



wwPDB EM Validation Summary Report ⓘ

Jun 13, 2024 – 03:18 PM EDT

PDB ID : 8UD1
EMDB ID : EMD-42143
Title : High resolution in-situ structure of complex I in respiratory supercomplex
(composite)
Authors : Zheng, W.; Zhu, J.; Zhang, K.
Deposited on : 2023-09-27
Resolution : 2.10 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:

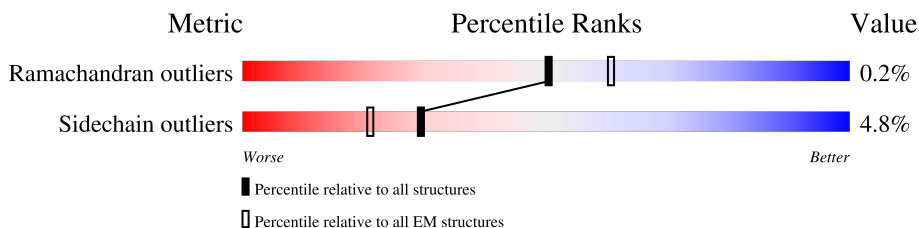
EMDB validation analysis : 0.0.1.dev92
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

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 2.10 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	1A	115	
2	1B	258	
3	1C	264	
4	1D	466	
5	1E	249	
6	1F	464	
7	1G	727	
8	1H	318	
9	1I	239	

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Mol	Chain	Length	Quality of chain
10	1J	175	15% 92% 7% ..
11	1K	98	97% .
12	1L	606	96% .
13	1M	459	97% .
14	1N	347	96% .
15	1O	357	9% 85% . 10%
16	1P	377	6% 87% . 9%
17	1Q	175	7% 69% 5% 26%
18	1R	123	5% 72% 6% 22%
19	1S	99	5% 86% . 12%
20	1T	156	31% 51% . 46%
20	1U	156	52% . 45%
21	1V	116	15% 94% 5% .
22	1W	128	8% 89% . 10%
23	1X	172	94% 6% .
24	1Y	141	5% 93% 6% .
25	1Z	144	94% . .
26	1a	70	97% .
27	1b	84	11% 92% 7% .
28	1c	76	8% 64% 36%
29	1d	122	95% . .
30	1e	106	89% 5% 7%
31	1f	135	7% 39% . 58%
32	1g	154	5% 61% . 35%
33	1h	189	70% . 27%

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Mol	Chain	Length	Quality of chain
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	113	
44	1s	471	

2 Entry composition

There are 59 unique types of molecules in this entry. The entry contains 71989 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
			Total	C	N	O	S		
1	1A	115	916	616	134	159	7	0	0

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	1C	209	1740	1125	297	316	2	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1C	104	GLN	ARG	conflict	UNP A0A286ZNN4
1C	154	GLY	ASP	conflict	UNP A0A286ZNN4

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

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

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	1H	318	2504	1673	385	425	21	0	0

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	1J	174	1329	892	189	236	12	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	1K	98	750	494	113	129	14	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	1L	606	4818	3195	746	826	51	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	1M	459	3632	2411	572	610	39	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	1N	347	2712	1783	420	463	46	0	0

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

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

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

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

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

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

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

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

- Molecule 19 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex sub-

unit 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
			Total	C	N	O	S		
25	1Z	141	1168	752	202	205	9	0	0

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	1i	127	1100	723	194	181	2	0	0

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
38	1m	128	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
			Total	C	N	O	S		
39	1n	172	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
			Total	C	N	O	S		
40	1o	122	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
			Total	C	N	O	S		
41	1p	173	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
			Total	C	N	O	S		
42	1q	145	1212	775	219	213	5	0	0

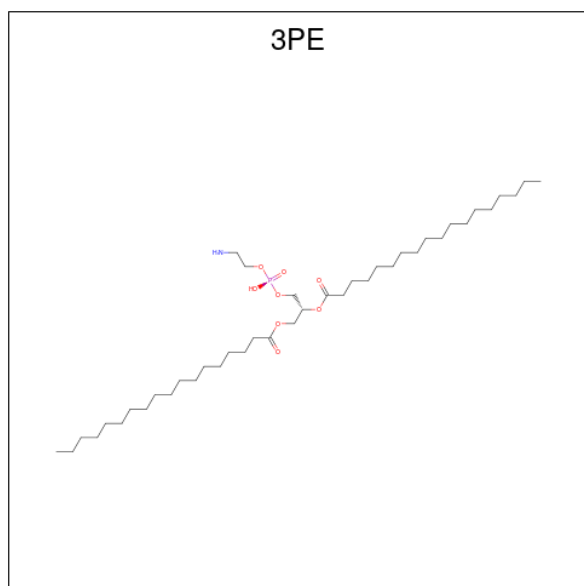
- Molecule 43 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
43	1r	94	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
			Total	C	N	O	S		
44	1s	45	382	238	70	73	1	0	0

- Molecule 45 is 1,2-Distearoyl-sn-glycerophosphoethanolamine (three-letter code: 3PE) (formula: $C_{41}H_{82}NO_8P$).



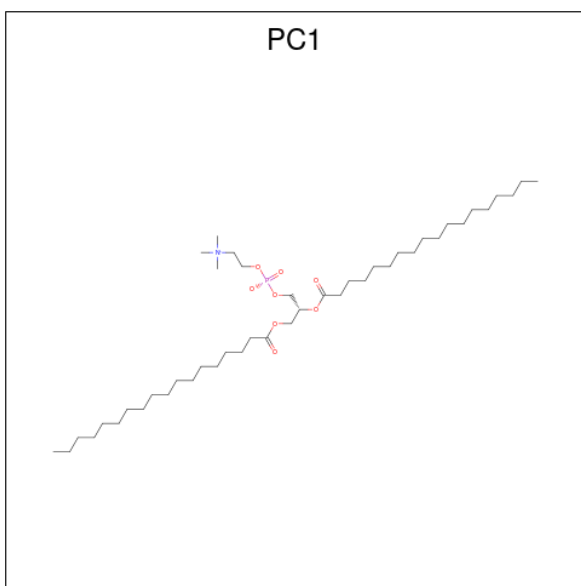
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
45	1A	1	Total 47	C 37	N 1	O 8	P 1	0
45	1J	1	Total 44	C 34	N 1	O 8	P 1	0
45	1L	1	Total 46	C 36	N 1	O 8	P 1	0
45	1L	1	Total 45	C 35	N 1	O 8	P 1	0
45	1L	1	Total 31	C 21	N 1	O 8	P 1	0
45	1M	1	Total 45	C 35	N 1	O 8	P 1	0
45	1M	1	Total 51	C 41	N 1	O 8	P 1	0
45	1M	1	Total 50	C 40	N 1	O 8	P 1	0
45	1N	1	Total 49	C 39	N 1	O 8	P 1	0
45	1N	1	Total 33	C 23	N 1	O 8	P 1	0

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Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
45	1Y	1	Total 40	C 30	N 1	O 8	P 1	0
45	1Y	1	Total 30	C 20	N 1	O 8	P 1	0
45	1Y	1	Total 27	C 17	N 1	O 8	P 1	0
45	1Y	1	Total 41	C 31	N 1	O 8	P 1	0
45	1d	1	Total 48	C 38	N 1	O 8	P 1	0
45	1j	1	Total 44	C 34	N 1	O 8	P 1	0

- Molecule 46 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PC1) (formula: $C_{44}H_{88}NO_8P$).



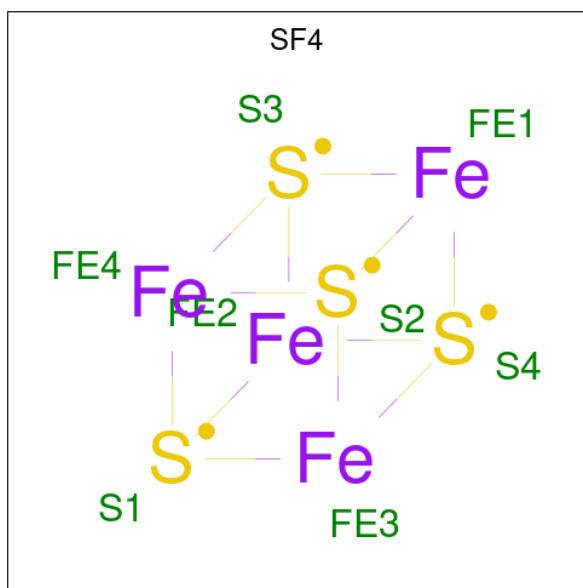
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
46	1A	1	Total 35	C 25	N 1	O 8	P 1	0
46	1B	1	Total 46	C 36	N 1	O 8	P 1	0
46	1B	1	Total 48	C 38	N 1	O 8	P 1	0
46	1H	1	Total 48	C 38	N 1	O 8	P 1	0
46	1I	1	Total 54	C 44	N 1	O 8	P 1	0

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Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
46	1M	1	Total 44	C 34	N 1	O 8	P 1	0
46	1P	1	Total 33	C 23	N 1	O 8	P 1	0
46	1Y	1	Total 35	C 25	N 1	O 8	P 1	0
46	1Z	1	Total 44	C 34	N 1	O 8	P 1	0
46	1h	1	Total 47	C 37	N 1	O 8	P 1	0
46	1m	1	Total 46	C 36	N 1	O 8	P 1	0
46	1q	1	Total 49	C 39	N 1	O 8	P 1	0

- Molecule 47 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe₄S₄).



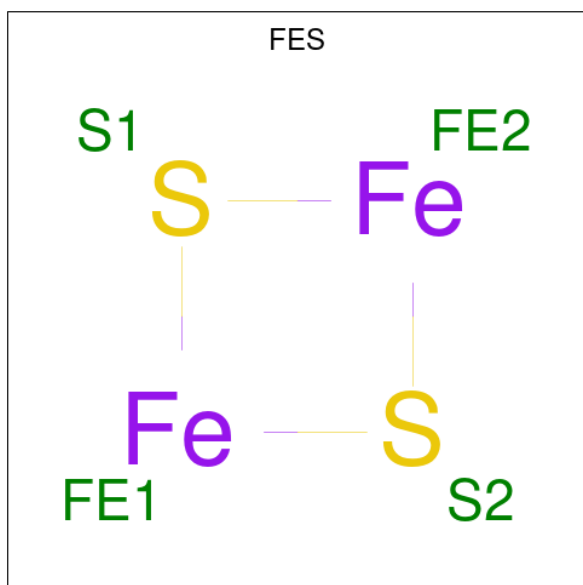
Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
47	1B	1	Total 8	Fe 4	S 4	0
47	1F	1	Total 8	Fe 4	S 4	0
47	1G	1	Total 8	Fe 4	S 4	0
47	1G	1	Total 8	Fe 4	S 4	0

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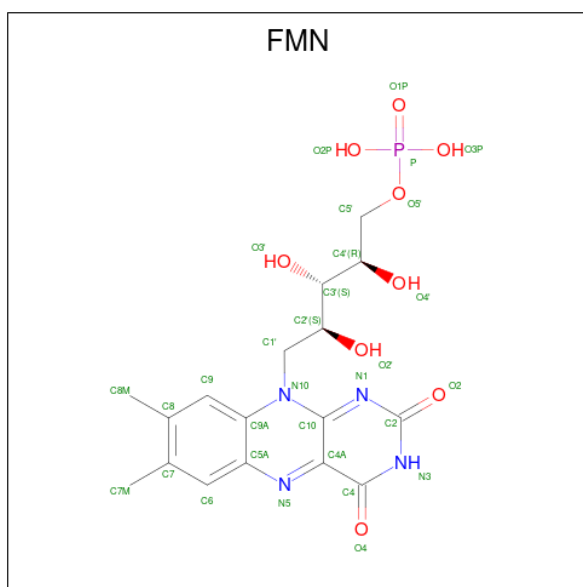
Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
47	1I	1	8	4	4	0
47	1I	1	8	4	4	0

- Molecule 48 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



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

- Molecule 49 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: C₁₇H₂₁N₄O₉P).

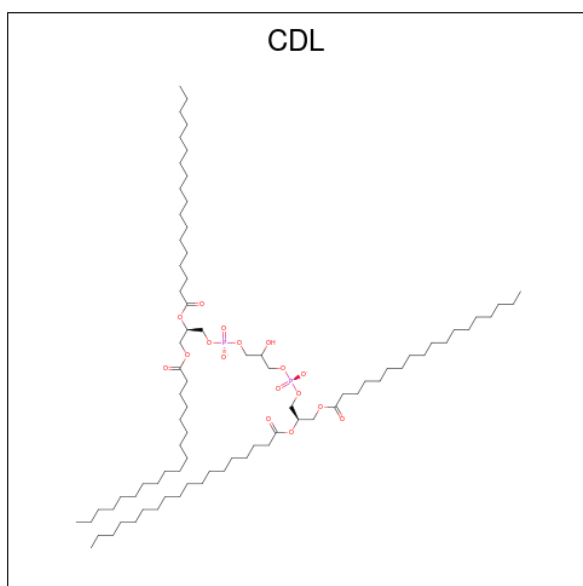


Mol	Chain	Residues	Atoms					AltConf
49	1F	1	Total	C	N	O	P	0
			31	17	4	9	1	

- Molecule 50 is POTASSIUM ION (three-letter code: K) (formula: K).

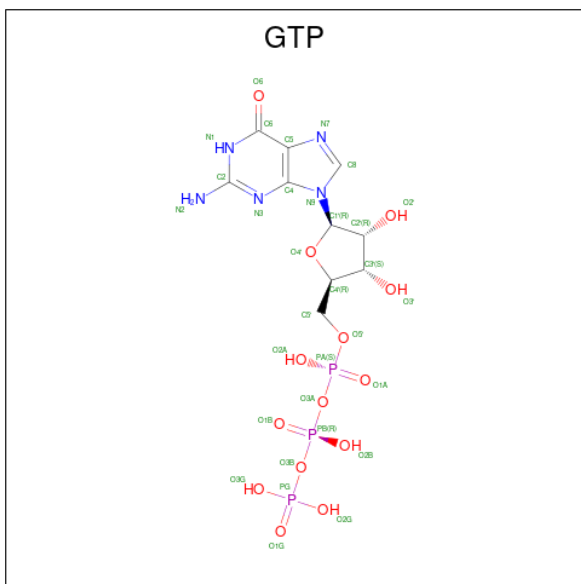
Mol	Chain	Residues	Atoms		AltConf
50	1G	1	Total	K	0
			1	1	

- Molecule 51 is CARDIOLIPIN (three-letter code: CDL) (formula: C₈₁H₁₅₆O₁₇P₂).



Mol	Chain	Residues	Atoms				AltConf
51	1L	1	Total	C	O	P	0
			76	57	17	2	
51	1N	1	Total	C	O	P	0
			62	43	17	2	
51	1X	1	Total	C	O	P	0
			86	67	17	2	
51	1d	1	Total	C	O	P	0
			65	46	17	2	
51	1h	1	Total	C	O	P	0
			80	61	17	2	
51	1q	1	Total	C	O	P	0
			61	42	17	2	

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



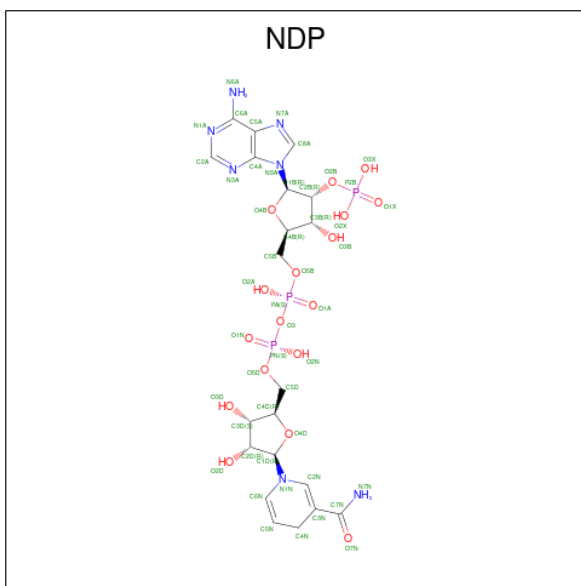
Mol	Chain	Residues	Atoms					AltConf
52	1O	1	Total	C	N	O	P	0
			32	10	5	14	3	

- Molecule 53 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

- Molecule 54 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE

PHOSPHATE (three-letter code: NDP) (formula: C₂₁H₃₀N₇O₁₇P₃).

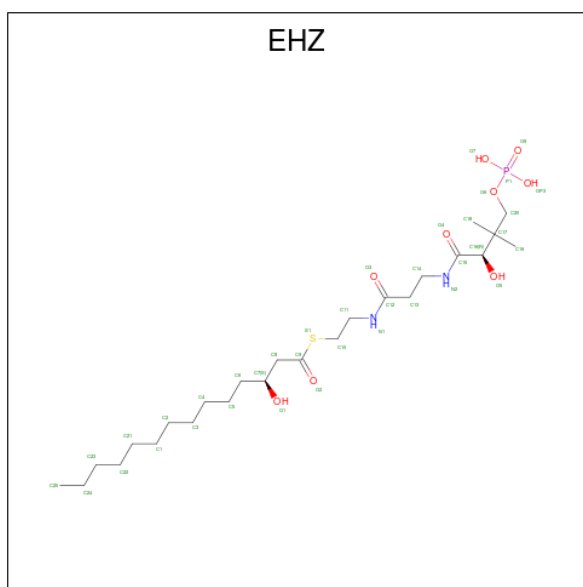


Mol	Chain	Residues	Atoms				AltConf	
54	1P	1	Total	C	N	O	P	0
			48	21	7	17	3	

- Molecule 55 is ZINC ION (three-letter code: ZN) (formula: Zn).

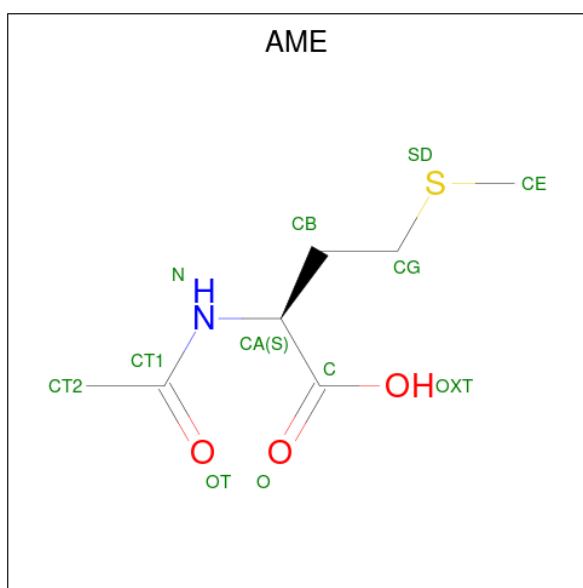
Mol	Chain	Residues	Atoms		AltConf
55	1R	1	Total	Zn	0
			1	1	

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



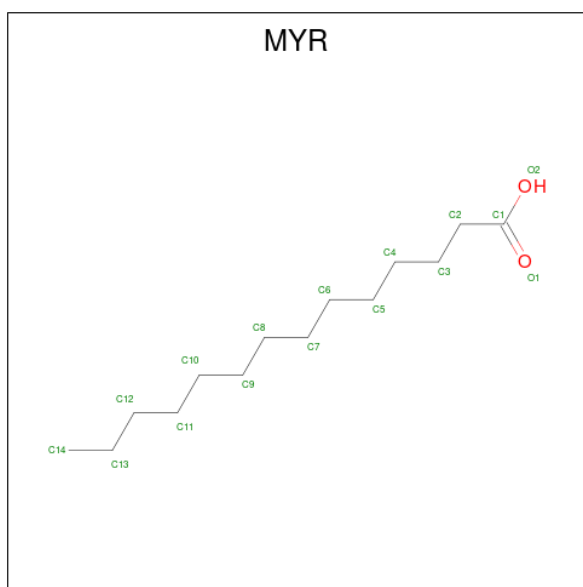
Mol	Chain	Residues	Atoms					AltConf	
			Total	C	N	O	P		S
56	1T	1	37	25	2	8	1	1	0
56	1n	1	37	25	2	8	1	1	0

- Molecule 57 is N-ACETYL METHIONINE (three-letter code: AME) (formula: $C_7H_{13}NO_3S$).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	S	
57	1h	1	11	7	1	2	1	0

- Molecule 58 is MYRISTIC ACID (three-letter code: MYR) (formula: $C_{14}H_{28}O_2$).



Mol	Chain	Residues	Atoms		AltConf
58	1I	1	Total	C O	0
			15	14 1	

- Molecule 59 is water.

Mol	Chain	Residues	Atoms		AltConf
59	1A	21	Total	O	0
			21	21	
59	1B	53	Total	O	0
			53	53	
59	1C	96	Total	O	0
			96	96	
59	1D	138	Total	O	0
			138	138	
59	1E	55	Total	O	0
			55	55	
59	1F	113	Total	O	0
			113	113	
59	1G	255	Total	O	0
			255	255	
59	1H	80	Total	O	0
			80	80	
59	1I	75	Total	O	0
			75	75	
59	1J	56	Total	O	0
			56	56	
59	1K	38	Total	O	0
			38	38	

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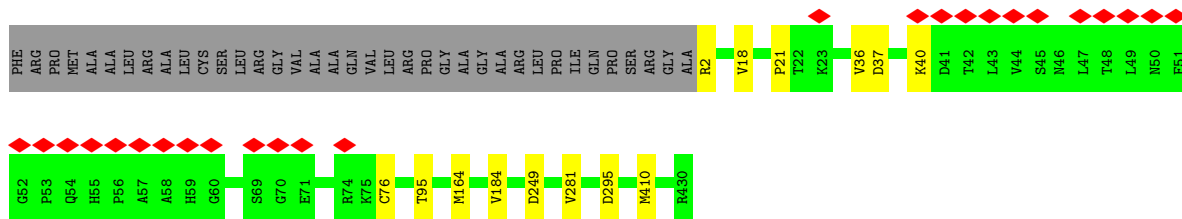
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Mol	Chain	Residues	Atoms		AltConf
59	1L	228	Total 228	O 228	0
59	1M	201	Total 201	O 201	0
59	1N	154	Total 154	O 154	0
59	1O	150	Total 150	O 150	0
59	1P	118	Total 118	O 118	0
59	1Q	63	Total 63	O 63	0
59	1R	41	Total 41	O 41	0
59	1S	56	Total 56	O 56	0
59	1T	12	Total 12	O 12	0
59	1U	26	Total 26	O 26	0
59	1V	20	Total 20	O 20	0
59	1W	37	Total 37	O 37	0
59	1X	106	Total 106	O 106	0
59	1Y	54	Total 54	O 54	0
59	1Z	83	Total 83	O 83	0
59	1a	30	Total 30	O 30	0
59	1b	35	Total 35	O 35	0
59	1c	23	Total 23	O 23	0
59	1d	95	Total 95	O 95	0
59	1e	91	Total 91	O 91	0
59	1f	43	Total 43	O 43	0

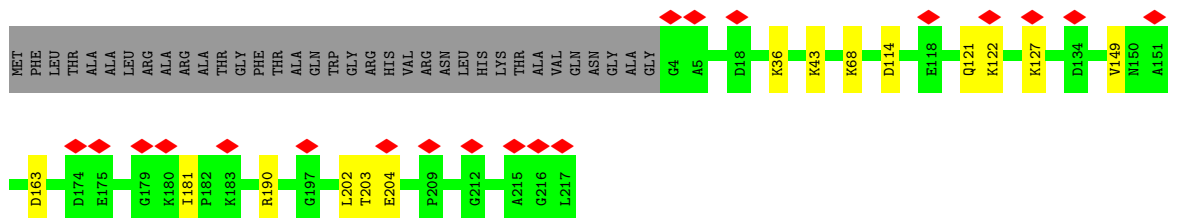
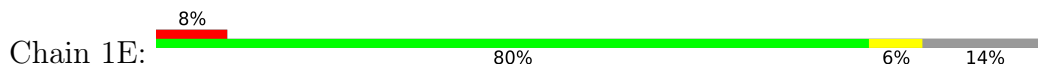
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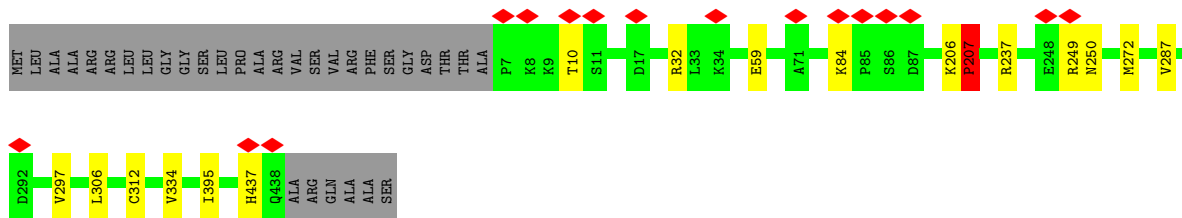
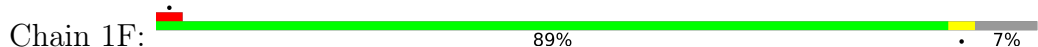
Mol	Chain	Residues	Atoms		AltConf
59	1g	76	Total 76	O 76	0
59	1h	116	Total 116	O 116	0
59	1i	48	Total 48	O 48	0
59	1j	37	Total 37	O 37	0
59	1k	35	Total 35	O 35	0
59	1l	97	Total 97	O 97	0
59	1m	82	Total 82	O 82	0
59	1n	120	Total 120	O 120	0
59	1o	100	Total 100	O 100	0
59	1p	141	Total 141	O 141	0
59	1q	47	Total 47	O 47	0
59	1r	25	Total 25	O 25	0
59	1s	15	Total 15	O 15	0



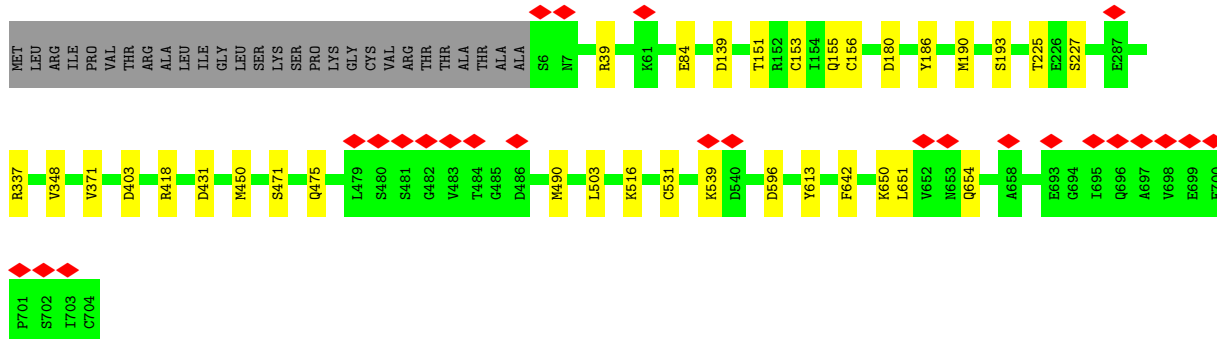
• Molecule 5: NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial



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



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

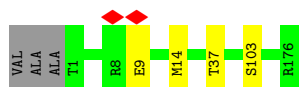


• Molecule 8: NADH-ubiquinone oxidoreductase chain 1

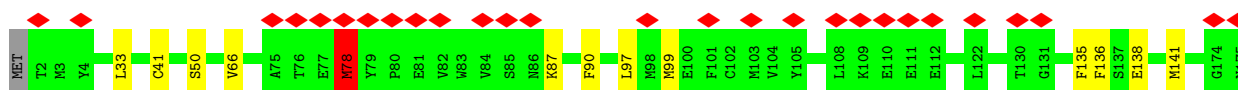
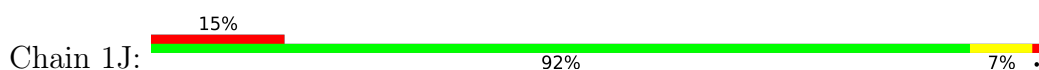




- Molecule 9: NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial



- 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

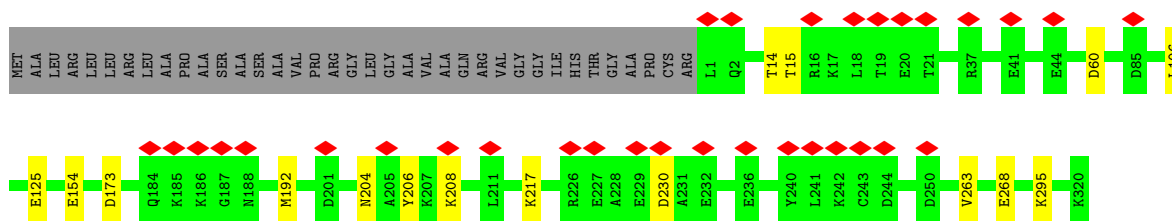


- Molecule 14: NADH-ubiquinone oxidoreductase chain 2



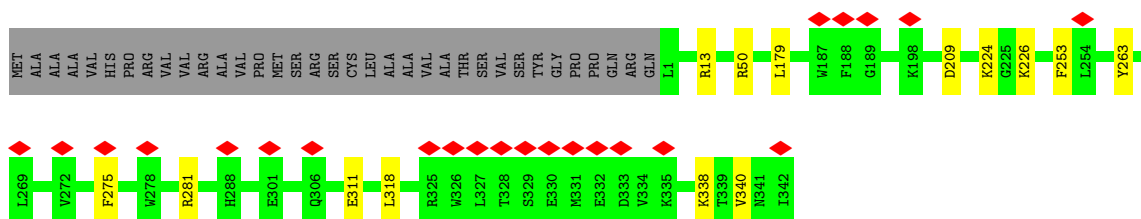
- Molecule 15: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial

Chain 10: 9% 85% 10%



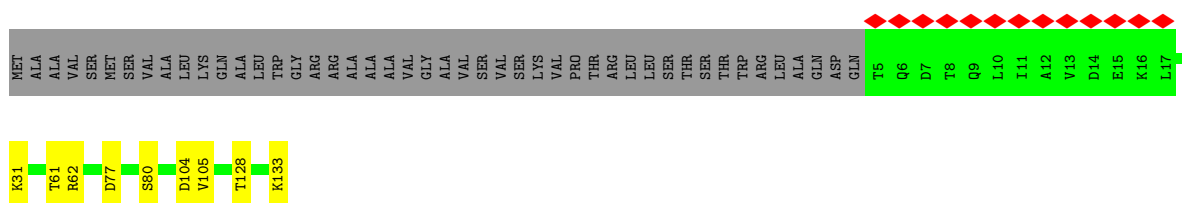
- Molecule 16: NADH:ubiquinone oxidoreductase subunit A9

Chain 1P: 6% 87% 9%



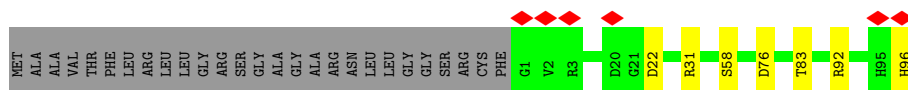
- Molecule 17: NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial

Chain 1Q: 7% 69% 5% 26%



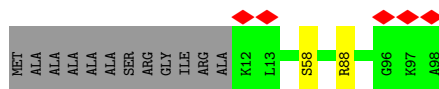
- Molecule 18: NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial

Chain 1R: 5% 72% 6% 22%

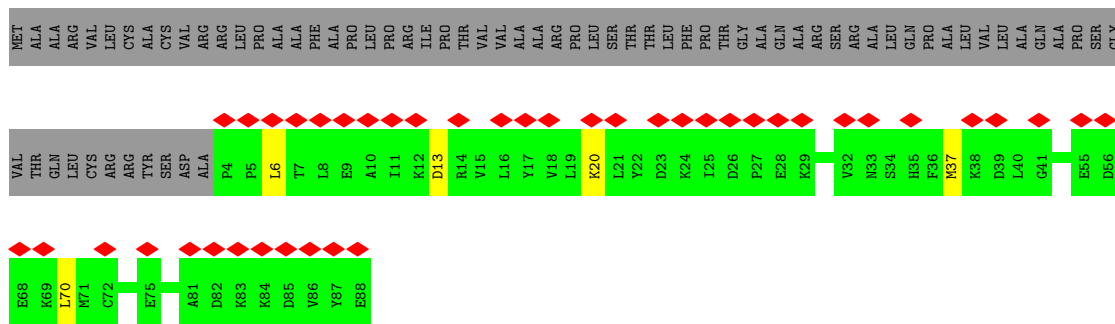


- Molecule 19: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2

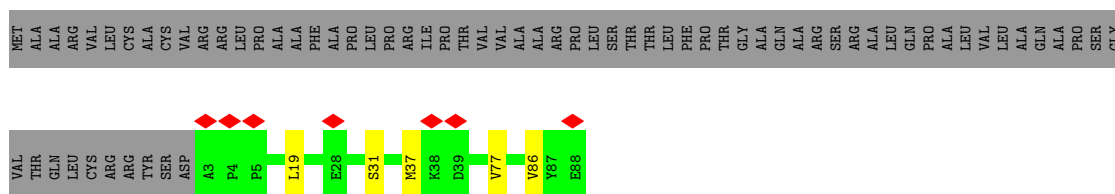
Chain 1S: 5% 86% 12%



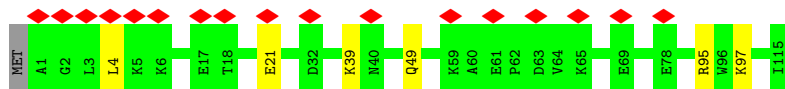
- Molecule 20: NADH:ubiquinone oxidoreductase subunit AB1



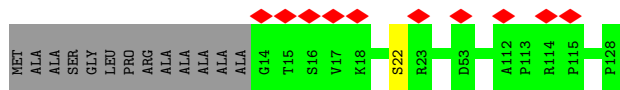
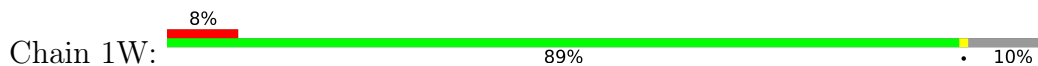
- Molecule 20: NADH:ubiquinone oxidoreductase subunit AB1



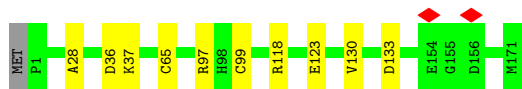
- Molecule 21: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 5 isoform X1



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

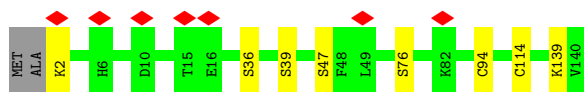


- Molecule 23: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8

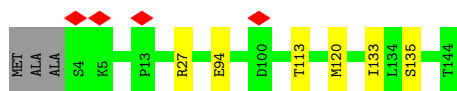


- Molecule 24: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 11

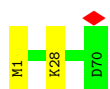




- Molecule 25: NADH:ubiquinone oxidoreductase subunit A13



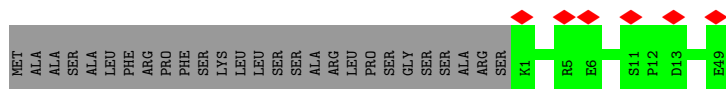
- Molecule 26: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 1



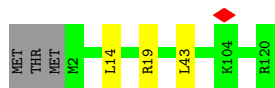
- Molecule 27: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 3



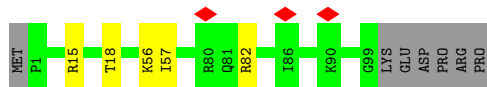
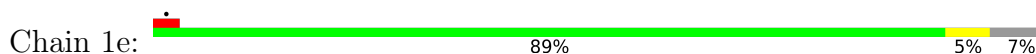
- Molecule 28: NADH dehydrogenase [ubiquinone] 1 subunit C1, mitochondrial



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

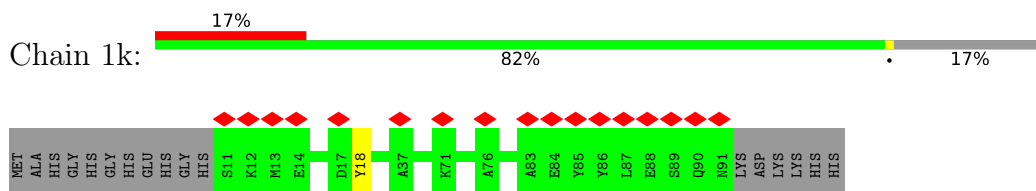


- Molecule 30: NADH dehydrogenase [ubiquinone] iron-sulfur protein 5

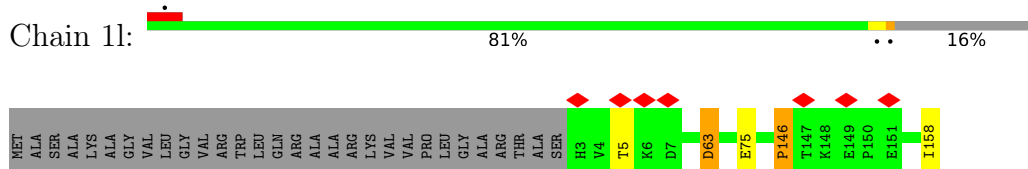


- Molecule 31: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 1

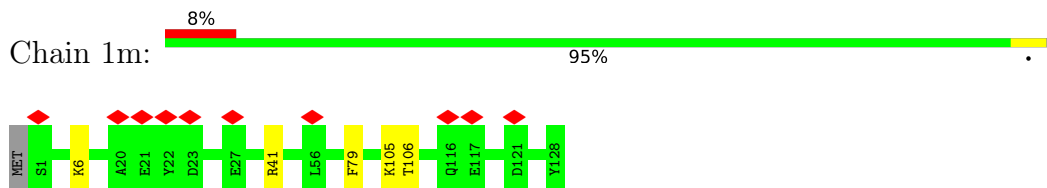
- Molecule 36: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 3



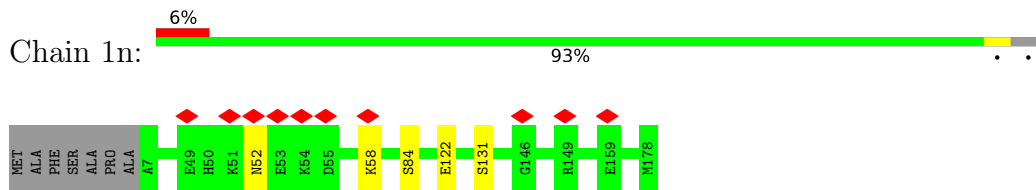
- Molecule 37: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial



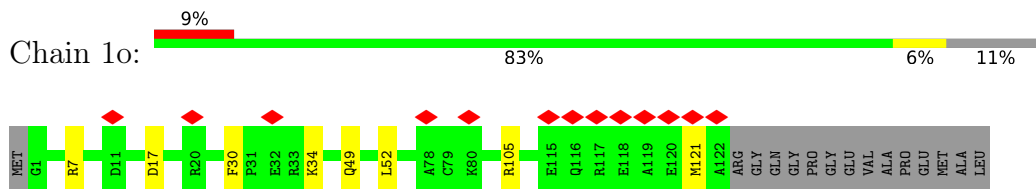
- Molecule 38: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 4



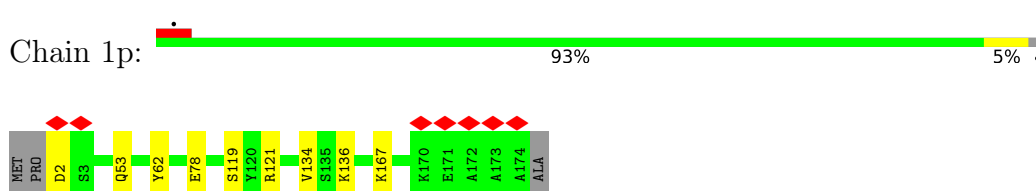
- Molecule 39: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 9



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



- Molecule 41: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 10



- Molecule 42: 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	113902	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	0.780	Depositor
Minimum map value	-0.107	Depositor
Average map value	0.004	Depositor
Map value standard deviation	0.021	Depositor
Recommended contour level	0.09	Depositor
Map size (\AA)	300.24, 300.24, 300.24	wwPDB
Map dimensions	720, 720, 720	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.417, 0.417, 0.417	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: FME, MG, FES, FMN, AME, PC1, CDL, GTP, MYR, EHZ, K, SF4, NDP, ZN, 3PE, SAC

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	0.25	0/930	0.49	0/1271
2	1B	0.27	0/1273	0.54	0/1722
3	1C	0.26	0/1791	0.51	0/2439
4	1D	0.36	2/3545 (0.1%)	0.65	4/4806 (0.1%)
5	1E	0.27	0/1698	0.51	1/2311 (0.0%)
6	1F	0.36	1/3401 (0.0%)	0.62	3/4595 (0.1%)
7	1G	0.26	0/5451	0.51	0/7387
8	1H	0.27	0/2566	0.54	3/3509 (0.1%)
9	1I	0.26	0/1443	0.51	0/1952
10	1J	0.28	0/1364	0.56	1/1850 (0.1%)
11	1K	0.26	0/751	0.47	0/1018
12	1L	0.27	0/4939	0.45	0/6718
13	1M	0.26	0/3713	0.47	0/5063
14	1N	0.26	0/2765	0.46	0/3758
15	1O	0.26	0/2650	0.51	0/3588
16	1P	0.26	0/2828	0.50	0/3834
17	1Q	0.26	0/1070	0.51	0/1446
18	1R	0.25	0/755	0.51	0/1018
19	1S	0.27	0/711	0.54	0/956
20	1T	0.26	0/701	0.45	0/946
20	1U	0.26	0/706	0.42	0/954
21	1V	0.25	0/946	0.43	0/1281
22	1W	0.26	0/995	0.51	0/1340
23	1X	0.27	0/1436	0.51	0/1938
24	1Y	0.41	2/1037 (0.2%)	0.55	1/1404 (0.1%)
25	1Z	0.27	0/1199	0.52	0/1617
26	1a	0.26	0/577	0.45	0/777
27	1b	1.12	3/664 (0.5%)	1.23	6/912 (0.7%)
28	1c	0.25	0/430	0.47	0/581
29	1d	0.28	0/1016	0.49	0/1374
30	1e	0.27	0/836	0.52	0/1118
31	1f	0.25	0/499	0.54	0/673

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
32	1g	0.27	0/858	0.53	0/1165
33	1h	0.27	0/1184	0.52	0/1603
34	1i	0.24	0/1131	0.49	0/1541
35	1j	0.24	0/627	0.46	0/858
36	1k	0.26	0/668	0.44	0/903
37	1l	0.41	1/1365 (0.1%)	0.72	4/1867 (0.2%)
38	1m	0.27	0/1092	0.54	0/1481
39	1n	0.26	0/1549	0.52	0/2098
40	1o	0.26	0/1069	0.52	0/1430
41	1p	0.26	0/1481	0.52	0/1997
42	1q	0.25	0/1253	0.50	0/1704
43	1r	0.27	0/777	0.51	0/1051
44	1s	0.27	0/394	0.51	0/533
All	All	0.30	9/68134 (0.0%)	0.53	23/92387 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
6	1F	0	2
8	1H	0	1
All	All	0	3

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
27	1b	63	PRO	CB-CG	20.89	2.54	1.50
27	1b	63	PRO	CG-CD	-17.12	0.94	1.50
6	1F	207	PRO	CG-CD	-12.54	1.09	1.50
4	1D	21	PRO	CG-CD	-11.81	1.11	1.50
37	1l	146	PRO	CG-CD	-10.52	1.16	1.50

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
27	1b	63	PRO	CB-CG-CD	-25.44	7.28	106.50
4	1D	21	PRO	N-CD-CG	-19.68	73.68	103.20
6	1F	207	PRO	N-CD-CG	-17.61	76.78	103.20
4	1D	21	PRO	CA-CB-CG	-17.24	71.24	104.00
6	1F	207	PRO	CA-CB-CG	-14.99	75.52	104.00

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	1F	206	LYS	Peptide
6	1F	207	PRO	Peptide
8	1H	91	MET	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	1A	113/115 (98%)	105 (93%)	6 (5%)	2 (2%)	8	4
2	1B	153/258 (59%)	145 (95%)	8 (5%)	0	100	100
3	1C	207/264 (78%)	204 (99%)	3 (1%)	0	100	100
4	1D	427/466 (92%)	408 (96%)	19 (4%)	0	100	100
5	1E	212/249 (85%)	198 (93%)	14 (7%)	0	100	100
6	1F	430/464 (93%)	410 (95%)	18 (4%)	2 (0%)	29	26
7	1G	697/727 (96%)	672 (96%)	22 (3%)	3 (0%)	34	32
8	1H	316/318 (99%)	297 (94%)	18 (6%)	1 (0%)	41	41
9	1I	174/239 (73%)	169 (97%)	5 (3%)	0	100	100
10	1J	172/175 (98%)	157 (91%)	13 (8%)	2 (1%)	13	8
11	1K	96/98 (98%)	93 (97%)	3 (3%)	0	100	100
12	1L	604/606 (100%)	572 (95%)	30 (5%)	2 (0%)	41	41
13	1M	457/459 (100%)	450 (98%)	6 (1%)	1 (0%)	47	49
14	1N	345/347 (99%)	334 (97%)	10 (3%)	1 (0%)	41	41

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
15	1O	318/357 (89%)	308 (97%)	10 (3%)	0	100	100
16	1P	340/377 (90%)	324 (95%)	16 (5%)	0	100	100
17	1Q	127/175 (73%)	120 (94%)	7 (6%)	0	100	100
18	1R	94/123 (76%)	88 (94%)	6 (6%)	0	100	100
19	1S	85/99 (86%)	81 (95%)	4 (5%)	0	100	100
20	1T	83/156 (53%)	83 (100%)	0	0	100	100
20	1U	84/156 (54%)	83 (99%)	1 (1%)	0	100	100
21	1V	113/116 (97%)	111 (98%)	2 (2%)	0	100	100
22	1W	113/128 (88%)	109 (96%)	4 (4%)	0	100	100
23	1X	169/172 (98%)	161 (95%)	7 (4%)	1 (1%)	25	21
24	1Y	137/141 (97%)	136 (99%)	1 (1%)	0	100	100
25	1Z	139/144 (96%)	138 (99%)	1 (1%)	0	100	100
26	1a	68/70 (97%)	68 (100%)	0	0	100	100
27	1b	81/84 (96%)	77 (95%)	4 (5%)	0	100	100
28	1c	47/76 (62%)	47 (100%)	0	0	100	100
29	1d	117/122 (96%)	116 (99%)	1 (1%)	0	100	100
30	1e	97/106 (92%)	93 (96%)	4 (4%)	0	100	100
31	1f	55/135 (41%)	51 (93%)	4 (7%)	0	100	100
32	1g	98/154 (64%)	87 (89%)	11 (11%)	0	100	100
33	1h	136/189 (72%)	134 (98%)	2 (2%)	0	100	100
34	1i	125/128 (98%)	123 (98%)	2 (2%)	0	100	100
35	1j	69/105 (66%)	65 (94%)	4 (6%)	0	100	100
36	1k	79/98 (81%)	76 (96%)	3 (4%)	0	100	100
37	1l	154/186 (83%)	149 (97%)	5 (3%)	0	100	100
38	1m	126/129 (98%)	121 (96%)	5 (4%)	0	100	100
39	1n	170/179 (95%)	163 (96%)	7 (4%)	0	100	100
40	1o	120/137 (88%)	117 (98%)	3 (2%)	0	100	100
41	1p	171/176 (97%)	170 (99%)	1 (1%)	0	100	100
42	1q	143/145 (99%)	141 (99%)	2 (1%)	0	100	100
43	1r	90/113 (80%)	86 (96%)	4 (4%)	0	100	100
44	1s	43/471 (9%)	41 (95%)	2 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	8194/9732 (84%)	7881 (96%)	298 (4%)	15 (0%)	50	49

5 of 15 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
10	1J	66	VAL
13	1M	82	SER
23	1X	28	ALA
7	1G	155	GLN
8	1H	208	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	1A	99/99 (100%)	93 (94%)	6 (6%)	18	16
2	1B	131/212 (62%)	117 (89%)	14 (11%)	6	3
3	1C	190/227 (84%)	187 (98%)	3 (2%)	62	69
4	1D	371/396 (94%)	358 (96%)	13 (4%)	36	38
5	1E	183/207 (88%)	170 (93%)	13 (7%)	14	11
6	1F	346/368 (94%)	332 (96%)	14 (4%)	31	32
7	1G	588/610 (96%)	558 (95%)	30 (5%)	24	22
8	1H	274/274 (100%)	265 (97%)	9 (3%)	38	40
9	1I	151/201 (75%)	147 (97%)	4 (3%)	46	50
10	1J	140/141 (99%)	128 (91%)	12 (9%)	10	7
11	1K	84/84 (100%)	82 (98%)	2 (2%)	49	53
12	1L	539/539 (100%)	516 (96%)	23 (4%)	29	29
13	1M	408/408 (100%)	394 (97%)	14 (3%)	37	39
14	1N	310/310 (100%)	298 (96%)	12 (4%)	32	33
15	1O	283/307 (92%)	267 (94%)	16 (6%)	20	18
16	1P	296/323 (92%)	282 (95%)	14 (5%)	26	25

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
17	1Q	117/152 (77%)	108 (92%)	9 (8%)	13 9
18	1R	79/97 (81%)	72 (91%)	7 (9%)	9 6
19	1S	77/82 (94%)	75 (97%)	2 (3%)	46 50
20	1T	79/133 (59%)	74 (94%)	5 (6%)	18 15
20	1U	79/133 (59%)	74 (94%)	5 (6%)	18 15
21	1V	100/101 (99%)	94 (94%)	6 (6%)	19 16
22	1W	107/112 (96%)	106 (99%)	1 (1%)	78 84
23	1X	153/154 (99%)	144 (94%)	9 (6%)	19 17
24	1Y	101/102 (99%)	95 (94%)	6 (6%)	19 17
25	1Z	123/124 (99%)	117 (95%)	6 (5%)	25 23
26	1a	58/58 (100%)	56 (97%)	2 (3%)	37 39
27	1b	69/70 (99%)	65 (94%)	4 (6%)	20 17
28	1c	45/66 (68%)	45 (100%)	0	100 100
29	1d	106/109 (97%)	103 (97%)	3 (3%)	43 47
30	1e	87/94 (93%)	82 (94%)	5 (6%)	20 18
31	1f	54/113 (48%)	50 (93%)	4 (7%)	13 10
32	1g	92/129 (71%)	86 (94%)	6 (6%)	17 14
33	1h	121/158 (77%)	116 (96%)	5 (4%)	30 31
34	1i	119/120 (99%)	111 (93%)	8 (7%)	16 13
35	1j	62/84 (74%)	55 (89%)	7 (11%)	6 3
36	1k	63/76 (83%)	62 (98%)	1 (2%)	62 69
37	1l	141/161 (88%)	136 (96%)	5 (4%)	36 38
38	1m	113/114 (99%)	108 (96%)	5 (4%)	28 28
39	1n	156/160 (98%)	151 (97%)	5 (3%)	39 41
40	1o	110/120 (92%)	102 (93%)	8 (7%)	14 11
41	1p	154/156 (99%)	145 (94%)	9 (6%)	20 17
42	1q	131/131 (100%)	126 (96%)	5 (4%)	33 34
43	1r	85/98 (87%)	80 (94%)	5 (6%)	19 17
44	1s	44/351 (12%)	37 (84%)	7 (16%)	2 1
All	All	7218/8264 (87%)	6869 (95%)	349 (5%)	29 24

5 of 349 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
21	1V	95	ARG
34	1i	34	LEU
23	1X	99	CYS
27	1b	83	LEU
37	1l	5	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
37	1l	99	ASN
41	1p	130	GLN
44	1s	43	HIS
43	1r	50	ASN
15	1O	200	GLN

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	$\# Z > 2$
14	FME	1N	1	14	8,9,10	0.52	0	7,9,11	1.00	1 (14%)
13	FME	1M	1	13	8,9,10	0.50	0	7,9,11	1.13	1 (14%)
34	SAC	1i	1	34	7,8,9	0.53	0	8,9,11	0.89	1 (12%)
8	FME	1H	1	8	8,9,10	0.51	0	7,9,11	1.08	1 (14%)
1	FME	1A	1	1	8,9,10	0.52	0	7,9,11	1.05	1 (14%)
11	FME	1K	1	11	8,9,10	0.49	0	7,9,11	1.02	1 (14%)
12	FME	1L	1	12	8,9,10	0.52	0	7,9,11	0.95	1 (14%)

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
14	FME	1N	1	14	-	0/7/9/11	-
13	FME	1M	1	13	-	1/7/9/11	-
34	SAC	1i	1	34	-	0/7/8/10	-
8	FME	1H	1	8	-	1/7/9/11	-
1	FME	1A	1	1	-	1/7/9/11	-
11	FME	1K	1	11	-	1/7/9/11	-
12	FME	1L	1	12	-	0/7/9/11	-

There are no bond length outliers.

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	1K	1	FME	O-C-CA	-2.62	117.91	124.78
8	1H	1	FME	O-C-CA	-2.61	117.93	124.78
13	1M	1	FME	O-C-CA	-2.61	117.94	124.78
14	1N	1	FME	O-C-CA	-2.57	118.04	124.78
1	1A	1	FME	O-C-CA	-2.42	118.44	124.78

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	1H	1	FME	O1-CN-N-CA
11	1K	1	FME	N-CA-CB-CG
13	1M	1	FME	C-CA-CB-CG
1	1A	1	FME	CB-CG-SD-CE

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 52 ligands modelled in this entry, 3 are monoatomic - leaving 49 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	1N	903	-	32,32,50	0.33	0	35,37,55	0.43	0
45	3PE	1M	501	-	44,44,50	0.29	0	47,49,55	0.37	0
45	3PE	1J	201	-	43,43,50	0.28	0	46,48,55	0.39	0
45	3PE	1Y	204	-	26,26,50	0.35	0	29,31,55	0.42	0
46	PC1	1H	401	-	47,47,53	0.29	0	53,55,61	0.37	0
46	PC1	1Z	201	-	43,43,53	0.28	0	49,51,61	0.33	0
47	SF4	1G	802	7	0,12,12	-	-	-	-	-
49	FMN	1F	501	-	33,33,33	0.60	0	48,50,50	0.67	1 (2%)
46	PC1	1B	203	-	47,47,53	0.28	0	53,55,61	0.44	0
51	CDL	1h	202	-	79,79,99	0.30	0	85,91,111	0.44	0
46	PC1	1B	202	-	45,45,53	0.28	0	51,53,61	0.32	0
57	AME	1h	201	-	9,10,11	0.49	0	9,11,13	1.06	1 (11%)
47	SF4	1I	203	9	0,12,12	-	-	-	-	-
46	PC1	1M	503	-	43,43,53	0.31	0	49,51,61	0.37	0
45	3PE	1Y	202	-	39,39,50	0.29	0	42,44,55	0.40	0
47	SF4	1G	801	7	0,12,12	-	-	-	-	-
51	CDL	1q	202	-	60,60,99	0.34	0	66,72,111	0.42	0
45	3PE	1d	201	-	47,47,50	0.28	0	50,52,55	0.43	0
45	3PE	1A	201	-	46,46,50	0.28	0	49,51,55	0.34	0
46	PC1	1m	201	-	45,45,53	0.30	0	51,53,61	1.09	3 (5%)
46	PC1	1q	201	-	48,48,53	0.28	0	54,56,61	0.54	1 (1%)
48	FES	1G	803	7	0,4,4	-	-	-	-	-
47	SF4	1B	201	2	0,12,12	-	-	-	-	-
51	CDL	1d	202	-	64,64,99	0.32	0	70,76,111	0.41	0
45	3PE	1j	101	-	43,43,50	0.29	0	46,48,55	0.45	0
46	PC1	1Y	201	-	34,34,53	0.33	0	40,42,61	0.42	0
45	3PE	1L	701	-	45,45,50	0.30	0	48,50,55	0.46	0
51	CDL	1L	702	-	75,75,99	0.29	0	81,87,111	0.38	0
51	CDL	1X	201	-	85,85,99	0.28	0	91,97,111	0.39	0
52	GTP	1O	401	53	26,34,34	0.95	2 (7%)	32,54,54	0.89	1 (3%)
47	SF4	1F	502	6	0,12,12	-	-	-	-	-

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
45	3PE	1N	901	-	48,48,50	0.31	0	51,53,55	0.41	0
45	3PE	1Y	205	-	40,40,50	0.30	0	43,45,55	0.67	1 (2%)
45	3PE	1L	703	-	44,44,50	0.28	0	47,49,55	0.48	0
46	PC1	1h	203	-	46,46,53	0.28	0	52,54,61	0.30	0
56	EHZ	1T	101	-	29,36,37	0.17	0	35,44,47	1.07	1 (2%)
56	EHZ	1n	201	-	29,36,37	0.15	0	35,44,47	1.08	1 (2%)
45	3PE	1Y	203	-	29,29,50	0.34	0	32,34,55	0.70	1 (3%)
54	NDP	1P	402	-	45,52,52	0.60	0	53,80,80	0.75	2 (3%)
48	FES	1E	301	5	0,4,4	-	-	-	-	-
46	PC1	1I	201	-	53,53,53	0.26	0	59,61,61	0.38	0
45	3PE	1L	704	-	30,30,50	0.34	0	33,35,55	0.68	1 (3%)
58	MYR	1l	201	-	14,14,15	0.35	0	13,13,15	0.38	0
46	PC1	1A	202	-	34,34,53	0.33	0	40,42,61	0.39	0
51	CDL	1N	902	-	61,61,99	0.31	0	67,73,111	0.56	1 (1%)
45	3PE	1M	502	-	50,50,50	0.27	0	53,55,55	0.39	0
46	PC1	1P	401	-	32,32,53	0.33	0	38,40,61	0.47	0
45	3PE	1M	504	-	49,49,50	0.26	0	52,54,55	0.36	0
47	SF4	1I	202	9	0,12,12	-	-	-	-	-

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
45	3PE	1N	903	-	-	4/36/36/54	-
45	3PE	1M	501	-	-	9/48/48/54	-
45	3PE	1J	201	-	-	12/47/47/54	-
45	3PE	1Y	204	-	-	6/30/30/54	-
46	PC1	1H	401	-	-	13/51/51/57	-
46	PC1	1Z	201	-	-	2/47/47/57	-
47	SF4	1G	802	7	-	-	0/6/5/5
49	FMN	1F	501	-	-	1/18/18/18	0/3/3/3
46	PC1	1B	203	-	-	13/51/51/57	-
46	PC1	1B	202	-	-	9/49/49/57	-
57	AME	1h	201	-	-	2/9/10/12	-
47	SF4	1I	203	9	-	-	0/6/5/5
46	PC1	1M	503	-	-	8/47/47/57	-
47	SF4	1I	202	9	-	-	0/6/5/5

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
45	3PE	1Y	202	-	-	9/43/43/54	-
47	SF4	1G	801	7	-	-	0/6/5/5
51	CDL	1q	202	-	-	9/71/71/110	-
45	3PE	1d	201	-	-	18/51/51/54	-
45	3PE	1A	201	-	-	10/50/50/54	-
46	PC1	1m	201	-	-	12/49/49/57	-
46	PC1	1q	201	-	-	9/52/52/57	-
51	CDL	1d	202	-	-	25/75/75/110	-
47	SF4	1B	201	2	-	-	0/6/5/5
48	FES	1G	803	7	-	-	0/1/1/1
45	3PE	1j	101	-	-	5/47/47/54	-
46	PC1	1Y	201	-	-	9/38/38/57	-
45	3PE	1L	701	-	-	6/49/49/54	-
51	CDL	1L	702	-	-	13/86/86/110	-
51	CDL	1X	201	-	-	18/96/96/110	-
52	GTP	1O	401	53	-	4/18/38/38	0/3/3/3
47	SF4	1F	502	6	-	-	0/6/5/5
45	3PE	1N	901	-	-	13/52/52/54	-
45	3PE	1Y	205	-	-	16/44/44/54	-
45	3PE	1L	703	-	-	9/48/48/54	-
46	PC1	1h	203	-	-	14/50/50/57	-
56	EHZ	1T	101	-	-	15/42/44/45	-
56	EHZ	1n	201	-	-	2/42/44/45	-
45	3PE	1Y	203	-	-	14/33/33/54	-
54	NDP	1P	402	-	-	3/30/77/77	0/5/5/5
48	FES	1E	301	5	-	-	0/1/1/1
46	PC1	1I	201	-	-	10/57/57/57	-
45	3PE	1L	704	-	-	9/34/34/54	-
58	MYR	1l	201	-	-	0/11/12/13	-
46	PC1	1A	202	-	-	5/38/38/57	-
51	CDL	1N	902	-	-	12/71/71/110	-
45	3PE	1M	502	-	-	12/54/54/54	-
46	PC1	1P	401	-	-	10/36/36/57	-
45	3PE	1M	504	-	-	6/53/53/54	-
51	CDL	1h	202	-	-	10/90/90/110	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
52	1O	401	GTP	C5-C6	-2.62	1.42	1.47
52	1O	401	GTP	C8-N7	-2.05	1.31	1.35

The worst 5 of 15 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
46	1m	201	PC1	O21-C21-C22	5.93	124.29	111.50
56	1n	201	EHZ	C10-S1-C9	5.89	120.20	101.87
56	1T	101	EHZ	C10-S1-C9	5.60	119.29	101.87
45	1Y	205	3PE	O21-C21-C22	3.15	118.28	111.50
51	1N	902	CDL	OB6-CB5-C51	3.12	116.82	111.09

There are no chirality outliers.

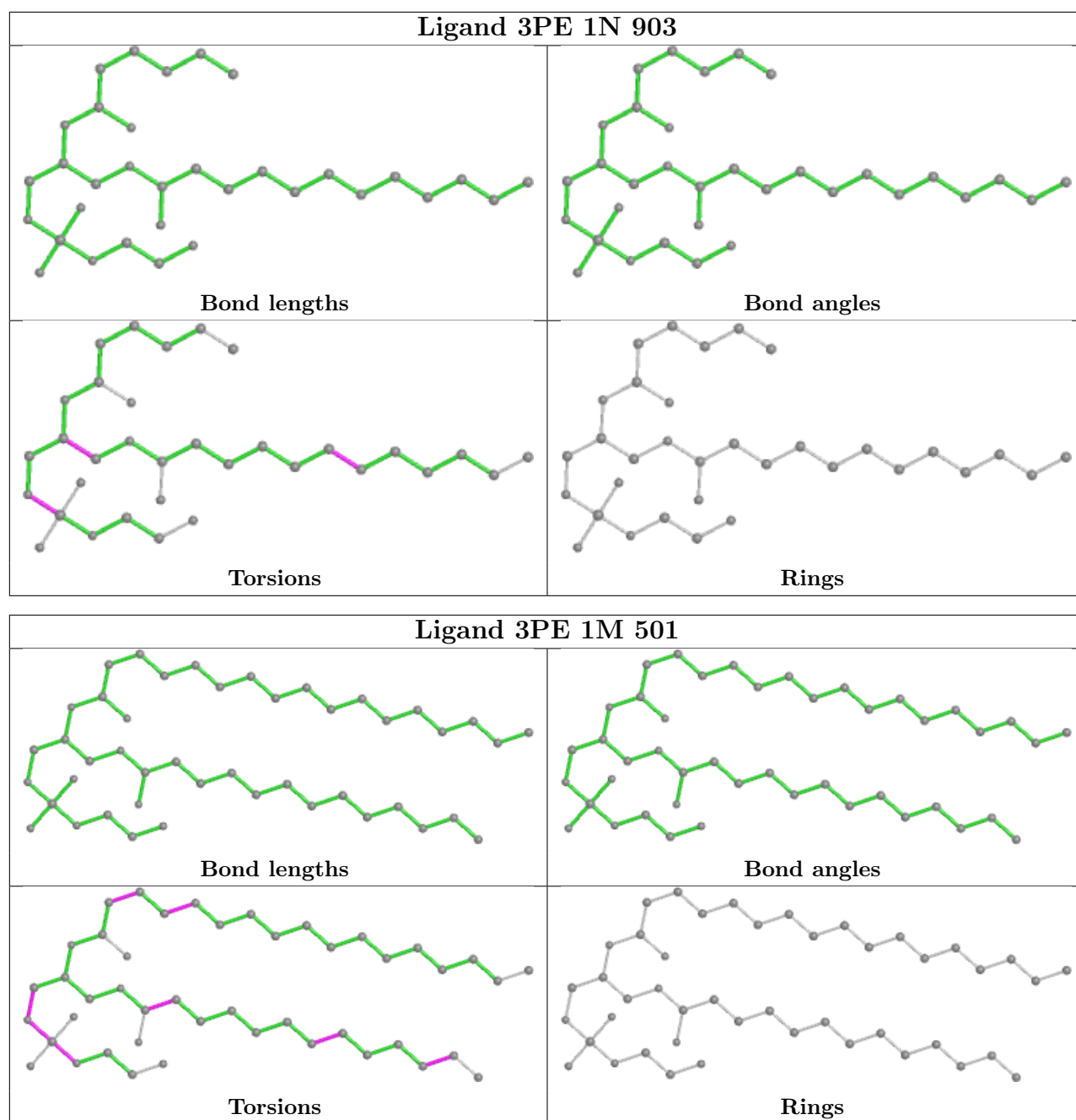
5 of 386 torsion outliers are listed below:

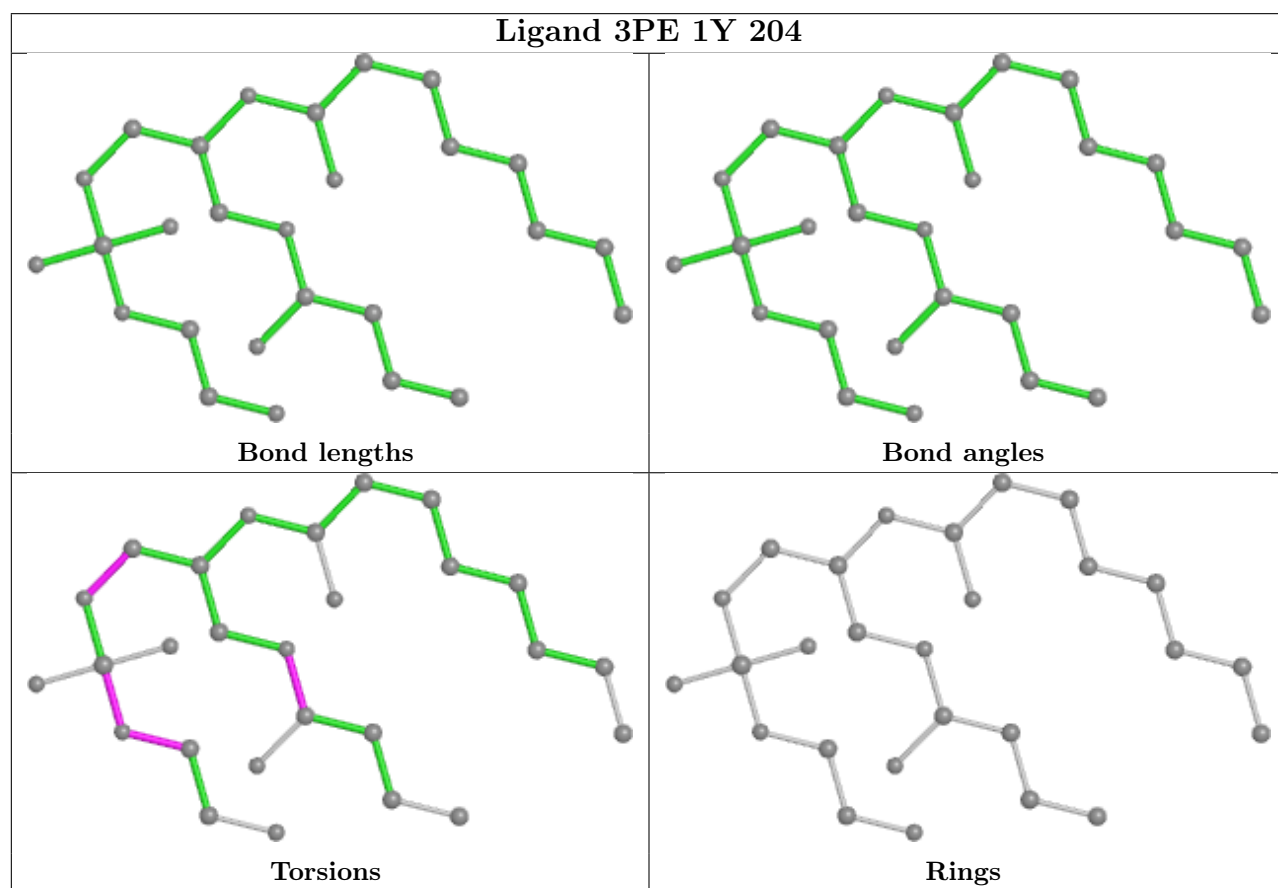
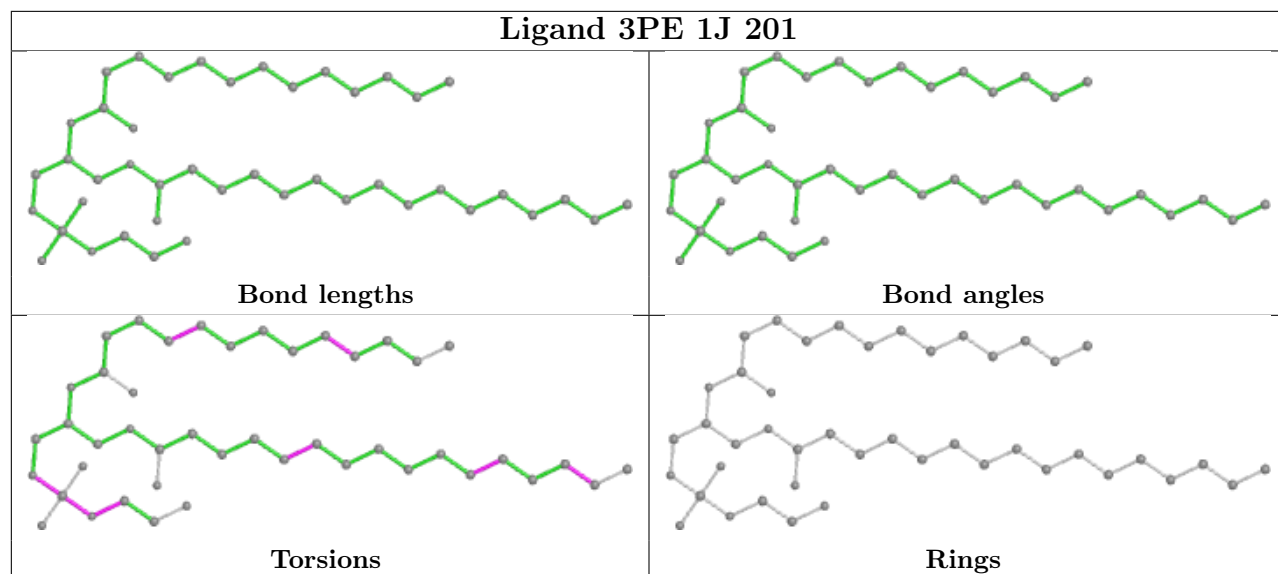
Mol	Chain	Res	Type	Atoms
45	1A	201	3PE	C1-O11-P-O14
45	1J	201	3PE	C1-O11-P-O14
45	1J	201	3PE	C11-O13-P-O12
45	1J	201	3PE	C12-C11-O13-P
45	1L	701	3PE	O32-C31-O31-C3

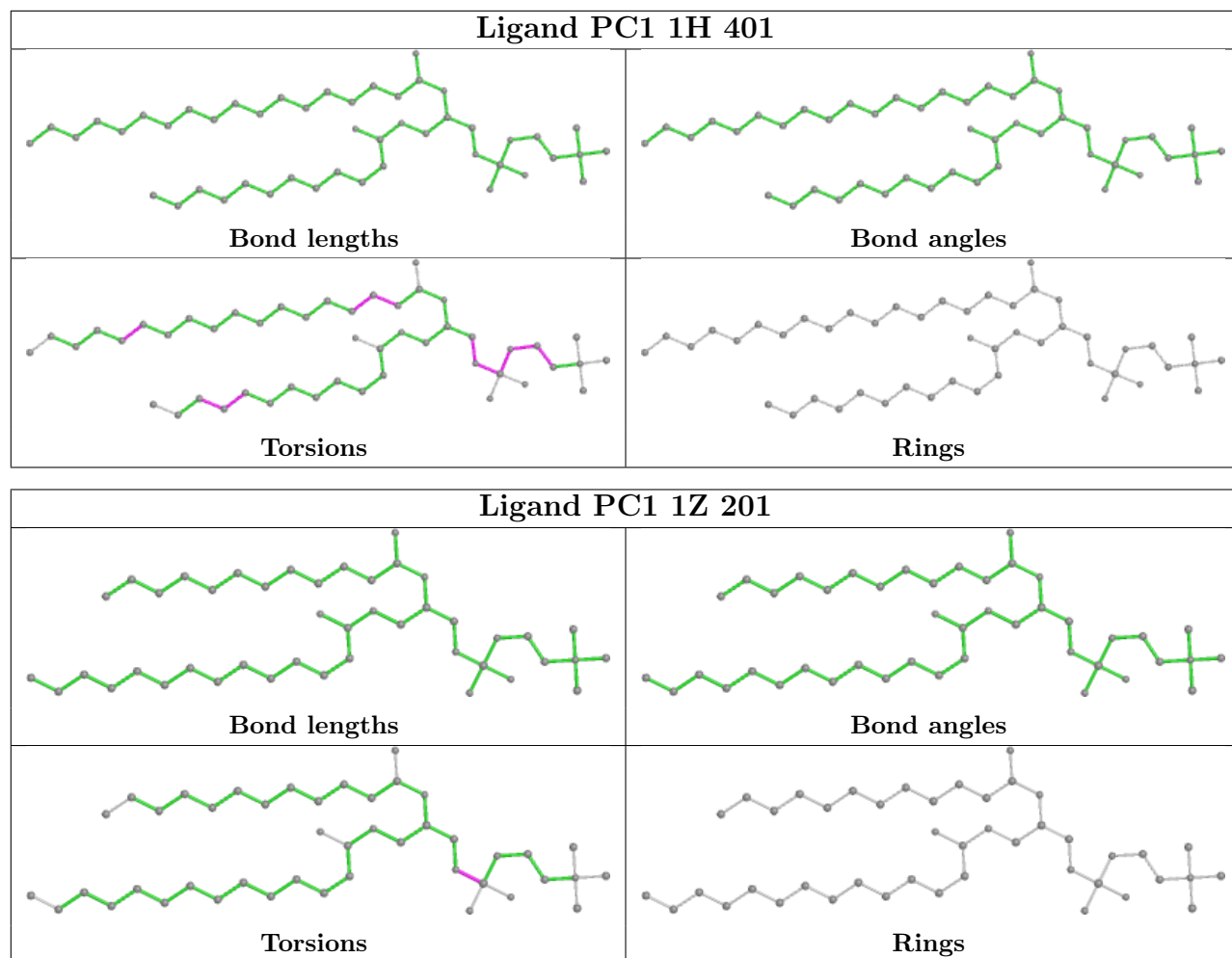
There are no ring outliers.

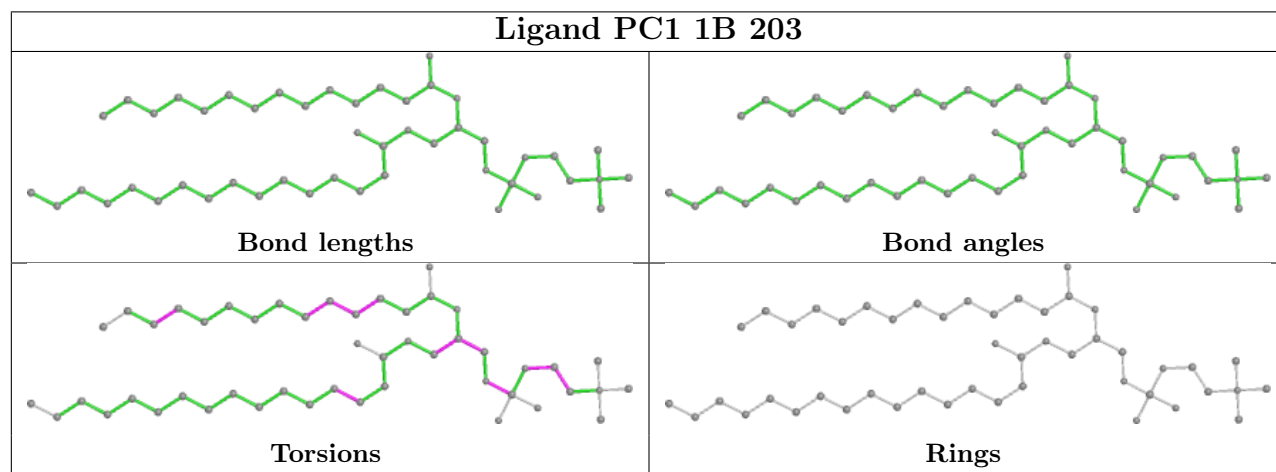
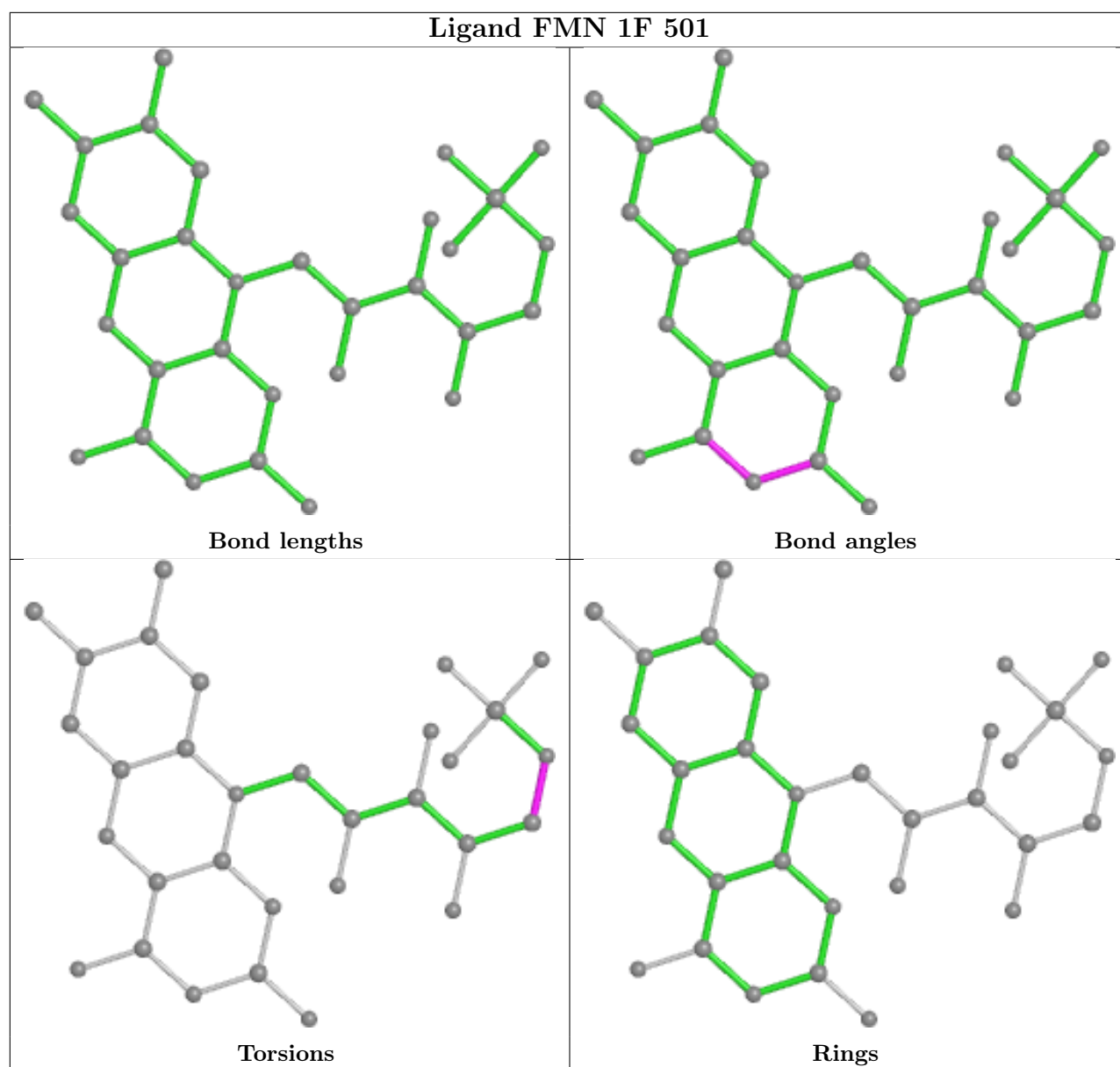
No monomer is involved in short contacts.

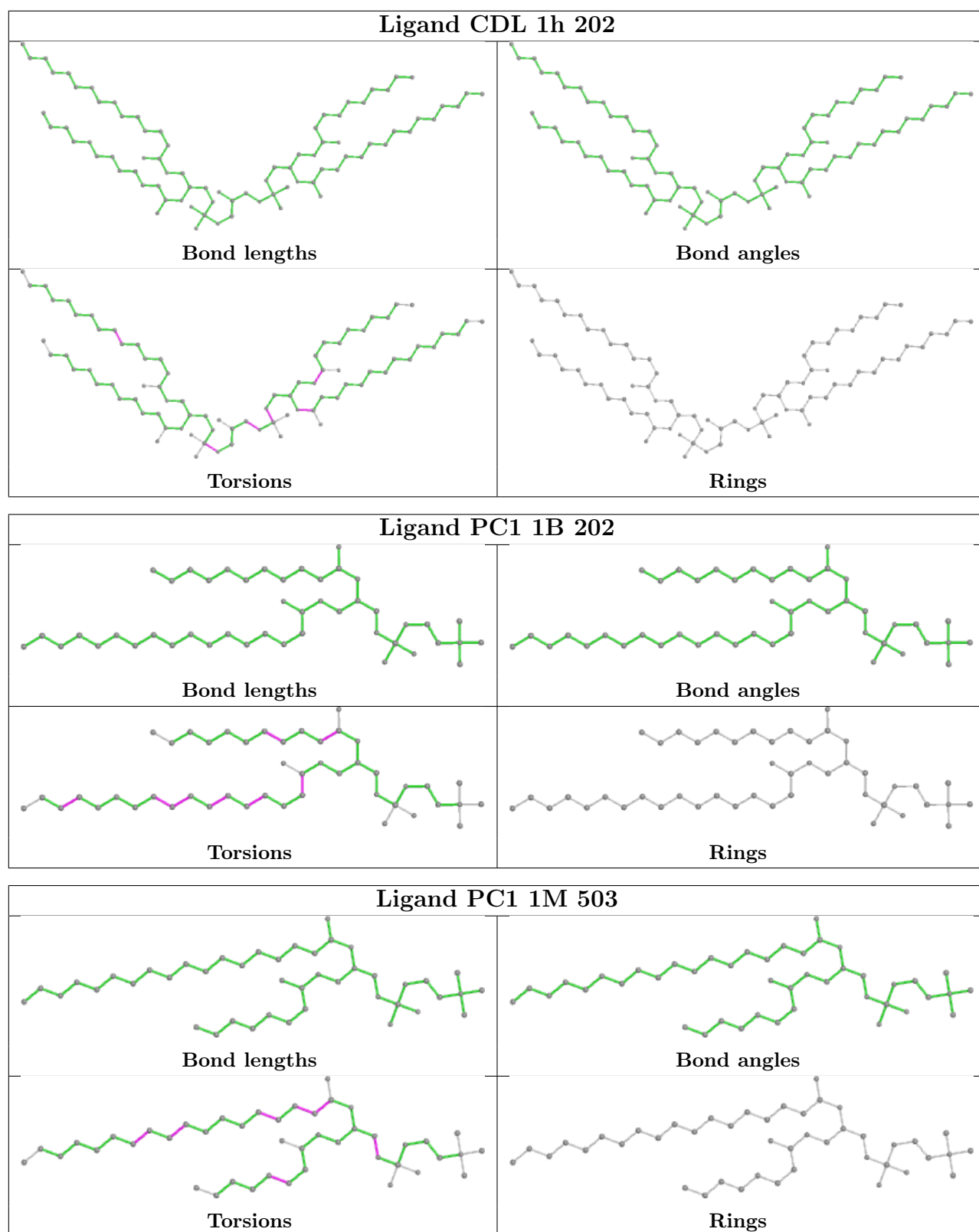
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

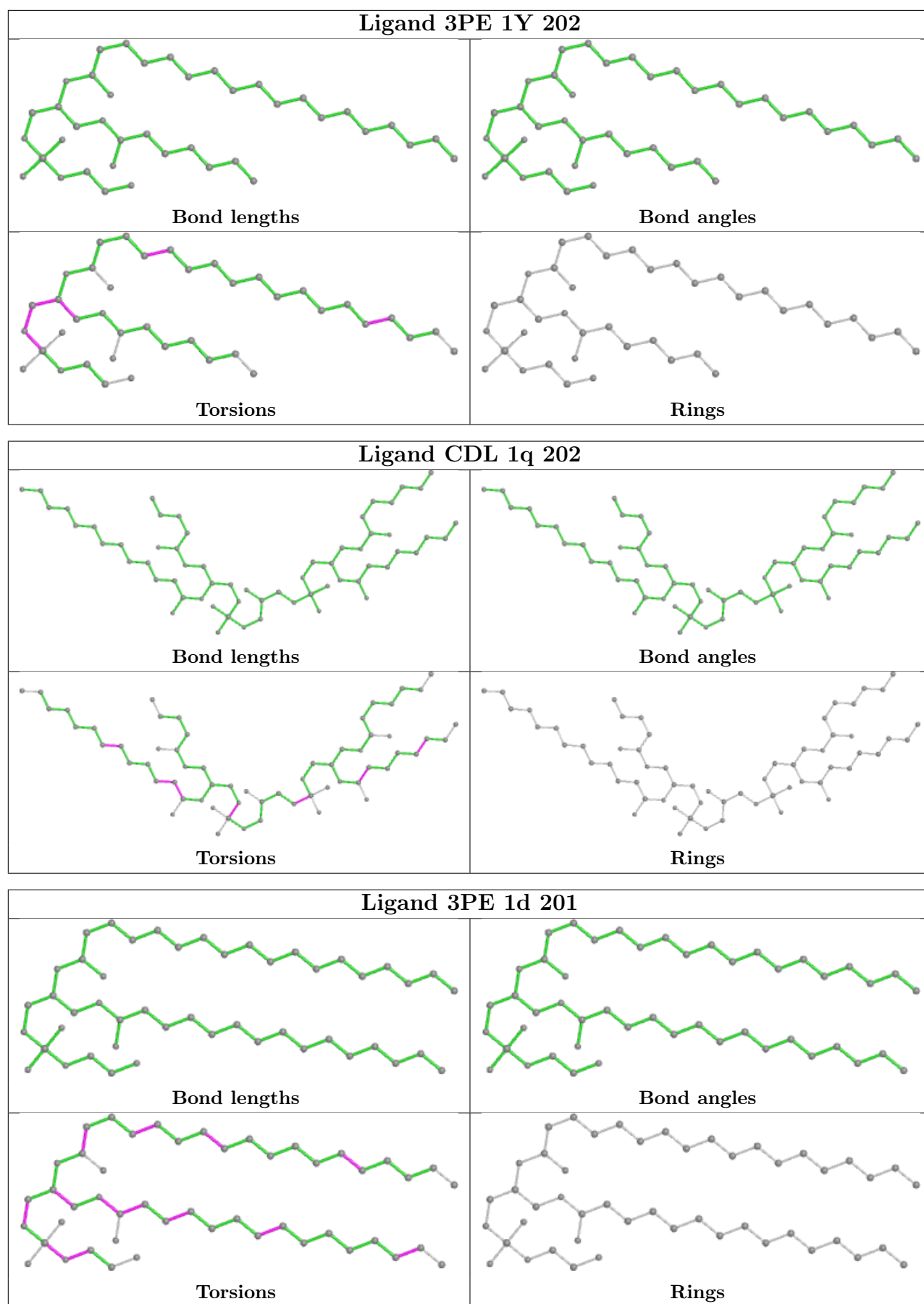


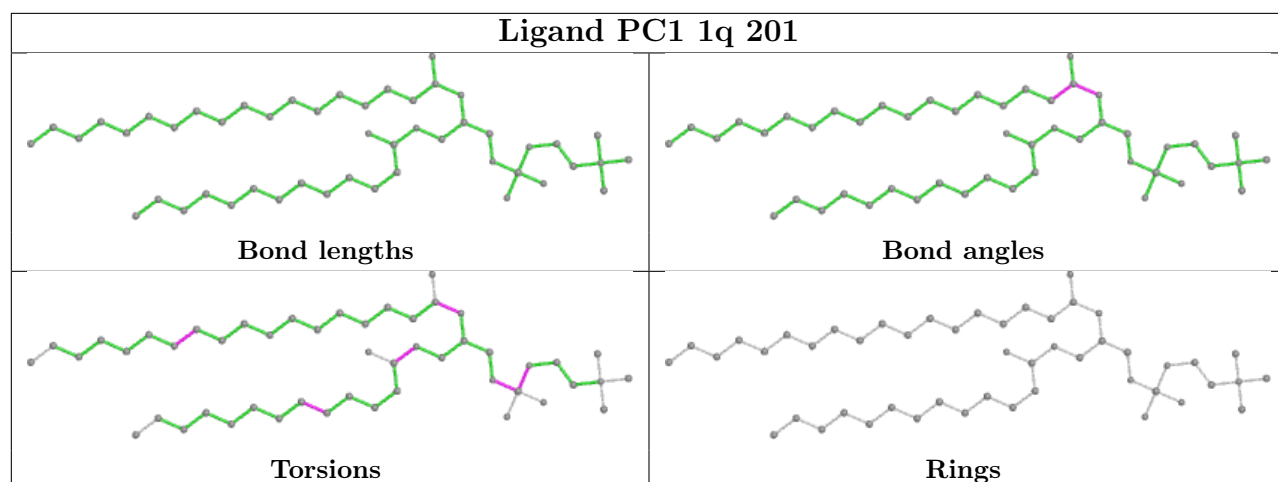
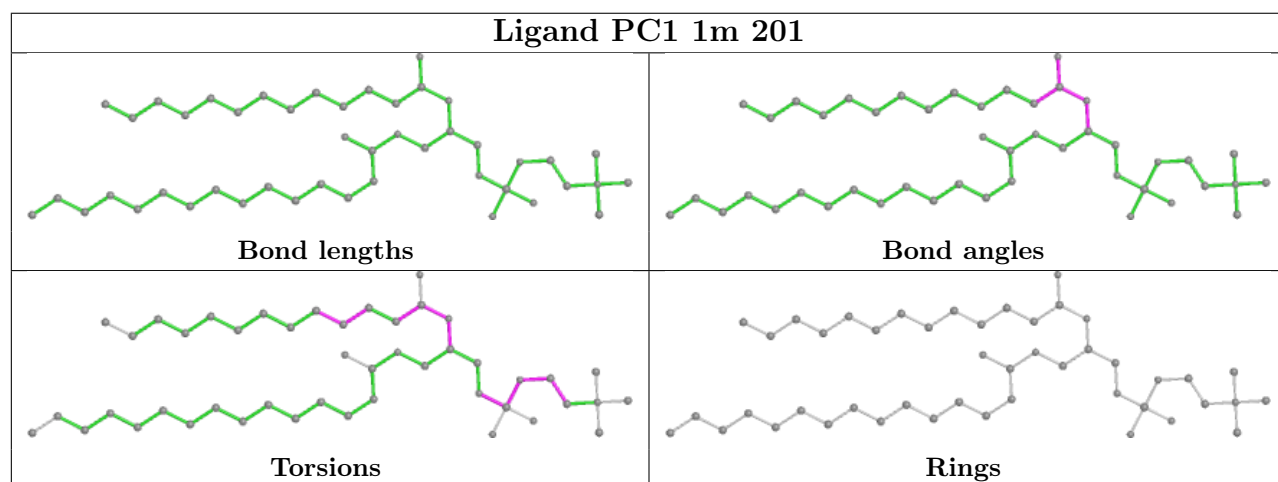
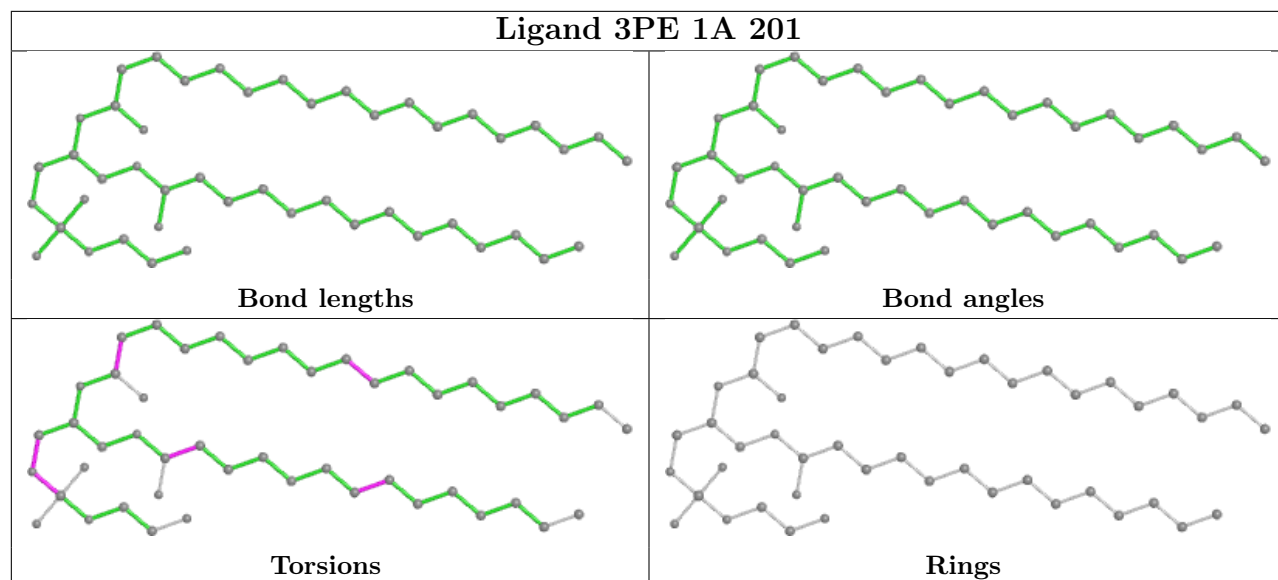


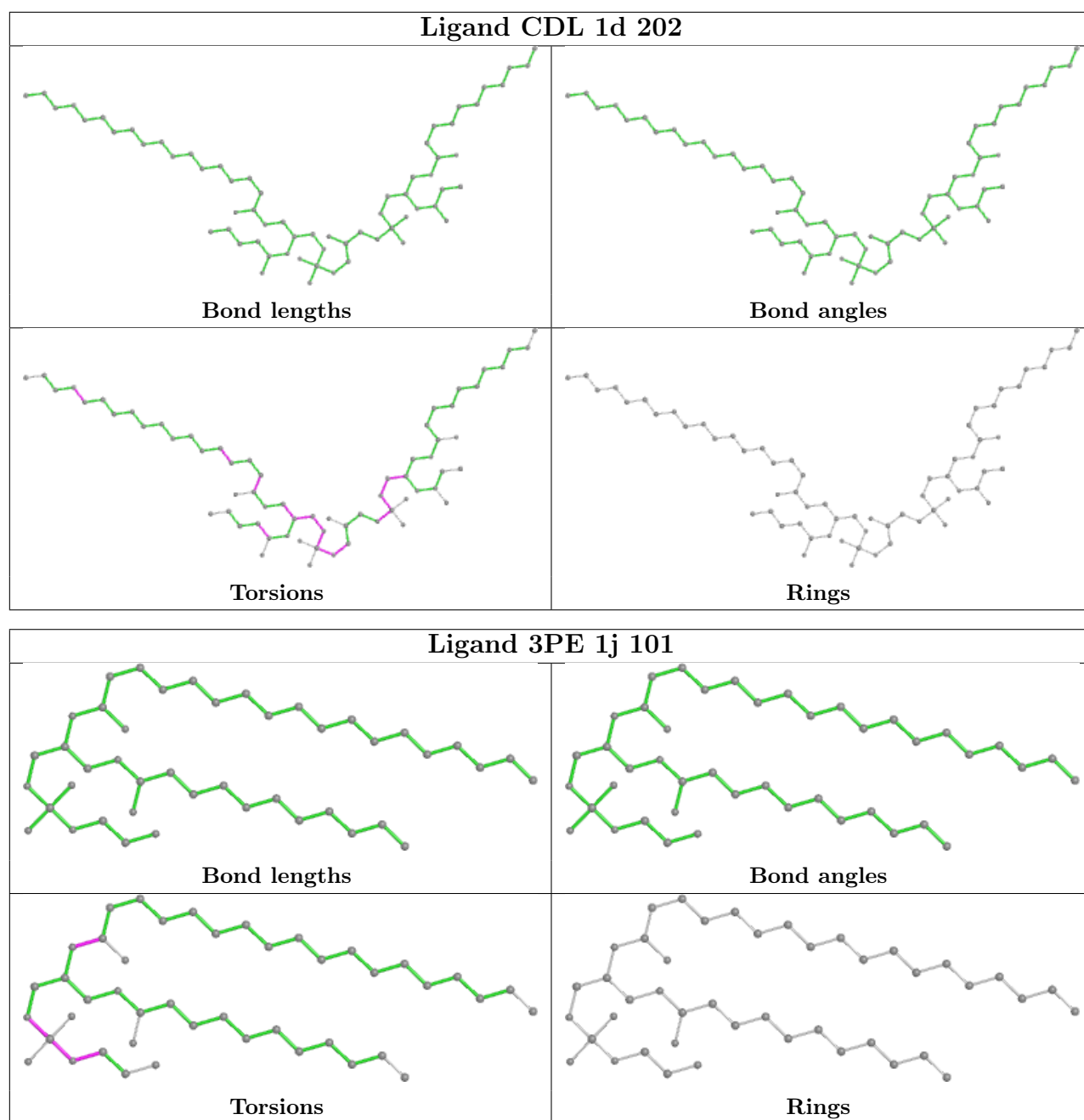


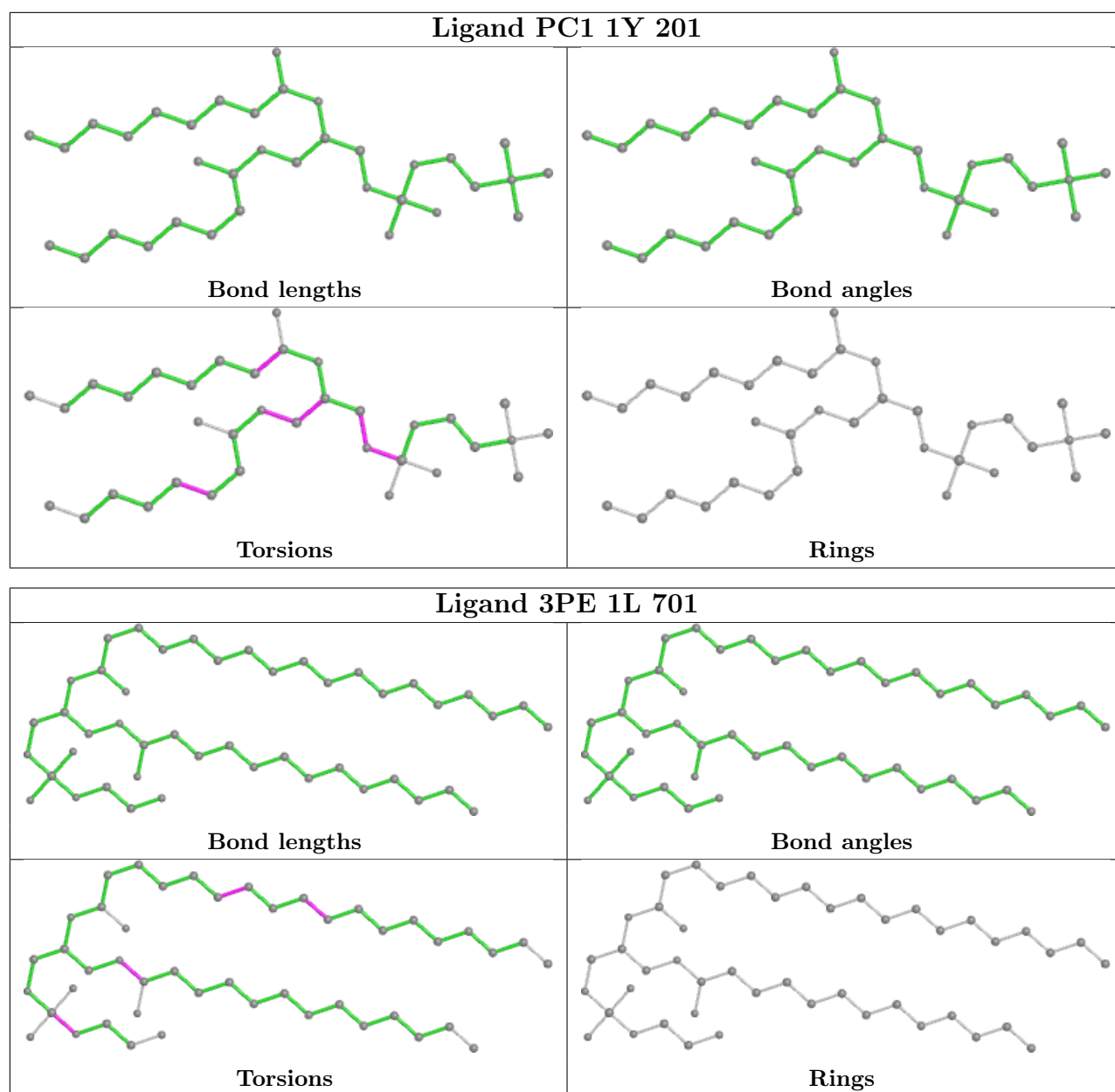


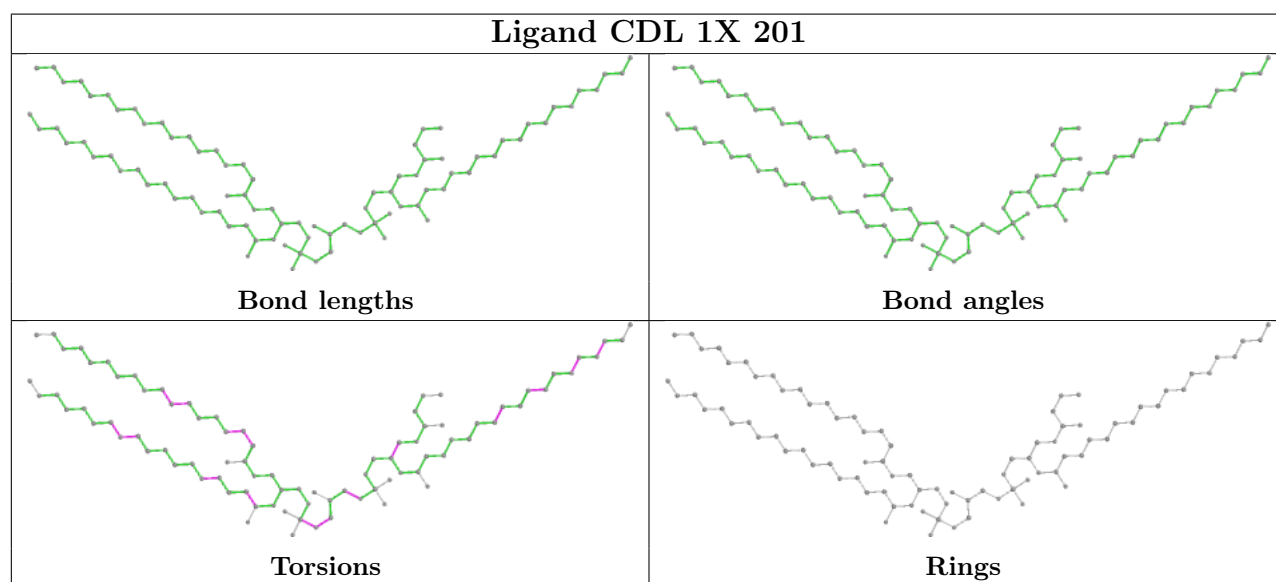
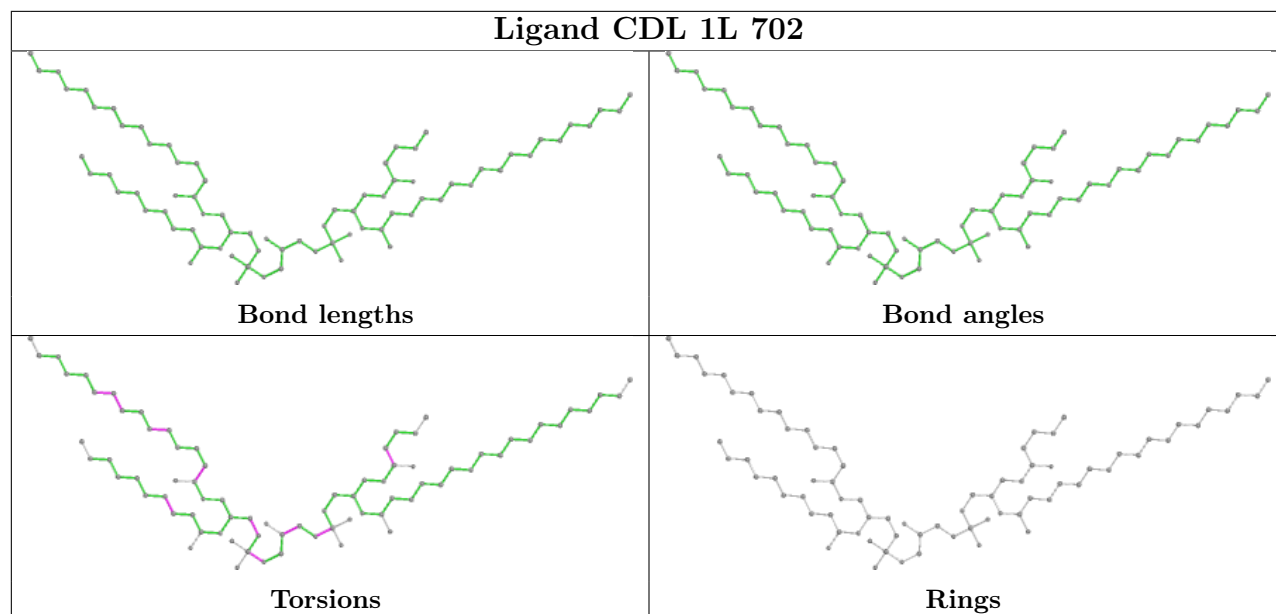


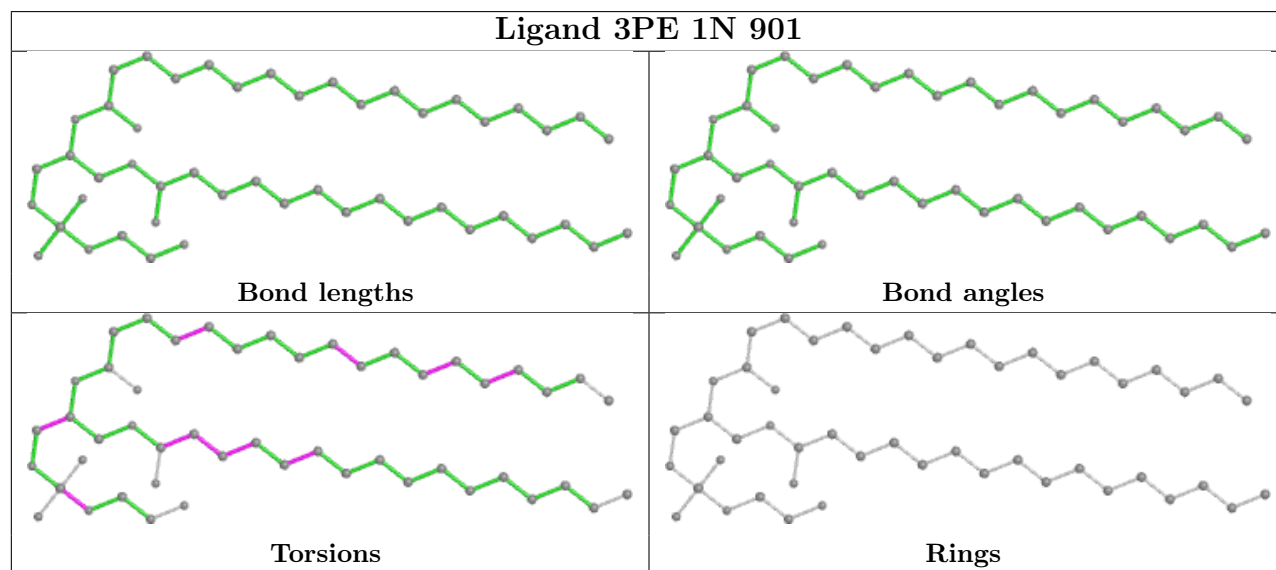
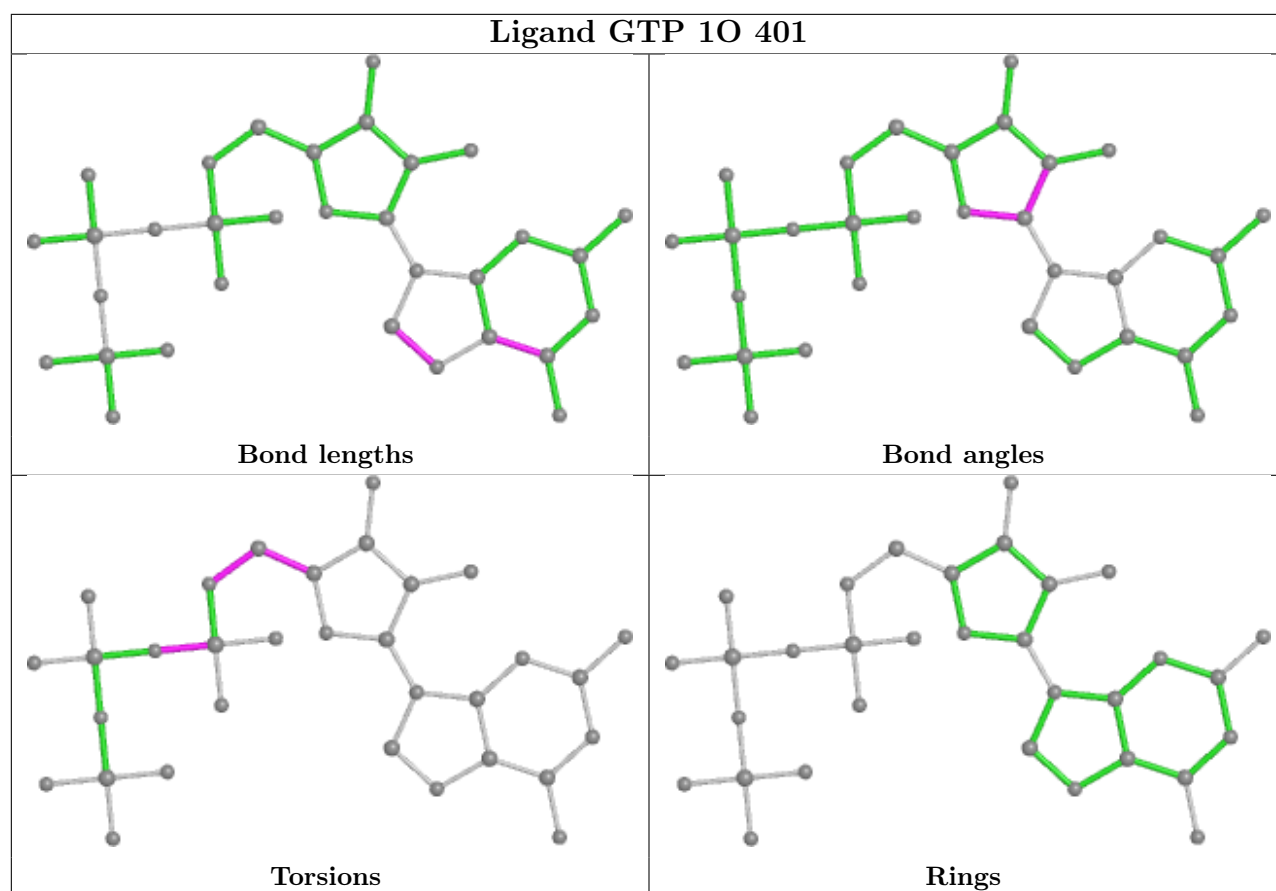


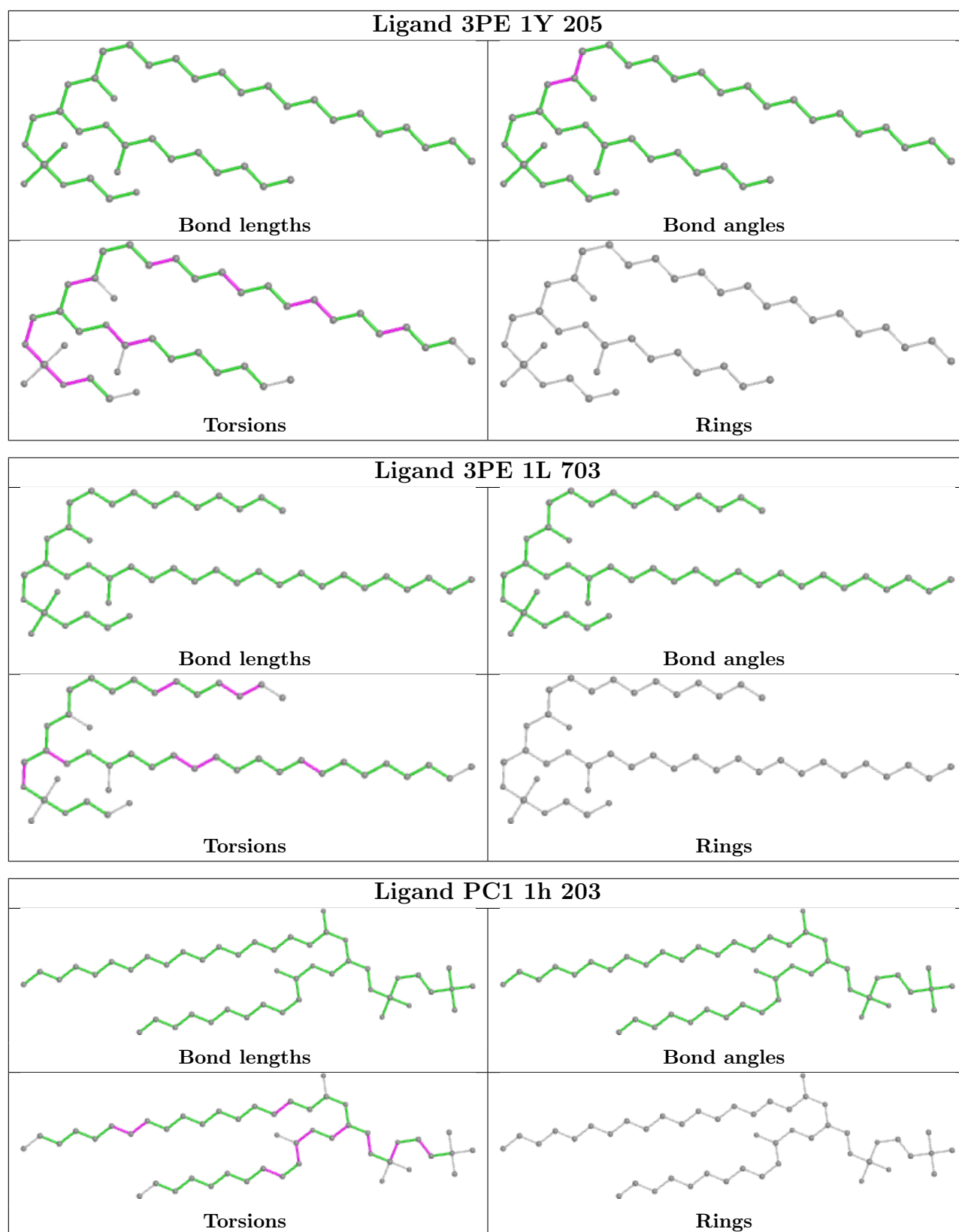


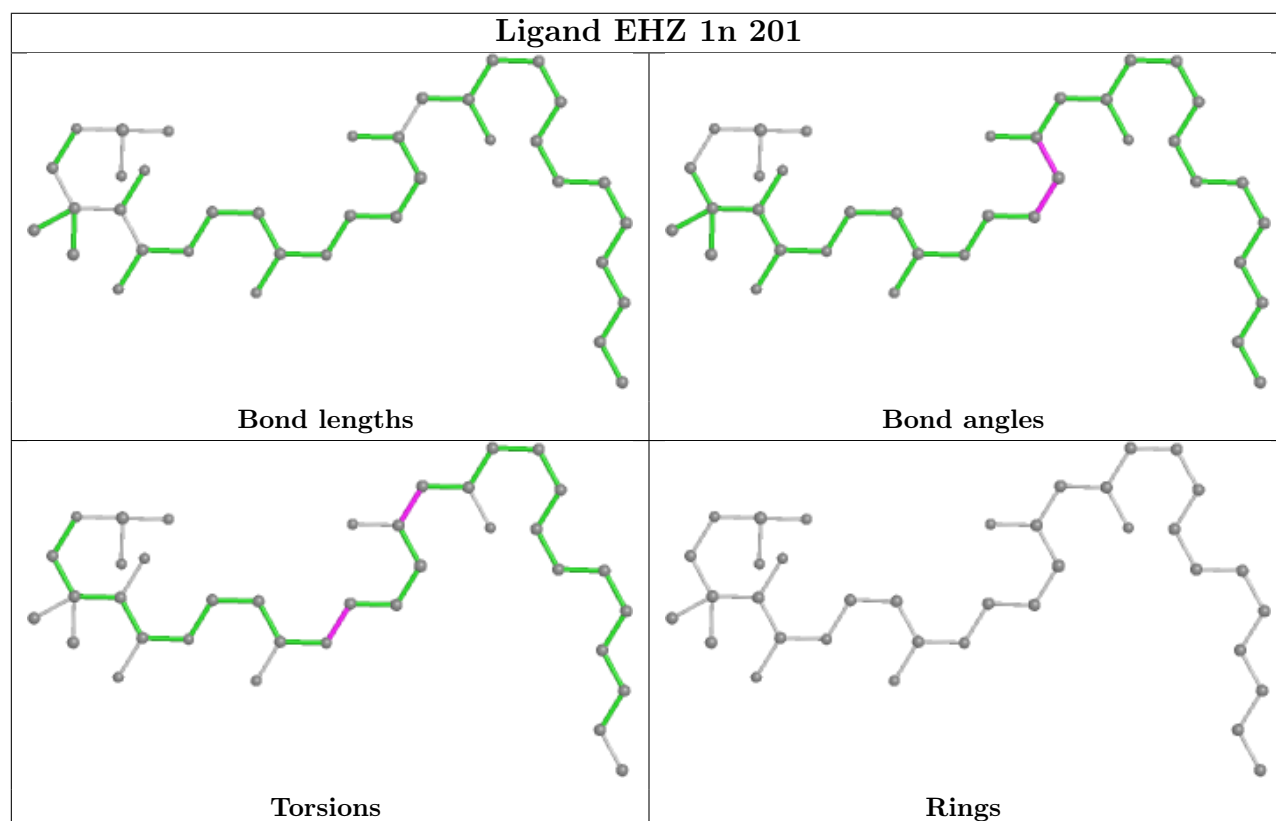
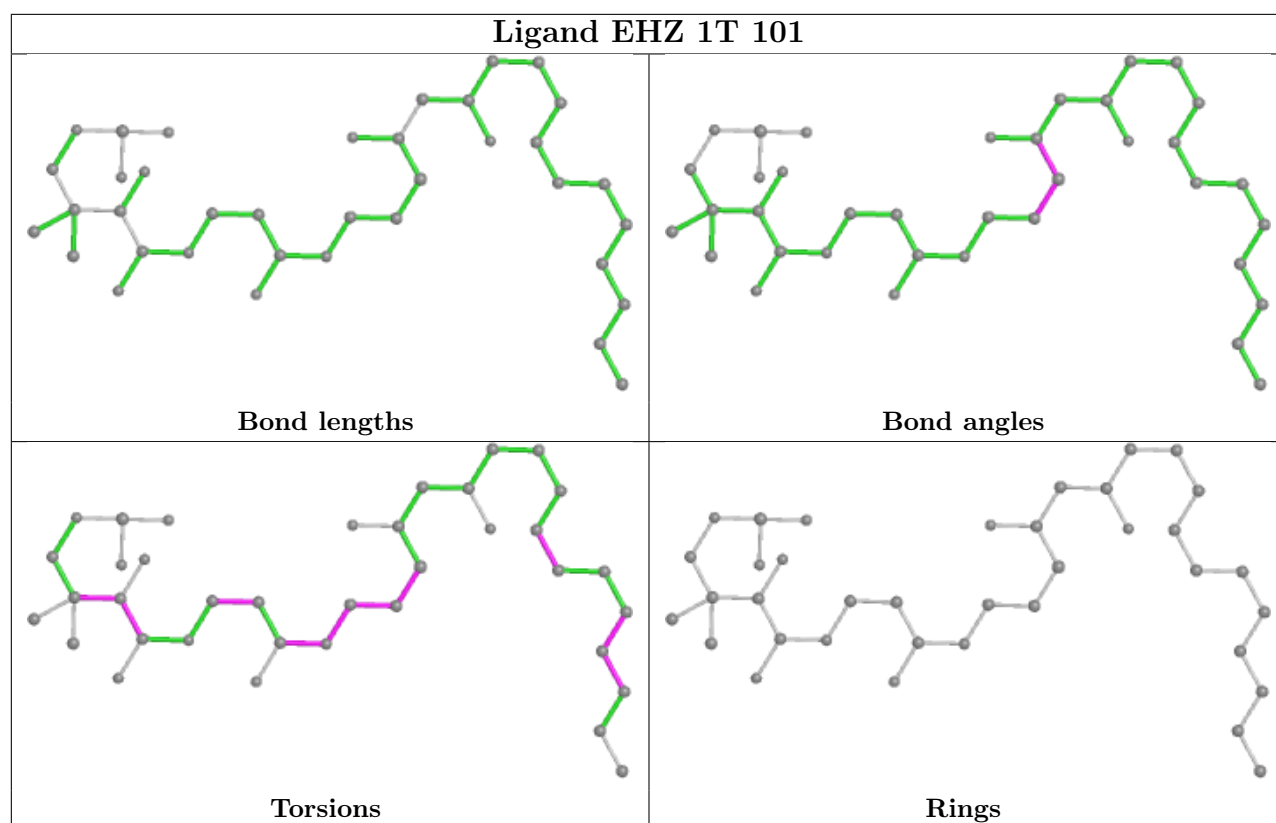


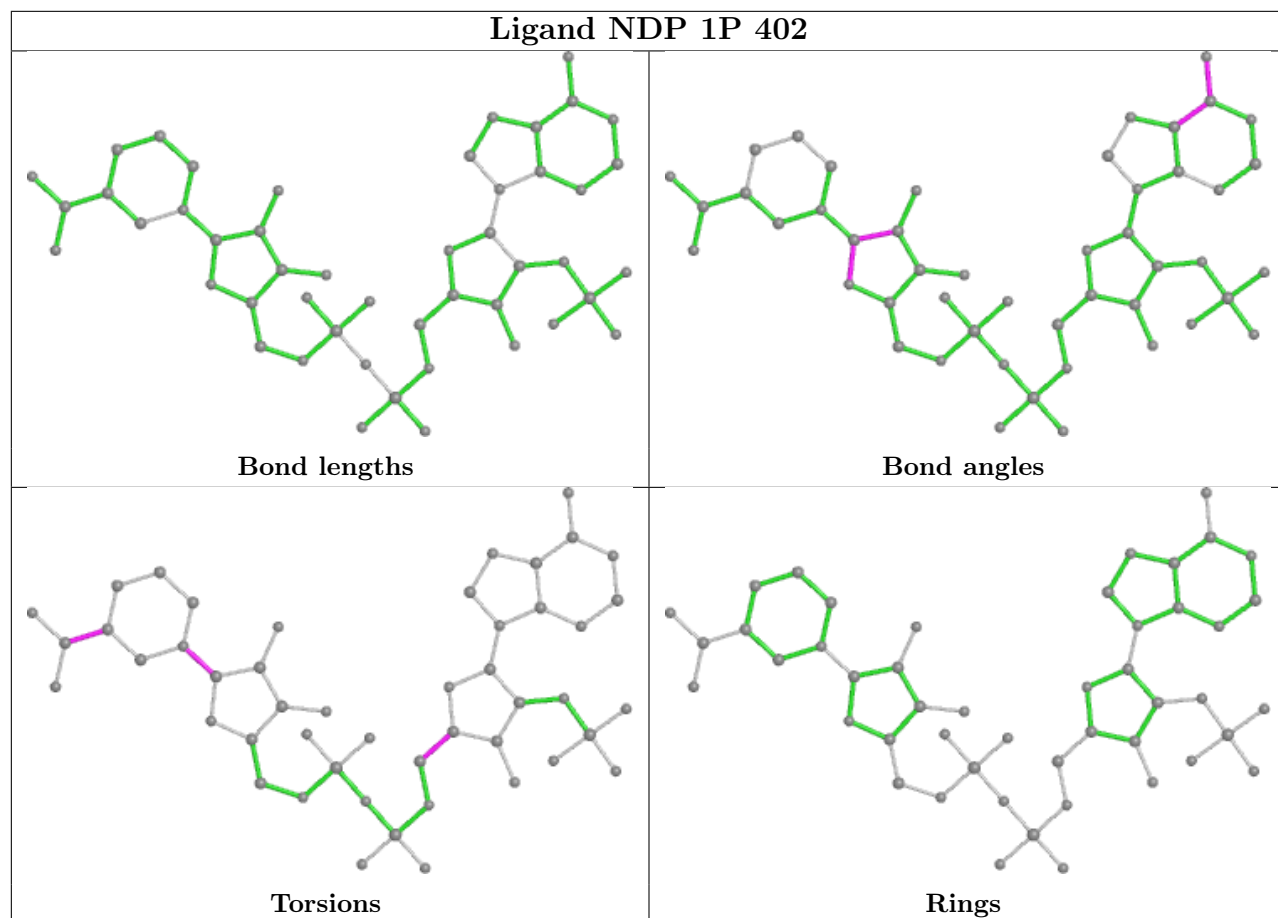
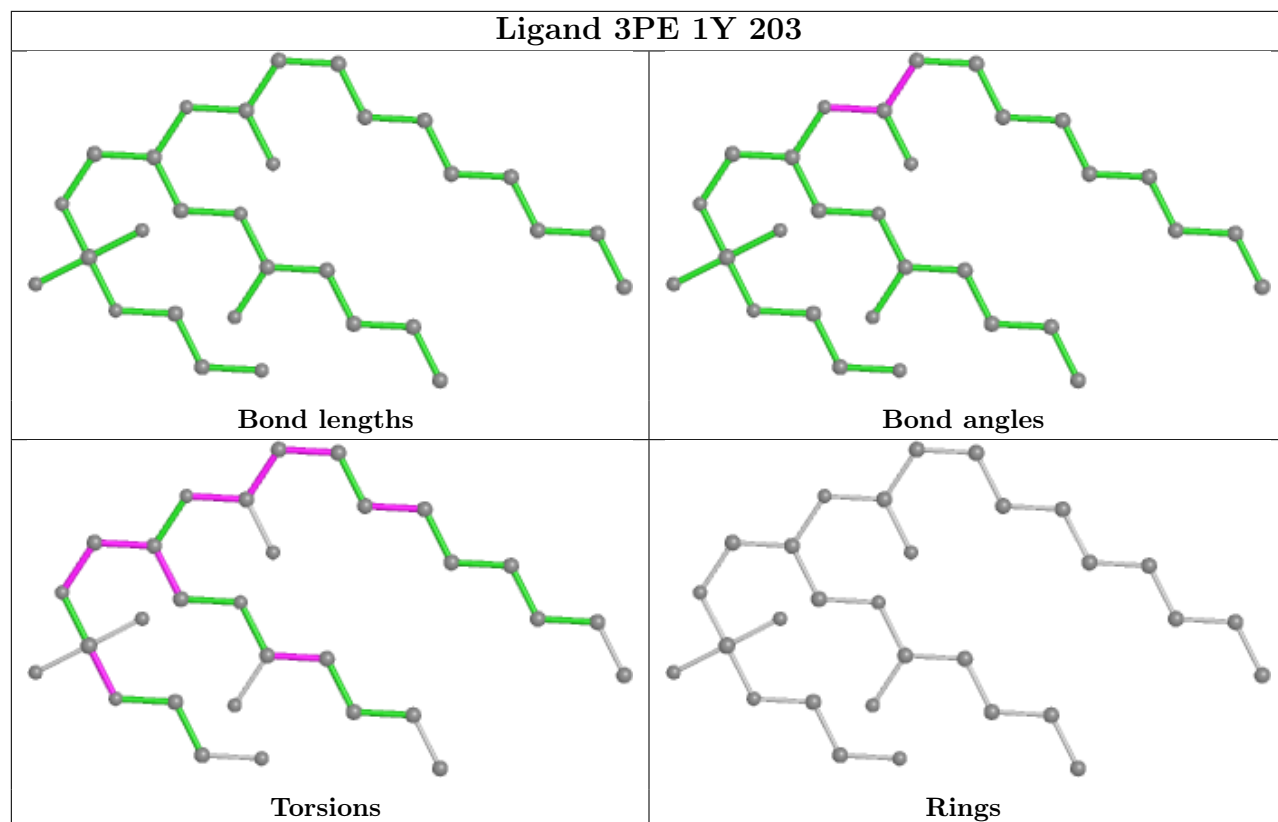


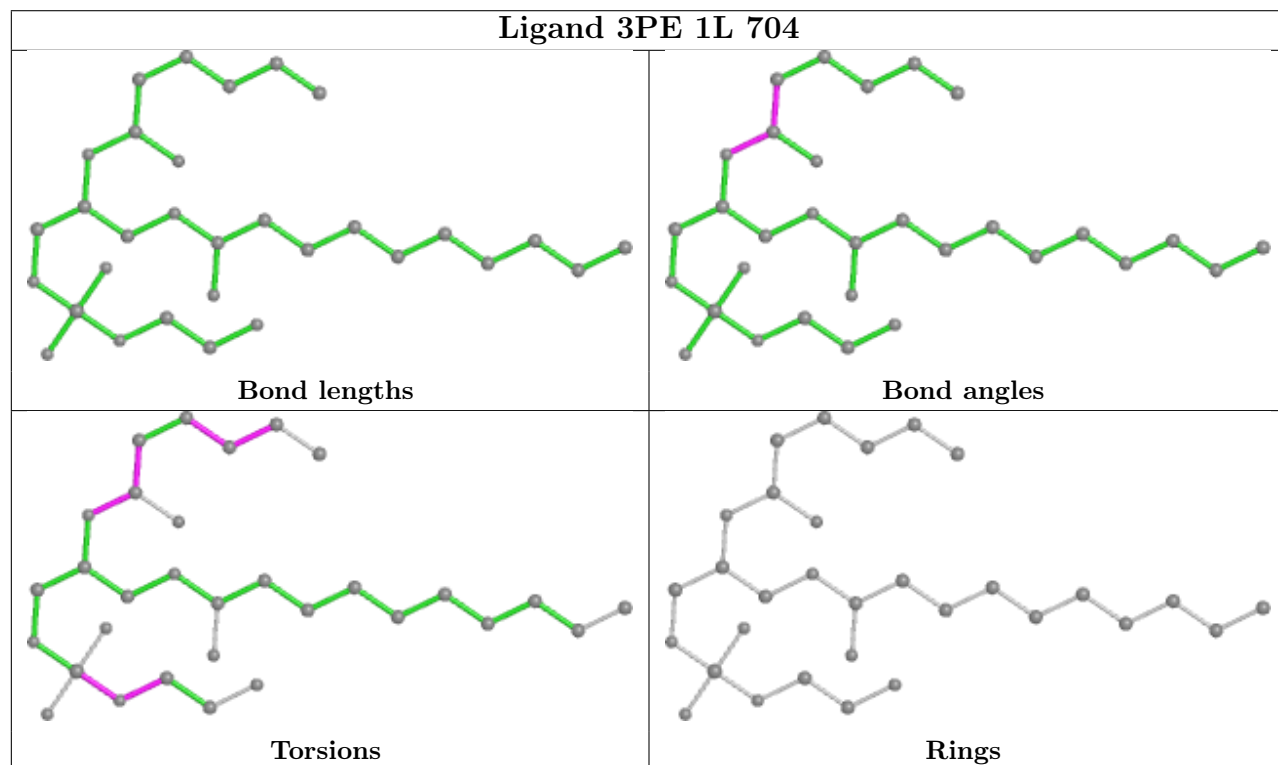
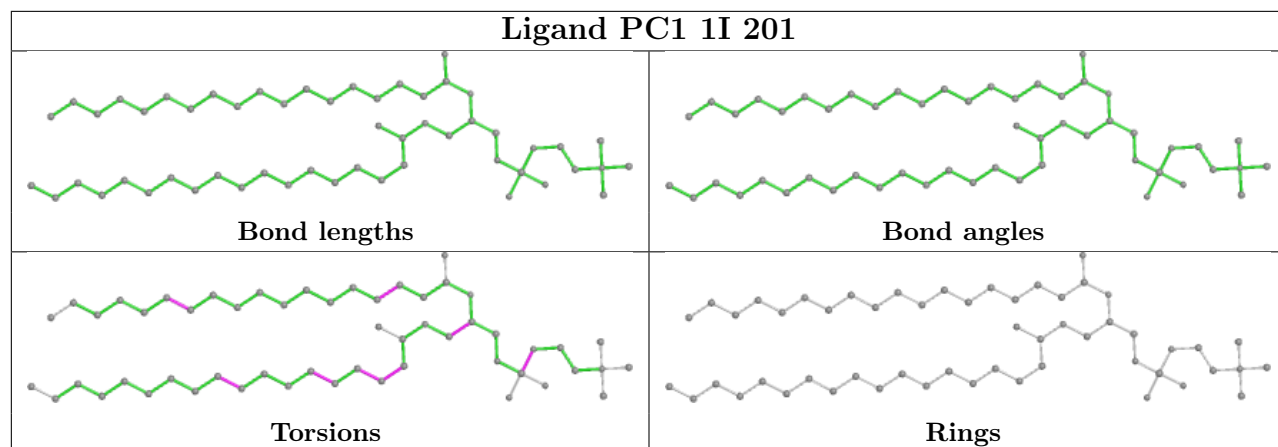


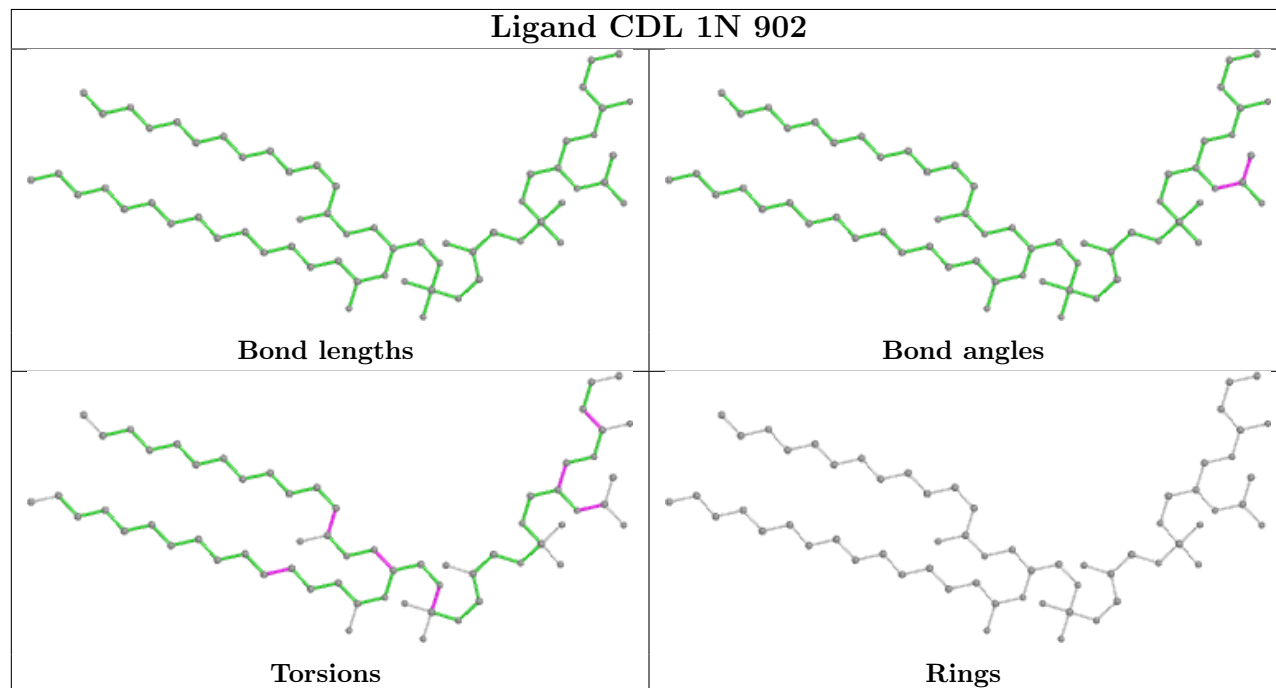
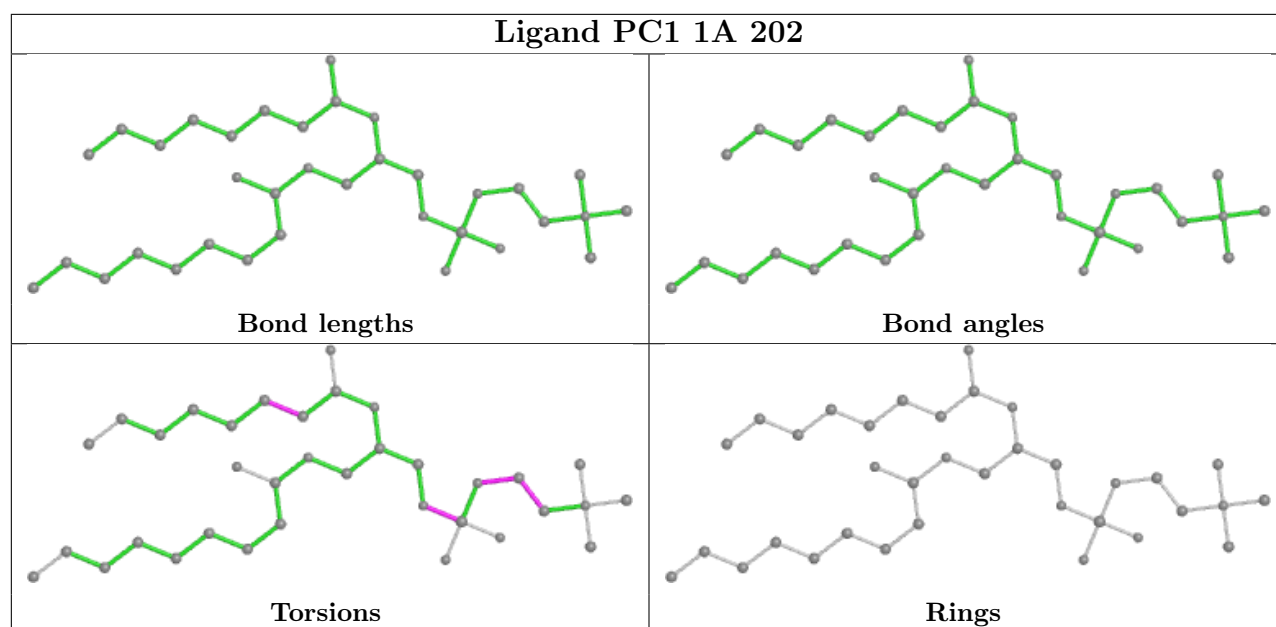


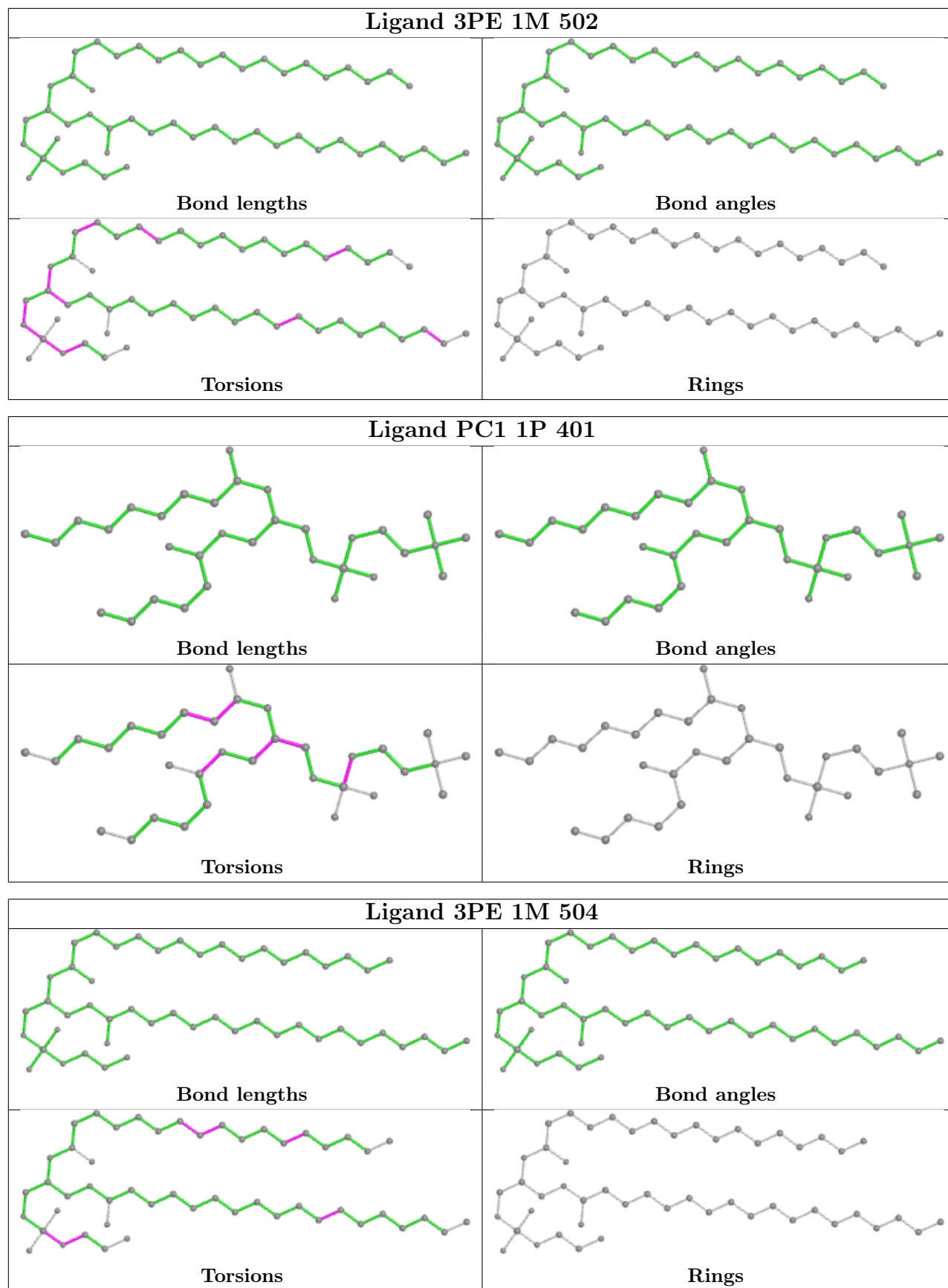












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

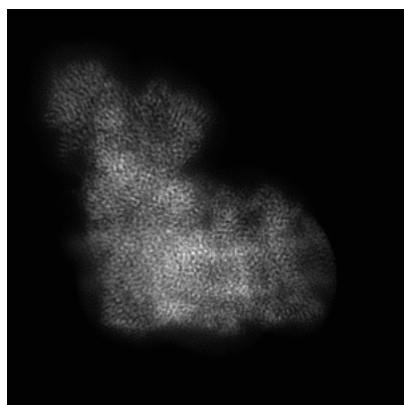
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-42143. These allow visual inspection of the internal detail of the map and identification of artifacts.

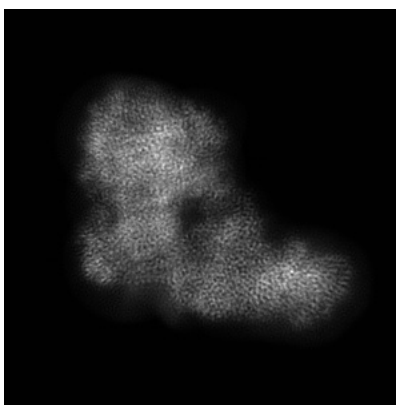
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

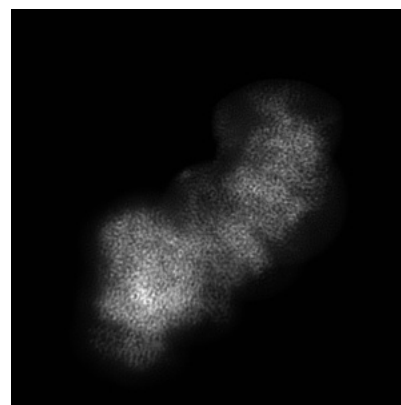
6.1.1 Primary map



X



Y

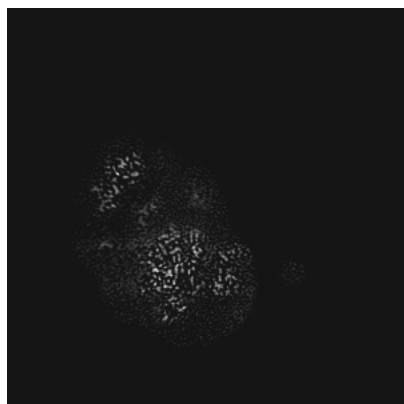


Z

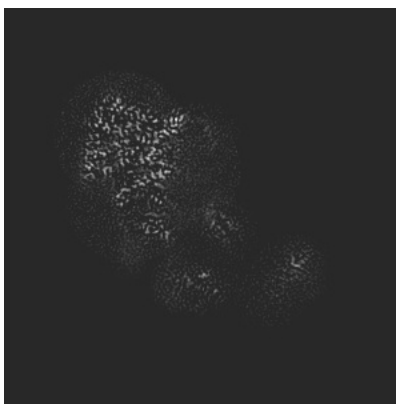
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

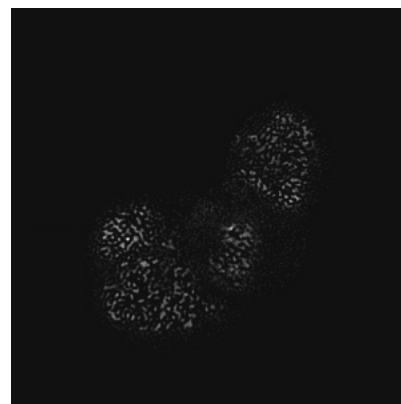
6.2.1 Primary map



X Index: 360



Y Index: 360

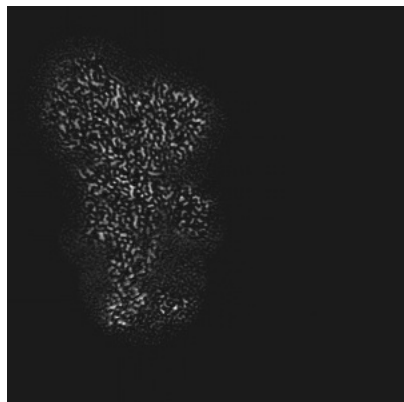


Z Index: 360

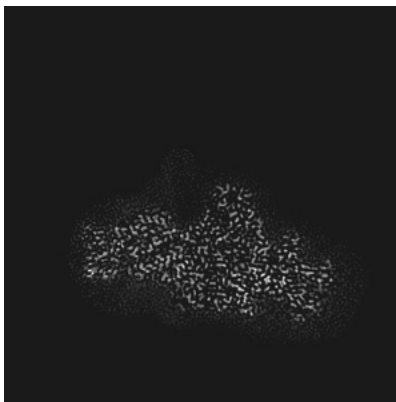
The images above show central slices of the map in three orthogonal directions.

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

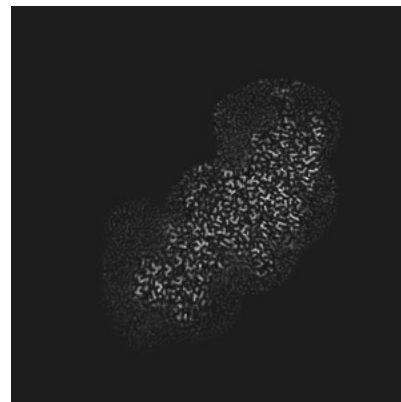
6.3.1 Primary map



X Index: 239



Y Index: 196

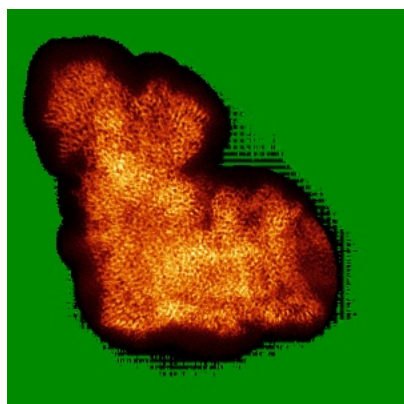


Z Index: 275

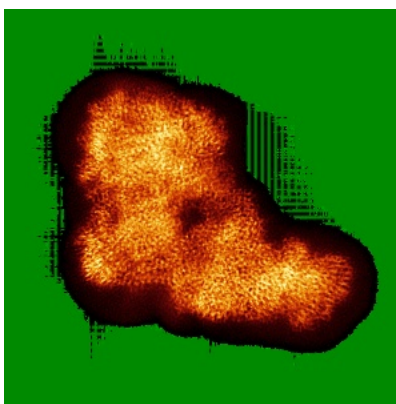
The images above show the largest variance slices of the map in three orthogonal directions.

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

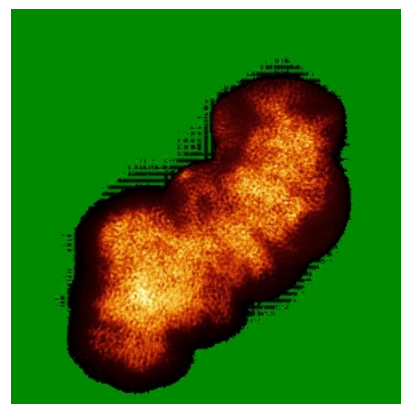
6.4.1 Primary map



X



Y

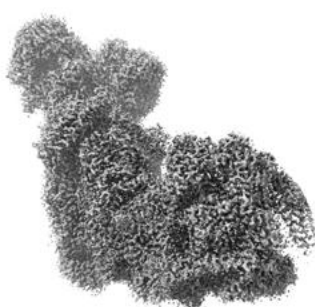


Z

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

6.5 Orthogonal surface views [i](#)

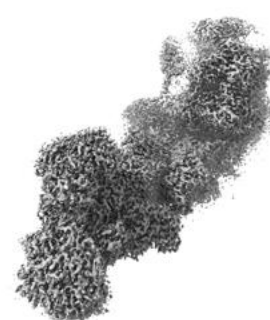
6.5.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.09. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

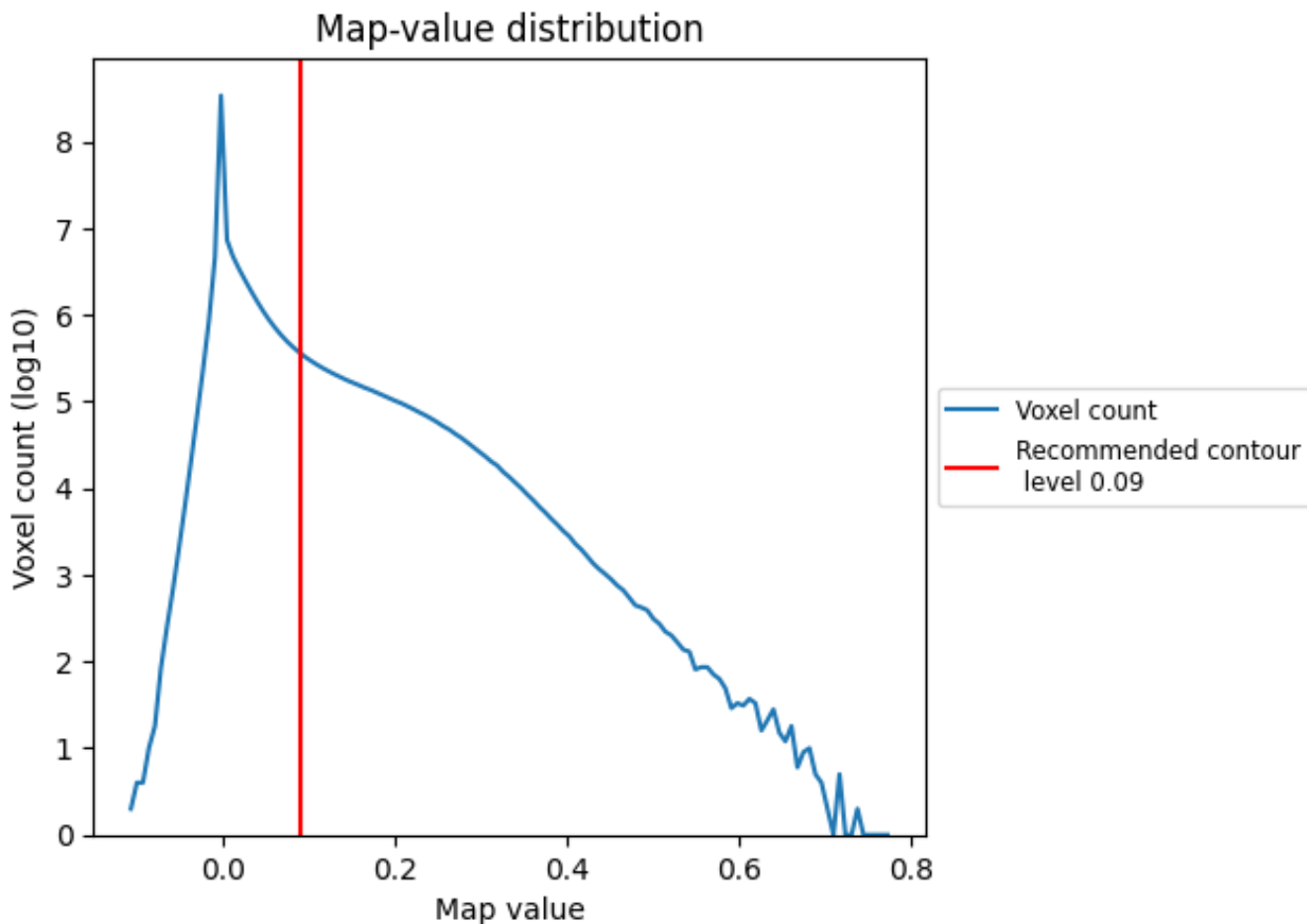
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

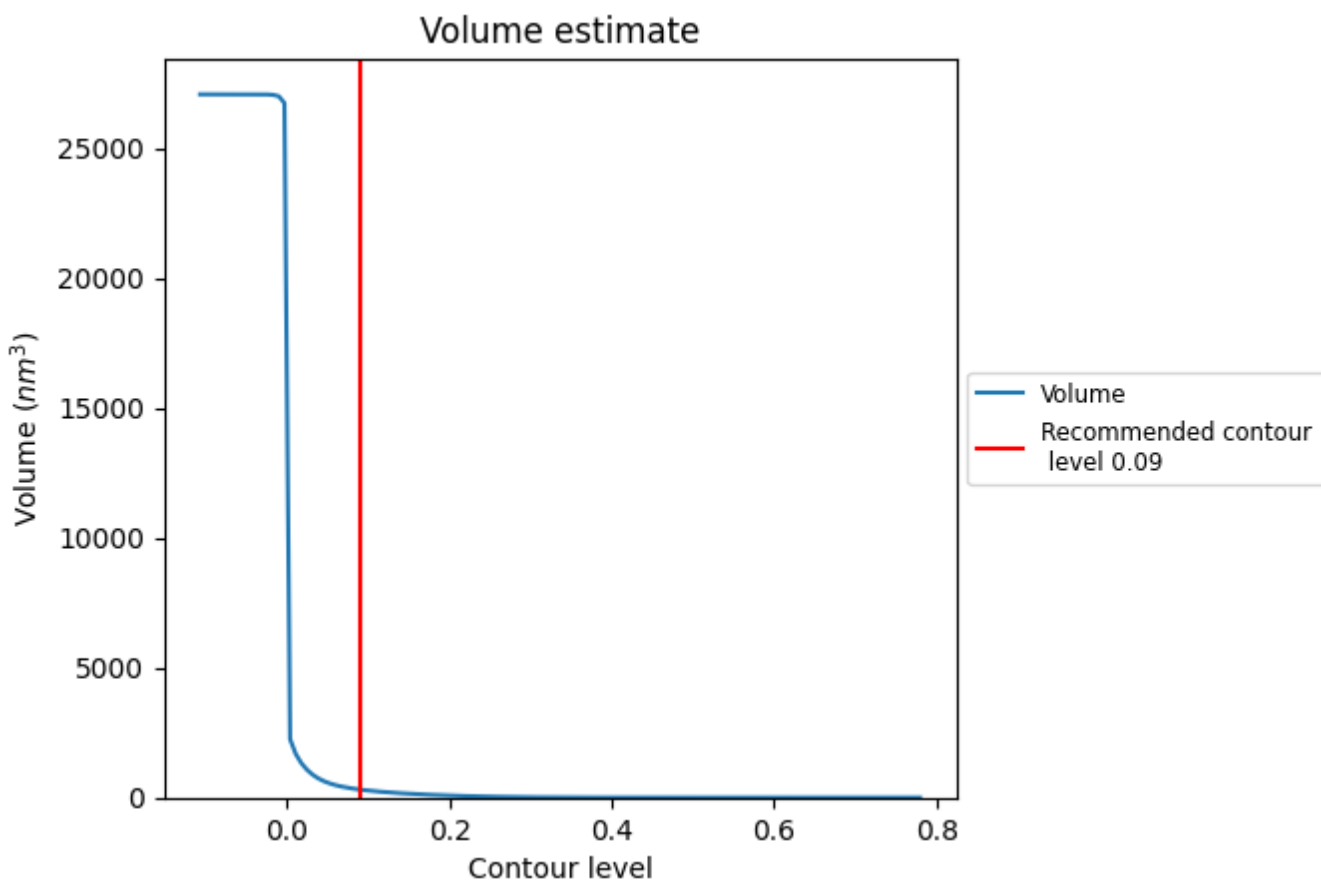
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

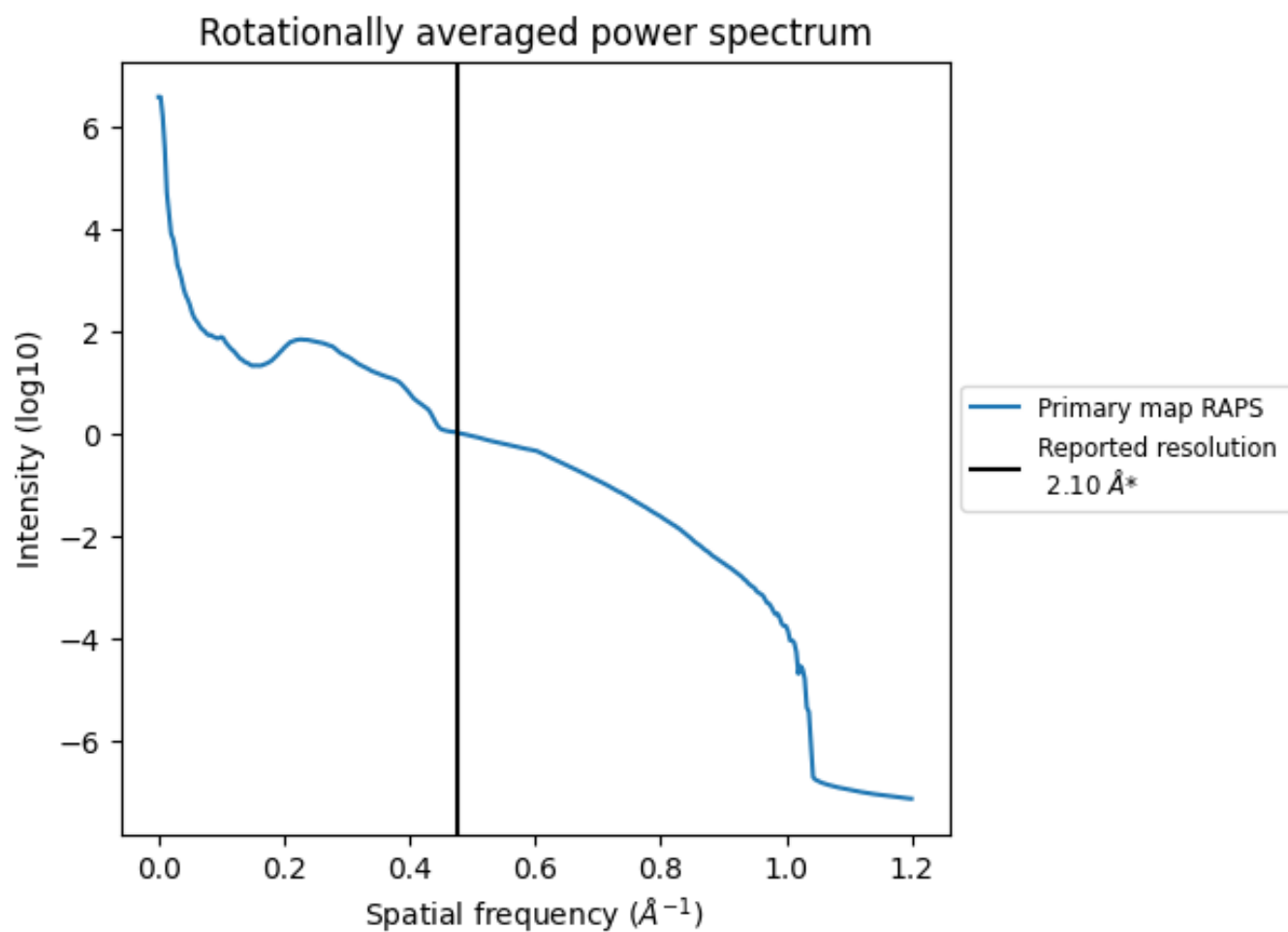
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 306 nm^3 ; this corresponds to an approximate mass of 277 kDa.

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

7.3 Rotationally averaged power spectrum [i](#)



*Reported resolution corresponds to spatial frequency of 0.476 Å⁻¹

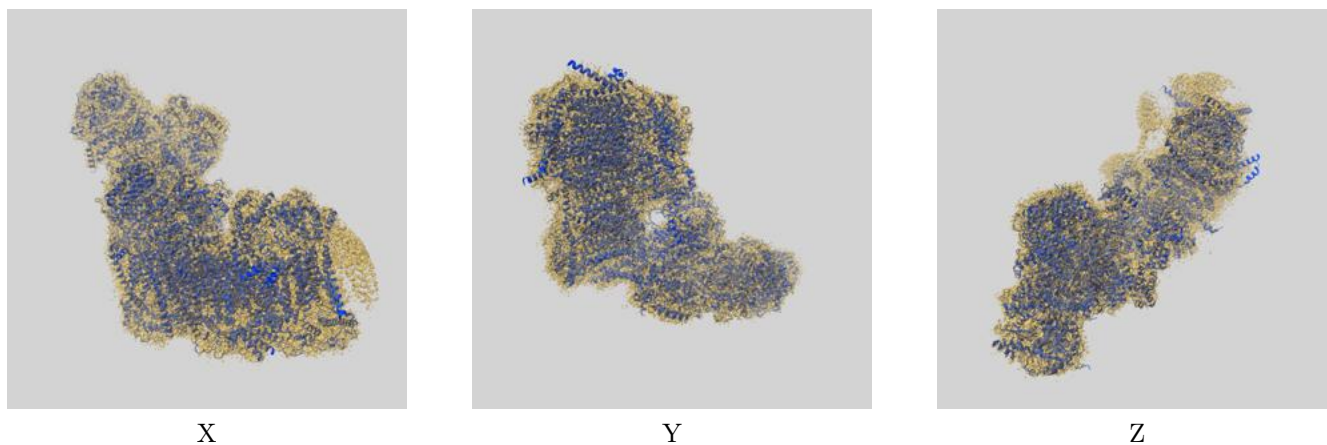
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

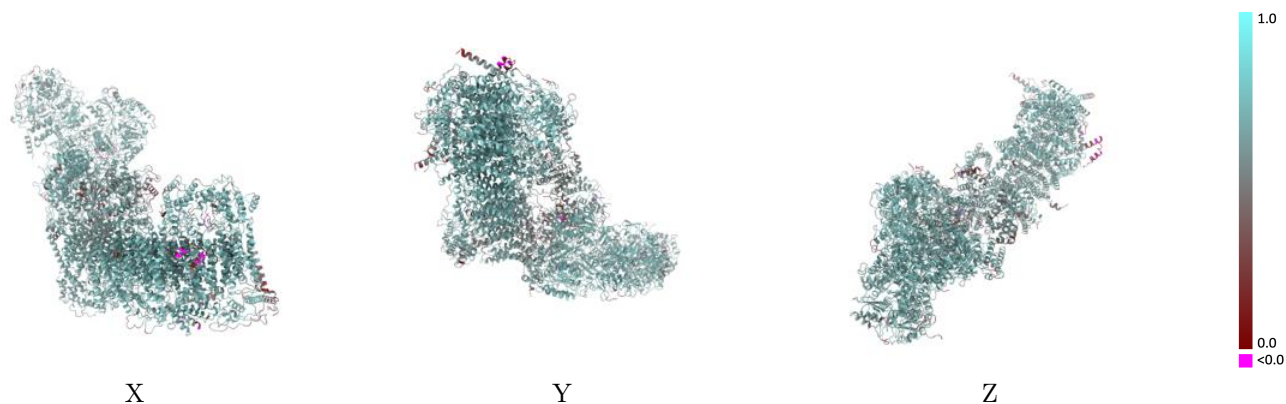
This section contains information regarding the fit between EMDB map EMD-42143 and PDB model 8UD1. Per-residue inclusion information can be found in section 3 on page 23.

9.1 Map-model overlay [i](#)



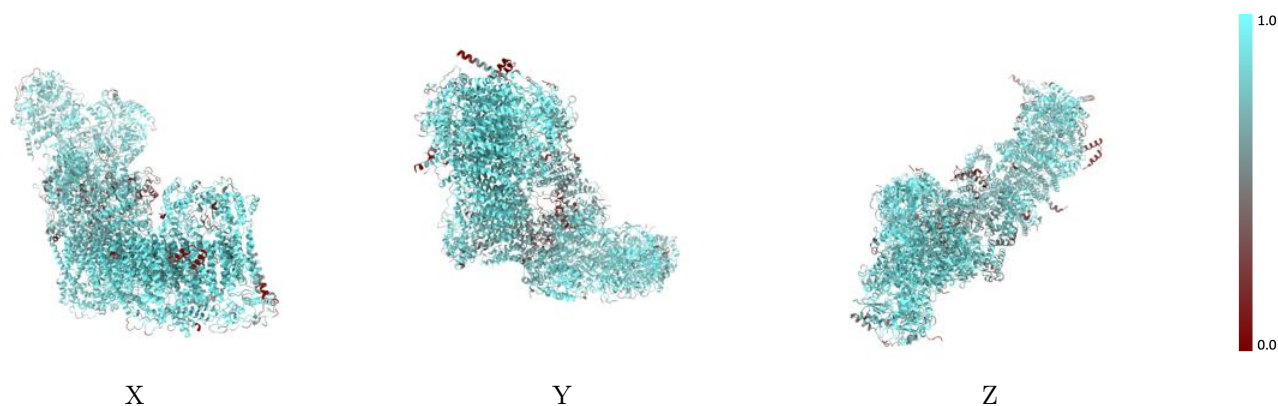
The images above show the 3D surface view of the map at the recommended contour level 0.09 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



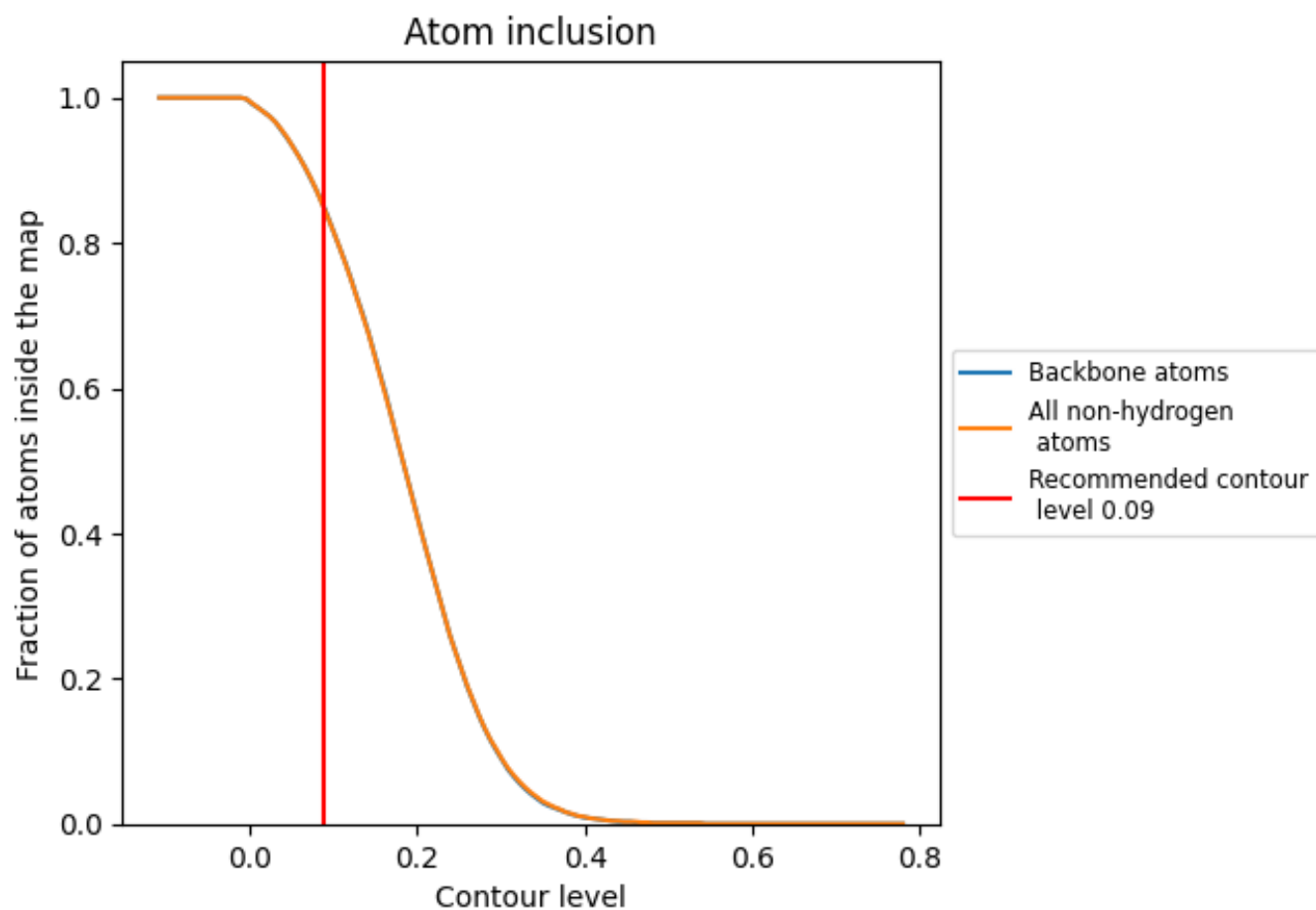
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.09).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 85% of all backbone atoms, 85% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary


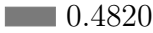

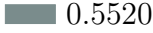

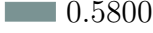
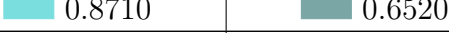
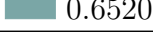
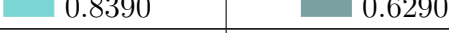
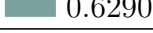
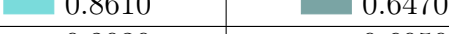
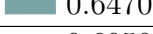

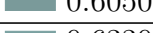
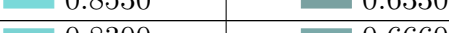
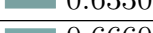

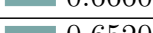

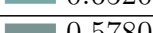

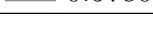
The table lists the average atom inclusion at the recommended contour level (0.09) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8460	 0.6360
1A	 0.6650	 0.5360
1B	 0.8760	 0.6660
1C	 0.9180	 0.6910
1D	 0.8850	 0.6720
1E	 0.7590	 0.5920
1F	 0.8410	 0.6220
1G	 0.8900	 0.6600
1H	 0.8730	 0.6260
1I	 0.9340	 0.6930
1J	 0.7620	 0.5670
1K	 0.9580	 0.6740
1L	 0.9260	 0.6680
1M	 0.9560	 0.6910
1N	 0.9480	 0.6880
1O	 0.7660	 0.5680
1P	 0.8070	 0.6270
1Q	 0.8410	 0.6280
1R	 0.8410	 0.6420
1S	 0.8530	 0.6160
1T	 0.4010	 0.4190
1U	 0.7860	 0.6260
1V	 0.7200	 0.6110
1W	 0.8340	 0.6520
1X	 0.8640	 0.6320
1Y	 0.7570	 0.6180
1Z	 0.8690	 0.6430
1a	 0.9240	 0.6580
1b	 0.8000	 0.6040
1c	 0.7240	 0.5960
1d	 0.8980	 0.6640
1e	 0.9050	 0.6490
1f	 0.7350	 0.5720
1g	 0.8290	 0.6170
1h	 0.8650	 0.6580



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Chain	Atom inclusion	Q-score
1i	 0.5870	 0.4820
1j	 0.7250	 0.5520
1k	 0.7030	 0.5800
1l	 0.8710	 0.6520
1m	 0.8390	 0.6290
1n	 0.8610	 0.6470
1o	 0.8030	 0.6050
1p	 0.8530	 0.6330
1q	 0.8300	 0.6660
1r	 0.8310	 0.6520
1s	 0.7060	 0.5780