



wwPDB EM Validation Summary Report ⓘ

Nov 29, 2022 – 04:27 AM EST

PDB ID : 7UTL
EMDB ID : EMD-0728
Title : ALTERNATIVE MODELING OF TROPOMYOSIN IN HUMAN CARDIAC THIN FILAMENT IN THE CALCIUM FREE STATE
Authors : Rynkiewicz, M.J.; Pavadai, E.; Lehman, W.
Deposited on : 2022-04-27
Resolution : 6.60 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:

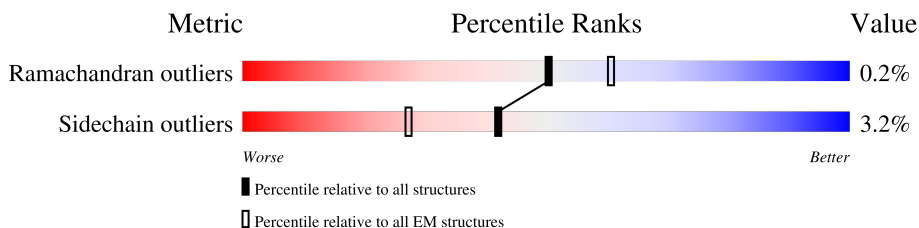
EMDB validation analysis : 0.0.1.dev43
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

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 6.60 Å.

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



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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	377	<div style="display: flex; align-items: center;"> <div style="width: 94%; height: 10px; background: linear-gradient(to right, red, orange, yellow, green);"></div> <div style="margin-left: 5px;">94%</div> </div> <div style="display: flex; align-items: center; margin-top: 2px;"> <div style="width: 96%; height: 10px; background-color: red;"></div> <div style="margin-left: 5px;">96%</div> </div>
1	B	377	<div style="display: flex; align-items: center;"> <div style="width: 43%; height: 10px; background-color: red;"></div> <div style="margin-left: 5px;">43%</div> </div> <div style="display: flex; align-items: center; margin-top: 2px;"> <div style="width: 96%; height: 10px; background-color: green;"></div> <div style="margin-left: 5px;">96%</div> </div>
1	C	377	<div style="display: flex; align-items: center;"> <div style="width: 96%; height: 10px; background-color: green;"></div> <div style="margin-left: 5px;">96%</div> </div>
1	D	377	<div style="display: flex; align-items: center;"> <div style="width: 96%; height: 10px; background-color: green;"></div> <div style="margin-left: 5px;">96%</div> </div>
1	E	377	<div style="display: flex; align-items: center;"> <div style="width: 96%; height: 10px; background-color: green;"></div> <div style="margin-left: 5px;">96%</div> </div>
1	F	377	<div style="display: flex; align-items: center;"> <div style="width: 96%; height: 10px; background-color: green;"></div> <div style="margin-left: 5px;">96%</div> </div>
1	G	377	<div style="display: flex; align-items: center;"> <div style="width: 96%; height: 10px; background-color: green;"></div> <div style="margin-left: 5px;">96%</div> </div>
1	H	377	<div style="display: flex; align-items: center;"> <div style="width: 96%; height: 10px; background-color: green;"></div> <div style="margin-left: 5px;">96%</div> </div>
1	I	377	<div style="display: flex; align-items: center;"> <div style="width: 96%; height: 10px; background-color: green;"></div> <div style="margin-left: 5px;">96%</div> </div>

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Mol	Chain	Length	Quality of chain
1	J	377	96%
1	K	377	96%
1	L	377	96%
1	M	377	96%
1	N	377	96%
1	O	377	96%
1	P	377	96%
1	Q	377	96%
1	R	377	49% 96%
2	W	284	21% 77%
2	Z	284	23% 77%
2	a	284	89% 10%
2	b	284	89% 10%
2	g	284	29% 70%
2	h	284	30% 70%
2	i	284	82% 17%
2	j	284	82% 17%
3	X	288	20% 78%
3	Y	288	25% 74%
3	e	288	20% 78%
3	f	288	25% 74%
4	V	210	77% 19%
4	c	210	78% 19%
5	U	161	17% 97%
5	d	161	11% 98%

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 141796 atoms, of which 70424 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 Actin, alpha skeletal muscle.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	A	375	5827	1855	2893	493	565	21	0	0
1	B	375	5827	1855	2893	493	565	21	0	0
1	C	375	5827	1855	2893	493	565	21	0	0
1	D	375	5827	1855	2893	493	565	21	0	0
1	E	375	5827	1855	2893	493	565	21	0	0
1	F	375	5827	1855	2893	493	565	21	0	0
1	G	375	5827	1855	2893	493	565	21	0	0
1	H	375	5827	1855	2893	493	565	21	0	0
1	I	375	5827	1855	2893	493	565	21	0	0
1	J	375	5827	1855	2893	493	565	21	0	0
1	K	375	5827	1855	2893	493	565	21	0	0
1	L	375	5827	1855	2893	493	565	21	0	0
1	M	375	5827	1855	2893	493	565	21	0	0
1	N	375	5827	1855	2893	493	565	21	0	0
1	O	375	5827	1855	2893	493	565	21	0	0
1	P	375	5827	1855	2893	493	565	21	0	0
1	Q	375	5827	1855	2893	493	565	21	0	0

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Mol	Chain	Residues	Atoms						AltConf	Trace
1	R	375	Total	C	H	N	O	S	0	0
			5827	1855	2893	493	565	21		

- Molecule 2 is a protein called Tropomyosin alpha-1 chain.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	a	257	Total	C	H	N	O	S	0	0
			4142	1267	2068	352	451	4		
2	b	257	Total	C	H	N	O	S	0	0
			4142	1267	2068	352	451	4		
2	W	65	Total	C	H	N	O	S	0	0
			1061	319	541	89	109	3		
2	Z	65	Total	C	H	N	O	S	0	0
			1061	319	541	89	109	3		
2	i	237	Total	C	H	N	O	S	0	0
			3822	1171	1908	324	415	4		
2	j	237	Total	C	H	N	O	S	0	0
			3822	1171	1908	324	415	4		
2	g	85	Total	C	H	N	O	S	0	0
			1358	410	687	113	145	3		
2	h	85	Total	C	H	N	O	S	0	0
			1358	410	687	113	145	3		

- Molecule 3 is a protein called Isoform 6 of Troponin T, cardiac muscle.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	X	63	Total	C	H	N	O	S	0	0
			1122	332	563	120	106	1		
3	Y	74	Total	C	H	N	O		0	0
			1306	401	663	123	119			
3	e	63	Total	C	H	N	O	S	0	0
			1122	332	563	120	106	1		
3	f	74	Total	C	H	N	O		0	0
			1306	401	663	123	119			

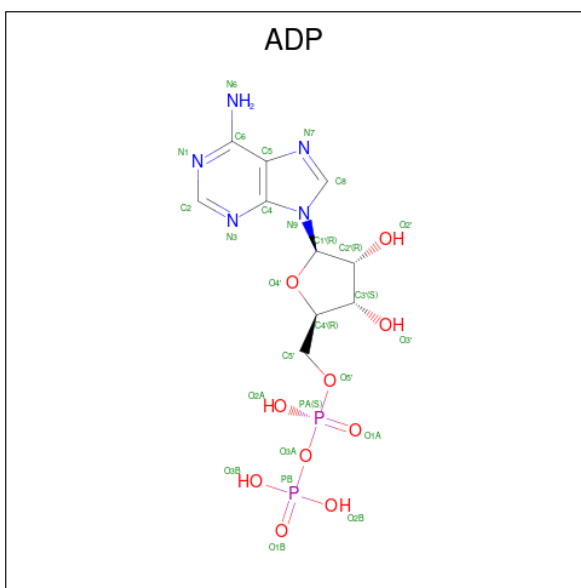
- Molecule 4 is a protein called Troponin I, cardiac muscle.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	V	170	Total	C	H	N	O	S	0	0
			2810	848	1436	263	258	5		
4	c	170	Total	C	H	N	O	S	0	0
			2810	848	1436	263	258	5		

- Molecule 5 is a protein called Troponin C, slow skeletal and cardiac muscles.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
5	U	160	2474	788	1201	195	278	12	0	0
5	d	160	2474	788	1201	195	278	12	0	0

- Molecule 6 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
6	A	1	39	10	12	5	10	2	0
6	B	1	39	10	12	5	10	2	0
6	C	1	39	10	12	5	10	2	0
6	D	1	39	10	12	5	10	2	0
6	E	1	39	10	12	5	10	2	0
6	F	1	39	10	12	5	10	2	0
6	G	1	39	10	12	5	10	2	0
6	H	1	39	10	12	5	10	2	0

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Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
6	I	1	39	10	12	5	10	2	0
6	J	1	39	10	12	5	10	2	0
6	K	1	39	10	12	5	10	2	0
6	L	1	39	10	12	5	10	2	0
6	M	1	39	10	12	5	10	2	0
6	N	1	39	10	12	5	10	2	0
6	O	1	39	10	12	5	10	2	0
6	P	1	39	10	12	5	10	2	0
6	Q	1	39	10	12	5	10	2	0
6	R	1	39	10	12	5	10	2	0

- Molecule 7 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

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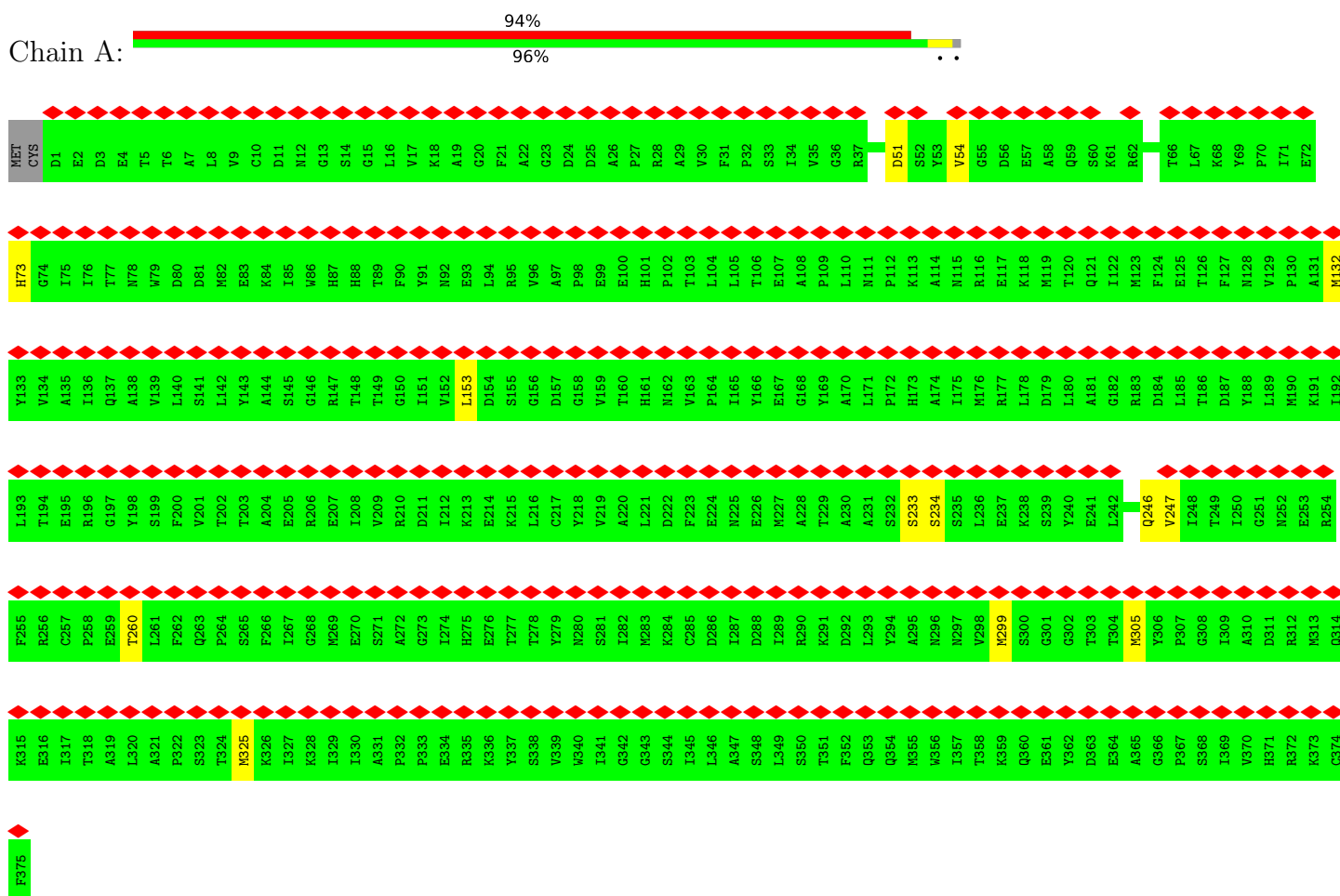
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Mol	Chain	Residues	Atoms		AltConf
7	J	1	Total 1	Mg 1	0
7	K	1	Total 1	Mg 1	0
7	L	1	Total 1	Mg 1	0
7	M	1	Total 1	Mg 1	0
7	N	1	Total 1	Mg 1	0
7	O	1	Total 1	Mg 1	0
7	P	1	Total 1	Mg 1	0
7	Q	1	Total 1	Mg 1	0
7	R	1	Total 1	Mg 1	0

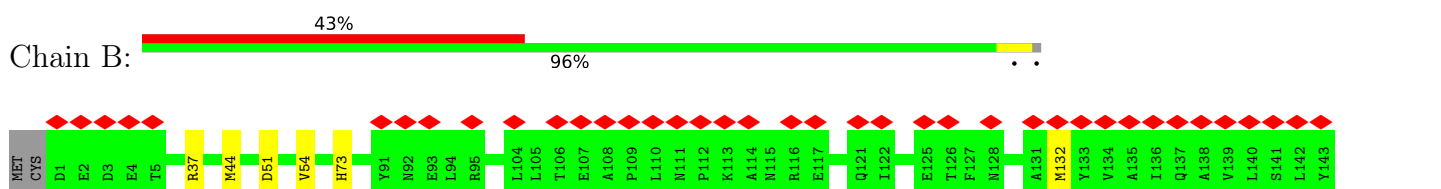
3 Residue-property plots i

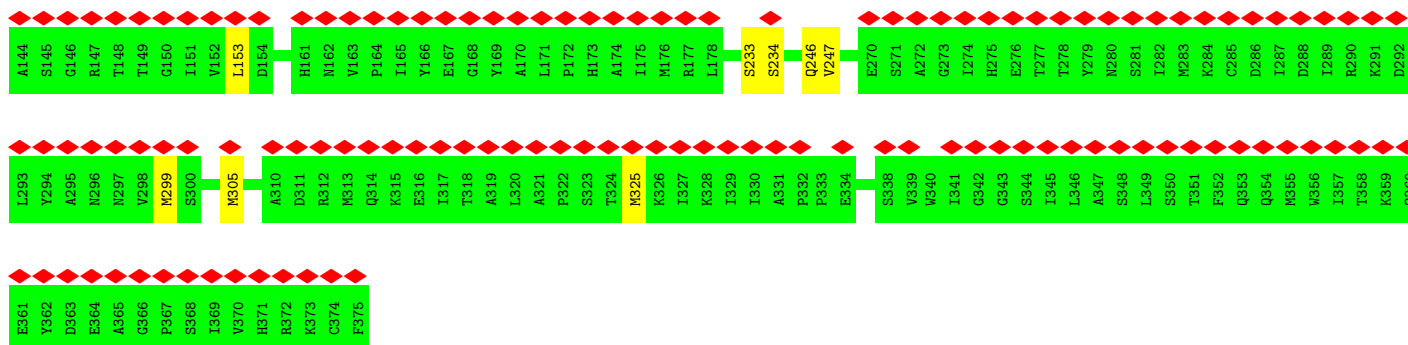
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

- Molecule 1: Actin, alpha skeletal muscle

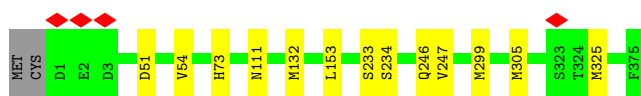


- Molecule 1: Actin, alpha skeletal muscle

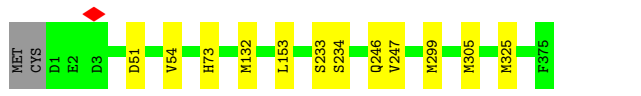




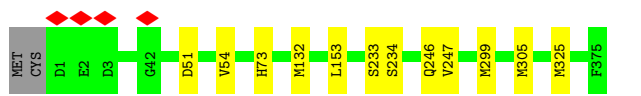
● Molecule 1: Actin, alpha skeletal muscle



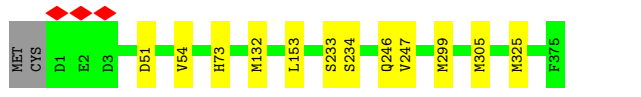
● Molecule 1: Actin, alpha skeletal muscle



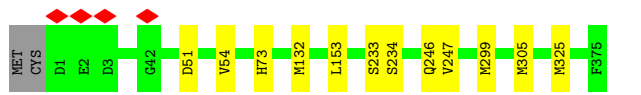
● Molecule 1: Actin, alpha skeletal muscle



● Molecule 1: Actin, alpha skeletal muscle



● Molecule 1: Actin, alpha skeletal muscle



● Molecule 1: Actin, alpha skeletal muscle

Chain H:  96%



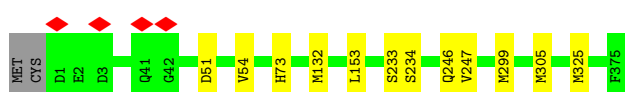
- Molecule 1: Actin, alpha skeletal muscle

Chain I:  96%



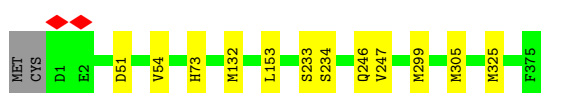
- Molecule 1: Actin, alpha skeletal muscle

Chain J:  96%



- Molecule 1: Actin, alpha skeletal muscle

Chain K:  96%



- Molecule 1: Actin, alpha skeletal muscle

Chain L:  96%



- Molecule 1: Actin, alpha skeletal muscle

Chain M:  96%



- Molecule 1: Actin, alpha skeletal muscle

Chain N:  96%



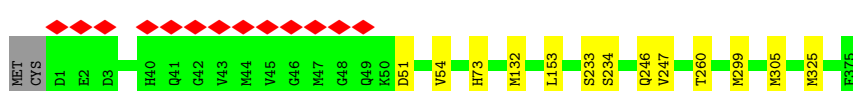
- Molecule 1: Actin, alpha skeletal muscle



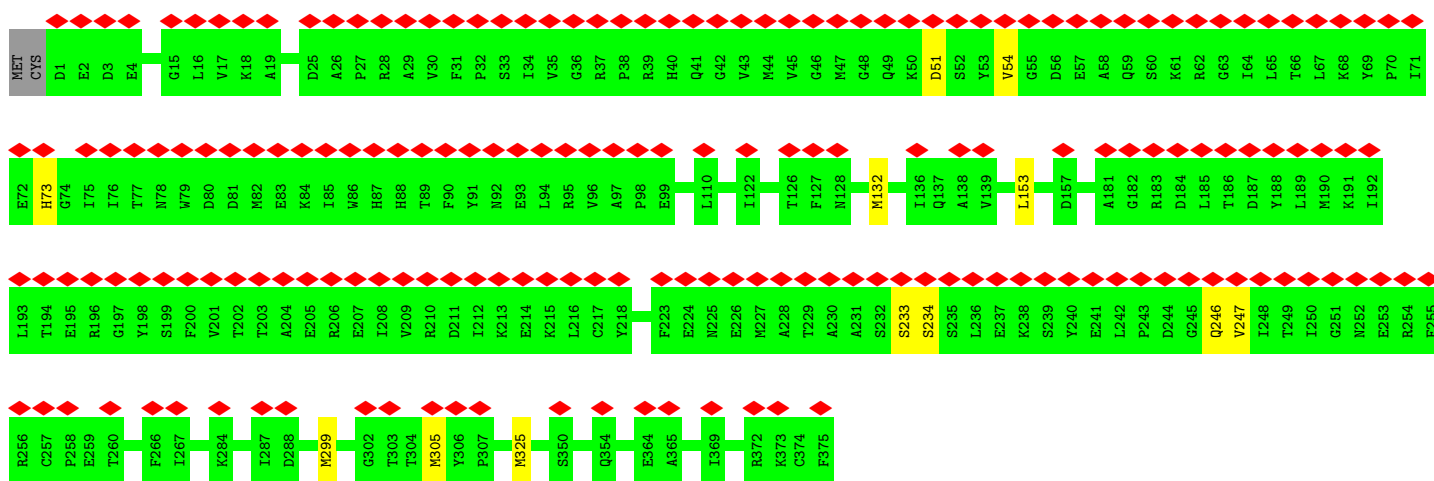
- Molecule 1: Actin, alpha skeletal muscle



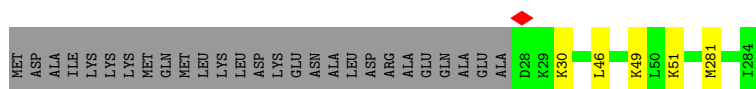
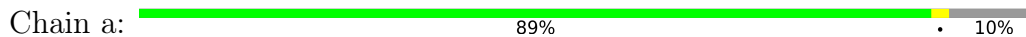
- Molecule 1: Actin, alpha skeletal muscle




- Molecule 1: Actin, alpha skeletal muscle

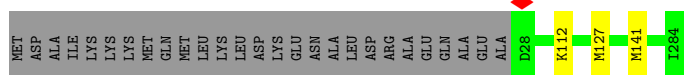


- Molecule 2: Tropomyosin alpha-1 chain



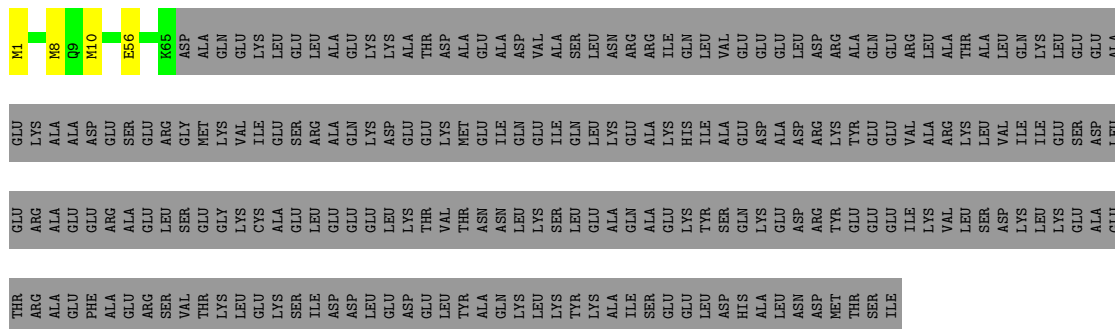
- Molecule 2: Tropomyosin alpha-1 chain

Chain b:  89% • 10%



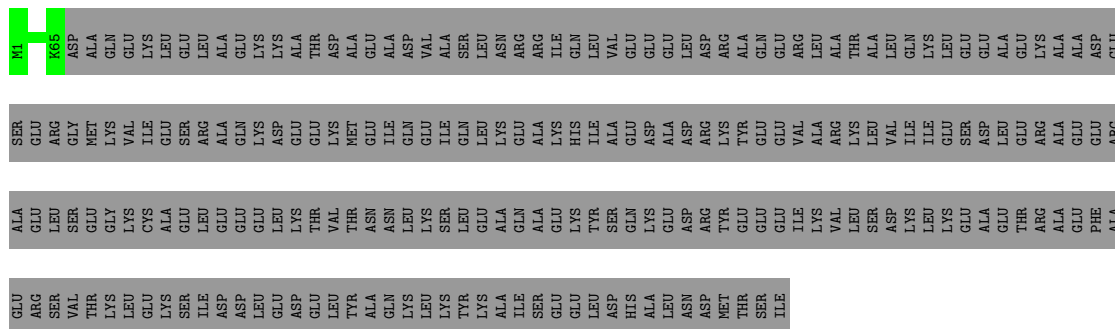
• Molecule 2: Tropomyosin alpha-1 chain

Chain W:  21% • 77%




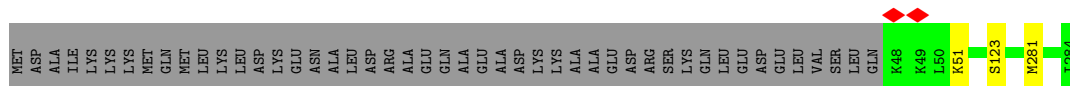
• Molecule 2: Tropomyosin alpha-1 chain

Chain Z:  23% • 77%




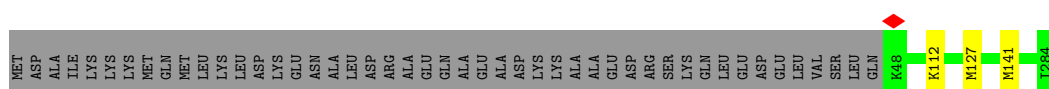
• Molecule 2: Tropomyosin alpha-1 chain

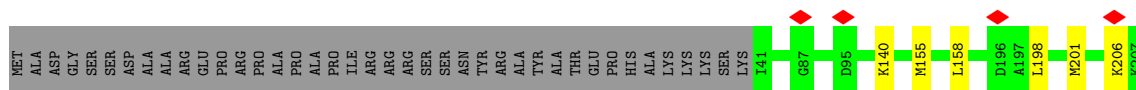
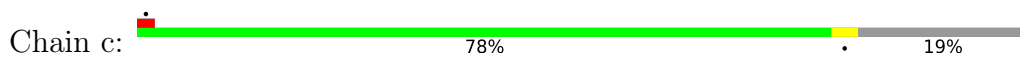
Chain i:  82% • 17%



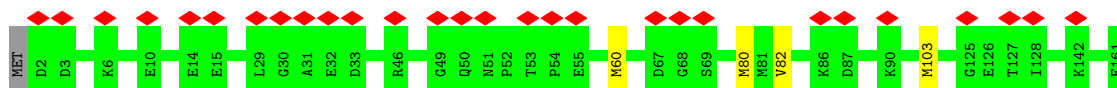
• Molecule 2: Tropomyosin alpha-1 chain

Chain j:  82% • 17%





- Molecule 5: Troponin C, slow skeletal and cardiac muscles



- Molecule 5: Troponin C, slow skeletal and cardiac muscles



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	21588	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	JEOL CRYO ARM 200	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	65	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.226	Depositor
Minimum map value	-0.071	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.011	Depositor
Recommended contour level	0.0376	Depositor
Map size (\AA)	444.0, 444.0, 444.0	wwPDB
Map dimensions	200, 200, 200	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	2.22, 2.22, 2.22	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: MG, ADP, HIC

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	0.29	0/2984	0.58	0/4040
1	B	0.30	0/2984	0.59	0/4040
1	C	0.31	0/2984	0.60	1/4040 (0.0%)
1	D	0.29	0/2984	0.58	0/4040
1	E	0.30	0/2984	0.58	0/4040
1	F	0.29	0/2984	0.58	0/4040
1	G	0.29	0/2984	0.58	0/4040
1	H	0.29	0/2984	0.58	0/4040
1	I	0.30	0/2984	0.58	0/4040
1	J	0.29	0/2984	0.58	0/4040
1	K	0.29	0/2984	0.58	0/4040
1	L	0.29	0/2984	0.58	0/4040
1	M	0.30	0/2984	0.59	0/4040
1	N	0.29	0/2984	0.58	0/4040
1	O	0.30	0/2984	0.58	0/4040
1	P	0.30	0/2984	0.59	0/4040
1	Q	0.30	0/2984	0.58	0/4040
1	R	0.29	0/2984	0.58	0/4040
2	W	0.30	0/520	0.64	0/686
2	Z	0.29	0/520	0.58	0/686
2	a	0.33	0/2082	0.60	1/2776 (0.0%)
2	b	0.28	0/2082	0.55	0/2776
2	g	0.29	0/671	0.60	0/889
2	h	0.29	0/671	0.54	0/889
2	i	0.33	0/1922	0.60	0/2563
2	j	0.28	0/1922	0.55	0/2563
3	X	0.33	0/561	0.75	0/739
3	Y	0.32	0/649	0.66	0/861
3	e	0.33	0/561	0.78	1/739 (0.1%)
3	f	0.30	0/649	0.65	0/861
4	V	0.30	0/1384	0.73	0/1840
4	c	0.29	0/1384	0.73	0/1840

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
5	U	0.31	0/1286	0.59	0/1719
5	d	0.31	0/1286	0.58	0/1719
All	All	0.30	0/71862	0.59	3/96866 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	111	ASN	N-CA-C	-5.63	95.79	111.00
3	e	94	ARG	NE-CZ-NH1	5.43	123.02	120.30
2	a	46	LEU	CB-CG-CD1	5.07	119.62	111.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

5.3 Torsion angles [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	A	372/377 (99%)	353 (95%)	18 (5%)	1 (0%)	41	76
1	B	372/377 (99%)	353 (95%)	18 (5%)	1 (0%)	41	76
1	C	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	D	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	E	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	F	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	G	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	H	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	I	372/377 (99%)	353 (95%)	18 (5%)	1 (0%)	41	76
1	J	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	K	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	L	372/377 (99%)	353 (95%)	18 (5%)	1 (0%)	41	76
1	M	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	N	372/377 (99%)	353 (95%)	18 (5%)	1 (0%)	41	76
1	O	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	P	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	Q	372/377 (99%)	352 (95%)	19 (5%)	1 (0%)	41	76
1	R	372/377 (99%)	353 (95%)	18 (5%)	1 (0%)	41	76
2	W	63/284 (22%)	63 (100%)	0	0	100	100
2	Z	63/284 (22%)	63 (100%)	0	0	100	100
2	a	255/284 (90%)	254 (100%)	1 (0%)	0	100	100
2	b	255/284 (90%)	255 (100%)	0	0	100	100
2	g	83/284 (29%)	83 (100%)	0	0	100	100
2	h	83/284 (29%)	83 (100%)	0	0	100	100
2	i	235/284 (83%)	234 (100%)	1 (0%)	0	100	100
2	j	235/284 (83%)	235 (100%)	0	0	100	100
3	X	61/288 (21%)	59 (97%)	2 (3%)	0	100	100
3	Y	72/288 (25%)	70 (97%)	2 (3%)	0	100	100
3	e	61/288 (21%)	59 (97%)	2 (3%)	0	100	100
3	f	72/288 (25%)	70 (97%)	2 (3%)	0	100	100
4	V	168/210 (80%)	156 (93%)	12 (7%)	0	100	100
4	c	168/210 (80%)	156 (93%)	12 (7%)	0	100	100
5	U	158/161 (98%)	145 (92%)	13 (8%)	0	100	100
5	d	158/161 (98%)	145 (92%)	13 (8%)	0	100	100
All	All	8886/10952 (81%)	8472 (95%)	396 (4%)	18 (0%)	50	81

5 of 18 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	51	ASP

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Mol	Chain	Res	Type
1	B	51	ASP
1	C	51	ASP
1	D	51	ASP
1	E	51	ASP

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	317/319 (99%)	306 (96%)	11 (4%)	36	59
1	B	317/319 (99%)	305 (96%)	12 (4%)	33	57
1	C	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	D	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	E	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	F	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	G	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	H	317/319 (99%)	306 (96%)	11 (4%)	36	59
1	I	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	J	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	K	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	L	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	M	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	N	317/319 (99%)	305 (96%)	12 (4%)	33	57
1	O	317/319 (99%)	307 (97%)	10 (3%)	39	61
1	P	317/319 (99%)	306 (96%)	11 (4%)	36	59
1	Q	317/319 (99%)	306 (96%)	11 (4%)	36	59
1	R	317/319 (99%)	307 (97%)	10 (3%)	39	61
2	W	56/245 (23%)	52 (93%)	4 (7%)	14	39
2	Z	56/245 (23%)	56 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	a	223/245 (91%)	219 (98%)	4 (2%)	59	77
2	b	223/245 (91%)	220 (99%)	3 (1%)	69	82
2	g	71/245 (29%)	67 (94%)	4 (6%)	21	46
2	h	71/245 (29%)	71 (100%)	0	100	100
2	i	205/245 (84%)	202 (98%)	3 (2%)	65	80
2	j	205/245 (84%)	202 (98%)	3 (2%)	65	80
3	X	59/256 (23%)	54 (92%)	5 (8%)	10	33
3	Y	69/256 (27%)	67 (97%)	2 (3%)	42	64
3	e	59/256 (23%)	53 (90%)	6 (10%)	7	25
3	f	69/256 (27%)	68 (99%)	1 (1%)	67	80
4	V	145/176 (82%)	137 (94%)	8 (6%)	21	47
4	c	145/176 (82%)	138 (95%)	7 (5%)	25	51
5	U	141/142 (99%)	137 (97%)	4 (3%)	43	65
5	d	141/142 (99%)	138 (98%)	3 (2%)	53	72
All	All	7644/9362 (82%)	7399 (97%)	245 (3%)	42	61

5 of 245 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	L	132	MET
2	j	112	LYS
1	N	299	MET
2	i	123	SER
4	c	155	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	R	162	ASN
3	Y	228	GLN
3	f	228	GLN
1	N	162	ASN
1	O	162	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

18 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	HIC	E	73	1	8,11,12	1.65	1 (12%)	6,14,16	1.32	1 (16%)
1	HIC	G	73	1	8,11,12	1.66	1 (12%)	6,14,16	1.32	1 (16%)
1	HIC	P	73	1	8,11,12	1.67	2 (25%)	6,14,16	1.32	1 (16%)
1	HIC	M	73	1	8,11,12	1.66	2 (25%)	6,14,16	1.31	1 (16%)
1	HIC	C	73	1	8,11,12	1.66	2 (25%)	6,14,16	1.32	1 (16%)
1	HIC	F	73	1	8,11,12	1.67	2 (25%)	6,14,16	1.32	1 (16%)
1	HIC	L	73	1	8,11,12	1.66	1 (12%)	6,14,16	1.33	1 (16%)
1	HIC	H	73	1	8,11,12	1.68	2 (25%)	6,14,16	1.32	1 (16%)
1	HIC	I	73	1	8,11,12	1.66	2 (25%)	6,14,16	1.31	1 (16%)
1	HIC	K	73	1	8,11,12	1.66	2 (25%)	6,14,16	1.32	1 (16%)
1	HIC	N	73	1	8,11,12	1.67	2 (25%)	6,14,16	1.33	1 (16%)
1	HIC	O	73	1	8,11,12	1.65	2 (25%)	6,14,16	1.32	1 (16%)
1	HIC	D	73	1	8,11,12	1.67	2 (25%)	6,14,16	1.34	1 (16%)
1	HIC	B	73	1	8,11,12	1.66	2 (25%)	6,14,16	1.33	1 (16%)
1	HIC	A	73	1	8,11,12	1.65	1 (12%)	6,14,16	1.30	1 (16%)
1	HIC	J	73	1	8,11,12	1.66	1 (12%)	6,14,16	1.32	1 (16%)
1	HIC	Q	73	1	8,11,12	1.66	2 (25%)	6,14,16	1.32	1 (16%)
1	HIC	R	73	1	8,11,12	1.66	2 (25%)	6,14,16	1.31	1 (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
1	HIC	E	73	1	-	2/5/6/8	0/1/1/1
1	HIC	G	73	1	-	2/5/6/8	0/1/1/1
1	HIC	P	73	1	-	2/5/6/8	0/1/1/1
1	HIC	M	73	1	-	2/5/6/8	0/1/1/1
1	HIC	C	73	1	-	2/5/6/8	0/1/1/1
1	HIC	F	73	1	-	2/5/6/8	0/1/1/1
1	HIC	L	73	1	-	2/5/6/8	0/1/1/1
1	HIC	H	73	1	-	2/5/6/8	0/1/1/1
1	HIC	I	73	1	-	2/5/6/8	0/1/1/1
1	HIC	K	73	1	-	2/5/6/8	0/1/1/1
1	HIC	N	73	1	-	2/5/6/8	0/1/1/1
1	HIC	O	73	1	-	2/5/6/8	0/1/1/1
1	HIC	D	73	1	-	2/5/6/8	0/1/1/1
1	HIC	B	73	1	-	2/5/6/8	0/1/1/1
1	HIC	A	73	1	-	2/5/6/8	0/1/1/1
1	HIC	J	73	1	-	2/5/6/8	0/1/1/1
1	HIC	Q	73	1	-	2/5/6/8	0/1/1/1
1	HIC	R	73	1	-	2/5/6/8	0/1/1/1

The worst 5 of 31 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	73	HIC	CD2-CG	3.70	1.41	1.36
1	P	73	HIC	CD2-CG	3.69	1.41	1.36
1	N	73	HIC	CD2-CG	3.67	1.41	1.36
1	K	73	HIC	CD2-CG	3.66	1.41	1.36
1	F	73	HIC	CD2-CG	3.66	1.41	1.36

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	73	HIC	CB-CA-C	-2.55	106.68	111.47
1	L	73	HIC	CB-CA-C	-2.55	106.69	111.47
1	D	73	HIC	CB-CA-C	-2.55	106.69	111.47
1	J	73	HIC	CB-CA-C	-2.55	106.69	111.47
1	Q	73	HIC	CB-CA-C	-2.54	106.70	111.47

There are no chirality outliers.

5 of 36 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	73	HIC	N-CA-CB-CG
1	A	73	HIC	C-CA-CB-CG
1	B	73	HIC	N-CA-CB-CG
1	B	73	HIC	C-CA-CB-CG
1	C	73	HIC	N-CA-CB-CG

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 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
6	ADP	J	401	7	24,29,29	0.95	1 (4%)	29,45,45	1.41	4 (13%)
6	ADP	A	401	7	24,29,29	0.95	1 (4%)	29,45,45	1.40	4 (13%)
6	ADP	N	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.41	4 (13%)
6	ADP	C	401	7	24,29,29	0.95	1 (4%)	29,45,45	1.40	4 (13%)
6	ADP	K	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.40	4 (13%)
6	ADP	B	401	7	24,29,29	0.95	1 (4%)	29,45,45	1.41	4 (13%)
6	ADP	O	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.41	4 (13%)
6	ADP	D	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.40	4 (13%)
6	ADP	I	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.40	4 (13%)
6	ADP	P	401	7	24,29,29	0.95	1 (4%)	29,45,45	1.40	4 (13%)
6	ADP	E	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.40	4 (13%)
6	ADP	H	401	7	24,29,29	0.95	1 (4%)	29,45,45	1.40	4 (13%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	ADP	F	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.40	4 (13%)
6	ADP	M	401	7	24,29,29	0.95	1 (4%)	29,45,45	1.41	4 (13%)
6	ADP	Q	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.41	4 (13%)
6	ADP	R	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.41	4 (13%)
6	ADP	G	401	7	24,29,29	0.95	1 (4%)	29,45,45	1.41	4 (13%)
6	ADP	L	401	7	24,29,29	0.94	1 (4%)	29,45,45	1.40	4 (13%)

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
6	ADP	J	401	7	-	2/12/32/32	0/3/3/3
6	ADP	A	401	7	-	2/12/32/32	0/3/3/3
6	ADP	N	401	7	-	2/12/32/32	0/3/3/3
6	ADP	C	401	7	-	2/12/32/32	0/3/3/3
6	ADP	K	401	7	-	2/12/32/32	0/3/3/3
6	ADP	B	401	7	-	2/12/32/32	0/3/3/3
6	ADP	O	401	7	-	2/12/32/32	0/3/3/3
6	ADP	D	401	7	-	2/12/32/32	0/3/3/3
6	ADP	I	401	7	-	2/12/32/32	0/3/3/3
6	ADP	P	401	7	-	2/12/32/32	0/3/3/3
6	ADP	E	401	7	-	2/12/32/32	0/3/3/3
6	ADP	H	401	7	-	2/12/32/32	0/3/3/3
6	ADP	F	401	7	-	2/12/32/32	0/3/3/3
6	ADP	M	401	7	-	2/12/32/32	0/3/3/3
6	ADP	Q	401	7	-	2/12/32/32	0/3/3/3
6	ADP	R	401	7	-	2/12/32/32	0/3/3/3
6	ADP	G	401	7	-	2/12/32/32	0/3/3/3
6	ADP	L	401	7	-	2/12/32/32	0/3/3/3

The worst 5 of 18 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	P	401	ADP	C5-C4	2.54	1.47	1.40
6	M	401	ADP	C5-C4	2.53	1.47	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	L	401	ADP	C5-C4	2.53	1.47	1.40
6	D	401	ADP	C5-C4	2.53	1.47	1.40
6	G	401	ADP	C5-C4	2.53	1.47	1.40

The worst 5 of 72 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	I	401	ADP	PA-O3A-PB	-3.44	121.03	132.83
6	B	401	ADP	PA-O3A-PB	-3.44	121.03	132.83
6	R	401	ADP	PA-O3A-PB	-3.43	121.05	132.83
6	E	401	ADP	PA-O3A-PB	-3.43	121.06	132.83
6	Q	401	ADP	PA-O3A-PB	-3.43	121.06	132.83

There are no chirality outliers.

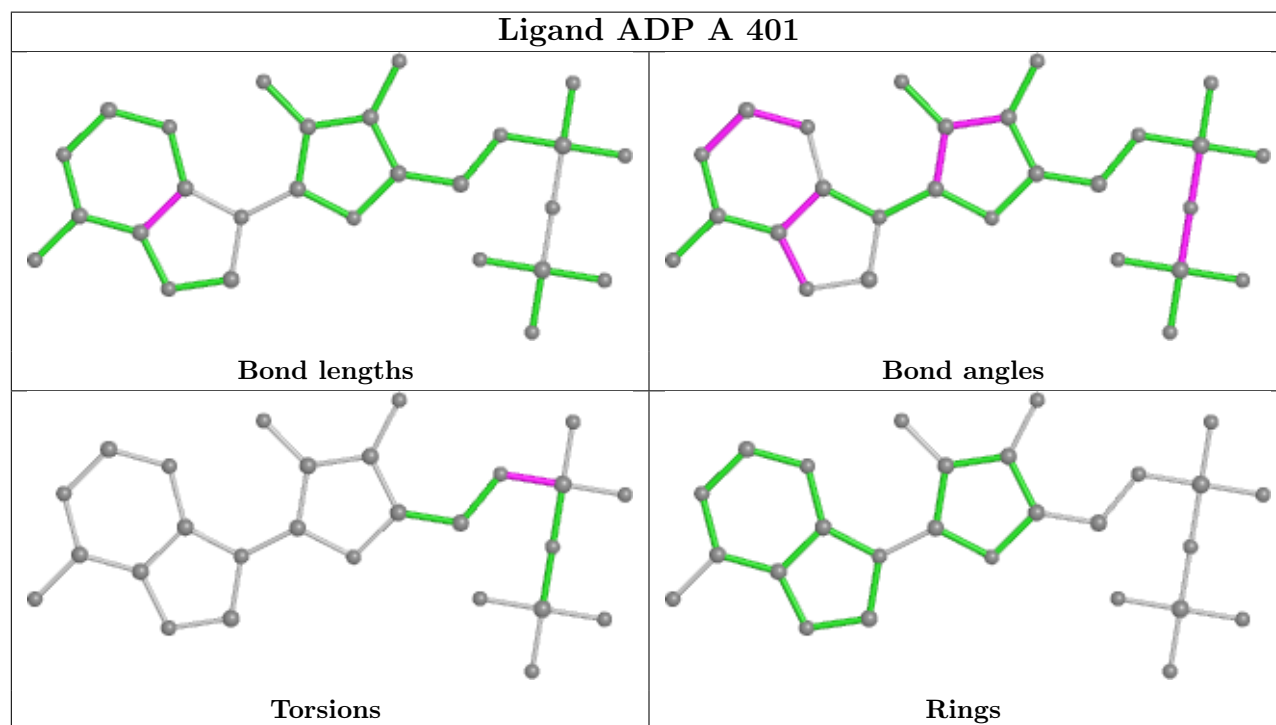
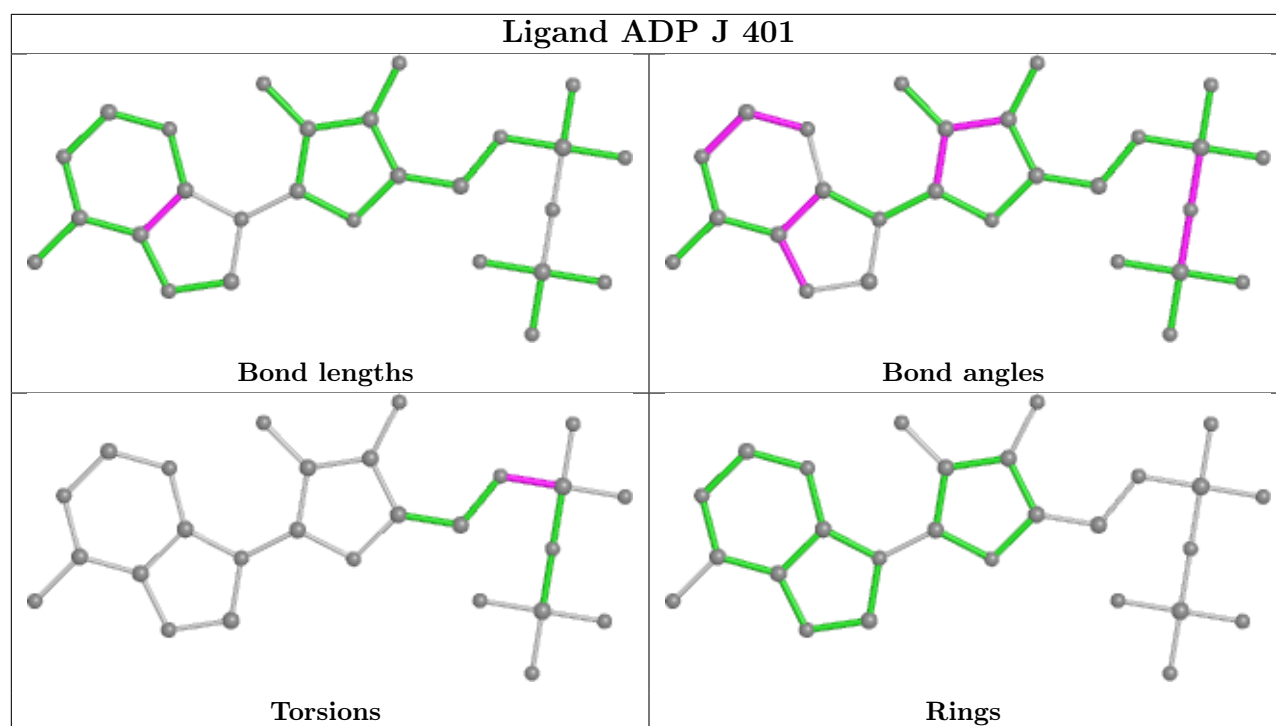
5 of 36 torsion outliers are listed below:

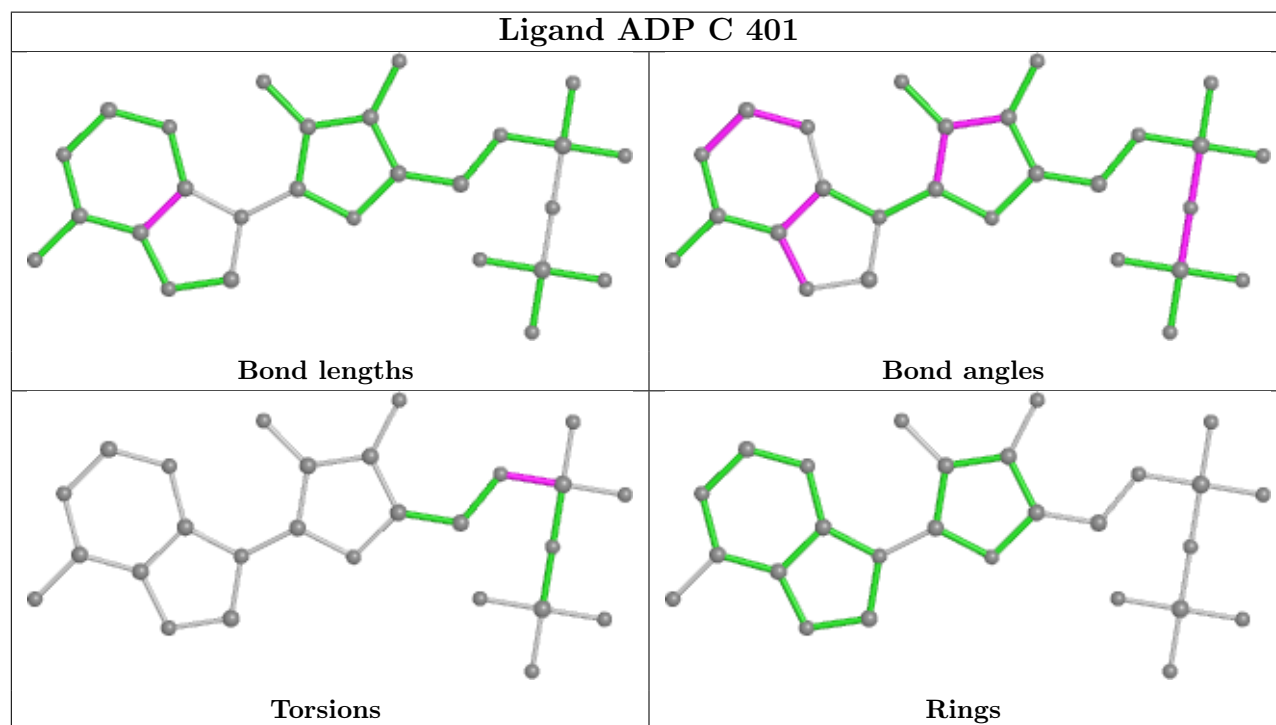
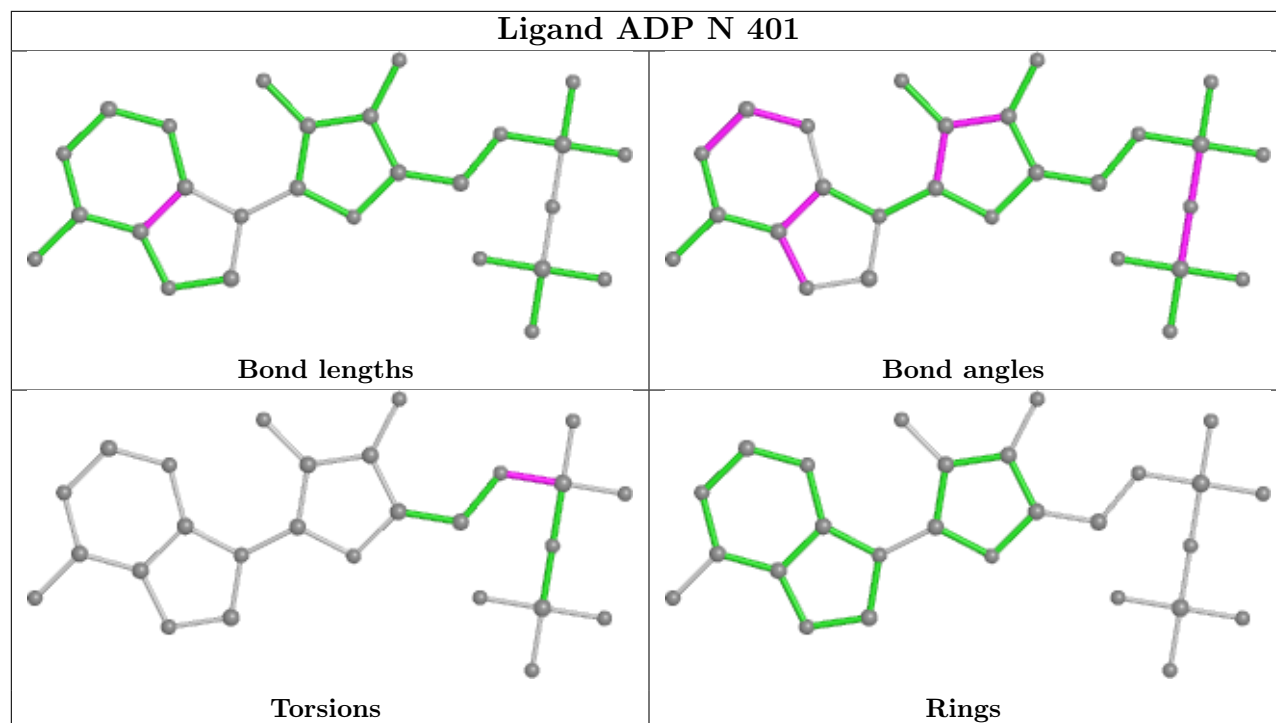
Mol	Chain	Res	Type	Atoms
6	A	401	ADP	C5'-O5'-PA-O2A
6	A	401	ADP	C5'-O5'-PA-O3A
6	B	401	ADP	C5'-O5'-PA-O2A
6	B	401	ADP	C5'-O5'-PA-O3A
6	C	401	ADP	C5'-O5'-PA-O2A

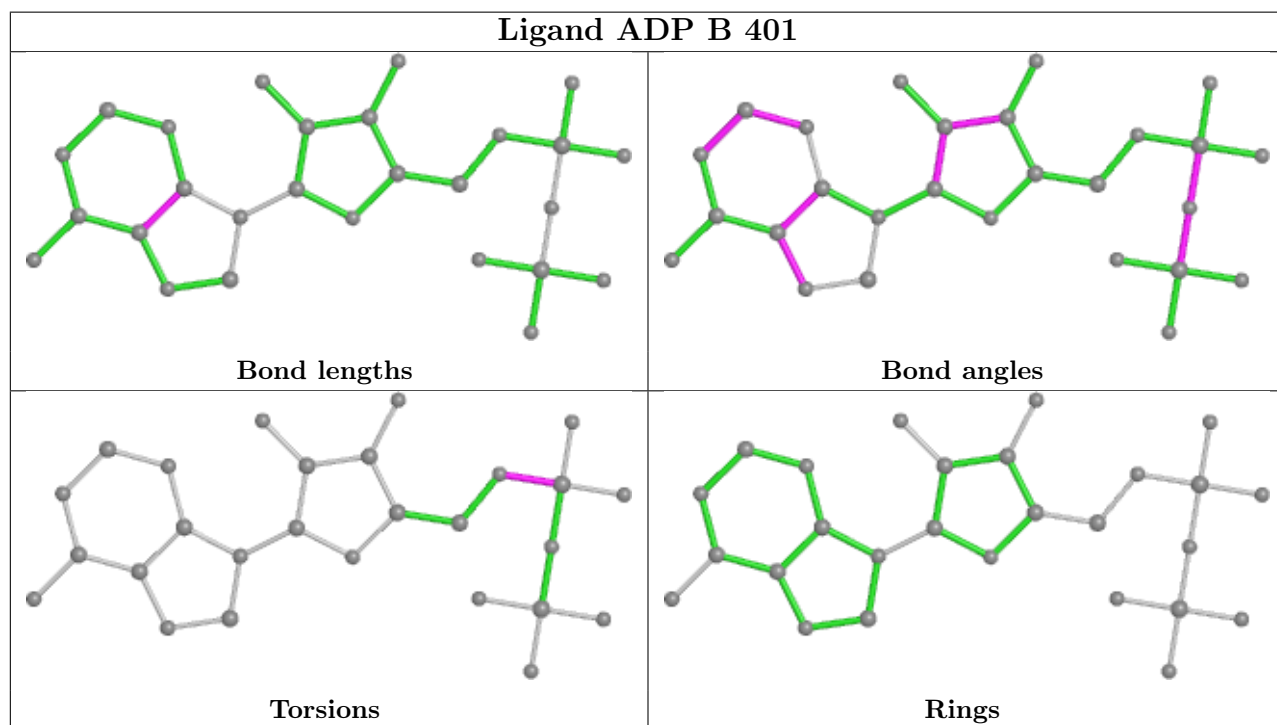
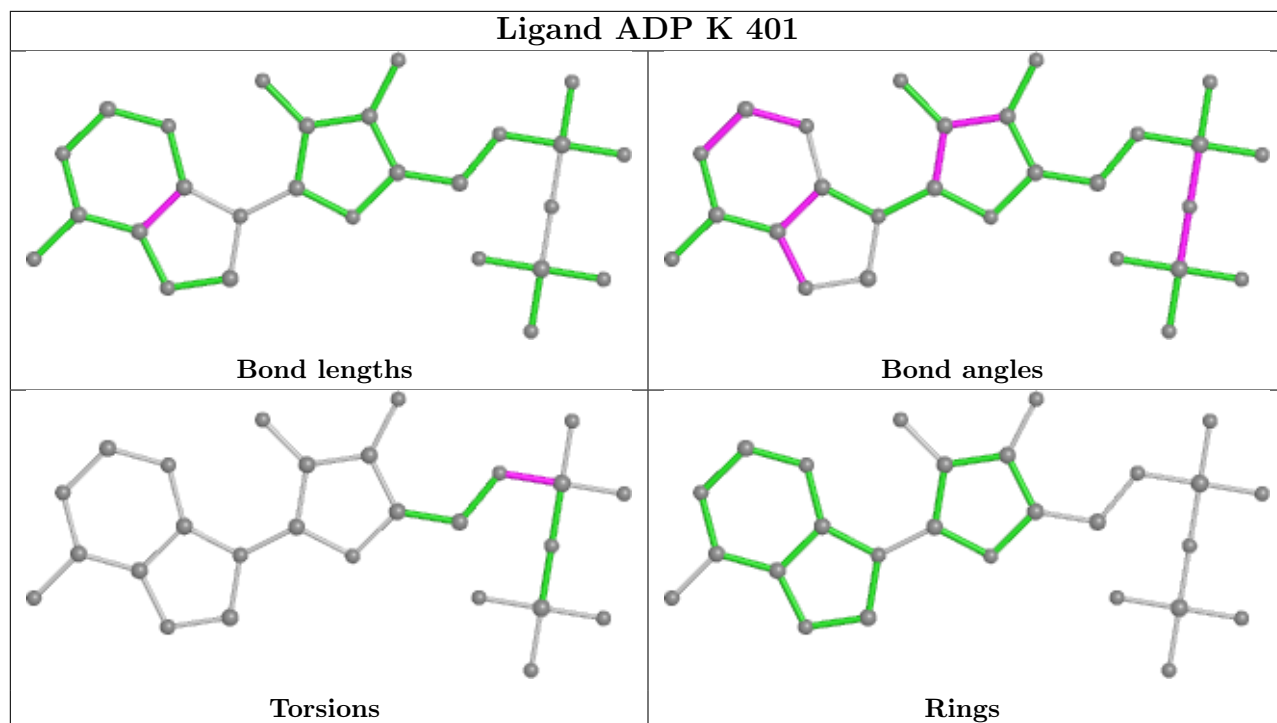
There are no ring outliers.

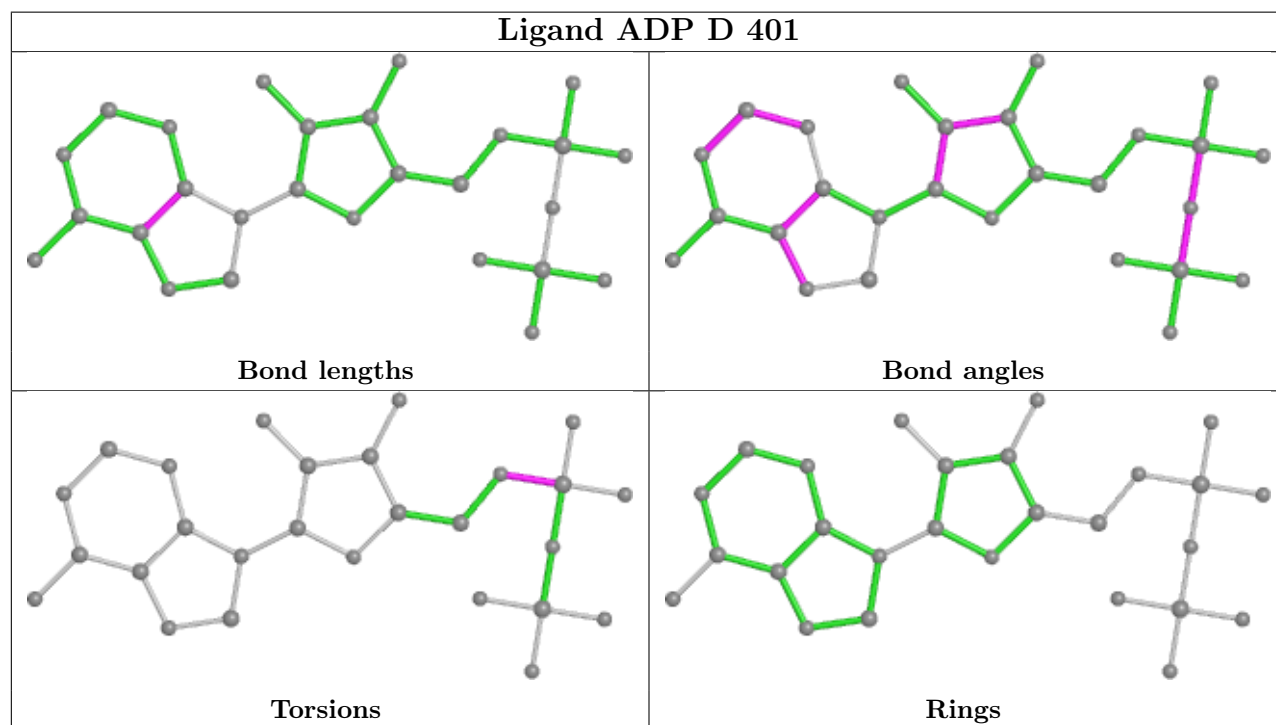
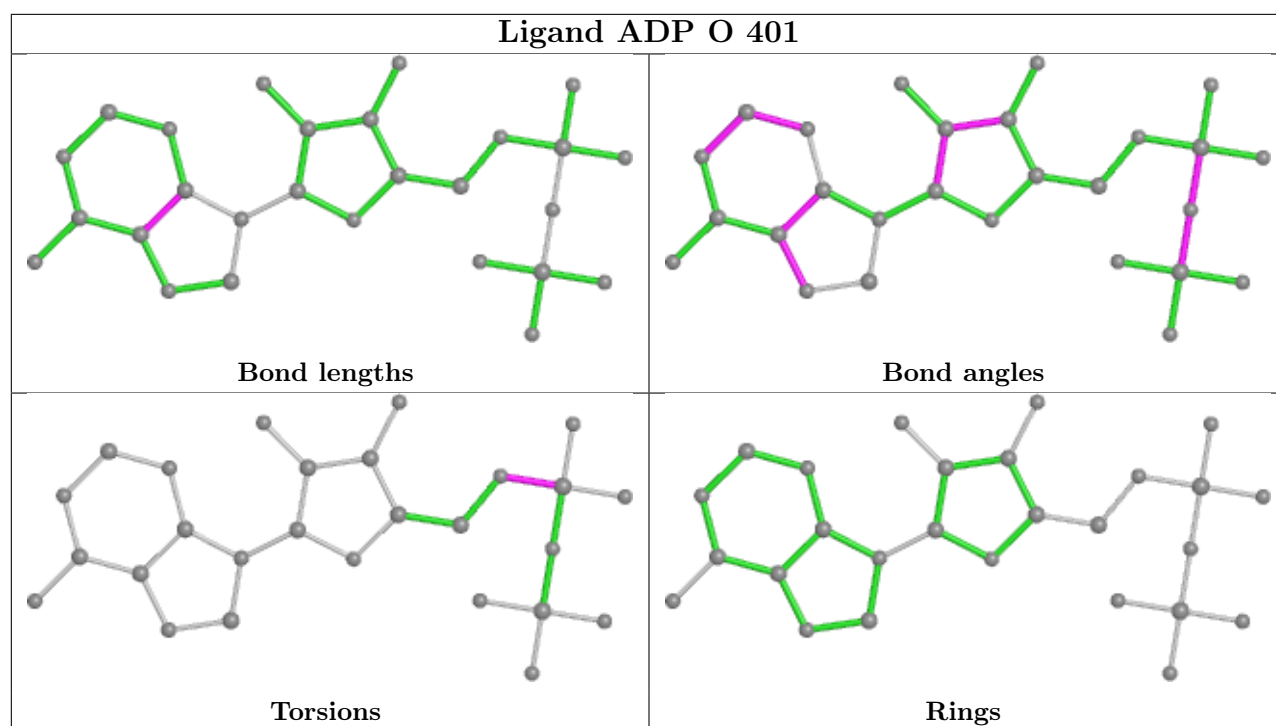
No monomer is involved in short contacts.

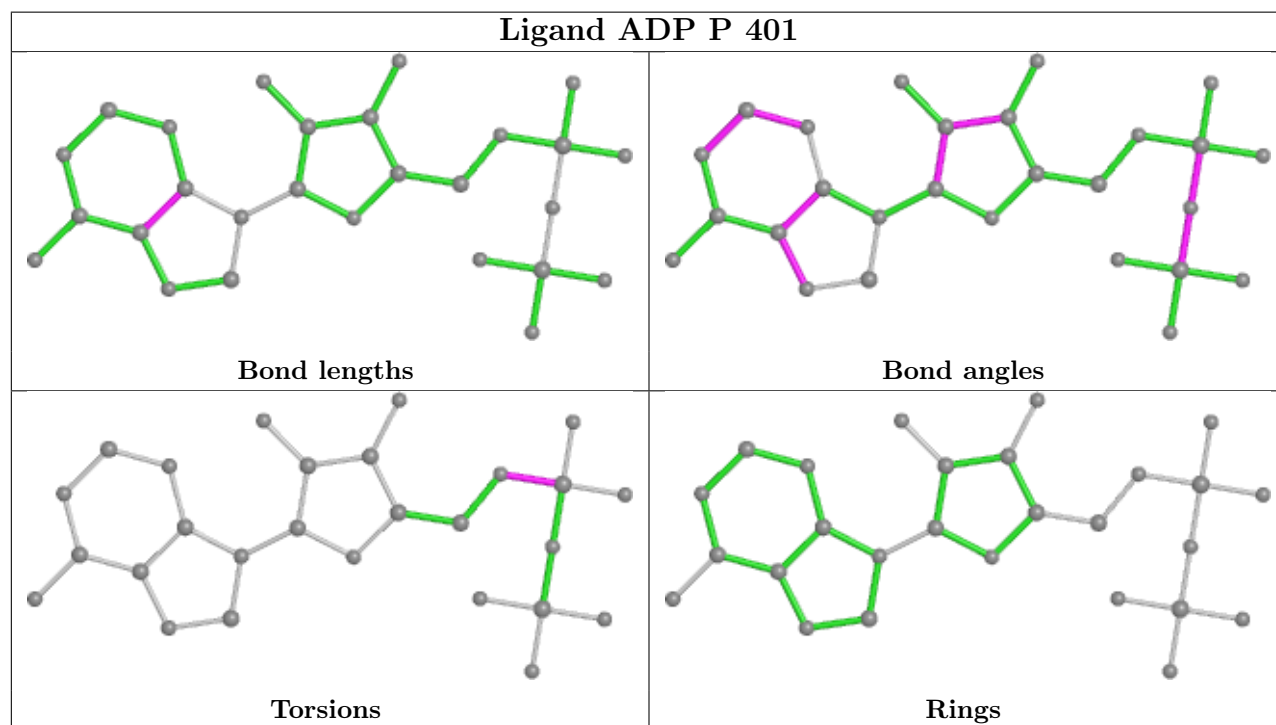
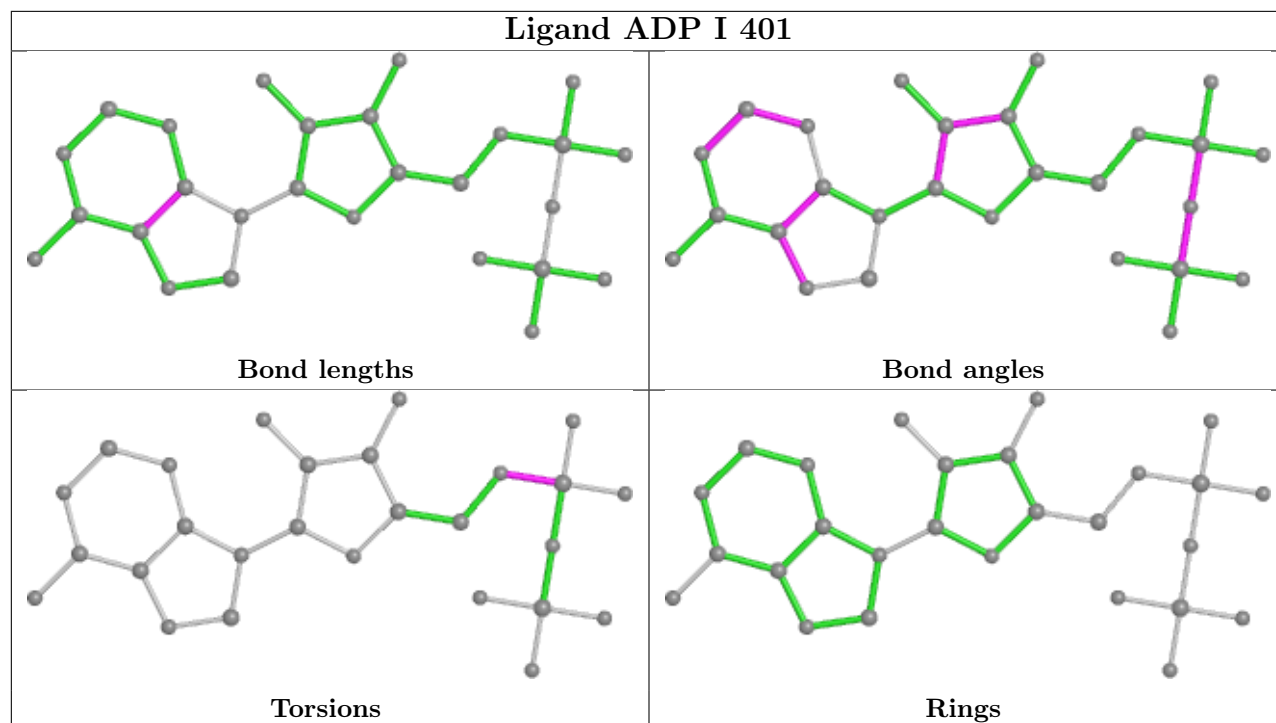
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

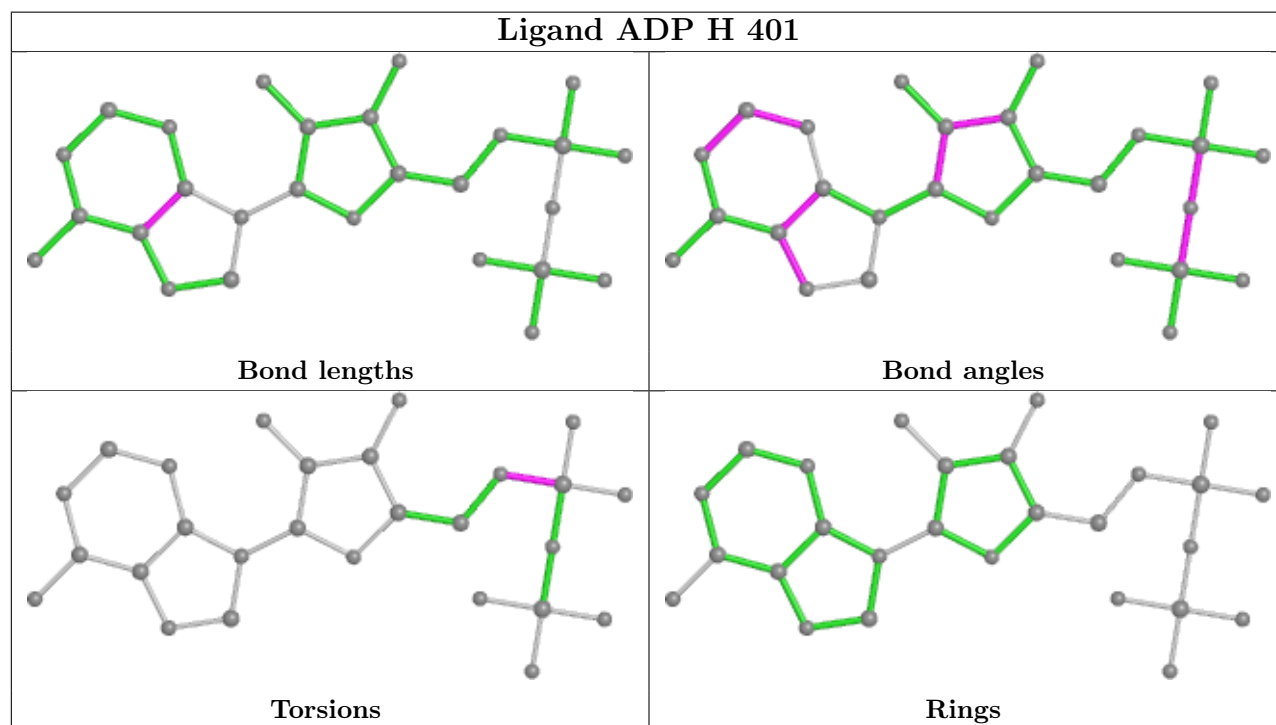
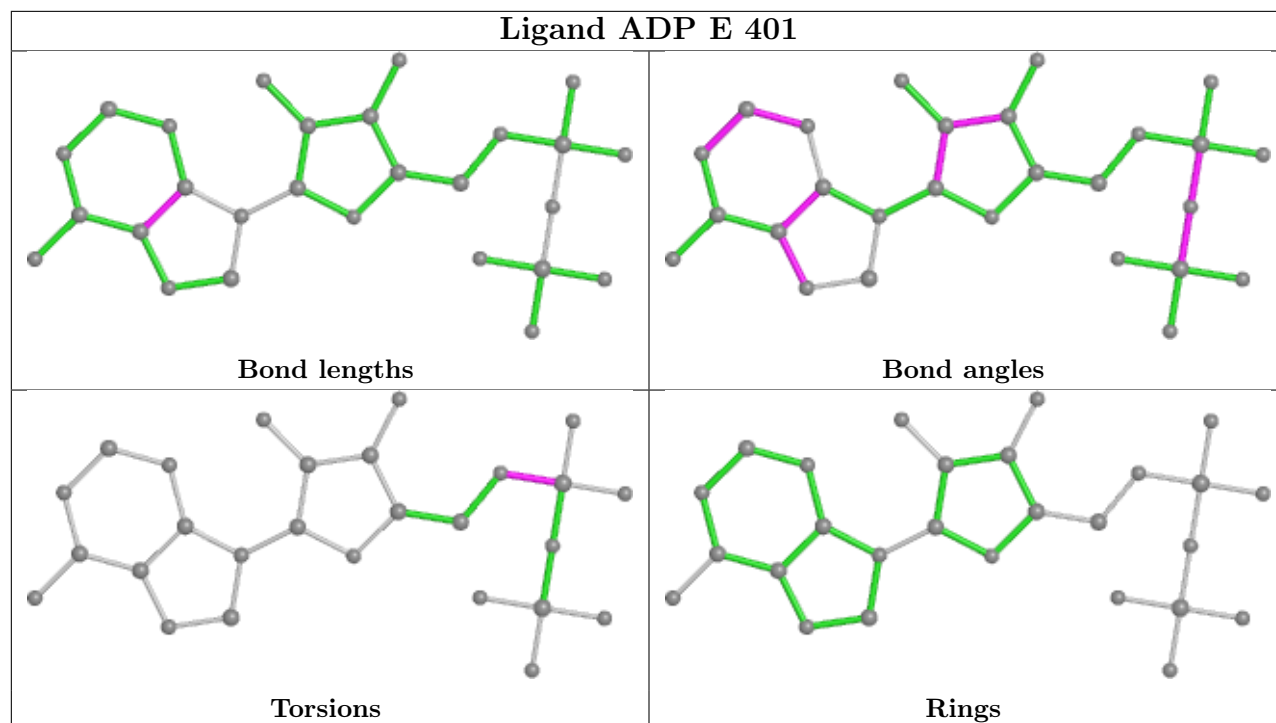


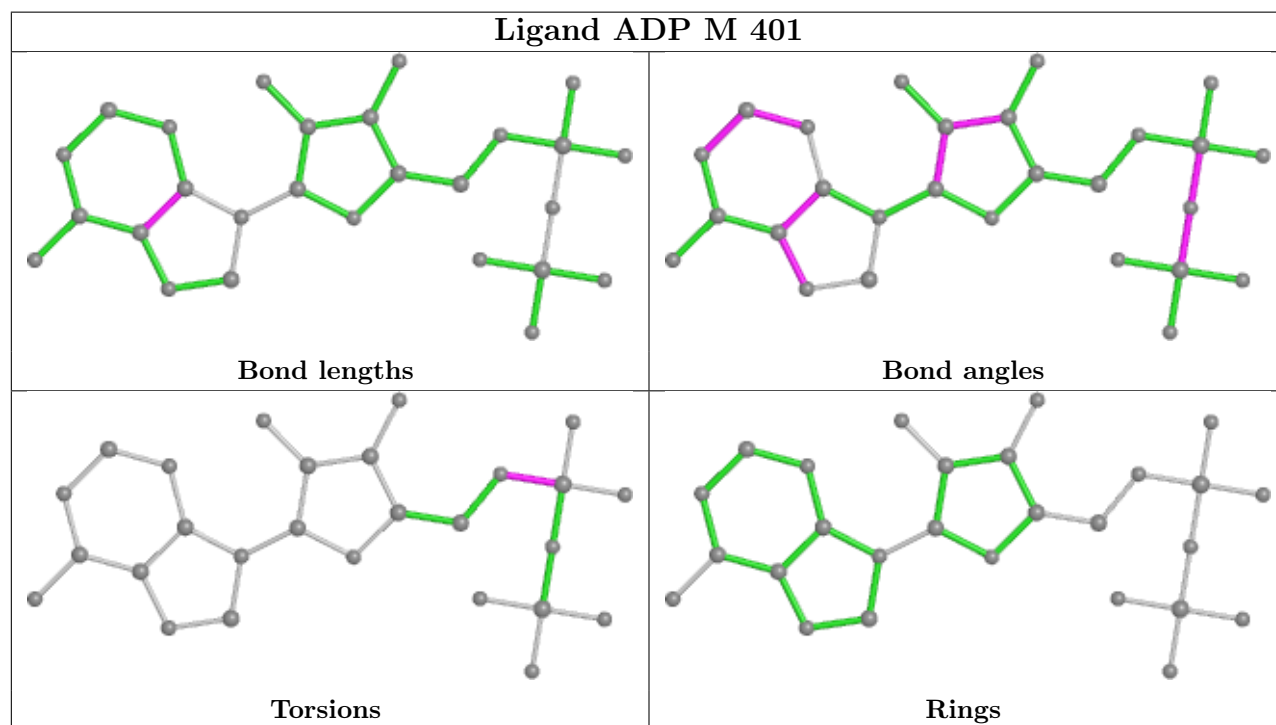
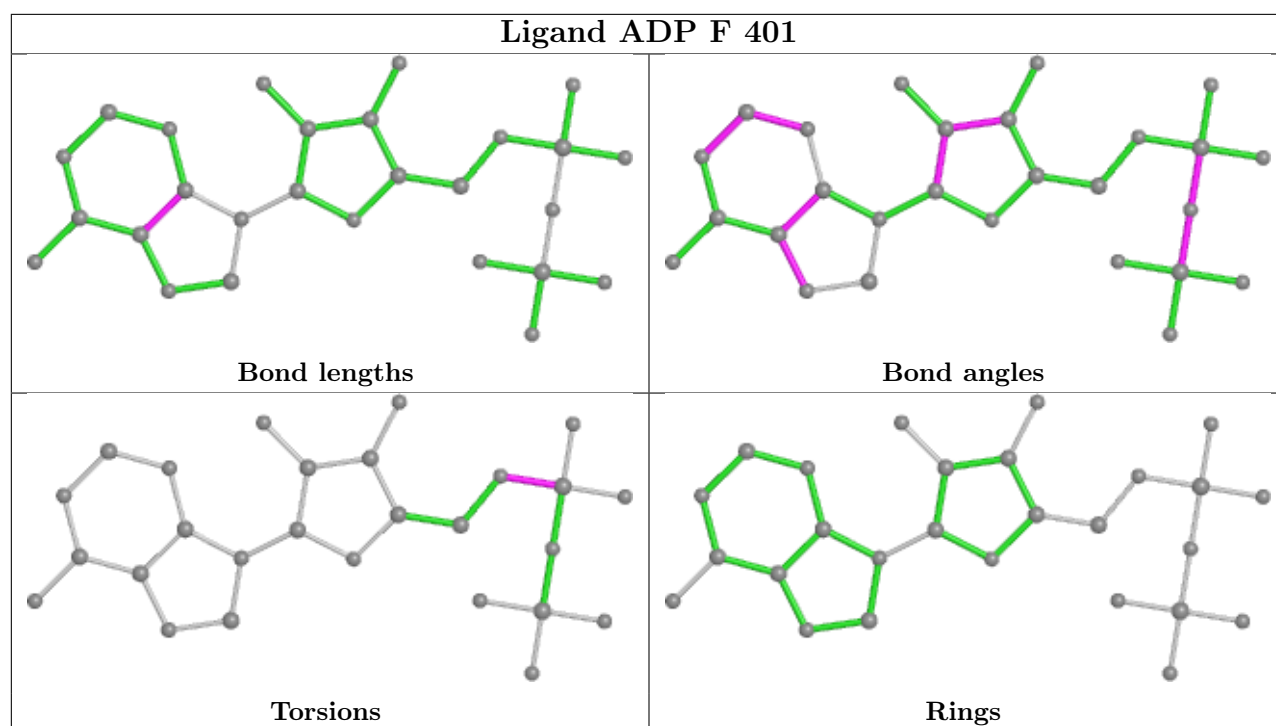


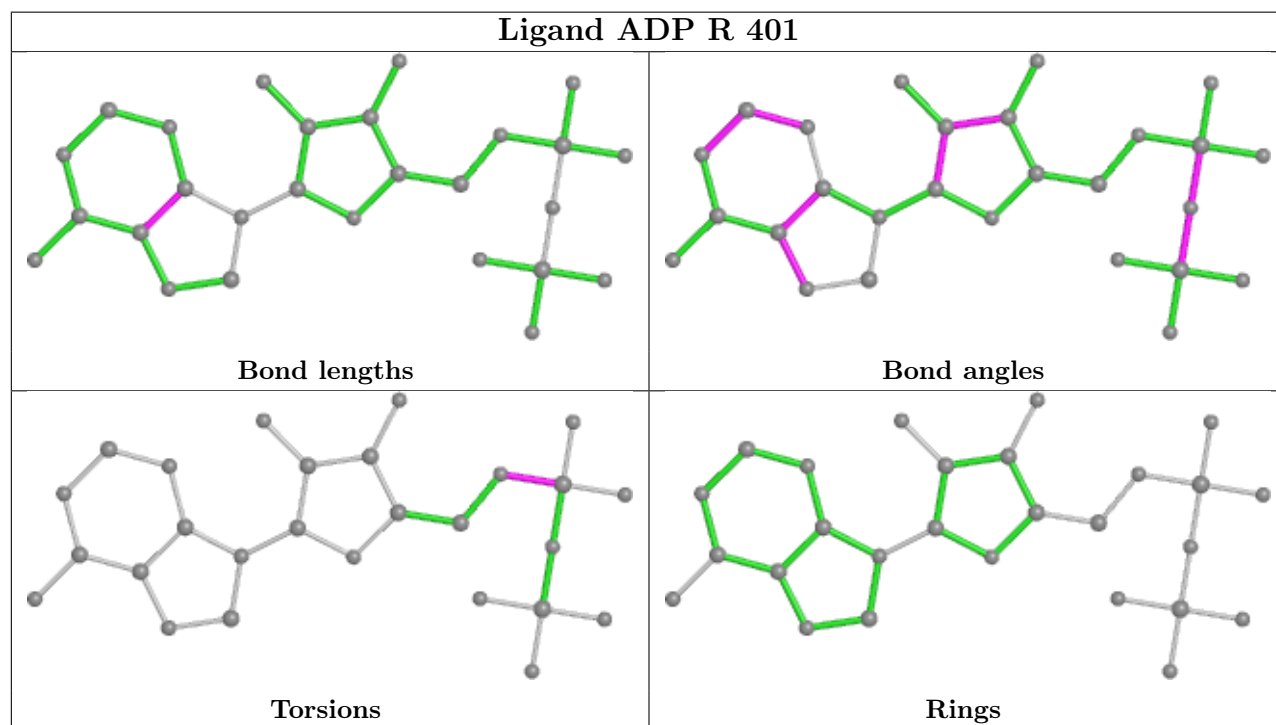
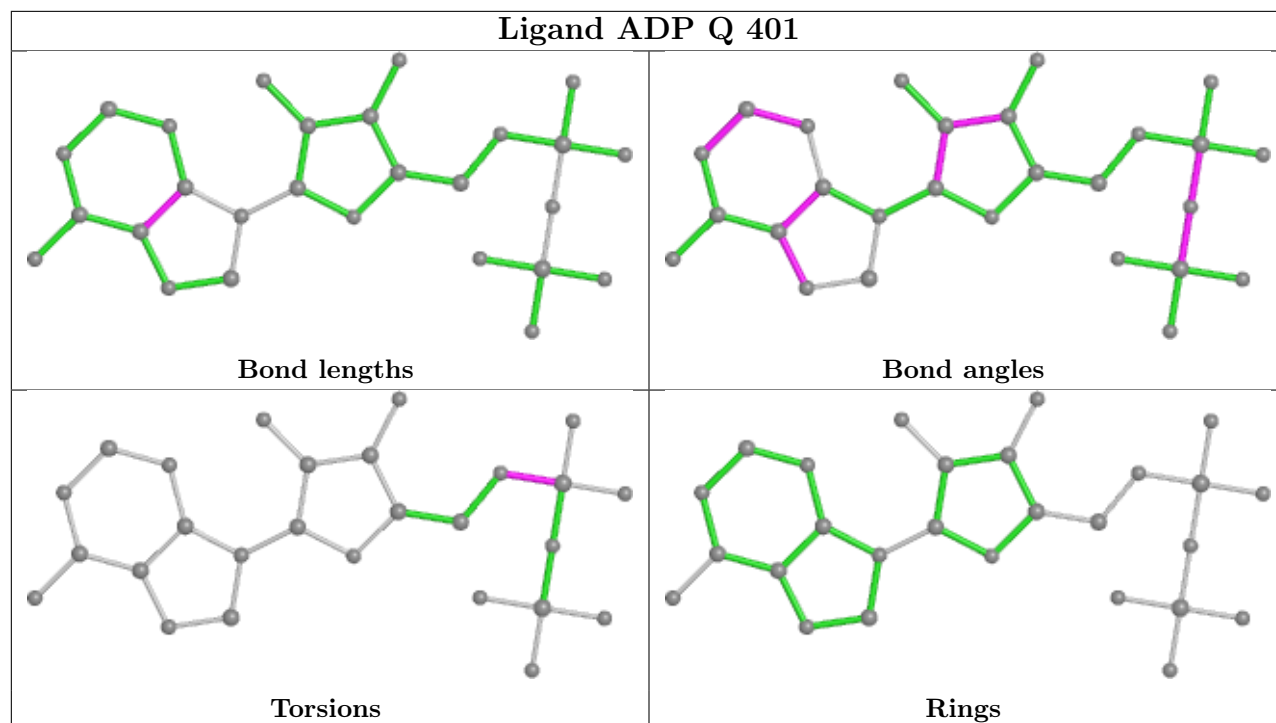


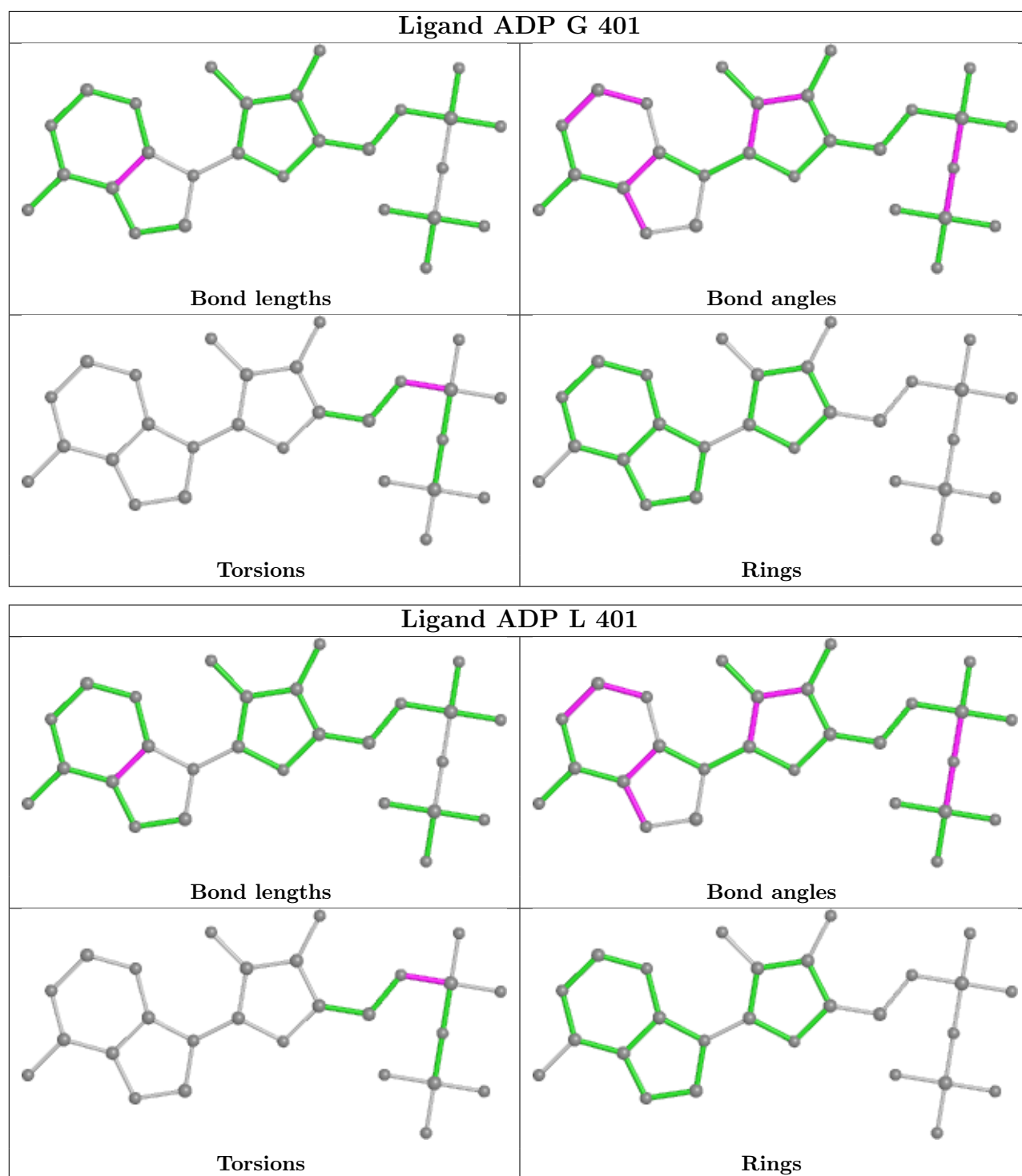












5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

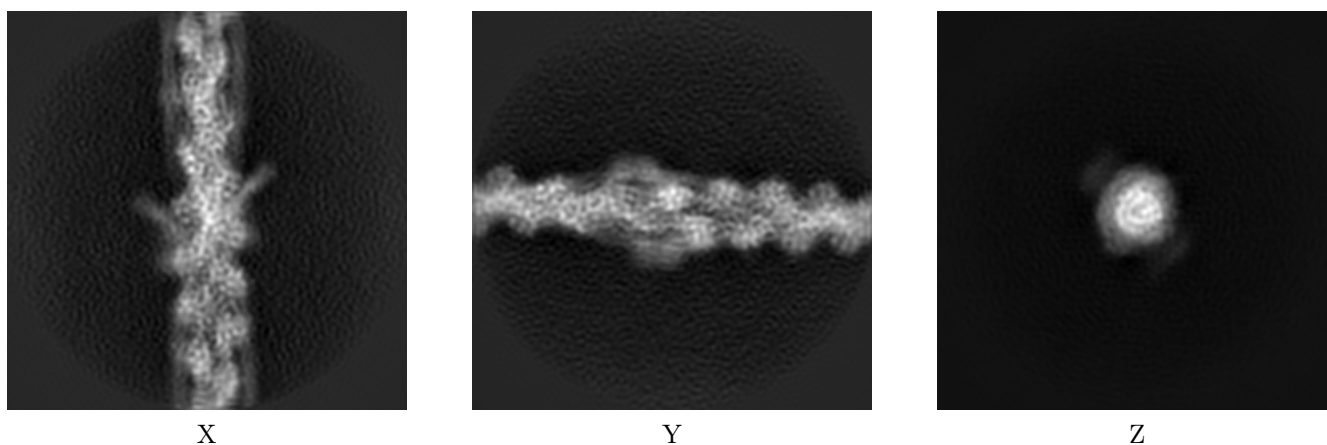
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-0728. 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](#)

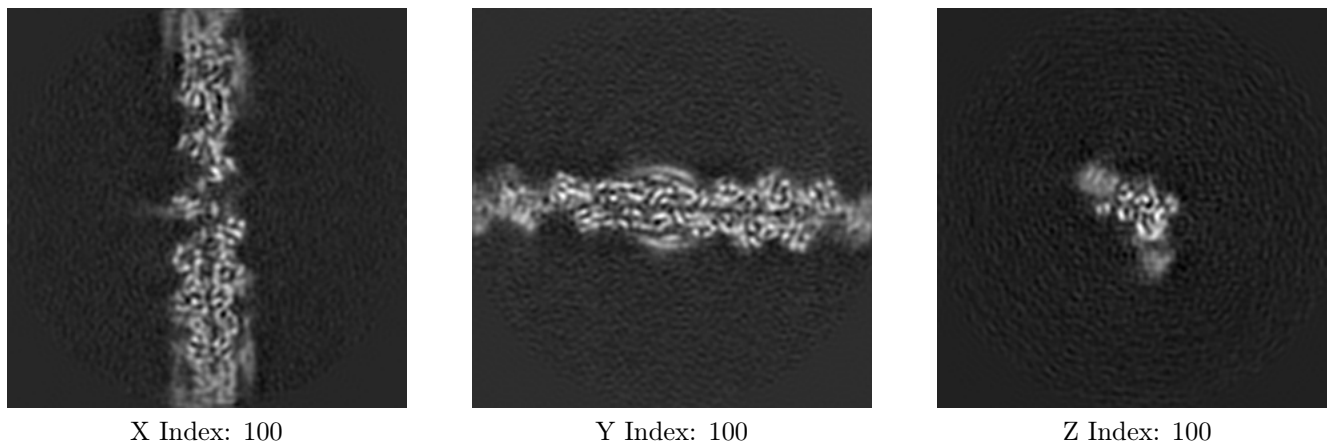
6.1.1 Primary map



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

6.2 Central slices [i](#)

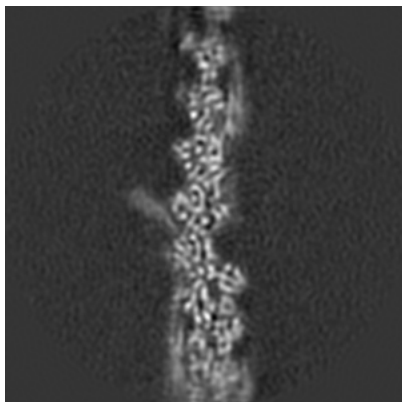
6.2.1 Primary map



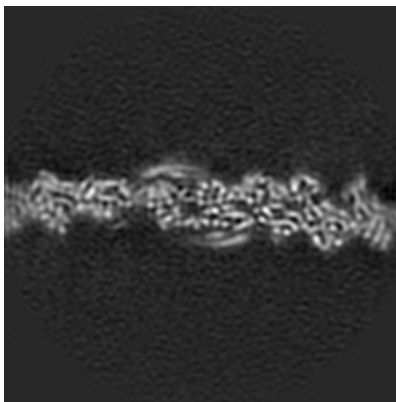
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

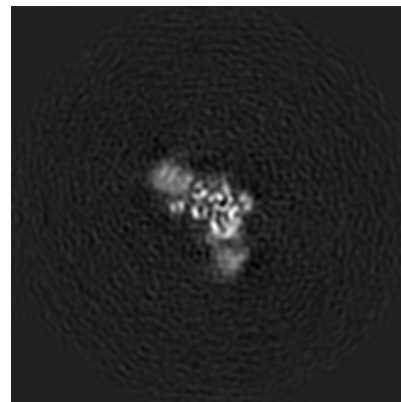
6.3.1 Primary map



X Index: 106



Y Index: 96



Z Index: 100

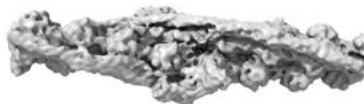
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0376. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

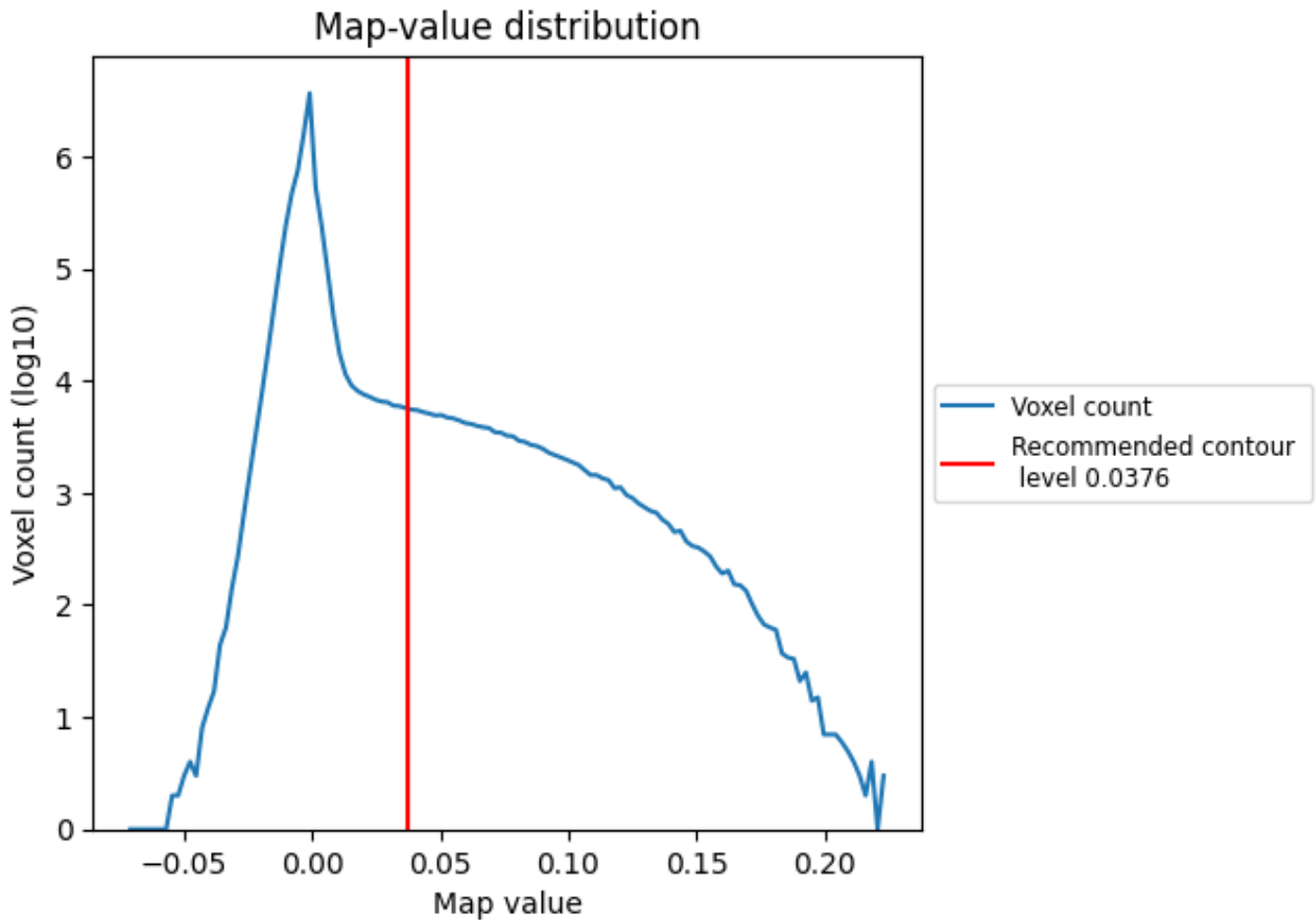
6.5 Mask visualisation

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

7 Map analysis [i](#)

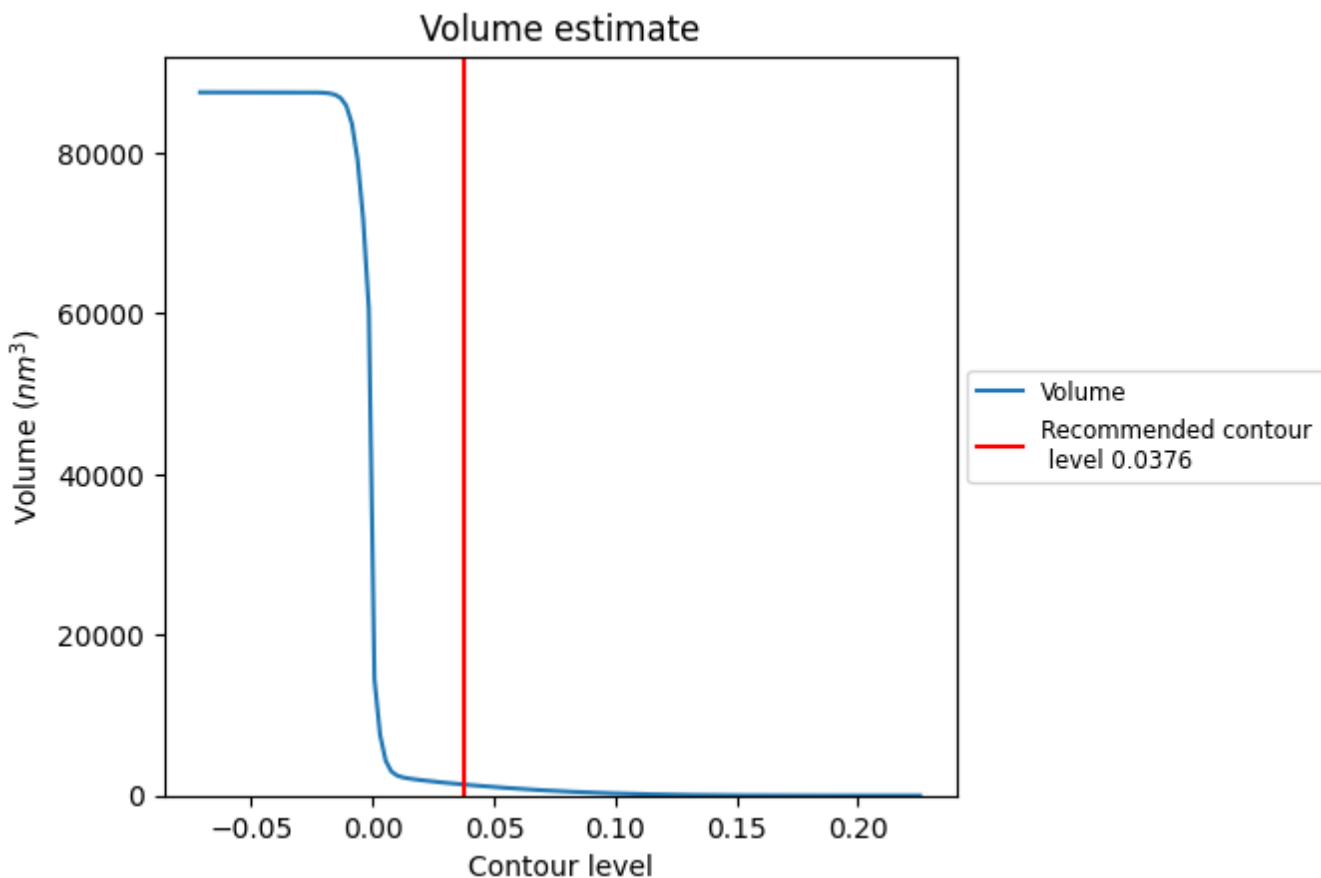
This section contains the results of statistical analysis of the map.

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.

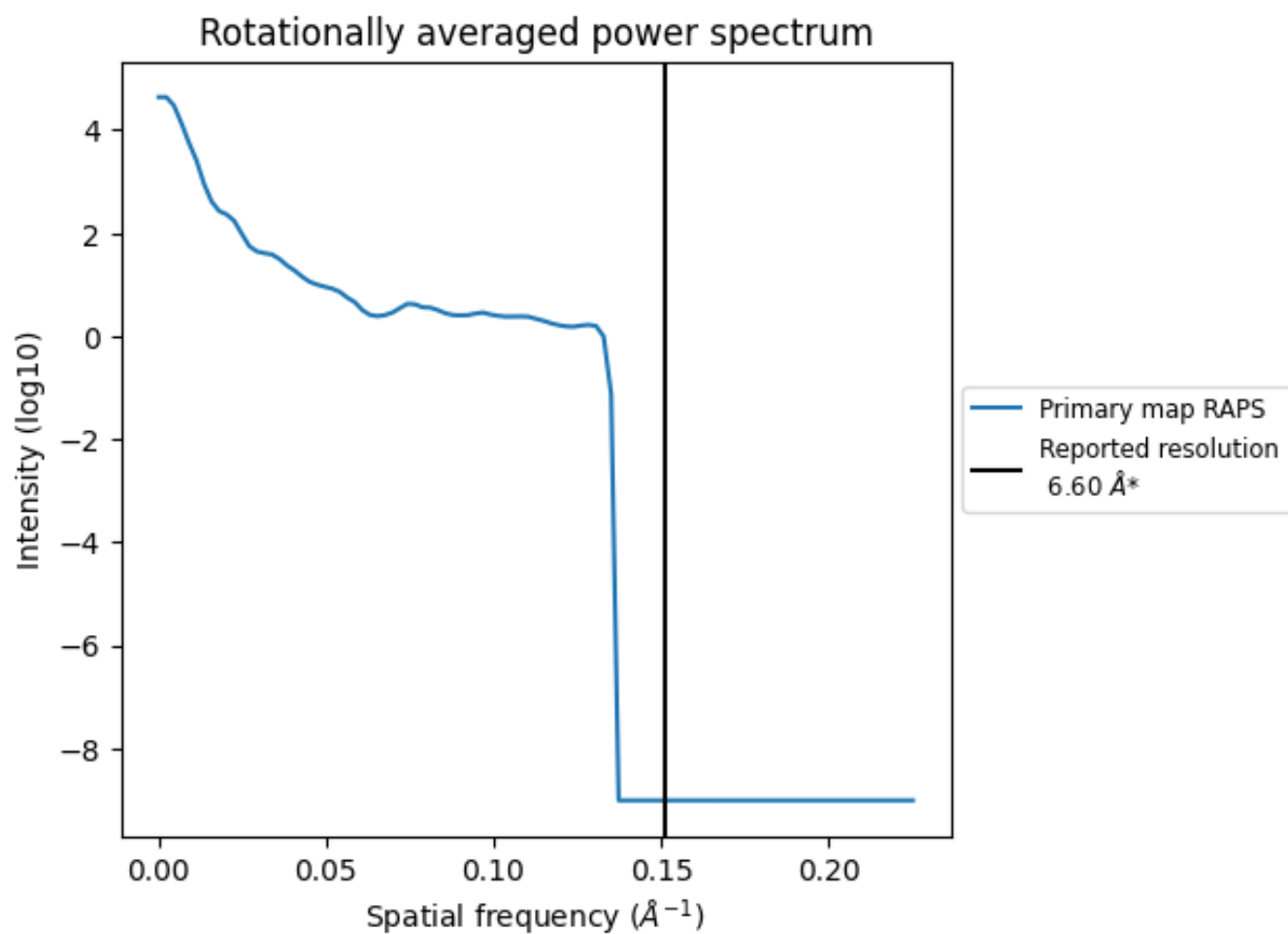
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1377 nm^3 ; this corresponds to an approximate mass of 1244 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](#)

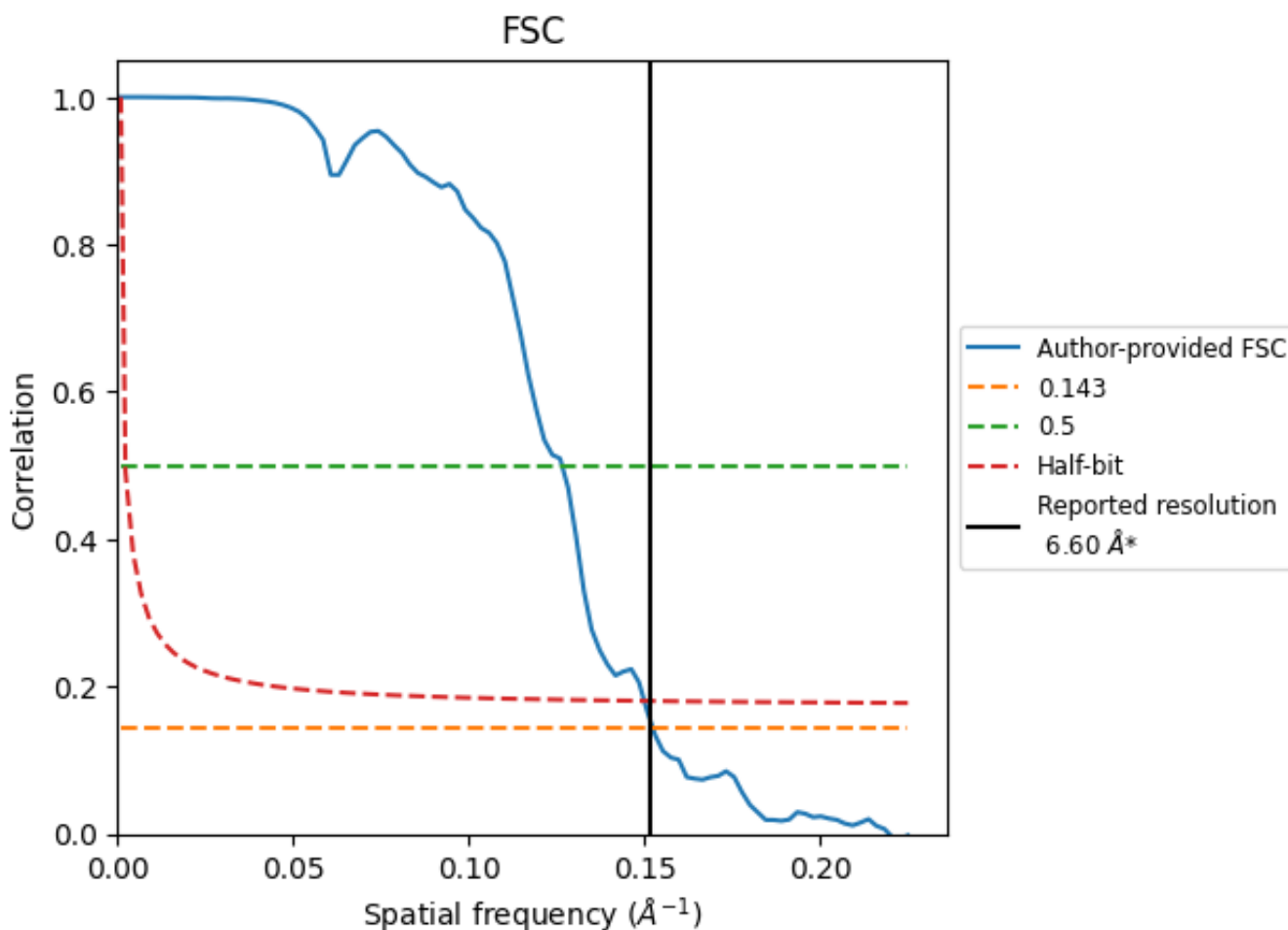


*Reported resolution corresponds to spatial frequency of 0.152 Å⁻¹

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 0.152 Å⁻¹

8.2 Resolution estimates [i](#)

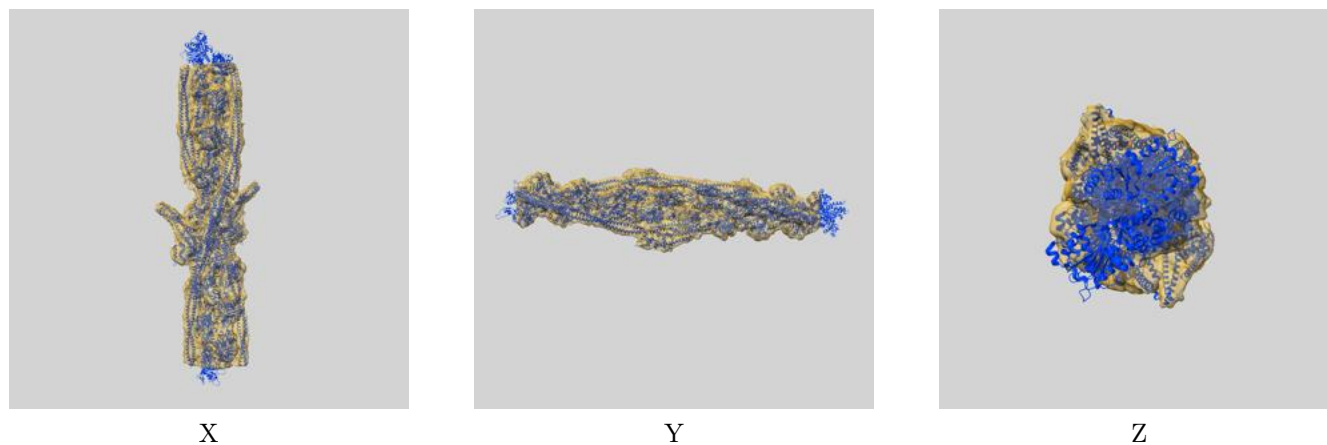
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	6.60	-	-
Author-provided FSC curve	6.56	7.89	6.66
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

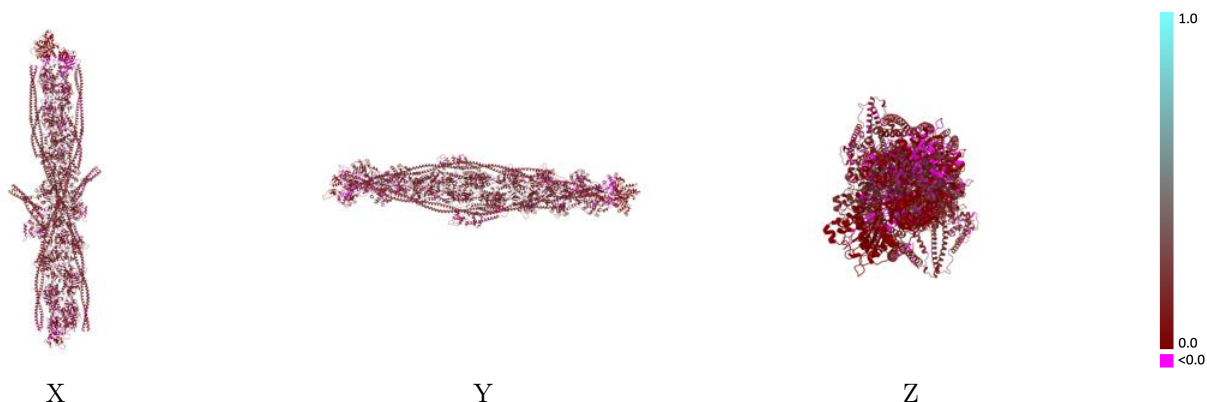
This section contains information regarding the fit between EMDB map EMD-0728 and PDB model 7UTL. Per-residue inclusion information can be found in section 3 on page 9.

9.1 Map-model overlay [i](#)



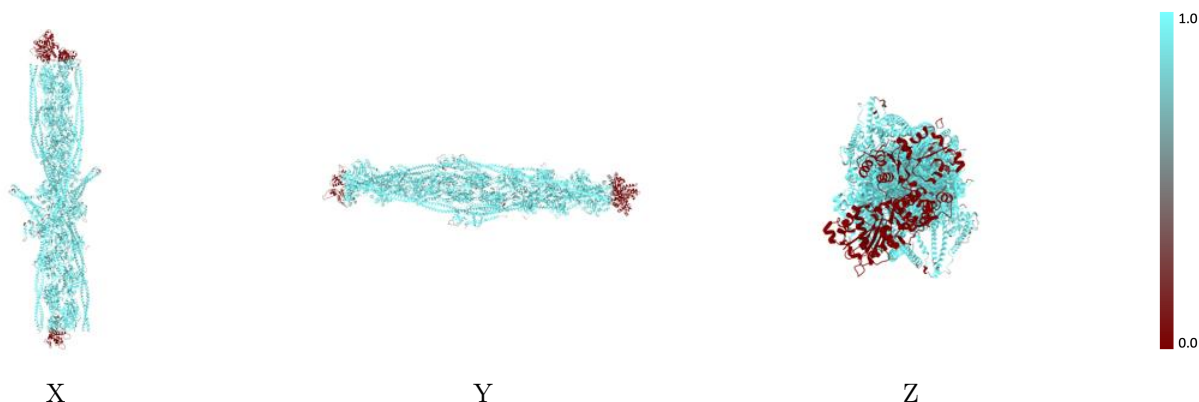
The images above show the 3D surface view of the map at the recommended contour level 0.0376 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



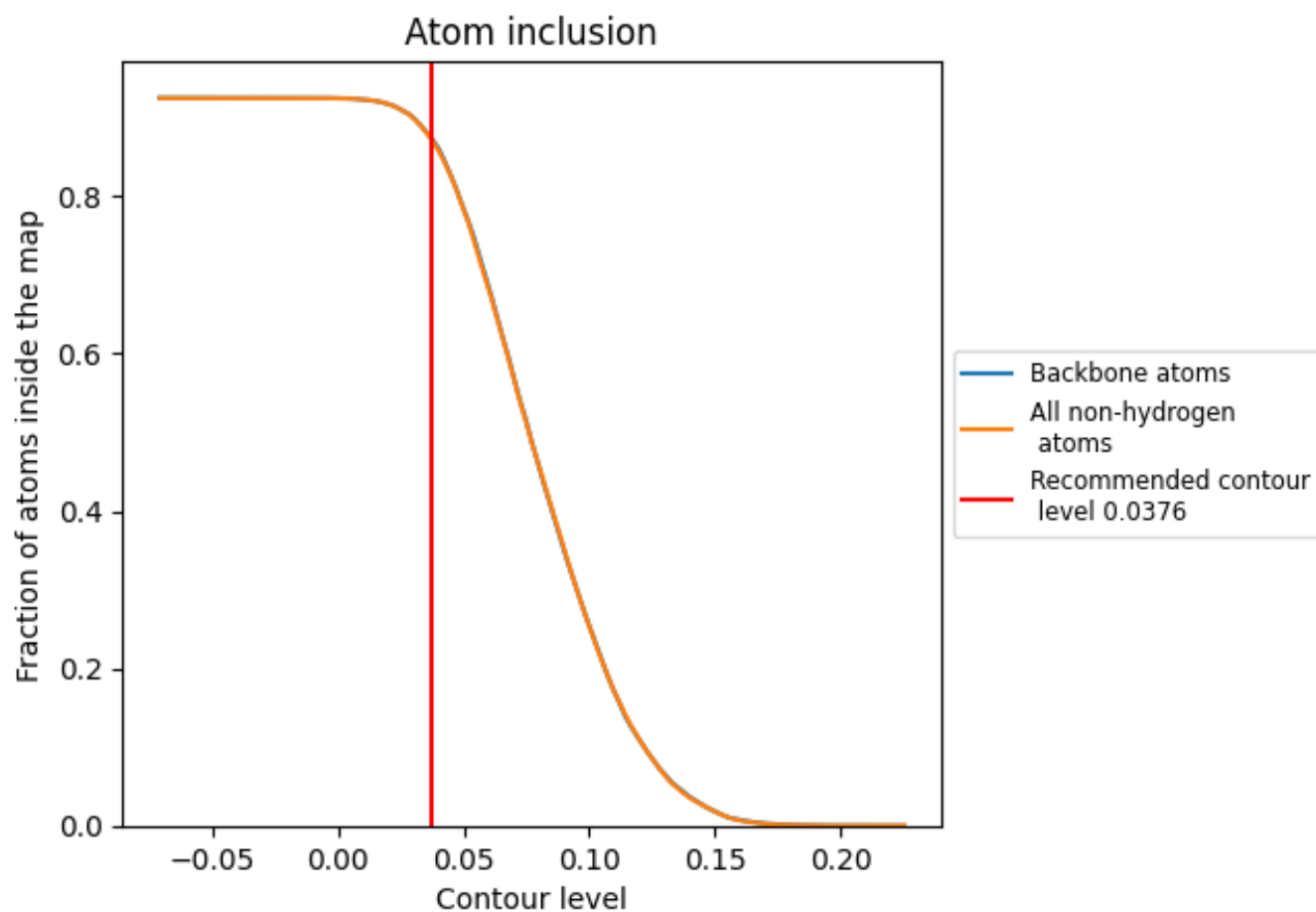
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0376).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 87% of all backbone atoms, 87% 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 (0.0376) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8707	 0.1320
A	 0.0575	 -0.0010
B	 0.5420	 0.0420
C	 0.9687	 0.1310
D	 0.9529	 0.1310
E	 0.9621	 0.1480
F	 0.9429	 0.1390
G	 0.9556	 0.1620
H	 0.9584	 0.1550
I	 0.9601	 0.1600
J	 0.9611	 0.1580
K	 0.9504	 0.1600
L	 0.9563	 0.1580
M	 0.9463	 0.1520
N	 0.9566	 0.1480
O	 0.9504	 0.1440
P	 0.9542	 0.1300
Q	 0.9449	 0.1200
R	 0.4677	 0.0320
U	 0.8177	 0.0840
V	 0.9100	 0.1620
W	 0.9320	 0.1550
X	 0.9662	 0.1570
Y	 0.8898	 0.1540
Z	 0.9476	 0.1480
a	 0.9525	 0.1760
b	 0.9578	 0.1730
c	 0.9123	 0.1310
d	 0.8415	 0.0840
e	 0.8968	 0.1510
f	 0.8850	 0.1290
g	 0.9550	 0.1490
h	 0.9324	 0.1370
i	 0.9511	 0.1760
j	 0.9564	 0.1690

