



Full wwPDB EM Validation Report ⓘ

Sep 26, 2022 – 11:10 pm BST

PDB ID : 7ZEB
EMDB ID : EMD-14688
Title : Complex I from *Ovis aries* at pH9, Closed state
Authors : Sazanov, L.; Petrova, O.
Deposited on : 2022-03-30
Resolution : 3.80 Å (reported)
Based on initial model : 6ZKC

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

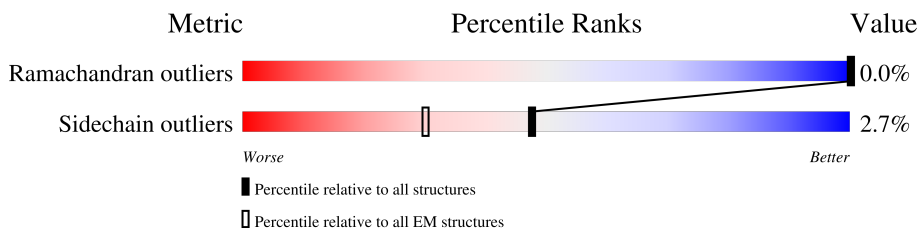
EMDB validation analysis : 0.0.1.dev43
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

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 3.80 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.



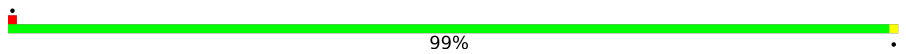


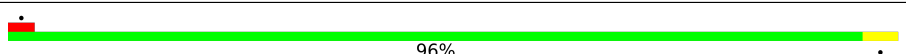
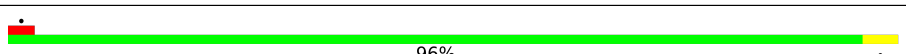
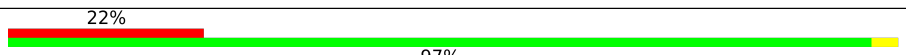
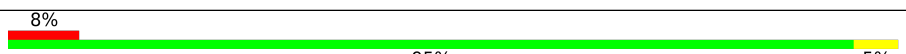
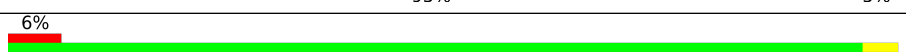
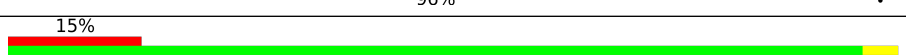
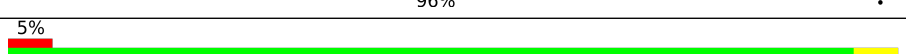
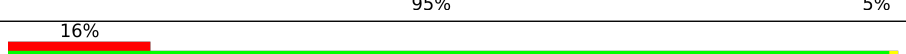
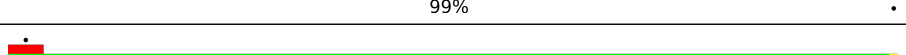
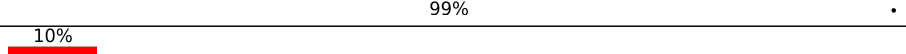
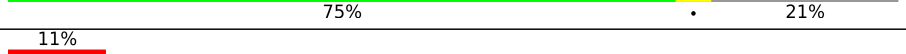
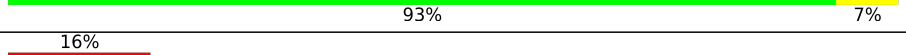
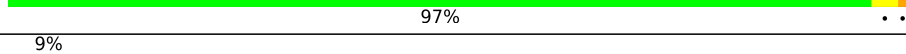
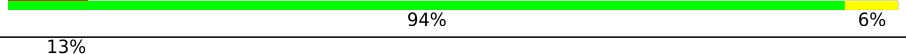
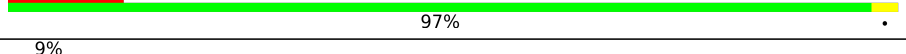
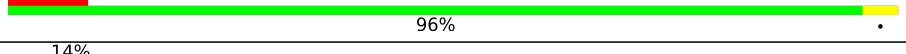
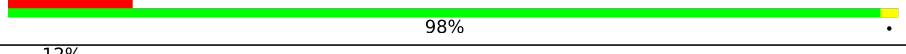
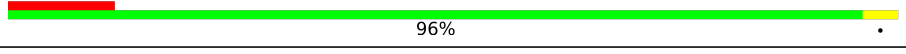
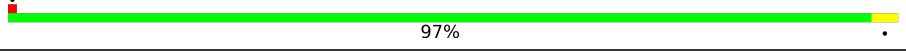
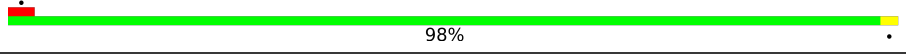
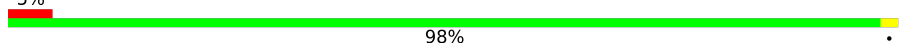
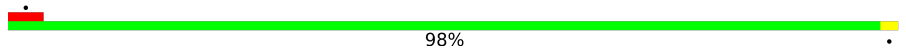
Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	4	430	97% ..
2	A	115	95% 5%
3	H	318	97% .
4	J	175	97% .
5	K	98	97% .
6	L	606	98% .
7	M	459	98% .
8	N	347	99% .
9	V	140	22% 97% .

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Mol	Chain	Length	Quality of chain
10	W	139	 99%
11	X	157	 10% 55% 45%
11	j	157	 24% 47% 51%
12	Y	171	 96%
13	Z	171	 96%
14	k	320	 22% 97%
15	l	105	 8% 95% 5%
16	m	80	 6% 96%
17	n	79	 15% 96%
18	o	120	 5% 95% 5%
19	p	128	 16% 99%
20	q	139	 99%
21	r	126	 10% 75% 21%
22	s	122	 11% 93% 7%
23	t	177	 16% 97%
24	u	65	 9% 94% 6%
25	v	155	 13% 97%
26	w	101	 9% 96%
27	x	49	 14% 98%
28	y	50	 12% 96%
29	z	70	 97%
30	1	430	 98%
31	2	213	 5% 98%
32	3	688	 98%
33	5	208	 97%

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Mol	Chain	Length	Quality of chain
34	6	150	 94% 6%
35	9	217	 78% 21%
36	a	44	 98%
37	b	95	 99%
38	c	126	 99%
39	d	340	 95%
40	e	86	 95% 5%
41	f	113	 98%
42	g	114	 98%
43	h	112	 82% 14%
44	i	145	 99%

2 Entry composition [i](#)

There are 55 unique types of molecules in this entry. The entry contains 66396 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 NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	4	423	3404	2172	586	621	25	0	0

- Molecule 2 is a protein called NADH-ubiquinone oxidoreductase chain 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	A	115	922	621	133	161	7	0	0

- Molecule 3 is a protein called NADH-ubiquinone oxidoreductase chain 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	H	318	2528	1704	384	421	19	0	0

- Molecule 4 is a protein called NADH-ubiquinone oxidoreductase chain 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	J	175	1344	904	192	235	13	0	0

- Molecule 5 is a protein called NADH-ubiquinone oxidoreductase chain 4L.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	K	98	749	490	112	132	15	0	0

- Molecule 6 is a protein called NADH-ubiquinone oxidoreductase chain 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	L	606	4807	3188	746	829	44	0	0

- Molecule 7 is a protein called NADH-ubiquinone oxidoreductase chain 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	M	459	3647	2429	571	607	40	0	0

- Molecule 8 is a protein called NADH-ubiquinone oxidoreductase chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	N	347	2723	1808	416	459	40	0	0

- Molecule 9 is a protein called Complex I-B14.7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	V	140	1028	656	175	191	6	0	0

- Molecule 10 is a protein called Complex I-SGDH.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	W	139	1155	761	194	198	2	0	0

- Molecule 11 is a protein called Acyl carrier protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	X	87	701	451	103	142	5	0	0
11	j	77	619	399	92	123	5	0	0

- Molecule 12 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	Y	171	1403	889	253	251	10	0	0

- Molecule 13 is a protein called Complex I-PDSW.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	Z	171	1441	905	266	262	8	0	0

- Molecule 14 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	N	O	P			S
14	k	320	2596	1659	432	494	1	10	0	0

- Molecule 15 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	N	O	S			
15	l	105	874	551	164	153	6		0	0

- Molecule 16 is a protein called Complex I-B9.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	N	O	S			
16	m	80	626	411	103	110	2		0	0

- Molecule 17 is a protein called Complex I-B12.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	N	O	S			
17	n	79	634	415	106	111	2		0	0

- Molecule 18 is a protein called NADH dehydrogenase [ubiquinone] 1 subunit C2.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	N	O	S			
18	o	120	1004	652	175	172	5		0	0

- Molecule 19 is a protein called NADH:ubiquinone oxidoreductase subunit B4.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	N	O	S			
19	p	128	1059	675	189	194	1		0	0

- Molecule 20 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 13.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	N	O	S			
20	q	139	1142	733	200	200	9		0	0

- Molecule 21 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	r	99	846	554	149	142	1	0	0

- Molecule 22 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	s	122	1047	653	199	186	9	0	0

- Molecule 23 is a protein called Complex I-B22.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	t	177	1520	973	279	262	6	0	0

- Molecule 24 is a protein called Complex I-AGGG.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	u	65	563	372	93	97	1	0	0

- Molecule 25 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	v	155	1307	846	213	239	9	0	0

- Molecule 26 is a protein called Complex I-ESSS.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	w	101	846	542	140	160	4	0	0

- Molecule 27 is a protein called Complex I-KFYI.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
27	x	49	412	271	70	71	0	0

- Molecule 28 is a protein called Complex I-MNLL.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
28	y	50	436	287	77	72	0	0

- Molecule 29 is a protein called Complex I-MWFE.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	z	70	576	369	106	96	5	0	0

- Molecule 30 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	1	430	3312	2086	593	613	20	0	0

- Molecule 31 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	2	213	1655	1058	278	309	10	0	0

- Molecule 32 is a protein called NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	3	688	5275	3301	922	1011	41	0	0

- Molecule 33 is a protein called Complex I-30kD.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	5	208	1726	1112	296	315	3	0	0

- Molecule 34 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	6	150	1198	765	216	203	14	0	0

- Molecule 35 is a protein called Complex I-23kD.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	9	171	1376	867	238	260	11	0	0

- Molecule 36 is a protein called Complex I-9kD.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	a	44	371	233	66	71	1	0	0

- Molecule 37 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	b	95	737	451	139	144	3	0	0

- Molecule 38 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	c	126	1024	646	182	193	3	0	0

- Molecule 39 is a protein called NADH:ubiquinone oxidoreductase subunit A9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
39	d	331	2662	1715	474	468	5	0	0

- Molecule 40 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
40	e	86	691	434	129	126	2	0	0

- Molecule 41 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex sub-

unit 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
41	f	113	917	595	153	167	2	0	0

- Molecule 42 is a protein called Complex I-B14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
42	g	114	969	619	180	166	4	0	0

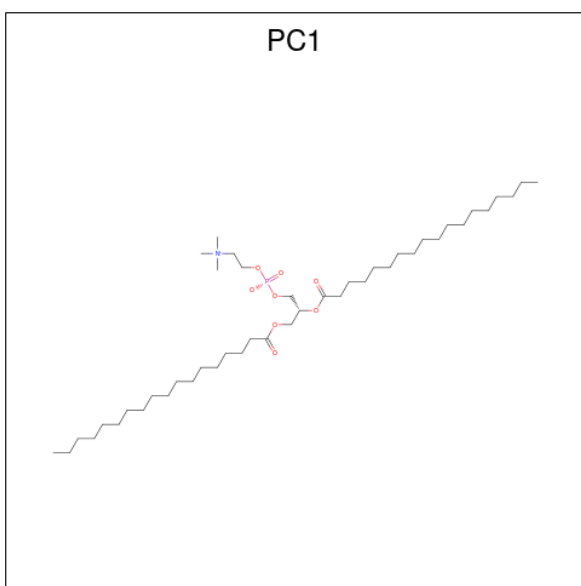
- Molecule 43 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
43	h	96	769	480	146	140	3	0	0

- Molecule 44 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12.

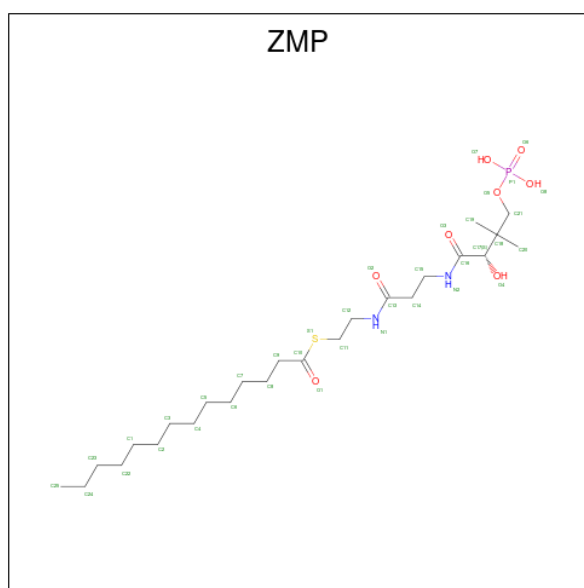
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
44	i	145	1209	778	216	210	5	0	0

- Molecule 45 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PC1) (formula: C₄₄H₈₈NO₈P).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
45	H	1	54	44	1	8	1	0
45	L	1	54	44	1	8	1	0
45	M	1	54	44	1	8	1	0
45	w	1	54	44	1	8	1	0
45	d	1	46	36	1	8	1	0

- Molecule 46 is S-[2-({N-[(2S)-2-hydroxy-3,3-dimethyl-4-(phosphonoxy)butanoyl]-beta-alanyl}amino)ethyl] tetradecanethioate (three-letter code: ZMP) (formula: C₂₅H₄₉N₂O₈PS).



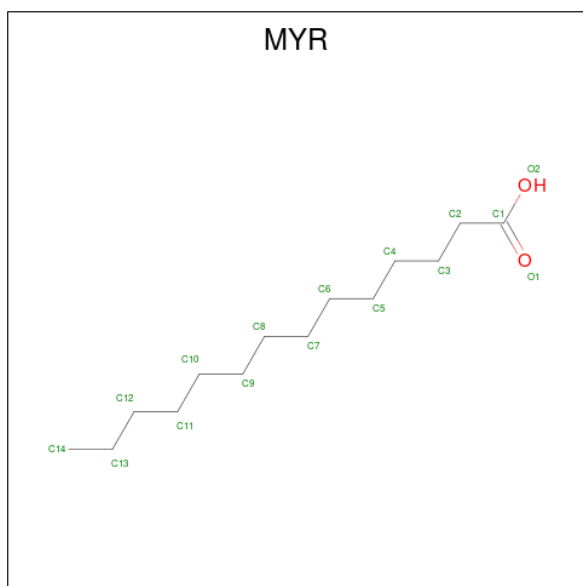
Mol	Chain	Residues	Atoms					AltConf	
			Total	C	N	O	P		S
46	X	1	31	20	2	7	1	1	0
46	j	1	34	23	2	7	1	1	0

- Molecule 47 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: C₁₀H₁₄N₅O₇P).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
47	k	1	23	10	5	7	1	0

- Molecule 48 is MYRISTIC ACID (three-letter code: MYR) (formula: $C_{14}H_{28}O_2$).



Mol	Chain	Residues	Atoms			AltConf
			Total	C	O	
48	s	1	15	14	1	0

- Molecule 49 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



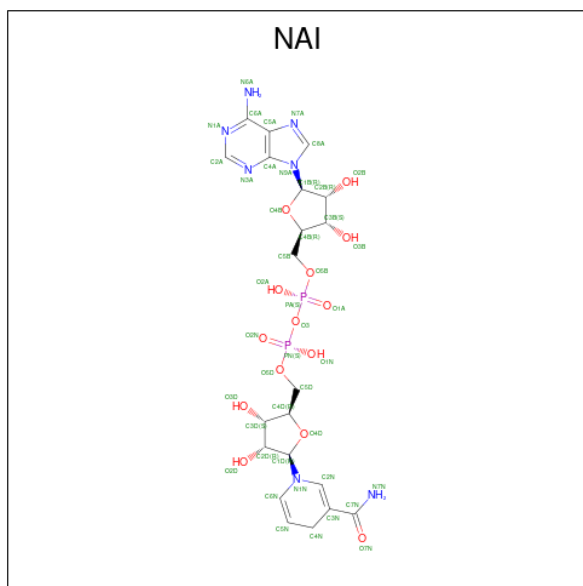
Mol	Chain	Residues	Atoms			AltConf
49	1	1	Total	Fe	S	0
			8	4	4	
49	3	1	Total	Fe	S	0
			16	8	8	
49	3	1	Total	Fe	S	0
			16	8	8	
49	6	1	Total	Fe	S	0
			8	4	4	
49	9	1	Total	Fe	S	0
			16	8	8	
49	9	1	Total	Fe	S	0
			16	8	8	

- Molecule 50 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: C₁₇H₂₁N₄O₉P).



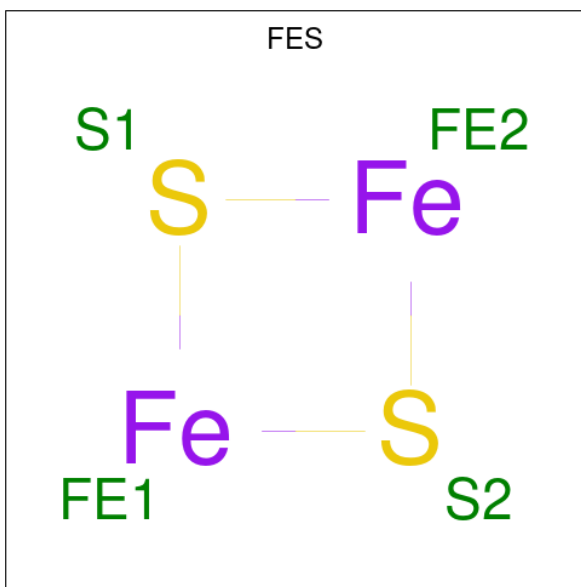
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
50	1	1	31	17	4	9	1	0

- Molecule 51 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: $C_{21}H_{29}N_7O_{14}P_2$).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
51	1	1	44	21	7	14	2	0

- Molecule 52 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).



Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
52	2	1	4	2	2	0
52	3	1	4	2	2	0

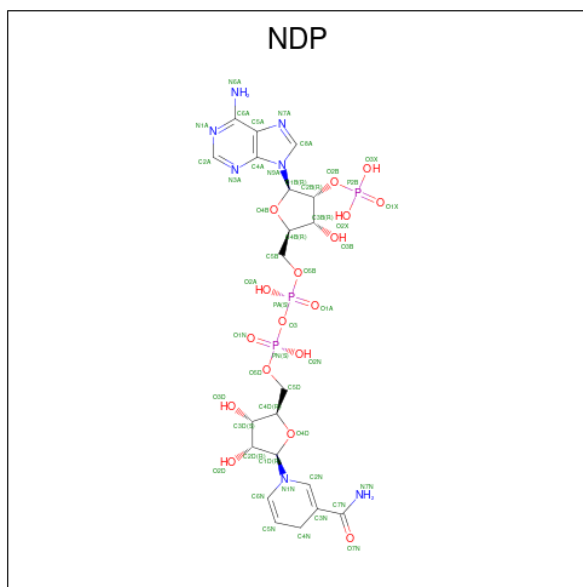
- Molecule 53 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
			Total	K	
53	3	1	1	1	0

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

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

- Molecule 55 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: C₂₁H₃₀N₇O₁₇P₃).

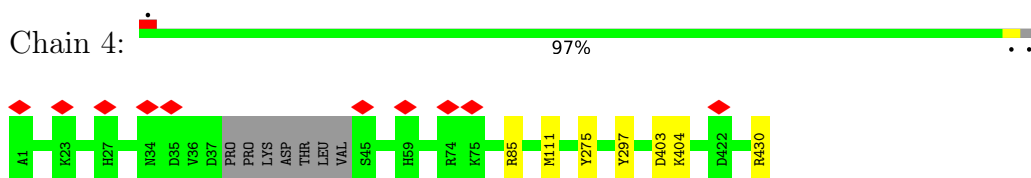


Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
55	d	1	48	21	7	17	3	0

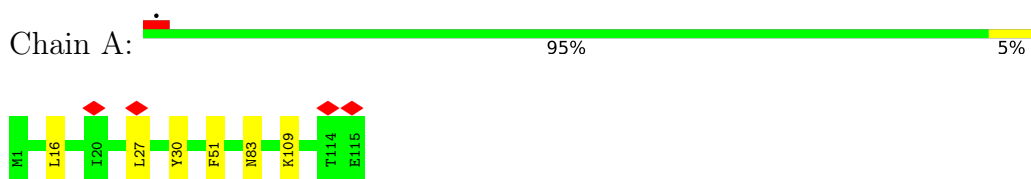
3 Residue-property plots [i](#)

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.

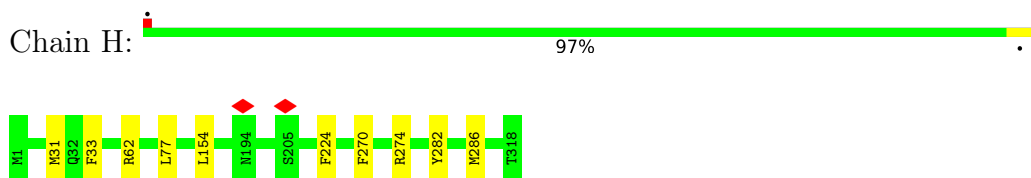
- Molecule 1: NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial



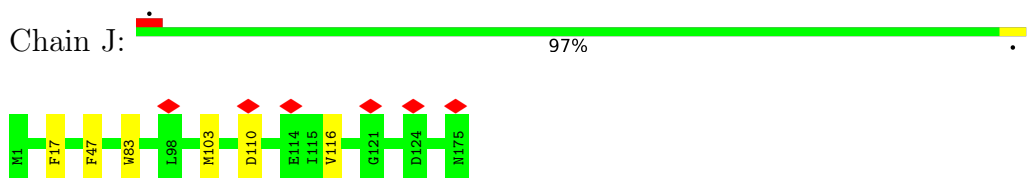
- Molecule 2: NADH-ubiquinone oxidoreductase chain 3



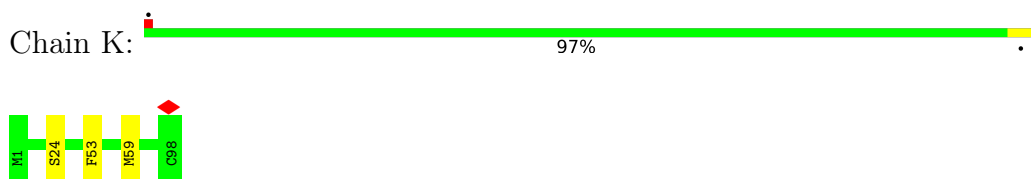
- Molecule 3: NADH-ubiquinone oxidoreductase chain 1



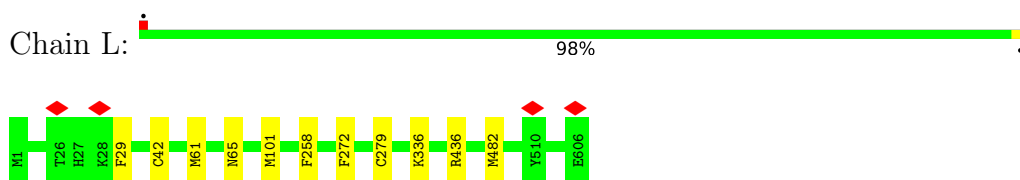
- Molecule 4: NADH-ubiquinone oxidoreductase chain 6



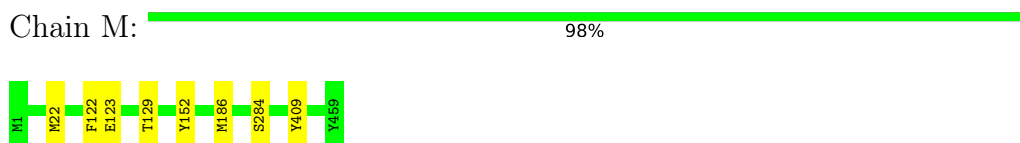
- Molecule 5: NADH-ubiquinone oxidoreductase chain 4L



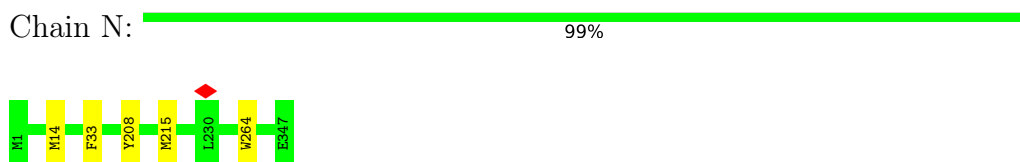
- Molecule 6: NADH-ubiquinone oxidoreductase chain 5



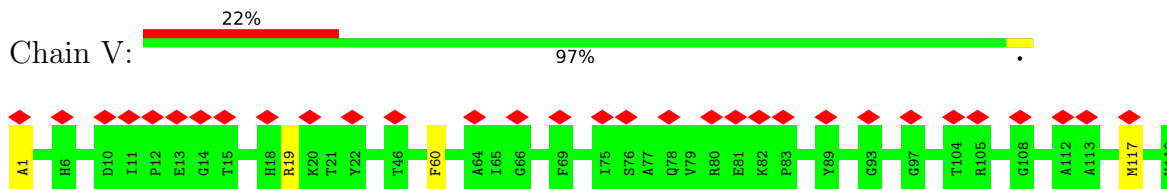
- Molecule 7: NADH-ubiquinone oxidoreductase chain 4



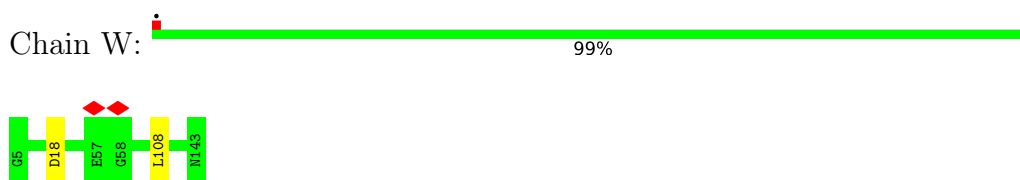
- Molecule 8: NADH-ubiquinone oxidoreductase chain 2



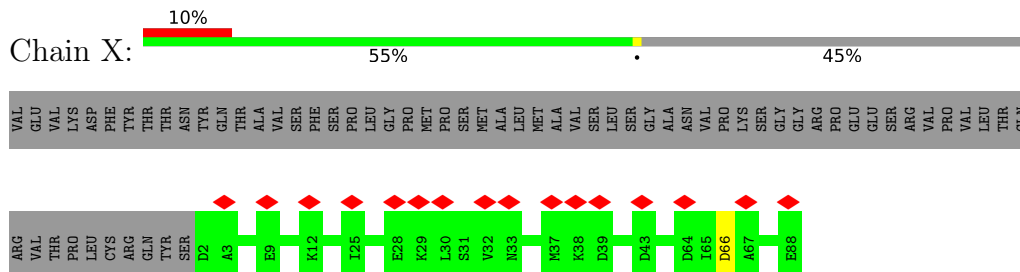
- Molecule 9: Complex I-B14.7



- Molecule 10: Complex I-SGDH

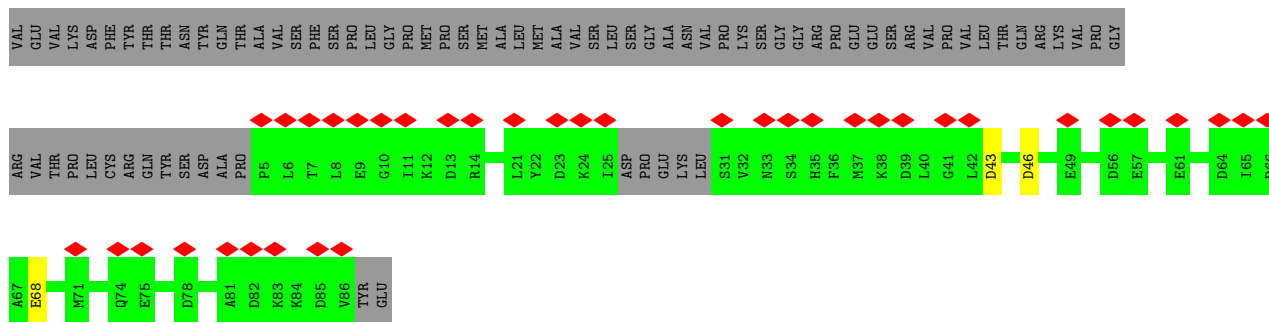


- Molecule 11: Acyl carrier protein

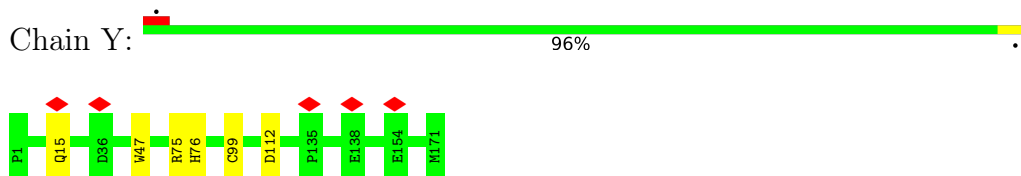


- Molecule 11: Acyl carrier protein

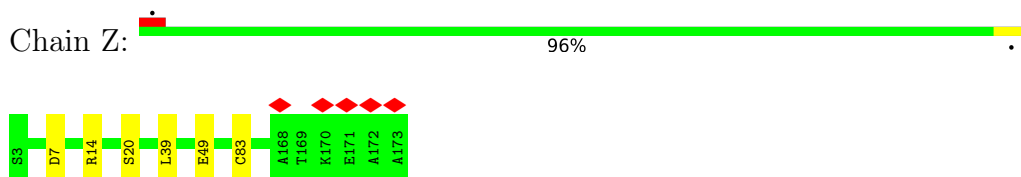




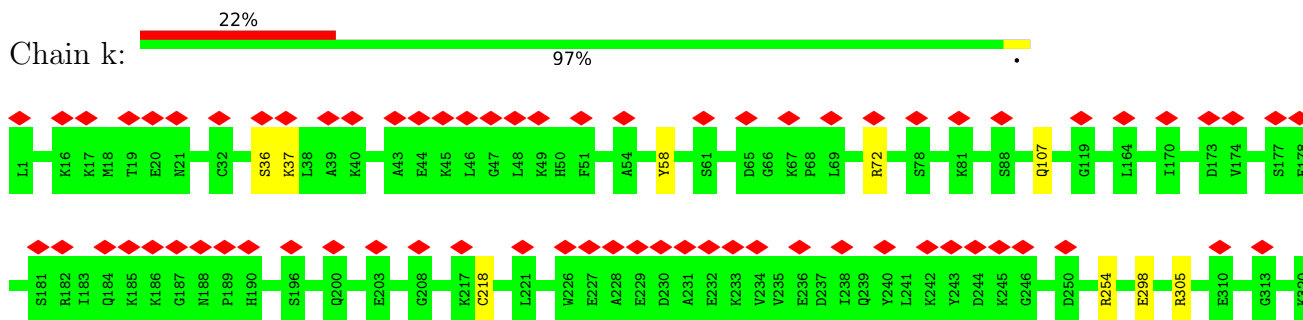
- Molecule 12: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8



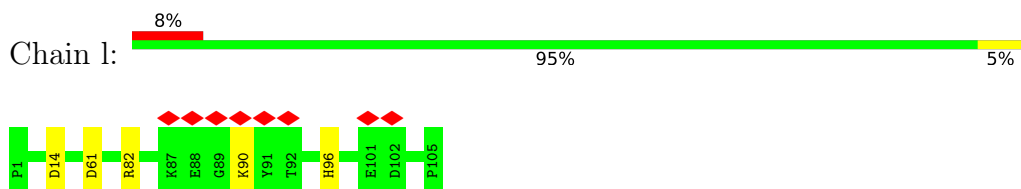
- Molecule 13: Complex I-PDSW



- Molecule 14: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial

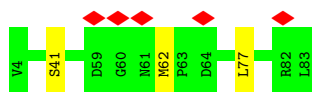


- Molecule 15: NADH dehydrogenase [ubiquinone] iron-sulfur protein 5

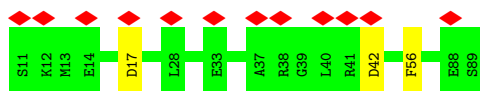


- Molecule 16: Complex I-B9





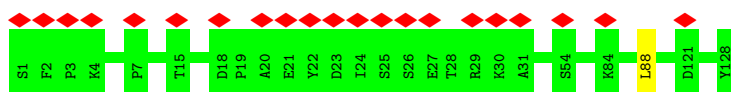
- Molecule 17: Complex I-B12



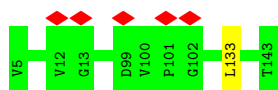
- Molecule 18: NADH dehydrogenase [ubiquinone] 1 subunit C2



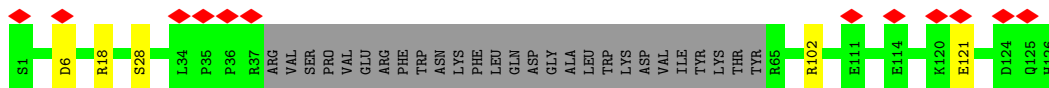
- Molecule 19: NADH:ubiquinone oxidoreductase subunit B4



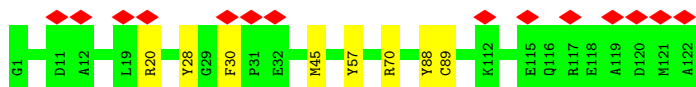
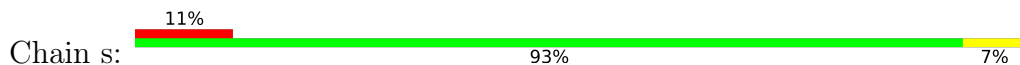
- Molecule 20: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 13



- Molecule 21: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 6



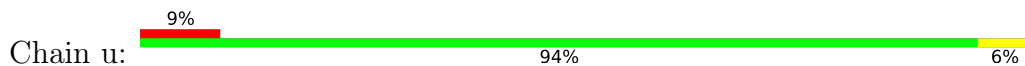
- Molecule 22: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 7



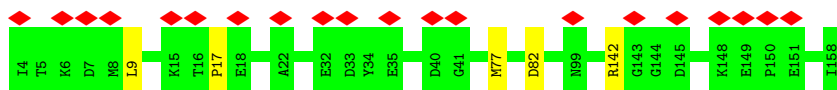
- Molecule 23: Complex I-B22



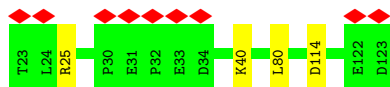
- Molecule 24: Complex I-AGGG



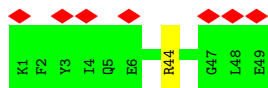
- Molecule 25: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial



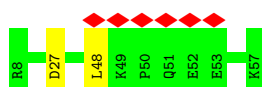
- Molecule 26: Complex I-ESSS



- Molecule 27: Complex I-KFYI



- Molecule 28: Complex I-MNLL

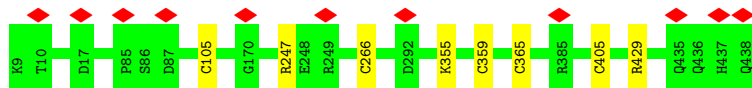


- Molecule 29: Complex I-MWFE

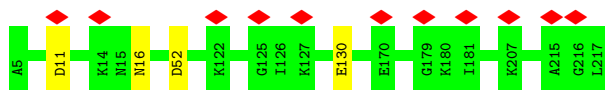




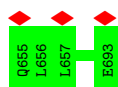
- Molecule 30: NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial



- Molecule 31: NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial



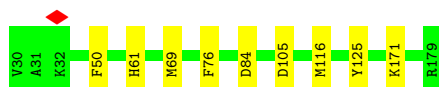
- Molecule 32: NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial



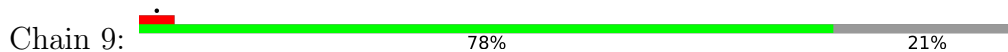
- Molecule 33: Complex I-30kD

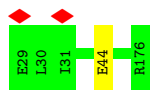
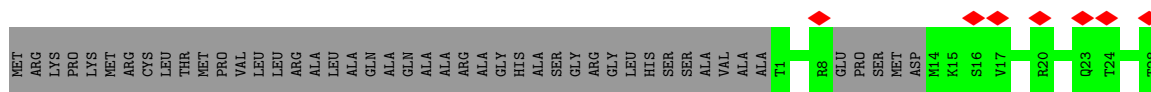


- Molecule 34: NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial

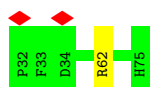


- Molecule 35: Complex I-23kD

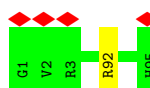




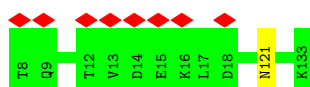
- Molecule 36: Complex I-9kD



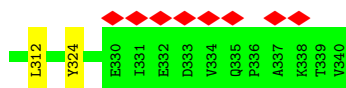
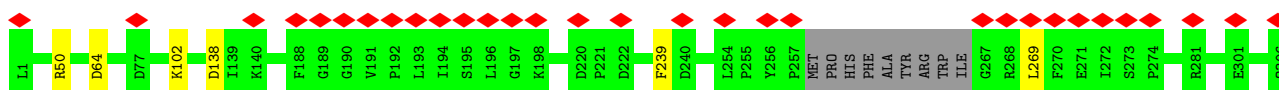
- Molecule 37: NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial



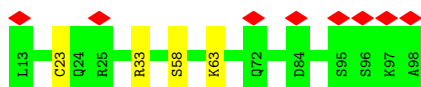
- Molecule 38: NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial



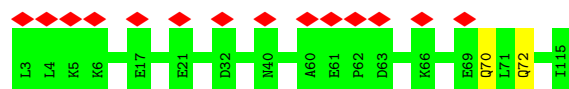
- Molecule 39: NADH:ubiquinone oxidoreductase subunit A9



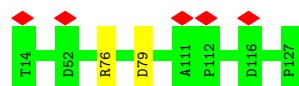
- Molecule 40: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2



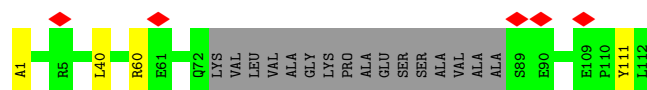
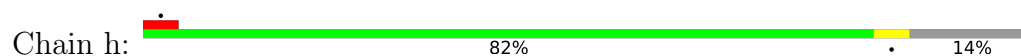
- Molecule 41: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 5



- Molecule 42: Complex I-B14



- Molecule 43: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7



- Molecule 44: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	41421	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	90	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	120000	Depositor
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.532	Depositor
Minimum map value	-0.076	Depositor
Average map value	0.011	Depositor
Map value standard deviation	0.030	Depositor
Recommended contour level	0.077	Depositor
Map size (Å)	165.92, 196.42, 287.92	wwPDB
Map dimensions	236, 161, 136	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.22, 1.22, 1.22	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: FES, FMN, PC1, ZN, SF4, NDP, SEP, FME, AYA, K, ZMP, AMP, MYR, NAI, 2MR

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	4	0.27	0/3479	0.52	0/4711
2	A	0.28	0/947	0.55	0/1296
3	H	0.27	0/2603	0.57	1/3561 (0.0%)
4	J	0.31	0/1378	0.59	0/1868
5	K	0.29	0/749	0.58	1/1014 (0.1%)
6	L	0.27	0/4925	0.52	1/6700 (0.0%)
7	M	0.27	0/3731	0.56	0/5085
8	N	0.28	0/2787	0.55	0/3795
9	V	0.28	0/1041	0.58	0/1412
10	W	0.26	0/1188	0.49	0/1607
11	X	0.25	0/713	0.48	0/963
11	j	0.28	0/627	0.61	1/842 (0.1%)
12	Y	0.26	0/1440	0.52	0/1942
13	Z	0.26	0/1475	0.54	1/1989 (0.1%)
14	k	0.26	0/2646	0.52	0/3579
15	l	0.26	0/896	0.56	0/1200
16	m	0.26	0/647	0.55	1/890 (0.1%)
17	n	0.30	0/653	0.60	1/882 (0.1%)
18	o	0.31	0/1035	0.61	2/1398 (0.1%)
19	p	0.30	0/1085	0.61	0/1467
20	q	0.27	0/1171	0.59	1/1579 (0.1%)
21	r	0.28	0/874	0.61	0/1188
22	s	0.25	0/1072	0.61	1/1436 (0.1%)
23	t	0.27	0/1573	0.57	1/2130 (0.0%)
24	u	0.25	0/590	0.45	0/810
25	v	0.29	0/1361	0.58	1/1861 (0.1%)
26	w	0.29	0/872	0.58	0/1185
27	x	0.28	0/425	0.55	0/576
28	y	0.30	0/449	0.62	1/605 (0.2%)
29	z	0.31	0/591	0.60	0/795
30	1	0.26	0/3386	0.53	0/4575
31	2	0.26	0/1695	0.50	0/2306

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
32	3	0.26	0/5362	0.53	1/7266 (0.0%)
33	5	0.26	0/1776	0.54	0/2417
34	6	0.27	0/1228	0.57	0/1661
35	9	0.28	0/1405	0.54	0/1900
36	a	0.24	0/383	0.52	0/518
37	b	0.26	0/749	0.54	0/1009
38	c	0.25	0/1047	0.53	0/1415
39	d	0.26	0/2731	0.53	1/3701 (0.0%)
40	e	0.27	0/702	0.59	0/945
41	f	0.29	0/937	0.48	0/1271
42	g	0.28	0/993	0.53	0/1336
43	h	0.28	0/779	0.59	0/1053
44	i	0.26	0/1250	0.56	1/1698 (0.1%)
All	All	0.27	0/67446	0.55	17/91437 (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
1	4	0	1
7	M	0	1
32	3	0	1
All	All	0	3

There are no bond length outliers.

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
32	3	272	ASP	CB-CG-OD1	8.27	125.74	118.30
44	i	42	ASP	CB-CG-OD1	7.58	125.12	118.30
25	v	17	PRO	CA-N-CD	-7.14	101.51	111.50
3	H	154	LEU	CA-CB-CG	7.08	131.58	115.30
11	j	43	ASP	CB-CG-OD1	6.73	124.35	118.30
17	n	42	ASP	CB-CG-OD1	6.50	124.15	118.30
28	y	48	LEU	CA-CB-CG	6.23	129.63	115.30
18	o	10	PRO	CA-N-CD	-6.18	102.84	111.50
39	d	269	LEU	CA-CB-CG	5.97	129.04	115.30
16	m	77	LEU	CA-CB-CG	5.79	128.62	115.30
5	K	59	MET	CB-CG-SD	5.57	129.10	112.40
22	s	45	MET	CA-CB-CG	5.55	122.74	113.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	L	101	MET	CB-CG-SD	5.46	128.78	112.40
23	t	64	ARG	CA-CB-CG	-5.34	101.65	113.40
20	q	133	LEU	CA-CB-CG	5.24	127.35	115.30
18	o	16	ASP	CB-CG-OD1	5.19	122.97	118.30
13	Z	7	ASP	CB-CG-OD1	5.03	122.83	118.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
32	3	259	ASN	Peptide
1	4	275	TYR	Peptide
7	M	123	GLU	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	4	418/430 (97%)	398 (95%)	20 (5%)	0	100	100
2	A	113/115 (98%)	107 (95%)	6 (5%)	0	100	100
3	H	316/318 (99%)	305 (96%)	11 (4%)	0	100	100
4	J	173/175 (99%)	165 (95%)	7 (4%)	1 (1%)	25	62
5	K	96/98 (98%)	93 (97%)	3 (3%)	0	100	100
6	L	604/606 (100%)	576 (95%)	28 (5%)	0	100	100
7	M	457/459 (100%)	445 (97%)	12 (3%)	0	100	100
8	N	345/347 (99%)	335 (97%)	10 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
9	V	138/140 (99%)	137 (99%)	1 (1%)	0	100	100
10	W	137/139 (99%)	137 (100%)	0	0	100	100
11	X	85/157 (54%)	81 (95%)	4 (5%)	0	100	100
11	j	73/157 (46%)	73 (100%)	0	0	100	100
12	Y	169/171 (99%)	165 (98%)	4 (2%)	0	100	100
13	Z	169/171 (99%)	167 (99%)	2 (1%)	0	100	100
14	k	317/320 (99%)	300 (95%)	17 (5%)	0	100	100
15	l	103/105 (98%)	95 (92%)	8 (8%)	0	100	100
16	m	78/80 (98%)	70 (90%)	8 (10%)	0	100	100
17	n	77/79 (98%)	75 (97%)	2 (3%)	0	100	100
18	o	118/120 (98%)	113 (96%)	5 (4%)	0	100	100
19	p	126/128 (98%)	121 (96%)	5 (4%)	0	100	100
20	q	137/139 (99%)	133 (97%)	4 (3%)	0	100	100
21	r	95/126 (75%)	91 (96%)	4 (4%)	0	100	100
22	s	120/122 (98%)	118 (98%)	2 (2%)	0	100	100
23	t	175/177 (99%)	171 (98%)	4 (2%)	0	100	100
24	u	63/65 (97%)	60 (95%)	3 (5%)	0	100	100
25	v	153/155 (99%)	140 (92%)	13 (8%)	0	100	100
26	w	99/101 (98%)	92 (93%)	7 (7%)	0	100	100
27	x	47/49 (96%)	47 (100%)	0	0	100	100
28	y	48/50 (96%)	47 (98%)	1 (2%)	0	100	100
29	z	68/70 (97%)	65 (96%)	3 (4%)	0	100	100
30	1	428/430 (100%)	416 (97%)	12 (3%)	0	100	100
31	2	211/213 (99%)	195 (92%)	16 (8%)	0	100	100
32	3	686/688 (100%)	656 (96%)	30 (4%)	0	100	100
33	5	206/208 (99%)	196 (95%)	10 (5%)	0	100	100
34	6	148/150 (99%)	145 (98%)	3 (2%)	0	100	100
35	9	167/217 (77%)	160 (96%)	7 (4%)	0	100	100
36	a	42/44 (96%)	41 (98%)	1 (2%)	0	100	100
37	b	93/95 (98%)	90 (97%)	3 (3%)	0	100	100
38	c	124/126 (98%)	120 (97%)	4 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
39	d	327/340 (96%)	319 (98%)	8 (2%)	0	100	100
40	e	84/86 (98%)	81 (96%)	3 (4%)	0	100	100
41	f	111/113 (98%)	106 (96%)	5 (4%)	0	100	100
42	g	112/114 (98%)	108 (96%)	4 (4%)	0	100	100
43	h	92/112 (82%)	87 (95%)	5 (5%)	0	100	100
44	i	143/145 (99%)	138 (96%)	5 (4%)	0	100	100
All	All	8091/8450 (96%)	7780 (96%)	310 (4%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	J	116	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	
1	4	363/370 (98%)	358 (99%)	5 (1%)	67	81
2	A	103/103 (100%)	97 (94%)	6 (6%)	20	51
3	H	278/278 (100%)	269 (97%)	9 (3%)	39	65
4	J	144/144 (100%)	139 (96%)	5 (4%)	36	64
5	K	86/86 (100%)	84 (98%)	2 (2%)	50	72
6	L	538/538 (100%)	528 (98%)	10 (2%)	57	76
7	M	411/411 (100%)	404 (98%)	7 (2%)	60	78
8	N	315/315 (100%)	310 (98%)	5 (2%)	62	79
9	V	101/101 (100%)	98 (97%)	3 (3%)	41	66
10	W	122/122 (100%)	120 (98%)	2 (2%)	62	79
11	X	80/141 (57%)	79 (99%)	1 (1%)	69	82
11	j	71/141 (50%)	69 (97%)	2 (3%)	43	68

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
12	Y	154/154 (100%)	148 (96%)	6 (4%)	32	60
13	Z	155/155 (100%)	150 (97%)	5 (3%)	39	65
14	k	283/283 (100%)	275 (97%)	8 (3%)	43	68
15	l	94/94 (100%)	89 (95%)	5 (5%)	22	54
16	m	69/69 (100%)	67 (97%)	2 (3%)	42	67
17	n	61/61 (100%)	59 (97%)	2 (3%)	38	65
18	o	107/107 (100%)	103 (96%)	4 (4%)	34	62
19	p	114/114 (100%)	113 (99%)	1 (1%)	78	88
20	q	119/119 (100%)	119 (100%)	0	100	100
21	r	95/120 (79%)	90 (95%)	5 (5%)	22	54
22	s	110/110 (100%)	103 (94%)	7 (6%)	17	48
23	t	159/159 (100%)	153 (96%)	6 (4%)	33	61
24	u	59/59 (100%)	55 (93%)	4 (7%)	16	47
25	v	140/140 (100%)	136 (97%)	4 (3%)	42	67
26	w	92/92 (100%)	88 (96%)	4 (4%)	29	58
27	x	44/44 (100%)	43 (98%)	1 (2%)	50	72
28	y	46/46 (100%)	45 (98%)	1 (2%)	52	72
29	z	59/59 (100%)	57 (97%)	2 (3%)	37	64
30	1	344/344 (100%)	336 (98%)	8 (2%)	50	72
31	2	183/183 (100%)	179 (98%)	4 (2%)	52	72
32	3	578/578 (100%)	561 (97%)	17 (3%)	42	67
33	5	189/189 (100%)	183 (97%)	6 (3%)	39	65
34	6	127/127 (100%)	118 (93%)	9 (7%)	14	45
35	9	146/179 (82%)	145 (99%)	1 (1%)	84	91
36	a	43/43 (100%)	42 (98%)	1 (2%)	50	72
37	b	79/79 (100%)	78 (99%)	1 (1%)	69	82
38	c	113/113 (100%)	112 (99%)	1 (1%)	78	88
39	d	286/294 (97%)	279 (98%)	7 (2%)	49	71
40	e	76/76 (100%)	72 (95%)	4 (5%)	22	54
41	f	101/101 (100%)	99 (98%)	2 (2%)	55	75
42	g	107/107 (100%)	105 (98%)	2 (2%)	57	76

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
43	h	84/94 (89%)	81 (96%)	3 (4%)	35	63
44	i	131/131 (100%)	129 (98%)	2 (2%)	65	81
All	All	7159/7373 (97%)	6967 (97%)	192 (3%)	48	69

All (192) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	4	111	MET
1	4	297	TYR
1	4	403	ASP
1	4	404	LYS
1	4	430	ARG
2	A	16	LEU
2	A	27	LEU
2	A	30	TYR
2	A	51	PHE
2	A	83	ASN
2	A	109	LYS
3	H	31	MET
3	H	33	PHE
3	H	62	ARG
3	H	77	LEU
3	H	224	PHE
3	H	270	PHE
3	H	274	ARG
3	H	282	TYR
3	H	286	MET
4	J	17	PHE
4	J	47	PHE
4	J	83	TRP
4	J	103	MET
4	J	110	ASP
5	K	24	SER
5	K	53	PHE
6	L	29	PHE
6	L	42	CYS
6	L	61	MET
6	L	65	ASN
6	L	258	PHE
6	L	272	PHE
6	L	279	CYS

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Mol	Chain	Res	Type
6	L	336	LYS
6	L	436	ARG
6	L	482	MET
7	M	22	MET
7	M	122	PHE
7	M	129	THR
7	M	152	TYR
7	M	186	MET
7	M	284	SER
7	M	409	TYR
8	N	14	MET
8	N	33	PHE
8	N	208	TYR
8	N	215	MET
8	N	264	TRP
9	V	19	ARG
9	V	60	PHE
9	V	117	MET
10	W	18	ASP
10	W	108	LEU
11	X	66	ASP
12	Y	15	GLN
12	Y	47	TRP
12	Y	75	ARG
12	Y	76	HIS
12	Y	99	CYS
12	Y	112	ASP
13	Z	14	ARG
13	Z	20	SER
13	Z	39	LEU
13	Z	49	GLU
13	Z	83	CYS
14	k	37	LYS
14	k	58	TYR
14	k	72	ARG
14	k	107	GLN
14	k	218	CYS
14	k	254	ARG
14	k	298	GLU
14	k	305	ARG
15	l	14	ASP
15	l	61	ASP

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Mol	Chain	Res	Type
15	l	82	ARG
15	l	90	LYS
15	l	96	HIS
16	m	41	SER
16	m	62	MET
17	n	17	ASP
17	n	56	PHE
18	o	1	MET
18	o	2	MET
18	o	86	ARG
18	o	101	PHE
19	p	88	LEU
21	r	6	ASP
21	r	18	ARG
21	r	28	SER
21	r	102	ARG
21	r	121	GLU
22	s	20	ARG
22	s	28	TYR
22	s	30	PHE
22	s	57	TYR
22	s	70	ARG
22	s	88	TYR
22	s	89	CYS
23	t	34	ASP
23	t	64	ARG
23	t	128	ARG
23	t	140	GLN
23	t	149	ARG
23	t	172	ARG
24	u	24	GLN
24	u	39	ARG
24	u	58	GLN
24	u	61	ASP
25	v	9	LEU
25	v	77	MET
25	v	82	ASP
25	v	142	ARG
26	w	25	ARG
26	w	40	LYS
26	w	80	LEU
26	w	114	ASP

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Mol	Chain	Res	Type
27	x	44	ARG
28	y	27	ASP
29	z	28	ARG
29	z	59	ARG
30	1	105	CYS
30	1	247	ARG
30	1	266	CYS
30	1	355	LYS
30	1	359	CYS
30	1	365	CYS
30	1	405	CYS
30	1	429	ARG
31	2	11	ASP
31	2	16	ASN
31	2	52	ASP
31	2	130	GLU
32	3	39	ARG
32	3	77	TRP
32	3	78	ASN
32	3	115	ASP
32	3	156	CYS
32	3	259	ASN
32	3	272	ASP
32	3	288	LYS
32	3	310	CYS
32	3	324	ASP
32	3	357	ASP
32	3	394	ARG
32	3	418	ARG
32	3	540	ASP
32	3	588	MET
32	3	604	SER
32	3	613	TYR
33	5	16	ASP
33	5	45	PHE
33	5	66	ASP
33	5	118	GLU
33	5	130	TYR
33	5	157	PHE
34	6	50	PHE
34	6	61	HIS
34	6	69	MET

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Mol	Chain	Res	Type
34	6	76	PHE
34	6	84	ASP
34	6	105	ASP
34	6	116	MET
34	6	125	TYR
34	6	171	LYS
35	9	44	GLU
36	a	62	ARG
37	b	92	ARG
38	c	121	ASN
39	d	50	ARG
39	d	64	ASP
39	d	102	LYS
39	d	138	ASP
39	d	239	PHE
39	d	312	LEU
39	d	324	TYR
40	e	23	CYS
40	e	33	ARG
40	e	58	SER
40	e	63	LYS
41	f	70	GLN
41	f	72	GLN
42	g	76	ARG
42	g	79	ASP
43	h	40	LEU
43	h	60	ARG
43	h	111	TYR
44	i	42	ASP
44	i	144	TYR
11	j	46	ASP
11	j	68	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
6	L	296	ASN
6	L	524	ASN
7	M	26	ASN
7	M	48	ASN
7	M	51	ASN
8	N	289	ASN

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Mol	Chain	Res	Type
10	W	86	ASN
28	y	13	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

7 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
1	2MR	4	85	1	10,12,13	2.43	2 (20%)	5,13,15	0.95	0
9	AYA	V	1	9	6,7,8	1.21	1 (16%)	5,8,10	1.74	2 (40%)
43	AYA	h	1	43	6,7,8	1.25	1 (16%)	5,8,10	1.27	1 (20%)
5	FME	K	1	5	8,9,10	0.92	0	7,9,11	0.87	0
14	SEP	k	36	14	8,9,10	1.53	1 (12%)	8,12,14	1.58	2 (25%)
7	FME	M	1	7	8,9,10	0.93	0	7,9,11	0.88	0
6	FME	L	1	6	8,9,10	0.95	0	7,9,11	0.83	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	2MR	4	85	1	-	1/10/13/15	-
9	AYA	V	1	9	-	2/4/6/8	-
43	AYA	h	1	43	-	0/4/6/8	-
5	FME	K	1	5	-	3/7/9/11	-
14	SEP	k	36	14	-	4/5/8/10	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	FME	M	1	7	-	2/7/9/11	-
6	FME	L	1	6	-	1/7/9/11	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	4	85	2MR	CZ-NE	5.14	1.45	1.34
1	4	85	2MR	CZ-NH2	5.08	1.44	1.33
14	k	36	SEP	P-O1P	3.35	1.61	1.50
43	h	1	AYA	CA-N	-2.33	1.44	1.46
9	V	1	AYA	CA-N	-2.13	1.44	1.46

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
14	k	36	SEP	OG-CB-CA	2.89	110.95	108.14
9	V	1	AYA	CB-CA-N	2.83	112.75	109.61
14	k	36	SEP	P-OG-CB	-2.80	110.58	118.30
43	h	1	AYA	CB-CA-N	2.61	112.51	109.61
9	V	1	AYA	CA-N-CT	2.17	124.68	121.52

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	K	1	FME	N-CA-CB-CG
5	K	1	FME	C-CA-CB-CG
6	L	1	FME	O-C-CA-CB
7	M	1	FME	CB-CA-N-CN
7	M	1	FME	O-C-CA-CB
14	k	36	SEP	CB-OG-P-O1P
14	k	36	SEP	CB-OG-P-O2P
14	k	36	SEP	CB-OG-P-O3P
9	V	1	AYA	OT-CT-N-CA
9	V	1	AYA	CM-CT-N-CA
5	K	1	FME	CB-CG-SD-CE
1	4	85	2MR	C-CA-CB-CG
14	k	36	SEP	CA-CB-OG-P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 22 ligands modelled in this entry, 2 are monoatomic - leaving 20 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
46	ZMP	j	101	11	27,33,36	0.70	1 (3%)	32,40,45	1.10	2 (6%)
45	PC1	H	401	-	53,53,53	0.31	0	59,61,61	0.44	0
49	SF4	9	201	35	0,12,12	-	-	-	-	-
45	PC1	d	401	-	45,45,53	0.32	0	51,53,61	0.29	0
46	ZMP	X	101	11	24,30,36	0.80	1 (4%)	29,37,45	0.91	2 (6%)
52	FES	3	803	32	0,4,4	-	-	-	-	-
49	SF4	9	202	35	0,12,12	-	-	-	-	-
45	PC1	L	701	-	53,53,53	0.31	0	59,61,61	0.55	2 (3%)
49	SF4	1	501	30	0,12,12	-	-	-	-	-
48	MYR	s	201	22	14,14,15	0.22	0	13,13,15	0.18	0
49	SF4	6	300	34	0,12,12	-	-	-	-	-
45	PC1	w	801	-	53,53,53	0.29	0	59,61,61	0.26	0
52	FES	2	300	31	0,4,4	-	-	-	-	-
45	PC1	M	501	-	53,53,53	0.30	0	59,61,61	0.31	0
47	AMP	k	501	-	22,25,25	0.90	1 (4%)	25,38,38	1.20	2 (8%)
49	SF4	3	802	32	0,12,12	-	-	-	-	-
51	NAI	1	503	-	42,48,48	0.60	1 (2%)	47,73,73	1.91	4 (8%)
55	NDP	d	402	-	45,52,52	0.53	0	53,80,80	0.54	1 (1%)
49	SF4	3	801	32	0,12,12	-	-	-	-	-
50	FMN	1	502	-	33,33,33	1.05	2 (6%)	48,50,50	1.21	6 (12%)

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
46	ZMP	j	101	11	-	14/38/40/43	-
45	PC1	H	401	-	-	13/57/57/57	-
49	SF4	9	201	35	-	-	0/6/5/5
45	PC1	d	401	-	-	12/49/49/57	-
46	ZMP	X	101	11	-	15/35/37/43	-
52	FES	3	803	32	-	-	0/1/1/1
49	SF4	9	202	35	-	-	0/6/5/5
45	PC1	L	701	-	-	13/57/57/57	-
49	SF4	1	501	30	-	-	0/6/5/5
48	MYR	s	201	22	-	0/11/12/13	-
49	SF4	6	300	34	-	-	0/6/5/5
45	PC1	w	801	-	-	5/57/57/57	-
52	FES	2	300	31	-	-	0/1/1/1
45	PC1	M	501	-	-	17/57/57/57	-
47	AMP	k	501	-	-	3/6/26/26	0/3/3/3
51	NAI	1	503	-	-	11/25/72/72	0/5/5/5
49	SF4	3	802	32	-	-	0/6/5/5
55	NDP	d	402	-	-	7/30/77/77	0/5/5/5
49	SF4	3	801	32	-	-	0/6/5/5
50	FMN	1	502	-	-	9/18/18/18	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
50	1	502	FMN	C4A-N5	3.69	1.37	1.30
46	X	101	ZMP	C9-C10	2.74	1.53	1.50
47	k	501	AMP	C5-C4	2.48	1.47	1.40
46	j	101	ZMP	C9-C10	2.41	1.53	1.50
50	1	502	FMN	C10-N1	2.35	1.38	1.33
51	1	503	NAI	PA-O5B	2.17	1.68	1.59

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
51	1	503	NAI	O5B-PA-O1A	-9.70	71.17	109.07
51	1	503	NAI	O2A-PA-O1A	-7.66	74.36	112.24
47	k	501	AMP	N3-C2-N1	-3.16	123.73	128.68
50	1	502	FMN	C4-N3-C2	-3.14	119.83	125.64
46	j	101	ZMP	O1-C10-C9	-3.04	120.40	123.99
50	1	502	FMN	C4A-C10-N10	2.75	120.50	116.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
50	1	502	FMN	C4A-C4-N3	2.62	119.85	113.19
47	k	501	AMP	C4-C5-N7	-2.61	106.68	109.40
50	1	502	FMN	O4-C4-C4A	-2.49	120.00	126.60
46	X	101	ZMP	O1-C10-C9	-2.37	121.19	123.99
51	1	503	NAI	O2A-PA-O5B	2.35	118.67	107.75
51	1	503	NAI	C5A-C6A-N6A	2.34	123.90	120.35
45	L	701	PC1	O21-C2-C1	2.32	116.80	108.40
50	1	502	FMN	C10-C4A-N5	-2.28	120.02	124.86
55	d	402	NDP	C5A-C6A-N6A	2.28	123.82	120.35
50	1	502	FMN	C4A-C10-N1	-2.26	119.50	124.73
45	L	701	PC1	C2-O21-C21	2.24	123.32	117.79
46	X	101	ZMP	C15-C14-C13	-2.19	108.71	112.36
46	j	101	ZMP	C14-C15-N2	-2.13	107.59	111.90

There are no chirality outliers.

All (119) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
45	H	401	PC1	C11-O13-P-O12
45	H	401	PC1	C11-O13-P-O14
45	H	401	PC1	C11-O13-P-O11
45	H	401	PC1	C1-O11-P-O14
45	L	701	PC1	C1-O11-P-O12
45	L	701	PC1	C1-O11-P-O14
45	L	701	PC1	C1-O11-P-O13
45	M	501	PC1	C1-O11-P-O12
45	w	801	PC1	C11-O13-P-O11
45	d	401	PC1	C1-O11-P-O12
45	d	401	PC1	C1-O11-P-O14
45	d	401	PC1	C1-O11-P-O13
46	X	101	ZMP	O4-C17-C18-C21
46	X	101	ZMP	C16-C17-C18-C21
46	X	101	ZMP	C17-C16-N2-C15
46	X	101	ZMP	C12-C11-S1-C10
46	X	101	ZMP	O1-C10-S1-C11
46	X	101	ZMP	C9-C10-S1-C11
46	X	101	ZMP	C7-C8-C9-C10
46	j	101	ZMP	C19-C18-C21-O5
46	j	101	ZMP	C20-C18-C21-O5
46	j	101	ZMP	C17-C18-C21-O5
46	j	101	ZMP	C16-C17-C18-C21
46	j	101	ZMP	O4-C17-C18-C19

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Mol	Chain	Res	Type	Atoms
46	j	101	ZMP	S1-C11-C12-N1
46	j	101	ZMP	C7-C8-C9-C10
47	k	501	AMP	O4'-C4'-C5'-O5'
47	k	501	AMP	C3'-C4'-C5'-O5'
50	1	502	FMN	N10-C1'-C2'-O2'
50	1	502	FMN	N10-C1'-C2'-C3'
50	1	502	FMN	C1'-C2'-C3'-C4'
50	1	502	FMN	C5'-O5'-P-O2P
50	1	502	FMN	C5'-O5'-P-O3P
51	1	503	NAI	C5D-O5D-PN-O3
51	1	503	NAI	C5D-O5D-PN-O1N
55	d	402	NDP	C2N-C3N-C7N-N7N
46	X	101	ZMP	O3-C16-N2-C15
45	H	401	PC1	C21-C22-C23-C24
45	M	501	PC1	C11-C12-N-C14
45	d	401	PC1	C11-C12-N-C14
45	M	501	PC1	C11-O13-P-O11
51	1	503	NAI	C2D-C1D-N1N-C2N
51	1	503	NAI	C2D-C1D-N1N-C6N
45	M	501	PC1	C3A-C3B-C3C-C3D
45	d	401	PC1	C3B-C3C-C3D-C3E
45	L	701	PC1	C31-C32-C33-C34
45	M	501	PC1	C11-C12-N-C15
45	d	401	PC1	C11-C12-N-C15
45	L	701	PC1	C38-C39-C3A-C3B
45	M	501	PC1	C11-C12-N-C13
45	d	401	PC1	C11-C12-N-C13
50	1	502	FMN	O2'-C2'-C3'-C4'
45	H	401	PC1	C1-O11-P-O13
45	w	801	PC1	C3E-C3F-C3G-C3H
46	j	101	ZMP	C22-C1-C2-C3
45	M	501	PC1	O31-C31-C32-C33
50	1	502	FMN	C5'-O5'-P-O1P
55	d	402	NDP	PN-O3-PA-O1A
50	1	502	FMN	O2'-C2'-C3'-O3'
45	M	501	PC1	O11-C1-C2-C3
45	L	701	PC1	C2-C1-O11-P
45	M	501	PC1	C1-O11-P-O13
51	1	503	NAI	O4D-C1D-N1N-C6N
51	1	503	NAI	C4D-C5D-O5D-PN
51	1	503	NAI	PN-O3-PA-O5B
45	L	701	PC1	O11-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
45	H	401	PC1	C2B-C2C-C2D-C2E
46	X	101	ZMP	C4-C5-C6-C7
46	j	101	ZMP	C3-C4-C5-C6
46	X	101	ZMP	C16-C17-C18-C19
46	X	101	ZMP	C16-C17-C18-C20
46	j	101	ZMP	C16-C17-C18-C19
46	j	101	ZMP	C16-C17-C18-C20
51	1	503	NAI	O4D-C1D-N1N-C2N
45	M	501	PC1	C2-C1-O11-P
45	d	401	PC1	C2-C1-O11-P
45	H	401	PC1	C1-O11-P-O12
45	M	501	PC1	C11-O13-P-O14
45	M	501	PC1	C1-O11-P-O14
45	w	801	PC1	C11-O13-P-O12
51	1	503	NAI	C5B-O5B-PA-O1A
51	1	503	NAI	C5D-O5D-PN-O2N
45	L	701	PC1	O11-C1-C2-O21
45	M	501	PC1	O11-C1-C2-O21
45	H	401	PC1	O13-C11-C12-N
45	L	701	PC1	O13-C11-C12-N
46	j	101	ZMP	O4-C17-C18-C21
55	d	402	NDP	C2N-C3N-C7N-O7N
46	X	101	ZMP	O3-C16-C17-O4
45	M	501	PC1	C36-C37-C38-C39
45	H	401	PC1	C2C-C2D-C2E-C2F
45	L	701	PC1	O31-C31-C32-C33
45	L	701	PC1	C24-C25-C26-C27
45	L	701	PC1	C11-O13-P-O11
46	X	101	ZMP	O4-C17-C18-C19
47	k	501	AMP	C4'-C5'-O5'-P
45	M	501	PC1	O32-C31-C32-C33
55	d	402	NDP	O4D-C1D-N1N-C6N
46	X	101	ZMP	C5-C6-C7-C8
46	j	101	ZMP	C4-C5-C6-C7
45	H	401	PC1	C3-C2-O21-C21
45	L	701	PC1	C1-C2-O21-C21
45	M	501	PC1	C25-C26-C27-C28
55	d	402	NDP	C2D-C1D-N1N-C6N
46	j	101	ZMP	C2-C1-C22-C23
45	d	401	PC1	O31-C31-C32-C33
45	d	401	PC1	O21-C21-C22-C23
45	w	801	PC1	O31-C31-C32-C33

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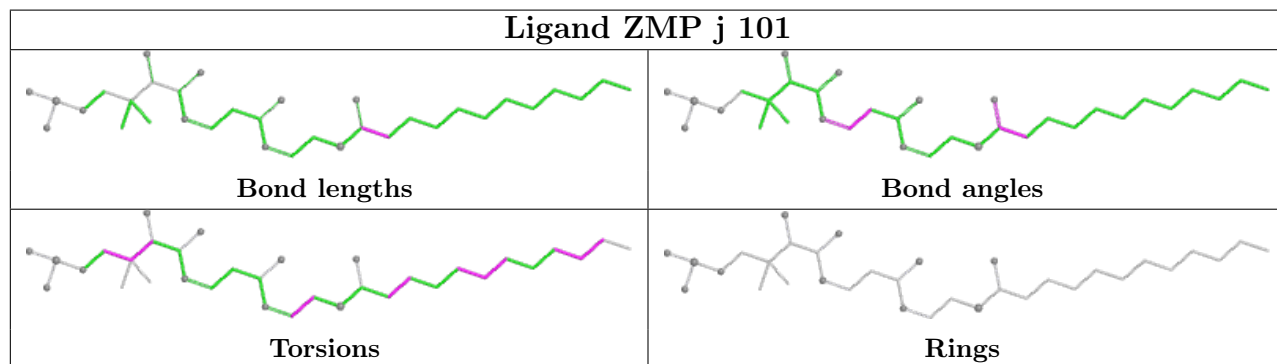
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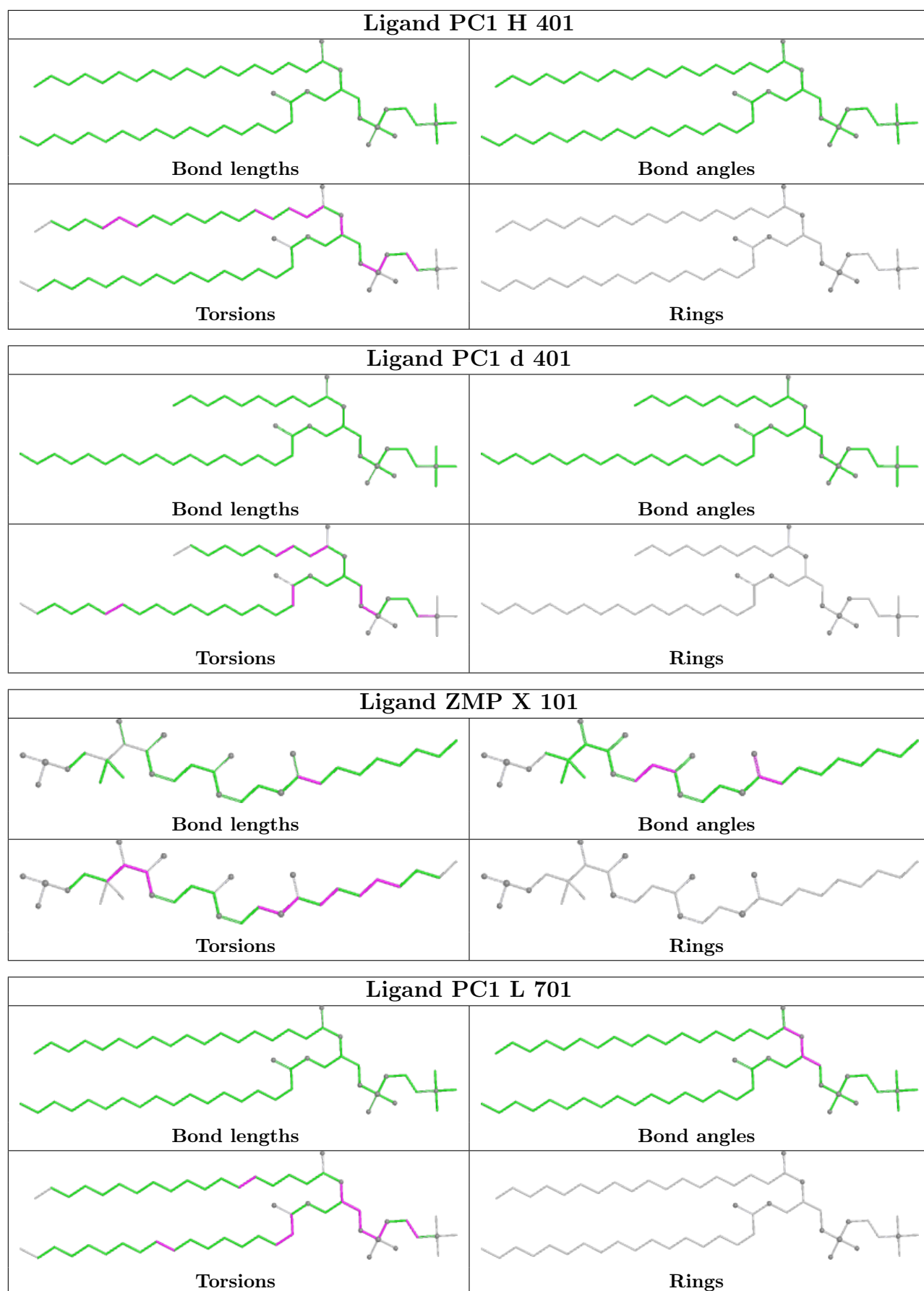
Mol	Chain	Res	Type	Atoms
46	X	101	ZMP	O4-C17-C18-C20
55	d	402	NDP	C2B-O2B-P2B-O2X
45	H	401	PC1	C23-C24-C25-C26
51	1	503	NAI	C2N-C3N-C7N-N7N
55	d	402	NDP	O4B-C4B-C5B-O5B
45	d	401	PC1	O22-C21-C22-C23
45	d	401	PC1	C22-C23-C24-C25
50	1	502	FMN	C1'-C2'-C3'-O3'
45	w	801	PC1	O32-C31-C32-C33
45	M	501	PC1	O21-C21-C22-C23
45	H	401	PC1	O21-C21-C22-C23

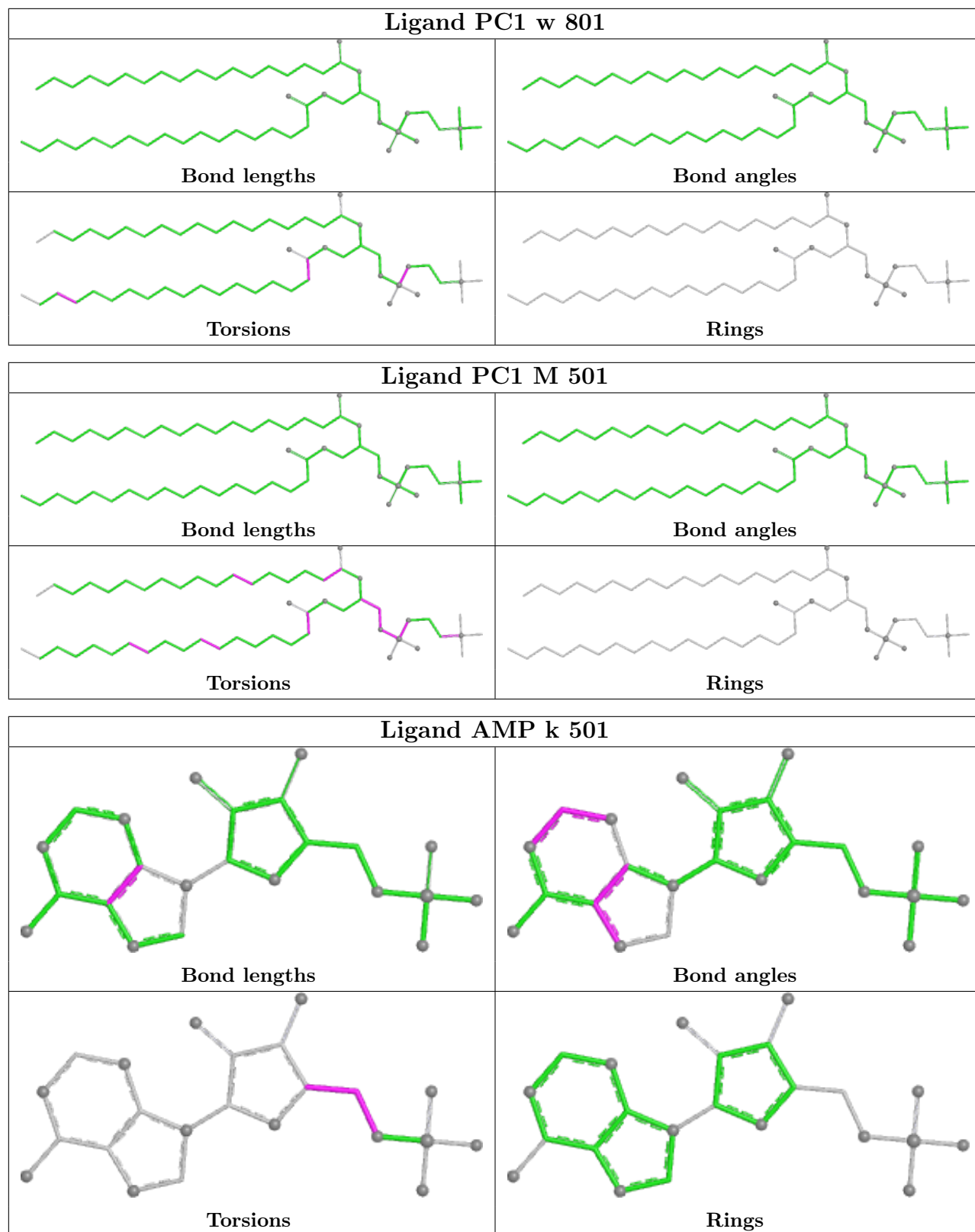
There are no ring outliers.

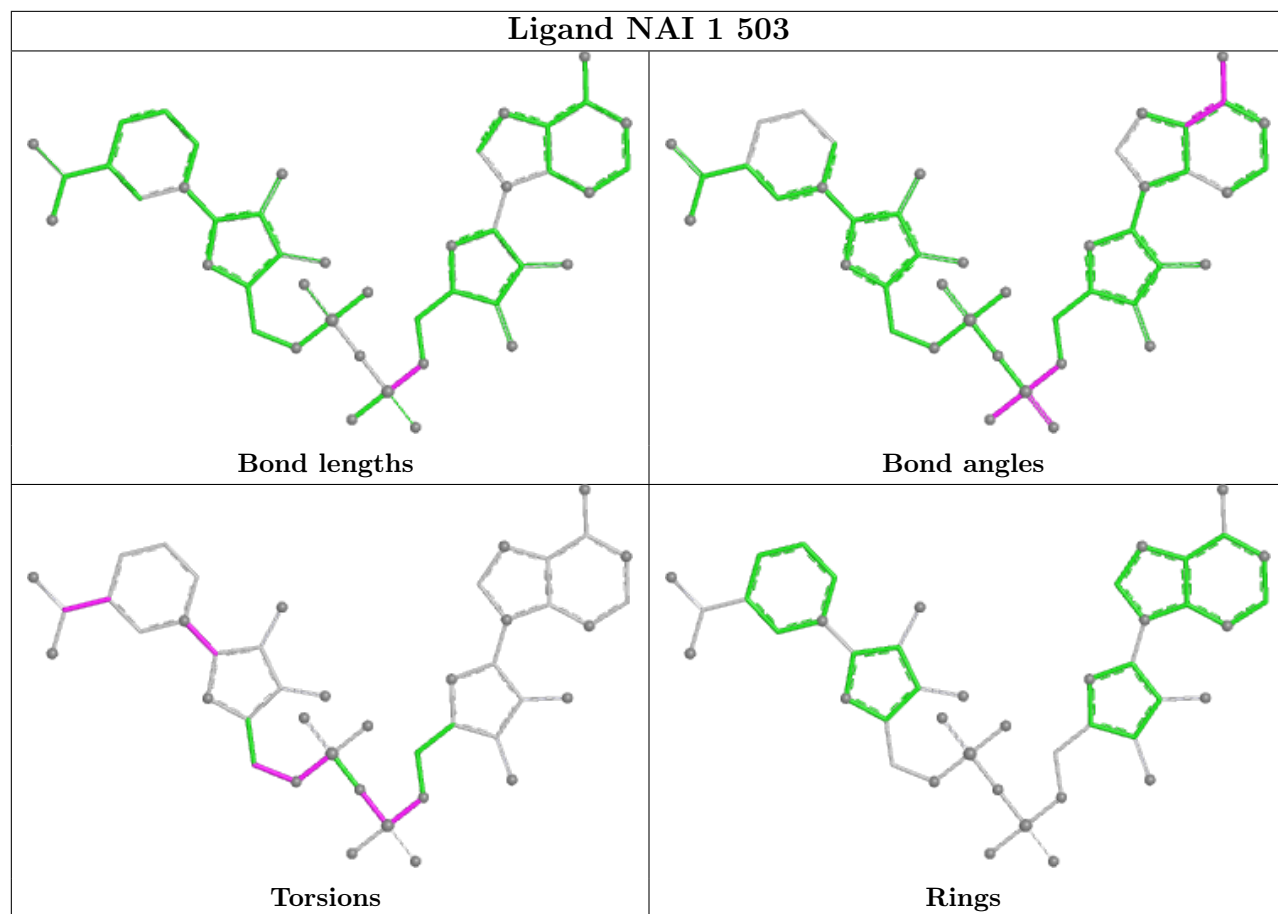
No monomer is involved in short contacts.

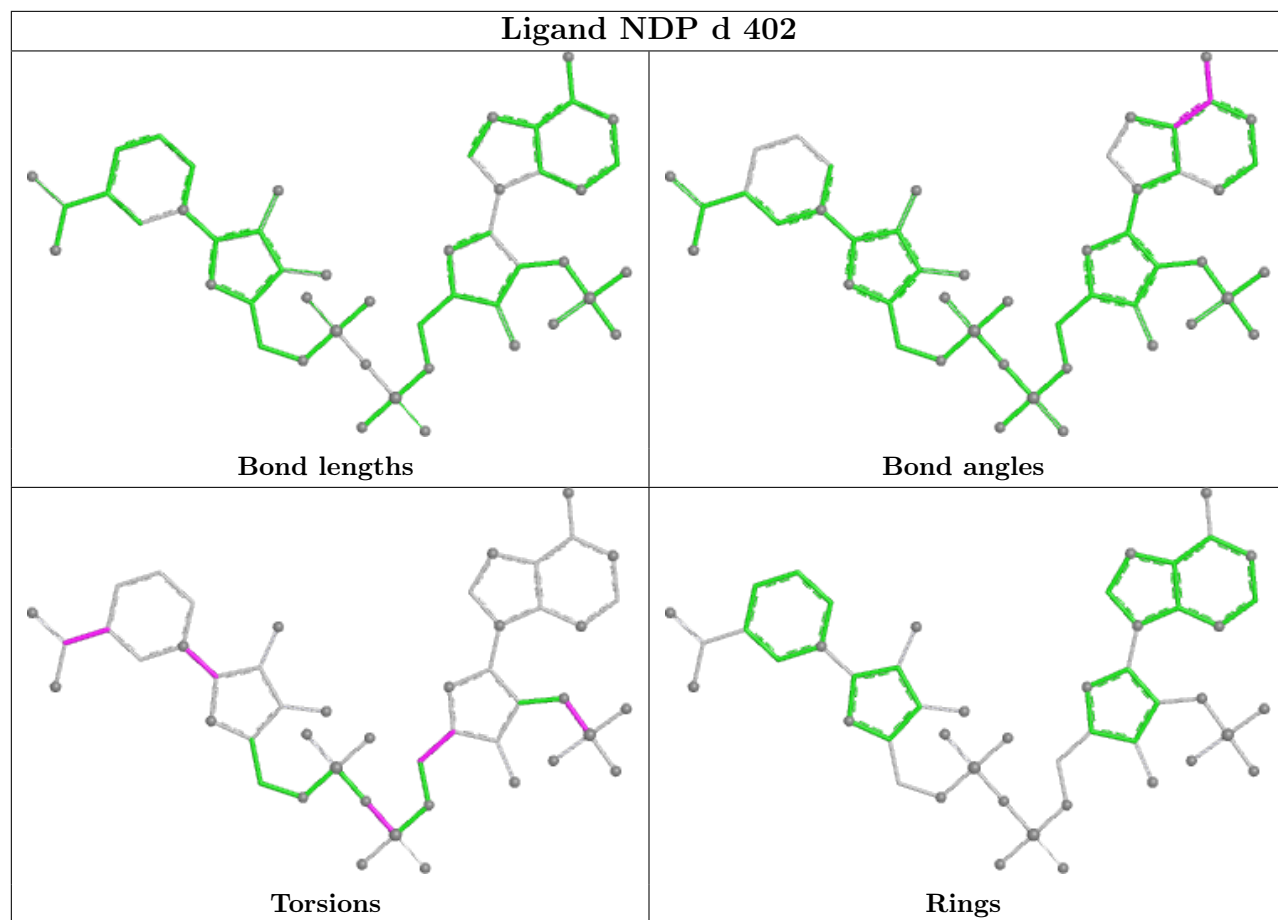
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

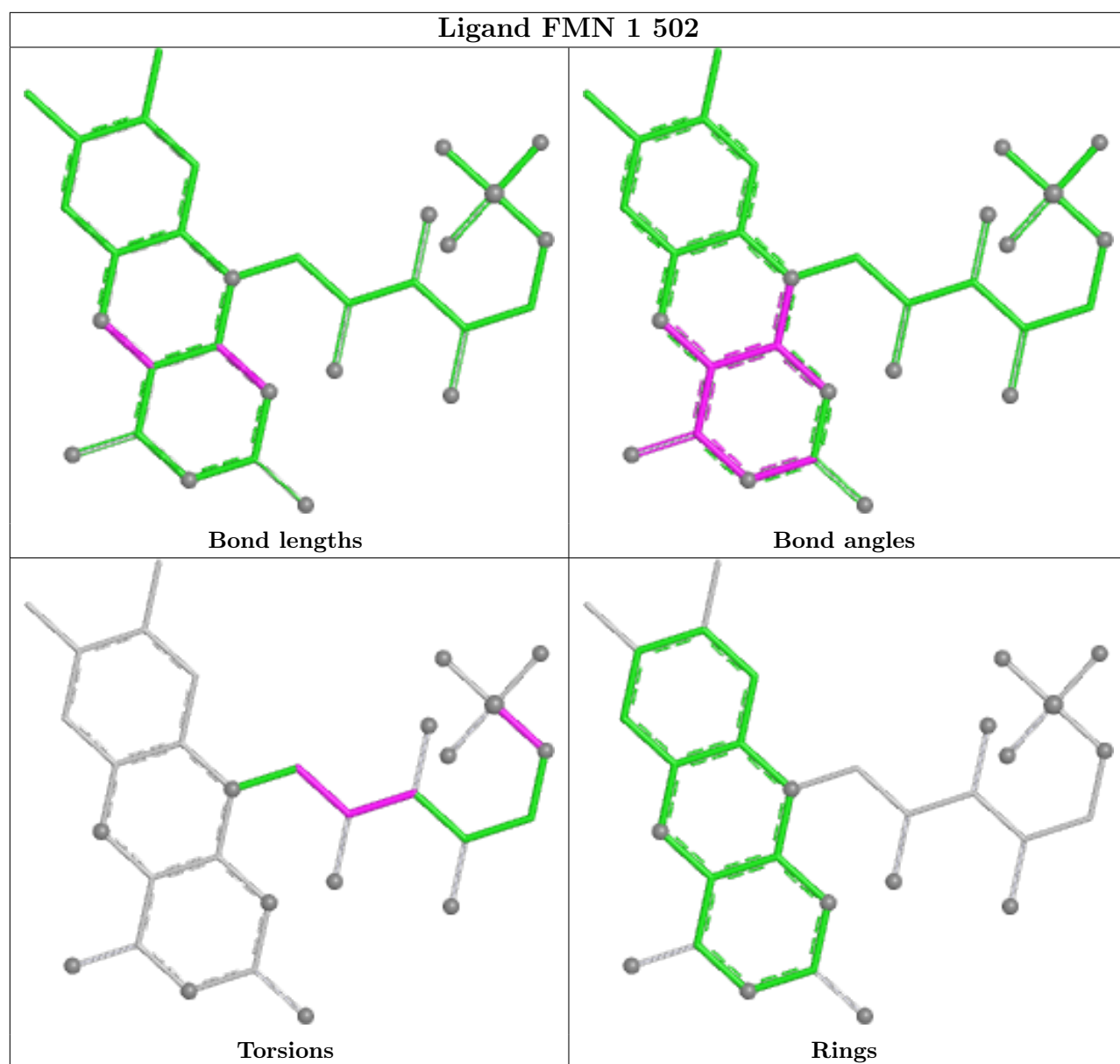












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

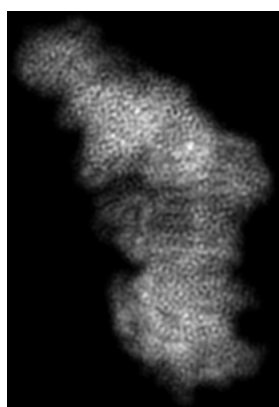
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-14688. These allow visual inspection of the internal detail of the map and identification of artifacts.

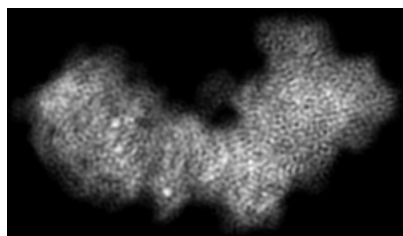
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

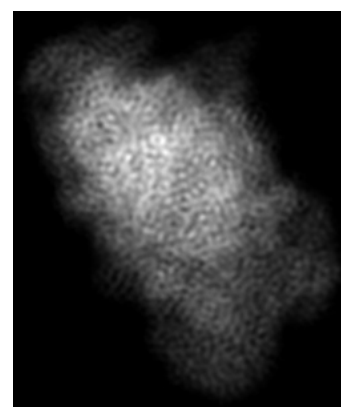
6.1.1 Primary map



X



Y



Z

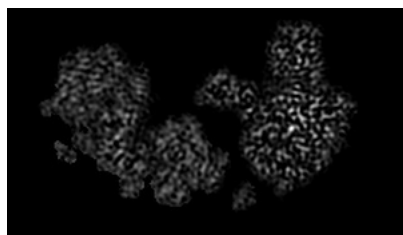
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

6.2.1 Primary map



X Index: 68



Y Index: 80



Z Index: 118

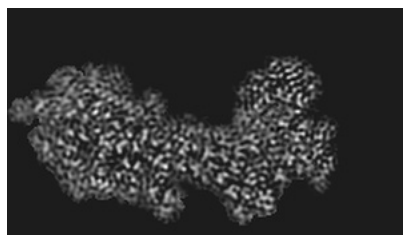
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

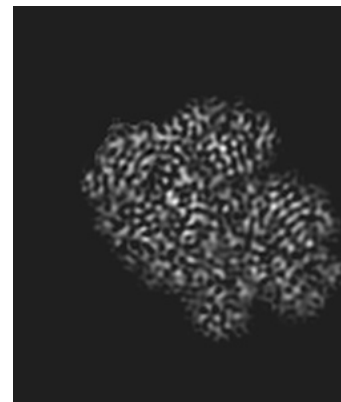
6.3.1 Primary map



X Index: 60



Y Index: 104



Z Index: 172

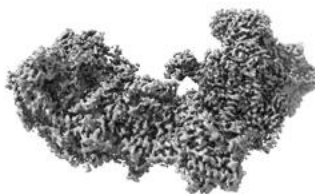
The images above show the largest variance slices of the map in three orthogonal directions.

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

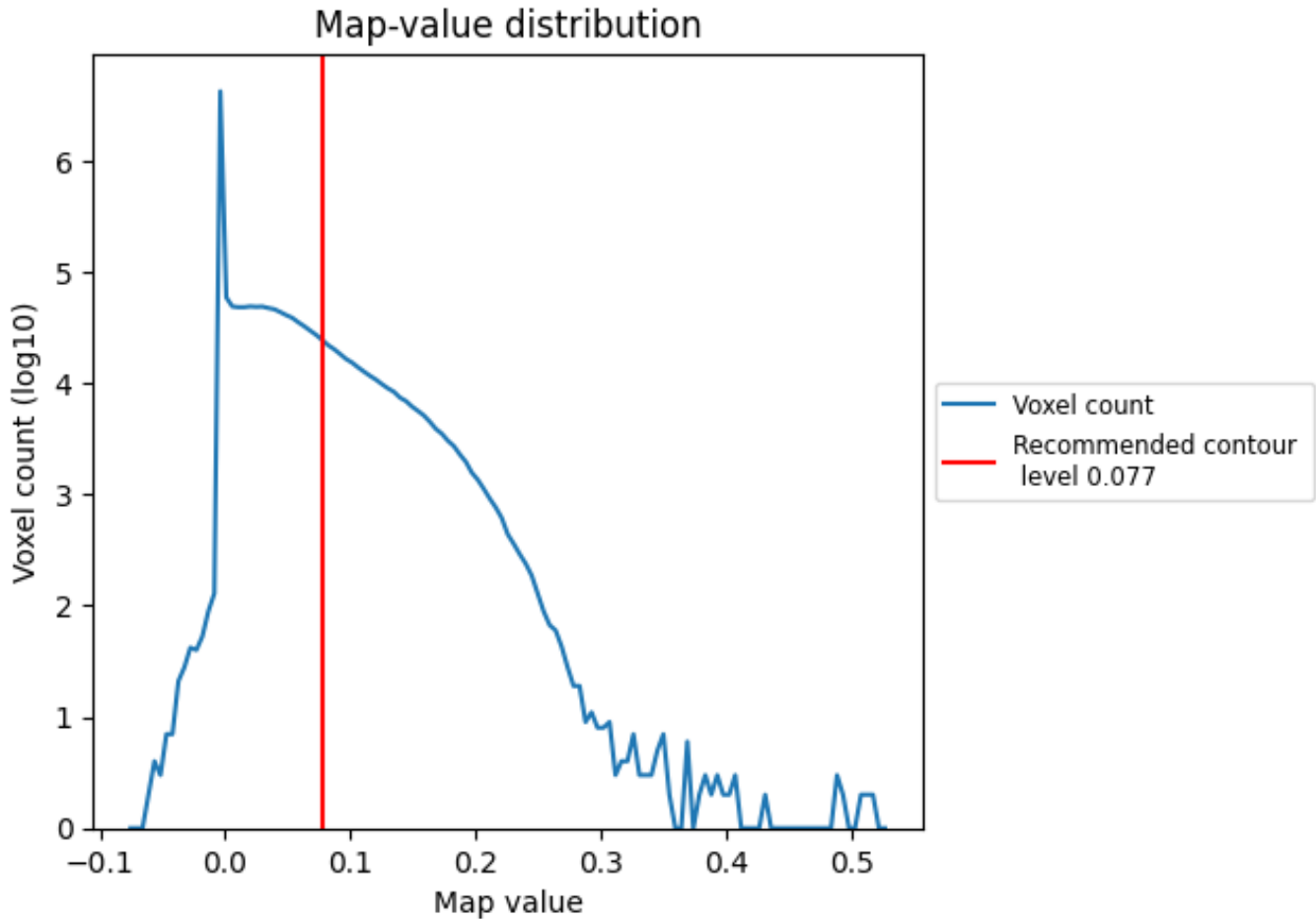
6.5 Mask visualisation

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

7 Map analysis [i](#)

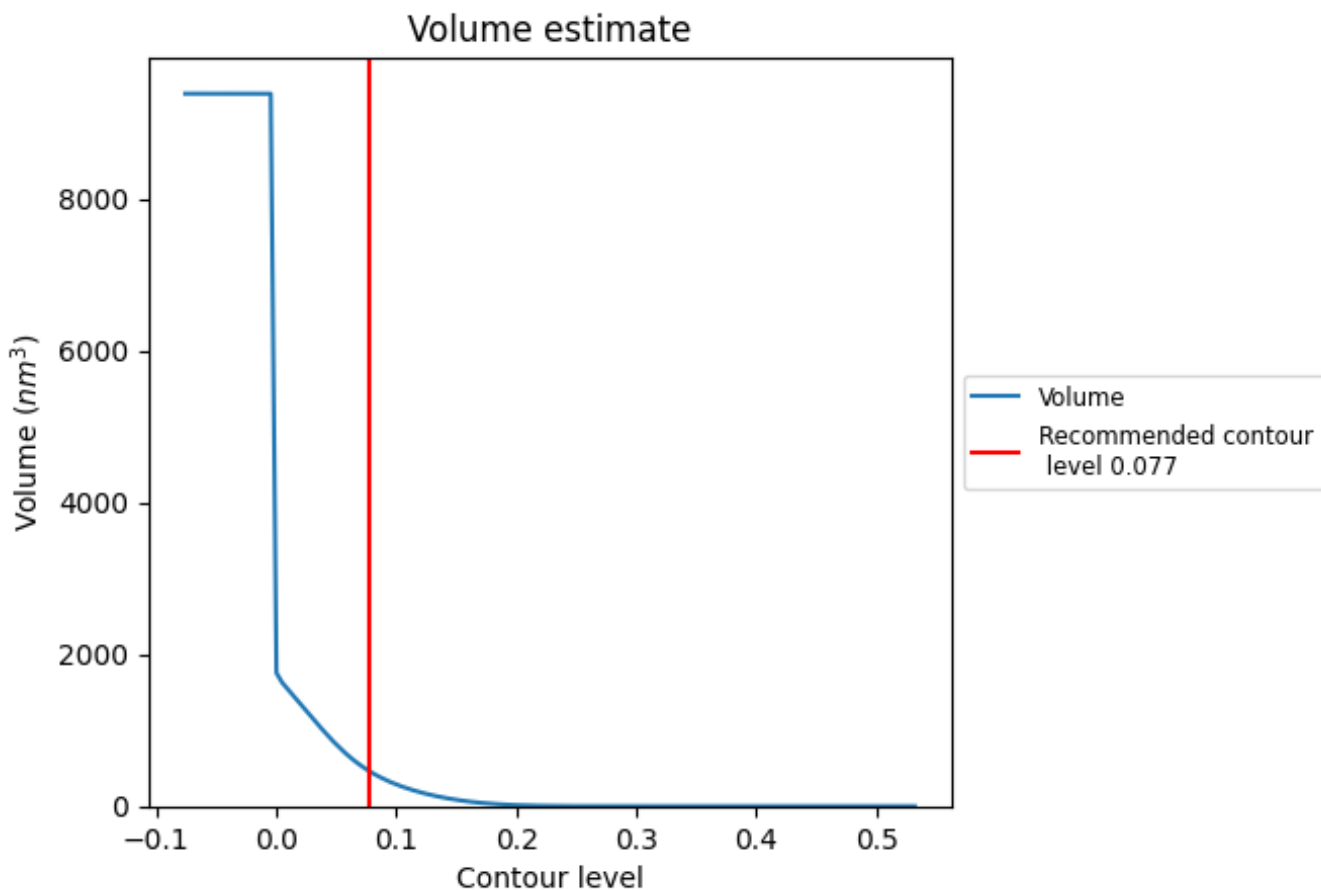
This section contains the results of statistical analysis of the map.

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 467 nm^3 ; this corresponds to an approximate mass of 422 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.

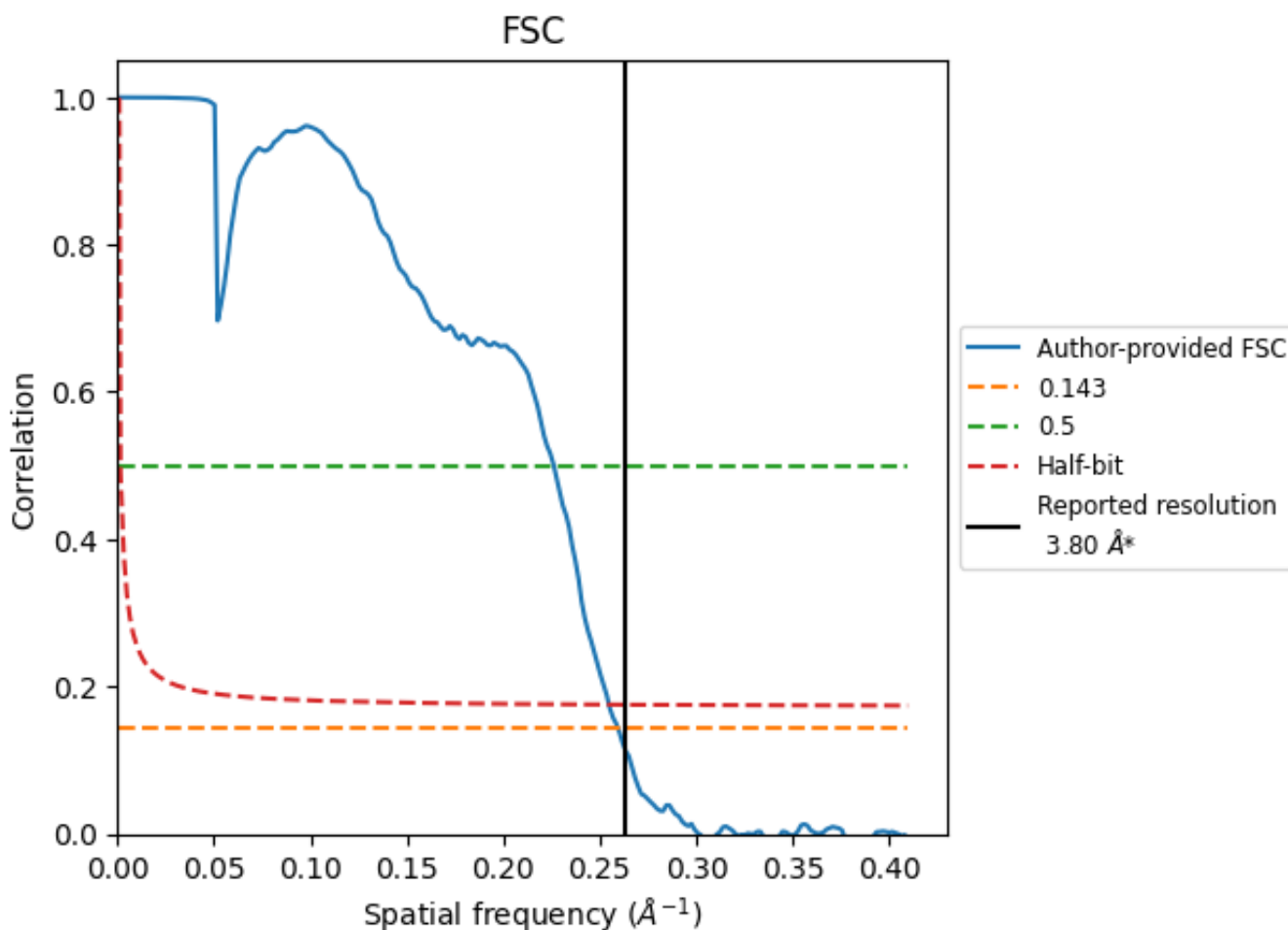
7.3 Rotationally averaged power spectrum [i](#)

This section was not generated. The rotationally averaged power spectrum is only generated for cubic maps.

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.263 Å⁻¹

8.2 Resolution estimates [i](#)

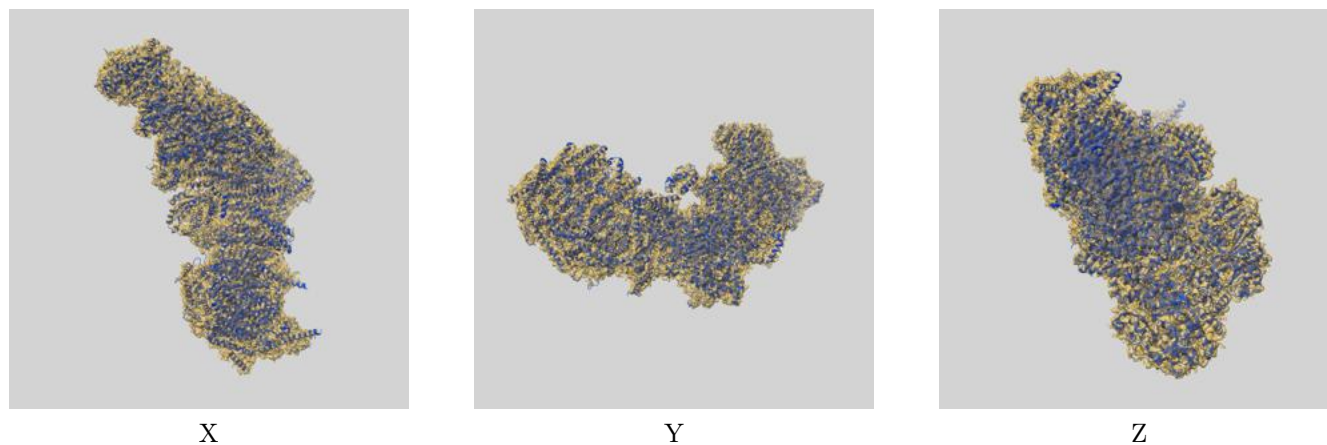
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.80	-	-
Author-provided FSC curve	3.85	4.42	3.92
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

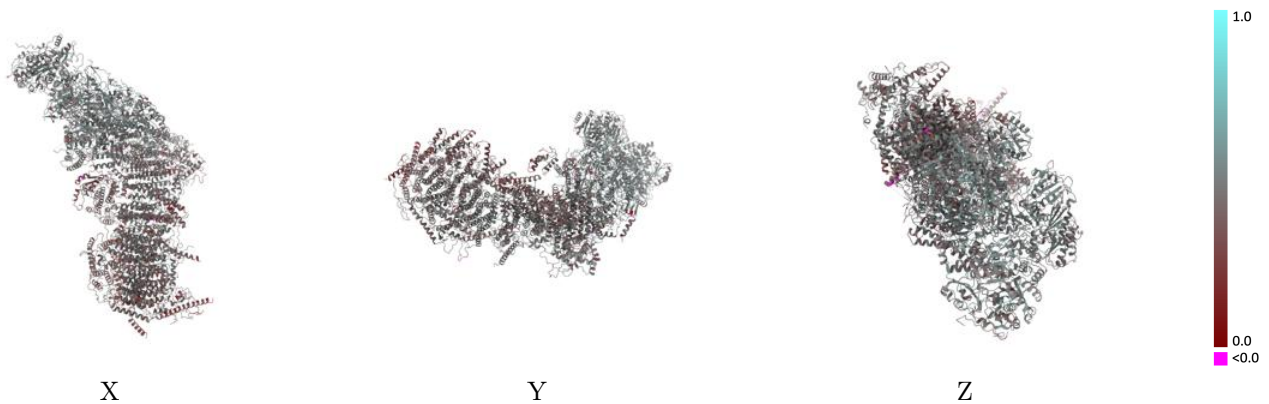
This section contains information regarding the fit between EMDB map EMD-14688 and PDB model 7ZEB. Per-residue inclusion information can be found in section 3 on page 18.

9.1 Map-model overlay [i](#)



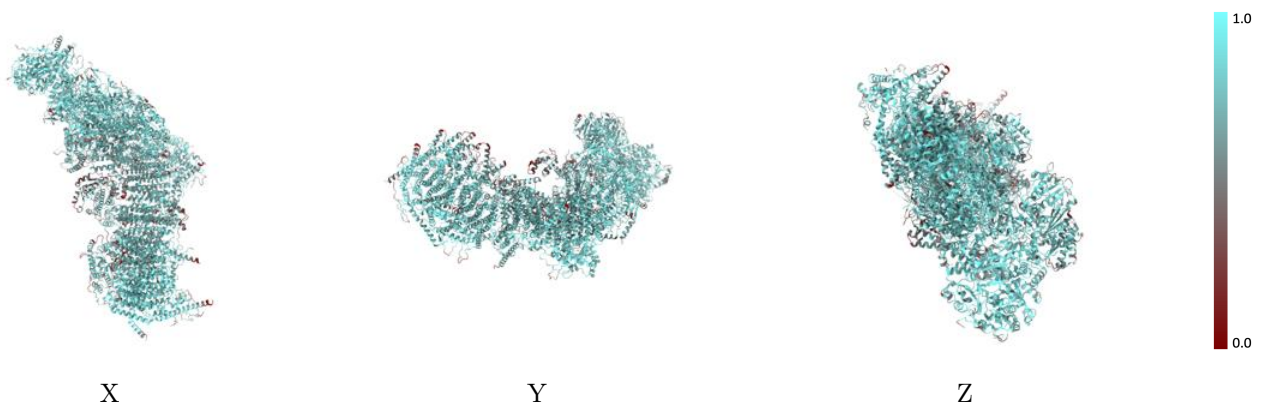
The images above show the 3D surface view of the map at the recommended contour level 0.077 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



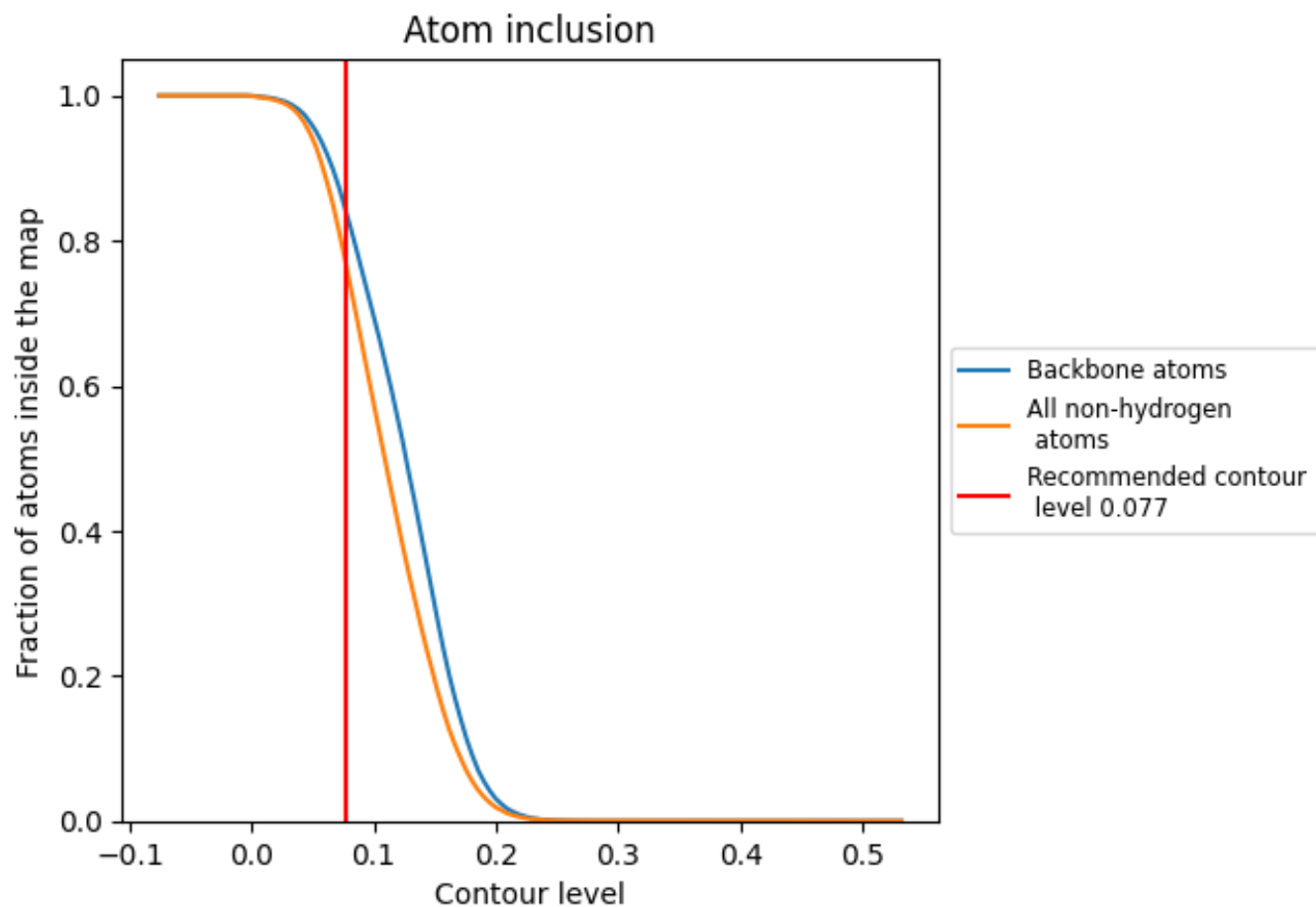
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.077).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 84% of all backbone atoms, 77% 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 (0.077) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7695	 0.4520
1	 0.7984	 0.4800
2	 0.7766	 0.4780
3	 0.7818	 0.4990
4	 0.7941	 0.4910
5	 0.8124	 0.5140
6	 0.8581	 0.5100
9	 0.8277	 0.4820
A	 0.7689	 0.4340
H	 0.8400	 0.4570
J	 0.7590	 0.4070
K	 0.7860	 0.4270
L	 0.8394	 0.4280
M	 0.8513	 0.4680
N	 0.8287	 0.4590
V	 0.5879	 0.3810
W	 0.8179	 0.4530
X	 0.6309	 0.3730
Y	 0.7915	 0.4570
Z	 0.8074	 0.4370
a	 0.8039	 0.4880
b	 0.7674	 0.5100
c	 0.7592	 0.5070
d	 0.7175	 0.4690
e	 0.6860	 0.4850
f	 0.6637	 0.4570
g	 0.7053	 0.4890
h	 0.7389	 0.4980
i	 0.7702	 0.5000
j	 0.4522	 0.3800
k	 0.6097	 0.3700
l	 0.7608	 0.4400
m	 0.7541	 0.4320
n	 0.6780	 0.3680
o	 0.7920	 0.4460



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Chain	Atom inclusion	Q-score
p	 0.6895	 0.3950
q	 0.8022	 0.4510
r	 0.7211	 0.4140
s	 0.7302	 0.3510
t	 0.6933	 0.3920
u	 0.8029	 0.3960
v	 0.7388	 0.4100
w	 0.7386	 0.4440
x	 0.6873	 0.4190
y	 0.7045	 0.4120
z	 0.8644	 0.4520