



wwPDB EM Validation Summary Report ⓘ

Mar 25, 2026 – 09:42 AM UTC

PDB ID : 3J1F / pdb_00003j1f
EMDB ID : EMD-5396
Title : Cryo-EM structure of 9-fold symmetric rATcpn-beta in ATP-binding state
Authors : Zhang, K.; Wang, L.; Liu, Y.X.; Wang, X.; Gao, B.; Hu, Z.J.; Ji, G.; Chan, K.Y.; Schulten, K.; Dong, Z.Y.; Sun, F.
Deposited on : 2012-02-06
Resolution : 6.20 Å(reported)
Based on initial model : 3KO1

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

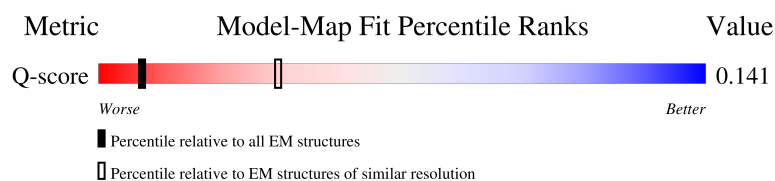
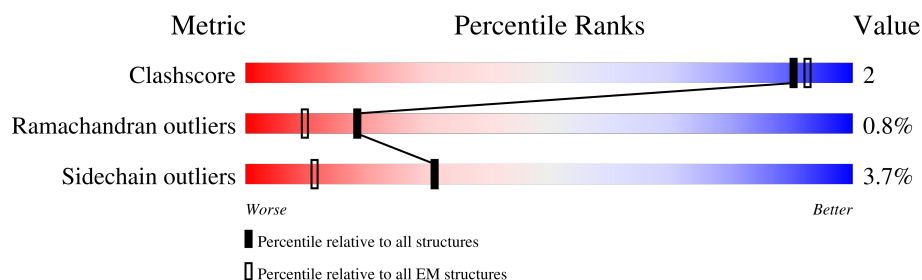
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data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

1 Overall quality at a glance

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

The reported resolution of this entry is 6.20 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.



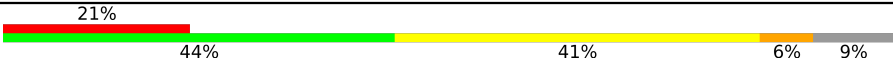
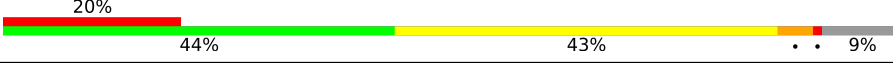
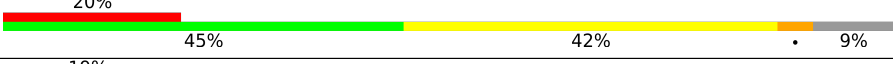
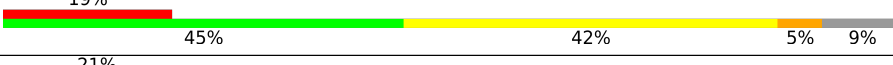
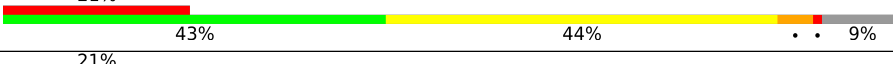
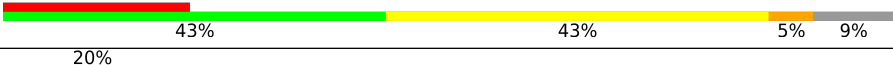
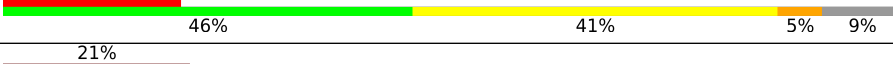
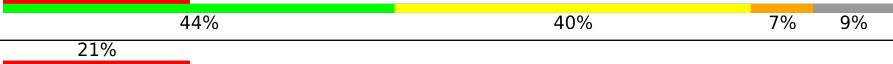
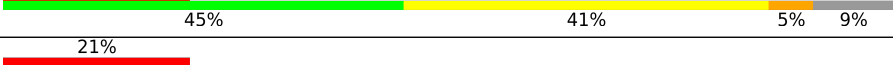
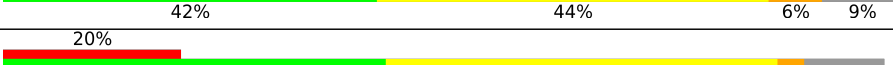
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	537 (5.70 - 6.70)

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	553	20% 47% 39% 5% 9%
1	B	553	21% 45% 39% 6% 9%
1	C	553	20% 42% 45% 5% 9%
1	D	553	20% 47% 41% • 9%

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Mol	Chain	Length	Quality of chain
1	E	553	
1	F	553	
1	G	553	
1	H	553	
1	I	553	
1	K	553	
1	L	553	
1	M	553	
1	N	553	
1	O	553	
1	P	553	
1	Q	553	
1	R	553	
1	S	553	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 69858 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 Chaperonin beta subunit.

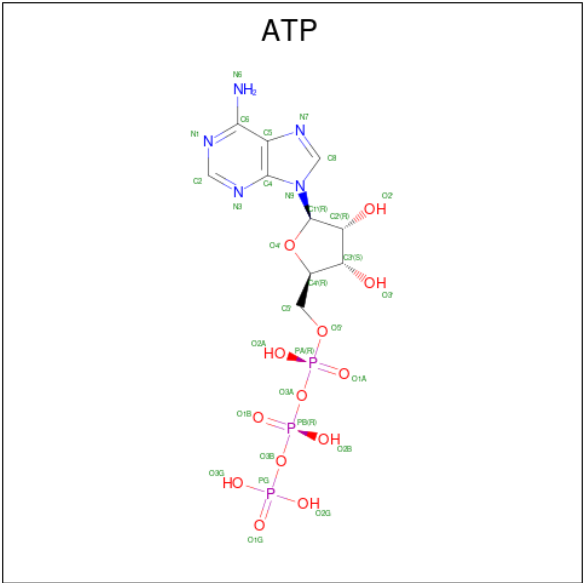
Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	B	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	C	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	D	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	E	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	F	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	G	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	H	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	I	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	K	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	L	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	M	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	N	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	O	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	P	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	Q	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		
1	R	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		

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Mol	Chain	Residues	Atoms					AltConf	Trace
1	S	505	Total	C	N	O	S	0	0
			3849	2423	658	757	11		

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: C₁₀H₁₆N₅O₁₃P₃).



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Mol	Chain	Residues	Atoms					AltConf
2	L	1	Total	C	N	O	P	0
			31	10	5	13	3	
2	M	1	Total	C	N	O	P	0
			31	10	5	13	3	
2	N	1	Total	C	N	O	P	0
			31	10	5	13	3	
2	O	1	Total	C	N	O	P	0
			31	10	5	13	3	
2	P	1	Total	C	N	O	P	0
			31	10	5	13	3	
2	Q	1	Total	C	N	O	P	0
			31	10	5	13	3	
2	R	1	Total	C	N	O	P	0
			31	10	5	13	3	
2	S	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
3	A	1	Total	Mg	0
			1	1	
3	B	1	Total	Mg	0
			1	1	
3	C	1	Total	Mg	0
			1	1	
3	D	1	Total	Mg	0
			1	1	
3	E	1	Total	Mg	0
			1	1	
3	F	1	Total	Mg	0
			1	1	
3	G	1	Total	Mg	0
			1	1	
3	H	1	Total	Mg	0
			1	1	
3	I	1	Total	Mg	0
			1	1	
3	K	1	Total	Mg	0
			1	1	
3	L	1	Total	Mg	0
			1	1	

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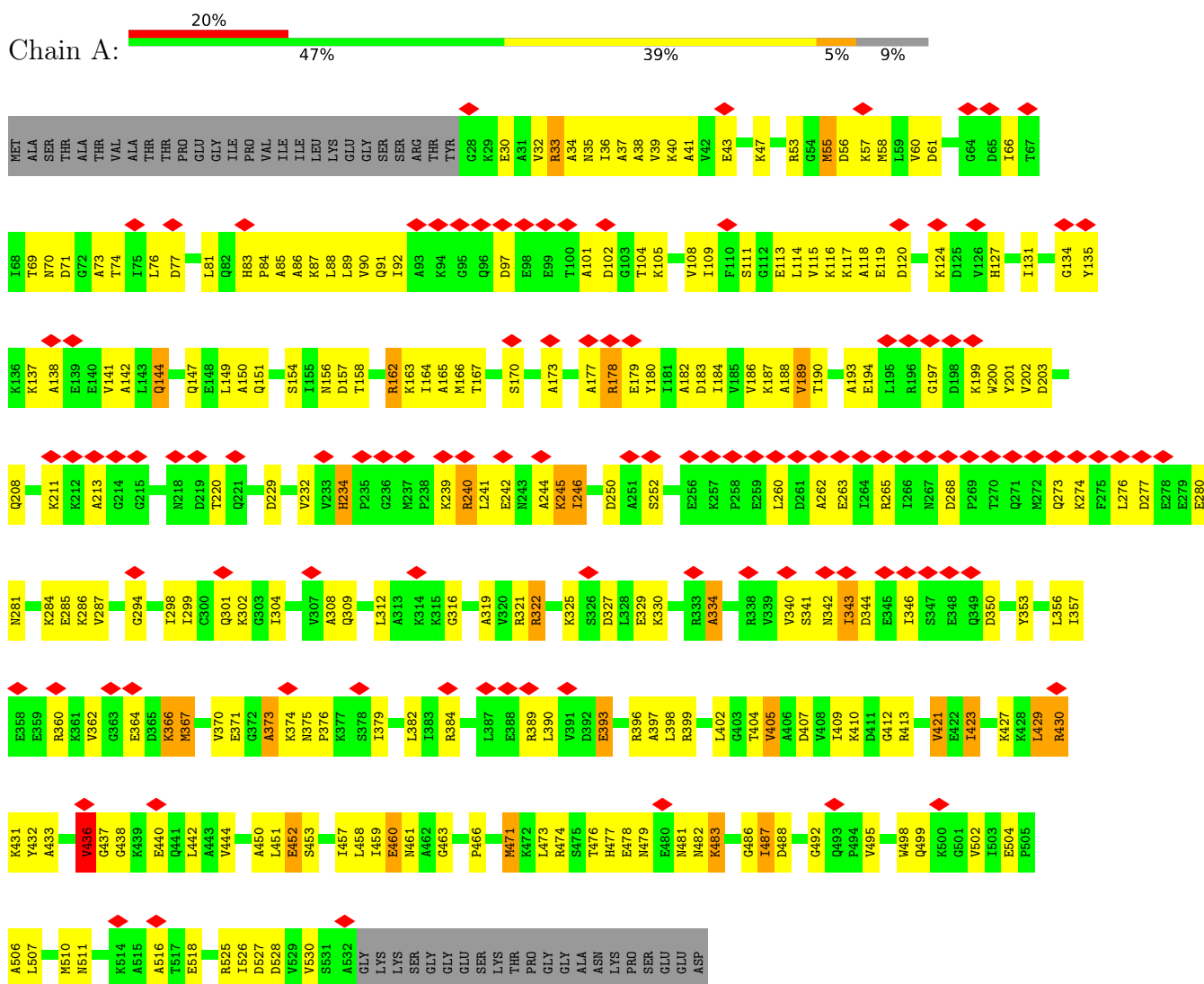
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Mol	Chain	Residues	Atoms		AltConf
3	M	1	Total 1	Mg 1	0
3	N	1	Total 1	Mg 1	0
3	O	1	Total 1	Mg 1	0
3	P	1	Total 1	Mg 1	0
3	Q	1	Total 1	Mg 1	0
3	R	1	Total 1	Mg 1	0
3	S	1	Total 1	Mg 1	0

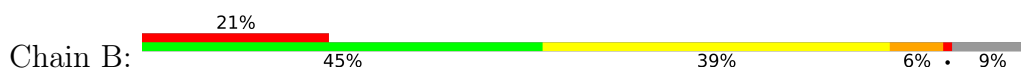
3 Residue-property plots

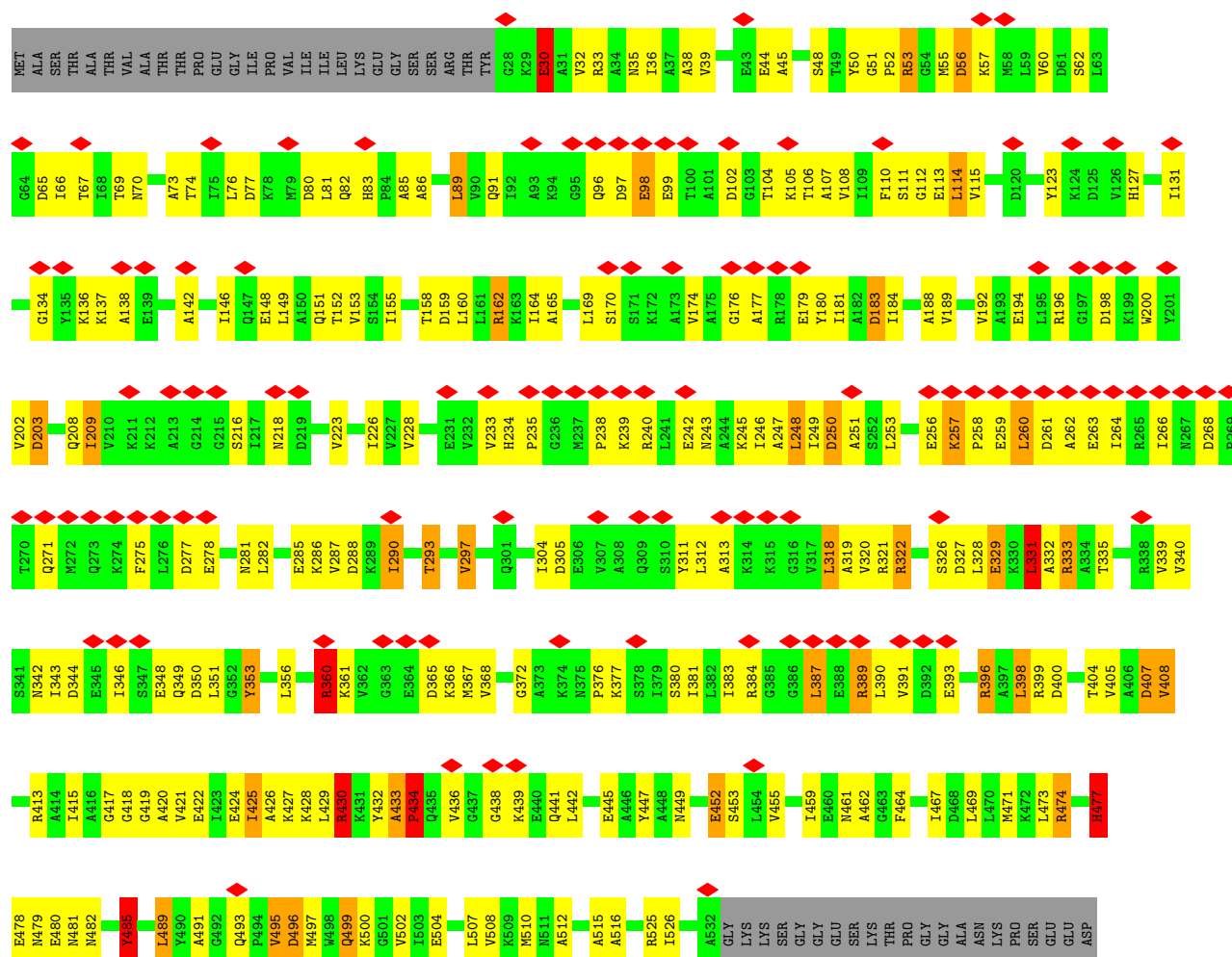
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Chaperonin beta subunit

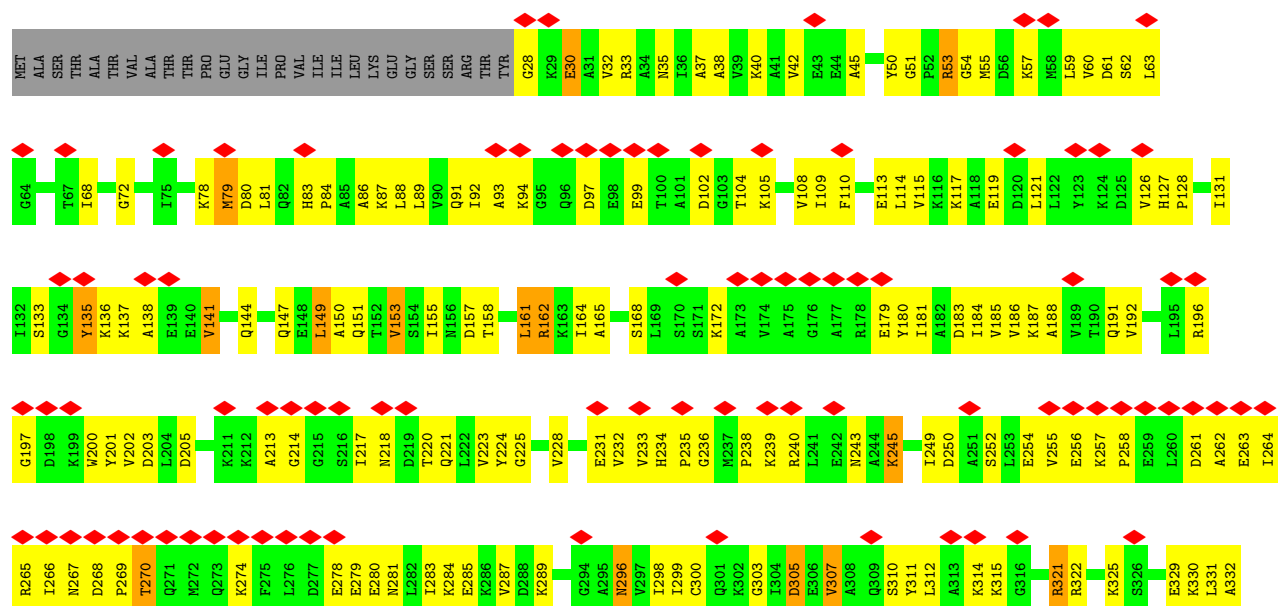


• Molecule 1: Chaperonin beta subunit



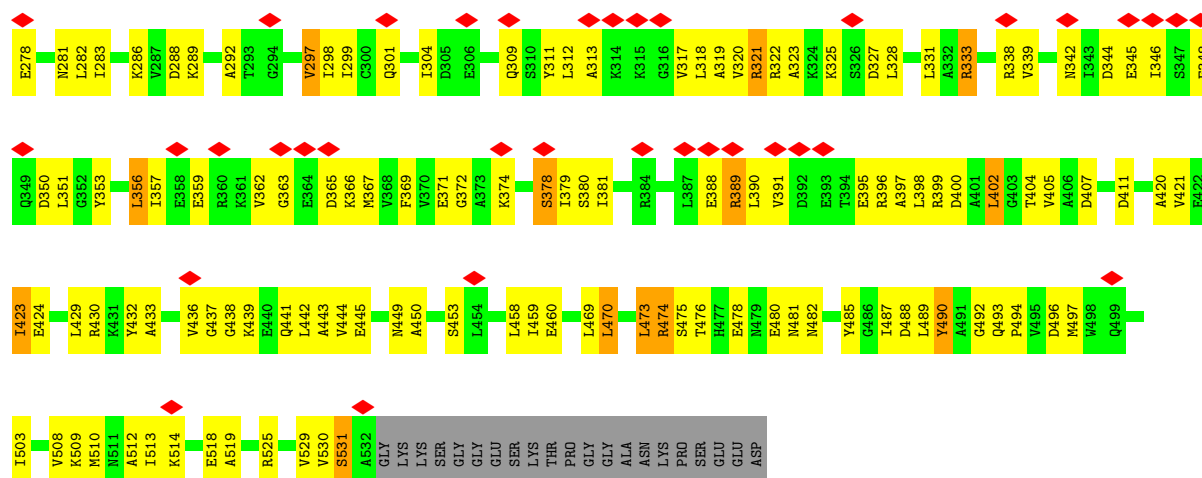


● Molecule 1: Chaperonin beta subunit

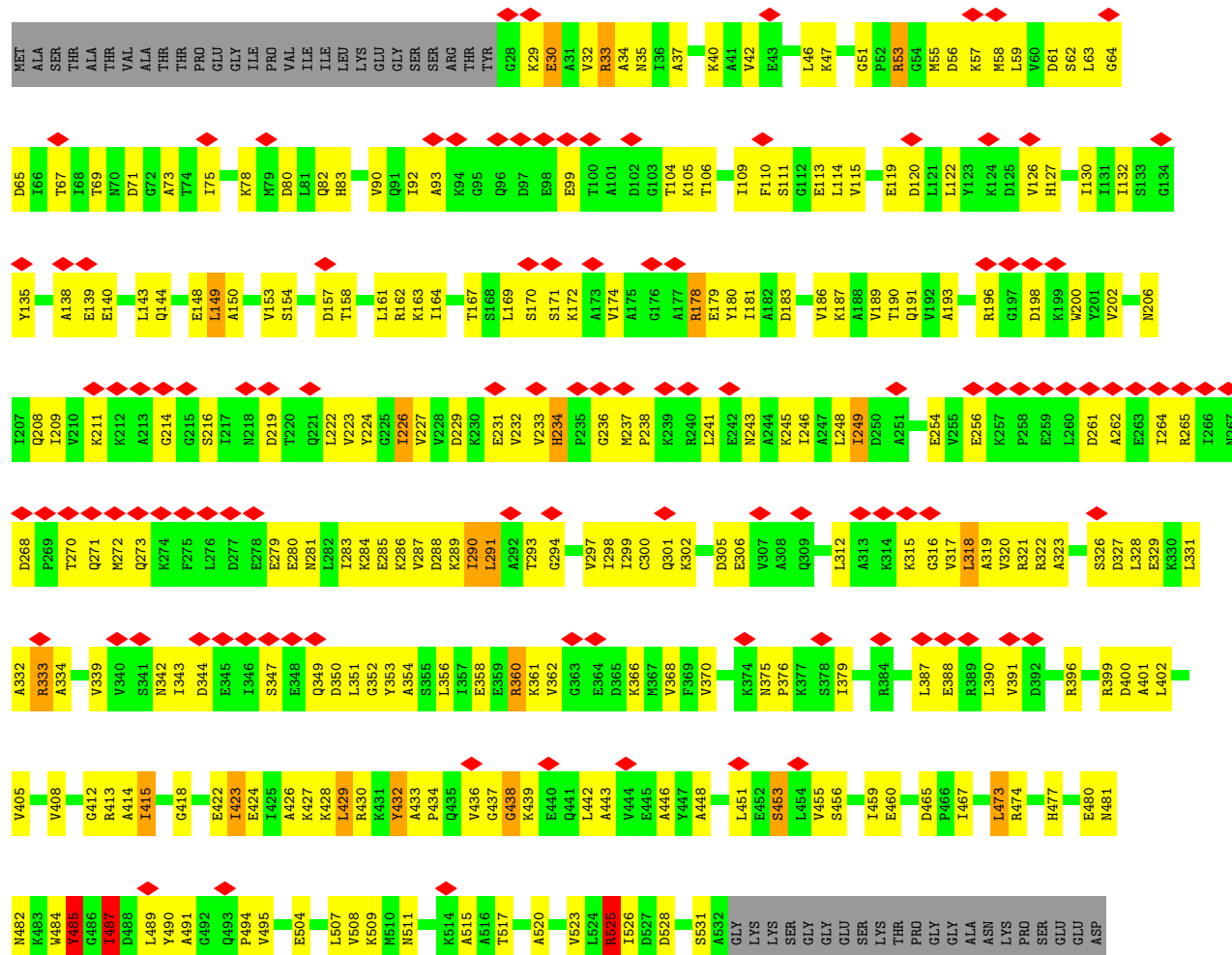
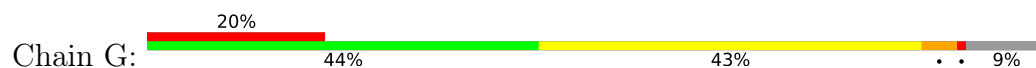








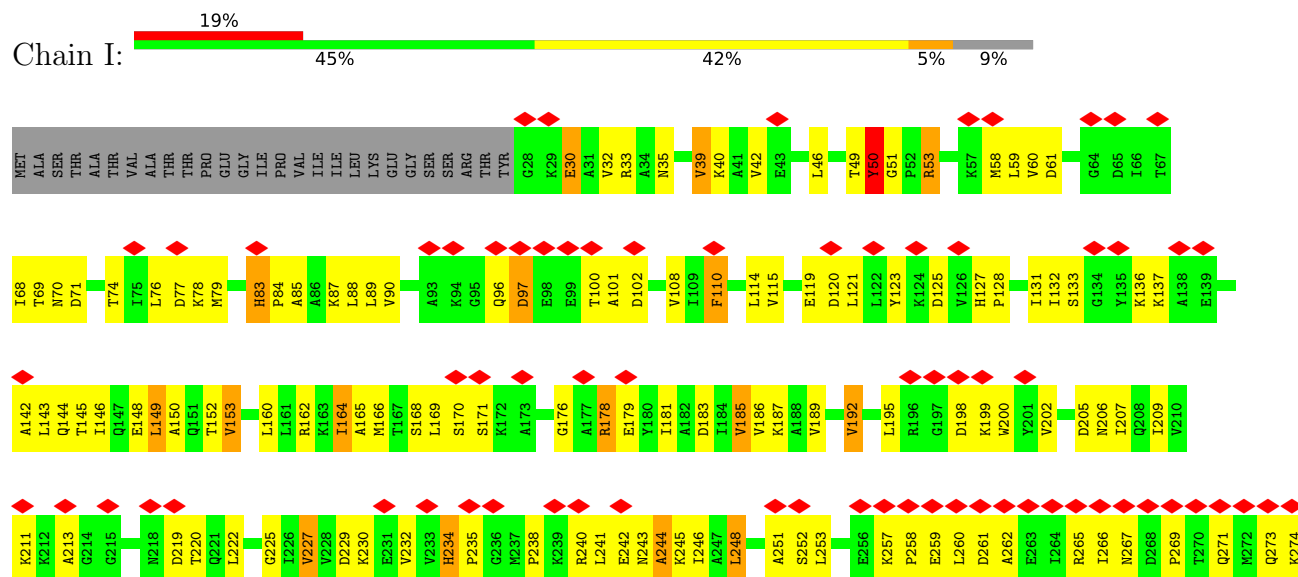
• Molecule 1: Chaperonin beta subunit

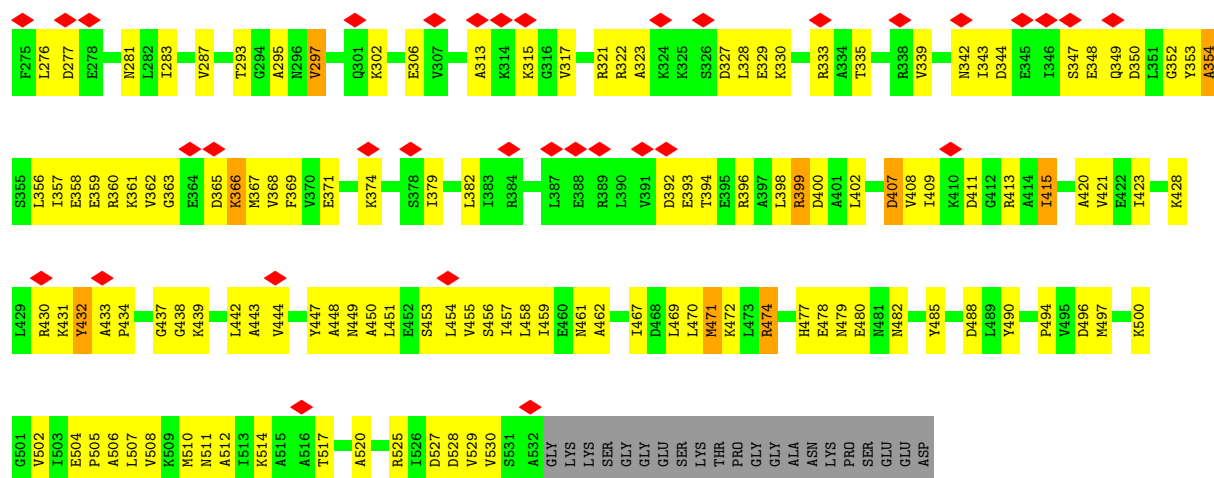


• Molecule 1: Chaperonin beta subunit

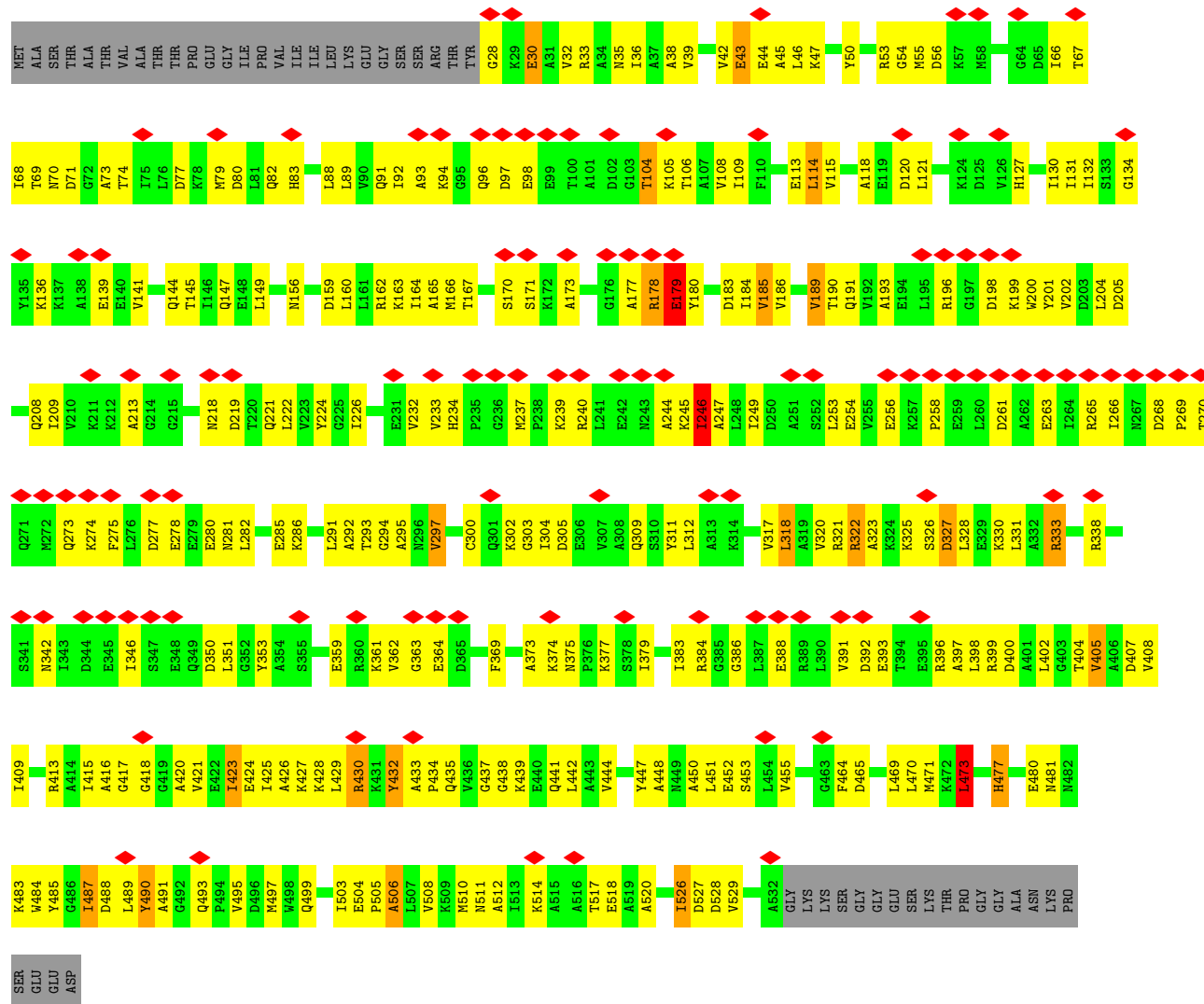
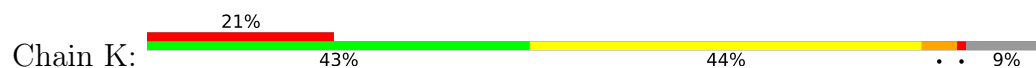


• Molecule 1: Chaperonin beta subunit





• Molecule 1: Chaperonin beta subunit



Chain L:



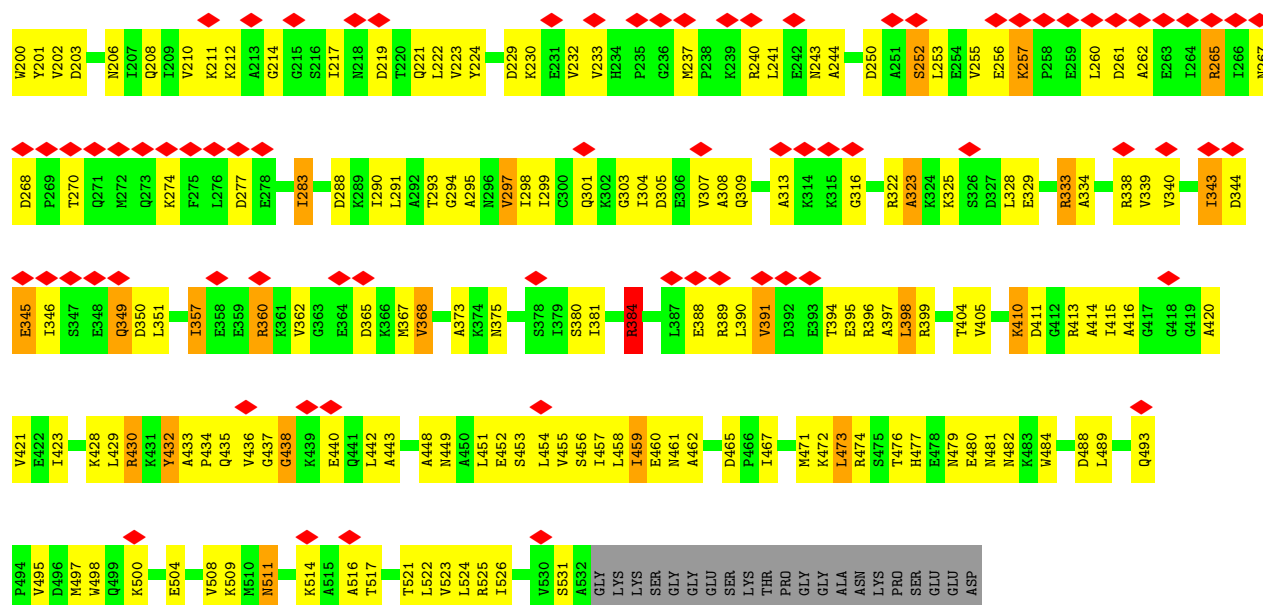
Chain M:



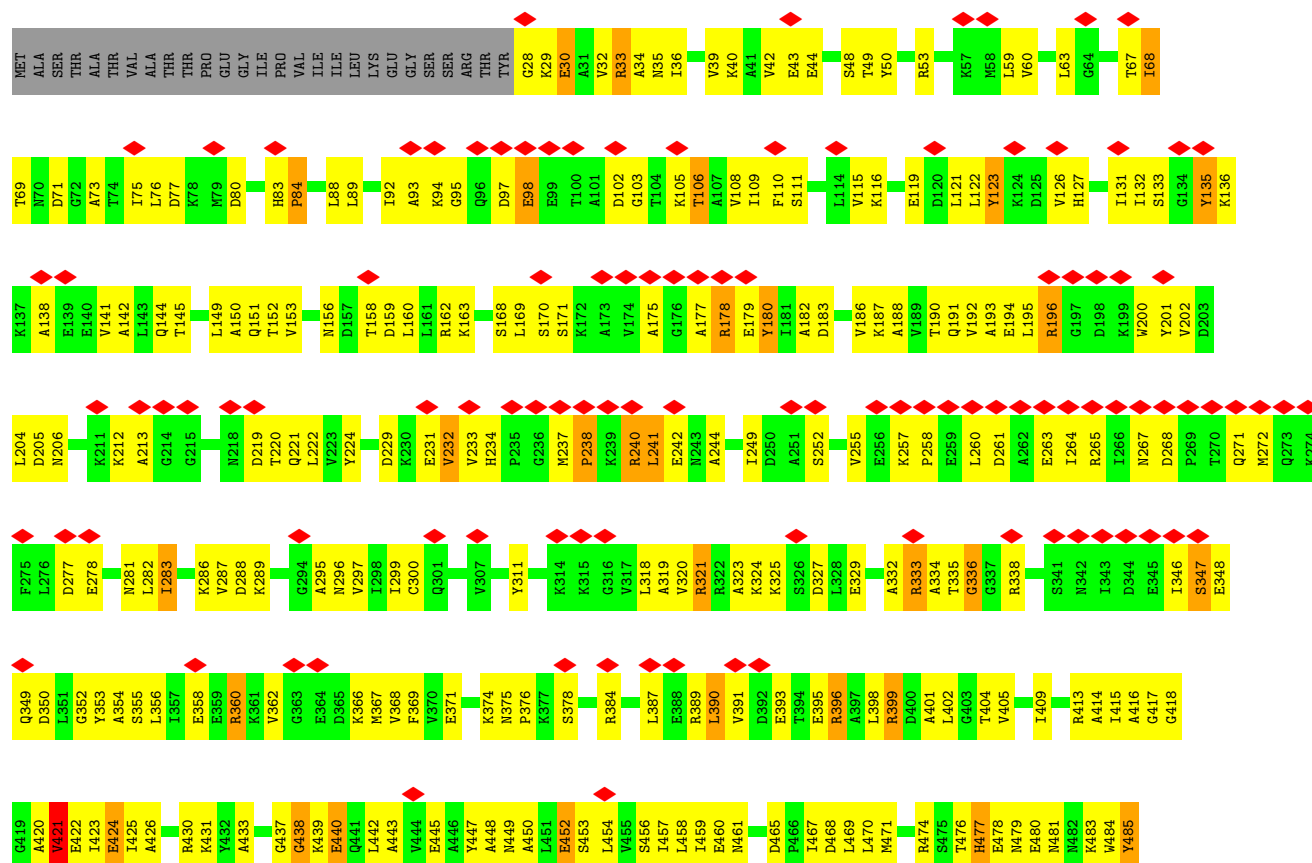


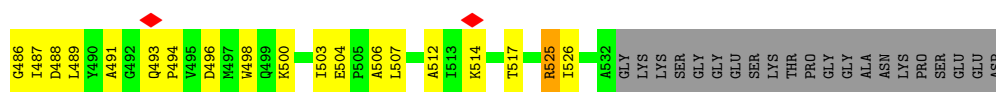
Chain O:



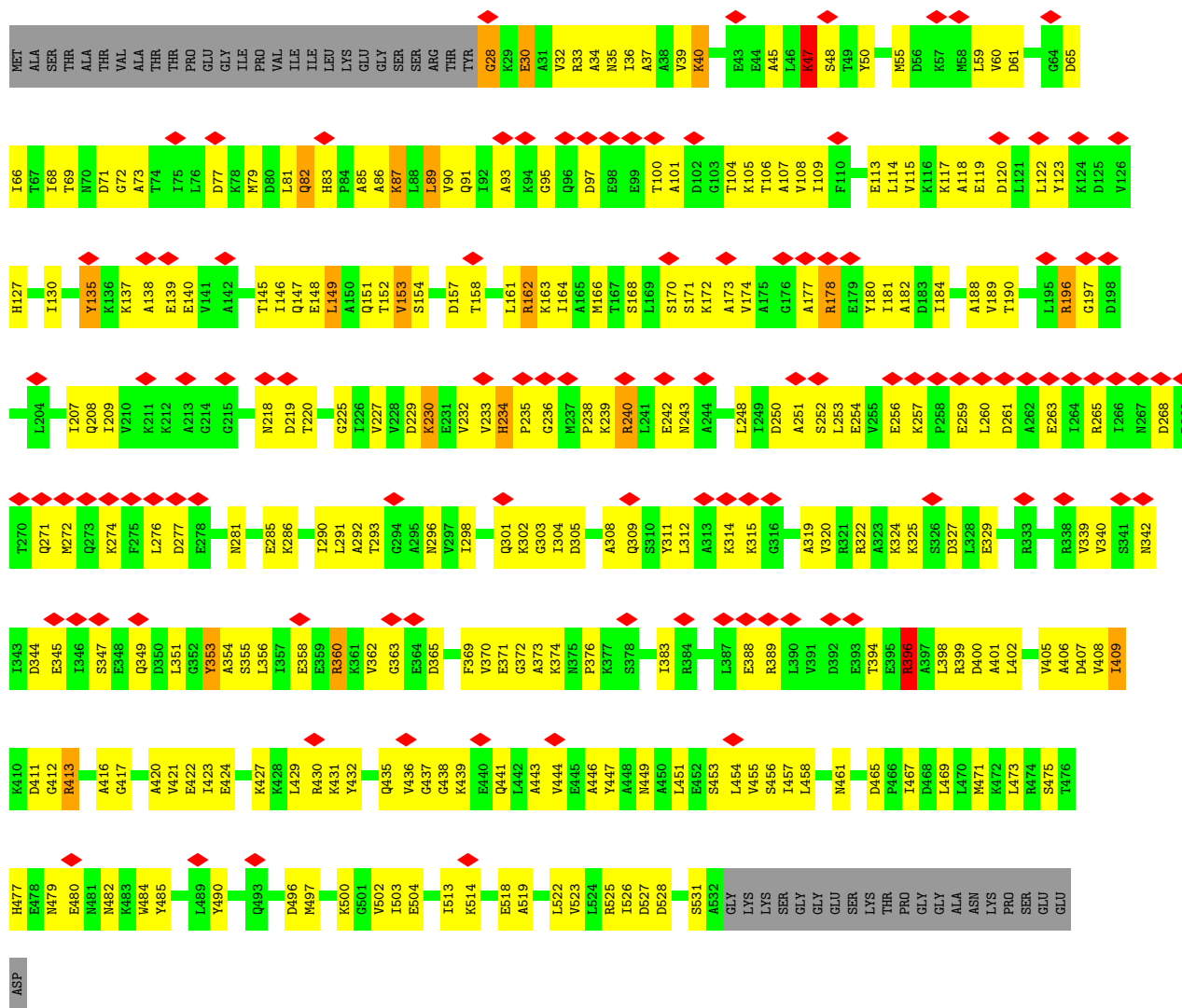
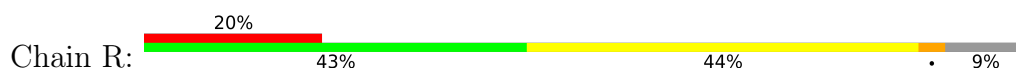


• Molecule 1: Chaperonin beta subunit

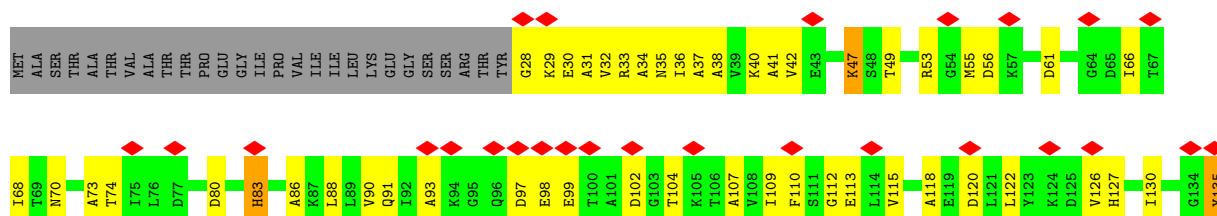




• Molecule 1: Chaperonin beta subunit



• Molecule 1: Chaperonin beta subunit



N511	A512	F513	K514	A515	A516	F517	E518	A519	A520	T521	L522	V523		F526	D527	V529	V530	S531	A532	GLY	LYS	LYS	SER	GLY	GLY	GLU	SER	LYS	THR	PRO	GLY	GLY	ALA	ASN	LYS	PRO	SER	SER	GLU	GLU	ASP																				
E424	I425	A426	K427	K428	L429	R430		A433	V436	G437	G438	K439		E440	Q441	V444	Y447		L451	E452	S453	L454	V455	S456	I457	L458	I459	E460	N461		D468	L469	L470	N471		N481	N482	K483	W484		L489	Y490		Q493	P494	V495	D496		K500	G501	V502	I503	E504		L507	V508					
Q349		G352		S355	L356	I357	E358	E359	R360	K361	V362	G363	E364	D365		V368	F369	V370		K374	N375	P376	K377	S378	I379	S380		R384		L387	E388	R389	L390	V391	D392	E393	T394		R396	A397	L398	R399	D400		V405	A406	D407	V408	I409		R413		A416	G417	G418	A420		I423			
M272	Q273	K274	F275	L276	D277	E278		E279	E280	N281		E285	K286	V287		A292	T293	G294		A296	N296	V297	I298	I299	Q300	Q301		D305	E306		Q309	S310	Y311	L312	A313	K314	K315	G316		V320	R321	R322	A323	K324	K325	S326	D327		R333		R338	V339	V340	S341	N342	I343	D344	E345	I346	S347	E348
K211	K212	A213	G214	G215	S216	I217	N218	D219	T220	Q221	L222	V223	Y224	G225	I226		D229	K230		E231	V232	V233	H234	P235	G236	M237	P238	K239	R240	L241	E242	N243	A244	K245	I246	A247	L248	I249	D250	A251	S252	L253	E254	V255	E256	K257	P258	E259	L260	D261	A262	E263	I264	R265	I266	N267	D268	P269	T270	Q271	
A138	E139		A142	L143		I146		L149	A150	Q151	T152	V153	S154	I155	N156	D157	T158		L161	R162	K163		T167	S168	L169	S170	S171	K172	A173	V174	A175	G176	A177	R178	E179	Y180	I181	D182	D183	I184	V185	V186	K187		V192		L195	R196	G197	D198		Y201		L204		Q208	I209	V210			

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C9	Depositor
Number of particles used	28374	Depositor
Resolution determination method	Not provided	
CTF correction method	The whole micrograph	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	20	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	96000	Depositor
Image detector	GATAN ULTRASCAN 4000 (4k x 4k)	Depositor
Maximum map value	17.418	Depositor
Minimum map value	-16.157	Depositor
Average map value	-0.139	Depositor
Map value standard deviation	1.599	Depositor
Recommended contour level	4	Depositor
Map size ($\text{\AA}$)	298.56, 298.56, 298.56	wwPDB
Map dimensions	160, 160, 160	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.8659999, 1.8659999, 1.8659999	Depositor

5 Model quality

5.1 Standard geometry

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

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	2.14	110/3886 (2.8%)	2.49	256/5245 (4.9%)
1	B	2.13	114/3886 (2.9%)	2.46	250/5245 (4.8%)
1	C	2.19	125/3886 (3.2%)	2.48	279/5245 (5.3%)
1	D	2.13	109/3886 (2.8%)	2.46	251/5245 (4.8%)
1	E	2.14	119/3886 (3.1%)	2.44	261/5245 (5.0%)
1	F	2.22	131/3886 (3.4%)	2.43	244/5245 (4.7%)
1	G	2.15	118/3886 (3.0%)	2.46	253/5245 (4.8%)
1	H	2.15	112/3886 (2.9%)	2.44	246/5245 (4.7%)
1	I	2.21	125/3886 (3.2%)	2.45	240/5245 (4.6%)
1	K	2.16	122/3886 (3.1%)	2.45	252/5245 (4.8%)
1	L	2.12	96/3886 (2.5%)	2.55	294/5245 (5.6%)
1	M	2.10	108/3886 (2.8%)	2.43	256/5245 (4.9%)
1	N	2.16	120/3886 (3.1%)	2.47	269/5245 (5.1%)
1	O	2.15	114/3886 (2.9%)	2.45	245/5245 (4.7%)
1	P	2.11	108/3886 (2.8%)	2.50	268/5245 (5.1%)
1	Q	2.14	95/3886 (2.4%)	2.51	297/5245 (5.7%)
1	R	2.13	119/3886 (3.1%)	2.50	279/5245 (5.3%)
1	S	2.14	107/3886 (2.8%)	2.46	254/5245 (4.8%)
All	All	2.15	2052/69948 (2.9%)	2.47	4694/94410 (5.0%)

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
1	A	0	9
1	B	0	16
1	C	0	15
1	D	0	12
1	E	0	7

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Mol	Chain	#Chirality outliers	#Planarity outliers
1	F	0	9
1	G	0	14
1	H	0	13
1	I	0	12
1	K	0	14
1	L	0	13
1	M	0	8
1	N	0	6
1	O	0	13
1	P	0	10
1	Q	0	17
1	R	0	12
1	S	0	7
All	All	0	207

The worst 5 of 2052 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	257	LYS	C-N	11.32	1.42	1.33
1	K	234	HIS	CA-C	-11.25	1.43	1.52
1	D	95	GLY	CA-C	-11.21	1.41	1.52
1	H	504	GLU	N-CA	-10.83	1.35	1.45
1	C	502	VAL	CA-C	10.57	1.61	1.52

The worst 5 of 4694 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	302	LYS	CA-C-N	15.09	134.68	120.34
1	I	302	LYS	C-N-CA	15.09	134.68	120.34
1	G	196	ARG	NE-CZ-NH1	-13.69	107.81	121.50
1	A	156	ASN	CA-CB-CG	-12.75	99.85	112.60
1	E	327	ASP	CA-CB-CG	-12.04	100.56	112.60

There are no chirality outliers.

5 of 207 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	135	TYR	Sidechain
1	A	178	ARG	Sidechain
1	A	234	HIS	Sidechain
1	A	240	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	A	33	ARG	Sidechain

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3849	0	3995	8	0
1	B	3849	0	3995	19	0
1	C	3849	0	3995	15	0
1	D	3849	0	3995	14	0
1	E	3849	0	3995	21	0
1	F	3849	0	3995	13	0
1	G	3849	0	3995	19	0
1	H	3849	0	3995	11	0
1	I	3849	0	3995	14	0
1	K	3849	0	3995	18	0
1	L	3849	0	3995	8	0
1	M	3849	0	3995	13	0
1	N	3849	0	3995	16	0
1	O	3849	0	3995	12	0
1	P	3849	0	3995	17	0
1	Q	3849	0	3995	14	0
1	R	3849	0	3995	7	0
1	S	3849	0	3995	10	0
2	A	31	0	12	0	0
2	B	31	0	12	0	0
2	C	31	0	12	0	0
2	D	31	0	12	0	0
2	E	31	0	12	0	0
2	F	31	0	12	0	0
2	G	31	0	12	0	0
2	H	31	0	12	0	0
2	I	31	0	12	0	0
2	K	31	0	12	0	0
2	L	31	0	12	0	0
2	M	31	0	12	0	0
2	N	31	0	12	0	0
2	O	31	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	P	31	0	12	0	0
2	Q	31	0	12	0	0
2	R	31	0	12	0	0
2	S	31	0	12	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	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	K	1	0	0	0	0
3	L	1	0	0	0	0
3	M	1	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	1	0	0	0	0
3	S	1	0	0	0	0
All	All	69858	0	72126	241	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 2.

The worst 5 of 241 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:F:246:ILE:HA	1:F:297:VAL:HG13	1.62	0.79
1:P:88:LEU:HD13	1:Q:68:ILE:HD11	1.73	0.71
1:K:189:VAL:HG11	1:K:405:VAL:HG12	1.76	0.67
1:E:331:LEU:HD11	1:E:370:VAL:HG11	1.76	0.66
1:C:79:MET:HE2	1:C:81:LEU:HD21	1.79	0.65

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	503/553 (91%)	453 (90%)	46 (9%)	4 (1%)	16	54
1	B	503/553 (91%)	451 (90%)	44 (9%)	8 (2%)	7	37
1	C	503/553 (91%)	456 (91%)	44 (9%)	3 (1%)	21	59
1	D	503/553 (91%)	459 (91%)	41 (8%)	3 (1%)	21	59
1	E	503/553 (91%)	449 (89%)	50 (10%)	4 (1%)	16	54
1	F	503/553 (91%)	457 (91%)	42 (8%)	4 (1%)	16	54
1	G	503/553 (91%)	449 (89%)	50 (10%)	4 (1%)	16	54
1	H	503/553 (91%)	459 (91%)	42 (8%)	2 (0%)	30	67
1	I	503/553 (91%)	456 (91%)	44 (9%)	3 (1%)	21	59
1	K	503/553 (91%)	457 (91%)	44 (9%)	2 (0%)	30	67
1	L	503/553 (91%)	451 (90%)	46 (9%)	6 (1%)	10	43
1	M	503/553 (91%)	456 (91%)	42 (8%)	5 (1%)	12	48
1	N	503/553 (91%)	454 (90%)	43 (8%)	6 (1%)	10	43
1	O	503/553 (91%)	452 (90%)	46 (9%)	5 (1%)	12	48
1	P	503/553 (91%)	455 (90%)	43 (8%)	5 (1%)	12	48
1	Q	503/553 (91%)	450 (90%)	50 (10%)	3 (1%)	21	59
1	R	503/553 (91%)	455 (90%)	43 (8%)	5 (1%)	12	48
1	S	503/553 (91%)	451 (90%)	49 (10%)	3 (1%)	21	59
All	All	9054/9954 (91%)	8170 (90%)	809 (9%)	75 (1%)	18	54

5 of 75 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	L	213	ALA
1	B	30	GLU
1	C	30	GLU
1	D	30	GLU

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Mol	Chain	Res	Type
1	F	30	GLU

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	410/447 (92%)	392 (96%)	18 (4%)	25	47
1	B	410/447 (92%)	395 (96%)	15 (4%)	30	51
1	C	410/447 (92%)	397 (97%)	13 (3%)	34	56
1	D	410/447 (92%)	397 (97%)	13 (3%)	34	56
1	E	410/447 (92%)	395 (96%)	15 (4%)	30	51
1	F	410/447 (92%)	395 (96%)	15 (4%)	30	51
1	G	410/447 (92%)	395 (96%)	15 (4%)	30	51
1	H	410/447 (92%)	391 (95%)	19 (5%)	24	45
1	I	410/447 (92%)	393 (96%)	17 (4%)	27	48
1	K	410/447 (92%)	398 (97%)	12 (3%)	37	58
1	L	410/447 (92%)	397 (97%)	13 (3%)	34	56
1	M	410/447 (92%)	387 (94%)	23 (6%)	19	40
1	N	410/447 (92%)	387 (94%)	23 (6%)	19	40
1	O	410/447 (92%)	397 (97%)	13 (3%)	34	56
1	P	410/447 (92%)	396 (97%)	14 (3%)	32	54
1	Q	410/447 (92%)	395 (96%)	15 (4%)	30	51
1	R	410/447 (92%)	399 (97%)	11 (3%)	39	60
1	S	410/447 (92%)	399 (97%)	11 (3%)	39	60
All	All	7380/8046 (92%)	7105 (96%)	275 (4%)	31	51

5 of 275 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	P	283	ILE

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Mol	Chain	Res	Type
1	Q	84	PRO
1	R	293	THR
1	G	453	SER
1	G	429	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 78 such sidechains are listed below:

Mol	Chain	Res	Type
1	P	156	ASN
1	R	499	GLN
1	P	243	ASN
1	Q	267	ASN
1	S	91	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 36 ligands modelled in this entry, 18 are monoatomic - leaving 18 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
2	ATP	S	800	3	32,33,33	2.21	8 (25%)	48,52,52	1.37	8 (16%)
2	ATP	E	800	3	32,33,33	1.61	7 (21%)	48,52,52	1.49	9 (18%)
2	ATP	D	800	3	32,33,33	2.18	3 (9%)	48,52,52	1.35	5 (10%)
2	ATP	K	800	3	32,33,33	2.00	8 (25%)	48,52,52	1.20	6 (12%)
2	ATP	M	800	3	32,33,33	2.58	7 (21%)	48,52,52	1.53	8 (16%)
2	ATP	H	800	3	32,33,33	1.71	5 (15%)	48,52,52	1.48	5 (10%)
2	ATP	R	800	3	32,33,33	1.09	1 (3%)	48,52,52	1.55	9 (18%)
2	ATP	G	800	3	32,33,33	2.78	6 (18%)	48,52,52	1.55	10 (20%)
2	ATP	P	800	3	32,33,33	1.61	5 (15%)	48,52,52	1.14	2 (4%)
2	ATP	L	800	3	32,33,33	2.72	5 (15%)	48,52,52	1.31	6 (12%)
2	ATP	F	800	3	32,33,33	1.64	7 (21%)	48,52,52	1.52	10 (20%)
2	ATP	Q	800	3	32,33,33	2.02	6 (18%)	48,52,52	1.30	5 (10%)
2	ATP	O	800	3	32,33,33	1.76	3 (9%)	48,52,52	1.31	6 (12%)
2	ATP	A	800	3	32,33,33	1.58	3 (9%)	48,52,52	1.60	9 (18%)
2	ATP	C	800	3	32,33,33	1.65	6 (18%)	48,52,52	1.19	5 (10%)
2	ATP	B	800	3	32,33,33	2.14	3 (9%)	48,52,52	1.29	6 (12%)
2	ATP	I	800	3	32,33,33	2.30	6 (18%)	48,52,52	1.28	7 (14%)
2	ATP	N	800	3	32,33,33	2.56	6 (18%)	48,52,52	1.39	8 (16%)

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
2	ATP	S	800	3	-	4/22/38/38	0/3/3/3
2	ATP	E	800	3	-	5/22/38/38	0/3/3/3
2	ATP	D	800	3	-	3/22/38/38	0/3/3/3
2	ATP	K	800	3	-	4/22/38/38	0/3/3/3
2	ATP	M	800	3	-	4/22/38/38	0/3/3/3
2	ATP	H	800	3	-	8/22/38/38	0/3/3/3
2	ATP	R	800	3	-	4/22/38/38	0/3/3/3
2	ATP	G	800	3	-	5/22/38/38	0/3/3/3
2	ATP	P	800	3	-	2/22/38/38	0/3/3/3
2	ATP	L	800	3	-	3/22/38/38	0/3/3/3
2	ATP	F	800	3	-	4/22/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ATP	Q	800	3	-	3/22/38/38	0/3/3/3
2	ATP	O	800	3	-	4/22/38/38	0/3/3/3
2	ATP	A	800	3	-	6/22/38/38	0/3/3/3
2	ATP	C	800	3	-	5/22/38/38	0/3/3/3
2	ATP	B	800	3	-	4/22/38/38	0/3/3/3
2	ATP	I	800	3	-	4/22/38/38	0/3/3/3
2	ATP	N	800	3	-	4/22/38/38	0/3/3/3

The worst 5 of 95 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	800	ATP	PA-O3A	-13.74	1.44	1.59
2	L	800	ATP	PA-O3A	-12.46	1.46	1.59
2	N	800	ATP	PA-O3A	-12.16	1.46	1.59
2	M	800	ATP	PA-O3A	-11.93	1.46	1.59
2	I	800	ATP	PA-O3A	-10.58	1.48	1.59

The worst 5 of 124 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	800	ATP	O4'-C1'-N9	4.98	117.65	108.09
2	F	800	ATP	O2A-PA-O3A	4.87	120.43	107.27
2	M	800	ATP	C4-N9-C8	-4.81	100.69	105.74
2	H	800	ATP	O4'-C1'-N9	4.08	115.93	108.09
2	A	800	ATP	N6-C6-N1	4.07	127.44	118.38

There are no chirality outliers.

5 of 76 torsion outliers are listed below:

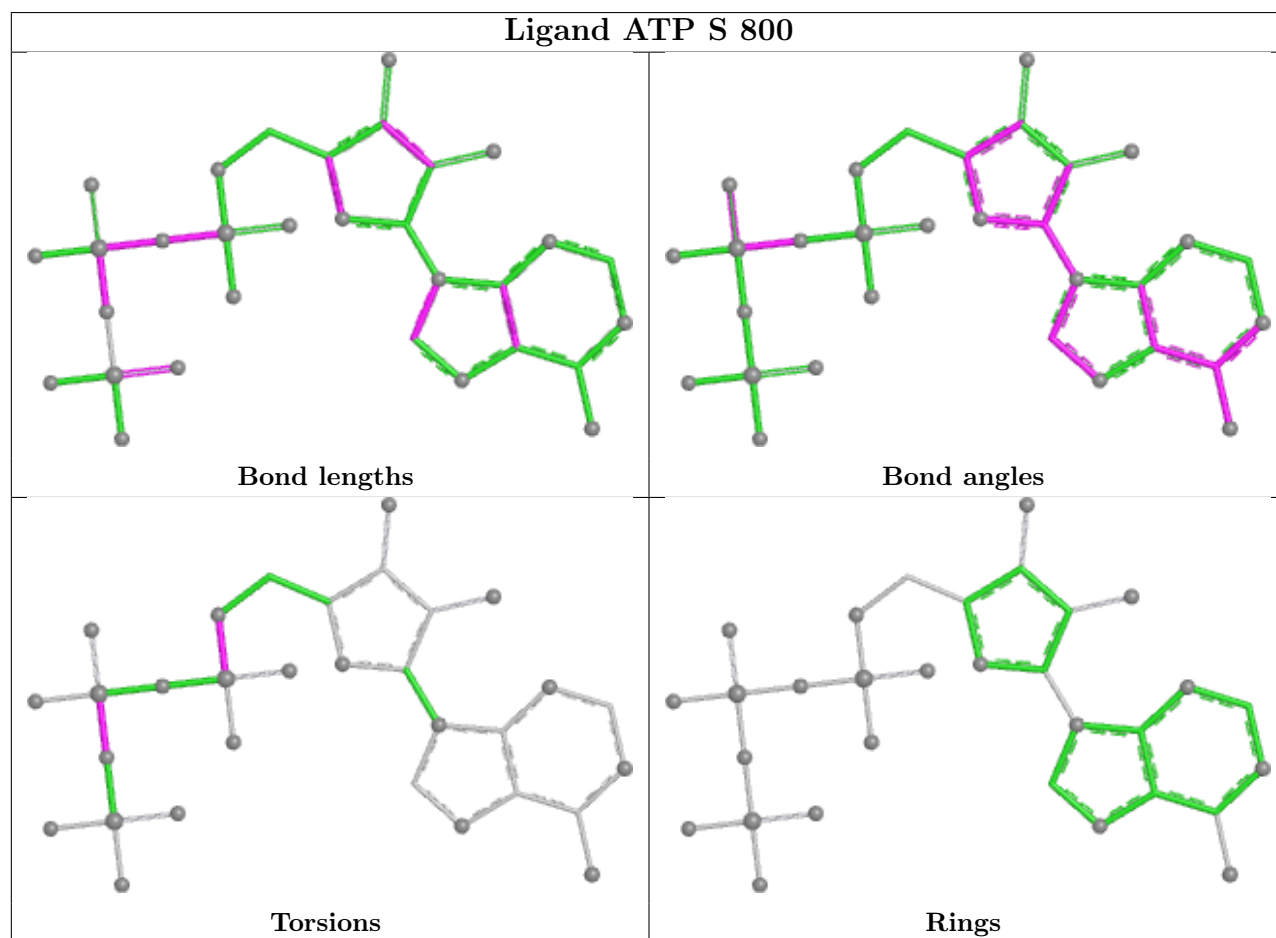
Mol	Chain	Res	Type	Atoms
2	A	800	ATP	C5'-O5'-PA-O1A
2	B	800	ATP	C5'-O5'-PA-O1A
2	B	800	ATP	C5'-O5'-PA-O2A
2	B	800	ATP	C5'-O5'-PA-O3A
2	C	800	ATP	C5'-O5'-PA-O1A

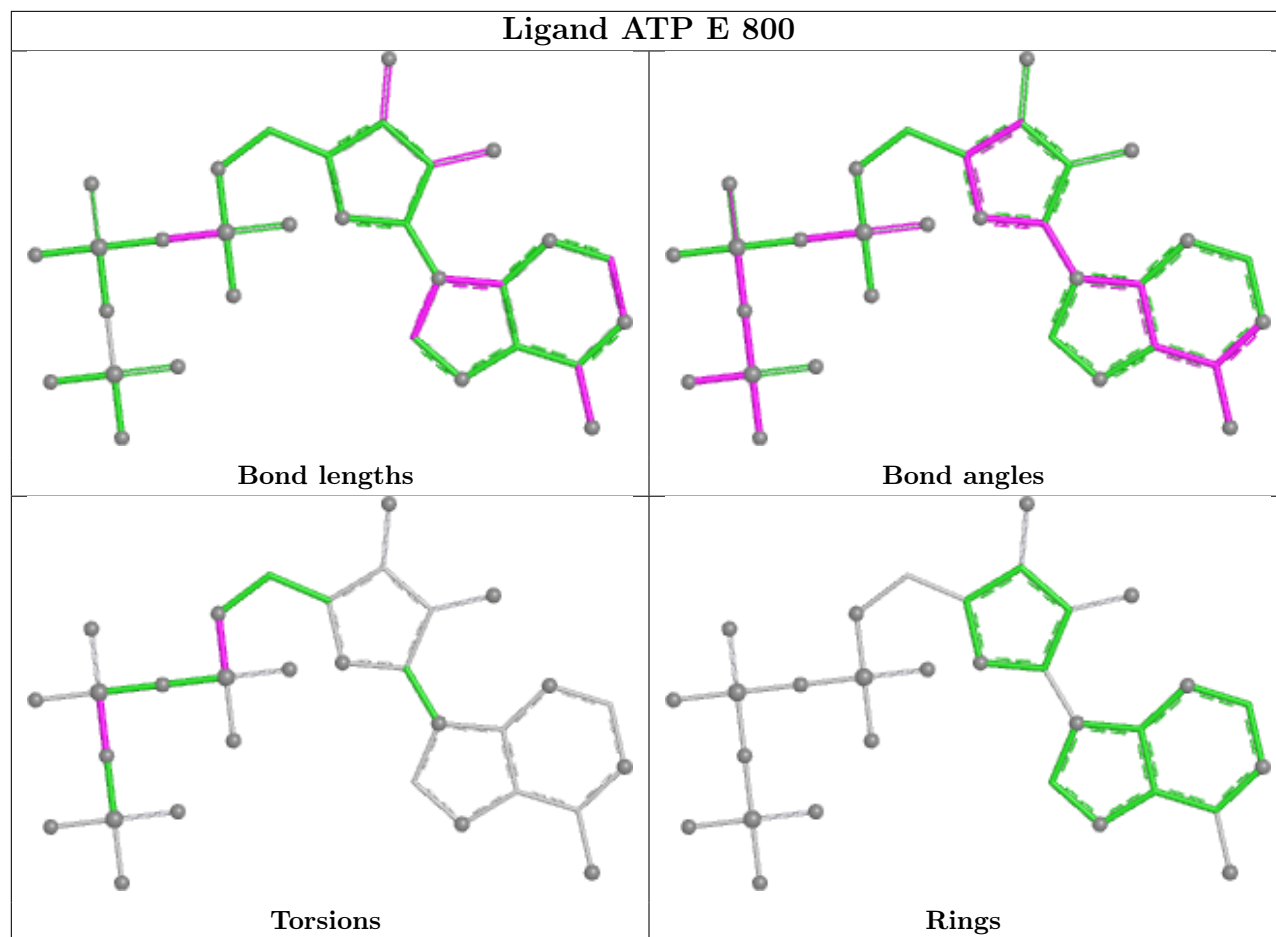
There are no ring outliers.

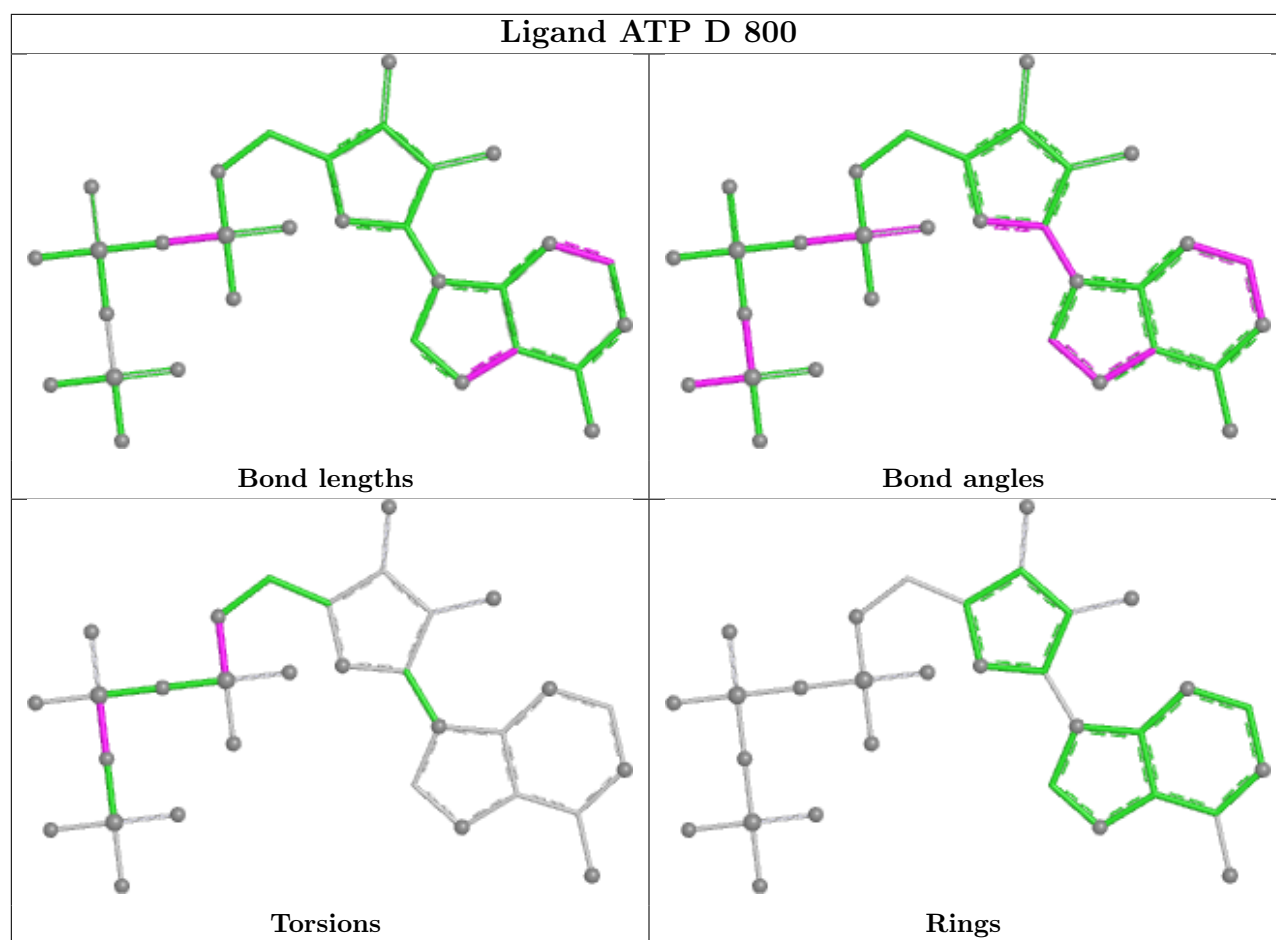
No monomer is involved in short contacts.

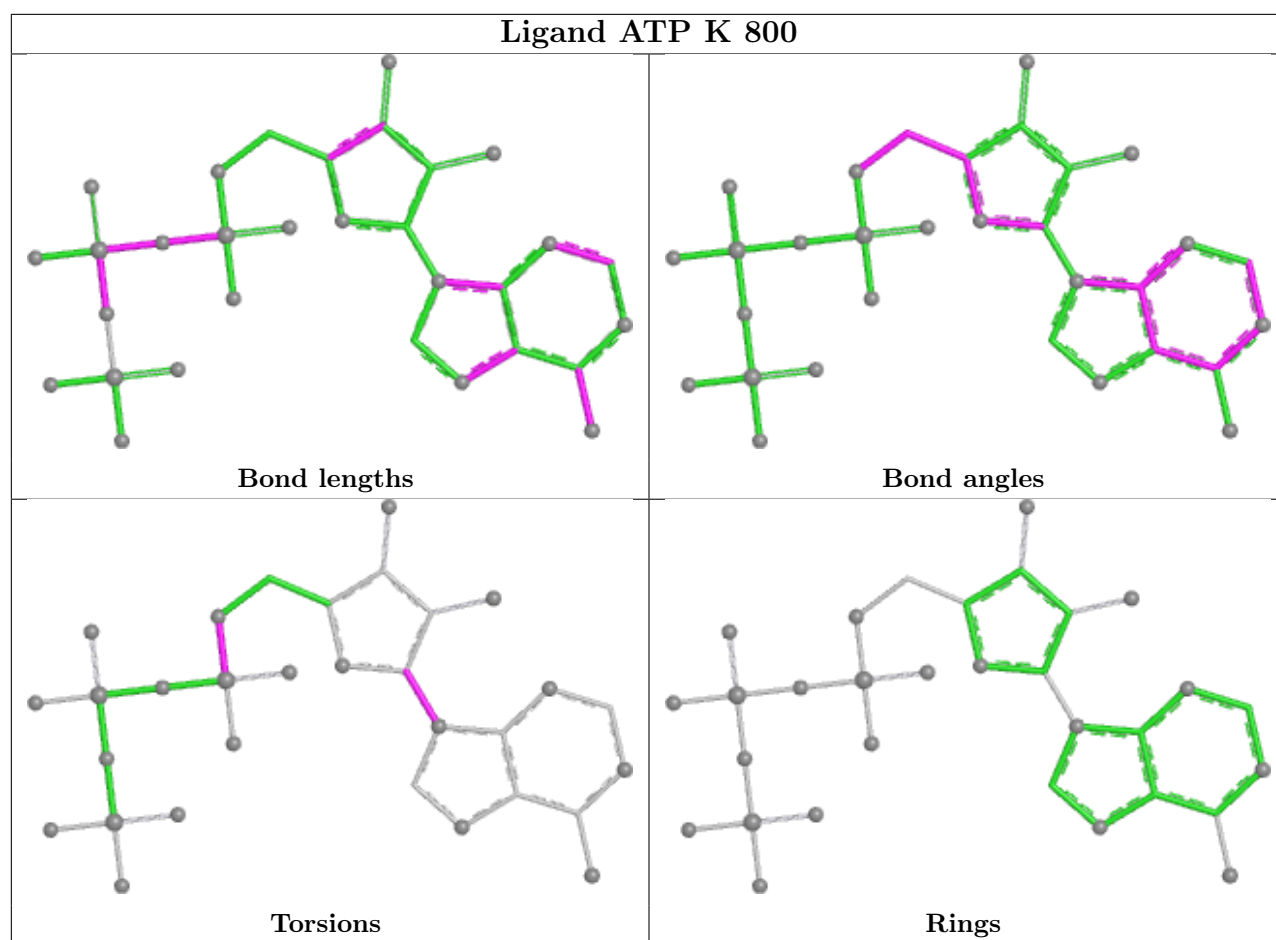
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

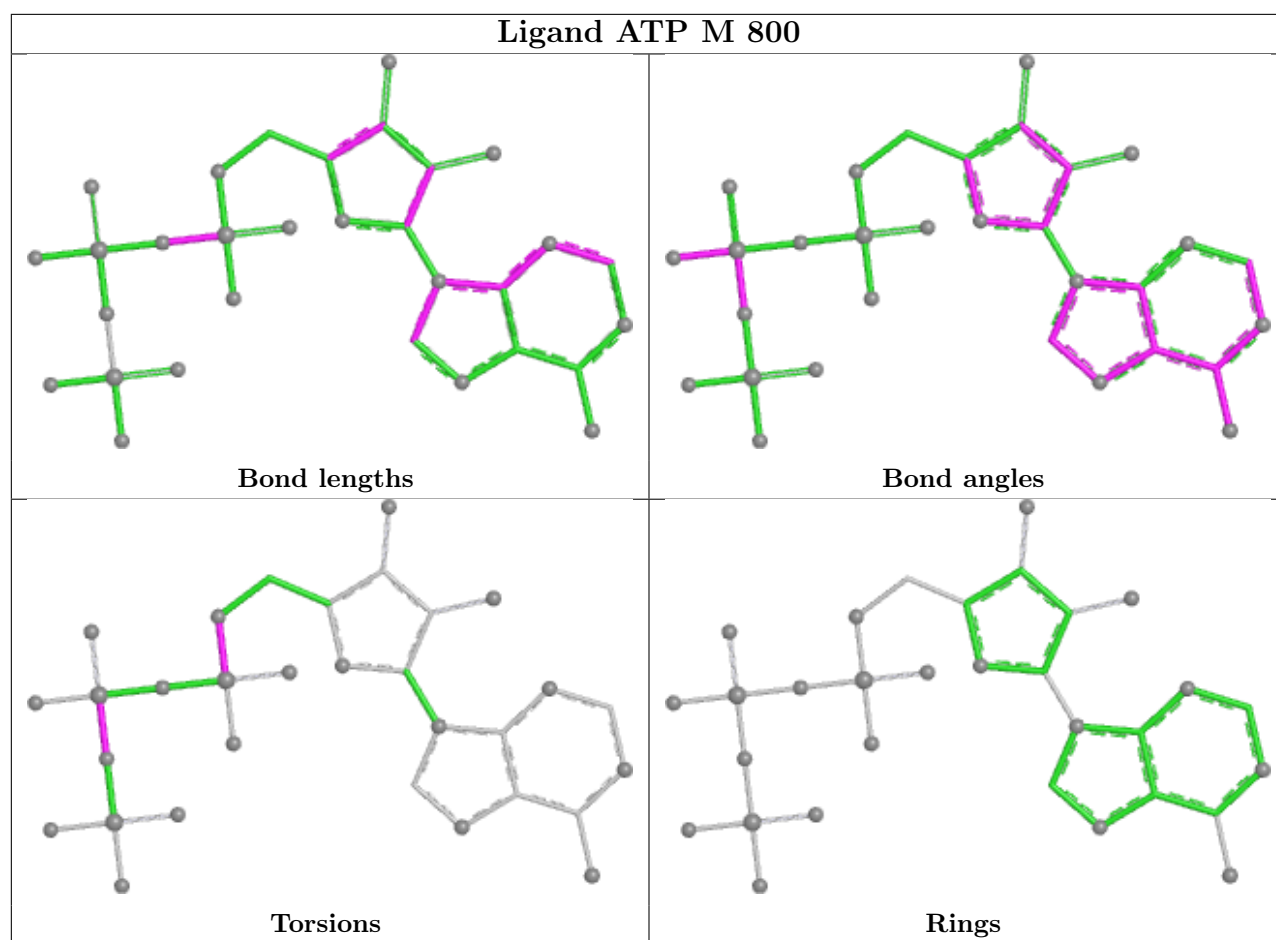
bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 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.

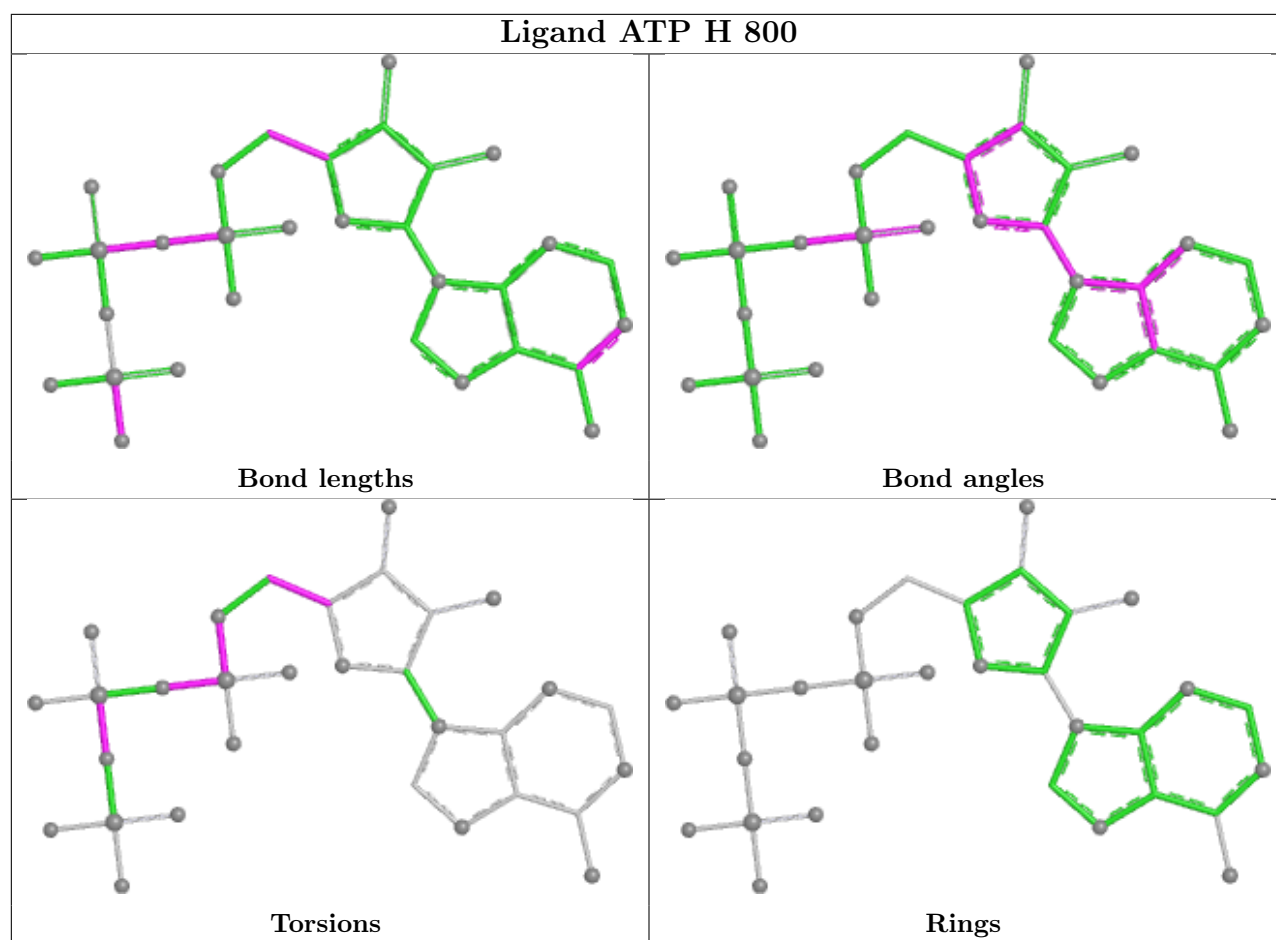


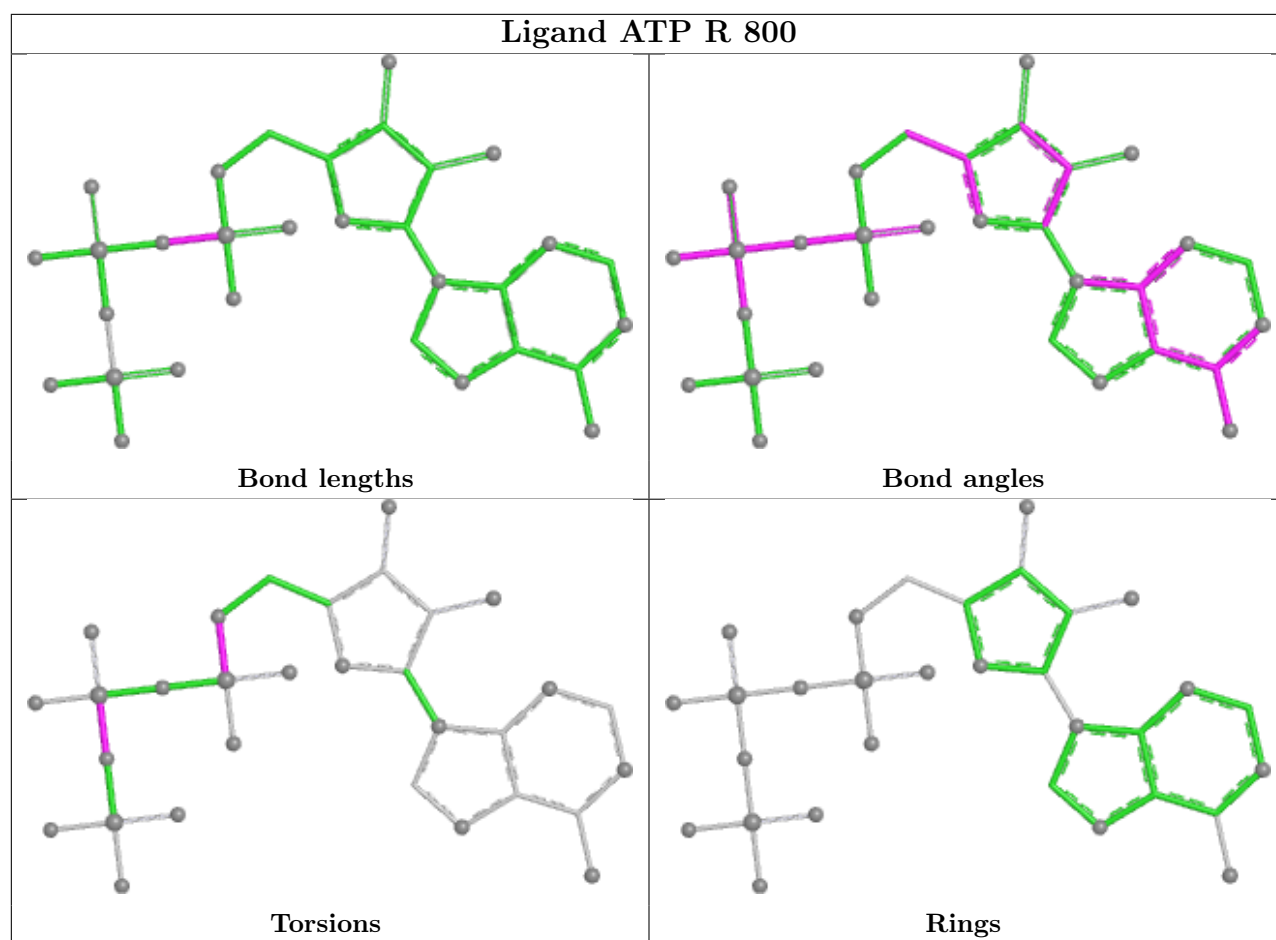


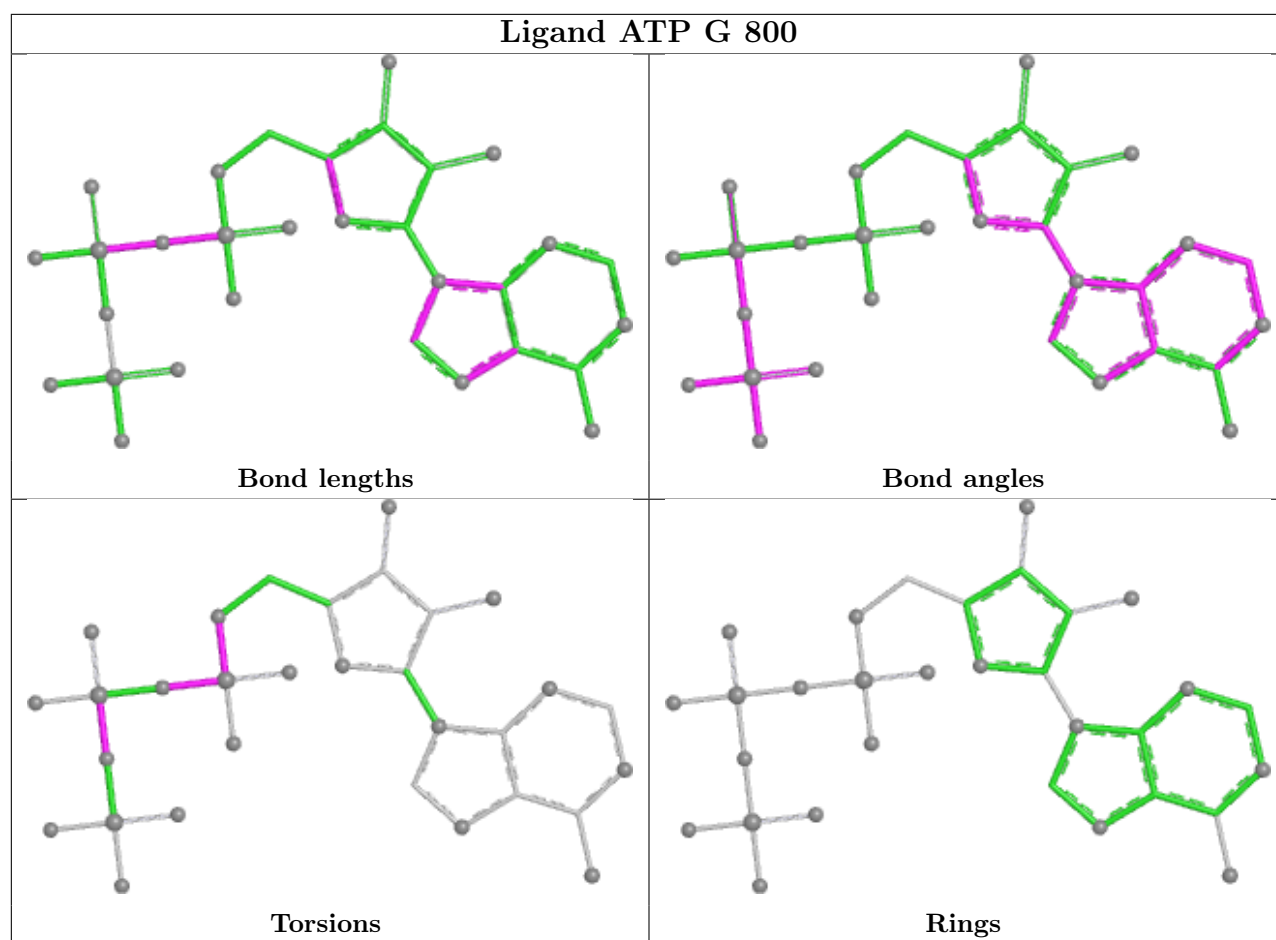


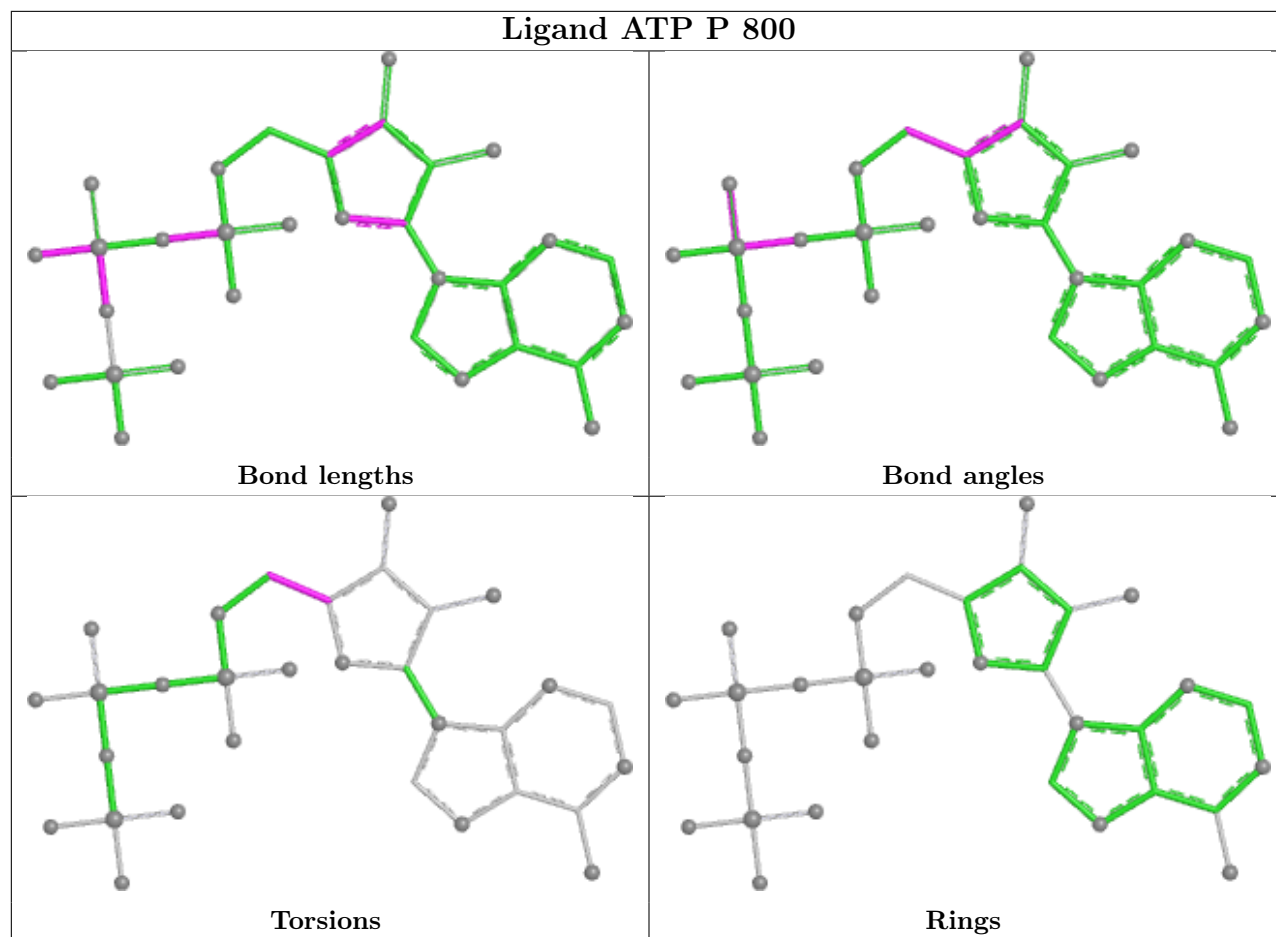


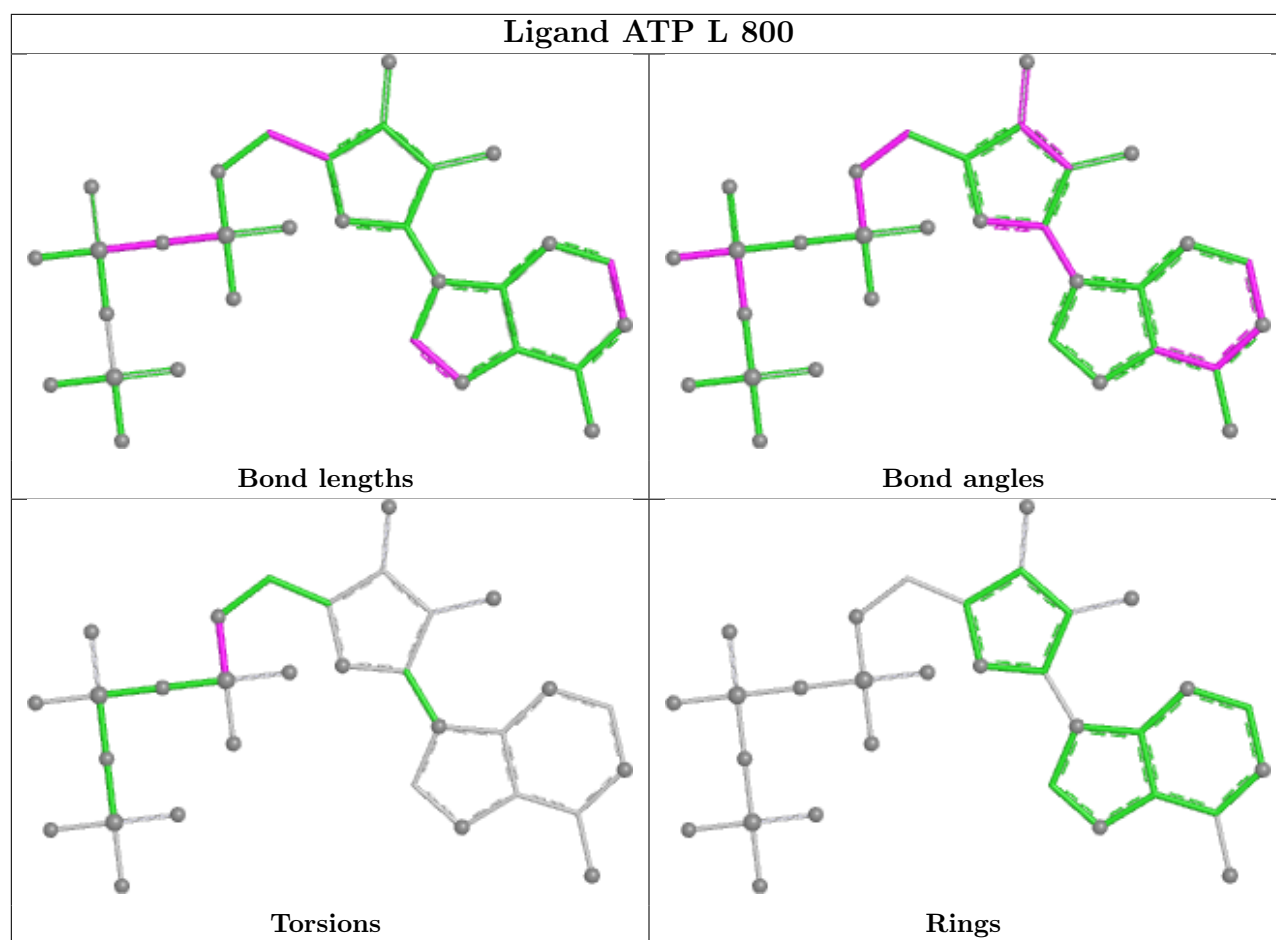


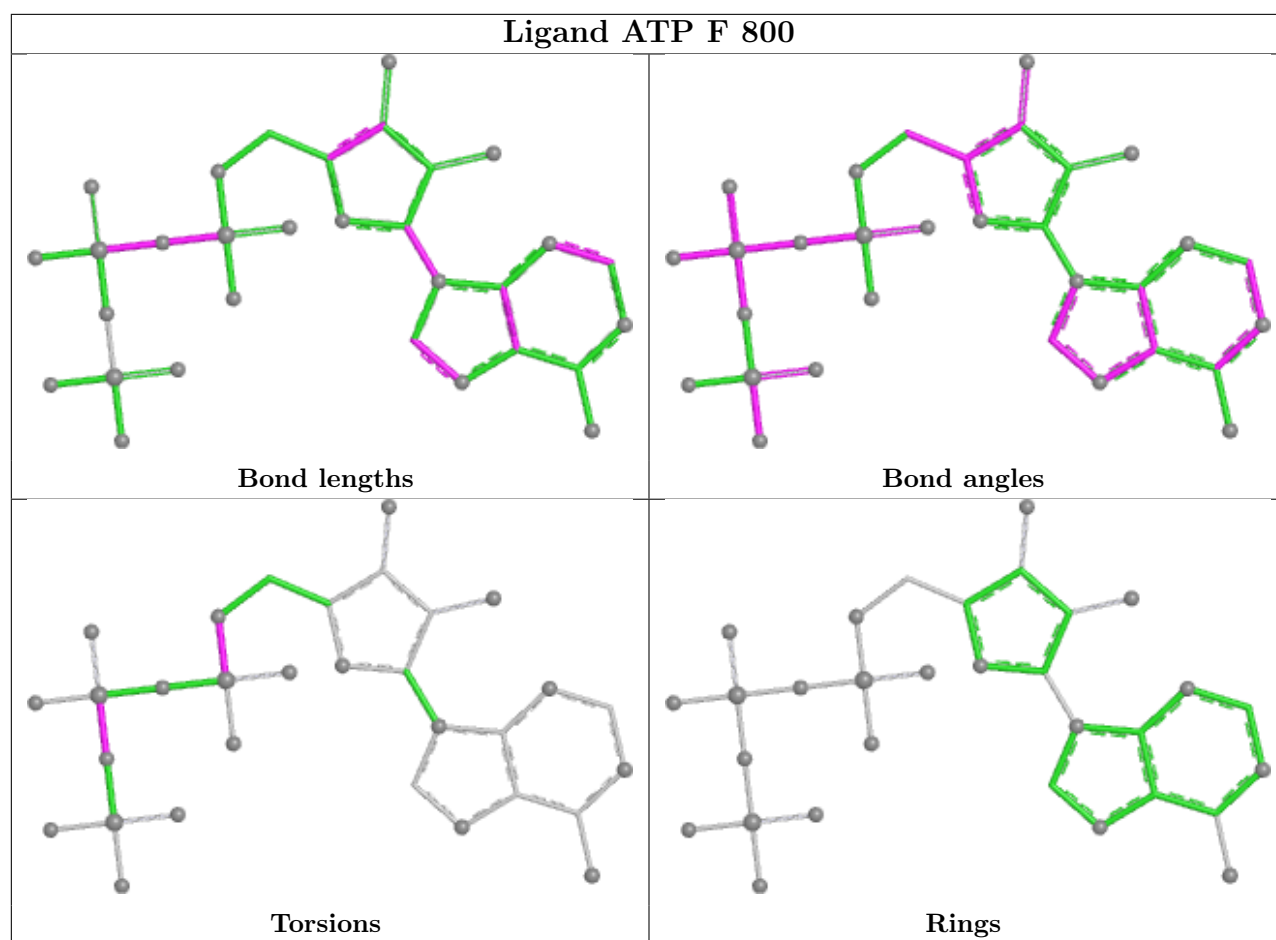


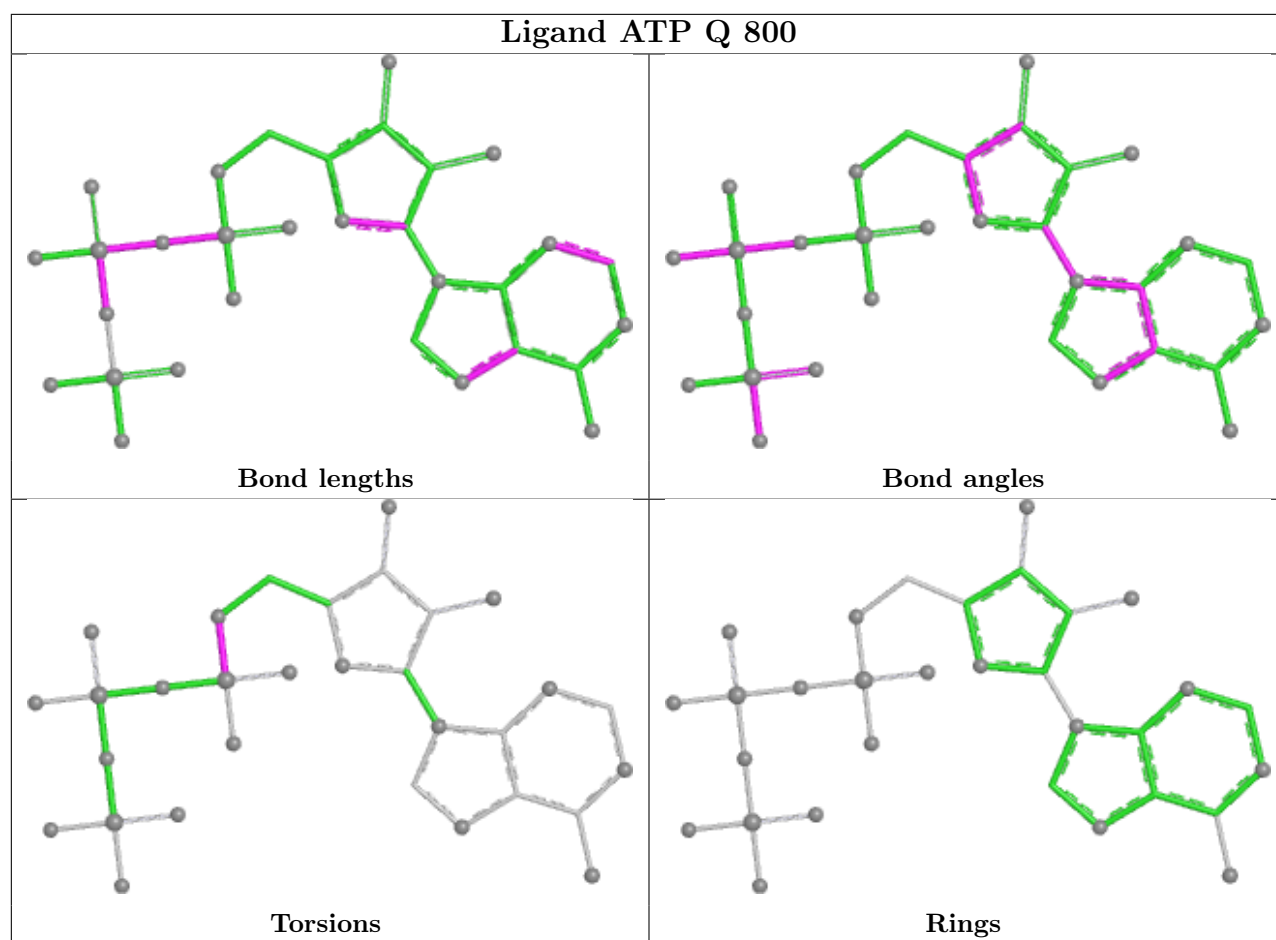


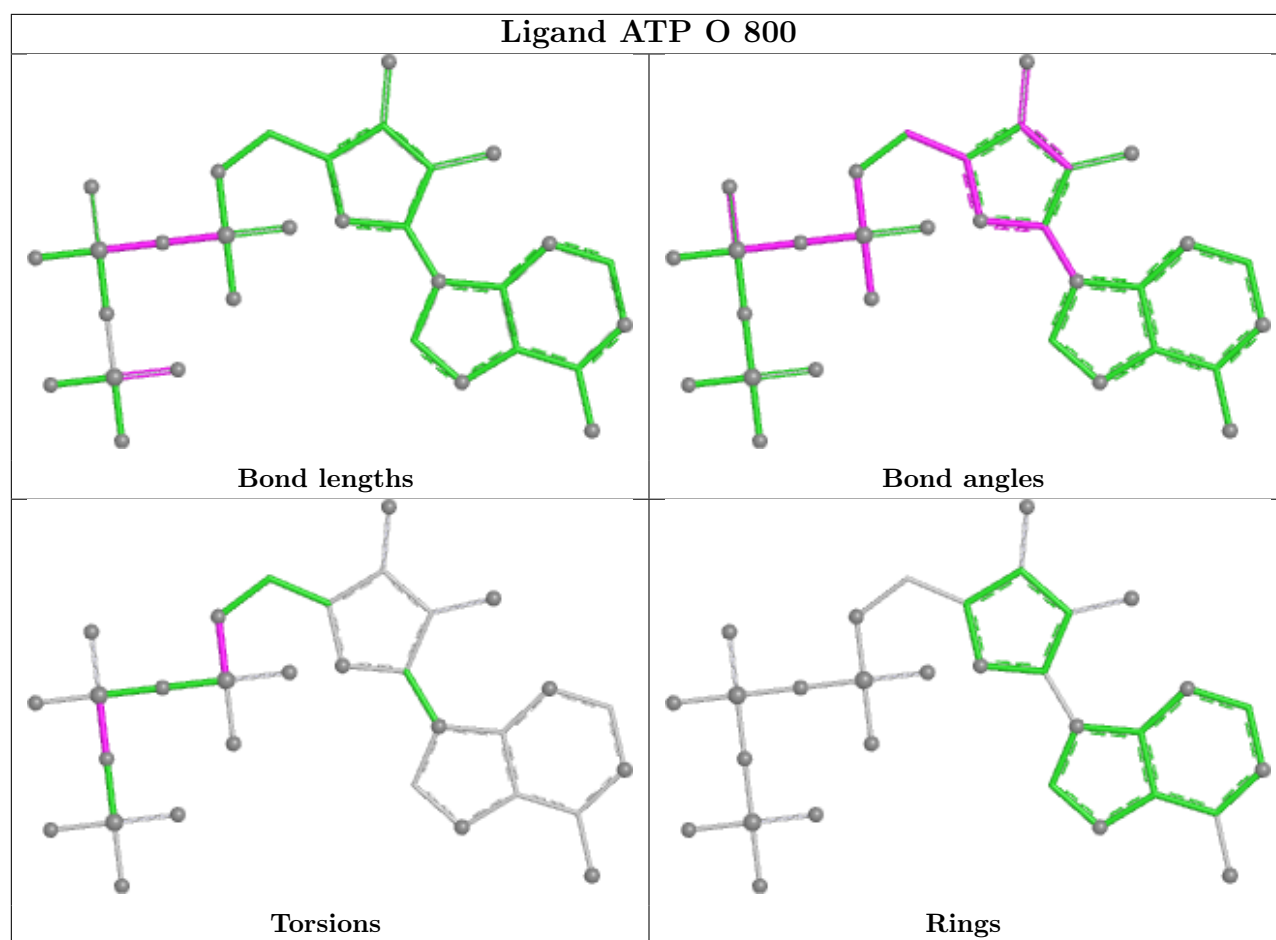


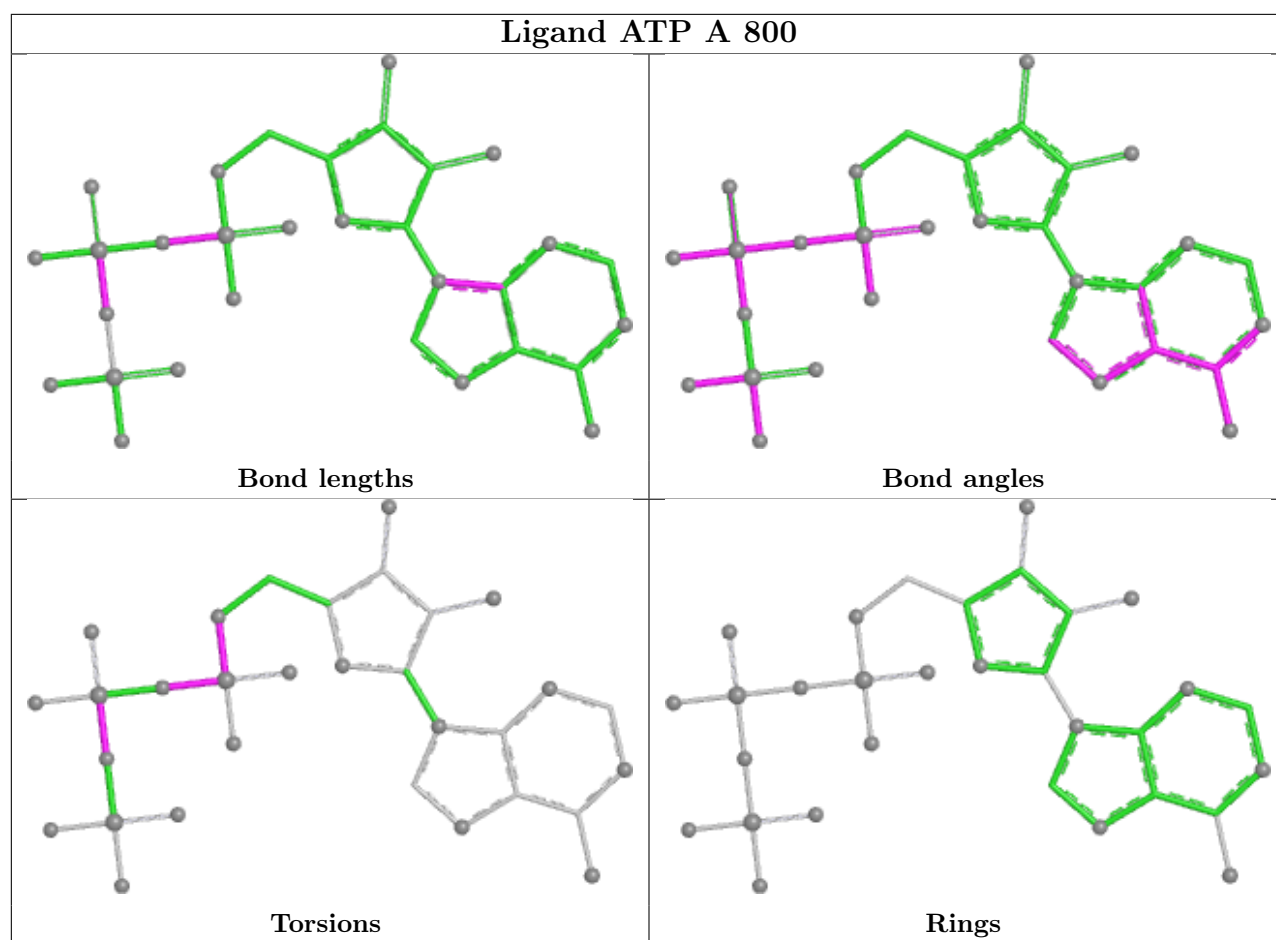


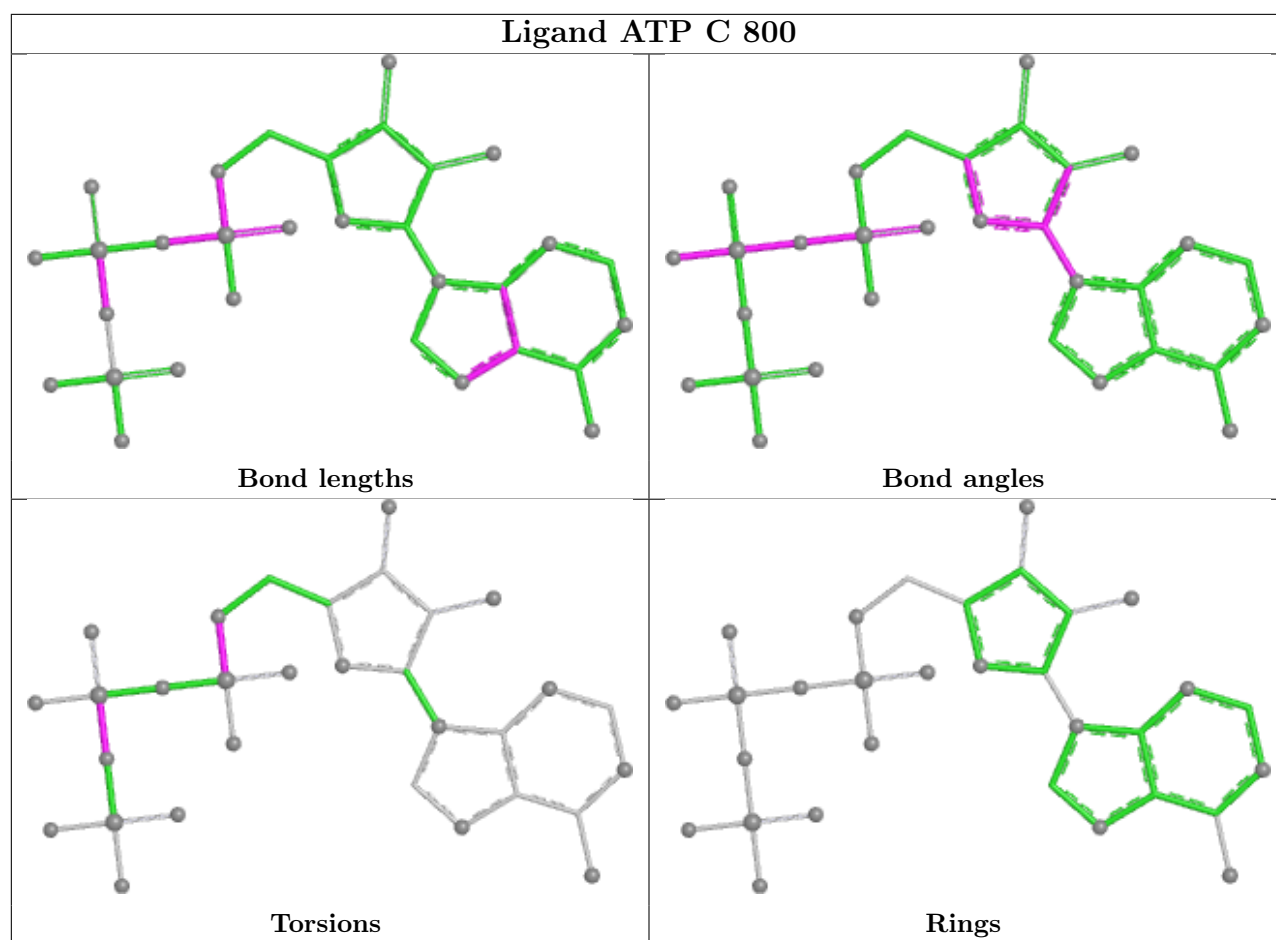


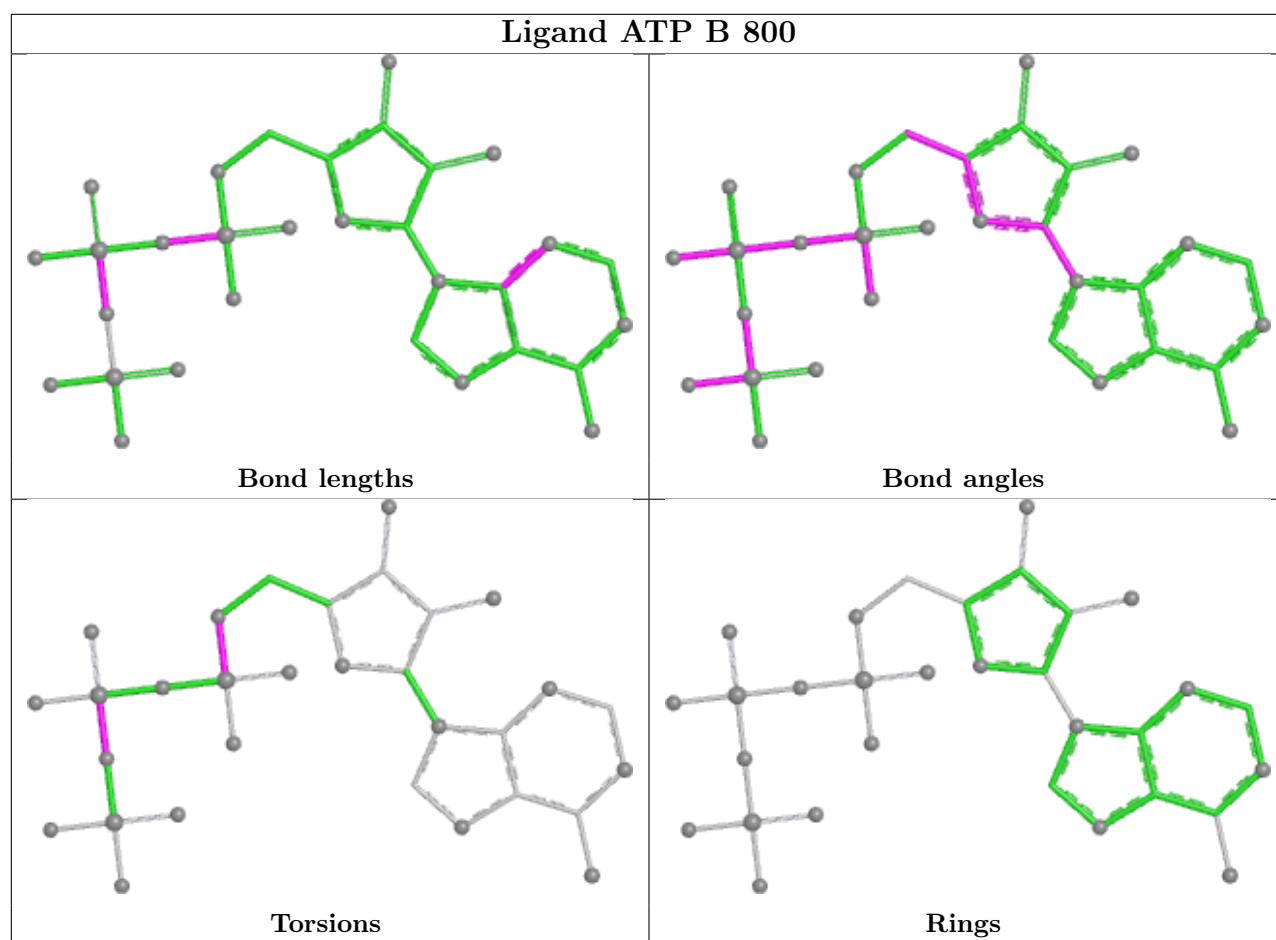




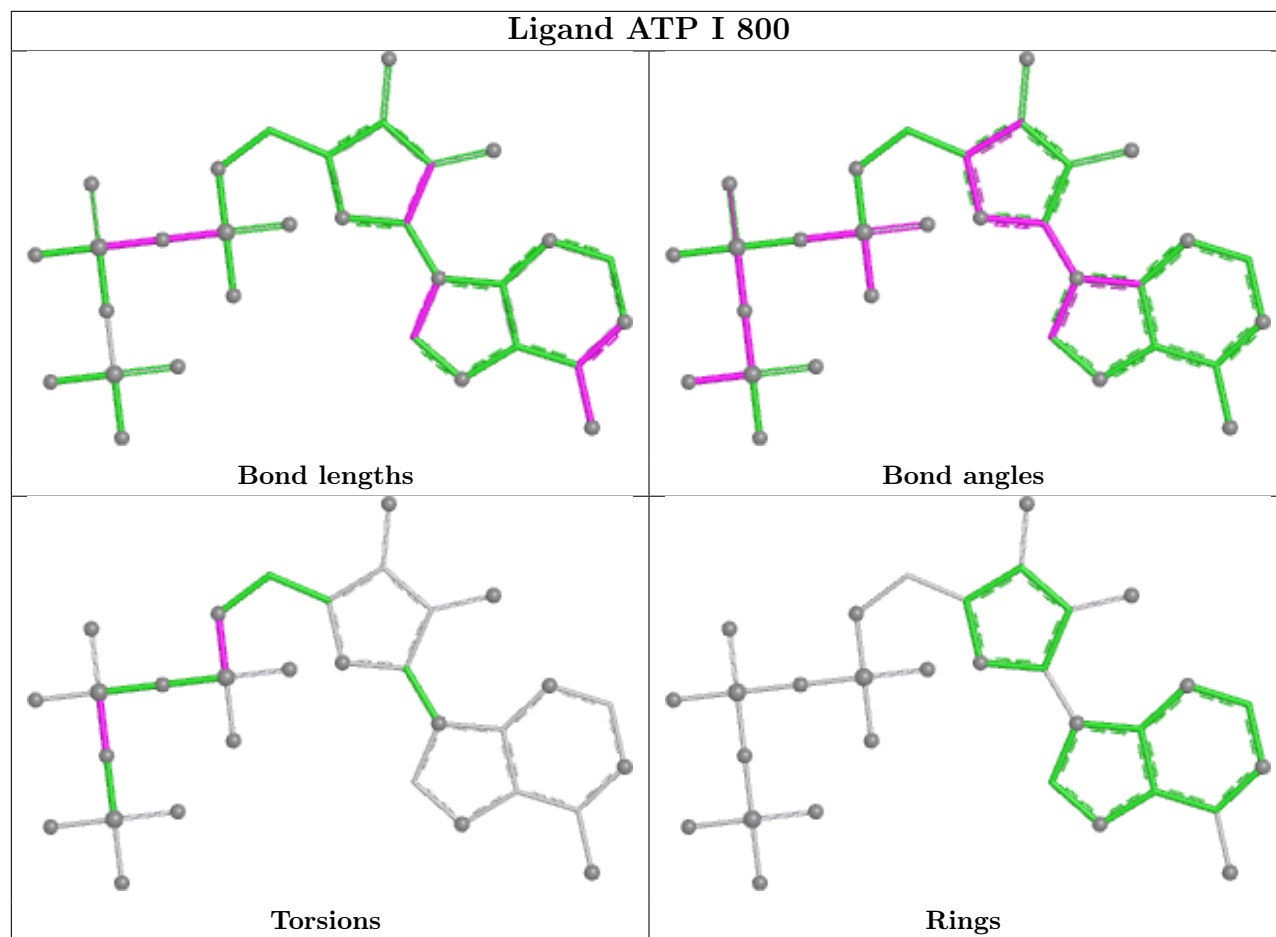


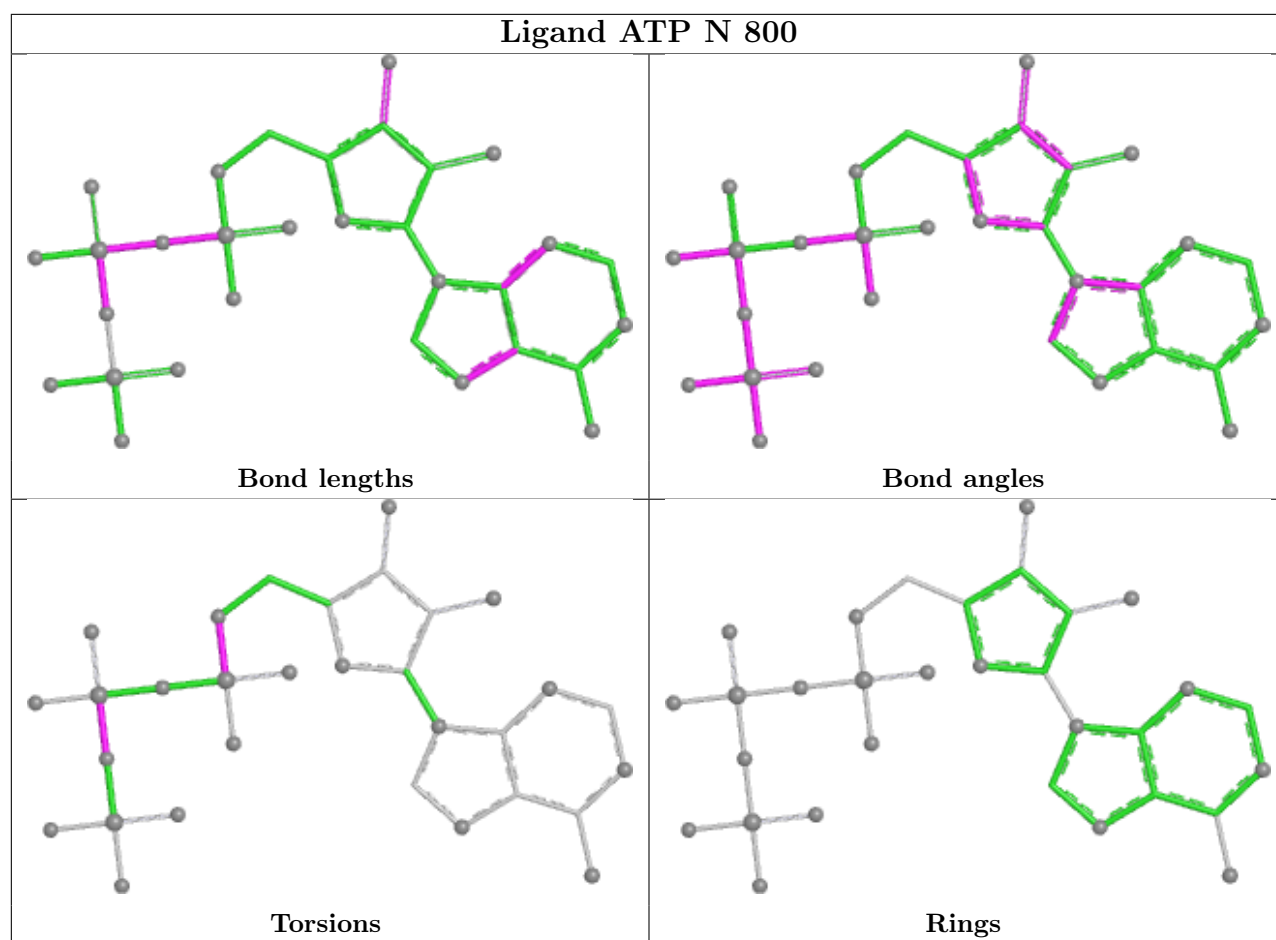






Ligand ATP I 800





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.

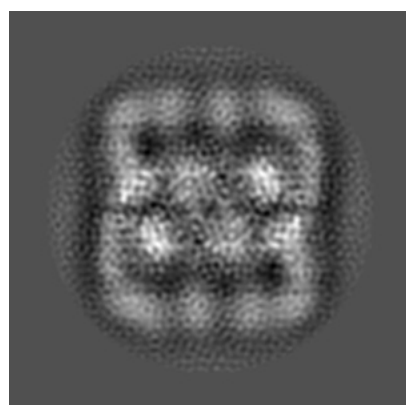
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-5396. These allow visual inspection of the internal detail of the map and identification of artifacts.

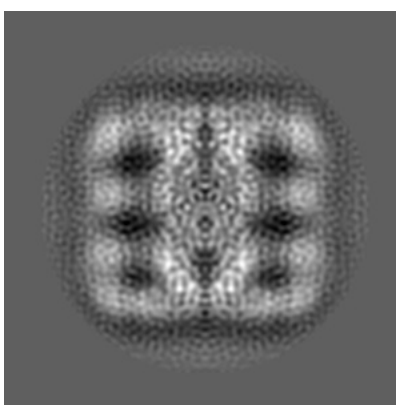
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

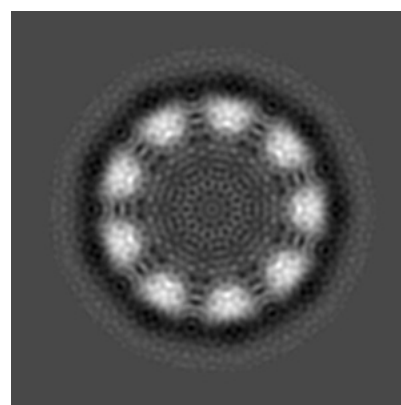
6.1.1 Primary map



X



Y

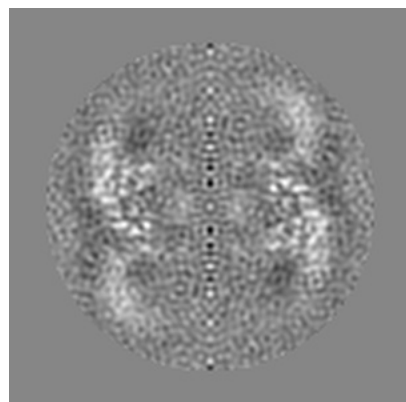


Z

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

6.2 Central slices [i](#)

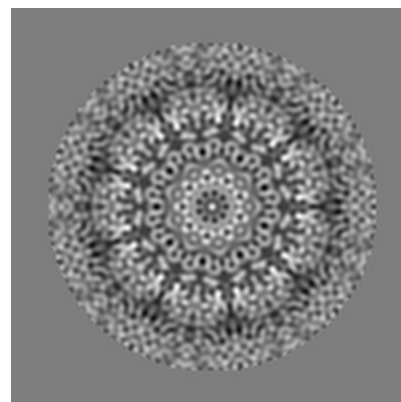
6.2.1 Primary map



X Index: 80



Y Index: 80

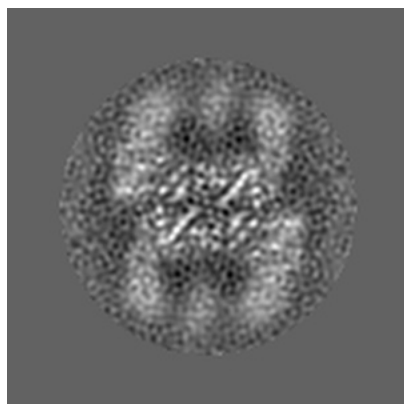


Z Index: 80

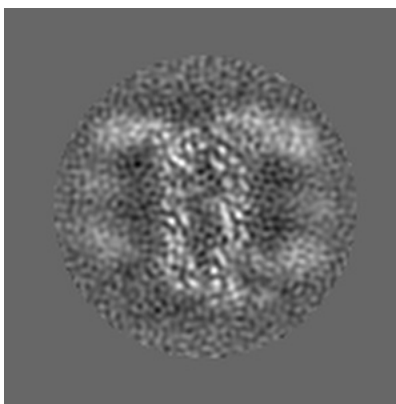
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

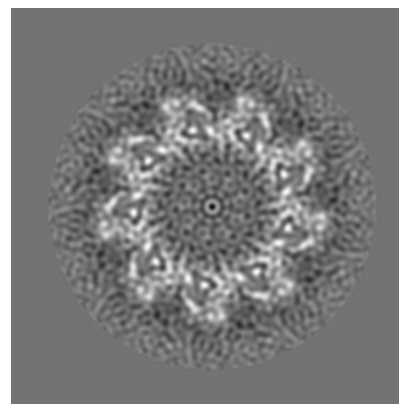
6.3.1 Primary map



X Index: 109



Y Index: 106

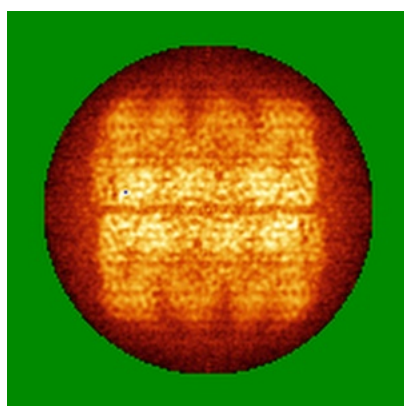


Z Index: 90

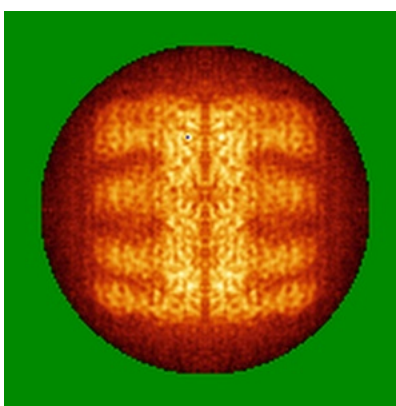
The images above show the largest variance slices of the map in three orthogonal directions.

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

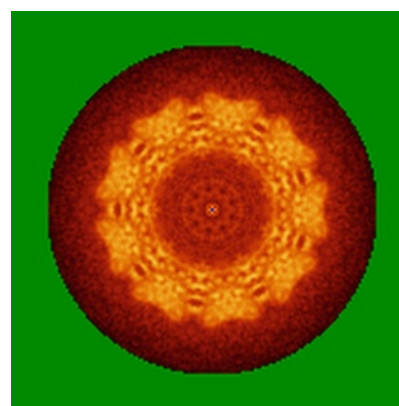
6.4.1 Primary map



X



Y

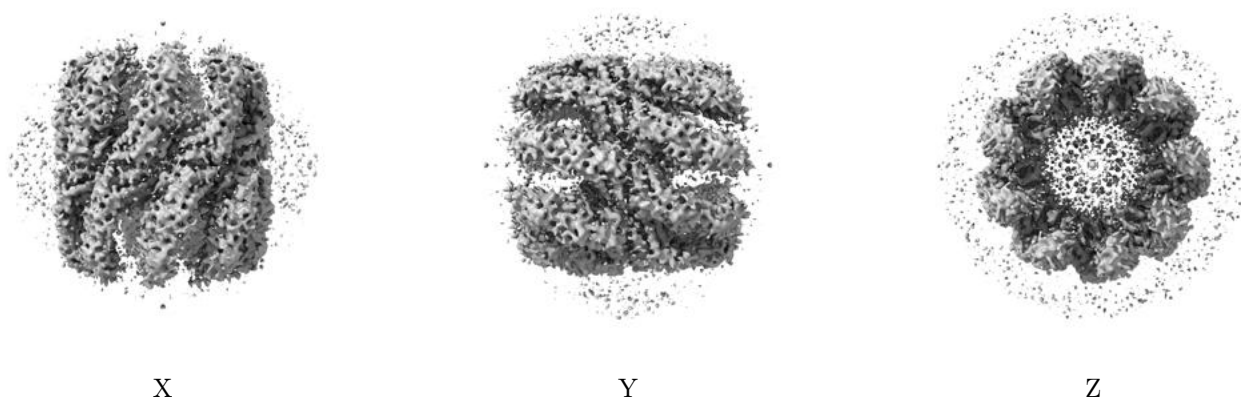


Z

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

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 4.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

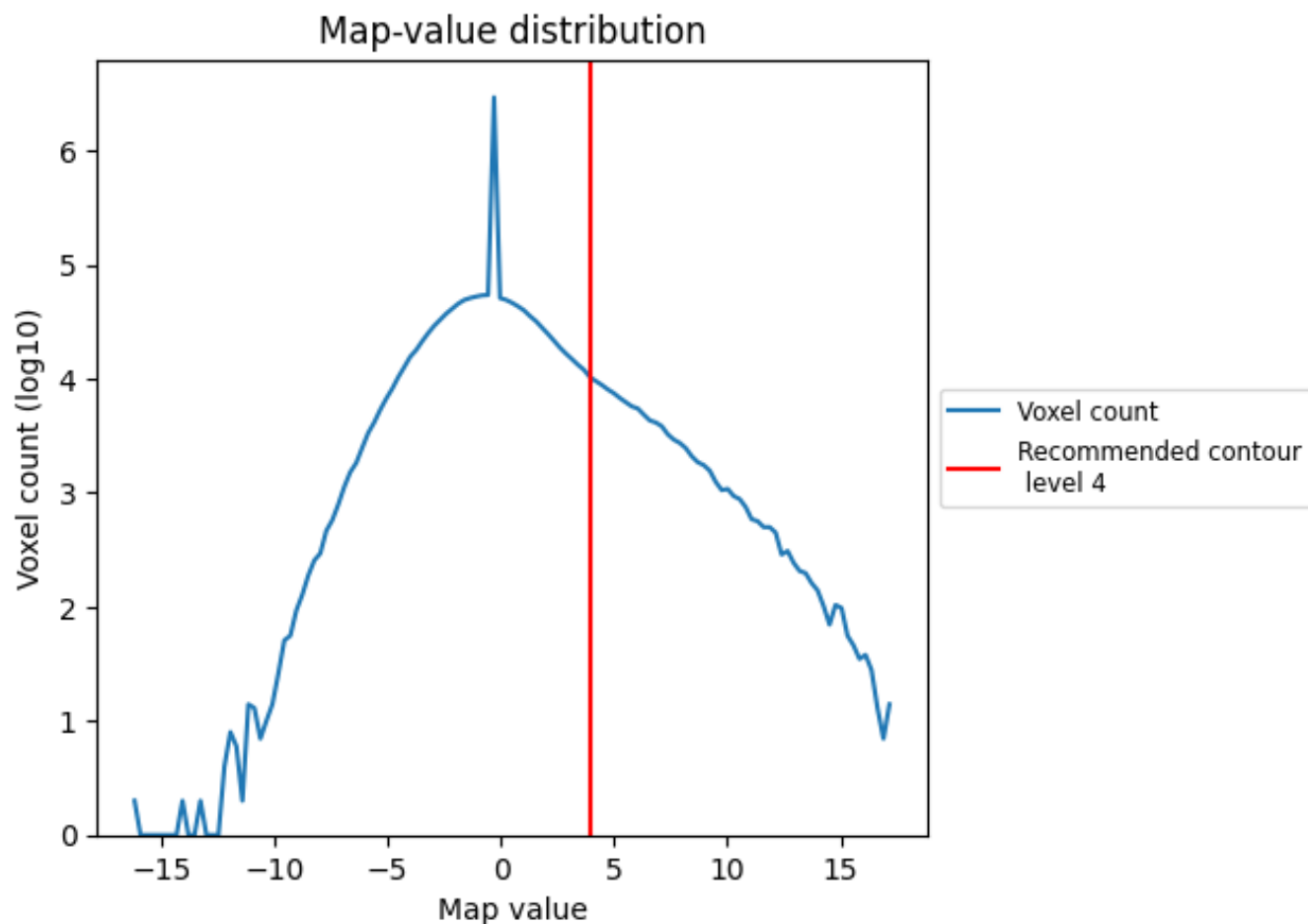
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

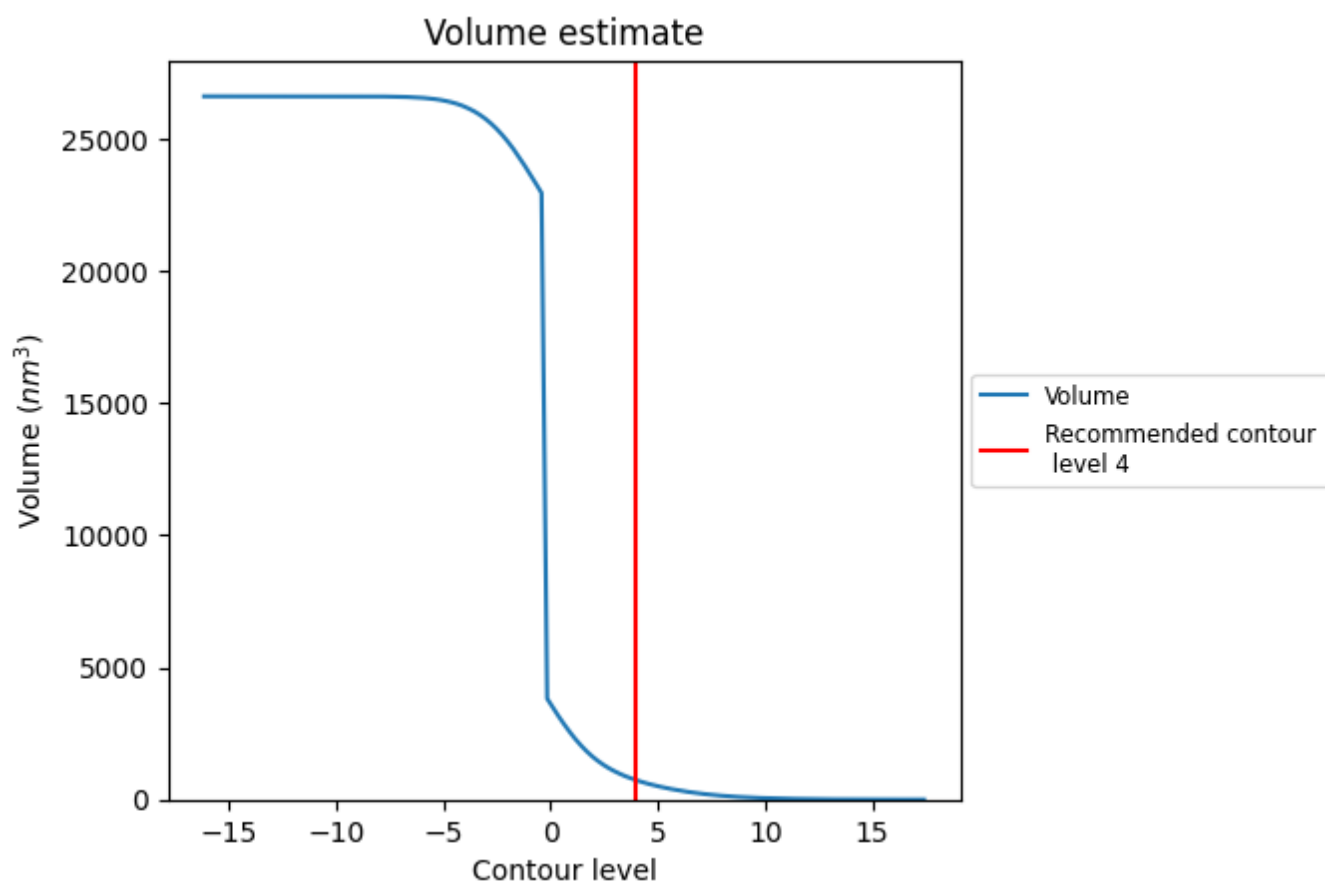
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

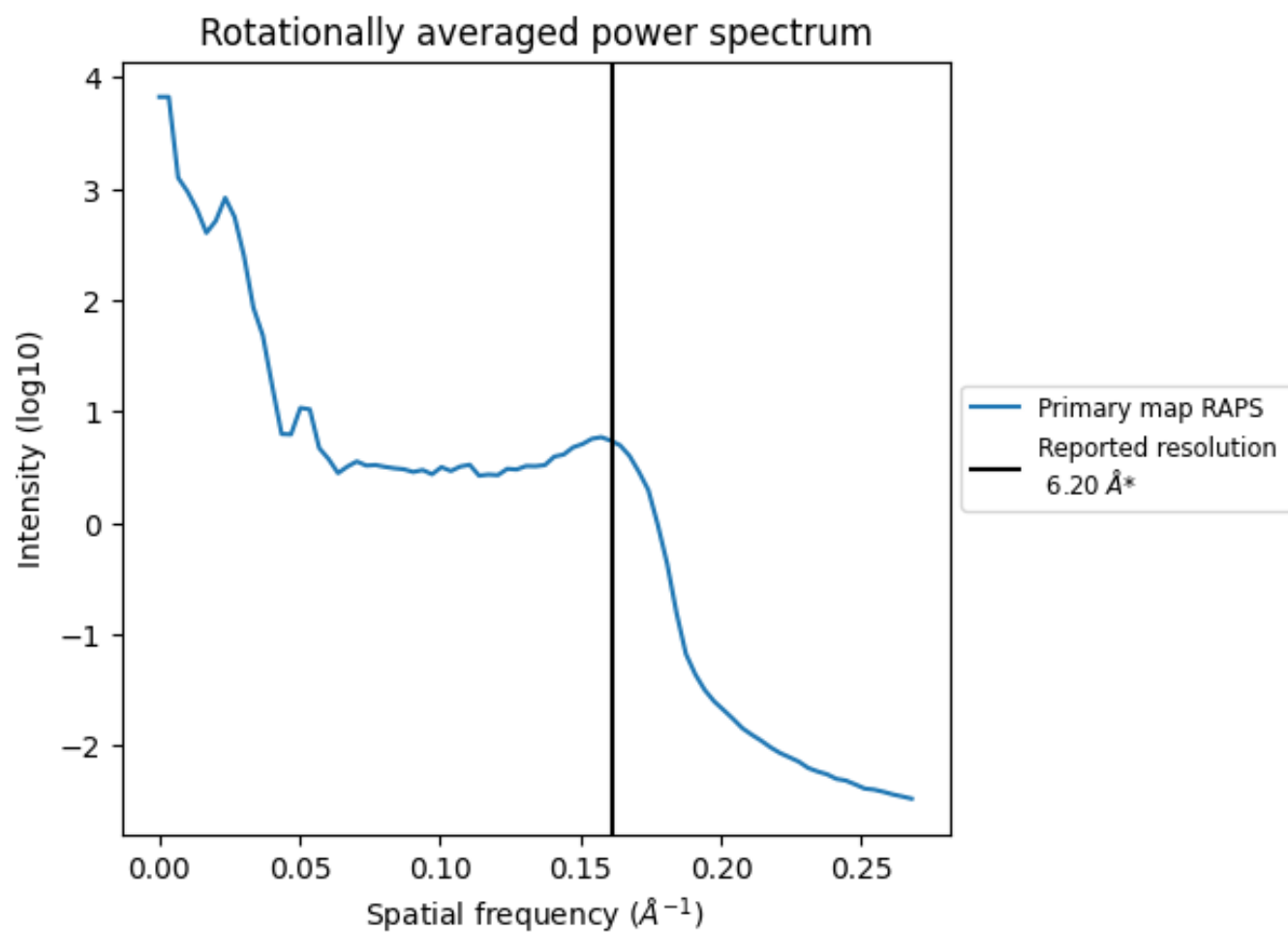
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 731 nm³; this corresponds to an approximate mass of 660 kDa.

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

7.3 Rotationally averaged power spectrum ⓘ



*Reported resolution corresponds to spatial frequency of 0.161 Å⁻¹

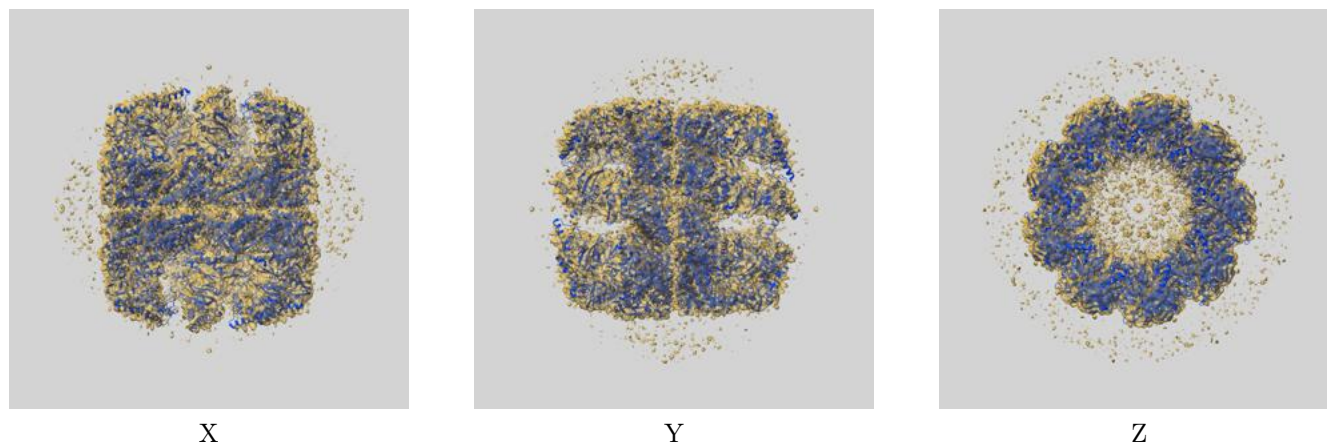
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

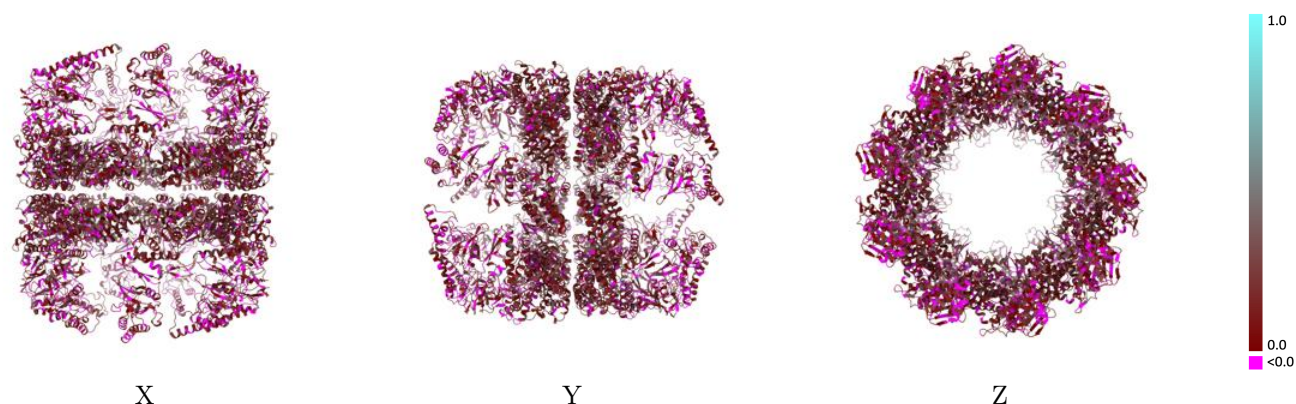
This section contains information regarding the fit between EMDB map EMD-5396 and PDB model 3J1F. Per-residue inclusion information can be found in section [3](#) on page [8](#).

9.1 Map-model overlay [i](#)



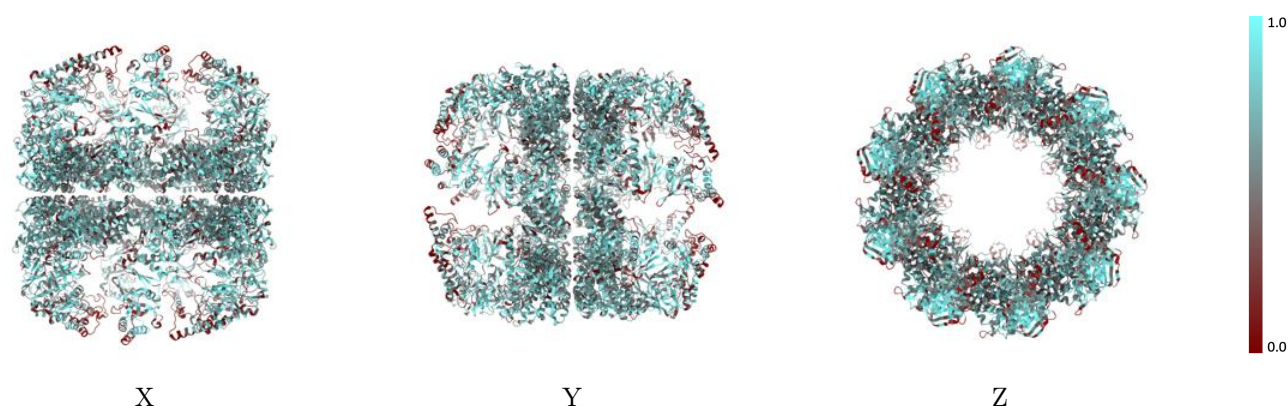
The images above show the 3D surface view of the map at the recommended contour level 4.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



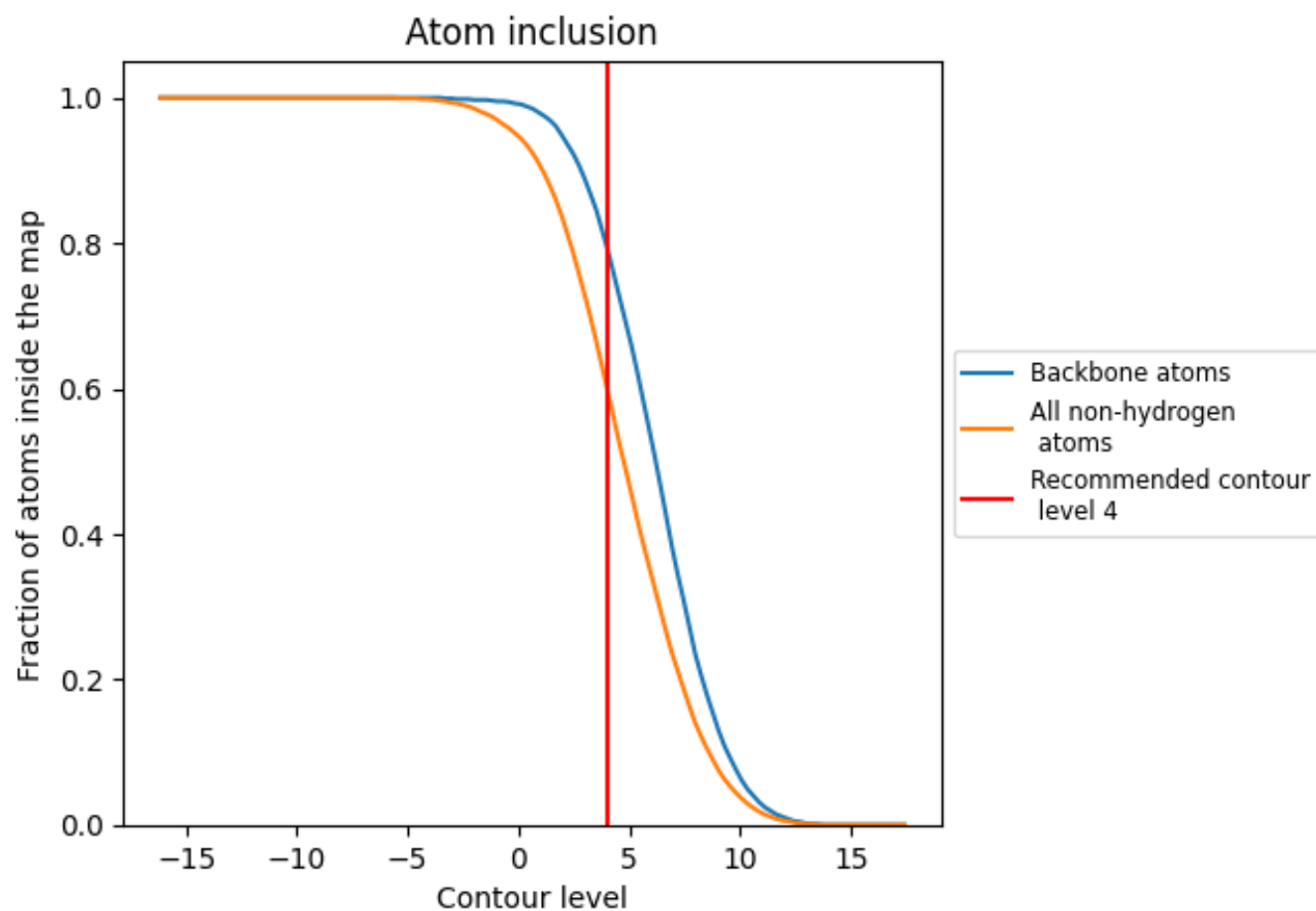
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (4).

9.4 Atom inclusion [i](#)



At the recommended contour level, 79% of all backbone atoms, 60% 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 (4) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6000	 0.1410
A	 0.6040	 0.1420
B	 0.5990	 0.1430
C	 0.6020	 0.1430
D	 0.6020	 0.1410
E	 0.6000	 0.1380
F	 0.6000	 0.1350
G	 0.6010	 0.1390
H	 0.5990	 0.1410
I	 0.6030	 0.1410
K	 0.5990	 0.1410
L	 0.6010	 0.1420
M	 0.6030	 0.1400
N	 0.6020	 0.1450
O	 0.5970	 0.1400
P	 0.5950	 0.1410
Q	 0.5990	 0.1410
R	 0.5990	 0.1450
S	 0.6000	 0.1420

