



wwPDB EM Validation Summary Report ⓘ

Mar 9, 2026 – 06:45 AM UTC

PDB ID : 8UEO / pdb_00008ueo
EMDB ID : EMD-42165
Title : In-situ complex I (Active-Apo)
Authors : Zheng, W.; Zhu, J.; Zhang, K.
Deposited on : 2023-10-02
Resolution : 3.80 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

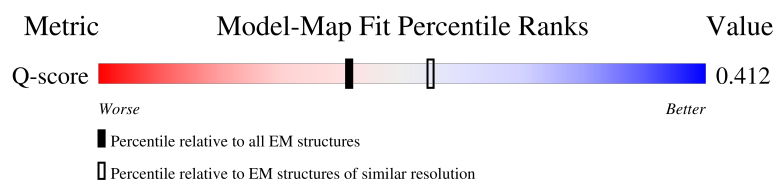
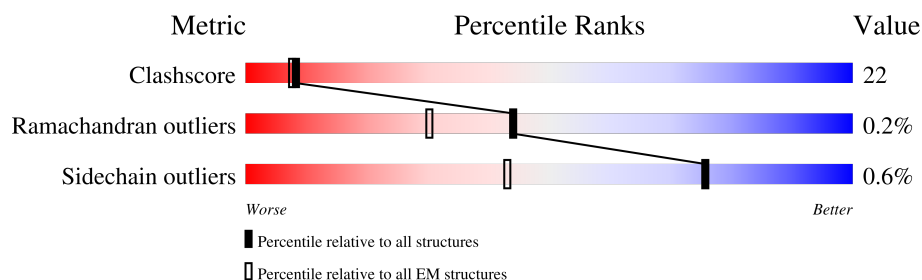
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data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

1 Overall quality at a glance

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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	10198 (3.30 - 4.30)

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	1A	115	27% 49% 50% .
2	1B	258	9% 26% 33% 40%
3	1C	264	15% 42% 36% . 21%
4	1D	430	15% 54% 46%

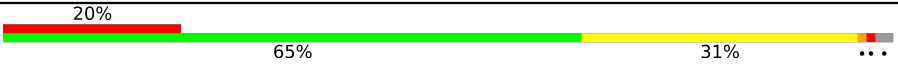
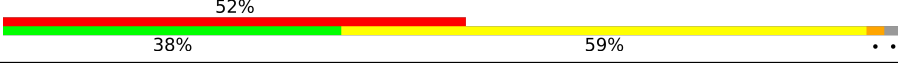
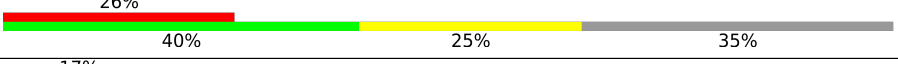
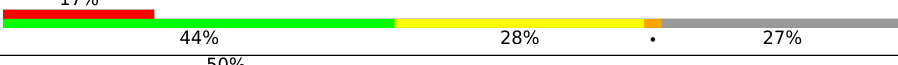
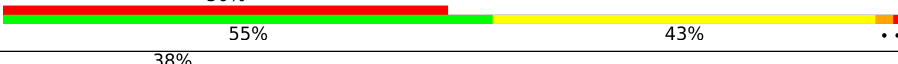
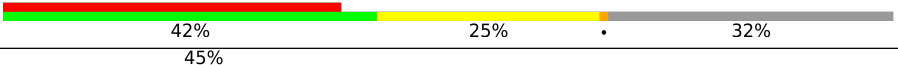
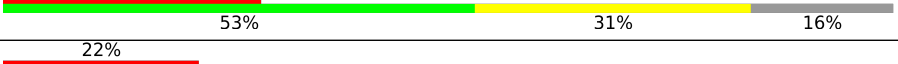
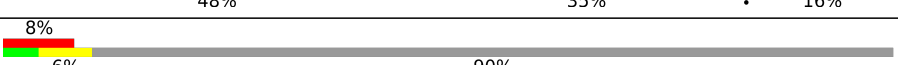
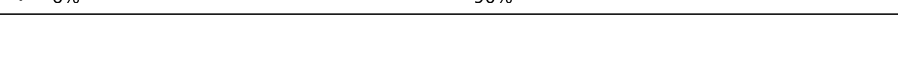
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Mol	Chain	Length	Quality of chain
5	1E	249	
6	1F	464	
7	1G	727	
8	1H	318	
9	1I	239	
10	1J	175	
11	1K	98	
12	1L	606	
13	1M	459	
14	1N	347	
15	1O	357	
16	1P	377	
17	1Q	175	
18	1R	123	
19	1S	99	
20	1T	156	
20	1U	156	
21	1V	116	
22	1W	128	
23	1X	172	
24	1Y	141	
25	1Z	144	
26	1a	70	
27	1b	84	
28	1c	76	

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Mol	Chain	Length	Quality of chain
29	1d	122	
30	1e	106	
31	1f	58	
32	1g	154	
33	1h	189	
34	1i	128	
35	1j	105	
36	1k	98	
37	1l	186	
38	1m	129	
39	1n	179	
40	1o	137	
41	1p	176	
42	1q	145	
43	1r	112	
44	1s	471	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
47	SF4	1G	801	-	-	X	-
47	SF4	1I	201	-	-	X	-
48	FES	1E	301	-	-	X	-
48	FES	1G	803	-	-	X	-

2 Entry composition

There are 57 unique types of molecules in this entry. The entry contains 68026 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-ubiquinone oxidoreductase chain 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	1A	115	Total	C	N	O	S	0	0
			914	615	134	158	7		

- Molecule 2 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	1B	155	Total	C	N	O	S	0	0
			1242	791	226	211	14		

- Molecule 3 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 3, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	1C	209	Total	C	N	O	S	0	0
			1746	1128	299	317	2		

- Molecule 4 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	1D	429	Total	C	N	O	S	0	0
			3452	2207	593	628	24		

- Molecule 5 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	1E	214	Total	C	N	O	S	0	0
			1658	1058	278	312	10		

- Molecule 6 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	1F	432	Total	C	N	O	S	0	0
			3325	2100	592	613	20		

- Molecule 7 is a protein called NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	1G	699	Total	C	N	O	S	0	0
			5362	3360	933	1029	40		

- Molecule 8 is a protein called NADH-ubiquinone oxidoreductase chain 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	1H	317	Total	C	N	O	S	0	0
			2494	1667	384	423	20		

- Molecule 9 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	1I	176	Total	C	N	O	S	0	0
			1412	887	243	269	13		

- Molecule 10 is a protein called NADH-ubiquinone oxidoreductase chain 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	1J	173	Total	C	N	O	S	0	0
			1322	888	188	234	12		

- Molecule 11 is a protein called NADH-ubiquinone oxidoreductase chain 4L.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	1K	97	Total	C	N	O	S	0	0
			740	488	112	127	13		

- Molecule 12 is a protein called NADH-ubiquinone oxidoreductase chain 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	1L	605	Total	C	N	O	S	0	0
			4808	3189	745	824	50		

- Molecule 13 is a protein called NADH-ubiquinone oxidoreductase chain 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	1M	458	Total	C	N	O	S	0	0
			3622	2405	571	608	38		

- Molecule 14 is a protein called NADH-ubiquinone oxidoreductase chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	1N	346	Total	C	N	O	S	0	0
			2702	1777	419	461	45		

- Molecule 15 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	1O	320	Total	C	N	O	S	0	0
			2590	1649	440	491	10		

- Molecule 16 is a protein called NADH:ubiquinone oxidoreductase subunit A9.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	1P	342	Total	C	N	O	S	0	0
			2751	1783	481	478	9		

- Molecule 17 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	1Q	129	Total	C	N	O	S	0	0
			1047	659	186	199	3		

- Molecule 18 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	1R	96	Total	C	N	O	S	0	0
			741	452	140	146	3		

- Molecule 19 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	1S	87	Total	C	N	O	S	0	0
			700	440	131	127	2		

- Molecule 20 is a protein called NADH:ubiquinone oxidoreductase subunit AB1.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	1T	85	Total	C	N	O	S	0	0
			689	445	101	138	5		
20	1U	86	Total	C	N	O	S	0	0
			694	448	102	139	5		

- Molecule 21 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 5 isoform X1.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	1V	115	Total	C	N	O	S	0	0
			927	599	157	168	3		

- Molecule 22 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	1W	115	Total	C	N	O	S	0	0
			971	619	179	168	5		

- Molecule 23 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	1X	171	Total	C	N	O	S	0	0
			1398	887	250	251	10		

- Molecule 24 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 11.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	1Y	139	Total	C	N	O	S	0	0
			1016	648	173	189	6		

- Molecule 25 is a protein called NADH:ubiquinone oxidoreductase subunit A13.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	1Z	141	Total	C	N	O	S	0	0
			1168	752	202	205	9		

- Molecule 26 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	1a	70	Total	C	N	O	S	0	0
			562	361	101	94	6		

- Molecule 27 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	1b	83	Total	C	N	O	S	0	0
			643	417	110	115	1		

- Molecule 28 is a protein called NADH dehydrogenase [ubiquinone] 1 subunit C1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	1c	49	Total	C	N	O		0	0
			417	276	71	70			

- Molecule 29 is a protein called NADH dehydrogenase [ubiquinone] 1 subunit C2.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	1d	119	Total	C	N	O	S	0	0
			985	641	171	168	5		

- Molecule 30 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	1e	99	Total	C	N	O	S	0	0
			816	519	151	140	6		

- Molecule 31 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	1f	57	Total	C	N	O	S	0	0
			487	316	89	80	2		

- Molecule 32 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 11, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	1g	100	Total	C	N	O	S	0	0
			835	535	138	158	4		

- Molecule 33 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 5, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	1h	138	Total	C	N	O	S	0	0
			1151	754	195	199	3		

- Molecule 34 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	1i	128	Total	C	N	O	S	0	0
			1100	723	194	181	2		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1i	0	ACE	-	acetylation	UNP A0A4X1UIV8

- Molecule 35 is a protein called NADH:ubiquinone oxidoreductase subunit B2.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	1j	71	Total	C	N	O	S	0	0
			601	394	99	107	1		

- Molecule 36 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	1k	81	Total	C	N	O	S	0	0
			649	422	110	116	1		

- Molecule 37 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	1l	156	Total	C	N	O	S	0	0
			1310	847	213	242	8		

- Molecule 38 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 4.

Mol	Chain	Residues	Atoms				AltConf	Trace
38	1m	128	Total	C	N	O		
			1062	691	182	189	0	0

- Molecule 39 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 9.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	1n	172	Total	C	N	O	S		
			1495	956	273	258	8	0	0

- Molecule 40 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	1o	122	Total	C	N	O	S		
			1045	650	198	187	10	0	0

- Molecule 41 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 10.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	1p	173	Total	C	N	O	S		
			1449	908	263	270	8	0	0

- Molecule 42 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	1q	145	Total	C	N	O	S		
			1212	775	219	213	5	0	0

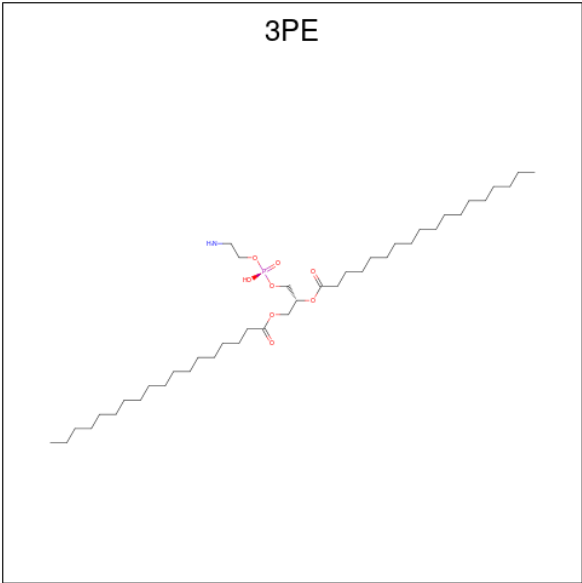
- Molecule 43 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	1r	94	Total	C	N	O	S		
			759	478	143	135	3	0	0

- Molecule 44 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 3, mitochondrial.

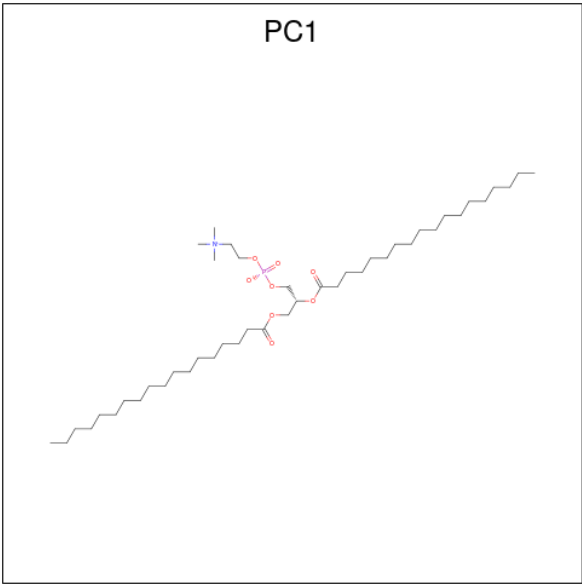
Mol	Chain	Residues	Atoms					AltConf	Trace
44	1s	45	Total	C	N	O	S	0	0
			382	238	70	73	1		

- Molecule 45 is 1,2-Distearoyl-sn-glycerophosphoethanolamine (CCD ID: 3PE) (formula: C₄₁H₈₂NO₈P).



Mol	Chain	Residues	Atoms					AltConf
45	1A	1	Total	C	N	O	P	0
			31	21	1	8	1	
45	1D	1	Total	C	N	O	P	0
			46	36	1	8	1	
45	1L	1	Total	C	N	O	P	0
			46	36	1	8	1	
45	1L	1	Total	C	N	O	P	0
			42	32	1	8	1	
45	1M	1	Total	C	N	O	P	0
			38	28	1	8	1	
45	1M	1	Total	C	N	O	P	0
			38	28	1	8	1	
45	1Y	1	Total	C	N	O	P	0
			31	21	1	8	1	
45	1Y	1	Total	C	N	O	P	0
			40	30	1	8	1	
45	1Y	1	Total	C	N	O	P	0
			35	25	1	8	1	
45	1f	1	Total	C	N	O	P	0
			51	41	1	8	1	

- Molecule 46 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (CCD ID: PC1) (formula: C₄₄H₈₈NO₈P).



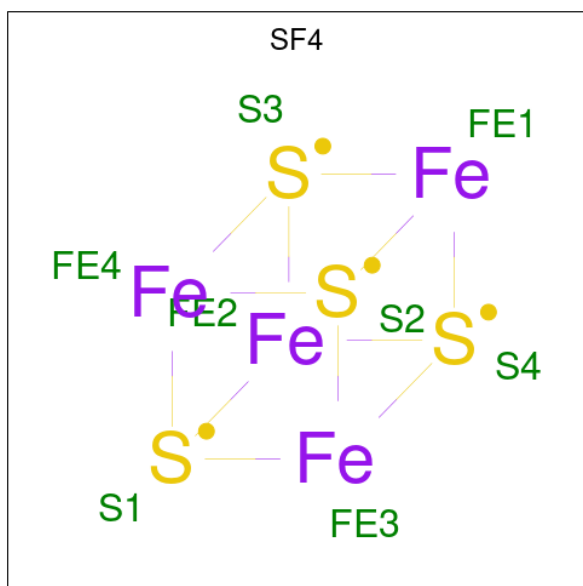
Mol	Chain	Residues	Atoms					AltConf
46	1A	1	Total	C	N	O	P	0
			27	17	1	8	1	
46	1B	1	Total	C	N	O	P	0
			34	24	1	8	1	
46	1B	1	Total	C	N	O	P	0
			48	38	1	8	1	
46	1H	1	Total	C	N	O	P	0
			54	44	1	8	1	
46	1I	1	Total	C	N	O	P	0
			44	34	1	8	1	
46	1J	1	Total	C	N	O	P	0
			32	22	1	8	1	
46	1L	1	Total	C	N	O	P	0
			38	28	1	8	1	
46	1M	1	Total	C	N	O	P	0
			35	25	1	8	1	
46	1Y	1	Total	C	N	O	P	0
			46	36	1	8	1	
46	1Z	1	Total	C	N	O	P	0
			34	24	1	8	1	
46	1d	1	Total	C	N	O	P	0
			39	29	1	8	1	
46	1f	1	Total	C	N	O	P	0
			34	24	1	8	1	

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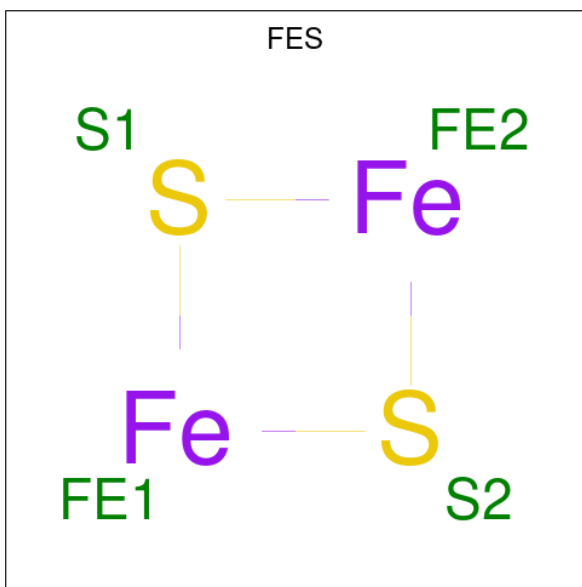
Mol	Chain	Residues	Atoms					AltConf
46	1h	1	Total	C	N	O	P	0
			47	37	1	8	1	

- Molecule 47 is IRON/SULFUR CLUSTER (CCD ID: SF4) (formula: Fe_4S_4).



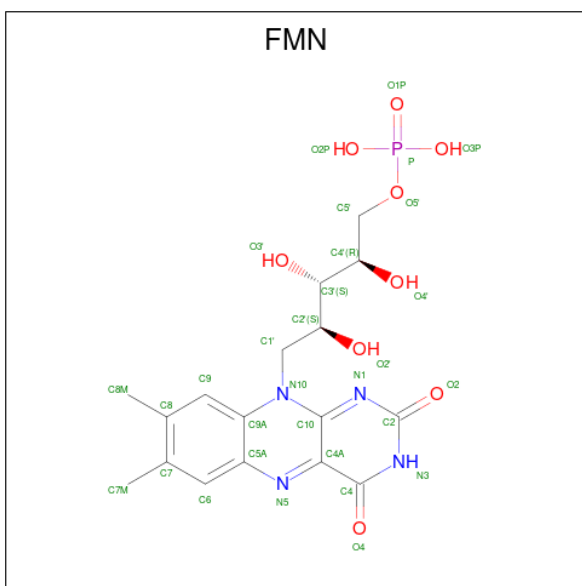
Mol	Chain	Residues	Atoms			AltConf
47	1B	1	Total	Fe	S	0
			8	4	4	
47	1F	1	Total	Fe	S	0
			8	4	4	
47	1G	1	Total	Fe	S	0
			8	4	4	
47	1G	1	Total	Fe	S	0
			8	4	4	
47	1I	1	Total	Fe	S	0
			8	4	4	
47	1I	1	Total	Fe	S	0
			8	4	4	

- Molecule 48 is FE2/S2 (INORGANIC) CLUSTER (CCD ID: FES) (formula: Fe_2S_2).



Mol	Chain	Residues	Atoms			AltConf
48	1E	1	Total 4	Fe 2	S 2	0
48	1G	1	Total 4	Fe 2	S 2	0

- Molecule 49 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula: $C_{17}H_{21}N_4O_9P$).

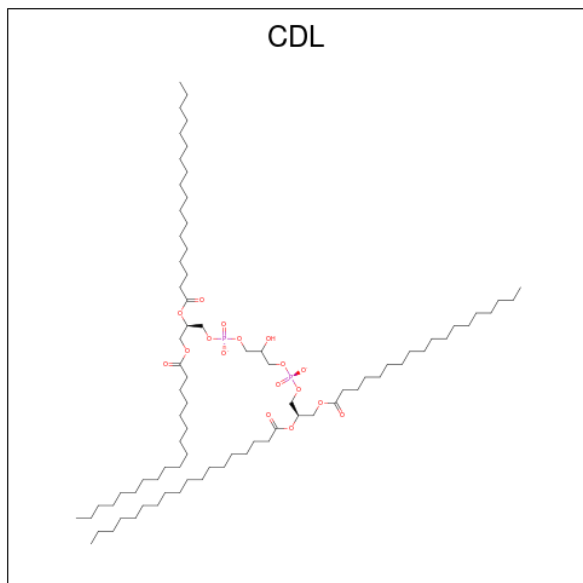


Mol	Chain	Residues	Atoms					AltConf
49	1F	1	Total	C	N	O	P	0
			31	17	4	9	1	

- Molecule 50 is POTASSIUM ION (CCD ID: K) (formula: K).

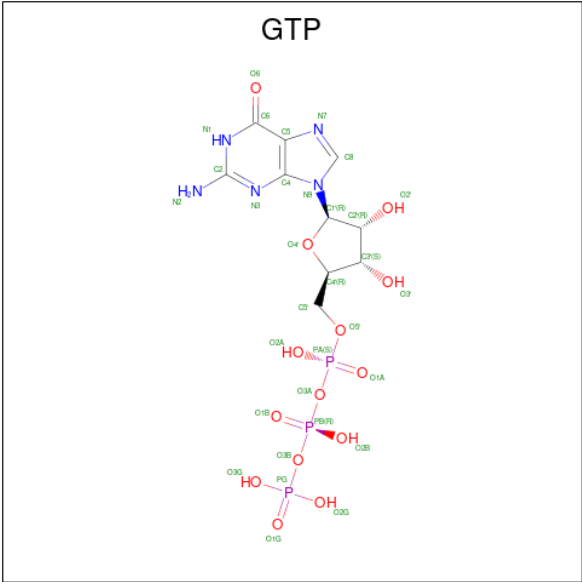
Mol	Chain	Residues	Atoms		AltConf
50	1G	1	Total	K	0
			1	1	

- Molecule 51 is CARDIOLIPIN (CCD ID: CDL) (formula: $C_{81}H_{156}O_{17}P_2$).



Mol	Chain	Residues	Atoms				AltConf
51	1H	1	Total	C	O	P	0
			51	32	17	2	
51	1L	1	Total	C	O	P	0
			76	57	17	2	
51	1N	1	Total	C	O	P	0
			65	46	17	2	
51	1N	1	Total	C	O	P	0
			67	48	17	2	
51	1X	1	Total	C	O	P	0
			86	67	17	2	
51	1a	1	Total	C	O	P	0
			61	42	17	2	

- Molecule 52 is GUANOSINE-5'-TRIPHOSPHATE (CCD ID: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).

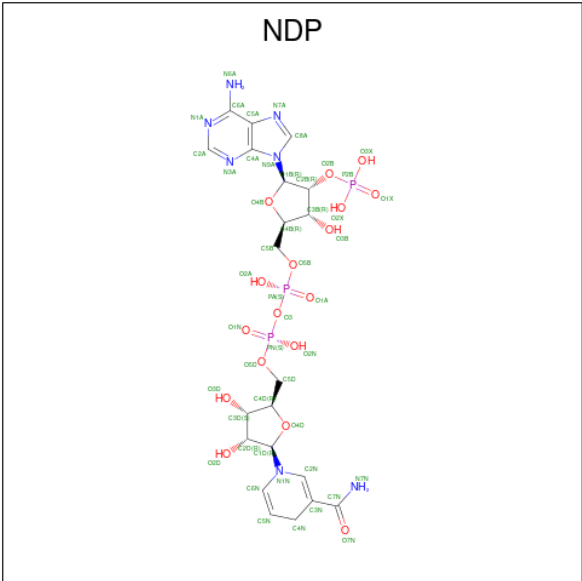


Mol	Chain	Residues	Atoms					AltConf
52	10	1	Total	C	N	O	P	0
			32	10	5	14	3	

- Molecule 53 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
53	10	1	Total	Mg	0
			1	1	

- Molecule 54 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NDP) (formula: C₂₁H₃₀N₇O₁₇P₃).

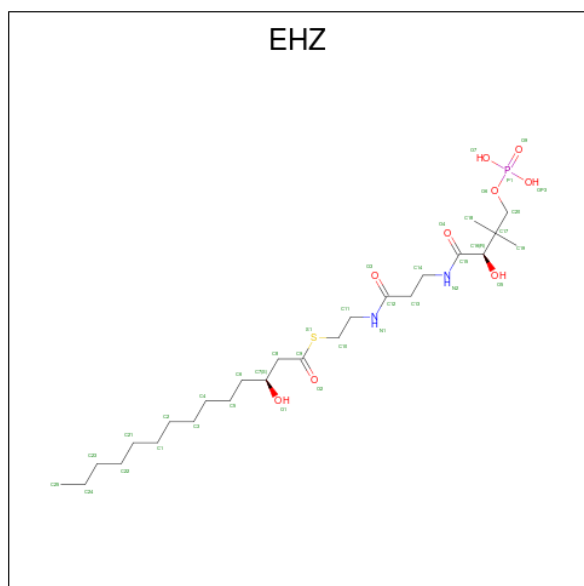


Mol	Chain	Residues	Atoms					AltConf
54	1P	1	Total	C	N	O	P	0
			48	21	7	17	3	

- Molecule 55 is ZINC ION (CCD ID: ZN) (formula: Zn).

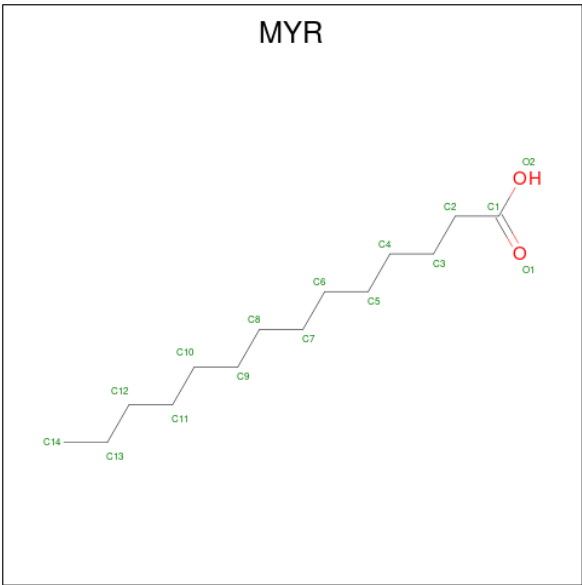
Mol	Chain	Residues	Atoms		AltConf
55	1R	1	Total	Zn	0
			1	1	

- Molecule 56 is {S}-[2-[3-[(2 {R})-3,3-dimethyl-2-oxidanyl-4-phosphonooxy-butanoyl]amino]propanoylamino]ethyl] (3 {S})-3-oxidanyltetradecanethioate (CCD ID: EHZ) (formula: C₂₅H₄₉N₂O₉PS).



Mol	Chain	Residues	Atoms						AltConf
56	1W	1	Total	C	N	O	P	S	0
			37	25	2	8	1	1	
56	1n	1	Total	C	N	O	P	S	0
			37	25	2	8	1	1	

- Molecule 57 is MYRISTIC ACID (CCD ID: MYR) (formula: C₁₄H₂₈O₂).

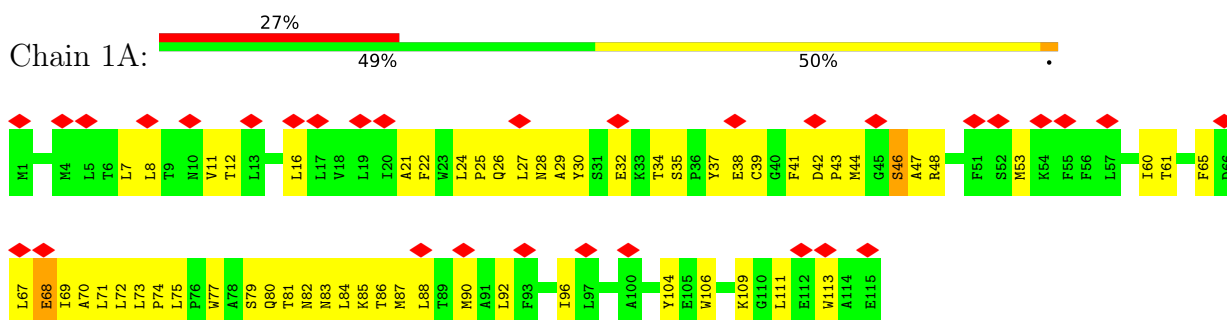


Mol	Chain	Residues	Atoms			AltConf
57	1l	1	Total	C	O	0
			15	14	1	

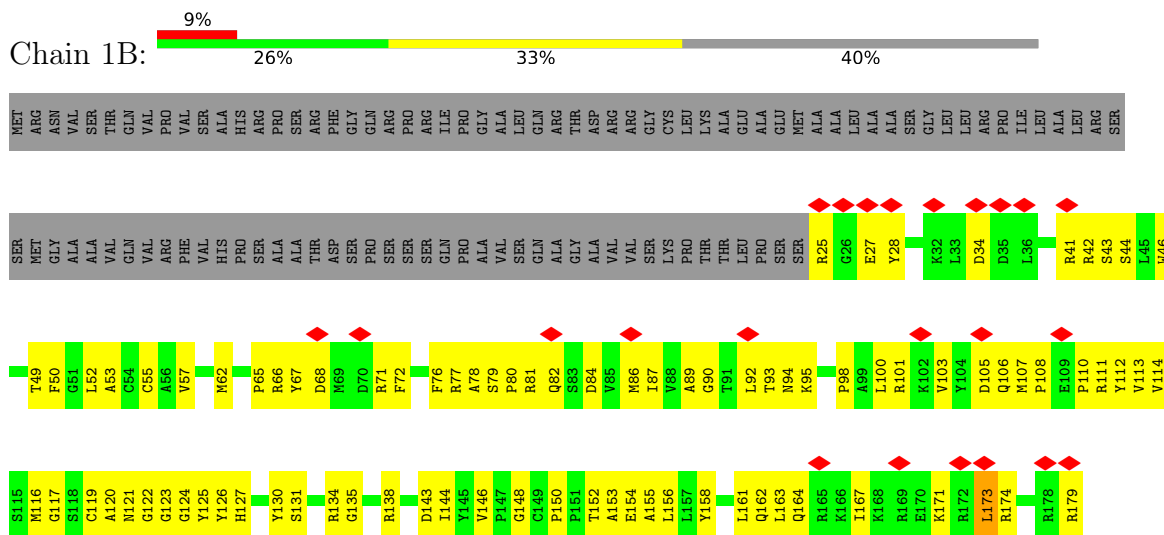
3 Residue-property plots

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.

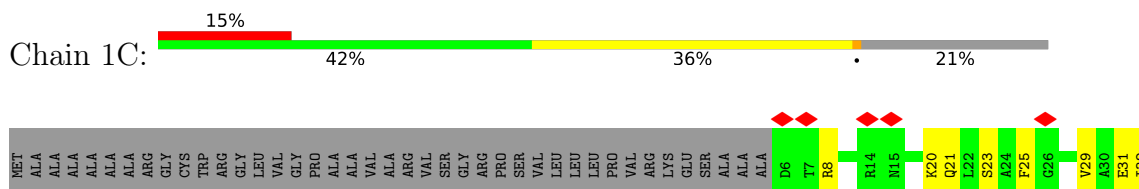
- Molecule 1: NADH-ubiquinone oxidoreductase chain 3

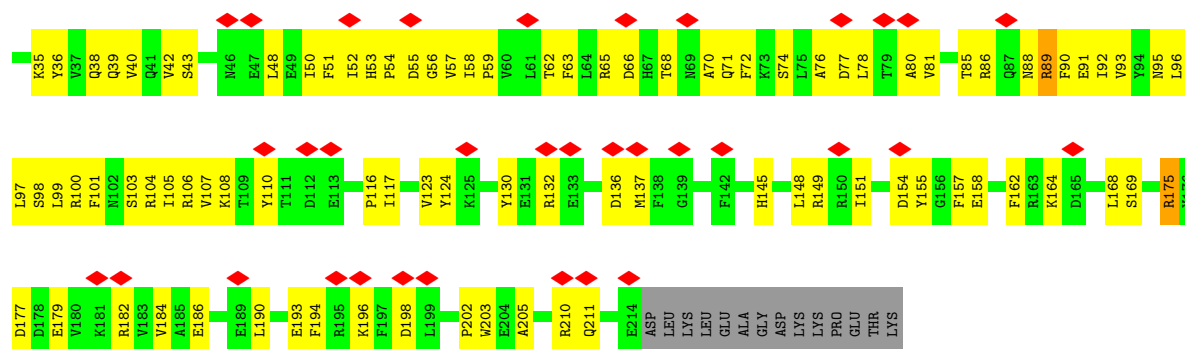


- Molecule 2: NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial

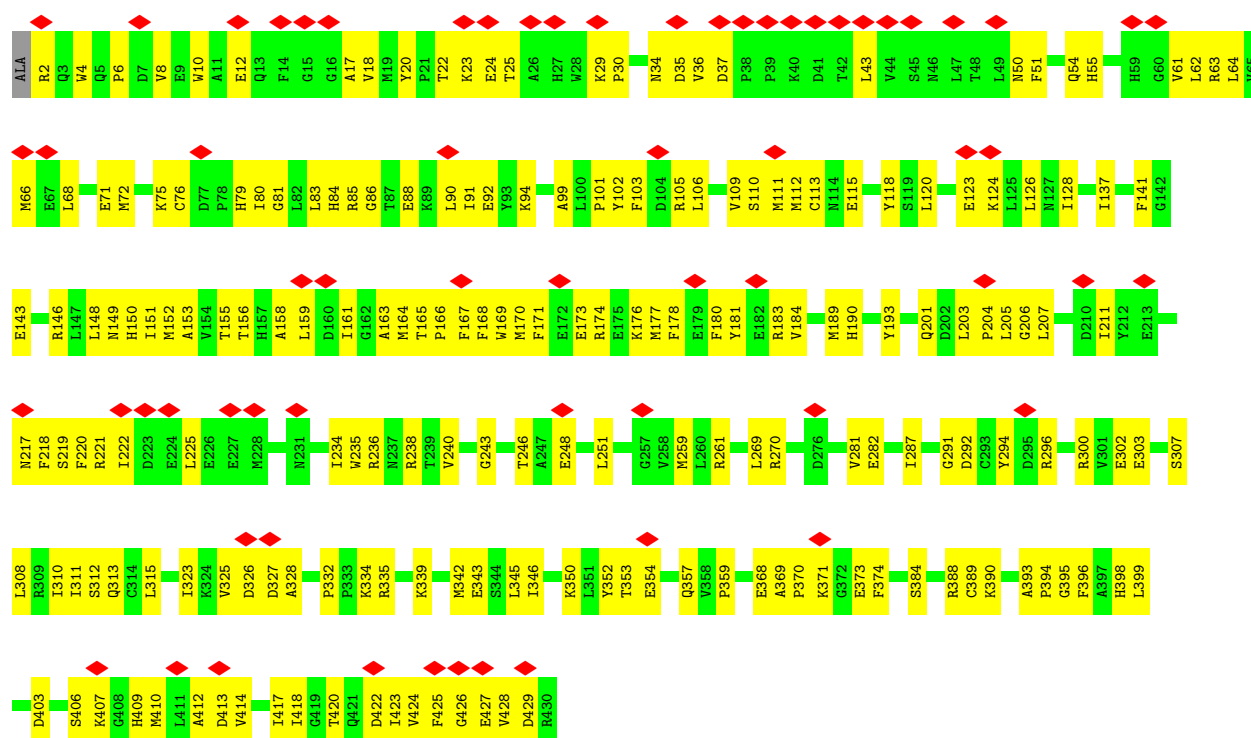


- Molecule 3: NADH dehydrogenase [ubiquinone] iron-sulfur protein 3, mitochondrial

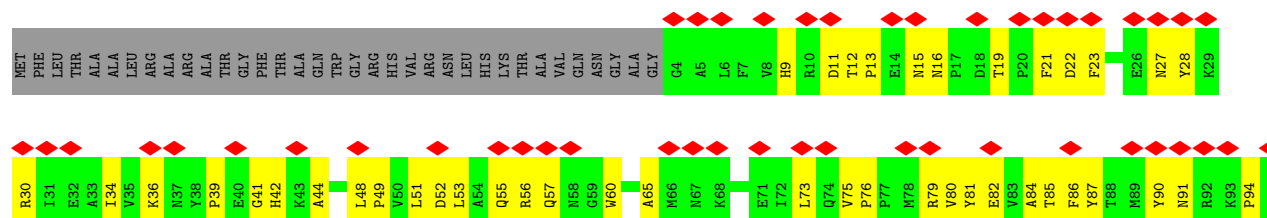
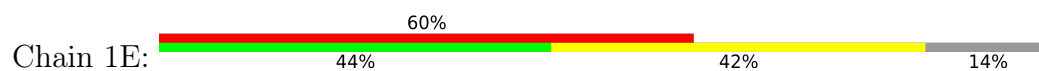




• Molecule 4: NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial



• Molecule 5: NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial

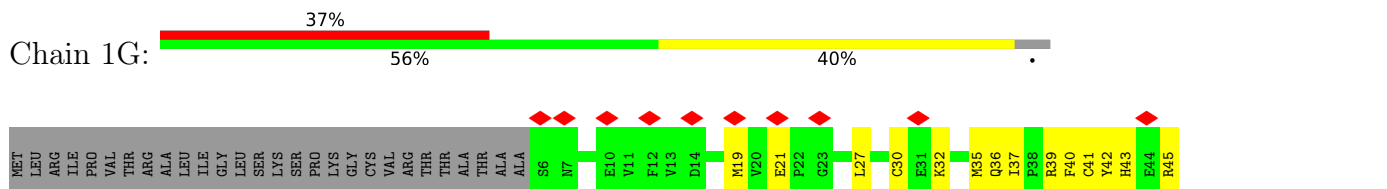


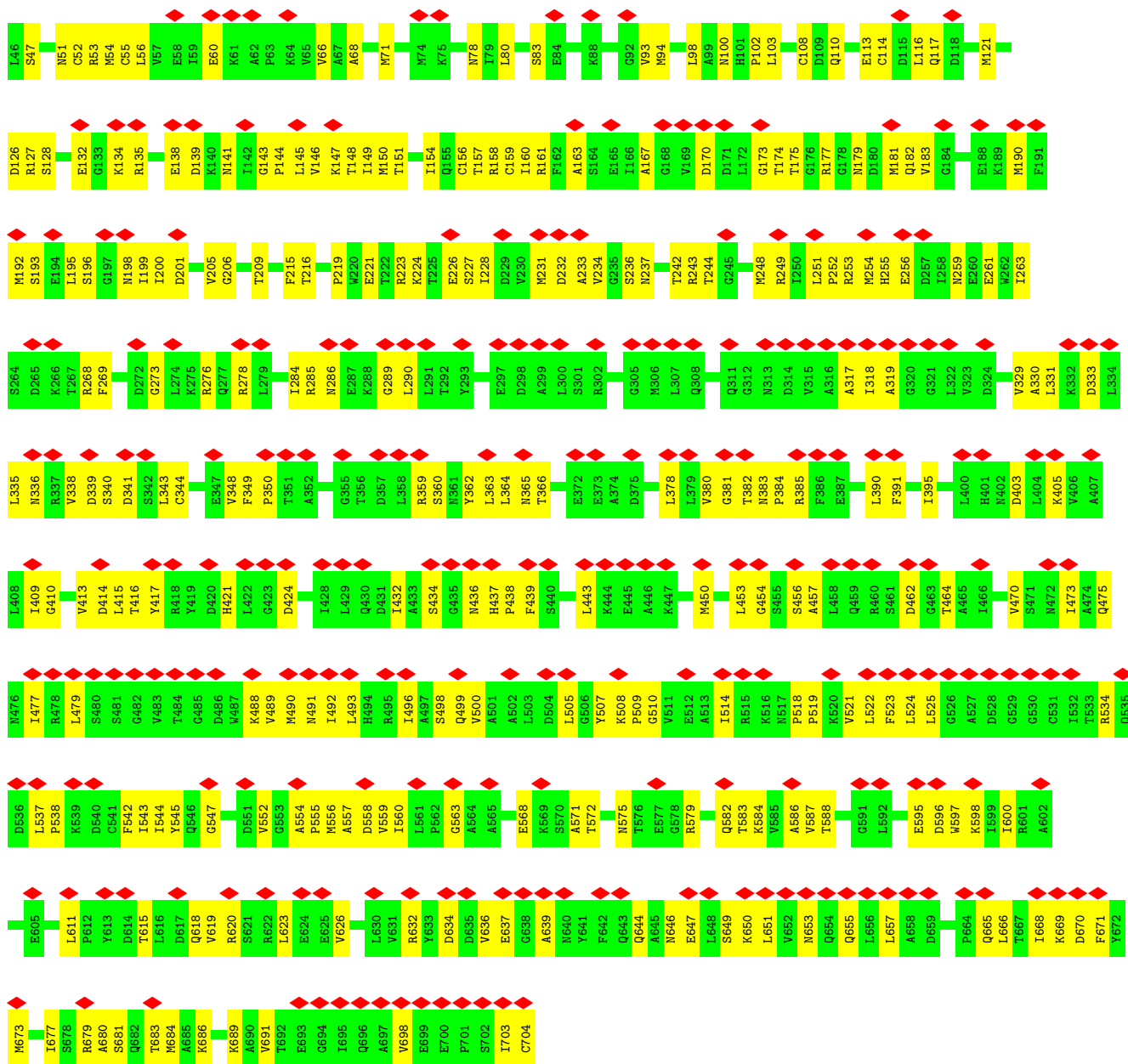


• Molecule 6: NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial

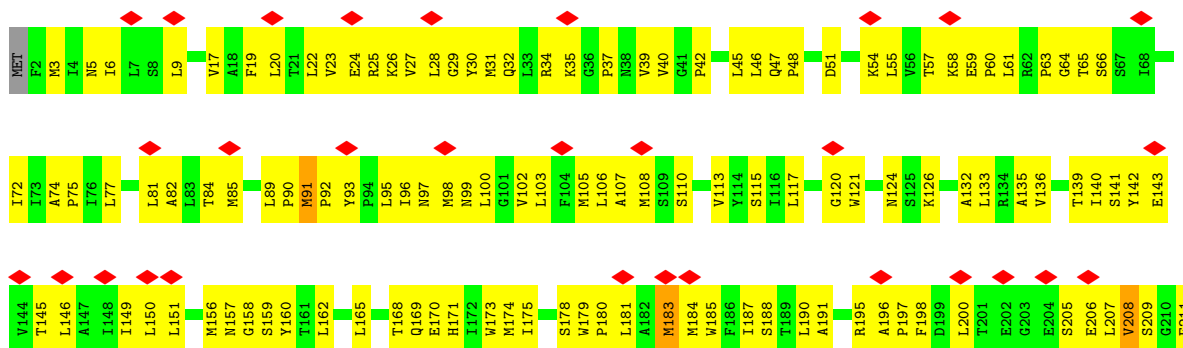


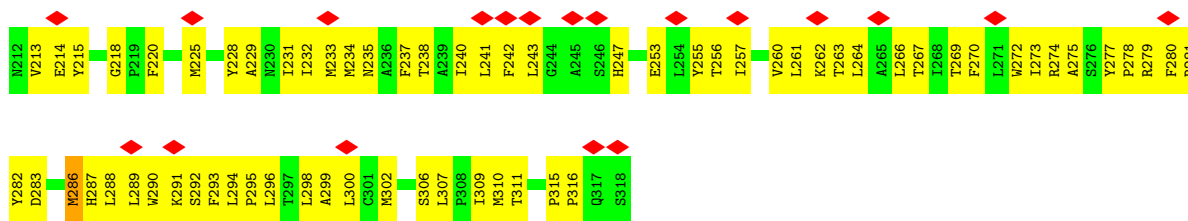
• Molecule 7: NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial



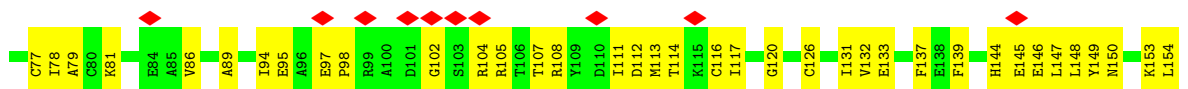
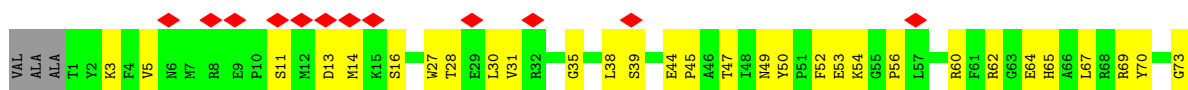


• Molecule 8: NADH-ubiquinone oxidoreductase chain 1

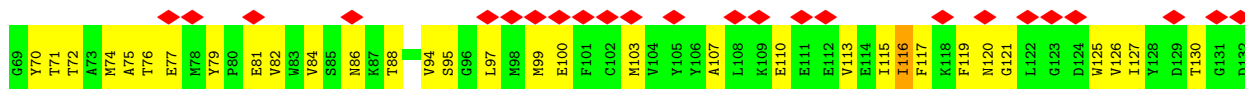
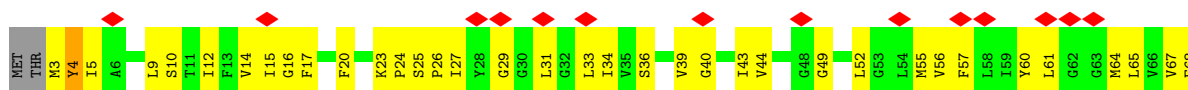




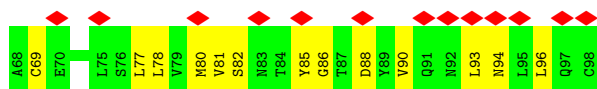
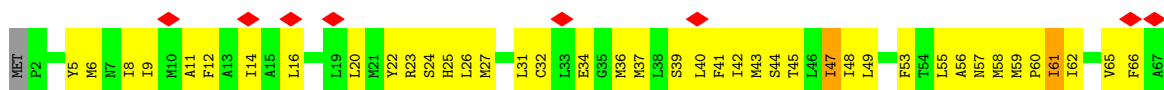
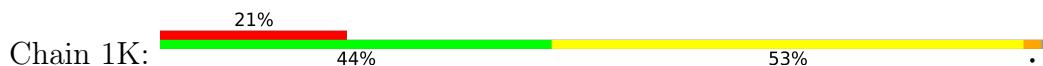
- Molecule 9: NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial



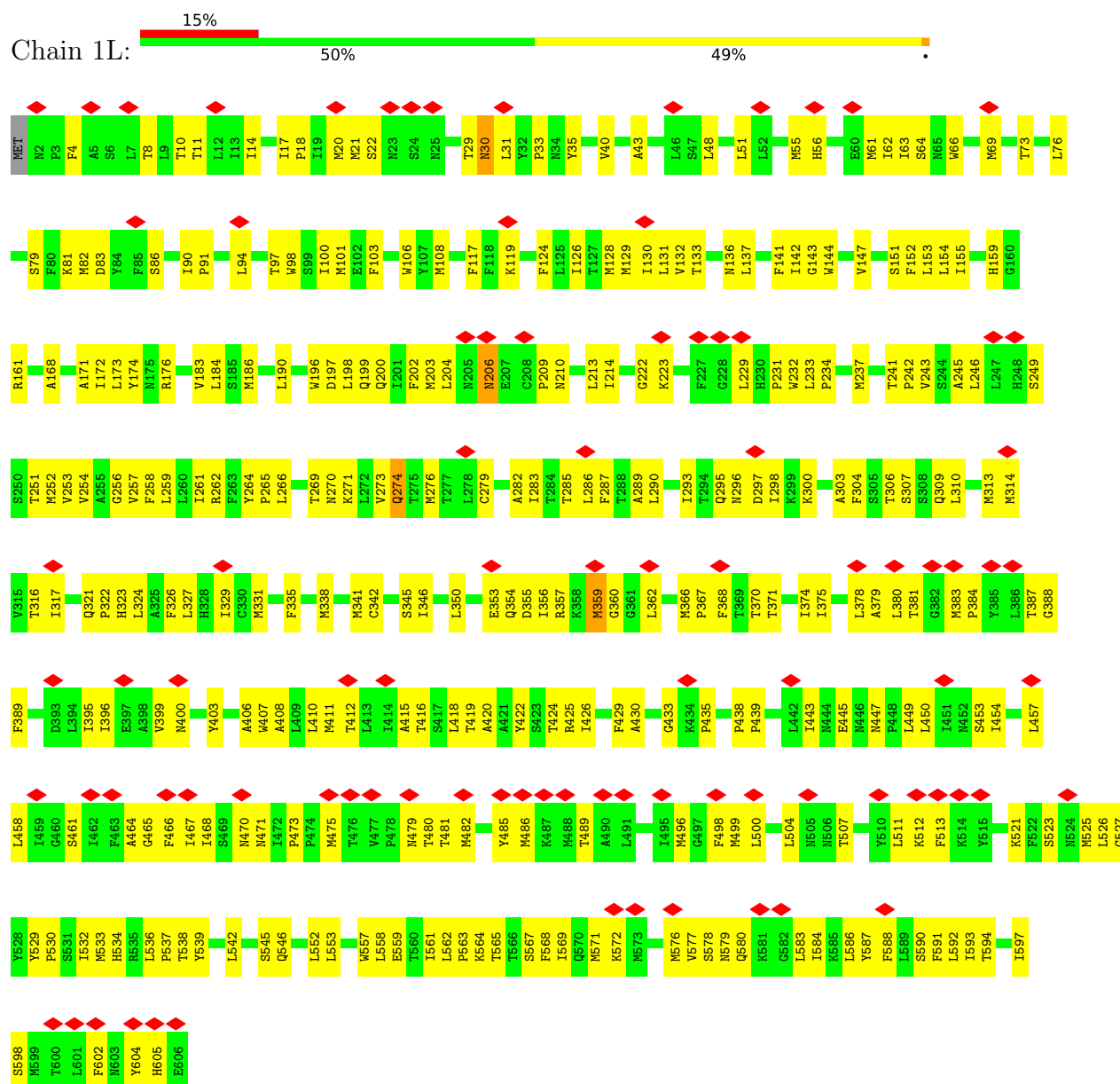
- Molecule 10: NADH-ubiquinone oxidoreductase chain 6



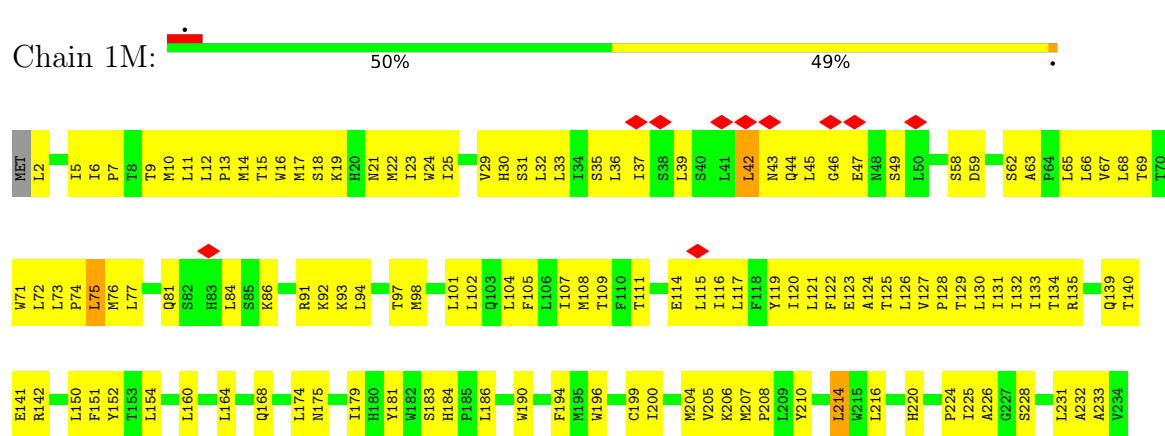
- Molecule 11: NADH-ubiquinone oxidoreductase chain 4L

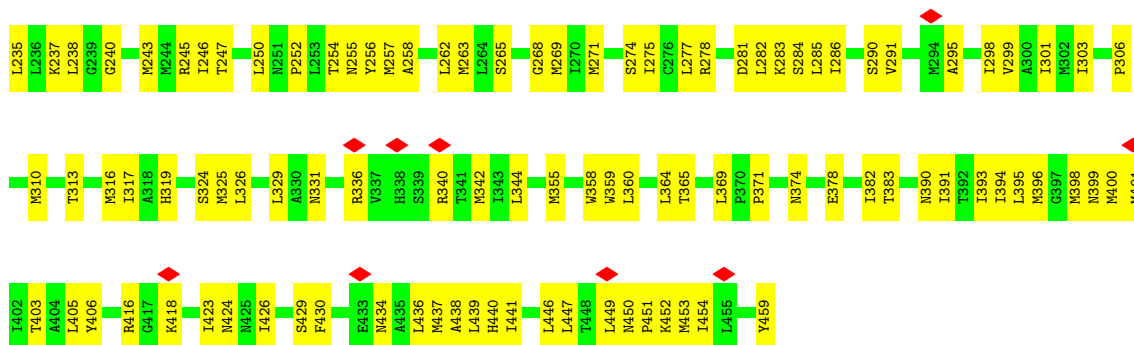


• Molecule 12: NADH-ubiquinone oxidoreductase chain 5

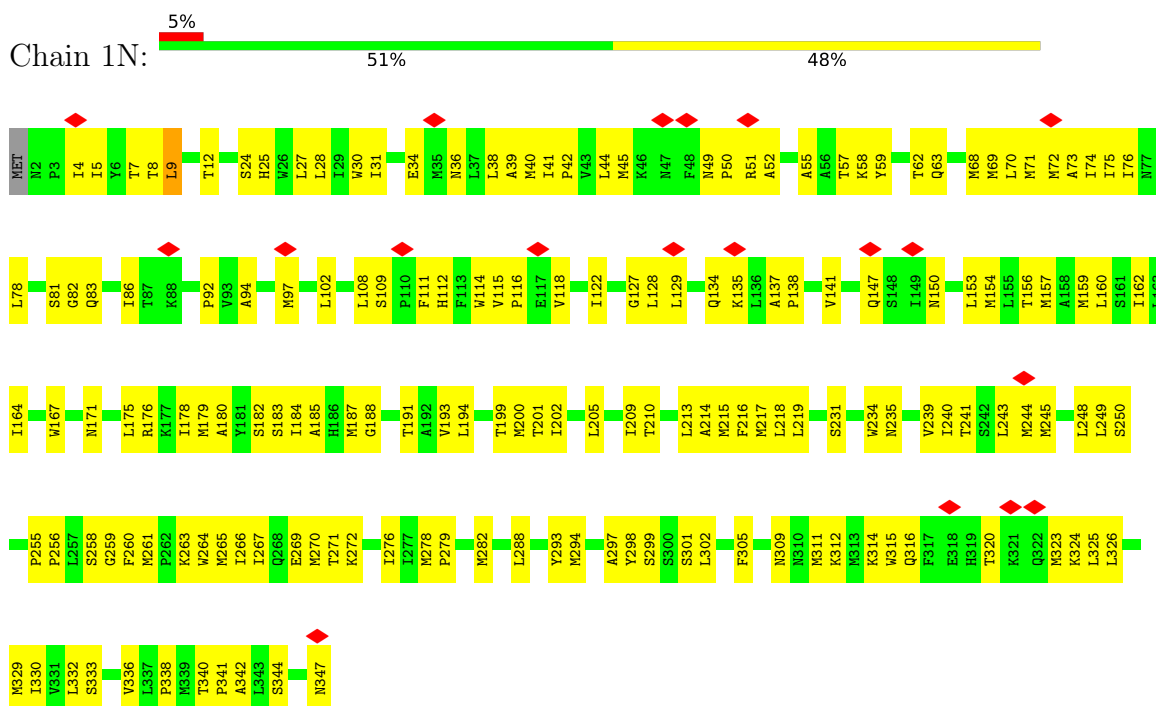


• Molecule 13: NADH-ubiquinone oxidoreductase chain 4



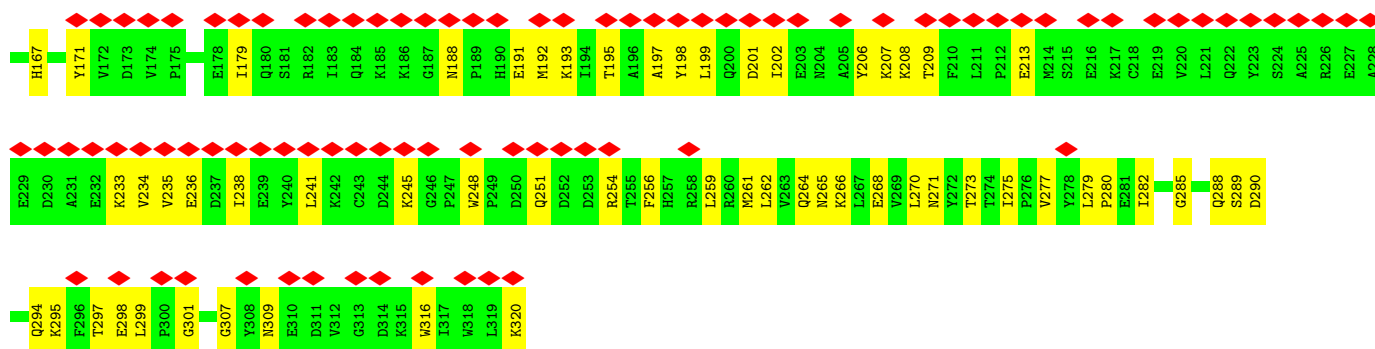


• Molecule 14: NADH-ubiquinone oxidoreductase chain 2

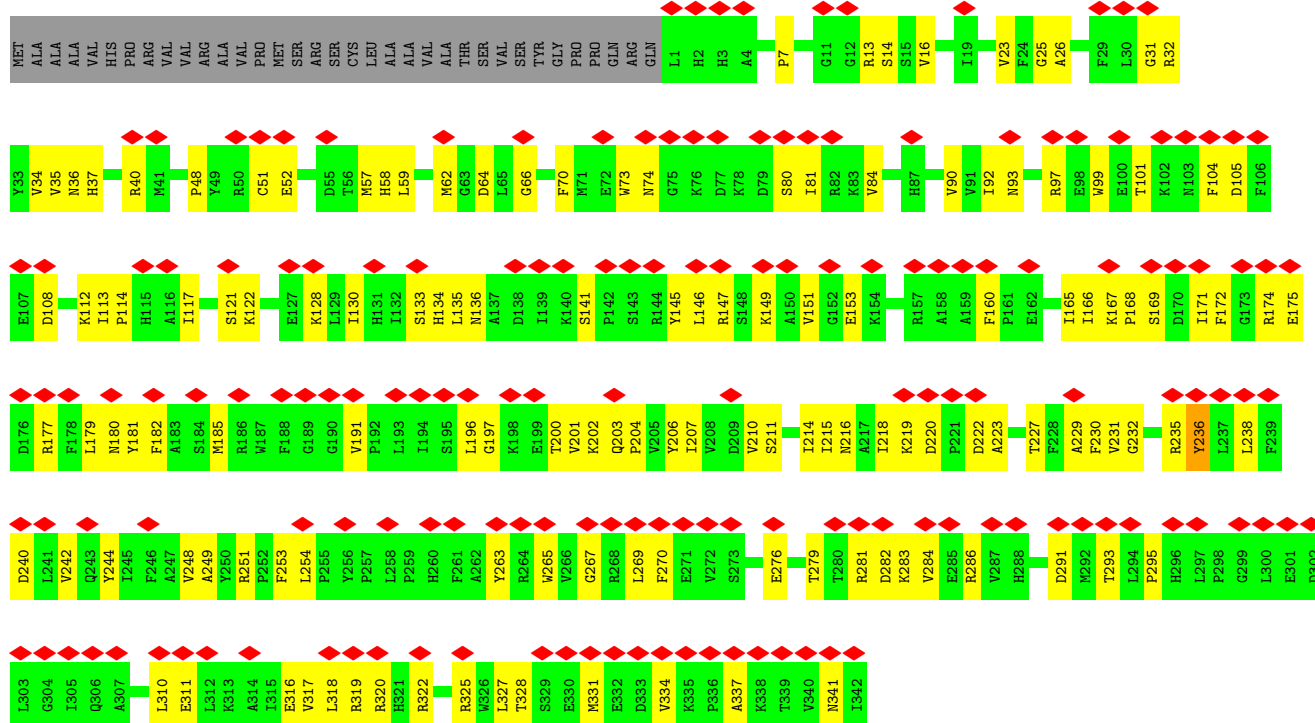


• Molecule 15: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial

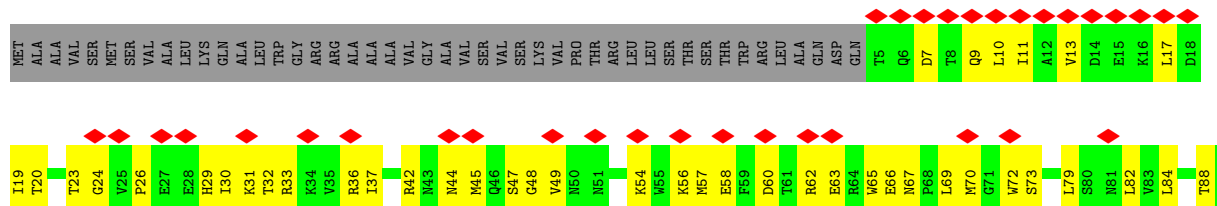


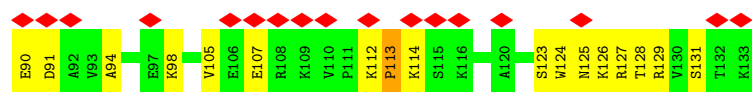


• Molecule 16: NADH:ubiquinone oxidoreductase subunit A9

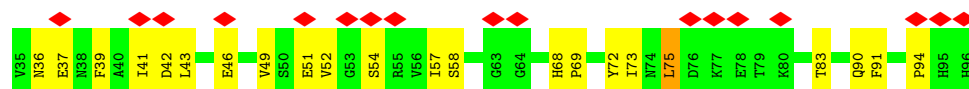
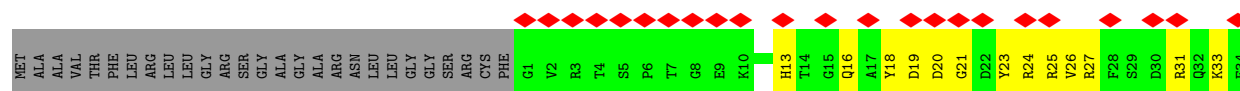


• Molecule 17: NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial

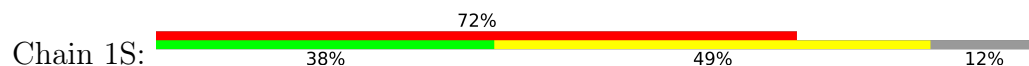




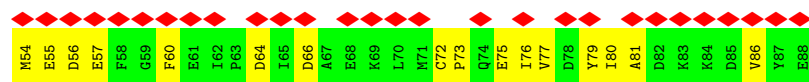
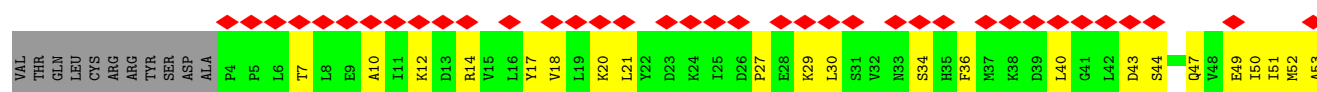
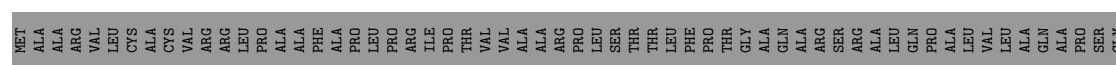
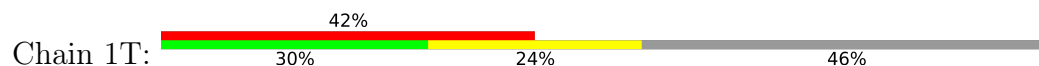
- Molecule 18: NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial



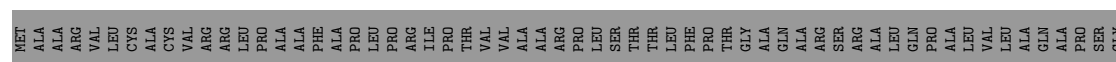
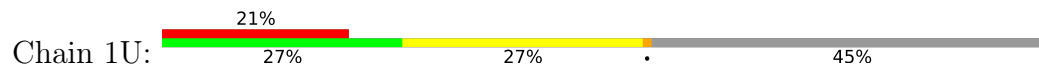
- Molecule 19: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2

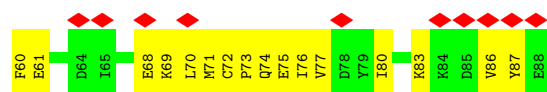


- Molecule 20: NADH:ubiquinone oxidoreductase subunit AB1

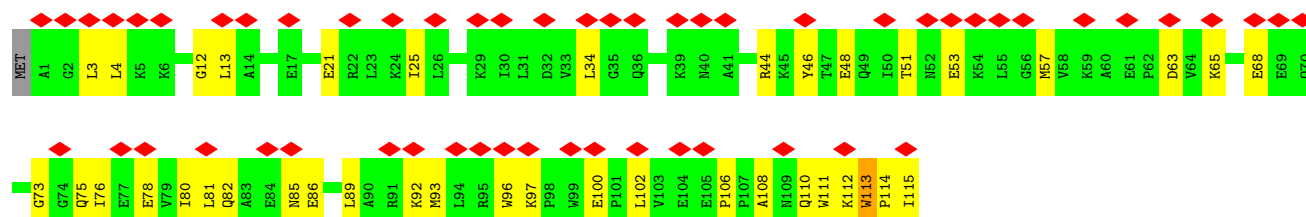


- Molecule 20: NADH:ubiquinone oxidoreductase subunit AB1

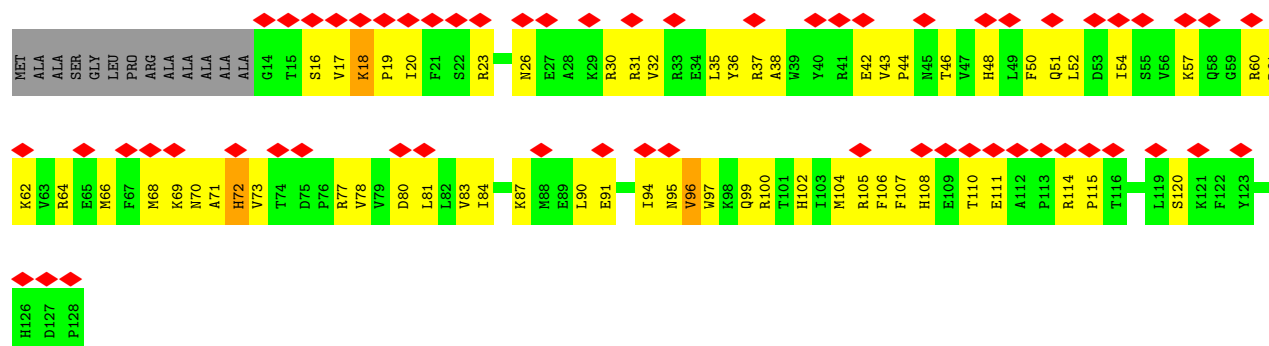




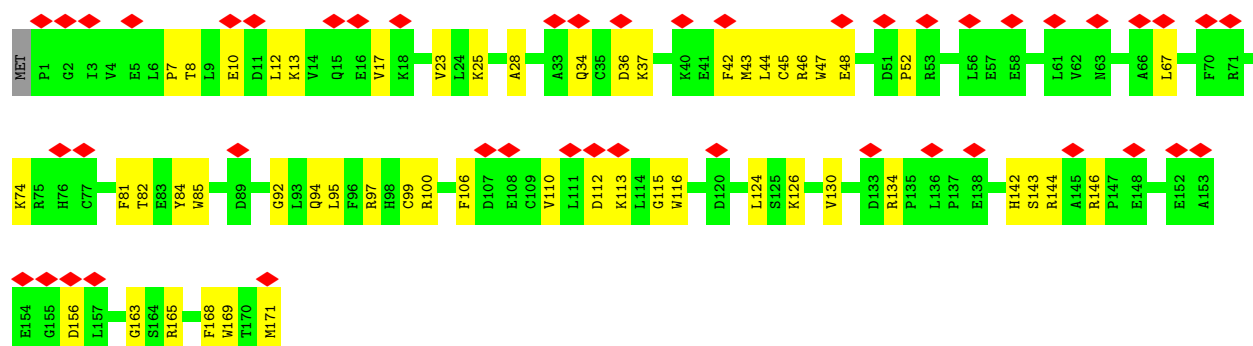
- Molecule 21: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 5 isoform X1



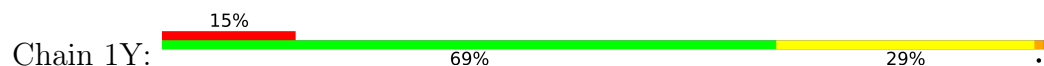
- Molecule 22: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6

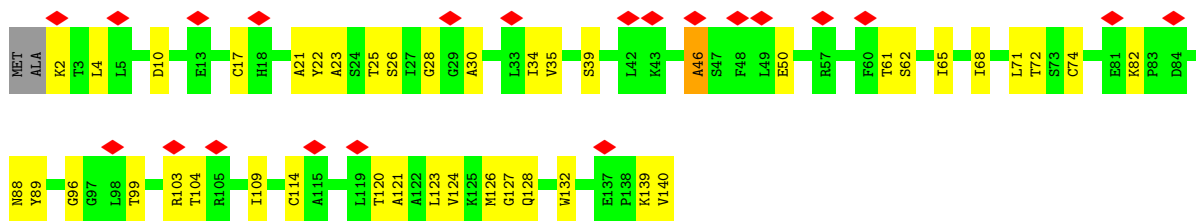


- Molecule 23: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8

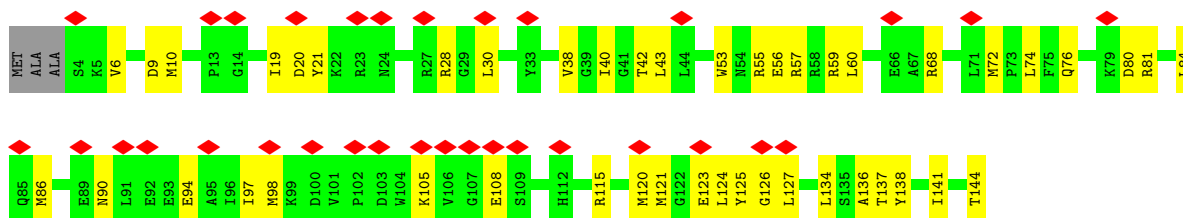


- Molecule 24: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 11

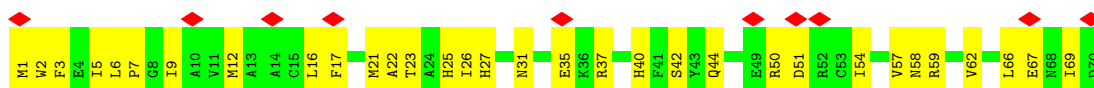




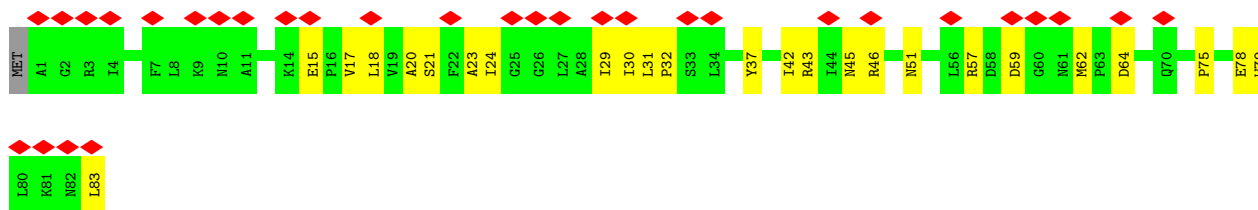
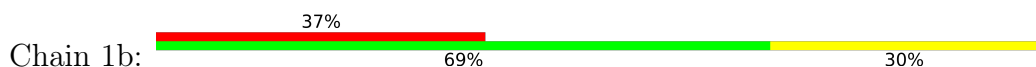
- Molecule 25: NADH:ubiquinone oxidoreductase subunit A13



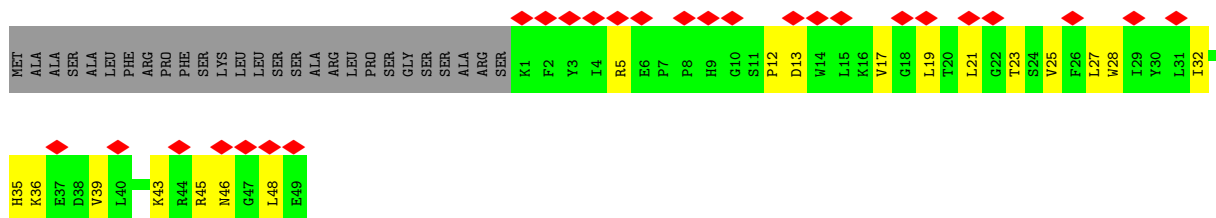
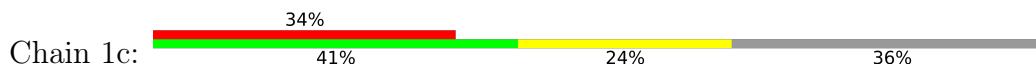
- Molecule 26: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 1



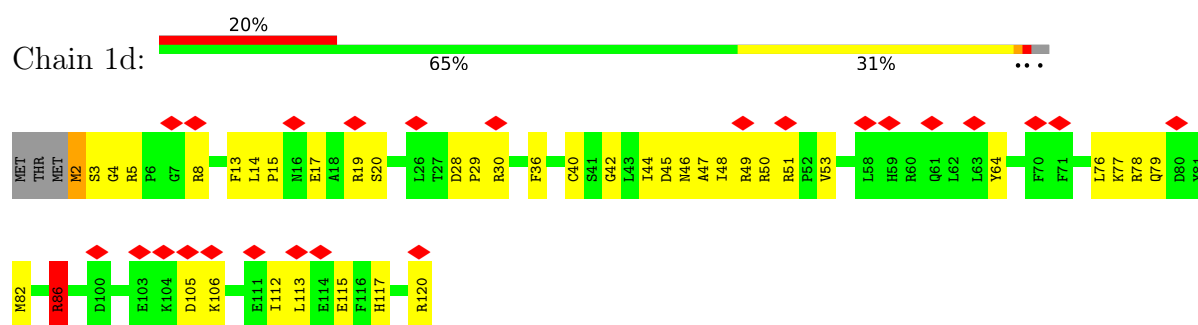
- Molecule 27: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 3



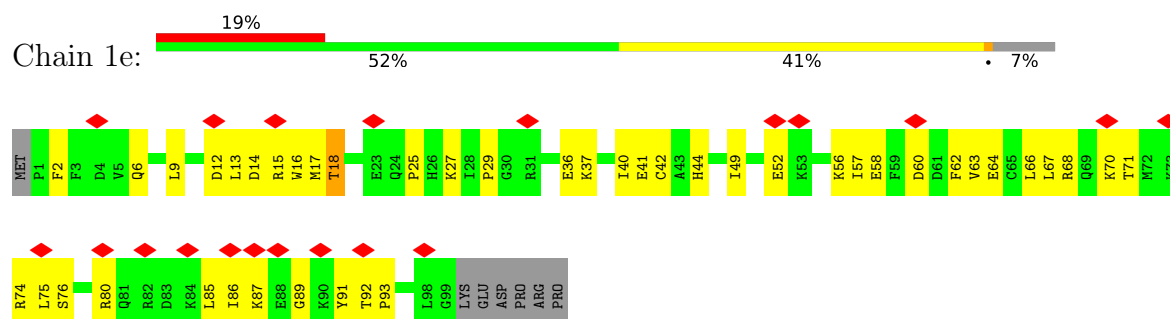
- Molecule 28: NADH dehydrogenase [ubiquinone] 1 subunit C1, mitochondrial



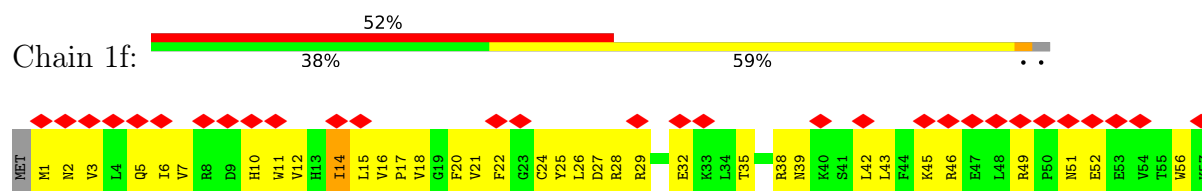
- Molecule 29: NADH dehydrogenase [ubiquinone] 1 subunit C2



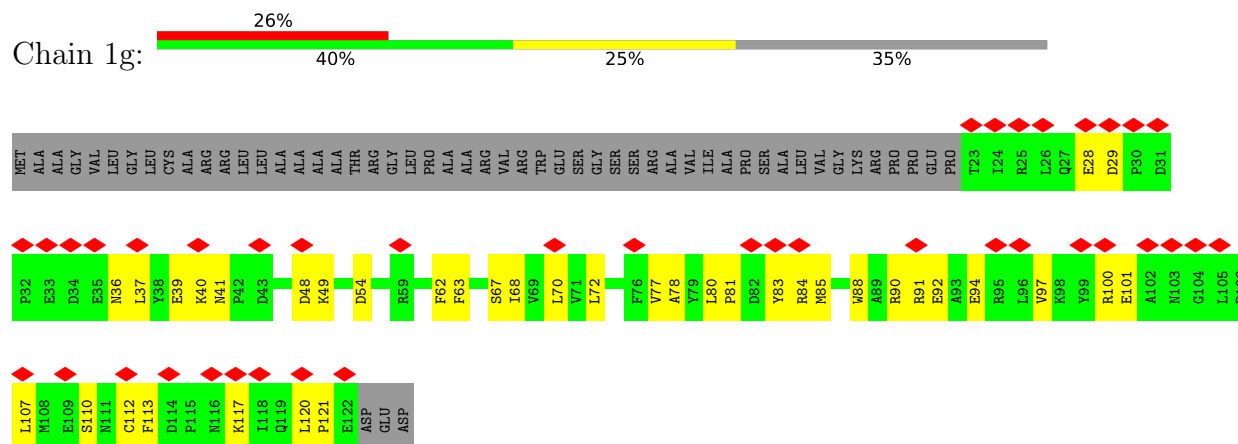
- Molecule 30: NADH dehydrogenase [ubiquinone] iron-sulfur protein 5



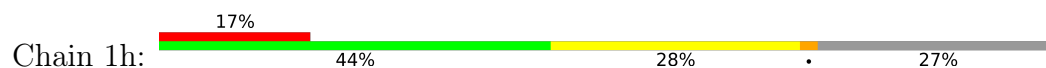
- Molecule 31: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 1

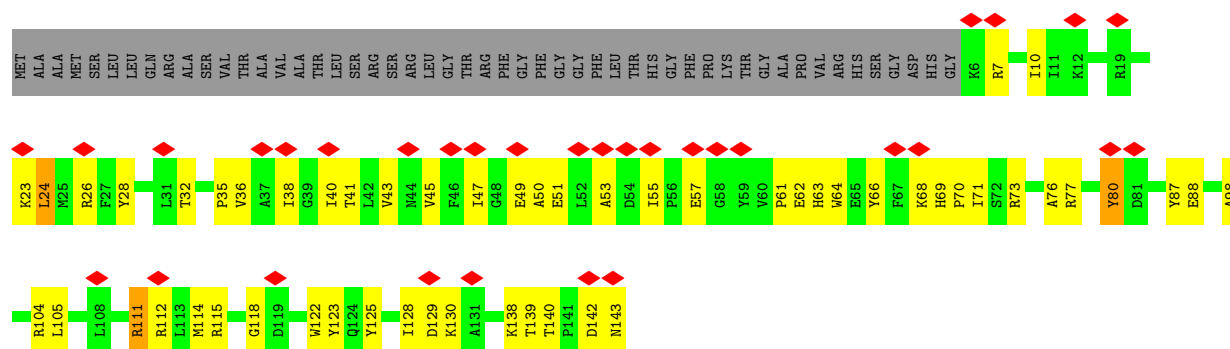


- Molecule 32: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 11, mitochondrial

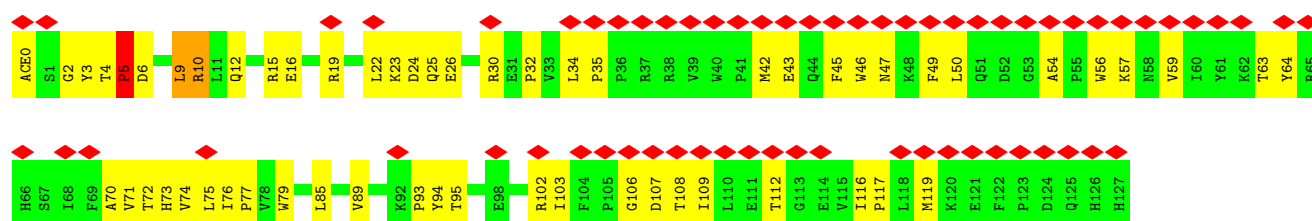


- Molecule 33: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 5, mitochondrial

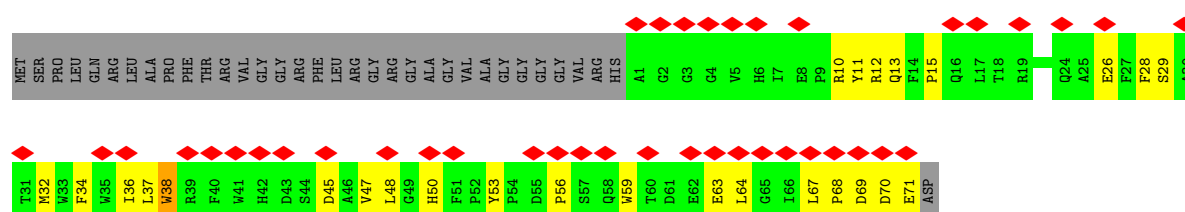
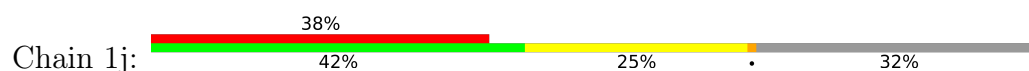




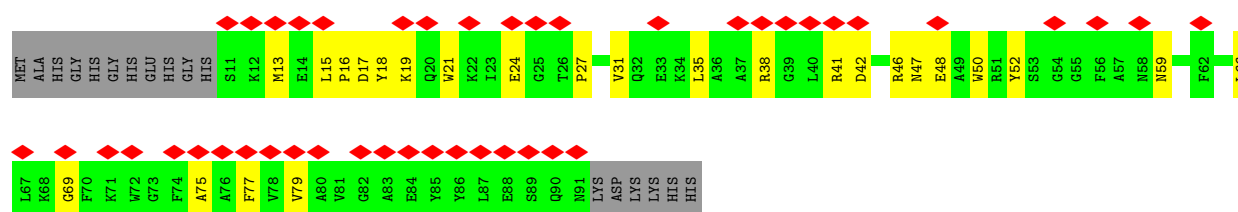
• Molecule 34: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 6



• Molecule 35: NADH:ubiquinone oxidoreductase subunit B2

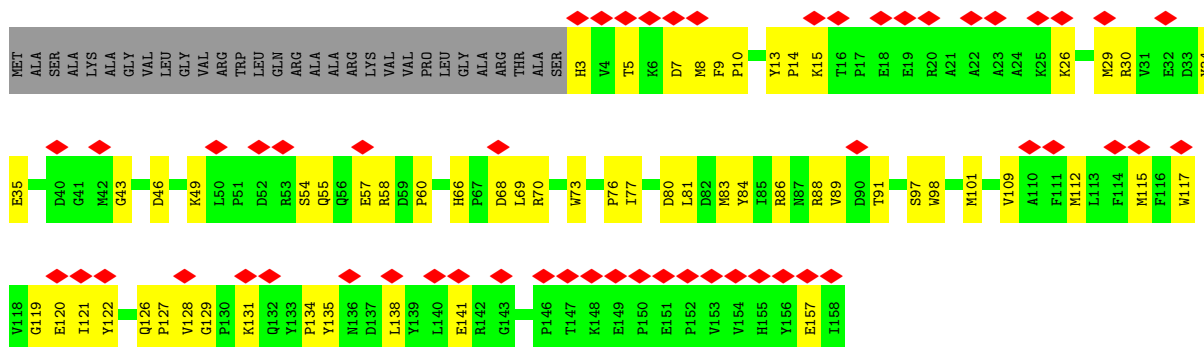


• Molecule 36: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 3

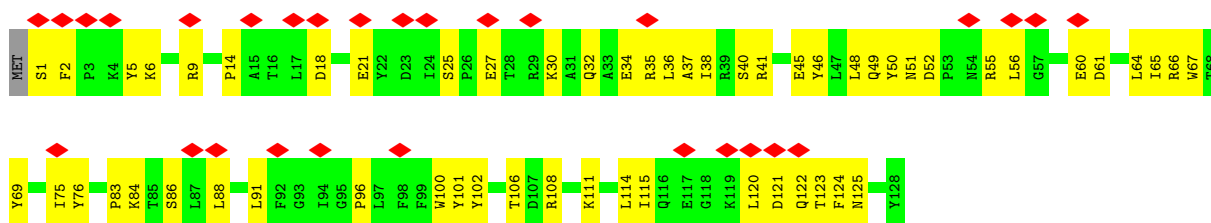


• Molecule 37: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial

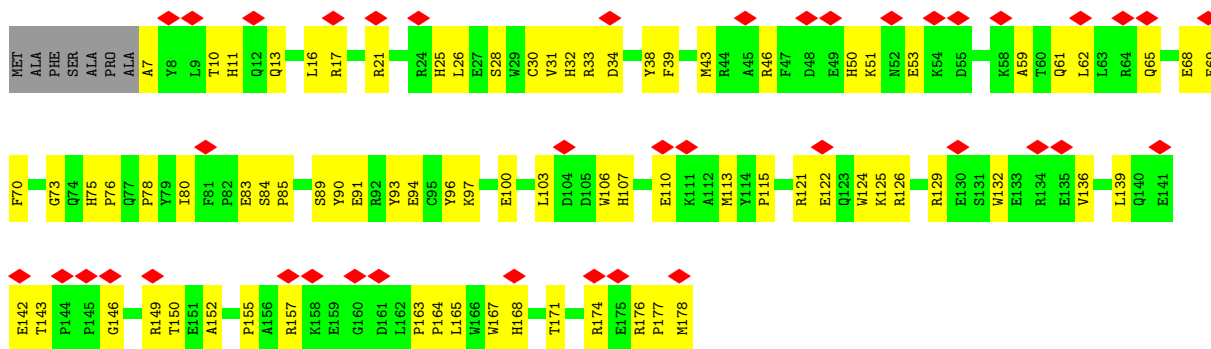




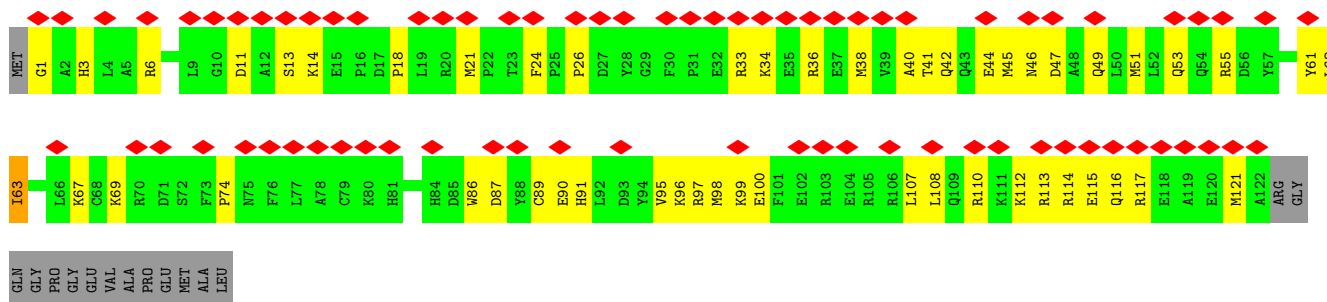
• Molecule 38: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 4



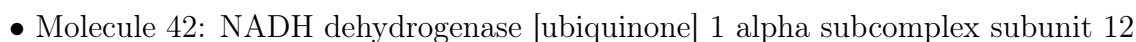
• Molecule 39: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 9



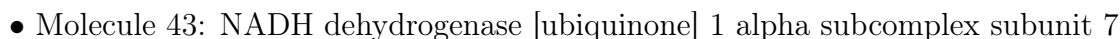
• Molecule 40: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 7



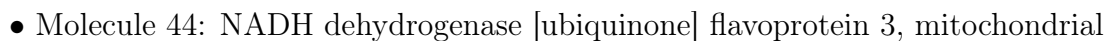
- Chain 1p:



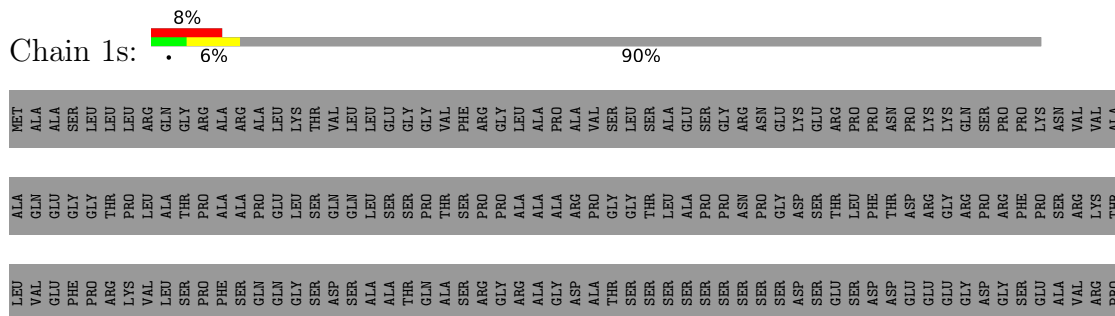
Chain 1q:



Chain 1r:



Chain 1s:



[illegible]

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	30000	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1300	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.782	Depositor
Minimum map value	-0.197	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.018	Depositor
Recommended contour level	0.12	Depositor
Map size (Å)	426.00003, 426.00003, 426.00003	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.065, 1.065, 1.065	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SF4, FES, NDP, EHZ, FMN, MG, PC1, 3PE, CDL, ZN, K, GTP, MYR, ACE

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	1A	0.17	0/938	0.47	0/1281
2	1B	0.16	0/1273	0.39	0/1722
3	1C	0.15	0/1797	0.42	0/2447
4	1D	0.15	0/3545	0.41	0/4806
5	1E	0.16	0/1698	0.44	0/2311
6	1F	0.13	0/3401	0.37	0/4595
7	1G	0.12	0/5451	0.37	0/7387
8	1H	0.17	0/2566	0.45	0/3509
9	1I	0.18	0/1443	0.49	0/1952
10	1J	0.16	0/1357	0.44	0/1840
11	1K	0.19	0/751	0.56	0/1018
12	1L	0.16	0/4939	0.44	0/6718
13	1M	0.15	0/3713	0.40	0/5063
14	1N	0.17	0/2765	0.45	0/3758
15	1O	0.12	0/2650	0.33	0/3588
16	1P	0.12	0/2828	0.33	0/3834
17	1Q	0.17	0/1070	0.44	1/1446 (0.1%)
18	1R	0.15	0/755	0.40	0/1018
19	1S	0.18	0/711	0.50	0/956
20	1T	0.17	0/701	0.51	0/946
20	1U	0.18	0/706	0.53	1/954 (0.1%)
21	1V	0.17	0/946	0.48	0/1281
22	1W	0.27	0/995	0.52	0/1340
23	1X	0.14	0/1436	0.44	0/1938
24	1Y	0.09	0/1037	0.28	0/1404
25	1Z	0.16	0/1199	0.39	0/1617
26	1a	0.15	0/577	0.48	1/777 (0.1%)
27	1b	0.15	0/664	0.40	0/912
28	1c	0.17	0/430	0.55	0/581
29	1d	0.22	0/1016	0.43	0/1374
30	1e	0.17	0/836	0.50	0/1118
31	1f	0.17	0/499	0.55	1/673 (0.1%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
32	1g	0.17	0/858	0.50	0/1165
33	1h	0.27	0/1184	0.54	0/1603
34	1i	0.24	0/1138	0.54	1/1551 (0.1%)
35	1j	0.18	0/627	0.49	0/858
36	1k	0.15	0/668	0.42	0/903
37	1l	0.12	0/1365	0.41	0/1867
38	1m	0.14	0/1092	0.37	0/1481
39	1n	0.14	0/1549	0.39	0/2098
40	1o	0.15	0/1069	0.39	0/1430
41	1p	0.11	0/1481	0.34	0/1997
42	1q	0.14	0/1253	0.36	0/1704
43	1r	0.15	0/777	0.40	0/1051
44	1s	0.21	0/394	0.57	0/533
All	All	0.16	0/68148	0.43	5/92405 (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
7	1G	0	1
8	1H	0	1
21	1V	0	1
29	1d	0	1
33	1h	0	1
34	1i	0	1
All	All	0	6

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
26	1a	57	VAL	N-CA-C	-7.34	106.16	113.20
17	1Q	113	PRO	CA-N-CD	-6.79	102.50	112.00
20	1U	46	ASP	N-CA-C	-5.92	107.29	114.75
34	1i	5	PRO	N-CA-CB	-5.42	97.55	103.25
31	1f	14	ILE	N-CA-C	-5.32	107.65	112.12

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
7	1G	649	SER	Peptide
8	1H	91	MET	Peptide
21	1V	113	TRP	Peptide
29	1d	86	ARG	Sidechain
33	1h	111	ARG	Sidechain

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	1A	914	0	951	66	0
2	1B	1242	0	1249	89	0
3	1C	1746	0	1697	91	0
4	1D	3452	0	3389	204	0
5	1E	1658	0	1664	90	0
6	1F	3325	0	3288	168	0
7	1G	5362	0	5387	228	0
8	1H	2494	0	2591	203	0
9	1I	1412	0	1366	93	0
10	1J	1322	0	1319	96	0
11	1K	740	0	788	67	0
12	1L	4808	0	4945	269	0
13	1M	3622	0	3825	216	0
14	1N	2702	0	2862	162	0
15	1O	2590	0	2556	83	0
16	1P	2751	0	2776	109	0
17	1Q	1047	0	1042	55	0
18	1R	741	0	704	29	0
19	1S	700	0	719	44	0
20	1T	689	0	687	28	0
20	1U	694	0	691	41	0
21	1V	927	0	972	38	0
22	1W	971	0	975	64	0
23	1X	1398	0	1378	53	0
24	1Y	1016	0	1020	36	0
25	1Z	1168	0	1161	49	0
26	1a	562	0	557	29	0
27	1b	643	0	645	28	0
28	1c	417	0	425	17	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
29	1d	985	0	978	44	0
30	1e	816	0	823	50	0
31	1f	487	0	497	35	0
32	1g	835	0	795	45	0
33	1h	1151	0	1164	53	0
34	1i	1100	0	1107	54	0
35	1j	601	0	546	33	0
36	1k	649	0	626	28	0
37	1l	1310	0	1204	64	0
38	1m	1062	0	1075	54	0
39	1n	1495	0	1434	70	0
40	1o	1045	0	1018	55	0
41	1p	1449	0	1416	66	0
42	1q	1212	0	1174	50	0
43	1r	759	0	783	42	0
44	1s	382	0	351	30	0
45	1A	31	0	36	2	0
45	1D	46	0	66	4	0
45	1L	88	0	127	3	0
45	1M	76	0	100	4	0
45	1Y	106	0	137	11	0
45	1f	51	0	82	2	0
46	1A	27	0	28	1	0
46	1B	82	0	112	2	0
46	1H	54	0	88	3	0
46	1I	44	0	62	6	0
46	1J	32	0	38	2	0
46	1L	38	0	53	4	0
46	1M	35	0	44	1	0
46	1Y	46	0	66	2	0
46	1Z	34	0	42	5	0
46	1d	39	0	52	9	0
46	1f	34	0	40	3	0
46	1h	47	0	71	2	0
47	1B	8	0	0	1	0
47	1F	8	0	0	1	0
47	1G	16	0	0	2	0
47	1I	16	0	0	3	0
48	1E	4	0	0	2	0
48	1G	4	0	0	3	0
49	1F	31	0	19	2	0
50	1G	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
51	1H	51	0	46	4	0
51	1L	76	0	99	3	0
51	1N	132	0	155	8	0
51	1X	86	0	125	12	0
51	1a	61	0	66	4	0
52	1O	32	0	12	2	0
53	1O	1	0	0	0	0
54	1P	48	0	26	8	0
55	1R	1	0	0	0	0
56	1W	37	0	0	0	0
56	1n	37	0	0	2	0
57	1l	15	0	27	2	0
All	All	68026	0	68439	2958	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 22.

The worst 5 of 2958 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:1M:424:ASN:HD21	38:1m:56:LEU:HA	1.32	0.93
12:1L:151:SER:HB2	12:1L:252:MET:HE1	1.51	0.92
40:1o:113:ARG:HA	40:1o:116:GLN:HE21	1.37	0.89
10:1J:119:PHE:HB2	11:1K:6:MET:HE2	1.53	0.89
20:1T:52:MET:HE1	22:1W:37:ARG:HA	1.55	0.88

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	1A	113/115 (98%)	106 (94%)	6 (5%)	1 (1%)	14	45
2	1B	153/258 (59%)	145 (95%)	8 (5%)	0	100	100
3	1C	207/264 (78%)	191 (92%)	15 (7%)	1 (0%)	24	57
4	1D	427/430 (99%)	406 (95%)	21 (5%)	0	100	100
5	1E	212/249 (85%)	184 (87%)	27 (13%)	1 (0%)	24	57
6	1F	430/464 (93%)	408 (95%)	21 (5%)	1 (0%)	43	73
7	1G	697/727 (96%)	648 (93%)	47 (7%)	2 (0%)	36	67
8	1H	315/318 (99%)	297 (94%)	17 (5%)	1 (0%)	36	67
9	1I	174/239 (73%)	159 (91%)	15 (9%)	0	100	100
10	1J	171/175 (98%)	159 (93%)	9 (5%)	3 (2%)	6	33
11	1K	95/98 (97%)	88 (93%)	7 (7%)	0	100	100
12	1L	603/606 (100%)	554 (92%)	48 (8%)	1 (0%)	43	73
13	1M	456/459 (99%)	432 (95%)	24 (5%)	0	100	100
14	1N	344/347 (99%)	321 (93%)	23 (7%)	0	100	100
15	1O	318/357 (89%)	305 (96%)	13 (4%)	0	100	100
16	1P	340/377 (90%)	326 (96%)	14 (4%)	0	100	100
17	1Q	127/175 (73%)	118 (93%)	9 (7%)	0	100	100
18	1R	94/123 (76%)	90 (96%)	4 (4%)	0	100	100
19	1S	85/99 (86%)	83 (98%)	2 (2%)	0	100	100
20	1T	83/156 (53%)	78 (94%)	5 (6%)	0	100	100
20	1U	84/156 (54%)	77 (92%)	7 (8%)	0	100	100
21	1V	113/116 (97%)	100 (88%)	12 (11%)	1 (1%)	14	45
22	1W	113/128 (88%)	106 (94%)	6 (5%)	1 (1%)	14	45
23	1X	169/172 (98%)	160 (95%)	9 (5%)	0	100	100
24	1Y	137/141 (97%)	133 (97%)	3 (2%)	1 (1%)	18	51
25	1Z	139/144 (96%)	134 (96%)	5 (4%)	0	100	100
26	1a	68/70 (97%)	67 (98%)	1 (2%)	0	100	100
27	1b	81/84 (96%)	74 (91%)	7 (9%)	0	100	100
28	1c	47/76 (62%)	44 (94%)	3 (6%)	0	100	100
29	1d	117/122 (96%)	107 (92%)	9 (8%)	1 (1%)	14	45
30	1e	97/106 (92%)	84 (87%)	12 (12%)	1 (1%)	12	43
31	1f	55/58 (95%)	49 (89%)	6 (11%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
32	1g	98/154 (64%)	84 (86%)	14 (14%)	0	100	100
33	1h	136/189 (72%)	131 (96%)	5 (4%)	0	100	100
34	1i	126/128 (98%)	118 (94%)	7 (6%)	1 (1%)	16	48
35	1j	69/105 (66%)	63 (91%)	6 (9%)	0	100	100
36	1k	79/98 (81%)	73 (92%)	6 (8%)	0	100	100
37	1l	154/186 (83%)	141 (92%)	13 (8%)	0	100	100
38	1m	126/129 (98%)	119 (94%)	7 (6%)	0	100	100
39	1n	170/179 (95%)	160 (94%)	9 (5%)	1 (1%)	21	54
40	1o	120/137 (88%)	113 (94%)	7 (6%)	0	100	100
41	1p	171/176 (97%)	164 (96%)	7 (4%)	0	100	100
42	1q	143/145 (99%)	136 (95%)	7 (5%)	0	100	100
43	1r	90/112 (80%)	84 (93%)	6 (7%)	0	100	100
44	1s	43/471 (9%)	42 (98%)	1 (2%)	0	100	100
All	All	8189/9618 (85%)	7661 (94%)	510 (6%)	18 (0%)	44	73

5 of 18 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	1A	46	SER
3	1C	89	ARG
7	1G	499	GLN
8	1H	208	VAL
10	1J	4	TYR

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	1A	100/100 (100%)	99 (99%)	1 (1%)	68	74
2	1B	131/212 (62%)	129 (98%)	2 (2%)	57	69
3	1C	191/228 (84%)	188 (98%)	3 (2%)	55	68

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	1D	371/371 (100%)	371 (100%)	0	100	100
5	1E	183/207 (88%)	183 (100%)	0	100	100
6	1F	346/368 (94%)	346 (100%)	0	100	100
7	1G	588/610 (96%)	586 (100%)	2 (0%)	86	84
8	1H	274/275 (100%)	270 (98%)	4 (2%)	57	69
9	1I	151/201 (75%)	151 (100%)	0	100	100
10	1J	139/141 (99%)	139 (100%)	0	100	100
11	1K	84/85 (99%)	82 (98%)	2 (2%)	43	62
12	1L	539/540 (100%)	535 (99%)	4 (1%)	76	77
13	1M	408/409 (100%)	405 (99%)	3 (1%)	76	77
14	1N	310/311 (100%)	308 (99%)	2 (1%)	78	79
15	1O	283/307 (92%)	283 (100%)	0	100	100
16	1P	296/323 (92%)	294 (99%)	2 (1%)	76	77
17	1Q	117/152 (77%)	117 (100%)	0	100	100
18	1R	79/97 (81%)	78 (99%)	1 (1%)	61	71
19	1S	77/82 (94%)	77 (100%)	0	100	100
20	1T	79/133 (59%)	79 (100%)	0	100	100
20	1U	79/133 (59%)	78 (99%)	1 (1%)	61	71
21	1V	100/101 (99%)	99 (99%)	1 (1%)	68	74
22	1W	107/112 (96%)	105 (98%)	2 (2%)	50	66
23	1X	153/154 (99%)	153 (100%)	0	100	100
24	1Y	101/102 (99%)	100 (99%)	1 (1%)	68	74
25	1Z	123/124 (99%)	122 (99%)	1 (1%)	73	76
26	1a	58/58 (100%)	58 (100%)	0	100	100
27	1b	69/70 (99%)	69 (100%)	0	100	100
28	1c	45/66 (68%)	45 (100%)	0	100	100
29	1d	106/109 (97%)	103 (97%)	3 (3%)	38	58
30	1e	87/94 (93%)	87 (100%)	0	100	100
31	1f	54/55 (98%)	53 (98%)	1 (2%)	50	66
32	1g	92/129 (71%)	91 (99%)	1 (1%)	65	73
33	1h	121/158 (77%)	119 (98%)	2 (2%)	53	67

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
34	1i	120/120 (100%)	118 (98%)	2 (2%)	53	67
35	1j	62/84 (74%)	61 (98%)	1 (2%)	55	68
36	1k	63/76 (83%)	63 (100%)	0	100	100
37	1l	141/161 (88%)	141 (100%)	0	100	100
38	1m	113/114 (99%)	113 (100%)	0	100	100
39	1n	156/160 (98%)	156 (100%)	0	100	100
40	1o	110/120 (92%)	109 (99%)	1 (1%)	70	74
41	1p	154/156 (99%)	154 (100%)	0	100	100
42	1q	131/131 (100%)	130 (99%)	1 (1%)	73	76
43	1r	85/97 (88%)	84 (99%)	1 (1%)	63	72
44	1s	44/351 (12%)	44 (100%)	0	100	100
All	All	7220/8187 (88%)	7175 (99%)	45 (1%)	76	79

5 of 45 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
22	1W	18	LYS
31	1f	51	ASN
22	1W	72	HIS
29	1d	2	MET
33	1h	24	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 84 such sidechains are listed below:

Mol	Chain	Res	Type
29	1d	79	GLN
37	1l	87	ASN
32	1g	57	ASN
34	1i	13	GLN
41	1p	133	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 46 ligands modelled in this entry, 3 are monoatomic - leaving 43 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	$\# Z > 2$
45	3PE	1Y	802	-	39,39,50	0.30	0	42,44,55	0.37	0
46	PC1	1L	703	-	37,37,53	0.29	0	43,45,61	0.32	0
52	GTP	1O	401	53	33,34,34	0.60	0	50,54,54	0.61	0
45	3PE	1L	704	-	41,41,50	0.30	0	44,46,55	0.36	0
45	3PE	1f	102	-	50,50,50	0.29	0	53,55,55	0.99	3 (5%)
48	FES	1E	301	5	0,4,4	-	-	-		
45	3PE	1M	501	-	37,37,50	0.31	0	40,42,55	0.46	0
51	CDL	1X	201	-	85,85,99	0.29	0	91,97,111	0.33	0
46	PC1	1Y	803	-	45,45,53	0.28	0	51,53,61	0.33	0
47	SF4	1I	202	9	0,12,12	-	-	-		
56	EHZ	1W	201	-	31,36,37	0.21	0	36,44,47	1.44	1 (2%)
46	PC1	1H	401	-	53,53,53	0.27	0	59,61,61	0.40	0
45	3PE	1M	503	-	37,37,50	0.30	0	40,42,55	0.39	0
46	PC1	1h	201	-	46,46,53	0.28	0	52,54,61	0.30	0
45	3PE	1Y	804	-	34,34,50	0.31	0	37,39,55	0.57	1 (2%)
51	CDL	1N	401	-	64,64,99	0.32	0	70,76,111	0.36	0
47	SF4	1F	502	6	0,12,12	-	-	-		
49	FMN	1F	501	-	33,33,33	0.59	0	48,50,50	0.65	1 (2%)
51	CDL	1H	402	-	50,50,99	0.36	0	56,62,111	0.54	1 (1%)
56	EHZ	1n	201	-	31,36,37	0.17	0	36,44,47	1.14	1 (2%)
47	SF4	1I	201	9	0,12,12	-	-	-		

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
45	3PE	1D	901	-	45,45,50	0.28	0	48,50,55	0.33	0
46	PC1	1B	202	-	33,33,53	0.32	0	39,41,61	0.33	0
46	PC1	1A	202	-	25,25,53	0.36	0	29,32,61	0.53	0
46	PC1	1J	201	-	31,31,53	0.33	0	37,39,61	0.35	0
46	PC1	1M	502	-	34,34,53	0.32	0	40,42,61	0.36	0
46	PC1	1I	203	-	43,43,53	0.30	0	49,51,61	0.43	0
47	SF4	1B	201	2	0,12,12	-	-	-		
51	CDL	1L	702	-	75,75,99	0.31	0	81,87,111	0.37	0
57	MYR	1l	201	-	13,14,15	0.30	0	12,13,15	0.32	0
47	SF4	1G	802	7	0,12,12	-	-	-		
45	3PE	1L	701	-	45,45,50	0.28	0	48,50,55	0.38	0
45	3PE	1Y	801	-	30,30,50	0.35	0	33,35,55	1.28	4 (12%)
46	PC1	1f	101	-	33,33,53	0.30	0	39,41,61	0.36	0
46	PC1	1B	203	-	47,47,53	0.27	0	53,55,61	0.37	0
51	CDL	1N	402	-	66,66,99	0.30	0	72,78,111	0.46	0
51	CDL	1a	101	-	60,60,99	0.33	0	66,72,111	0.43	0
45	3PE	1A	201	-	30,30,50	0.33	0	33,35,55	0.40	0
46	PC1	1d	201	-	38,38,53	0.31	0	44,46,61	0.44	0
54	NDP	1P	501	-	51,52,52	0.50	0	71,80,80	0.78	1 (1%)
47	SF4	1G	801	7	0,12,12	-	-	-		
48	FES	1G	803	7	0,4,4	-	-	-		
46	PC1	1Z	201	-	33,33,53	0.33	0	39,41,61	0.39	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
45	3PE	1Y	802	-	-	11/43/43/54	-
46	PC1	1L	703	-	-	4/40/40/57	-
52	GTP	1O	401	53	-	1/22/38/38	0/3/3/3
45	3PE	1L	704	-	-	2/45/45/54	-
45	3PE	1f	102	-	-	10/54/54/54	-
48	FES	1E	301	5	-	-	0/1/1/1
45	3PE	1M	501	-	-	6/41/41/54	-
51	CDL	1X	201	-	-	19/96/96/110	-
46	PC1	1Y	803	-	-	6/49/49/57	-
47	SF4	1I	202	9	-	-	0/6/5/5
56	EHZ	1W	201	-	-	13/42/44/45	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
46	PC1	1H	401	-	-	3/57/57/57	-
45	3PE	1M	503	-	-	8/41/41/54	-
46	PC1	1h	201	-	-	18/50/50/57	-
45	3PE	1Y	804	-	-	6/38/38/54	-
51	CDL	1N	401	-	-	11/75/75/110	-
47	SF4	1F	502	6	-	-	0/6/5/5
49	FMN	1F	501	-	-	0/18/18/18	0/3/3/3
51	CDL	1H	402	-	-	7/61/61/110	-
56	EHZ	1n	201	-	-	7/42/44/45	-
47	SF4	1I	201	9	-	-	0/6/5/5
45	3PE	1D	901	-	-	2/49/49/54	-
46	PC1	1B	202	-	-	9/37/37/57	-
46	PC1	1A	202	-	-	4/28/28/57	-
46	PC1	1J	201	-	-	5/35/35/57	-
46	PC1	1M	502	-	-	3/38/38/57	-
46	PC1	1I	203	-	-	7/47/47/57	-
47	SF4	1B	201	2	-	-	0/6/5/5
51	CDL	1L	702	-	-	10/86/86/110	-
57	MYR	1l	201	-	-	3/12/12/13	-
47	SF4	1G	802	7	-	-	0/6/5/5
45	3PE	1L	701	-	-	4/49/49/54	-
45	3PE	1Y	801	-	-	6/34/34/54	-
46	PC1	1f	101	-	-	10/36/36/57	-
46	PC1	1B	203	-	-	8/51/51/57	-
51	CDL	1N	402	-	-	6/76/76/110	-
51	CDL	1a	101	-	-	4/71/71/110	-
45	3PE	1A	201	-	-	3/34/34/54	-
46	PC1	1d	201	-	-	11/42/42/57	-
54	NDP	1P	501	-	-	9/34/77/77	0/5/5/5
47	SF4	1G	801	7	-	-	0/6/5/5
48	FES	1G	803	7	-	-	0/1/1/1
46	PC1	1Z	201	-	-	1/37/37/57	-

There are no bond length outliers.

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
56	1W	201	EHZ	C10-S1-C9	8.05	125.63	101.84
56	1n	201	EHZ	C10-S1-C9	6.33	120.56	101.84
45	1Y	801	3PE	O21-C21-C22	5.39	123.14	111.48
45	1f	102	3PE	O21-C21-C22	5.06	122.43	111.48
54	1P	501	NDP	P2B-O2B-C2B	-4.54	111.30	123.43

There are no chirality outliers.

5 of 237 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
45	1M	501	3PE	C1-O11-P-O14
45	1M	501	3PE	C12-C11-O13-P
45	1M	503	3PE	C1-O11-P-O13
45	1Y	801	3PE	C2-C1-O11-P
45	1Y	801	3PE	O32-C31-O31-C3

There are no ring outliers.

39 monomers are involved in 124 short contacts:

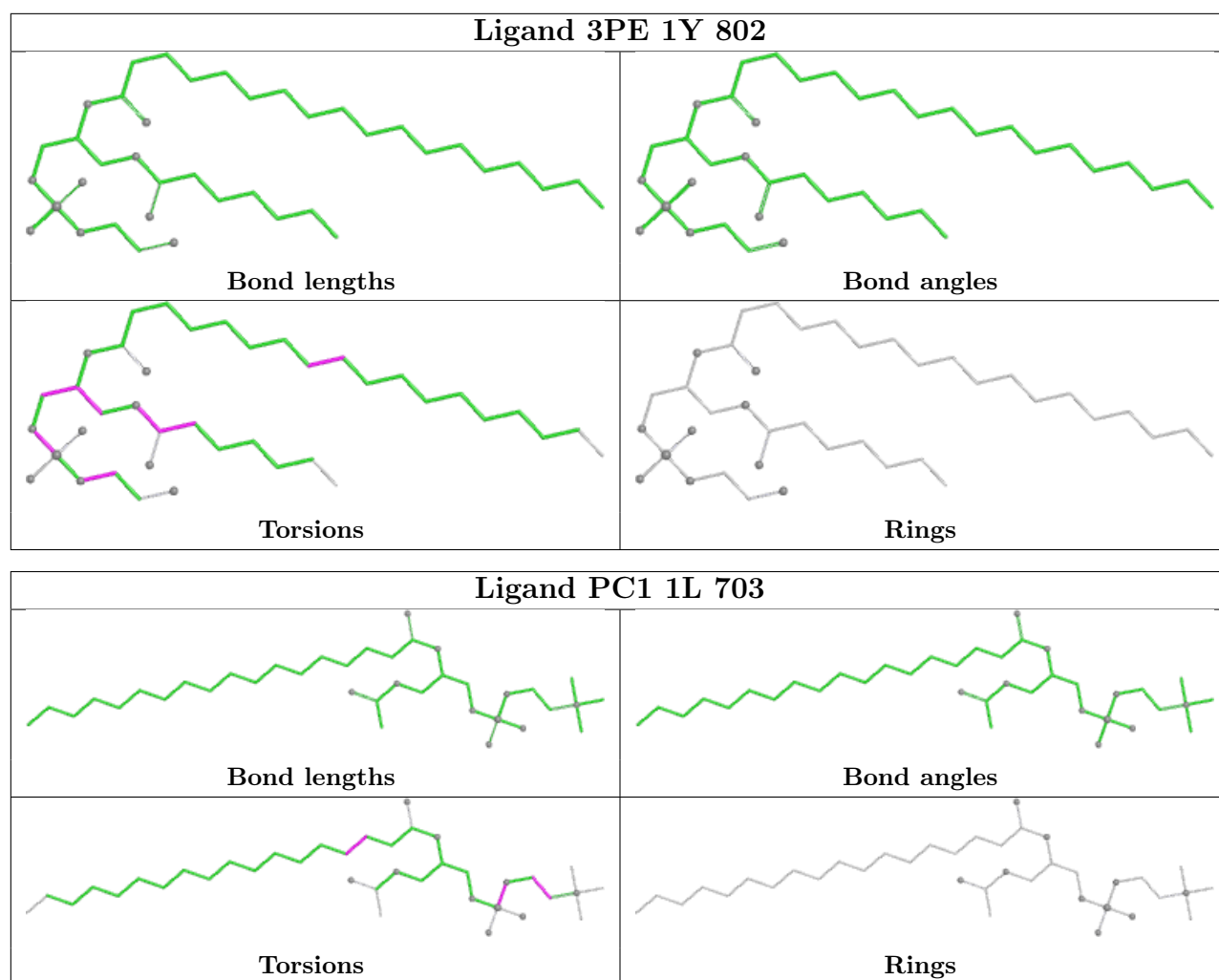
Mol	Chain	Res	Type	Clashes	Symm-Clashes
45	1Y	802	3PE	4	0
46	1L	703	PC1	4	0
52	1O	401	GTP	2	0
45	1L	704	3PE	1	0
45	1f	102	3PE	2	0
48	1E	301	FES	2	0
45	1M	501	3PE	1	0
51	1X	201	CDL	12	0
46	1Y	803	PC1	2	0
46	1H	401	PC1	3	0
45	1M	503	3PE	3	0
46	1h	201	PC1	2	0
45	1Y	804	3PE	4	0
51	1N	401	CDL	5	0
47	1F	502	SF4	1	0
49	1F	501	FMN	2	0
51	1H	402	CDL	4	0
56	1n	201	EHZ	2	0
47	1I	201	SF4	3	0
45	1D	901	3PE	4	0
46	1B	202	PC1	2	0
46	1A	202	PC1	1	0

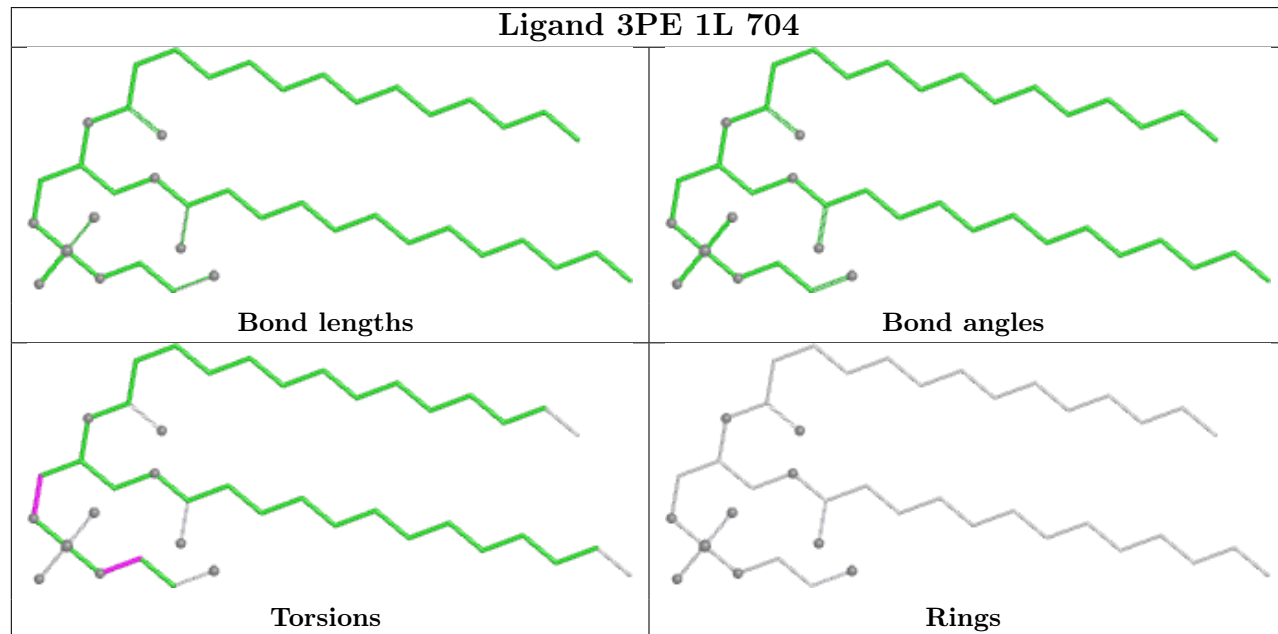
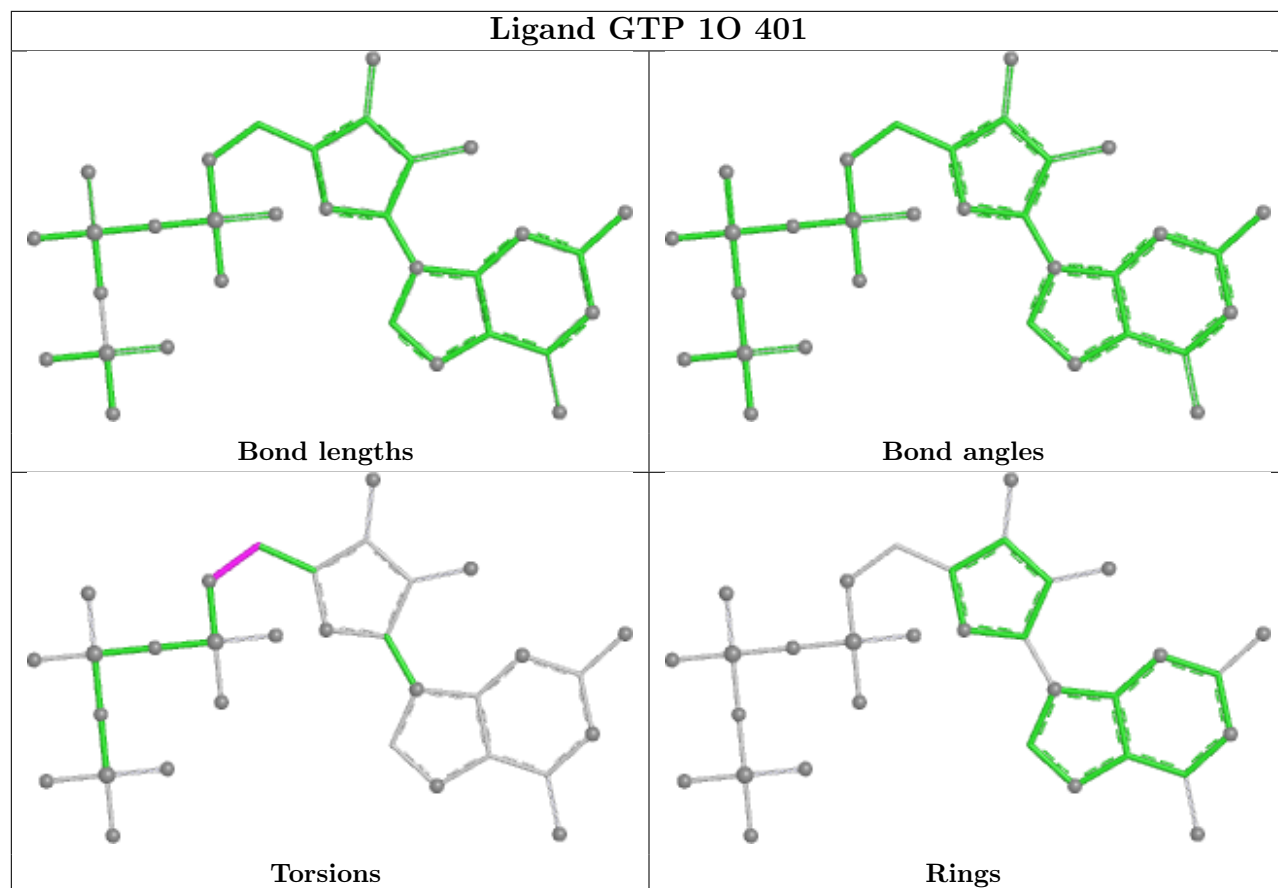
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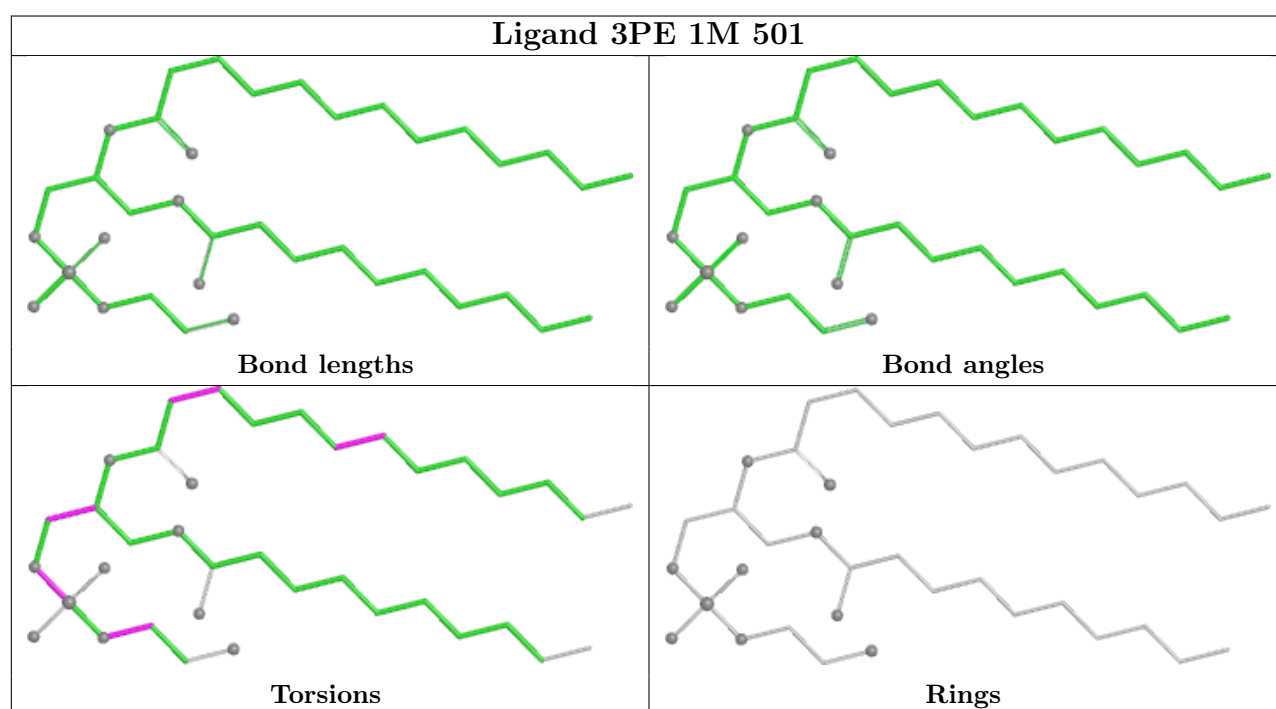
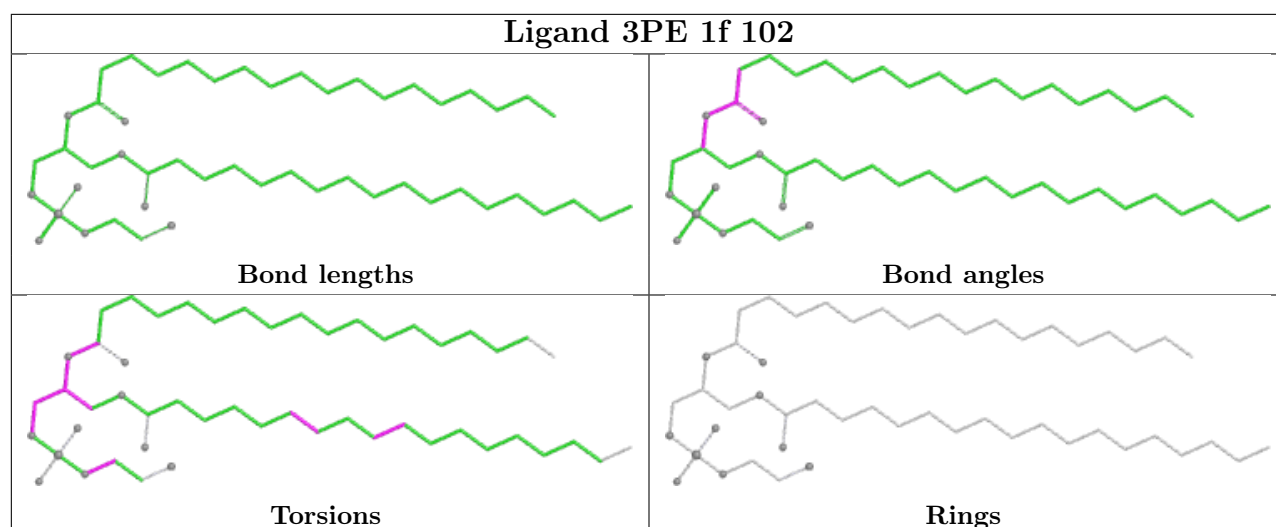
Continued from previous page...

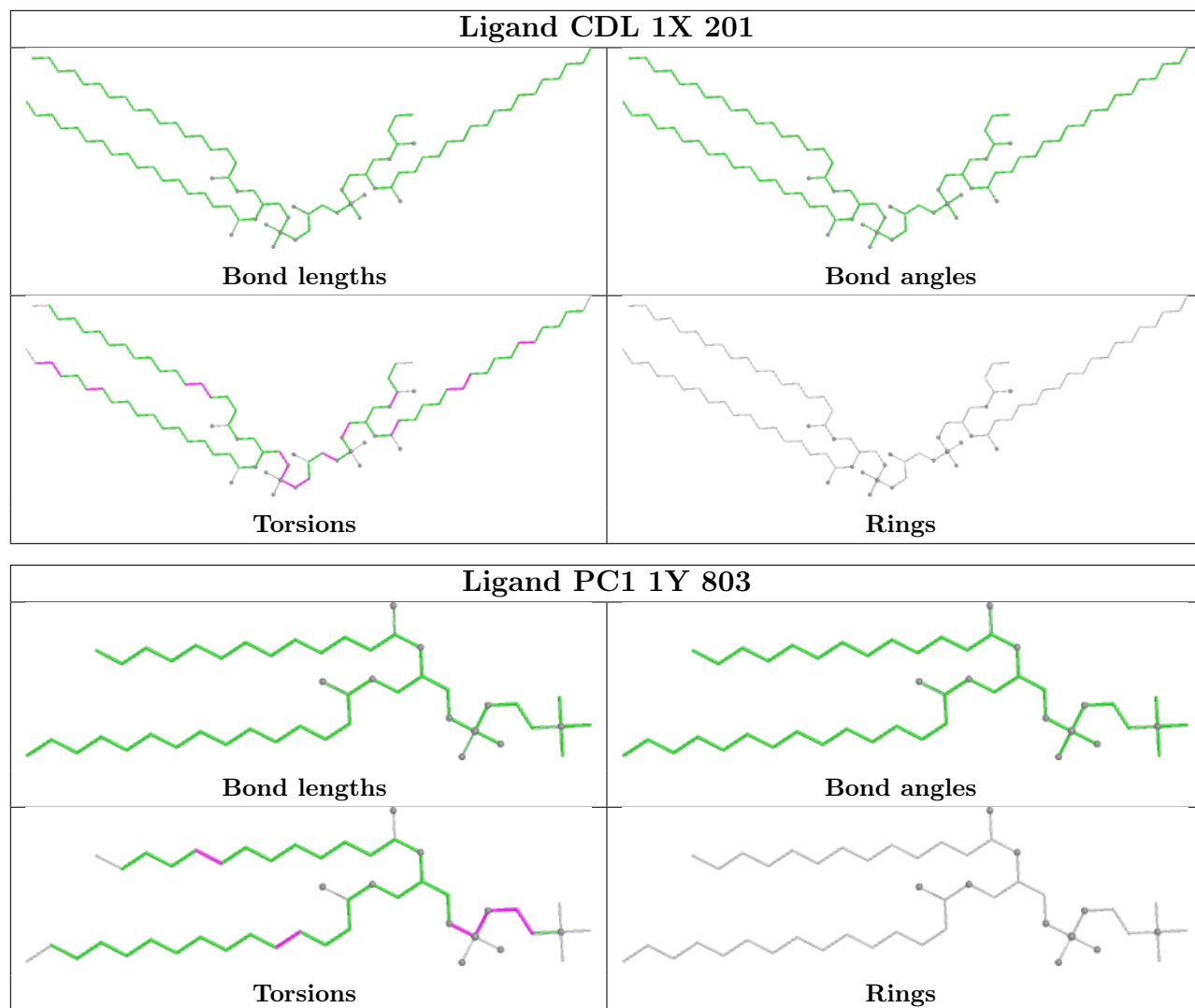
Mol	Chain	Res	Type	Clashes	Symm-Clashes
46	1J	201	PC1	2	0
46	1M	502	PC1	1	0
46	1I	203	PC1	6	0
47	1B	201	SF4	1	0
51	1L	702	CDL	3	0
57	1I	201	MYR	2	0
45	1L	701	3PE	2	0
45	1Y	801	3PE	4	0
46	1f	101	PC1	3	0
51	1N	402	CDL	3	0
51	1a	101	CDL	4	0
45	1A	201	3PE	2	0
46	1d	201	PC1	9	0
54	1P	501	NDP	8	0
47	1G	801	SF4	2	0
48	1G	803	FES	3	0
46	1Z	201	PC1	5	0

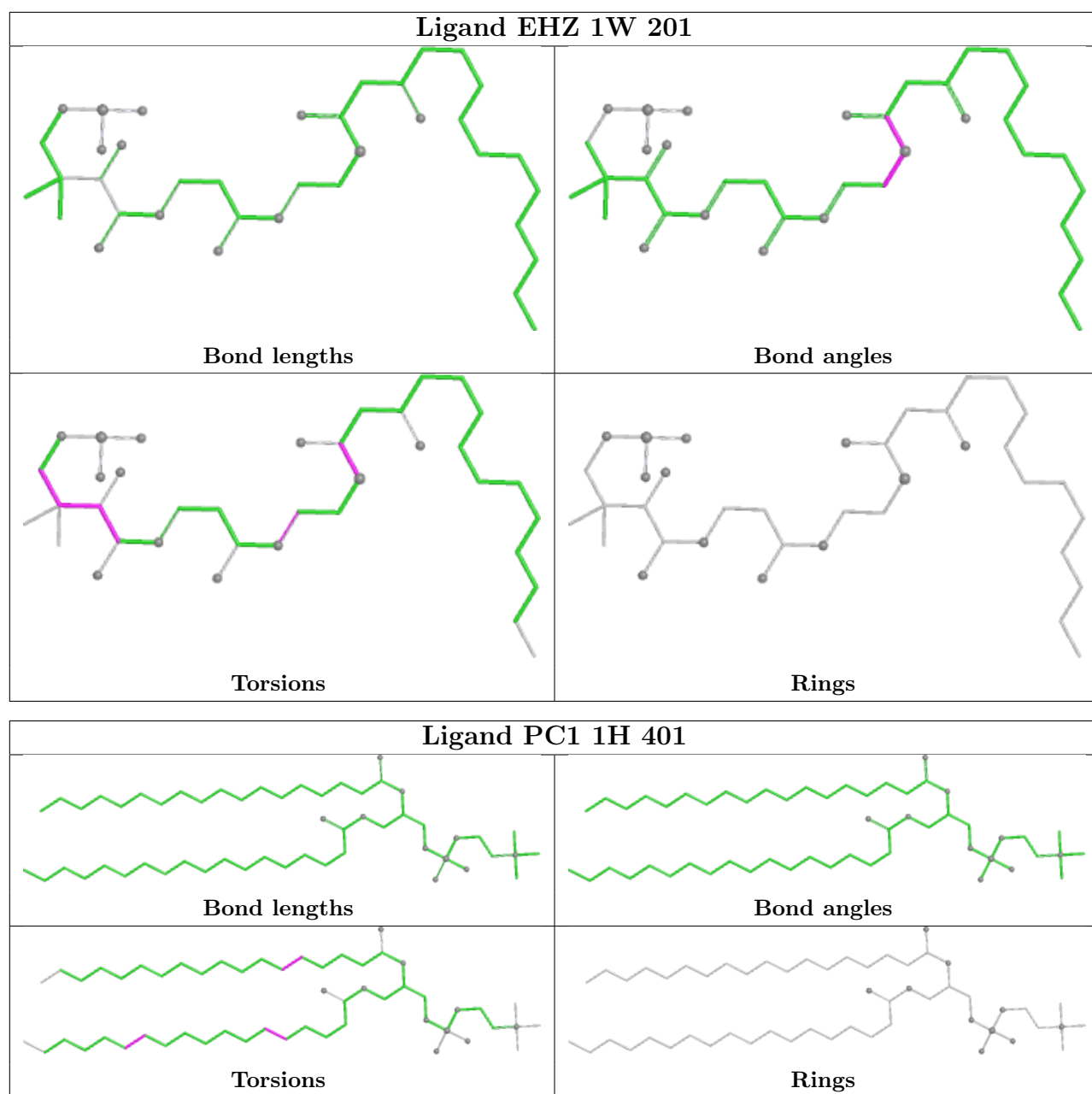
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

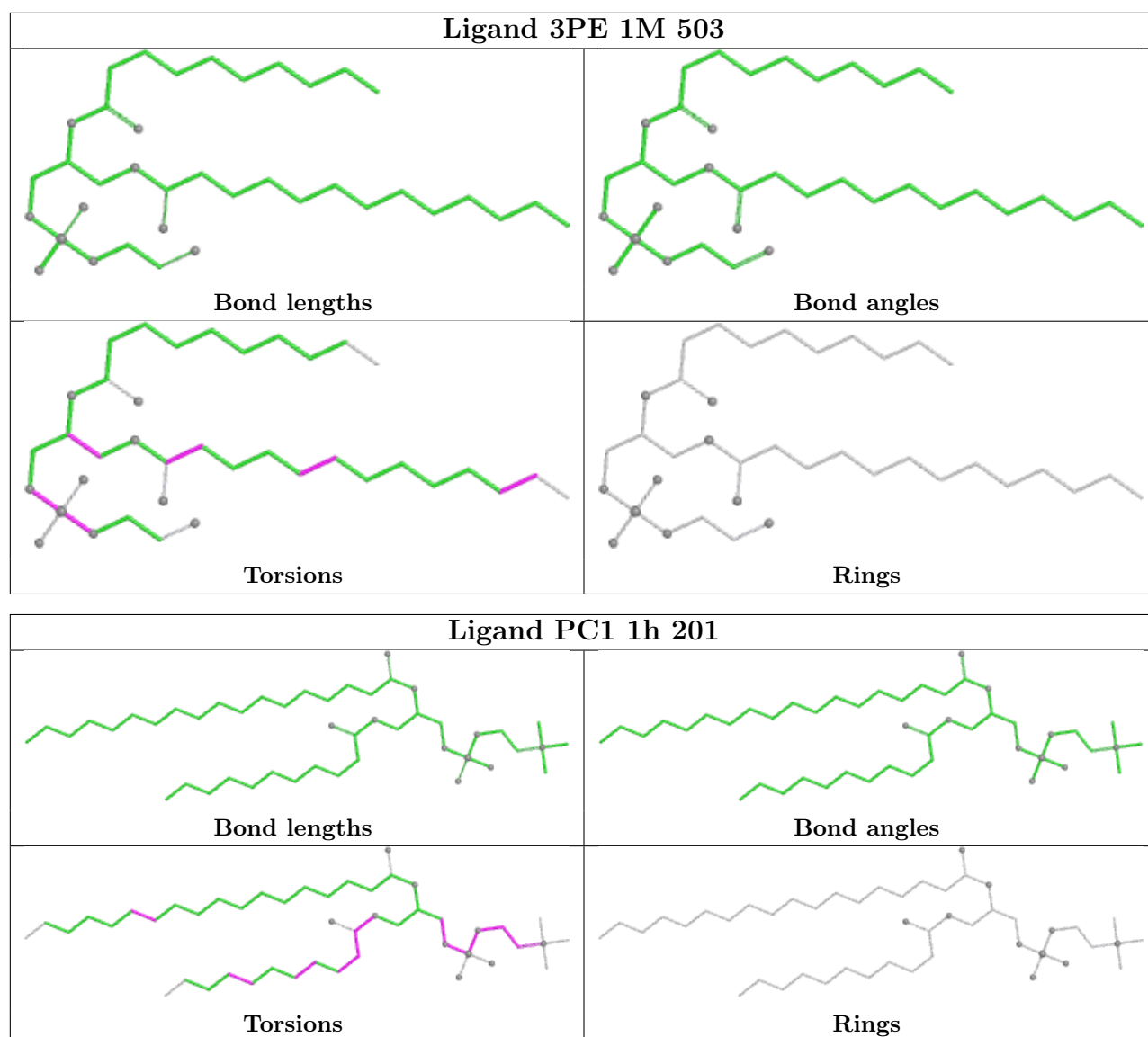


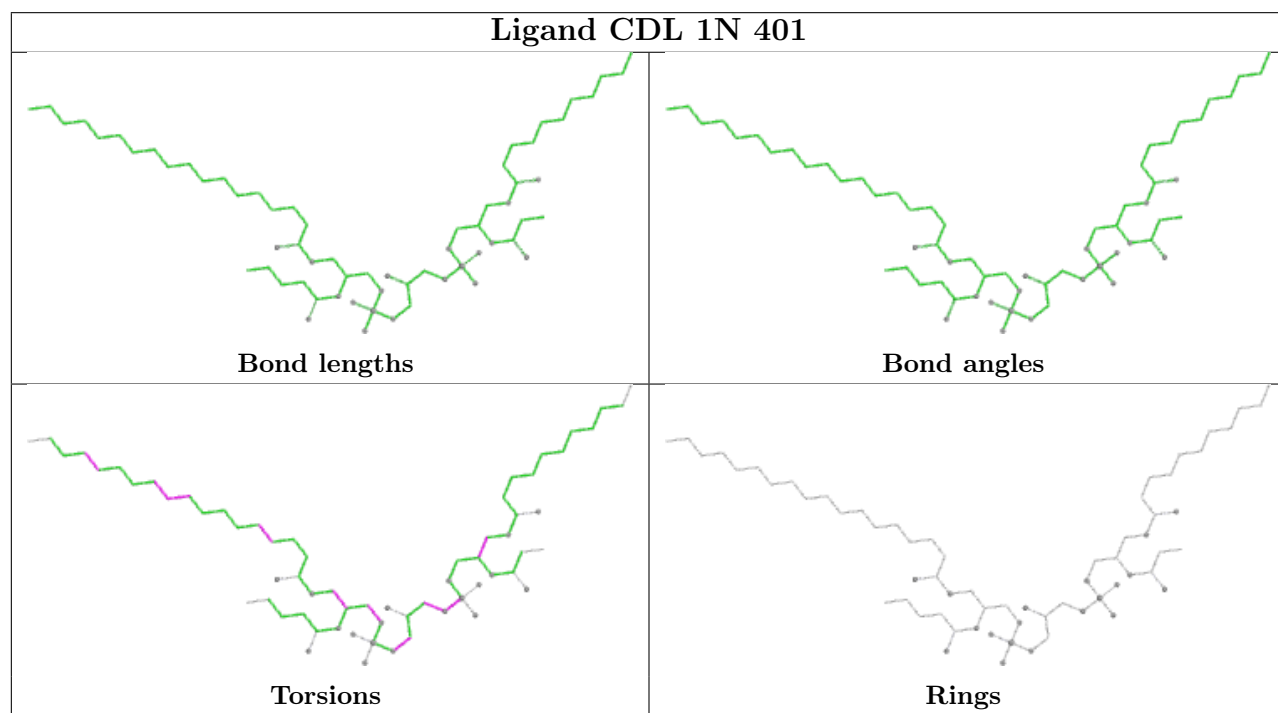
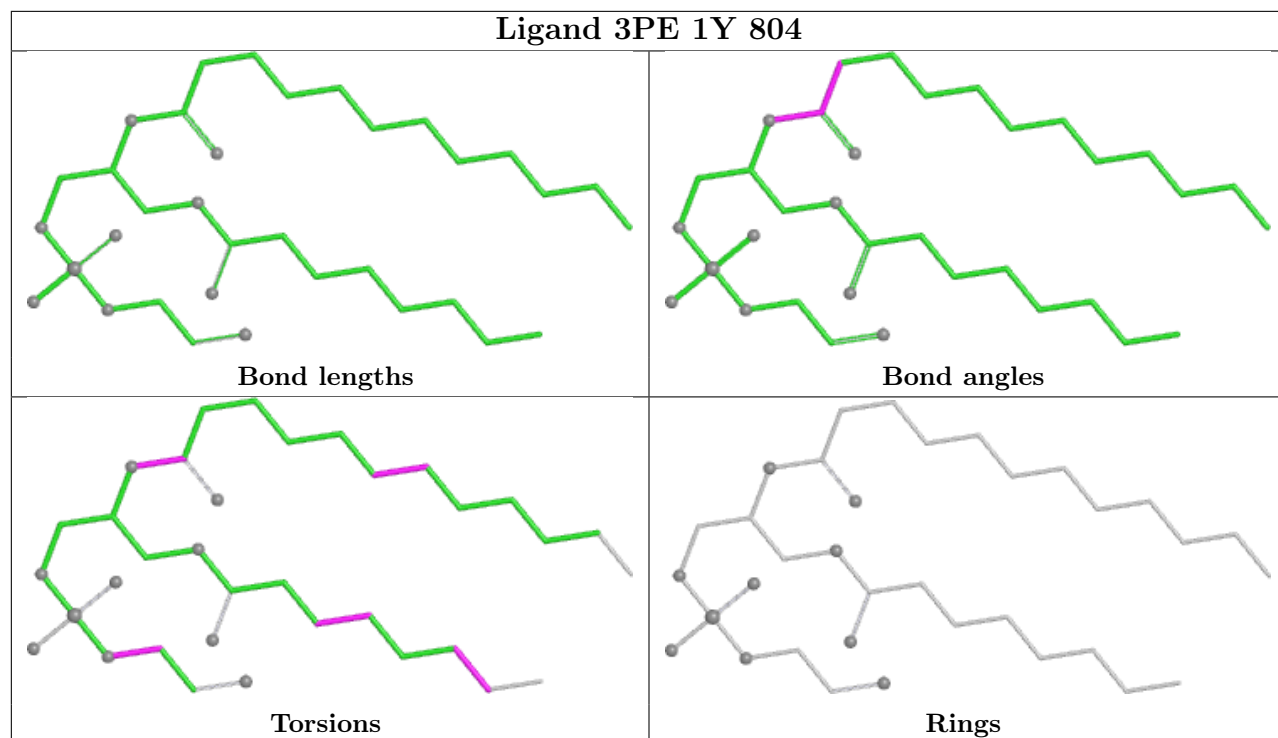




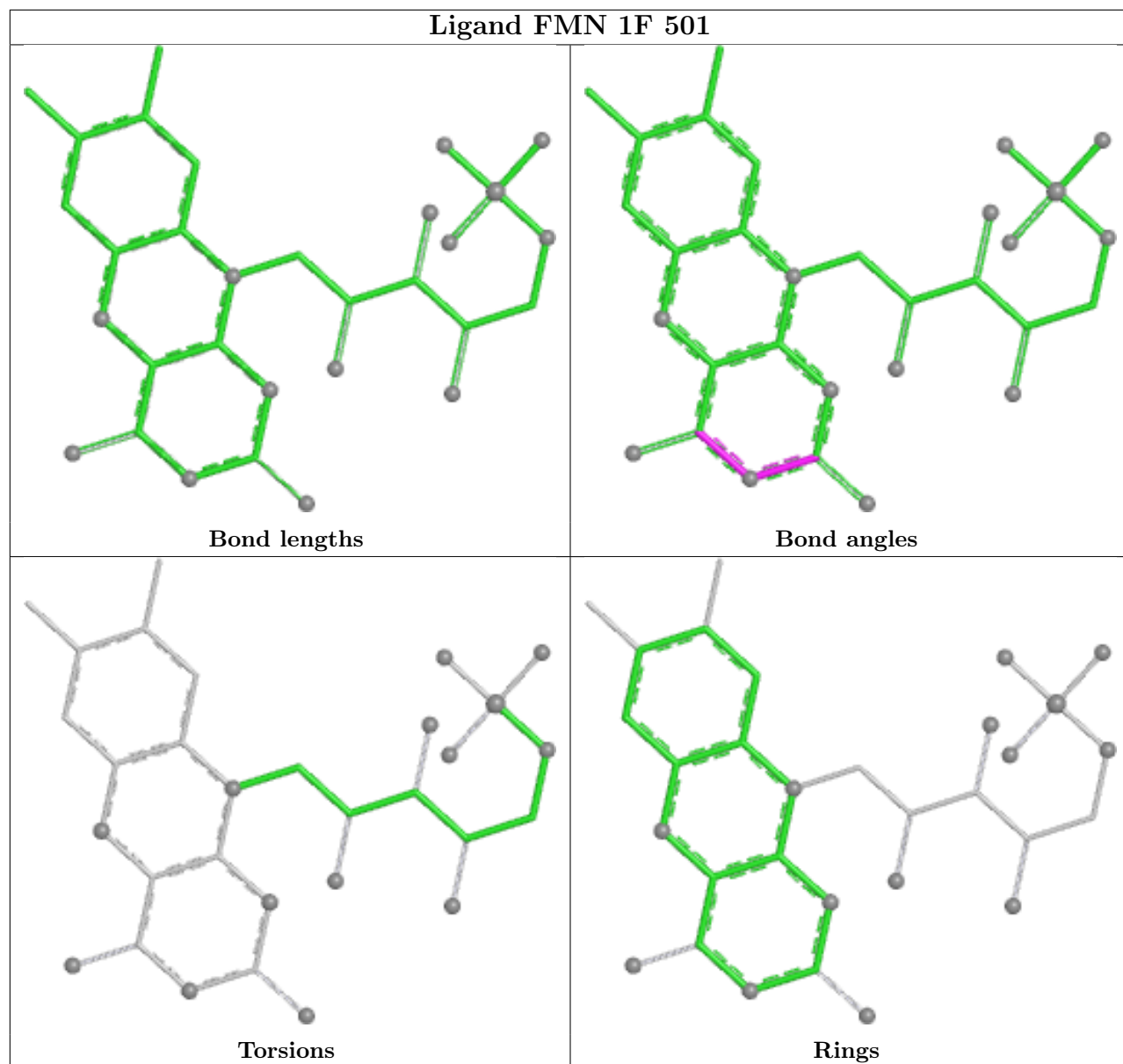


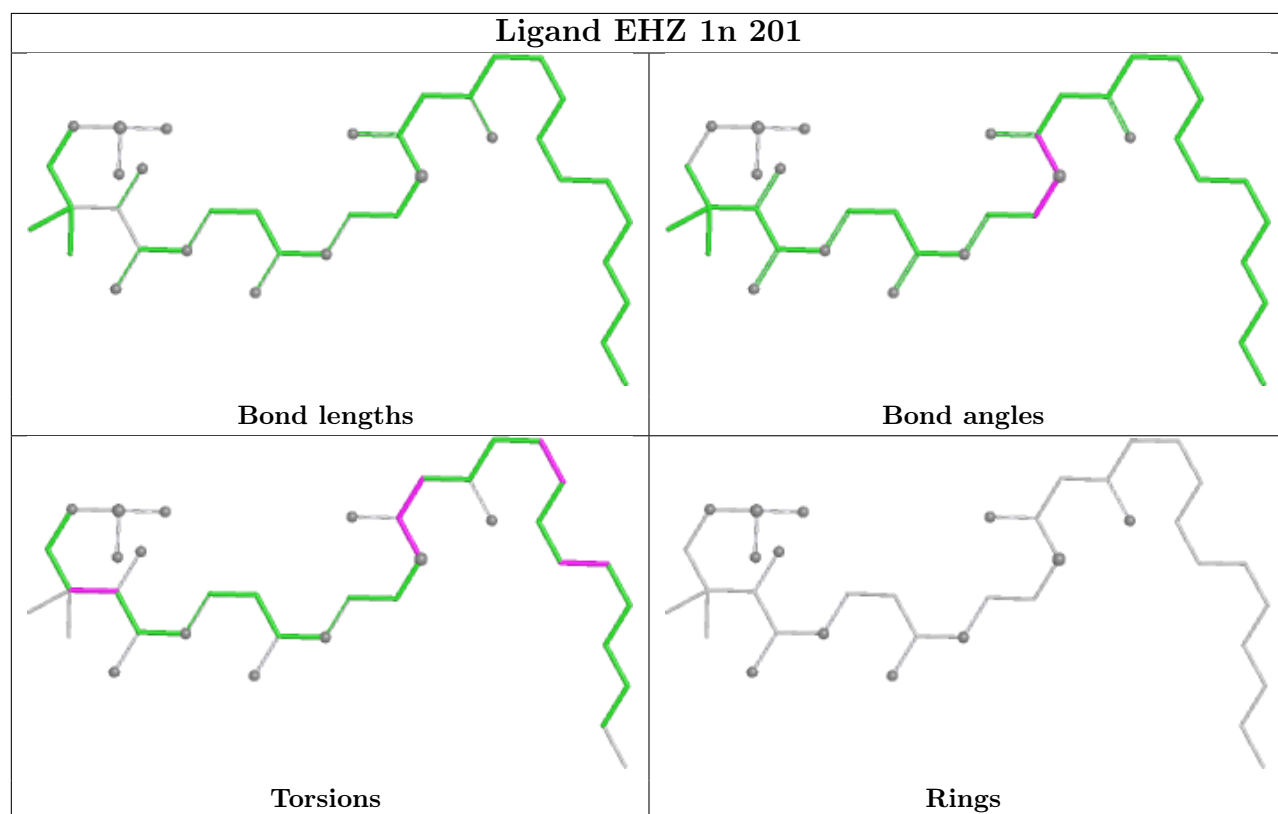
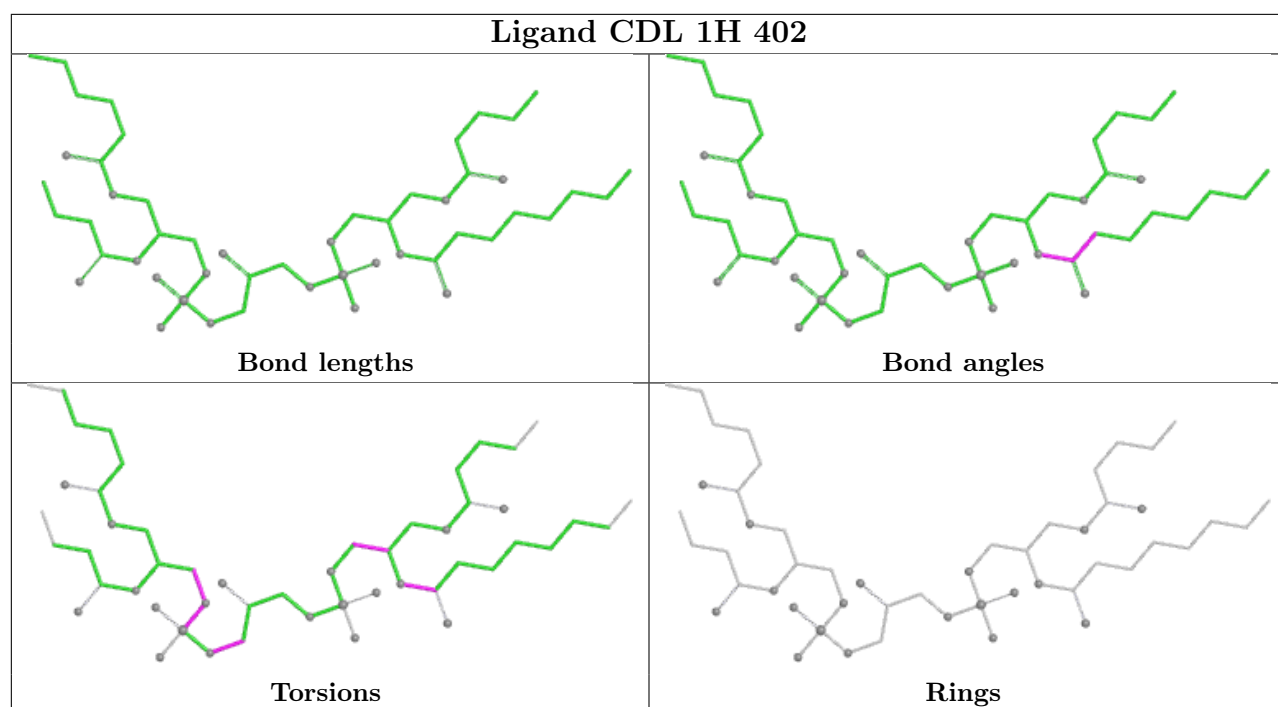


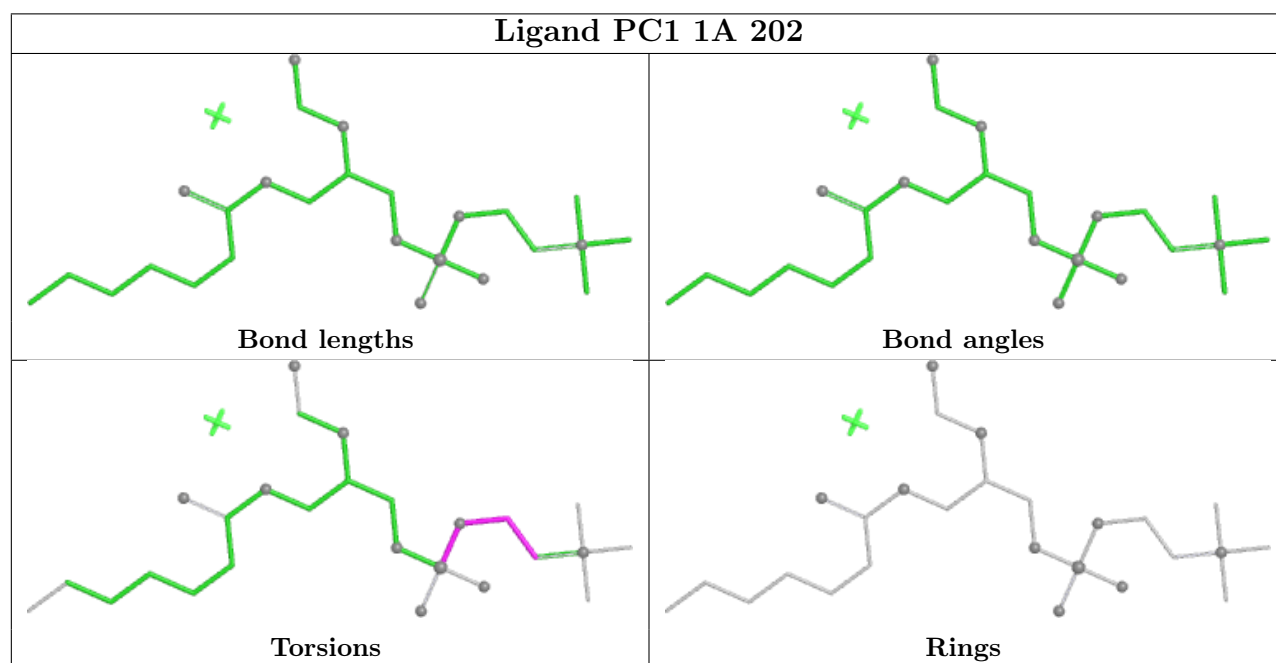
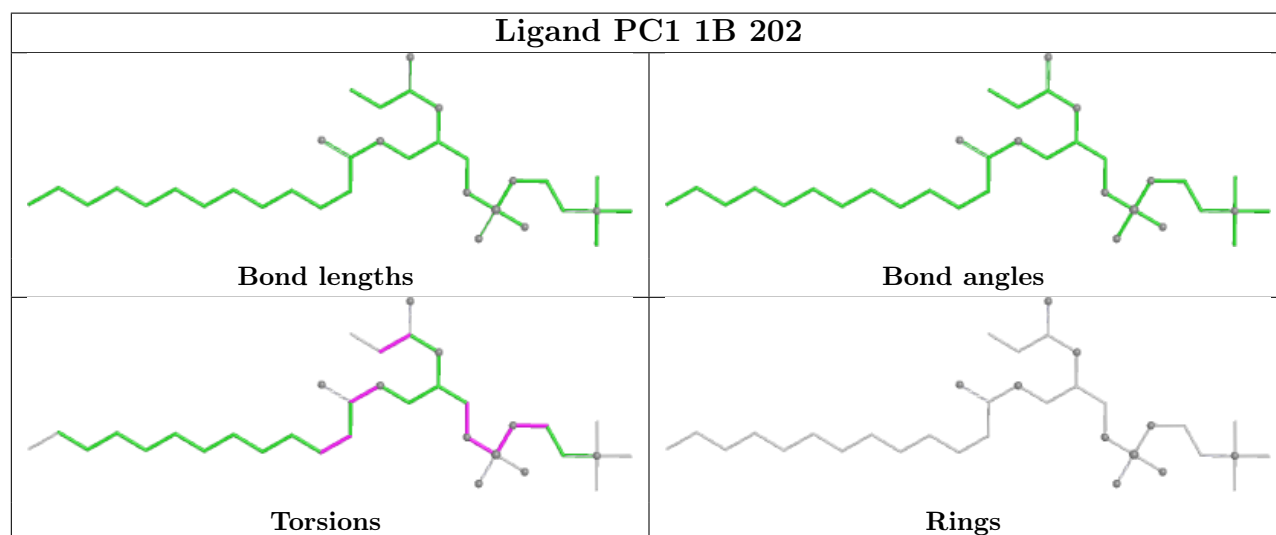
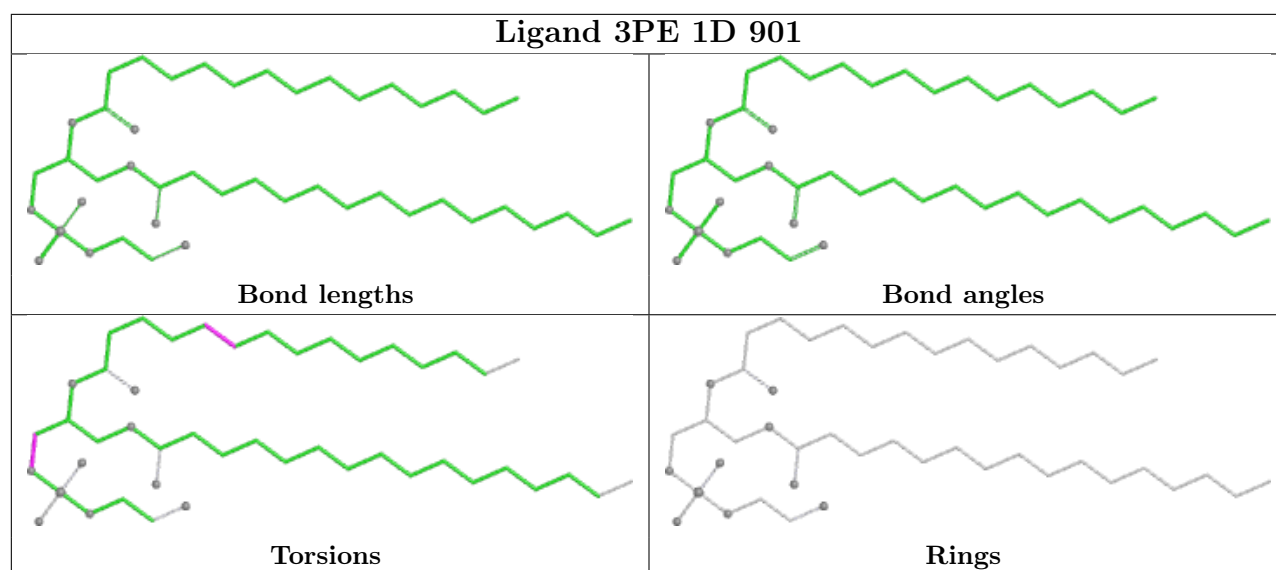


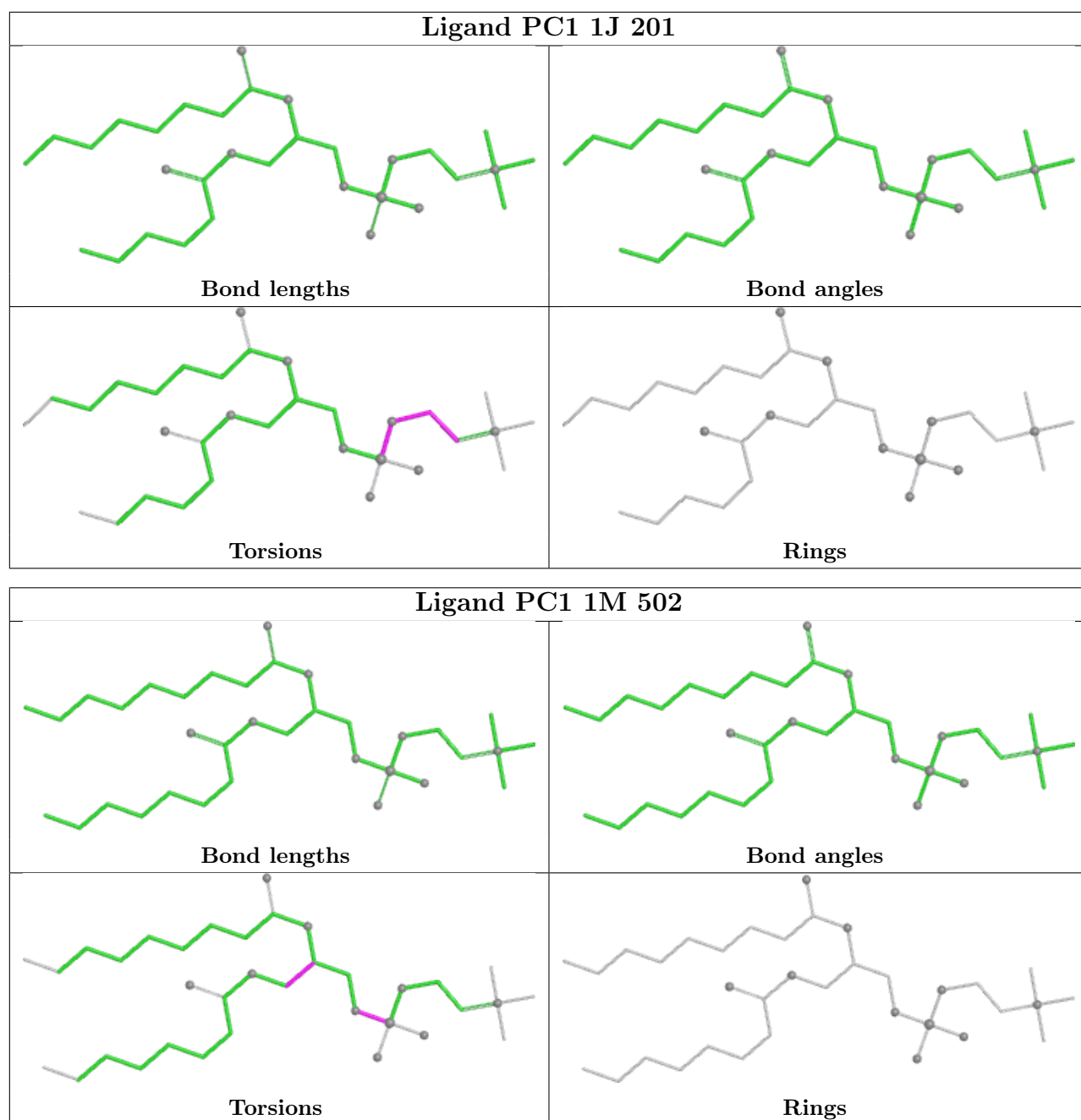


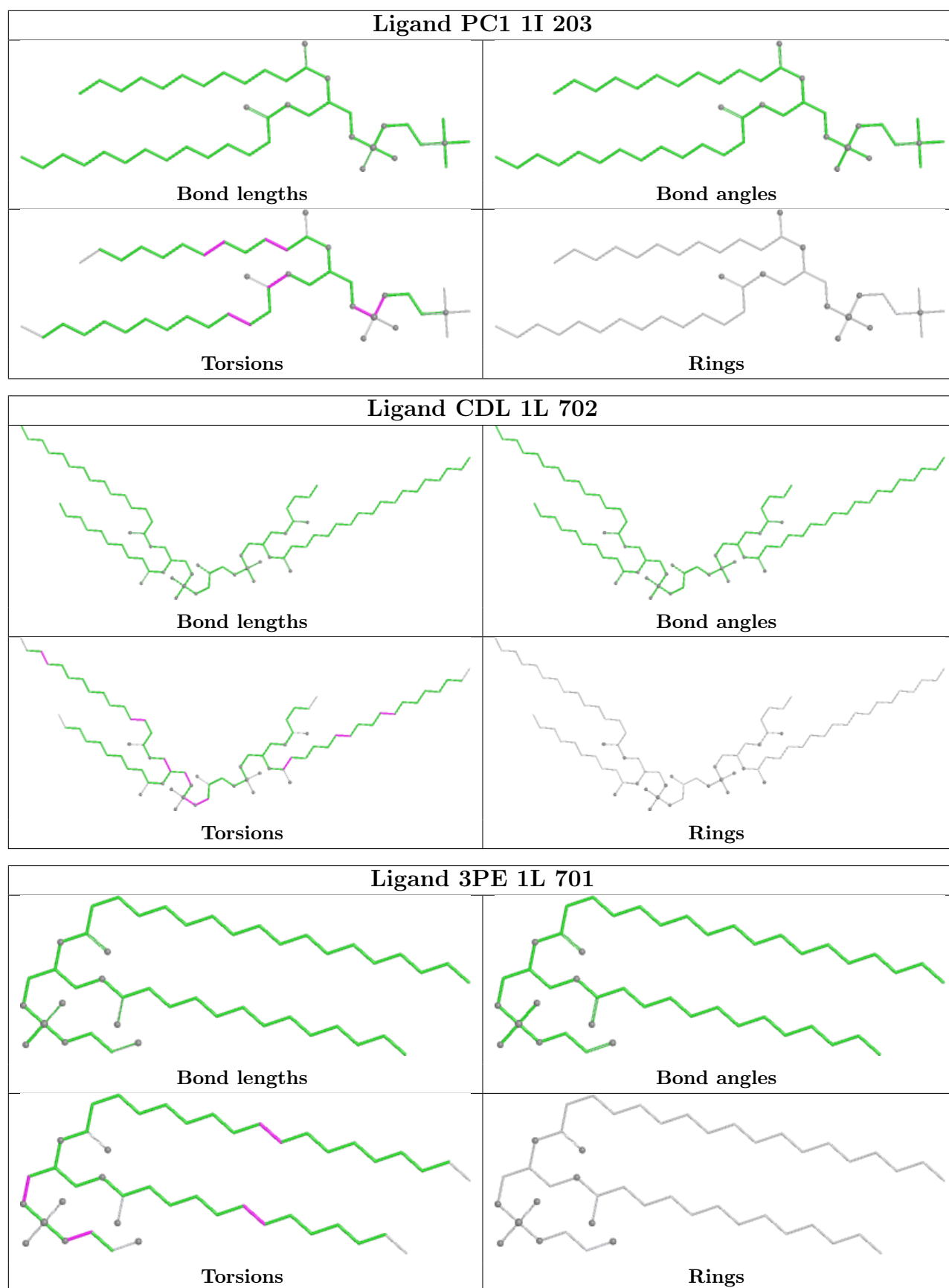
Ligand FMN 1F 501

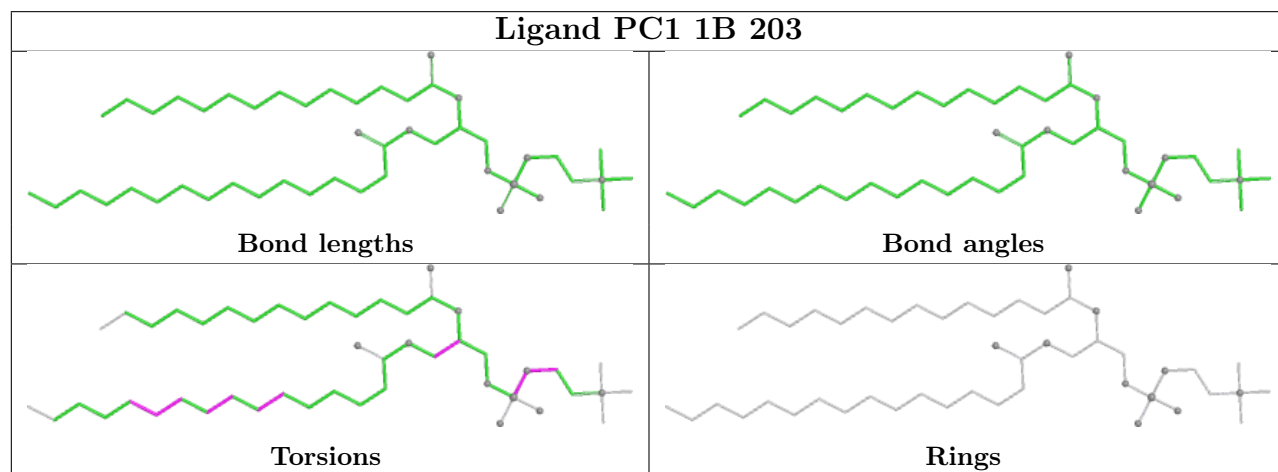
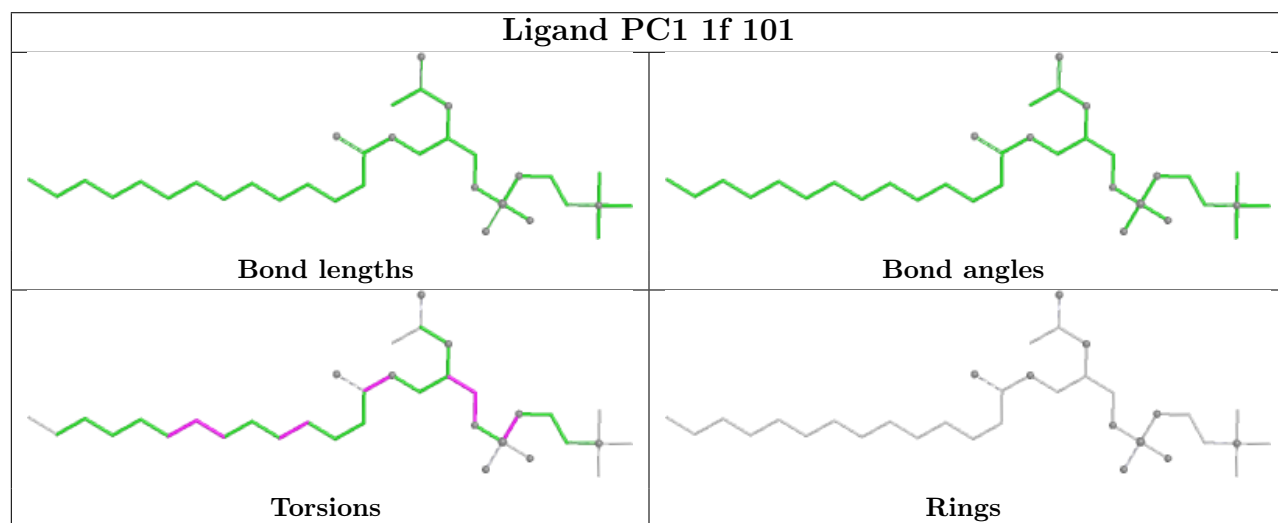
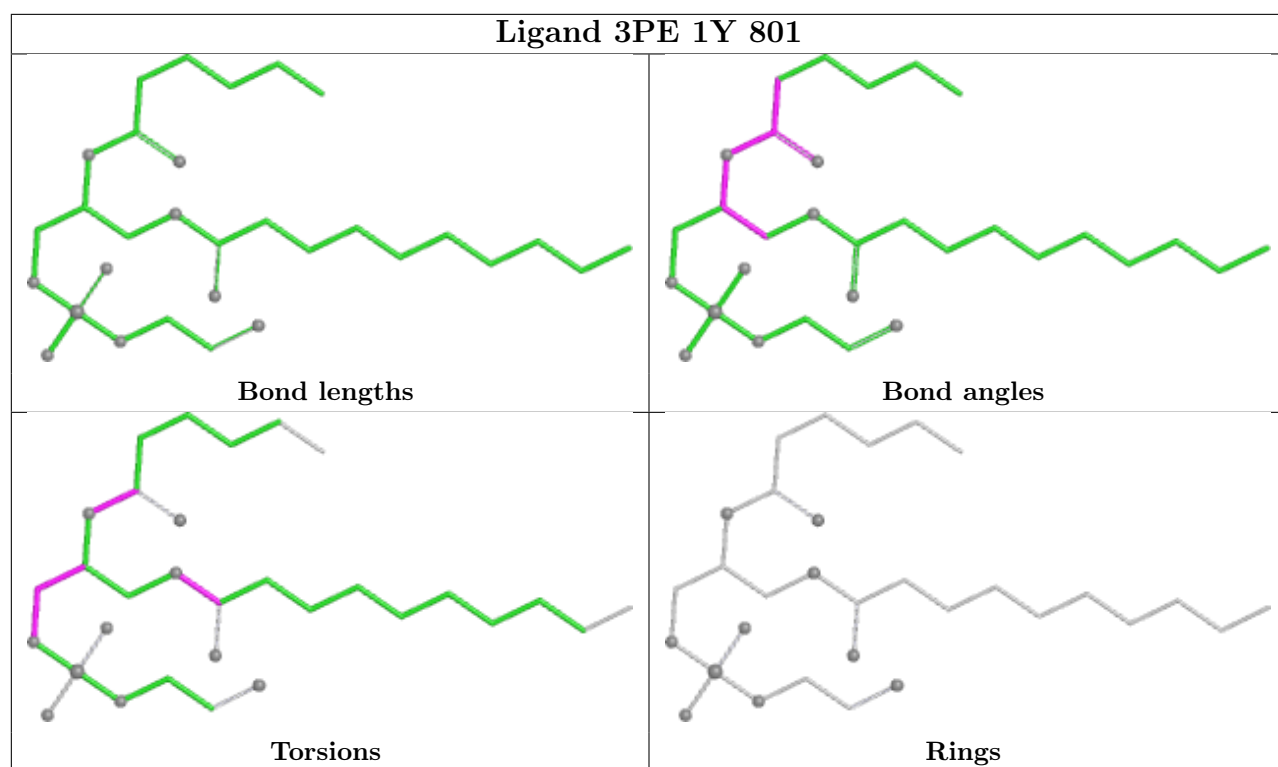


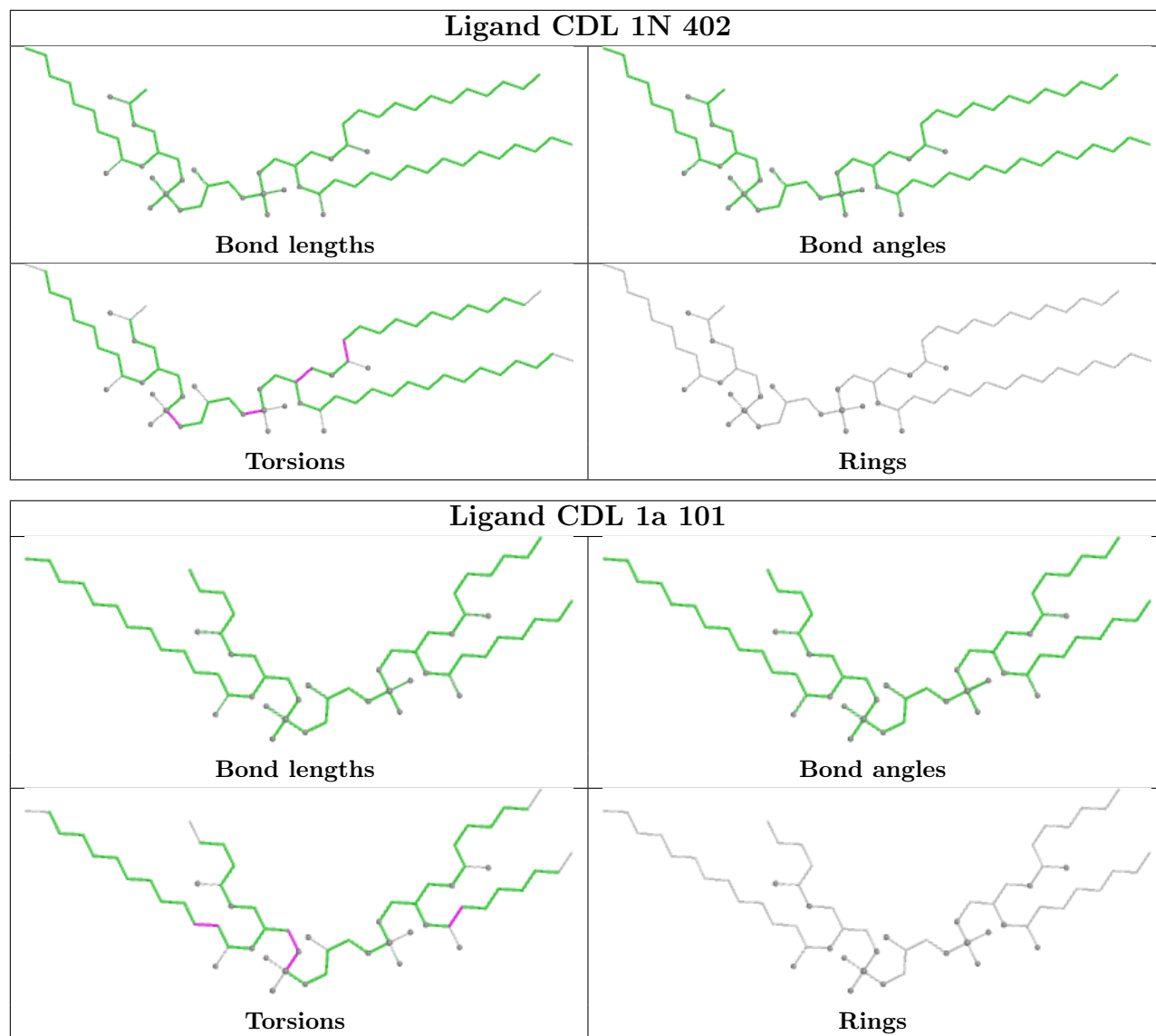


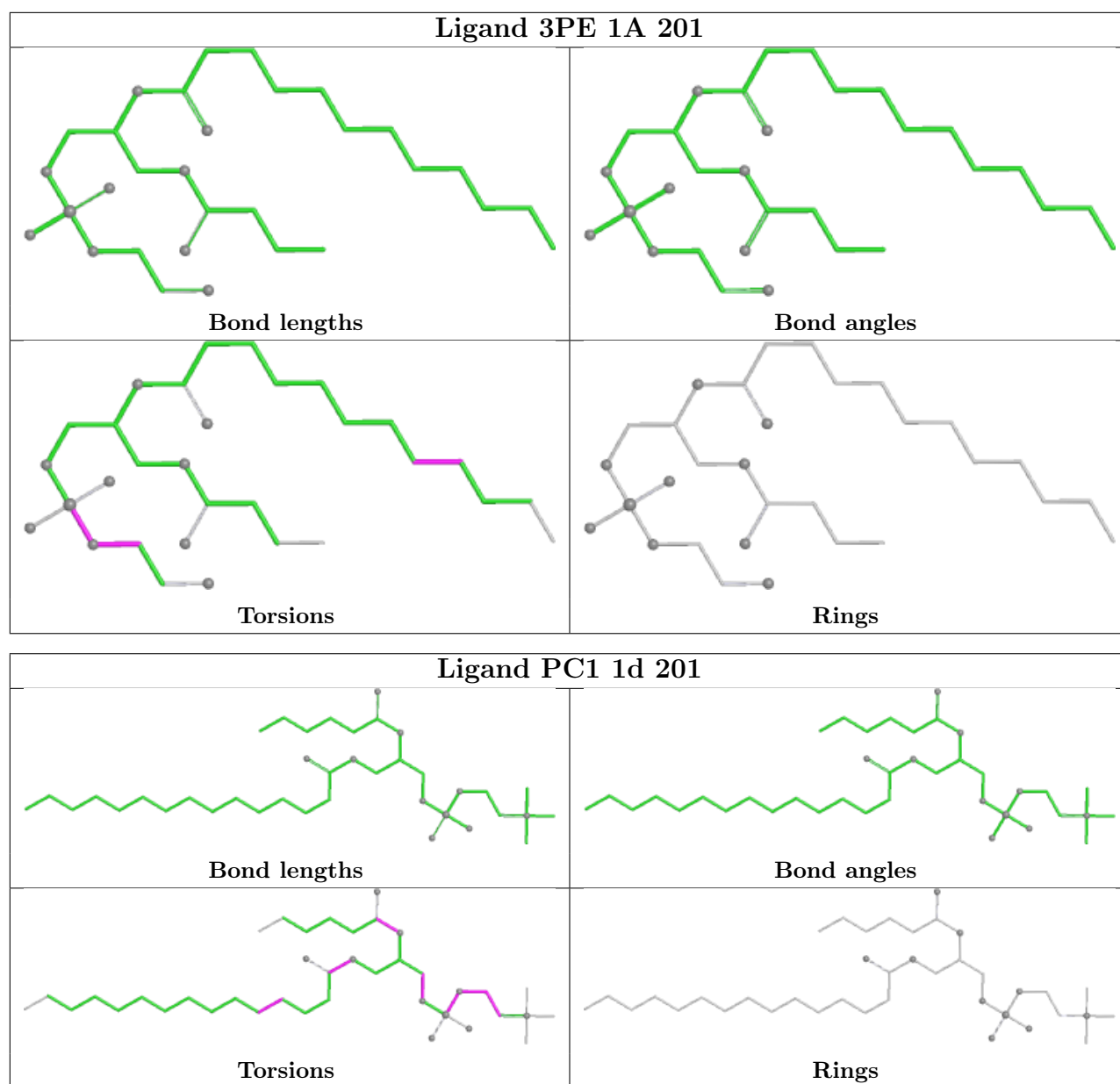


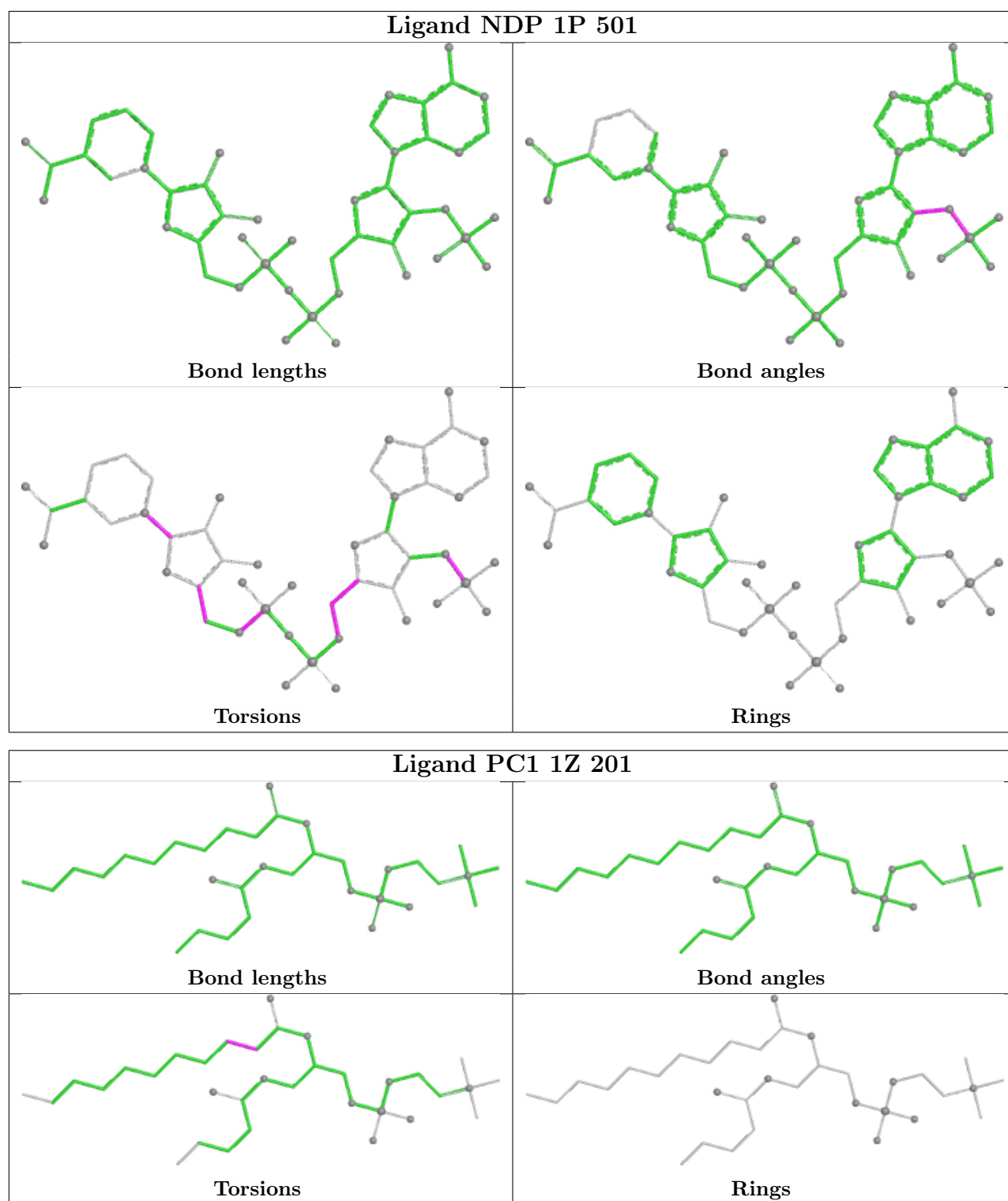












5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

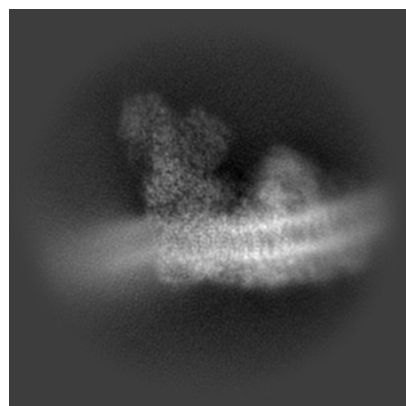
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-42165. These allow visual inspection of the internal detail of the map and identification of artifacts.

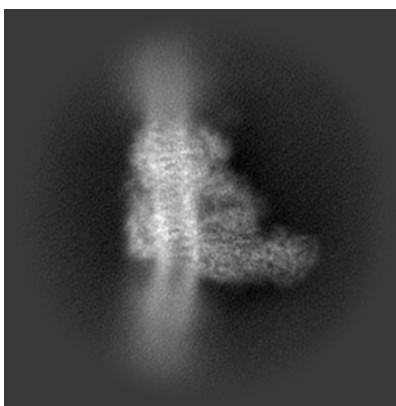
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

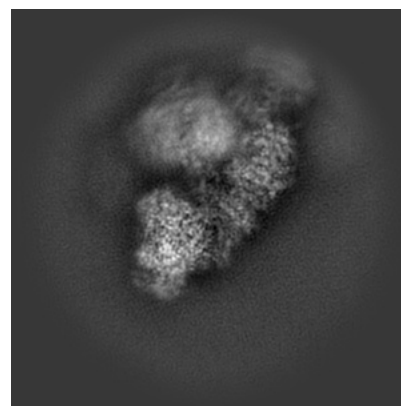
6.1.1 Primary map



X

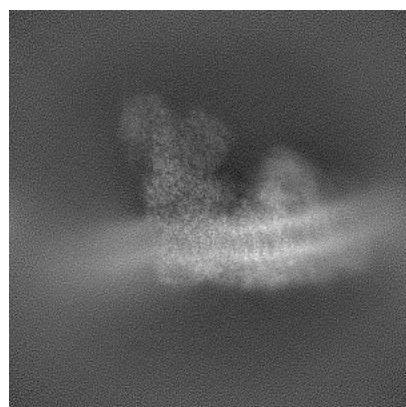


Y

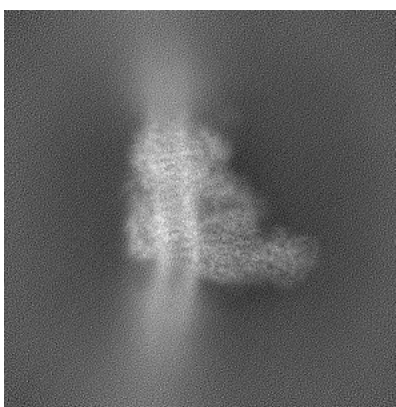


Z

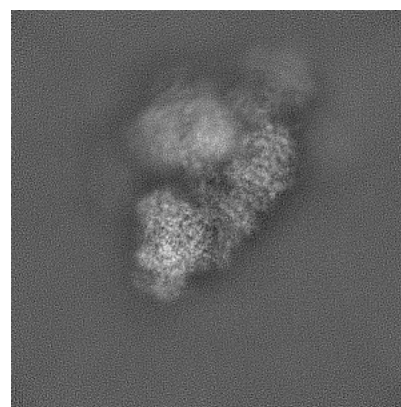
6.1.2 Raw map



X



Y

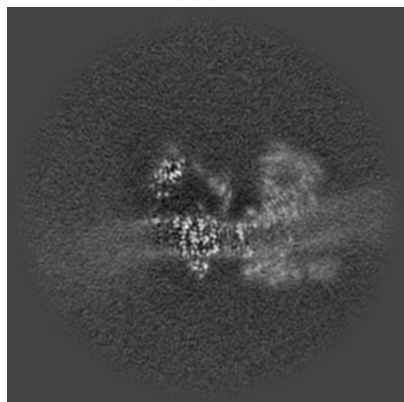


Z

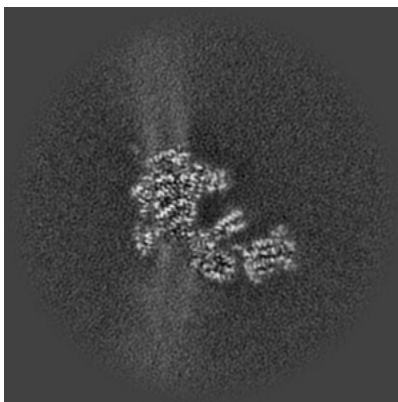
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

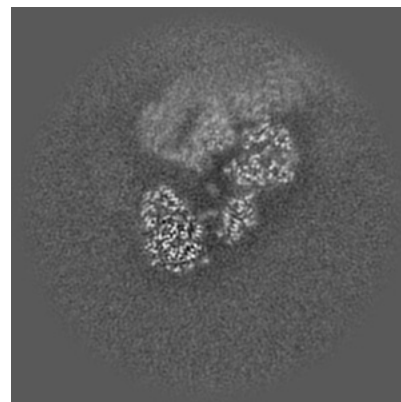
6.2.1 Primary map



X Index: 200

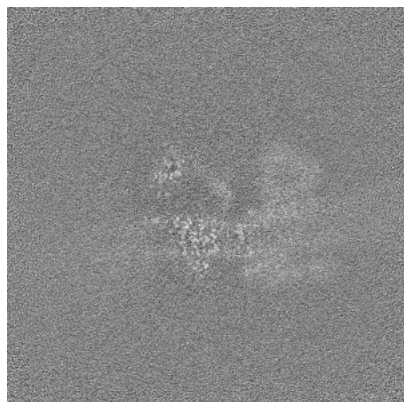


Y Index: 200

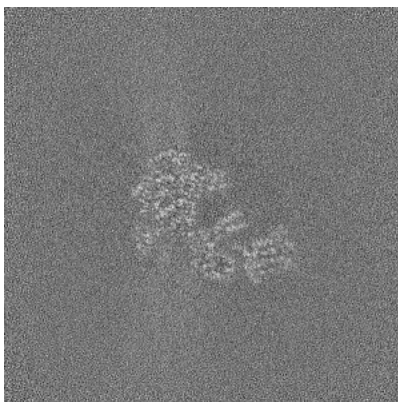


Z Index: 200

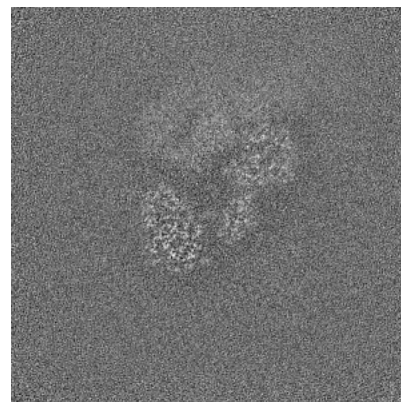
6.2.2 Raw map



X Index: 200



Y Index: 200

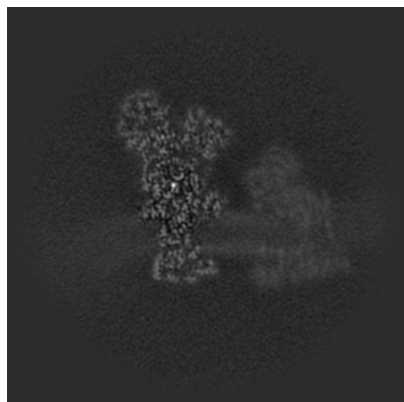


Z Index: 200

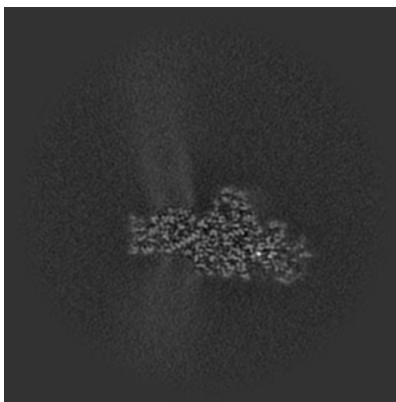
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

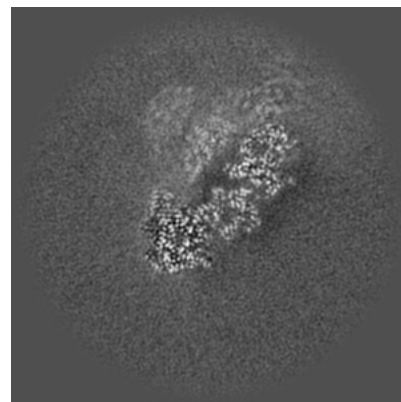
6.3.1 Primary map



X Index: 162

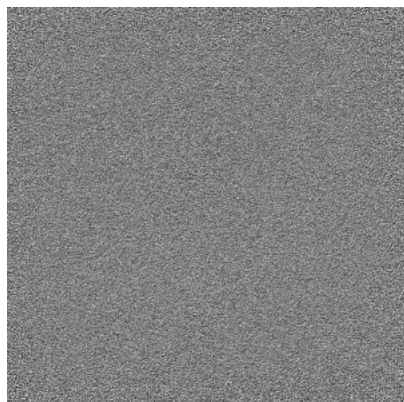


Y Index: 157

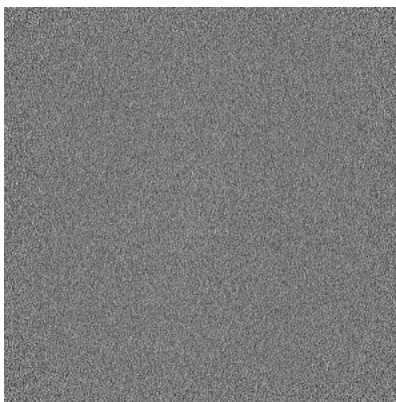


Z Index: 190

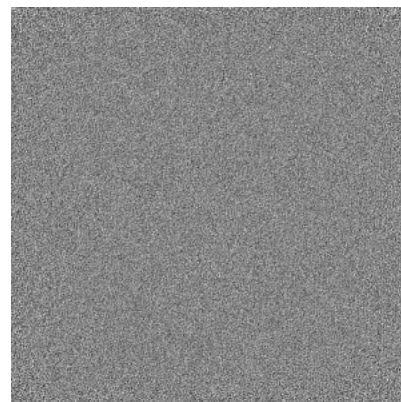
6.3.2 Raw map



X Index: 0



Y Index: 0

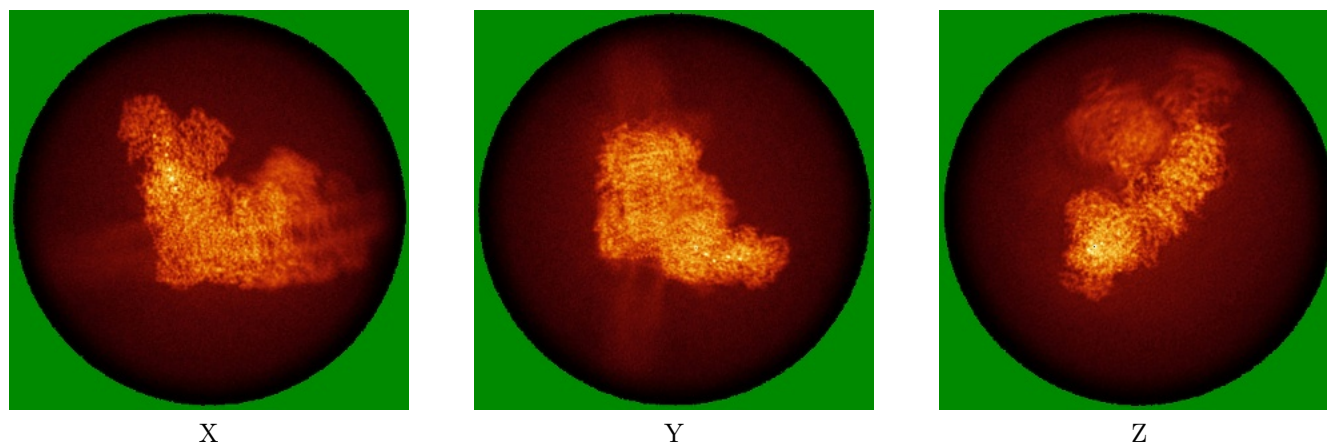


Z Index: 0

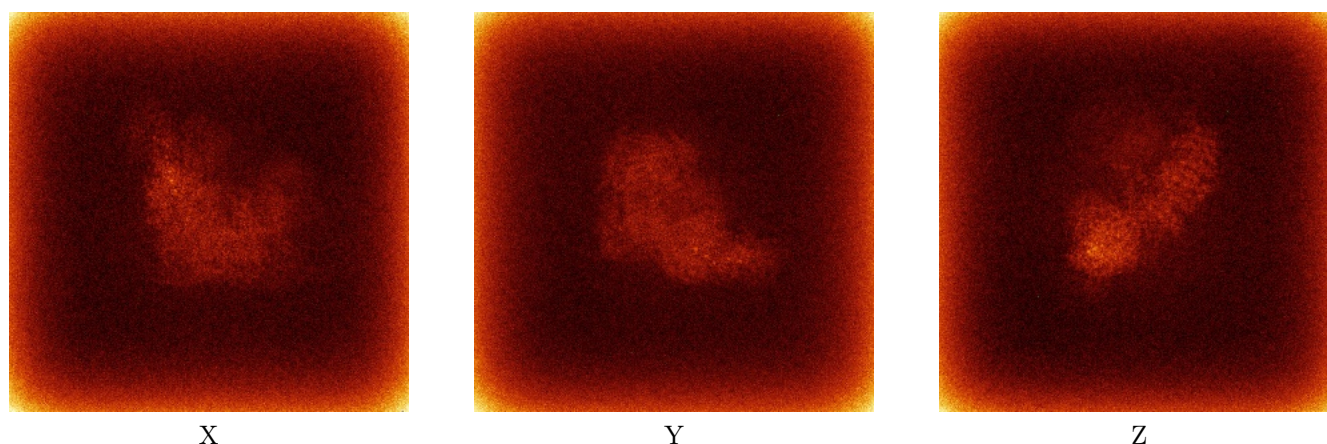
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



6.4.2 Raw map



The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

This section was not generated.

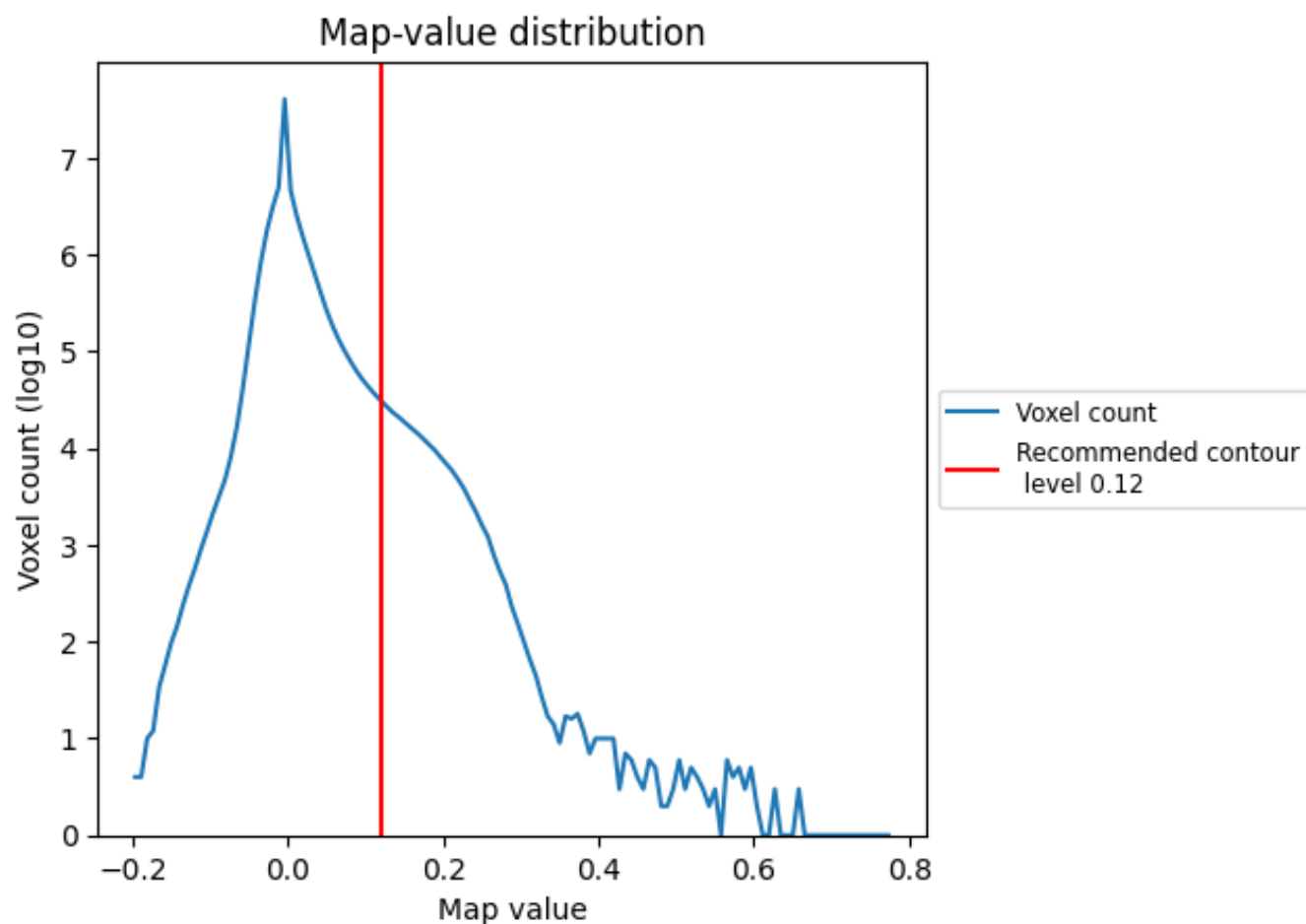
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

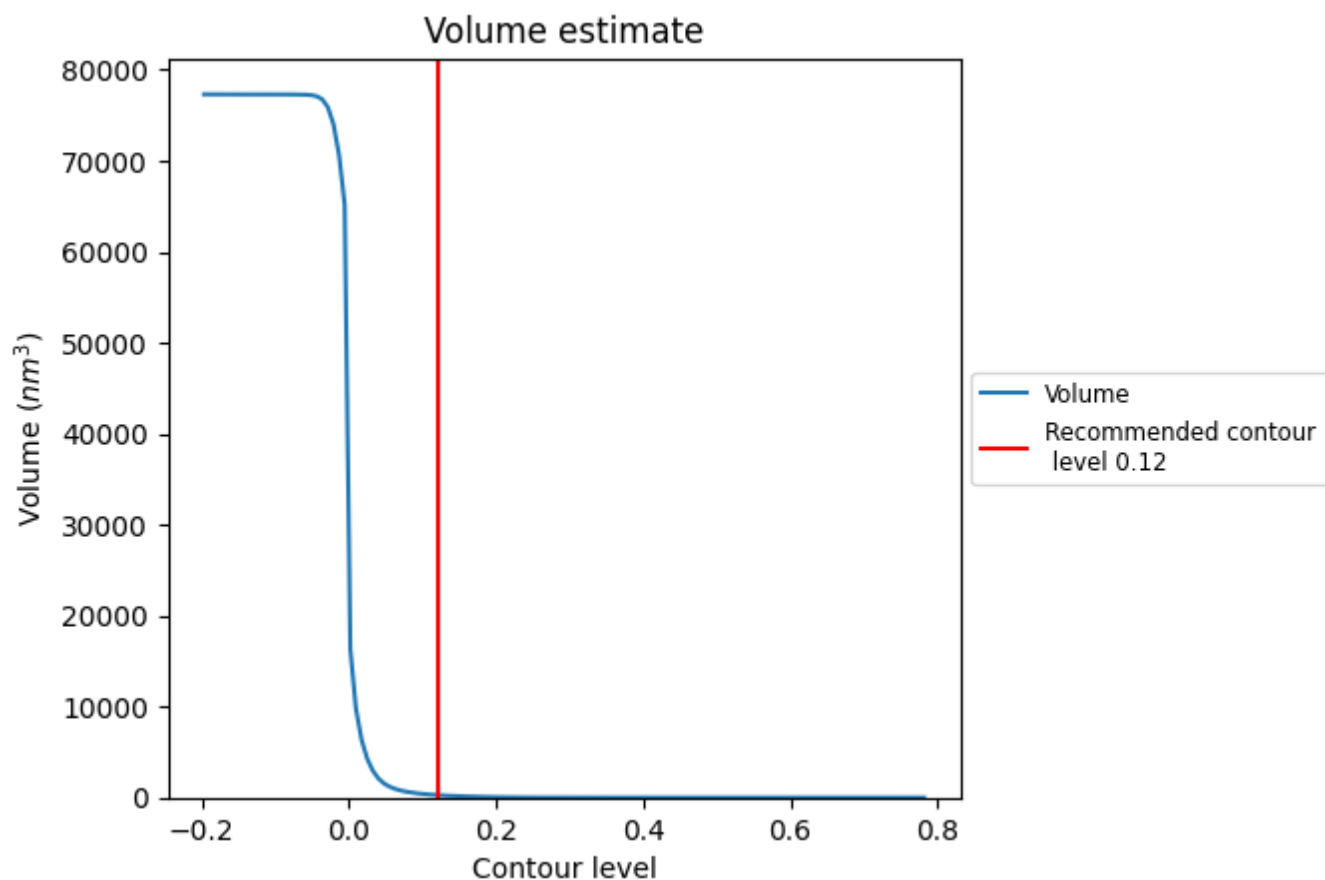
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

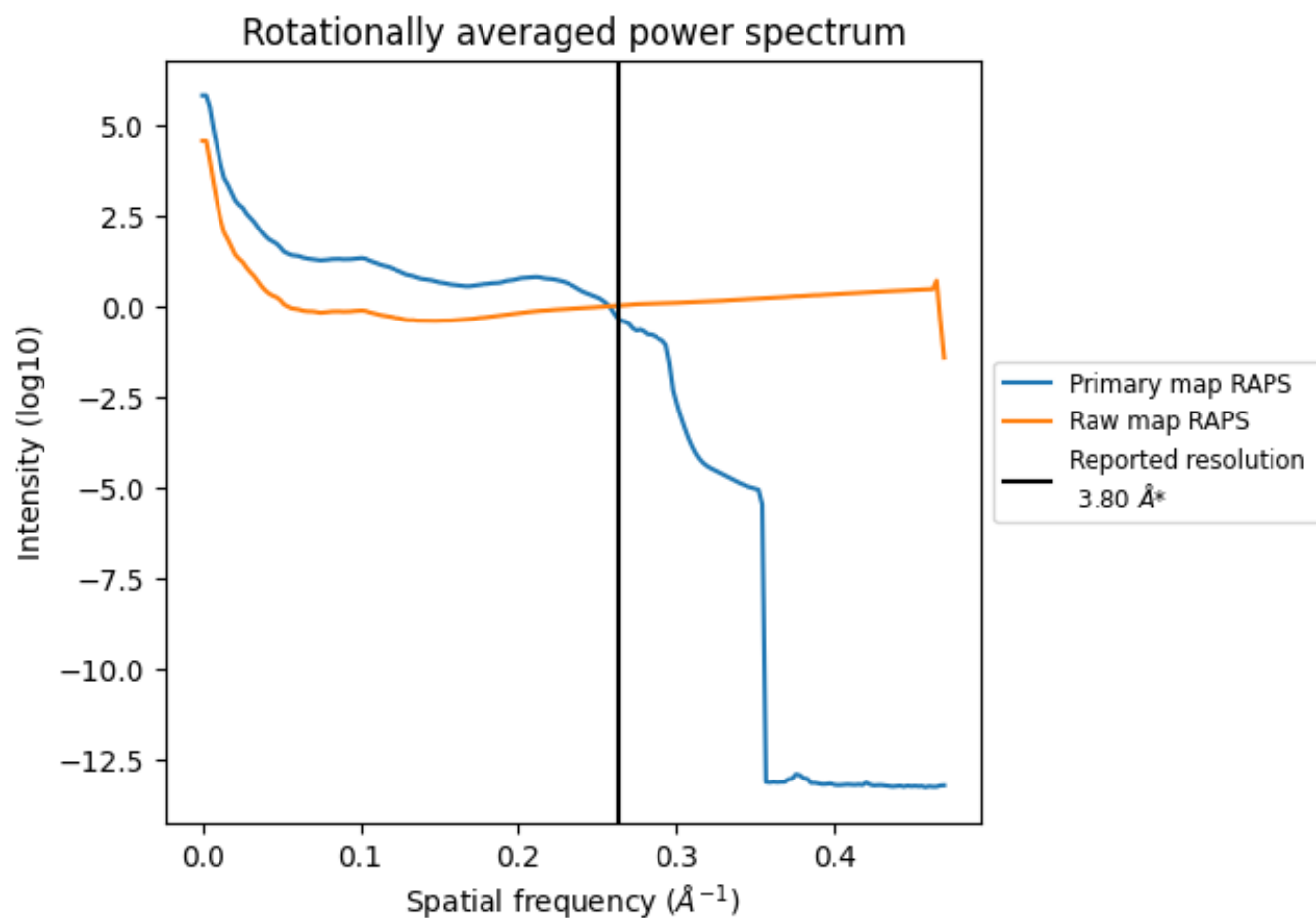
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 269 nm³; this corresponds to an approximate mass of 243 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ

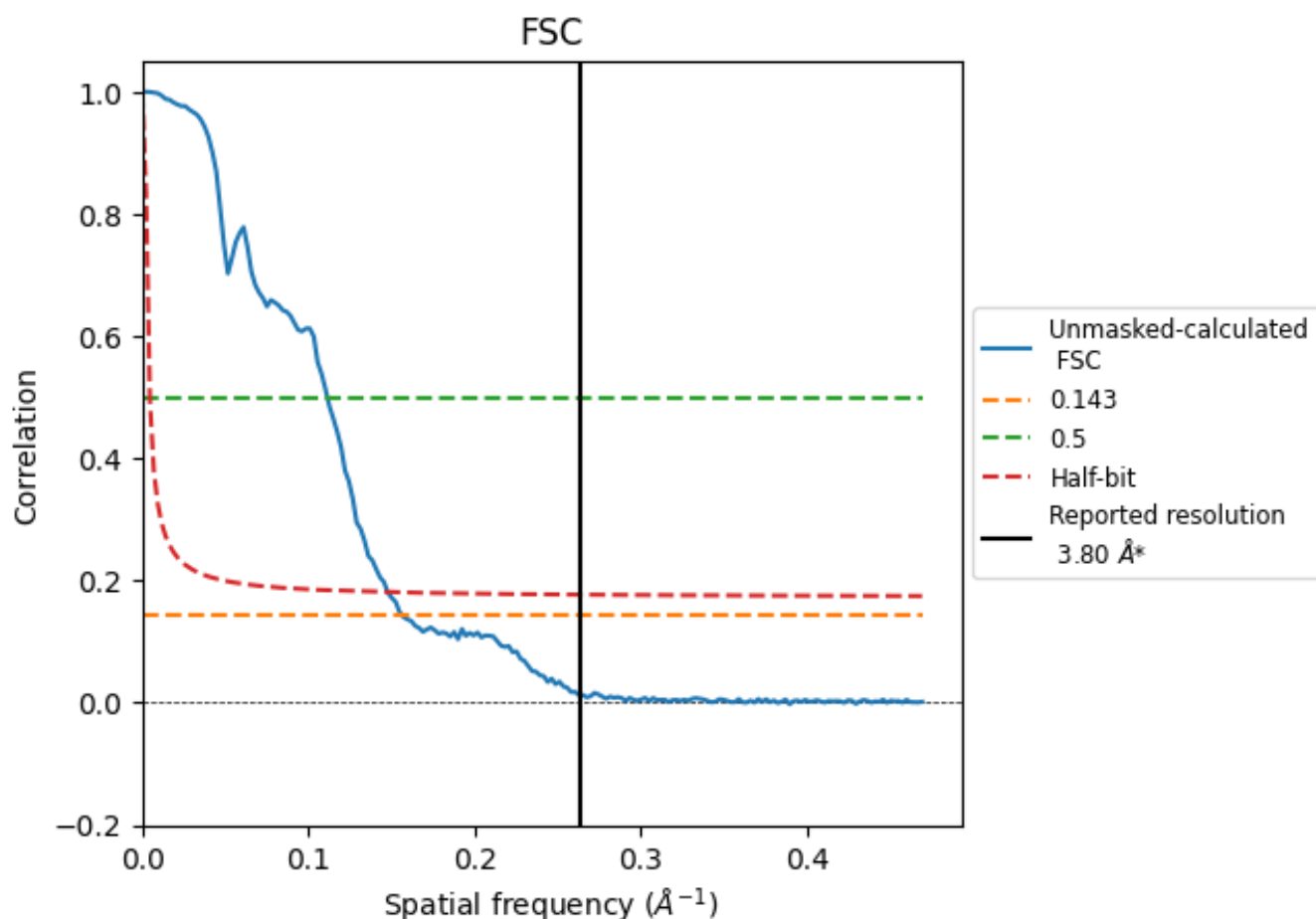


*Reported resolution corresponds to spatial frequency of 0.263 Å⁻¹

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](#)

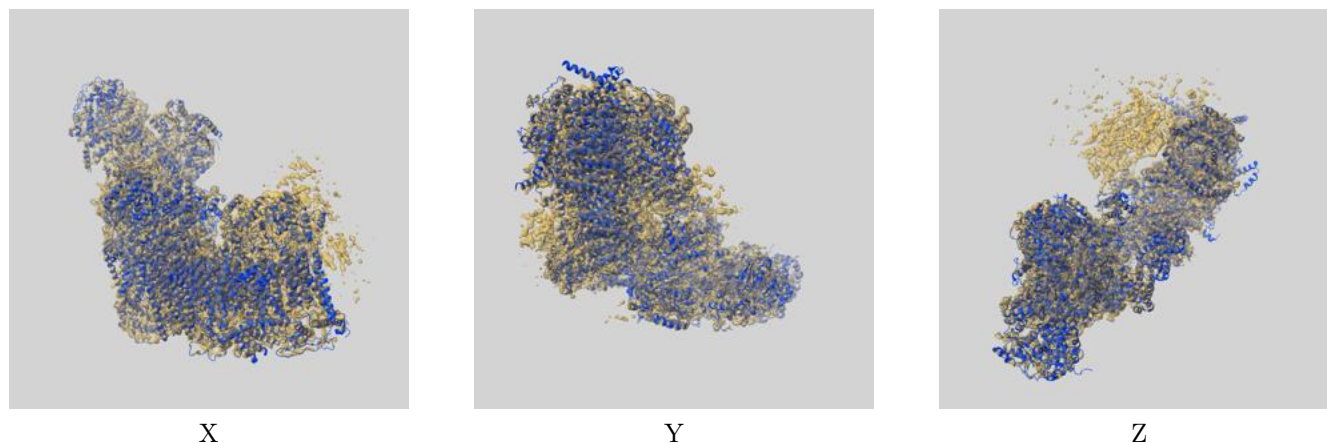
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.80	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	6.39	8.98	6.77

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 6.39 differs from the reported value 3.8 by more than 10 %

9 Map-model fit [i](#)

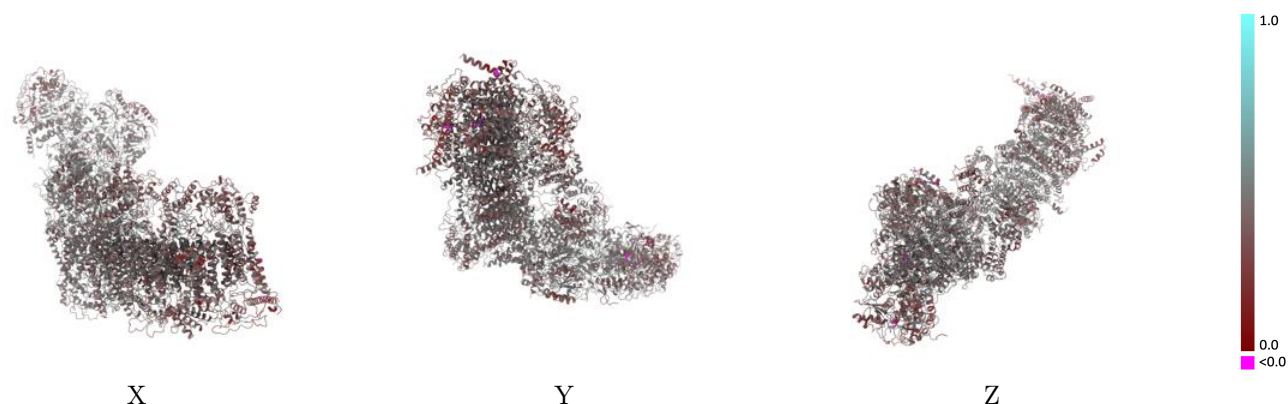
This section contains information regarding the fit between EMDB map EMD-42165 and PDB model 8UEO. Per-residue inclusion information can be found in section [3](#) on page [20](#).

9.1 Map-model overlay [i](#)



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

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

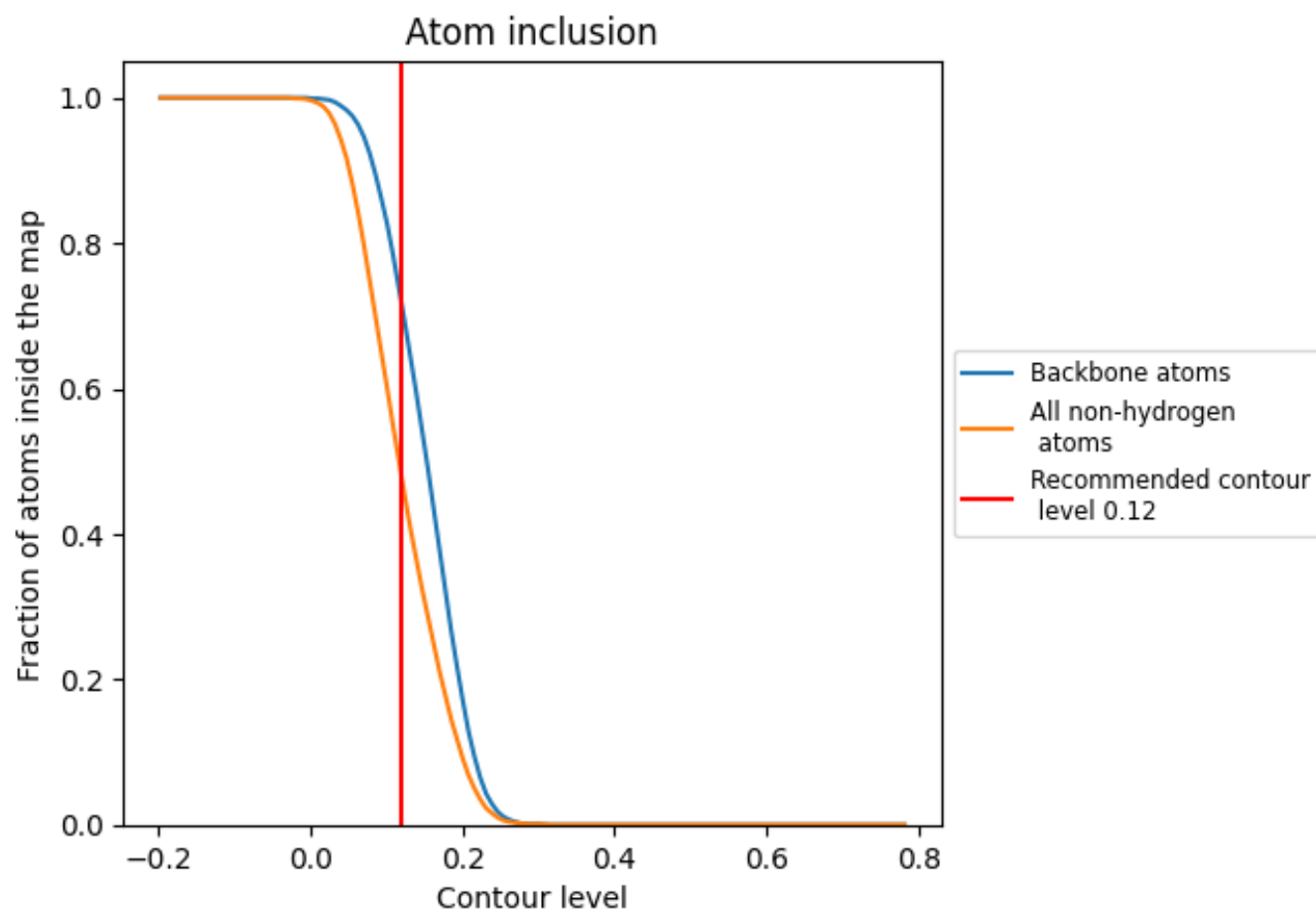


The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

This section was not generated.

9.4 Atom inclusion [i](#)



At the recommended contour level, 72% of all backbone atoms, 48% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.12) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.4770	 0.4120
1A	 0.4680	 0.4240
1B	 0.5590	 0.4530
1C	 0.5460	 0.4500
1D	 0.5640	 0.4510
1E	 0.3100	 0.3780
1F	 0.3360	 0.3820
1G	 0.4480	 0.4200
1H	 0.5340	 0.4450
1I	 0.5720	 0.4370
1J	 0.4850	 0.4140
1K	 0.5120	 0.4170
1L	 0.5500	 0.4030
1M	 0.6230	 0.4450
1N	 0.5770	 0.4400
1O	 0.3790	 0.3960
1P	 0.4070	 0.4220
1Q	 0.4150	 0.4260
1R	 0.4500	 0.4420
1S	 0.2940	 0.3440
1T	 0.2020	 0.3200
1U	 0.4740	 0.3560
1V	 0.4060	 0.3980
1W	 0.3770	 0.4010
1X	 0.4940	 0.4180
1Y	 0.4990	 0.4060
1Z	 0.5300	 0.4280
1a	 0.5290	 0.4310
1b	 0.4780	 0.4150
1c	 0.3920	 0.3890
1d	 0.5450	 0.4260
1e	 0.5390	 0.4300
1f	 0.3190	 0.3980
1g	 0.4690	 0.3820
1h	 0.5310	 0.4090



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Chain	Atom inclusion	Q-score
1i	 0.3260	 0.3440
1j	 0.3690	 0.3460
1k	 0.3620	 0.3670
1l	 0.5030	 0.3960
1m	 0.5540	 0.4000
1n	 0.5320	 0.3750
1o	 0.3410	 0.3020
1p	 0.4820	 0.3850
1q	 0.4960	 0.4440
1r	 0.5170	 0.4500
1s	 0.2000	 0.3420