



wwPDB EM Validation Summary Report ⓘ

Mar 9, 2026 – 07:18 AM UTC

PDB ID : 9CL2 / pdb_00009cl2
EMDB ID : EMD-45659
Title : Particulate methane monooxygenase in washed native membranes
Authors : Tucci, F.J.; Rosenzweig, A.C.
Deposited on : 2024-07-10
Resolution : 2.42 Å(reported)

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

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A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

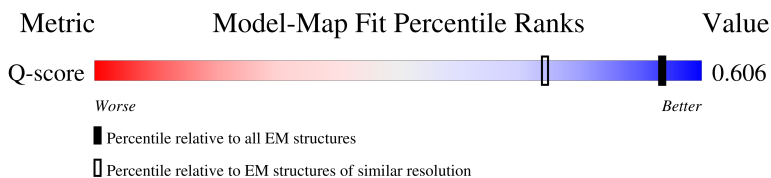
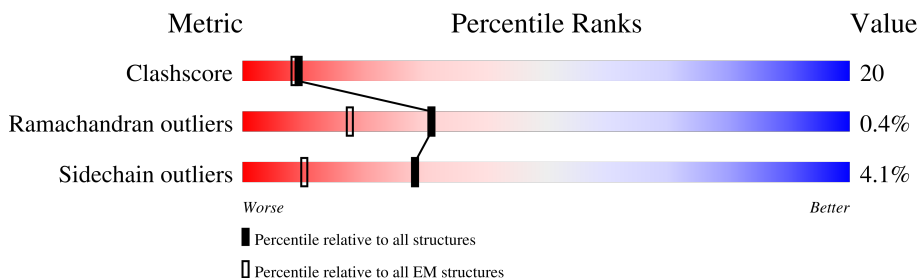
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data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

1 Overall quality at a glance i

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

The reported resolution of this entry is 2.42 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	5729 (1.92 - 2.92)

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	Ba	239	77% (green), 23% (yellow)
1	Bb	239	77% (green), 23% (yellow)
1	Bc	239	77% (green), 23% (yellow)
2	Ca	241	73% (green), 26% (yellow)

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Mol	Chain	Length	Quality of chain
2	Cb	241	 74% 26%
2	Cc	241	 73% 26%
3	Aa	382	 74% 23% •
3	Ab	382	 74% 23% •
3	Ac	382	 72% 25% •

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
4	A1A0P	Ca	304	-	-	X	-
4	A1A0P	Ca	307	-	-	X	-
4	A1A0P	Ca	308	-	-	X	-
4	A1A0P	Cb	304	-	-	X	-
4	A1A0P	Cb	306	-	-	X	-
4	A1A0P	Cb	307	-	-	X	-
4	A1A0P	Cb	308	-	-	X	-
4	A1A0P	Cc	304	-	-	X	-
4	A1A0P	Cc	307	-	-	X	-
4	A1A0P	Cc	308	-	-	X	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 28437 atoms, of which 4161 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 Particulate methane monooxygenase gamma subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	Ba	239	Total	C	N	O	S	0	0
			1993	1352	302	334	5		
1	Bb	239	Total	C	N	O	S	0	0
			1993	1352	302	334	5		
1	Bc	239	Total	C	N	O	S	0	0
			1993	1352	302	334	5		

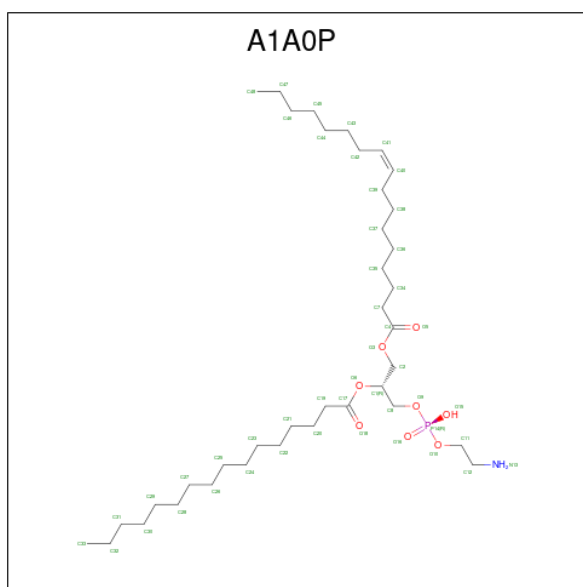
- Molecule 2 is a protein called Particulate methane monooxygenase beta subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	Ca	241	Total	C	N	O	S	0	0
			1976	1328	315	322	11		
2	Cb	241	Total	C	N	O	S	0	0
			1976	1328	315	322	11		
2	Cc	241	Total	C	N	O	S	0	0
			1976	1328	315	322	11		

- Molecule 3 is a protein called Particulate methane monooxygenase alpha subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	Aa	382	Total	C	N	O	S	0	0
			3017	1938	513	551	15		
3	Ab	382	Total	C	N	O	S	0	0
			3017	1938	513	551	15		
3	Ac	382	Total	C	N	O	S	0	0
			3017	1938	513	551	15		

- Molecule 4 is (2R)-3-{[(R)-(2-aminoethoxy)(hydroxy)phosphoryl]oxy}-2-(hexadecanoyloxy)propyl (9Z)-heptadec-9-enoate (CCD ID: A1A0P) (formula: C₃₈H₇₄NO₈P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
4	Ba	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ba	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ba	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ba	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ba	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ba	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ba	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ba	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ca	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ca	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ca	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ca	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ca	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	
4	Ca	1	Total	C	H	N	O	P	0
			121	38	73	1	8	1	

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Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
4	Ca	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Ca	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Ca	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Ca	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Aa	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0

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Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Cc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Ab	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Ac	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bb	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0
4	Bc	1	Total 121	C 38	H 73	N 1	O 8	P 1	0

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Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
4	Bc	1	121	38	73	1	8	1	0

- Molecule 5 is COPPER (II) ION (CCD ID: CU) (formula: Cu) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
5	Ba	1	Total 1	Cu 1	0
5	Aa	2	Total 2	Cu 2	0
5	Ab	2	Total 2	Cu 2	0
5	Ac	2	Total 2	Cu 2	0
5	Bb	1	Total 1	Cu 1	0
5	Bc	1	Total 1	Cu 1	0

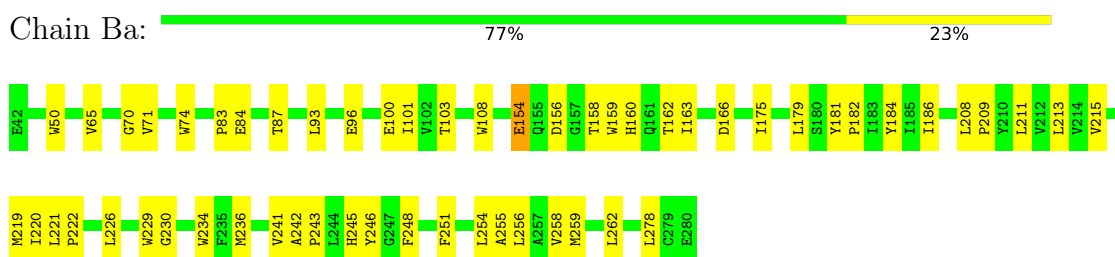
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		AltConf
6	Ba	27	Total 27	O 27	0
6	Ca	45	Total 45	O 45	0
6	Aa	119	Total 119	O 119	0
6	Cb	45	Total 45	O 45	0
6	Cc	45	Total 45	O 45	0
6	Ab	119	Total 119	O 119	0
6	Ac	119	Total 119	O 119	0
6	Bb	27	Total 27	O 27	0
6	Bc	27	Total 27	O 27	0

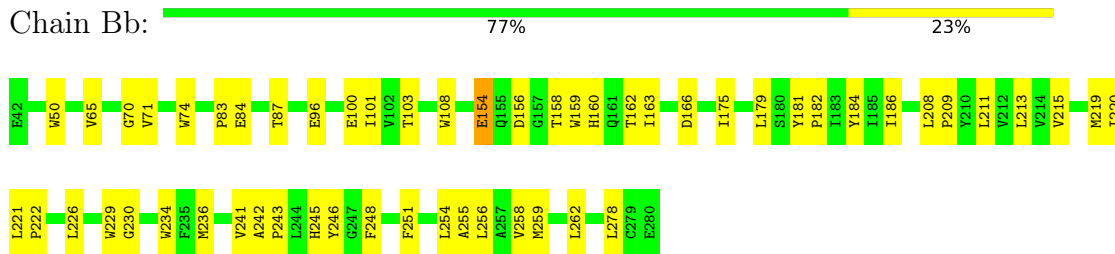
3 Residue-property plots

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

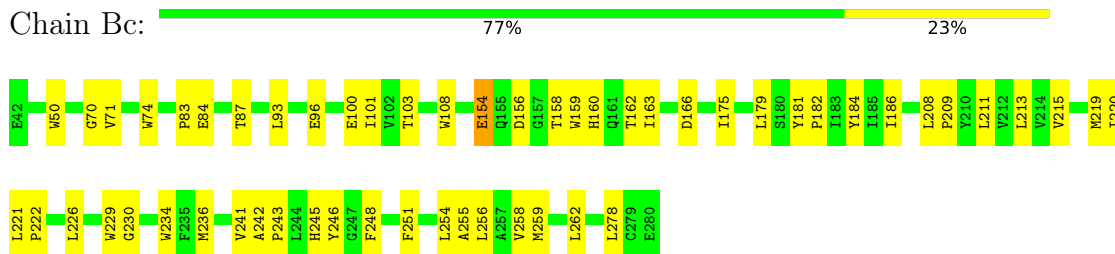
- Molecule 1: Particulate methane monooxygenase gamma subunit



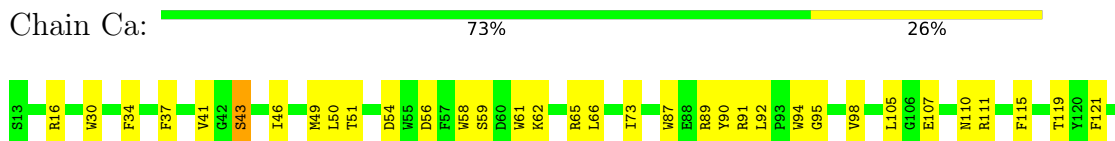
- Molecule 1: Particulate methane monooxygenase gamma subunit



- Molecule 1: Particulate methane monooxygenase gamma subunit

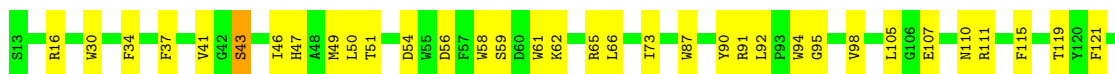
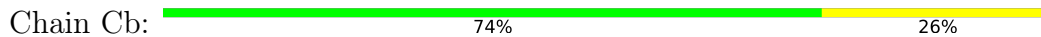


- Molecule 2: Particulate methane monooxygenase beta subunit





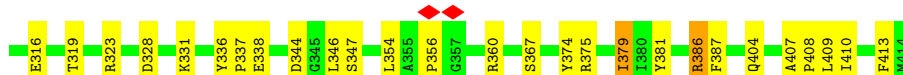
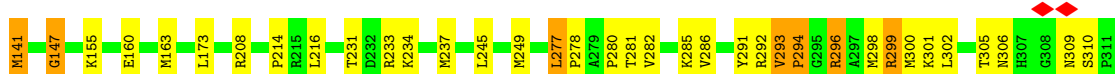
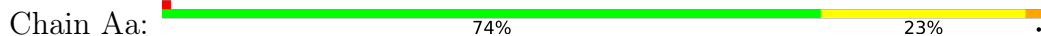
• Molecule 2: Particulate methane monooxygenase beta subunit



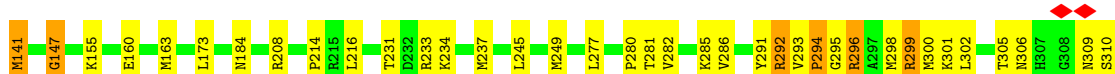
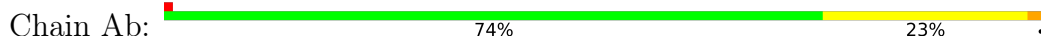
• Molecule 2: Particulate methane monooxygenase beta subunit

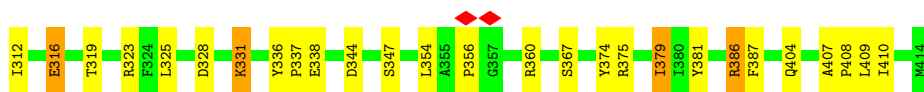


• Molecule 3: Particulate methane monooxygenase alpha subunit

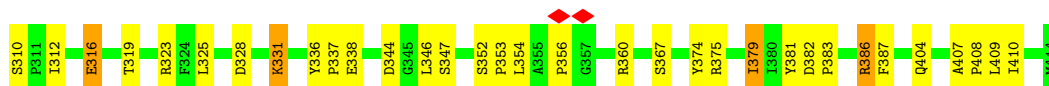
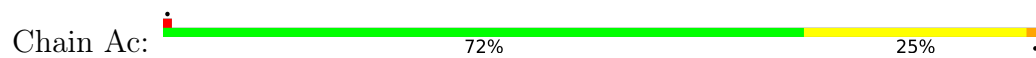


• Molecule 3: Particulate methane monooxygenase alpha subunit





- Molecule 3: Particulate methane monooxygenase alpha subunit



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	129495	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.835	Depositor
Minimum map value	-0.468	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.026	Depositor
Recommended contour level	0.06	Depositor
Map size (\AA)	265.6, 265.6, 265.6	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.83000004, 0.83000004, 0.83000004	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: A1A0P, CU

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	Ba	0.17	0/2073	0.34	0/2841
1	Bb	0.18	0/2073	0.34	0/2841
1	Bc	0.18	0/2073	0.34	0/2841
2	Ca	0.13	0/2052	0.31	0/2808
2	Cb	0.13	0/2052	0.31	0/2808
2	Cc	0.13	0/2052	0.31	0/2808
3	Aa	0.57	0/3099	0.80	2/4215 (0.0%)
3	Ab	0.57	0/3099	0.80	2/4215 (0.0%)
3	Ac	0.57	0/3099	0.80	2/4215 (0.0%)
All	All	0.39	0/21672	0.58	6/29592 (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
3	Aa	0	8
3	Ab	0	8
3	Ac	0	8
All	All	0	24

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	Ab	50	TYR	N-CA-CB	7.22	122.70	110.49
3	Ac	50	TYR	N-CA-CB	7.22	122.69	110.49
3	Aa	50	TYR	N-CA-CB	7.21	122.68	110.49
3	Aa	50	TYR	CA-CB-CG	6.41	125.44	113.90

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Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	Ab	50	TYR	CA-CB-CG	6.41	125.44	113.90

There are no chirality outliers.

5 of 24 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	Aa	292	ARG	Sidechain
3	Aa	294	PRO	Peptide
3	Aa	296	ARG	Sidechain
3	Aa	299	ARG	Sidechain
3	Aa	323	ARG	Sidechain

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	Ba	1993	0	1922	94	0
1	Bb	1993	0	1922	93	0
1	Bc	1993	0	1922	93	0
2	Ca	1976	0	1934	95	0
2	Cb	1976	0	1934	94	0
2	Cc	1976	0	1934	93	0
3	Aa	3017	0	2980	73	0
3	Ab	3017	0	2980	75	0
3	Ac	3017	0	2980	78	0
4	Aa	48	73	0	17	0
4	Ab	48	73	0	17	0
4	Ac	48	73	0	17	0
4	Ba	336	511	0	35	0
4	Bb	336	511	0	37	0
4	Bc	336	511	0	37	0
4	Ca	528	803	0	158	0
4	Cb	528	803	0	155	0
4	Cc	528	803	0	156	0
5	Aa	2	0	0	0	0
5	Ab	2	0	0	0	0
5	Ac	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	Ba	1	0	0	0	0
5	Bb	1	0	0	0	0
5	Bc	1	0	0	0	0
6	Aa	119	0	0	4	0
6	Ab	119	0	0	3	0
6	Ac	119	0	0	4	0
6	Ba	27	0	0	0	0
6	Bb	27	0	0	0	0
6	Bc	27	0	0	0	0
6	Ca	45	0	0	1	0
6	Cb	45	0	0	1	0
6	Cc	45	0	0	1	0
All	All	24276	4161	20508	903	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 20.

The worst 5 of 903 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:Ba:251:PHE:CD1	4:Cc:305:A1A0P:C33	1.78	1.65
4:Ca:305:A1A0P:C33	1:Bc:251:PHE:CD1	1.78	1.63
4:Cb:305:A1A0P:C33	1:Bb:251:PHE:CD1	1.78	1.61
4:Ca:305:A1A0P:C48	1:Bc:254:LEU:CD2	1.76	1.60
2:Ca:233:LEU:HD11	4:Ca:308:A1A0P:C46	1.29	1.59

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	Ba	237/239 (99%)	228 (96%)	9 (4%)	0	100	100
1	Bb	237/239 (99%)	228 (96%)	9 (4%)	0	100	100
1	Bc	237/239 (99%)	228 (96%)	9 (4%)	0	100	100
2	Ca	239/241 (99%)	229 (96%)	10 (4%)	0	100	100
2	Cb	239/241 (99%)	229 (96%)	10 (4%)	0	100	100
2	Cc	239/241 (99%)	229 (96%)	10 (4%)	0	100	100
3	Aa	380/382 (100%)	359 (94%)	18 (5%)	3 (1%)	16	23
3	Ab	380/382 (100%)	359 (94%)	18 (5%)	3 (1%)	16	23
3	Ac	380/382 (100%)	359 (94%)	18 (5%)	3 (1%)	16	23
All	All	2568/2586 (99%)	2448 (95%)	111 (4%)	9 (0%)	31	42

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	Aa	281	THR
3	Aa	294	PRO
3	Ab	281	THR
3	Ab	294	PRO
3	Ac	281	THR

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	Ba	202/202 (100%)	200 (99%)	2 (1%)	68	82
1	Bb	202/202 (100%)	200 (99%)	2 (1%)	68	82
1	Bc	202/202 (100%)	200 (99%)	2 (1%)	68	82
2	Ca	206/206 (100%)	204 (99%)	2 (1%)	68	82
2	Cb	206/206 (100%)	204 (99%)	2 (1%)	68	82
2	Cc	206/206 (100%)	204 (99%)	2 (1%)	68	82
3	Aa	323/323 (100%)	297 (92%)	26 (8%)	11	18

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	Ab	323/323 (100%)	297 (92%)	26 (8%)	11	18
3	Ac	323/323 (100%)	297 (92%)	26 (8%)	11	18
All	All	2193/2193 (100%)	2103 (96%)	90 (4%)	28	44

5 of 90 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	Ab	367	SER
3	Ac	301	LYS
3	Ab	404	GLN
3	Ac	141	MET
3	Ac	312	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
3	Ab	38	GLN
1	Bb	173	HIS
3	Ab	145	GLN
1	Bc	173	HIS
3	Ac	145	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](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 66 ligands modelled in this entry, 9 are monoatomic - leaving 57 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
4	A1A0P	Bb	314	-	47,47,47	0.30	0	50,52,52	0.35	0
4	A1A0P	Ca	307	-	47,47,47	0.31	0	50,52,52	0.49	0
4	A1A0P	Cb	312	-	47,47,47	0.39	0	50,52,52	0.63	1 (2%)
4	A1A0P	Ca	308	-	47,47,47	0.77	0	50,52,52	1.22	2 (4%)
4	A1A0P	Ca	304	-	47,47,47	0.45	0	50,52,52	0.73	1 (2%)
4	A1A0P	Cc	312	-	47,47,47	0.39	0	50,52,52	0.63	1 (2%)
4	A1A0P	Cc	313	-	47,47,47	0.41	0	50,52,52	0.83	2 (4%)
4	A1A0P	Ab	537	-	47,47,47	0.32	0	50,52,52	0.51	1 (2%)
4	A1A0P	Cb	310	-	47,47,47	0.33	0	50,52,52	0.37	0
4	A1A0P	Ca	309	-	47,47,47	0.39	0	50,52,52	0.51	1 (2%)
4	A1A0P	Cb	313	-	47,47,47	0.41	0	50,52,52	0.82	2 (4%)
4	A1A0P	Cc	309	-	47,47,47	0.39	0	50,52,52	0.51	1 (2%)
4	A1A0P	Bc	313	-	47,47,47	0.33	0	50,52,52	0.45	0
4	A1A0P	Cb	304	-	47,47,47	0.45	0	50,52,52	0.73	1 (2%)
4	A1A0P	Cb	308	-	47,47,47	0.77	0	50,52,52	1.22	2 (4%)
4	A1A0P	Ac	537	-	47,47,47	0.32	0	50,52,52	0.51	1 (2%)
4	A1A0P	Bb	311	-	47,47,47	0.32	0	50,52,52	0.50	1 (2%)
4	A1A0P	Bc	309	-	47,47,47	0.34	0	50,52,52	0.52	0
4	A1A0P	Bc	314	-	47,47,47	0.30	0	50,52,52	0.35	0
4	A1A0P	Ca	312	-	47,47,47	0.39	0	50,52,52	0.63	1 (2%)
4	A1A0P	Bc	312	-	47,47,47	0.31	0	50,52,52	0.43	0
4	A1A0P	Cc	307	-	47,47,47	0.31	0	50,52,52	0.49	0
4	A1A0P	Cc	305	-	47,47,47	0.31	0	50,52,52	0.34	0
4	A1A0P	Cc	303	-	47,47,47	0.36	0	50,52,52	0.77	3 (6%)
4	A1A0P	Cc	306	-	47,47,47	0.82	3 (6%)	50,52,52	1.24	6 (12%)
4	A1A0P	Bb	310	-	47,47,47	0.37	0	50,52,52	0.45	0
4	A1A0P	Ba	310	-	47,47,47	0.37	0	50,52,52	0.46	0
4	A1A0P	Cc	308	-	47,47,47	0.77	0	50,52,52	1.22	2 (4%)
4	A1A0P	Cc	304	-	47,47,47	0.45	0	50,52,52	0.73	1 (2%)
4	A1A0P	Bb	312	-	47,47,47	0.31	0	50,52,52	0.43	0
4	A1A0P	Ba	314	-	47,47,47	0.30	0	50,52,52	0.35	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	A1A0P	Ca	306	-	47,47,47	0.81	3 (6%)	50,52,52	1.24	6 (12%)
4	A1A0P	Ca	310	-	47,47,47	0.33	0	50,52,52	0.37	0
4	A1A0P	Ca	303	-	47,47,47	0.36	0	50,52,52	0.77	3 (6%)
4	A1A0P	Cb	314	-	47,47,47	0.68	1 (2%)	50,52,52	0.44	0
4	A1A0P	Bc	308	-	47,47,47	0.31	0	50,52,52	0.33	0
4	A1A0P	Ca	313	-	47,47,47	0.41	0	50,52,52	0.82	2 (4%)
4	A1A0P	Bb	308	-	47,47,47	0.30	0	50,52,52	0.33	0
4	A1A0P	Bc	310	-	47,47,47	0.37	0	50,52,52	0.46	0
4	A1A0P	Cb	305	-	47,47,47	0.31	0	50,52,52	0.34	0
4	A1A0P	Bc	311	-	47,47,47	0.32	0	50,52,52	0.50	1 (2%)
4	A1A0P	Cb	307	-	47,47,47	0.31	0	50,52,52	0.49	0
4	A1A0P	Bb	313	-	47,47,47	0.33	0	50,52,52	0.45	0
4	A1A0P	Cb	306	-	47,47,47	0.82	3 (6%)	50,52,52	1.24	6 (12%)
4	A1A0P	Aa	537	-	47,47,47	0.32	0	50,52,52	0.51	1 (2%)
4	A1A0P	Ba	309	-	47,47,47	0.34	0	50,52,52	0.52	0
4	A1A0P	Cb	303	-	47,47,47	0.36	0	50,52,52	0.77	3 (6%)
4	A1A0P	Ba	313	-	47,47,47	0.33	0	50,52,52	0.45	0
4	A1A0P	Ca	305	-	47,47,47	0.30	0	50,52,52	0.34	0
4	A1A0P	Ba	311	-	47,47,47	0.32	0	50,52,52	0.50	1 (2%)
4	A1A0P	Cc	310	-	47,47,47	0.33	0	50,52,52	0.37	0
4	A1A0P	Bb	309	-	47,47,47	0.34	0	50,52,52	0.52	0
4	A1A0P	Ca	314	-	47,47,47	0.68	1 (2%)	50,52,52	0.44	0
4	A1A0P	Ba	312	-	47,47,47	0.31	0	50,52,52	0.42	0
4	A1A0P	Cc	314	-	47,47,47	0.68	1 (2%)	50,52,52	0.44	0
4	A1A0P	Ba	308	-	47,47,47	0.31	0	50,52,52	0.33	0
4	A1A0P	Cb	309	-	47,47,47	0.39	0	50,52,52	0.51	1 (2%)

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
4	A1A0P	Bb	314	-	-	23/51/51/51	-
4	A1A0P	Ca	307	-	-	27/51/51/51	-
4	A1A0P	Cb	312	-	-	25/51/51/51	-
4	A1A0P	Ca	308	-	-	26/51/51/51	-
4	A1A0P	Ca	304	-	-	25/51/51/51	-
4	A1A0P	Cc	312	-	-	25/51/51/51	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	A1A0P	Cc	313	-	-	26/51/51/51	-
4	A1A0P	Ab	537	-	-	21/51/51/51	-
4	A1A0P	Cb	310	-	-	16/51/51/51	-
4	A1A0P	Ca	309	-	-	25/51/51/51	-
4	A1A0P	Cb	313	-	-	26/51/51/51	-
4	A1A0P	Cc	309	-	-	26/51/51/51	-
4	A1A0P	Bc	313	-	-	24/51/51/51	-
4	A1A0P	Cb	304	-	-	25/51/51/51	-
4	A1A0P	Cb	308	-	-	26/51/51/51	-
4	A1A0P	Ac	537	-	-	21/51/51/51	-
4	A1A0P	Bb	311	-	-	21/51/51/51	-
4	A1A0P	Bc	309	-	-	26/51/51/51	-
4	A1A0P	Bc	314	-	-	23/51/51/51	-
4	A1A0P	Ca	312	-	-	25/51/51/51	-
4	A1A0P	Bc	312	-	-	22/51/51/51	-
4	A1A0P	Cc	307	-	-	27/51/51/51	-
4	A1A0P	Cc	305	-	-	24/51/51/51	-
4	A1A0P	Cc	303	-	-	28/51/51/51	-
4	A1A0P	Cc	306	-	-	28/51/51/51	-
4	A1A0P	Bb	310	-	-	25/51/51/51	-
4	A1A0P	Ba	310	-	-	25/51/51/51	-
4	A1A0P	Cc	308	-	-	26/51/51/51	-
4	A1A0P	Cc	304	-	-	25/51/51/51	-
4	A1A0P	Bb	312	-	-	22/51/51/51	-
4	A1A0P	Ba	314	-	-	23/51/51/51	-
4	A1A0P	Ca	306	-	-	28/51/51/51	-
4	A1A0P	Ca	310	-	-	16/51/51/51	-
4	A1A0P	Ca	303	-	-	28/51/51/51	-
4	A1A0P	Cb	314	-	-	22/51/51/51	-
4	A1A0P	Bc	308	-	-	17/51/51/51	-
4	A1A0P	Ca	313	-	-	26/51/51/51	-
4	A1A0P	Bb	308	-	-	17/51/51/51	-
4	A1A0P	Bc	310	-	-	25/51/51/51	-
4	A1A0P	Cb	305	-	-	24/51/51/51	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	A1A0P	Bc	311	-	-	21/51/51/51	-
4	A1A0P	Cb	307	-	-	27/51/51/51	-
4	A1A0P	Bb	313	-	-	24/51/51/51	-
4	A1A0P	Cb	306	-	-	28/51/51/51	-
4	A1A0P	Aa	537	-	-	21/51/51/51	-
4	A1A0P	Ba	309	-	-	26/51/51/51	-
4	A1A0P	Cb	303	-	-	28/51/51/51	-
4	A1A0P	Ba	313	-	-	24/51/51/51	-
4	A1A0P	Ca	305	-	-	24/51/51/51	-
4	A1A0P	Ba	311	-	-	21/51/51/51	-
4	A1A0P	Cc	310	-	-	16/51/51/51	-
4	A1A0P	Bb	309	-	-	26/51/51/51	-
4	A1A0P	Ca	314	-	-	22/51/51/51	-
4	A1A0P	Ba	312	-	-	22/51/51/51	-
4	A1A0P	Cc	314	-	-	22/51/51/51	-
4	A1A0P	Ba	308	-	-	17/51/51/51	-
4	A1A0P	Cb	309	-	-	25/51/51/51	-

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	Cc	306	A1A0P	P14-O10	3.40	1.72	1.59
4	Cb	306	A1A0P	P14-O10	3.40	1.72	1.59
4	Ca	306	A1A0P	P14-O10	3.39	1.72	1.59
4	Cb	306	A1A0P	O10-C11	2.73	1.55	1.44
4	Ca	306	A1A0P	O10-C11	2.73	1.55	1.44

The worst 5 of 54 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	Cb	308	A1A0P	O3-C2-C1	-5.12	93.63	108.40
4	Cc	308	A1A0P	O3-C2-C1	-5.11	93.65	108.40
4	Ca	308	A1A0P	O3-C2-C1	-5.11	93.66	108.40
4	Cc	308	A1A0P	C8-C1-C2	-4.22	101.95	111.78
4	Cb	308	A1A0P	C8-C1-C2	-4.22	101.96	111.78

There are no chirality outliers.

5 of 1354 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	Ba	308	A1A0P	C11-O10-P14-O9
4	Ba	308	A1A0P	C11-O10-P14-O15
4	Ba	308	A1A0P	O10-C11-C12-N13
4	Ba	309	A1A0P	O5-C4-O3-C2
4	Ba	309	A1A0P	C7-C4-O3-C2

There are no ring outliers.

51 monomers are involved in 579 short contacts:

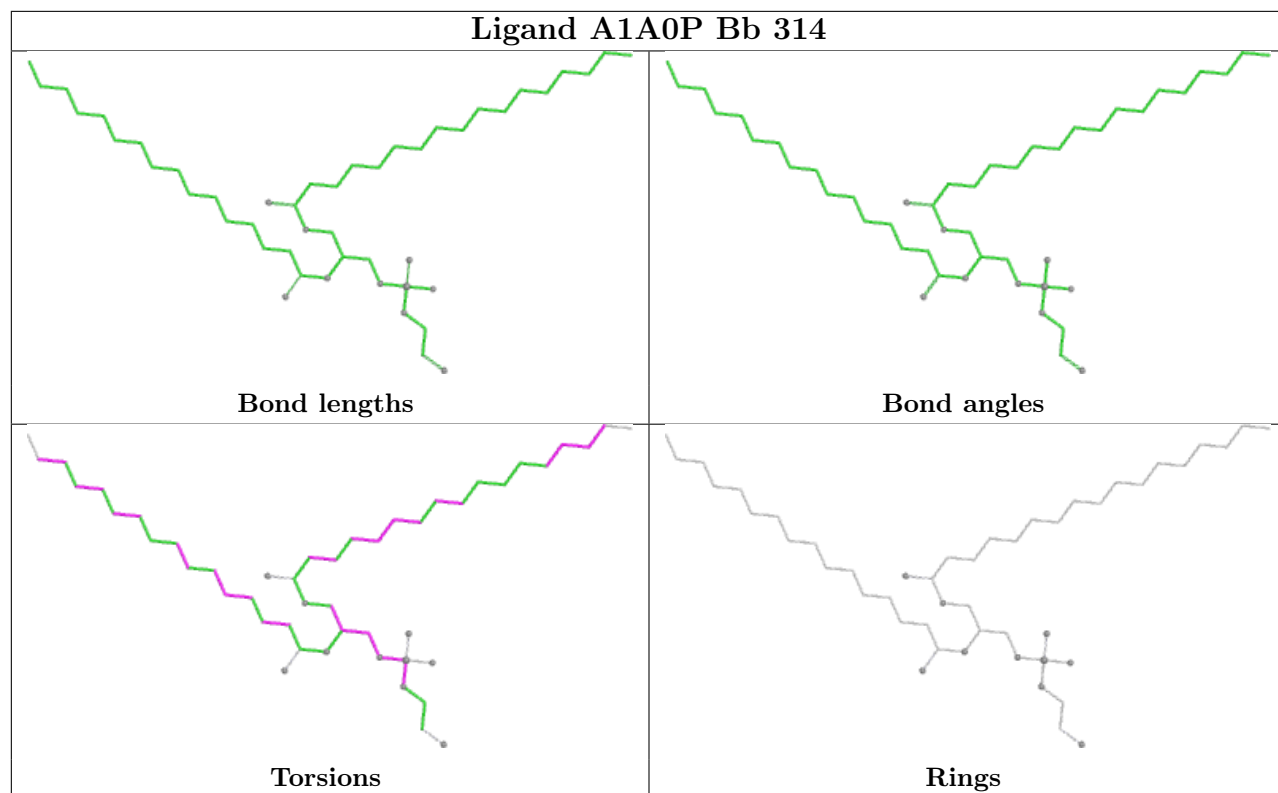
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	Bb	314	A1A0P	17	0
4	Ca	307	A1A0P	41	0
4	Cb	312	A1A0P	2	0
4	Ca	308	A1A0P	41	0
4	Ca	304	A1A0P	32	0
4	Cc	312	A1A0P	2	0
4	Cc	313	A1A0P	2	0
4	Ab	537	A1A0P	17	0
4	Cb	310	A1A0P	11	0
4	Cb	313	A1A0P	2	0
4	Bc	313	A1A0P	2	0
4	Cb	304	A1A0P	31	0
4	Cb	308	A1A0P	42	0
4	Ac	537	A1A0P	17	0
4	Bb	311	A1A0P	6	0
4	Bc	309	A1A0P	6	0
4	Bc	314	A1A0P	18	0
4	Ca	312	A1A0P	2	0
4	Bc	312	A1A0P	9	0
4	Cc	307	A1A0P	40	0
4	Cc	305	A1A0P	16	0
4	Cc	303	A1A0P	4	0
4	Cc	306	A1A0P	20	0
4	Cc	308	A1A0P	41	0
4	Cc	304	A1A0P	32	0
4	Bb	312	A1A0P	9	0
4	Ba	314	A1A0P	16	0
4	Ca	306	A1A0P	20	0
4	Ca	310	A1A0P	11	0
4	Ca	303	A1A0P	4	0
4	Cb	314	A1A0P	17	0
4	Bc	308	A1A0P	4	0
4	Ca	313	A1A0P	2	0

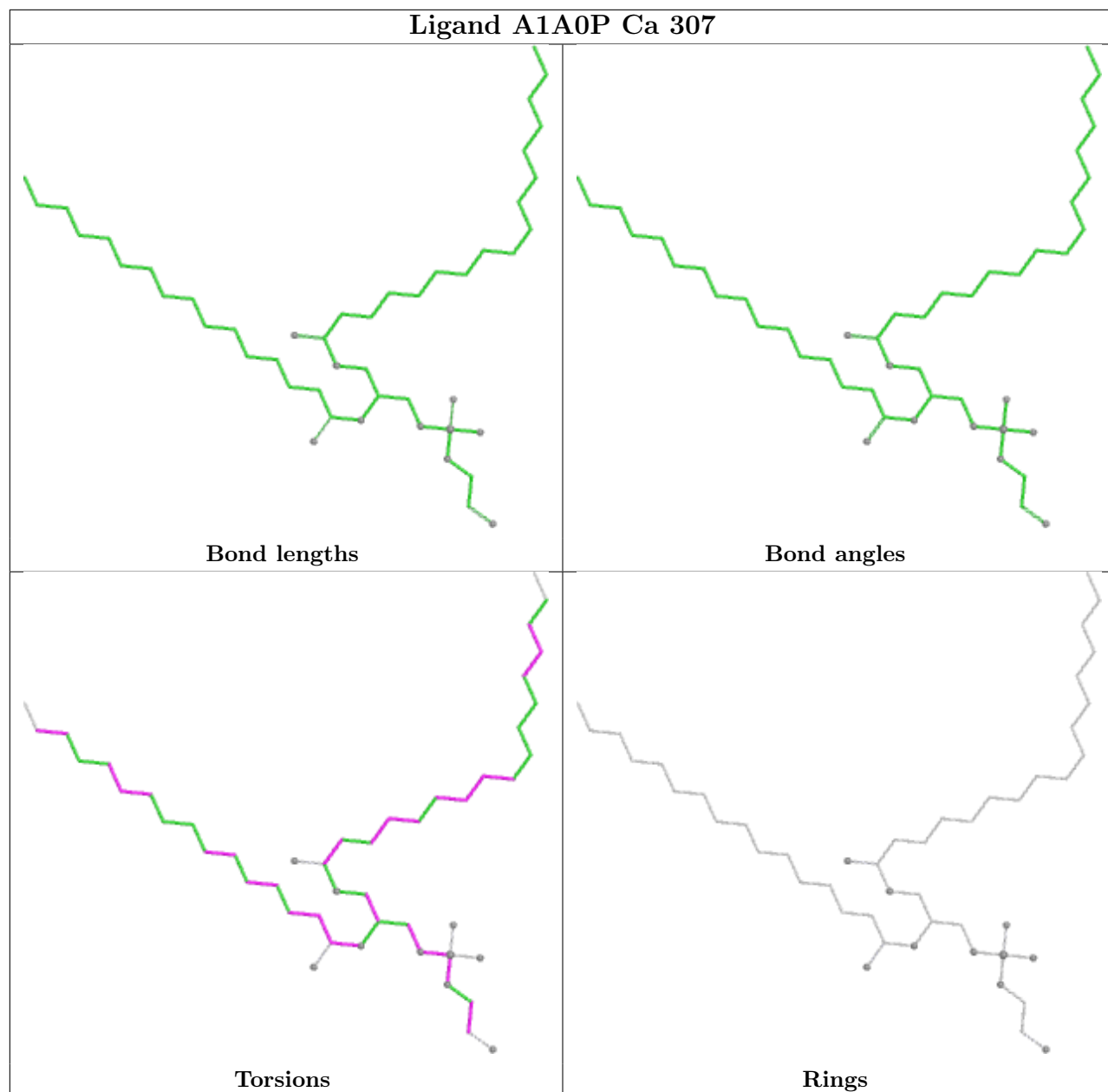
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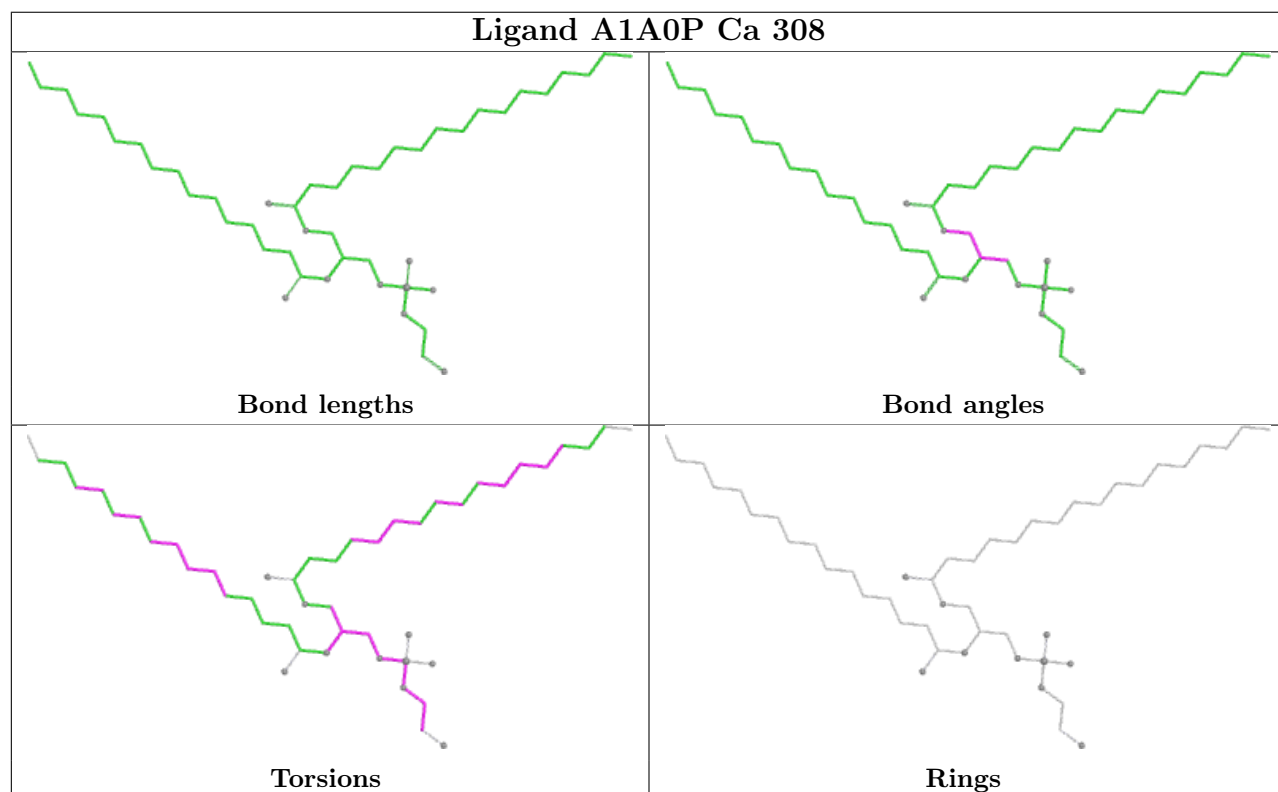
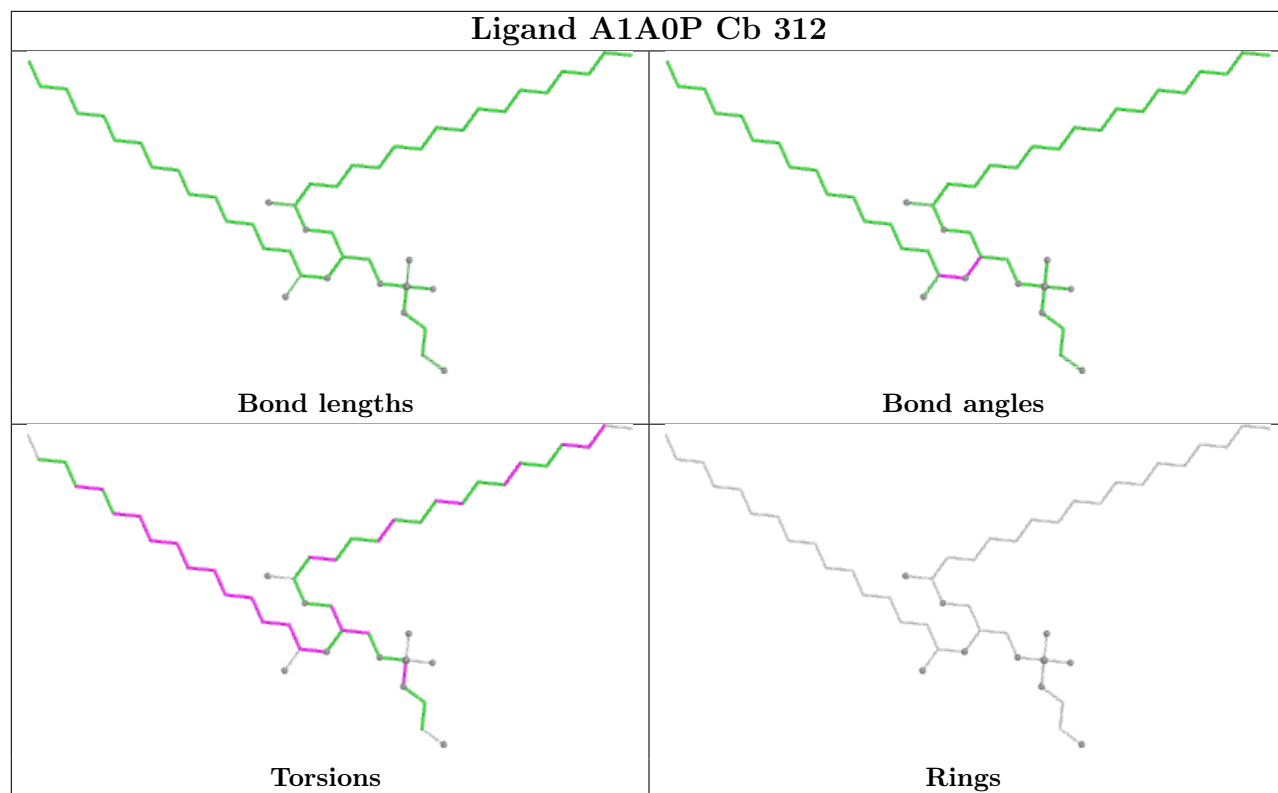
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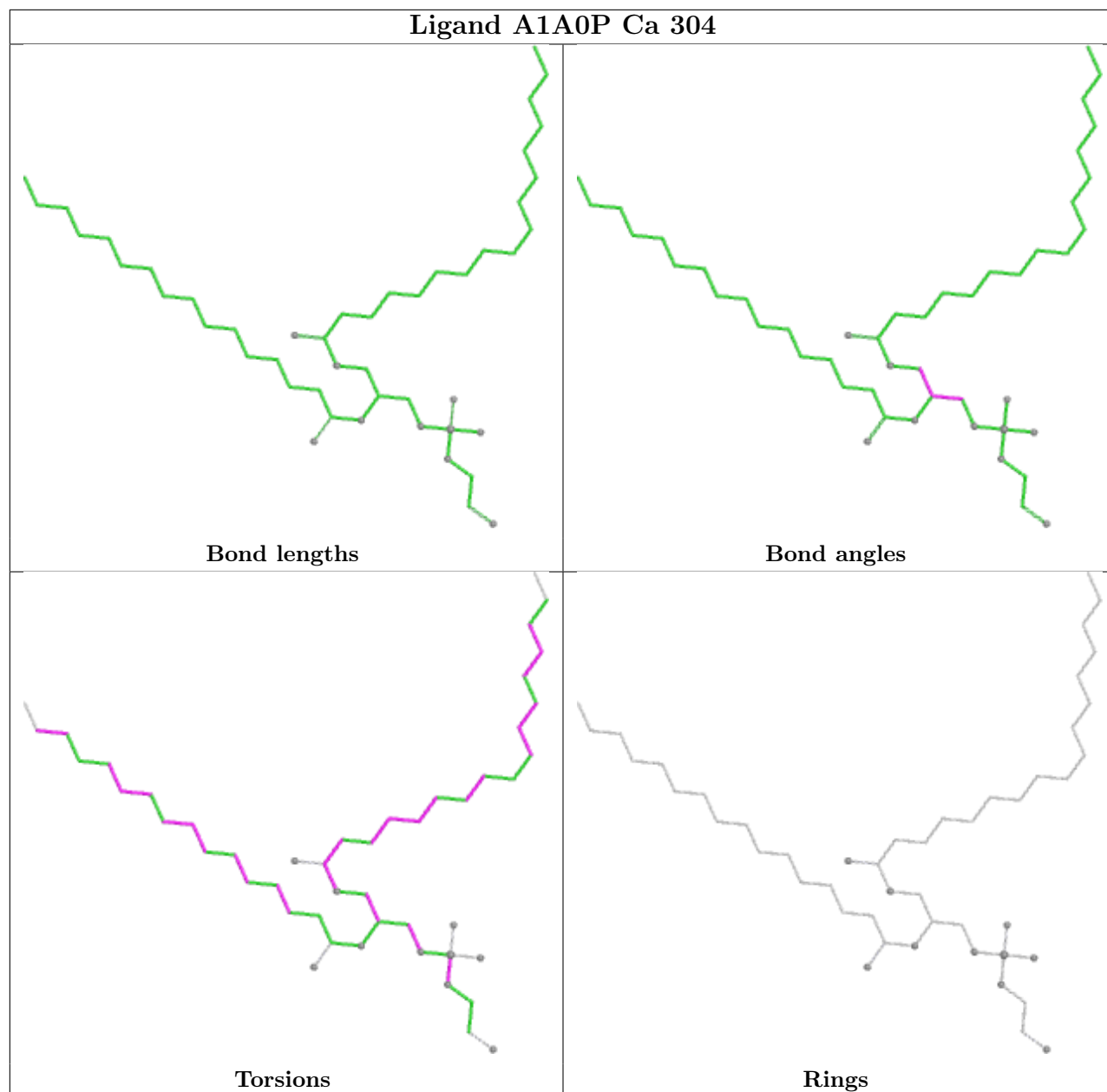
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	Bb	308	A1A0P	4	0
4	Cb	305	A1A0P	15	0
4	Bc	311	A1A0P	6	0
4	Cb	307	A1A0P	40	0
4	Bb	313	A1A0P	2	0
4	Cb	306	A1A0P	21	0
4	Aa	537	A1A0P	17	0
4	Ba	309	A1A0P	6	0
4	Cb	303	A1A0P	3	0
4	Ba	313	A1A0P	2	0
4	Ca	305	A1A0P	16	0
4	Ba	311	A1A0P	6	0
4	Cc	310	A1A0P	11	0
4	Bb	309	A1A0P	7	0
4	Ca	314	A1A0P	18	0
4	Ba	312	A1A0P	8	0
4	Cc	314	A1A0P	17	0
4	Ba	308	A1A0P	4	0

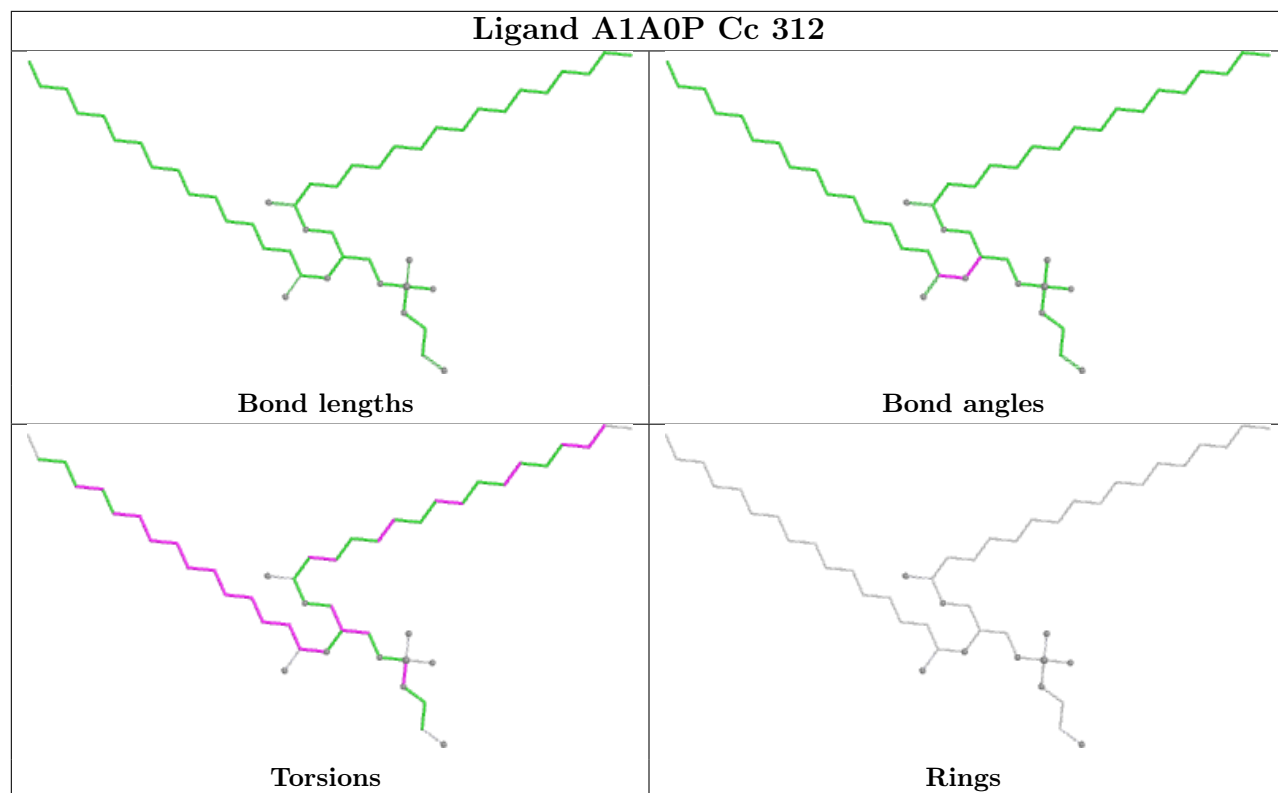
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

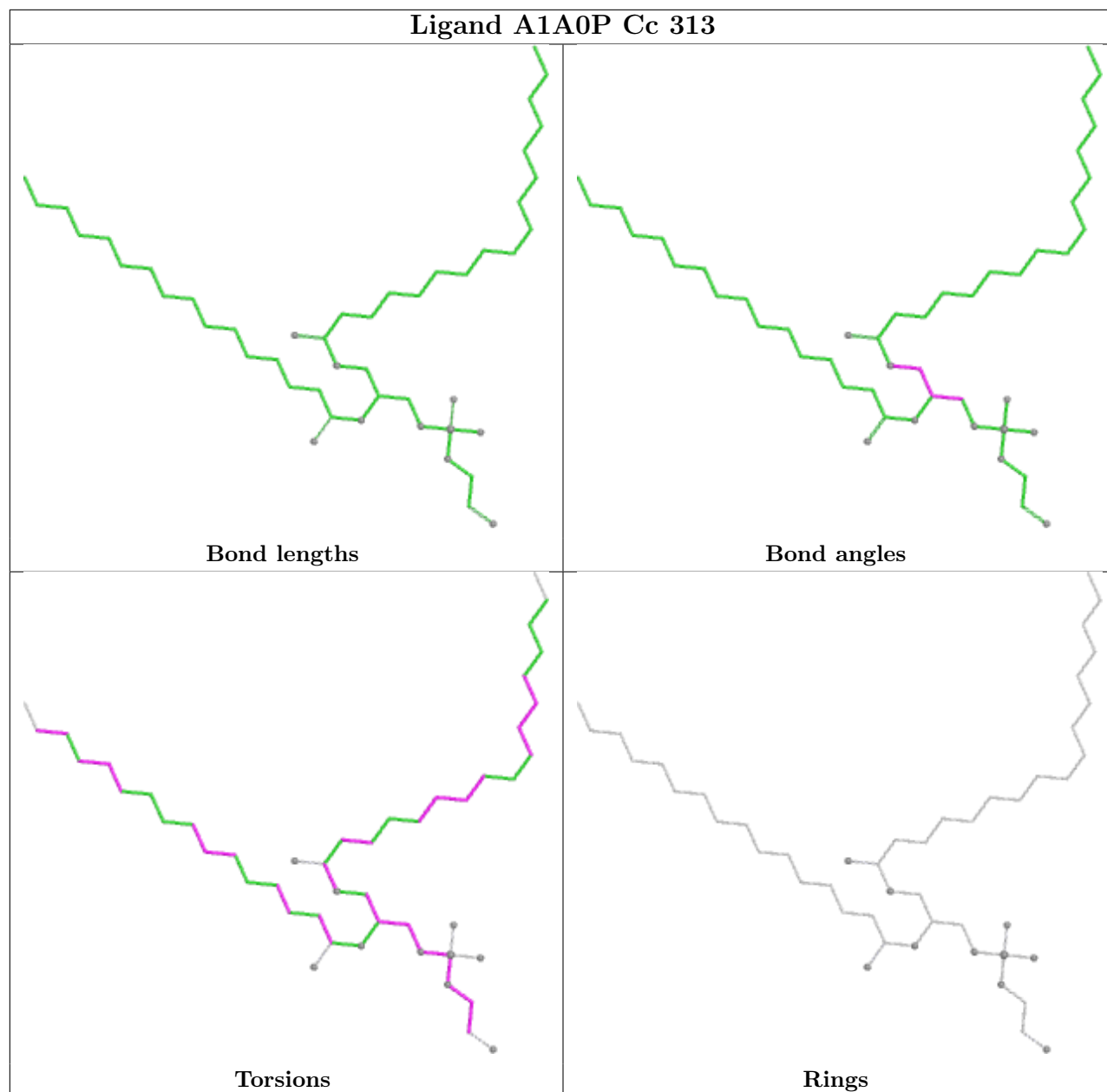


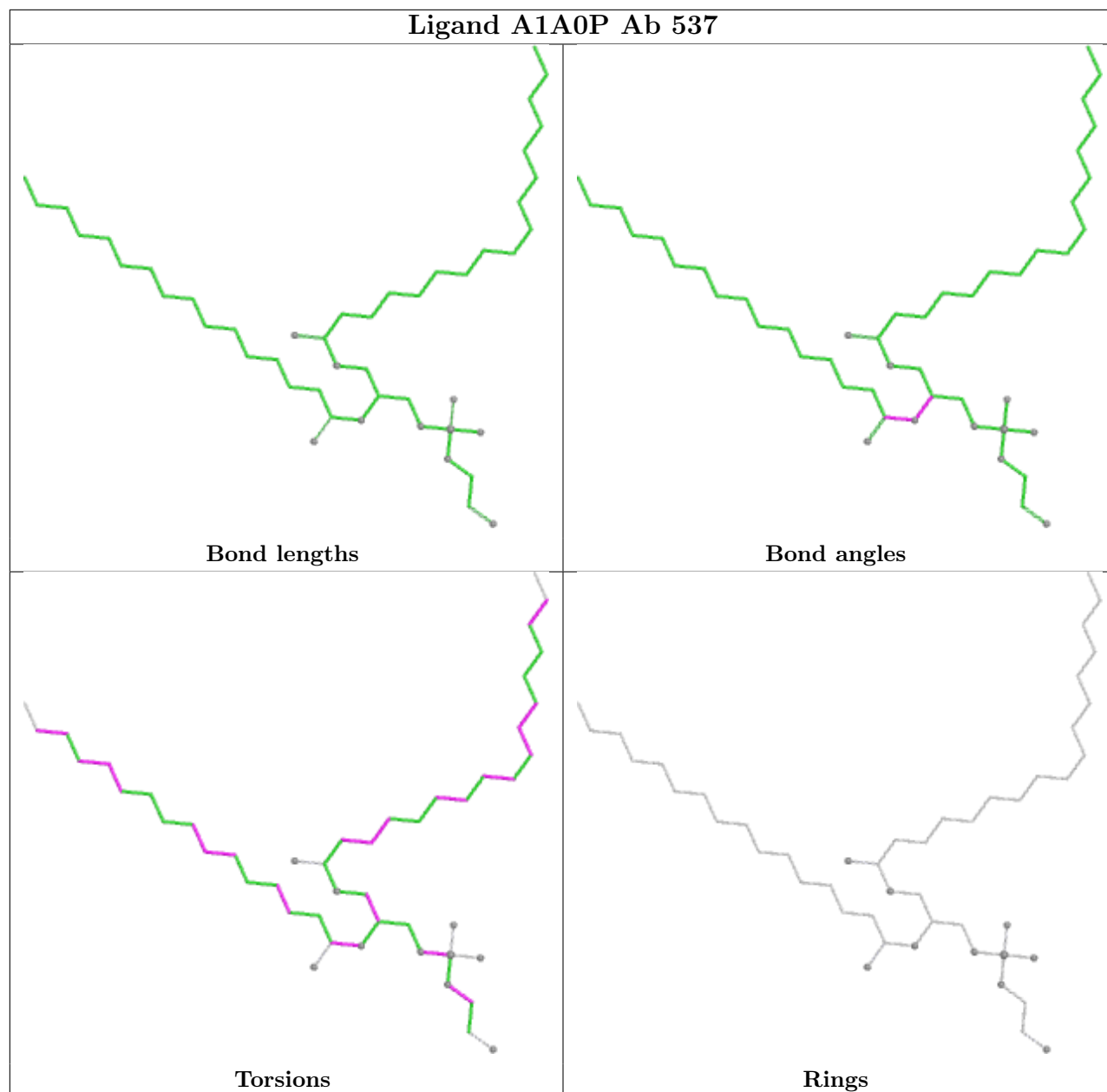


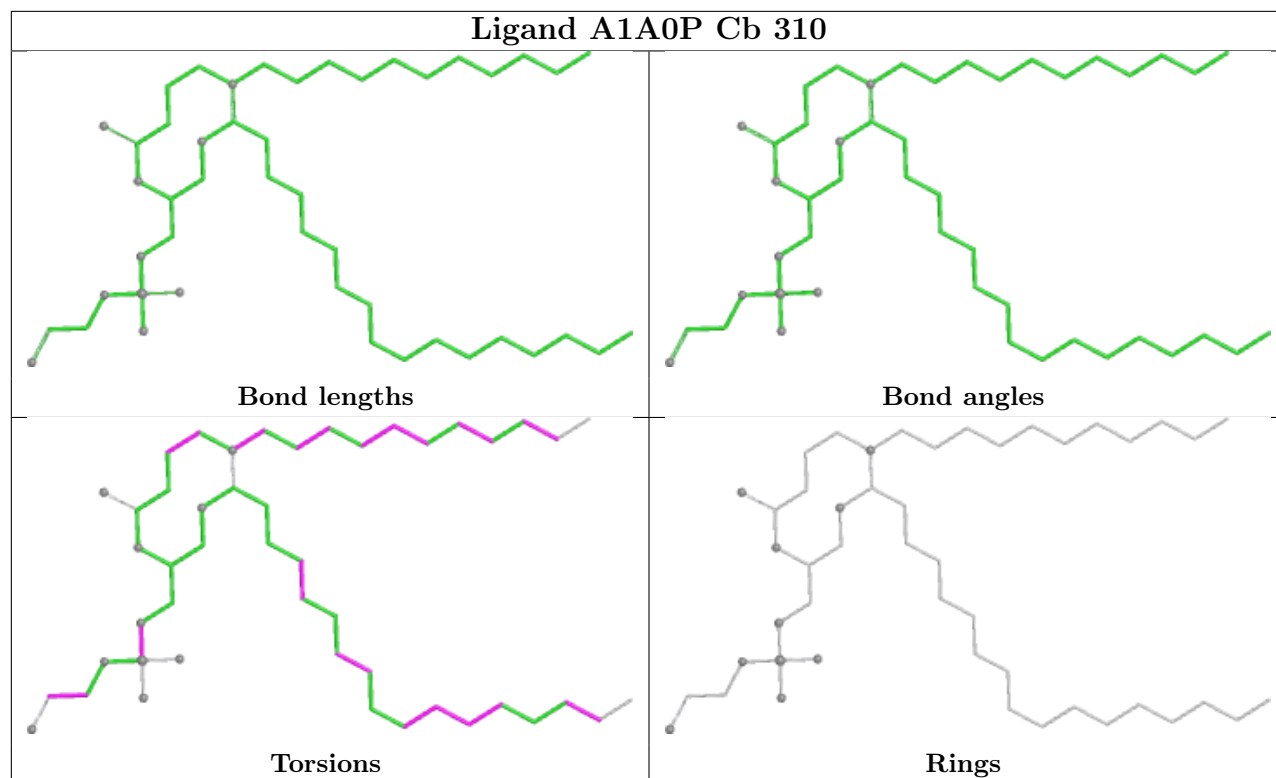


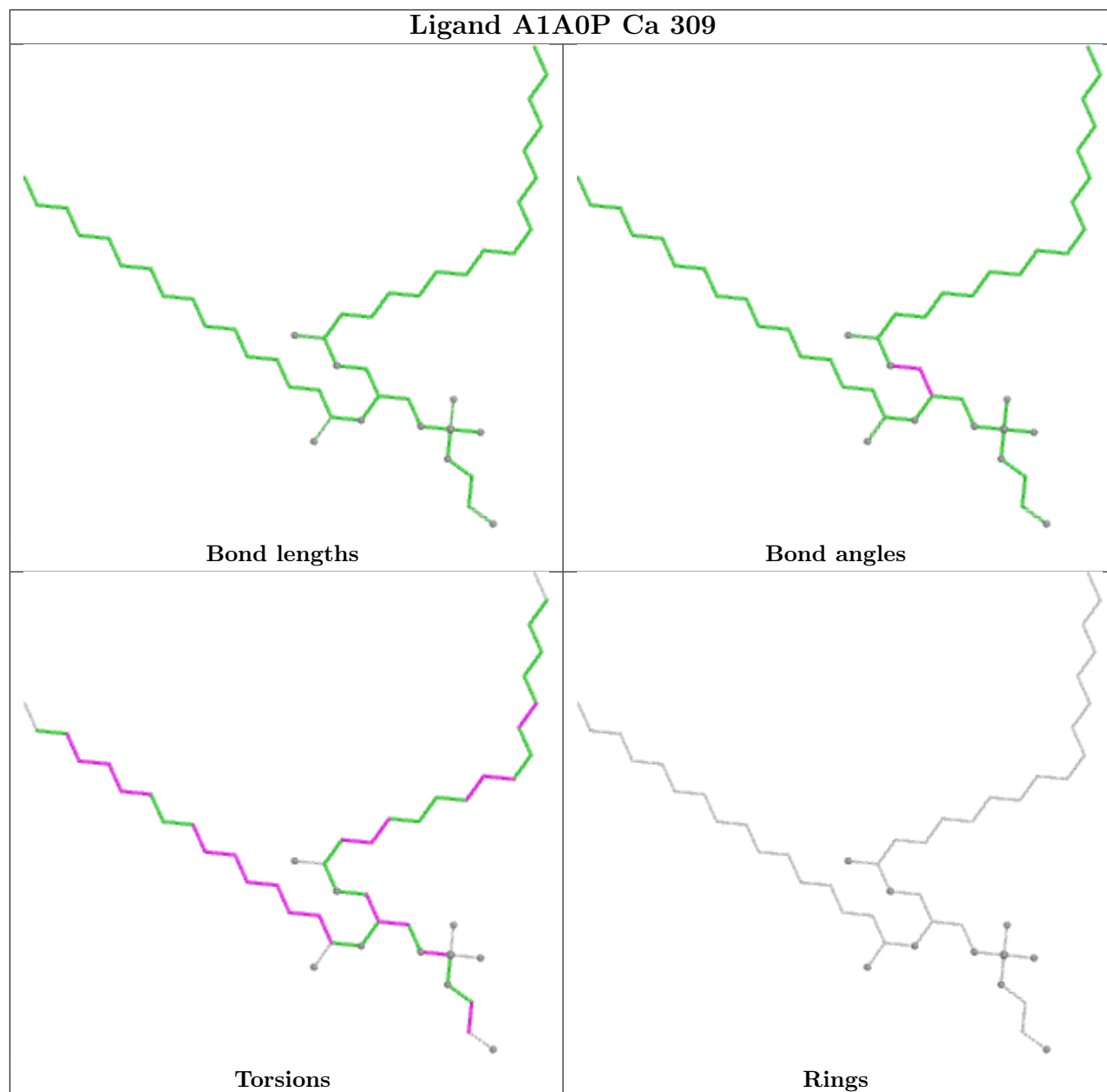


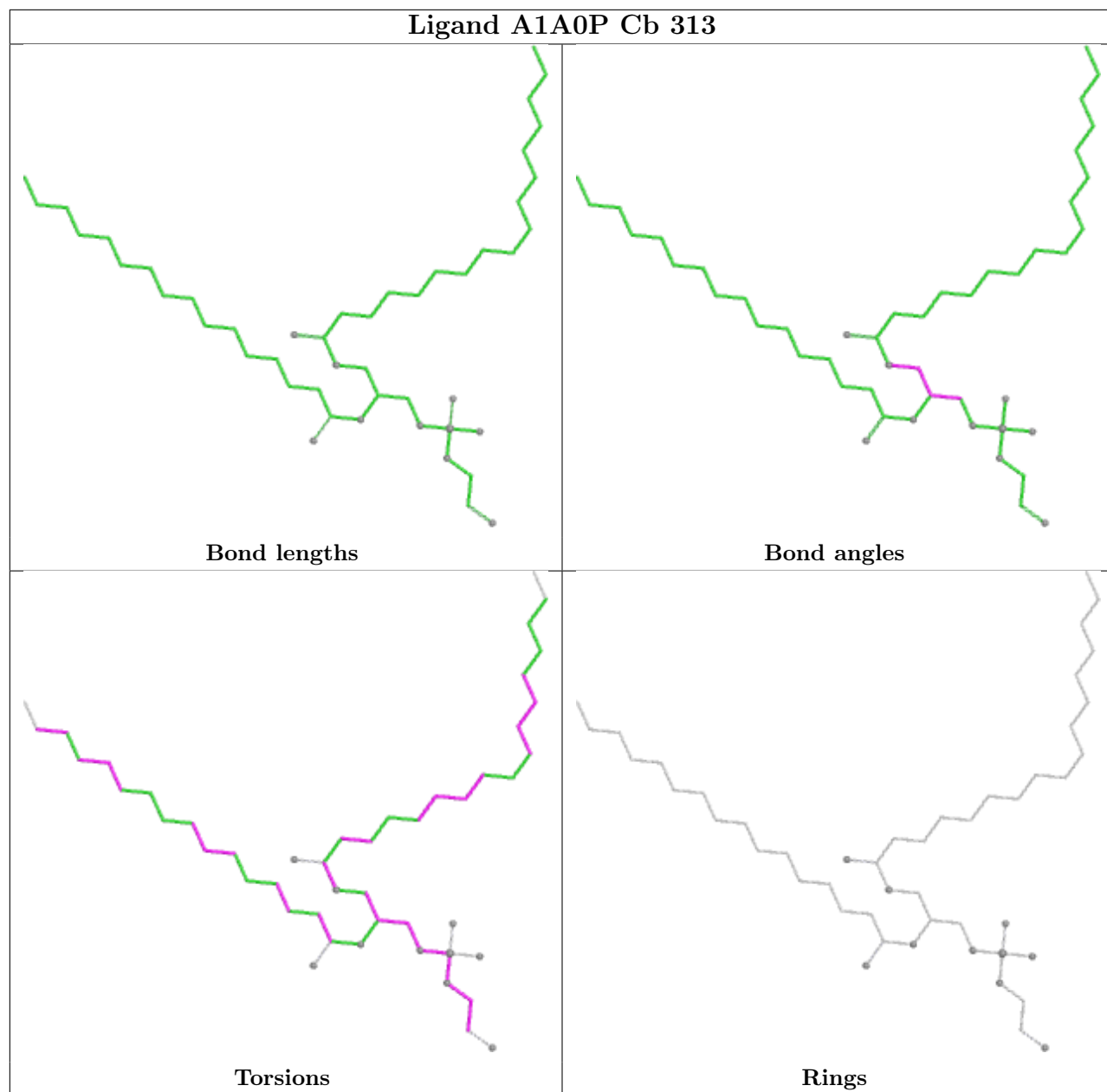


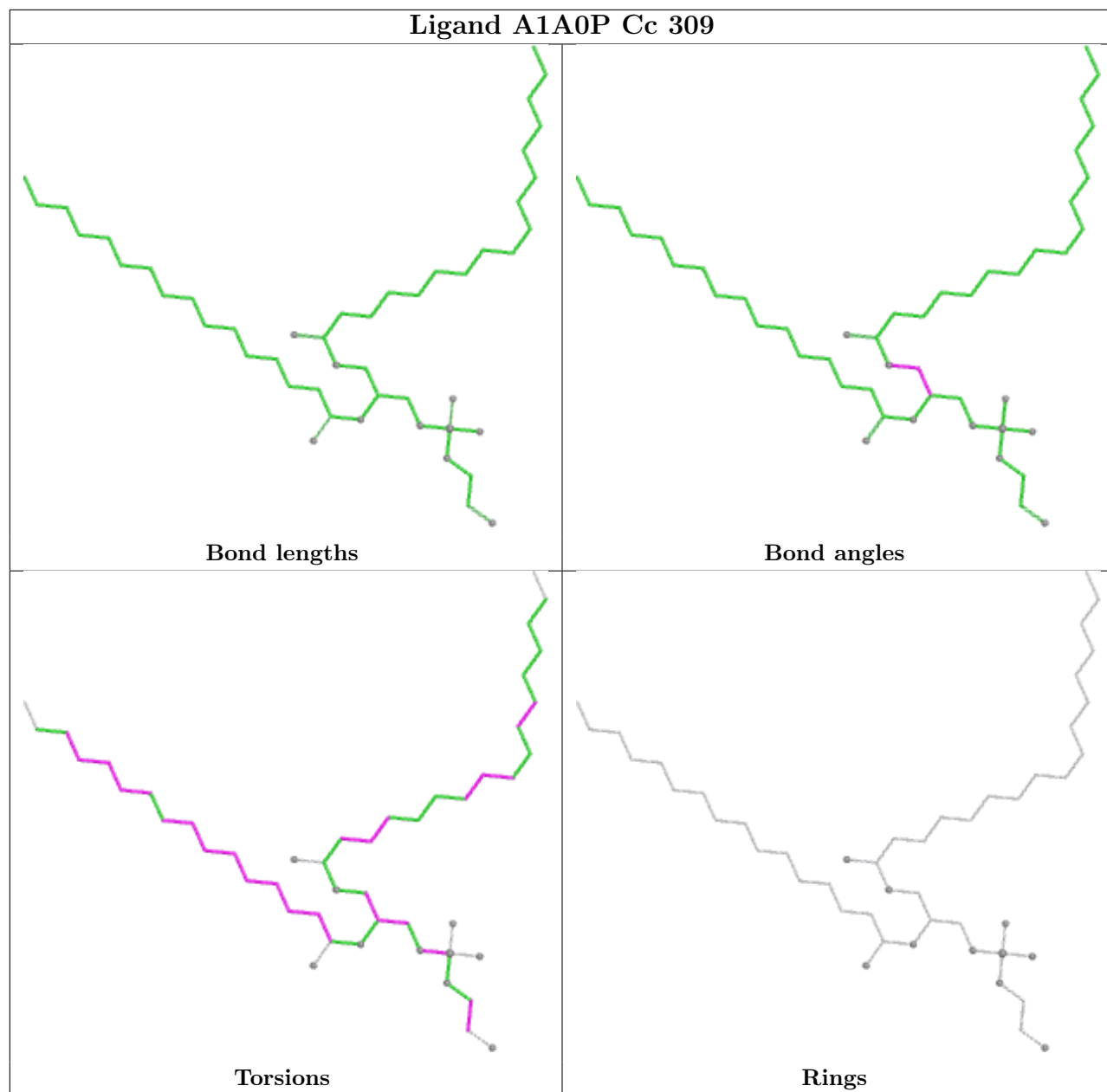


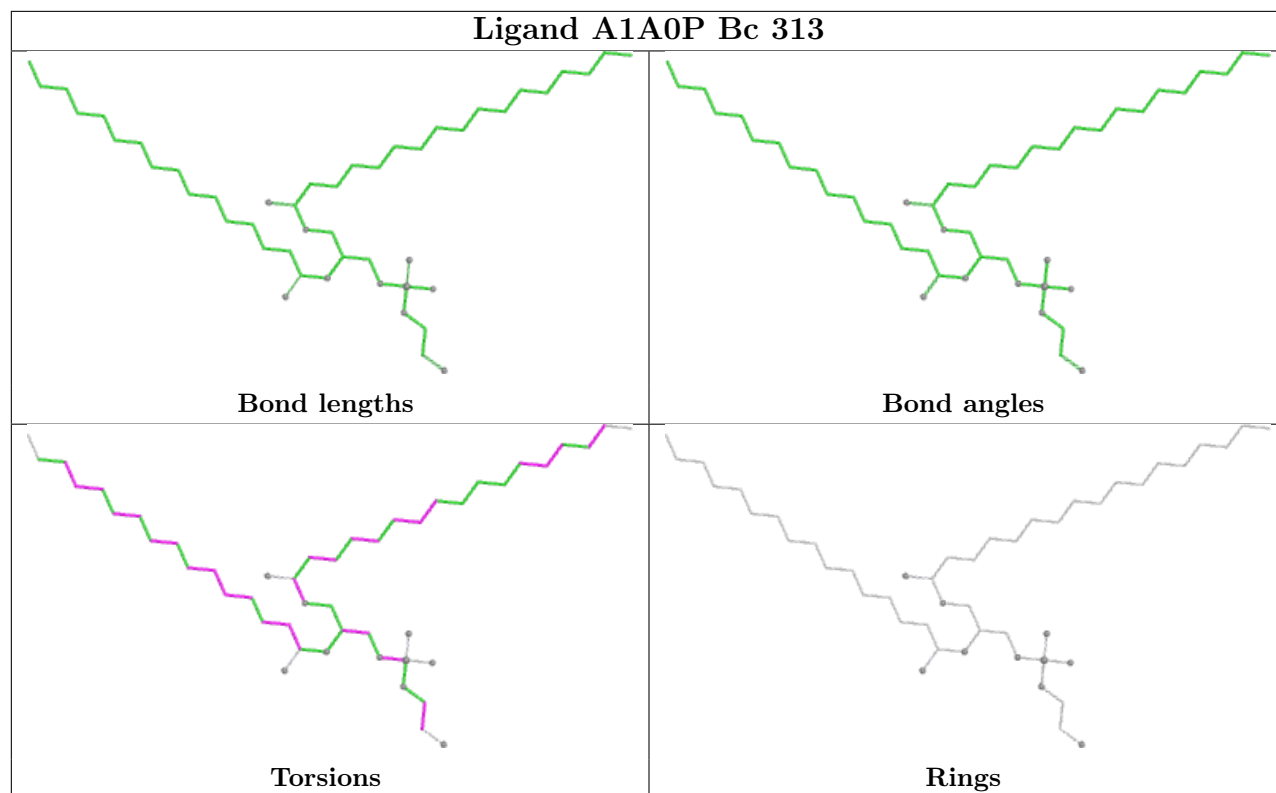


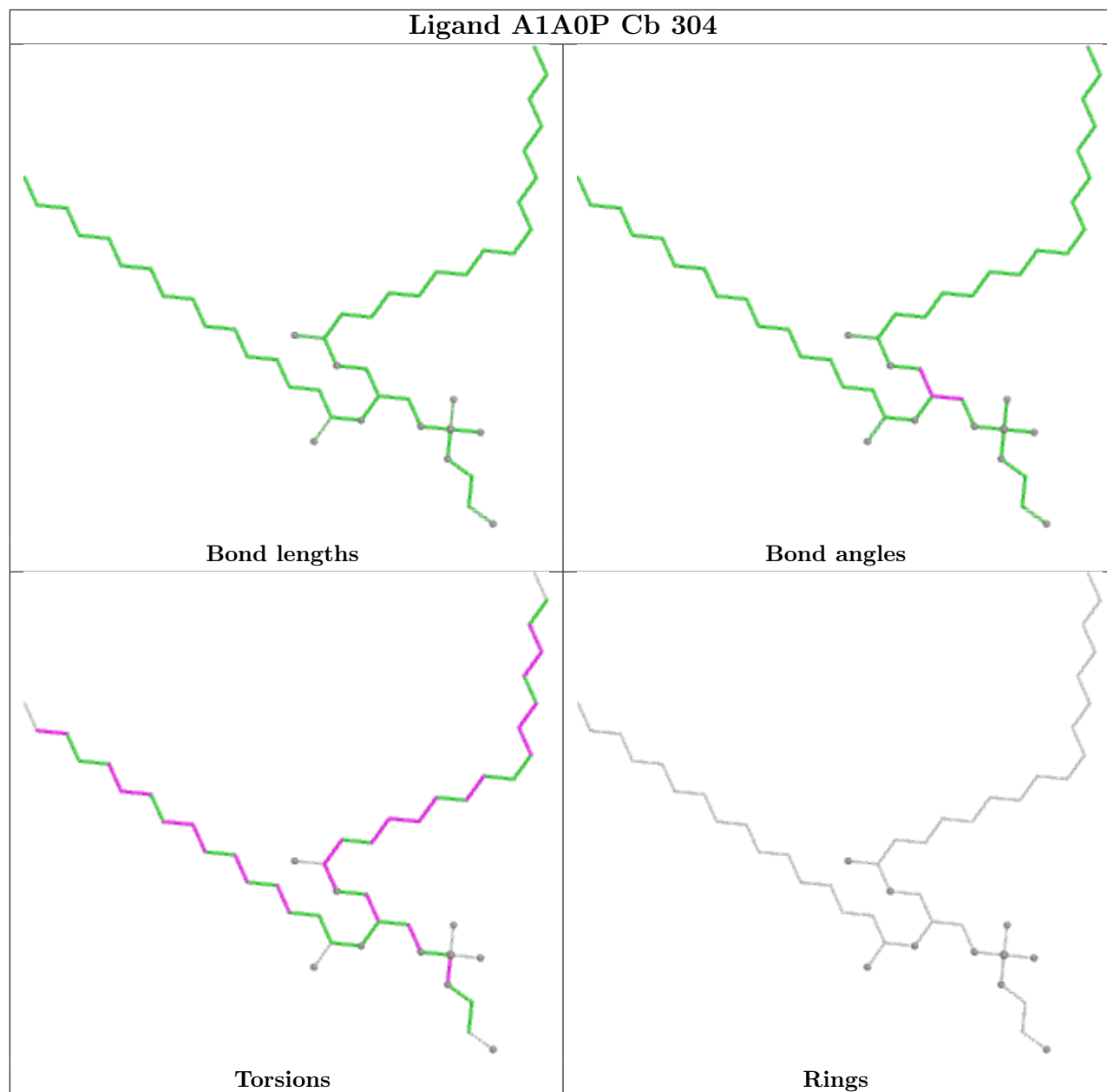


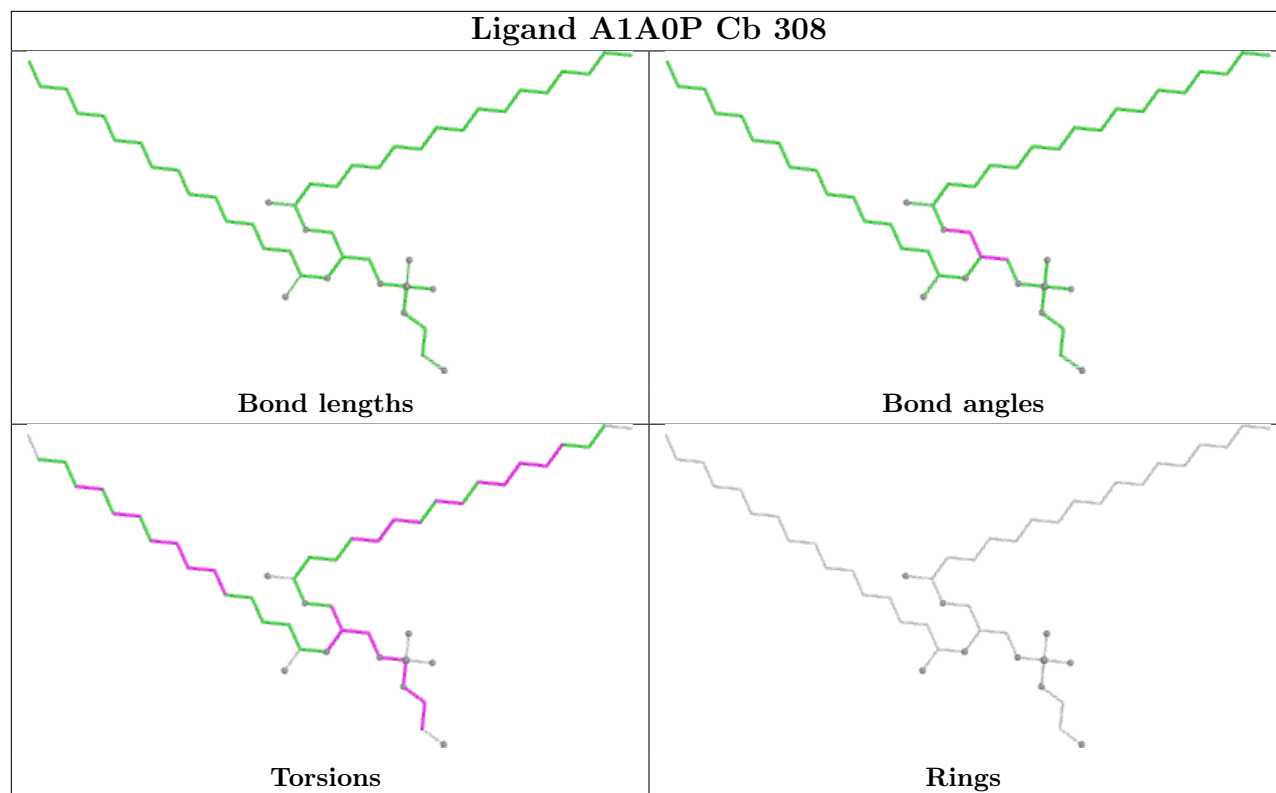


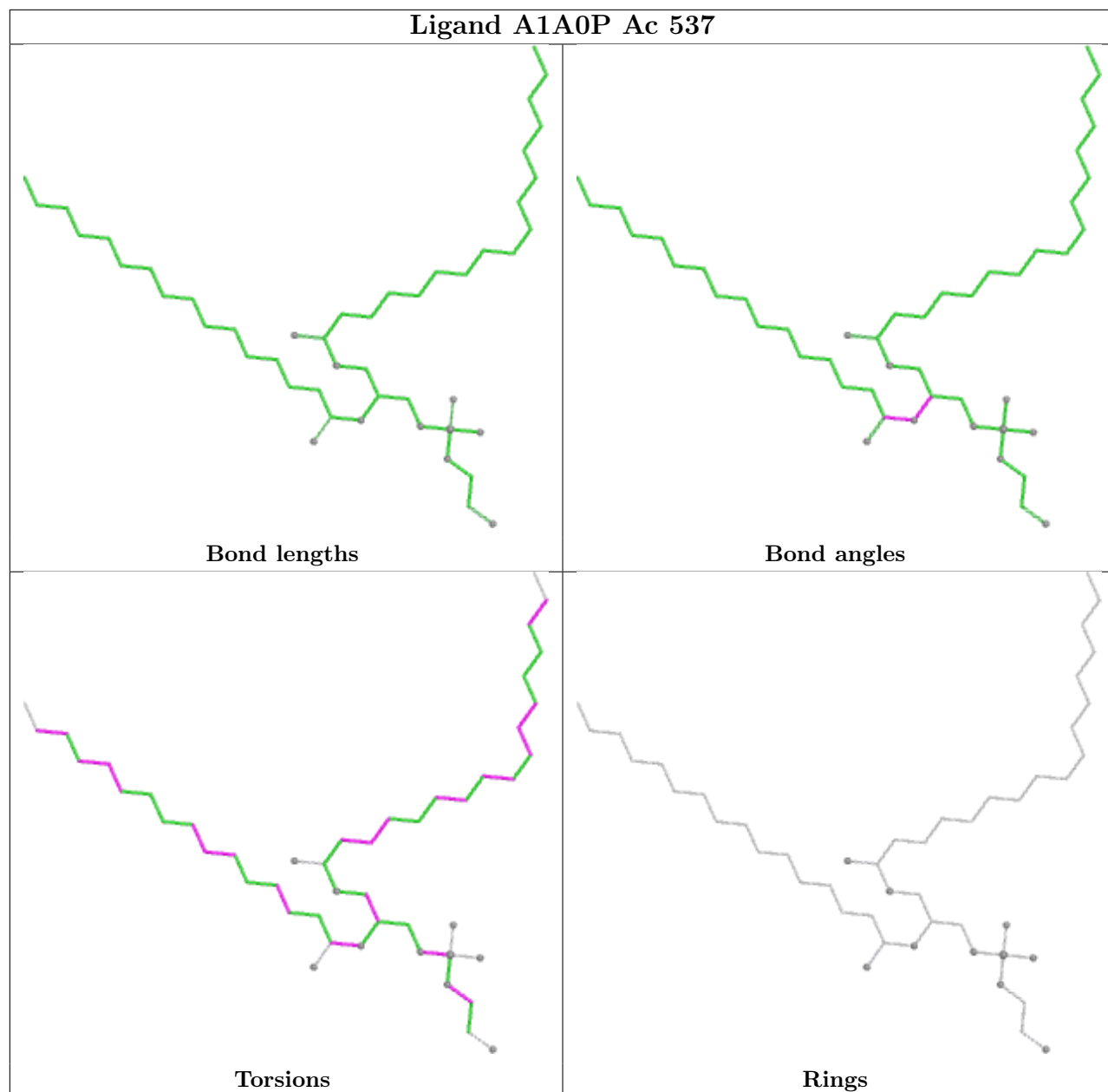


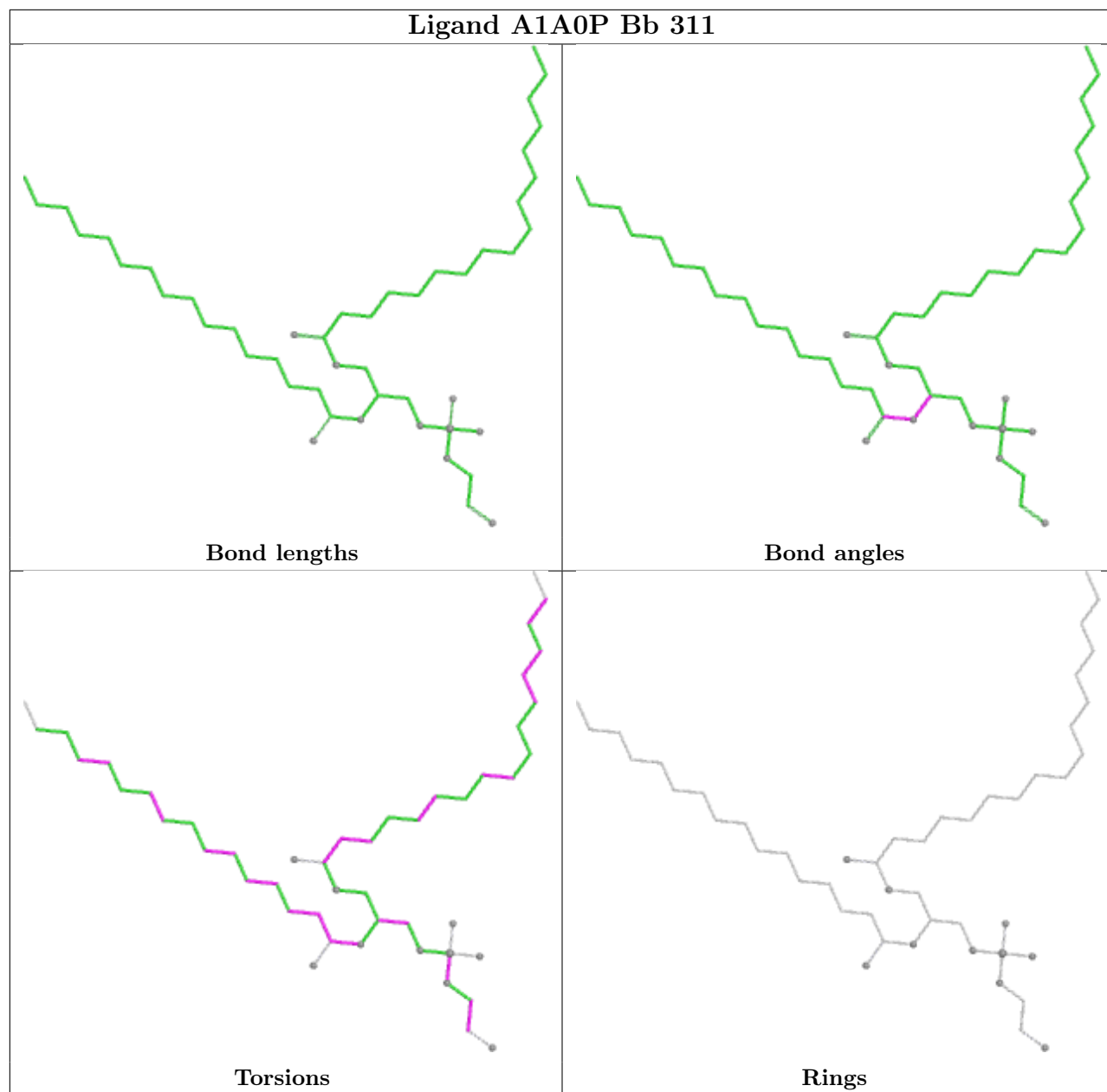


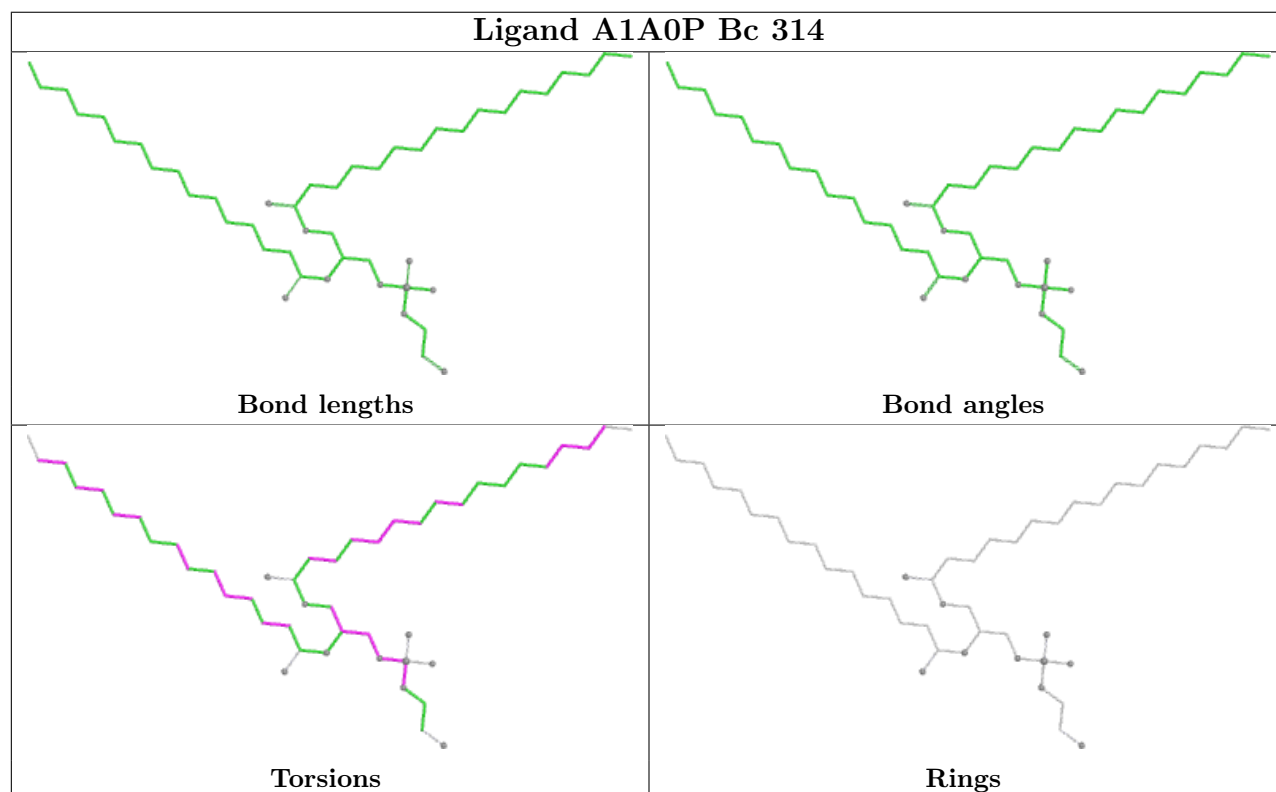
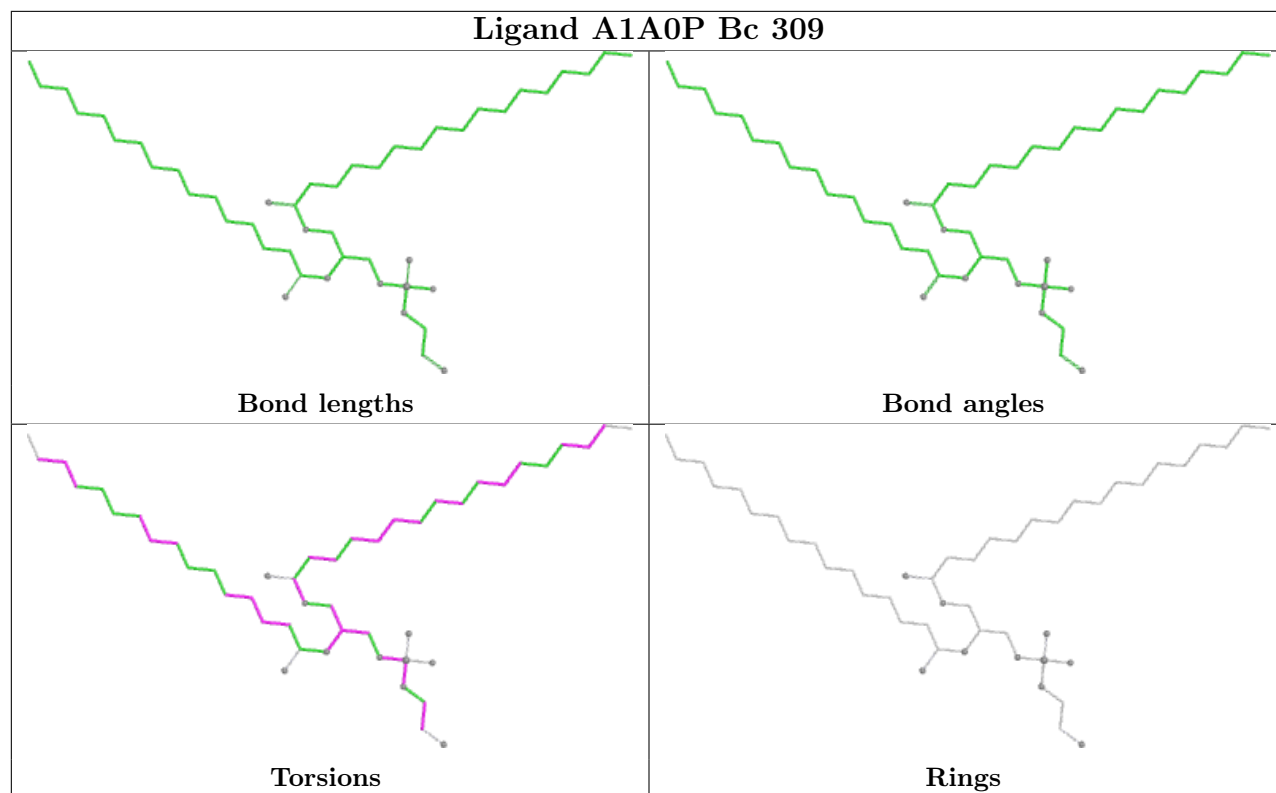


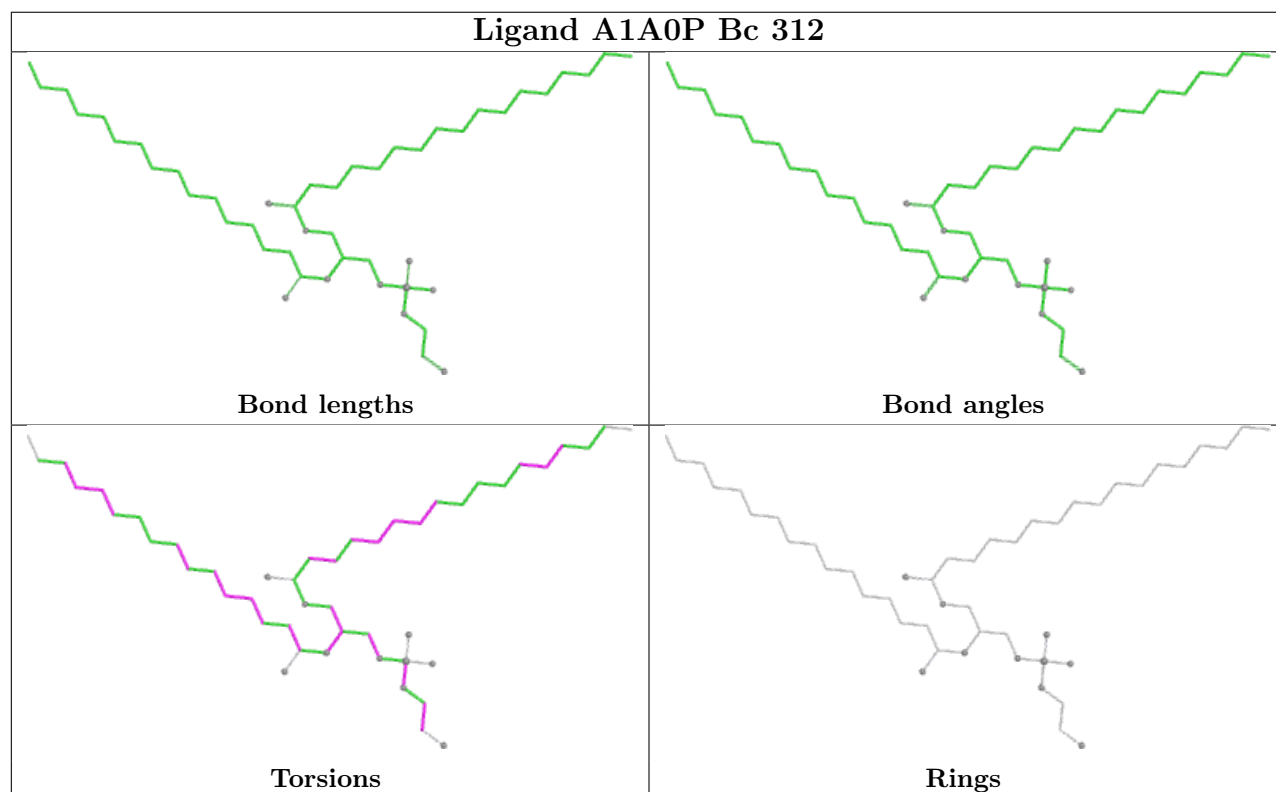
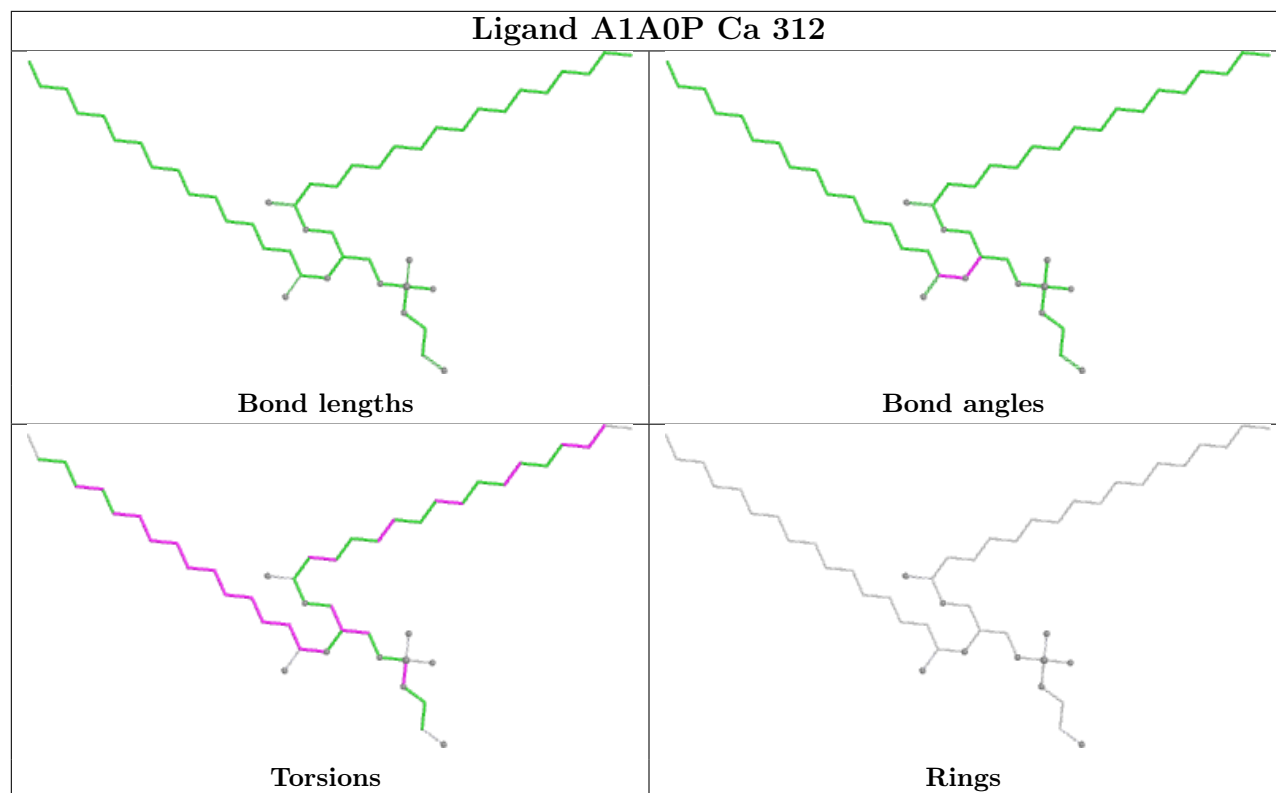


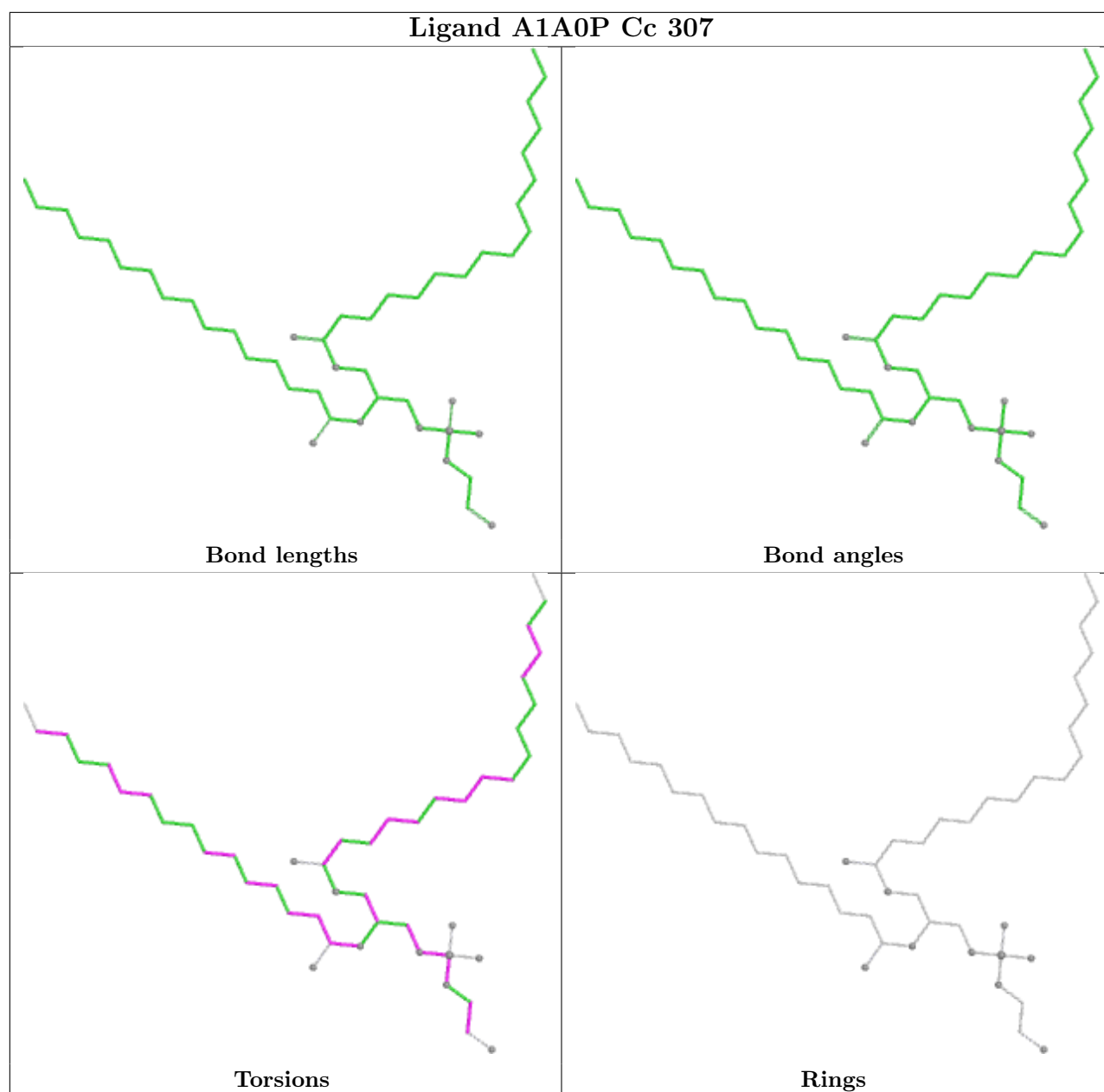


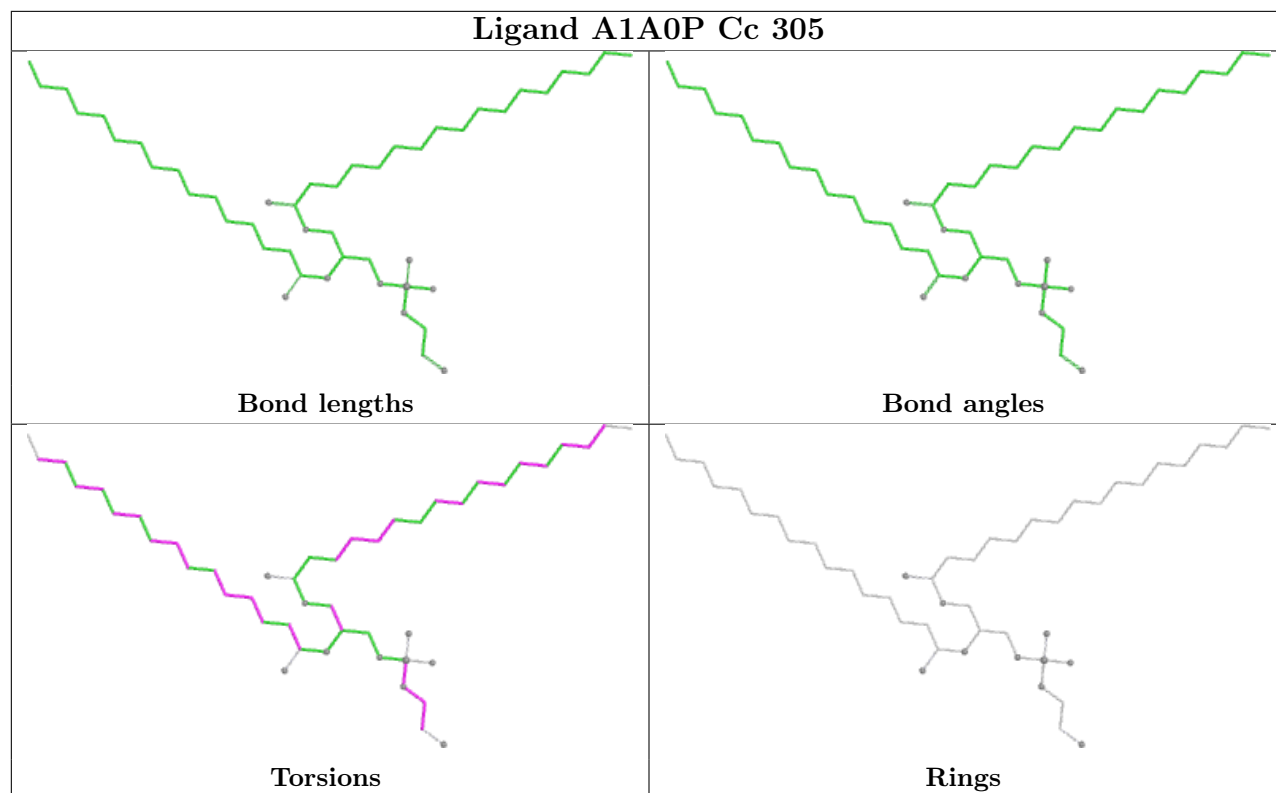


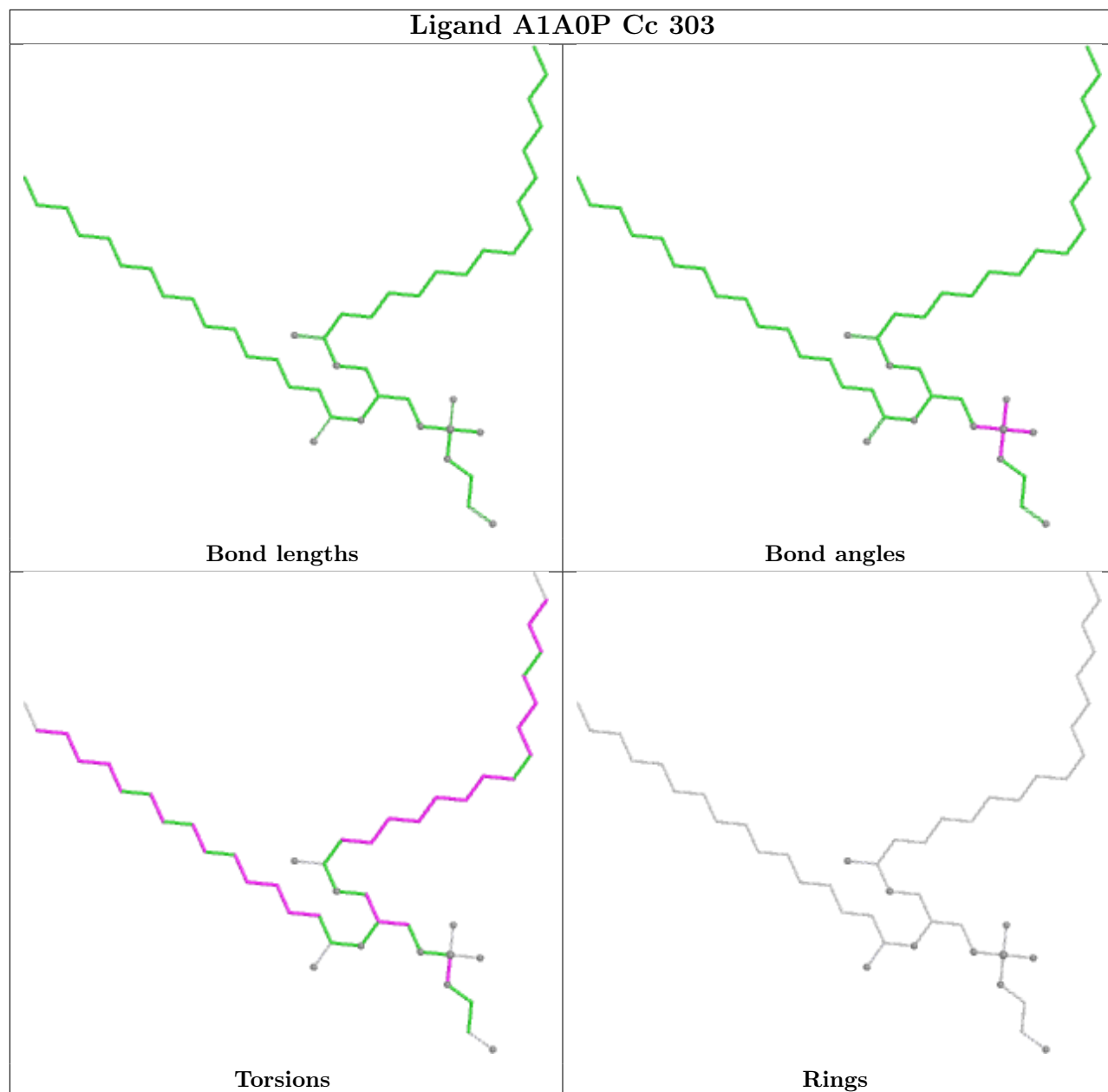


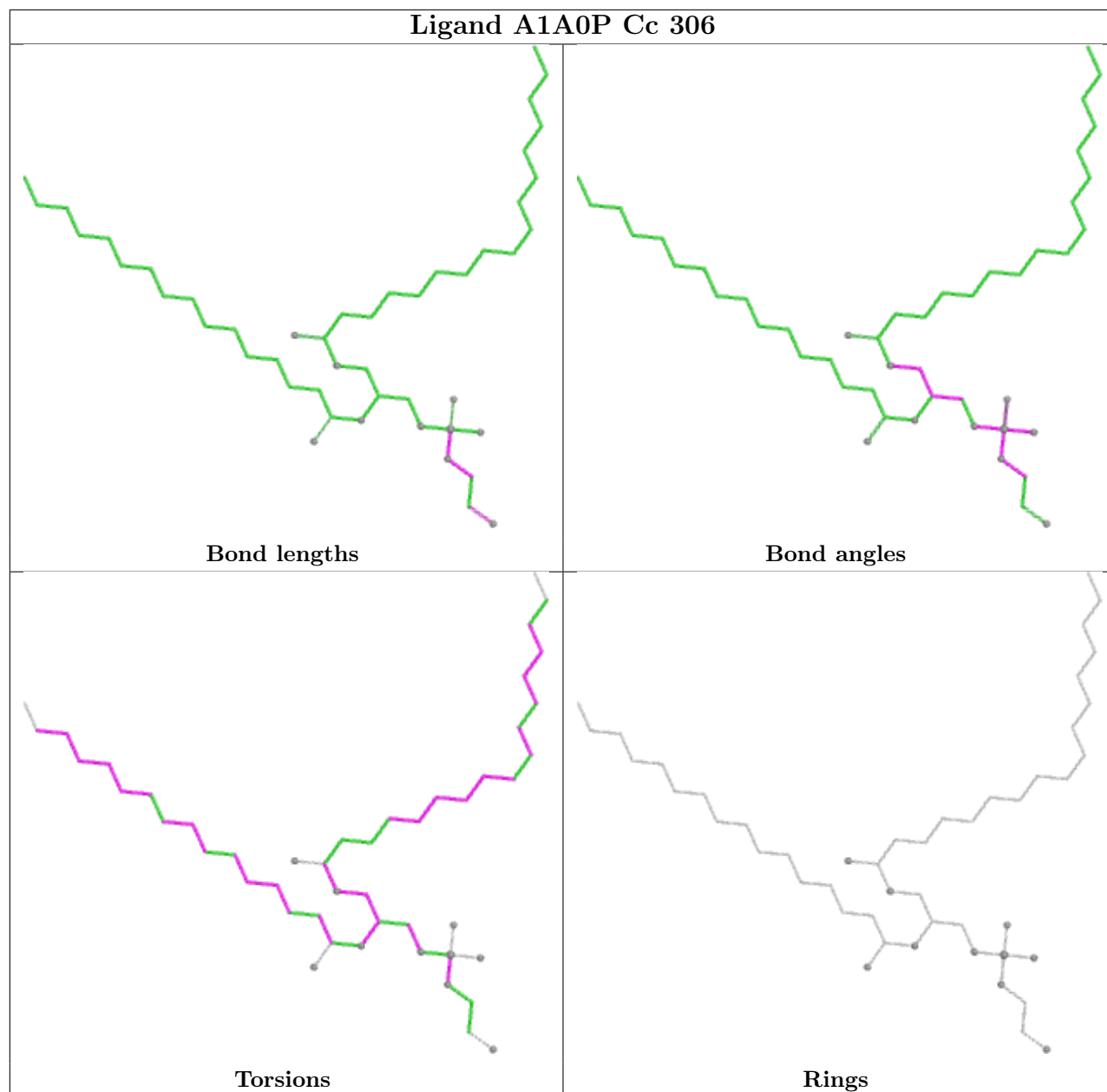


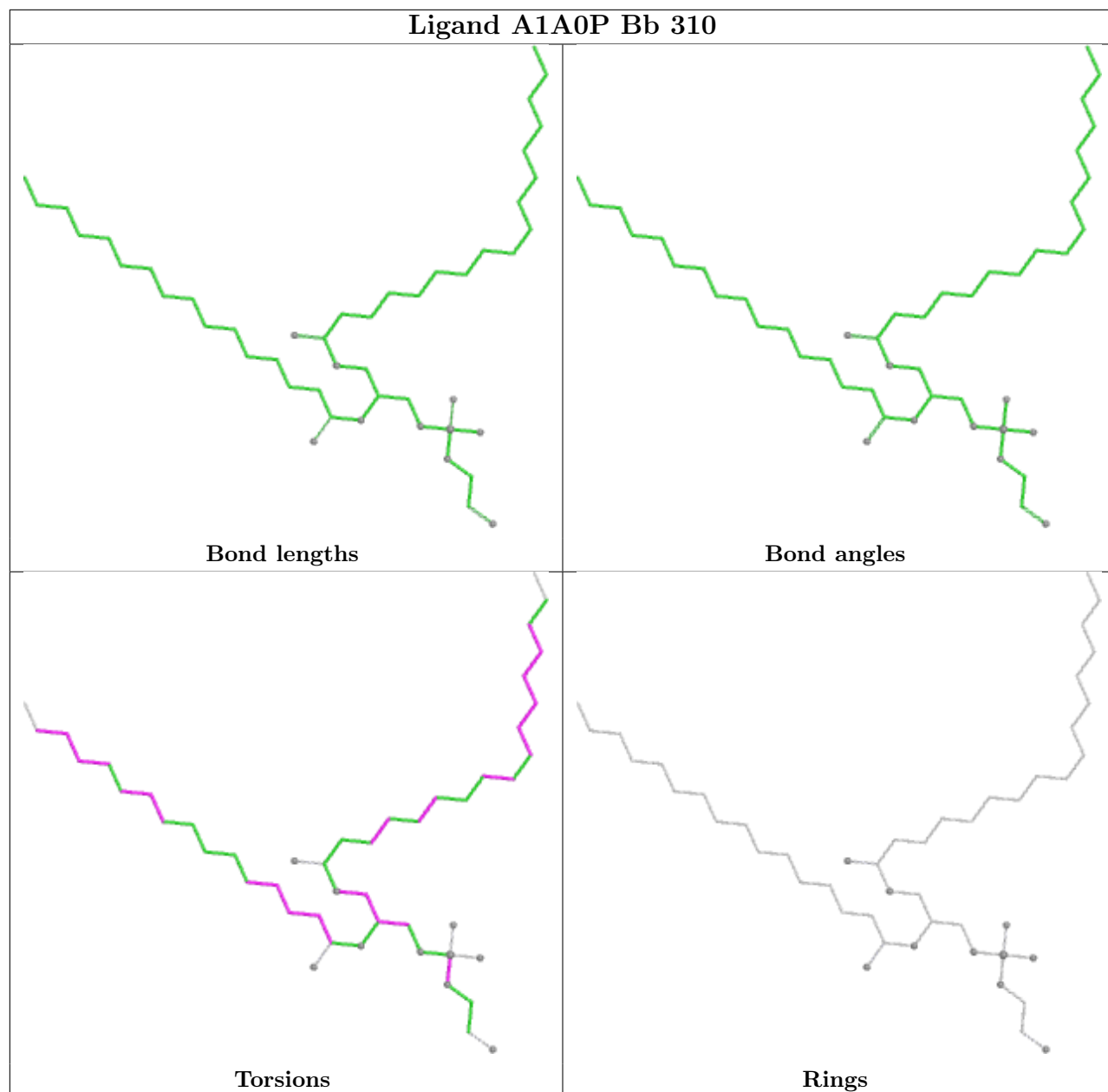


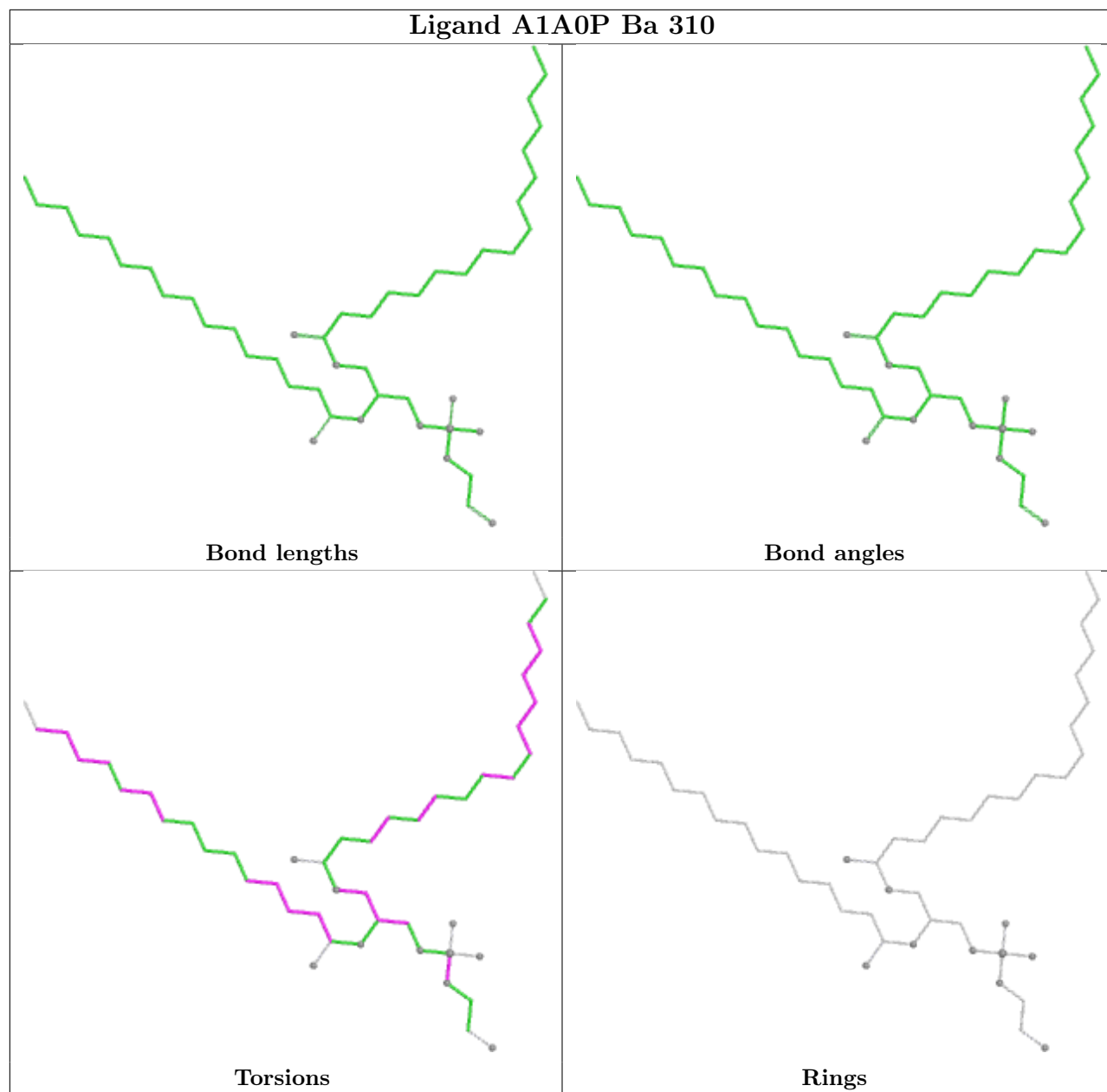


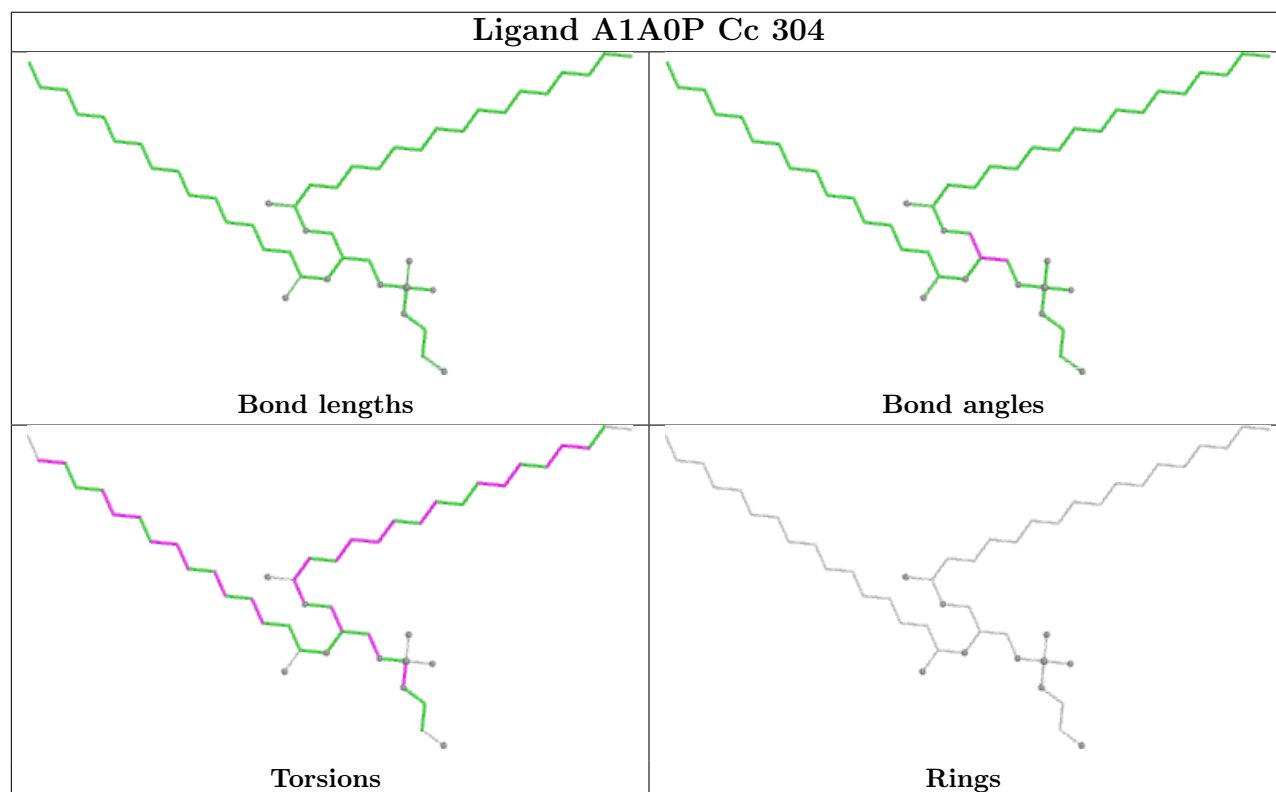
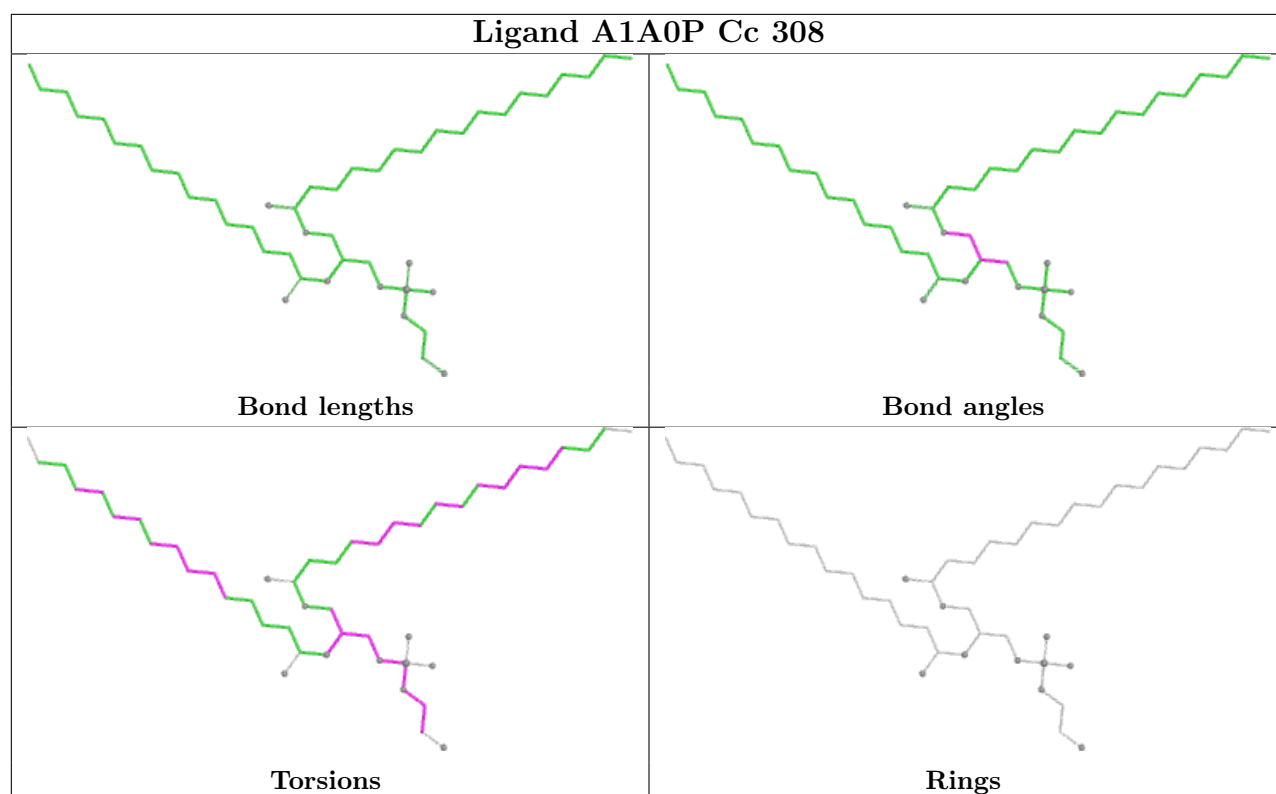


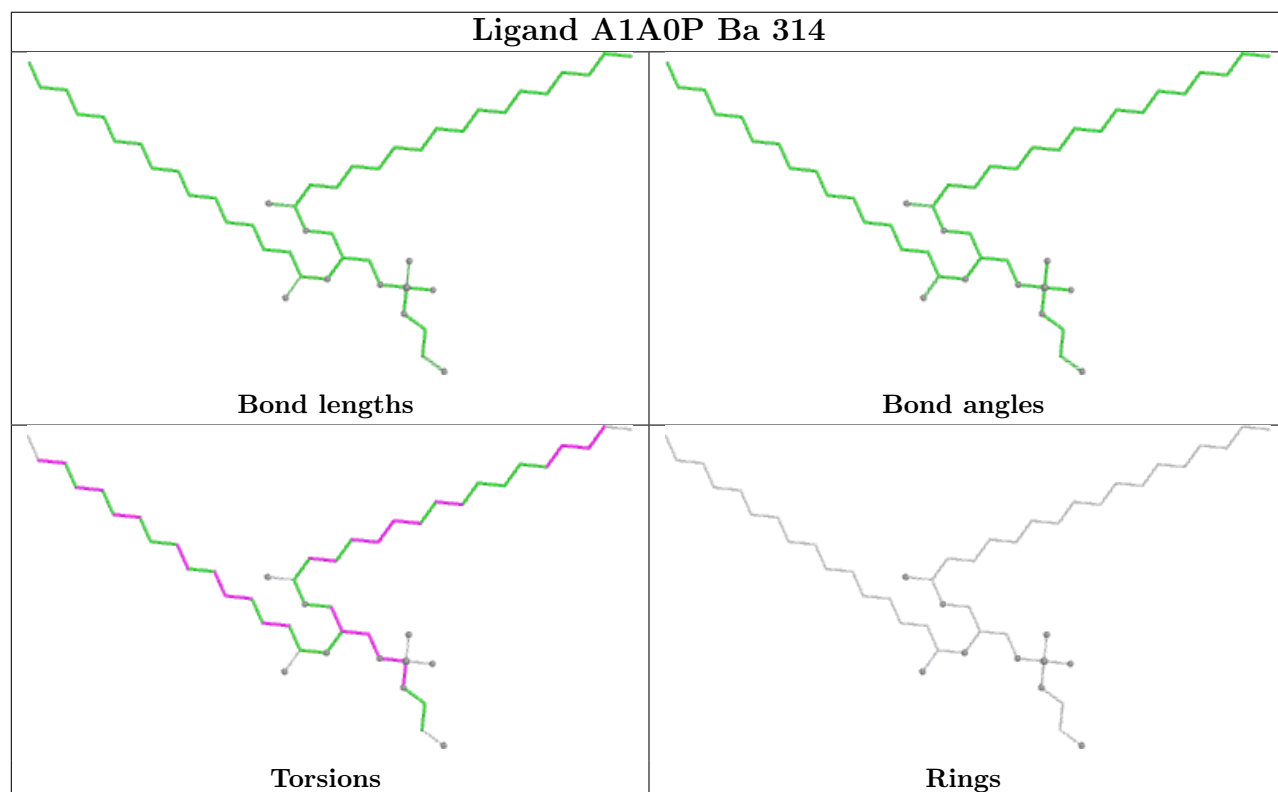
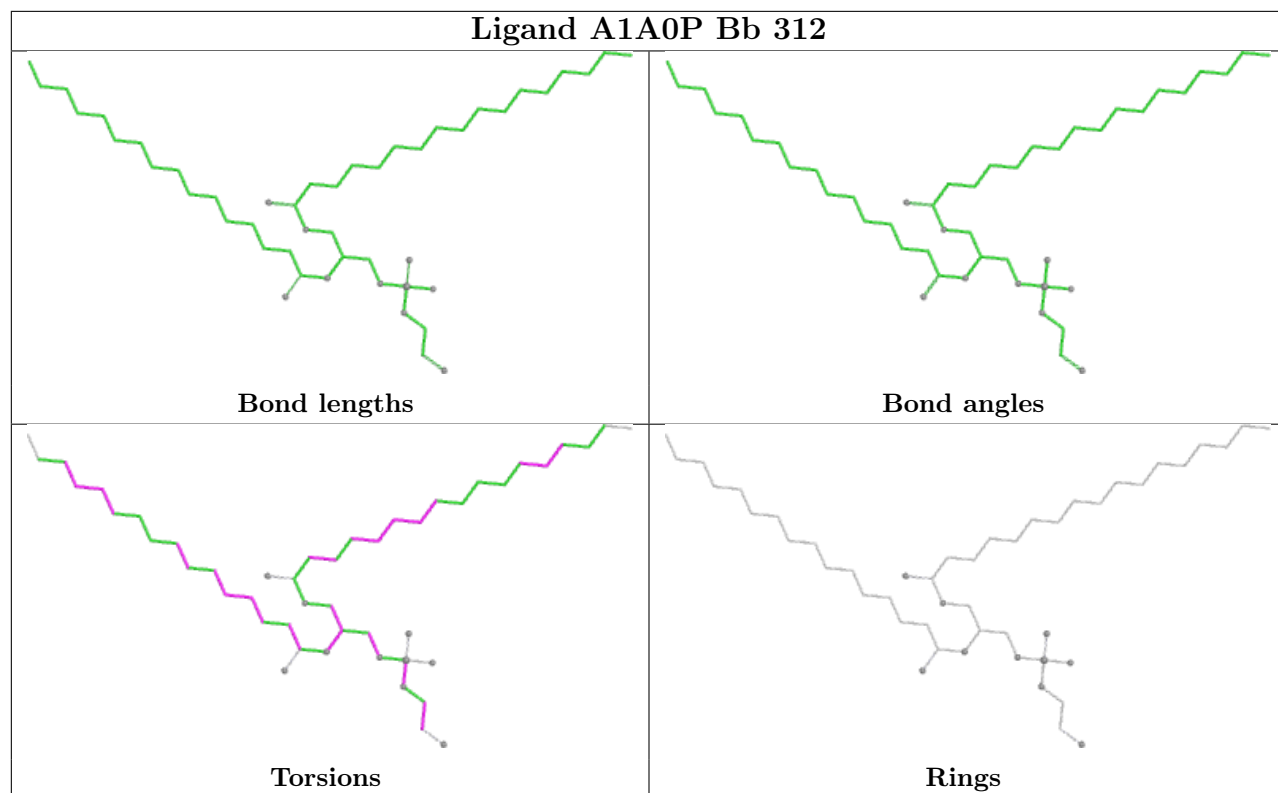


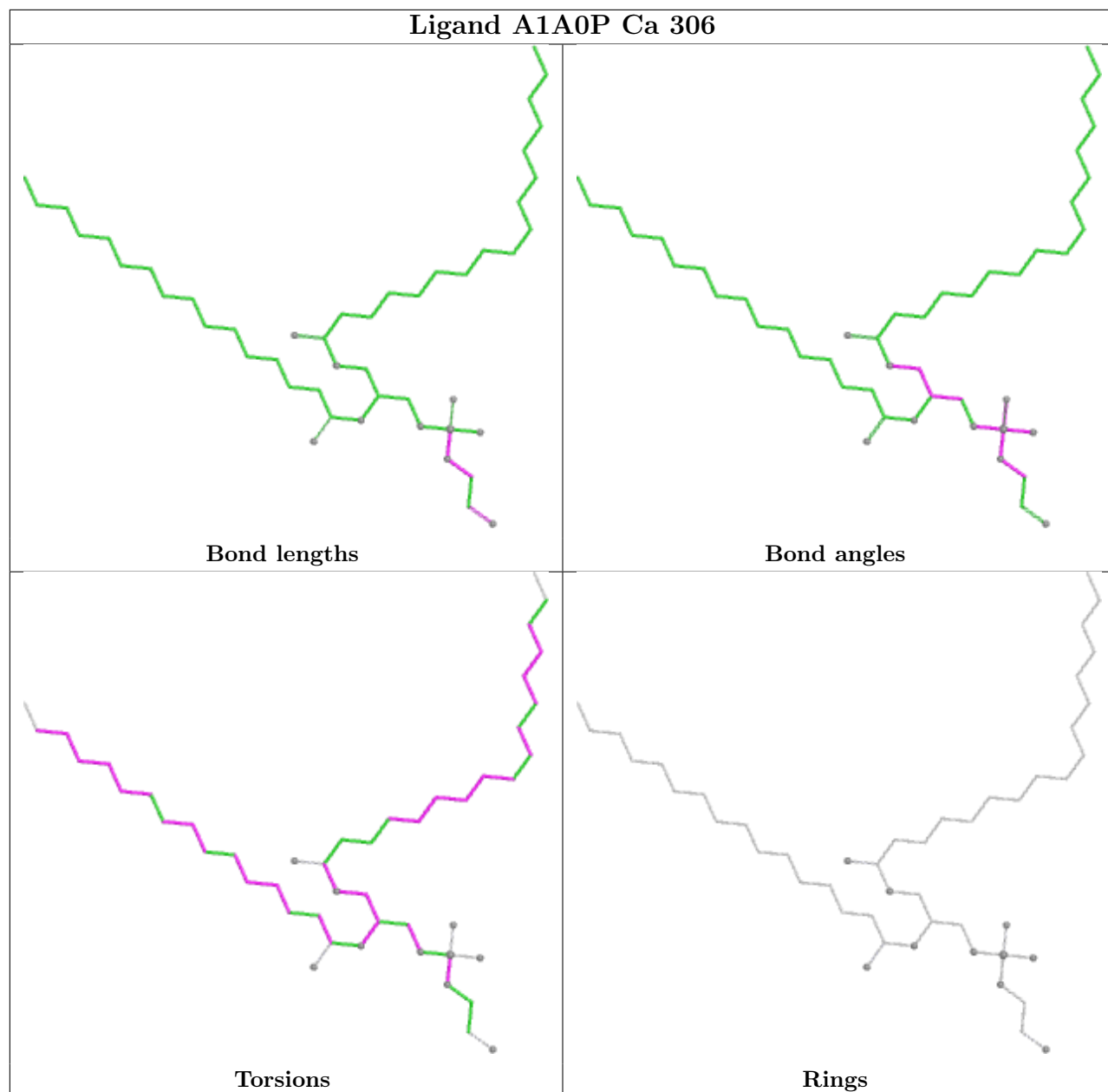


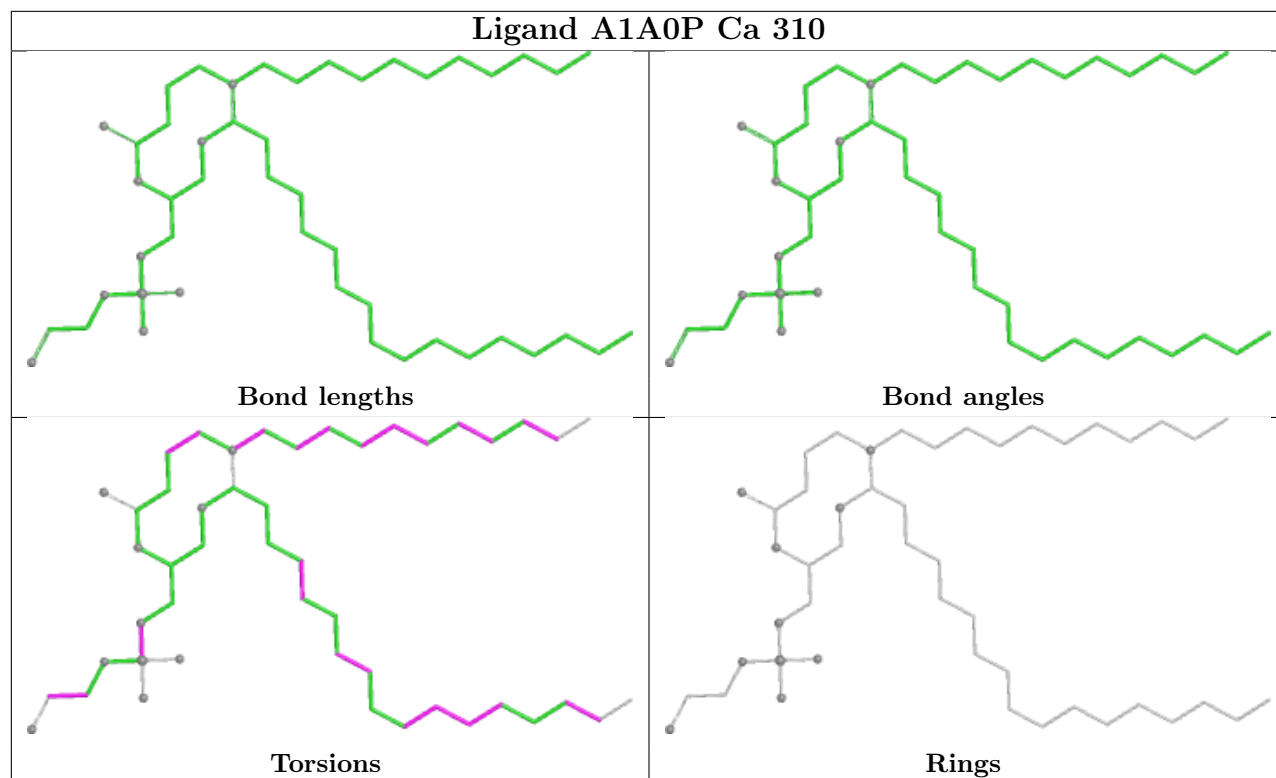


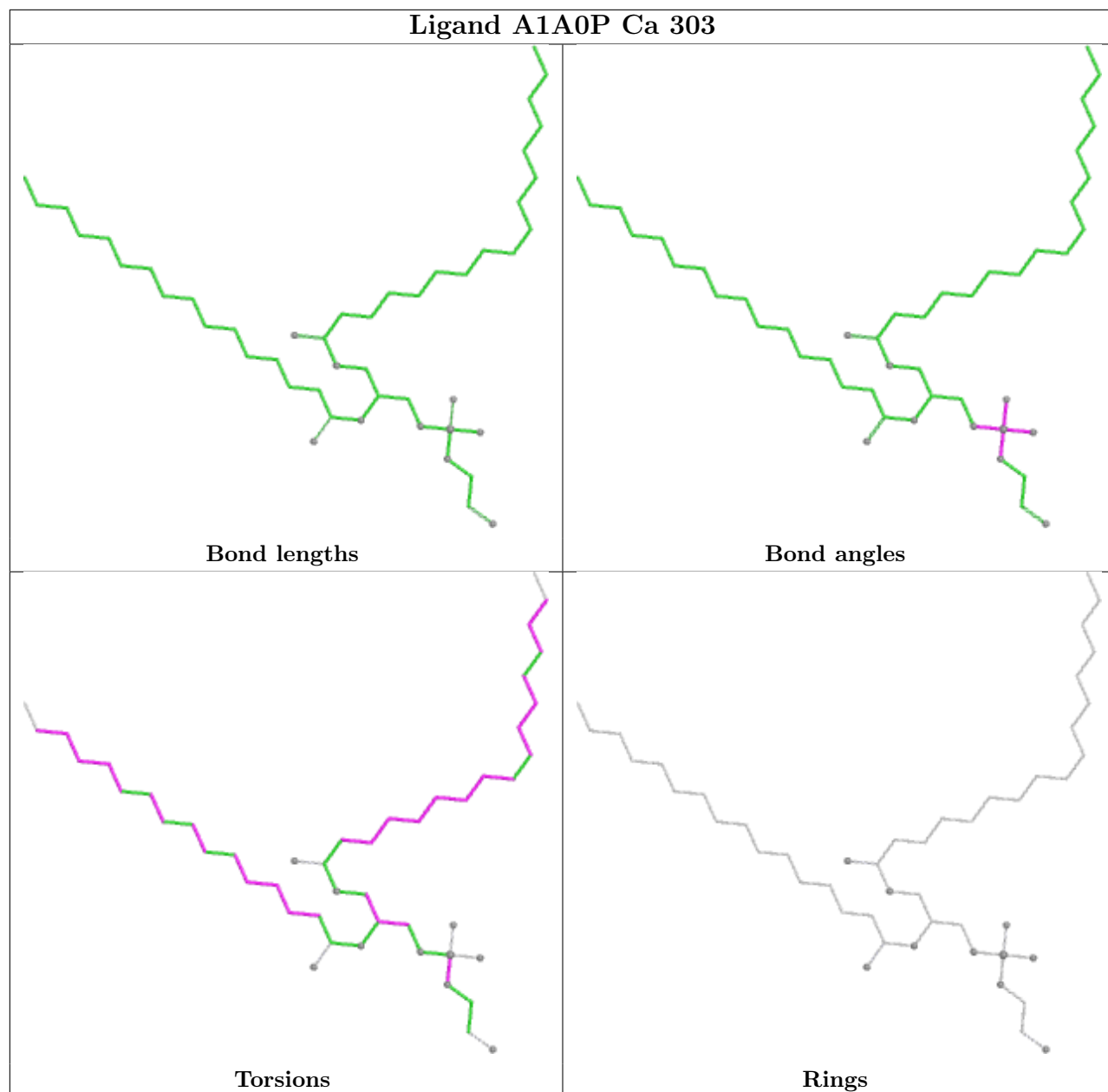


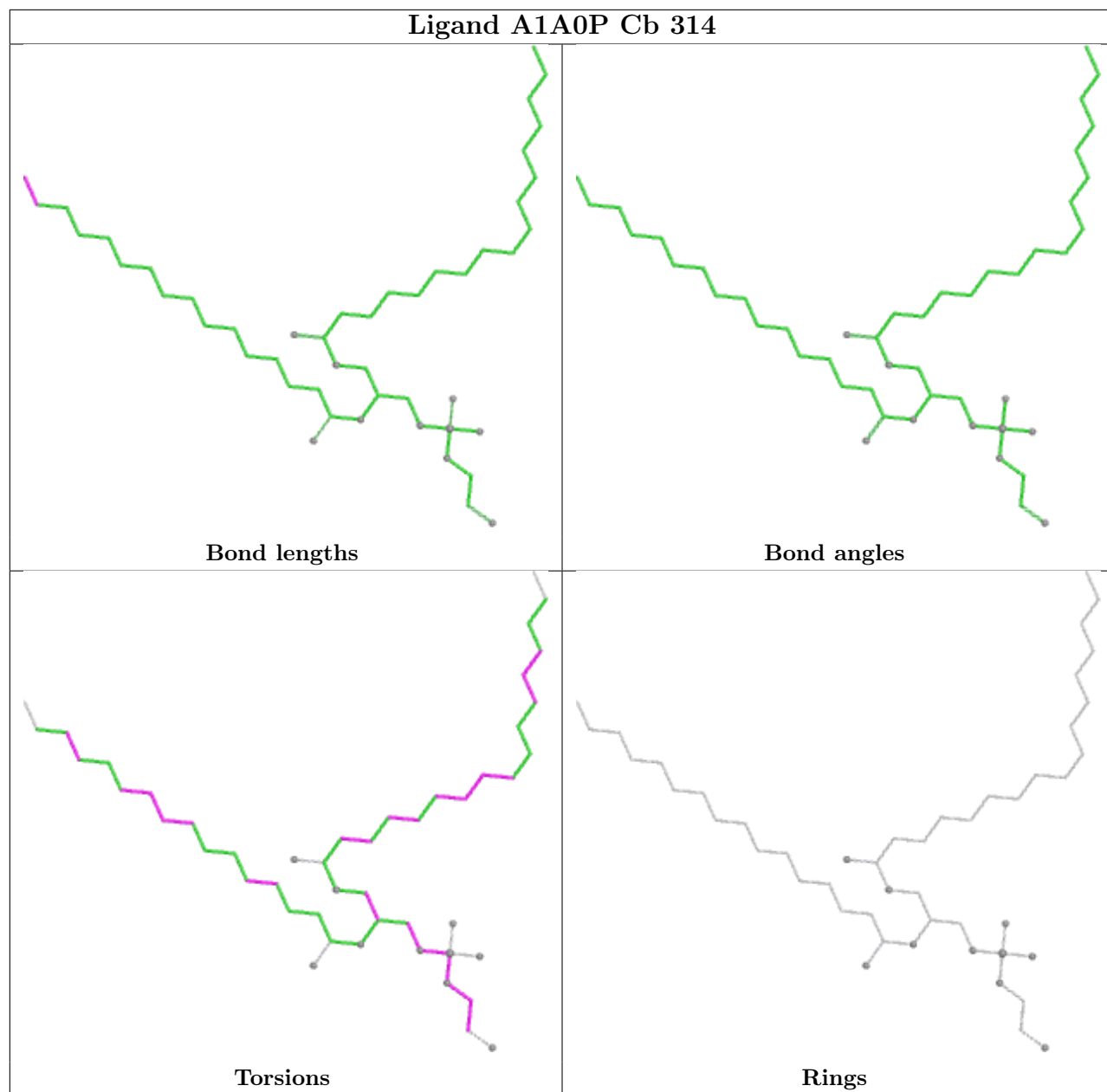


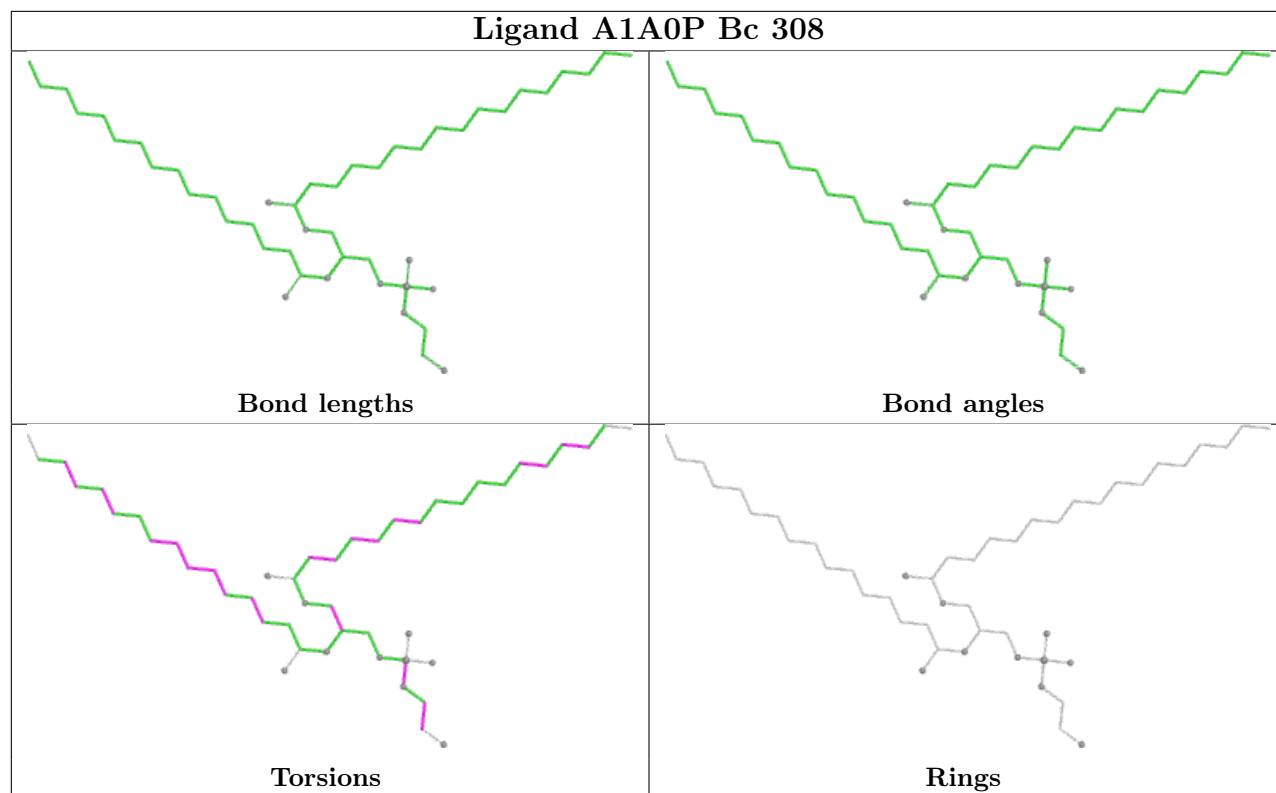


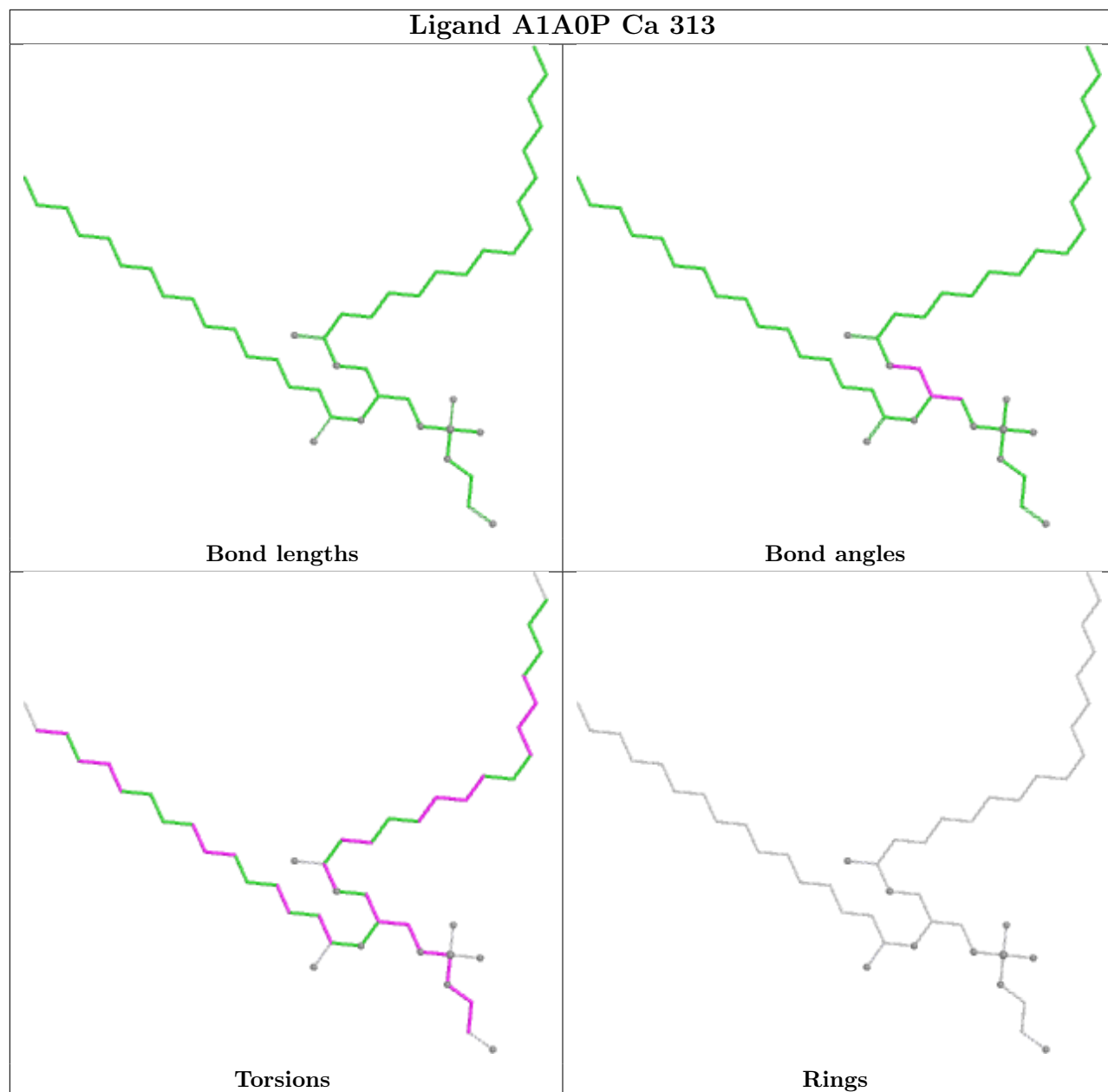


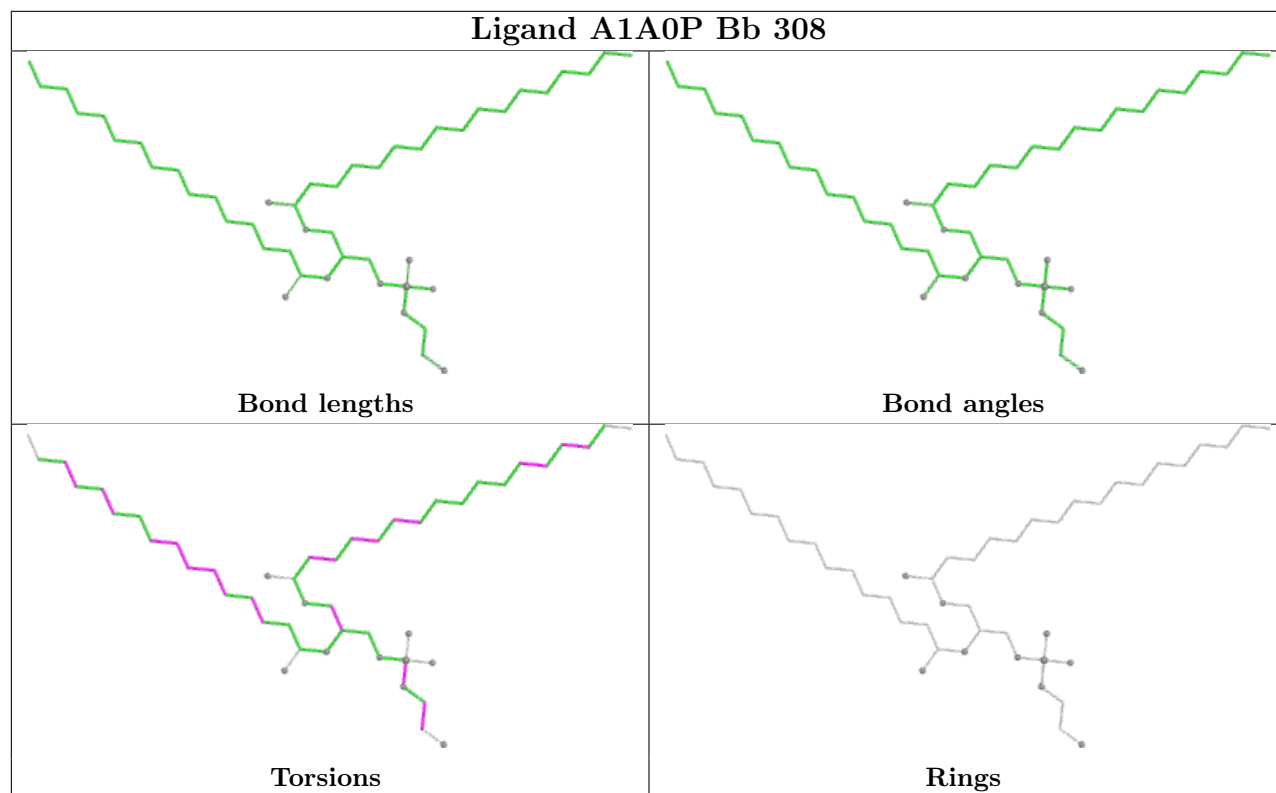


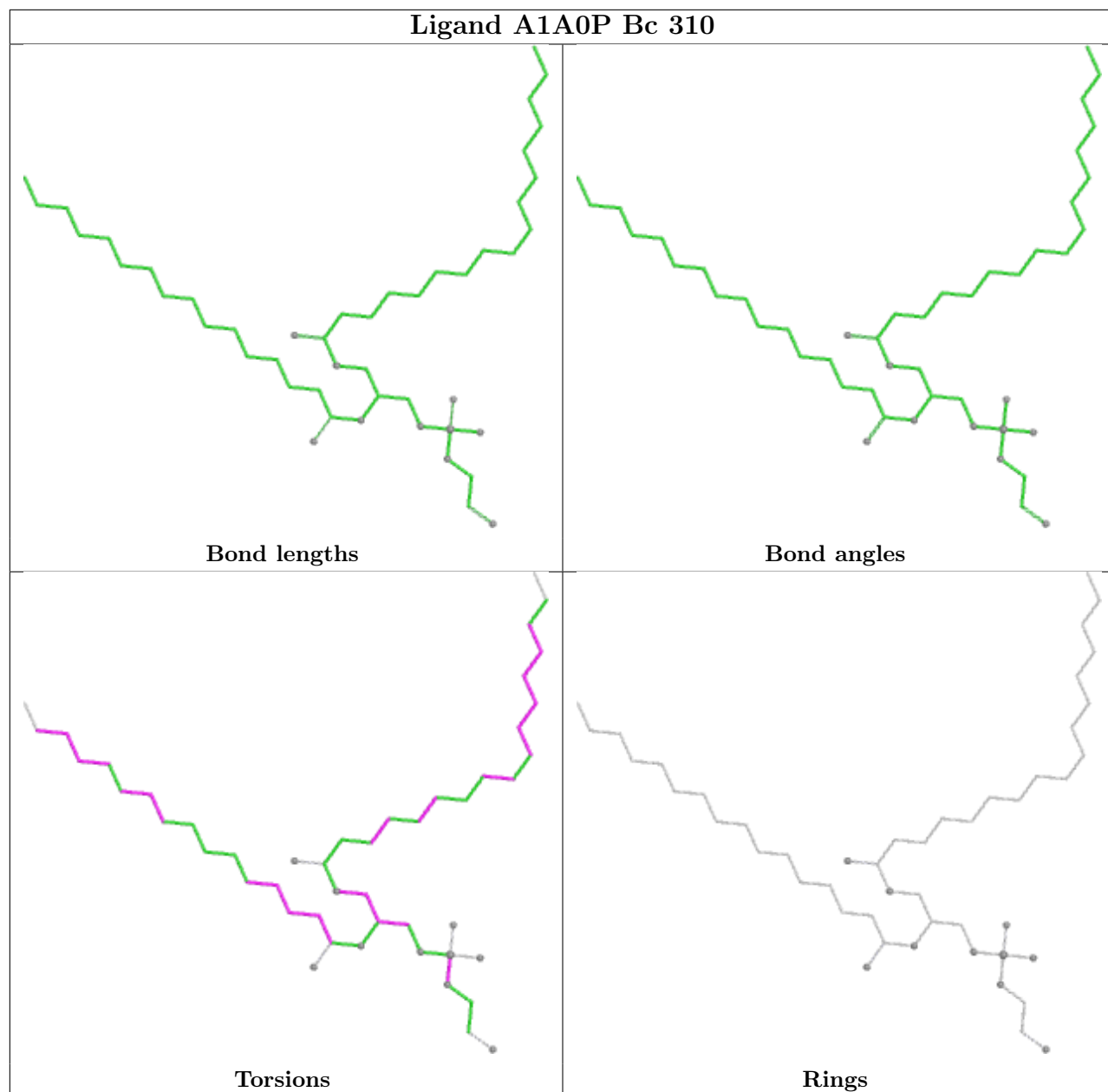


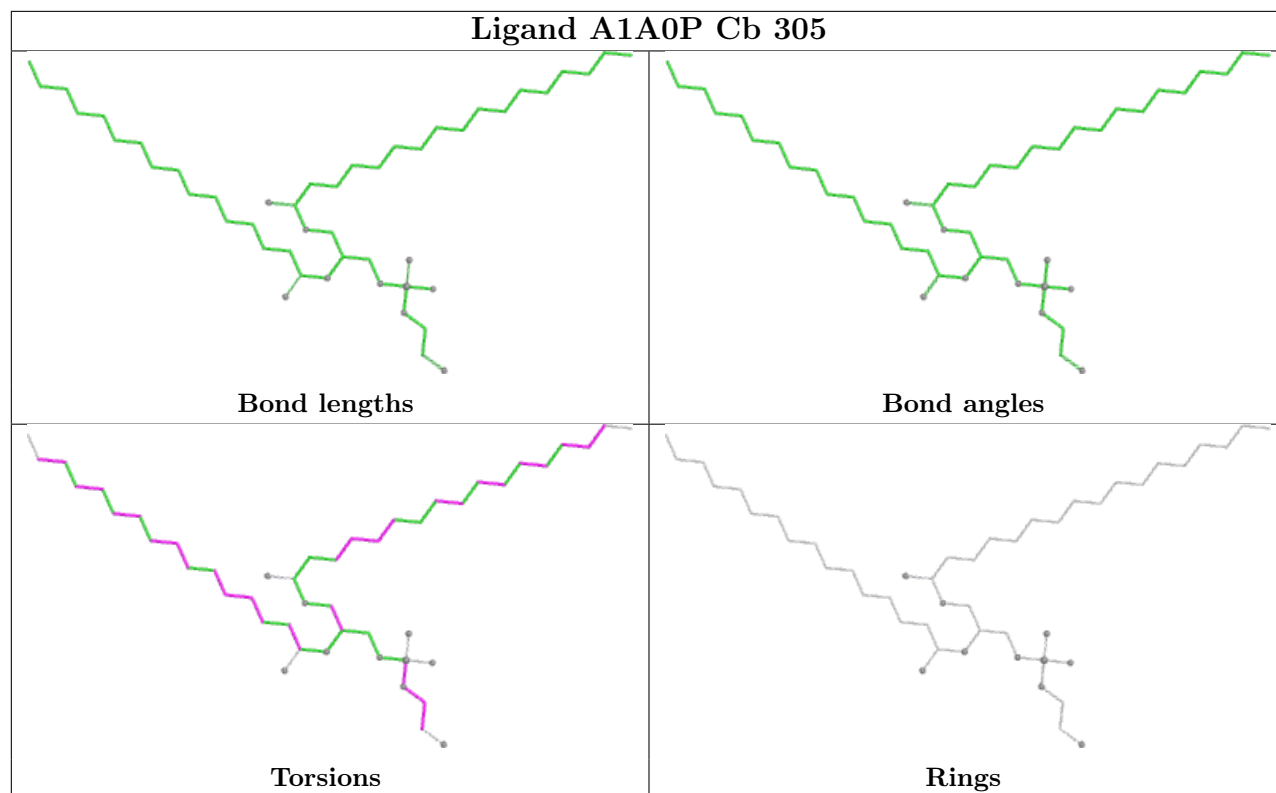


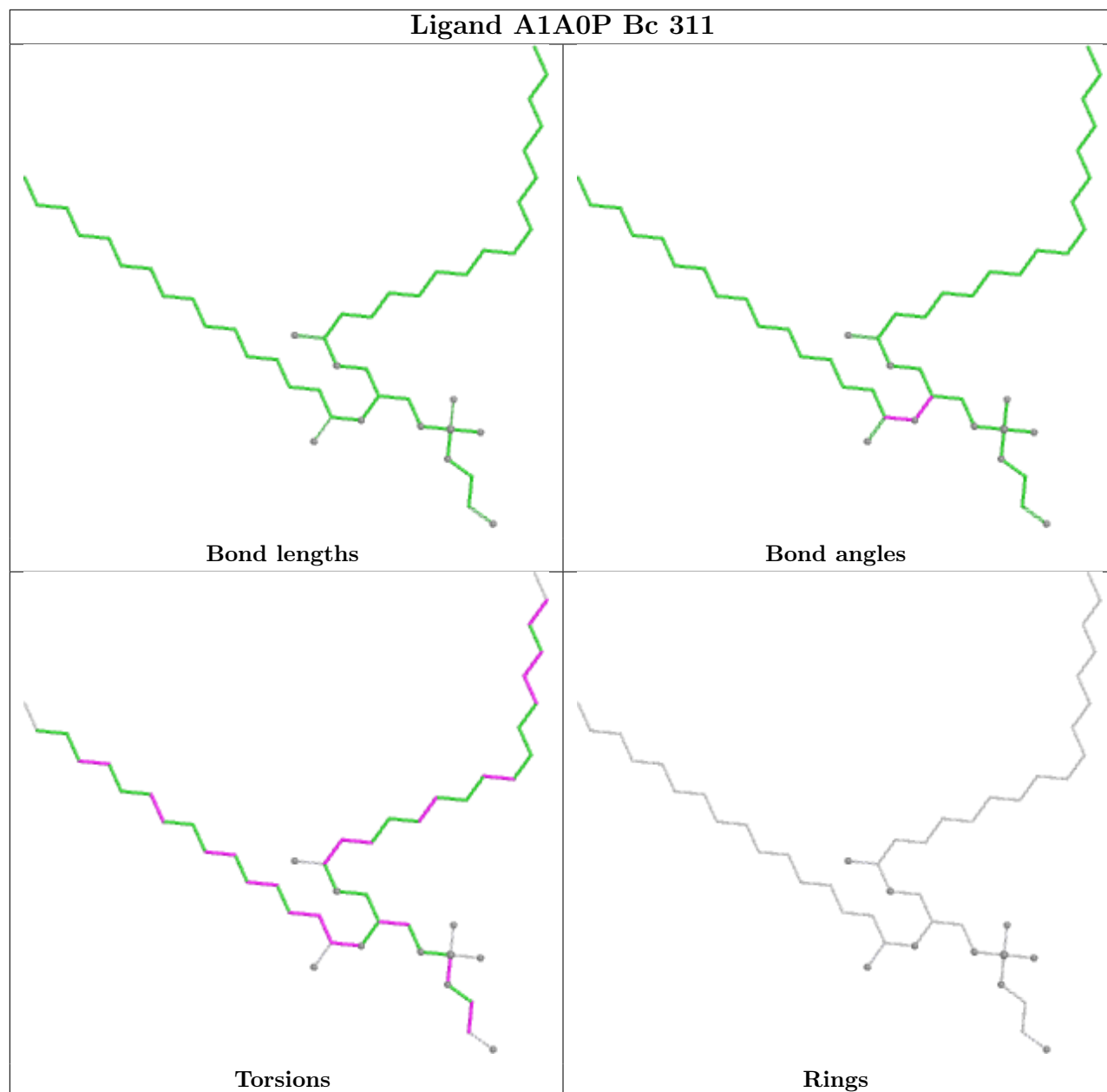


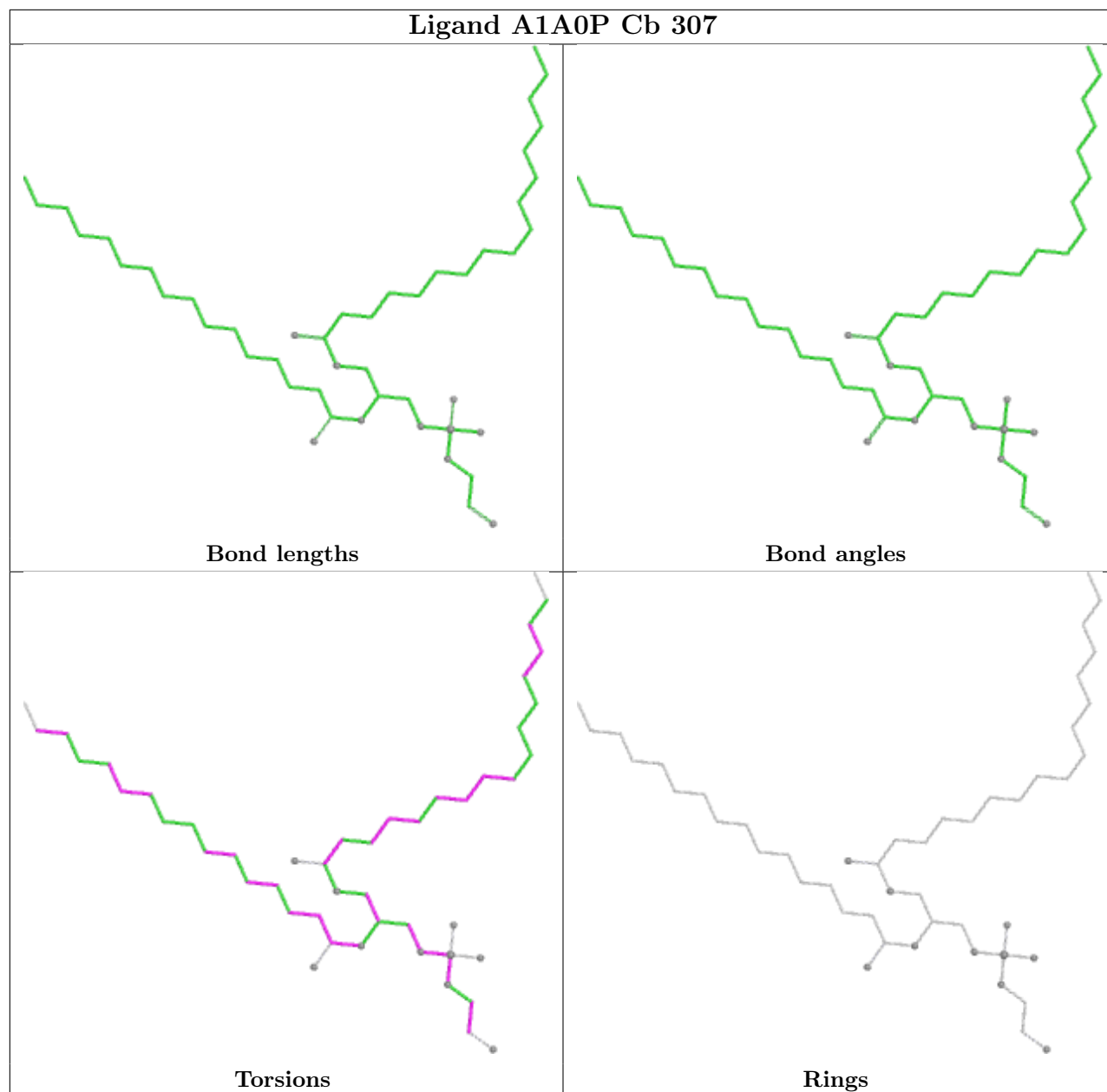


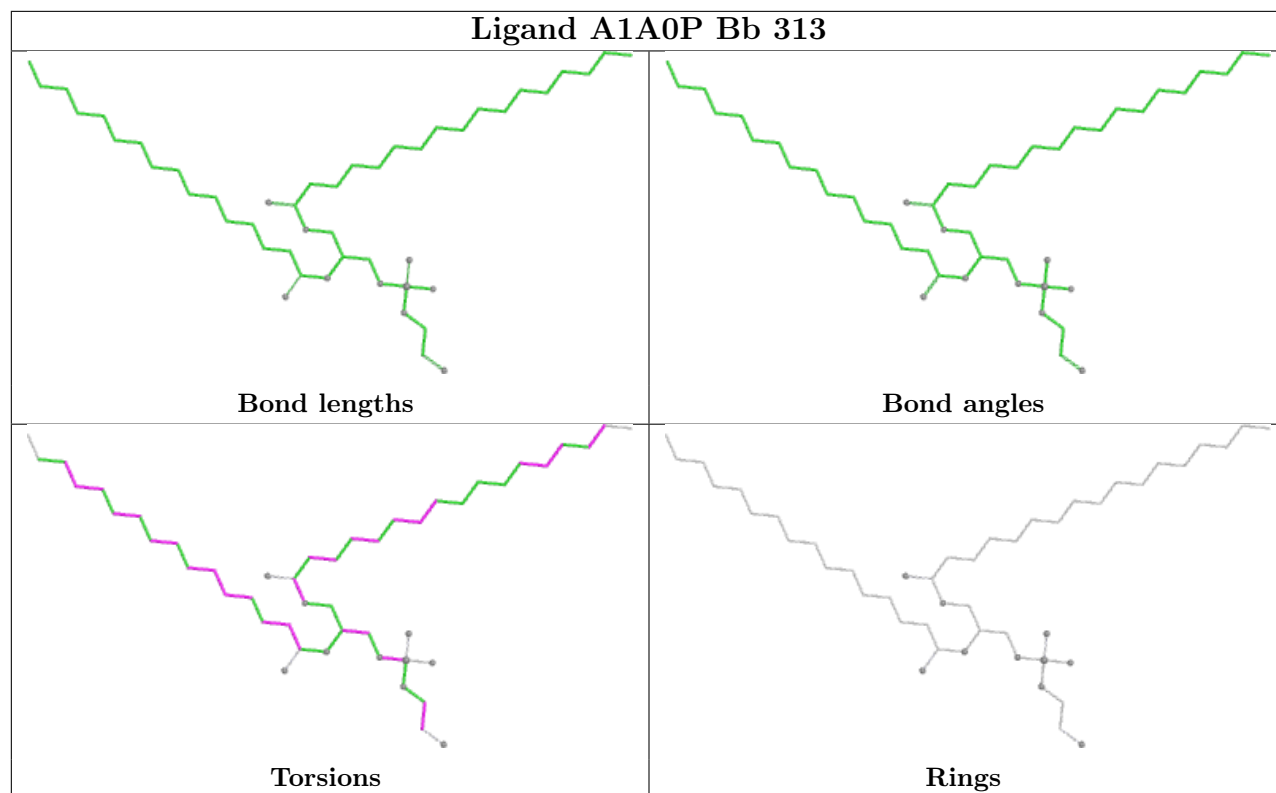


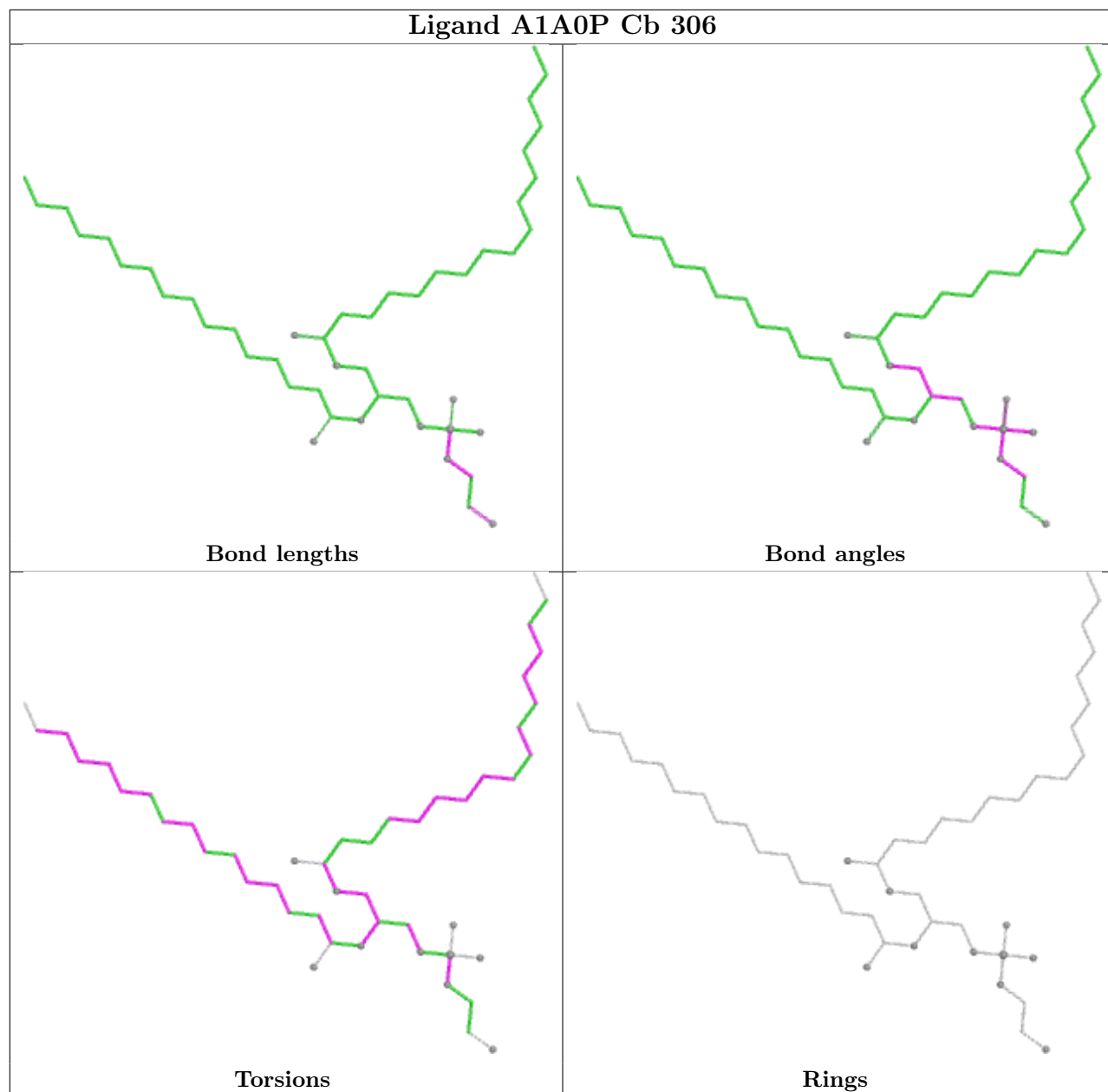


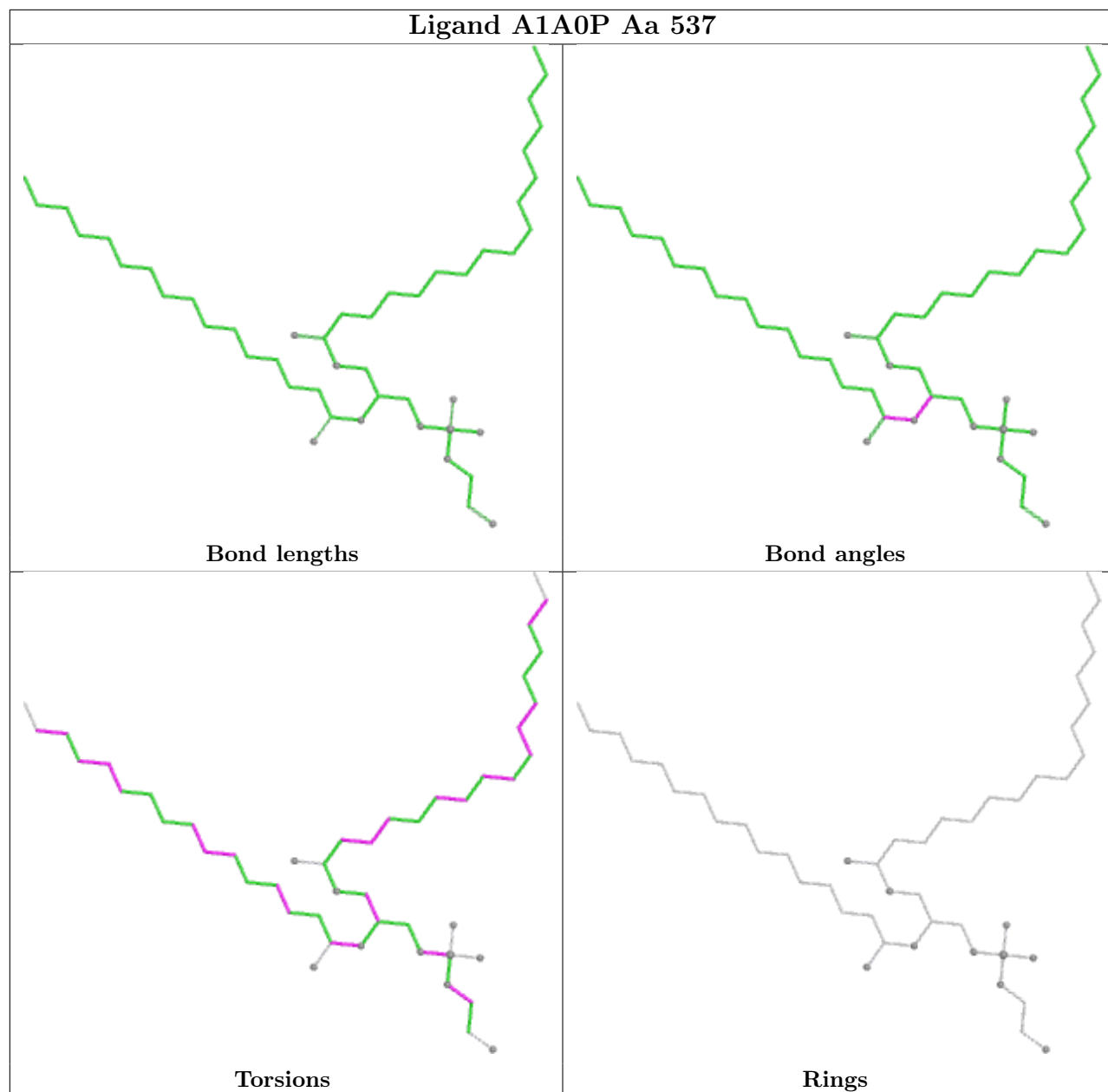


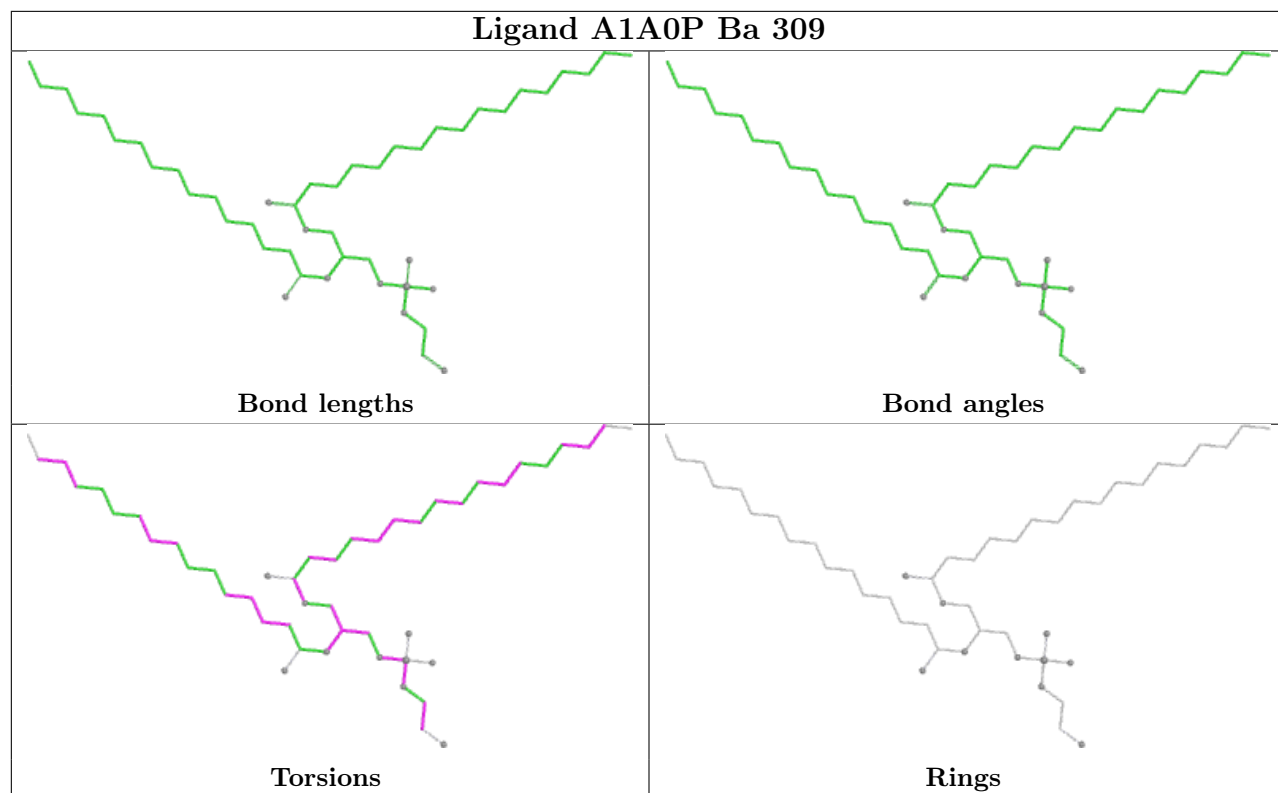


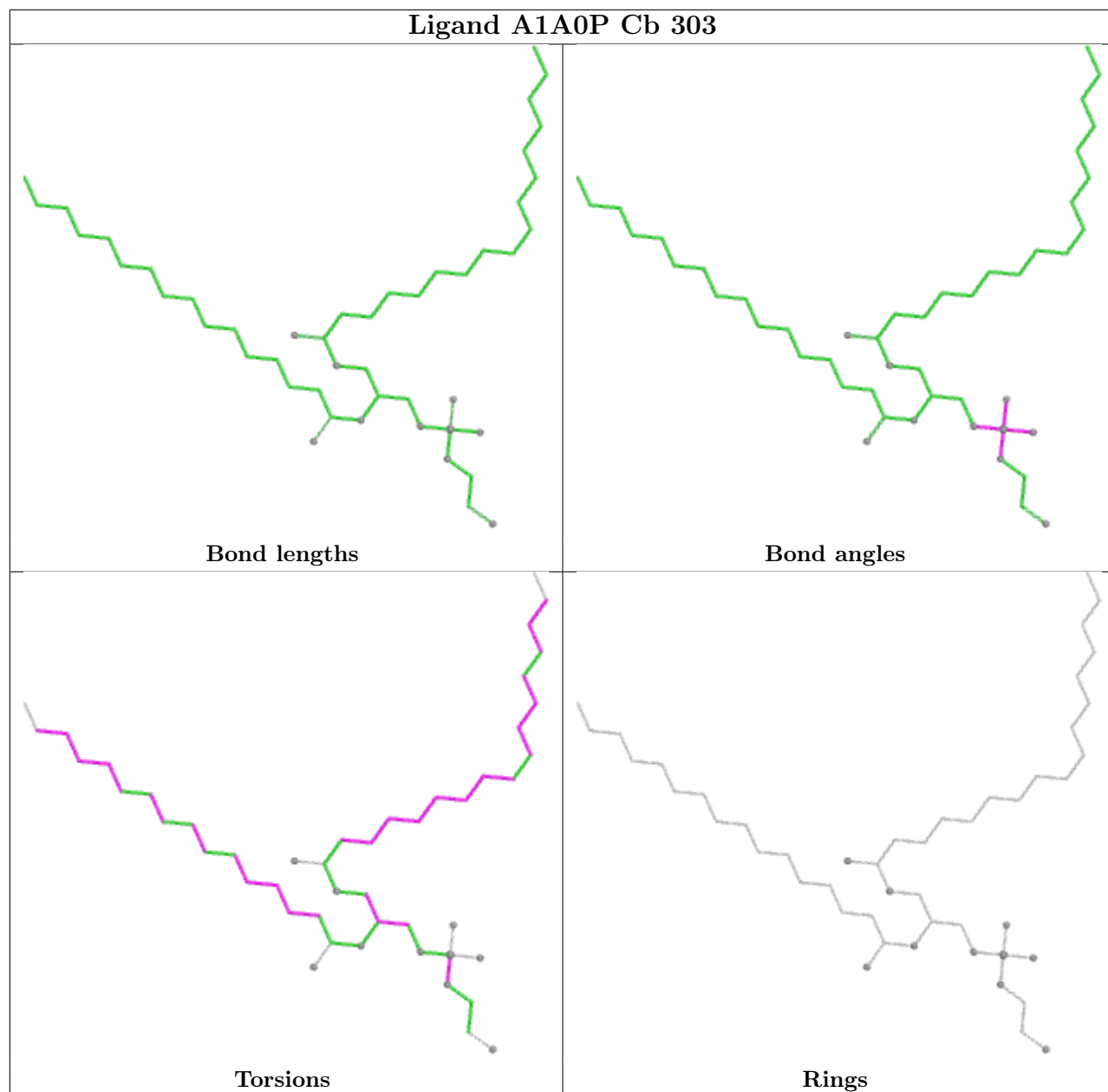


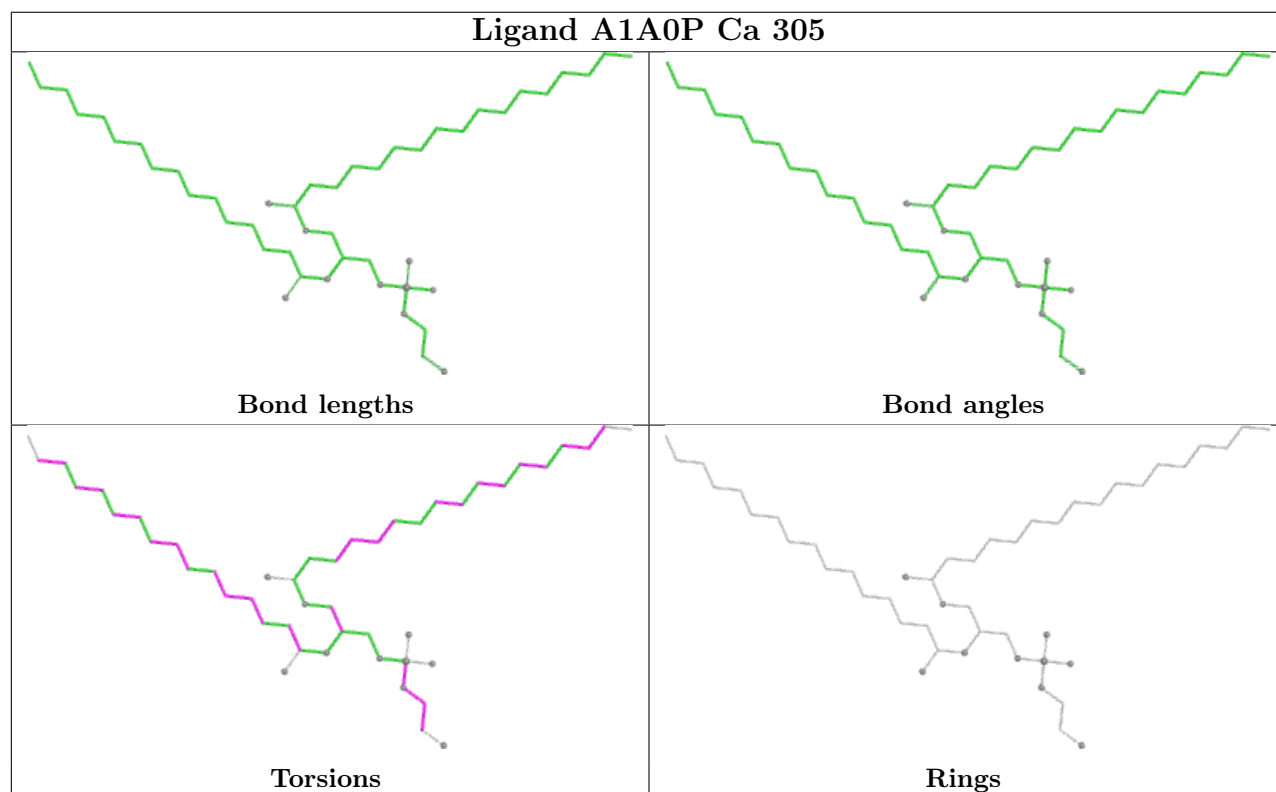
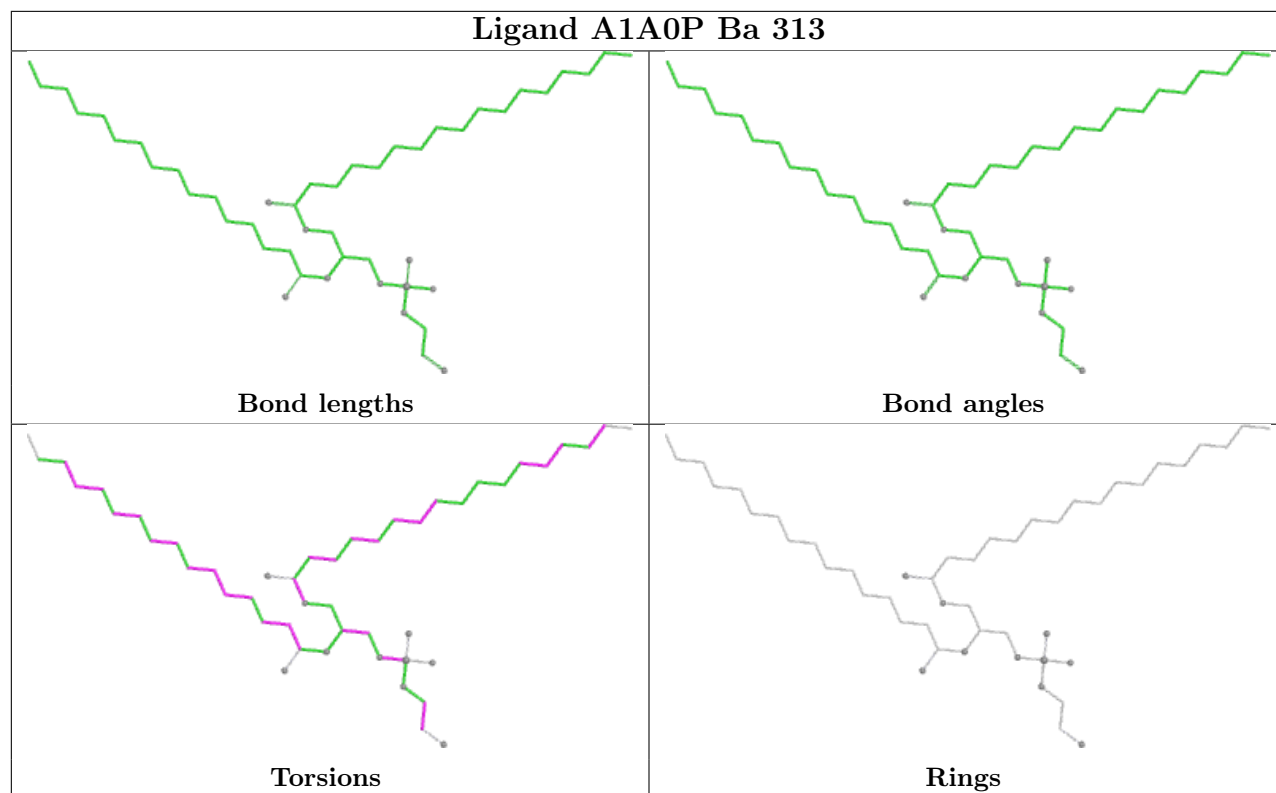


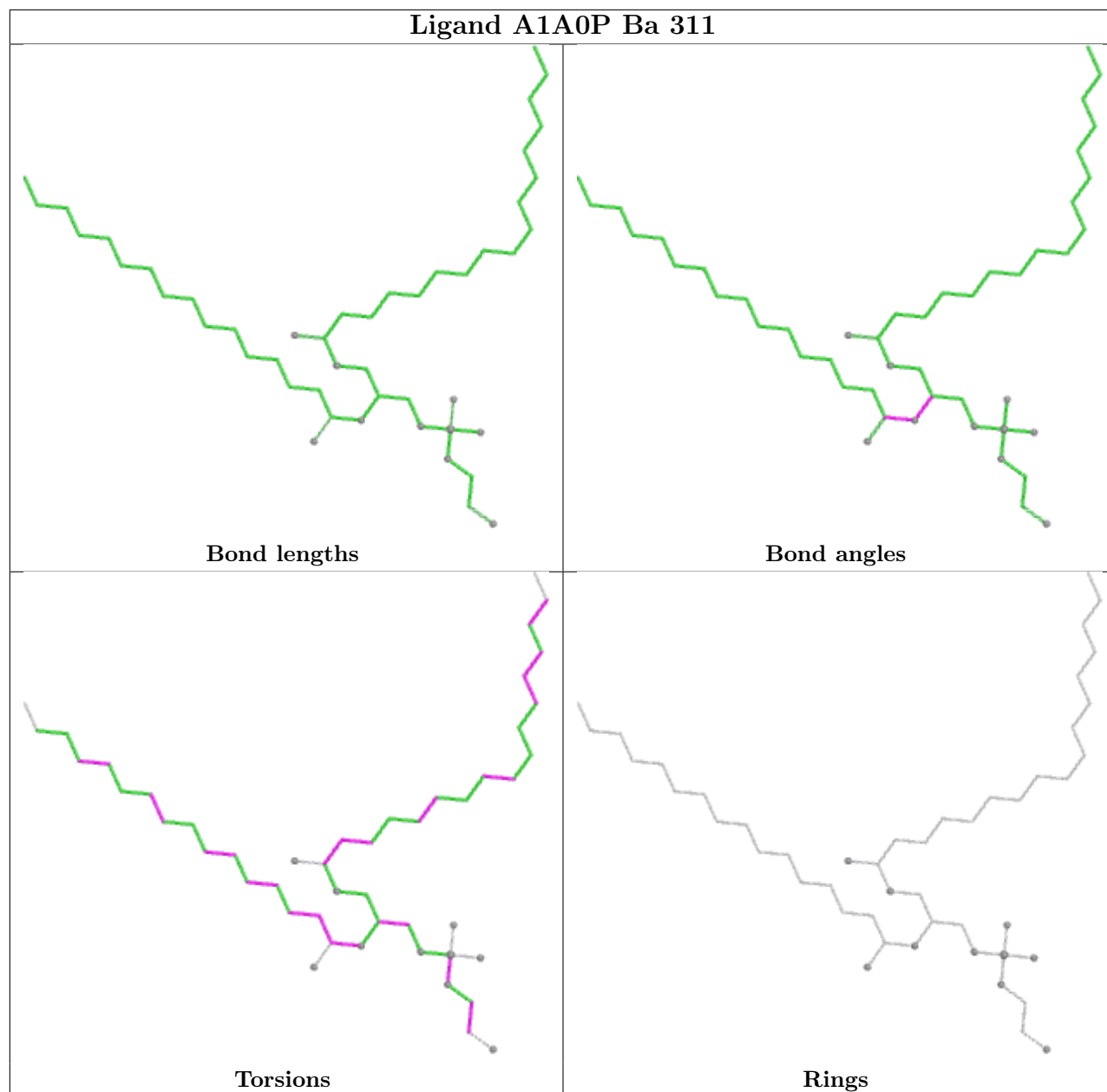


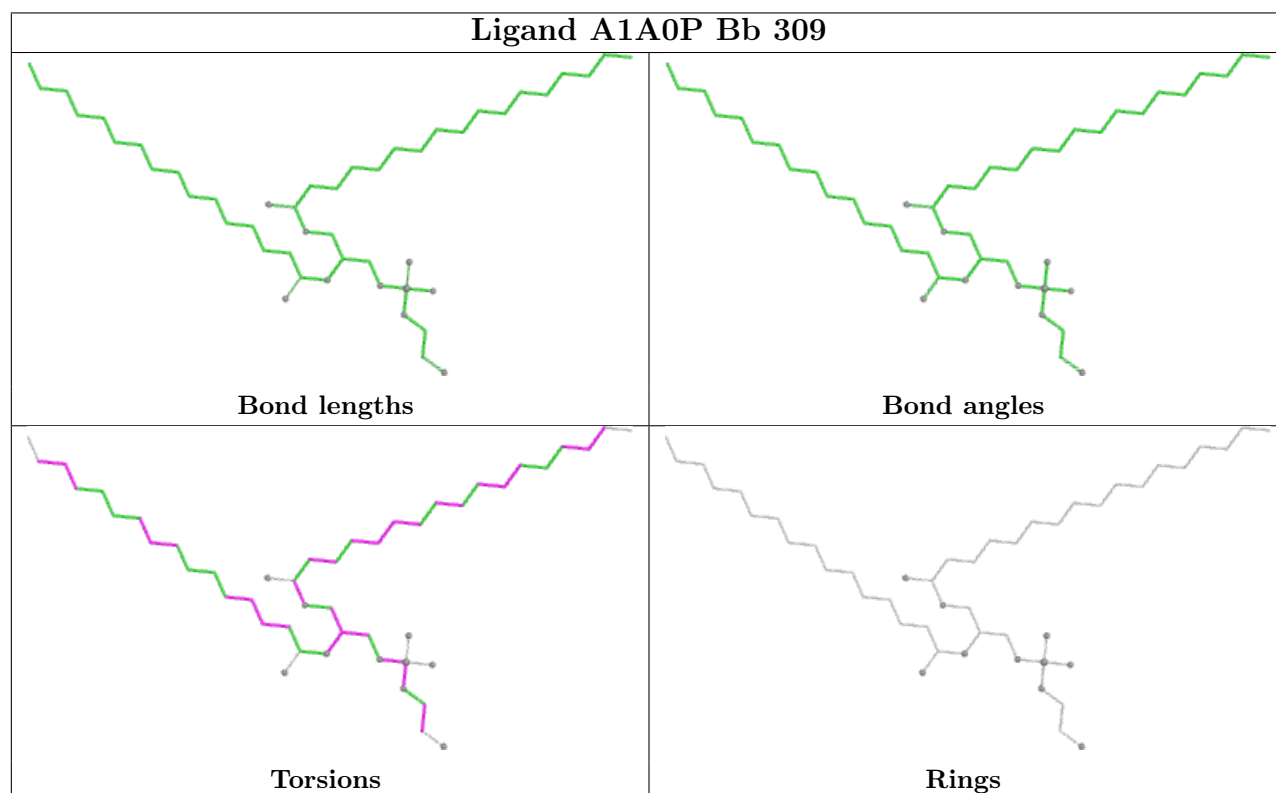
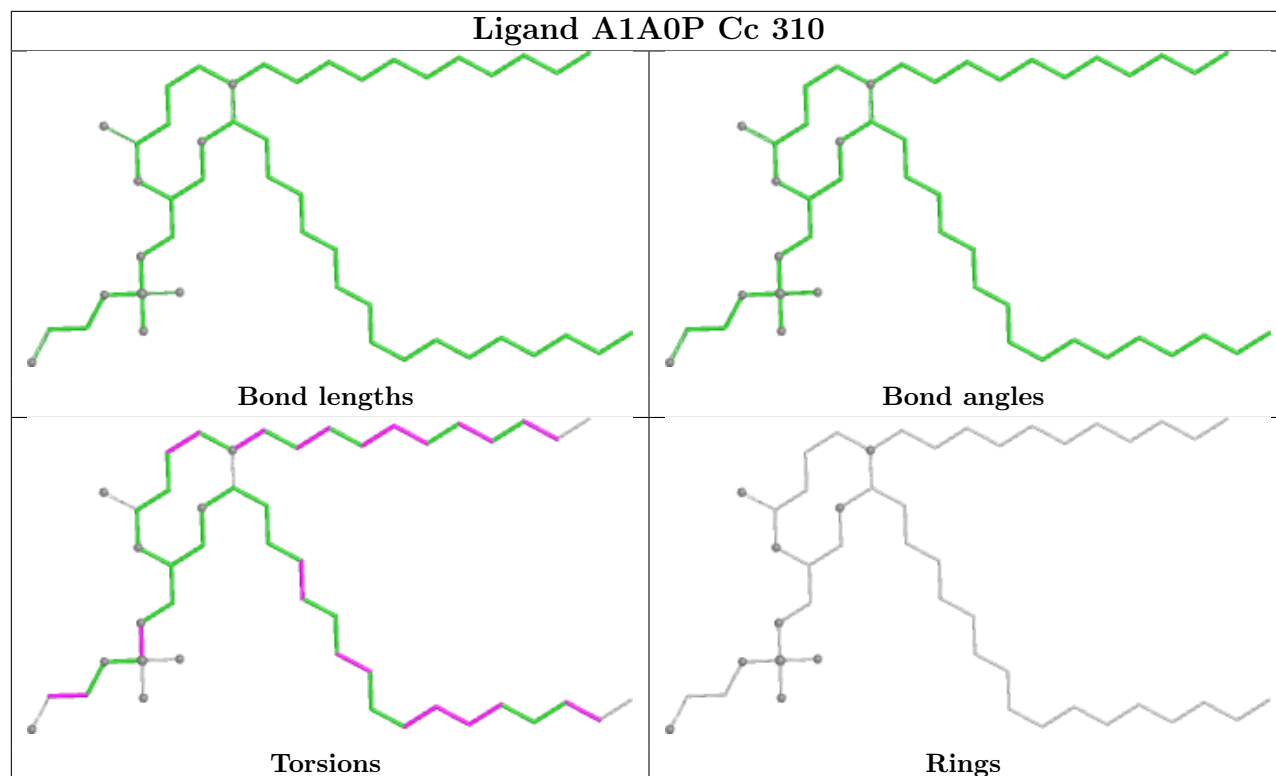


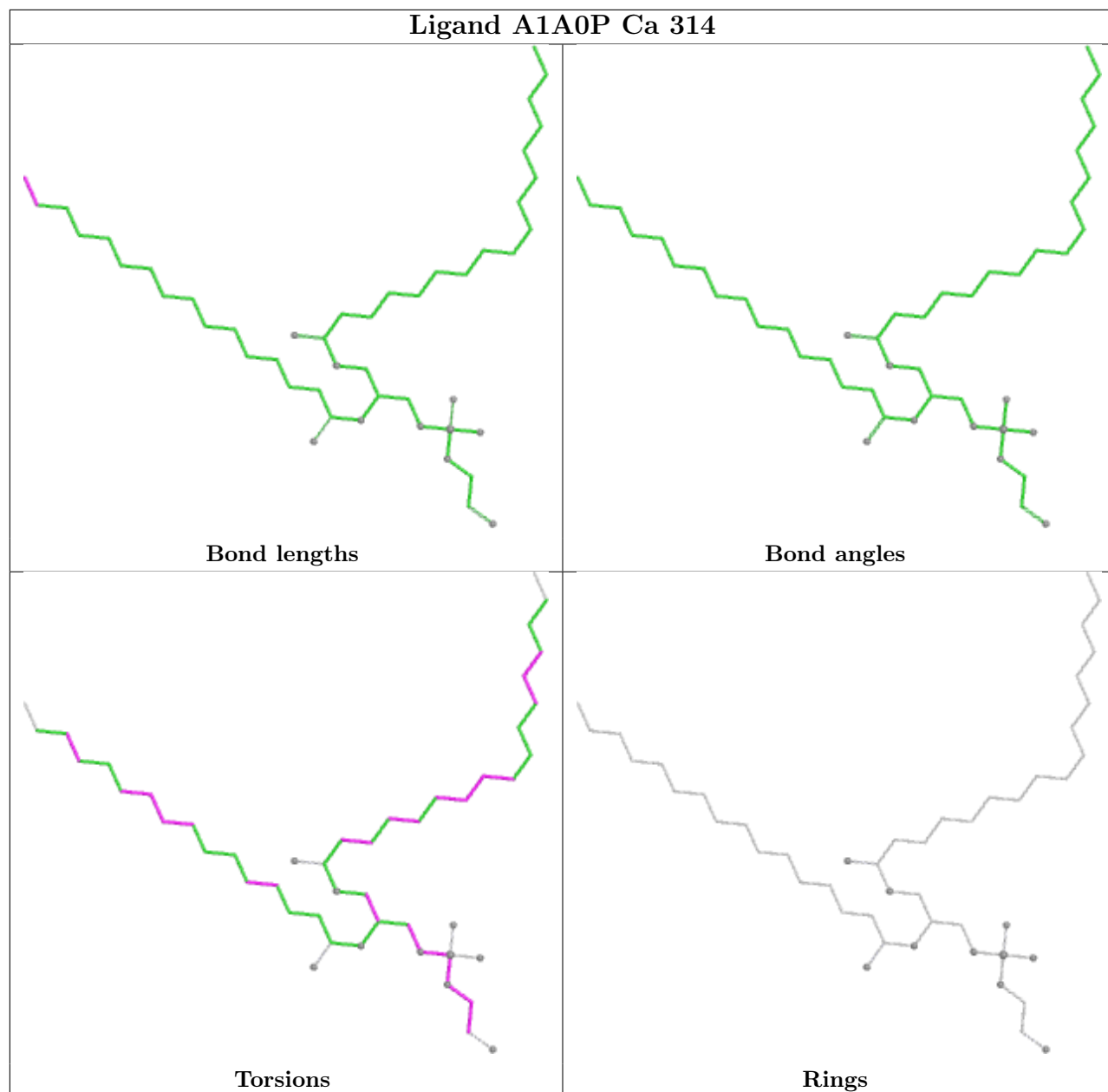


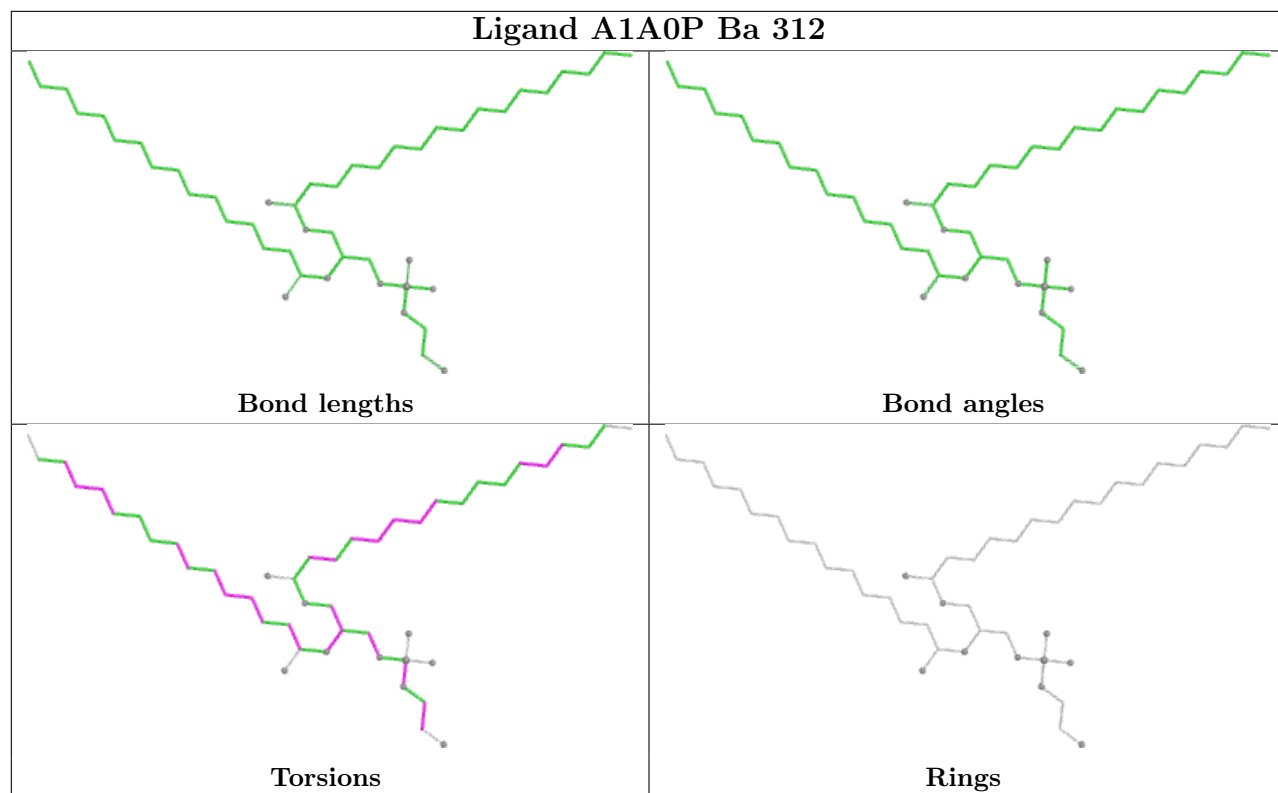


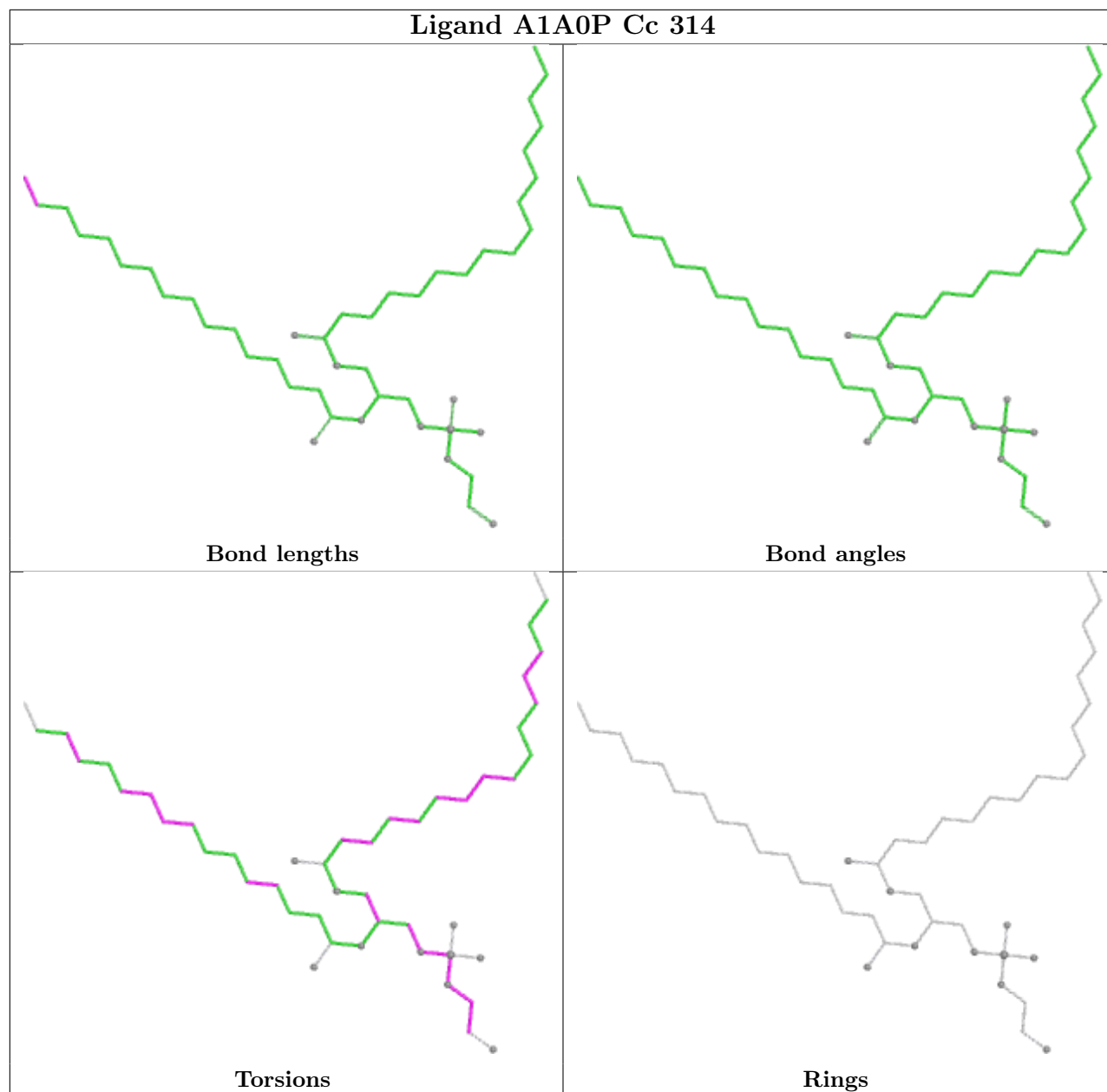


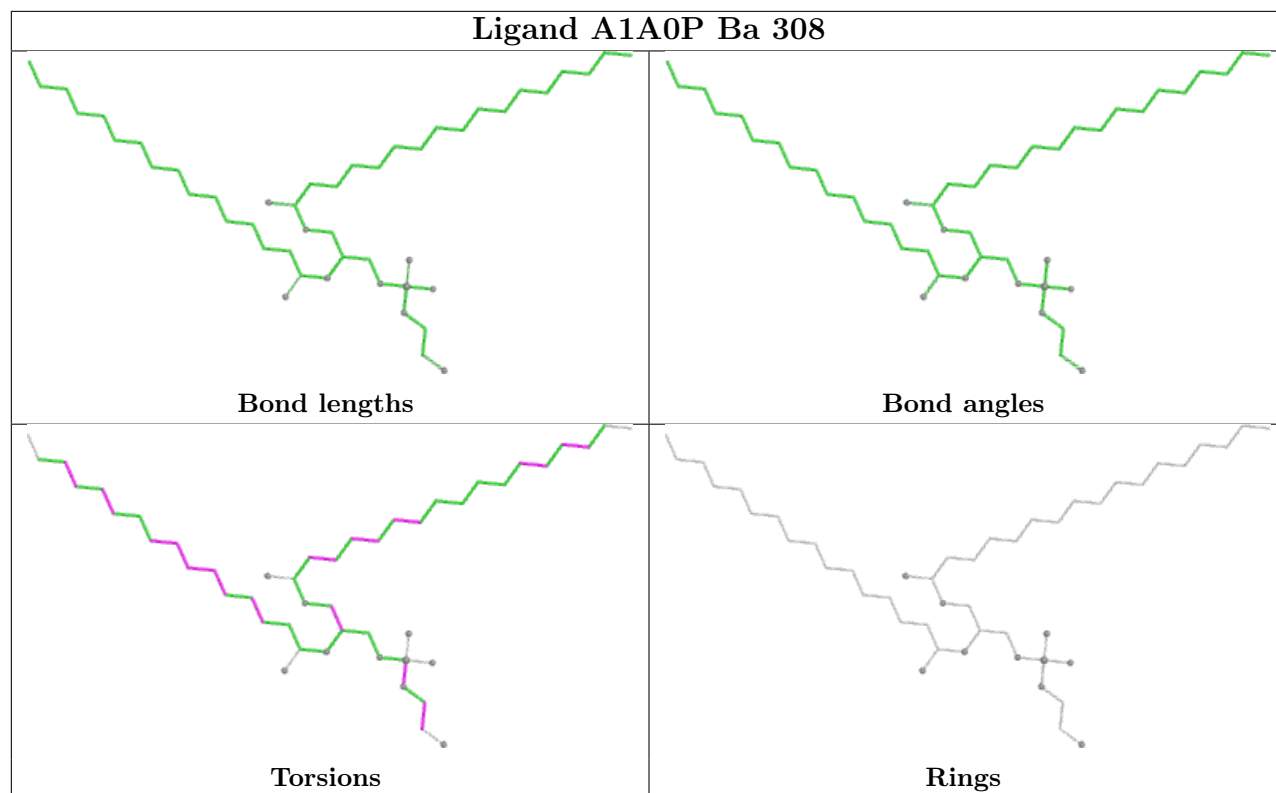


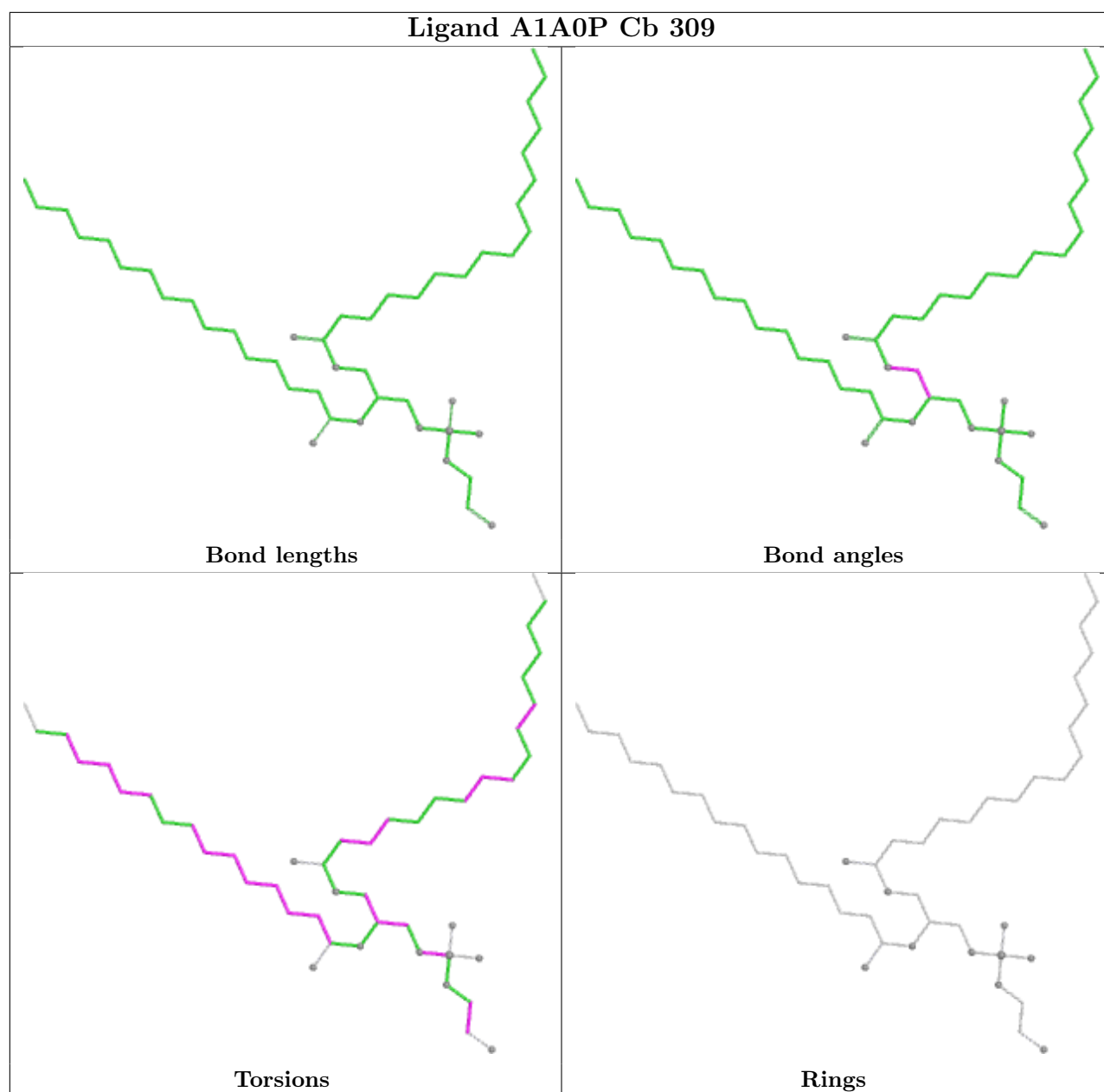












5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

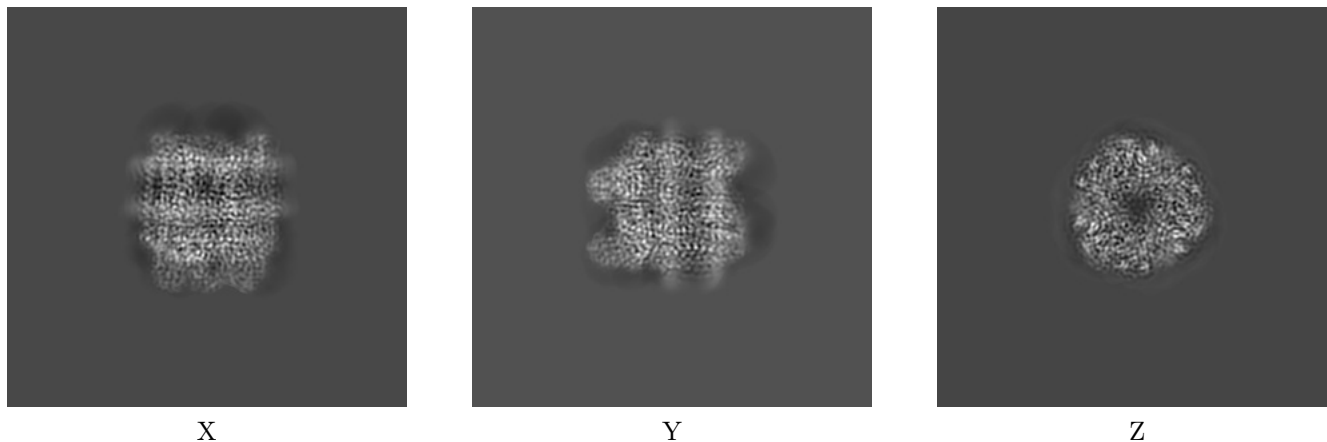
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-45659. These allow visual inspection of the internal detail of the map and identification of artifacts.

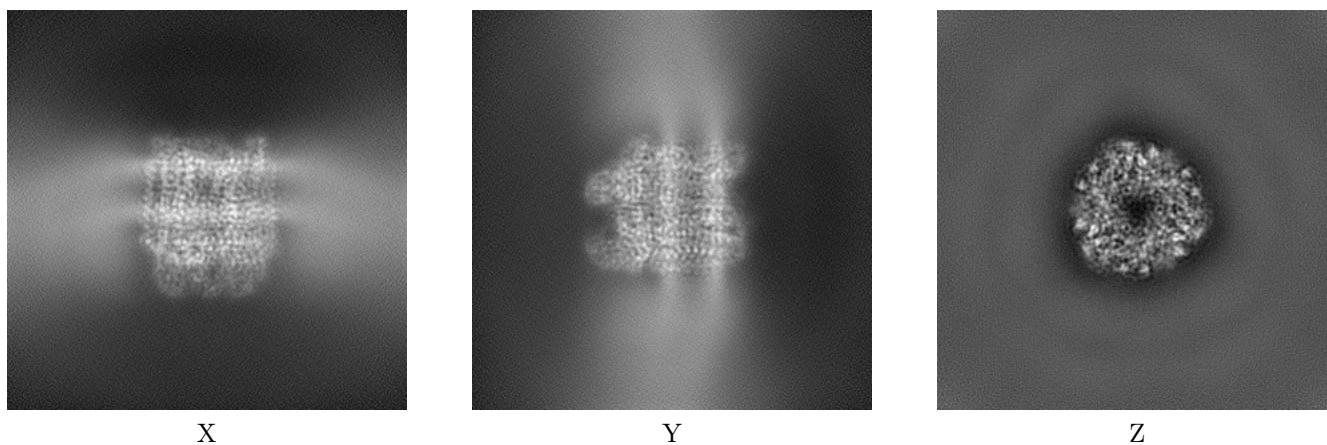
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

6.1.1 Primary map



6.1.2 Raw map



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

6.2 Central slices [i](#)

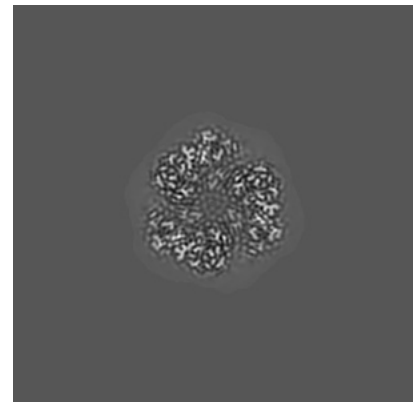
6.2.1 Primary map



X Index: 160

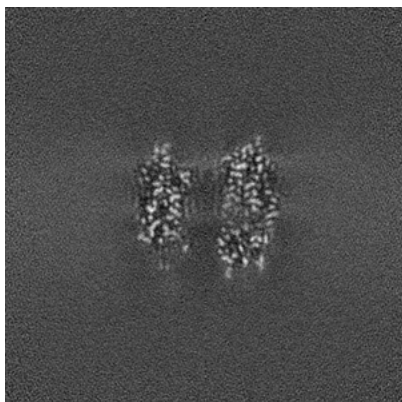


Y Index: 160

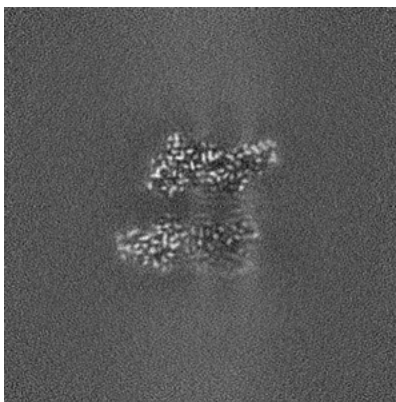


Z Index: 160

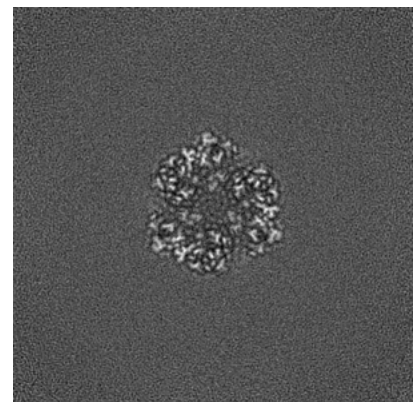
6.2.2 Raw map



X Index: 160



Y Index: 160

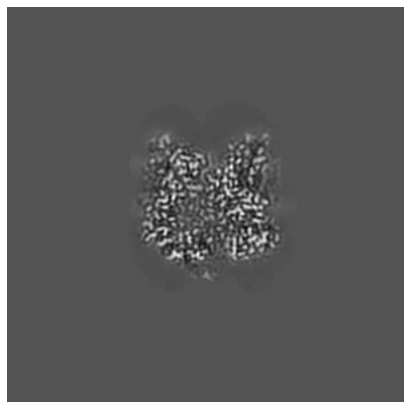


Z Index: 160

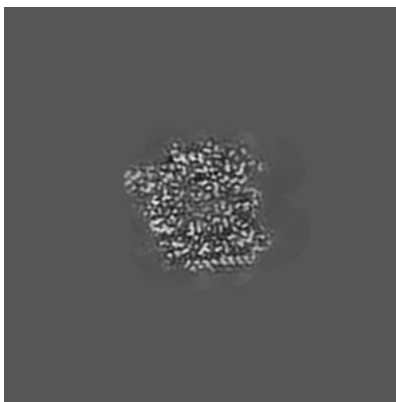
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

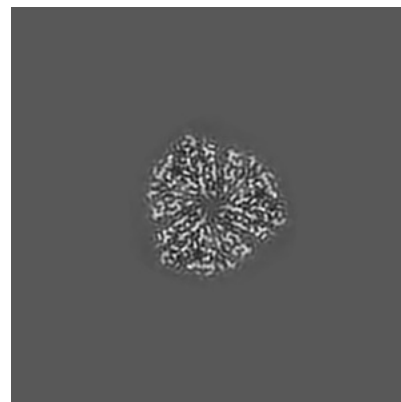
6.3.1 Primary map



X Index: 141

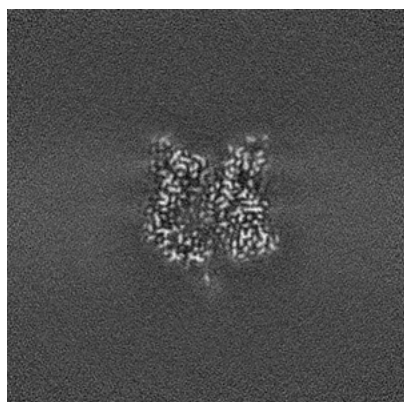


Y Index: 181

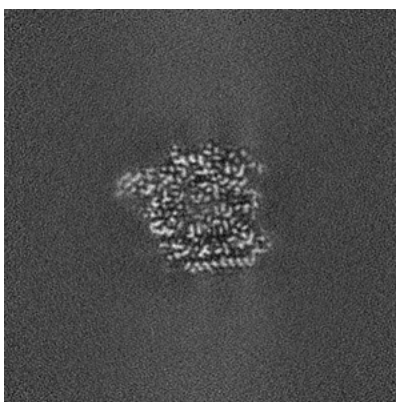


Z Index: 134

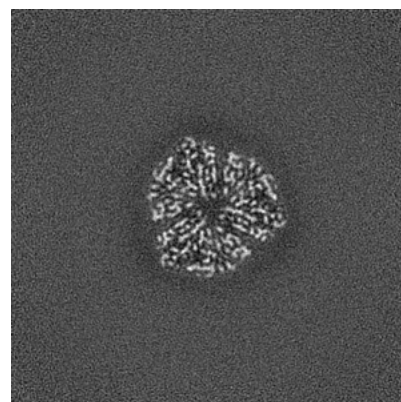
6.3.2 Raw map



X Index: 140



Y Index: 181

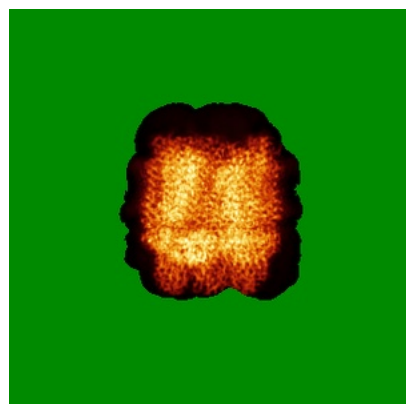


Z Index: 134

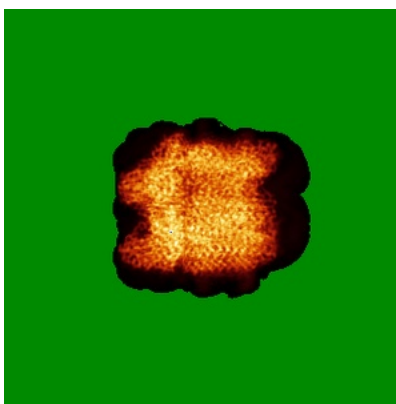
The images above show the largest variance slices of the map in three orthogonal directions.

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

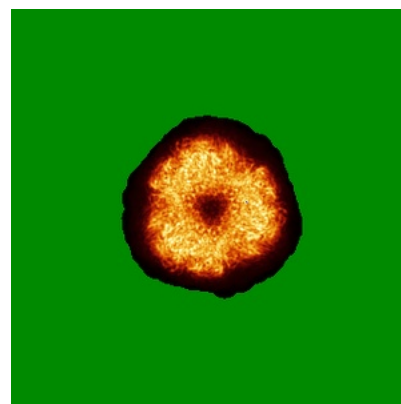
6.4.1 Primary map



X

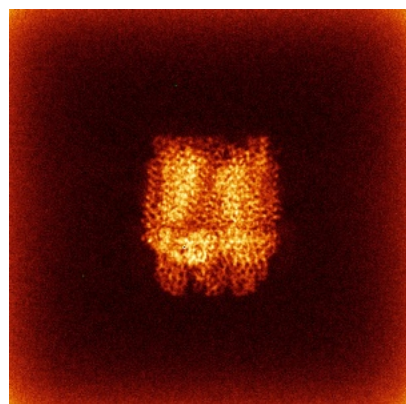


Y

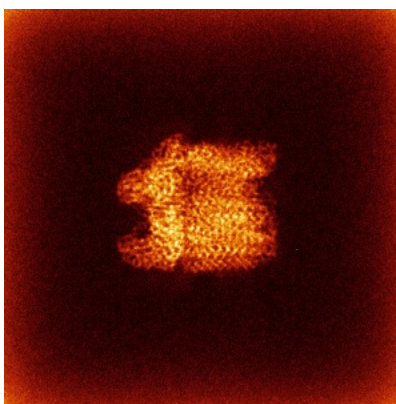


Z

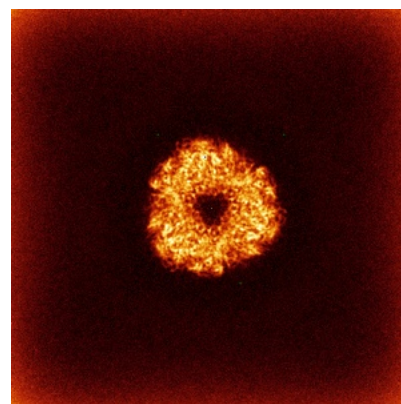
6.4.2 Raw map



X



Y

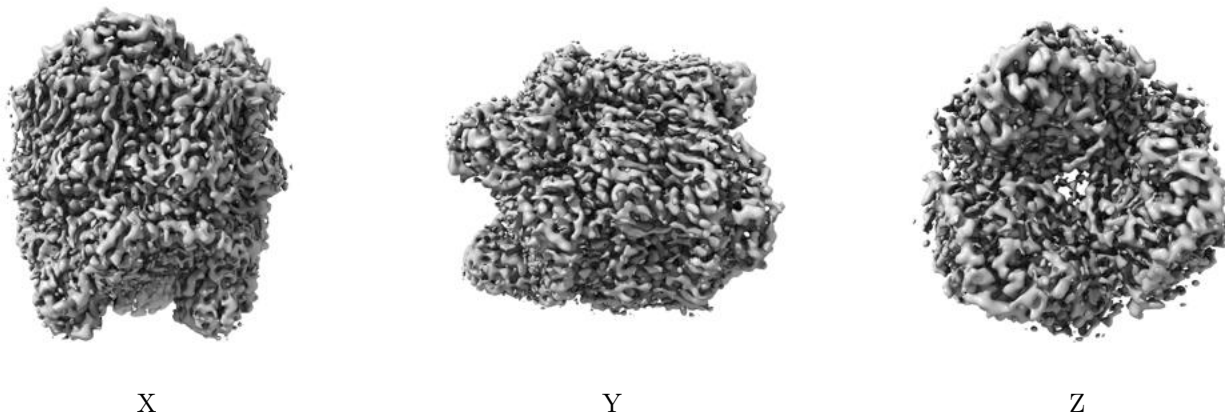


Z

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.

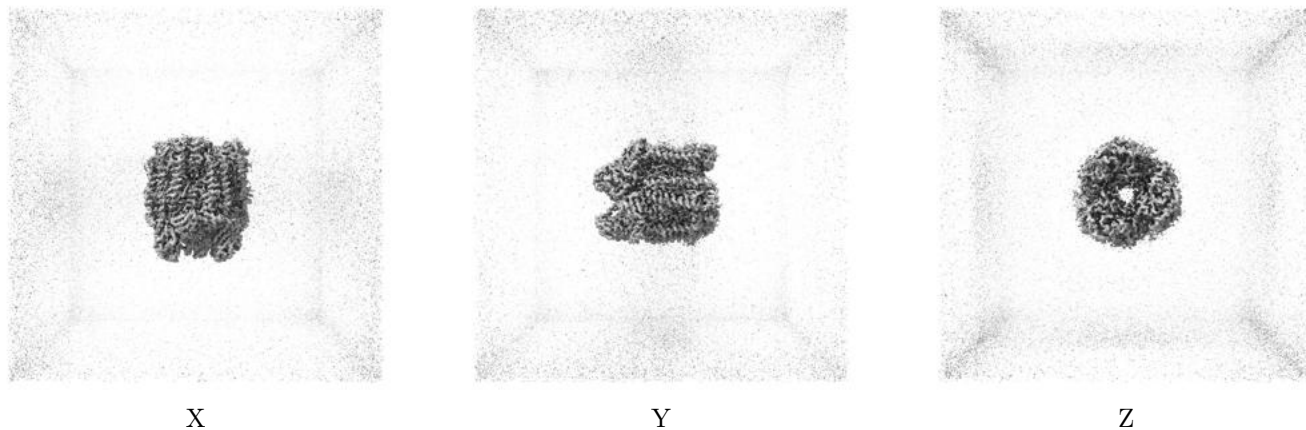
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.06. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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.

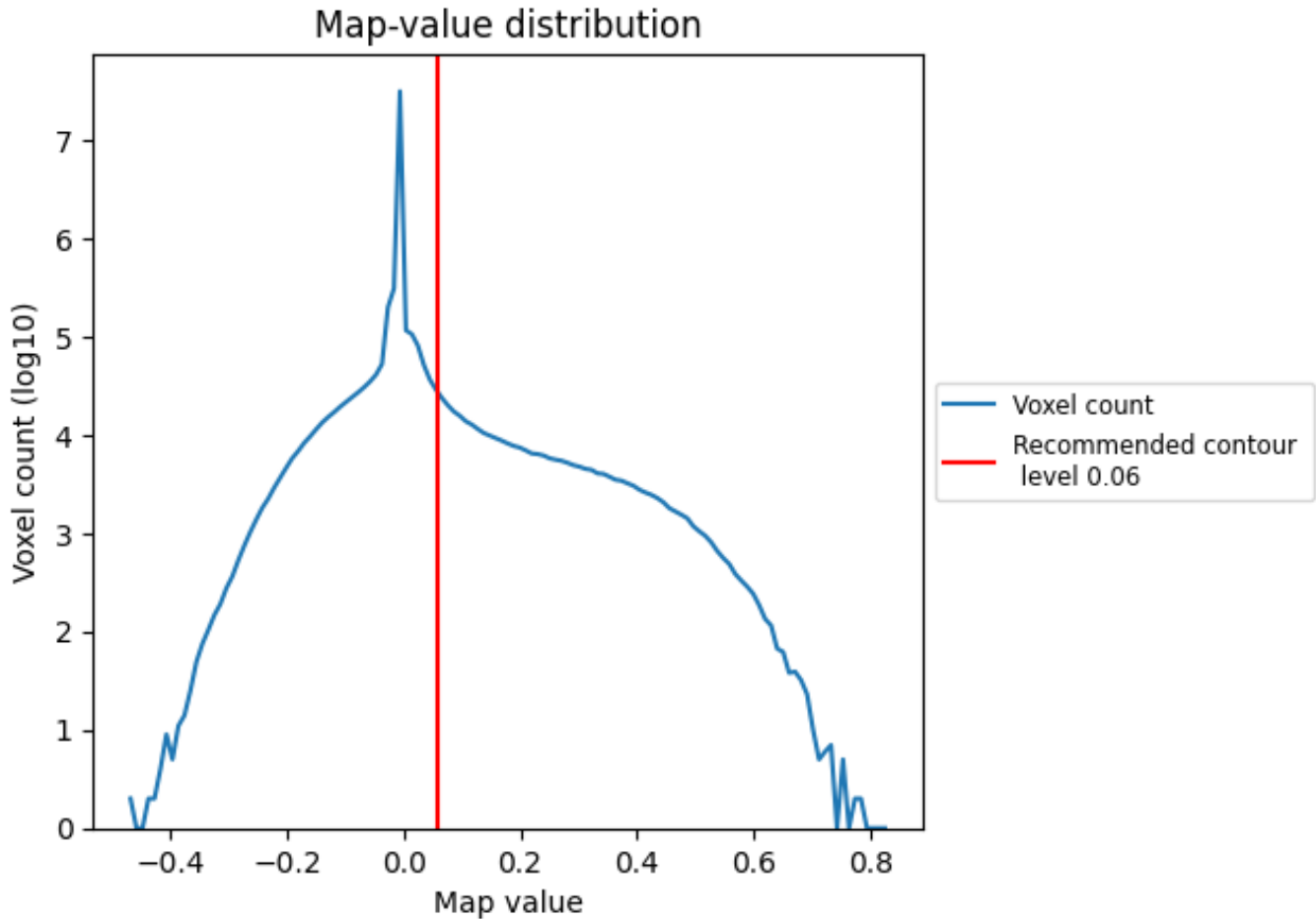
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

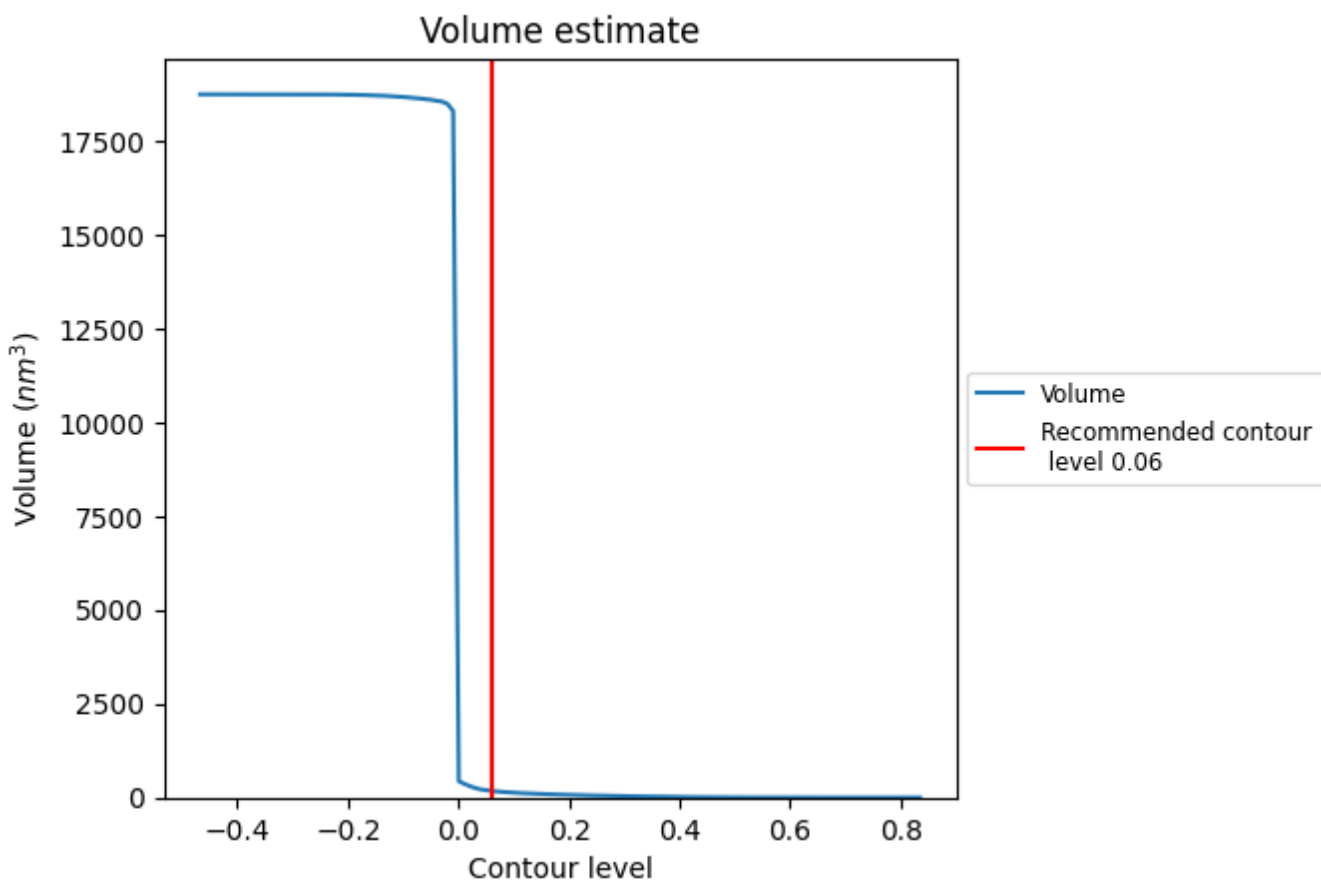
This section contains the results of statistical analysis of the map.

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.

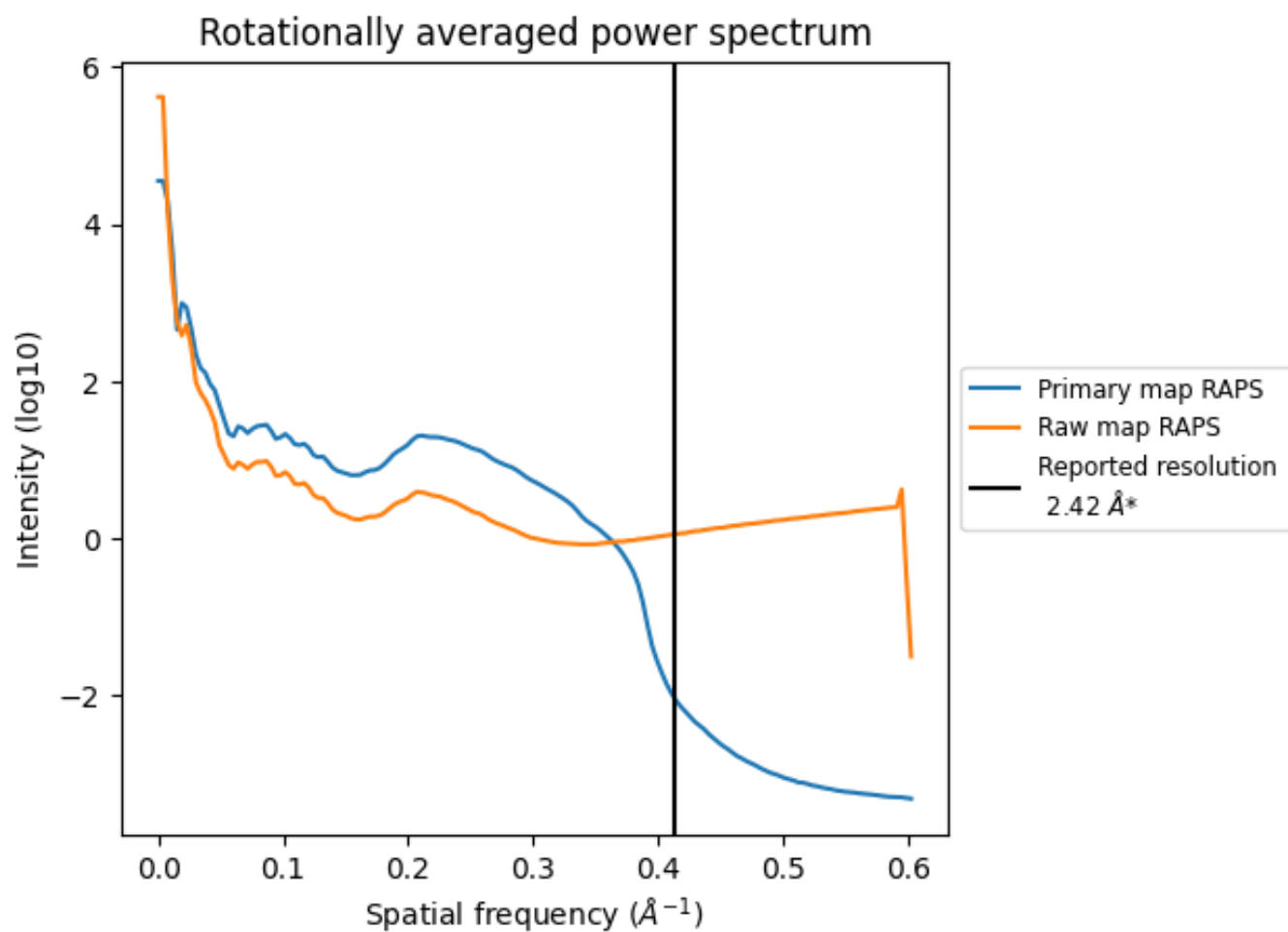
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 177 nm³; this corresponds to an approximate mass of 160 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](#)

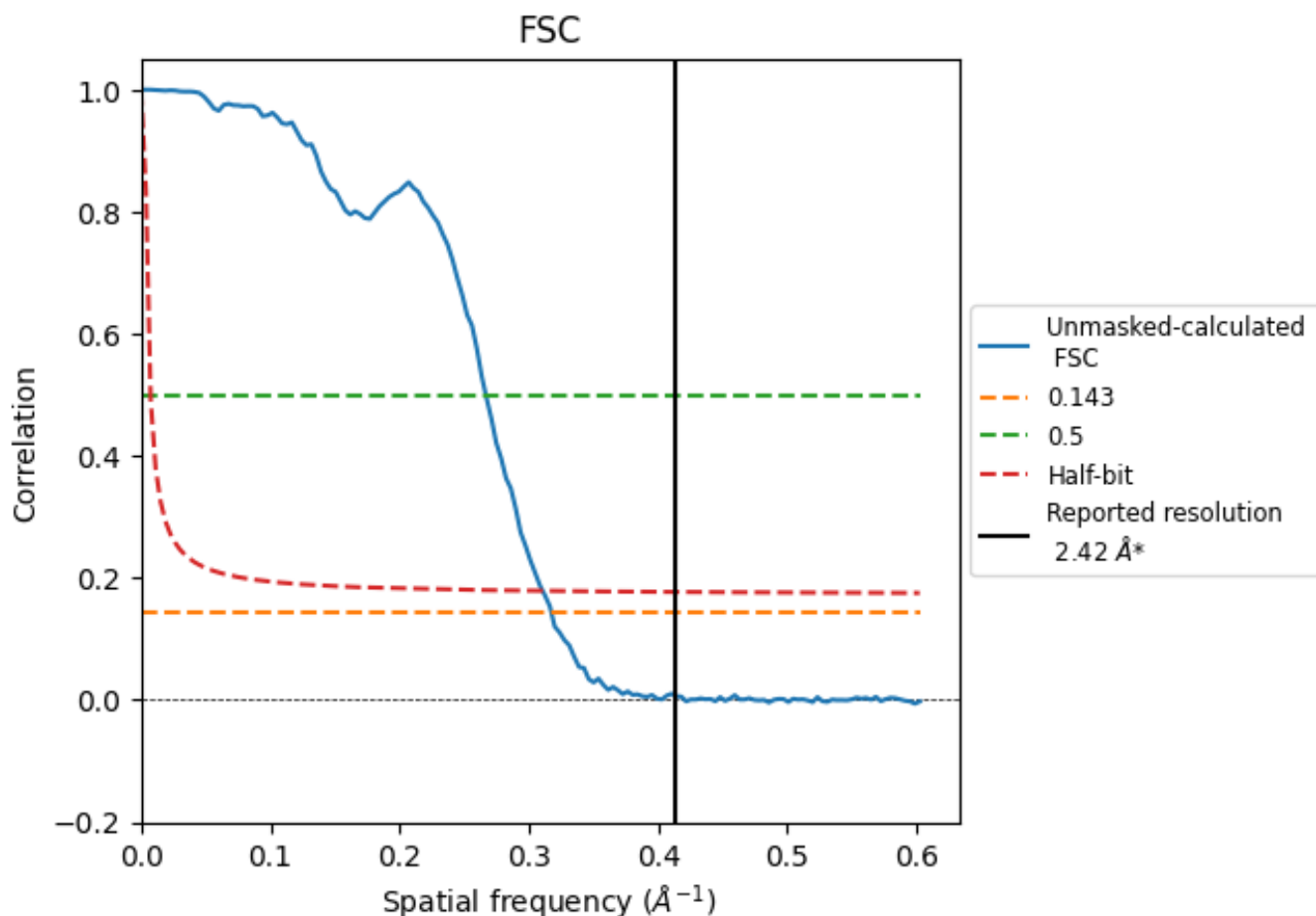


*Reported resolution corresponds to spatial frequency of 0.413 Å⁻¹

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 0.413\AA^{-1}

8.2 Resolution estimates [i](#)

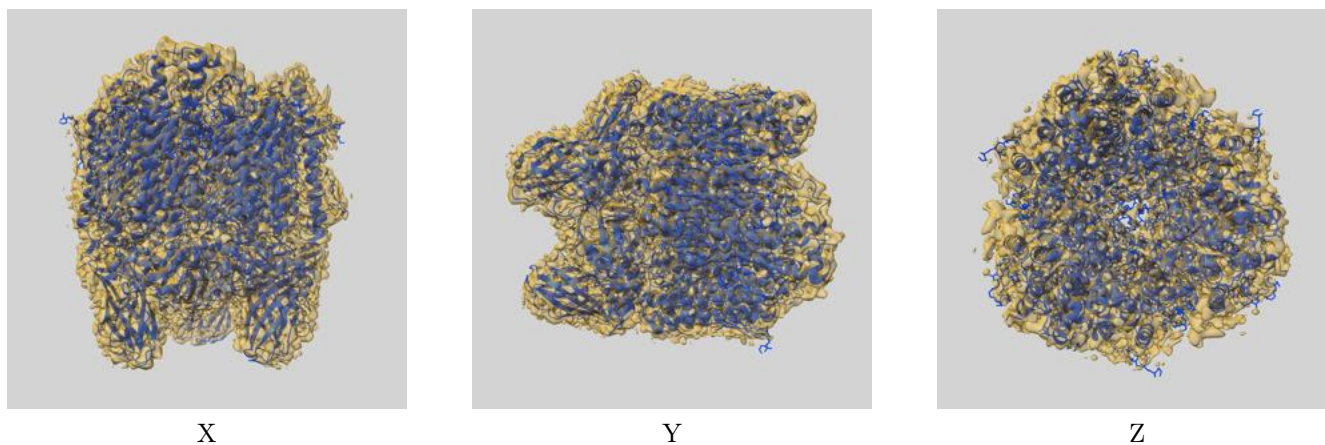
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.42	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.15	3.75	3.22

*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 3.15 differs from the reported value 2.42 by more than 10 %

9 Map-model fit [i](#)

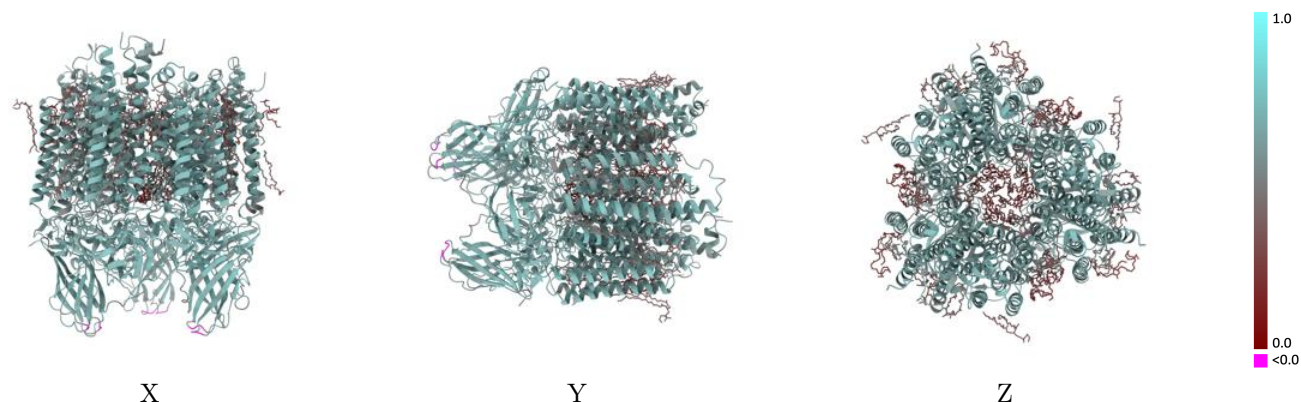
This section contains information regarding the fit between EMDB map EMD-45659 and PDB model 9CL2. Per-residue inclusion information can be found in section 3 on page 9.

9.1 Map-model overlay [i](#)



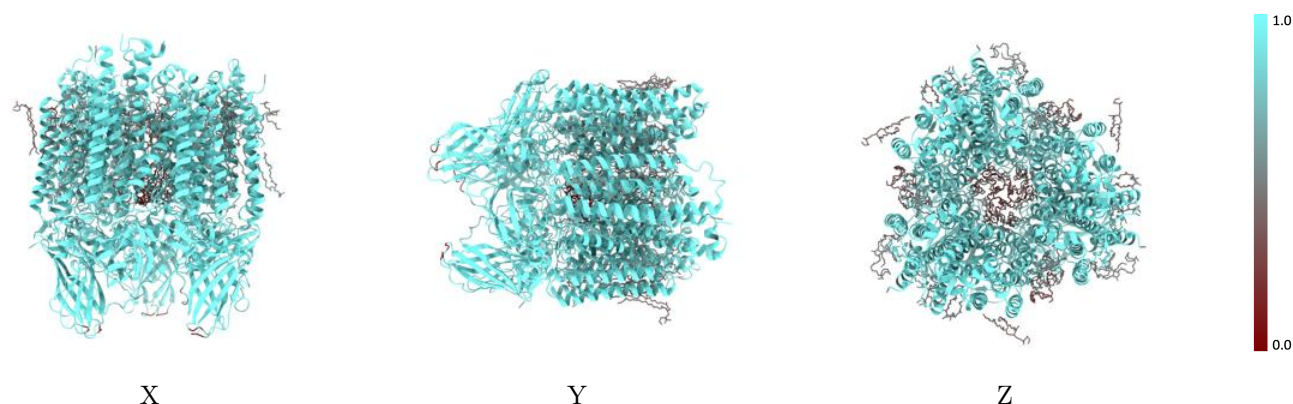
The images above show the 3D surface view of the map at the recommended contour level 0.06 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



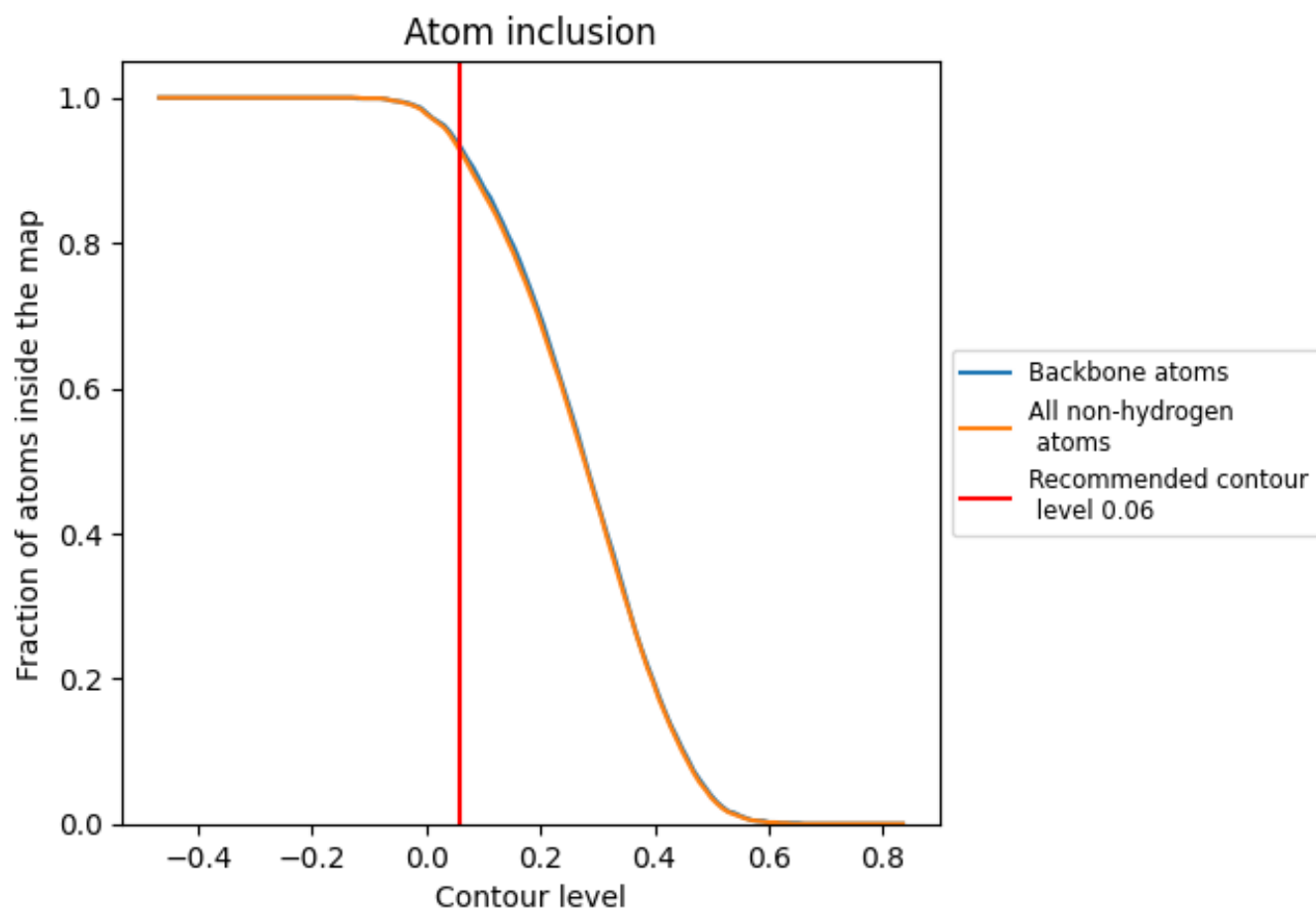
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.06).





















9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 93% 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 (0.06) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9260	 0.6060
Aa	 0.9610	 0.6320
Ab	 0.9590	 0.6310
Ac	 0.9600	 0.6310
Ba	 0.9150	 0.5930
Bb	 0.9180	 0.5920
Bc	 0.9180	 0.5910
Ca	 0.8850	 0.5880
Cb	 0.8860	 0.5880
Cc	 0.8860	 0.5880

