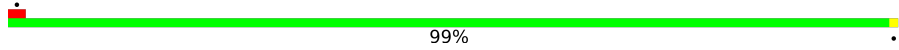

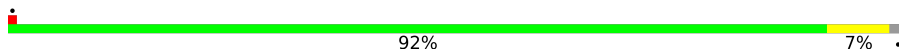


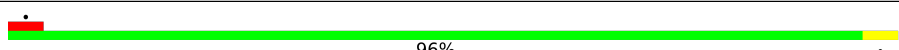
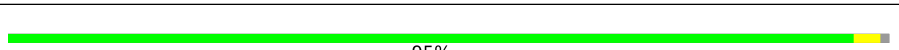
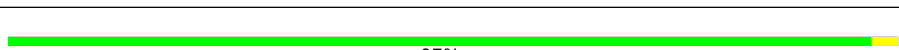
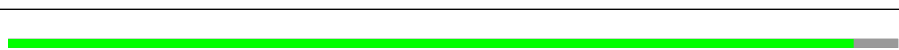
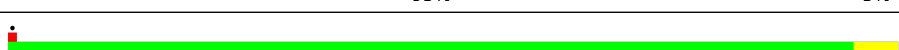
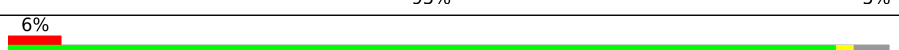
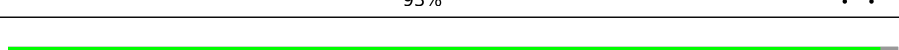
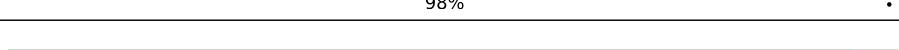
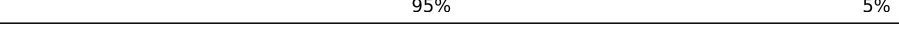
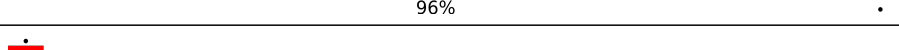
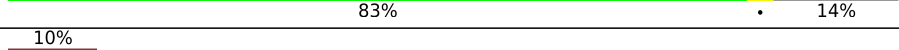
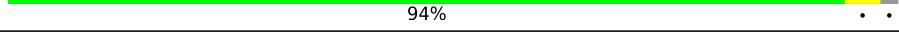
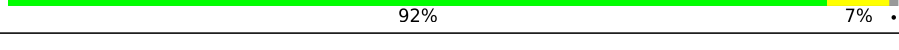

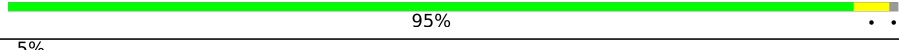

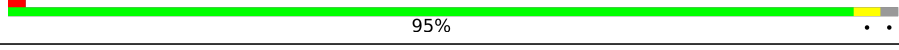
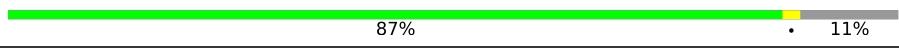


Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	0	51	
2	1	44	
3	2	64	
4	3	38	
5	A	2918	
6	B	115	
7	C	274	
8	D	212	

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Mol	Chain	Length	Quality of chain
9	E	200	 99%
10	F	178	 87% 11% 10%
11	G	177	 92% 7%
12	H	148	 38% 20% 59%
13	I	142	 100%
14	J	122	 96%
15	K	146	 95%
16	L	137	 97%
17	M	125	 95% 5%
18	N	116	 95% 5%
19	O	122	 93% 6%
20	P	119	 98%
21	Q	103	 95% 5%
22	R	109	 96%
23	S	106	 83% 14%
24	T	105	 94% 10%
25	U	98	 92% 7%
26	V	85	 86% 11%
27	W	78	 95%
28	X	65	 85% 8% 8%
29	Y	58	 95%
30	Z	61	 87% 11%
31	a	1544	 85% 13%
32	b	250	 81% 86% 9% 10%
33	c	250	 83% 14%

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Mol	Chain	Length	Quality of chain
34	d	208	5% 95% 5%
35	e	165	88% 6% 6%
36	f	127	6% 76% 6% 18%
37	g	156	15% 81% 6% 13%
38	h	131	94% 5% .
39	i	128	98% ..
40	j	103	93% . .
41	k	128	86% 5% 9%
42	l	124	90% 8% .
43	m	118	92% 6% .
44	n	101	97% ..
45	o	89	96% ..
46	p	101	80% . 19%
47	q	85	91% . 7%
48	r	75	67% . 31%
49	s	91	86% . 10%
50	t	88	92% 6% .
51	u	71	75% 86% . 11%
52	v	77	8% 68% 27% 5%
53	w	3	100%

## 2 Entry composition [i](#)

There are 54 unique types of molecules in this entry. The entry contains 138233 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 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	0	51	427	274	77	73	3	0	0

- Molecule 2 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	1	44	363	222	85	54	2	0	0

- Molecule 3 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	2	63	509	319	110	76	4	0	0

- Molecule 4 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	3	38	295	179	64	48	4	0	0

- Molecule 5 is a RNA chain called 23s ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
5	A	2719	58332	26037	10679	18897	2719	0	0

- Molecule 6 is a RNA chain called 5s ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
6	B	115	2450	1095	440	800	115	0	0

- Molecule 7 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	C	272	2111	1302	436	365	8	0	0

- Molecule 8 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	D	211	1572	972	297	300	3	0	0

- Molecule 9 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	E	200	1516	952	281	278	5	0	0

- Molecule 10 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	F	174	1370	871	243	248	8	0	0

- Molecule 11 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	G	174	1318	832	236	249	1	0	0

- Molecule 12 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	H	60	458	287	84	86	1	0	0

- Molecule 13 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	I	142	1125	718	200	203	4	0	0

- Molecule 14 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	J	122	946	592	180	169	5	0	0

- Molecule 15 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	K	144	1071	663	213	195		0	0

- Molecule 16 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	L	137	1087	687	210	185	5	0	0

- Molecule 17 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	M	119	942	590	186	163	3	0	0

- Molecule 18 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	N	116	873	537	176	158	2	0	0

- Molecule 19 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	O	117	919	578	177	164		0	0

- Molecule 20 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	P	117	934	589	197	146	2	0	0

- Molecule 21 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	Q	103	Total	C	N	O	S	0	0
			807	506	155	143	3		

- Molecule 22 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	R	109	Total	C	N	O	S	0	0
			826	514	158	150	4		

- Molecule 23 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	S	91	Total	C	N	O	S	0	0
			710	452	128	129	1		

- Molecule 24 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms				AltConf	Trace
24	T	103	Total	C	N	O	0	0
			766	476	142	148		

- Molecule 25 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	U	97	Total	C	N	O	S	0	0
			760	477	143	139	1		

- Molecule 26 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	V	76	Total	C	N	O	S	0	0
			577	358	111	106	2		

- Molecule 27 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	W	77	Total	C	N	O	S	0	0
			632	395	130	105	2		

- Molecule 28 is a protein called 50S ribosomal protein L29.



Mol	Chain	Residues	Atoms					AltConf	Trace
28	X	60	Total	C	N	O	S	0	0
			486	302	93	90	1		

- Molecule 29 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	Y	57	Total	C	N	O	S	0	0
			455	281	87	84	3		

- Molecule 30 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	Z	54	Total	C	N	O	S	0	0
			447	265	100	81	1		

- Molecule 31 is a RNA chain called 16s Ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	a	1528	Total	C	N	O	P	0	0
			32782	14631	5994	10630	1527		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	1007	U	C	conflict	GB 1211343212
a	1034	C	U	conflict	GB 1211343212

- Molecule 32 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	b	225	Total	C	N	O	S	0	0
			1769	1110	328	325	6		

- Molecule 33 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	c	215	Total	C	N	O	S	0	0
			1690	1065	318	299	8		

- Molecule 34 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	d	207	Total	C	N	O	S	0	0
			1631	1017	313	299	2		

- Molecule 35 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	e	155	Total	C	N	O	S	0	0
			1129	700	217	207	5		

- Molecule 36 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	f	104	Total	C	N	O	S	0	0
			867	546	158	159	4		

- Molecule 37 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	g	136	Total	C	N	O	S	0	0
			1073	671	201	194	7		

- Molecule 38 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	h	130	Total	C	N	O	S	0	0
			985	615	177	187	6		

- Molecule 39 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	i	126	Total	C	N	O	S	0	0
			991	618	197	175	1		

- Molecule 40 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	j	100	Total	C	N	O	S	0	0
			801	500	150	148	3		

- Molecule 41 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	k	117	Total	C	N	O	S	0	0
			862	535	167	159	1		

- Molecule 42 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	l	122	Total	C	N	O	S	0	0
			945	580	193	167	5		

- Molecule 43 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	m	115	Total	C	N	O	S	0	0
			903	558	184	158	3		

- Molecule 44 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	n	100	Total	C	N	O	S	0	0
			792	493	158	137	4		

- Molecule 45 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	o	88	Total	C	N	O	S	0	0
			705	434	144	126	1		

- Molecule 46 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	p	82	Total	C	N	O	S	0	0
			644	403	128	112	1		

- Molecule 47 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	q	79	Total	C	N	O	S	0	0
			621	390	116	114	1		

- Molecule 48 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms				AltConf	Trace
48	r	52	Total	C	N	O	0	0
			426	273	74	79		

- Molecule 49 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	s	82	Total	C	N	O	S	0	0
			646	412	125	107	2		

- Molecule 50 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	t	86	Total	C	N	O	S	0	0
			663	409	139	113	2		

- Molecule 51 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	u	63	Total	C	N	O	S	0	0
			522	327	105	89	1		

- Molecule 52 is a RNA chain called tRNA-met.

Mol	Chain	Residues	Atoms						AltConf	Trace
52	v	77	Total	C	N	O	P	S	0	0
			1636	733	291	535	76	1		

- Molecule 53 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	w	3	Total	C	N	O	P	0	0
			65	29	12	21	3		

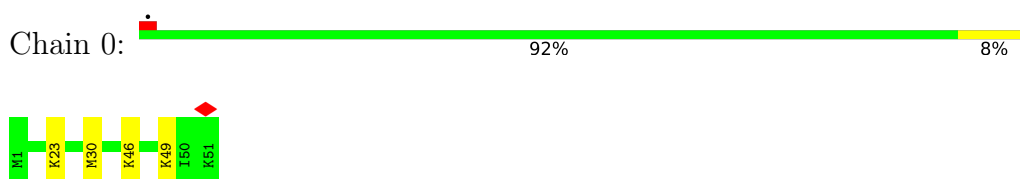
- Molecule 54 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
54	3	1	Total	Zn	0
			1	1	

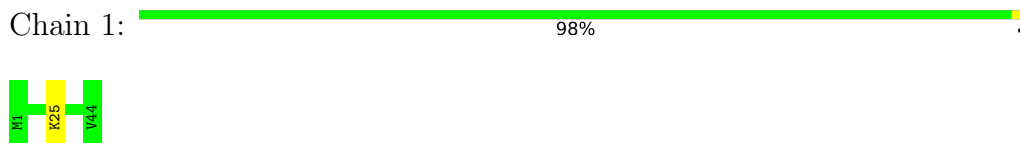
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry 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.

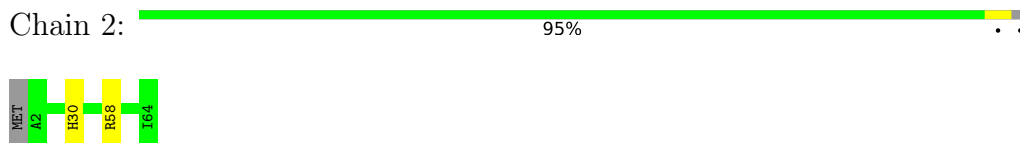
- Molecule 1: 50S ribosomal protein L33



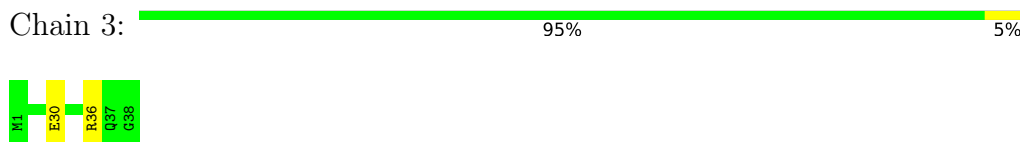
- Molecule 2: 50S ribosomal protein L34



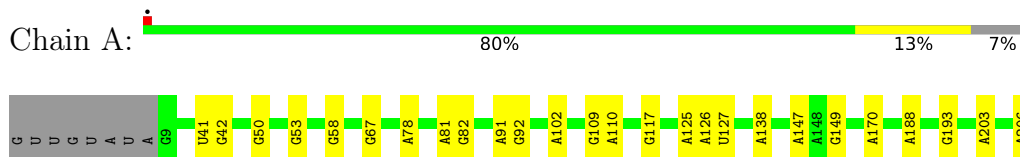
- Molecule 3: 50S ribosomal protein L35

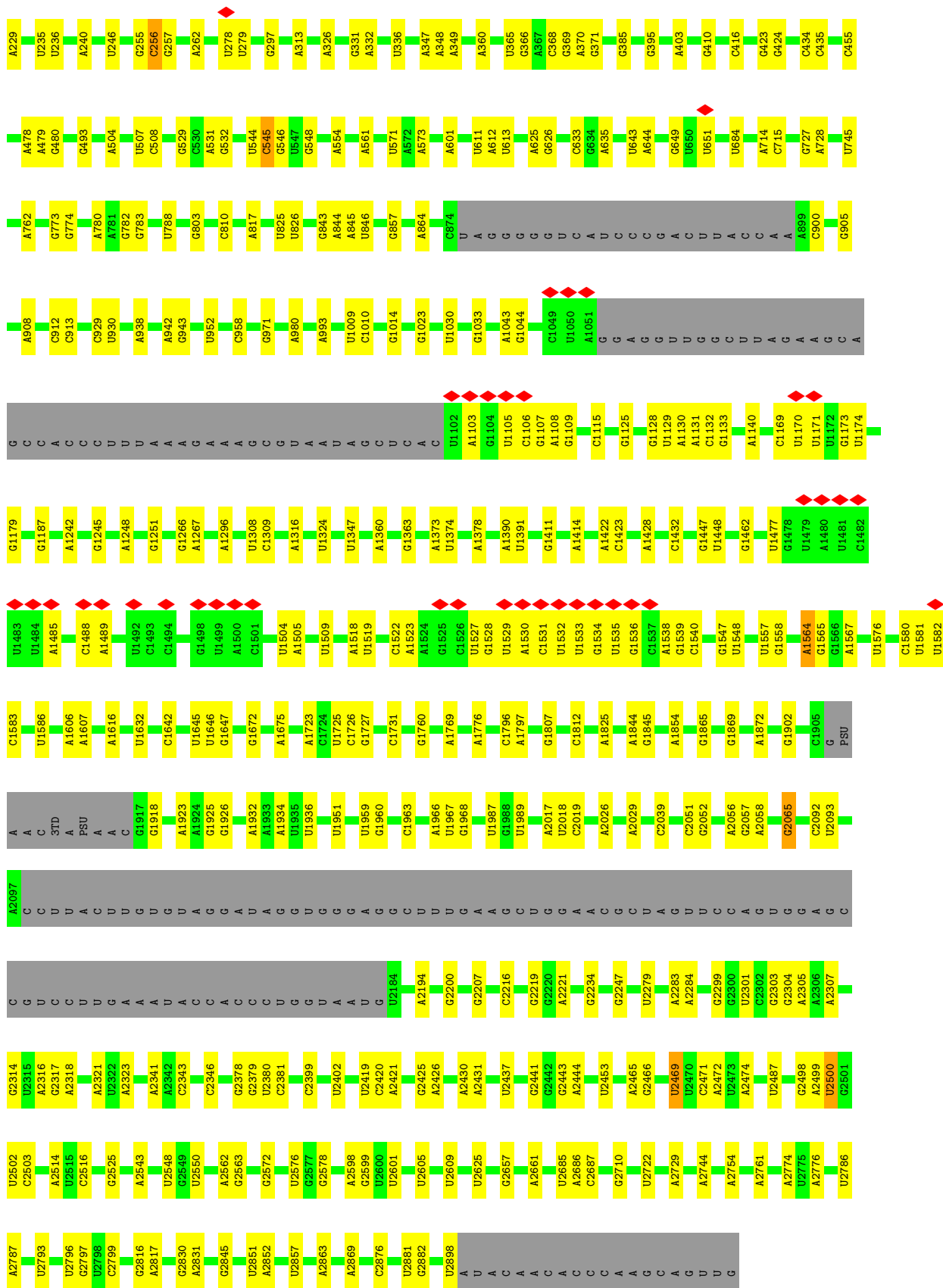


- Molecule 4: 50S ribosomal protein L36

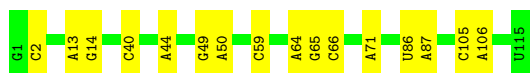
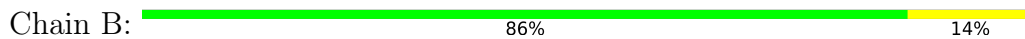


- Molecule 5: 23s ribosomal RNA





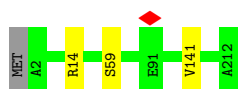
• Molecule 6: 5s ribosomal RNA



• Molecule 7: 50S ribosomal protein L2



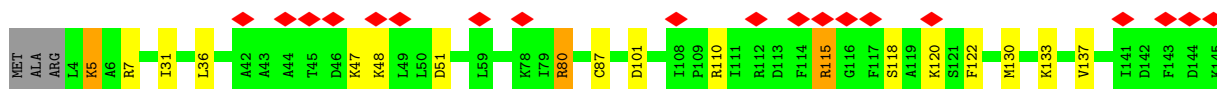
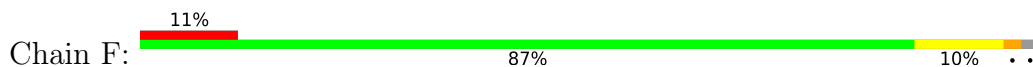
• Molecule 8: 50S ribosomal protein L3



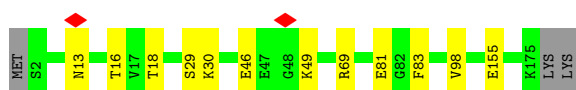
• Molecule 9: 50S ribosomal protein L4



• Molecule 10: 50S ribosomal protein L5

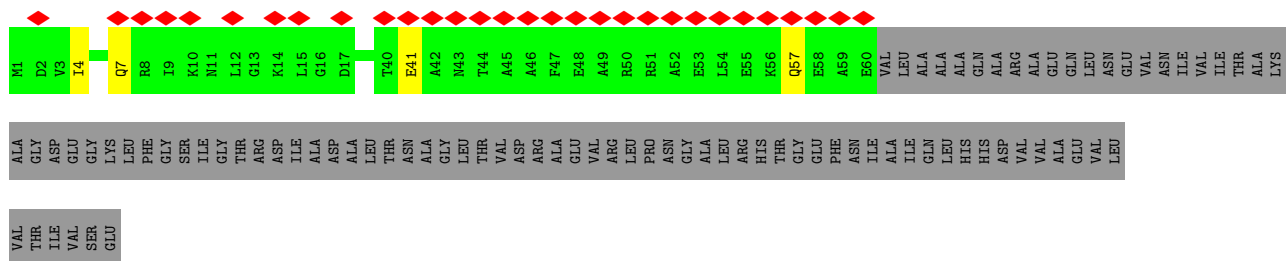


• Molecule 11: 50S ribosomal protein L6



• Molecule 12: 50S ribosomal protein L9



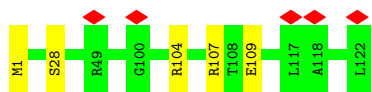


- Molecule 13: 50S ribosomal protein L13



There are no outlier residues recorded for this chain.

- Molecule 14: 50S ribosomal protein L14



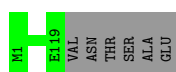
- Molecule 15: 50S ribosomal protein L15



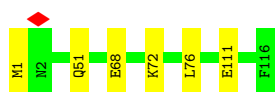
- Molecule 16: 50S ribosomal protein L16



- Molecule 17: 50S ribosomal protein L17

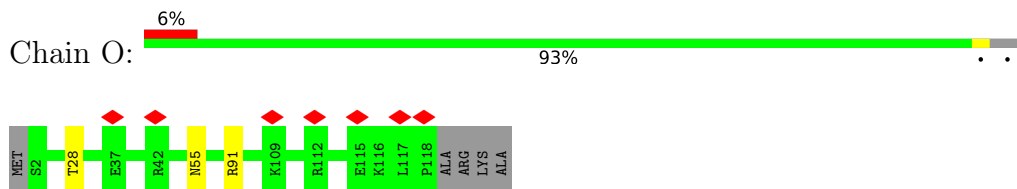


- Molecule 18: 50S ribosomal protein L18

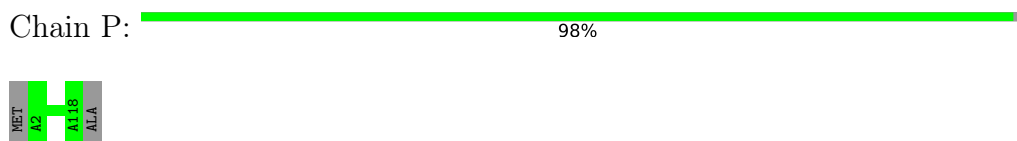




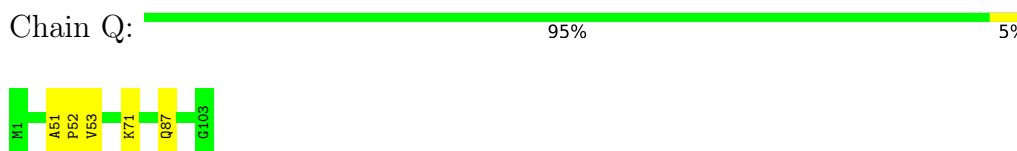
- Molecule 19: 50S ribosomal protein L19



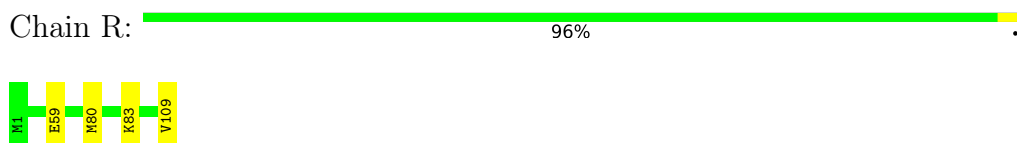
- Molecule 20: 50S ribosomal protein L20



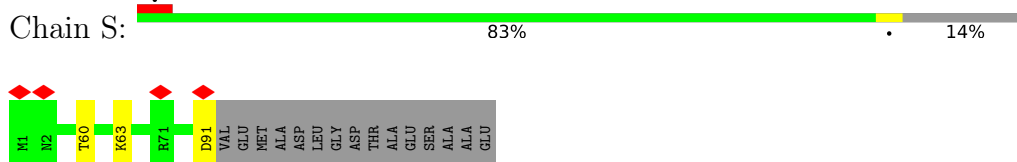
- Molecule 21: 50S ribosomal protein L21



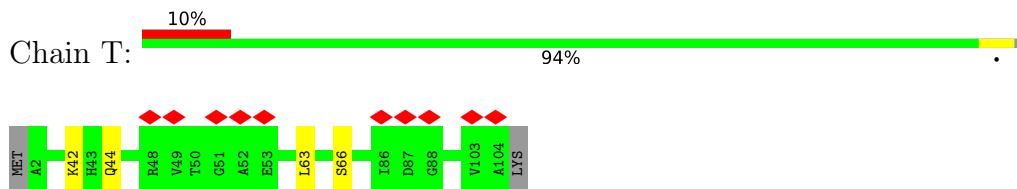
- Molecule 22: 50S ribosomal protein L22



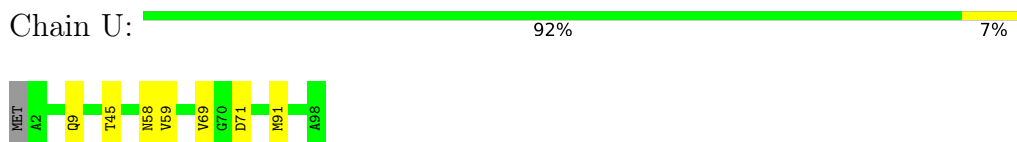
- Molecule 23: 50S ribosomal protein L23




- Molecule 24: 50S ribosomal protein L24

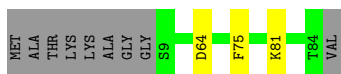


- Molecule 25: 50S ribosomal protein L25



- Molecule 26: 50S ribosomal protein L27

Chain V:  86% 11%




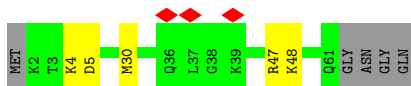
- Molecule 27: 50S ribosomal protein L28

Chain W:  95%



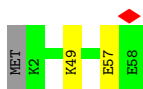
- Molecule 28: 50S ribosomal protein L29

Chain X:  5% 85% 8% 8%




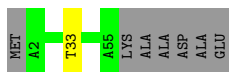
- Molecule 29: 50S ribosomal protein L30

Chain Y:  95%




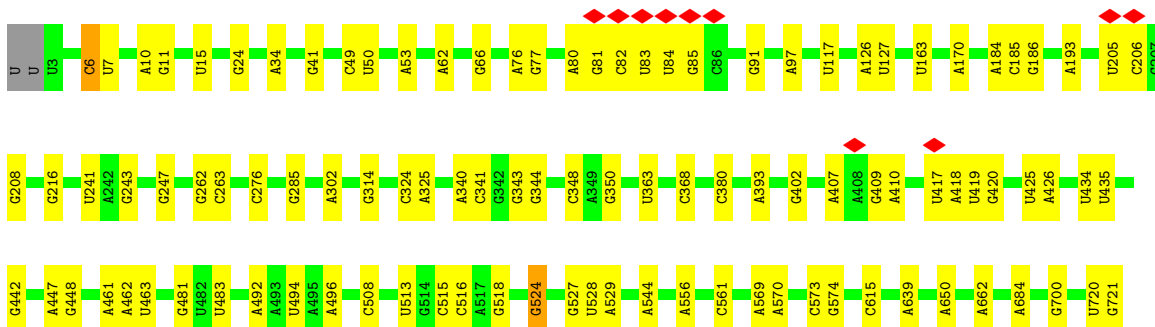
- Molecule 30: 50S ribosomal protein L32

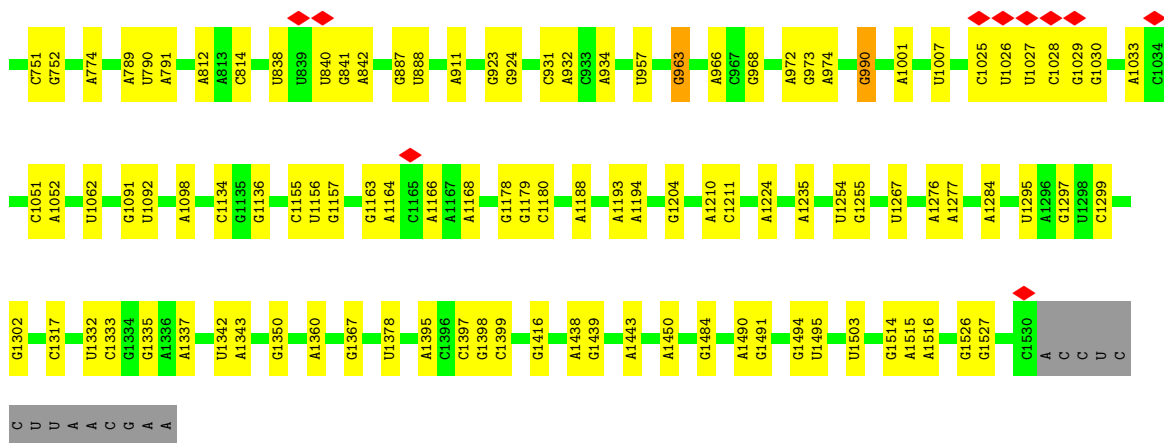
Chain Z:  87% 11%



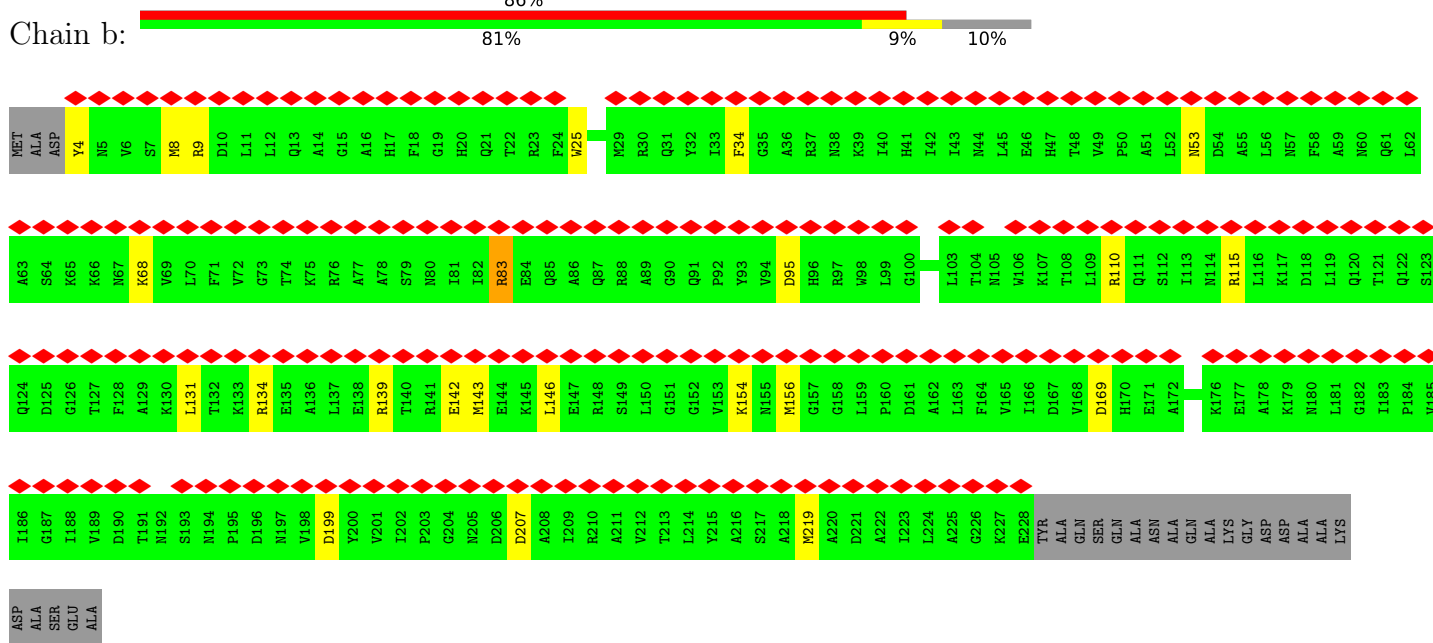
- Molecule 31: 16s Ribosomal RNA

Chain a:  85% 13%

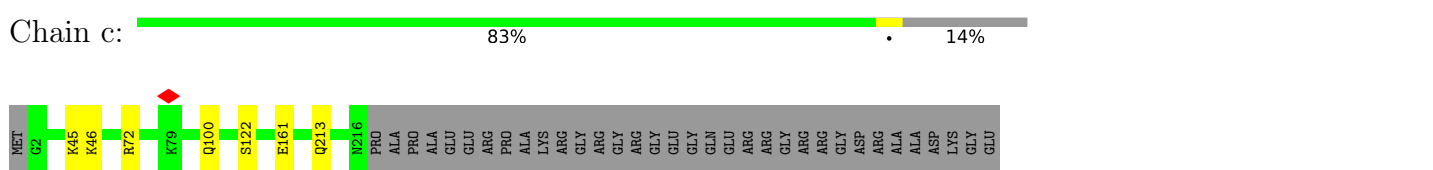




• Molecule 32: 30S ribosomal protein S2




• Molecule 33: 30S ribosomal protein S3



• Molecule 34: 30S ribosomal protein S4




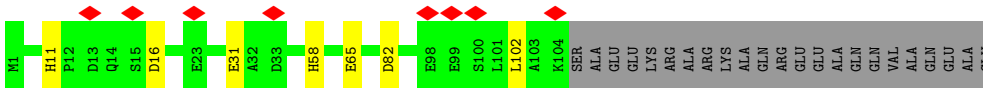
• Molecule 35: 30S ribosomal protein S5

Chain e:  88% 6% 6%




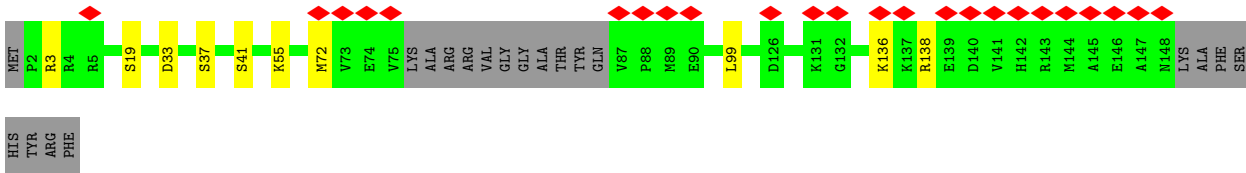
- Molecule 36: 30S ribosomal protein S6

Chain f:  6% 76% 6% 18%



- Molecule 37: 30S ribosomal protein S7

Chain g:  15% 81% 6% 13%



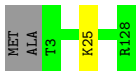
- Molecule 38: 30S ribosomal protein S8

Chain h:  94% 5%



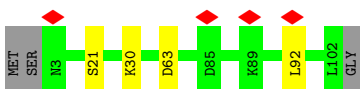
- Molecule 39: 30S ribosomal protein S9

Chain i:  98%




- Molecule 40: 30S ribosomal protein S10

Chain j:  93%

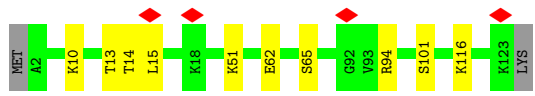
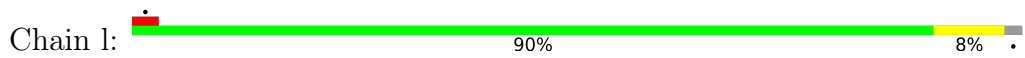


- Molecule 41: 30S ribosomal protein S11

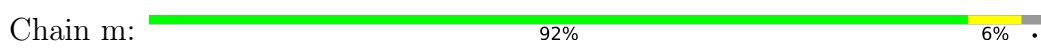
Chain k:  86% 5% 9%



• Molecule 42: 30S ribosomal protein S12



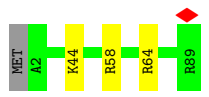
• Molecule 43: 30S ribosomal protein S13



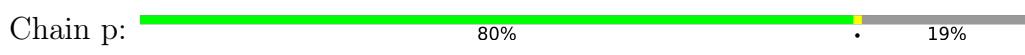
• Molecule 44: 30S ribosomal protein S14



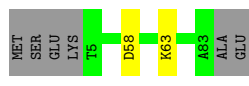
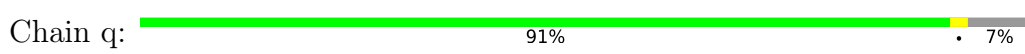
• Molecule 45: 30S ribosomal protein S15



• Molecule 46: 30S ribosomal protein S16

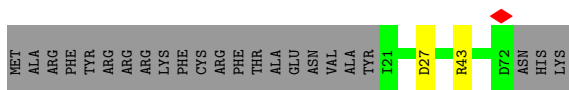


• Molecule 47: 30S ribosomal protein S17

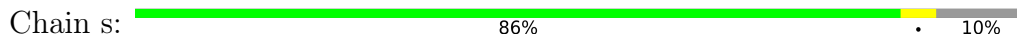


• Molecule 48: 30S ribosomal protein S18





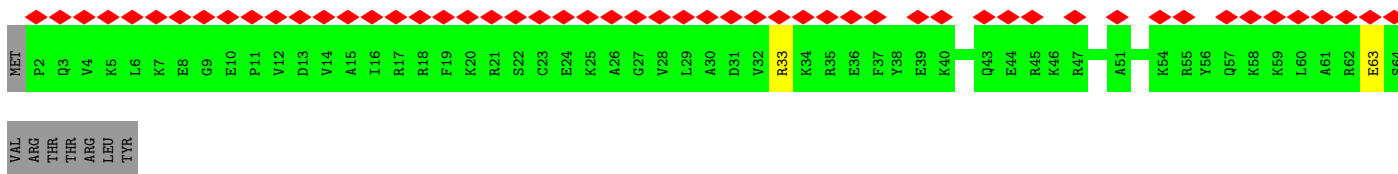
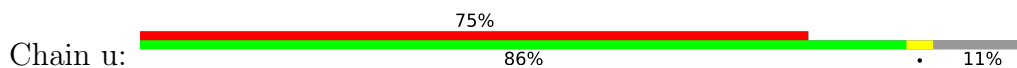
- Molecule 49: 30S ribosomal protein S19



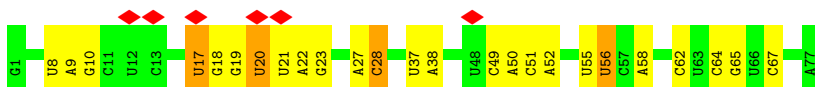
- Molecule 50: 30S ribosomal protein S20



- Molecule 51: 30S ribosomal protein S21



- Molecule 52: tRNA-met



- Molecule 53: mRNA



There are no outlier residues recorded for this chain.

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	109944	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	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.362	Depositor
Minimum map value	0.000	Depositor
Average map value	0.005	Depositor
Map value standard deviation	0.036	Depositor
Recommended contour level	0.12	Depositor
Map size (Å)	434.176, 434.176, 434.176	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.848, 0.848, 0.848	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: 5MU, 5MC, H2U, PSU, OMG, OMU, MA6, ZN, 7MG, 2MG, 4SU, UR3, 6MZ, 4OC, 2MA

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	0	0.29	0/434	0.53	0/573
2	1	0.26	0/367	0.65	0/481
3	2	0.28	0/515	0.59	0/678
4	3	0.28	0/296	0.57	0/389
5	A	0.48	0/65034	0.82	17/101432 (0.0%)
6	B	0.37	0/2739	0.81	0/4266
7	C	0.30	0/2152	0.61	0/2891
8	D	0.29	0/1590	0.55	0/2142
9	E	0.29	0/1537	0.53	0/2073
10	F	0.30	0/1390	0.67	1/1863 (0.1%)
11	G	0.28	0/1337	0.51	0/1807
12	H	0.27	0/461	0.55	0/616
13	I	0.31	0/1151	0.51	0/1551
14	J	0.29	0/956	0.63	0/1286
15	K	0.27	0/1079	0.58	0/1439
16	L	0.28	0/1104	0.58	0/1475
17	M	0.28	0/956	0.58	0/1282
18	N	0.28	0/881	0.63	0/1177
19	O	0.30	0/931	0.61	0/1249
20	P	0.33	0/947	0.59	0/1262
21	Q	0.28	0/818	0.55	0/1094
22	R	0.28	0/831	0.51	0/1113
23	S	0.28	0/716	0.55	0/957
24	T	0.26	0/770	0.53	0/1034
25	U	0.27	0/770	0.53	0/1036
26	V	0.30	0/585	0.54	0/783
27	W	0.28	0/642	0.58	0/856
28	X	0.26	0/487	0.47	0/646
29	Y	0.29	0/460	0.54	0/614
30	Z	0.27	0/453	0.64	0/604
31	a	0.42	0/36476	0.80	15/56895 (0.0%)
32	b	0.28	0/1799	0.65	4/2429 (0.2%)



Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
33	c	0.28	0/1714	0.58	0/2304
34	d	0.27	0/1653	0.55	0/2213
35	e	0.28	0/1141	0.57	0/1537
36	f	0.28	0/882	0.57	0/1189
37	g	0.31	0/1087	0.69	1/1456 (0.1%)
38	h	0.29	0/993	0.52	0/1331
39	i	0.29	0/1002	0.59	0/1339
40	j	0.30	0/811	0.56	0/1096
41	k	0.26	0/878	0.54	0/1189
42	l	0.28	0/958	0.61	0/1284
43	m	0.27	0/913	0.60	0/1226
44	n	0.29	0/803	0.55	0/1071
45	o	0.28	0/715	0.52	0/958
46	p	0.28	0/655	0.56	0/879
47	q	0.26	0/628	0.54	0/847
48	r	0.28	0/432	0.51	0/583
49	s	0.29	0/664	0.53	0/897
50	t	0.30	0/669	0.50	0/892
51	u	0.26	0/528	0.50	0/697
52	v	0.30	0/1739	0.90	6/2709 (0.2%)
53	w	0.31	0/72	0.77	0/110
All	All	0.41	0/149601	0.76	44/223800 (0.0%)

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
10	F	0	1
21	Q	0	1
All	All	0	2

There are no bond length outliers.

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
32	b	146	LEU	CA-CB-CG	7.90	133.47	115.30
52	v	28	C	C2-N1-C1'	7.71	127.28	118.80
5	A	2469	U	N1-C2-O2	7.49	128.04	122.80
52	v	17	U	C2-N1-C1'	7.45	126.63	117.70
31	a	1254	U	C2-N1-C1'	7.38	126.56	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	2469	U	C2-N1-C1'	7.37	126.54	117.70
52	v	17	U	N1-C2-O2	7.00	127.70	122.80
5	A	1308	U	C2-N1-C1'	6.96	126.06	117.70
31	a	1254	U	N1-C2-O2	6.88	127.62	122.80
52	v	17	U	N3-C2-O2	-6.52	117.64	122.20
5	A	788	U	C2-N1-C1'	6.48	125.48	117.70
5	A	2469	U	N3-C2-O2	-6.19	117.87	122.20
31	a	6	C	C2-N1-C1'	6.19	125.61	118.80
31	a	1254	U	N3-C2-O2	-6.09	117.94	122.20
52	v	28	C	C6-N1-C1'	-6.04	113.56	120.80
32	b	131	LEU	CA-CB-CG	6.02	129.14	115.30
31	a	434	U	P-O3'-C3'	5.90	126.78	119.70
5	A	1309	C	C2-N1-C1'	5.83	125.22	118.80
31	a	838	U	C2-N1-C1'	5.81	124.67	117.70
32	b	83	ARG	CG-CD-NE	-5.78	99.67	111.80
31	a	6	C	N1-C2-O2	5.71	122.33	118.90
5	A	727	G	O4'-C1'-N9	5.70	112.76	108.20
32	b	115	ARG	CA-CB-CG	5.62	125.77	113.40
31	a	990	G	C4-N9-C1'	5.53	133.69	126.50
5	A	2572	G	C4-N9-C1'	5.51	133.67	126.50
31	a	1155	C	C2-N1-C1'	5.51	124.86	118.80
31	a	1397	C	N1-C2-O2	5.45	122.17	118.90
31	a	1397	C	C2-N1-C1'	5.40	124.74	118.80
5	A	912	C	C2-N1-C1'	5.36	124.70	118.80
31	a	990	G	N3-C4-N9	5.36	129.22	126.00
5	A	434	C	C2-N1-C1'	5.30	124.63	118.80
31	a	1051	C	P-O3'-C3'	5.21	125.95	119.70
10	F	115	ARG	CA-CB-CG	5.18	124.81	113.40
37	g	99	LEU	CA-CB-CG	5.15	127.15	115.30
52	v	62	C	C2-N1-C1'	5.14	124.46	118.80
31	a	990	G	C8-N9-C1'	-5.14	120.32	127.00
5	A	2469	U	C6-N1-C1'	-5.10	114.06	121.20
31	a	751	C	C2-N1-C1'	5.08	124.39	118.80
5	A	256	C	P-O3'-C3'	5.07	125.79	119.70
5	A	715	C	C2-N1-C1'	5.07	124.38	118.80
5	A	1564	A	P-O3'-C3'	5.05	125.76	119.70
5	A	912	C	N1-C2-O2	5.02	121.91	118.90
5	A	545	C	C2-N1-C1'	5.02	124.33	118.80
5	A	434	C	N1-C2-O2	5.01	121.91	118.90

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
10	F	80	ARG	Peptide
21	Q	51	ALA	Peptide

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

Due to software issues we are unable to calculate clashes - this section is therefore empty.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	0	49/51 (96%)	49 (100%)	0	0	100	100
2	1	42/44 (96%)	42 (100%)	0	0	100	100
3	2	61/64 (95%)	59 (97%)	2 (3%)	0	100	100
4	3	36/38 (95%)	36 (100%)	0	0	100	100
7	C	270/274 (98%)	262 (97%)	7 (3%)	1 (0%)	34	46
8	D	209/212 (99%)	201 (96%)	8 (4%)	0	100	100
9	E	198/200 (99%)	198 (100%)	0	0	100	100
10	F	172/178 (97%)	159 (92%)	11 (6%)	2 (1%)	13	17
11	G	172/177 (97%)	164 (95%)	7 (4%)	1 (1%)	25	34
12	H	58/148 (39%)	55 (95%)	3 (5%)	0	100	100
13	I	140/142 (99%)	137 (98%)	3 (2%)	0	100	100
14	J	120/122 (98%)	115 (96%)	5 (4%)	0	100	100
15	K	142/146 (97%)	139 (98%)	3 (2%)	0	100	100
16	L	135/137 (98%)	132 (98%)	2 (2%)	1 (1%)	22	30
17	M	117/125 (94%)	115 (98%)	2 (2%)	0	100	100
18	N	114/116 (98%)	111 (97%)	3 (3%)	0	100	100
19	O	115/122 (94%)	113 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
20	P	115/119 (97%)	115 (100%)	0	0	100	100
21	Q	101/103 (98%)	97 (96%)	3 (3%)	1 (1%)	15	21
22	R	107/109 (98%)	106 (99%)	1 (1%)	0	100	100
23	S	89/106 (84%)	88 (99%)	1 (1%)	0	100	100
24	T	101/105 (96%)	98 (97%)	3 (3%)	0	100	100
25	U	95/98 (97%)	94 (99%)	1 (1%)	0	100	100
26	V	74/85 (87%)	73 (99%)	1 (1%)	0	100	100
27	W	75/78 (96%)	75 (100%)	0	0	100	100
28	X	58/65 (89%)	58 (100%)	0	0	100	100
29	Y	55/58 (95%)	53 (96%)	2 (4%)	0	100	100
30	Z	52/61 (85%)	50 (96%)	2 (4%)	0	100	100
32	b	223/250 (89%)	209 (94%)	13 (6%)	1 (0%)	34	46
33	c	213/250 (85%)	206 (97%)	7 (3%)	0	100	100
34	d	205/208 (99%)	200 (98%)	5 (2%)	0	100	100
35	e	153/165 (93%)	152 (99%)	1 (1%)	0	100	100
36	f	102/127 (80%)	97 (95%)	5 (5%)	0	100	100
37	g	132/156 (85%)	127 (96%)	5 (4%)	0	100	100
38	h	128/131 (98%)	123 (96%)	5 (4%)	0	100	100
39	i	124/128 (97%)	121 (98%)	3 (2%)	0	100	100
40	j	98/103 (95%)	95 (97%)	3 (3%)	0	100	100
41	k	115/128 (90%)	111 (96%)	4 (4%)	0	100	100
42	l	120/124 (97%)	114 (95%)	6 (5%)	0	100	100
43	m	113/118 (96%)	109 (96%)	4 (4%)	0	100	100
44	n	98/101 (97%)	95 (97%)	3 (3%)	0	100	100
45	o	86/89 (97%)	84 (98%)	2 (2%)	0	100	100
46	p	80/101 (79%)	80 (100%)	0	0	100	100
47	q	77/85 (91%)	77 (100%)	0	0	100	100
48	r	50/75 (67%)	50 (100%)	0	0	100	100
49	s	80/91 (88%)	77 (96%)	3 (4%)	0	100	100
50	t	84/88 (96%)	84 (100%)	0	0	100	100
51	u	61/71 (86%)	59 (97%)	2 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	5414/5872 (92%)	5264 (97%)	143 (3%)	7 (0%)	54 67

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
10	F	137	VAL
32	b	8	MET
10	F	5	LYS
11	G	13	ASN
16	L	79	LEU
7	C	3	ILE
21	Q	52	PRO

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

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	0	47/47 (100%)	43 (92%)	4 (8%)	10 14
2	1	36/36 (100%)	35 (97%)	1 (3%)	43 61
3	2	52/53 (98%)	50 (96%)	2 (4%)	33 49
4	3	33/33 (100%)	31 (94%)	2 (6%)	18 27
7	C	218/220 (99%)	212 (97%)	6 (3%)	43 61
8	D	166/167 (99%)	163 (98%)	3 (2%)	59 75
9	E	155/155 (100%)	153 (99%)	2 (1%)	69 82
10	F	144/147 (98%)	125 (87%)	19 (13%)	4 4
11	G	139/142 (98%)	128 (92%)	11 (8%)	12 17
12	H	45/112 (40%)	41 (91%)	4 (9%)	9 13
13	I	118/118 (100%)	118 (100%)	0	100 100
14	J	103/103 (100%)	98 (95%)	5 (5%)	25 38
15	K	106/108 (98%)	101 (95%)	5 (5%)	26 39
16	L	113/113 (100%)	110 (97%)	3 (3%)	44 62

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
17	M	96/101 (95%)	96 (100%)	0	100	100
18	N	85/85 (100%)	79 (93%)	6 (7%)	14	21
19	O	99/102 (97%)	96 (97%)	3 (3%)	41	59
20	P	85/86 (99%)	85 (100%)	0	100	100
21	Q	84/84 (100%)	81 (96%)	3 (4%)	35	51
22	R	88/88 (100%)	84 (96%)	4 (4%)	27	41
23	S	77/87 (88%)	74 (96%)	3 (4%)	32	48
24	T	83/85 (98%)	79 (95%)	4 (5%)	25	39
25	U	79/80 (99%)	72 (91%)	7 (9%)	9	13
26	V	59/64 (92%)	56 (95%)	3 (5%)	24	36
27	W	69/70 (99%)	66 (96%)	3 (4%)	29	43
28	X	53/56 (95%)	48 (91%)	5 (9%)	8	11
29	Y	53/54 (98%)	51 (96%)	2 (4%)	33	49
30	Z	46/50 (92%)	45 (98%)	1 (2%)	52	69
32	b	185/200 (92%)	166 (90%)	19 (10%)	7	9
33	c	175/198 (88%)	168 (96%)	7 (4%)	31	47
34	d	170/171 (99%)	160 (94%)	10 (6%)	19	29
35	e	113/120 (94%)	103 (91%)	10 (9%)	10	13
36	f	94/111 (85%)	87 (93%)	7 (7%)	13	19
37	g	113/128 (88%)	104 (92%)	9 (8%)	12	17
38	h	108/109 (99%)	101 (94%)	7 (6%)	17	24
39	i	99/100 (99%)	98 (99%)	1 (1%)	76	87
40	j	89/91 (98%)	85 (96%)	4 (4%)	27	41
41	k	88/98 (90%)	81 (92%)	7 (8%)	12	17
42	l	104/106 (98%)	94 (90%)	10 (10%)	8	11
43	m	95/98 (97%)	88 (93%)	7 (7%)	13	19
44	n	81/82 (99%)	79 (98%)	2 (2%)	47	65
45	o	71/72 (99%)	68 (96%)	3 (4%)	30	44
46	p	63/77 (82%)	62 (98%)	1 (2%)	62	78
47	q	71/76 (93%)	69 (97%)	2 (3%)	43	61
48	r	46/66 (70%)	44 (96%)	2 (4%)	29	43

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
49	s	70/78 (90%)	66 (94%)	4 (6%)	20	30
50	t	65/67 (97%)	60 (92%)	5 (8%)	13	18
51	u	54/62 (87%)	52 (96%)	2 (4%)	34	50
All	All	4485/4756 (94%)	4255 (95%)	230 (5%)	27	36

All (230) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	0	23	LYS
1	0	30	MET
1	0	46	LYS
1	0	49	LYS
2	1	25	LYS
3	2	30	HIS
3	2	58	ARG
4	3	30	GLU
4	3	36	ARG
7	C	117	GLN
7	C	133	ARG
7	C	145	GLU
7	C	163	GLN
7	C	175	ARG
7	C	194	GLU
8	D	14	ARG
8	D	59	SER
8	D	141	VAL
9	E	119	LEU
9	E	139	ASP
10	F	5	LYS
10	F	7	ARG
10	F	31	ILE
10	F	36	LEU
10	F	47	LYS
10	F	48	LYS
10	F	51	ASP
10	F	80	ARG
10	F	87	CYS
10	F	101	ASP
10	F	110	ARG
10	F	115	ARG
10	F	118	SER

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
10	F	120	LYS
10	F	122	PHE
10	F	130	MET
10	F	133	LYS
10	F	173	PHE
10	F	177	PHE
11	G	16	THR
11	G	18	THR
11	G	29	SER
11	G	30	LYS
11	G	46	GLU
11	G	49	LYS
11	G	69	ARG
11	G	81	GLU
11	G	83	PHE
11	G	98	VAL
11	G	155	GLU
12	H	4	ILE
12	H	7	GLN
12	H	41	GLU
12	H	57	GLN
14	J	1	MET
14	J	28	SER
14	J	104	ARG
14	J	107	ARG
14	J	109	GLU
15	K	12	GLU
15	K	19	ARG
15	K	29	VAL
15	K	88	GLU
15	K	143	LYS
16	L	35	LYS
16	L	57	ARG
16	L	135	THR
18	N	1	MET
18	N	51	GLN
18	N	68	GLU
18	N	72	LYS
18	N	76	LEU
18	N	111	GLU
19	O	28	THR
19	O	55	ASN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
19	O	91	ARG
21	Q	53	VAL
21	Q	71	LYS
21	Q	87	GLN
22	R	59	GLU
22	R	80	MET
22	R	83	LYS
22	R	109	VAL
23	S	60	THR
23	S	63	LYS
23	S	91	ASP
24	T	42	LYS
24	T	44	GLN
24	T	63	LEU
24	T	66	SER
25	U	9	GLN
25	U	45	THR
25	U	58	ASN
25	U	59	VAL
25	U	69	VAL
25	U	71	ASP
25	U	91	MET
26	V	64	ASP
26	V	75	PHE
26	V	81	LYS
27	W	24	LYS
27	W	42	SER
27	W	65	GLU
28	X	4	LYS
28	X	5	ASP
28	X	30	MET
28	X	47	ARG
28	X	48	LYS
29	Y	49	LYS
29	Y	57	GLU
30	Z	33	THR
32	b	4	TYR
32	b	9	ARG
32	b	25	TRP
32	b	34	PHE
32	b	53	ASN
32	b	68	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	b	83	ARG
32	b	95	ASP
32	b	110	ARG
32	b	134	ARG
32	b	139	ARG
32	b	142	GLU
32	b	143	MET
32	b	154	LYS
32	b	156	MET
32	b	169	ASP
32	b	199	ASP
32	b	207	ASP
32	b	219	MET
33	c	45	LYS
33	c	46	LYS
33	c	72	ARG
33	c	100	GLN
33	c	122	SER
33	c	161	GLU
33	c	213	GLN
34	d	4	TYR
34	d	41	GLN
34	d	49	LYS
34	d	72	ARG
34	d	113	ARG
34	d	118	GLN
34	d	140	LYS
34	d	153	GLN
34	d	179	LYS
34	d	193	LEU
35	e	10	LEU
35	e	40	ASP
35	e	44	ARG
35	e	53	ARG
35	e	64	GLU
35	e	91	SER
35	e	100	GLU
35	e	129	SER
35	e	137	ASN
35	e	150	GLU
36	f	11	HIS
36	f	16	ASP

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
36	f	31	GLU
36	f	58	HIS
36	f	65	GLU
36	f	82	ASP
36	f	102	LEU
37	g	3	ARG
37	g	19	SER
37	g	33	ASP
37	g	37	SER
37	g	41	SER
37	g	55	LYS
37	g	72	MET
37	g	136	LYS
37	g	138	ARG
38	h	29	SER
38	h	30	SER
38	h	31	LYS
38	h	53	GLN
38	h	74	GLU
38	h	97	LYS
38	h	108	SER
39	i	25	LYS
40	j	21	SER
40	j	30	LYS
40	j	63	ASP
40	j	92	LEU
41	k	25	SER
41	k	29	THR
41	k	52	ARG
41	k	63	GLN
41	k	71	LYS
41	k	93	GLU
41	k	118	ASN
42	l	10	LYS
42	l	13	THR
42	l	14	THR
42	l	15	LEU
42	l	51	LYS
42	l	62	GLU
42	l	65	SER
42	l	94	ARG
42	l	101	SER

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Mol	Chain	Res	Type
42	l	116	LYS
43	m	11	ASP
43	m	16	VAL
43	m	31	LYS
43	m	32	ASN
43	m	54	ASP
43	m	74	SER
43	m	93	ARG
44	n	56	SER
44	n	85	ARG
45	o	44	LYS
45	o	58	ARG
45	o	64	ARG
46	p	53	ARG
47	q	58	ASP
47	q	63	LYS
48	r	27	ASP
48	r	43	ARG
49	s	12	ASP
49	s	29	LYS
49	s	43	ASP
49	s	50	SER
50	t	26	SER
50	t	27	MET
50	t	34	ARG
50	t	37	SER
50	t	48	THR
51	u	33	ARG
51	u	63	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
24	T	47	ASN
32	b	114	ASN
33	c	25	ASN
33	c	28	GLN
36	f	58	HIS
50	t	3	ASN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
31	a	1524/1544 (98%)	195 (12%)	0
5	A	2712/2918 (92%)	368 (13%)	20 (0%)
52	v	76/77 (98%)	23 (30%)	0
53	w	2/3 (66%)	0	0
6	B	114/115 (99%)	15 (13%)	2 (1%)
All	All	4428/4657 (95%)	601 (13%)	22 (0%)

All (601) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
5	A	41	U
5	A	42	G
5	A	50	G
5	A	53	G
5	A	58	G
5	A	67	G
5	A	78	A
5	A	81	A
5	A	82	G
5	A	92	G
5	A	102	A
5	A	109	G
5	A	110	A
5	A	117	G
5	A	125	A
5	A	126	A
5	A	127	U
5	A	138	A
5	A	147	A
5	A	149	G
5	A	170	A
5	A	188	A
5	A	193	G
5	A	203	A
5	A	206	A
5	A	222	G
5	A	223	A
5	A	228	A
5	A	229	A
5	A	235	U
5	A	236	U
5	A	240	A
5	A	246	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	A	255	G
5	A	257	G
5	A	262	A
5	A	278	U
5	A	279	U
5	A	297	G
5	A	313	A
5	A	326	A
5	A	331	G
5	A	332	A
5	A	336	U
5	A	347	A
5	A	348	A
5	A	349	A
5	A	360	A
5	A	365	U
5	A	366	G
5	A	369	G
5	A	370	A
5	A	371	G
5	A	385	G
5	A	395	G
5	A	403	A
5	A	410	G
5	A	416	C
5	A	423	G
5	A	435	C
5	A	455	C
5	A	479	A
5	A	480	G
5	A	493	G
5	A	504	A
5	A	508	C
5	A	529	G
5	A	531	A
5	A	532	G
5	A	544	U
5	A	545	C
5	A	546	G
5	A	548	G
5	A	554	A
5	A	561	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	A	571	U
5	A	573	A
5	A	601	A
5	A	611	U
5	A	612	A
5	A	613	U
5	A	625	A
5	A	626	G
5	A	633	C
5	A	635	A
5	A	643	U
5	A	644	A
5	A	649	G
5	A	651	U
5	A	684	U
5	A	714	A
5	A	728	A
5	A	745	U
5	A	762	A
5	A	773	G
5	A	774	G
5	A	780	A
5	A	782	G
5	A	783	G
5	A	803	G
5	A	810	C
5	A	817	A
5	A	825	U
5	A	826	U
5	A	843	G
5	A	844	A
5	A	845	A
5	A	846	U
5	A	857	G
5	A	864	A
5	A	900	C
5	A	905	G
5	A	908	A
5	A	913	C
5	A	929	C
5	A	930	U
5	A	938	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	A	942	A
5	A	943	G
5	A	958	C
5	A	971	G
5	A	980	A
5	A	993	A
5	A	1009	U
5	A	1010	C
5	A	1014	G
5	A	1023	G
5	A	1030	U
5	A	1033	G
5	A	1043	A
5	A	1044	G
5	A	1103	A
5	A	1105	U
5	A	1106	C
5	A	1107	G
5	A	1108	A
5	A	1109	G
5	A	1115	C
5	A	1125	G
5	A	1128	G
5	A	1129	U
5	A	1130	A
5	A	1131	A
5	A	1132	C
5	A	1133	G
5	A	1140	A
5	A	1169	C
5	A	1170	U
5	A	1171	U
5	A	1173	G
5	A	1174	U
5	A	1242	A
5	A	1245	G
5	A	1248	A
5	A	1251	G
5	A	1266	G
5	A	1267	A
5	A	1296	A
5	A	1316	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	A	1324	U
5	A	1347	U
5	A	1360	A
5	A	1363	G
5	A	1373	A
5	A	1374	U
5	A	1378	A
5	A	1390	A
5	A	1391	U
5	A	1411	G
5	A	1414	A
5	A	1422	A
5	A	1423	C
5	A	1428	A
5	A	1432	C
5	A	1447	G
5	A	1448	U
5	A	1462	G
5	A	1477	U
5	A	1485	A
5	A	1488	C
5	A	1489	A
5	A	1504	U
5	A	1505	A
5	A	1509	U
5	A	1518	A
5	A	1519	U
5	A	1522	C
5	A	1523	A
5	A	1527	U
5	A	1528	G
5	A	1529	U
5	A	1530	A
5	A	1531	C
5	A	1532	U
5	A	1533	U
5	A	1534	G
5	A	1535	U
5	A	1536	G
5	A	1538	A
5	A	1539	G
5	A	1540	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	A	1547	G
5	A	1548	U
5	A	1557	U
5	A	1558	G
5	A	1564	A
5	A	1565	G
5	A	1567	A
5	A	1576	U
5	A	1580	C
5	A	1581	U
5	A	1582	U
5	A	1583	C
5	A	1586	U
5	A	1606	A
5	A	1607	A
5	A	1616	A
5	A	1632	U
5	A	1642	C
5	A	1645	U
5	A	1646	U
5	A	1647	G
5	A	1672	G
5	A	1675	A
5	A	1723	A
5	A	1725	U
5	A	1726	C
5	A	1727	G
5	A	1731	C
5	A	1760	G
5	A	1769	A
5	A	1776	A
5	A	1796	C
5	A	1797	A
5	A	1807	G
5	A	1812	C
5	A	1825	A
5	A	1844	A
5	A	1845	G
5	A	1854	A
5	A	1865	G
5	A	1869	G
5	A	1872	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	A	1902	G
5	A	1918	G
5	A	1923	A
5	A	1925	G
5	A	1926	G
5	A	1932	A
5	A	1934	A
5	A	1936	U
5	A	1951	U
5	A	1959	U
5	A	1960	G
5	A	1963	C
5	A	1966	A
5	A	1967	U
5	A	1968	G
5	A	1987	U
5	A	1989	U
5	A	2017	A
5	A	2018	U
5	A	2019	C
5	A	2029	A
5	A	2039	C
5	A	2051	C
5	A	2052	G
5	A	2056	A
5	A	2057	G
5	A	2058	A
5	A	2065	7MG
5	A	2092	C
5	A	2093	U
5	A	2194	A
5	A	2200	G
5	A	2207	G
5	A	2216	C
5	A	2219	G
5	A	2221	A
5	A	2234	G
5	A	2279	U
5	A	2283	A
5	A	2284	A
5	A	2299	G
5	A	2301	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	A	2303	G
5	A	2304	G
5	A	2305	A
5	A	2307	A
5	A	2314	G
5	A	2316	A
5	A	2317	G
5	A	2318	A
5	A	2321	A
5	A	2323	A
5	A	2341	A
5	A	2343	C
5	A	2346	C
5	A	2378	G
5	A	2379	G
5	A	2380	U
5	A	2381	C
5	A	2399	C
5	A	2402	U
5	A	2420	C
5	A	2421	A
5	A	2425	G
5	A	2426	A
5	A	2430	A
5	A	2431	A
5	A	2437	U
5	A	2444	A
5	A	2465	A
5	A	2466	G
5	A	2469	U
5	A	2471	C
5	A	2472	A
5	A	2474	A
5	A	2487	U
5	A	2498	G
5	A	2500	PSU
5	A	2503	C
5	A	2514	A
5	A	2516	C
5	A	2525	G
5	A	2543	A
5	A	2550	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	A	2562	A
5	A	2563	G
5	A	2578	G
5	A	2598	A
5	A	2599	G
5	A	2605	U
5	A	2609	U
5	A	2625	U
5	A	2657	G
5	A	2661	A
5	A	2685	U
5	A	2686	A
5	A	2687	C
5	A	2710	G
5	A	2722	U
5	A	2729	A
5	A	2744	A
5	A	2754	A
5	A	2761	A
5	A	2774	A
5	A	2776	A
5	A	2786	U
5	A	2787	A
5	A	2793	U
5	A	2796	U
5	A	2797	G
5	A	2799	C
5	A	2816	G
5	A	2817	A
5	A	2830	G
5	A	2831	A
5	A	2845	G
5	A	2851	U
5	A	2852	A
5	A	2857	U
5	A	2863	A
5	A	2869	A
5	A	2876	C
5	A	2881	U
5	A	2882	G
5	A	2898	U
6	B	2	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
6	B	13	A
6	B	14	G
6	B	40	C
6	B	44	A
6	B	49	G
6	B	50	A
6	B	59	C
6	B	64	A
6	B	65	G
6	B	66	C
6	B	71	A
6	B	87	A
6	B	105	C
6	B	106	A
31	a	6	C
31	a	7	U
31	a	10	A
31	a	11	G
31	a	15	U
31	a	24	G
31	a	34	A
31	a	41	G
31	a	49	C
31	a	50	U
31	a	53	A
31	a	62	A
31	a	66	G
31	a	76	A
31	a	77	G
31	a	80	A
31	a	81	G
31	a	82	C
31	a	83	U
31	a	84	U
31	a	85	G
31	a	91	G
31	a	97	A
31	a	117	U
31	a	126	A
31	a	127	U
31	a	163	U
31	a	170	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	184	A
31	a	185	C
31	a	186	G
31	a	193	A
31	a	205	U
31	a	206	C
31	a	208	G
31	a	216	G
31	a	241	U
31	a	243	G
31	a	247	G
31	a	262	G
31	a	263	C
31	a	276	C
31	a	285	G
31	a	302	A
31	a	314	G
31	a	324	C
31	a	325	A
31	a	340	A
31	a	341	C
31	a	343	G
31	a	344	G
31	a	348	C
31	a	350	G
31	a	363	U
31	a	368	C
31	a	380	C
31	a	393	A
31	a	402	G
31	a	407	A
31	a	409	G
31	a	410	A
31	a	417	U
31	a	418	A
31	a	419	U
31	a	420	G
31	a	425	U
31	a	426	A
31	a	435	U
31	a	442	G
31	a	447	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	448	G
31	a	461	A
31	a	462	A
31	a	463	U
31	a	481	G
31	a	483	U
31	a	492	A
31	a	494	U
31	a	496	A
31	a	508	C
31	a	515	C
31	a	516	C
31	a	518	G
31	a	524	7MG
31	a	527	G
31	a	528	U
31	a	529	A
31	a	544	A
31	a	556	A
31	a	561	C
31	a	569	A
31	a	570	A
31	a	573	C
31	a	574	G
31	a	615	C
31	a	639	A
31	a	650	A
31	a	662	A
31	a	684	A
31	a	700	G
31	a	720	U
31	a	721	G
31	a	752	G
31	a	774	A
31	a	789	A
31	a	790	U
31	a	791	A
31	a	812	A
31	a	814	C
31	a	840	U
31	a	841	G
31	a	842	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	887	G
31	a	888	U
31	a	911	A
31	a	923	G
31	a	924	G
31	a	931	C
31	a	932	A
31	a	934	A
31	a	957	U
31	a	963	2MG
31	a	966	A
31	a	968	G
31	a	972	A
31	a	973	G
31	a	974	A
31	a	990	G
31	a	1001	A
31	a	1007	U
31	a	1025	C
31	a	1026	U
31	a	1027	U
31	a	1028	C
31	a	1029	G
31	a	1030	G
31	a	1033	A
31	a	1052	A
31	a	1062	U
31	a	1091	G
31	a	1092	U
31	a	1098	A
31	a	1134	C
31	a	1136	G
31	a	1156	U
31	a	1157	G
31	a	1163	G
31	a	1164	A
31	a	1166	A
31	a	1168	A
31	a	1178	G
31	a	1179	G
31	a	1180	C
31	a	1188	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	a	1193	A
31	a	1194	A
31	a	1210	A
31	a	1211	C
31	a	1224	A
31	a	1235	A
31	a	1255	G
31	a	1267	U
31	a	1276	A
31	a	1277	A
31	a	1284	A
31	a	1295	U
31	a	1297	G
31	a	1299	C
31	a	1302	G
31	a	1317	C
31	a	1332	U
31	a	1333	C
31	a	1335	G
31	a	1337	A
31	a	1342	U
31	a	1343	A
31	a	1350	G
31	a	1360	A
31	a	1367	G
31	a	1378	U
31	a	1395	A
31	a	1398	G
31	a	1416	G
31	a	1438	A
31	a	1439	G
31	a	1443	A
31	a	1450	A
31	a	1484	G
31	a	1490	A
31	a	1491	G
31	a	1494	G
31	a	1503	U
31	a	1514	G
31	a	1526	G
31	a	1527	G
52	v	9	A

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Mol	Chain	Res	Type
52	v	10	G
52	v	17	U
52	v	18	G
52	v	19	G
52	v	20	H2U
52	v	21	U
52	v	22	A
52	v	23	G
52	v	27	A
52	v	28	C
52	v	37	U
52	v	38	A
52	v	49	C
52	v	50	A
52	v	51	C
52	v	52	A
52	v	55	5MU
52	v	56	PSU
52	v	58	A
52	v	64	C
52	v	65	G
52	v	67	C

All (22) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
5	A	91	A
5	A	109	G
5	A	256	C
5	A	365	U
5	A	368	C
5	A	424	G
5	A	478	A
5	A	507	U
5	A	625	A
5	A	782	G
5	A	844	A
5	A	1173	G
5	A	1179	G
5	A	1187	G
5	A	1564	A
5	A	2379	G

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Mol	Chain	Res	Type
5	A	2419	U
5	A	2443	G
5	A	2502	U
5	A	2786	U
6	B	13	A
6	B	86	U

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

25 non-standard protein/DNA/RNA residues are modelled in this entry.

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
5	PSU	A	2500	5	18,21,22	1.05	1 (5%)	22,30,33	1.76	4 (18%)
31	7MG	a	524	31	22,26,27	1.20	1 (4%)	29,39,42	0.82	1 (3%)
5	7MG	A	2065	5	22,26,27	1.10	1 (4%)	29,39,42	0.85	1 (3%)
52	5MU	v	55	52	19,22,23	0.44	0	28,32,35	0.59	0
31	PSU	a	513	31	18,21,22	1.06	1 (5%)	22,30,33	1.81	5 (22%)
31	5MC	a	964	31	18,22,23	0.62	0	26,32,35	0.56	0
5	PSU	A	2601	5	18,21,22	1.03	1 (5%)	22,30,33	1.83	3 (13%)
5	PSU	A	2576	5	18,21,22	1.08	2 (11%)	22,30,33	1.88	5 (22%)
31	4OC	a	1399	31	20,23,24	3.09	8 (40%)	26,32,35	0.89	1 (3%)
52	PSU	v	56	52	18,21,22	1.02	1 (5%)	22,30,33	1.76	5 (22%)
31	2MG	a	1204	31	18,26,27	1.18	2 (11%)	16,38,41	0.92	1 (6%)
31	MA6	a	1516	31	18,26,27	1.07	2 (11%)	19,38,41	3.56	2 (10%)
5	PSU	A	952	5	18,21,22	1.02	1 (5%)	22,30,33	1.83	4 (18%)
5	5MU	A	1935	5	19,22,23	0.52	0	28,32,35	0.51	0
31	MA6	a	1515	31	18,26,27	1.04	2 (11%)	19,38,41	3.44	2 (10%)
31	UR3	a	1495	31	19,22,23	2.83	7 (36%)	26,32,35	1.29	1 (3%)
31	2MG	a	963	31	18,26,27	1.18	2 (11%)	16,38,41	0.92	1 (6%)
5	OMU	A	2548	5	19,22,23	2.90	8 (42%)	26,31,34	1.73	5 (19%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	OMG	A	2247	5	18,26,27	1.19	2 (11%)	19,38,41	0.85	1 (5%)
5	2MA	A	2499	5	17,25,26	2.47	5 (29%)	17,37,40	1.45	4 (23%)
52	4SU	v	8	52	18,21,22	4.30	8 (44%)	26,30,33	2.21	5 (19%)
52	H2U	v	20	52	18,21,22	0.51	0	21,30,33	1.42	4 (19%)
5	PSU	A	2453	5	18,21,22	1.05	1 (5%)	22,30,33	1.83	4 (18%)
5	6MZ	A	2026	5	18,25,26	1.86	3 (16%)	16,36,39	3.43	3 (18%)
5	2MG	A	2441	5	18,26,27	1.24	2 (11%)	16,38,41	0.84	1 (6%)

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
5	PSU	A	2500	5	-	1/7/25/26	0/2/2/2
31	7MG	a	524	31	-	2/7/37/38	0/3/3/3
5	7MG	A	2065	5	-	1/7/37/38	0/3/3/3
52	5MU	v	55	52	-	7/7/25/26	0/2/2/2
31	PSU	a	513	31	-	0/7/25/26	0/2/2/2
31	5MC	a	964	31	-	0/7/25/26	0/2/2/2
5	PSU	A	2601	5	-	0/7/25/26	0/2/2/2
5	PSU	A	2576	5	-	0/7/25/26	0/2/2/2
31	4OC	a	1399	31	-	2/9/29/30	0/2/2/2
52	PSU	v	56	52	-	1/7/25/26	0/2/2/2
31	2MG	a	1204	31	-	0/5/27/28	0/3/3/3
31	MA6	a	1516	31	-	0/7/29/30	0/3/3/3
5	PSU	A	952	5	-	0/7/25/26	0/2/2/2
5	5MU	A	1935	5	-	0/7/25/26	0/2/2/2
31	MA6	a	1515	31	-	0/7/29/30	0/3/3/3
31	UR3	a	1495	31	-	0/7/25/26	0/2/2/2
31	2MG	a	963	31	-	0/5/27/28	0/3/3/3
5	OMU	A	2548	5	-	0/9/27/28	0/2/2/2
5	OMG	A	2247	5	-	1/5/27/28	0/3/3/3
5	2MA	A	2499	5	-	2/3/25/26	0/3/3/3
52	4SU	v	8	52	-	2/7/25/26	0/2/2/2
52	H2U	v	20	52	-	3/7/38/39	0/2/2/2
5	PSU	A	2453	5	-	0/7/25/26	0/2/2/2
5	6MZ	A	2026	5	-	2/5/27/28	0/3/3/3
5	2MG	A	2441	5	-	2/5/27/28	0/3/3/3

All (61) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
52	v	8	4SU	C2-N1	9.49	1.53	1.38
52	v	8	4SU	C4-N3	8.54	1.46	1.37
5	A	2499	2MA	C2-N3	7.08	1.46	1.31
52	v	8	4SU	C2-N3	7.03	1.50	1.38
31	a	1495	UR3	C2-N1	6.73	1.48	1.38
52	v	8	4SU	C5-C4	6.72	1.51	1.42
31	a	1399	4OC	C4-N3	6.69	1.44	1.32
31	a	1495	UR3	C6-C5	6.69	1.50	1.35
5	A	2548	OMU	C2-N1	6.59	1.49	1.38
52	v	8	4SU	C6-C5	6.38	1.49	1.35
5	A	2548	OMU	C2-N3	6.36	1.49	1.38
5	A	2026	6MZ	C6-N6	6.27	1.45	1.35
31	a	1399	4OC	C6-C5	6.18	1.49	1.35
31	a	1399	4OC	C2-N3	5.99	1.48	1.36
31	a	1495	UR3	C2-N3	5.62	1.49	1.39
5	A	2548	OMU	C6-C5	5.48	1.47	1.35
5	A	2499	2MA	C4-N3	5.07	1.49	1.37
31	a	524	7MG	C5-N7	4.98	1.41	1.35
31	a	1399	4OC	C4-N4	4.77	1.45	1.35
5	A	2065	7MG	C5-N7	4.41	1.40	1.35
52	v	8	4SU	C4-S4	-4.40	1.60	1.68
31	a	1399	4OC	C2-N1	4.09	1.48	1.40
5	A	2548	OMU	C4-N3	3.86	1.45	1.38
31	a	1399	4OC	C5-C4	3.71	1.48	1.40
5	A	2441	2MG	C8-N7	-3.38	1.29	1.35
31	a	1495	UR3	C6-N1	3.31	1.46	1.38
31	a	513	PSU	C6-C5	3.28	1.39	1.35
52	v	56	PSU	C6-C5	3.25	1.39	1.35
5	A	2500	PSU	C6-C5	3.24	1.39	1.35
5	A	2548	OMU	O4-C4	-3.18	1.18	1.24
5	A	2576	PSU	C6-C5	3.14	1.39	1.35
5	A	2453	PSU	C6-C5	3.13	1.39	1.35
31	a	1399	4OC	C6-N1	3.11	1.45	1.38
5	A	2247	OMG	C8-N7	-3.05	1.29	1.35
31	a	963	2MG	C8-N7	-3.02	1.29	1.35
31	a	1204	2MG	C8-N7	-3.00	1.29	1.35
5	A	2601	PSU	C6-C5	3.00	1.38	1.35
5	A	952	PSU	C6-C5	2.96	1.38	1.35
5	A	2499	2MA	C5-C4	-2.92	1.35	1.43
31	a	1516	MA6	C5-C4	-2.85	1.33	1.40
31	a	1399	4OC	O2-C2	-2.82	1.18	1.23
5	A	2026	6MZ	C5-C4	-2.81	1.33	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	2499	2MA	C6-N1	2.77	1.44	1.38
31	a	1515	MA6	C5-C4	-2.76	1.33	1.40
5	A	2548	OMU	C6-N1	2.71	1.44	1.38
5	A	2548	OMU	O2-C2	-2.65	1.18	1.23
52	v	8	4SU	C6-N1	2.59	1.44	1.38
52	v	8	4SU	O2-C2	-2.58	1.18	1.23
5	A	2441	2MG	C5-C6	-2.54	1.42	1.47
5	A	2499	2MA	C2-N1	2.50	1.44	1.36
31	a	963	2MG	C5-C6	-2.48	1.42	1.47
31	a	1204	2MG	C5-C6	-2.47	1.42	1.47
5	A	2247	OMG	C5-C6	-2.46	1.42	1.47
31	a	1516	MA6	C2-N3	2.39	1.35	1.32
31	a	1515	MA6	C2-N3	2.34	1.35	1.32
5	A	2026	6MZ	C2-N3	2.32	1.35	1.32
5	A	2548	OMU	C5-C4	2.27	1.48	1.43
31	a	1495	UR3	C5-C4	2.16	1.49	1.43
31	a	1495	UR3	C4-N3	2.09	1.45	1.40
5	A	2576	PSU	O4'-C1'	-2.06	1.41	1.43
31	a	1495	UR3	O2-C2	-2.03	1.18	1.22

All (63) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
31	a	1516	MA6	N1-C6-N6	-14.24	102.07	117.06
31	a	1515	MA6	N1-C6-N6	-13.71	102.63	117.06
5	A	2026	6MZ	C1'-N9-C4	-12.21	105.19	126.64
52	v	8	4SU	C4-N3-C2	-7.52	120.04	127.34
31	a	1516	MA6	N3-C2-N1	-5.65	119.86	128.68
31	a	1515	MA6	N3-C2-N1	-5.55	120.00	128.68
52	v	8	4SU	C5-C4-N3	5.44	119.74	114.69
5	A	2548	OMU	C4-N3-C2	-5.40	119.46	126.58
5	A	2026	6MZ	N3-C2-N1	-5.15	120.64	128.68
5	A	2453	PSU	C4-N3-C2	-4.79	119.43	126.34
5	A	2601	PSU	C4-N3-C2	-4.79	119.43	126.34
5	A	2576	PSU	N1-C2-N3	4.77	120.53	115.13
5	A	952	PSU	C4-N3-C2	-4.74	119.51	126.34
31	a	1495	UR3	C4-N3-C2	-4.73	120.11	124.56
5	A	952	PSU	N1-C2-N3	4.68	120.43	115.13
5	A	2453	PSU	N1-C2-N3	4.67	120.42	115.13
5	A	2576	PSU	C4-N3-C2	-4.65	119.64	126.34
5	A	2601	PSU	N1-C2-N3	4.59	120.33	115.13
31	a	513	PSU	N1-C2-N3	4.58	120.32	115.13

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	2500	PSU	N1-C2-N3	4.55	120.29	115.13
5	A	2500	PSU	C4-N3-C2	-4.54	119.80	126.34
31	a	513	PSU	C4-N3-C2	-4.50	119.86	126.34
52	v	56	PSU	C4-N3-C2	-4.48	119.89	126.34
52	v	56	PSU	N1-C2-N3	4.41	120.13	115.13
5	A	2548	OMU	N3-C2-N1	3.89	120.06	114.89
5	A	2499	2MA	C5-C6-N1	3.85	120.66	114.02
52	v	20	H2U	C5-C4-N3	-3.60	112.60	116.65
52	v	8	4SU	N3-C2-N1	3.58	119.64	114.89
52	v	8	4SU	C5-C4-S4	-3.51	119.95	124.47
5	A	2548	OMU	C5-C4-N3	3.49	120.07	114.84
52	v	20	H2U	O2-C2-N1	3.35	127.32	123.11
5	A	2499	2MA	C8-N7-C5	3.02	108.75	102.99
52	v	56	PSU	O2-C2-N1	-2.99	119.50	122.79
5	A	2548	OMU	O4-C4-C5	-2.86	120.14	125.16
31	a	513	PSU	O2-C2-N1	-2.79	119.72	122.79
5	A	952	PSU	O2-C2-N1	-2.76	119.75	122.79
5	A	2500	PSU	O2-C2-N1	-2.63	119.90	122.79
5	A	2026	6MZ	C2-N1-C6	2.61	118.82	116.59
5	A	2576	PSU	O2-C2-N1	-2.56	119.97	122.79
5	A	2453	PSU	O2-C2-N1	-2.50	120.04	122.79
5	A	2576	PSU	O4'-C1'-C2'	2.50	108.66	105.14
5	A	2247	OMG	O6-C6-C5	2.46	129.17	124.37
52	v	8	4SU	C1'-N1-C2	2.46	122.02	117.57
5	A	2548	OMU	O2-C2-N1	-2.41	119.58	122.79
31	a	513	PSU	C6-N1-C2	-2.38	120.25	122.68
5	A	2576	PSU	C6-N1-C2	-2.38	120.25	122.68
5	A	2441	2MG	O6-C6-C5	2.36	128.97	124.37
31	a	513	PSU	O4'-C1'-C2'	2.33	108.44	105.14
31	a	1204	2MG	O6-C6-C5	2.33	128.93	124.37
31	a	1399	4OC	C6-C5-C4	2.31	119.79	116.96
5	A	2601	PSU	O2-C2-N1	-2.29	120.27	122.79
52	v	56	PSU	C6-N1-C2	-2.29	120.34	122.68
52	v	56	PSU	C6-C5-C4	2.29	119.80	118.20
5	A	2500	PSU	C6-N1-C2	-2.28	120.35	122.68
31	a	524	7MG	C5-C4-N9	2.28	109.30	106.35
52	v	20	H2U	O2-C2-N3	-2.25	117.30	121.50
31	a	963	2MG	O6-C6-C5	2.24	128.75	124.37
5	A	2065	7MG	C5-C4-N9	2.24	109.26	106.35
5	A	952	PSU	C6-N1-C2	-2.19	120.44	122.68
5	A	2499	2MA	CM2-C2-N1	2.08	120.85	116.23
5	A	2453	PSU	C6-N1-C2	-2.06	120.58	122.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	2499	2MA	N1-C2-N3	-2.03	119.69	123.06
52	v	20	H2U	C4-N3-C2	2.02	127.47	125.79

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
52	v	8	4SU	O4'-C1'-N1-C2
52	v	20	H2U	C2'-C1'-N1-C2
52	v	55	5MU	C3'-C4'-C5'-O5'
52	v	55	5MU	O4'-C4'-C5'-O5'
5	A	2026	6MZ	O4'-C4'-C5'-O5'
5	A	2247	OMG	C1'-C2'-O2'-CM2
5	A	2499	2MA	O4'-C4'-C5'-O5'
31	a	524	7MG	C3'-C4'-C5'-O5'
5	A	2026	6MZ	C3'-C4'-C5'-O5'
52	v	8	4SU	O4'-C1'-N1-C6
5	A	2499	2MA	C3'-C4'-C5'-O5'
52	v	20	H2U	C2'-C1'-N1-C6
52	v	55	5MU	C2'-C1'-N1-C6
5	A	2441	2MG	C3'-C4'-C5'-O5'
31	a	524	7MG	O4'-C4'-C5'-O5'
52	v	55	5MU	O4'-C1'-N1-C6
5	A	2441	2MG	O4'-C4'-C5'-O5'
52	v	55	5MU	C2'-C1'-N1-C2
52	v	55	5MU	C4'-C5'-O5'-P
31	a	1399	4OC	O4'-C4'-C5'-O5'
52	v	55	5MU	O4'-C1'-N1-C2
52	v	56	PSU	C4'-C5'-O5'-P
5	A	2500	PSU	O4'-C4'-C5'-O5'
52	v	20	H2U	O4'-C1'-N1-C2
31	a	1399	4OC	C3'-C4'-C5'-O5'
5	A	2065	7MG	O4'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

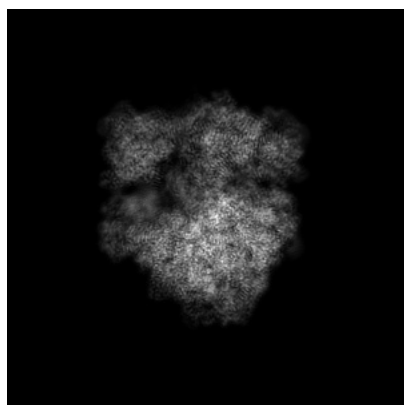
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-26818. These allow visual inspection of the internal detail of the map and identification of artifacts.

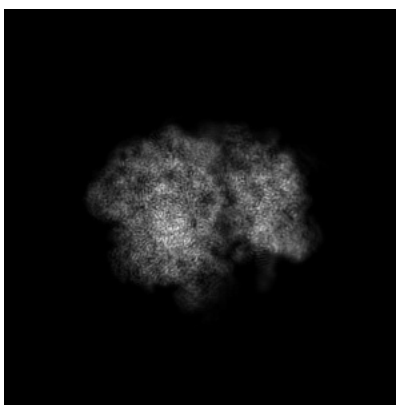
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

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

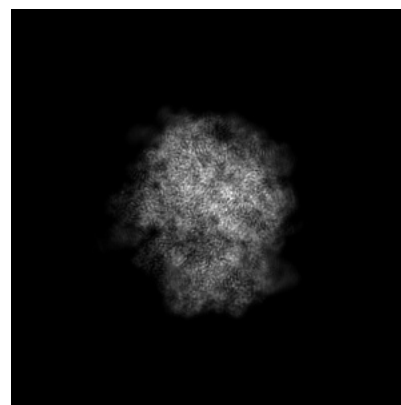
#### 6.1.1 Primary map



X



Y

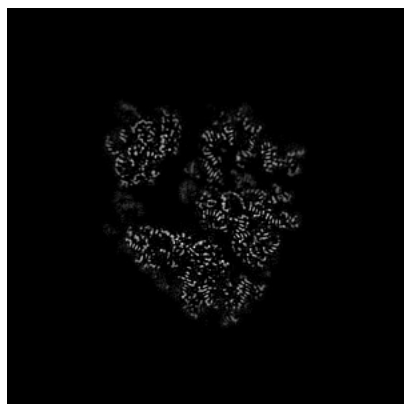


Z

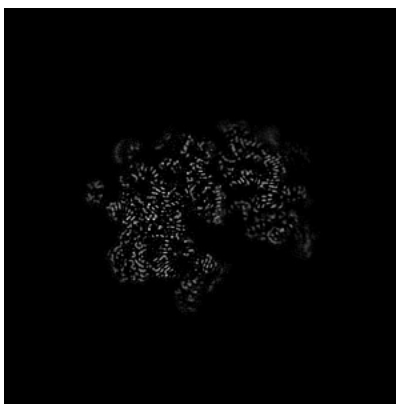
The images above show the map projected in three orthogonal directions.

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

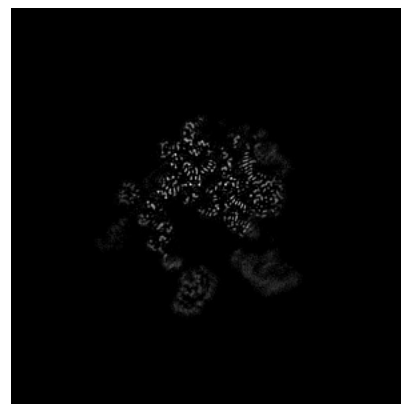
#### 6.2.1 Primary map



X Index: 256



Y Index: 256

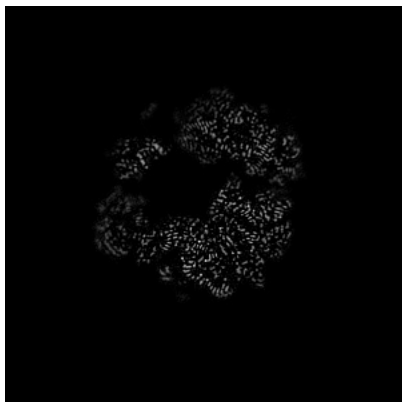


Z Index: 256

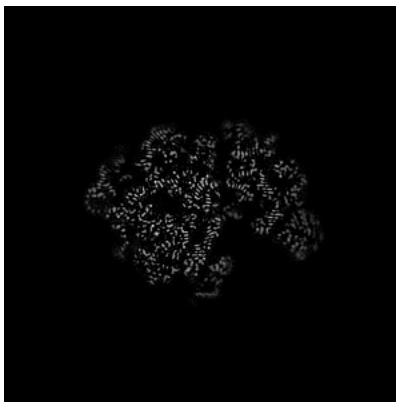
The images above show central slices of the map in three orthogonal directions.

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

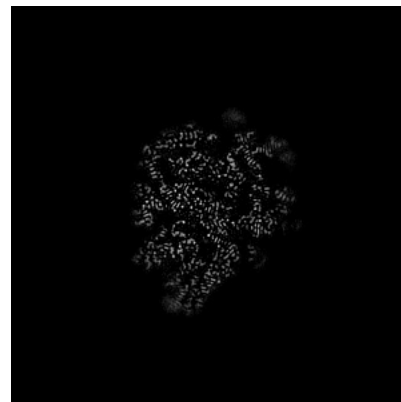
### 6.3.1 Primary map



X Index: 228



Y Index: 276

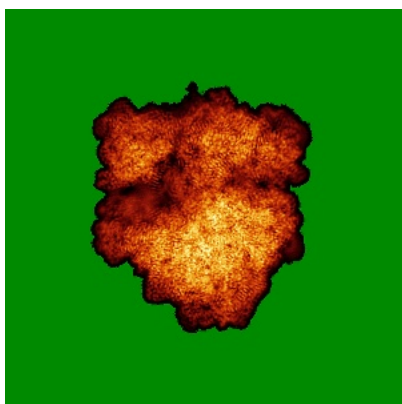


Z Index: 208

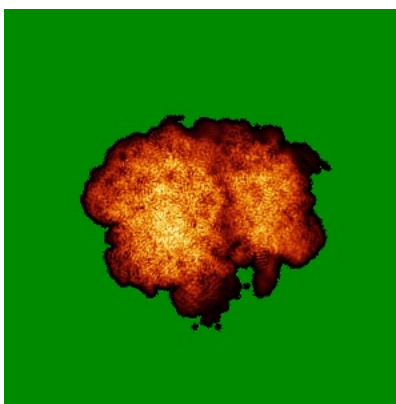
The images above show the largest variance slices of the map in three orthogonal directions.

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

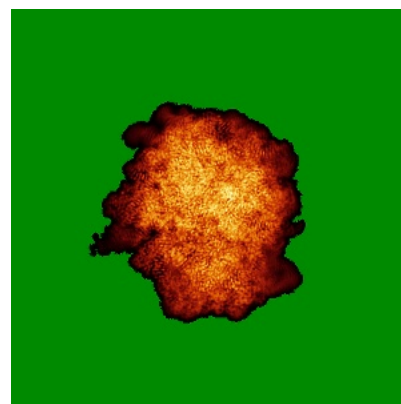
### 6.4.1 Primary map



X



Y

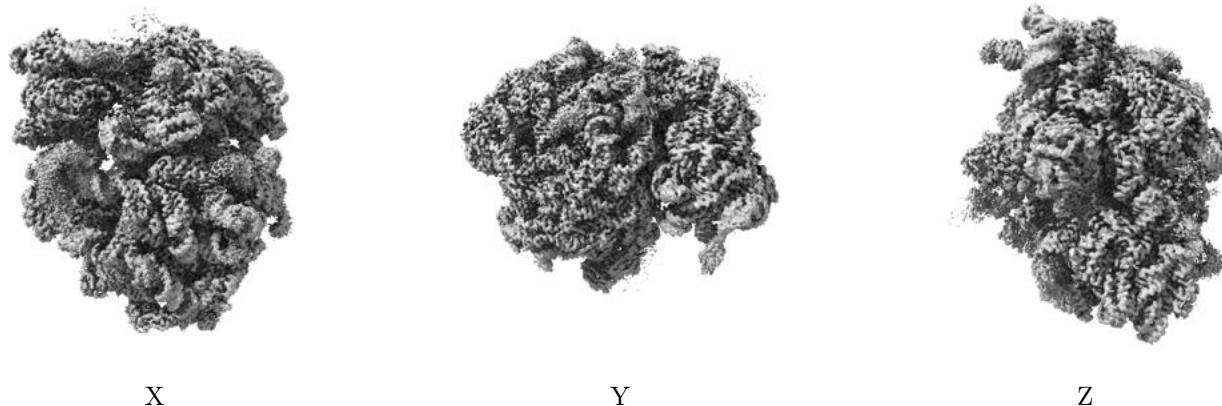


Z

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

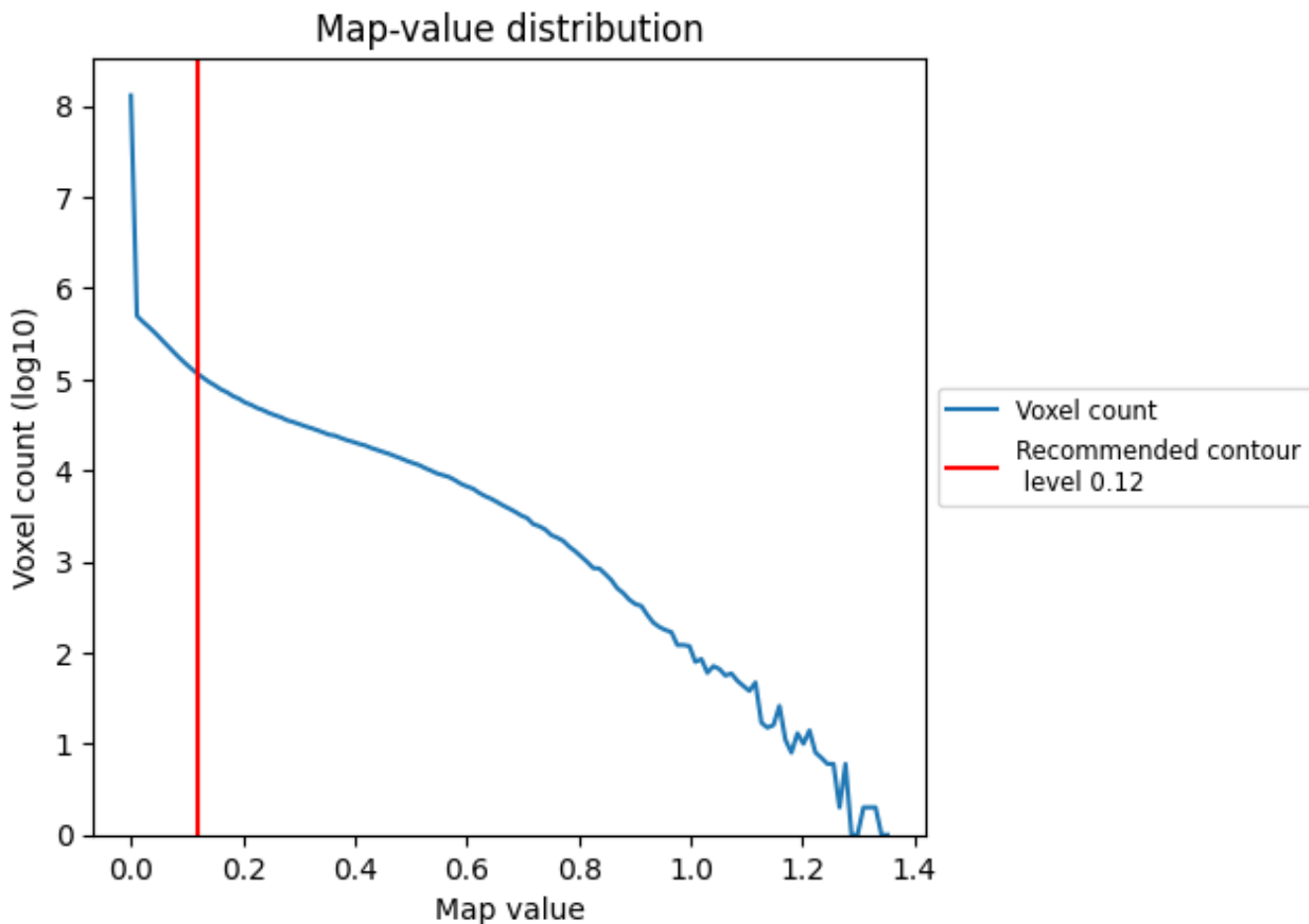
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

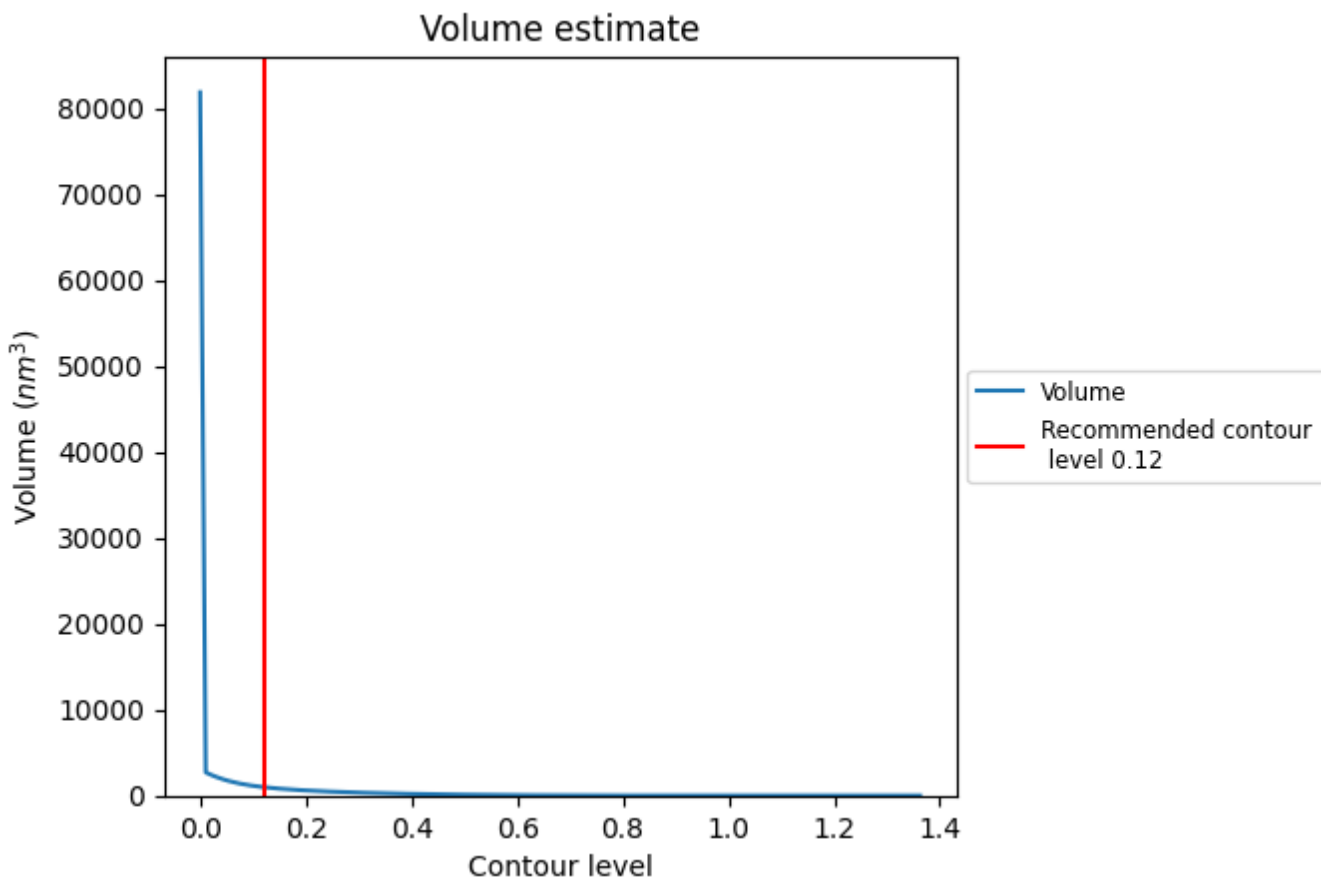
This section contains the results of statistical analysis of the map.

### 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.

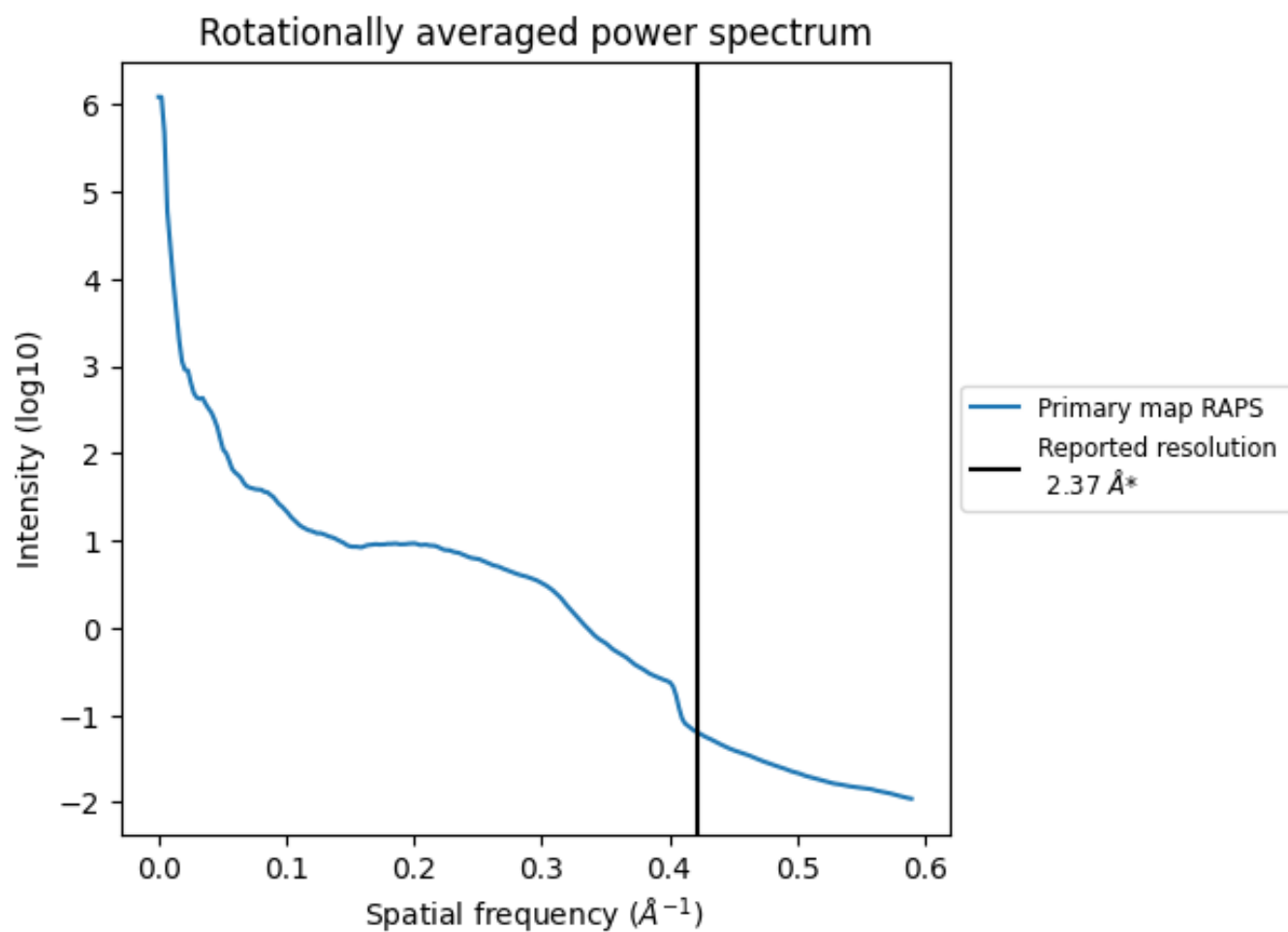
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 982 nm<sup>3</sup>; this corresponds to an approximate mass of 887 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 0.422 Å<sup>-1</sup>



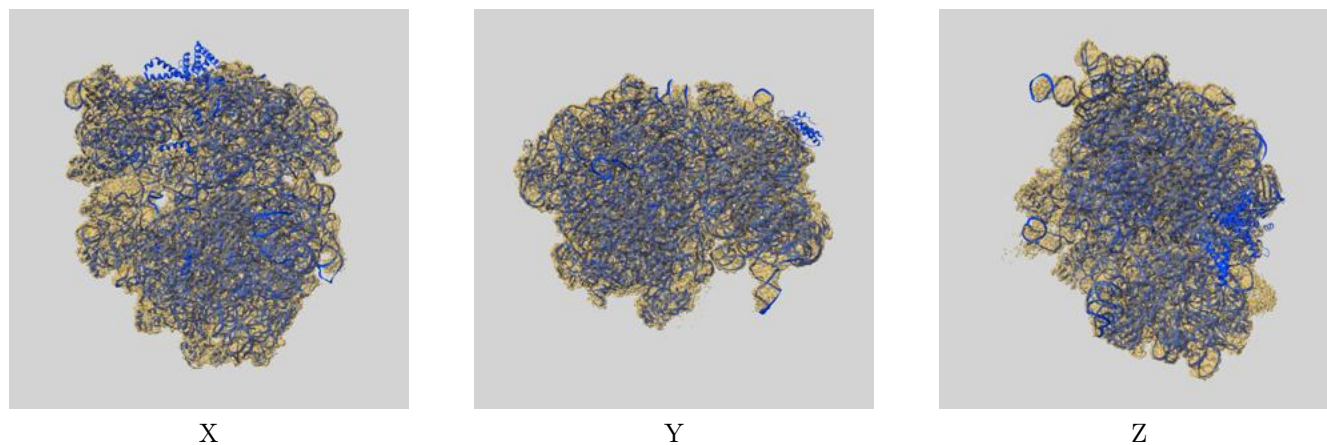
## 8 Fourier-Shell correlation

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

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

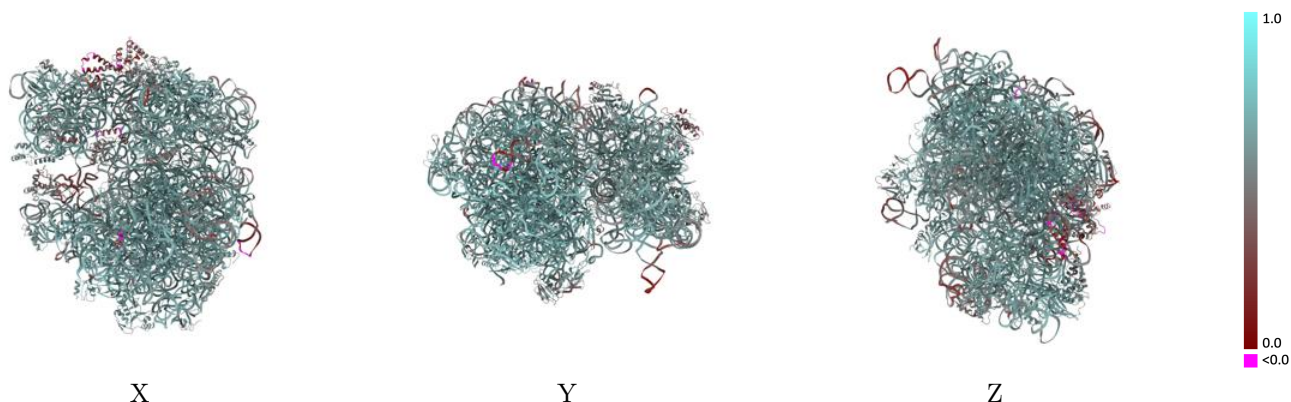
This section contains information regarding the fit between EMDB map EMD-26818 and PDB model 7UVW. Per-residue inclusion information can be found in section 3 on page 13.

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



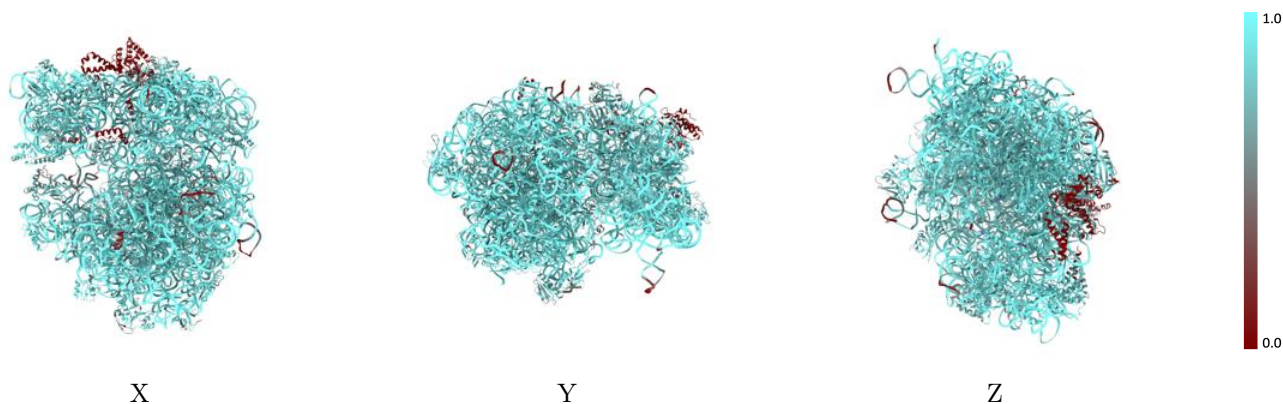
The images above show the 3D surface view of the map at the recommended contour level 0.12 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



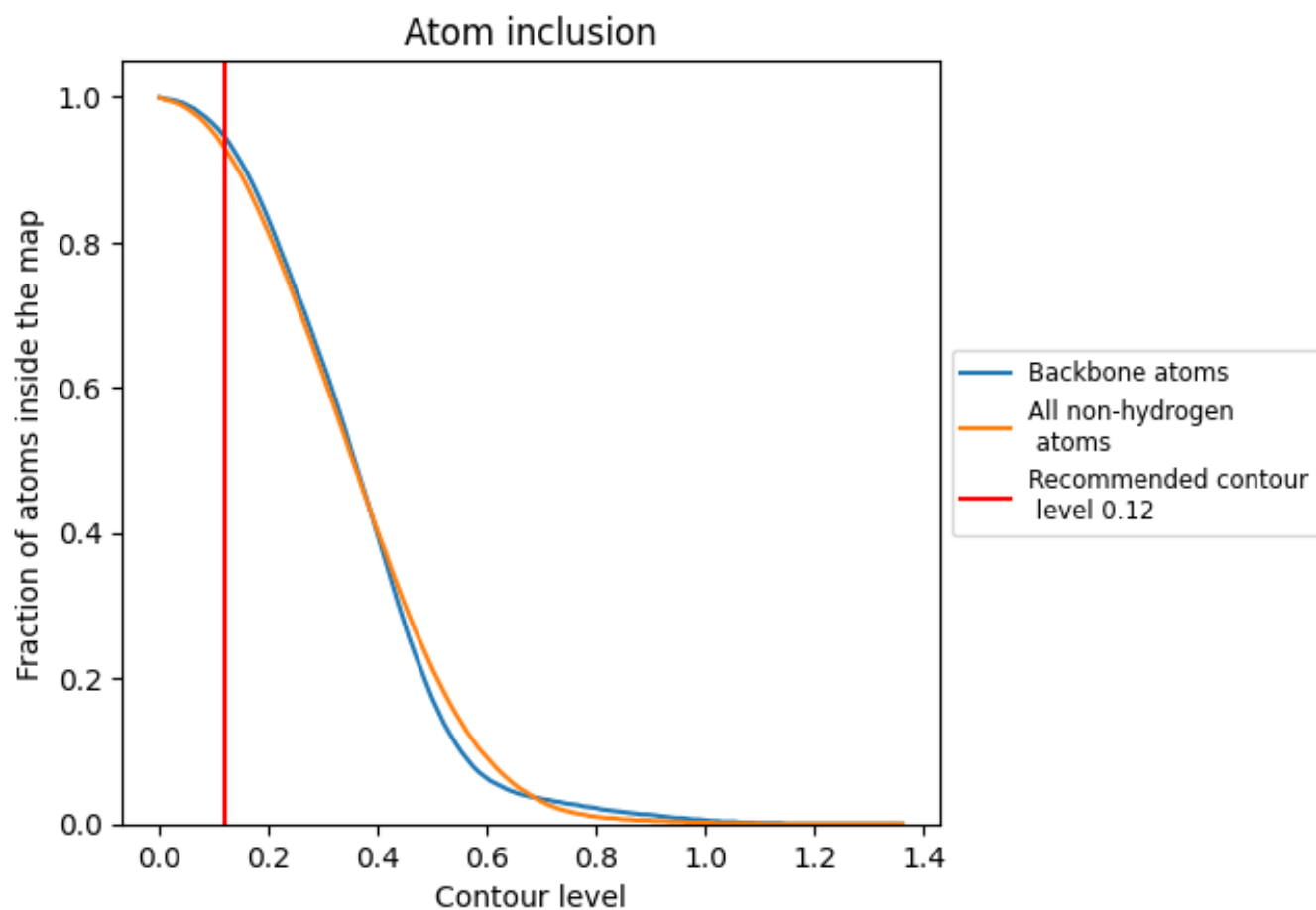
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.12).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 93% 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 (0.12) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9290	 0.6170
0	 0.9180	 0.6600
1	 0.9650	 0.6970
2	 0.9920	 0.7050
3	 0.9550	 0.6580
A	 0.9710	 0.6430
B	 0.9840	 0.5890
C	 0.9420	 0.6660
D	 0.9570	 0.6770
E	 0.9090	 0.6500
F	 0.6660	 0.4320
G	 0.8390	 0.5580
H	 0.4230	 0.4090
I	 0.9590	 0.6750
J	 0.8600	 0.6230
K	 0.9640	 0.6730
L	 0.9440	 0.6630
M	 0.9810	 0.6900
N	 0.9360	 0.5950
O	 0.8870	 0.6340
P	 0.9880	 0.6910
Q	 0.9620	 0.6660
R	 0.9530	 0.6750
S	 0.8800	 0.6230
T	 0.8310	 0.5960
U	 0.9290	 0.6310
V	 0.9770	 0.6900
W	 0.9450	 0.6690
X	 0.8170	 0.5540
Y	 0.9570	 0.6740
Z	 0.9460	 0.6700
a	 0.9660	 0.6020
b	 0.0830	 0.3320
c	 0.8990	 0.6040
d	 0.7790	 0.5230



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Chain	Atom inclusion	Q-score
e	 0.9240	 0.6150
f	 0.7280	 0.5100
g	 0.6780	 0.5050
h	 0.9380	 0.6280
i	 0.9370	 0.6290
j	 0.8600	 0.5900
k	 0.7100	 0.4990
l	 0.8380	 0.6070
m	 0.9270	 0.6160
n	 0.9330	 0.6320
o	 0.9310	 0.6200
p	 0.9530	 0.6390
q	 0.8880	 0.6000
r	 0.8690	 0.5880
s	 0.9430	 0.6230
t	 0.9500	 0.6170
u	 0.1710	 0.3520
v	 0.7730	 0.4380
w	 0.8770	 0.5180