



## Full wwPDB EM Validation Report ⓘ

Dec 19, 2022 – 08:33 am GMT

PDB ID : 7NFX  
EMDB ID : EMD-12303  
Title : Mammalian ribosome nascent chain complex with SRP and SRP receptor in early state A  
Authors : Jomaa, A.; Lee, J.H.; Shan, S.; Ban, N.  
Deposited on : 2021-02-08  
Resolution : 3.20 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:

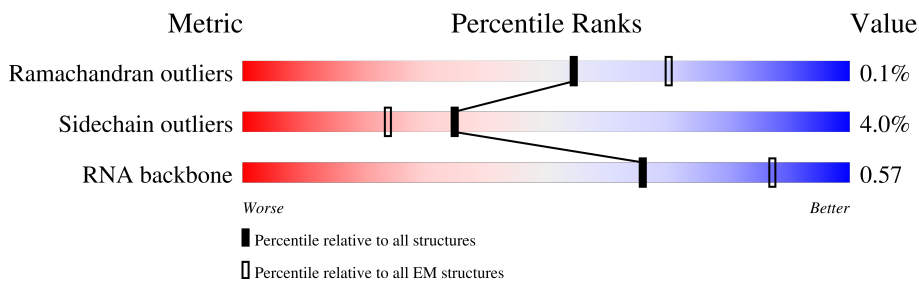
EMDB validation analysis : 0.0.1.dev43  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.3

# 1 Overall quality at a glance

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

The reported resolution of this entry is 3.20 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.



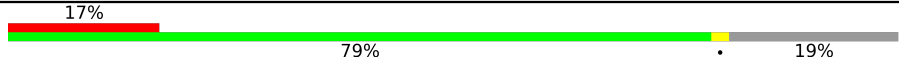
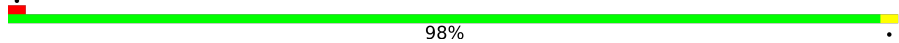

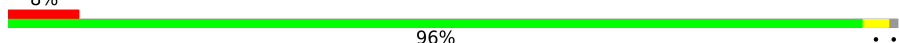
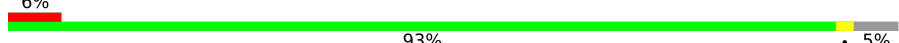
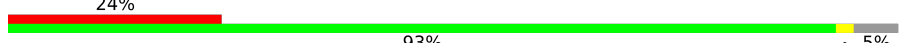
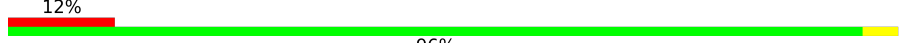

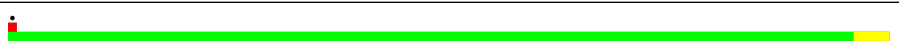

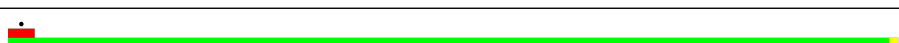

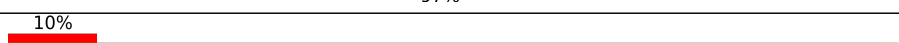
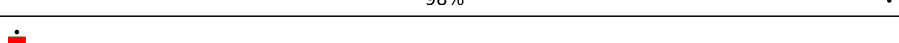
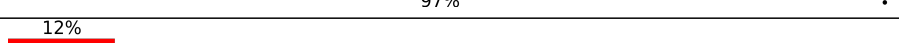
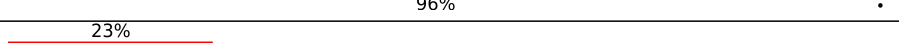
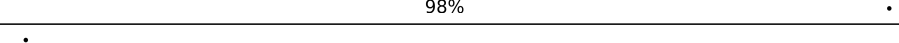
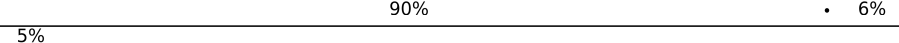
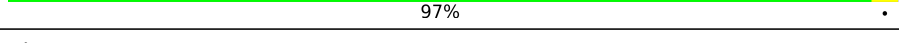


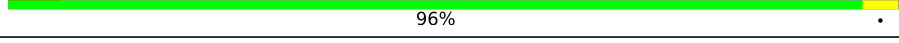
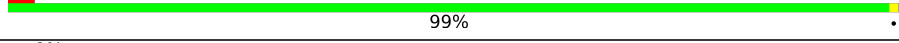

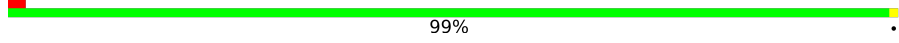
Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	1	299	
2	5	3493	
3	7	120	
4	8	156	
5	A	245	
6	B	403	
7	C	413	
8	D	297	

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Mol	Chain	Length	Quality of chain
9	E	291	
10	F	225	
11	G	319	
12	H	192	
13	I	214	
14	J	178	
15	L	210	
16	M	218	
17	N	204	
18	O	199	
19	P	153	
20	Q	187	
21	R	180	
22	S	175	
23	T	160	
24	U	99	
25	V	140	
26	W	63	
27	X	156	
28	Y	145	
29	Z	136	
30	a	148	
31	b	223	
32	c	94	
33	d	125	

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Mol	Chain	Length	Quality of chain
34	e	128	99%
35	f	110	95%
36	g	129	9% 84% 12%
37	h	123	93% 6%
38	i	104	10% 95%
39	j	97	86% 11%
40	k	69	25% 94% 6%
41	l	51	8% 94%
42	m	52	10% 94% 6%
43	n	25	92% 8%
44	o	105	8% 95%
45	p	92	8% 96%
46	q	144	72% 72% 28%
47	r	137	5% 86% 5% 9%
48	s	21	100% 100%
49	t	136	52% 65% 35%
50	u	627	31% 31% 69%
51	v	271	69% 67% 31%
52	w	86	76% 87% 13%
53	x	504	80% 67% 15% 17%
54	y	638	23% 23% 77%
55	z	671	97%

## 2 Entry composition [i](#)

There are 59 unique types of molecules in this entry. The entry contains 148232 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 RNA chain called SRP RNA 7SL.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	1	249	5341	2377	977	1738	249	0	0

- Molecule 2 is a RNA chain called 28S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	5	3493	74854	33335	13681	24346	3492	0	0

- Molecule 3 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	7	120	2558	1141	456	842	119	0	0

- Molecule 4 is a RNA chain called 5.8S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	8	156	3314	1480	585	1094	155	0	0

- Molecule 5 is a protein called uL2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	A	244	1868	1171	382	309	6	0	0

- Molecule 6 is a protein called uL3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	B	394	3148	2007	591	537	13	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1	MET	-	initiating methionine	UNP G1TL06

- Molecule 7 is a protein called 60S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	C	362	2883	1812	577	480	14	0	0

- Molecule 8 is a protein called 60S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	D	292	2386	1509	437	426	14	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	1	MET	-	initiating methionine	UNP G1SYJ6

- Molecule 9 is a protein called 60S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	E	236	1898	1215	362	318	3	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	126	ARG	LYS	conflict	UNP G1SKF7
E	217	GLN	LYS	conflict	UNP G1SKF7

- Molecule 10 is a protein called uL30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	F	225	1870	1202	358	301	9	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	175	ALA	THR	conflict	UNP G1SV32
F	185	GLY	ASN	conflict	UNP G1SV32
F	202	ARG	HIS	conflict	UNP G1SV32
F	233	GLU	GLY	conflict	UNP G1SV32

- Molecule 11 is a protein called 60S ribosomal protein L7a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	G	241	1934	1233	371	326	4	0	0

- Molecule 12 is a protein called 60S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	H	190	1516	954	284	272	6	0	0

- Molecule 13 is a protein called 60S ribosomal protein L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	I	204	1655	1051	319	272	13	0	0

- Molecule 14 is a protein called Ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	J	169	1353	855	252	240	6	0	0

- Molecule 15 is a protein called 60S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	L	210	1703	1065	354	280	4	0	0

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
L	47	ALA	-	insertion	UNP G1TPV0
L	48	PRO	-	insertion	UNP G1TPV0
L	49	ARG	-	insertion	UNP G1TPV0
L	50	PRO	-	insertion	UNP G1TPV0

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Chain	Residue	Modelled	Actual	Comment	Reference
L	51	ALA	-	insertion	UNP G1TPV0
L	52	SER	-	insertion	UNP G1TPV0
L	53	GLY	-	insertion	UNP G1TPV0
L	54	PRO	-	insertion	UNP G1TPV0
L	55	LEU	-	insertion	UNP G1TPV0

- Molecule 16 is a protein called 60S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	M	138	1137	727	221	182	7	0	0

- Molecule 17 is a protein called Ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	N	203	1701	1072	359	266	4	0	0

- Molecule 18 is a protein called uL13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	O	199	1638	1056	321	256	5	0	0

- Molecule 19 is a protein called uL22.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	P	153	1242	777	241	215	9	0	0

- Molecule 20 is a protein called eL18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	Q	187	1506	941	311	249	5	0	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Q	6	ARG	LEU	conflict	UNP G1TX70
Q	14	ARG	TRP	conflict	UNP G1TX70

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Chain	Residue	Modelled	Actual	Comment	Reference
Q	23	ILE	MET	conflict	UNP G1TX70
Q	24	TYR	CYS	conflict	UNP G1TX70
Q	38	ARG	HIS	conflict	UNP G1TX70
Q	57	ASN	LYS	conflict	UNP G1TX70
Q	66	MET	VAL	conflict	UNP G1TX70
Q	74	GLY	ASP	conflict	UNP G1TX70
Q	75	ARG	PRO	conflict	UNP G1TX70
Q	77	GLY	ASN	conflict	UNP G1TX70
Q	106	SER	THR	conflict	UNP G1TX70
Q	110	ARG	HIS	conflict	UNP G1TX70
Q	117	GLY	GLU	conflict	UNP G1TX70
Q	124	ASP	HIS	conflict	UNP G1TX70
Q	134	CYS	ARG	conflict	UNP G1TX70
Q	150	ARG	GLN	conflict	UNP G1TX70
Q	172	ARG	GLY	conflict	UNP G1TX70
Q	184	ARG	TRP	conflict	UNP G1TX70

- Molecule 21 is a protein called 60S RIBOSOMAL PROTEIN EL19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	R	180	1508	933	328	238	9	0	0

- Molecule 22 is a protein called eL20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	S	175	1454	925	284	235	10	0	0

- Molecule 23 is a protein called eL21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	T	159	1298	823	252	217	6	0	0

- Molecule 24 is a protein called Ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	U	99	808	518	141	147	2	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
U	32	GLY	ARG	variant	UNP G1TSG1
U	36	ALA	GLU	variant	UNP G1TSG1
U	39	PHE	SER	variant	UNP G1TSG1
U	54	GLY	ARG	variant	UNP G1TSG1
U	60	VAL	ALA	variant	UNP G1TSG1
U	97	ARG	HIS	variant	UNP G1TSG1

- Molecule 25 is a protein called Ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	V	131	979	618	184	172	5	0	0

- Molecule 26 is a protein called Ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	W	63	528	337	103	85	3	0	0

- Molecule 27 is a protein called uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	X	119	976	624	183	168	1	0	0

- Molecule 28 is a protein called Ribosomal protein L26.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	Y	134	1115	700	226	186	3	0	0

- Molecule 29 is a protein called 60S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	Z	135	1107	714	208	182	3	0	0

- Molecule 30 is a protein called uL15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	a	147	1162	734	239	185	4	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	1	MET	-	initiating methionine	UNP G1SNY0

- Molecule 31 is a protein called 60S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	b	75	609	378	130	98	3	0	0

- Molecule 32 is a protein called eL30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	c	94	732	465	130	131	6	0	0

- Molecule 33 is a protein called eL31.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	d	107	888	560	171	155	2	0	0

- Molecule 34 is a protein called eL32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	e	128	1053	667	216	165	5	0	0

- Molecule 35 is a protein called eL33.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	f	109	876	555	174	143	4	0	0

- Molecule 36 is a protein called 60S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	g	114	906	566	187	147	6	0	0

- Molecule 37 is a protein called uL29.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	h	122	Total	C	N	O	S	0	0
			1013	640	204	168	1		

- Molecule 38 is a protein called eL36.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	i	102	Total	C	N	O	S	0	0
			830	520	176	129	5		

- Molecule 39 is a protein called Ribosomal protein L37.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	j	86	Total	C	N	O	S	0	0
			705	434	155	111	5		

- Molecule 40 is a protein called eL38.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	k	69	Total	C	N	O	S	0	0
			569	366	103	99	1		

- Molecule 41 is a protein called eL39.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	l	50	Total	C	N	O	S	0	0
			444	281	98	64	1		

- Molecule 42 is a protein called 60S RIBOSOMAL PROTEIN EL40.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	m	52	Total	C	N	O	S	0	0
			429	266	90	67	6		

- Molecule 43 is a protein called 60s ribosomal protein l41.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	n	23	Total	C	N	O	S	0	0
			222	134	61	25	2		

- Molecule 44 is a protein called eL42.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	o	104	Total	C	N	O	S	0	0
			851	533	174	138	6		

- Molecule 45 is a protein called eL43.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	p	91	Total	C	N	O	S	0	0
			708	445	136	120	7		

- Molecule 46 is a protein called Signal recognition particle 19 kDa protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	q	104	Total	C	N	O	S	0	0
			842	534	152	150	6		

- Molecule 47 is a protein called eL28.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	r	125	Total	C	N	O	S	0	0
			1001	621	206	168	6		

- Molecule 48 is a protein called Signal Sequence.

Mol	Chain	Residues	Atoms				AltConf	Trace
48	s	21	Total	C	N	O	0	0
			105	63	21	21		

- Molecule 49 is a protein called Signal recognition particle 14 kDa protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	t	88	Total	C	N	O	S	0	0
			693	438	122	128	5		

- Molecule 50 is a protein called Signal recognition particle subunit SRP68.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	u	196	Total	C	N	O	S	0	0
			1637	1028	307	294	8		

- Molecule 51 is a protein called Signal recognition particle receptor subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
51	v	186	1455	923	252	274	6	0	0

- Molecule 52 is a protein called Signal recognition particle 9 kDa protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
52	w	75	623	397	108	112	6	1	0

- Molecule 53 is a protein called Signal recognition particle 54 kDa protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
53	x	417	3236	2042	552	620	22	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
x	226	GLU	GLY	engineered mutation	UNP P61011

- Molecule 54 is a protein called Signal recognition particle receptor subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
54	y	147	1133	724	194	213	2	0	0

- Molecule 55 is a protein called Signal recognition particle subunit SRP72.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
55	z	19	161	106	26	28	1	0	0

- Molecule 56 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
56	g	1	Total	Zn	0
			1	1	
56	j	1	Total	Zn	0
			1	1	
56	m	1	Total	Zn	0
			1	1	

*Continued on next page...*

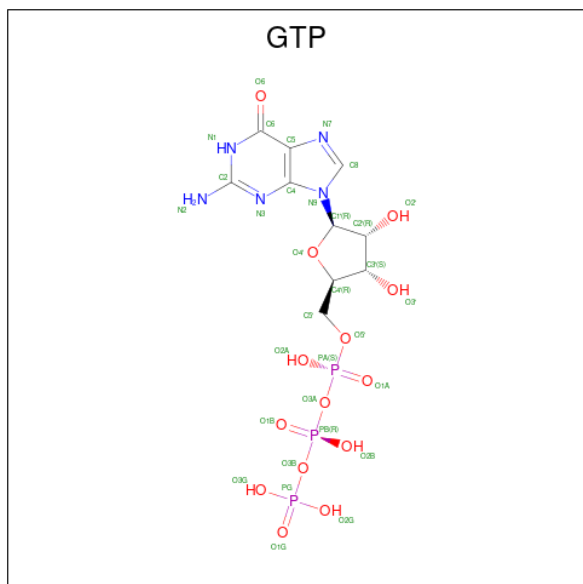
Continued from previous page...

Mol	Chain	Residues	Atoms		AltConf
56	o	1	Total	Zn	0
			1	1	
56	p	1	Total	Zn	0
			1	1	

- Molecule 57 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

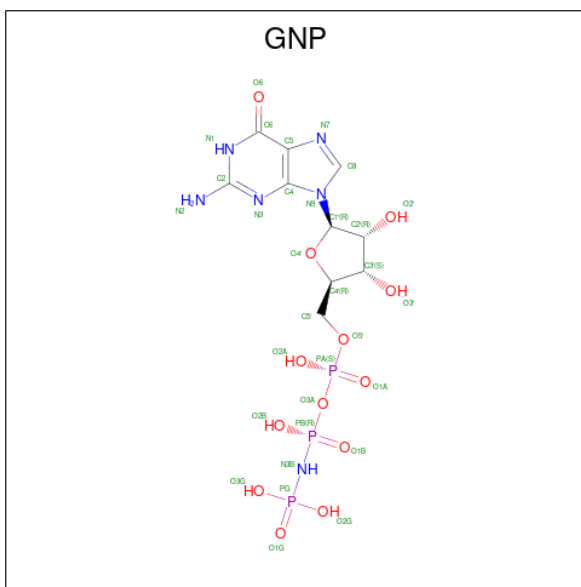
Mol	Chain	Residues	Atoms		AltConf
57	v	1	Total	Mg	0
			1	1	
57	x	1	Total	Mg	0
			1	1	

- Molecule 58 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula:  $C_{10}H_{16}N_5O_{14}P_3$ ).



Mol	Chain	Residues	Atoms					AltConf
58	v	1	Total	C	N	O	P	0
			32	10	5	14	3	

- Molecule 59 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula:  $C_{10}H_{17}N_6O_{13}P_3$ ).



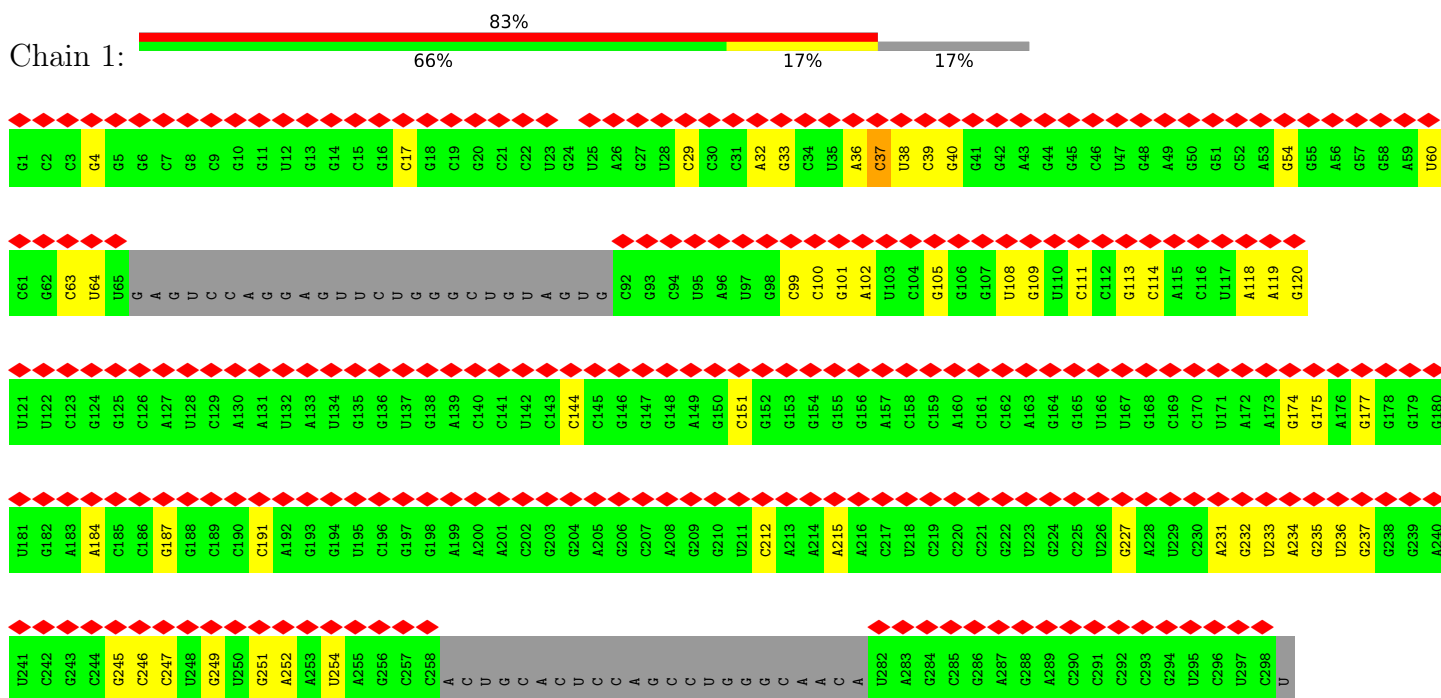
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
59	x	1	32	10	6	13	3	0



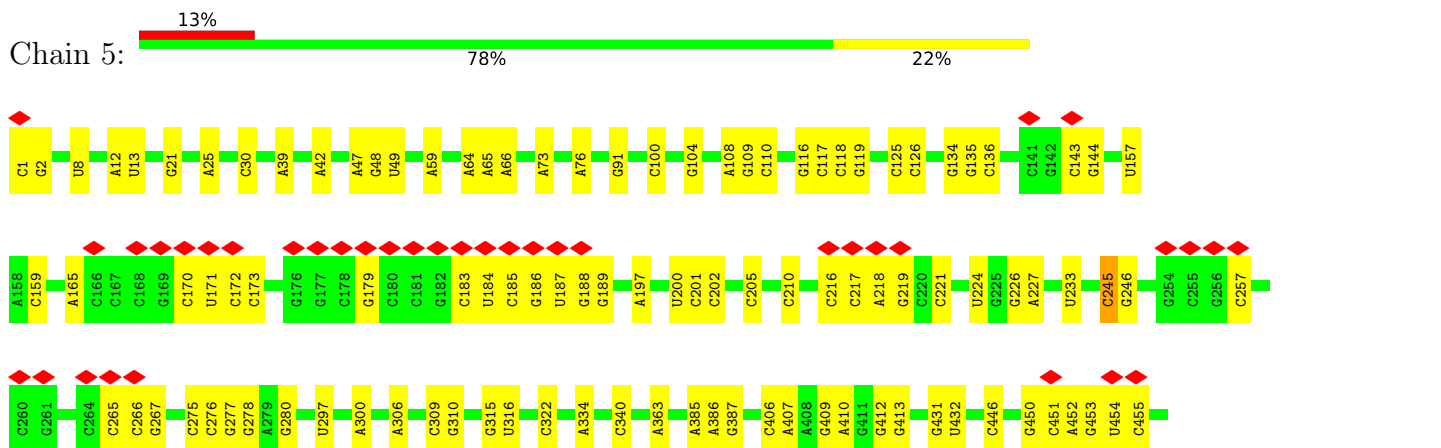
### 3 Residue-property plots

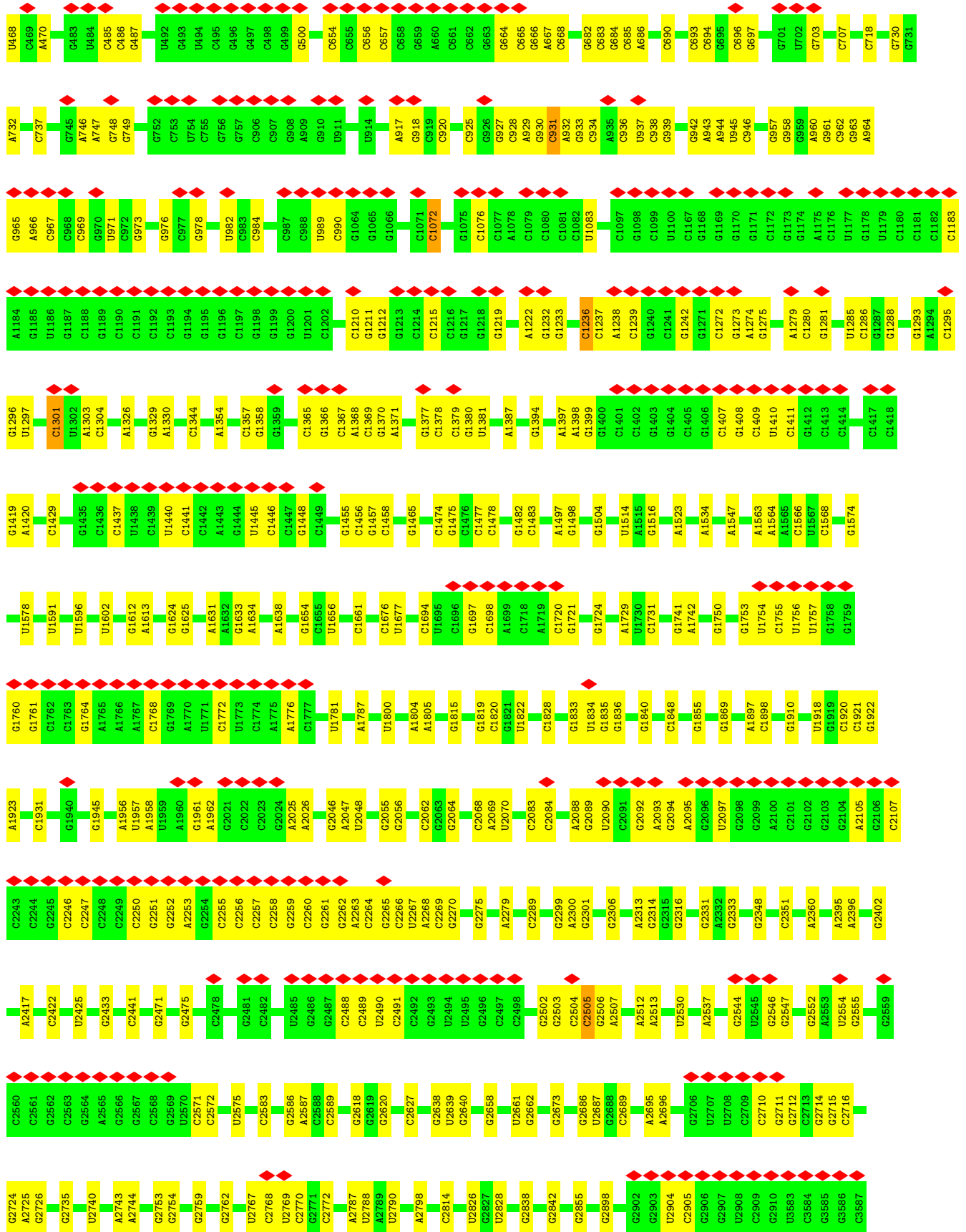
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

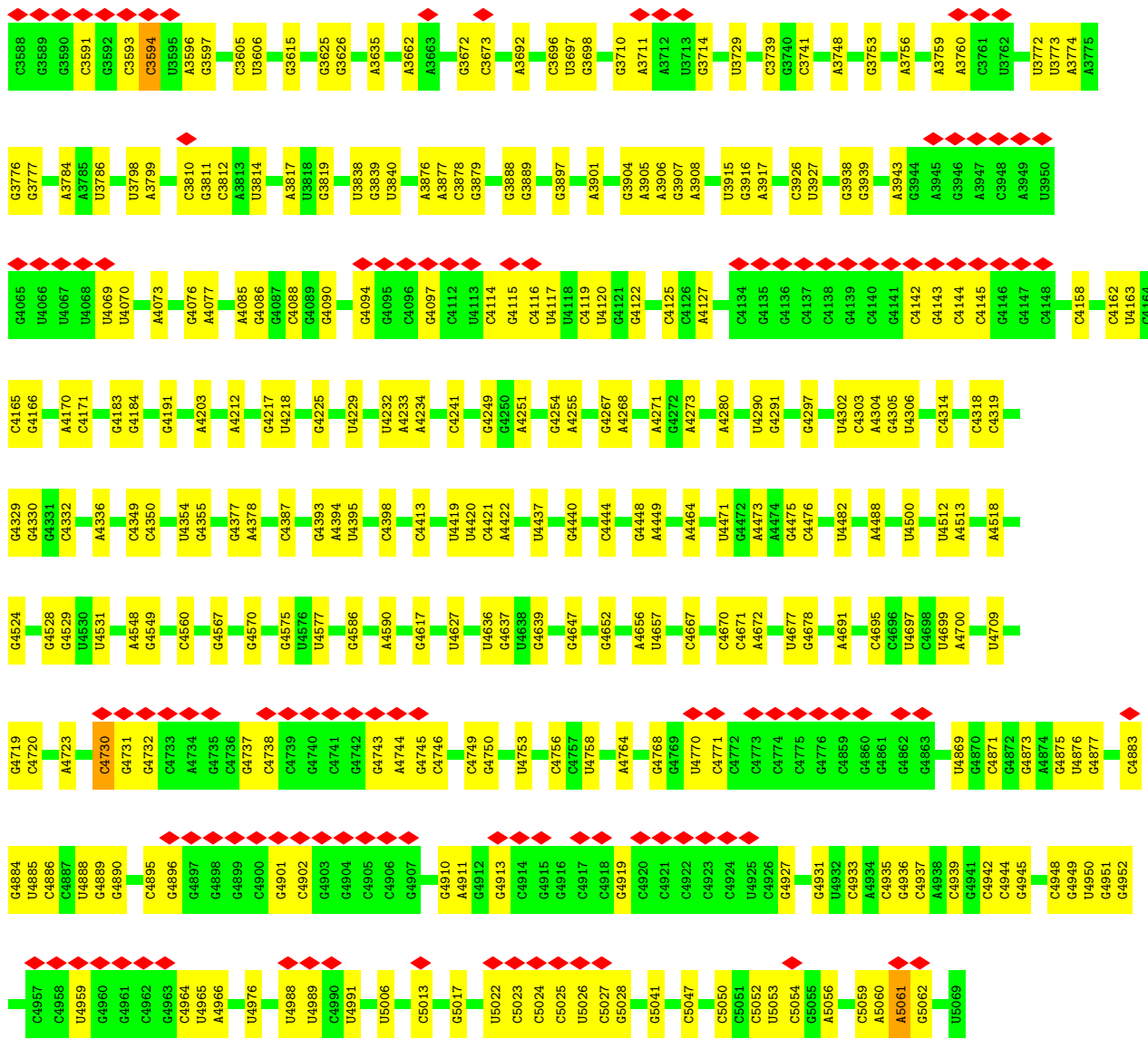
- Molecule 1: SRP RNA 7SL



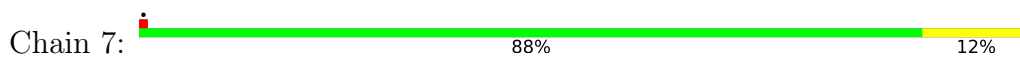
- Molecule 2: 28S ribosomal RNA



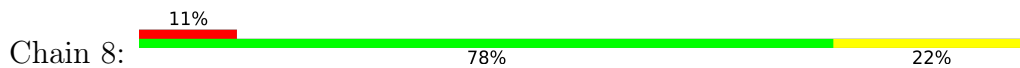




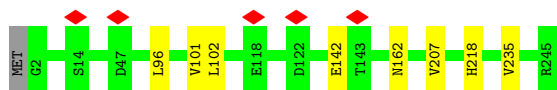
• Molecule 3: 5S ribosomal RNA



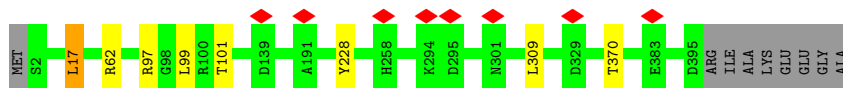
• Molecule 4: 5.8S ribosomal RNA



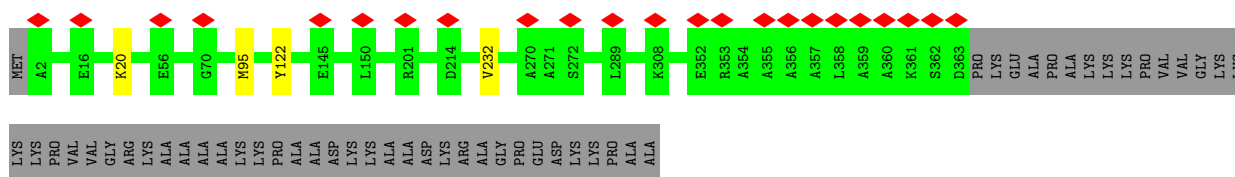
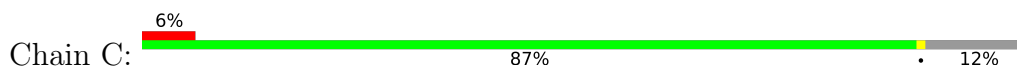
• Molecule 5: uL2



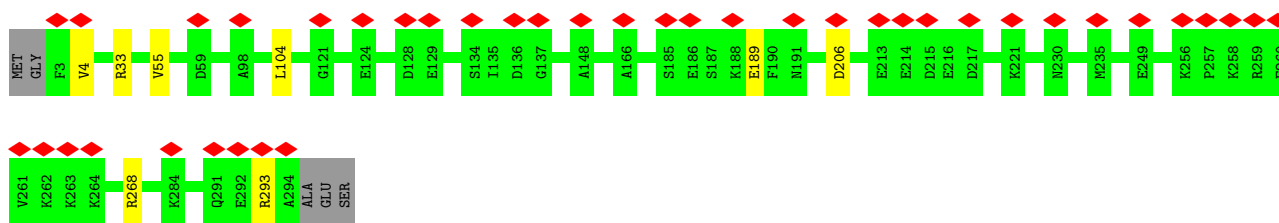
• Molecule 6: uL3



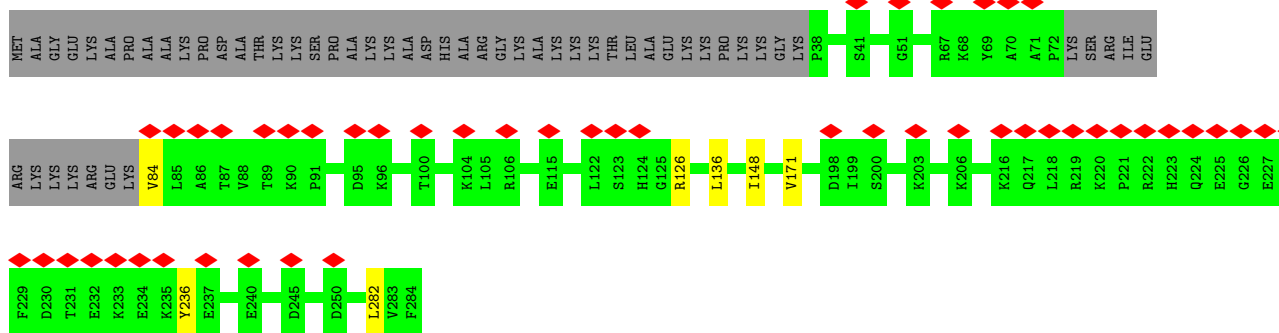
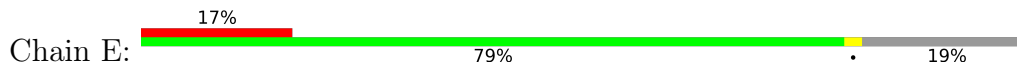
• Molecule 7: 60S ribosomal protein L4



• Molecule 8: 60S ribosomal protein L5



• Molecule 9: 60S ribosomal protein L6




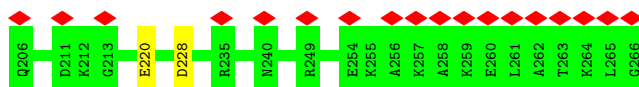
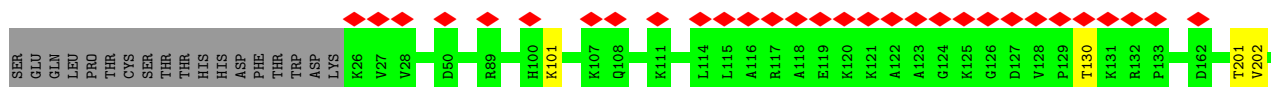
• Molecule 10: uL30

Chain F:  98%



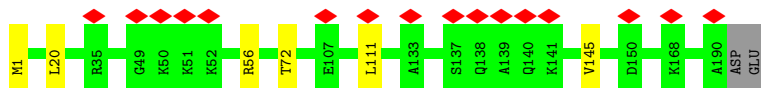
- Molecule 11: 60S ribosomal protein L7a

Chain G:  74%

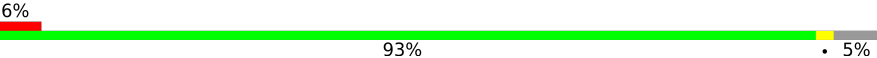


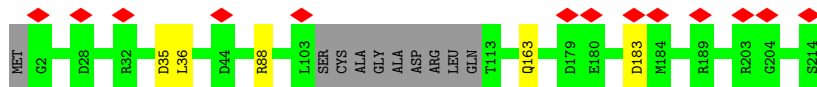
- Molecule 12: 60S ribosomal protein L9

Chain H:  96%



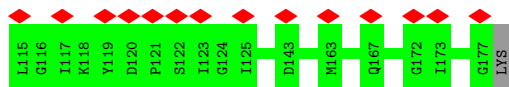
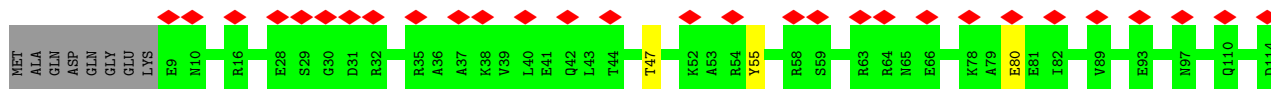
- Molecule 13: 60S ribosomal protein L10

Chain I:  93%



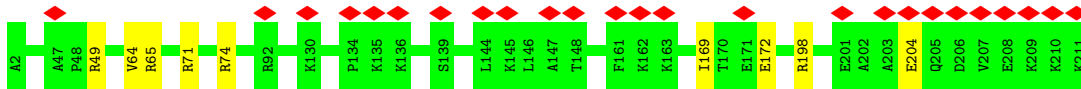
- Molecule 14: Ribosomal protein L11

Chain J:  93%



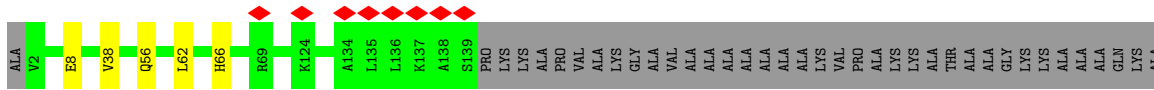
- Molecule 15: 60S ribosomal protein L13

Chain L:  96%



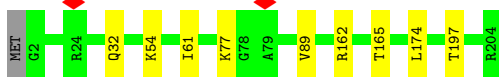
- Molecule 16: 60S ribosomal protein L14

Chain M: 61% 37%



- Molecule 17: Ribosomal protein L15

Chain N: 95%



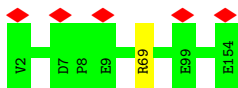
- Molecule 18: uL13

Chain O: 98%



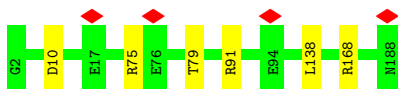
- Molecule 19: uL22

Chain P: 99%



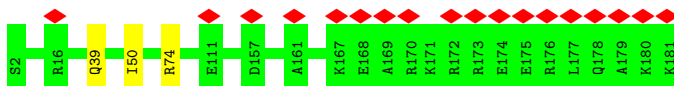
- Molecule 20: eL18

Chain Q: 97%

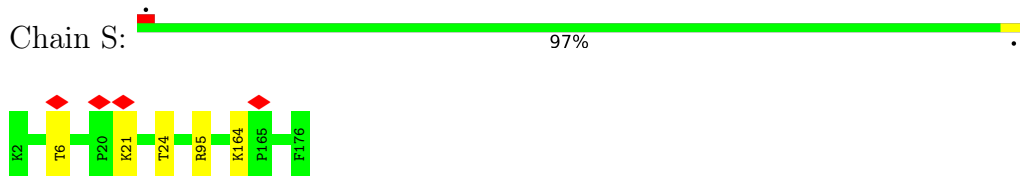


- Molecule 21: 60S RIBOSOMAL PROTEIN EL19

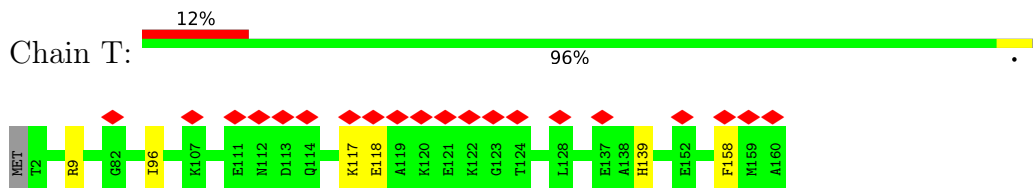
Chain R: 10% 98%



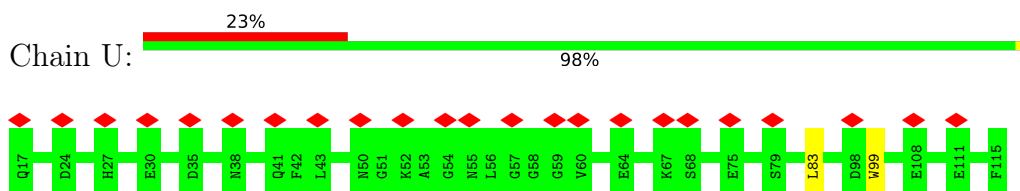
- Molecule 22: eL20



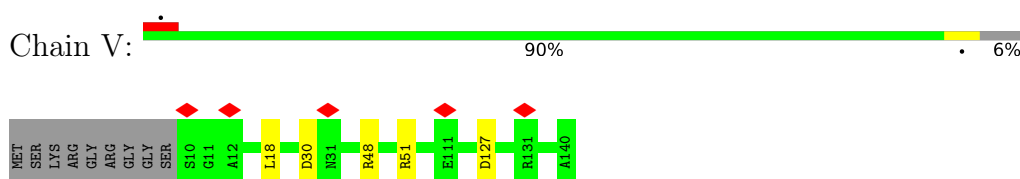
- Molecule 23: eL21



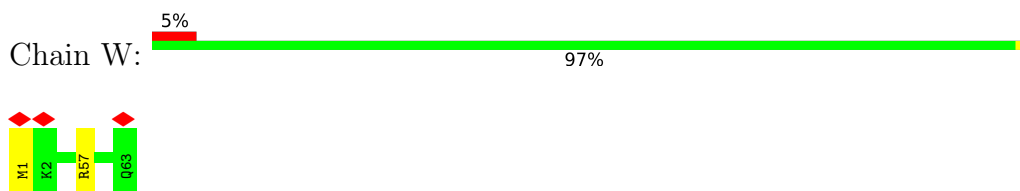
- Molecule 24: Ribosomal protein L22



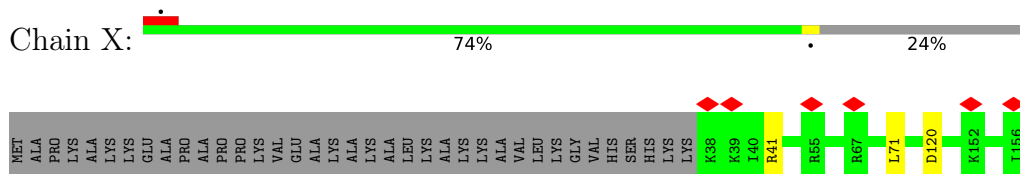
- Molecule 25: Ribosomal protein L23



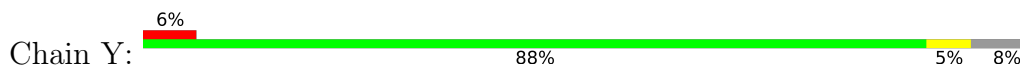
- Molecule 26: Ribosomal protein L24

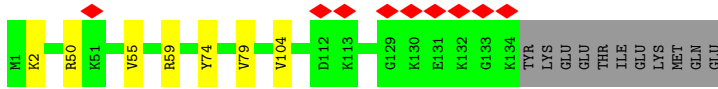


- Molecule 27: uL23

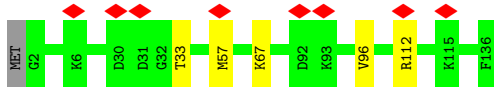


- Molecule 28: Ribosomal protein L26

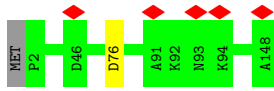




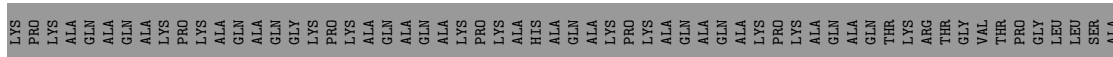
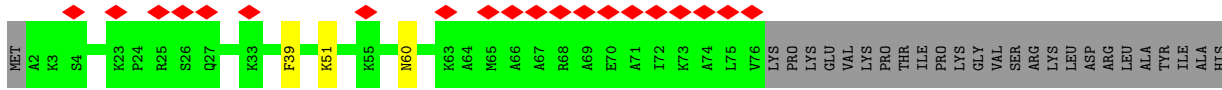
- Molecule 29: 60S ribosomal protein L27



- Molecule 30: uL15



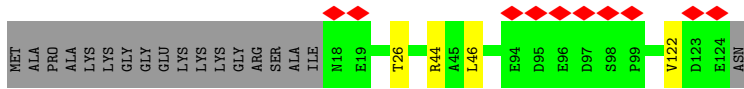
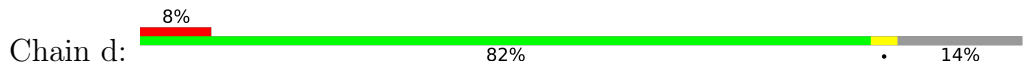
- Molecule 31: 60S ribosomal protein L29



- Molecule 32: eL30

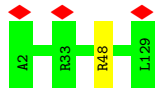


- Molecule 33: eL31



- Molecule 34: eL32

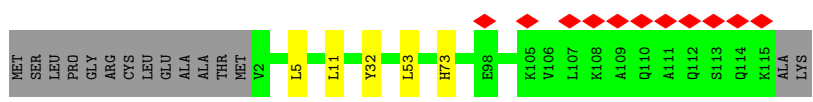
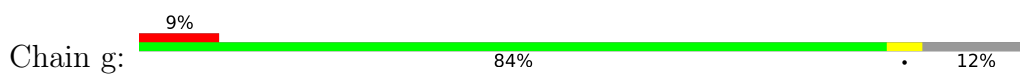




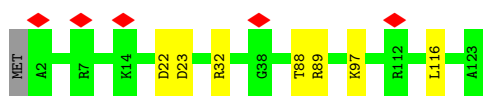
• Molecule 35: eL33



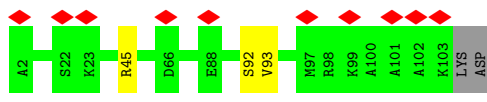
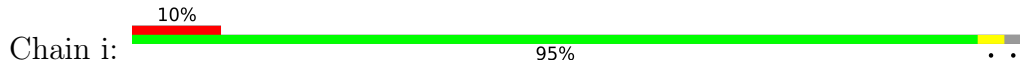
• Molecule 36: 60S ribosomal protein L34



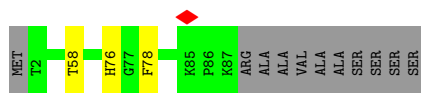
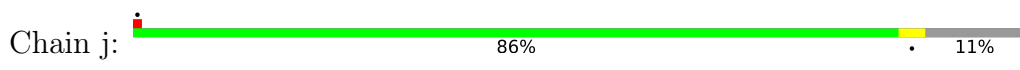
• Molecule 37: uL29



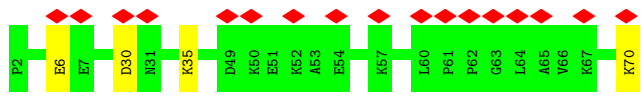
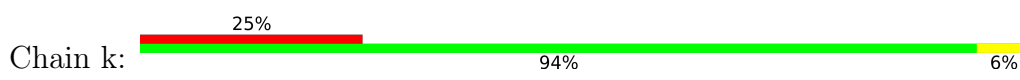
• Molecule 38: eL36



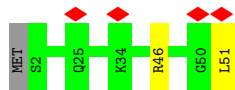
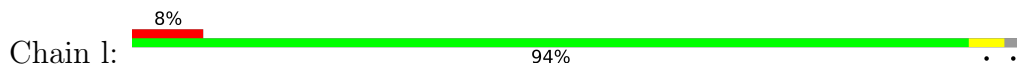
• Molecule 39: Ribosomal protein L37



• Molecule 40: eL38



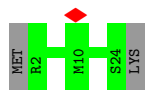
• Molecule 41: eL39



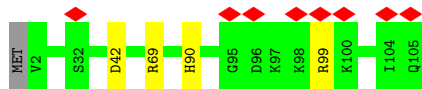
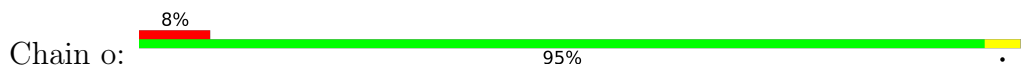
• Molecule 42: 60S RIBOSOMAL PROTEIN EL40



• Molecule 43: 60s ribosomal protein l41



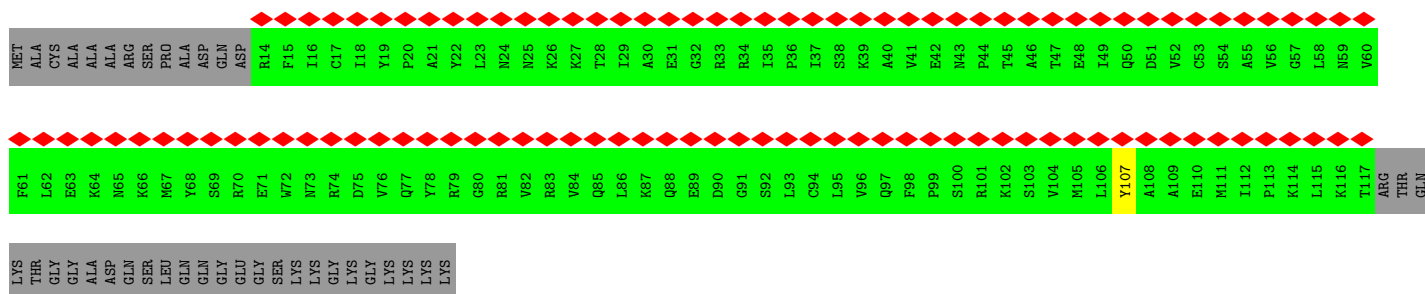
• Molecule 44: eL42



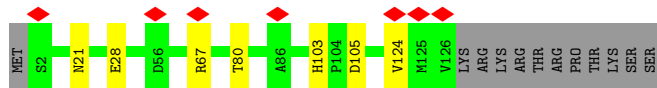
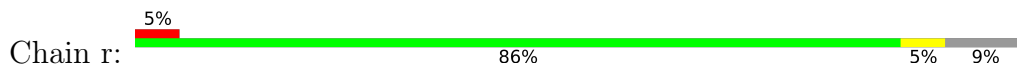
• Molecule 45: eL43



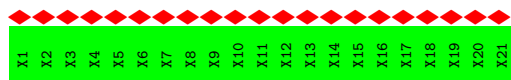
• Molecule 46: Signal recognition particle 19 kDa protein



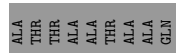
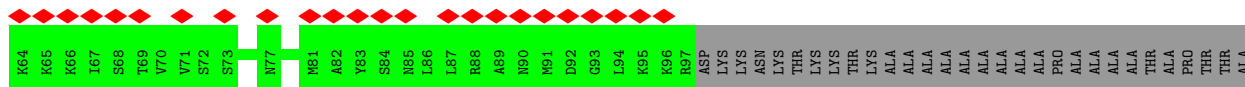
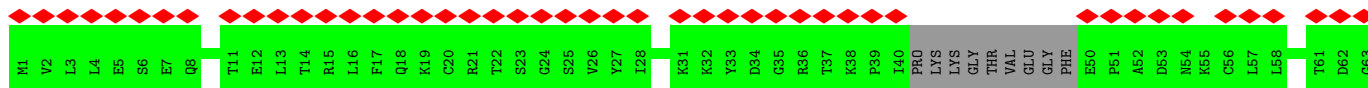
• Molecule 47: eL28



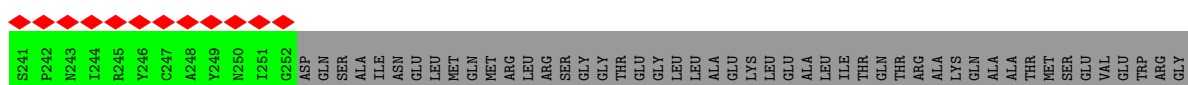
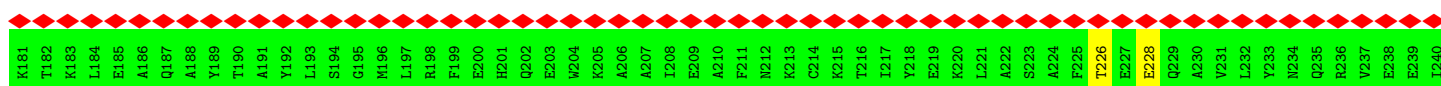
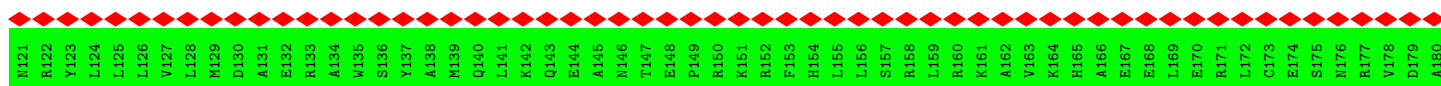
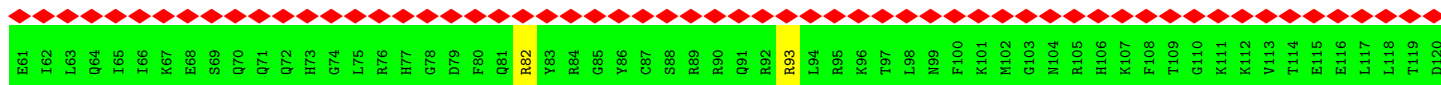
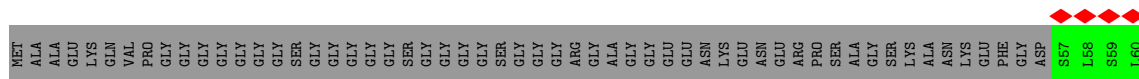
• Molecule 48: Signal Sequence



• Molecule 49: Signal recognition particle 14 kDa protein



• Molecule 50: Signal recognition particle subunit SRP68





MET	VAL	L3	A4	D5	L6	G7	H8	I10	L11	S12	A13	L14	R15	S16	L17	S18	H19	A20	T21	T22	T23	R24	E25	E26	V27	L28	R29	A30	K31	L32	K33	E34	V35	C36	T37	R38	L39	L40	E41	A42	D43	V44	H45	L46	K47	L48	V49	K50	Q51	L52	R53	E54	N55	V56	K57	S58	A59	L60		
D61	L62	E63	F64	M65	A66	S67	G68	L69	H70	K71	R72	K73	M74	L75	Q76	H77	F80	K81	E82	L83	H84	K85	L86	D88	P89	G90	V91	R92	A93	H94	T95	P96	T97	R98	G99	K100	Q101	M102	V103	L104	M105	F106	V107	G108	L109	Q110	G111	S112	G113	K114	T115	L116	T117	C118	S119	K120	L121			
A122	Y123	Y124	Y125	Q126	R127	K128	G129	M130	K131	L132	C133	L134	M135	C136	A137	D138	T139	F140	R141	A142	G143	K85	A144	F145	D146	Q147	L148	K149	Q150	M151	A152	T153	K154	A155	R156	I157	F158	F159	Y160	G161	S162	L163	T164	E165	M166	L167	F168	V169	I170	I171	A172	S173	E174	G175	V176	E177	K178	F179	K180	M181
E182	M183	F184	E185	I186	I188	V189	D190	T191	S192	G193	H194	H195	K196	Q197	E198	D199	S200	L201	F202	E203	E204	H205	L206	Q207	V208	A209	M210	A211	I212	Q213	T214	D215	M216	T217	V218	Y219	V220	M221	D222	A223	S224	I225	E226	Q227	A228	G229	E230	Q232	A233	K234	A235	F236	K237	D238	K239	V240	D241			
V242	A243	S244	V245	I246	T248	K249	L250	D251	G252	H253	A254	K255	G256	Q257	G258	A259	L260	S261	A262	V263	A264	A265	T266	K267	S268	P269	I270	I271	F272	I273	G274	T275	G276	E277	H278	I279	D280	D281	F282	E283	P284	F285	K286	T287	Q288	P289	F290	T291	S292	K293	L294	L295	G296	M297	G298	D299	I300	E301		
G302	L303	I304	D305	K306	V307	N308	E309	L310	K311	L312	D313	D314	M315	E316	A317	L318	I319	E320	K321	K323	H324	G325	Q326	F327	T328	L329	R330	D331	M332	Y333	E334	Q335	F336	Q337	N338	M340	K341	M342	G343	P344	PHE	SER	GLN	ILE	LEU	GLY	MET	ILE	PRO	GLY	PHE	GLY	GLY	THR	ASP	PHE	MET	SER		
L393	M364	E365	Q366	E367	S368	M369	A370	R371	L372	K373	K374	L375	M376	T377	I378	M379	D380	S381	M382	N383	D384	Q385	E386	L387	D388	S389	T390	D391	C392	A393	K394	V395	F396	S397	K398	Q399	P400	G401	R402	I403	Q404	R405	V406	A407	R408	G409	S410	G411	V412	S413	T414	R415	D416	V417	Q418	L420	L421			
T422	Y424	T425	K426	F427	A428	Q429	M430	V431	K432	K433	M434	G435	G436	I437	LYS	GLY	PHE	ASN	GLN	LEU	GLY	GLY	ASP	MET	SER	LYS	ASN	GLN	ALA	LYS	ASN	GLN	GLN	GLN	ALA	LYS	ASP	PRO	ARG	VAL	LEU	HIS	HIS	MET	GLY	GLY	MET	ALA	GLY	LEU	GLN									
SER	MET	MET	ARG	GLN	PHE	GLN	GLN	GLY	ALA	ALA	GLY	ASN	MET	LYS	LYS	MET	GLY	PHE	ASN	MET	LYS	GLY	ASP	ASN	GLN	GLN	SER	GLN	ALA	ALA	LYS	ASN	GLN	GLN	ALA	LYS	ASP	PRO	ARG	VAL	LEU	HIS	HIS	MET	GLY	GLY	MET	ALA	GLY	LEU	GLN									

● Molecule 54: Signal recognition particle receptor subunit alpha



MET	L2	D3	F4	F5	T6	I7	F8	S9	K10	G11	G12	L13	V14	L15	W16	C17	F18	Q19	G20	V21	S22	D23	S24	C25	T26	G27	P28	V29	N30	A31	L32	I33	R34	S35	V36	L37	L38	Q39	E40	R41	G42	G43	N44	M45	S46	F47	T48	H49	E50	A51	L52	T53	L54	K55	Y56	K57	L58	D59	M60
Q61	F62	E63	L64	V65	F66	V67	V68	G69	F70	Q71	K72	I73	L74	T75	L76	T77	Y78	V79	D80	K81	L82	I83	D84	D85	V86	H87	R88	L89	F90	R91	D92	K93	Y94	R95	T96	E97	I98	Q99	Q100	R101	S102	A103	L104	S105	L106	L107	N108	G109	T110	F111	D112	F113	L114	M115	L116	F117	L118	R119	L120
L121	R122	E123	A124	E125	E126	S127	S128	K129	ILE	ARG	ALA	PRO	GLY	THR	THR	LYS	ASN	VAL	GLU	ASP	GLU	ALA	LYS	VAL	ARG	ARG	SER	MET	ILE	THR	ARG	GLY	GLU	GLY	GLY	ALA	ASN	SER	LYS	LYS	THR	LYS	ALA	LYS	GLU	GLY	ASP	GLY	PRO										
LEU	ALA	THR	SER	LYS	VAL	PRO	ALA	SER	ILE	ARG	ALA	PRO	GLY	THR	THR	LYS	ASN	VAL	GLU	ASP	GLU	ALA	LYS	VAL	ARG	ARG	SER	MET	ILE	THR	ARG	GLY	GLU	GLY	GLY	ALA	ASN	SER	LYS	LYS	THR	LYS	ALA	LYS	GLU	GLY	ASP	GLY	PRO										
E239	K240																																																										



GLN  
LYS  
LYS  
LYS  
LYS  
GLY  
GLY  
LYS  
LYS  
GLY  
TRP

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	32881	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	50	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	81000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.106	Depositor
Minimum map value	-0.060	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.006	Depositor
Recommended contour level	0.018	Depositor
Map size ( $\text{\AA}$ )	475.776, 475.776, 475.776	wwPDB
Map dimensions	448, 448, 448	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.062, 1.062, 1.062	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: ZN, GTP, MG, GNP

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	1	0.17	0/5971	0.78	5/9308 (0.1%)
2	5	0.19	0/83726	0.79	36/130593 (0.0%)
3	7	0.16	0/2858	0.73	0/4455
4	8	0.17	0/3701	0.74	0/5766
5	A	0.24	0/1906	0.43	0/2556
6	B	0.24	0/3216	0.42	0/4311
7	C	0.23	0/2937	0.39	0/3946
8	D	0.24	0/2432	0.40	0/3257
9	E	0.24	0/1936	0.46	0/2600
10	F	0.24	0/1905	0.40	0/2539
11	G	0.24	0/1967	0.42	0/2647
12	H	0.24	0/1535	0.43	0/2063
13	I	0.24	0/1693	0.40	0/2260
14	J	0.23	0/1376	0.42	0/1841
15	L	0.24	0/1734	0.40	0/2317
16	M	0.24	0/1158	0.38	0/1547
17	N	0.23	0/1746	0.39	0/2338
18	O	0.24	0/1671	0.38	0/2234
19	P	0.23	0/1268	0.41	0/1700
20	Q	0.23	0/1530	0.41	0/2041
21	R	0.22	0/1524	0.38	0/2013
22	S	0.24	0/1493	0.41	0/2002
23	T	0.24	0/1326	0.40	0/1770
24	U	0.24	0/822	0.42	0/1103
25	V	0.25	0/993	0.42	0/1332
26	W	0.24	0/541	0.39	0/720
27	X	0.23	0/993	0.39	0/1334
28	Y	0.23	0/1132	0.40	0/1504
29	Z	0.25	0/1130	0.43	0/1507
30	a	0.24	0/1191	0.41	0/1590
31	b	0.23	0/619	0.34	0/818
32	c	0.24	0/742	0.39	0/996

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
33	d	0.23	0/903	0.42	0/1216
34	e	0.23	0/1071	0.38	0/1429
35	f	0.25	0/895	0.45	0/1198
36	g	0.23	0/916	0.40	0/1220
37	h	0.22	0/1021	0.37	0/1348
38	i	0.23	0/841	0.39	0/1112
39	j	0.23	0/720	0.43	0/952
40	k	0.24	0/575	0.45	0/761
41	l	0.22	0/454	0.40	0/599
42	m	0.23	0/435	0.42	0/575
43	n	0.20	0/223	0.32	0/284
44	o	0.24	0/864	0.44	0/1140
45	p	0.23	0/718	0.41	0/953
46	q	0.23	0/856	0.41	0/1152
47	r	0.23	0/1017	0.44	0/1364
49	t	0.25	0/699	0.40	0/932
50	u	0.24	0/1665	0.38	0/2229
51	v	0.24	0/1472	0.41	0/1979
52	w	0.23	0/634	0.37	0/851
53	x	0.56	0/3278	0.59	0/4401
54	y	0.25	0/1151	0.45	1/1553 (0.1%)
55	z	0.24	0/168	0.45	0/231
All	All	0.22	0/159348	0.67	42/234487 (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
6	B	0	1
22	S	0	1
35	f	0	1
53	x	0	1
All	All	0	4

There are no bond length outliers.

All (42) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	37	C	N1-C2-O2	9.44	124.56	118.90
1	1	37	C	N3-C2-O2	-8.69	115.81	121.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	37	C	C2-N1-C1'	8.28	127.91	118.80
2	5	931	C	C2-N1-C1'	8.26	127.89	118.80
2	5	1072	C	C2-N1-C1'	8.26	127.89	118.80
2	5	1072	C	N1-C2-O2	8.15	123.79	118.90
2	5	931	C	N1-C2-O2	7.82	123.59	118.90
2	5	3594	C	C2-N1-C1'	7.73	127.30	118.80
2	5	3594	C	N1-C2-O2	7.71	123.53	118.90
2	5	657	C	N3-C2-O2	-7.16	116.89	121.90
2	5	1236	C	N3-C2-O2	-7.09	116.94	121.90
2	5	5061	A	P-O3'-C3'	6.76	127.81	119.70
2	5	931	C	N3-C2-O2	-6.62	117.27	121.90
2	5	931	C	C6-N1-C2	-6.45	117.72	120.30
2	5	4723	A	C6-N1-C2	-6.33	114.80	118.60
1	1	37	C	C6-N1-C2	-6.28	117.79	120.30
54	y	245	PRO	N-CA-CB	6.28	110.84	103.30
2	5	5061	A	OP2-P-O3'	6.23	118.91	105.20
2	5	1236	C	N1-C2-O2	6.21	122.63	118.90
2	5	3594	C	N3-C2-O2	-6.17	117.58	121.90
2	5	1072	C	C6-N1-C1'	-6.12	113.45	120.80
2	5	1301	C	C2-N1-C1'	6.10	125.51	118.80
2	5	1072	C	N3-C2-O2	-5.98	117.72	121.90
2	5	100	C	C2-N1-C1'	5.75	125.12	118.80
2	5	3594	C	C6-N1-C2	-5.62	118.05	120.30
2	5	300	A	C6-N1-C2	-5.55	115.27	118.60
1	1	37	C	C6-N1-C1'	-5.44	114.27	120.80
2	5	931	C	C6-N1-C1'	-5.35	114.38	120.80
2	5	4420	U	C2-N1-C1'	5.32	124.09	117.70
2	5	4420	U	N1-C2-O2	5.24	126.47	122.80
2	5	4413	C	C2-N1-C1'	5.23	124.56	118.80
2	5	245	C	C2-N1-C1'	5.20	124.52	118.80
2	5	4749	C	N1-C2-O2	5.19	122.02	118.90
2	5	3594	C	C6-N1-C1'	-5.19	114.57	120.80
2	5	3741	C	N3-C2-O2	-5.19	118.27	121.90
2	5	2505	C	N1-C2-O2	5.15	121.99	118.90
2	5	1398	A	O4'-C1'-N9	5.13	112.30	108.20
2	5	931	C	C5-C6-N1	5.12	123.56	121.00
2	5	1458	C	N1-C2-O2	5.11	121.97	118.90
2	5	657	C	N1-C2-O2	5.07	121.94	118.90
2	5	1301	C	N1-C2-O2	5.06	121.94	118.90
2	5	4730	C	C2-N1-C1'	5.05	124.36	118.80

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	B	17	LEU	Peptide
22	S	164	LYS	Peptide
35	f	106	TYR	Peptide
53	x	298	GLY	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	
5	A	242/245 (99%)	225 (93%)	17 (7%)	0	100	100
6	B	392/403 (97%)	379 (97%)	13 (3%)	0	100	100
7	C	360/413 (87%)	345 (96%)	15 (4%)	0	100	100
8	D	290/297 (98%)	278 (96%)	12 (4%)	0	100	100
9	E	232/291 (80%)	198 (85%)	34 (15%)	0	100	100
10	F	223/225 (99%)	217 (97%)	6 (3%)	0	100	100
11	G	239/319 (75%)	225 (94%)	14 (6%)	0	100	100
12	H	188/192 (98%)	178 (95%)	10 (5%)	0	100	100
13	I	200/214 (94%)	194 (97%)	6 (3%)	0	100	100
14	J	167/178 (94%)	155 (93%)	12 (7%)	0	100	100
15	L	208/210 (99%)	191 (92%)	16 (8%)	1 (0%)	29	67
16	M	136/218 (62%)	132 (97%)	4 (3%)	0	100	100
17	N	201/204 (98%)	192 (96%)	9 (4%)	0	100	100
18	O	197/199 (99%)	193 (98%)	4 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
19	P	151/153 (99%)	148 (98%)	3 (2%)	0	100	100
20	Q	185/187 (99%)	180 (97%)	5 (3%)	0	100	100
21	R	178/180 (99%)	174 (98%)	4 (2%)	0	100	100
22	S	173/175 (99%)	166 (96%)	7 (4%)	0	100	100
23	T	157/160 (98%)	148 (94%)	9 (6%)	0	100	100
24	U	97/99 (98%)	90 (93%)	7 (7%)	0	100	100
25	V	129/140 (92%)	125 (97%)	4 (3%)	0	100	100
26	W	61/63 (97%)	61 (100%)	0	0	100	100
27	X	117/156 (75%)	114 (97%)	3 (3%)	0	100	100
28	Y	132/145 (91%)	129 (98%)	3 (2%)	0	100	100
29	Z	133/136 (98%)	122 (92%)	11 (8%)	0	100	100
30	a	145/148 (98%)	136 (94%)	9 (6%)	0	100	100
31	b	73/223 (33%)	70 (96%)	3 (4%)	0	100	100
32	c	92/94 (98%)	90 (98%)	2 (2%)	0	100	100
33	d	105/125 (84%)	101 (96%)	4 (4%)	0	100	100
34	e	126/128 (98%)	122 (97%)	4 (3%)	0	100	100
35	f	107/110 (97%)	100 (94%)	7 (6%)	0	100	100
36	g	112/129 (87%)	112 (100%)	0	0	100	100
37	h	120/123 (98%)	117 (98%)	3 (2%)	0	100	100
38	i	100/104 (96%)	94 (94%)	4 (4%)	2 (2%)	7	38
39	j	84/97 (87%)	84 (100%)	0	0	100	100
40	k	67/69 (97%)	58 (87%)	9 (13%)	0	100	100
41	l	48/51 (94%)	42 (88%)	6 (12%)	0	100	100
42	m	50/52 (96%)	47 (94%)	3 (6%)	0	100	100
43	n	21/25 (84%)	21 (100%)	0	0	100	100
44	o	102/105 (97%)	94 (92%)	8 (8%)	0	100	100
45	p	89/92 (97%)	84 (94%)	5 (6%)	0	100	100
46	q	102/144 (71%)	97 (95%)	5 (5%)	0	100	100
47	r	123/137 (90%)	111 (90%)	11 (9%)	1 (1%)	19	58
49	t	84/136 (62%)	83 (99%)	1 (1%)	0	100	100
50	u	194/627 (31%)	188 (97%)	6 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
51	v	182/271 (67%)	180 (99%)	2 (1%)	0	100	100
52	w	74/86 (86%)	74 (100%)	0	0	100	100
53	x	413/504 (82%)	377 (91%)	30 (7%)	6 (2%)	10	44
54	y	143/638 (22%)	126 (88%)	16 (11%)	1 (1%)	22	61
55	z	17/671 (2%)	13 (76%)	4 (24%)	0	100	100
All	All	7561/10091 (75%)	7180 (95%)	370 (5%)	11 (0%)	54	83

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
38	i	92	SER
53	x	96	PRO
53	x	286	LYS
54	y	245	PRO
38	i	93	VAL
53	x	299	ASP
53	x	21	THR
53	x	239	LYS
47	r	21	ASN
15	L	64	VAL
53	x	87	VAL

### 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	
5	A	187/188 (100%)	179 (96%)	8 (4%)	29	64
6	B	336/348 (97%)	328 (98%)	8 (2%)	49	77
7	C	302/337 (90%)	298 (99%)	4 (1%)	69	87
8	D	247/250 (99%)	239 (97%)	8 (3%)	39	71
9	E	208/251 (83%)	201 (97%)	7 (3%)	37	70
10	F	194/195 (100%)	190 (98%)	4 (2%)	53	79

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
11	G	206/273 (76%)	200 (97%)	6 (3%)	42	74
12	H	169/171 (99%)	163 (96%)	6 (4%)	35	69
13	I	174/181 (96%)	169 (97%)	5 (3%)	42	74
14	J	142/149 (95%)	139 (98%)	3 (2%)	53	79
15	L	176/176 (100%)	168 (96%)	8 (4%)	27	63
16	M	117/160 (73%)	112 (96%)	5 (4%)	29	64
17	N	171/172 (99%)	162 (95%)	9 (5%)	22	58
18	O	171/171 (100%)	167 (98%)	4 (2%)	50	78
19	P	134/134 (100%)	133 (99%)	1 (1%)	84	94
20	Q	163/163 (100%)	157 (96%)	6 (4%)	34	68
21	R	159/159 (100%)	156 (98%)	3 (2%)	57	81
22	S	156/156 (100%)	152 (97%)	4 (3%)	46	76
23	T	139/140 (99%)	133 (96%)	6 (4%)	29	64
24	U	89/89 (100%)	87 (98%)	2 (2%)	52	79
25	V	101/107 (94%)	96 (95%)	5 (5%)	24	60
26	W	55/55 (100%)	53 (96%)	2 (4%)	35	69
27	X	107/134 (80%)	104 (97%)	3 (3%)	43	74
28	Y	124/135 (92%)	117 (94%)	7 (6%)	21	57
29	Z	117/118 (99%)	112 (96%)	5 (4%)	29	64
30	a	119/120 (99%)	118 (99%)	1 (1%)	81	93
31	b	62/170 (36%)	59 (95%)	3 (5%)	25	61
32	c	79/79 (100%)	78 (99%)	1 (1%)	69	87
33	d	98/110 (89%)	94 (96%)	4 (4%)	30	66
34	e	114/114 (100%)	113 (99%)	1 (1%)	78	91
35	f	88/89 (99%)	85 (97%)	3 (3%)	37	70
36	g	98/109 (90%)	93 (95%)	5 (5%)	24	60
37	h	109/110 (99%)	102 (94%)	7 (6%)	17	52
38	i	86/88 (98%)	85 (99%)	1 (1%)	71	88
39	j	73/80 (91%)	70 (96%)	3 (4%)	30	66
40	k	64/64 (100%)	60 (94%)	4 (6%)	18	52
41	l	47/48 (98%)	45 (96%)	2 (4%)	29	64

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
42	m	48/48 (100%)	45 (94%)	3 (6%)	18	52
43	n	22/24 (92%)	22 (100%)	0	100	100
44	o	92/93 (99%)	88 (96%)	4 (4%)	29	64
45	p	74/75 (99%)	71 (96%)	3 (4%)	30	66
46	q	93/121 (77%)	92 (99%)	1 (1%)	73	88
47	r	109/121 (90%)	103 (94%)	6 (6%)	21	57
49	t	78/106 (74%)	78 (100%)	0	100	100
50	u	172/529 (32%)	168 (98%)	4 (2%)	50	78
51	v	160/229 (70%)	156 (98%)	4 (2%)	47	77
52	w	69/78 (88%)	69 (100%)	0	100	100
53	x	352/421 (84%)	276 (78%)	76 (22%)	1	5
54	y	116/533 (22%)	115 (99%)	1 (1%)	78	91
55	z	19/572 (3%)	19 (100%)	0	100	100
All	All	6585/8543 (77%)	6319 (96%)	266 (4%)	35	66

All (266) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	A	96	LEU
5	A	101	VAL
5	A	102	LEU
5	A	142	GLU
5	A	162	ASN
5	A	207	VAL
5	A	218	HIS
5	A	235	VAL
6	B	17	LEU
6	B	62	ARG
6	B	97	ARG
6	B	99	LEU
6	B	101	THR
6	B	228	TYR
6	B	309	LEU
6	B	370	THR
7	C	20	LYS
7	C	95	MET
7	C	122	TYR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
7	C	232	VAL
8	D	4	VAL
8	D	33	ARG
8	D	55	VAL
8	D	104	LEU
8	D	189	GLU
8	D	206	ASP
8	D	268	ARG
8	D	293	ARG
9	E	84	VAL
9	E	126	ARG
9	E	136	LEU
9	E	148	ILE
9	E	171	VAL
9	E	236	TYR
9	E	282	LEU
10	F	44	LEU
10	F	49	ARG
10	F	91	LEU
10	F	190	GLU
11	G	101	LYS
11	G	130	THR
11	G	201	THR
11	G	202	VAL
11	G	220	GLU
11	G	228	ASP
12	H	1	MET
12	H	20	LEU
12	H	56	ARG
12	H	72	THR
12	H	111	LEU
12	H	145	VAL
13	I	35	ASP
13	I	36	LEU
13	I	88	ARG
13	I	163	GLN
13	I	183	ASP
14	J	47	THR
14	J	55	TYR
14	J	80	GLU
15	L	49	ARG
15	L	65	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
15	L	71	ARG
15	L	74	ARG
15	L	169	ILE
15	L	172	GLU
15	L	198	ARG
15	L	204	GLU
16	M	8	GLU
16	M	38	VAL
16	M	56	GLN
16	M	62	LEU
16	M	66	HIS
17	N	32	GLN
17	N	54	LYS
17	N	61	ILE
17	N	77	LYS
17	N	89	VAL
17	N	162	ARG
17	N	165	THR
17	N	174	LEU
17	N	197	THR
18	O	18	ARG
18	O	42	ASN
18	O	145	VAL
18	O	186	GLU
19	P	69	ARG
20	Q	10	ASP
20	Q	75	ARG
20	Q	79	THR
20	Q	91	ARG
20	Q	138	LEU
20	Q	168	ARG
21	R	39	GLN
21	R	50	ILE
21	R	74	ARG
22	S	6	THR
22	S	21	LYS
22	S	24	THR
22	S	95	ARG
23	T	9	ARG
23	T	96	ILE
23	T	117	LYS
23	T	118	GLU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
23	T	139	HIS
23	T	158	PHE
24	U	83	LEU
24	U	99	TRP
25	V	18	LEU
25	V	30	ASP
25	V	48	ARG
25	V	51	ARG
25	V	127	ASP
26	W	1	MET
26	W	57	ARG
27	X	41	ARG
27	X	71	LEU
27	X	120	ASP
28	Y	2	LYS
28	Y	50	ARG
28	Y	55	VAL
28	Y	59	ARG
28	Y	74	TYR
28	Y	79	VAL
28	Y	104	VAL
29	Z	33	THR
29	Z	57	MET
29	Z	67	LYS
29	Z	96	VAL
29	Z	112	ARG
30	a	76	ASP
31	b	39	PHE
31	b	51	LYS
31	b	60	ASN
32	c	93	THR
33	d	26	THR
33	d	44	ARG
33	d	46	LEU
33	d	122	VAL
34	e	48	ARG
35	f	16	ARG
35	f	37	ASP
35	f	101	ILE
36	g	5	LEU
36	g	11	LEU
36	g	32	TYR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
36	g	53	LEU
36	g	73	HIS
37	h	22	ASP
37	h	23	ASP
37	h	32	ARG
37	h	88	THR
37	h	89	ARG
37	h	97	LYS
37	h	116	LEU
38	i	45	ARG
39	j	58	THR
39	j	76	HIS
39	j	78	PHE
40	k	6	GLU
40	k	30	ASP
40	k	35	LYS
40	k	70	LYS
41	l	46	ARG
41	l	51	LEU
42	m	97	ARG
42	m	111	ARG
42	m	119	ASN
44	o	42	ASP
44	o	69	ARG
44	o	90	HIS
44	o	99	ARG
45	p	8	VAL
45	p	49	ARG
45	p	54	ILE
46	q	107	TYR
47	r	28	GLU
47	r	67	ARG
47	r	80	THR
47	r	103	HIS
47	r	105	ASP
47	r	124	VAL
50	u	82	ARG
50	u	93	ARG
50	u	226	THR
50	u	228	GLU
51	v	67	VAL
51	v	114	THR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
51	v	121	HIS
51	v	158	PHE
53	x	6	LEU
53	x	12	SER
53	x	18	SER
53	x	19	ASN
53	x	21	THR
53	x	25	GLU
53	x	31	MET
53	x	33	LYS
53	x	36	CYS
53	x	43	ASP
53	x	46	ILE
53	x	47	LYS
53	x	53	ARG
53	x	55	ASN
53	x	56	VAL
53	x	57	LYS
53	x	60	ILE
53	x	63	GLU
53	x	65	MET
53	x	69	LEU
53	x	71	LYS
53	x	72	ARG
53	x	73	LYS
53	x	76	GLN
53	x	82	GLU
53	x	86	LEU
53	x	91	VAL
53	x	97	THR
53	x	105	MET
53	x	112	SER
53	x	117	THR
53	x	119	SER
53	x	120	LYS
53	x	121	LEU
53	x	127	ARG
53	x	131	LYS
53	x	132	THR
53	x	134	LEU
53	x	146	ASP
53	x	148	LEU

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Mol	Chain	Res	Type
53	x	149	LYS
53	x	154	LYS
53	x	156	ARG
53	x	164	THR
53	x	166	MET
53	x	169	VAL
53	x	180	LYS
53	x	185	GLU
53	x	187	ILE
53	x	188	ILE
53	x	196	LYS
53	x	202	PHE
53	x	207	GLN
53	x	221	MET
53	x	224	SER
53	x	230	GLU
53	x	240	VAL
53	x	244	SER
53	x	245	VAL
53	x	248	THR
53	x	250	LEU
53	x	251	ASP
53	x	260	LEU
53	x	261	SER
53	x	267	LYS
53	x	268	SER
53	x	279	ILE
53	x	286	LYS
53	x	287	THR
53	x	291	ILE
53	x	292	SER
53	x	293	LYS
53	x	297	MET
53	x	299	ASP
53	x	300	ILE
53	x	316	GLU
54	y	55	LYS

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

Mol	Chain	Res	Type
5	A	38	HIS

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Mol	Chain	Res	Type
7	C	85	HIS
8	D	39	GLN
8	D	111	ASN
9	E	163	GLN
9	E	275	ASN
9	E	280	HIS
10	F	241	GLN
11	G	195	HIS
12	H	39	ASN
17	N	201	HIS
19	P	80	GLN
23	T	3	ASN
28	Y	14	ASN
33	d	100	ASN
46	q	24	ASN
47	r	6	GLN
53	x	45	ASN
53	x	102	ASN
53	x	338	ASN
53	x	383	ASN
54	y	87	HIS

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	1	245/299 (81%)	50 (20%)	6 (2%)
2	5	3478/3493 (99%)	738 (21%)	87 (2%)
3	7	119/120 (99%)	14 (11%)	0
4	8	155/156 (99%)	34 (21%)	1 (0%)
All	All	3997/4068 (98%)	836 (20%)	94 (2%)

All (836) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	1	4	G
1	1	17	C
1	1	29	C
1	1	32	A
1	1	33	G
1	1	36	A
1	1	38	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	1	39	C
1	1	40	G
1	1	54	G
1	1	60	U
1	1	63	C
1	1	64	U
1	1	99	C
1	1	100	C
1	1	101	G
1	1	102	A
1	1	105	G
1	1	108	U
1	1	109	G
1	1	111	C
1	1	113	G
1	1	114	C
1	1	119	A
1	1	120	G
1	1	144	C
1	1	151	C
1	1	174	G
1	1	175	G
1	1	177	G
1	1	184	A
1	1	187	G
1	1	191	C
1	1	212	C
1	1	215	A
1	1	227	G
1	1	231	A
1	1	232	G
1	1	233	U
1	1	234	A
1	1	235	G
1	1	236	U
1	1	237	G
1	1	245	G
1	1	246	C
1	1	247	C
1	1	249	G
1	1	251	G
1	1	252	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	1	254	U
2	5	2	G
2	5	8	U
2	5	12	A
2	5	13	U
2	5	21	G
2	5	25	A
2	5	30	C
2	5	39	A
2	5	42	A
2	5	48	G
2	5	49	U
2	5	59	A
2	5	64	A
2	5	65	A
2	5	66	A
2	5	73	A
2	5	76	A
2	5	91	G
2	5	104	G
2	5	108	A
2	5	109	G
2	5	110	C
2	5	116	G
2	5	117	C
2	5	118	C
2	5	119	G
2	5	126	C
2	5	134	G
2	5	135	G
2	5	136	C
2	5	143	C
2	5	144	G
2	5	157	U
2	5	159	C
2	5	165	A
2	5	170	C
2	5	171	U
2	5	172	C
2	5	173	C
2	5	179	G
2	5	183	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	184	U
2	5	185	C
2	5	186	G
2	5	187	U
2	5	188	G
2	5	189	G
2	5	197	A
2	5	200	U
2	5	201	C
2	5	202	C
2	5	205	C
2	5	210	C
2	5	216	C
2	5	217	C
2	5	218	A
2	5	219	G
2	5	221	C
2	5	224	U
2	5	226	G
2	5	227	A
2	5	233	U
2	5	246	G
2	5	257	C
2	5	265	C
2	5	266	C
2	5	267	G
2	5	276	C
2	5	277	G
2	5	278	G
2	5	280	G
2	5	297	U
2	5	306	A
2	5	309	C
2	5	310	G
2	5	315	G
2	5	316	U
2	5	322	C
2	5	334	A
2	5	340	C
2	5	363	A
2	5	386	A
2	5	387	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	407	A
2	5	409	G
2	5	410	A
2	5	412	G
2	5	413	G
2	5	431	G
2	5	432	U
2	5	446	C
2	5	450	G
2	5	451	C
2	5	452	A
2	5	453	G
2	5	454	U
2	5	455	C
2	5	468	U
2	5	470	A
2	5	485	C
2	5	486	C
2	5	487	G
2	5	500	G
2	5	654	C
2	5	656	C
2	5	664	G
2	5	665	C
2	5	666	G
2	5	667	A
2	5	668	C
2	5	682	G
2	5	683	C
2	5	684	G
2	5	685	C
2	5	686	A
2	5	690	C
2	5	694	C
2	5	696	C
2	5	697	G
2	5	703	G
2	5	707	C
2	5	718	C
2	5	730	G
2	5	732	A
2	5	737	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	746	A
2	5	747	A
2	5	748	G
2	5	749	G
2	5	918	G
2	5	920	C
2	5	925	C
2	5	927	G
2	5	928	C
2	5	929	A
2	5	930	G
2	5	931	C
2	5	932	A
2	5	933	G
2	5	934	C
2	5	936	C
2	5	937	U
2	5	938	C
2	5	939	G
2	5	942	G
2	5	944	A
2	5	945	U
2	5	946	C
2	5	957	G
2	5	958	G
2	5	960	A
2	5	961	G
2	5	962	C
2	5	963	G
2	5	964	A
2	5	965	G
2	5	966	A
2	5	967	C
2	5	969	C
2	5	971	U
2	5	973	G
2	5	976	G
2	5	978	G
2	5	982	U
2	5	984	C
2	5	989	U
2	5	990	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	1072	C
2	5	1076	C
2	5	1083	U
2	5	1183	C
2	5	1210	C
2	5	1211	G
2	5	1212	G
2	5	1215	C
2	5	1219	G
2	5	1222	A
2	5	1233	G
2	5	1236	C
2	5	1237	C
2	5	1238	A
2	5	1239	C
2	5	1242	G
2	5	1272	C
2	5	1273	G
2	5	1274	A
2	5	1275	G
2	5	1279	A
2	5	1280	C
2	5	1281	G
2	5	1285	U
2	5	1286	C
2	5	1288	G
2	5	1293	G
2	5	1295	C
2	5	1296	G
2	5	1297	U
2	5	1301	C
2	5	1303	A
2	5	1304	C
2	5	1326	A
2	5	1330	A
2	5	1344	C
2	5	1354	A
2	5	1358	G
2	5	1366	G
2	5	1367	C
2	5	1369	C
2	5	1370	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	1371	A
2	5	1377	G
2	5	1378	C
2	5	1379	C
2	5	1380	G
2	5	1381	U
2	5	1387	A
2	5	1394	G
2	5	1397	A
2	5	1399	G
2	5	1407	C
2	5	1408	G
2	5	1409	C
2	5	1410	U
2	5	1411	C
2	5	1420	A
2	5	1429	C
2	5	1437	C
2	5	1440	U
2	5	1441	C
2	5	1445	U
2	5	1446	C
2	5	1448	G
2	5	1456	C
2	5	1457	G
2	5	1465	G
2	5	1475	G
2	5	1477	C
2	5	1478	C
2	5	1482	G
2	5	1483	C
2	5	1497	A
2	5	1498	G
2	5	1504	G
2	5	1514	U
2	5	1516	G
2	5	1523	A
2	5	1534	A
2	5	1547	A
2	5	1563	A
2	5	1564	A
2	5	1566	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	1568	C
2	5	1574	G
2	5	1578	U
2	5	1591	U
2	5	1596	U
2	5	1602	U
2	5	1612	G
2	5	1613	A
2	5	1624	G
2	5	1625	G
2	5	1631	A
2	5	1633	G
2	5	1634	A
2	5	1638	A
2	5	1654	G
2	5	1656	U
2	5	1661	C
2	5	1676	C
2	5	1677	U
2	5	1694	C
2	5	1697	G
2	5	1698	C
2	5	1720	C
2	5	1721	G
2	5	1724	G
2	5	1729	A
2	5	1731	C
2	5	1741	G
2	5	1742	A
2	5	1750	G
2	5	1753	G
2	5	1754	U
2	5	1755	C
2	5	1756	U
2	5	1757	U
2	5	1760	G
2	5	1761	G
2	5	1764	G
2	5	1768	C
2	5	1772	C
2	5	1776	A
2	5	1781	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	1787	A
2	5	1800	U
2	5	1804	A
2	5	1805	A
2	5	1815	G
2	5	1819	G
2	5	1820	C
2	5	1822	U
2	5	1828	C
2	5	1833	G
2	5	1834	U
2	5	1835	G
2	5	1836	G
2	5	1840	G
2	5	1848	C
2	5	1855	G
2	5	1869	G
2	5	1897	A
2	5	1898	C
2	5	1910	G
2	5	1918	U
2	5	1920	C
2	5	1921	C
2	5	1922	G
2	5	1923	A
2	5	1931	C
2	5	1945	G
2	5	1956	A
2	5	1957	U
2	5	1958	A
2	5	1961	G
2	5	1962	A
2	5	2025	A
2	5	2026	A
2	5	2047	A
2	5	2048	U
2	5	2055	G
2	5	2056	G
2	5	2062	C
2	5	2064	G
2	5	2069	A
2	5	2070	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	2084	C
2	5	2088	A
2	5	2089	G
2	5	2090	U
2	5	2092	G
2	5	2093	A
2	5	2094	G
2	5	2095	A
2	5	2097	U
2	5	2105	A
2	5	2107	C
2	5	2246	C
2	5	2247	C
2	5	2250	C
2	5	2251	G
2	5	2252	G
2	5	2253	A
2	5	2255	C
2	5	2257	C
2	5	2258	C
2	5	2259	G
2	5	2260	C
2	5	2261	G
2	5	2263	A
2	5	2264	C
2	5	2265	G
2	5	2266	C
2	5	2267	U
2	5	2268	A
2	5	2269	C
2	5	2270	G
2	5	2275	G
2	5	2279	A
2	5	2289	C
2	5	2299	G
2	5	2300	A
2	5	2301	G
2	5	2306	G
2	5	2313	A
2	5	2314	G
2	5	2316	G
2	5	2331	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	2333	G
2	5	2348	G
2	5	2351	C
2	5	2360	A
2	5	2395	A
2	5	2396	A
2	5	2402	G
2	5	2417	A
2	5	2422	C
2	5	2425	U
2	5	2433	G
2	5	2441	C
2	5	2471	G
2	5	2475	G
2	5	2488	C
2	5	2489	C
2	5	2490	U
2	5	2491	C
2	5	2503	G
2	5	2504	C
2	5	2505	C
2	5	2506	G
2	5	2507	A
2	5	2512	A
2	5	2513	A
2	5	2530	U
2	5	2537	A
2	5	2544	G
2	5	2546	G
2	5	2547	G
2	5	2552	G
2	5	2554	U
2	5	2555	G
2	5	2571	C
2	5	2572	C
2	5	2575	U
2	5	2583	C
2	5	2586	G
2	5	2587	A
2	5	2589	C
2	5	2618	G
2	5	2620	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	2627	C
2	5	2638	G
2	5	2640	G
2	5	2658	G
2	5	2661	U
2	5	2662	G
2	5	2673	G
2	5	2686	G
2	5	2687	U
2	5	2689	C
2	5	2695	A
2	5	2696	A
2	5	2710	C
2	5	2711	G
2	5	2712	G
2	5	2714	G
2	5	2715	G
2	5	2716	C
2	5	2724	G
2	5	2725	A
2	5	2726	G
2	5	2735	G
2	5	2740	U
2	5	2743	A
2	5	2744	A
2	5	2753	G
2	5	2754	G
2	5	2759	G
2	5	2762	G
2	5	2767	U
2	5	2768	C
2	5	2769	U
2	5	2770	C
2	5	2772	C
2	5	2787	A
2	5	2788	U
2	5	2790	U
2	5	2798	A
2	5	2814	C
2	5	2826	U
2	5	2828	U
2	5	2838	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	2842	G
2	5	2855	G
2	5	2898	G
2	5	2904	U
2	5	2905	C
2	5	3591	C
2	5	3593	C
2	5	3594	C
2	5	3596	A
2	5	3597	G
2	5	3605	C
2	5	3606	U
2	5	3615	G
2	5	3625	G
2	5	3626	G
2	5	3635	A
2	5	3662	A
2	5	3672	G
2	5	3673	C
2	5	3692	A
2	5	3696	C
2	5	3698	G
2	5	3710	G
2	5	3711	A
2	5	3714	G
2	5	3729	U
2	5	3739	C
2	5	3748	A
2	5	3753	G
2	5	3756	A
2	5	3759	A
2	5	3760	A
2	5	3772	U
2	5	3773	U
2	5	3774	A
2	5	3776	G
2	5	3777	G
2	5	3784	A
2	5	3786	U
2	5	3798	U
2	5	3799	A
2	5	3810	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	3811	G
2	5	3812	C
2	5	3814	U
2	5	3817	A
2	5	3819	G
2	5	3838	U
2	5	3839	G
2	5	3840	U
2	5	3876	A
2	5	3877	A
2	5	3878	C
2	5	3879	G
2	5	3889	G
2	5	3897	G
2	5	3901	A
2	5	3905	A
2	5	3906	A
2	5	3907	G
2	5	3908	A
2	5	3915	U
2	5	3916	G
2	5	3917	A
2	5	3926	C
2	5	3927	U
2	5	3938	G
2	5	3939	G
2	5	3943	A
2	5	4069	U
2	5	4070	U
2	5	4073	A
2	5	4076	G
2	5	4077	A
2	5	4085	A
2	5	4086	G
2	5	4088	C
2	5	4090	G
2	5	4094	G
2	5	4097	G
2	5	4114	C
2	5	4115	G
2	5	4116	C
2	5	4117	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	4119	C
2	5	4120	U
2	5	4122	G
2	5	4125	C
2	5	4127	A
2	5	4142	C
2	5	4143	G
2	5	4144	C
2	5	4145	C
2	5	4158	C
2	5	4162	C
2	5	4163	U
2	5	4165	C
2	5	4166	G
2	5	4170	A
2	5	4171	C
2	5	4183	G
2	5	4184	G
2	5	4191	G
2	5	4203	A
2	5	4212	A
2	5	4217	G
2	5	4218	U
2	5	4225	G
2	5	4229	U
2	5	4232	U
2	5	4233	A
2	5	4234	A
2	5	4241	C
2	5	4249	G
2	5	4251	A
2	5	4254	G
2	5	4255	A
2	5	4267	G
2	5	4268	A
2	5	4271	A
2	5	4273	A
2	5	4280	A
2	5	4290	U
2	5	4291	G
2	5	4297	G
2	5	4302	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	4303	C
2	5	4304	A
2	5	4305	G
2	5	4306	U
2	5	4314	C
2	5	4318	C
2	5	4319	C
2	5	4329	G
2	5	4330	G
2	5	4332	C
2	5	4336	A
2	5	4349	C
2	5	4350	C
2	5	4354	U
2	5	4355	G
2	5	4377	G
2	5	4378	A
2	5	4387	C
2	5	4393	G
2	5	4394	A
2	5	4395	U
2	5	4398	C
2	5	4419	U
2	5	4421	C
2	5	4422	A
2	5	4437	U
2	5	4440	G
2	5	4444	C
2	5	4448	G
2	5	4449	A
2	5	4464	A
2	5	4471	U
2	5	4473	A
2	5	4475	G
2	5	4476	C
2	5	4482	U
2	5	4488	A
2	5	4500	U
2	5	4512	U
2	5	4513	A
2	5	4518	A
2	5	4524	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	4528	G
2	5	4529	G
2	5	4531	U
2	5	4548	A
2	5	4549	G
2	5	4560	C
2	5	4567	G
2	5	4570	G
2	5	4575	G
2	5	4577	U
2	5	4586	G
2	5	4590	A
2	5	4617	G
2	5	4627	U
2	5	4636	U
2	5	4637	G
2	5	4639	G
2	5	4647	G
2	5	4652	G
2	5	4656	A
2	5	4657	U
2	5	4667	C
2	5	4670	C
2	5	4671	C
2	5	4672	A
2	5	4677	U
2	5	4678	G
2	5	4691	A
2	5	4695	C
2	5	4697	U
2	5	4700	A
2	5	4709	U
2	5	4720	C
2	5	4730	C
2	5	4731	G
2	5	4732	G
2	5	4737	G
2	5	4738	C
2	5	4743	G
2	5	4744	A
2	5	4745	G
2	5	4746	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	4750	G
2	5	4753	U
2	5	4756	C
2	5	4758	U
2	5	4764	A
2	5	4768	G
2	5	4770	U
2	5	4771	C
2	5	4869	U
2	5	4871	C
2	5	4873	G
2	5	4875	G
2	5	4876	U
2	5	4877	G
2	5	4883	C
2	5	4884	G
2	5	4886	C
2	5	4889	G
2	5	4890	G
2	5	4895	C
2	5	4896	G
2	5	4901	G
2	5	4902	C
2	5	4910	G
2	5	4911	A
2	5	4913	G
2	5	4919	G
2	5	4927	G
2	5	4931	G
2	5	4933	C
2	5	4936	G
2	5	4937	C
2	5	4939	C
2	5	4944	C
2	5	4945	G
2	5	4948	C
2	5	4949	G
2	5	4950	U
2	5	4951	G
2	5	4952	G
2	5	4959	U
2	5	4964	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	4965	U
2	5	4966	A
2	5	4976	U
2	5	4988	U
2	5	4989	U
2	5	4991	U
2	5	5006	U
2	5	5013	C
2	5	5017	G
2	5	5023	C
2	5	5024	C
2	5	5025	C
2	5	5026	U
2	5	5027	C
2	5	5028	G
2	5	5041	G
2	5	5047	C
2	5	5050	C
2	5	5052	C
2	5	5053	U
2	5	5054	C
2	5	5056	A
2	5	5060	A
2	5	5061	A
2	5	5062	G
3	7	7	G
3	7	22	A
3	7	33	U
3	7	40	U
3	7	49	A
3	7	51	G
3	7	53	U
3	7	54	A
3	7	63	C
3	7	64	G
3	7	100	A
3	7	110	G
3	7	111	C
3	7	120	U
4	8	2	G
4	8	16	G
4	8	34	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
4	8	35	C
4	8	39	G
4	8	51	U
4	8	59	A
4	8	62	A
4	8	63	U
4	8	75	G
4	8	77	A
4	8	79	G
4	8	80	A
4	8	81	C
4	8	82	A
4	8	83	C
4	8	84	A
4	8	85	U
4	8	86	U
4	8	87	G
4	8	90	C
4	8	94	G
4	8	103	A
4	8	105	C
4	8	110	U
4	8	111	U
4	8	113	C
4	8	114	G
4	8	123	U
4	8	125	C
4	8	126	C
4	8	127	U
4	8	128	C
4	8	153	C

All (94) RNA pucker outliers are listed below:

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	1	37	C
1	1	38	U
1	1	39	C
1	1	118	A
1	1	234	A
1	1	236	U
2	5	1	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	47	A
2	5	48	G
2	5	125	C
2	5	134	G
2	5	170	C
2	5	187	U
2	5	216	C
2	5	218	A
2	5	226	G
2	5	245	C
2	5	265	C
2	5	275	C
2	5	385	A
2	5	406	C
2	5	451	C
2	5	486	C
2	5	664	G
2	5	684	G
2	5	693	C
2	5	917	A
2	5	930	G
2	5	932	A
2	5	943	A
2	5	957	G
2	5	965	G
2	5	1211	G
2	5	1232	G
2	5	1236	C
2	5	1238	A
2	5	1296	G
2	5	1329	G
2	5	1357	C
2	5	1365	C
2	5	1368	A
2	5	1380	G
2	5	1407	C
2	5	1419	G
2	5	1440	U
2	5	1455	G
2	5	1474	C
2	5	1633	G
2	5	1720	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	5	1804	A
2	5	1835	G
2	5	2046	G
2	5	2068	C
2	5	2083	C
2	5	2088	A
2	5	2089	G
2	5	2093	A
2	5	2256	C
2	5	2257	C
2	5	2260	C
2	5	2262	G
2	5	2502	G
2	5	2506	G
2	5	2546	G
2	5	2639	U
2	5	2661	U
2	5	2695	A
2	5	3625	G
2	5	3697	U
2	5	3876	A
2	5	3888	G
2	5	3904	G
2	5	4069	U
2	5	4119	C
2	5	4170	A
2	5	4232	U
2	5	4448	G
2	5	4528	G
2	5	4656	A
2	5	4699	U
2	5	4719	G
2	5	4885	U
2	5	4888	U
2	5	4889	G
2	5	4935	C
2	5	4942	C
2	5	4948	C
2	5	4965	U
2	5	5022	U
2	5	5027	C
2	5	5059	C

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Mol	Chain	Res	Type
2	5	5060	A
2	5	5061	A
4	8	124	U

## 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 9 ligands modelled in this entry, 7 are monoatomic - leaving 2 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$
58	GTP	v	301	57	26,34,34	1.09	2 (7%)	32,54,54	1.75	7 (21%)
59	GNP	x	601	57	29,34,34	1.60	7 (24%)	33,54,54	2.11	6 (18%)

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
58	GTP	v	301	57	-	4/18/38/38	0/3/3/3
59	GNP	x	601	57	-	7/14/38/38	0/3/3/3

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
59	x	601	GNP	PB-O3A	4.14	1.64	1.59
58	v	301	GTP	C5-C6	-3.89	1.39	1.47
59	x	601	GNP	C6-N1	3.13	1.38	1.33
59	x	601	GNP	PG-N3B	3.08	1.71	1.63
59	x	601	GNP	PB-O1B	3.06	1.51	1.46
59	x	601	GNP	PG-O1G	2.80	1.50	1.46
58	v	301	GTP	C2-N3	2.22	1.38	1.33
59	x	601	GNP	PB-O2B	-2.19	1.50	1.56
59	x	601	GNP	C5-C6	2.12	1.45	1.41

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
59	x	601	GNP	C5-C6-N1	-8.45	111.87	123.43
59	x	601	GNP	C2-N1-C6	5.87	125.26	115.93
58	v	301	GTP	PB-O3B-PG	-4.81	116.32	132.83
58	v	301	GTP	PA-O3A-PB	-3.72	120.07	132.83
58	v	301	GTP	C5-C6-N1	3.25	119.69	113.95
58	v	301	GTP	C3'-C2'-C1'	3.10	105.64	100.98
58	v	301	GTP	C8-N7-C5	3.02	108.74	102.99
58	v	301	GTP	C2-N1-C6	-2.93	119.70	125.10
59	x	601	GNP	PB-O3A-PA	-2.93	122.31	132.62
59	x	601	GNP	N3-C2-N1	-2.74	123.57	127.22
59	x	601	GNP	C4-C5-C6	-2.55	118.37	120.80
59	x	601	GNP	C2-N3-C4	-2.17	112.88	115.36
58	v	301	GTP	O6-C6-C5	-2.11	120.25	124.37

There are no chirality outliers.

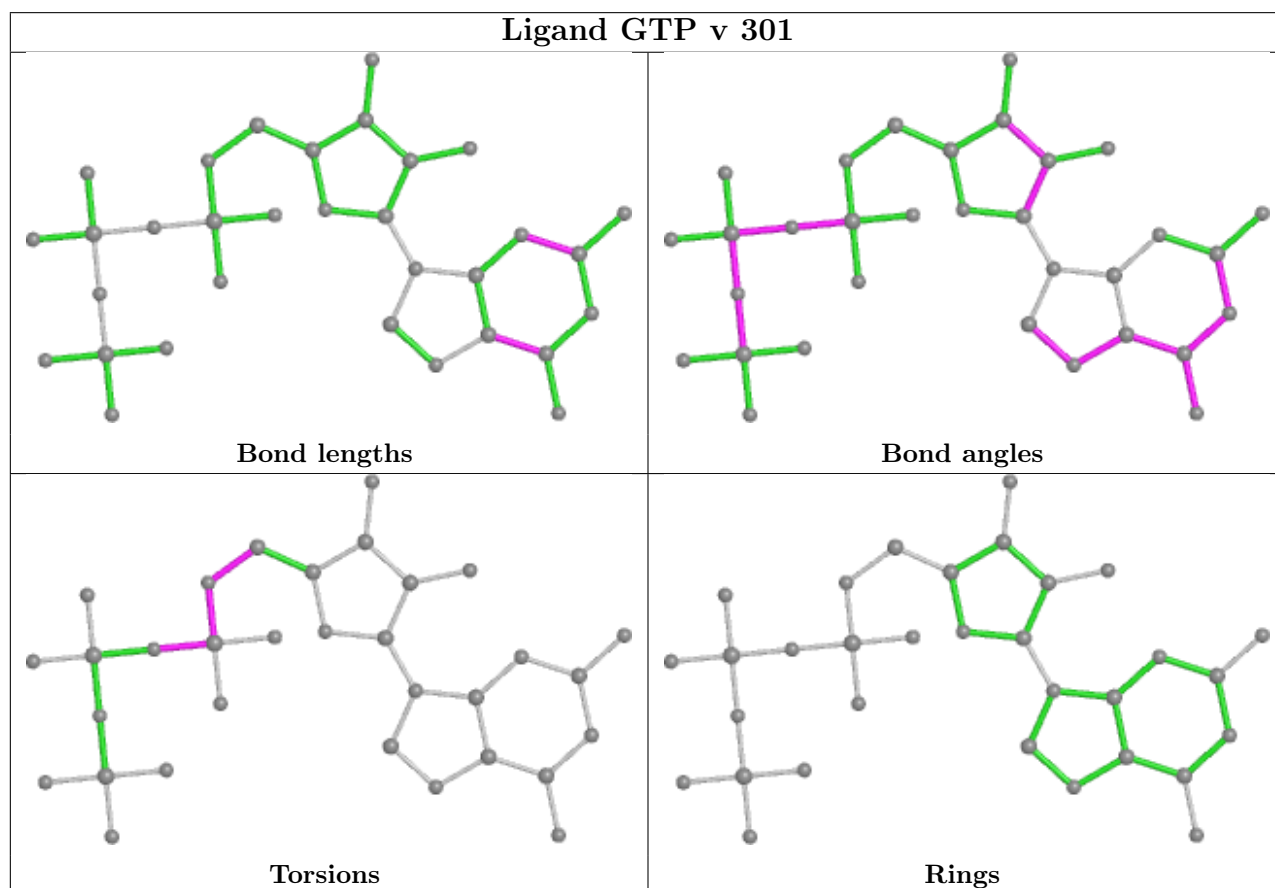
All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
59	x	601	GNP	PG-N3B-PB-O1B
59	x	601	GNP	PG-N3B-PB-O3A
59	x	601	GNP	C5'-O5'-PA-O1A
59	x	601	GNP	O4'-C4'-C5'-O5'
58	v	301	GTP	PB-O3A-PA-O1A
58	v	301	GTP	C4'-C5'-O5'-PA
59	x	601	GNP	C5'-O5'-PA-O3A
59	x	601	GNP	C3'-C4'-C5'-O5'
59	x	601	GNP	PB-O3A-PA-O1A
58	v	301	GTP	C5'-O5'-PA-O3A
58	v	301	GTP	PB-O3A-PA-O2A

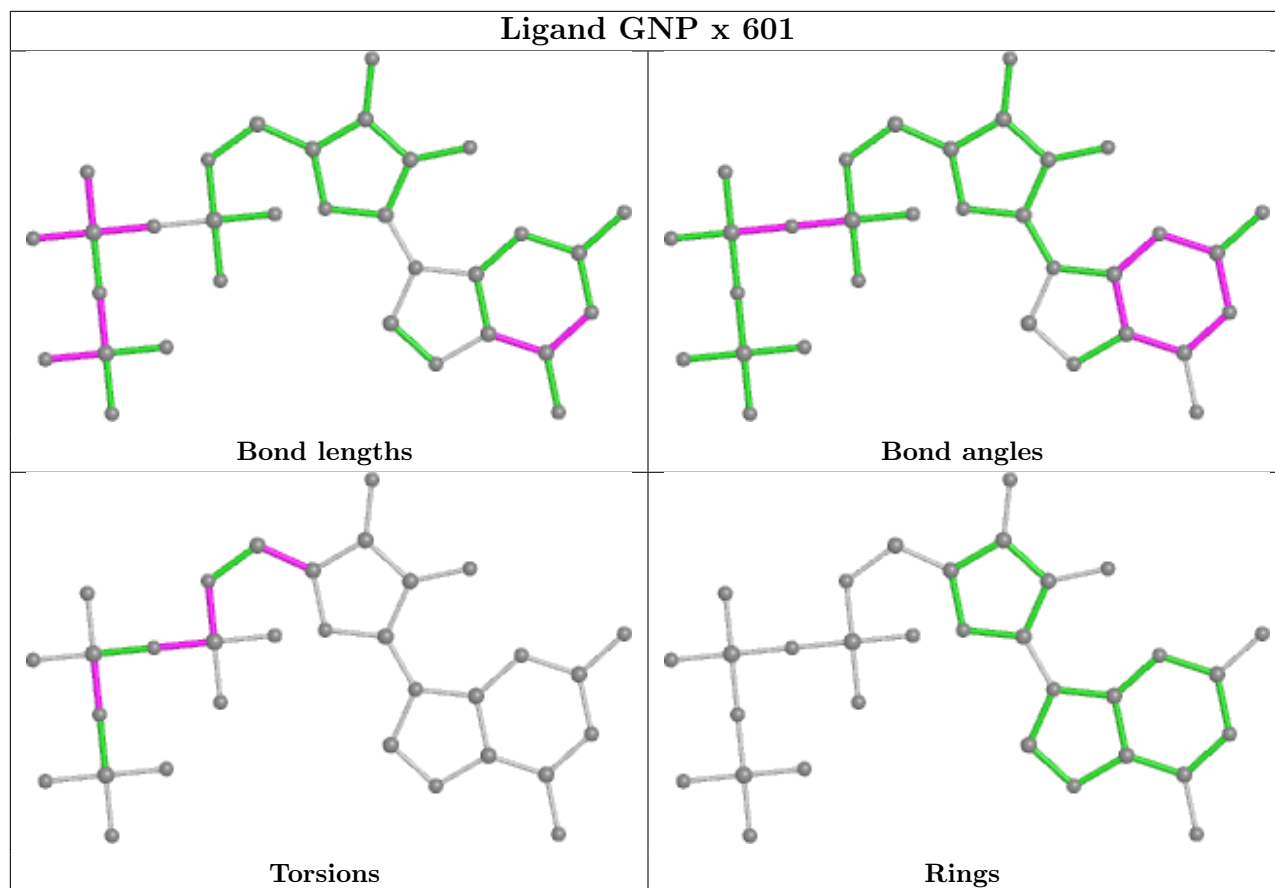
There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	5	15
1	1	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	5	462:G	O3'	467:U	P	20.97
1	5	4776:G	O3'	4859:C	P	17.65
1	5	4097:G	O3'	4112:C	P	17.38
1	5	2910:G	O3'	3583:U	P	17.30
1	5	757:G	O3'	906:C	P	17.29

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Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	5	500:G	O3'	652:G	P	16.28
1	5	990:C	O3'	1064:G	P	16.09
1	5	3950:U	O3'	4065:G	P	14.48
1	5	1962:A	O3'	2021:G	P	13.62
1	5	2107:C	O3'	2243:C	P	13.33
1	5	1242:G	O3'	1271:G	P	11.73
1	5	1840:G	O3'	1842:G	P	4.64
1	5	1699:A	O3'	1718:C	P	4.57
1	1	105:G	O3'	106:G	P	4.51
1	5	1222:A	O3'	1232:G	P	4.47
1	5	1100:U	O3'	1167:C	P	3.80

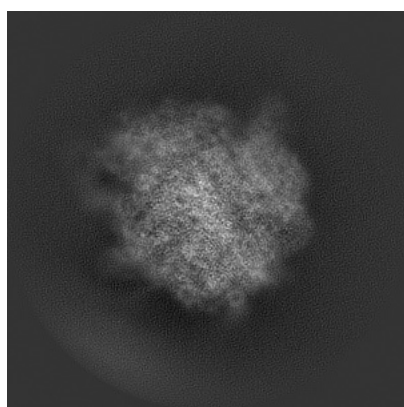
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12303. These allow visual inspection of the internal detail of the map and identification of artifacts.

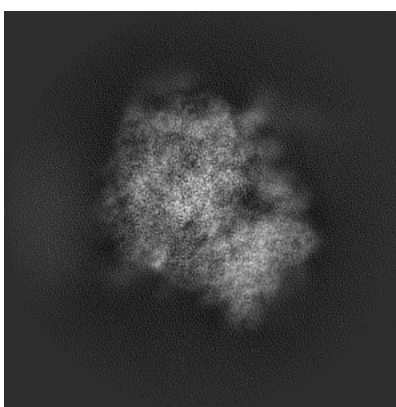
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

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

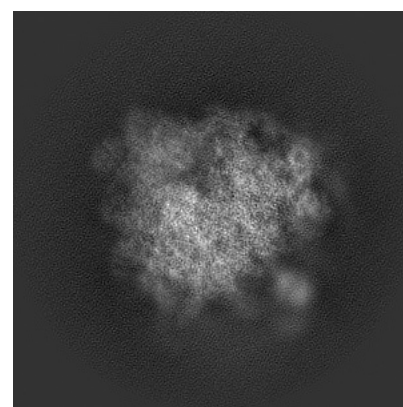
#### 6.1.1 Primary map



X



Y

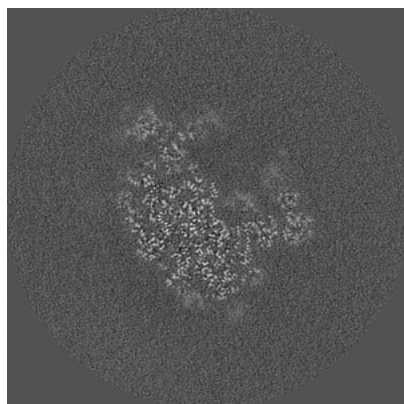


Z

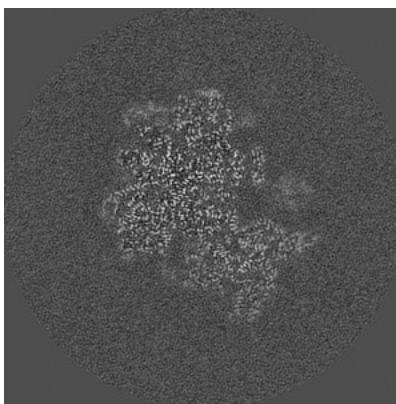
The images above show the map projected in three orthogonal directions.

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

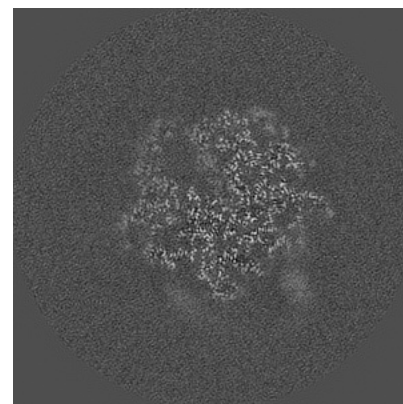
#### 6.2.1 Primary map



X Index: 224



Y Index: 224

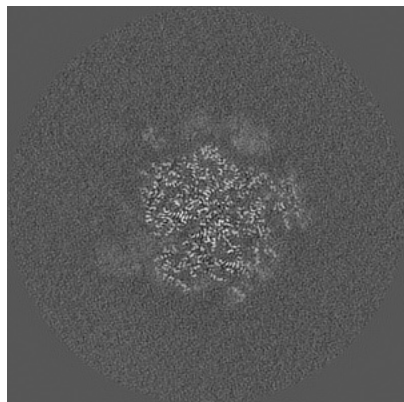


Z Index: 224

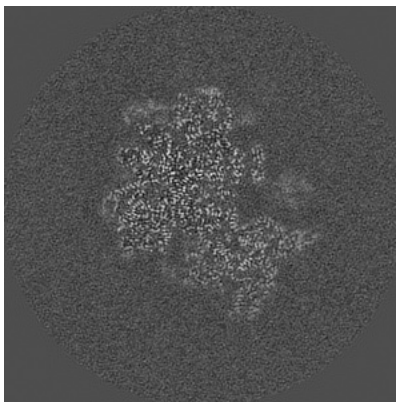
The images above show central slices of the map in three orthogonal directions.

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

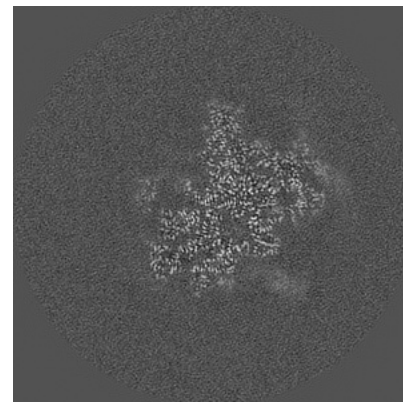
### 6.3.1 Primary map



X Index: 259



Y Index: 224

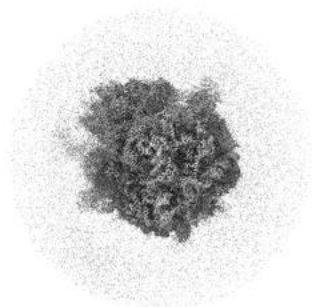


Z Index: 195

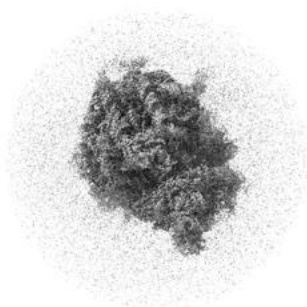
The images above show the largest variance slices of the map in three orthogonal directions.

## 6.4 Orthogonal surface views [i](#)

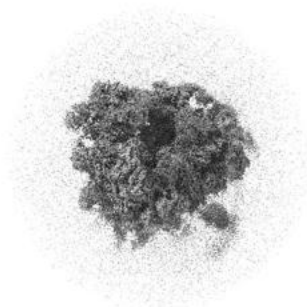
### 6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.018. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

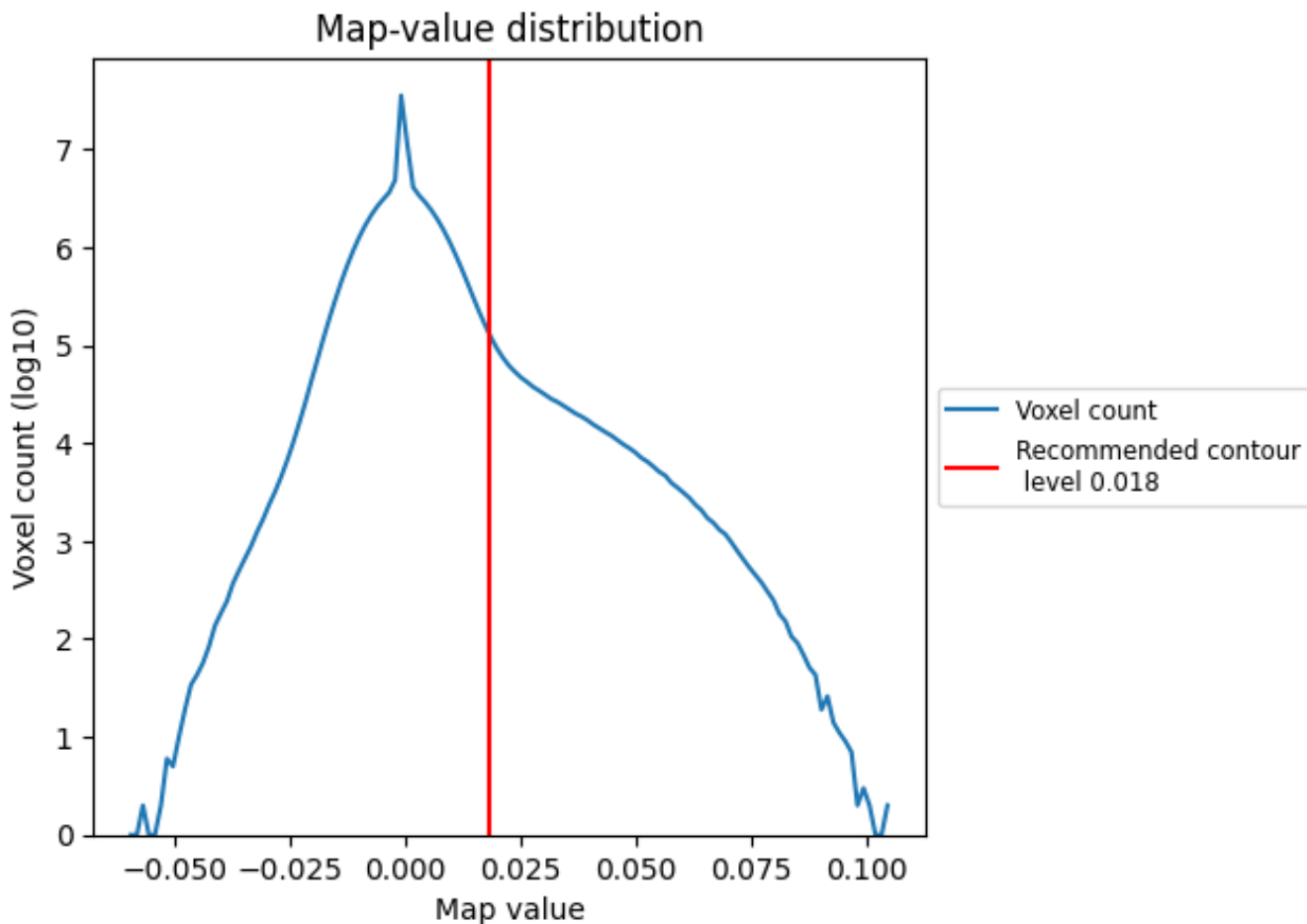
## 6.5 Mask visualisation

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

## 7 Map analysis [i](#)

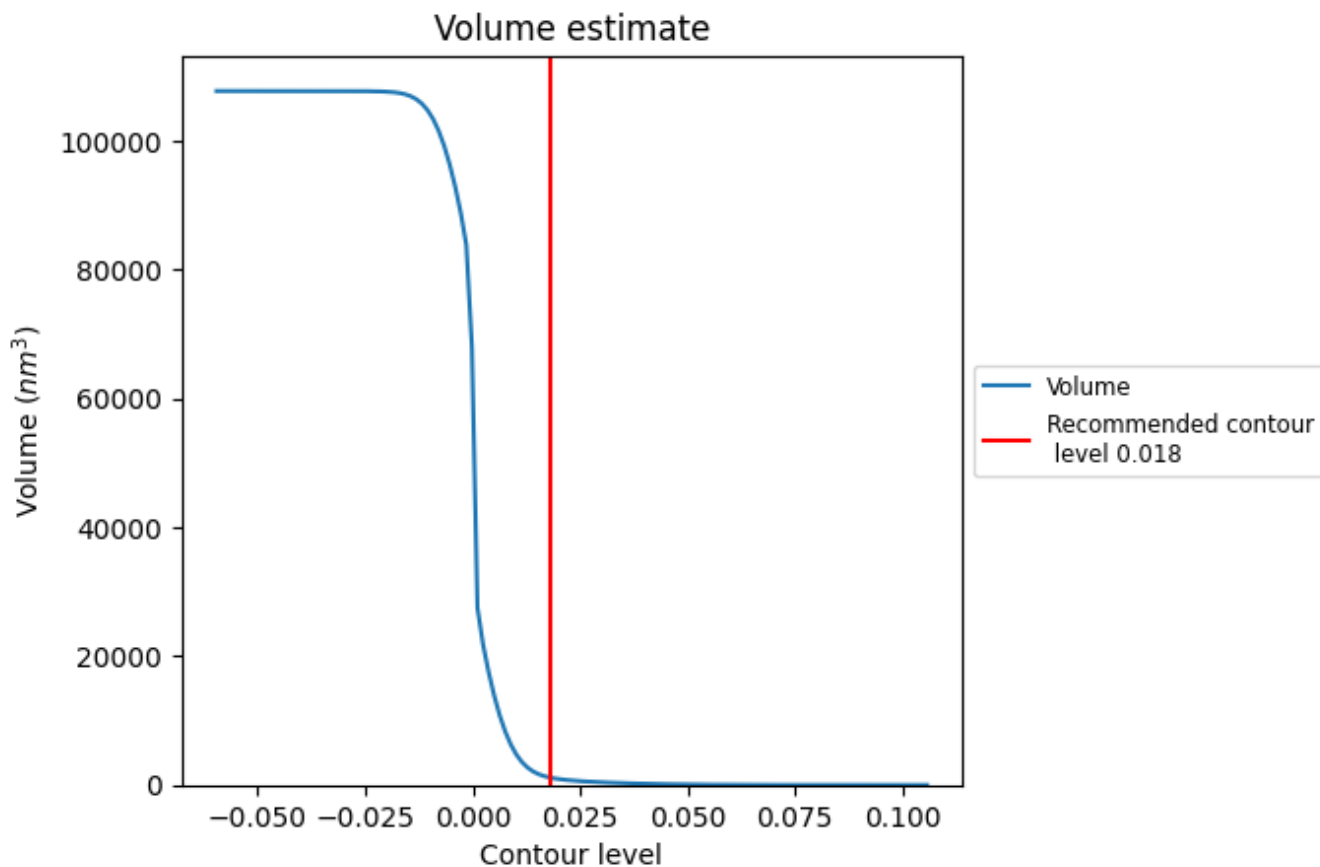
This section contains the results of statistical analysis of the map.

### 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.

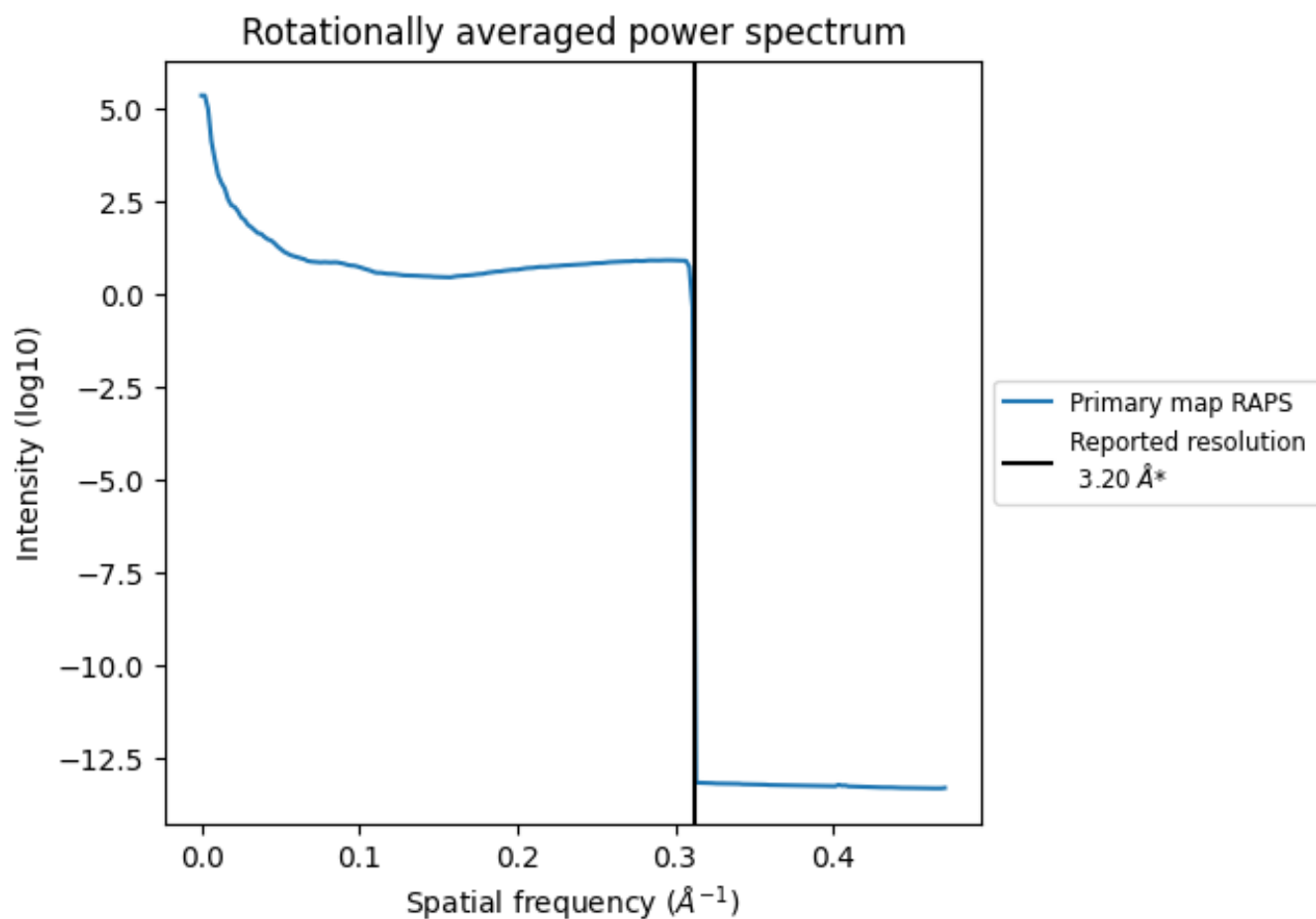
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1146  $\text{nm}^3$ ; this corresponds to an approximate mass of 1035 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  $0.312 \text{\AA}^{-1}$



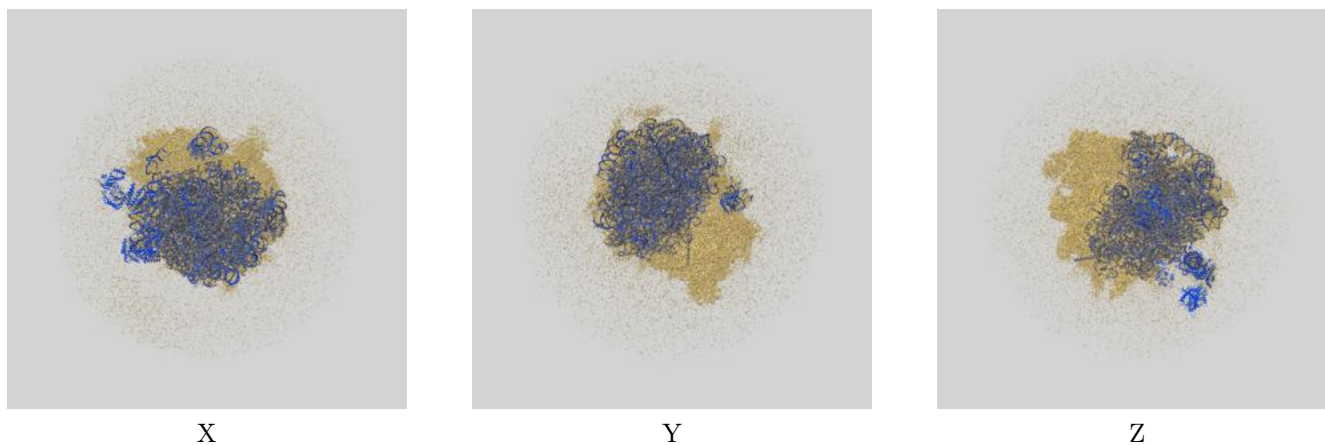
## 8 Fourier-Shell correlation

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

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

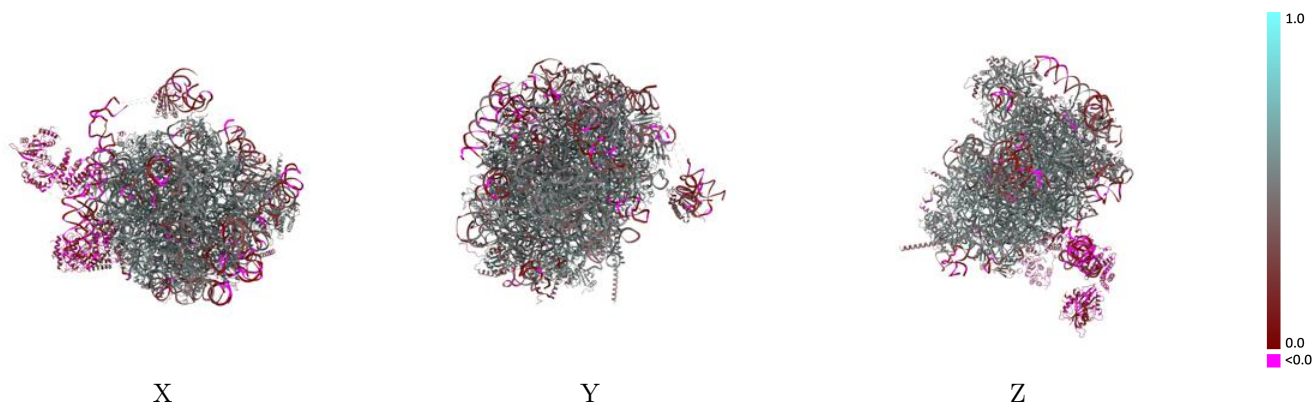
This section contains information regarding the fit between EMDB map EMD-12303 and PDB model 7NFX. Per-residue inclusion information can be found in section 3 on page 17.

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



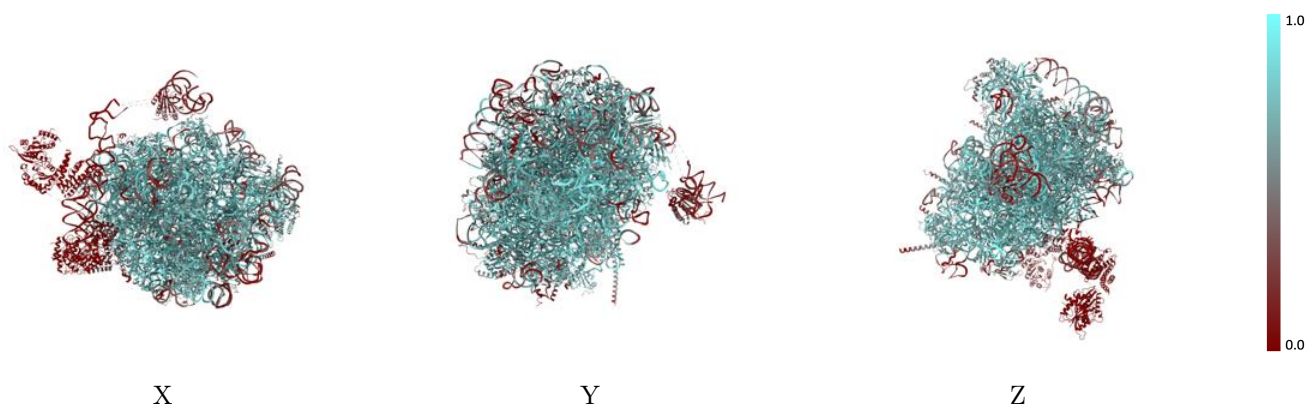
The images above show the 3D surface view of the map at the recommended contour level 0.018 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



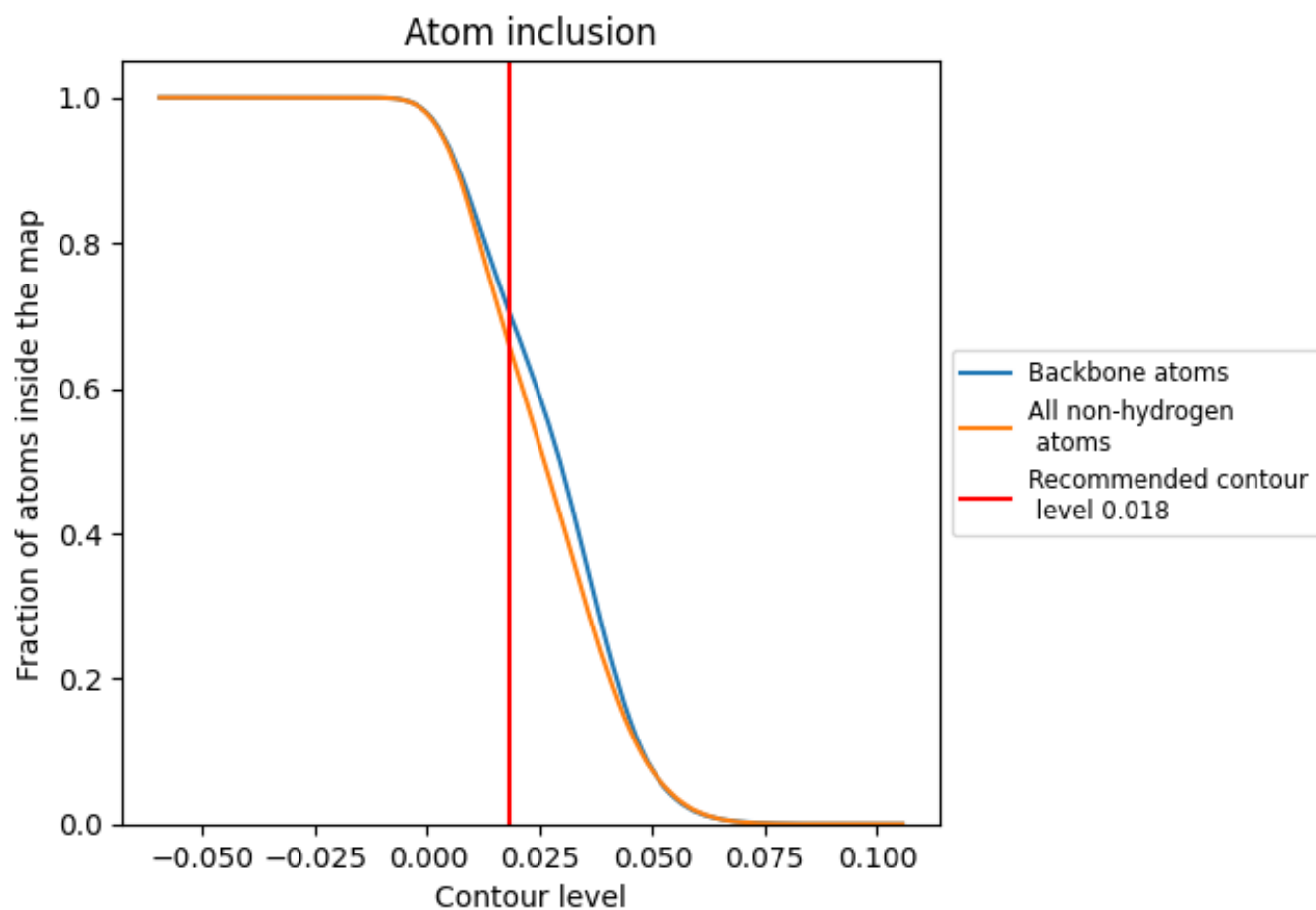
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.018).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 71% of all backbone atoms, 66% 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 (0.018) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6620	 0.4320
1	 0.0848	 0.0720
5	 0.7433	 0.4430
7	 0.8456	 0.4990
8	 0.7722	 0.4660
A	 0.7615	 0.5380
B	 0.7505	 0.5330
C	 0.7389	 0.5180
D	 0.6487	 0.4730
E	 0.6026	 0.4290
F	 0.7460	 0.5160
G	 0.5920	 0.4500
H	 0.6617	 0.4970
I	 0.7065	 0.4970
J	 0.5617	 0.4360
L	 0.6532	 0.4810
M	 0.7188	 0.5120
N	 0.7883	 0.5400
O	 0.7473	 0.5210
P	 0.7496	 0.5410
Q	 0.7630	 0.5250
R	 0.6808	 0.4920
S	 0.7436	 0.5180
T	 0.6833	 0.4940
U	 0.5582	 0.4470
V	 0.7335	 0.5280
W	 0.7151	 0.5250
X	 0.6923	 0.4980
Y	 0.7291	 0.5210
Z	 0.6990	 0.4930
a	 0.7713	 0.5330
b	 0.6037	 0.4410
c	 0.7063	 0.5000
d	 0.6873	 0.5070
e	 0.7758	 0.5450



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Chain	Atom inclusion	Q-score
f	 0.7743	 0.5370
g	 0.7172	 0.5110
h	 0.6813	 0.4990
i	 0.6344	 0.4600
j	 0.8009	 0.5320
k	 0.5907	 0.4400
l	 0.7352	 0.5220
m	 0.7115	 0.4930
n	 0.7065	 0.4920
o	 0.6755	 0.4910
p	 0.7155	 0.5190
q	 0.0281	 0.1090
r	 0.7261	 0.5140
s	 0.0286	 0.0640
t	 0.2059	 0.3110
u	 0.0309	 0.0940
v	 0.0034	 0.1180
w	 0.1738	 0.2720
x	 0.0669	 0.1390
y	 0.0099	 0.0960
z	 0.0127	 0.0750