



wwPDB EM Validation Summary Report ⓘ

Jan 20, 2026 – 04:56 PM JST

PDB ID : 9LO8 / pdb_00009lo8
EMDB ID : EMD-63242
Title : Twenty-two polymer Msp1 from *S.cerevisiae*(with a catalytic dead mutation)
in complex with an unknown peptide substrate
Authors : Chengdong, H.; Simin, W.; Xuan, C.
Deposited on : 2025-01-22
Resolution : 2.83 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.dev129
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : **NOT EXECUTED**
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.47

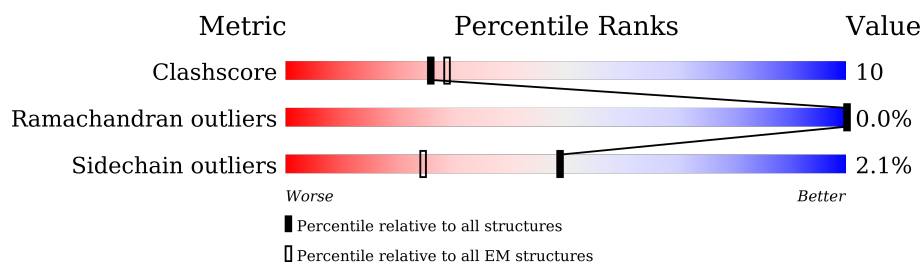
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.83 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.



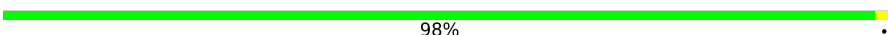
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	330	
1	B	330	
1	C	330	
1	D	330	
1	E	330	
1	F	330	
1	G	330	
1	H	330	
1	I	330	

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Mol	Chain	Length	Quality of chain
1	J	330	 71%19%8%
1	K	330	 71%21%8%
1	L	330	 71%21%8%
1	M	330	 71%20%8%
1	N	330	 68%23%8%
1	O	330	 68%22%9%
1	P	330	 67%23%9%
1	Q	330	 71%18%10%
1	R	330	 68%20%11%
1	S	330	 73%16%10%
1	T	330	 71%18%11%
1	U	330	 65%22%12%
1	V	330	 59%26%14%
2	X	40	 98%.

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 51040 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 Outer mitochondrial transmembrane helix translocase.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	91	Total	C	N	O	S	0	0
			719	455	124	138	2		
1	B	290	Total	C	N	O	S	0	0
			2290	1456	387	436	11		
1	C	290	Total	C	N	O	S	1	0
			2293	1456	389	437	11		
1	D	297	Total	C	N	O	S	0	0
			2343	1490	397	444	12		
1	E	300	Total	C	N	O	S	0	0
			2363	1504	401	447	11		
1	F	305	Total	C	N	O	S	1	0
			2411	1532	410	457	12		
1	G	304	Total	C	N	O	S	1	0
			2400	1524	409	455	12		
1	H	300	Total	C	N	O	S	0	0
			2360	1501	400	448	11		
1	I	304	Total	C	N	O	S	2	0
			2415	1534	413	456	12		
1	J	302	Total	C	N	O	S	0	0
			2379	1515	403	449	12		
1	K	303	Total	C	N	O	S	0	0
			2387	1519	404	452	12		
1	L	302	Total	C	N	O	S	1	0
			2390	1521	407	450	12		
1	M	303	Total	C	N	O	S	0	0
			2385	1518	404	451	12		
1	N	303	Total	C	N	O	S	1	0
			2396	1524	408	452	12		
1	O	300	Total	C	N	O	S	0	0
			2367	1507	401	447	12		
1	P	301	Total	C	N	O	S	1	0
			2386	1519	406	449	12		
1	Q	297	Total	C	N	O	S	1	0
			2358	1502	401	443	12		

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Mol	Chain	Residues	Atoms					AltConf	Trace
1	R	295	Total	C	N	O	S	0	0
			2334	1485	396	441	12		
1	S	296	Total	C	N	O	S	0	0
			2341	1491	396	442	12		
1	T	295	Total	C	N	O	S	0	0
			2333	1485	395	441	12		
1	U	292	Total	C	N	O	S	0	0
			2310	1470	391	437	12		
1	V	284	Total	C	N	O	S	0	0
			2240	1427	376	426	11		

There are 22 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	193	GLN	GLU	engineered mutation	UNP P28737
B	193	GLN	GLU	engineered mutation	UNP P28737
C	193	GLN	GLU	engineered mutation	UNP P28737
D	193	GLN	GLU	engineered mutation	UNP P28737
E	193	GLN	GLU	engineered mutation	UNP P28737
F	193	GLN	GLU	engineered mutation	UNP P28737
G	193	GLN	GLU	engineered mutation	UNP P28737
H	193	GLN	GLU	engineered mutation	UNP P28737
I	193	GLN	GLU	engineered mutation	UNP P28737
J	193	GLN	GLU	engineered mutation	UNP P28737
K	193	GLN	GLU	engineered mutation	UNP P28737
L	193	GLN	GLU	engineered mutation	UNP P28737
M	193	GLN	GLU	engineered mutation	UNP P28737
N	193	GLN	GLU	engineered mutation	UNP P28737
O	193	GLN	GLU	engineered mutation	UNP P28737
P	193	GLN	GLU	engineered mutation	UNP P28737
Q	193	GLN	GLU	engineered mutation	UNP P28737
R	193	GLN	GLU	engineered mutation	UNP P28737
S	193	GLN	GLU	engineered mutation	UNP P28737
T	193	GLN	GLU	engineered mutation	UNP P28737
U	193	GLN	GLU	engineered mutation	UNP P28737
V	193	GLN	GLU	engineered mutation	UNP P28737

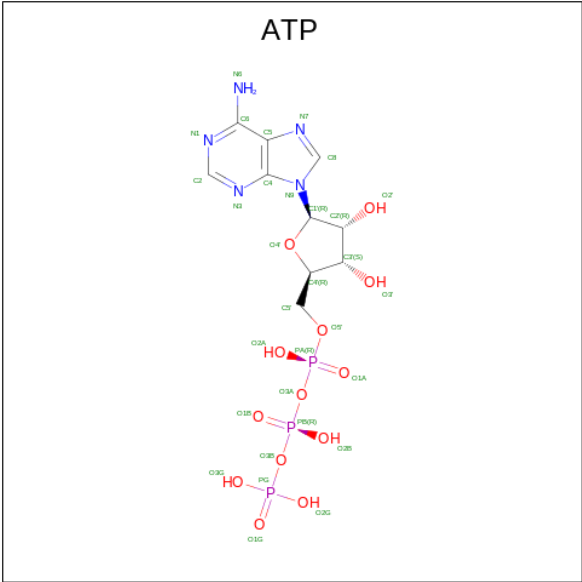
- Molecule 2 is a protein called An unknown peptide substrate.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	X	40	Total	C	N	O	0	0
			200	120	40	40		

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
3	C	2	Total 2	Mg 2	0
3	E	1	Total 1	Mg 1	0
3	F	1	Total 1	Mg 1	0
3	G	1	Total 1	Mg 1	0
3	H	1	Total 1	Mg 1	0
3	I	1	Total 1	Mg 1	0
3	J	1	Total 1	Mg 1	0
3	K	1	Total 1	Mg 1	0
3	L	2	Total 2	Mg 2	0
3	N	1	Total 1	Mg 1	0
3	O	1	Total 1	Mg 1	0
3	P	1	Total 1	Mg 1	0
3	Q	1	Total 1	Mg 1	0
3	R	2	Total 2	Mg 2	0
3	T	1	Total 1	Mg 1	0
3	U	1	Total 1	Mg 1	0
3	V	1	Total 1	Mg 1	0

- Molecule 4 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: C₁₀H₁₆N₅O₁₃P₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
4	C	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	D	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	E	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	F	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	G	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	H	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	I	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	J	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	K	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	L	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	M	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	N	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	O	1	Total	C	N	O	P	0
			31	10	5	13	3	
4	P	1	Total	C	N	O	P	0
			31	10	5	13	3	

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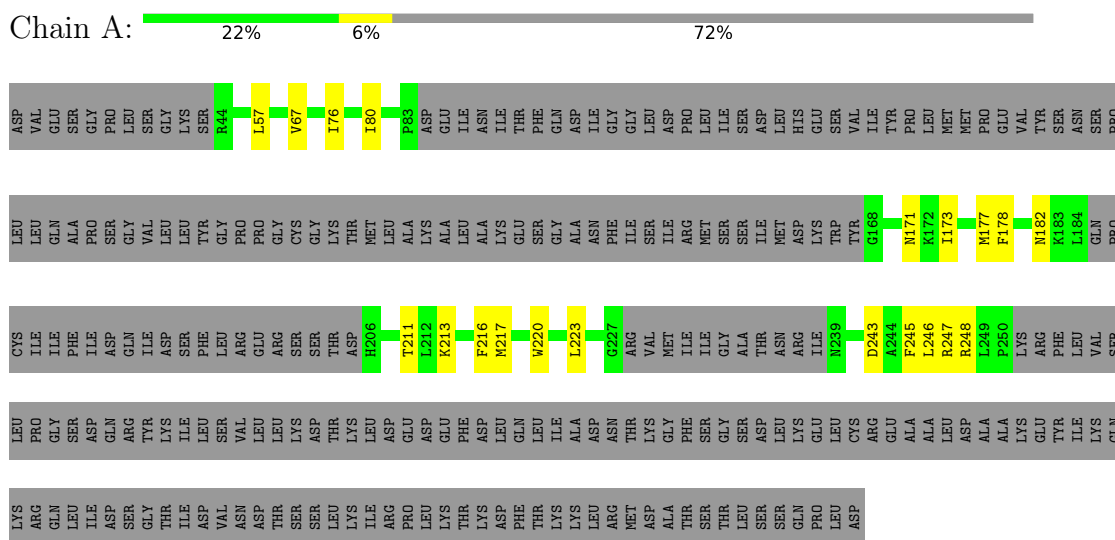
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Mol	Chain	Residues	Atoms					AltConf
4	Q	1	Total 31	C 10	N 5	O 13	P 3	0
4	R	1	Total 31	C 10	N 5	O 13	P 3	0
4	S	1	Total 31	C 10	N 5	O 13	P 3	0
4	T	1	Total 31	C 10	N 5	O 13	P 3	0
4	U	1	Total 31	C 10	N 5	O 13	P 3	0
4	V	1	Total 31	C 10	N 5	O 13	P 3	0

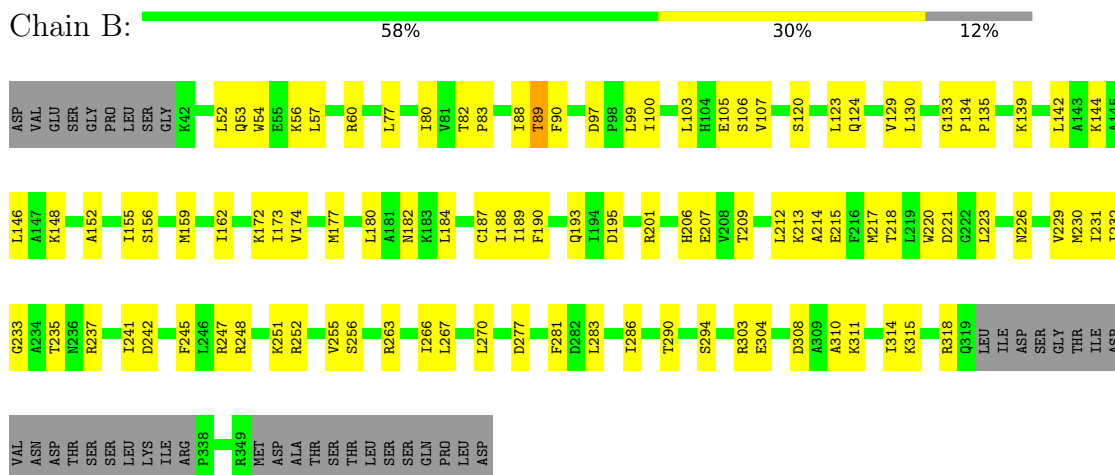
3 Residue-property plots

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. 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. 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: Outer mitochondrial transmembrane helix translocase



- Molecule 1: Outer mitochondrial transmembrane helix translocase



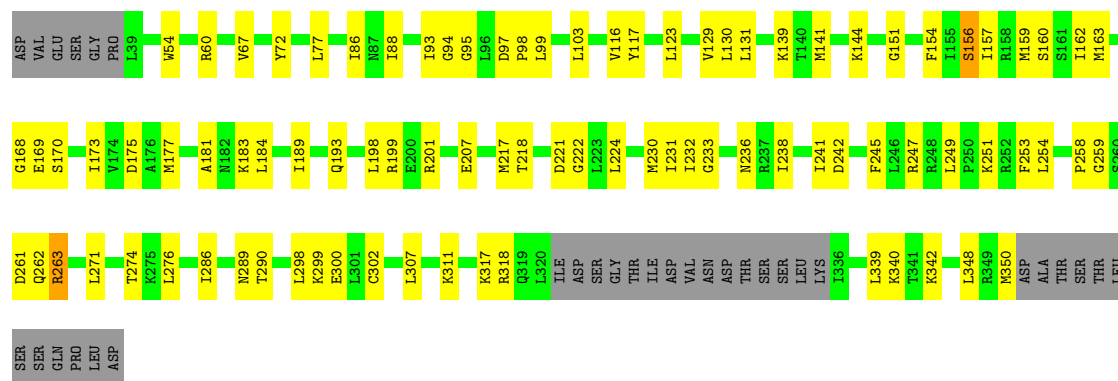
- Molecule 1: Outer mitochondrial transmembrane helix translocase





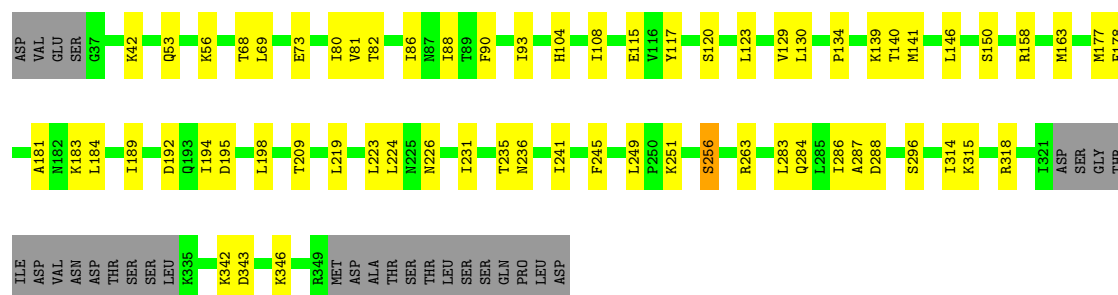
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain D: 63% 26% 10%



- Molecule 1: Outer mitochondrial transmembrane helix translocase

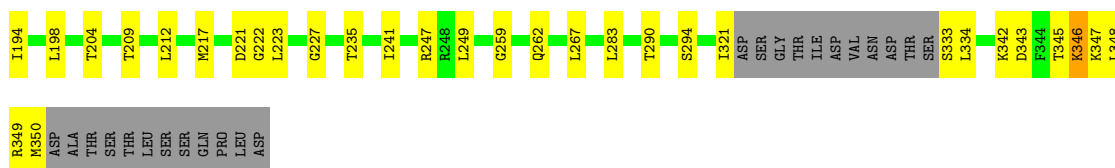
Chain E: 71% 19% 9%



- Molecule 1: Outer mitochondrial transmembrane helix translocase

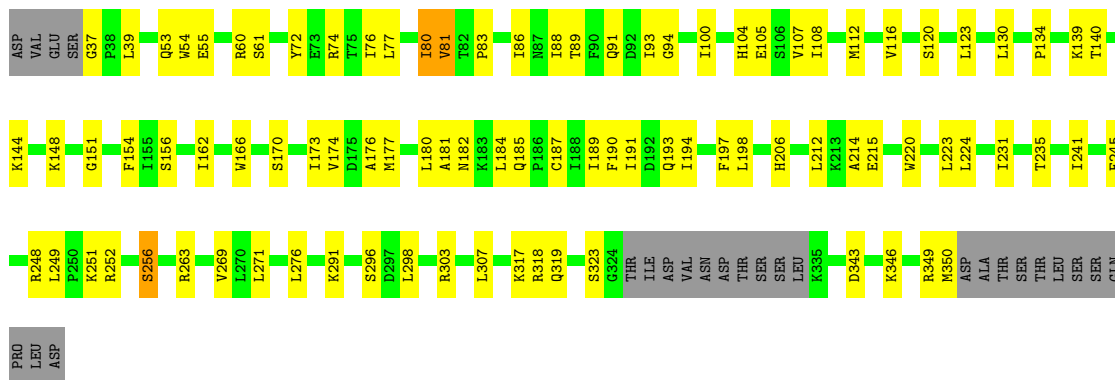
Chain F: 74% 18% 8%





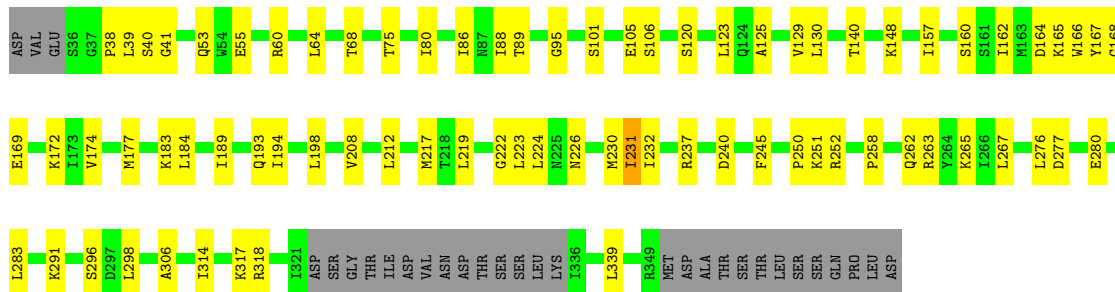
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain G: 65% 27% 8%



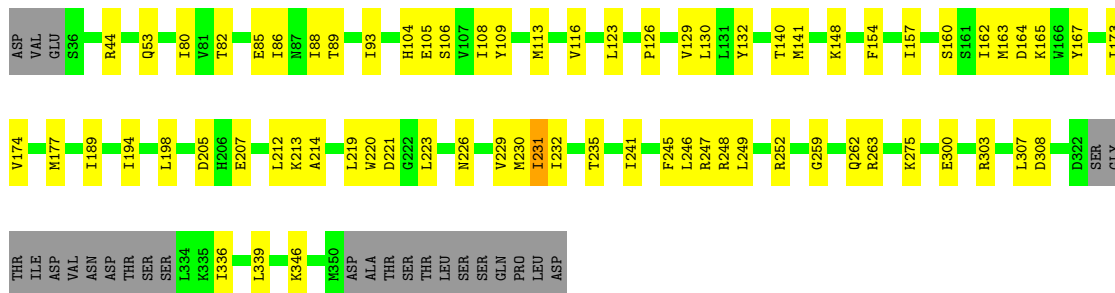
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain H: 68% 23% 9%



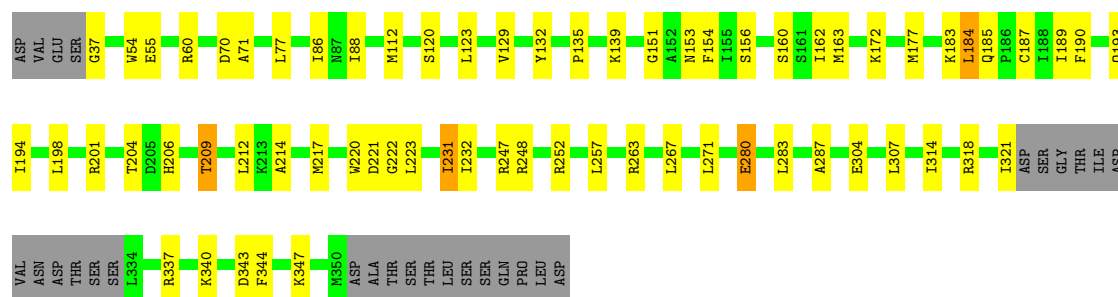
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain I: 71% 21% 8%



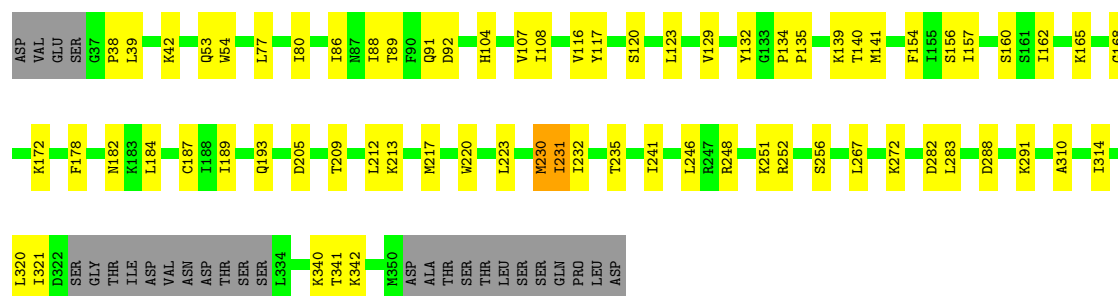
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain J:  71% 19% 8%



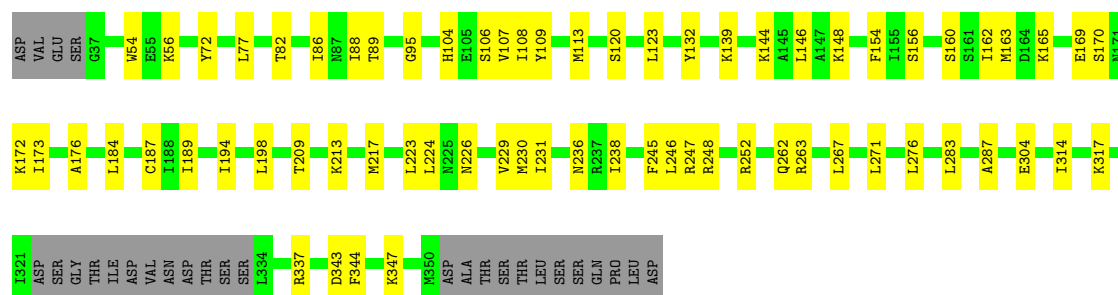
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain K:  71% 21% 8%



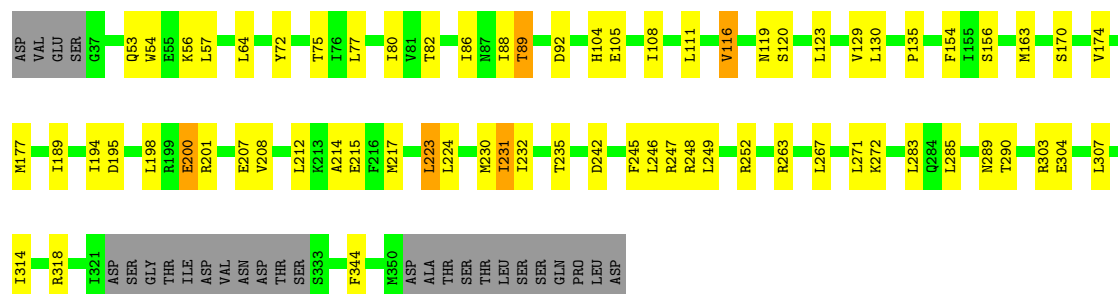
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain L:  71% 21% 8%



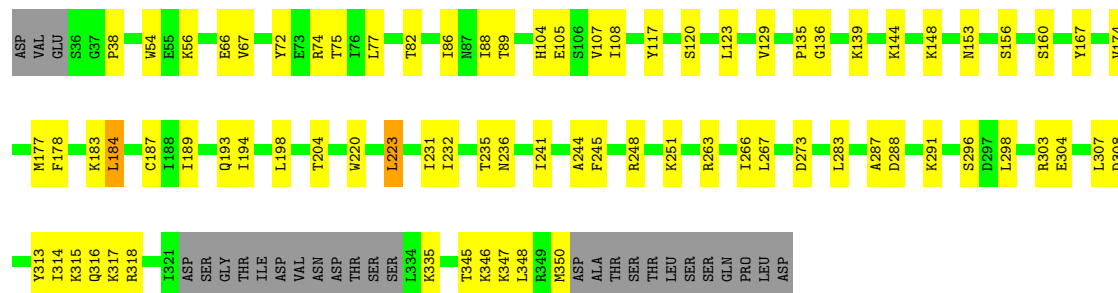
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain M:  71% 20% 8%



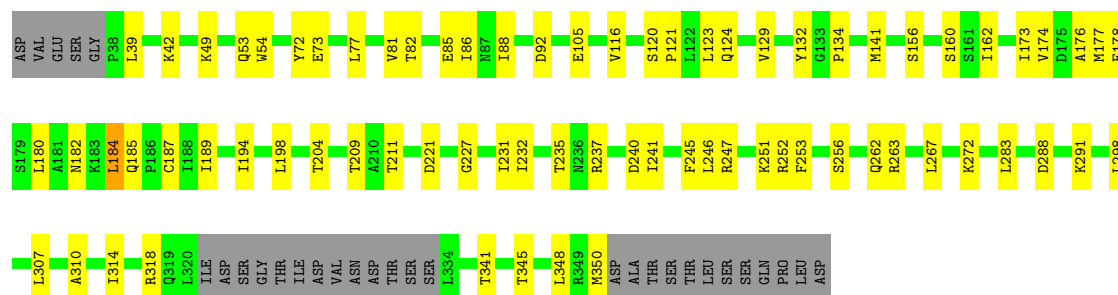
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain N:  68% 23% 8%



- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain O:  68% 22% 9%



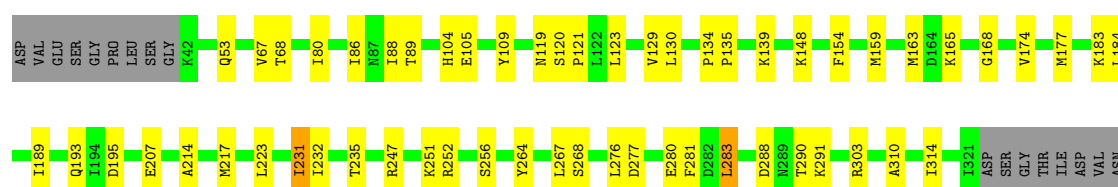
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain P:  67% 23% 9%



- Molecule 1: Outer mitochondrial transmembrane helix translocase

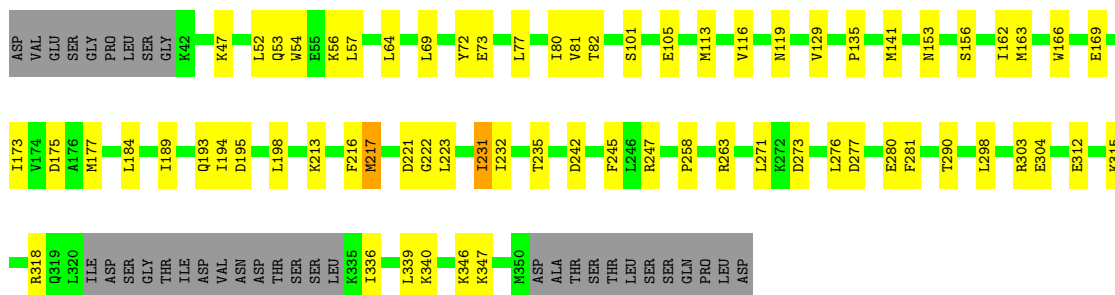
Chain Q:  71% 18% 10%





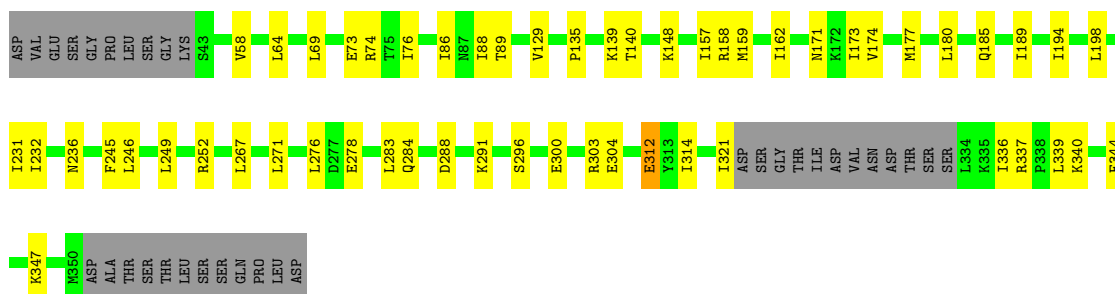
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain R: 68% 20% 11%



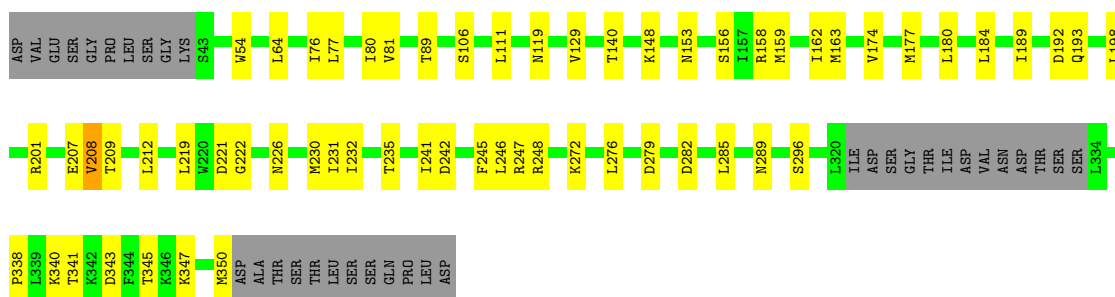
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain S: 73% 16% 10%



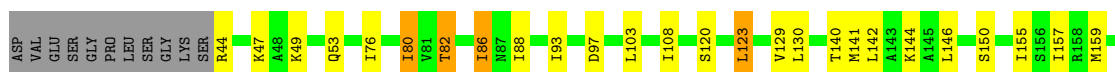
- Molecule 1: Outer mitochondrial transmembrane helix translocase

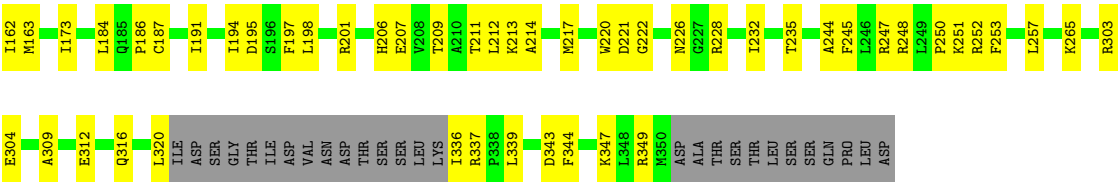
Chain T: 71% 18% 11%



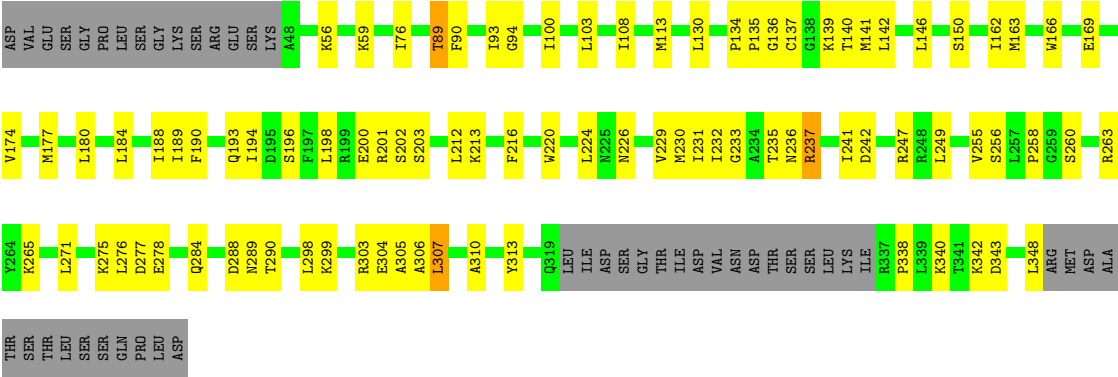
- Molecule 1: Outer mitochondrial transmembrane helix translocase

Chain U: 65% 22% 12%





• Molecule 1: Outer mitochondrial transmembrane helix translocase



• Molecule 2: An unknown peptide substrate



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	170516	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1300	Depositor
Maximum defocus (nm)	2300	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ATP, MG

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	0.14	0/727	0.31	0/978
1	B	0.22	0/2327	0.43	0/3135
1	C	0.24	0/2330	0.47	0/3140
1	D	0.29	0/2380	0.48	0/3206
1	E	0.36	0/2401	0.59	0/3235
1	F	0.23	0/2449	0.41	0/3298
1	G	0.27	0/2438	0.48	0/3283
1	H	0.24	0/2398	0.40	0/3232
1	I	0.22	0/2453	0.40	0/3303
1	J	0.27	0/2417	0.45	0/3256
1	K	0.23	0/2425	0.38	0/3267
1	L	0.28	0/2428	0.46	0/3270
1	M	0.25	0/2423	0.44	0/3264
1	N	0.28	0/2434	0.47	0/3278
1	O	0.26	0/2405	0.43	0/3239
1	P	0.23	0/2424	0.41	0/3264
1	Q	0.31	0/2398	0.43	0/3229
1	R	0.30	0/2371	0.48	0/3193
1	S	0.26	0/2378	0.43	0/3204
1	T	0.26	0/2370	0.46	0/3193
1	U	0.25	0/2347	0.45	0/3163
1	V	0.29	0/2277	0.52	0/3072
All	All	0.27	0/51000	0.45	0/68702

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	719	0	729	11	0
1	B	2290	0	2350	70	0
1	C	2293	0	2348	87	0
1	D	2343	0	2411	67	0
1	E	2363	0	2436	48	0
1	F	2411	0	2485	45	0
1	G	2400	0	2469	64	0
1	H	2360	0	2428	54	0
1	I	2415	0	2489	62	0
1	J	2379	0	2456	53	0
1	K	2387	0	2460	55	0
1	L	2390	0	2468	55	0
1	M	2385	0	2461	54	0
1	N	2396	0	2473	60	0
1	O	2367	0	2443	51	0
1	P	2386	0	2466	59	0
1	Q	2358	0	2440	45	0
1	R	2334	0	2405	59	0
1	S	2341	0	2414	36	0
1	T	2333	0	2404	39	0
1	U	2310	0	2374	67	0
1	V	2240	0	2294	62	0
2	X	200	0	63	1	0
3	C	2	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
3	I	1	0	0	0	0
3	J	1	0	0	0	0
3	K	1	0	0	0	0
3	L	2	0	0	0	0
3	N	1	0	0	0	0
3	O	1	0	0	0	0
3	P	1	0	0	0	0
3	Q	1	0	0	0	0
3	R	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	T	1	0	0	0	0
3	U	1	0	0	0	0
3	V	1	0	0	0	0
4	C	31	0	12	3	0
4	D	31	0	12	3	0
4	E	31	0	12	2	0
4	F	31	0	12	1	0
4	G	31	0	12	2	0
4	H	31	0	12	3	0
4	I	31	0	12	1	0
4	J	31	0	12	1	0
4	K	31	0	12	2	0
4	L	31	0	12	0	0
4	M	31	0	12	2	0
4	N	31	0	12	3	0
4	O	31	0	12	2	0
4	P	31	0	12	2	0
4	Q	31	0	12	0	0
4	R	31	0	12	1	0
4	S	31	0	12	1	0
4	T	31	0	12	2	0
4	U	31	0	12	0	0
4	V	31	0	12	3	0
All	All	51040	0	52006	1028	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 10.

The worst 5 of 1028 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:R:64:LEU:CD1	1:R:184:LEU:HD23	2.02	0.90
1:R:64:LEU:CD1	1:R:184:LEU:CD2	2.52	0.88
1:R:64:LEU:HD13	1:R:184:LEU:CD2	2.06	0.85
1:R:64:LEU:HD11	1:R:184:LEU:HD23	1.58	0.83
1:E:343:ASP:HA	1:E:346:LYS:HE2	1.66	0.75

There are no symmetry-related clashes.

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	83/330 (25%)	83 (100%)	0	0	100	100
1	B	286/330 (87%)	274 (96%)	12 (4%)	0	100	100
1	C	287/330 (87%)	278 (97%)	9 (3%)	0	100	100
1	D	293/330 (89%)	281 (96%)	12 (4%)	0	100	100
1	E	296/330 (90%)	286 (97%)	10 (3%)	0	100	100
1	F	302/330 (92%)	293 (97%)	9 (3%)	0	100	100
1	G	301/330 (91%)	293 (97%)	8 (3%)	0	100	100
1	H	296/330 (90%)	289 (98%)	7 (2%)	0	100	100
1	I	302/330 (92%)	297 (98%)	5 (2%)	0	100	100
1	J	298/330 (90%)	292 (98%)	5 (2%)	1 (0%)	37	55
1	K	299/330 (91%)	291 (97%)	8 (3%)	0	100	100
1	L	299/330 (91%)	288 (96%)	11 (4%)	0	100	100
1	M	299/330 (91%)	290 (97%)	9 (3%)	0	100	100
1	N	300/330 (91%)	290 (97%)	10 (3%)	0	100	100
1	O	296/330 (90%)	289 (98%)	7 (2%)	0	100	100
1	P	298/330 (90%)	288 (97%)	10 (3%)	0	100	100
1	Q	294/330 (89%)	287 (98%)	7 (2%)	0	100	100
1	R	291/330 (88%)	281 (97%)	10 (3%)	0	100	100
1	S	292/330 (88%)	282 (97%)	10 (3%)	0	100	100
1	T	291/330 (88%)	284 (98%)	7 (2%)	0	100	100
1	U	288/330 (87%)	275 (96%)	13 (4%)	0	100	100
1	V	280/330 (85%)	262 (94%)	18 (6%)	0	100	100
All	All	6271/7260 (86%)	6073 (97%)	197 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	J	184	LEU

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	79/292 (27%)	77 (98%)	2 (2%)	42	68
1	B	256/292 (88%)	250 (98%)	6 (2%)	45	70
1	C	256/292 (88%)	250 (98%)	6 (2%)	45	70
1	D	262/292 (90%)	255 (97%)	7 (3%)	40	65
1	E	264/292 (90%)	260 (98%)	4 (2%)	60	81
1	F	270/292 (92%)	267 (99%)	3 (1%)	70	86
1	G	268/292 (92%)	261 (97%)	7 (3%)	41	67
1	H	264/292 (90%)	257 (97%)	7 (3%)	40	65
1	I	270/292 (92%)	269 (100%)	1 (0%)	89	95
1	J	266/292 (91%)	259 (97%)	7 (3%)	41	67
1	K	267/292 (91%)	264 (99%)	3 (1%)	70	86
1	L	267/292 (91%)	264 (99%)	3 (1%)	70	86
1	M	267/292 (91%)	260 (97%)	7 (3%)	41	67
1	N	268/292 (92%)	262 (98%)	6 (2%)	47	71
1	O	265/292 (91%)	259 (98%)	6 (2%)	45	70
1	P	267/292 (91%)	262 (98%)	5 (2%)	52	75
1	Q	264/292 (90%)	259 (98%)	5 (2%)	52	75
1	R	261/292 (89%)	255 (98%)	6 (2%)	45	70
1	S	262/292 (90%)	257 (98%)	5 (2%)	52	75
1	T	261/292 (89%)	254 (97%)	7 (3%)	40	65
1	U	258/292 (88%)	252 (98%)	6 (2%)	45	70
1	V	250/292 (86%)	243 (97%)	7 (3%)	38	64
All	All	5612/6424 (87%)	5496 (98%)	116 (2%)	49	72

5 of 116 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	M	116	VAL
1	V	163	MET
1	O	204	THR
1	V	89	THR
1	T	208	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 53 such sidechains are listed below:

Mol	Chain	Res	Type
1	L	124	GLN
1	P	239	ASN
1	U	284	GLN
1	L	171	ASN
1	N	193	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 40 ligands modelled in this entry, 20 are monoatomic - leaving 20 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	ATP	T	402	3	26,33,33	0.69	0	31,52,52	0.75	1 (3%)
4	ATP	F	402	3	26,33,33	0.68	0	31,52,52	0.75	1 (3%)
4	ATP	E	402	3	26,33,33	0.69	0	31,52,52	0.76	1 (3%)
4	ATP	H	402	3	26,33,33	0.69	0	31,52,52	0.74	1 (3%)
4	ATP	N	402	3	26,33,33	0.70	0	31,52,52	0.73	1 (3%)
4	ATP	J	402	3	26,33,33	0.70	0	31,52,52	0.76	1 (3%)
4	ATP	V	402	3	26,33,33	0.69	0	31,52,52	0.74	1 (3%)
4	ATP	P	402	3	26,33,33	0.70	0	31,52,52	0.75	1 (3%)
4	ATP	I	402	3	26,33,33	0.69	0	31,52,52	0.74	1 (3%)
4	ATP	R	403	3	26,33,33	0.69	0	31,52,52	0.75	1 (3%)
4	ATP	K	402	3	26,33,33	0.70	0	31,52,52	0.72	1 (3%)
4	ATP	D	401	3	26,33,33	0.68	0	31,52,52	0.75	1 (3%)
4	ATP	U	402	3	26,33,33	0.68	0	31,52,52	0.73	1 (3%)
4	ATP	G	402	3	26,33,33	0.70	0	31,52,52	0.73	1 (3%)
4	ATP	S	401	3	26,33,33	0.69	0	31,52,52	0.74	1 (3%)
4	ATP	L	403	3	26,33,33	0.69	0	31,52,52	0.74	1 (3%)
4	ATP	O	402	3	26,33,33	0.67	0	31,52,52	0.83	1 (3%)
4	ATP	M	401	3	26,33,33	0.69	0	31,52,52	0.75	1 (3%)
4	ATP	C	403	3	26,33,33	0.68	0	31,52,52	0.78	1 (3%)
4	ATP	Q	402	3	26,33,33	0.70	0	31,52,52	0.72	1 (3%)

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	ATP	T	402	3	-	1/18/38/38	0/3/3/3
4	ATP	F	402	3	-	6/18/38/38	0/3/3/3
4	ATP	E	402	3	-	2/18/38/38	0/3/3/3
4	ATP	H	402	3	-	6/18/38/38	0/3/3/3
4	ATP	N	402	3	-	2/18/38/38	0/3/3/3
4	ATP	J	402	3	-	3/18/38/38	0/3/3/3
4	ATP	V	402	3	-	1/18/38/38	0/3/3/3
4	ATP	P	402	3	-	3/18/38/38	0/3/3/3
4	ATP	I	402	3	-	5/18/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	ATP	R	403	3	-	5/18/38/38	0/3/3/3
4	ATP	K	402	3	-	5/18/38/38	0/3/3/3
4	ATP	D	401	3	-	5/18/38/38	0/3/3/3
4	ATP	U	402	3	-	0/18/38/38	0/3/3/3
4	ATP	G	402	3	-	4/18/38/38	0/3/3/3
4	ATP	S	401	3	-	1/18/38/38	0/3/3/3
4	ATP	L	403	3	-	6/18/38/38	0/3/3/3
4	ATP	O	402	3	-	4/18/38/38	0/3/3/3
4	ATP	M	401	3	-	5/18/38/38	0/3/3/3
4	ATP	C	403	3	-	6/18/38/38	0/3/3/3
4	ATP	Q	402	3	-	3/18/38/38	0/3/3/3

There are no bond length outliers.

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	O	402	ATP	C5-C6-N6	2.28	123.81	120.35
4	R	403	ATP	C5-C6-N6	2.26	123.79	120.35
4	J	402	ATP	C5-C6-N6	2.26	123.79	120.35
4	I	402	ATP	C5-C6-N6	2.26	123.78	120.35
4	C	403	ATP	C5-C6-N6	2.26	123.78	120.35

There are no chirality outliers.

5 of 73 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	403	ATP	C5'-O5'-PA-O2A
4	F	402	ATP	C5'-O5'-PA-O3A
4	H	402	ATP	C5'-O5'-PA-O2A
4	J	402	ATP	C5'-O5'-PA-O1A
4	J	402	ATP	C5'-O5'-PA-O2A

There are no ring outliers.

17 monomers are involved in 34 short contacts:

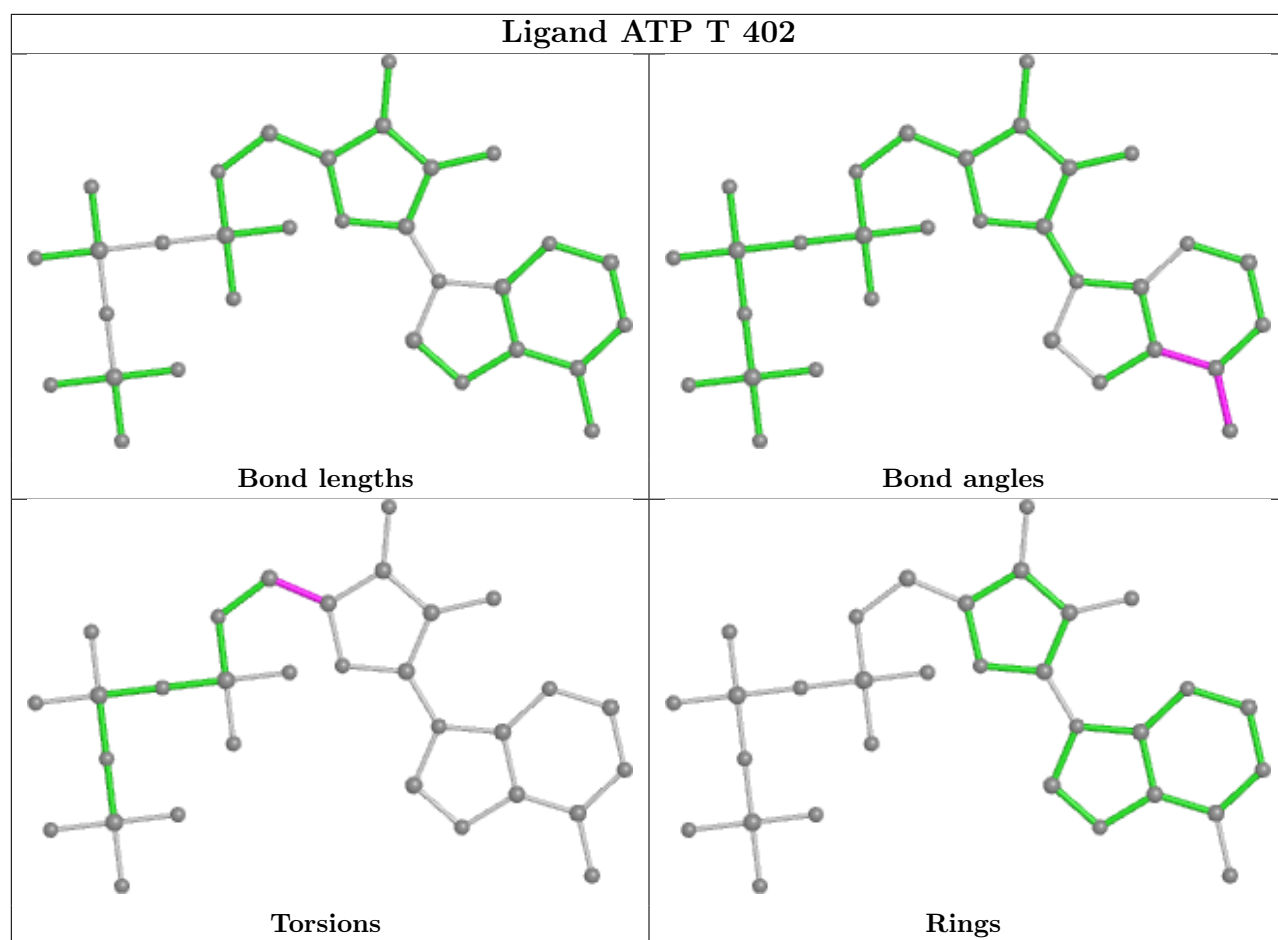
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	T	402	ATP	2	0
4	F	402	ATP	1	0
4	E	402	ATP	2	0

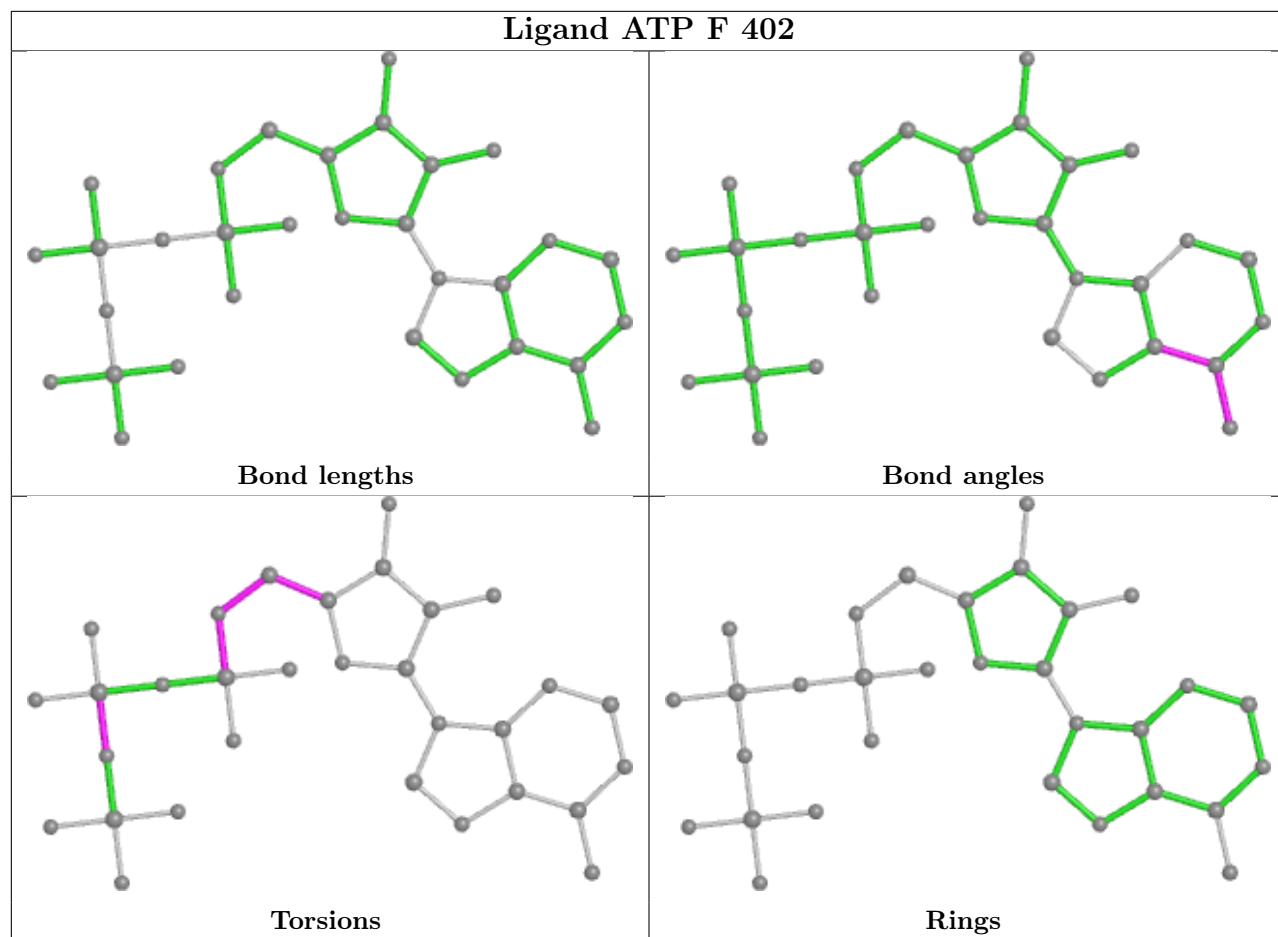
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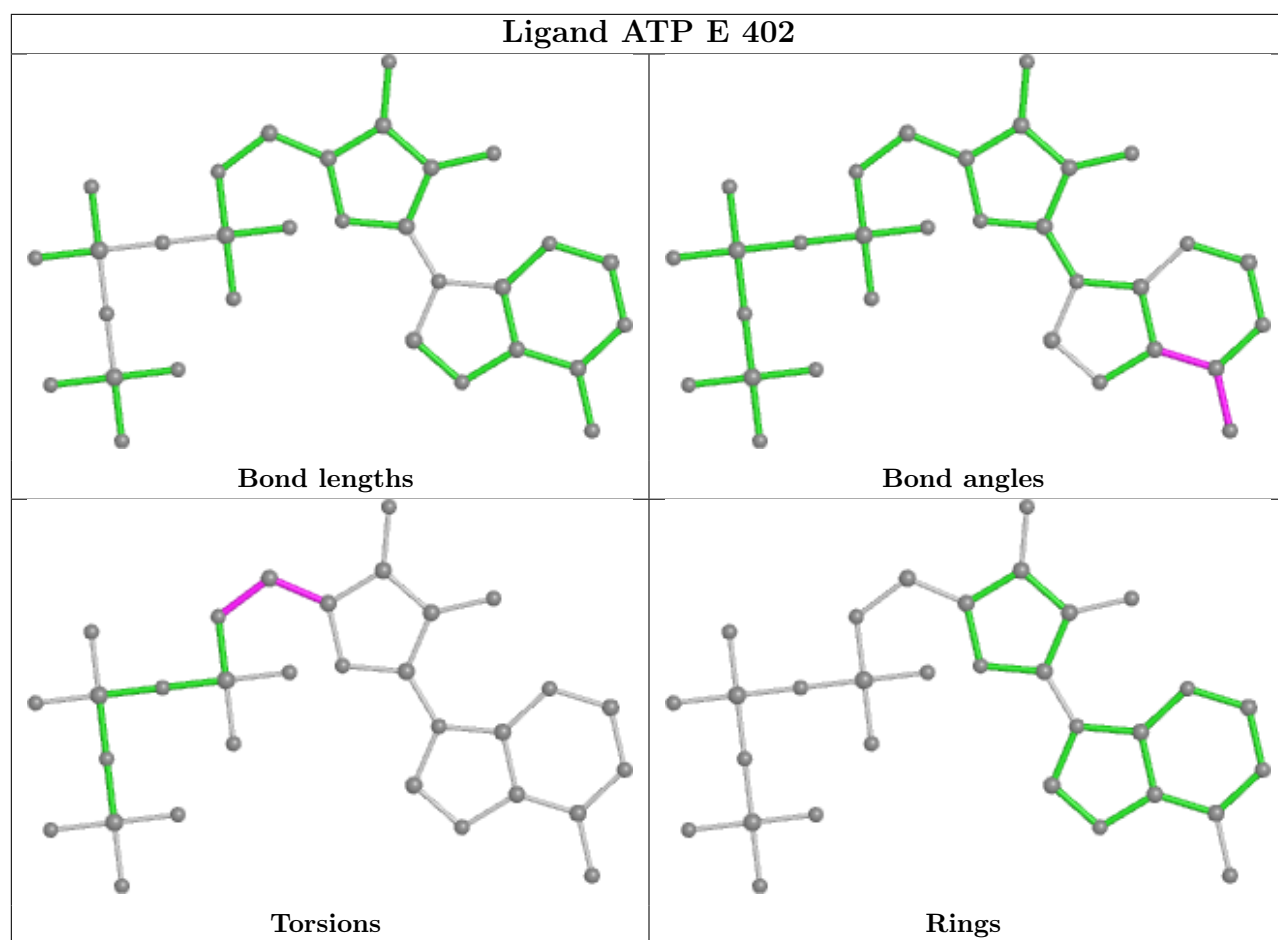
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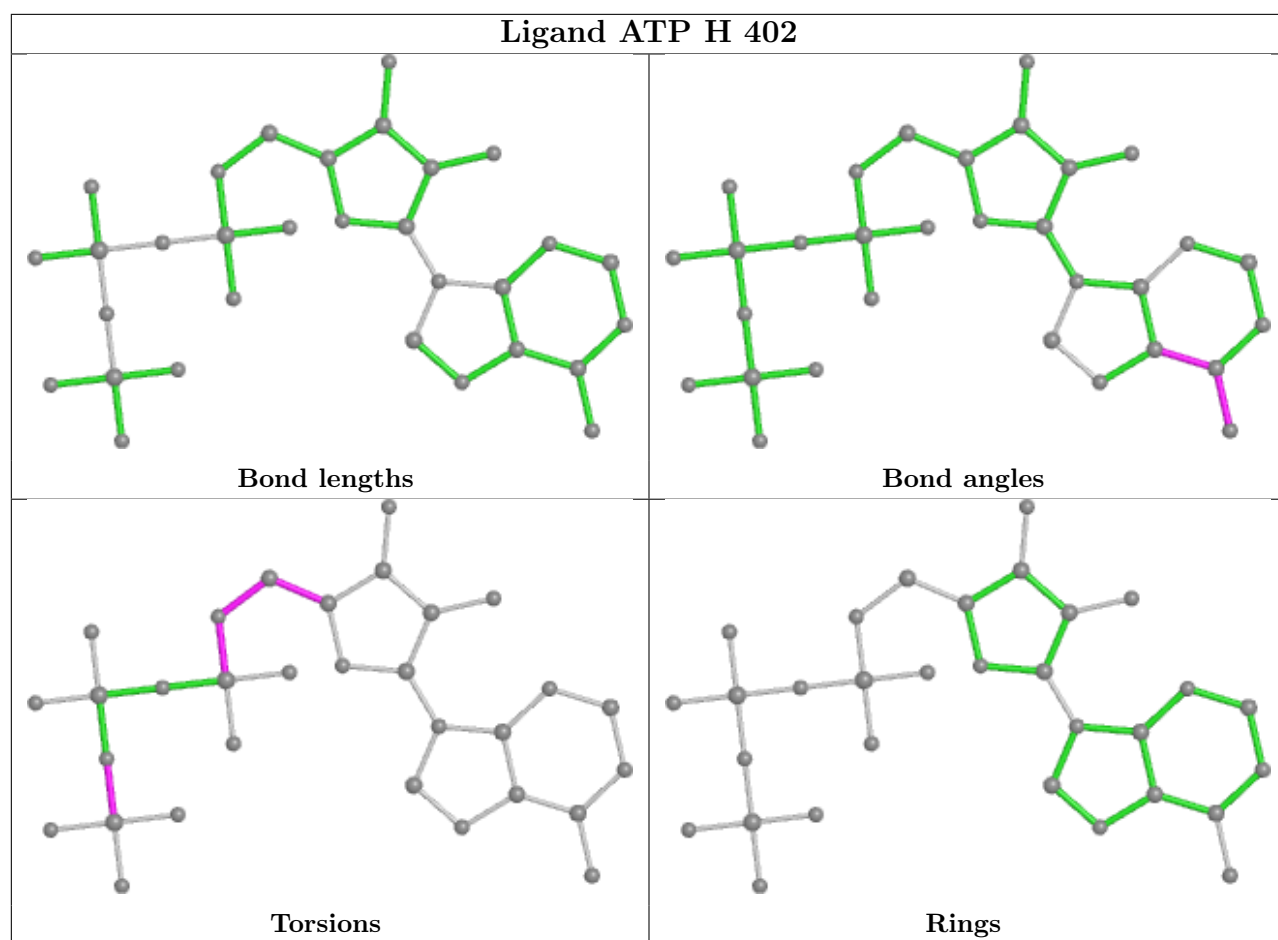
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	H	402	ATP	3	0
4	N	402	ATP	3	0
4	J	402	ATP	1	0
4	V	402	ATP	3	0
4	P	402	ATP	2	0
4	I	402	ATP	1	0
4	R	403	ATP	1	0
4	K	402	ATP	2	0
4	D	401	ATP	3	0
4	G	402	ATP	2	0
4	S	401	ATP	1	0
4	O	402	ATP	2	0
4	M	401	ATP	2	0
4	C	403	ATP	3	0

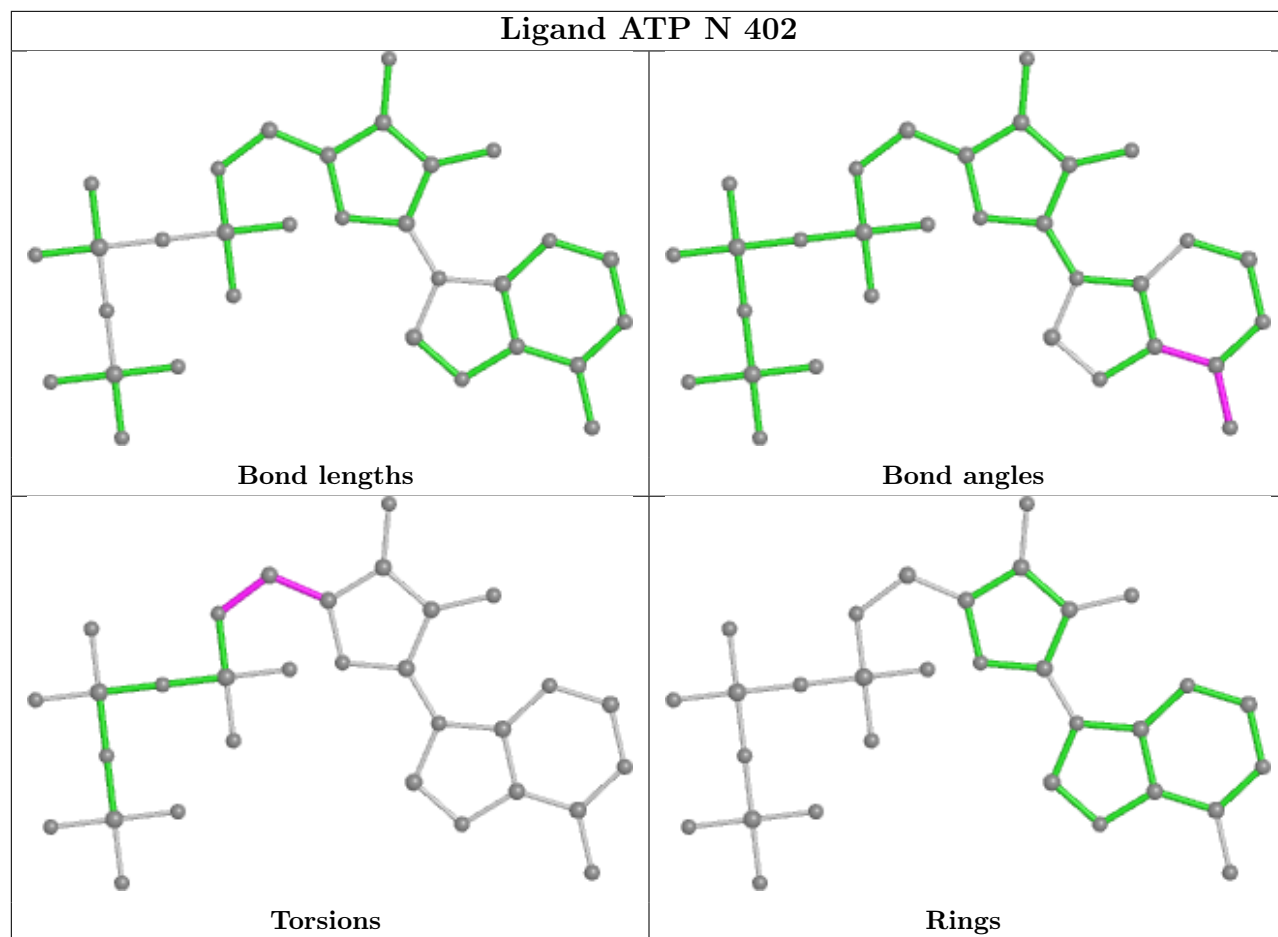
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

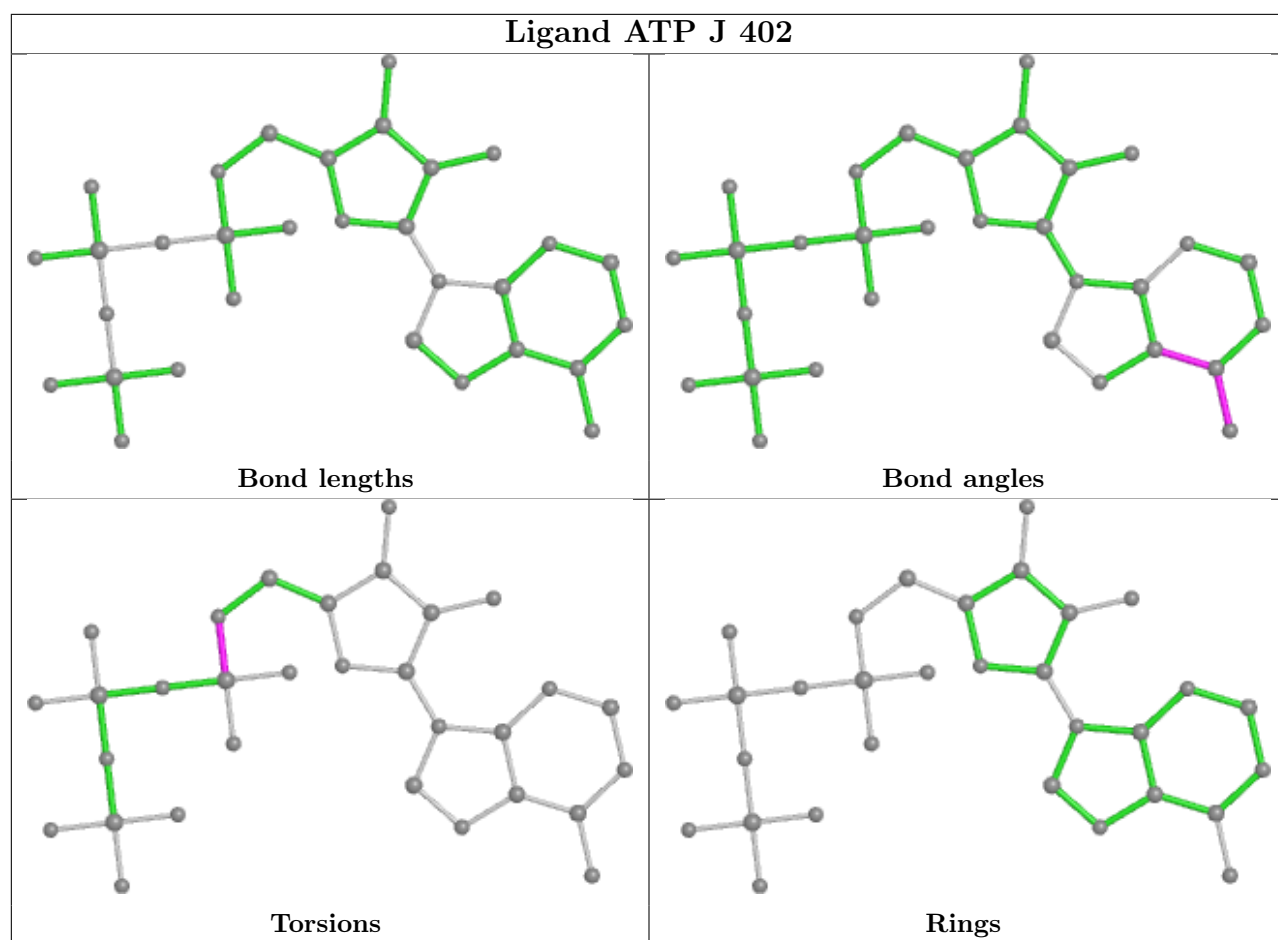


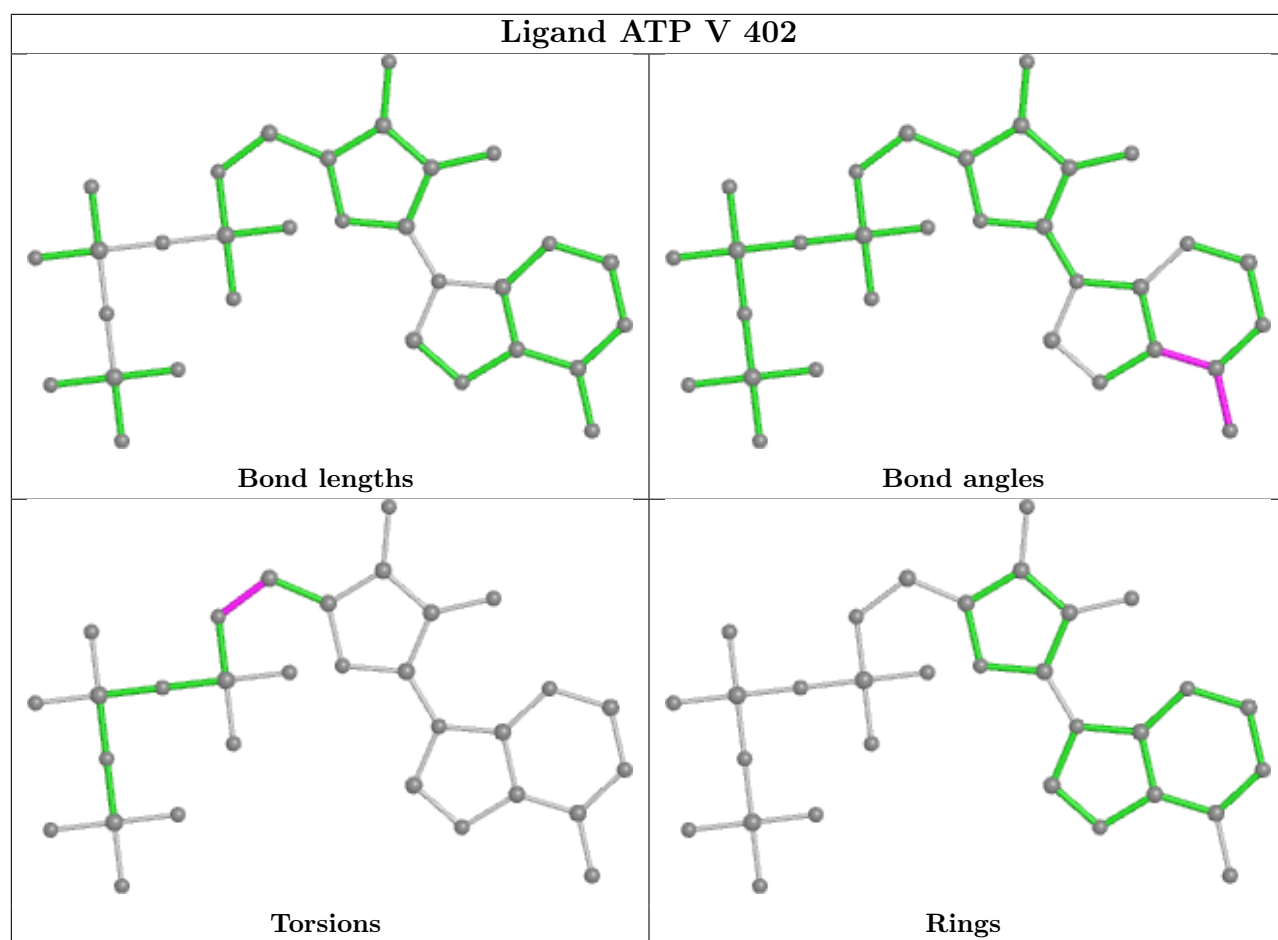


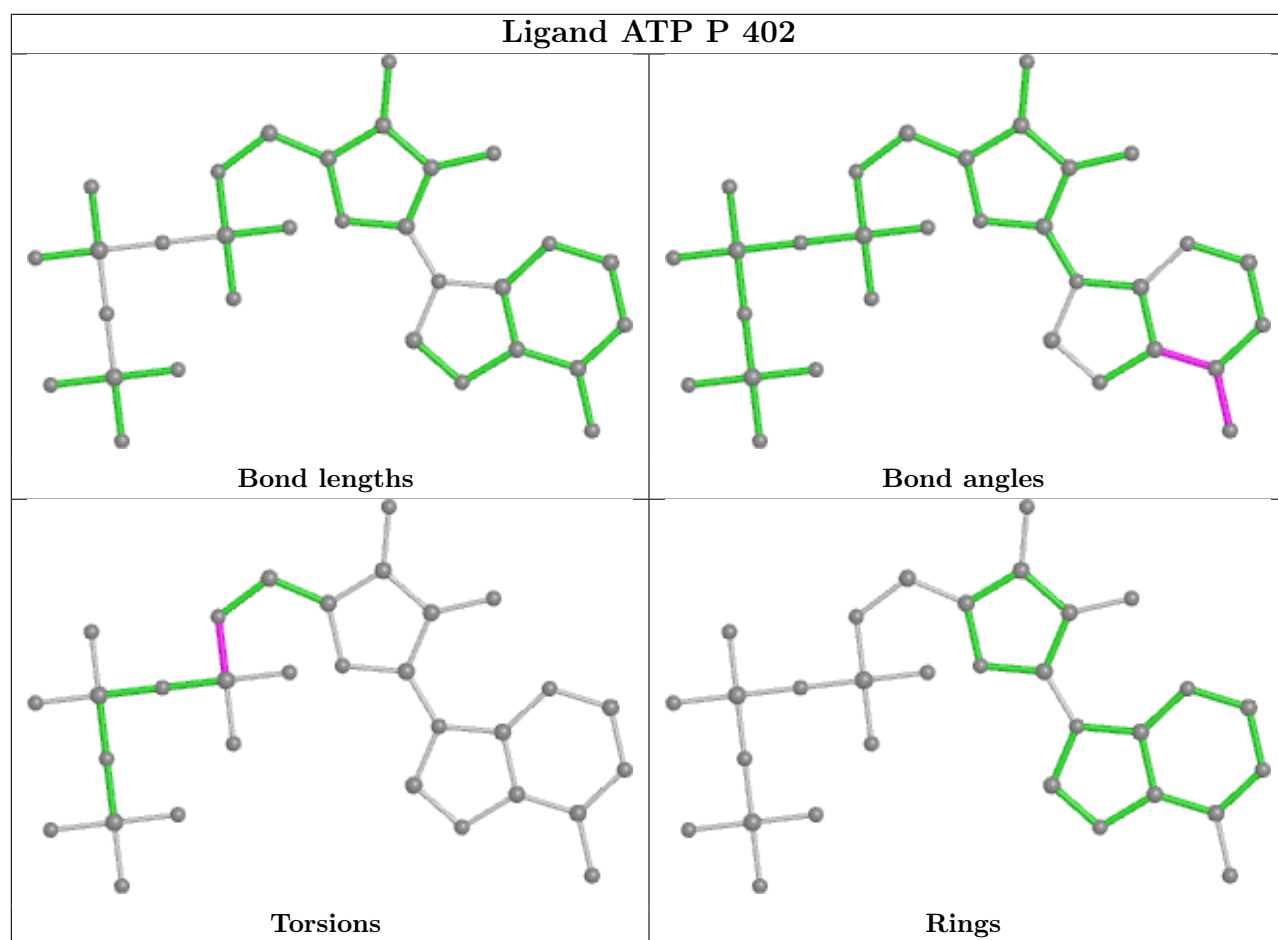


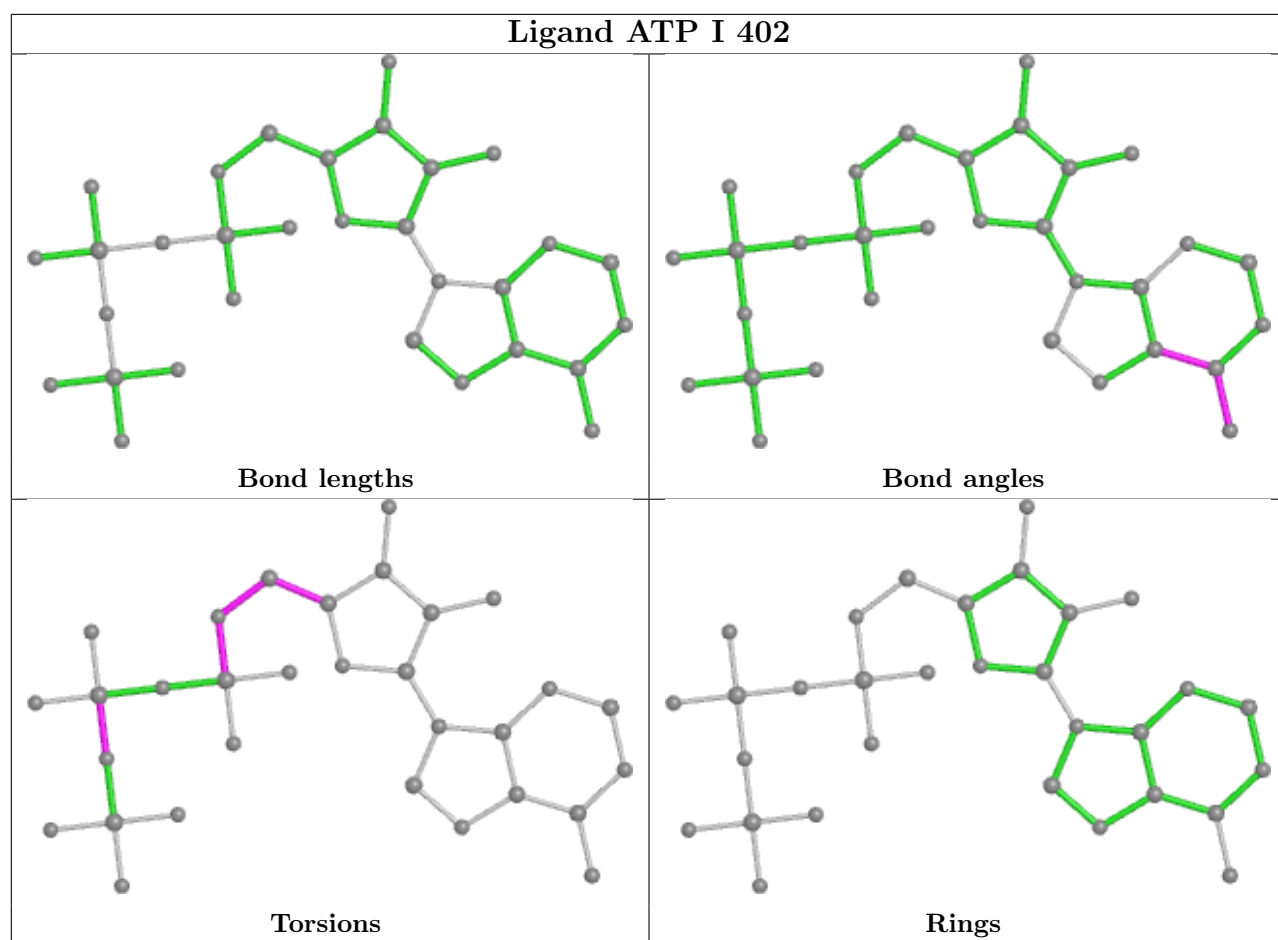


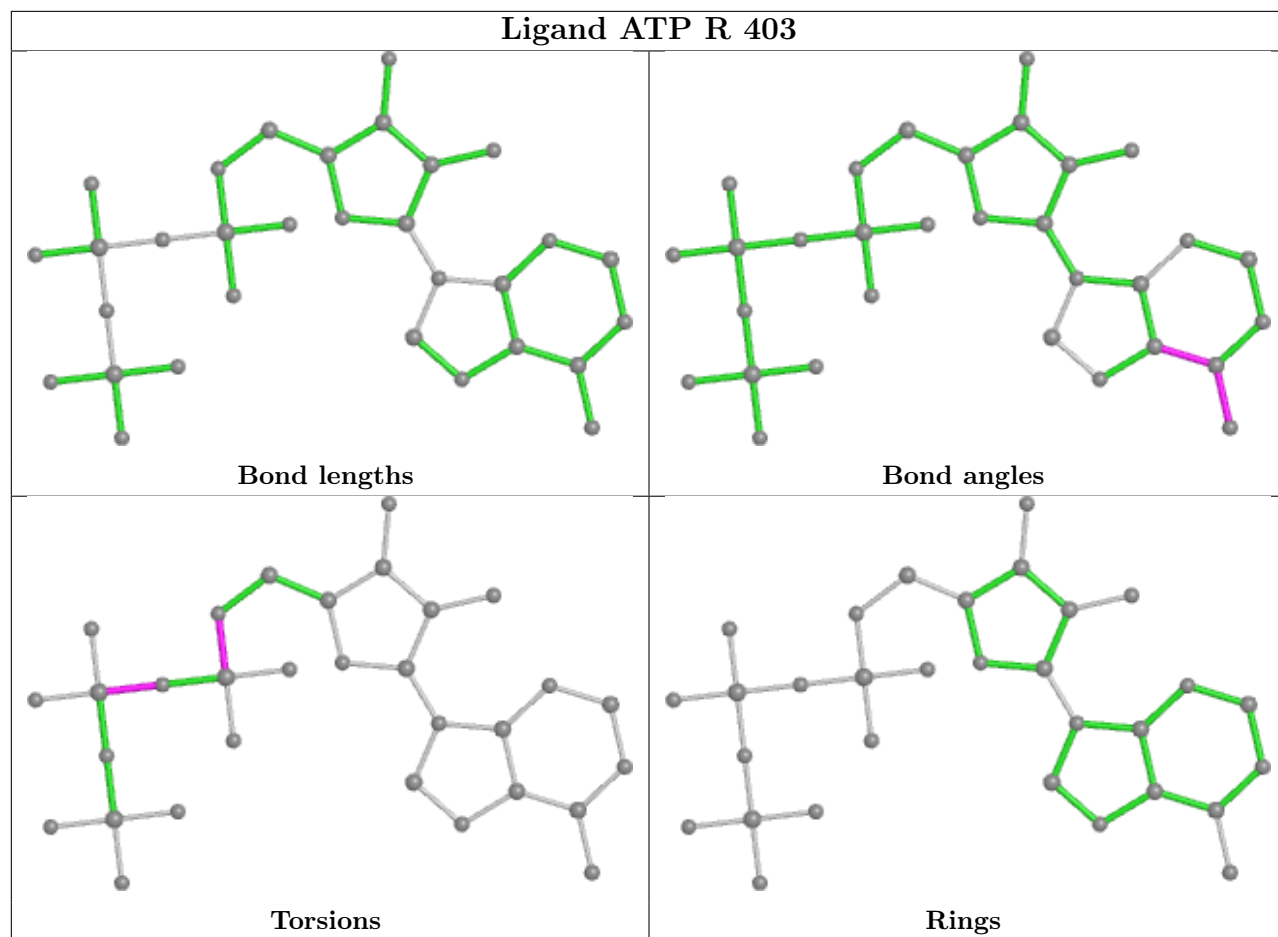


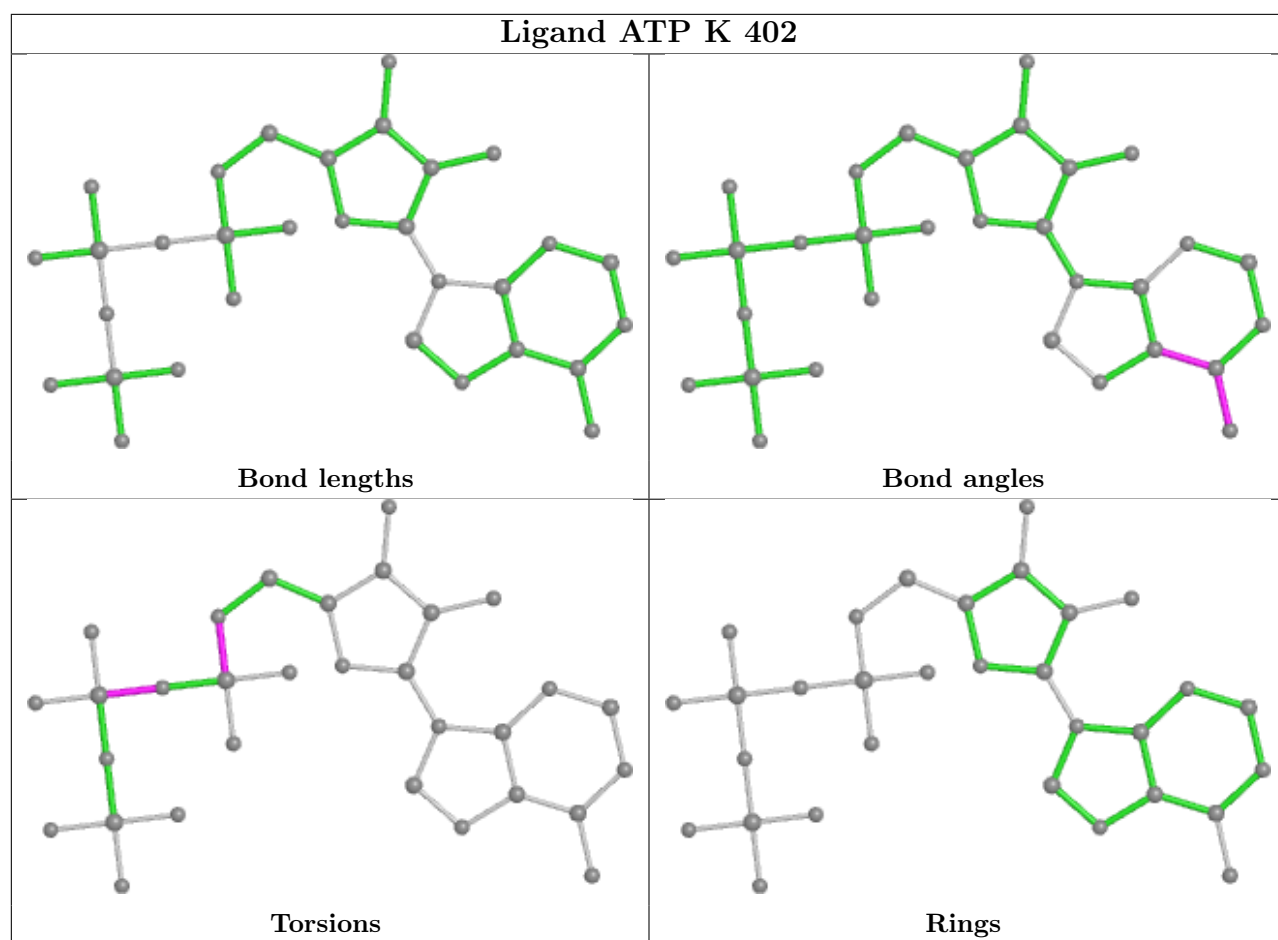


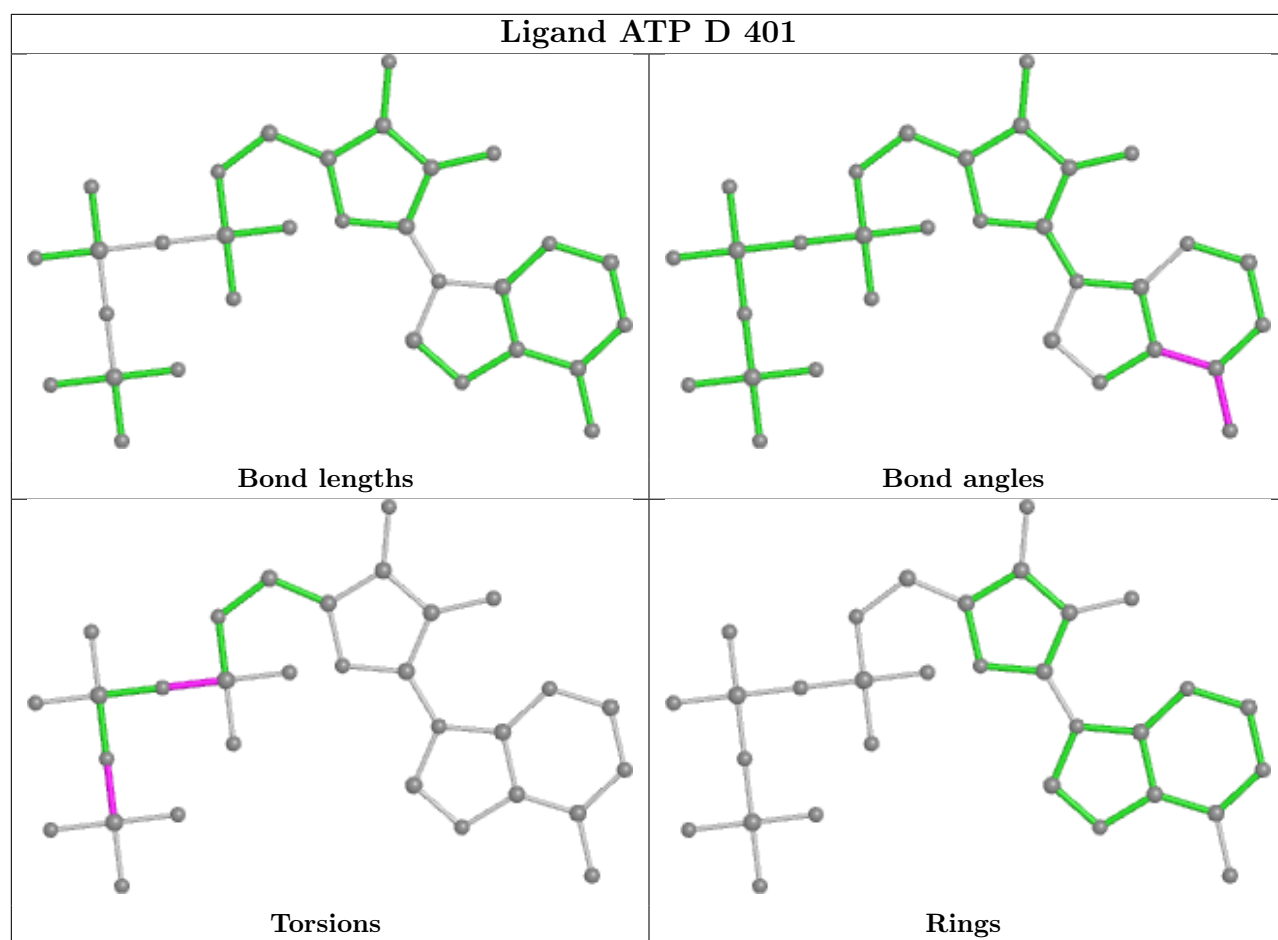


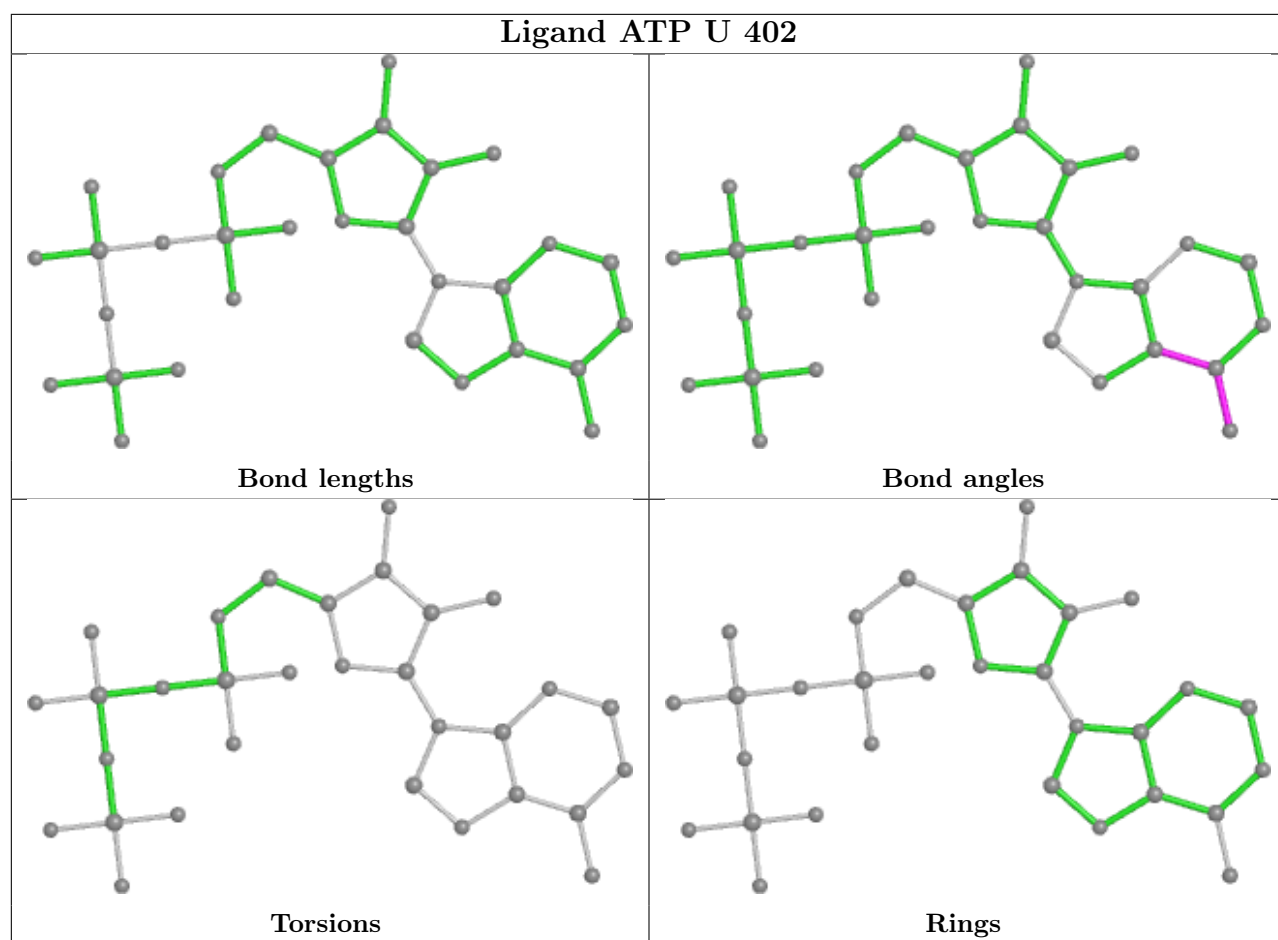


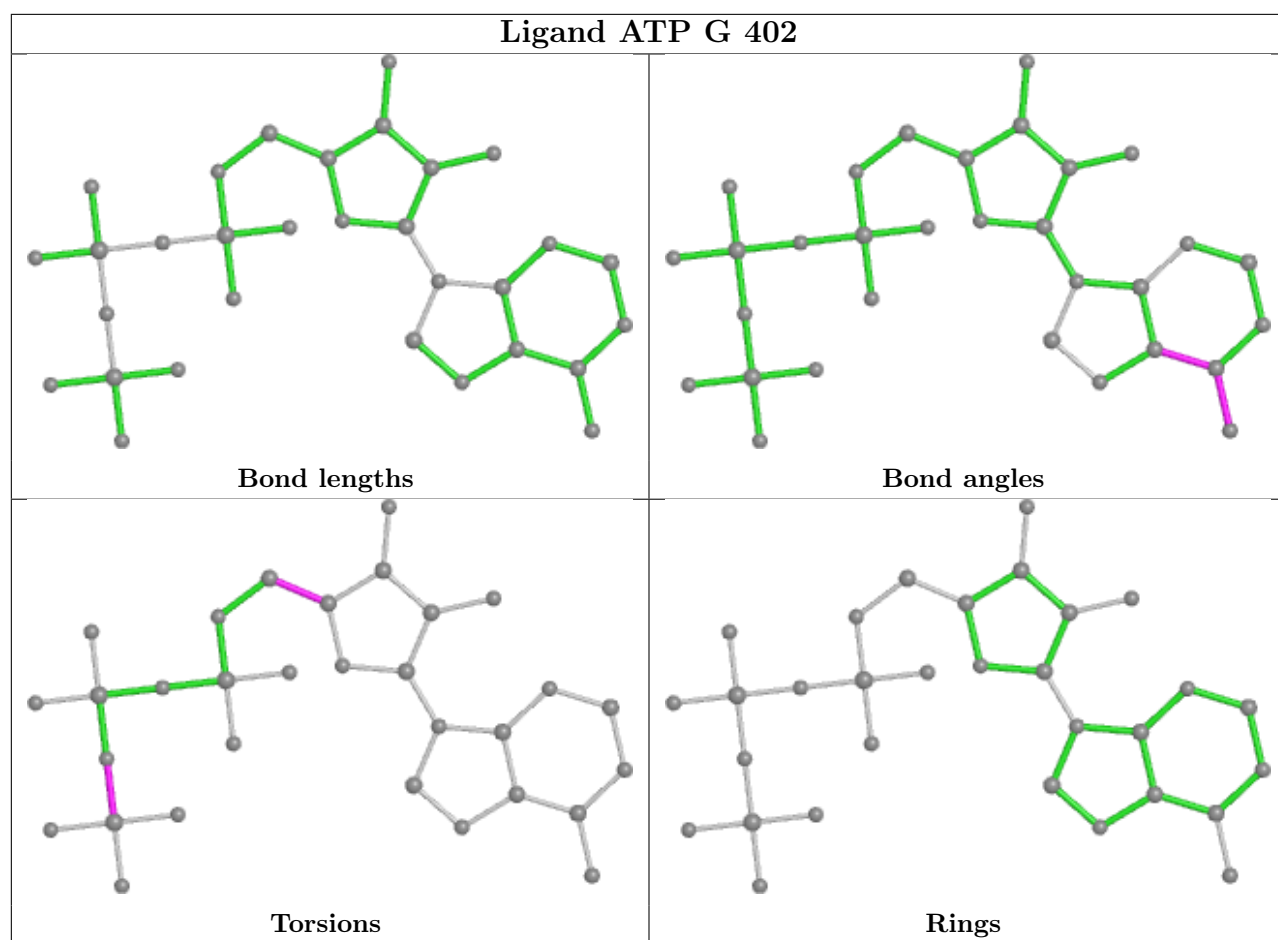


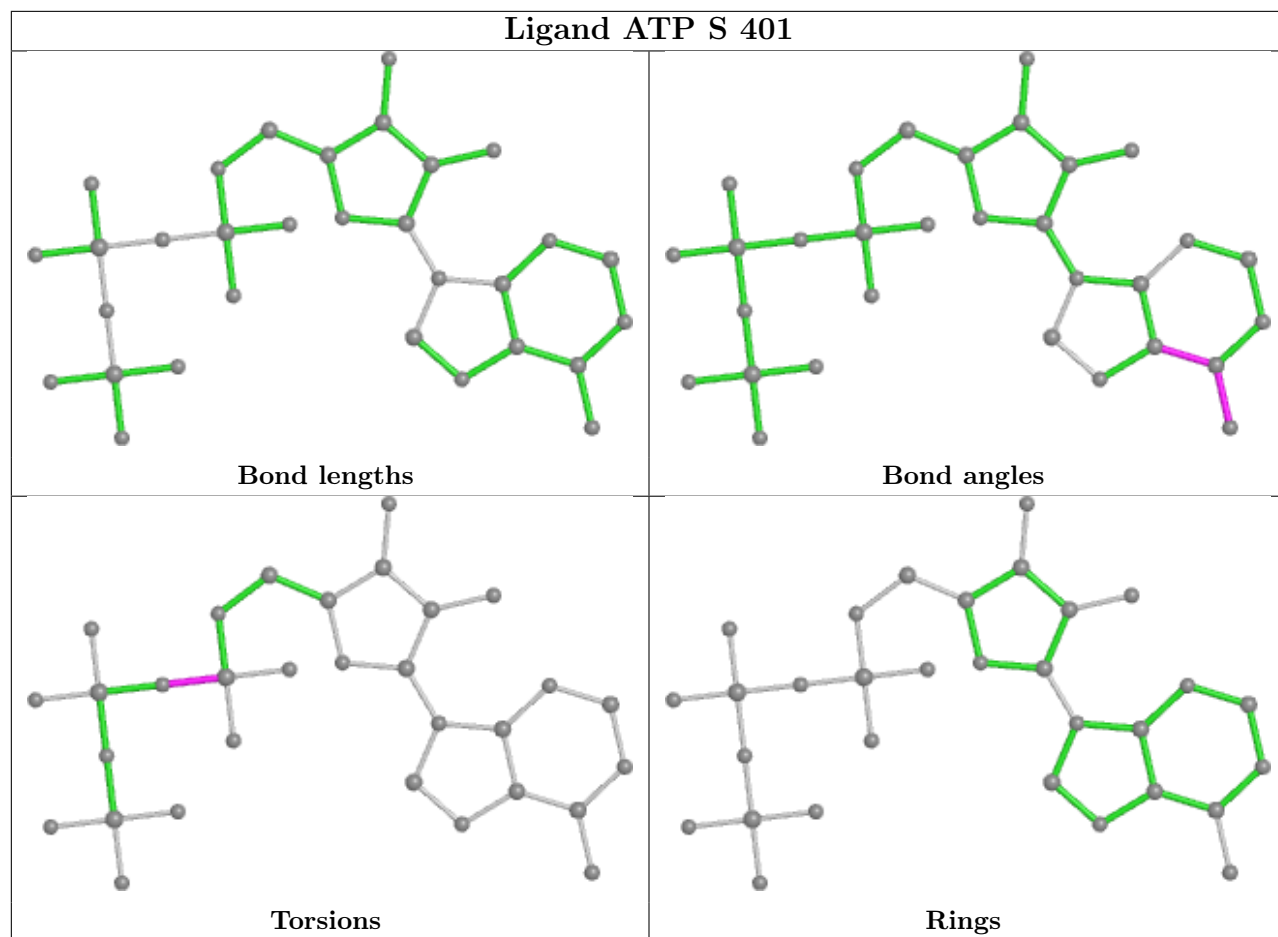


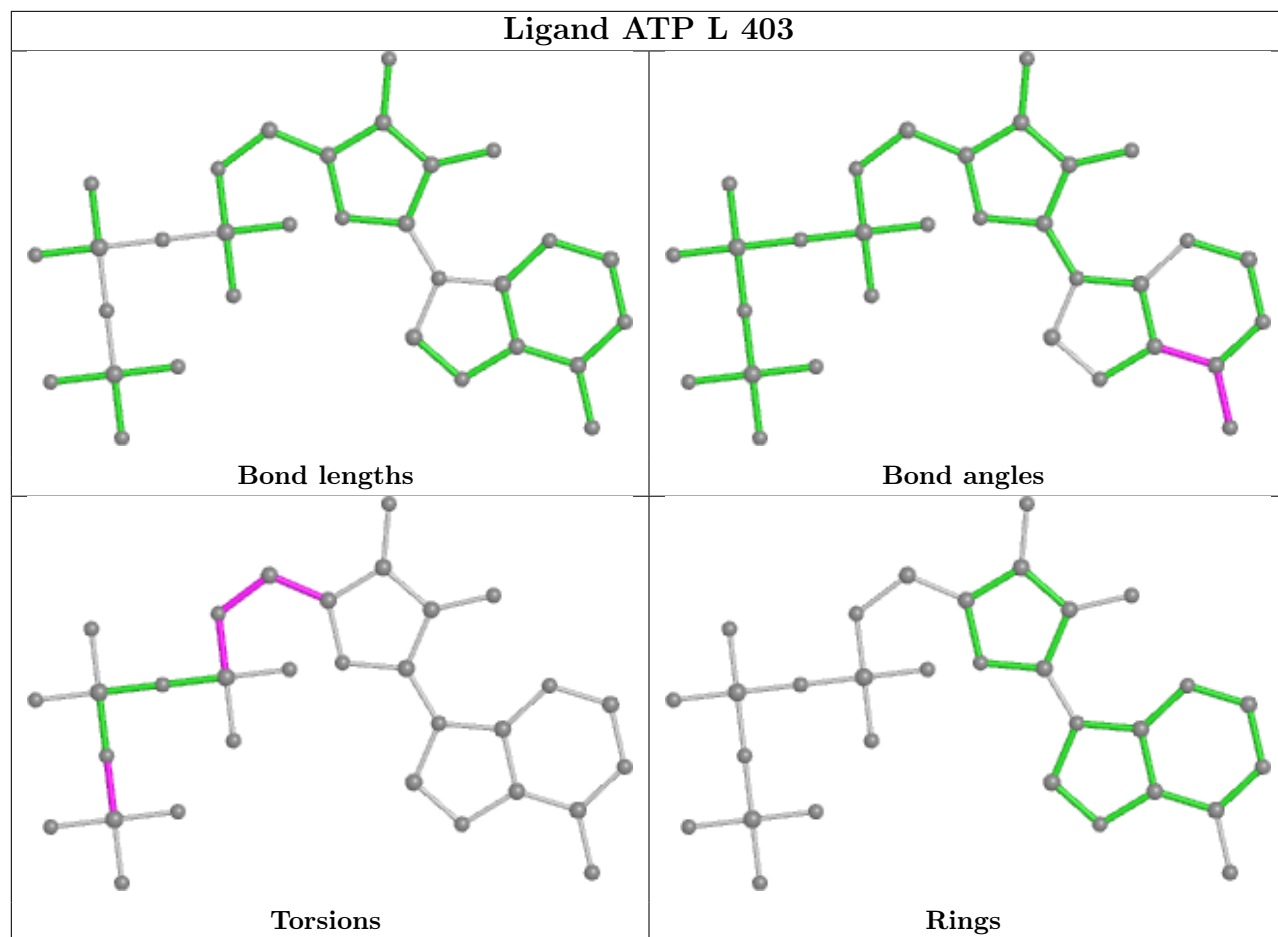


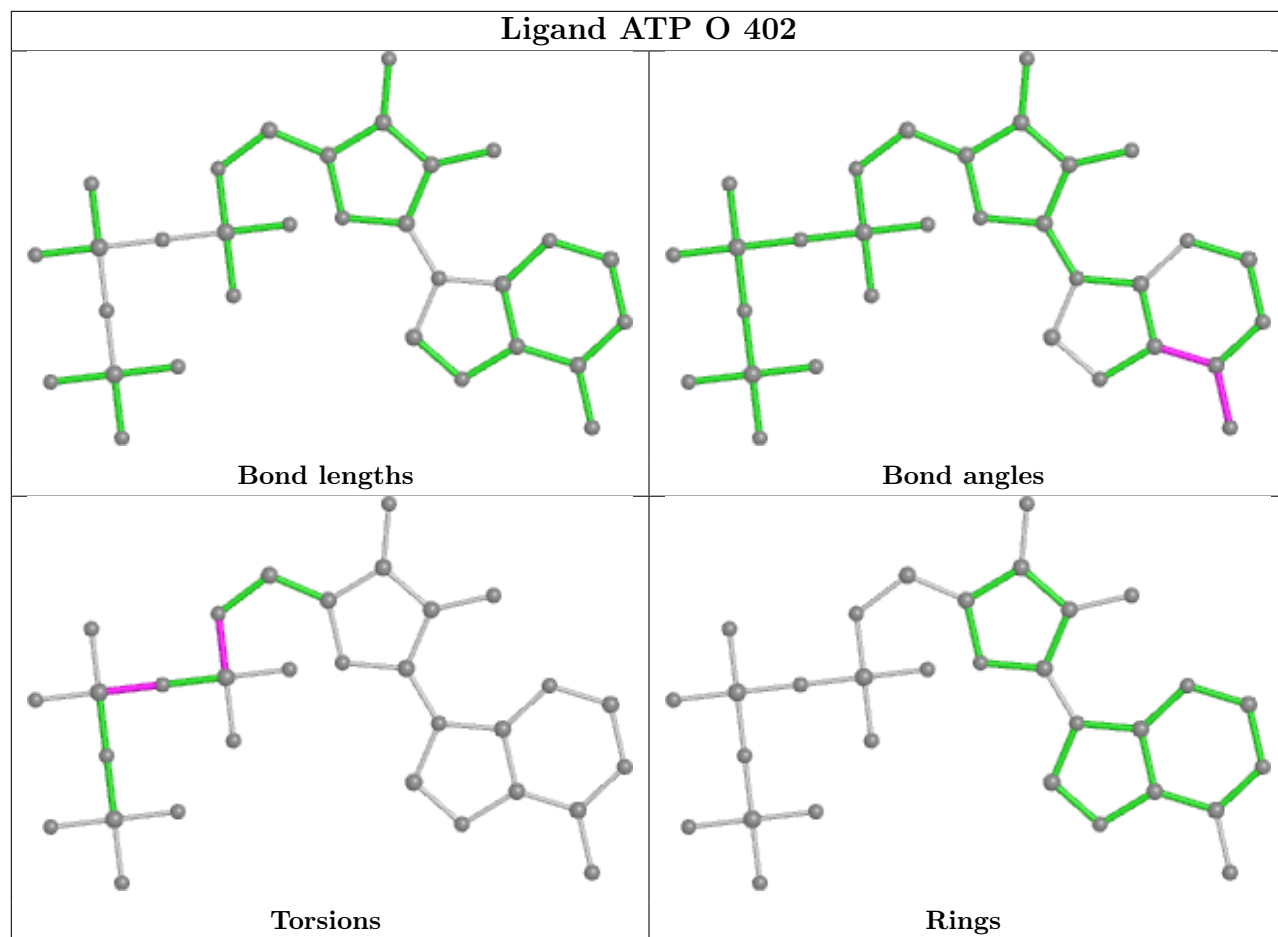


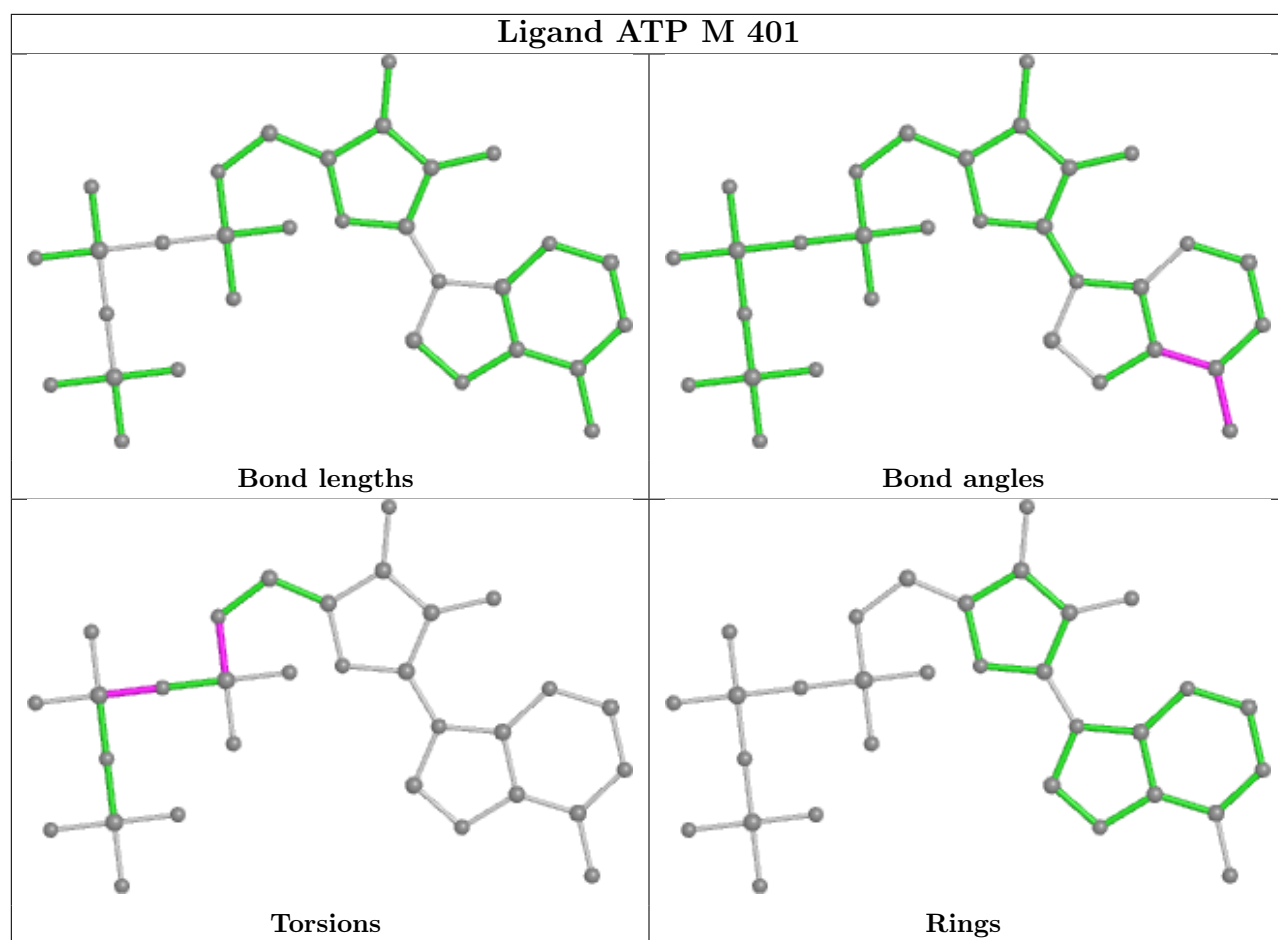


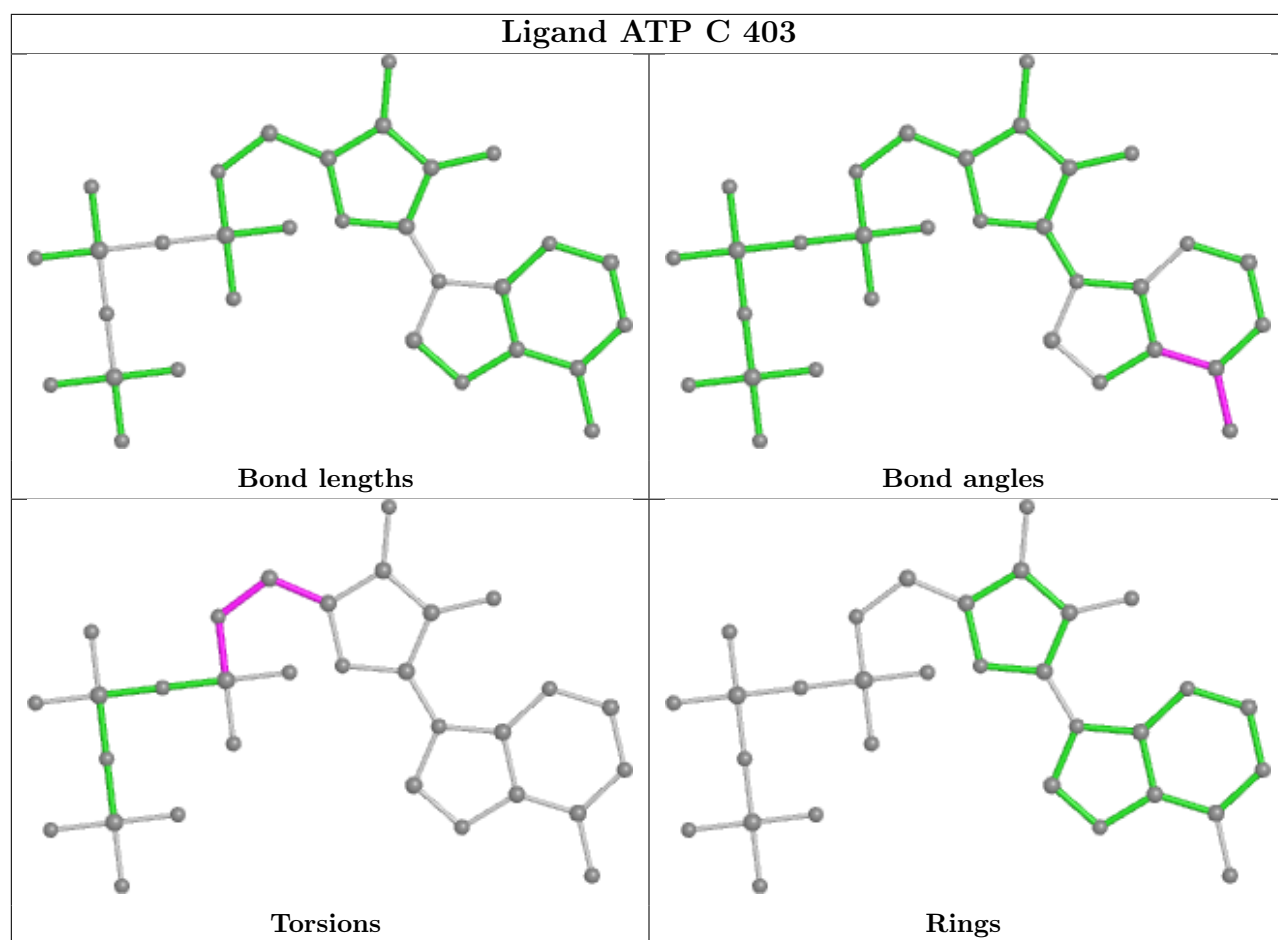


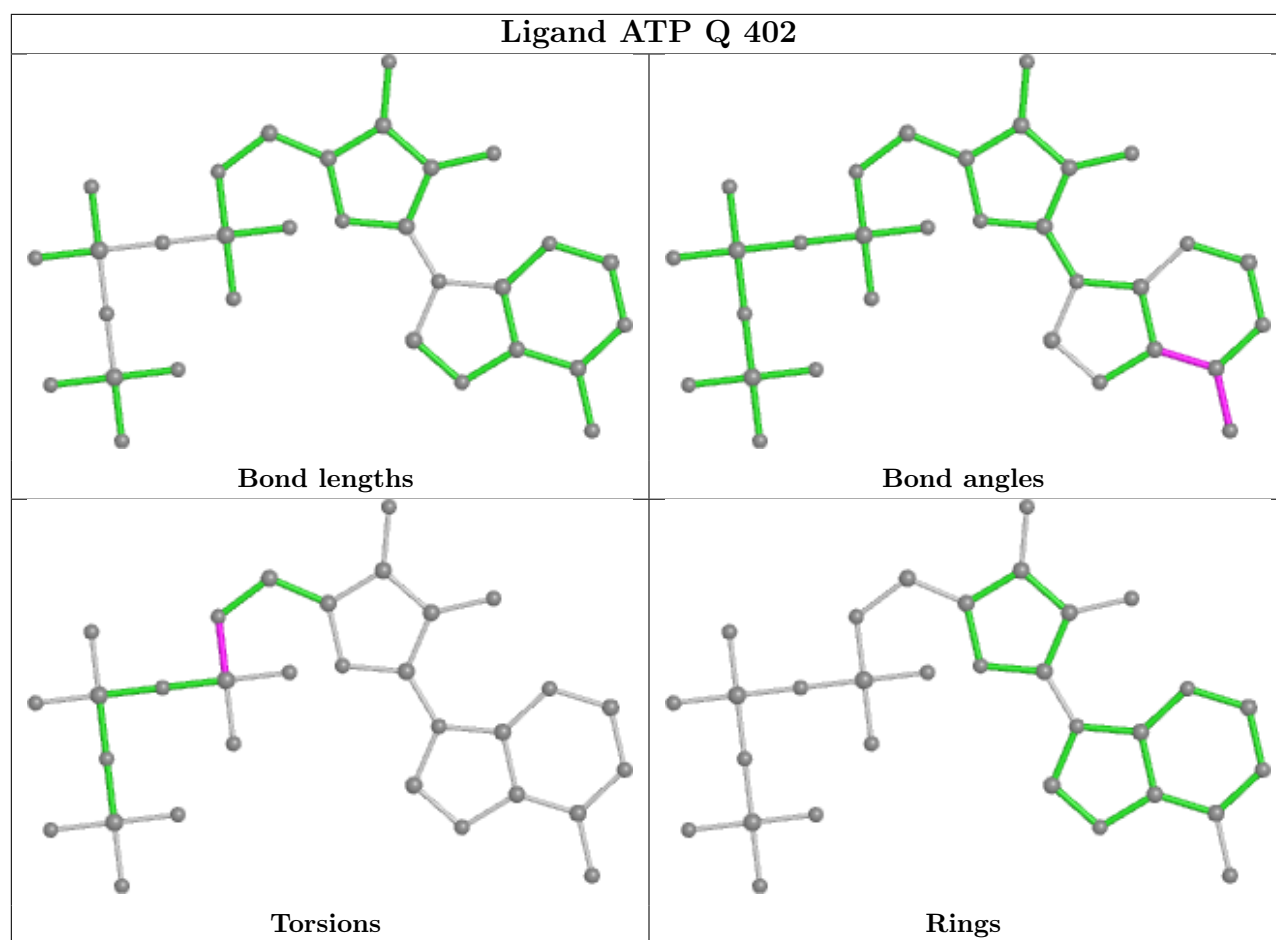












5.7 Other polymers [i](#)

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

This section contains visualisations of the EMDB entry EMD-63242. 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

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

6.5 Orthogonal surface views

This section was not generated.

6.6 Mask visualisation

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

7 Map analysis ⓘ

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

7.1 Map-value distribution ⓘ

This section was not generated.

7.2 Volume estimate versus contour level ⓘ

This section was not generated.

7.3 Rotationally averaged power spectrum ⓘ

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation

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

9 Map-model fit

This section was not generated.