



wwPDB EM Validation Summary Report ⓘ

Sep 22, 2022 – 04:29 am BST

PDB ID : 7QSL
EMDB ID : EMD-14133
Title : Bovine complex I in lipid nanodisc, Active-apo
Authors : Chung, I.; Bridges, H.R.; Hirst, J.
Deposited on : 2022-01-13
Resolution : 2.76 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.dev8
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.30

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 2.76 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.



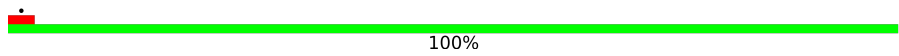
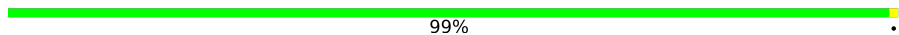
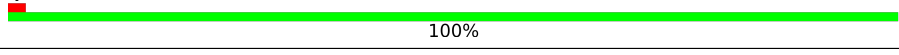
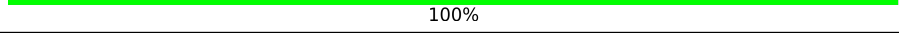
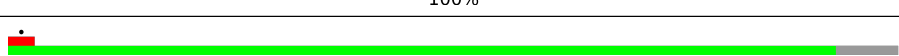





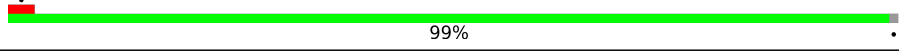
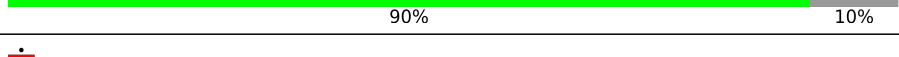
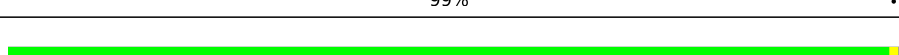
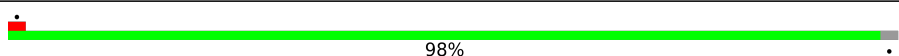
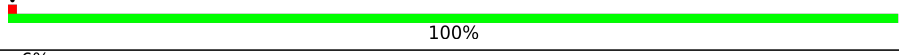
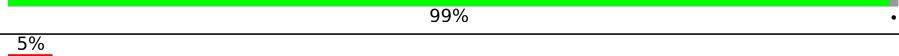

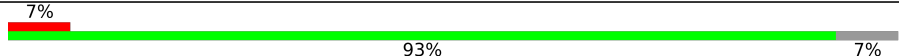
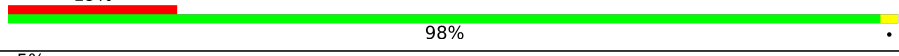

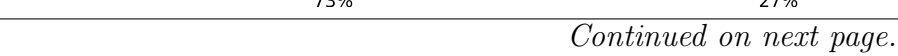


Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	A	115	99%
2	B	216	71% 28%
3	C	266	79% 21%
4	D	463	93% 7%
5	E	249	86% 14%
6	F	464	93% 7%
7	G	727	96%
8	H	318	100%
9	I	212	83% 17%

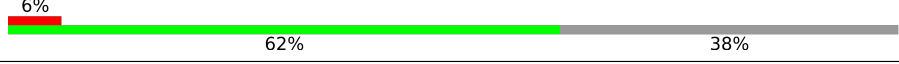


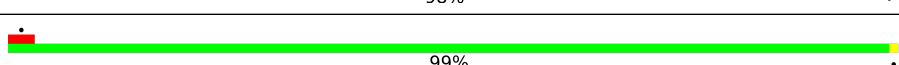
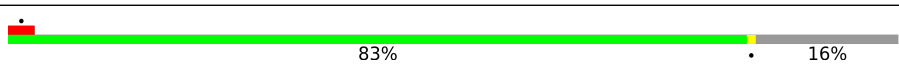


Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
10	J	175	 100%
11	K	98	 99%
12	L	606	 100%
13	M	459	 100%
14	N	347	 100%
15	O	343	 93% 7%
16	P	380	 90% 10%
17	Q	175	 74% 26%
18	R	124	 77% 23%
19	S	99	 87% 12%
20	T	156	 53% 46%
20	U	156	 54% 45%
21	V	116	 99%
22	W	128	 90% 10%
23	X	172	 99%
24	Y	141	 99%
25	Z	144	 98%
26	a	70	 100%
27	b	84	 99%
28	c	76	 64% 36%
29	d	120	 99%
30	e	106	 93% 7%
31	f	57	 98%
32	g	154	64% 35%
33	h	189	73% 27%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
34	i	127	
35	j	108	
36	k	98	
37	l	186	
38	m	129	
39	n	179	
40	o	137	
41	p	176	
42	q	145	
43	r	113	
44	s	109	

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
29	AME	d	1	-	X	-	-

2 Entry composition i

There are 59 unique types of molecules in this entry. The entry contains 69733 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	A	115	921	622	133	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	B	155	1241	792	224	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	C	209	1738	1120	298	317	3	0	0

- 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	D	430	3459	2209	596	629	25	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	129	ARG	GLN	variant	UNP P17694

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	214	1659	1059	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	F	432	3336	2102	597	617	20	1	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	G	699	5366	3362	934	1030	40	1	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	H	318	2517	1687	386	421	23	1	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	I	176	1414	889	243	270	12	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	J	175	1345	906	191	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	K	98	745	486	112	131	16	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	L	606	4802	3195	737	827	43	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	M	459	3654	2436	570	609	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	N	347	2733	1817	416	457	43	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	O	320	2589	1662	429	488	10	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
O	255	LYS	ASN	variant	UNP P34942

- Molecule 16 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 9, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	P	342	2768	1792	489	482	5	1	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	Q	129	1049	659	188	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	R	96	740	454	140	143	3	0	0

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

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

- Molecule 20 is a protein called Acyl carrier protein, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	T	85	688	444	101	138	5	0	0
20	U	86	693	447	102	139	5	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	V	115	928	600	157	168	3	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	W	115	976	625	181	166	4	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	X	171	1402	887	253	252	10	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	Y	140	1030	657	176	191	6	0	0

- Molecule 25 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	Z	141	1152	740	201	202	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	a	70	569	365	104	95	5	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	b	83	651	425	109	115	2	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	c	49	414	273	70	71	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	d	120	999	650	172	172	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	e	99	829	523	158	142	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	f	57	492	322	86	82	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	g	100	839	539	139	157	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	h	138	1154	759	196	197	2	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	i	127	1097	722	191	183	1	0	0

- Molecule 35 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	j	67	580	381	95	103	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	k	81	653	427	110	114	2	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	l	156	1314	850	216	240	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	S		
38	m	128	1067	684	188	195		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	n	172	1492	955	273	257	7	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	o	122	1048	653	201	185	9	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	p	173	1453	910	268	267	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	q	145	1209	778	216	210	5	0	0

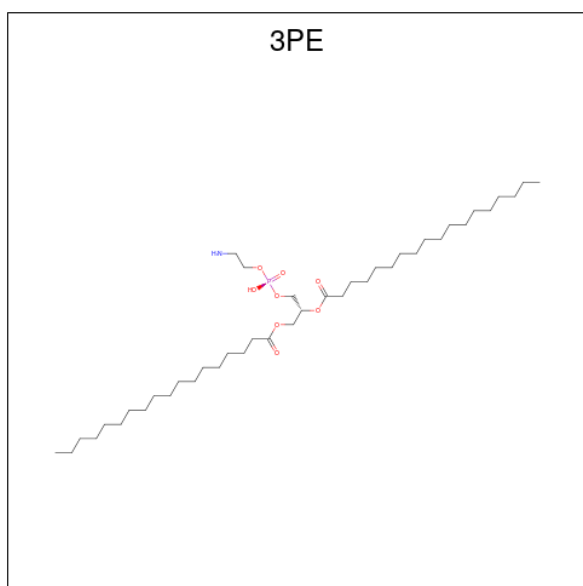
- Molecule 43 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
43	r	95	776	490	144	139	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	s	45	391	244	71	75	1	1	0

- Molecule 45 is 1,2-Distearoyl-sn-glycerophosphoethanolamine (three-letter code: 3PE) (formula: C₄₁H₈₂NO₈P).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
45	A	1	79	59	2	16	2	0
45	A	1	79	59	2	16	2	0
45	H	1	29	19	1	8	1	0
45	I	1	38	28	1	8	1	0
45	L	1	84	64	2	16	2	0
45	L	1	84	64	2	16	2	0
45	M	1	194	154	4	32	4	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
45	M	1	Total 194	C 154	N 4	O 32	P 4	0
45	M	1	Total 194	C 154	N 4	O 32	P 4	0
45	M	1	Total 194	C 154	N 4	O 32	P 4	0
45	N	1	Total 48	C 38	N 1	O 8	P 1	0
45	P	1	Total 35	C 25	N 1	O 8	P 1	0
45	Y	1	Total 157	C 117	N 4	O 32	P 4	0
45	Y	1	Total 157	C 117	N 4	O 32	P 4	0
45	Y	1	Total 157	C 117	N 4	O 32	P 4	0
45	Y	1	Total 157	C 117	N 4	O 32	P 4	0
45	Z	1	Total 35	C 25	N 1	O 8	P 1	0
45	b	1	Total 47	C 37	N 1	O 8	P 1	0
45	d	1	Total 37	C 27	N 1	O 8	P 1	0
45	m	1	Total 40	C 30	N 1	O 8	P 1	0

- Molecule 46 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PC1) (formula: C₄₄H₈₈NO₈P).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
46	A	1	68	48	2	16	2	0
46	A	1	68	48	2	16	2	0
46	B	1	41	31	1	8	1	0
46	M	1	81	61	2	16	2	0
46	M	1	81	61	2	16	2	0
46	P	1	54	44	1	8	1	0
46	Z	1	48	38	1	8	1	0
46	d	1	33	23	1	8	1	0
46	h	1	44	34	1	8	1	0
46	m	1	40	30	1	8	1	0

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



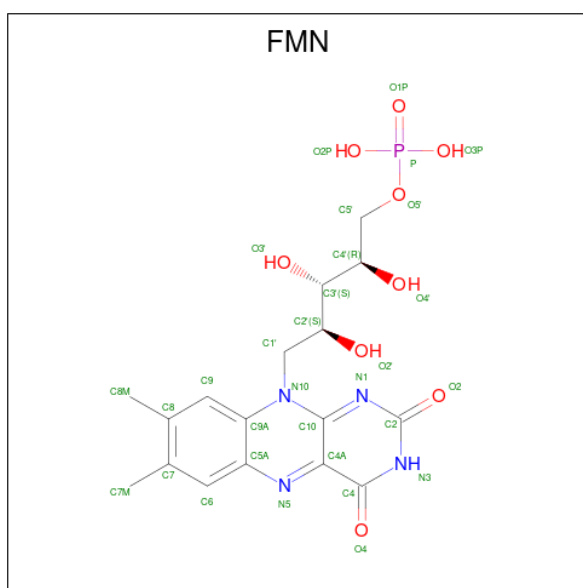
Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
47	B	1	8	4	4	0
47	F	1	8	4	4	0
47	G	1	16	8	8	0
47	G	1	16	8	8	0
47	I	1	16	8	8	0
47	I	1	16	8	8	0

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



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

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

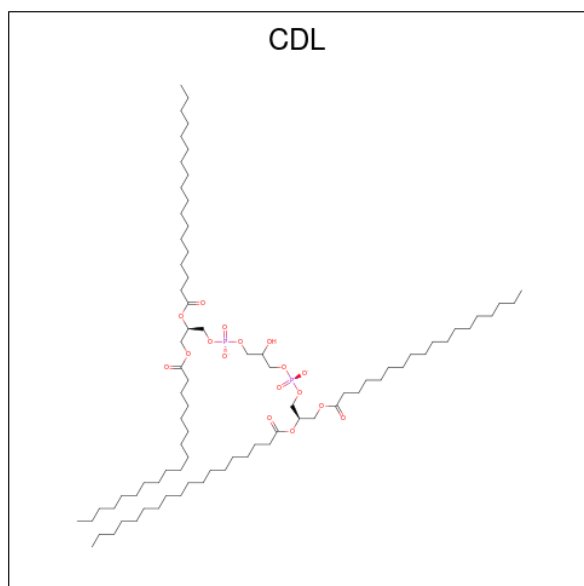


Mol	Chain	Residues	Atoms				AltConf	
49	F	1	Total	C	N	O	P	0
			31	17	4	9	1	

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

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

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



Mol	Chain	Residues	Atoms				AltConf
			Total	C	O	P	
51	H	1	Total	C	O	P	0
			50	31	17	2	
51	K	1	Total	C	O	P	0
			69	50	17	2	
51	L	1	Total	C	O	P	0
			60	41	17	2	
51	N	1	Total	C	O	P	0
			60	41	17	2	
51	X	1	Total	C	O	P	0
			73	54	17	2	
51	d	1	Total	C	O	P	0
			65	46	17	2	
51	h	1	Total	C	O	P	0
			78	59	17	2	
51	r	1	Total	C	O	P	0
			62	43	17	2	

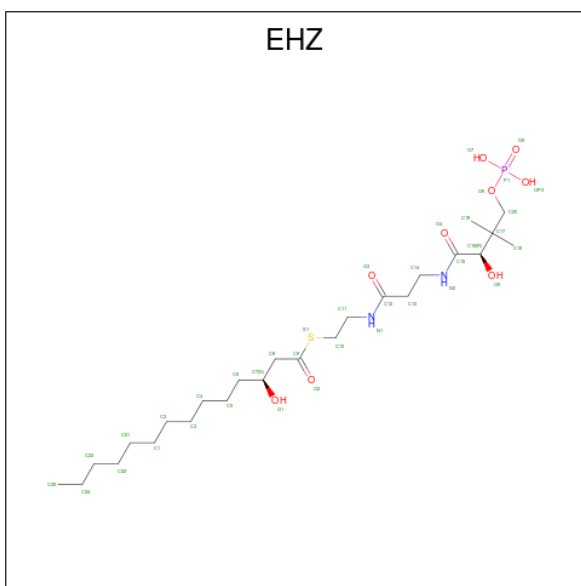
- Molecule 52 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).

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

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

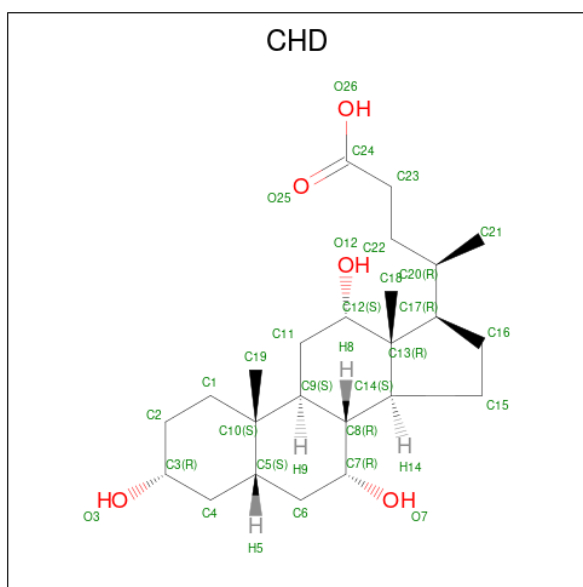
Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
55	R	1	1	1	0

- 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).



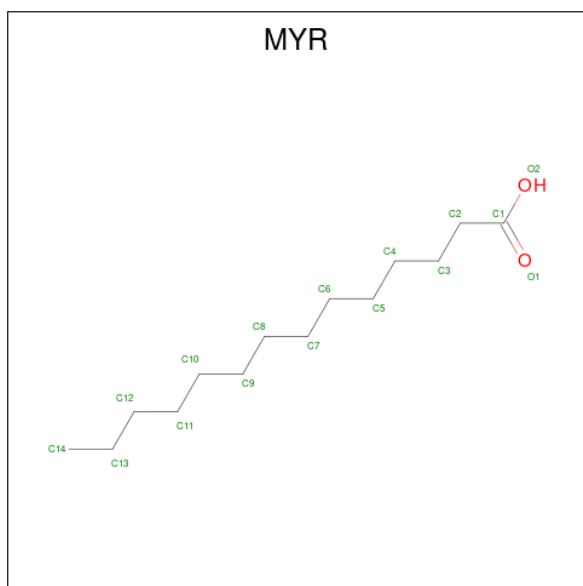
Mol	Chain	Residues	Atoms						AltConf
			Total	C	N	O	P	S	
56	T	1	37	25	2	8	1	1	0
56	U	1	37	25	2	8	1	1	0

- Molecule 57 is CHOLIC ACID (three-letter code: CHD) (formula: C₂₄H₄₀O₅).



Mol	Chain	Residues	Atoms			AltConf
57	i	1	Total	C	O	0
			29	24	5	

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



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

- Molecule 59 is water.

Mol	Chain	Residues	Atoms	AltConf
59	A	17	Total O 17 17	0
59	B	59	Total O 59 59	0
59	C	54	Total O 54 54	0
59	D	123	Total O 123 123	0
59	E	9	Total O 9 9	0
59	F	30	Total O 30 30	0
59	G	120	Total O 120 120	0
59	H	64	Total O 64 64	0
59	I	64	Total O 64 64	0
59	J	17	Total O 17 17	0
59	K	10	Total O 10 10	0
59	L	40	Total O 40 40	0
59	M	62	Total O 62 62	0
59	N	60	Total O 60 60	0
59	O	10	Total O 10 10	0
59	P	44	Total O 44 44	0
59	Q	51	Total O 51 51	0
59	R	14	Total O 14 14	0
59	U	1	Total O 1 1	0
59	W	6	Total O 6 6	0
59	X	22	Total O 22 22	0
59	Y	1	Total O 1 1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms		AltConf
59	Z	23	Total 23	O 23	0
59	a	15	Total 15	O 15	0
59	b	2	Total 2	O 2	0
59	d	10	Total 10	O 10	0
59	e	13	Total 13	O 13	0
59	g	5	Total 5	O 5	0
59	h	11	Total 11	O 11	0
59	i	1	Total 1	O 1	0
59	k	1	Total 1	O 1	0
59	l	7	Total 7	O 7	0
59	m	5	Total 5	O 5	0
59	n	10	Total 10	O 10	0
59	p	12	Total 12	O 12	0
59	q	18	Total 18	O 18	0
59	r	11	Total 11	O 11	0
59	s	2	Total 2	O 2	0

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

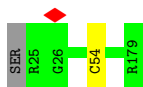
- Molecule 1: NADH-ubiquinone oxidoreductase chain 3

Chain A:  99%




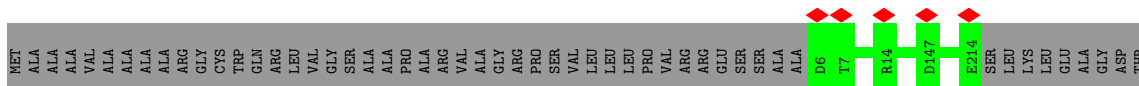
- Molecule 2: NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial

Chain B:  71% 28%



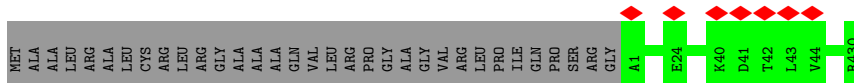
- Molecule 3: NADH dehydrogenase [ubiquinone] iron-sulfur protein 3, mitochondrial

Chain C:  79% 21%



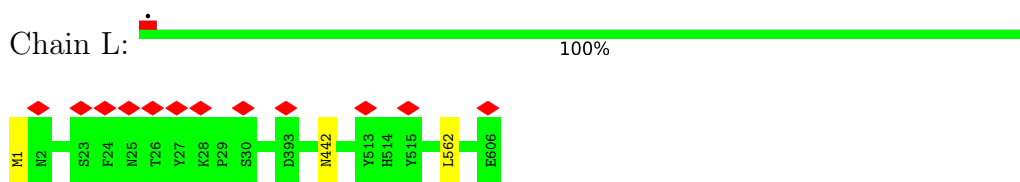
- Molecule 4: NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial

Chain D:  93% 7%

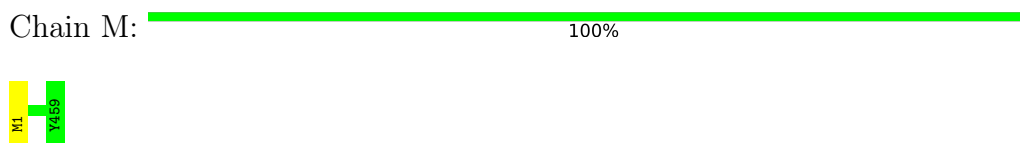


- Molecule 5: NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial

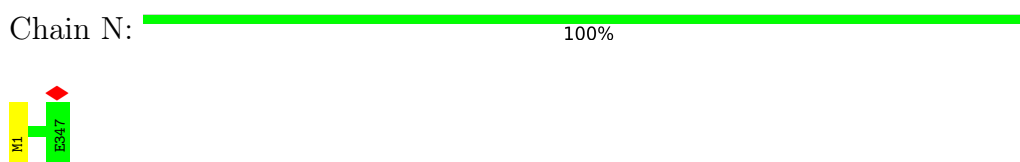
- Molecule 12: NADH-ubiquinone oxidoreductase chain 5



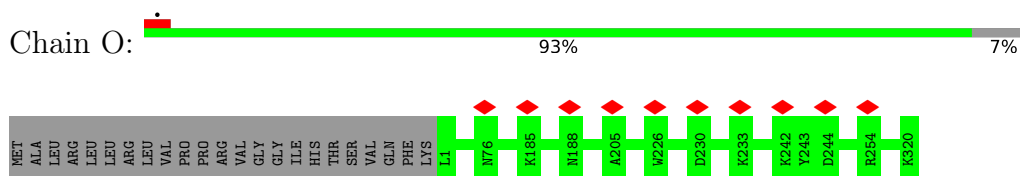
- Molecule 13: NADH-ubiquinone oxidoreductase chain 4



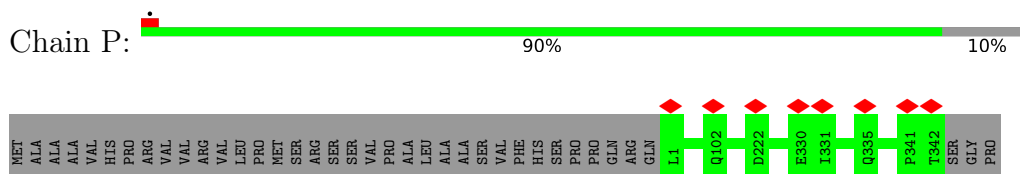
- Molecule 14: NADH-ubiquinone oxidoreductase chain 2



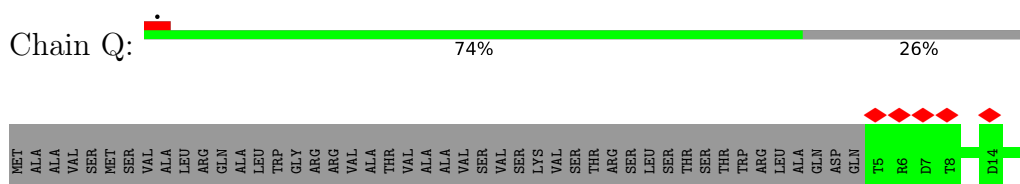
- Molecule 15: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial



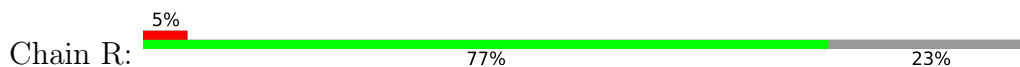
- Molecule 16: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 9, mitochondrial

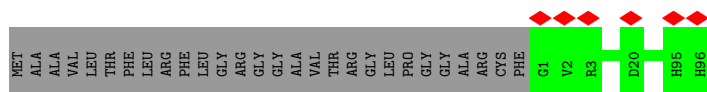


- Molecule 17: NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial

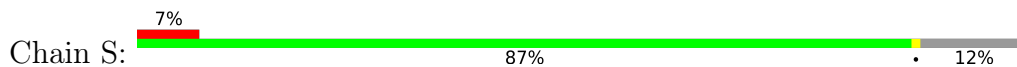


- Molecule 18: NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial

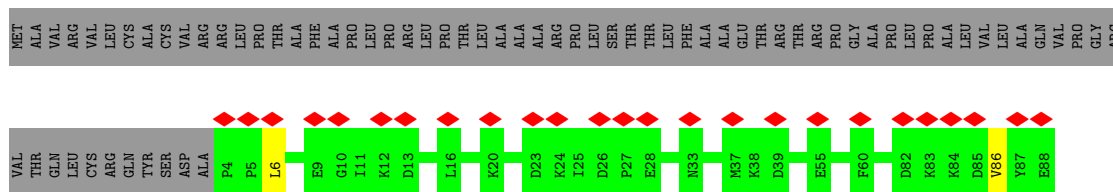




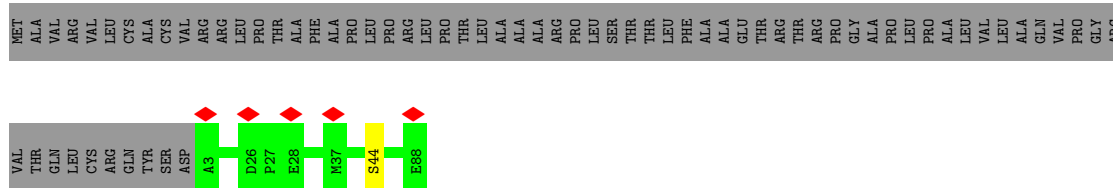
- Molecule 19: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2



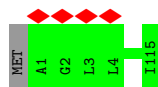
- Molecule 20: Acyl carrier protein, mitochondrial



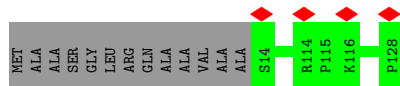
- Molecule 20: Acyl carrier protein, mitochondrial



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

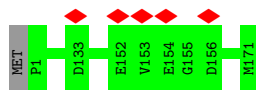


- Molecule 22: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6



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





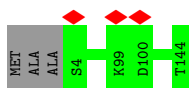
- Molecule 24: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 11

Chain Y: 99%



- Molecule 25: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 13

Chain Z: 98%



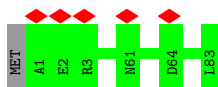
- Molecule 26: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 1

Chain a: 100%



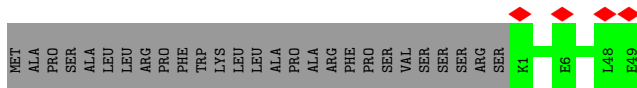
- Molecule 27: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 3

Chain b: 99% 6%



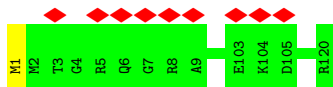
- Molecule 28: NADH dehydrogenase [ubiquinone] 1 subunit C1, mitochondrial

Chain c: 64% 5% 36%

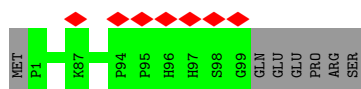
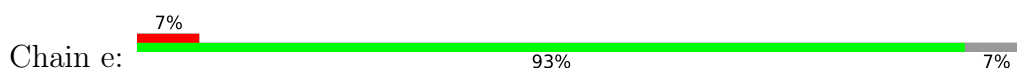


- Molecule 29: NADH dehydrogenase [ubiquinone] 1 subunit C2

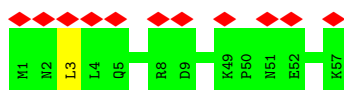
Chain d: 99% 8%



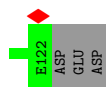
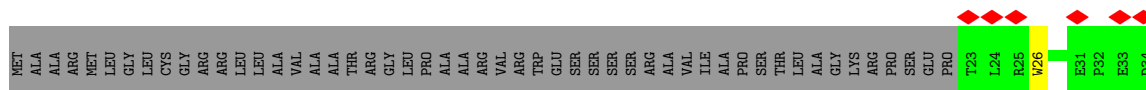
- Molecule 30: NADH dehydrogenase [ubiquinone] iron-sulfur protein 5



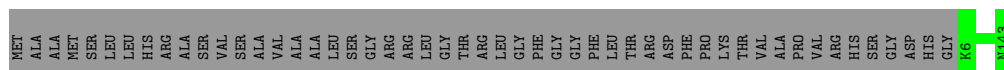
- Molecule 31: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 1



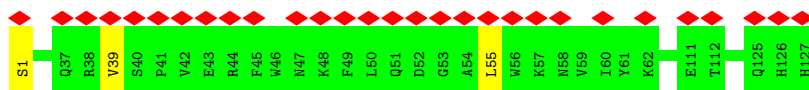
- Molecule 32: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 11, mitochondrial



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



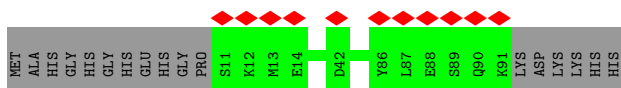
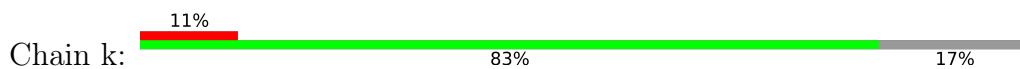
- Molecule 34: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 6



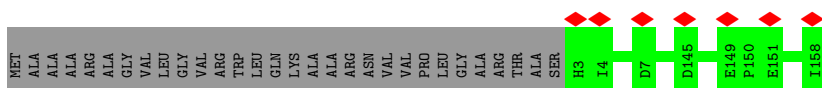
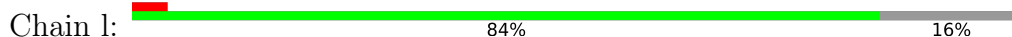
- Molecule 35: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 2, mitochondrial



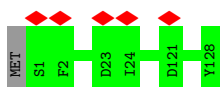
- Molecule 36: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 3



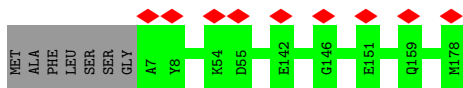
- Molecule 37: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial



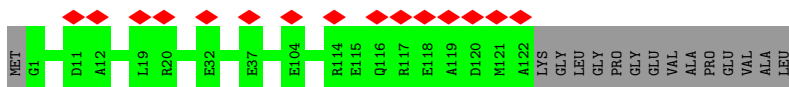
- Molecule 38: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 4



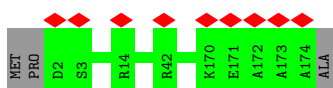
- Molecule 39: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 9



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

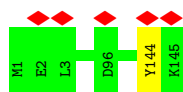


- Molecule 41: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 10

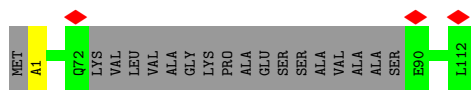
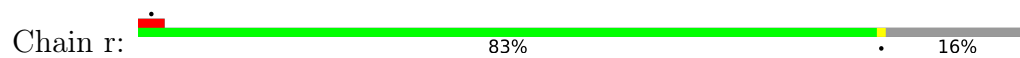


- Molecule 42: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12





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



- Molecule 44: NADH dehydrogenase [ubiquinone] flavoprotein 3, mitochondrial



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	38205	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	40.5	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	38.366	Depositor
Minimum map value	-15.492	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.938	Depositor
Recommended contour level	6.5	Depositor
Map size (Å)	479.744, 479.744, 479.744	wwPDB
Map dimensions	640, 640, 640	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.7496, 0.7496, 0.7496	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: EHZ, AME, GTP, CDL, AYA, FME, NDP, 2MR, MYR, SF4, SAC, CHD, MG, FES, 3PE, PC1, K, FMN, ZN

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	A	0.45	0/936	0.48	0/1281
2	B	0.56	1/1272 (0.1%)	0.54	1/1720 (0.1%)
3	C	0.48	0/1789	0.48	0/2436
4	D	0.48	0/3537	0.49	0/4794
5	E	0.42	0/1699	0.49	0/2312
6	F	0.42	0/3412	0.48	0/4610
7	G	0.44	0/5457	0.51	1/7397 (0.0%)
8	H	0.44	0/2579	0.47	0/3524
9	I	0.53	0/1445	0.53	0/1956
10	J	0.45	0/1370	0.47	0/1859
11	K	0.40	0/745	0.54	0/1008
12	L	0.41	0/4920	0.45	0/6694
13	M	0.42	0/3738	0.47	0/5097
14	N	0.41	0/2792	0.47	0/3800
15	O	0.45	0/2651	0.44	0/3587
16	P	0.44	0/2847	0.48	0/3864
17	Q	0.43	0/1072	0.50	0/1449
18	R	0.46	0/753	0.47	0/1014
19	S	0.41	0/711	0.46	0/956
20	T	0.36	0/700	0.56	4/944 (0.4%)
20	U	0.48	0/705	0.41	0/952
21	V	0.41	0/948	0.42	0/1284
22	W	0.43	0/1000	0.45	0/1344
23	X	0.43	0/1439	0.45	0/1942
24	Y	0.40	0/1042	0.47	0/1414
25	Z	0.47	0/1181	0.45	0/1592
26	a	0.44	0/584	0.43	0/786
27	b	0.41	0/672	0.43	0/923
28	c	0.43	0/427	0.39	0/579
29	d	0.50	0/1018	0.47	0/1375
30	e	0.42	0/850	0.47	0/1136

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
31	f	0.40	0/505	0.52	2/681 (0.3%)
32	g	0.45	0/865	0.47	0/1175
33	h	0.45	0/1188	0.43	0/1607
34	i	0.45	0/1127	0.57	3/1534 (0.2%)
35	j	0.46	0/607	0.43	0/833
36	k	0.42	0/672	0.44	0/906
37	l	0.50	0/1369	0.44	0/1873
38	m	0.47	0/1094	0.45	0/1480
39	n	0.47	0/1545	0.42	0/2092
40	o	0.39	0/1073	0.42	0/1437
41	p	0.45	0/1486	0.45	0/2004
42	q	0.49	0/1250	0.48	0/1698
43	r	0.43	0/789	0.47	0/1068
44	s	0.42	0/403	0.52	0/545
All	All	0.45	1/68264 (0.0%)	0.47	11/92562 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	54	CYS	CB-SG	-5.21	1.73	1.81

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
20	T	86	VAL	CG1-CB-CG2	6.99	122.09	110.90
34	i	39	VAL	CG1-CB-CG2	6.30	120.97	110.90
7	G	698	VAL	CG1-CB-CG2	6.13	120.70	110.90
2	B	54	CYS	CA-CB-SG	6.00	124.80	114.00
34	i	55	LEU	CB-CG-CD2	5.96	121.12	111.00

There are no chirality outliers.

There are no planarity outliers.

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

5.3.1 Protein backbone

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	A	113/115 (98%)	108 (96%)	5 (4%)	0	100	100
2	B	153/216 (71%)	147 (96%)	6 (4%)	0	100	100
3	C	207/266 (78%)	202 (98%)	5 (2%)	0	100	100
4	D	427/463 (92%)	411 (96%)	16 (4%)	0	100	100
5	E	212/249 (85%)	200 (94%)	11 (5%)	1 (0%)	29	47
6	F	431/464 (93%)	414 (96%)	17 (4%)	0	100	100
7	G	698/727 (96%)	676 (97%)	22 (3%)	0	100	100
8	H	317/318 (100%)	305 (96%)	12 (4%)	0	100	100
9	I	174/212 (82%)	170 (98%)	4 (2%)	0	100	100
10	J	173/175 (99%)	161 (93%)	12 (7%)	0	100	100
11	K	96/98 (98%)	94 (98%)	2 (2%)	0	100	100
12	L	604/606 (100%)	580 (96%)	23 (4%)	1 (0%)	47	69
13	M	457/459 (100%)	451 (99%)	6 (1%)	0	100	100
14	N	345/347 (99%)	338 (98%)	7 (2%)	0	100	100
15	O	318/343 (93%)	311 (98%)	7 (2%)	0	100	100
16	P	341/380 (90%)	330 (97%)	11 (3%)	0	100	100
17	Q	127/175 (73%)	124 (98%)	3 (2%)	0	100	100
18	R	94/124 (76%)	92 (98%)	2 (2%)	0	100	100
19	S	85/99 (86%)	82 (96%)	3 (4%)	0	100	100
20	T	83/156 (53%)	79 (95%)	4 (5%)	0	100	100
20	U	84/156 (54%)	82 (98%)	2 (2%)	0	100	100
21	V	113/116 (97%)	108 (96%)	5 (4%)	0	100	100
22	W	113/128 (88%)	110 (97%)	3 (3%)	0	100	100
23	X	169/172 (98%)	167 (99%)	2 (1%)	0	100	100
24	Y	138/141 (98%)	136 (99%)	2 (1%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
25	Z	139/144 (96%)	137 (99%)	2 (1%)	0	100	100
26	a	68/70 (97%)	66 (97%)	2 (3%)	0	100	100
27	b	81/84 (96%)	79 (98%)	2 (2%)	0	100	100
28	c	47/76 (62%)	46 (98%)	1 (2%)	0	100	100
29	d	118/120 (98%)	117 (99%)	1 (1%)	0	100	100
30	e	97/106 (92%)	95 (98%)	2 (2%)	0	100	100
31	f	55/57 (96%)	53 (96%)	2 (4%)	0	100	100
32	g	98/154 (64%)	92 (94%)	6 (6%)	0	100	100
33	h	136/189 (72%)	135 (99%)	1 (1%)	0	100	100
34	i	125/127 (98%)	118 (94%)	7 (6%)	0	100	100
35	j	65/108 (60%)	64 (98%)	1 (2%)	0	100	100
36	k	79/98 (81%)	75 (95%)	4 (5%)	0	100	100
37	l	154/186 (83%)	148 (96%)	6 (4%)	0	100	100
38	m	126/129 (98%)	119 (94%)	7 (6%)	0	100	100
39	n	170/179 (95%)	164 (96%)	6 (4%)	0	100	100
40	o	120/137 (88%)	115 (96%)	5 (4%)	0	100	100
41	p	171/176 (97%)	168 (98%)	3 (2%)	0	100	100
42	q	143/145 (99%)	141 (99%)	1 (1%)	1 (1%)	22	39
43	r	91/113 (80%)	87 (96%)	4 (4%)	0	100	100
44	s	44/109 (40%)	41 (93%)	3 (7%)	0	100	100
All	All	8199/9212 (89%)	7938 (97%)	258 (3%)	3 (0%)	100	100

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
12	L	562	LEU
42	q	144	TYR
5	E	199	LEU

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	A	100/100 (100%)	100 (100%)	0	100	100
2	B	131/175 (75%)	131 (100%)	0	100	100
3	C	190/228 (83%)	190 (100%)	0	100	100
4	D	370/392 (94%)	370 (100%)	0	100	100
5	E	183/205 (89%)	183 (100%)	0	100	100
6	F	347/368 (94%)	347 (100%)	0	100	100
7	G	587/608 (96%)	587 (100%)	0	100	100
8	H	275/274 (100%)	275 (100%)	0	100	100
9	I	151/175 (86%)	151 (100%)	0	100	100
10	J	141/141 (100%)	141 (100%)	0	100	100
11	K	85/85 (100%)	84 (99%)	1 (1%)	71	82
12	L	533/533 (100%)	532 (100%)	1 (0%)	93	96
13	M	412/412 (100%)	412 (100%)	0	100	100
14	N	315/315 (100%)	315 (100%)	0	100	100
15	O	283/303 (93%)	283 (100%)	0	100	100
16	P	297/327 (91%)	297 (100%)	0	100	100
17	Q	116/153 (76%)	116 (100%)	0	100	100
18	R	79/97 (81%)	79 (100%)	0	100	100
19	S	77/82 (94%)	76 (99%)	1 (1%)	69	81
20	T	79/135 (58%)	79 (100%)	0	100	100
20	U	79/135 (58%)	78 (99%)	1 (1%)	69	81
21	V	101/102 (99%)	101 (100%)	0	100	100
22	W	107/114 (94%)	107 (100%)	0	100	100
23	X	154/155 (99%)	154 (100%)	0	100	100
24	Y	101/102 (99%)	101 (100%)	0	100	100
25	Z	120/121 (99%)	120 (100%)	0	100	100
26	a	59/59 (100%)	59 (100%)	0	100	100
27	b	71/72 (99%)	71 (100%)	0	100	100
28	c	45/68 (66%)	45 (100%)	0	100	100
29	d	105/105 (100%)	105 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
30	e	89/96 (93%)	89 (100%)	0	100	100
31	f	54/54 (100%)	54 (100%)	0	100	100
32	g	91/131 (70%)	90 (99%)	1 (1%)	73	84
33	h	121/158 (77%)	121 (100%)	0	100	100
34	i	120/120 (100%)	120 (100%)	0	100	100
35	j	61/84 (73%)	61 (100%)	0	100	100
36	k	63/76 (83%)	63 (100%)	0	100	100
37	l	140/159 (88%)	140 (100%)	0	100	100
38	m	114/115 (99%)	114 (100%)	0	100	100
39	n	156/161 (97%)	156 (100%)	0	100	100
40	o	110/120 (92%)	110 (100%)	0	100	100
41	p	155/157 (99%)	155 (100%)	0	100	100
42	q	131/131 (100%)	131 (100%)	0	100	100
43	r	85/97 (88%)	85 (100%)	0	100	100
44	s	45/92 (49%)	45 (100%)	0	100	100
All	All	7228/7892 (92%)	7223 (100%)	5 (0%)	93	96

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
11	K	53	PHE
12	L	442	ASN
19	S	75	ASN
20	U	44	SER
32	g	26	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
13	M	81	GLN
13	M	82	HIS
30	e	26	HIS
26	a	27	HIS
12	L	199	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](#)

12 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
24	AYA	Y	1	24	6,7,8	1.33	1 (16%)	5,8,10	1.54	1 (20%)
43	AYA	r	1	43	6,7,8	1.21	1 (16%)	5,8,10	1.08	0
12	FME	L	1	12	8,9,10	1.09	1 (12%)	7,9,11	0.83	0
10	FME	J	1	10	8,9,10	0.92	0	7,9,11	0.63	0
4	2MR	D	85	4	10,12,13	0.55	0	5,13,15	1.06	0
29	AME	d	1	29	9,10,11	1.68	1 (11%)	9,11,13	3.39	6 (66%)
1	FME	A	1	1	8,9,10	1.04	1 (12%)	7,9,11	0.73	0
11	FME	K	1	11	8,9,10	0.90	0	7,9,11	0.77	0
13	FME	M	1	13	8,9,10	1.01	1 (12%)	7,9,11	0.87	0
14	FME	N	1	14	8,9,10	1.02	1 (12%)	7,9,11	0.85	0
8	FME	H	1	8	8,9,10	0.99	1 (12%)	7,9,11	1.00	0
34	SAC	i	1	34	7,8,9	1.09	1 (14%)	8,9,11	1.21	1 (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
24	AYA	Y	1	24	-	0/4/6/8	-
43	AYA	r	1	43	-	1/4/6/8	-
12	FME	L	1	12	-	2/7/9/11	-
10	FME	J	1	10	-	3/7/9/11	-
4	2MR	D	85	4	-	2/10/13/15	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
29	AME	d	1	29	-	6/9/10/12	-
1	FME	A	1	1	-	4/7/9/11	-
11	FME	K	1	11	-	2/7/9/11	-
13	FME	M	1	13	-	2/7/9/11	-
14	FME	N	1	14	-	3/7/9/11	-
8	FME	H	1	8	-	2/7/9/11	-
34	SAC	i	1	34	-	1/7/8/10	-

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
29	d	1	AME	CT1-N	4.00	1.48	1.34
24	Y	1	AYA	CA-N	-2.86	1.43	1.46
43	r	1	AYA	CA-N	-2.54	1.43	1.46
12	L	1	FME	CA-N	-2.47	1.42	1.46
1	A	1	FME	CA-N	-2.42	1.42	1.46

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
29	d	1	AME	CT2-CT1-N	7.14	128.19	116.10
29	d	1	AME	CA-N-CT1	3.89	130.33	123.15
29	d	1	AME	OT-CT1-N	-3.55	115.42	121.95
24	Y	1	AYA	CB-CA-N	3.18	113.14	109.61
29	d	1	AME	OT-CT1-CT2	-3.05	116.39	122.06

There are no chirality outliers.

5 of 28 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	1	FME	C-CA-CB-CG
1	A	1	FME	O-C-CA-CB
4	D	85	2MR	NH1-CZ-NH2-CQ2
8	H	1	FME	CA-CB-CG-SD
10	J	1	FME	O1-CN-N-CA

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 56 ligands modelled in this entry, 3 are monoatomic - leaving 53 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
47	SF4	I	203	9	0,12,12	-	-	-		
48	FES	G	803	7	0,4,4	-	-	-		
46	PC1	m	201	-	39,39,53	1.09	4 (10%)	45,47,61	1.11	2 (4%)
46	PC1	h	202	-	43,43,53	1.03	4 (9%)	49,51,61	1.06	2 (4%)
51	CDL	X	201	-	72,72,99	1.02	6 (8%)	78,84,111	1.07	4 (5%)
51	CDL	N	902	-	59,59,99	1.10	7 (11%)	65,71,111	1.17	4 (6%)
45	3PE	Y	803	-	30,30,50	1.06	3 (10%)	33,35,55	1.16	2 (6%)
45	3PE	Y	801	-	34,34,50	1.03	3 (8%)	37,39,55	1.21	3 (8%)
45	3PE	M	605	-	49,49,50	0.85	4 (8%)	52,54,55	1.05	2 (3%)
47	SF4	B	201	2	0,12,12	-	-	-		
51	CDL	h	201	-	77,77,99	0.98	8 (10%)	83,89,111	1.18	4 (4%)
51	CDL	L	702	-	59,59,99	1.12	5 (8%)	65,71,111	1.15	4 (6%)
45	3PE	A	201	-	41,41,50	0.94	3 (7%)	44,46,55	1.07	2 (4%)
45	3PE	Y	804	-	50,50,50	0.86	4 (8%)	53,55,55	1.00	2 (3%)
47	SF4	G	802	7	0,12,12	-	-	-		
46	PC1	A	204	-	32,32,53	1.24	4 (12%)	38,40,61	1.13	2 (5%)
52	GTP	O	401	53	26,34,34	2.91	10 (38%)	32,54,54	1.82	11 (34%)
47	SF4	F	502	6	0,12,12	-	-	-		
54	NDP	P	402	-	45,52,52	2.23	9 (20%)	53,80,80	1.68	7 (13%)
56	EHZ	U	101	20	29,36,37	1.66	5 (17%)	35,44,47	1.36	1 (2%)
46	PC1	d	202	-	32,32,53	1.24	5 (15%)	38,40,61	1.22	2 (5%)
46	PC1	M	604	-	38,38,53	1.12	3 (7%)	44,46,61	1.05	2 (4%)
45	3PE	M	602	-	47,47,50	0.88	4 (8%)	50,52,55	1.13	2 (4%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
51	CDL	r	201	-	61,61,99	1.09	5 (8%)	67,73,111	1.11	4 (5%)
45	3PE	N	901	-	47,47,50	0.89	3 (6%)	50,52,55	1.05	2 (4%)
46	PC1	B	202	-	40,40,53	1.08	3 (7%)	46,48,61	1.13	2 (4%)
45	3PE	L	701	-	38,38,50	1.00	3 (7%)	41,43,55	1.12	2 (4%)
45	3PE	H	601	-	28,28,50	1.05	2 (7%)	31,33,55	1.10	1 (3%)
47	SF4	G	801	7	0,12,12	-	-	-	-	-
51	CDL	K	101	-	68,68,99	1.04	7 (10%)	74,80,111	1.15	4 (5%)
46	PC1	M	606	-	41,41,53	1.08	4 (9%)	47,49,61	1.16	3 (6%)
47	SF4	I	202	9	0,12,12	-	-	-	-	-
45	3PE	b	101	-	46,46,50	0.89	3 (6%)	49,51,55	1.02	2 (4%)
56	EHZ	T	101	20	29,36,37	1.68	4 (13%)	35,44,47	1.80	7 (20%)
49	FMN	F	501	-	33,33,33	1.13	2 (6%)	48,50,50	1.30	8 (16%)
45	3PE	M	601	-	44,44,50	0.91	3 (6%)	47,49,55	1.13	2 (4%)
45	3PE	Y	802	-	39,39,50	0.95	2 (5%)	42,44,55	1.11	2 (4%)
45	3PE	I	201	-	37,37,50	1.01	4 (10%)	40,42,55	1.09	3 (7%)
46	PC1	A	202	-	34,34,53	1.18	3 (8%)	40,42,61	1.12	2 (5%)
45	3PE	P	403	-	34,34,50	1.05	4 (11%)	37,39,55	1.10	2 (5%)
45	3PE	A	203	-	36,36,50	1.01	4 (11%)	39,41,55	1.09	3 (7%)
46	PC1	P	401	-	53,53,53	1.03	3 (5%)	59,61,61	1.13	3 (5%)
57	CHD	i	201	-	32,32,32	3.27	10 (31%)	51,51,51	3.84	22 (43%)
58	MYR	o	201	40	14,14,15	0.67	0	13,13,15	0.61	0
46	PC1	Z	201	-	47,47,53	0.41	0	53,55,61	0.74	2 (3%)
48	FES	E	301	5	0,4,4	-	-	-	-	-
45	3PE	M	603	-	50,50,50	0.85	4 (8%)	53,55,55	1.18	3 (5%)
45	3PE	Z	202	-	34,34,50	1.03	4 (11%)	37,39,55	1.05	2 (5%)
45	3PE	L	703	-	44,44,50	0.90	3 (6%)	47,49,55	1.05	2 (4%)
51	CDL	d	203	-	64,64,99	1.06	8 (12%)	70,76,111	1.12	4 (5%)
51	CDL	H	602	-	49,49,99	1.21	8 (16%)	55,61,111	1.27	5 (9%)
45	3PE	m	202	-	39,39,50	0.97	4 (10%)	42,44,55	1.16	2 (4%)
45	3PE	d	201	-	36,36,50	1.01	3 (8%)	39,41,55	1.07	2 (5%)

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
47	SF4	I	203	9	-	-	0/6/5/5
48	FES	G	803	7	-	-	0/1/1/1
46	PC1	m	201	-	-	12/43/43/57	-
46	PC1	h	202	-	-	17/47/47/57	-
51	CDL	X	201	-	-	44/83/83/110	-
51	CDL	N	902	-	-	26/69/69/110	-
45	3PE	Y	803	-	-	16/34/34/54	-
45	3PE	Y	801	-	-	15/38/38/54	-
45	3PE	M	605	-	-	18/53/53/54	-
47	SF4	B	201	2	-	-	0/6/5/5
51	CDL	h	201	-	-	39/88/88/110	-
51	CDL	L	702	-	-	27/70/70/110	-
45	3PE	A	201	-	-	15/45/45/54	-
45	3PE	Y	804	-	-	21/54/54/54	-
47	SF4	G	802	7	-	-	0/6/5/5
46	PC1	A	204	-	-	17/36/36/57	-
52	GTP	O	401	53	-	5/18/38/38	0/3/3/3
47	SF4	F	502	6	-	-	0/6/5/5
54	NDP	P	402	-	-	6/30/77/77	0/5/5/5
56	EHZ	U	101	20	-	7/42/44/45	-
46	PC1	d	202	-	-	18/36/36/57	-
46	PC1	M	604	-	-	20/42/42/57	-
45	3PE	M	602	-	-	25/51/51/54	-
51	CDL	r	201	-	-	25/72/72/110	-
45	3PE	N	901	-	-	19/51/51/54	-
46	PC1	B	202	-	-	14/44/44/57	-
45	3PE	L	701	-	-	18/42/42/54	-
45	3PE	H	601	-	-	17/31/31/54	-
47	SF4	G	801	7	-	-	0/6/5/5
51	CDL	K	101	-	-	34/79/79/110	-
46	PC1	M	606	-	-	18/45/45/57	-
47	SF4	I	202	9	-	-	0/6/5/5
45	3PE	b	101	-	-	22/50/50/54	-
56	EHZ	T	101	20	-	12/42/44/45	-
49	FMN	F	501	-	-	2/18/18/18	0/3/3/3
45	3PE	M	601	-	-	26/48/48/54	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
45	3PE	Y	802	-	-	20/43/43/54	-
45	3PE	I	201	-	-	12/41/41/54	-
46	PC1	A	202	-	-	18/38/38/57	-
45	3PE	P	403	-	-	14/38/38/54	-
45	3PE	A	203	-	-	13/40/40/54	-
46	PC1	P	401	-	-	19/57/57/57	-
57	CHD	i	201	-	-	6/9/74/74	0/4/4/4
58	MYR	o	201	40	-	5/11/12/13	-
46	PC1	Z	201	-	-	19/51/51/57	-
48	FES	E	301	5	-	-	0/1/1/1
45	3PE	M	603	-	-	33/54/54/54	-
45	3PE	Z	202	-	-	11/38/38/54	-
45	3PE	L	703	-	-	13/48/48/54	-
51	CDL	d	203	-	-	33/75/75/110	-
51	CDL	H	602	-	-	25/60/60/110	-
45	3PE	m	202	-	-	16/43/43/54	-
45	3PE	d	201	-	-	19/40/40/54	-

The worst 5 of 194 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
54	P	402	NDP	P2B-O2B	11.74	1.81	1.59
57	i	201	CHD	C11-C12	9.14	1.68	1.53
52	O	401	GTP	O6-C6	8.10	1.39	1.23
57	i	201	CHD	C16-C15	7.16	1.73	1.54
57	i	201	CHD	C13-C17	5.83	1.65	1.55

The worst 5 of 154 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
57	i	201	CHD	C11-C9-C10	11.02	125.09	113.73
57	i	201	CHD	C4-C5-C10	9.22	122.45	112.66
57	i	201	CHD	C18-C13-C12	-8.34	100.57	109.07
57	i	201	CHD	C14-C13-C12	8.29	115.12	107.40
57	i	201	CHD	C14-C8-C7	8.28	122.79	111.81

There are no chirality outliers.

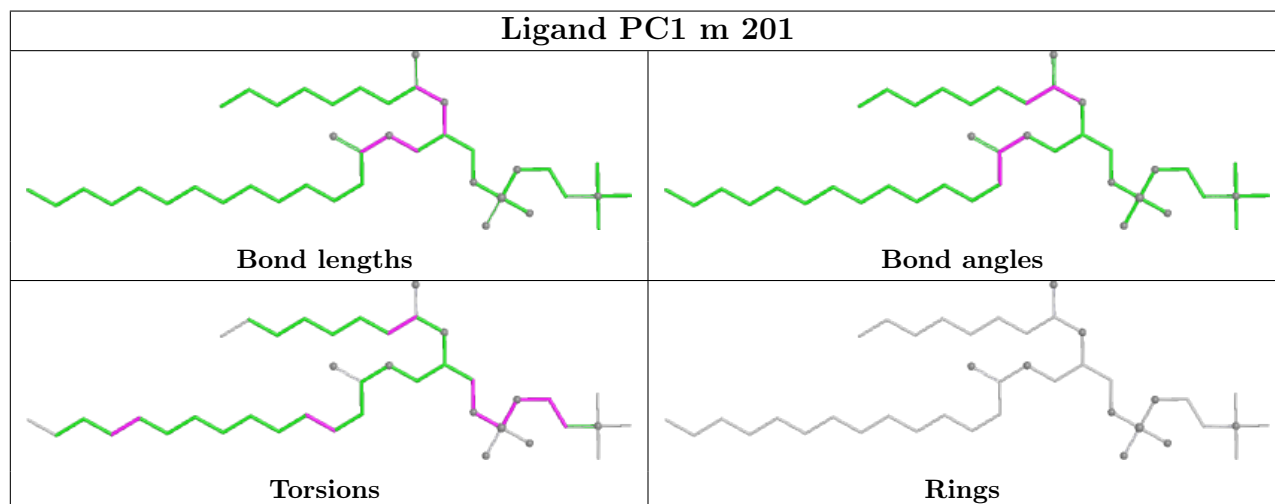
5 of 831 torsion outliers are listed below:

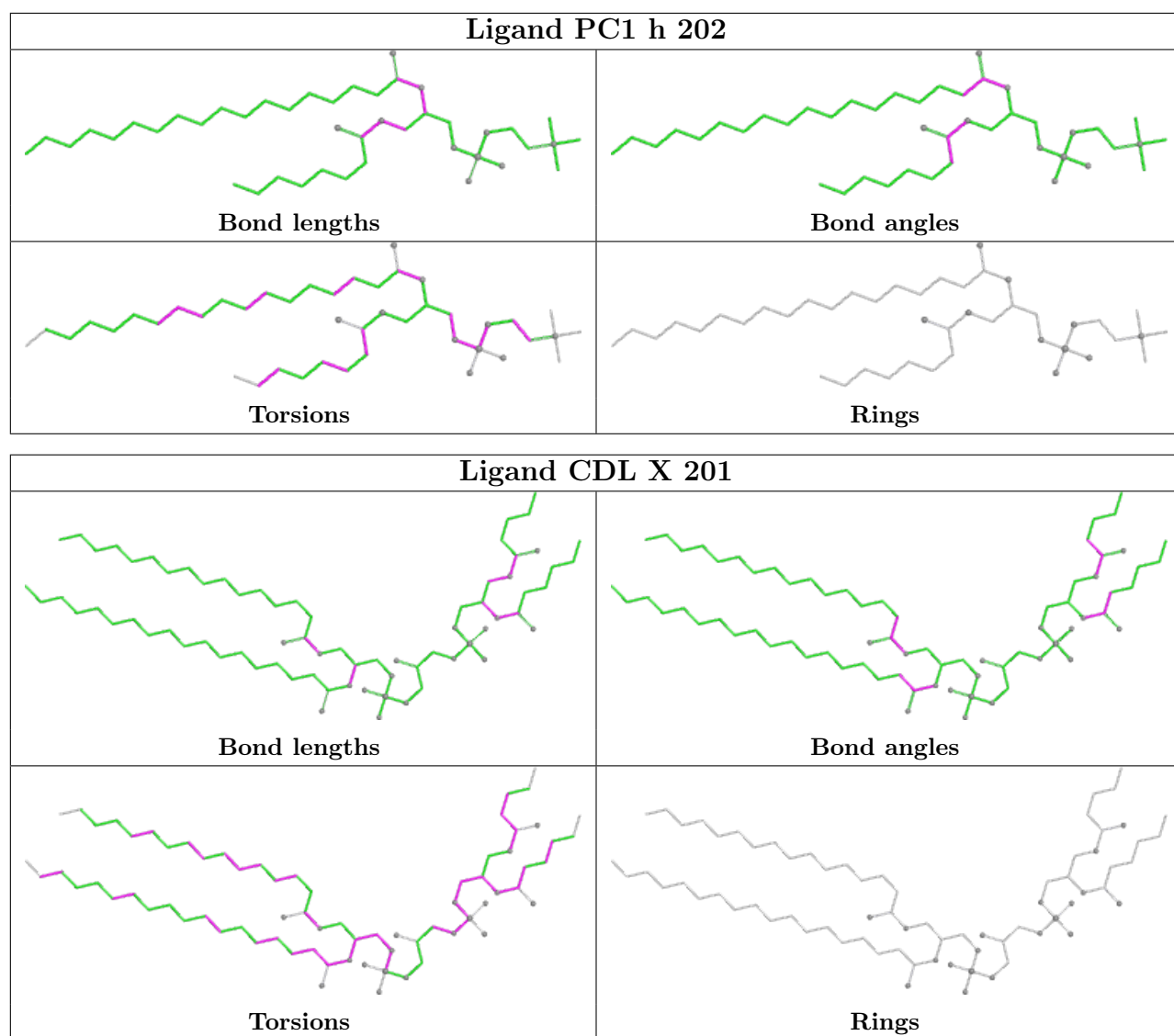
Mol	Chain	Res	Type	Atoms
45	A	201	3PE	C11-O13-P-O14
45	A	201	3PE	O13-C11-C12-N
45	H	601	3PE	C1-O11-P-O12
45	H	601	3PE	C1-O11-P-O14
45	H	601	3PE	O13-C11-C12-N

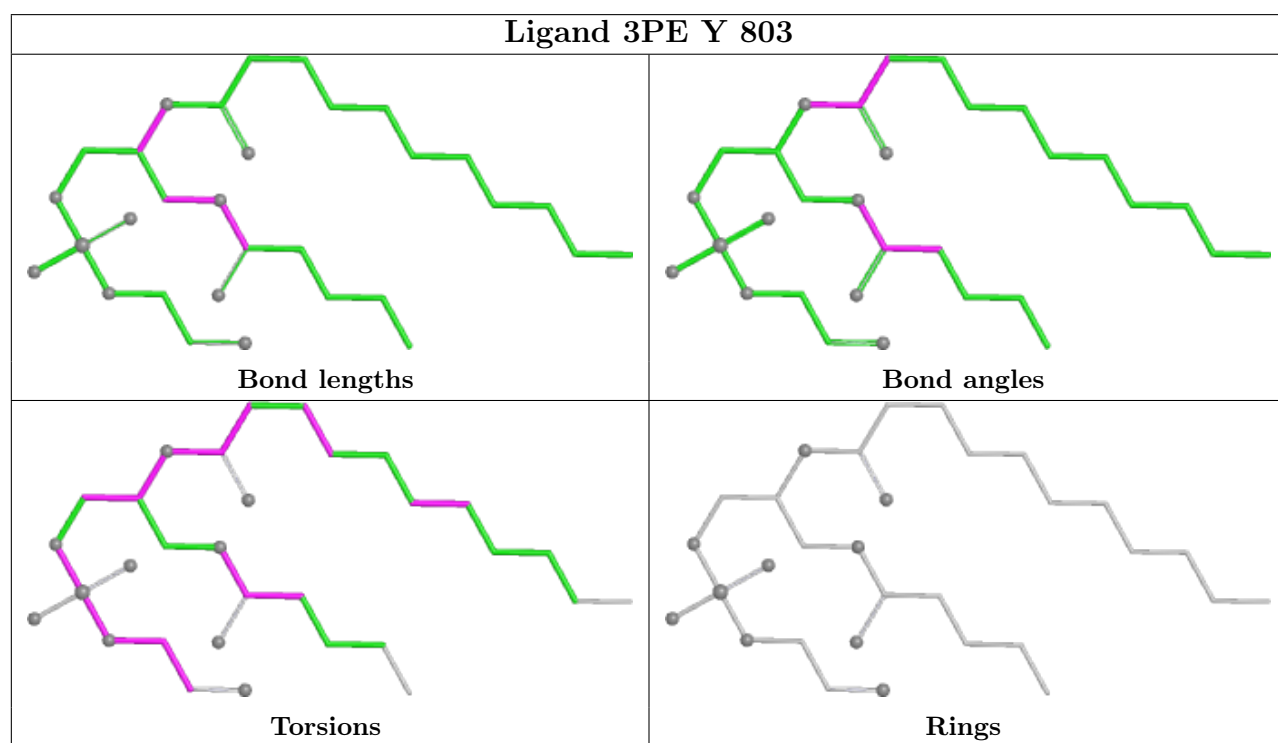
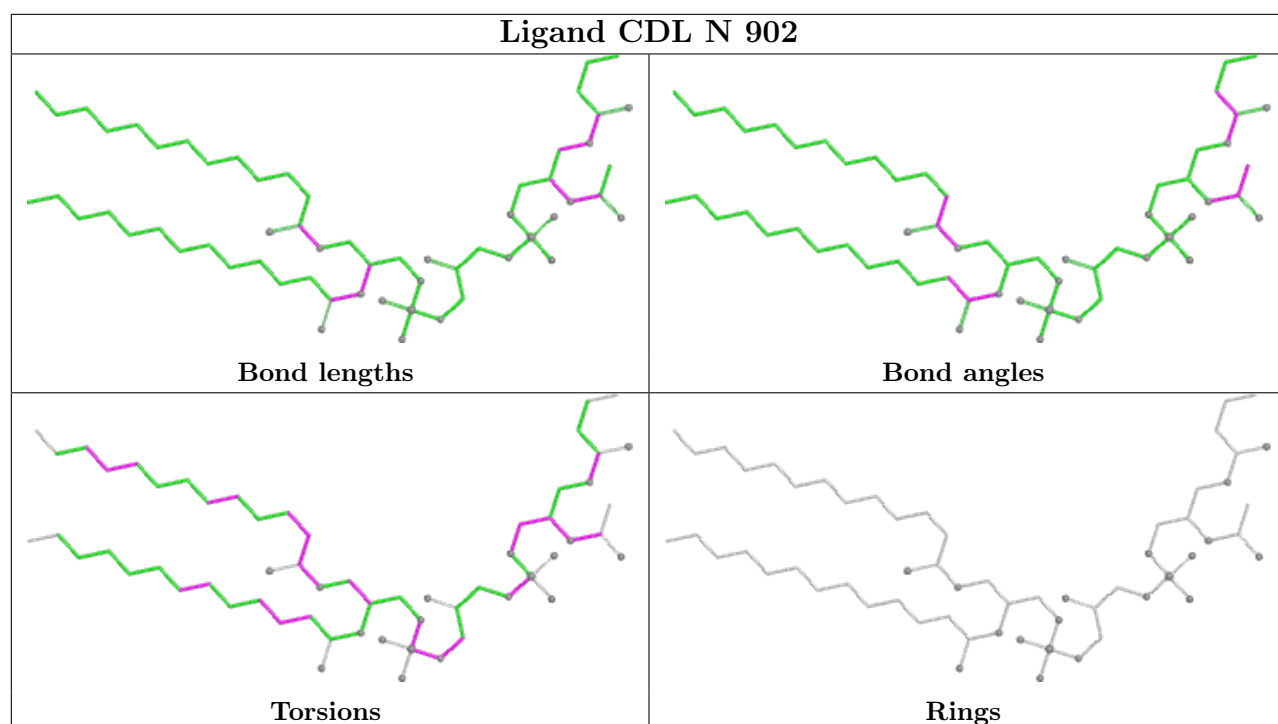
There are no ring outliers.

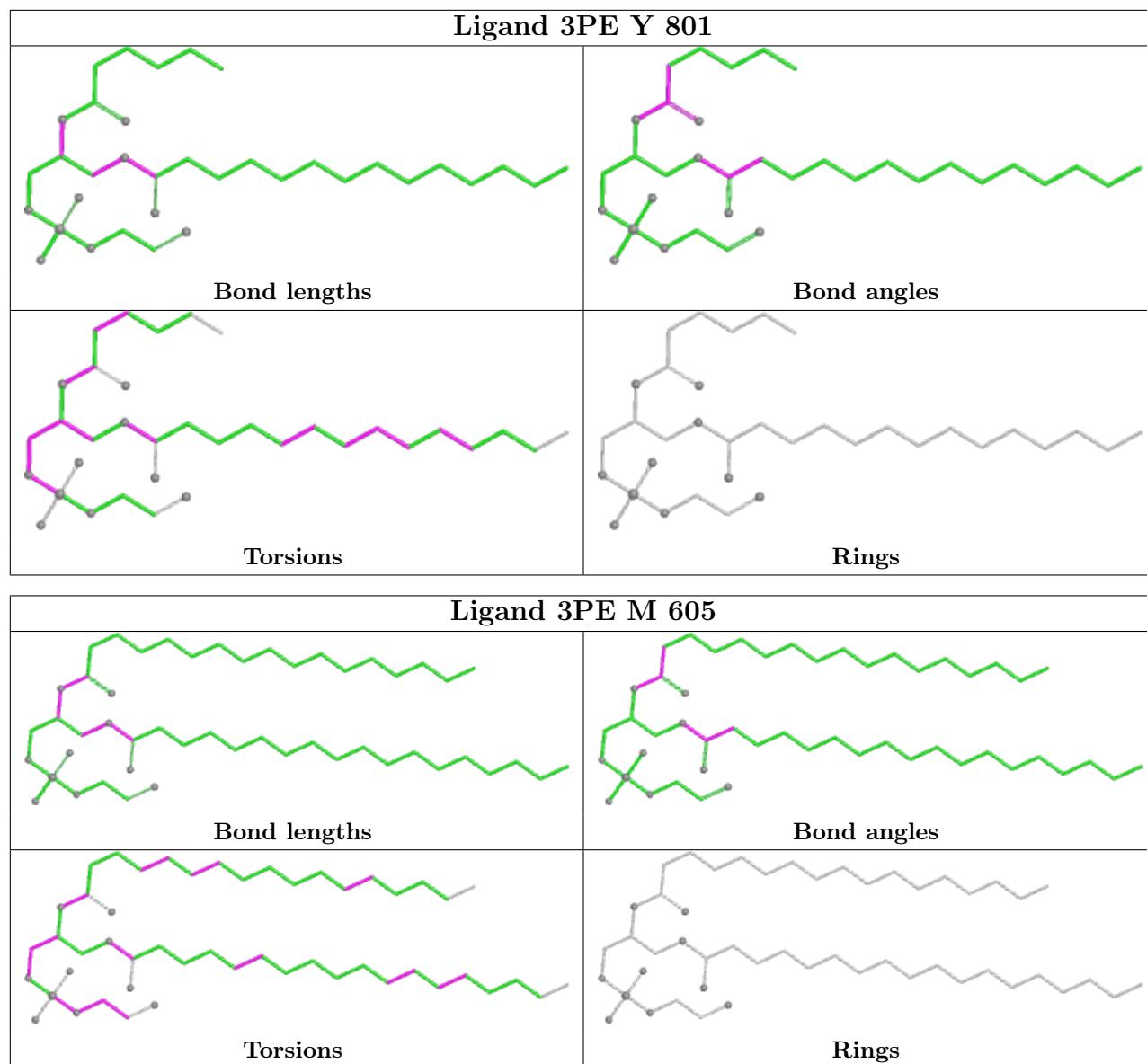
No monomer is involved in short contacts.

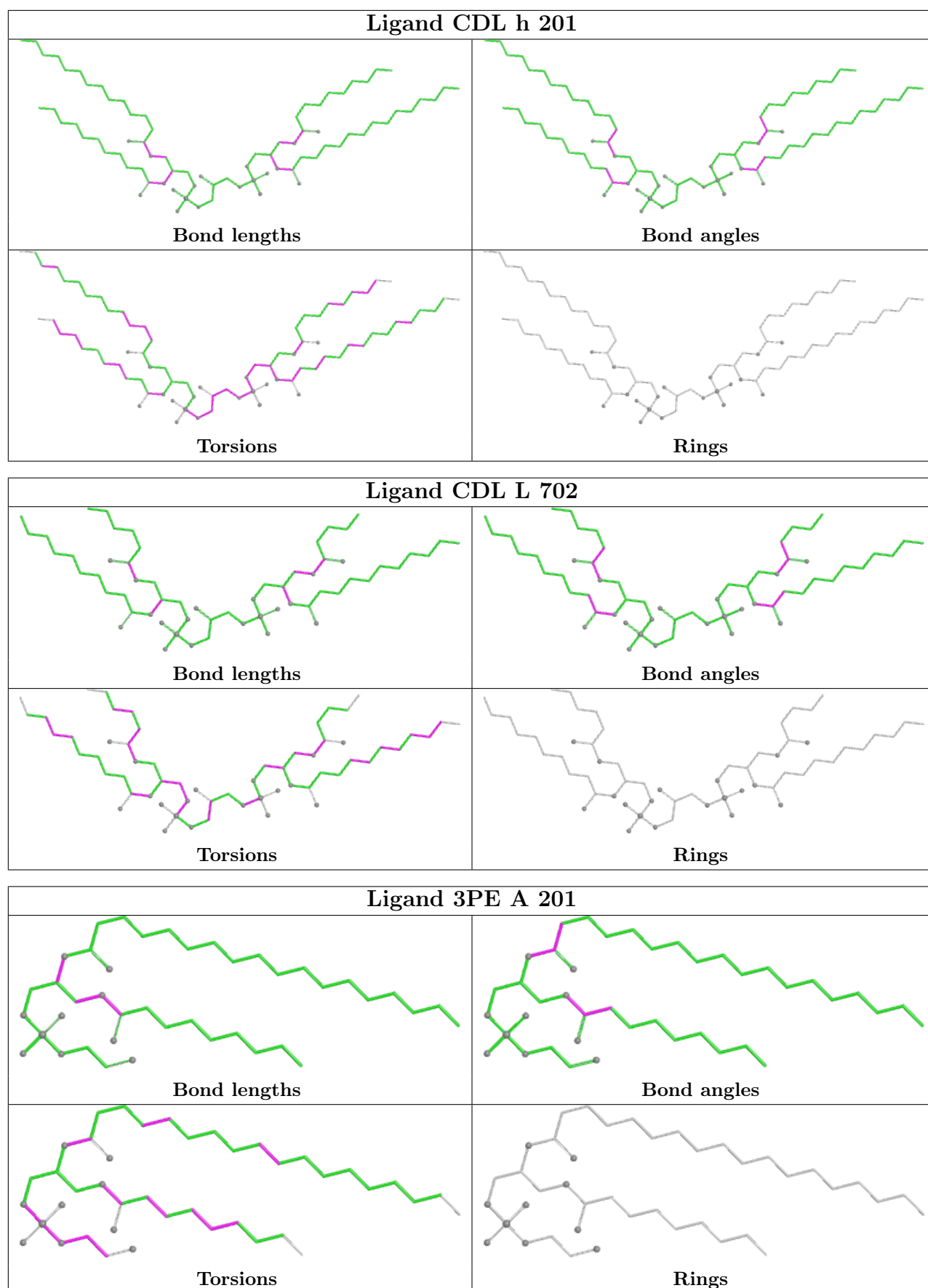
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

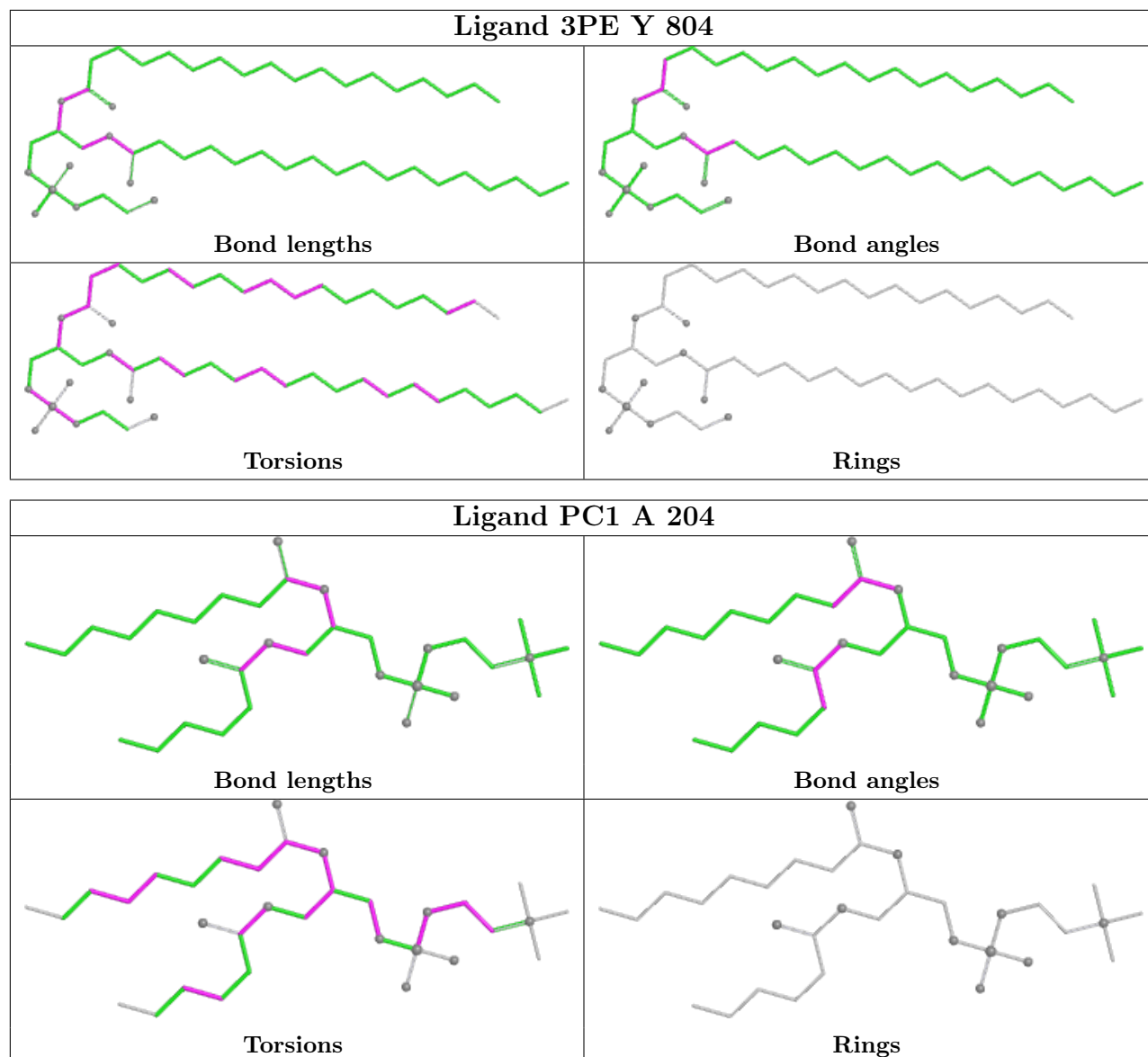


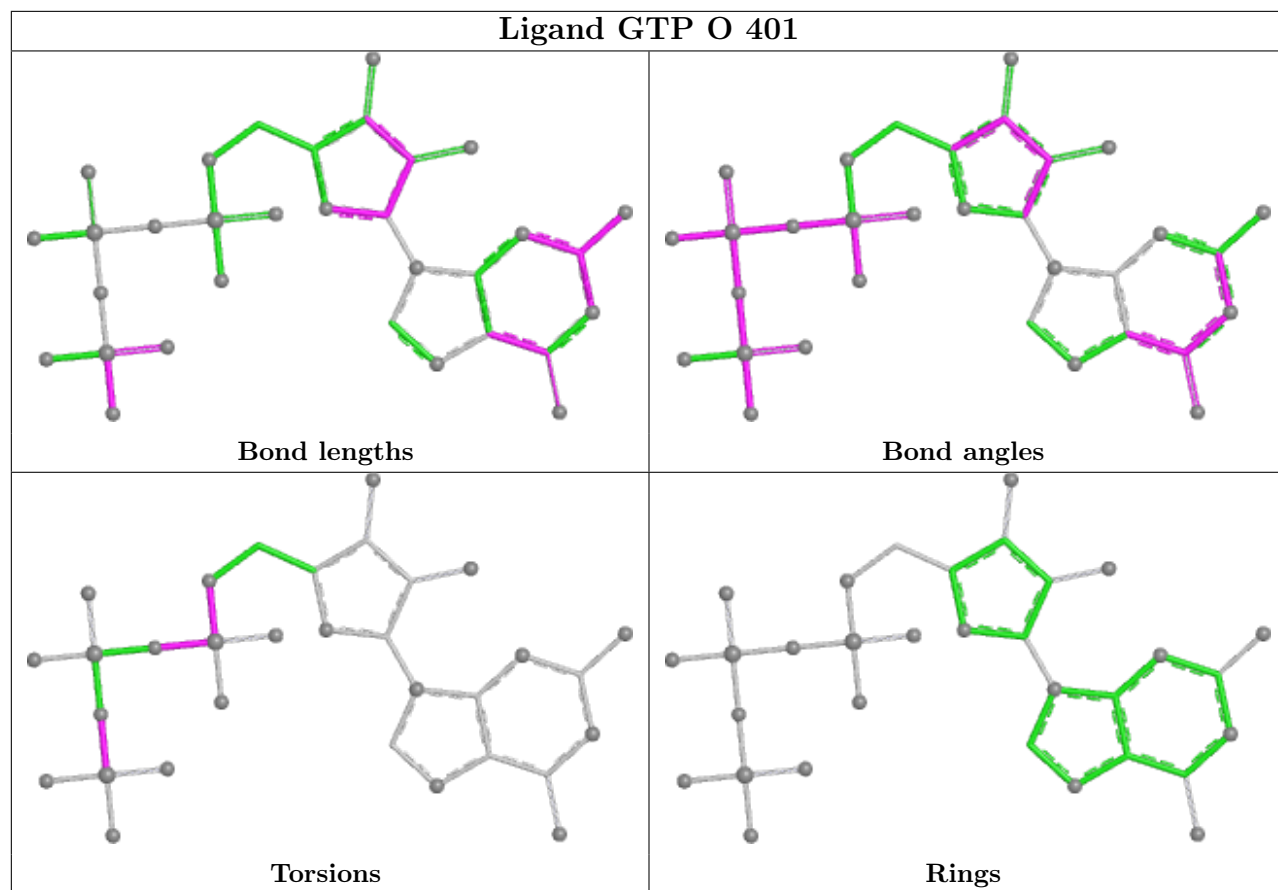


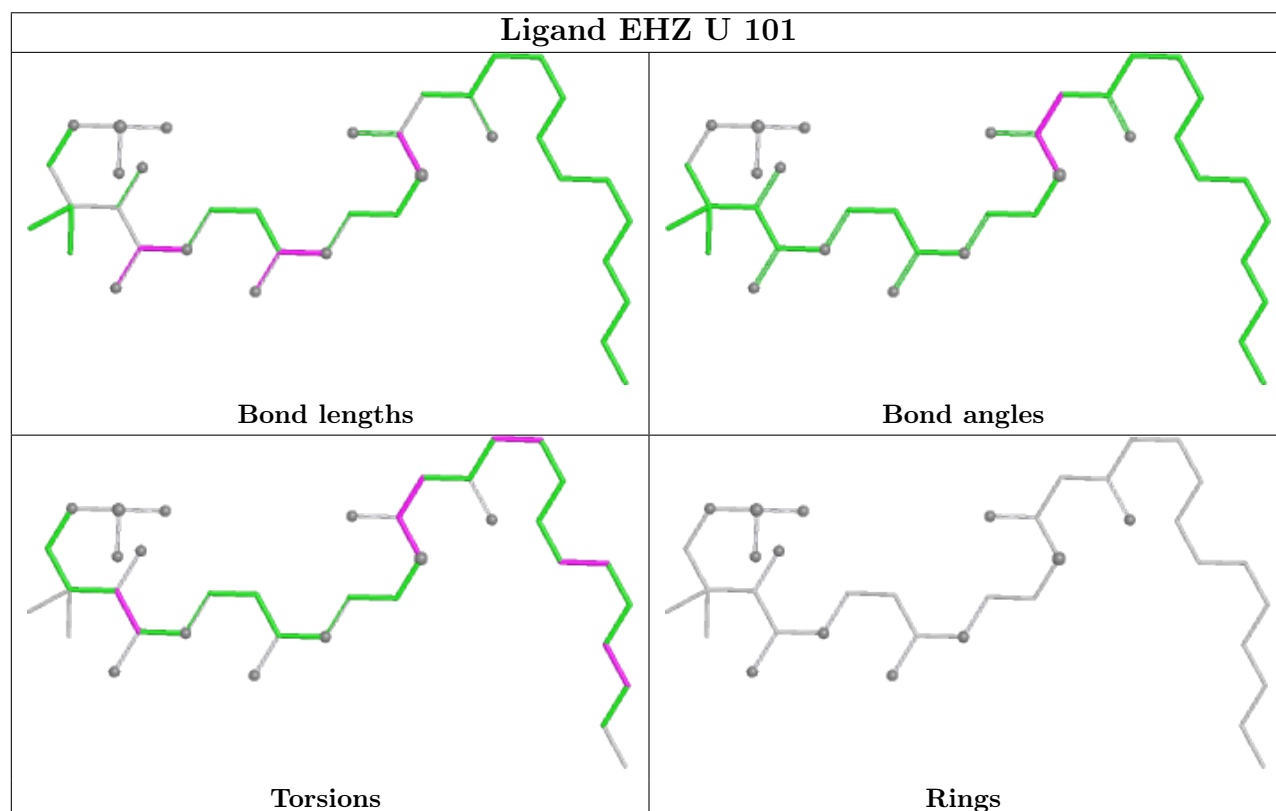
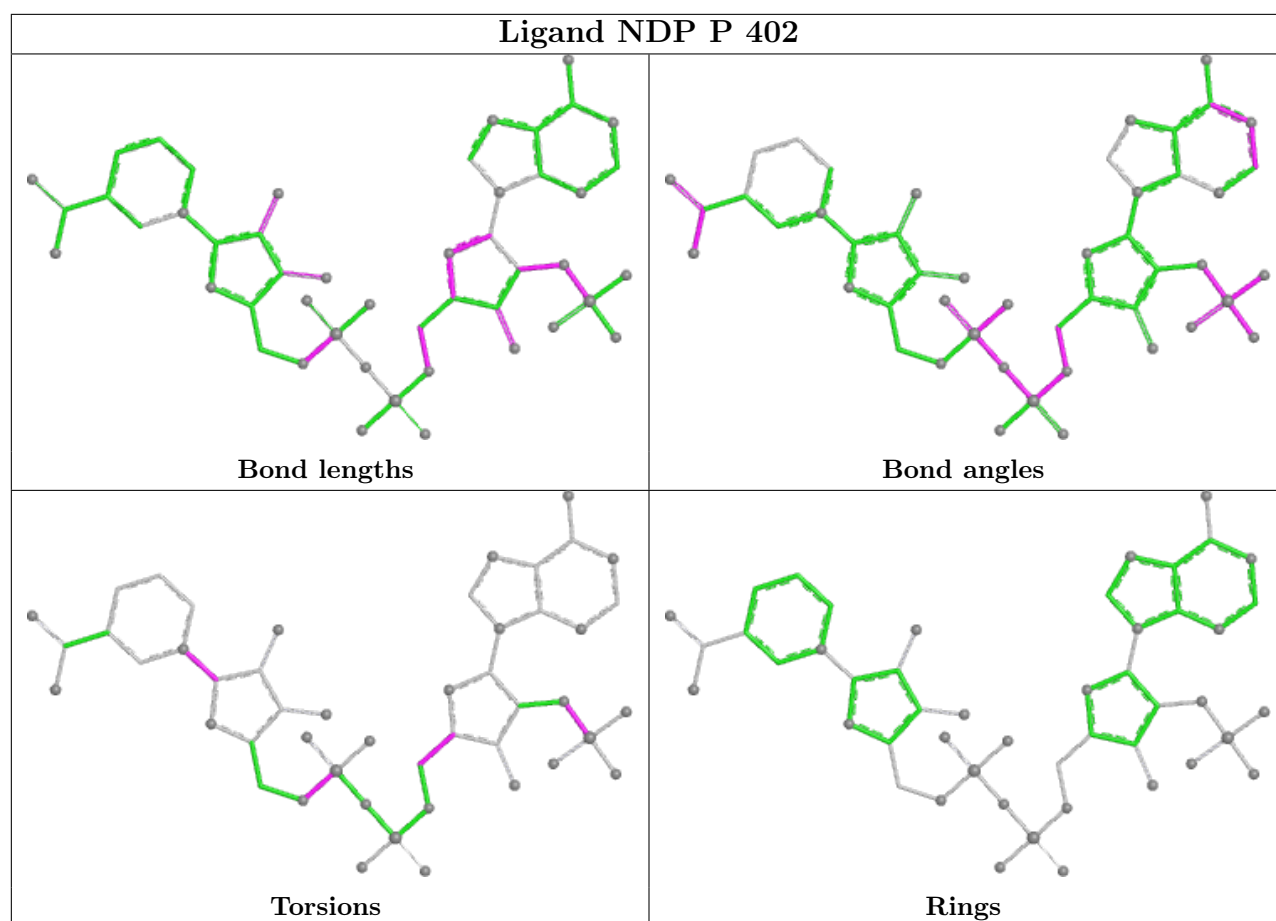


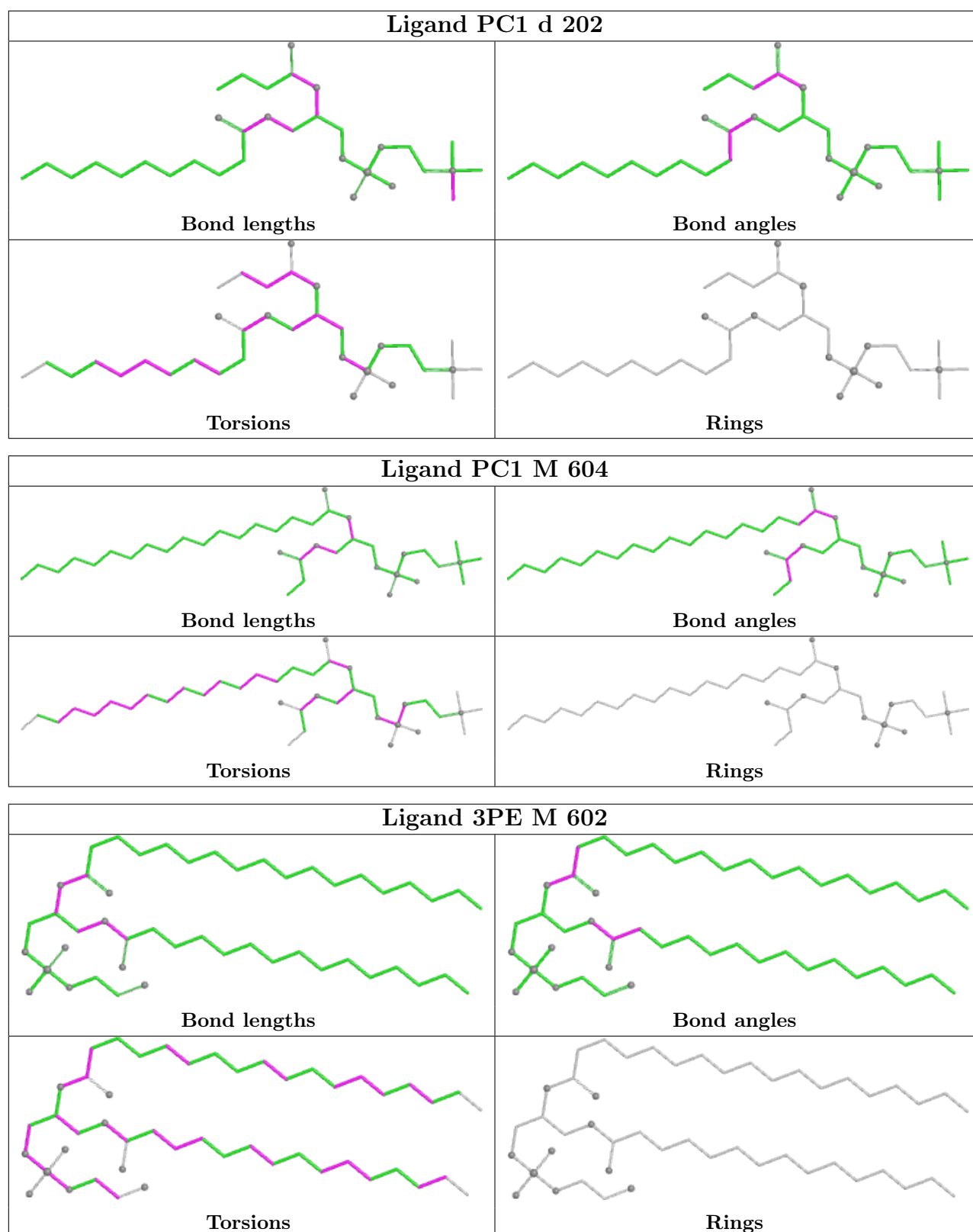


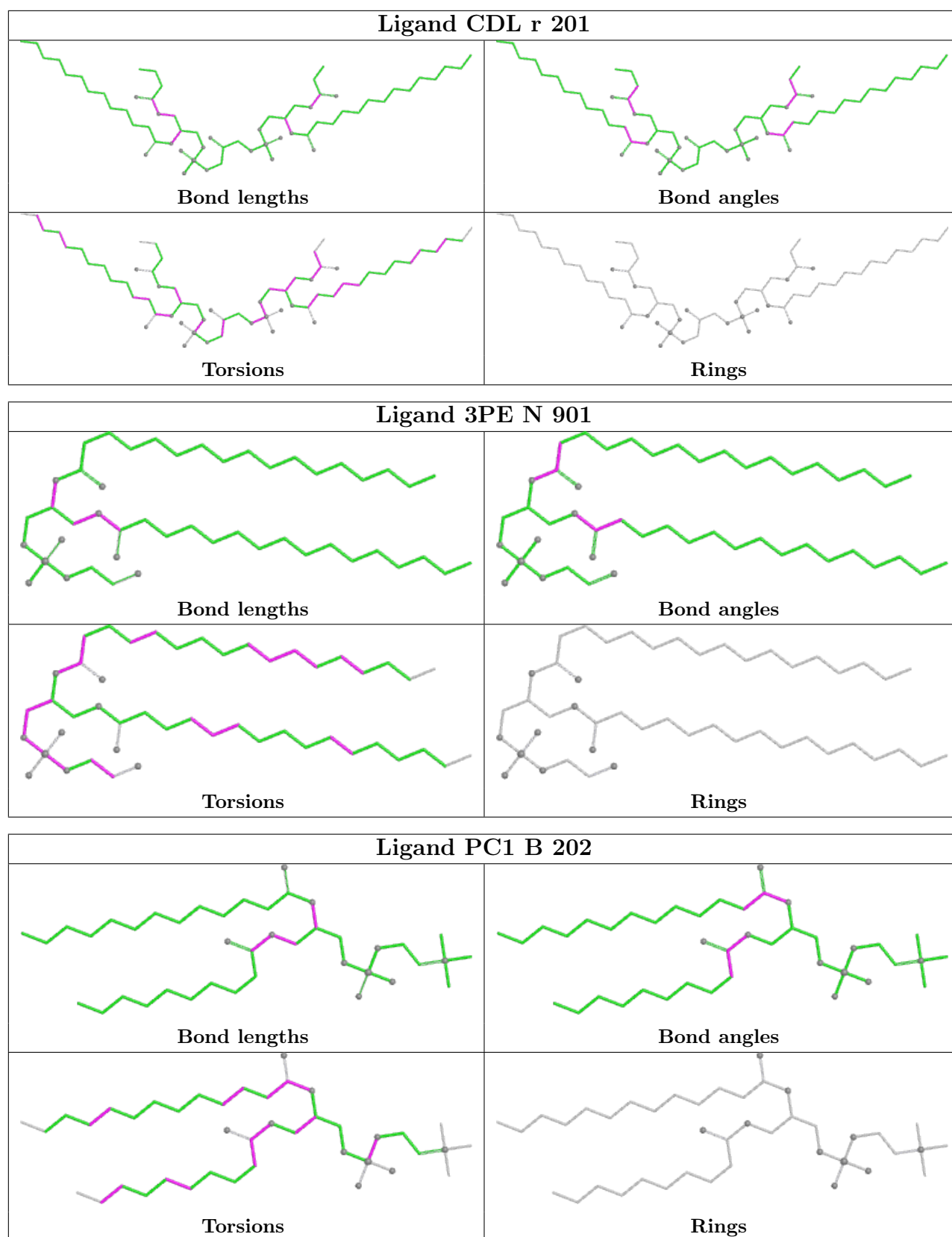


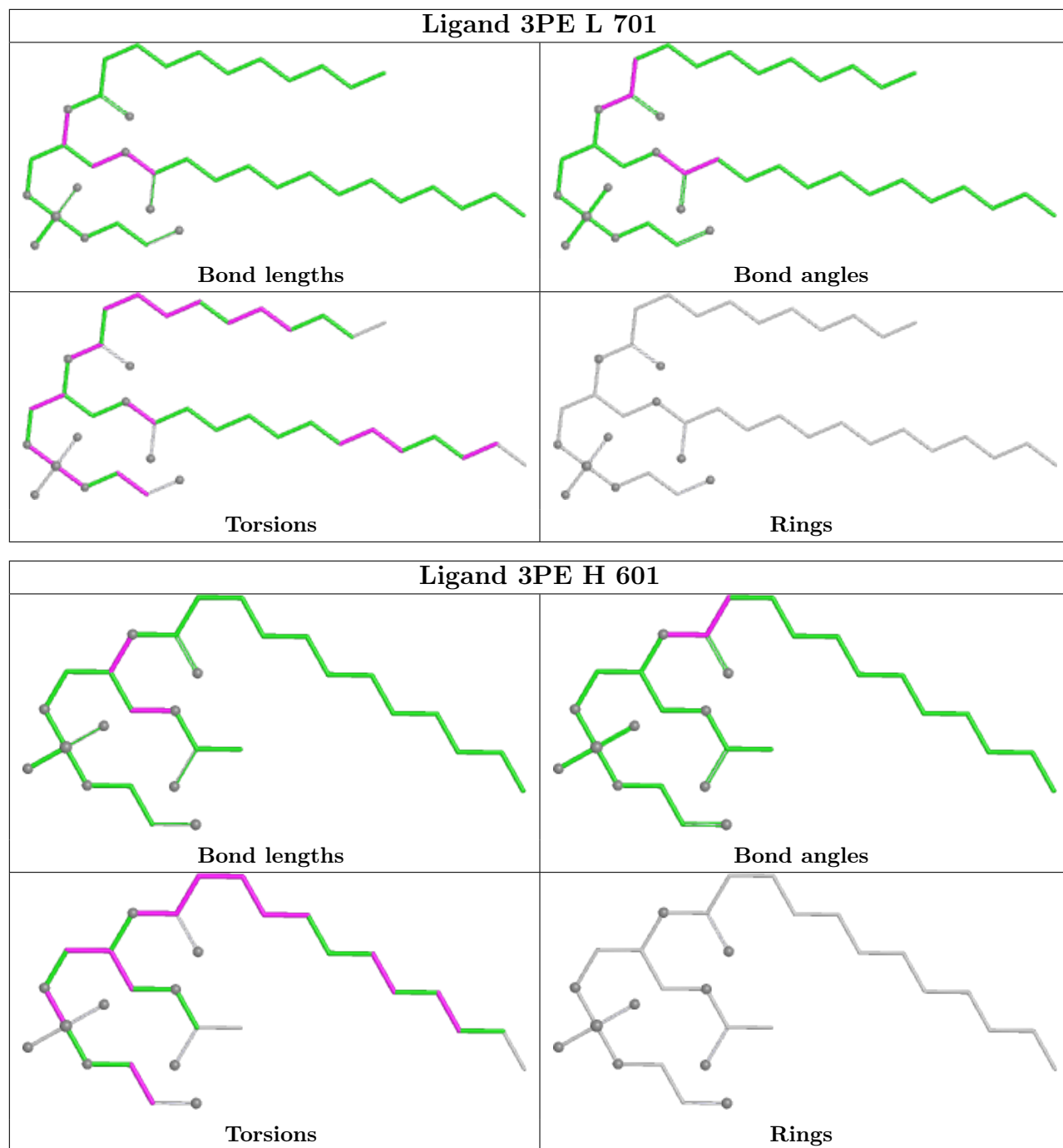


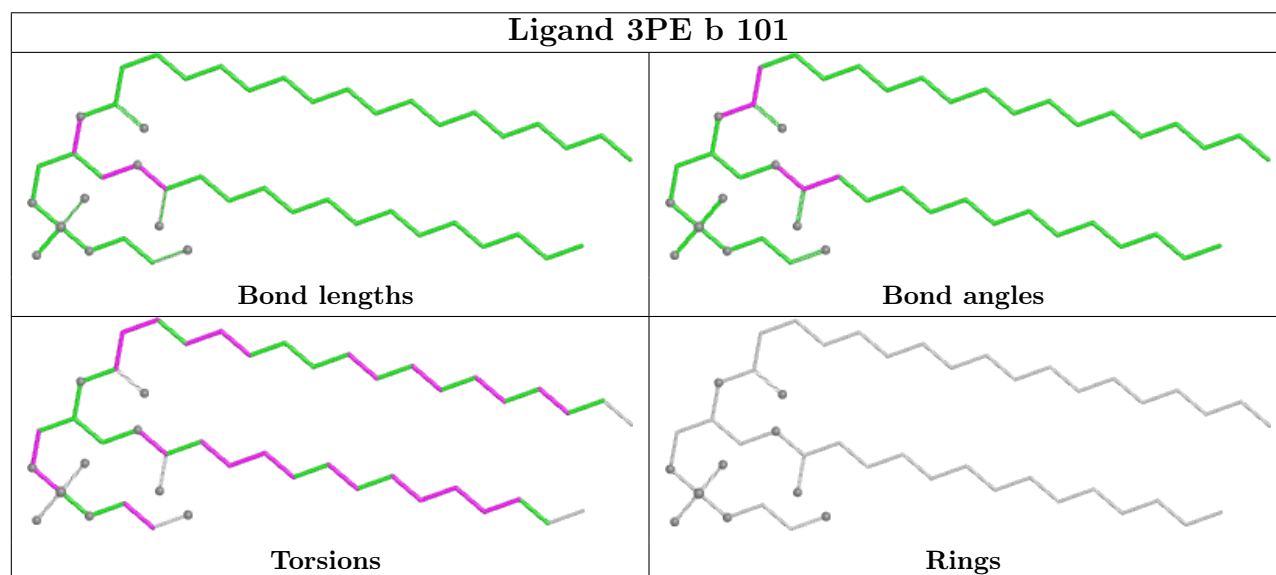
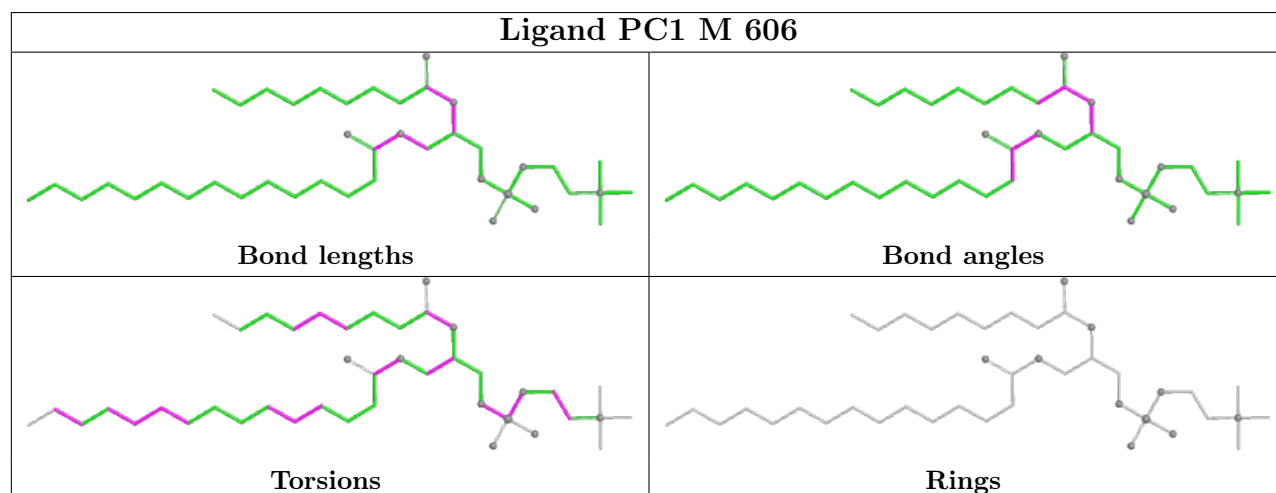
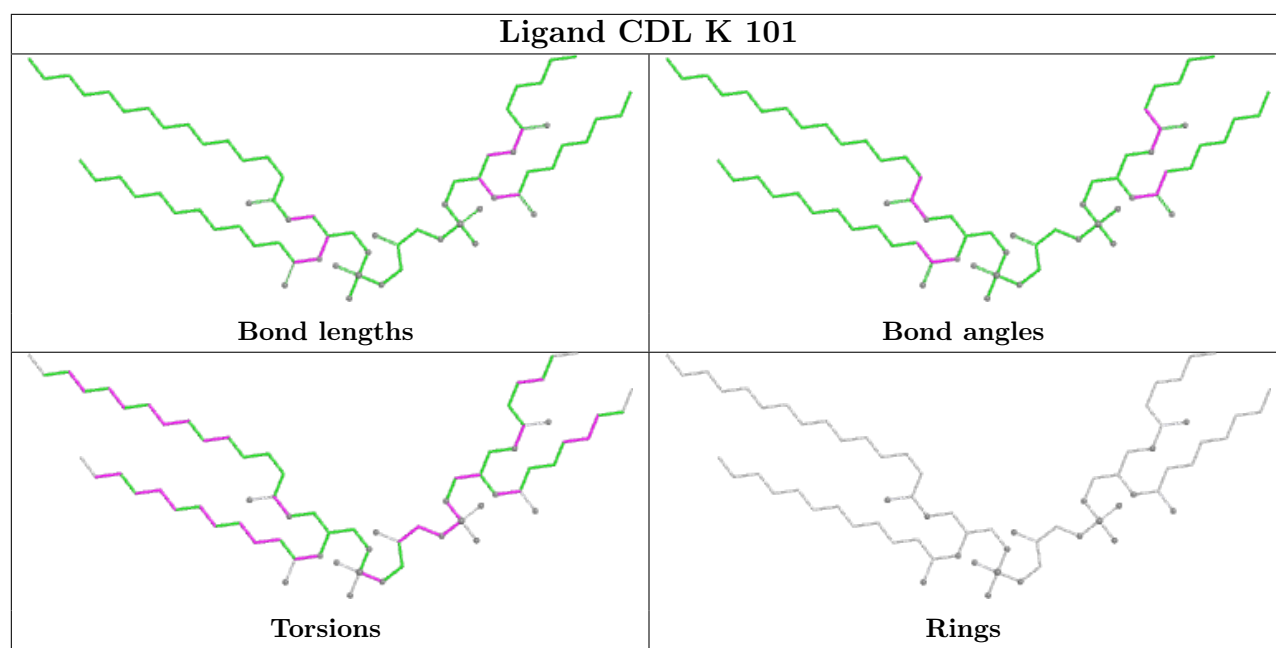


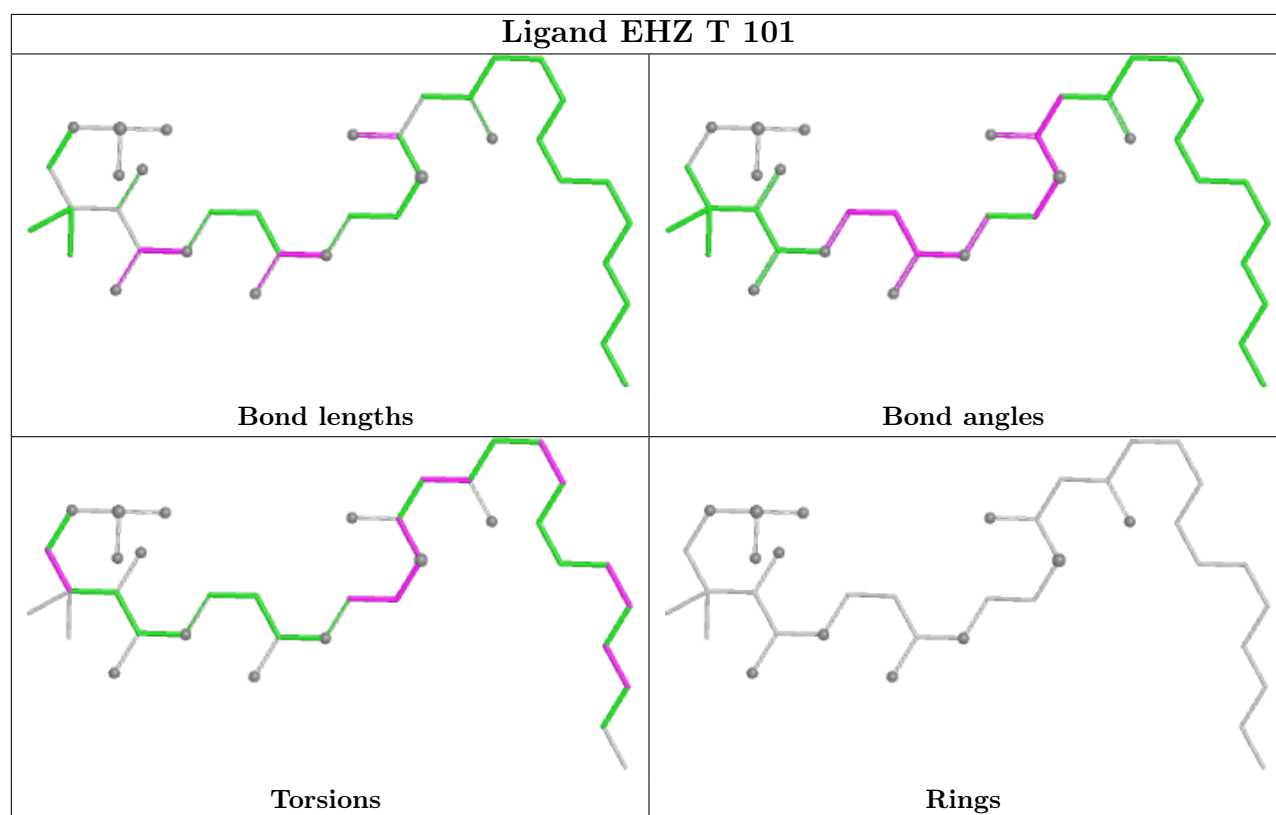


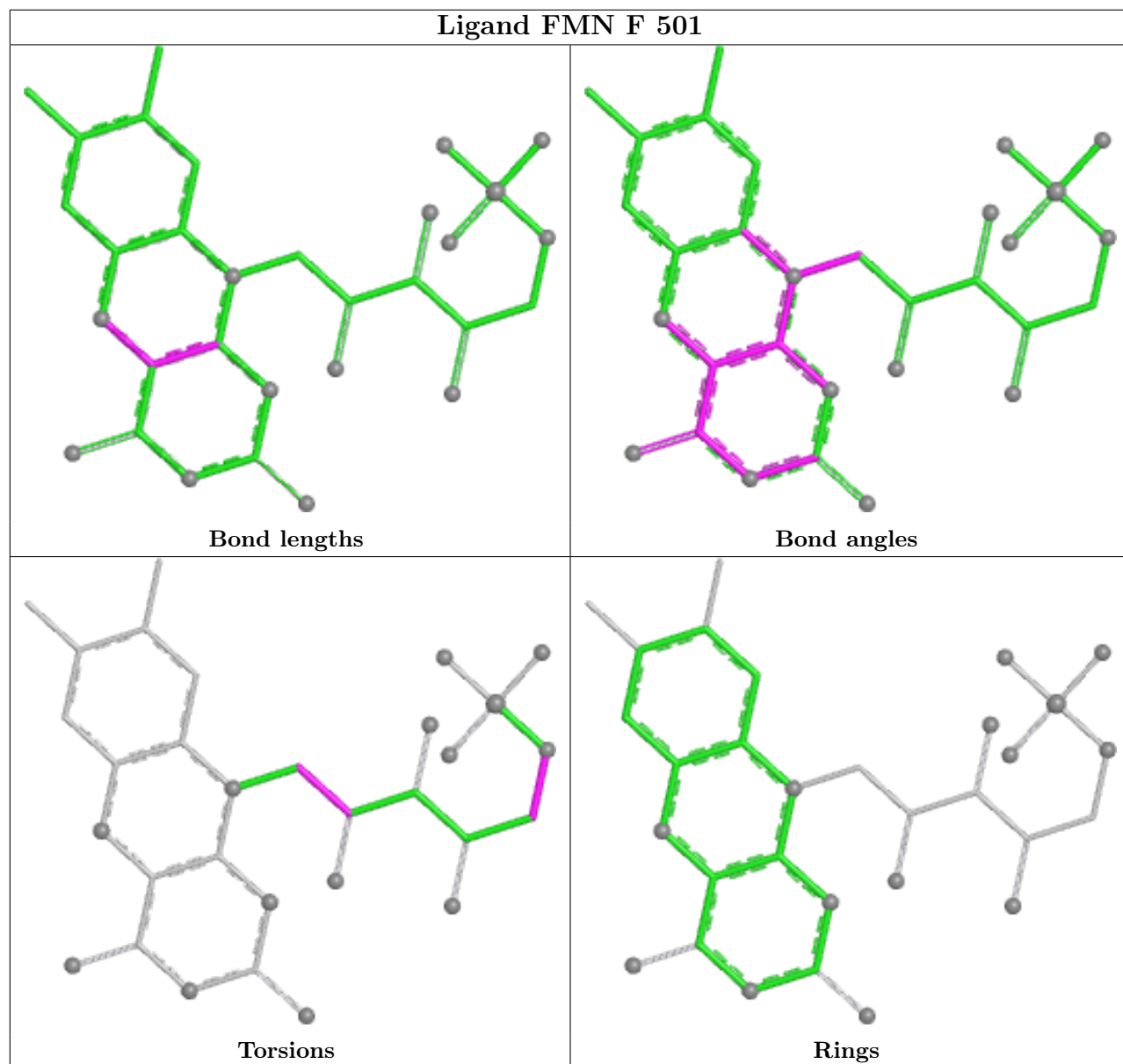


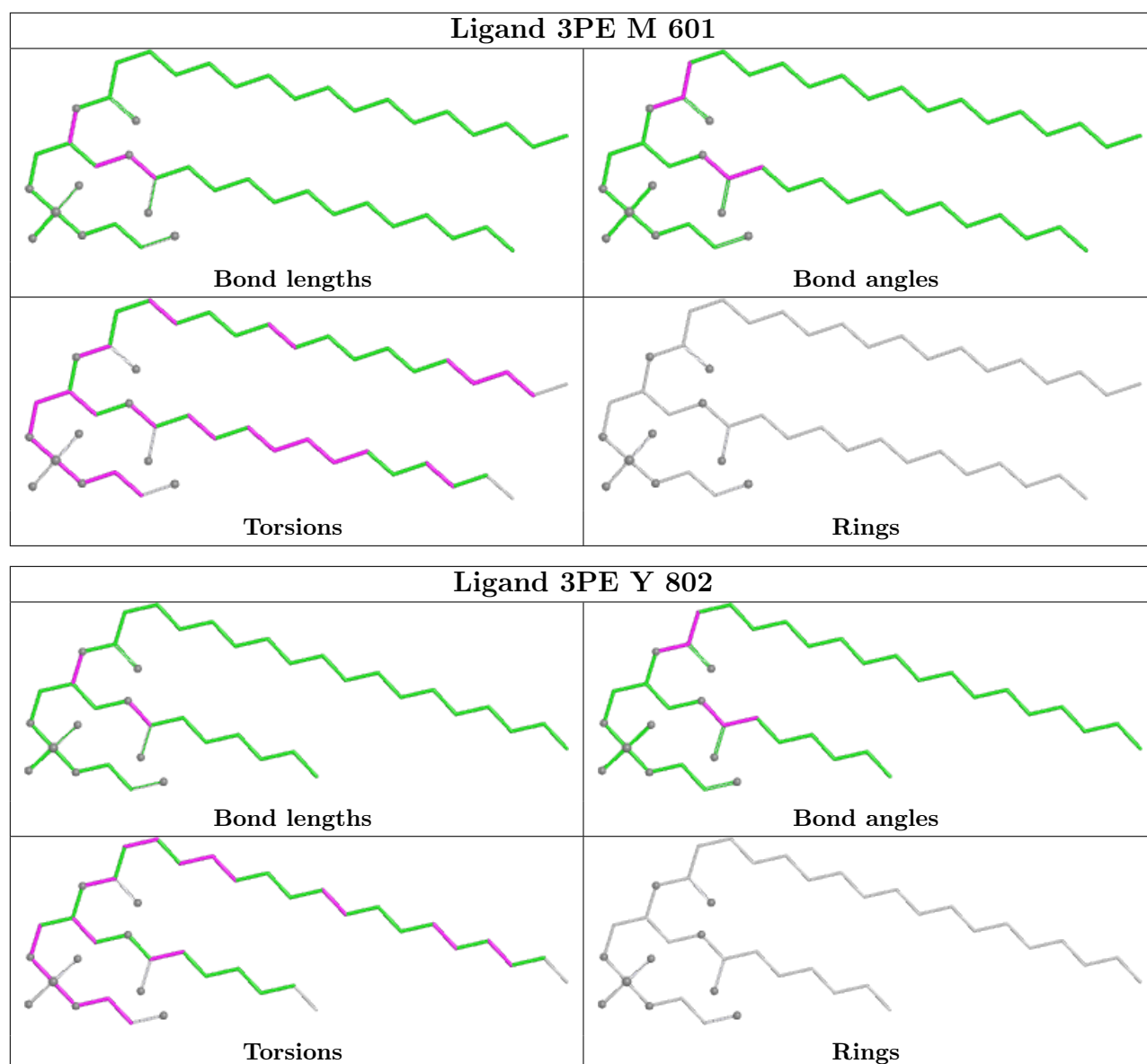


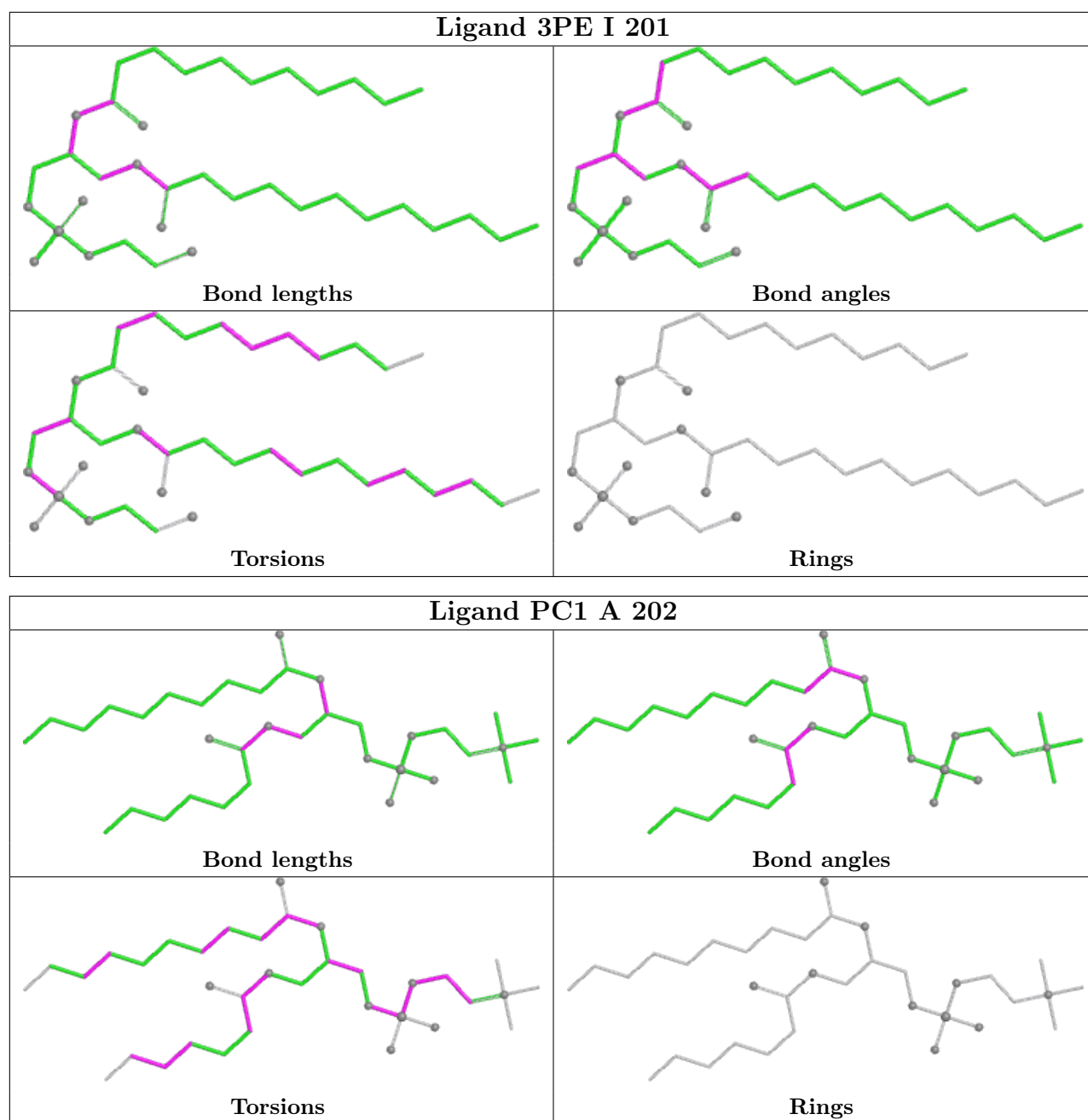


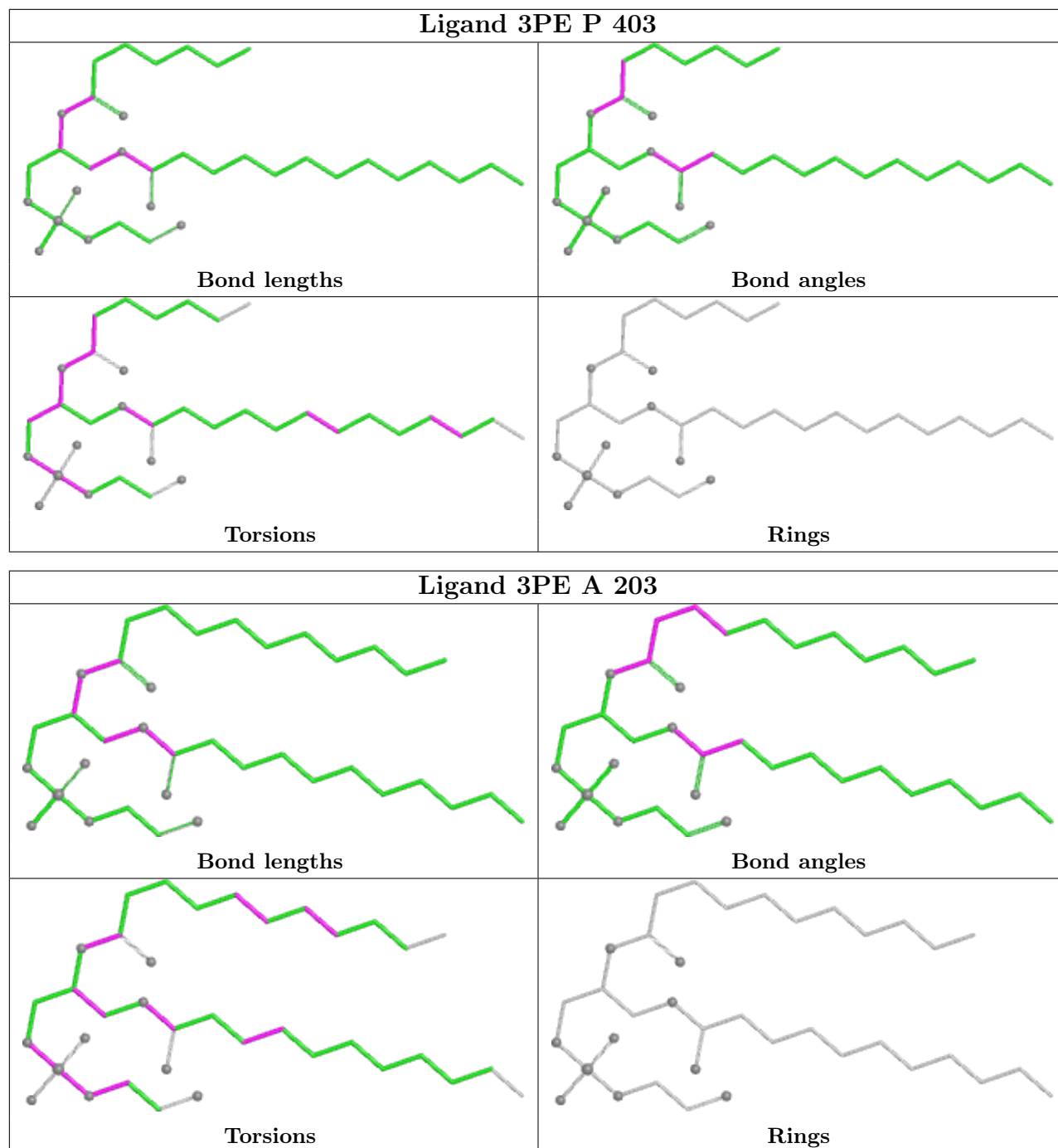


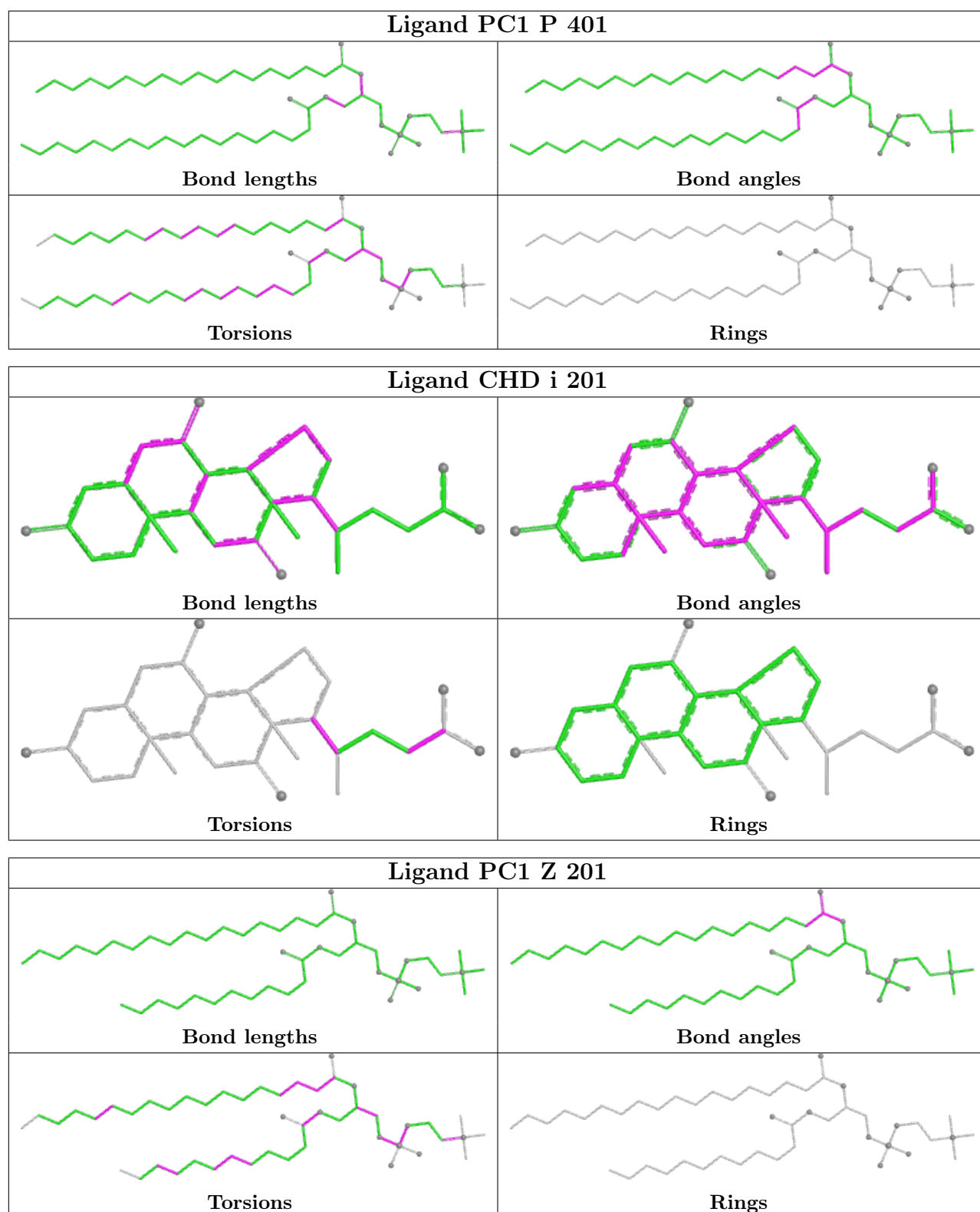


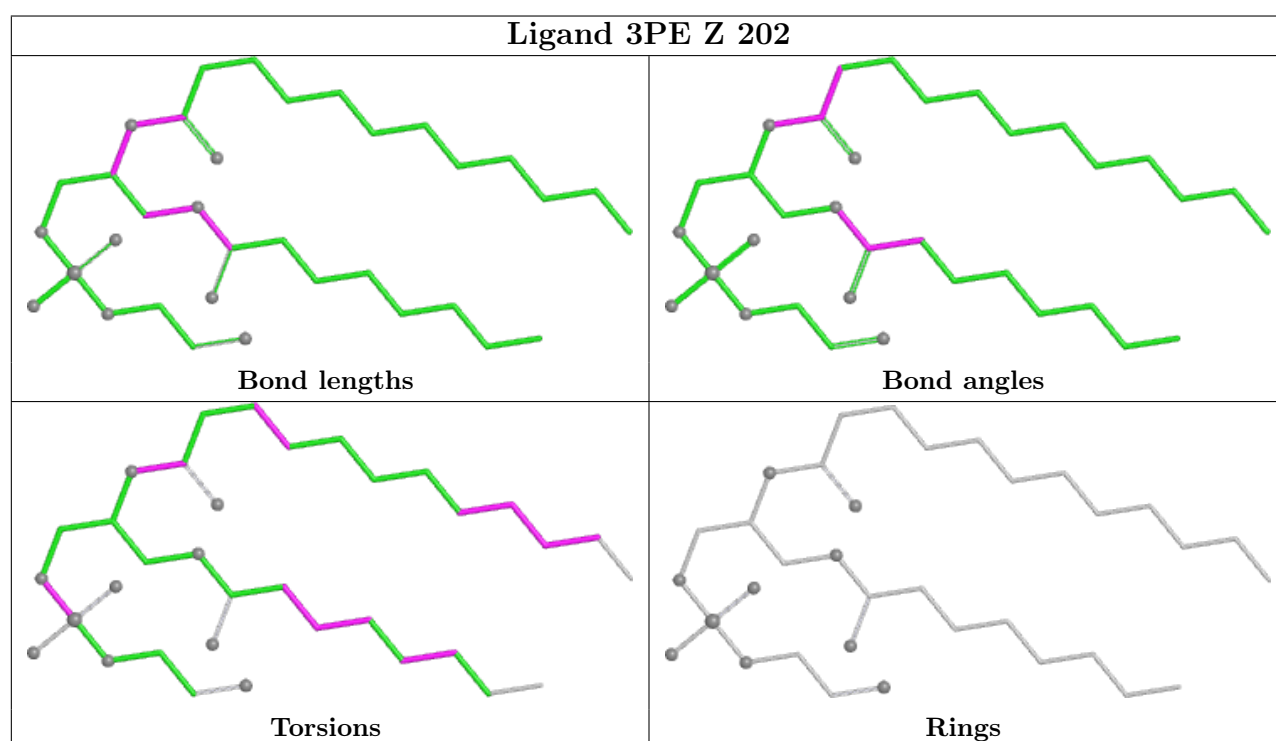
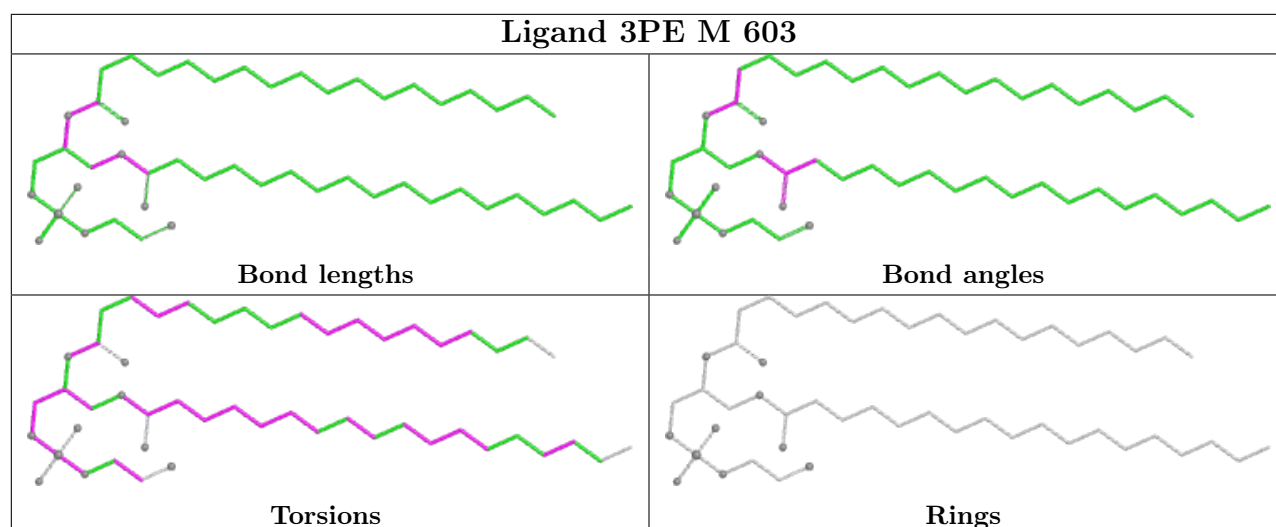


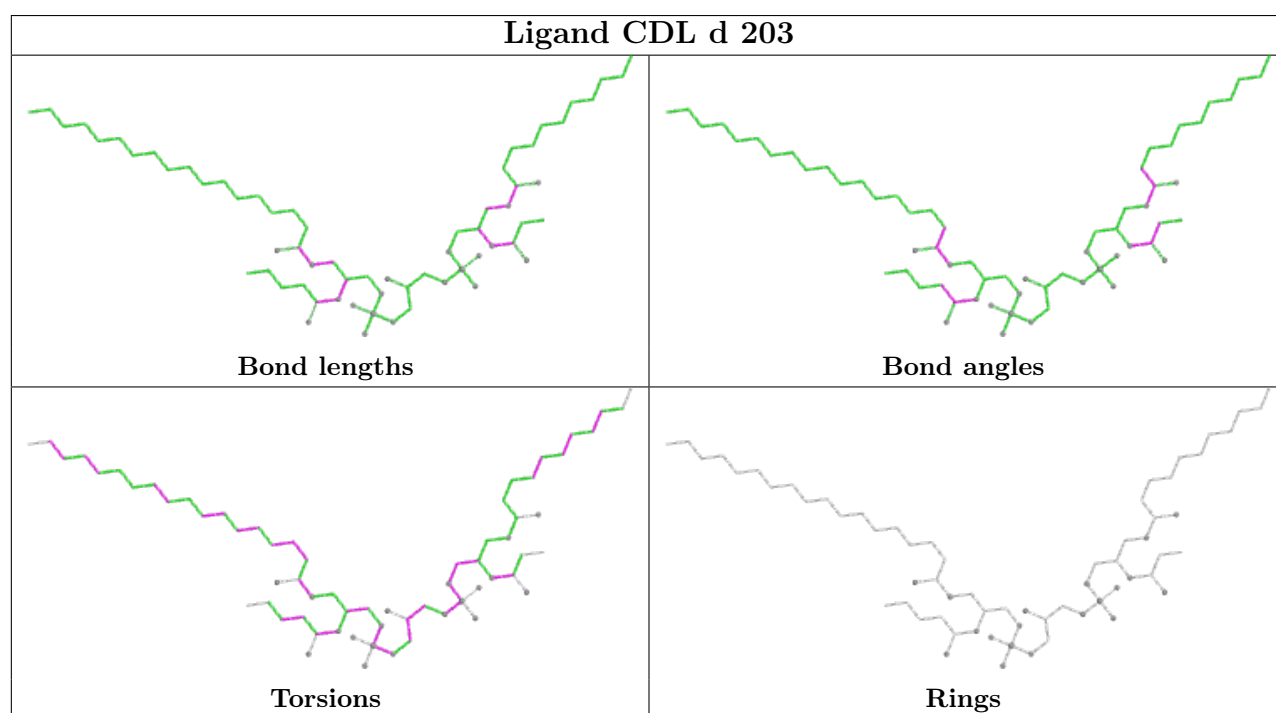
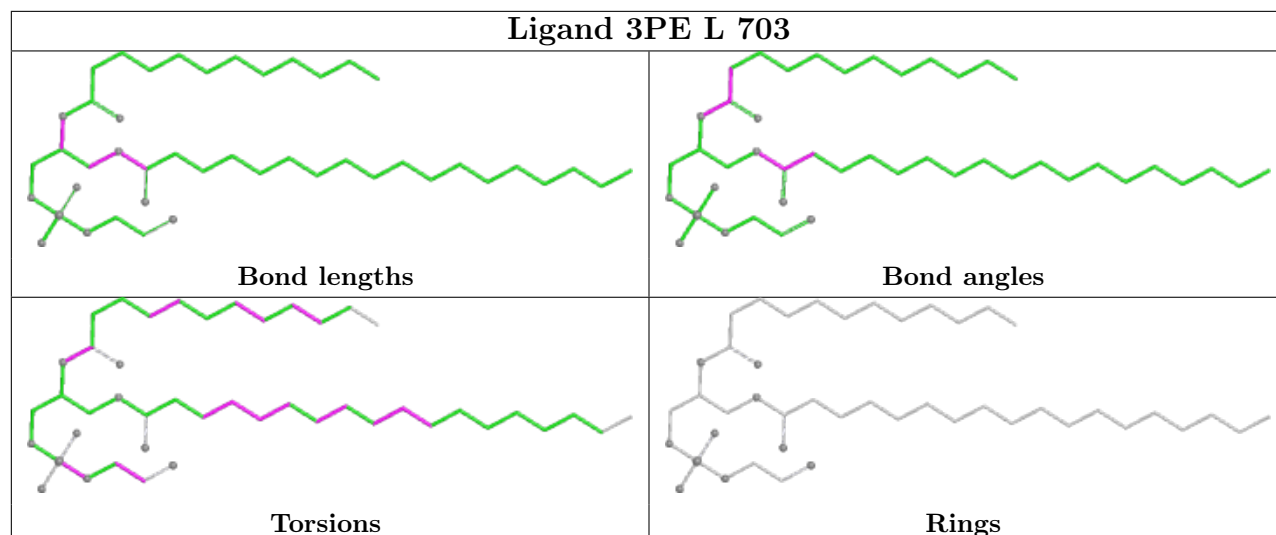


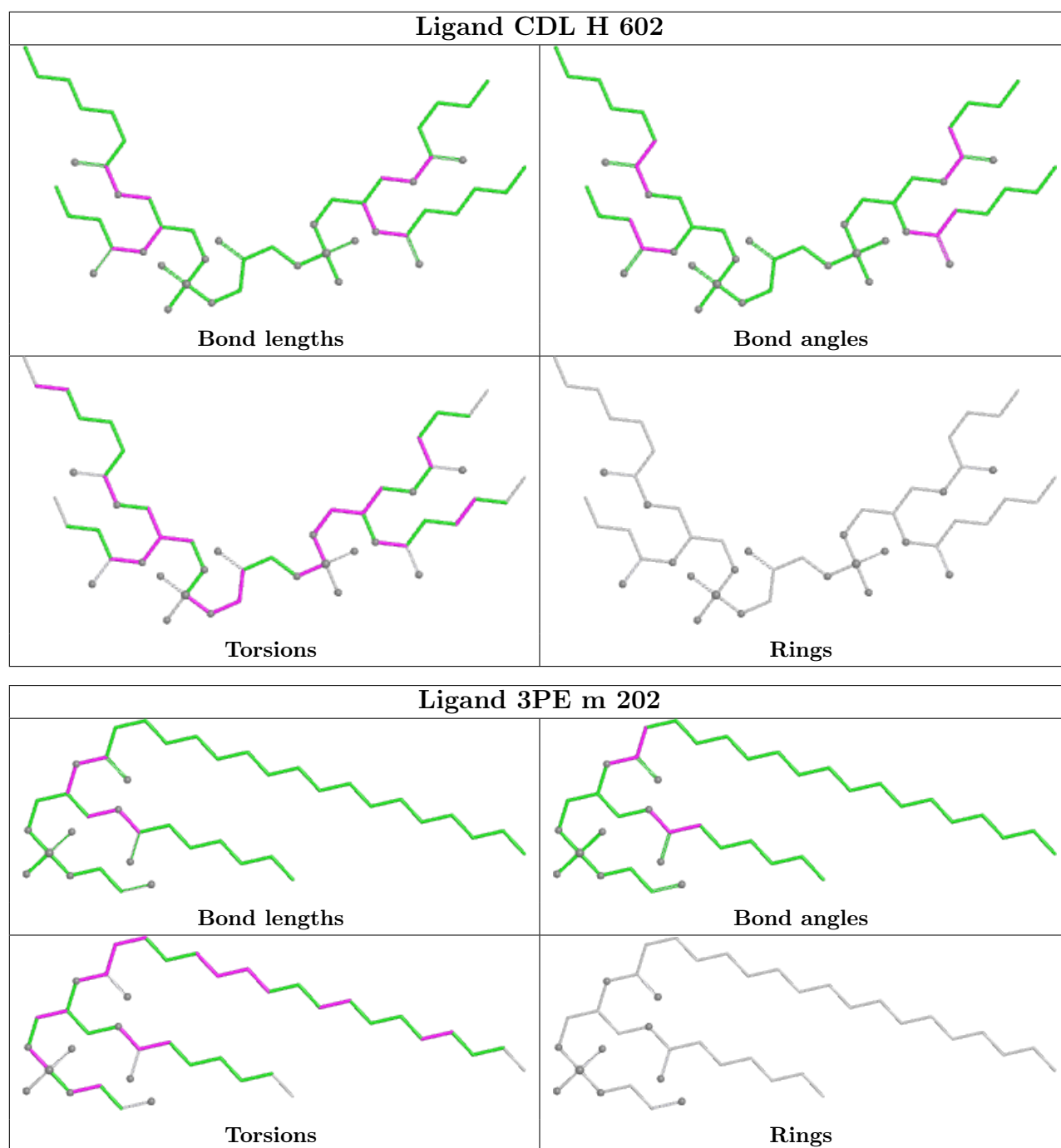


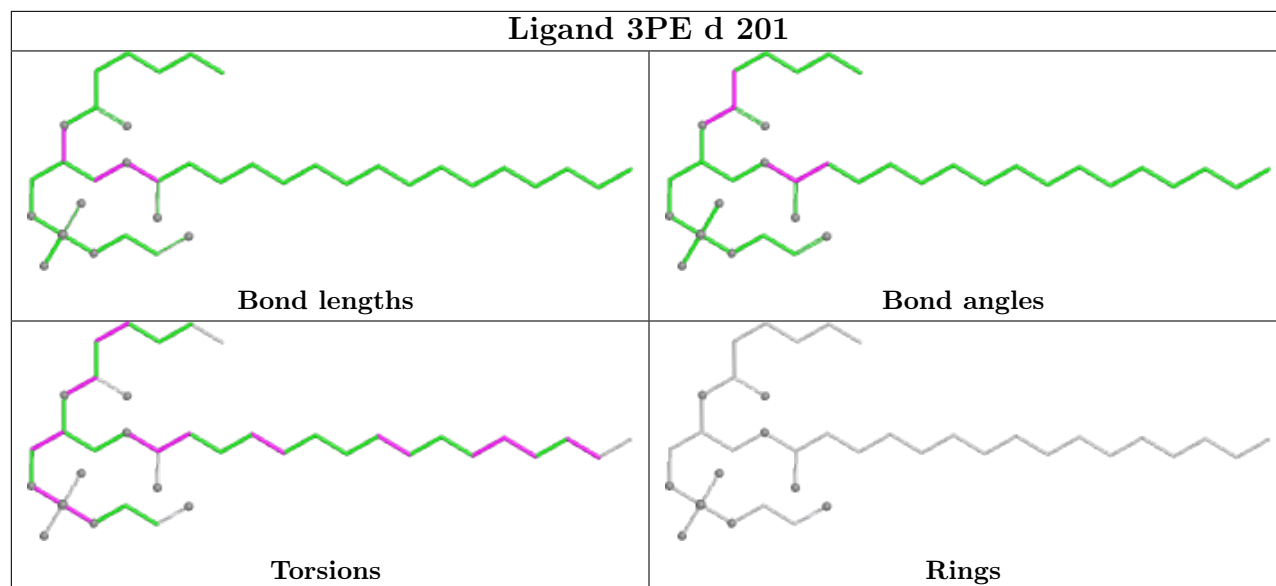












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

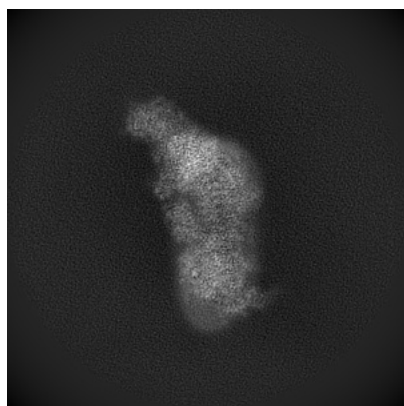
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-14133. These allow visual inspection of the internal detail of the map and identification of artifacts.

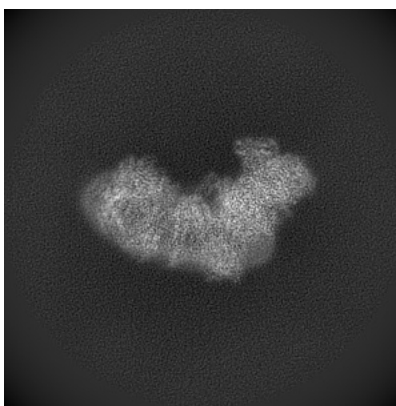
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

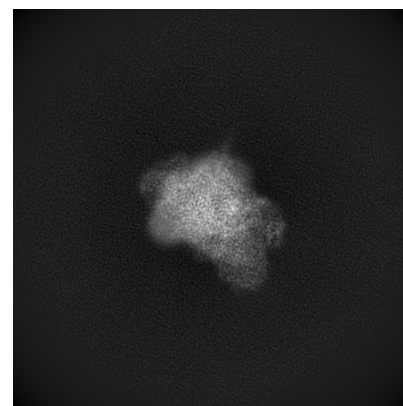
6.1.1 Primary map



X

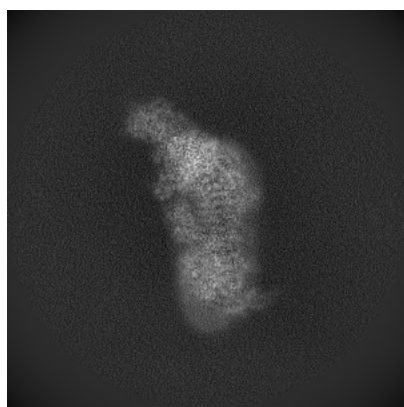


Y

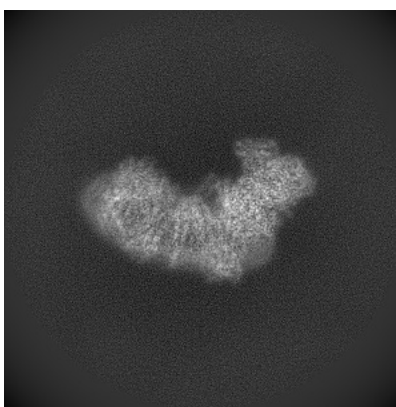


Z

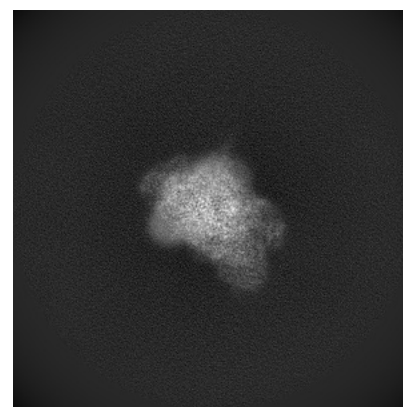
6.1.2 Raw map



X



Y

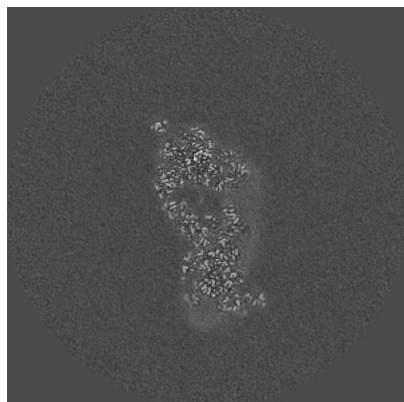


Z

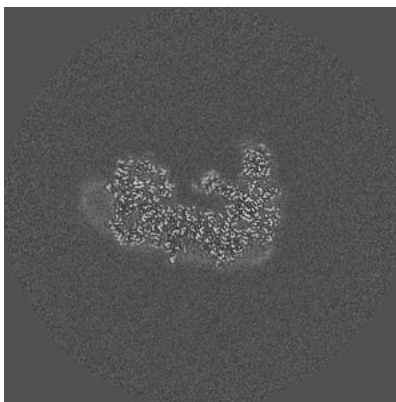
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

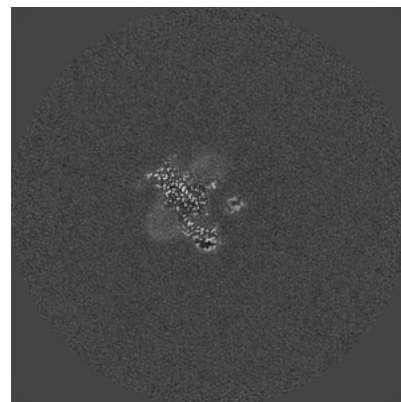
6.2.1 Primary map



X Index: 320

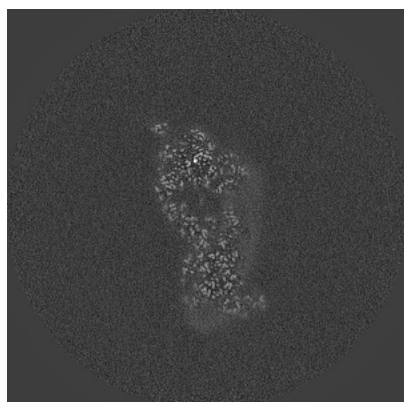


Y Index: 320

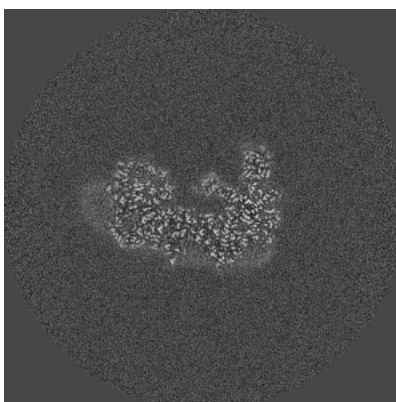


Z Index: 320

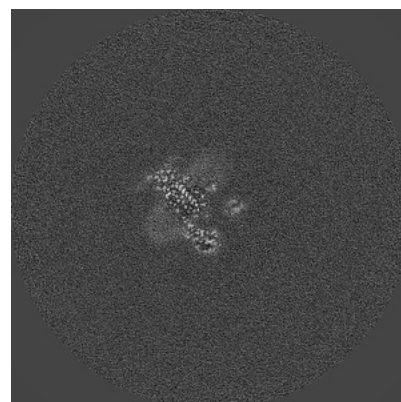
6.2.2 Raw map



X Index: 320



Y Index: 320

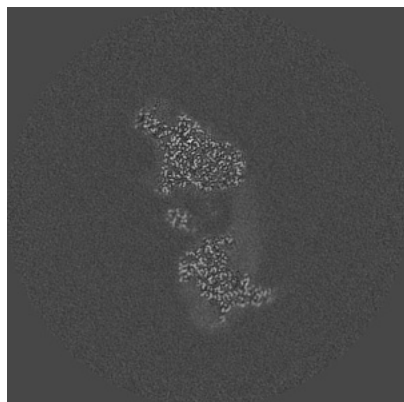


Z Index: 320

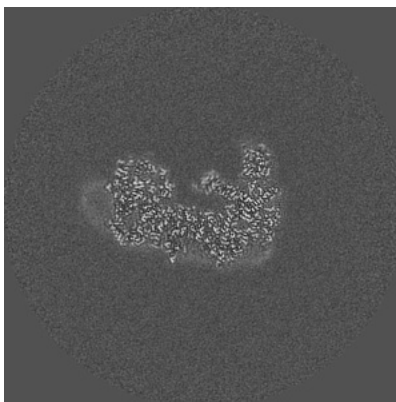
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

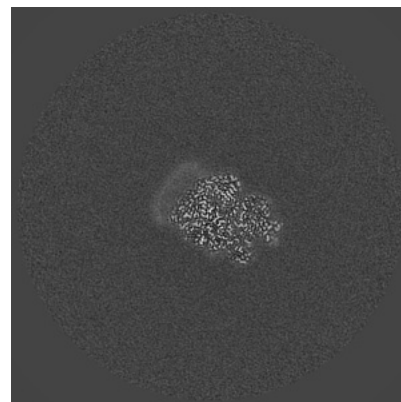
6.3.1 Primary map



X Index: 339

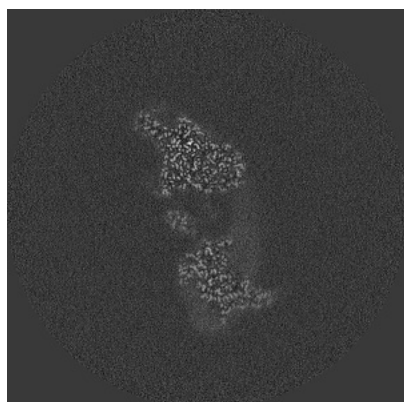


Y Index: 320

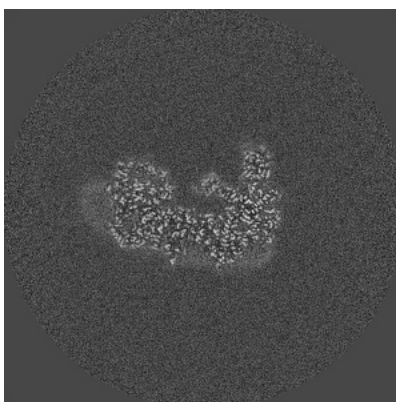


Z Index: 405

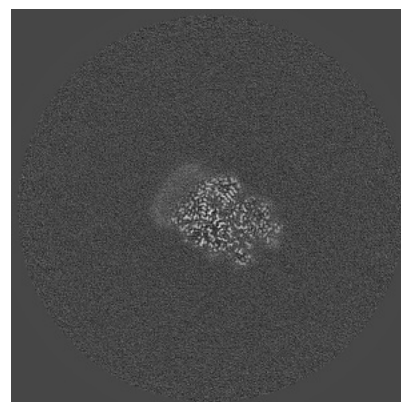
6.3.2 Raw map



X Index: 339



Y Index: 320



Z Index: 405

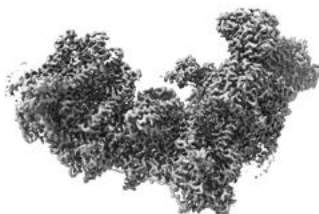
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



X



Y



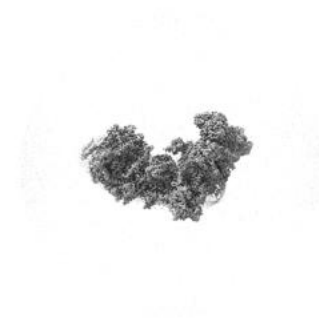
Z

The images above show the 3D surface view of the map at the recommended contour level 6.5. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 Raw map



X



Y



Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

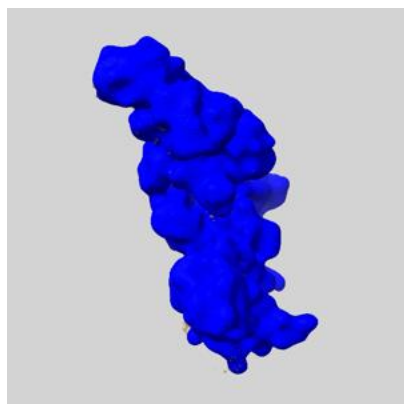
6.5 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

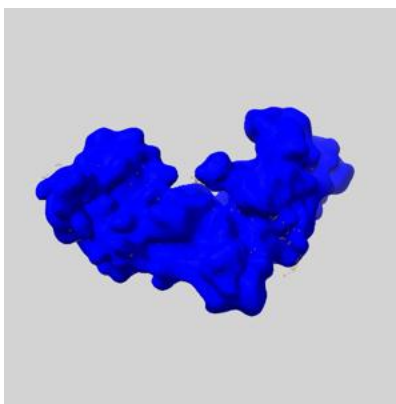
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

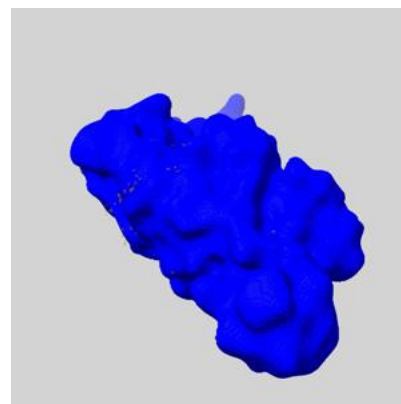
6.5.1 emd_14133_msk_1.map [i](#)



X



Y

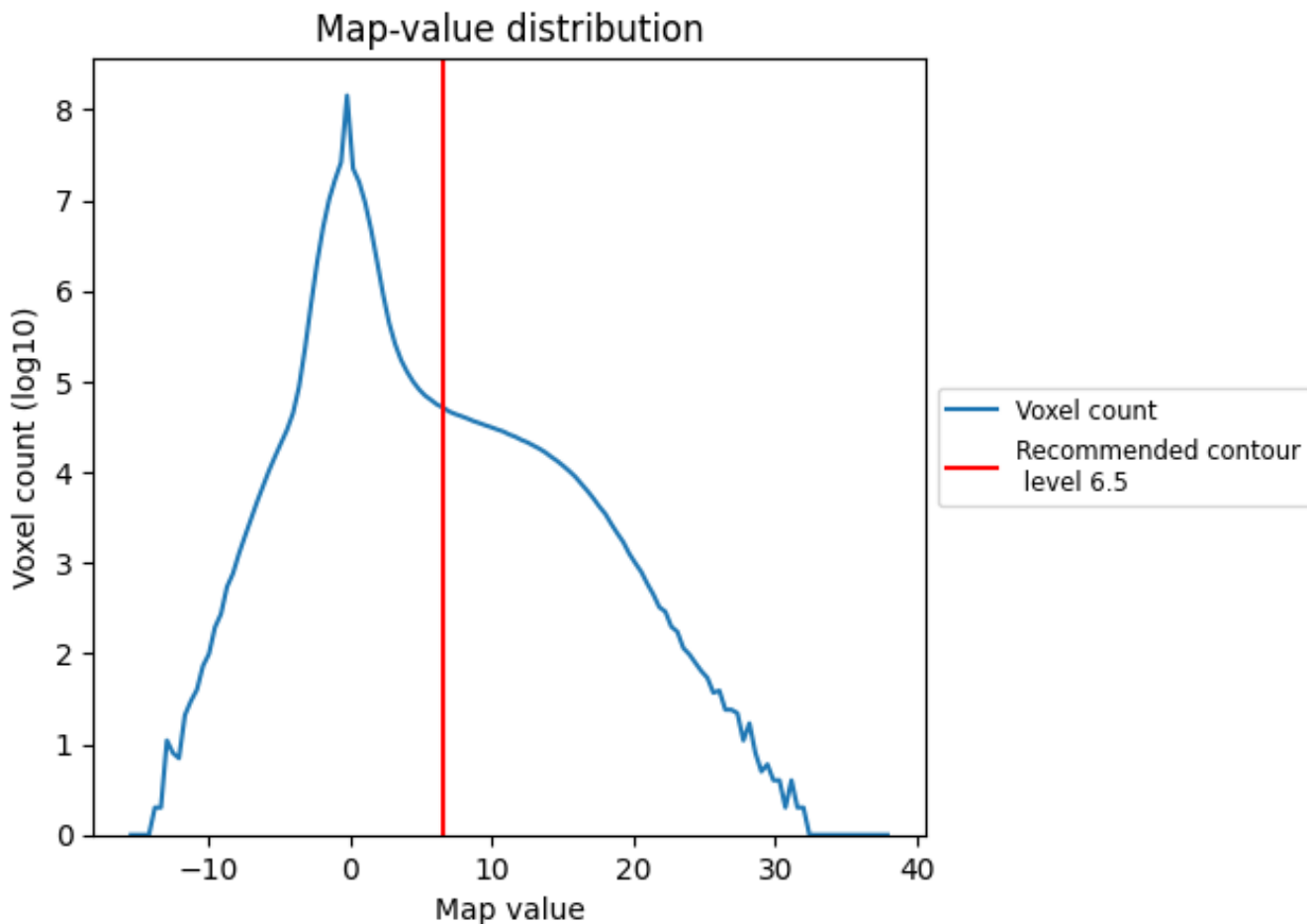


Z

7 Map analysis [i](#)

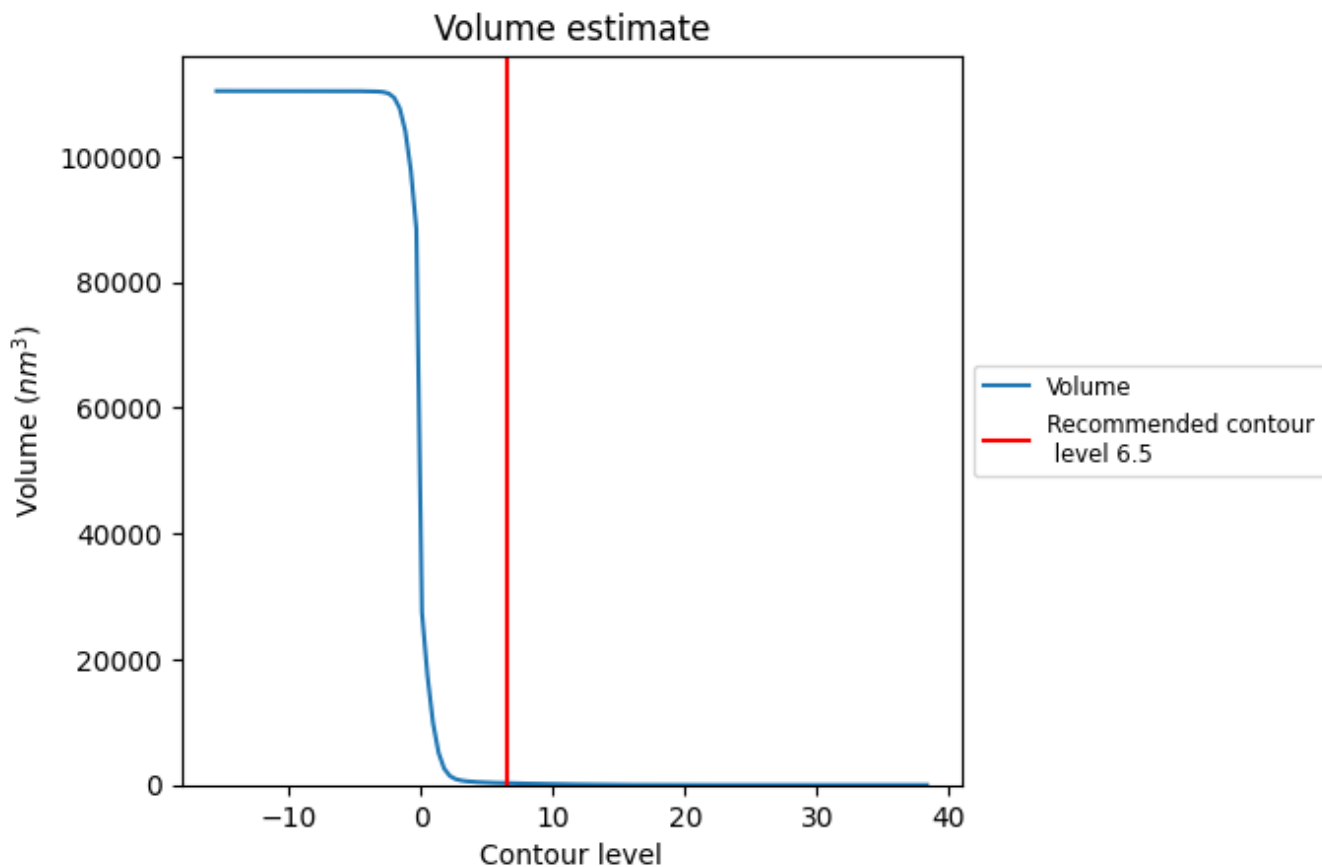
This section contains the results of statistical analysis of the map.

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.

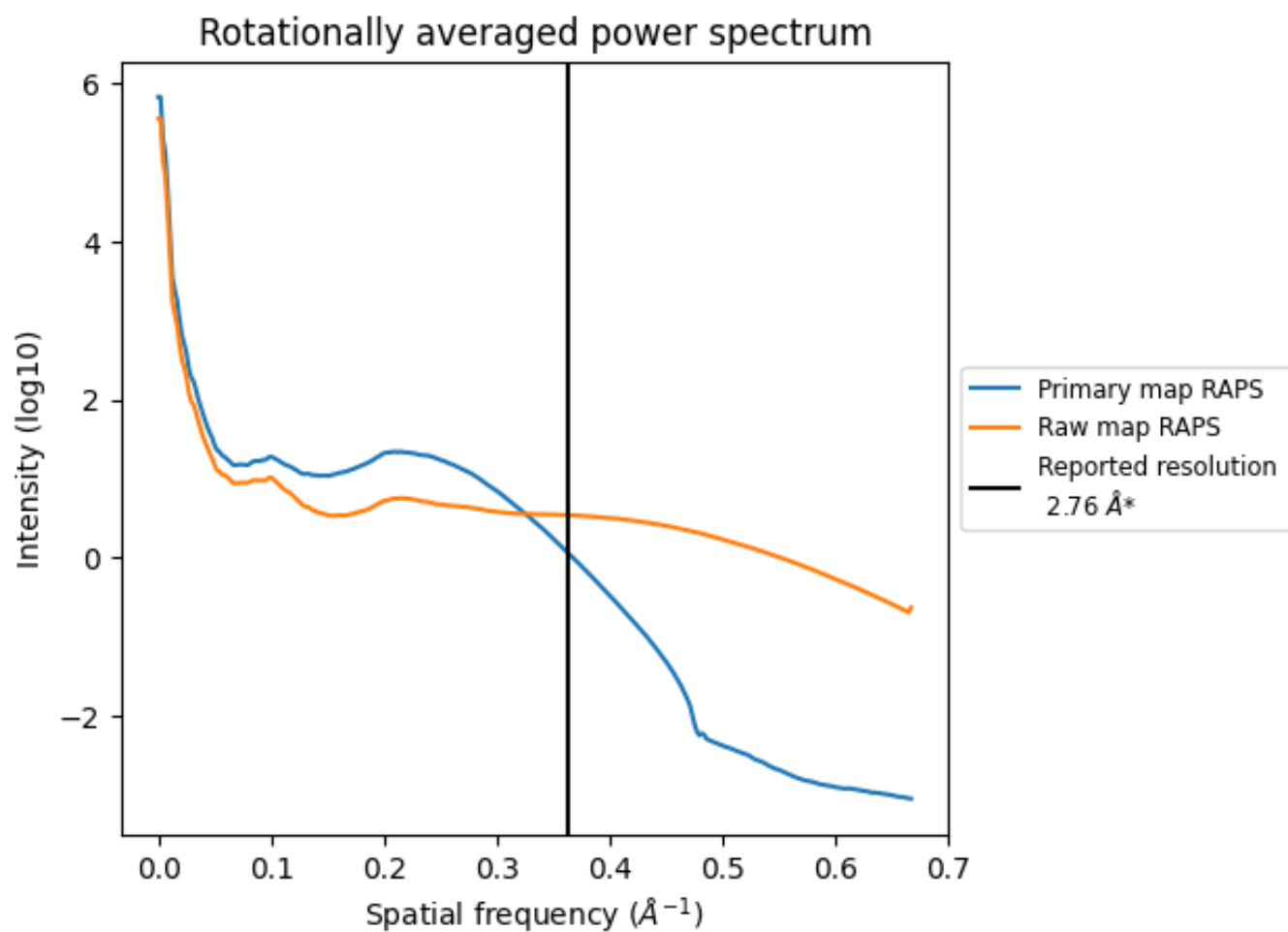
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 283 nm^3 ; this corresponds to an approximate mass of 256 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](#)

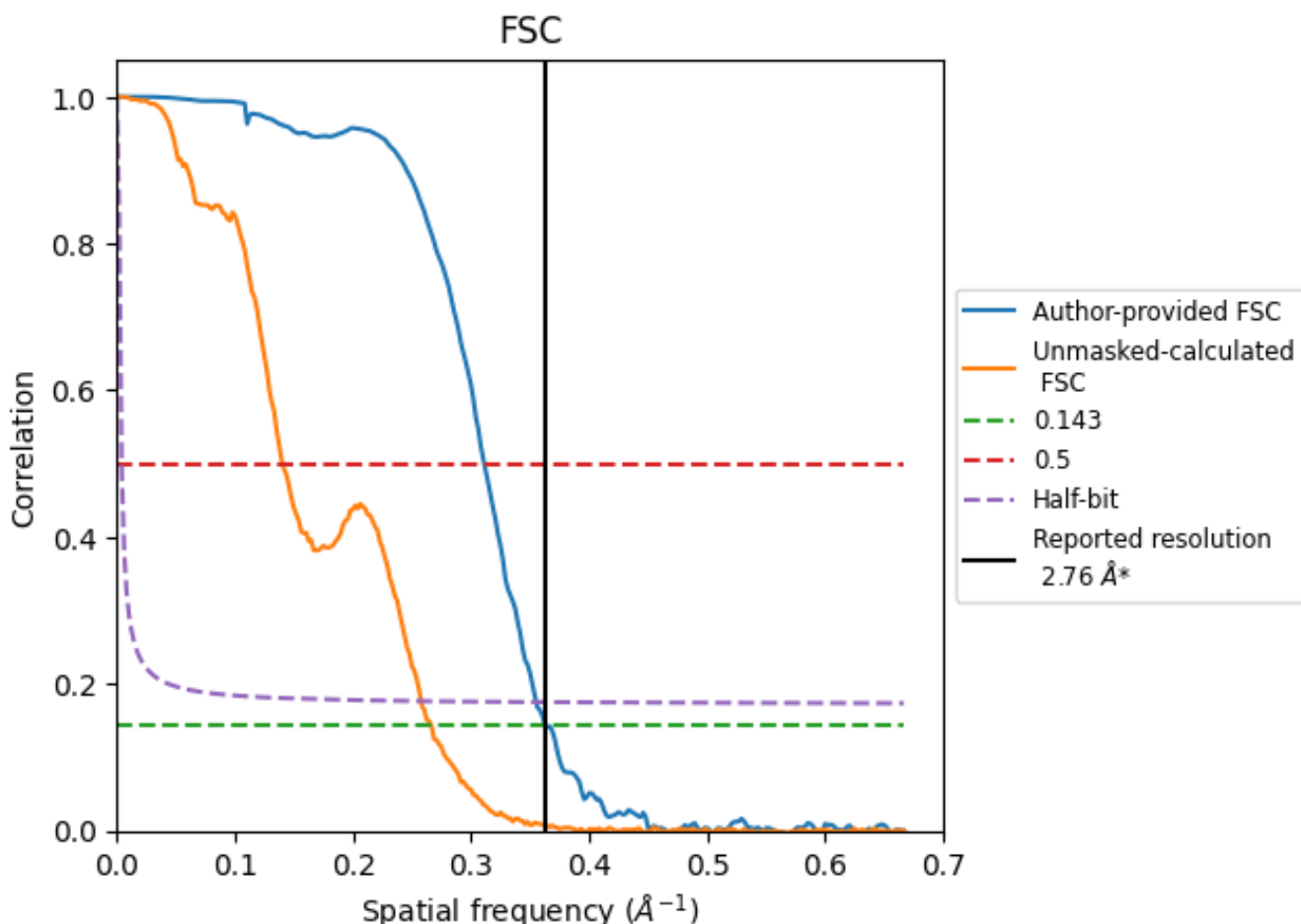


*Reported resolution corresponds to spatial frequency of 0.362 Å⁻¹

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 0.362 \AA^{-1}

8.2 Resolution estimates [i](#)

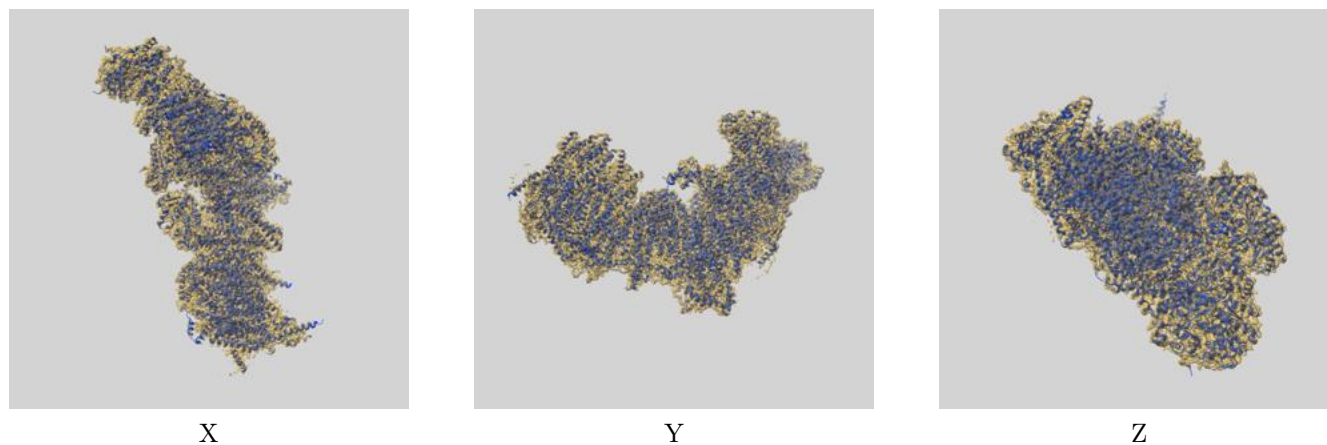
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.76	-	-
Author-provided FSC curve	2.75	3.21	2.81
Unmasked-calculated*	3.75	7.12	3.88

*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 3.75 differs from the reported value 2.76 by more than 10 %

9 Map-model fit [i](#)

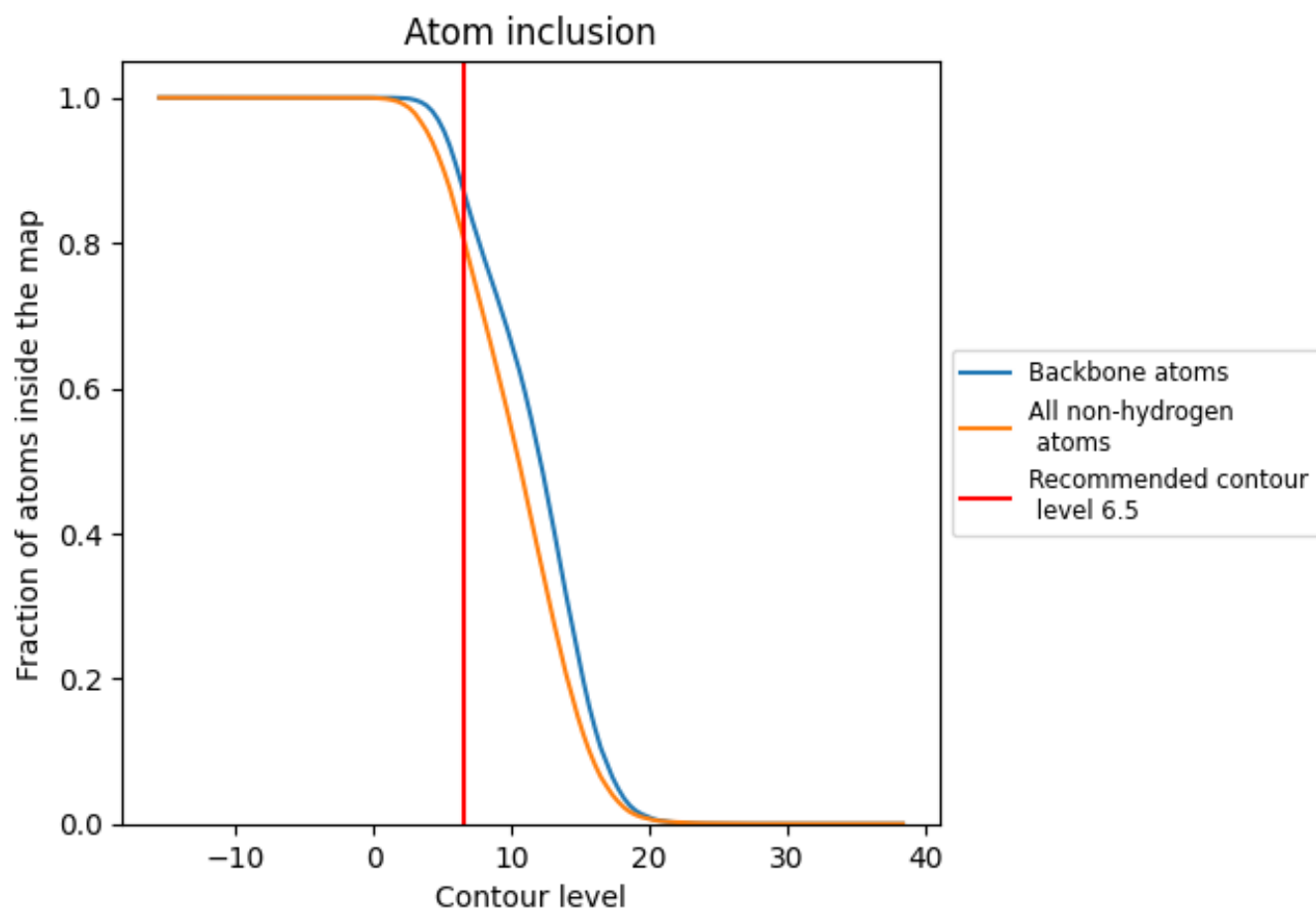
This section contains information regarding the fit between EMDB map EMD-14133 and PDB model 7QSL. Per-residue inclusion information can be found in section 3 on page 23.

9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 6.5 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 Atom inclusion [i](#)



At the recommended contour level, 87% of all backbone atoms, 81% of all non-hydrogen atoms, are inside the map.