



## Full wwPDB EM Validation Report ⓘ

Jun 9, 2024 – 10:17 PM EDT

PDB ID : 8G0D  
EMDB ID : EMD-29654  
Title : Cryo-EM structure of TBAJ-876-bound Mycobacterium smegmatis ATP synthase rotational state 2 (backbone model)  
Authors : Courbon, G.M.; Rubinstein, J.L.  
Deposited on : 2023-01-31  
Resolution : 2.90 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

EMDB validation analysis : 0.0.1.dev92  
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 : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

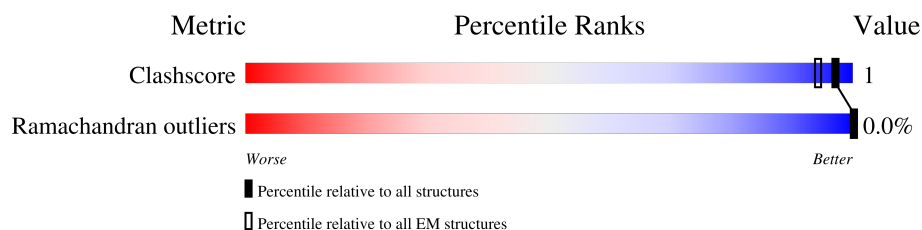
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.90 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	158937	4297
Ramachandran outliers	154571	4023

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  $\geq 3$ , 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	548	93% 6%
1	B	548	94% 6%
1	C	548	92% 7%
2	D	475	98% .
2	E	475	97% ..
2	F	475	97% .
3	G	307	90% . 9%
4	H	121	97% .
5	b	170	15% 82% . 17%

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Mol	Chain	Length	Quality of chain
6	d	445	
7	1	86	
7	2	86	
7	3	86	
7	4	86	
7	5	86	
7	6	86	
7	7	86	
7	8	86	
7	9	86	
8	a	252	

## 2 Entry composition

There are 12 unique types of molecules in this entry. The entry contains 19874 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 ATP synthase subunit alpha.

Mol	Chain	Residues	Atoms				AltConf	Trace
1	C	508	Total	C	N	O	0	0
			2032	1016	508	508		
1	A	514	Total	C	N	O	0	0
			2056	1028	514	514		
1	B	514	Total	C	N	O	0	0
			2056	1028	514	514		

- Molecule 2 is a protein called ATP synthase subunit beta.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	F	464	Total	C	N	O	0	0
			1856	928	464	464		
2	D	464	Total	C	N	O	0	0
			1856	928	464	464		
2	E	464	Total	C	N	O	0	0
			1856	928	464	464		

- Molecule 3 is a protein called ATP synthase gamma chain.

Mol	Chain	Residues	Atoms				AltConf	Trace
3	G	279	Total	C	N	O	0	0
			1116	558	279	279		

- Molecule 4 is a protein called ATP synthase epsilon chain.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	H	117	Total	C	N	O	0	0
			468	234	117	117		

- Molecule 5 is a protein called ATP synthase subunit b.

Mol	Chain	Residues	Atoms				AltConf	Trace
5	b	141	Total	C	N	O	0	0
			564	282	141	141		

- Molecule 6 is a protein called ATP synthase subunit b-delta.

Mol	Chain	Residues	Atoms				AltConf	Trace
6	d	432	Total	C	N	O	0	0
			1728	864	432	432		

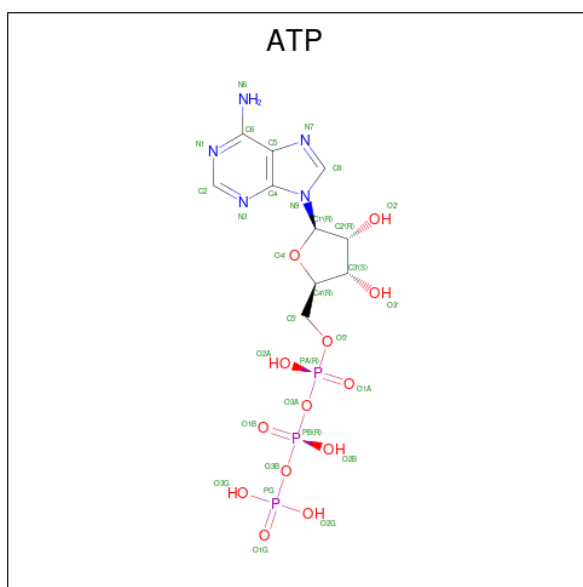
- Molecule 7 is a protein called ATP synthase subunit c.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	3	81	Total	C	N	O	0	0
			324	162	81	81		
7	4	81	Total	C	N	O	0	0
			324	162	81	81		
7	5	81	Total	C	N	O	0	0
			324	162	81	81		
7	6	81	Total	C	N	O	0	0
			324	162	81	81		
7	7	81	Total	C	N	O	0	0
			324	162	81	81		
7	8	81	Total	C	N	O	0	0
			324	162	81	81		
7	9	81	Total	C	N	O	0	0
			324	162	81	81		
7	1	81	Total	C	N	O	0	0
			324	162	81	81		
7	2	81	Total	C	N	O	0	0
			324	162	81	81		

- Molecule 8 is a protein called ATP synthase subunit a.

Mol	Chain	Residues	Atoms				AltConf	Trace
8	a	234	Total	C	N	O	0	0
			936	468	234	234		

- Molecule 9 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>13</sub>P<sub>3</sub>).



Mol	Chain	Residues	Atoms					AltConf
9	C	1	Total	C	N	O	P	0
			31	10	5	13	3	
9	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
9	B	1	Total	C	N	O	P	0
			31	10	5	13	3	
9	D	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 10 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

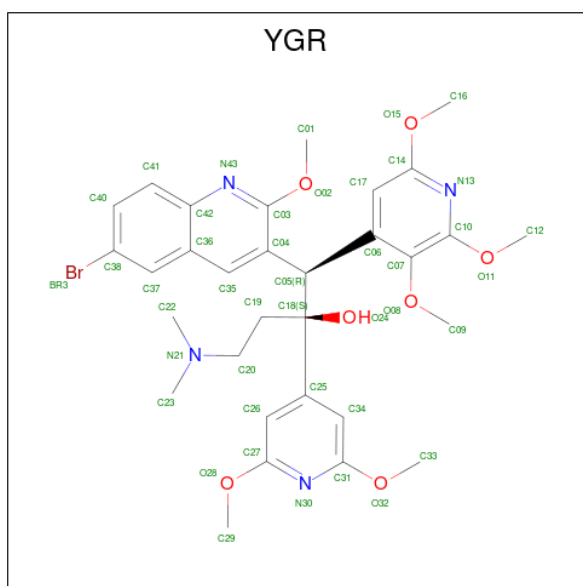
Mol	Chain	Residues	Atoms		AltConf
10	C	1	Total	Mg	0
			1	1	
10	A	1	Total	Mg	0
			1	1	
10	B	1	Total	Mg	0
			1	1	
10	D	1	Total	Mg	0
			1	1	

- Molecule 11 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			AltConf
11	E	1	Total	O	P	0
			5	4	1	

- Molecule 12 is (1R,2S)-1-(6-bromo-2-methoxyquinolin-3-yl)-2-(2,6-dimethoxypyridin-4-yl)-4-(dimethylamino)-1-(2,3,6-trimethoxypyridin-4-yl)butan-2-ol (three-letter code: YGR) (formula:  $C_{31}H_{37}BrN_4O_7$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
12	4	1	Total	Br	C	N	O	0
			43	1	31	4	7	
12	6	1	Total	Br	C	N	O	0
			43	1	31	4	7	

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Mol	Chain	Residues	Atoms					AltConf
12	8	1	Total 43	Br 1	C 31	N 4	O 7	0
12	9	1	Total 43	Br 1	C 31	N 4	O 7	0
12	9	1	Total 43	Br 1	C 31	N 4	O 7	0
12	2	1	Total 43	Br 1	C 31	N 4	O 7	0
12	2	1	Total 43	Br 1	C 31	N 4	O 7	0

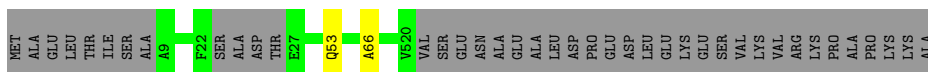


### 3 Residue-property plots [i](#)

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.

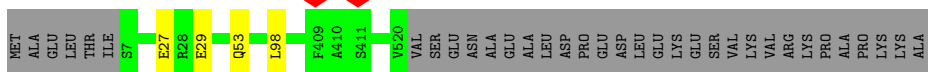
- Molecule 1: ATP synthase subunit alpha

Chain C:  92% 7%



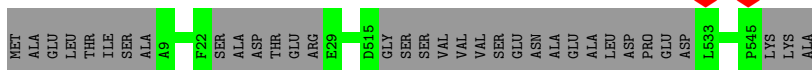
- Molecule 1: ATP synthase subunit alpha

Chain A:  93% 6%



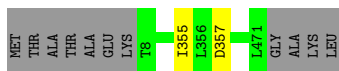
- Molecule 1: ATP synthase subunit alpha

Chain B:  94% 6%



- Molecule 2: ATP synthase subunit beta

Chain F:  97% 0%



- Molecule 2: ATP synthase subunit beta

Chain D:  98% 0%



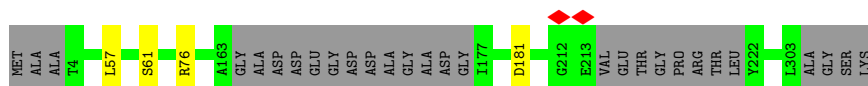
- Molecule 2: ATP synthase subunit beta

Chain E:  97%



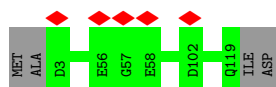
- Molecule 3: ATP synthase gamma chain

Chain G:  90%




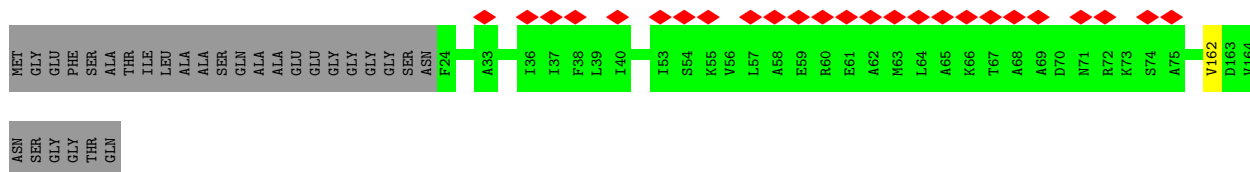
- Molecule 4: ATP synthase epsilon chain

Chain H:  97%



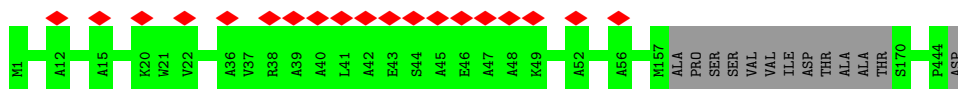
- Molecule 5: ATP synthase subunit b

Chain b:  15% 82% 17%

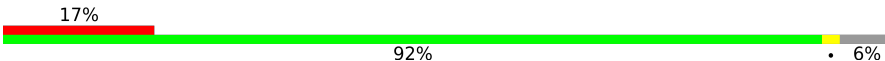


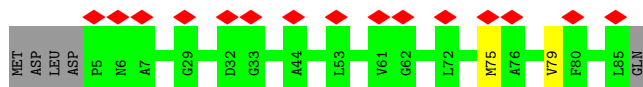
- Molecule 6: ATP synthase subunit b-delta

Chain d:  97%



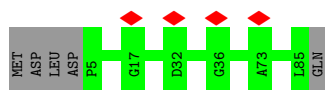
- Molecule 7: ATP synthase subunit c

Chain 3:  17% 92% 6%

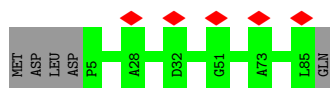


- Molecule 7: ATP synthase subunit c

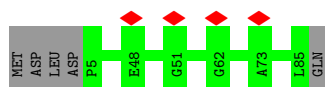
Chain 4:  5% 94% 6%



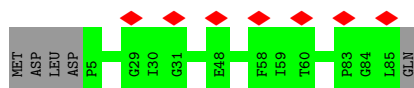
- Molecule 7: ATP synthase subunit c



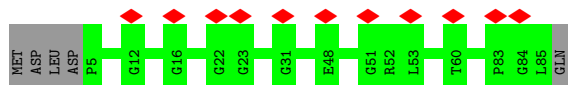
- Molecule 7: ATP synthase subunit c



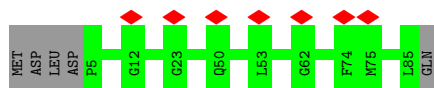
- Molecule 7: ATP synthase subunit c



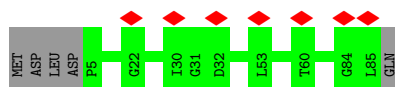
- Molecule 7: ATP synthase subunit c



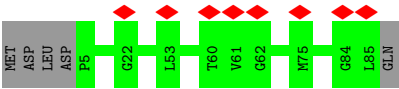
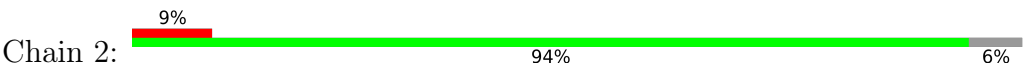
- Molecule 7: ATP synthase subunit c



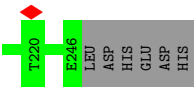
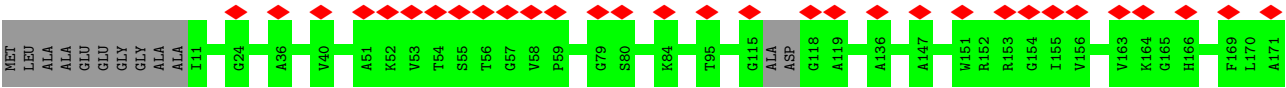
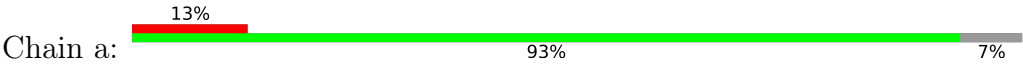
- Molecule 7: ATP synthase subunit c



- Molecule 7: ATP synthase subunit c



● Molecule 8: ATP synthase subunit a



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	58915	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	44	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	2100	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	2.950	Depositor
Minimum map value	-0.717	Depositor
Average map value	0.012	Depositor
Map value standard deviation	0.119	Depositor
Recommended contour level	0.6	Depositor
Map size ( $\text{\AA}$ )	329.59998, 329.59998, 329.59998	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.03, 1.03, 1.03	Depositor

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, YGR, 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	0.26	0/2055	0.49	0/2567
1	B	0.26	0/2053	0.51	0/2561
1	C	0.26	0/2030	0.50	0/2534
2	D	0.26	0/1855	0.52	0/2317
2	E	0.26	0/1855	0.49	0/2317
2	F	0.27	0/1855	0.52	0/2317
3	G	0.23	0/1113	0.45	0/1386
4	H	0.24	0/467	0.50	0/582
5	b	0.33	0/563	0.44	0/702
6	d	0.26	0/1726	0.45	0/2154
7	1	0.24	0/323	0.45	0/402
7	2	0.25	0/323	0.46	0/402
7	3	0.24	0/323	0.48	0/402
7	4	0.24	0/323	0.44	0/402
7	5	0.24	0/323	0.48	0/402
7	6	0.24	0/323	0.45	0/402
7	7	0.23	0/323	0.45	0/402
7	8	0.24	0/323	0.47	0/402
7	9	0.24	0/323	0.46	0/402
8	a	0.23	0/934	0.43	0/1164
All	All	0.26	0/19413	0.48	0/24219

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	2056	0	591	2	0
1	B	2056	0	585	0	0
1	C	2032	0	584	1	0
2	D	1856	0	524	0	0
2	E	1856	0	524	2	0
2	F	1856	0	524	1	0
3	G	1116	0	295	2	0
4	H	468	0	129	0	0
5	b	564	0	153	0	0
6	d	1728	0	468	0	0
7	1	324	0	109	0	0
7	2	324	0	109	0	0
7	3	324	0	109	1	0
7	4	324	0	109	0	0
7	5	324	0	109	0	0
7	6	324	0	109	0	0
7	7	324	0	109	0	0
7	8	324	0	109	0	0
7	9	324	0	109	0	0
8	a	936	0	258	0	0
9	A	31	0	12	0	0
9	B	31	0	12	0	0
9	C	31	0	12	0	0
9	D	31	0	12	0	0
10	A	1	0	0	0	0
10	B	1	0	0	0	0
10	C	1	0	0	0	0
10	D	1	0	0	0	0
11	E	5	0	0	1	0
12	2	86	0	0	0	0
12	4	43	0	0	0	0
12	6	43	0	0	0	0
12	8	43	0	0	0	0
12	9	86	0	0	0	0
All	All	19874	0	5664	9	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 1.

All (9) 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)
2:E:166:LYS:N	11:E:600:PO4:O1	2.27	0.67
3:G:57:LEU:O	3:G:61:SER:N	2.31	0.63
1:A:27:GLU:O	1:A:29:GLU:N	2.42	0.50
7:3:75:MET:O	7:3:79:VAL:N	2.45	0.47
1:A:53:GLN:O	1:A:98:LEU:N	2.47	0.46
2:F:355:ILE:O	2:F:357:ASP:N	2.49	0.43
1:C:53:GLN:N	1:C:66:ALA:O	2.42	0.42
2:E:96:GLY:HA2	2:E:210:LEU:O	2.20	0.42
3:G:76:ARG:O	3:G:181:ASP:N	2.54	0.41

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	512/548 (93%)	499 (98%)	13 (2%)	0	100	100
1	B	508/548 (93%)	493 (97%)	15 (3%)	0	100	100
1	C	504/548 (92%)	487 (97%)	17 (3%)	0	100	100
2	D	462/475 (97%)	445 (96%)	17 (4%)	0	100	100
2	E	462/475 (97%)	453 (98%)	8 (2%)	1 (0%)	47	78
2	F	462/475 (97%)	450 (97%)	12 (3%)	0	100	100
3	G	273/307 (89%)	271 (99%)	2 (1%)	0	100	100
4	H	115/121 (95%)	111 (96%)	4 (4%)	0	100	100
5	b	139/170 (82%)	132 (95%)	6 (4%)	1 (1%)	22	54
6	d	428/445 (96%)	422 (99%)	6 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
7	1	79/86 (92%)	75 (95%)	4 (5%)	0	100	100
7	2	79/86 (92%)	78 (99%)	1 (1%)	0	100	100
7	3	79/86 (92%)	77 (98%)	2 (2%)	0	100	100
7	4	79/86 (92%)	76 (96%)	3 (4%)	0	100	100
7	5	79/86 (92%)	77 (98%)	2 (2%)	0	100	100
7	6	79/86 (92%)	77 (98%)	2 (2%)	0	100	100
7	7	79/86 (92%)	77 (98%)	2 (2%)	0	100	100
7	8	79/86 (92%)	76 (96%)	3 (4%)	0	100	100
7	9	79/86 (92%)	77 (98%)	2 (2%)	0	100	100
8	a	230/252 (91%)	225 (98%)	5 (2%)	0	100	100
All	All	4806/5138 (94%)	4678 (97%)	126 (3%)	2 (0%)	100	100

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
5	b	162	VAL
2	E	277	VAL

### 5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry

Of 16 ligands modelled in this entry, 4 are monoatomic - leaving 12 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
12	YGR	6	601	-	44,46,46	2.02	11 (25%)	53,66,66	2.18	13 (24%)
12	YGR	8	601	-	44,46,46	2.01	11 (25%)	53,66,66	2.14	11 (20%)
9	ATP	B	600	10	26,33,33	0.66	0	31,52,52	1.06	2 (6%)
12	YGR	4	601	-	44,46,46	2.03	11 (25%)	53,66,66	2.18	13 (24%)
9	ATP	D	600	10	26,33,33	0.65	0	31,52,52	1.05	1 (3%)
12	YGR	2	602	-	44,46,46	2.05	11 (25%)	53,66,66	2.16	12 (22%)
12	YGR	9	601	-	44,46,46	2.01	11 (25%)	53,66,66	2.16	13 (24%)
9	ATP	C	600	10	26,33,33	0.66	0	31,52,52	1.08	1 (3%)
12	YGR	2	601	-	44,46,46	2.02	11 (25%)	53,66,66	2.15	13 (24%)
12	YGR	9	602	-	44,46,46	2.04	11 (25%)	53,66,66	2.18	13 (24%)
11	PO4	E	600	-	4,4,4	1.02	0	6,6,6	0.44	0
9	ATP	A	600	10	26,33,33	0.64	0	31,52,52	1.12	3 (9%)

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
12	YGR	6	601	-	-	6/38/38/38	0/4/4/4
12	YGR	8	601	-	-	7/38/38/38	0/4/4/4
9	ATP	B	600	10	-	6/18/38/38	0/3/3/3
12	YGR	4	601	-	-	7/38/38/38	0/4/4/4
9	ATP	D	600	10	-	3/18/38/38	0/3/3/3
12	YGR	2	602	-	-	6/38/38/38	0/4/4/4
12	YGR	9	601	-	-	8/38/38/38	0/4/4/4
9	ATP	C	600	10	-	7/18/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
12	YGR	2	601	-	-	10/38/38/38	0/4/4/4
12	YGR	9	602	-	-	6/38/38/38	0/4/4/4
9	ATP	A	600	10	-	9/18/38/38	0/3/3/3

All (77) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
12	2	602	YGR	O32-C31	5.23	1.43	1.35
12	9	601	YGR	O32-C31	5.02	1.43	1.35
12	2	601	YGR	O32-C31	4.97	1.43	1.35
12	8	601	YGR	O32-C31	4.97	1.43	1.35
12	9	602	YGR	O32-C31	4.95	1.43	1.35
12	6	601	YGR	O32-C31	4.93	1.43	1.35
12	4	601	YGR	O32-C31	4.90	1.43	1.35
12	2	602	YGR	O02-C03	4.70	1.42	1.35
12	9	602	YGR	O02-C03	4.63	1.42	1.35
12	2	601	YGR	O02-C03	4.63	1.42	1.35
12	9	601	YGR	O02-C03	4.61	1.42	1.35
12	4	601	YGR	O02-C03	4.60	1.42	1.35
12	8	601	YGR	O02-C03	4.60	1.42	1.35
12	9	602	YGR	O28-C27	4.59	1.42	1.35
12	8	601	YGR	O28-C27	4.59	1.42	1.35
12	4	601	YGR	O15-C14	4.57	1.42	1.35
12	6	601	YGR	O28-C27	4.56	1.42	1.35
12	6	601	YGR	O02-C03	4.56	1.42	1.35
12	9	601	YGR	O28-C27	4.55	1.42	1.35
12	4	601	YGR	O28-C27	4.55	1.42	1.35
12	9	602	YGR	O15-C14	4.54	1.42	1.35
12	6	601	YGR	O15-C14	4.54	1.42	1.35
12	8	601	YGR	O15-C14	4.53	1.42	1.35
12	2	602	YGR	O15-C14	4.53	1.42	1.35
12	2	601	YGR	O15-C14	4.53	1.42	1.35
12	2	602	YGR	O28-C27	4.52	1.42	1.35
12	9	601	YGR	O15-C14	4.49	1.42	1.35
12	2	601	YGR	O28-C27	4.46	1.42	1.35
12	4	601	YGR	O11-C10	3.94	1.41	1.35
12	6	601	YGR	O11-C10	3.93	1.41	1.35
12	9	602	YGR	O11-C10	3.93	1.41	1.35
12	2	601	YGR	O11-C10	3.92	1.41	1.35
12	9	601	YGR	O11-C10	3.92	1.41	1.35
12	8	601	YGR	O11-C10	3.92	1.41	1.35
12	2	602	YGR	O11-C10	3.90	1.41	1.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
12	6	601	YGR	C36-C42	-3.19	1.37	1.42
12	9	602	YGR	C36-C42	-3.16	1.37	1.42
12	2	602	YGR	C36-C42	-3.11	1.37	1.42
12	8	601	YGR	C36-C42	-3.11	1.37	1.42
12	4	601	YGR	C36-C42	-3.11	1.37	1.42
12	2	601	YGR	C36-C42	-3.09	1.37	1.42
12	9	601	YGR	C36-C42	-3.07	1.37	1.42
12	9	602	YGR	C19-C20	2.97	1.57	1.53
12	2	602	YGR	C34-C31	2.96	1.43	1.38
12	2	601	YGR	C19-C20	2.91	1.57	1.53
12	8	601	YGR	C19-C20	2.86	1.57	1.53
12	4	601	YGR	C34-C31	2.84	1.43	1.38
12	2	602	YGR	C19-C20	2.84	1.57	1.53
12	6	601	YGR	C34-C31	2.83	1.43	1.38
12	2	601	YGR	C04-C05	2.82	1.56	1.52
12	9	601	YGR	C19-C20	2.82	1.57	1.53
12	4	601	YGR	C19-C20	2.82	1.57	1.53
12	6	601	YGR	C19-C20	2.81	1.57	1.53
12	6	601	YGR	C04-C05	2.78	1.56	1.52
12	9	602	YGR	C34-C31	2.76	1.43	1.38
12	2	602	YGR	C04-C05	2.75	1.56	1.52
12	8	601	YGR	C34-C31	2.75	1.42	1.38
12	9	601	YGR	C34-C31	2.74	1.42	1.38
12	9	601	YGR	C04-C05	2.72	1.56	1.52
12	9	602	YGR	C04-C05	2.71	1.56	1.52
12	2	601	YGR	C34-C31	2.66	1.42	1.38
12	9	602	YGR	C26-C27	2.64	1.42	1.38
12	2	601	YGR	C26-C27	2.63	1.42	1.38
12	9	601	YGR	C26-C27	2.61	1.42	1.38
12	6	601	YGR	C26-C27	2.60	1.42	1.38
12	4	601	YGR	C04-C05	2.60	1.56	1.52
12	8	601	YGR	C26-C27	2.59	1.42	1.38
12	4	601	YGR	C26-C27	2.56	1.42	1.38
12	8	601	YGR	C04-C05	2.55	1.56	1.52
12	2	602	YGR	C26-C27	2.52	1.42	1.38
12	2	602	YGR	C37-C38	2.45	1.40	1.36
12	9	601	YGR	C37-C38	2.43	1.40	1.36
12	4	601	YGR	C37-C38	2.42	1.40	1.36
12	9	602	YGR	C37-C38	2.41	1.40	1.36
12	8	601	YGR	C37-C38	2.40	1.40	1.36
12	2	601	YGR	C37-C38	2.39	1.40	1.36
12	6	601	YGR	C37-C38	2.34	1.40	1.36

All (95) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
12	2	602	YGR	C31-N30-C27	7.79	123.19	115.70
12	4	601	YGR	C31-N30-C27	7.59	123.00	115.70
12	6	601	YGR	C31-N30-C27	7.54	122.96	115.70
12	9	601	YGR	C31-N30-C27	7.46	122.88	115.70
12	8	601	YGR	C31-N30-C27	7.39	122.81	115.70
12	9	602	YGR	C31-N30-C27	7.39	122.81	115.70
12	2	601	YGR	C31-N30-C27	7.16	122.59	115.70
12	9	602	YGR	C10-N13-C14	6.98	121.66	117.07
12	6	601	YGR	C10-N13-C14	6.95	121.64	117.07
12	8	601	YGR	C10-N13-C14	6.84	121.56	117.07
12	9	601	YGR	C10-N13-C14	6.83	121.56	117.07
12	2	602	YGR	C10-N13-C14	6.82	121.55	117.07
12	2	601	YGR	C10-N13-C14	6.77	121.52	117.07
12	4	601	YGR	C10-N13-C14	6.73	121.49	117.07
12	2	602	YGR	C04-C03-N43	-5.83	119.98	125.70
12	8	601	YGR	C04-C03-N43	-5.77	120.04	125.70
12	9	601	YGR	C04-C03-N43	-5.71	120.10	125.70
12	9	602	YGR	C04-C03-N43	-5.69	120.11	125.70
12	6	601	YGR	C04-C03-N43	-5.68	120.12	125.70
12	4	601	YGR	C04-C03-N43	-5.67	120.14	125.70
12	2	601	YGR	C04-C03-N43	-5.61	120.19	125.70
12	4	601	YGR	C26-C27-N30	-3.89	119.54	124.08
12	6	601	YGR	C26-C27-N30	-3.86	119.57	124.08
12	2	602	YGR	C26-C27-N30	-3.85	119.59	124.08
12	8	601	YGR	C26-C27-N30	-3.78	119.67	124.08
12	9	602	YGR	C26-C27-N30	-3.74	119.71	124.08
12	2	601	YGR	C26-C27-N30	-3.60	119.88	124.08
12	9	601	YGR	C26-C27-N30	-3.55	119.94	124.08
12	2	601	YGR	C12-O11-C10	-3.51	113.73	117.21
12	8	601	YGR	C12-O11-C10	-3.47	113.77	117.21
12	2	602	YGR	C34-C31-N30	-3.42	120.09	124.08
12	9	601	YGR	C34-C31-N30	-3.36	120.16	124.08
12	9	601	YGR	C12-O11-C10	-3.31	113.93	117.21
12	2	602	YGR	C12-O11-C10	-3.31	113.93	117.21
12	4	601	YGR	C12-O11-C10	-3.30	113.94	117.21
12	8	601	YGR	C35-C04-C03	3.29	120.12	116.37
12	2	602	YGR	C35-C04-C03	3.20	120.02	116.37
12	6	601	YGR	O02-C03-C04	3.20	119.97	115.03
12	2	601	YGR	O02-C03-C04	3.19	119.96	115.03
12	4	601	YGR	C35-C04-C03	3.16	119.97	116.37
12	6	601	YGR	C34-C31-N30	-3.14	120.42	124.08
12	9	602	YGR	C34-C31-N30	-3.14	120.42	124.08

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
12	8	601	YGR	C34-C31-N30	-3.13	120.42	124.08
12	9	602	YGR	O02-C03-C04	3.12	119.84	115.03
12	9	602	YGR	C35-C04-C03	3.12	119.92	116.37
12	2	601	YGR	C35-C04-C03	3.11	119.91	116.37
12	6	601	YGR	C12-O11-C10	-3.11	114.13	117.21
12	2	601	YGR	C34-C31-N30	-3.08	120.48	124.08
12	9	601	YGR	C35-C04-C03	3.08	119.89	116.37
12	9	601	YGR	O02-C03-C04	3.08	119.78	115.03
12	4	601	YGR	C34-C31-N30	-3.07	120.50	124.08
12	2	601	YGR	C01-O02-C03	-3.04	114.20	117.21
12	9	602	YGR	C12-O11-C10	-3.03	114.21	117.21
12	4	601	YGR	O02-C03-C04	3.01	119.68	115.03
12	4	601	YGR	C01-O02-C03	-3.00	114.24	117.21
12	6	601	YGR	C01-O02-C03	-2.97	114.27	117.21
12	8	601	YGR	O02-C03-C04	2.97	119.61	115.03
12	6	601	YGR	C35-C04-C03	2.96	119.75	116.37
12	9	601	YGR	C01-O02-C03	-2.95	114.29	117.21
12	9	602	YGR	C01-O02-C03	-2.94	114.30	117.21
12	9	602	YGR	C17-C14-N13	-2.77	120.85	124.08
12	6	601	YGR	C17-C14-N13	-2.77	120.85	124.08
12	2	602	YGR	O02-C03-C04	2.73	119.24	115.03
12	9	601	YGR	C17-C14-N13	-2.71	120.92	124.08
12	8	601	YGR	C17-C14-N13	-2.71	120.92	124.08
12	2	602	YGR	C17-C14-N13	-2.70	120.93	124.08
12	2	601	YGR	C17-C14-N13	-2.70	120.93	124.08
12	4	601	YGR	C17-C14-N13	-2.68	120.95	124.08
12	2	601	YGR	C29-O28-C27	-2.38	113.63	117.36
12	4	601	YGR	C33-O32-C31	-2.34	113.69	117.36
12	2	602	YGR	C03-N43-C42	2.31	121.54	116.41
12	9	601	YGR	C03-N43-C42	2.31	121.52	116.41
9	D	600	ATP	C5-C6-N6	2.30	123.84	120.35
12	6	601	YGR	C03-N43-C42	2.29	121.49	116.41
12	9	602	YGR	C33-O32-C31	-2.28	113.78	117.36
12	9	602	YGR	C03-N43-C42	2.28	121.46	116.41
12	4	601	YGR	C03-N43-C42	2.27	121.44	116.41
9	A	600	ATP	C5-C6-N6	2.27	123.80	120.35
12	2	601	YGR	C03-N43-C42	2.26	121.42	116.41
9	C	600	ATP	C5-C6-N6	2.26	123.78	120.35
12	8	601	YGR	C01-O02-C03	-2.25	114.98	117.21
12	8	601	YGR	C03-N43-C42	2.25	121.39	116.41
12	9	601	YGR	C29-O28-C27	-2.24	113.85	117.36
9	B	600	ATP	C5-C6-N6	2.20	123.69	120.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
12	2	601	YGR	C33-O32-C31	-2.19	113.93	117.36
12	4	601	YGR	C25-C26-C27	2.17	119.89	117.80
12	6	601	YGR	C33-O32-C31	-2.17	113.96	117.36
12	9	602	YGR	C25-C26-C27	2.15	119.86	117.80
12	9	601	YGR	C16-O15-C14	-2.14	114.01	117.36
9	B	600	ATP	O3'-C3'-C2'	-2.08	105.08	111.82
9	A	600	ATP	O3'-C3'-C2'	-2.08	105.09	111.82
12	6	601	YGR	C25-C26-C27	2.08	119.80	117.80
12	2	602	YGR	C16-O15-C14	-2.07	114.12	117.36
12	2	602	YGR	C25-C26-C27	2.06	119.78	117.80
9	A	600	ATP	PB-O3B-PG	2.01	139.71	132.83

There are no chirality outliers.

All (75) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
9	C	600	ATP	PB-O3B-PG-O2G
9	C	600	ATP	C5'-O5'-PA-O1A
9	C	600	ATP	C5'-O5'-PA-O3A
9	A	600	ATP	C5'-O5'-PA-O1A
12	6	601	YGR	C07-C10-O11-C12
12	6	601	YGR	N13-C10-O11-C12
12	6	601	YGR	C26-C27-O28-C29
12	6	601	YGR	N30-C27-O28-C29
12	8	601	YGR	C07-C10-O11-C12
12	8	601	YGR	N13-C10-O11-C12
12	8	601	YGR	C34-C31-O32-C33
12	8	601	YGR	N30-C31-O32-C33
12	9	601	YGR	C26-C27-O28-C29
12	9	601	YGR	N30-C27-O28-C29
12	9	602	YGR	C07-C10-O11-C12
12	9	602	YGR	N13-C10-O11-C12
12	2	601	YGR	C07-C10-O11-C12
12	2	601	YGR	N13-C10-O11-C12
12	2	601	YGR	C26-C27-O28-C29
12	2	601	YGR	N30-C27-O28-C29
12	2	602	YGR	C07-C10-O11-C12
12	2	602	YGR	N13-C10-O11-C12
12	2	602	YGR	C26-C27-O28-C29
12	2	602	YGR	N30-C27-O28-C29
12	8	601	YGR	C26-C27-O28-C29
12	9	601	YGR	C17-C14-O15-C16

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Mol	Chain	Res	Type	Atoms
12	2	602	YGR	C17-C14-O15-C16
12	4	601	YGR	N30-C27-O28-C29
12	6	601	YGR	N30-C31-O32-C33
12	8	601	YGR	N30-C27-O28-C29
12	9	601	YGR	N13-C14-O15-C16
12	9	602	YGR	N30-C27-O28-C29
12	2	601	YGR	N30-C31-O32-C33
12	2	602	YGR	N13-C14-O15-C16
9	B	600	ATP	O4'-C4'-C5'-O5'
12	9	601	YGR	N13-C10-O11-C12
12	2	601	YGR	C19-C20-N21-C22
12	2	601	YGR	C19-C20-N21-C23
12	4	601	YGR	C26-C27-O28-C29
12	6	601	YGR	C34-C31-O32-C33
12	9	602	YGR	C26-C27-O28-C29
12	2	601	YGR	C34-C31-O32-C33
12	9	602	YGR	N30-C31-O32-C33
12	4	601	YGR	C07-C10-O11-C12
12	9	601	YGR	C07-C10-O11-C12
9	D	600	ATP	C3'-C4'-C5'-O5'
12	4	601	YGR	N13-C10-O11-C12
12	9	602	YGR	C34-C31-O32-C33
9	B	600	ATP	C3'-C4'-C5'-O5'
9	A	600	ATP	O4'-C4'-C5'-O5'
9	D	600	ATP	O4'-C4'-C5'-O5'
9	A	600	ATP	PA-O3A-PB-O1B
9	B	600	ATP	PB-O3B-PG-O3G
9	A	600	ATP	C5'-O5'-PA-O3A
9	D	600	ATP	PG-O3B-PB-O1B
12	4	601	YGR	C18-C05-C06-C17
9	C	600	ATP	C5'-O5'-PA-O2A
9	A	600	ATP	C5'-O5'-PA-O2A
12	9	601	YGR	C03-C04-C05-C06
12	2	601	YGR	C17-C14-O15-C16
9	B	600	ATP	PA-O3A-PB-O2B
9	A	600	ATP	PB-O3B-PG-O1G
12	2	601	YGR	N13-C14-O15-C16
9	C	600	ATP	PB-O3B-PG-O3G
9	A	600	ATP	PB-O3B-PG-O2G
9	A	600	ATP	PB-O3B-PG-O3G
9	C	600	ATP	PG-O3B-PB-O1B
9	C	600	ATP	PG-O3B-PB-O2B

*Continued on next page...*



*Continued from previous page...*

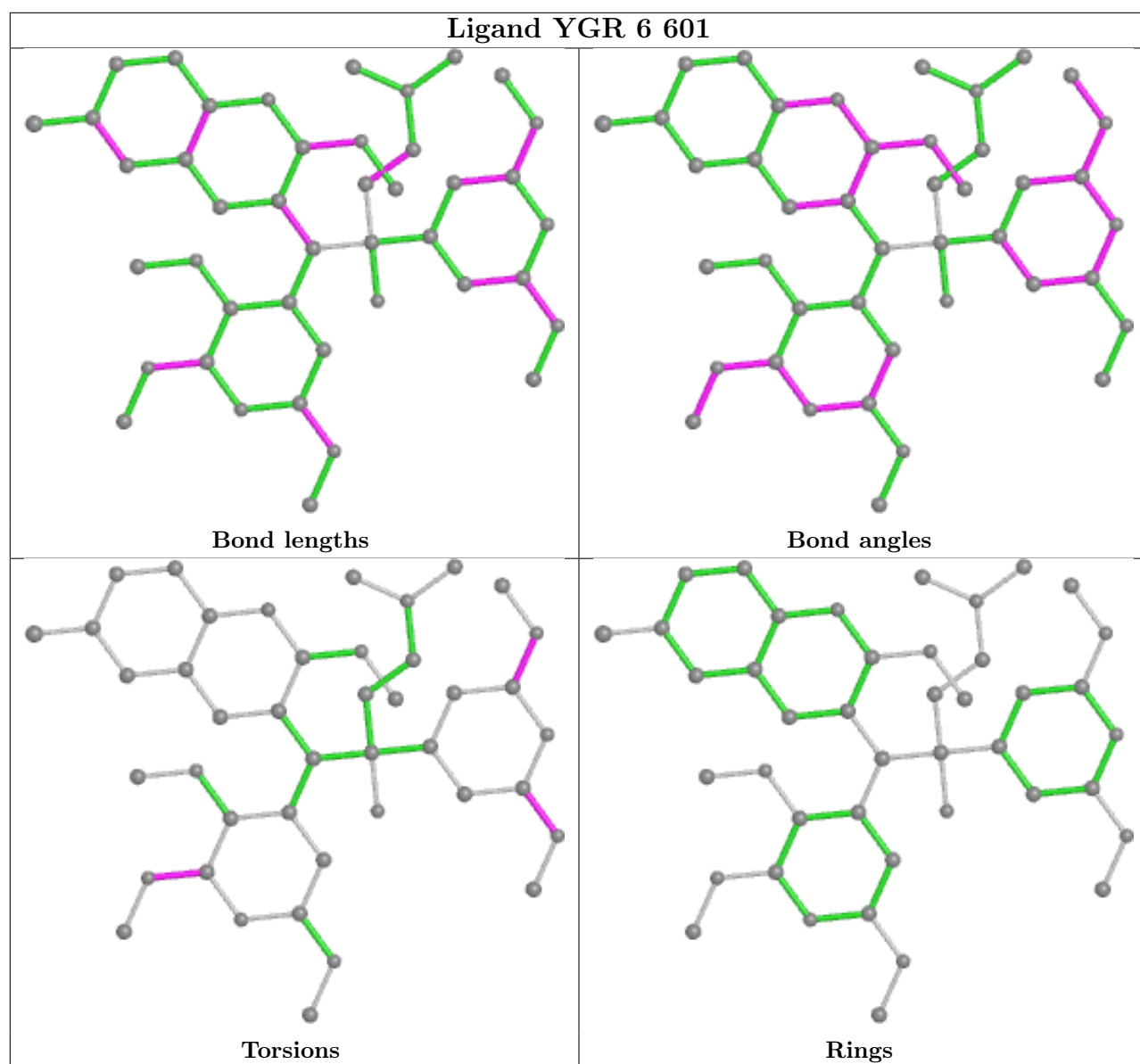
Mol	Chain	Res	Type	Atoms
9	A	600	ATP	PA-O3A-PB-O2B
9	B	600	ATP	PG-O3B-PB-O1B
9	B	600	ATP	PG-O3B-PB-O2B
12	4	601	YGR	C35-C04-C05-C06
12	9	601	YGR	C35-C04-C05-C06
12	4	601	YGR	C03-C04-C05-C06
12	8	601	YGR	C03-C04-C05-C06

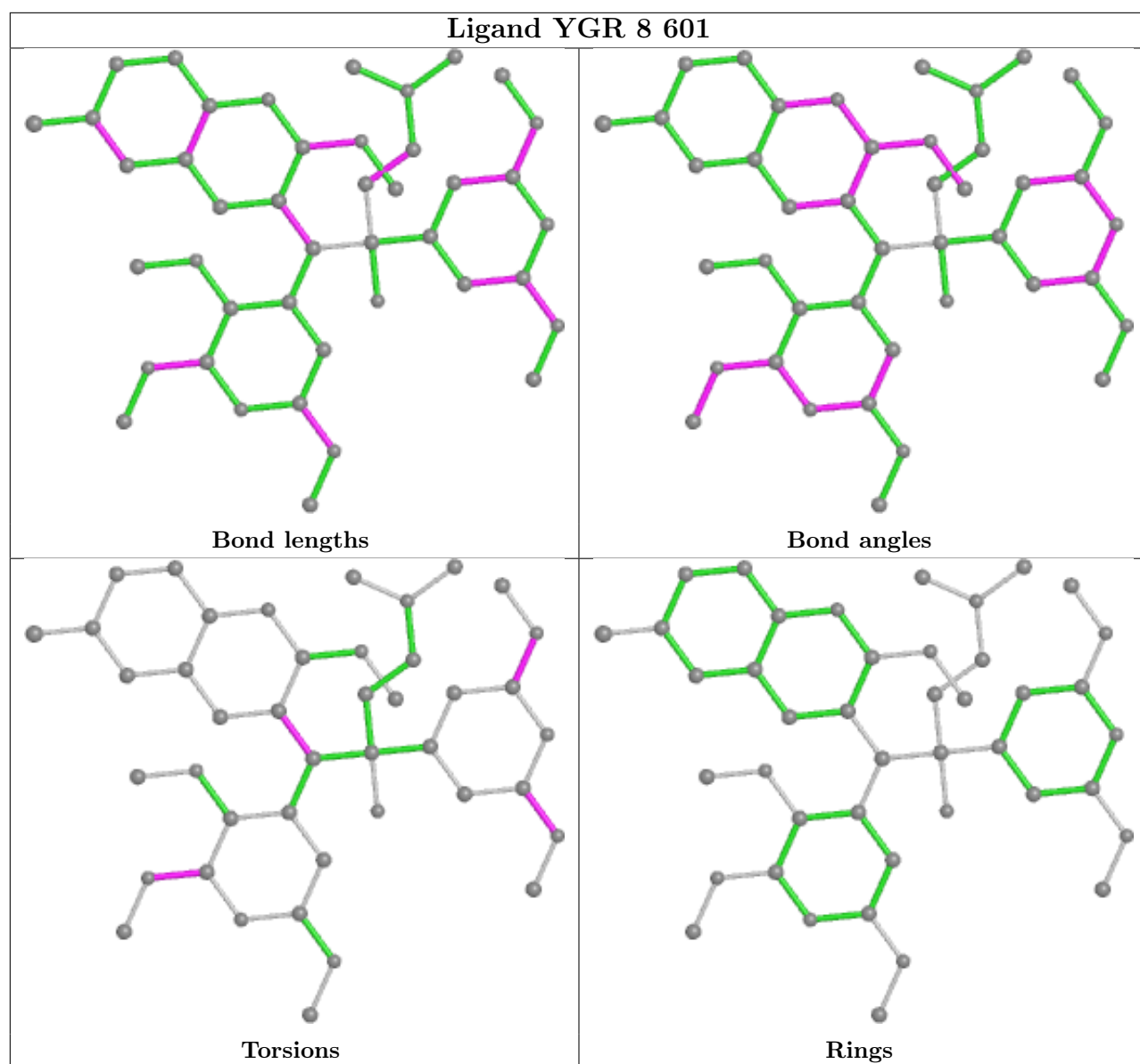
There are no ring outliers.

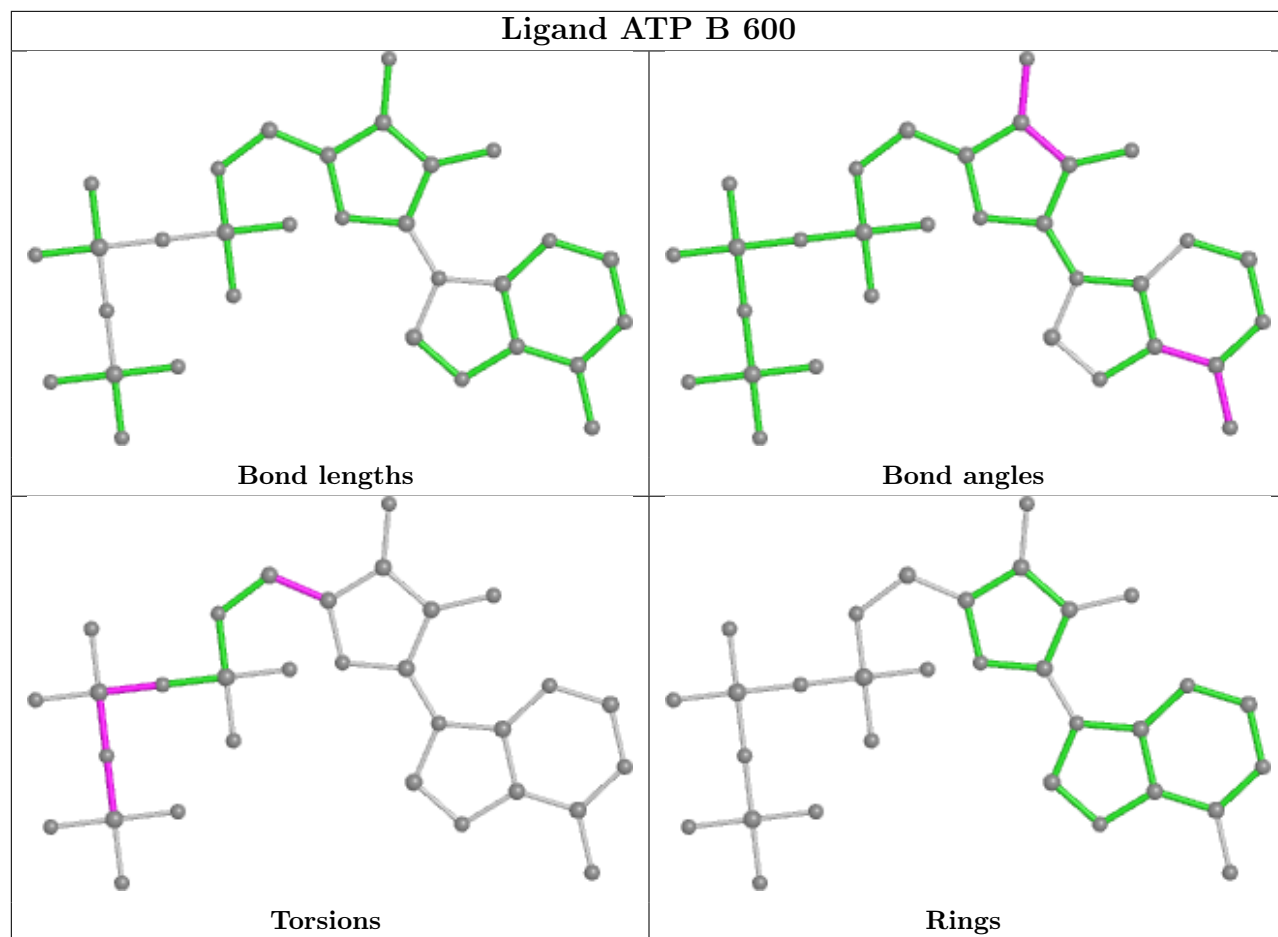
1 monomer is involved in 1 short contact:

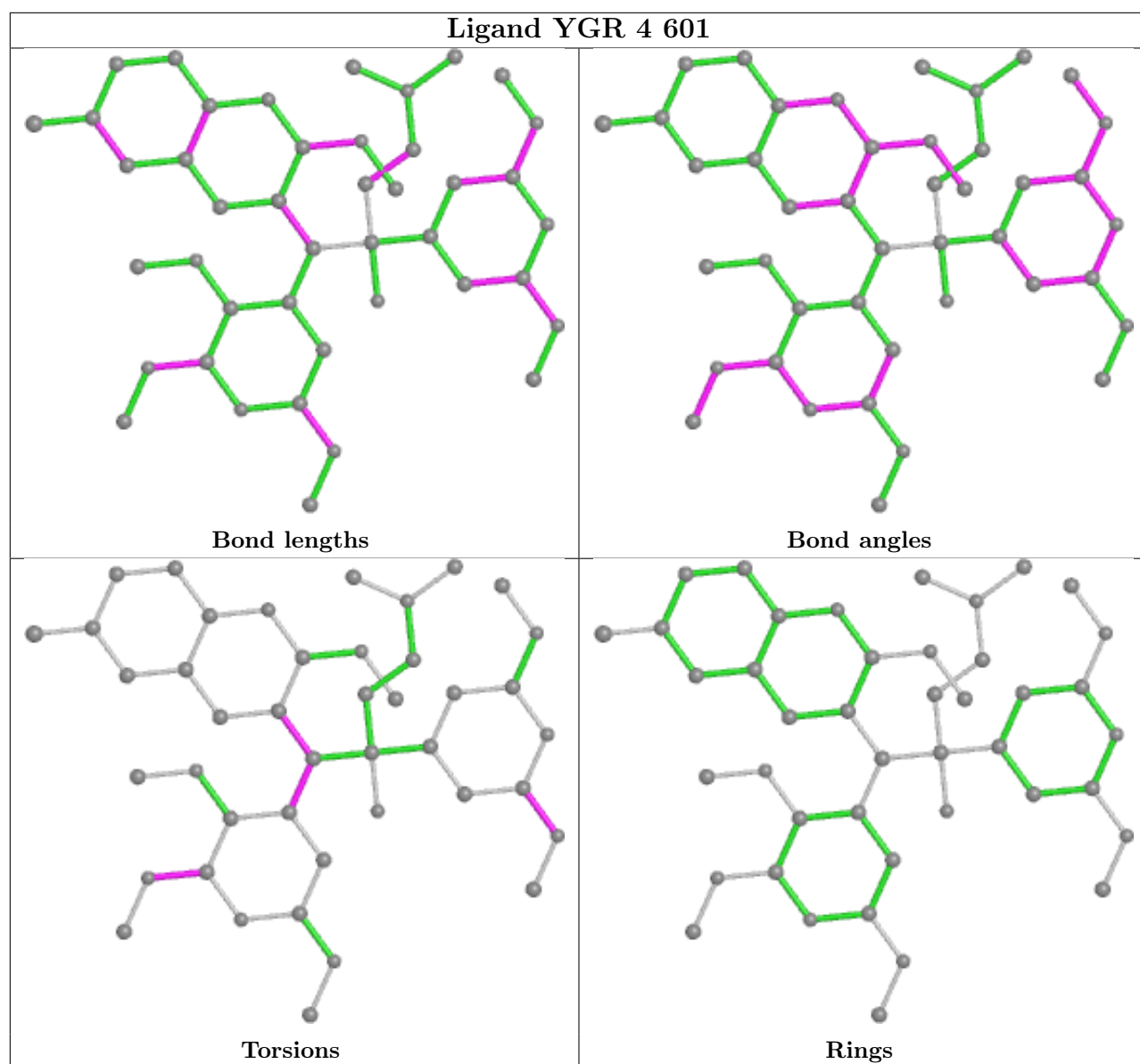
Mol	Chain	Res	Type	Clashes	Symm-Clashes
11	E	600	PO4	1	0

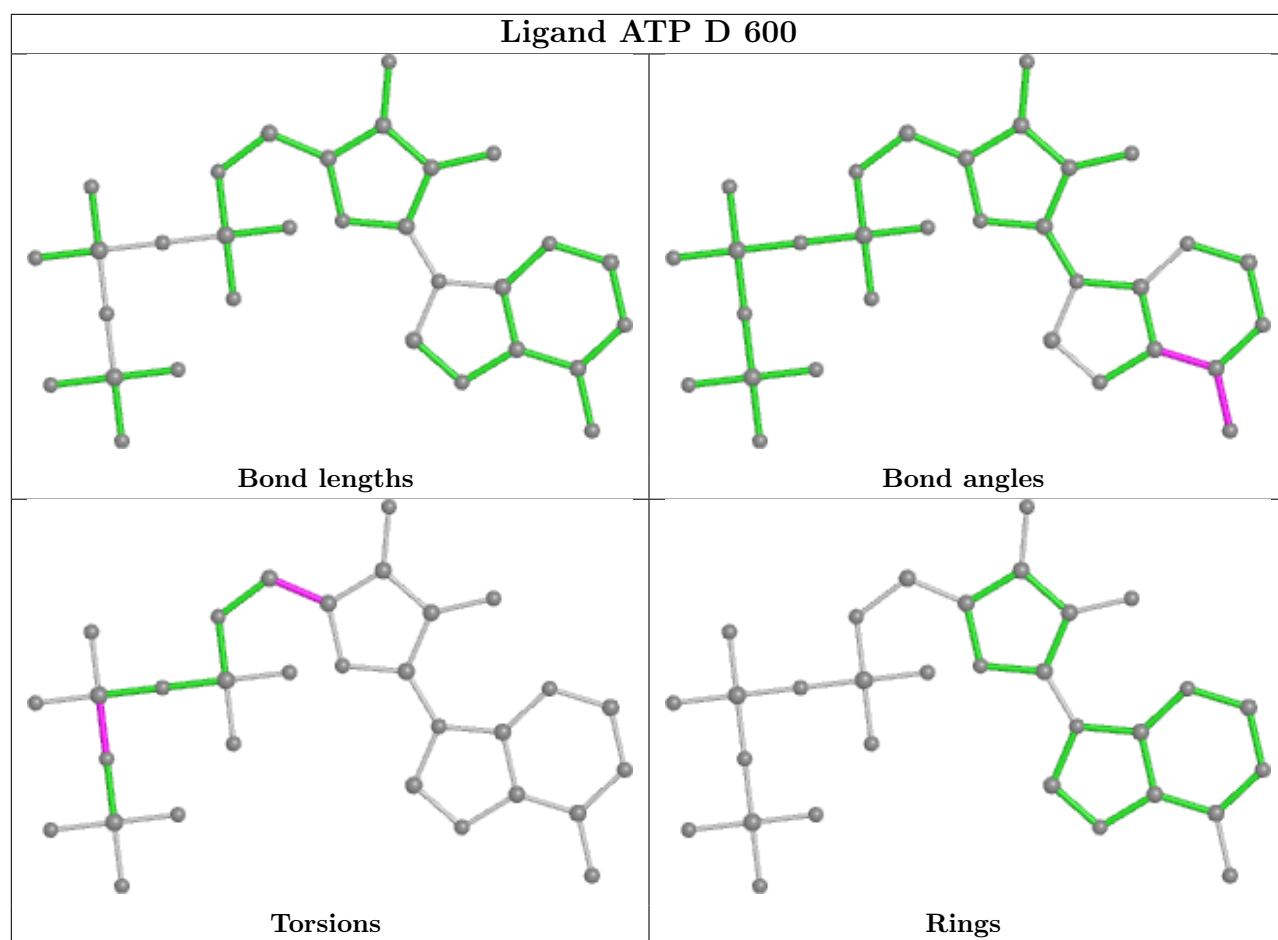
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

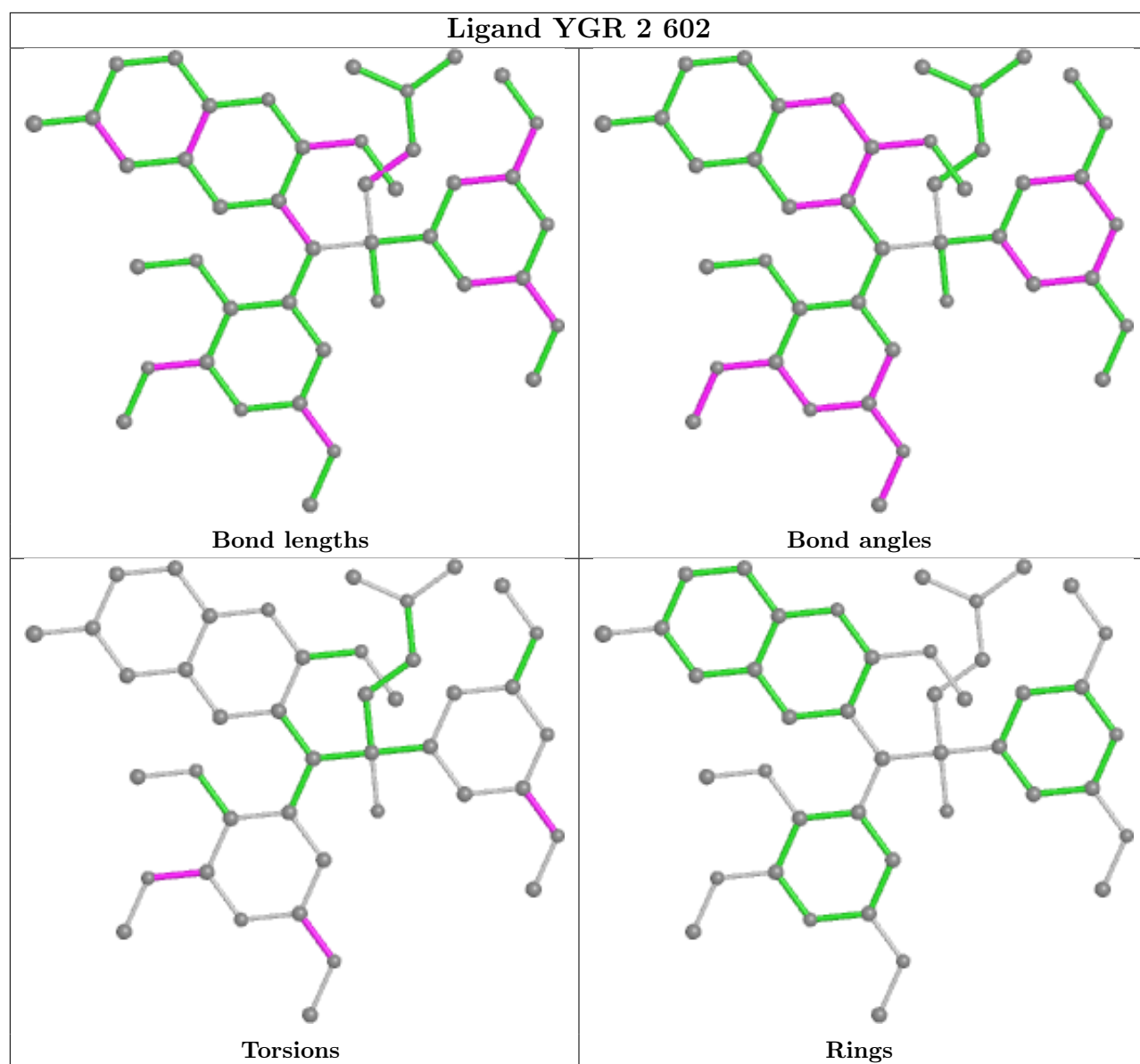


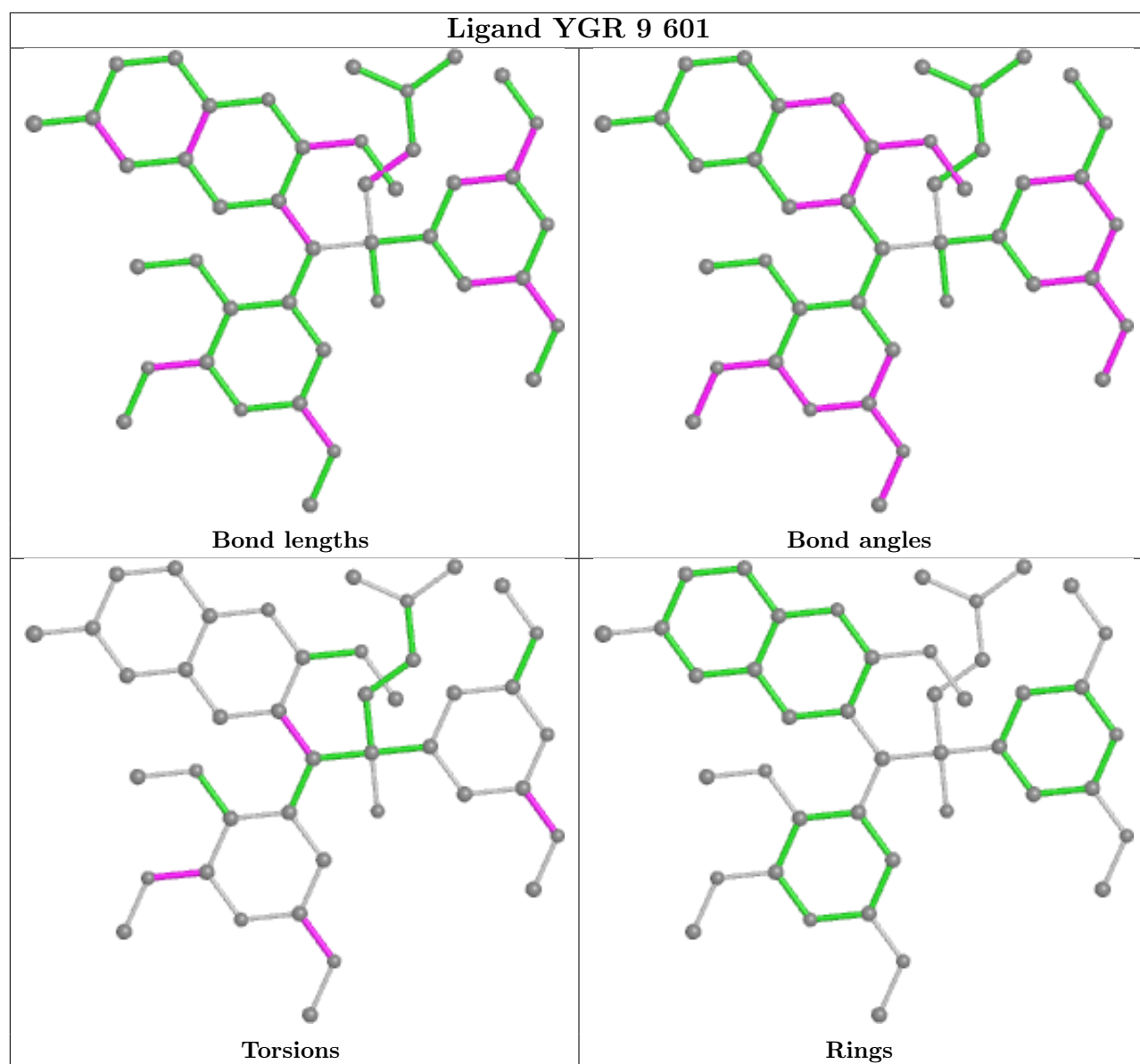




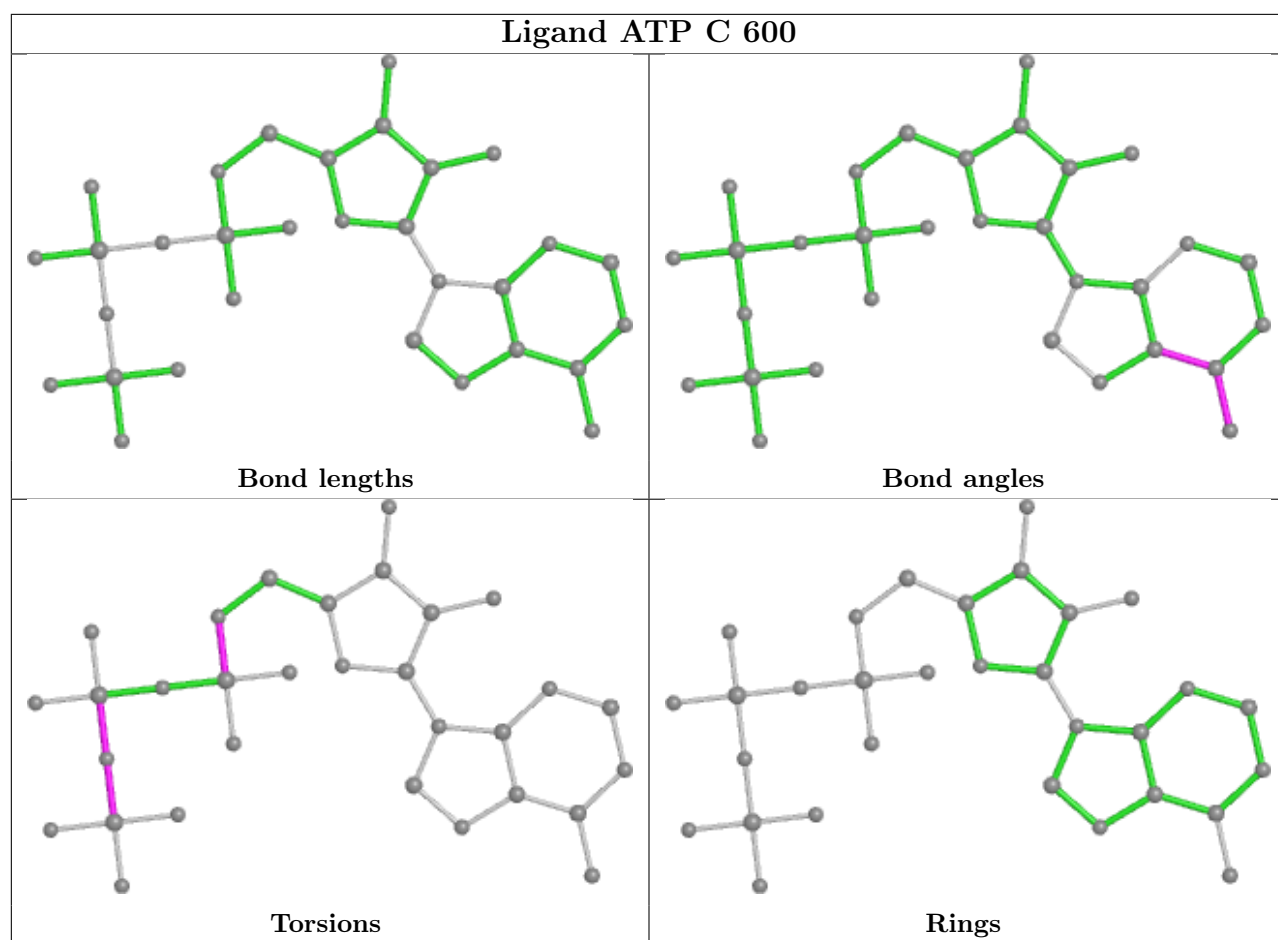


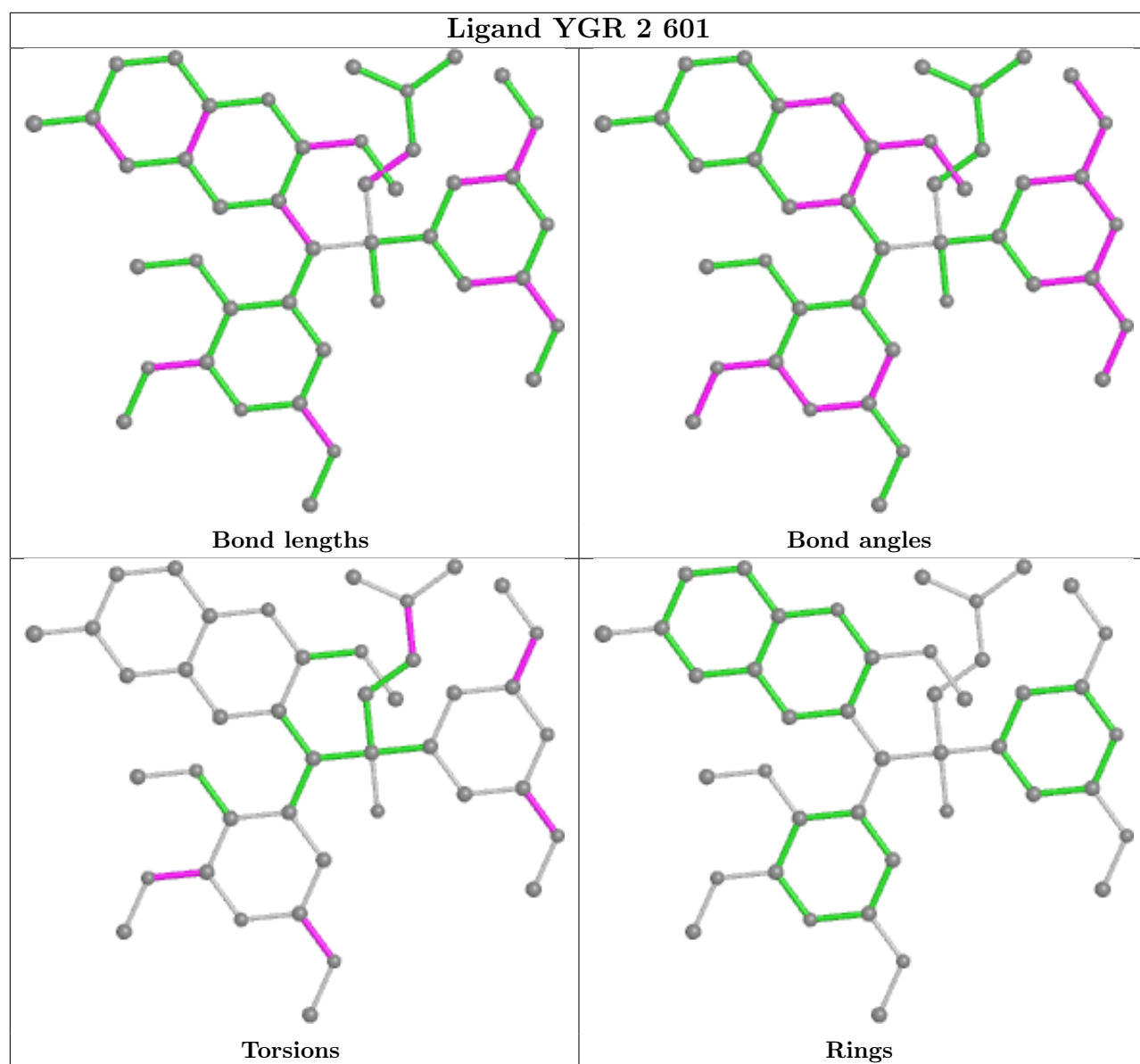


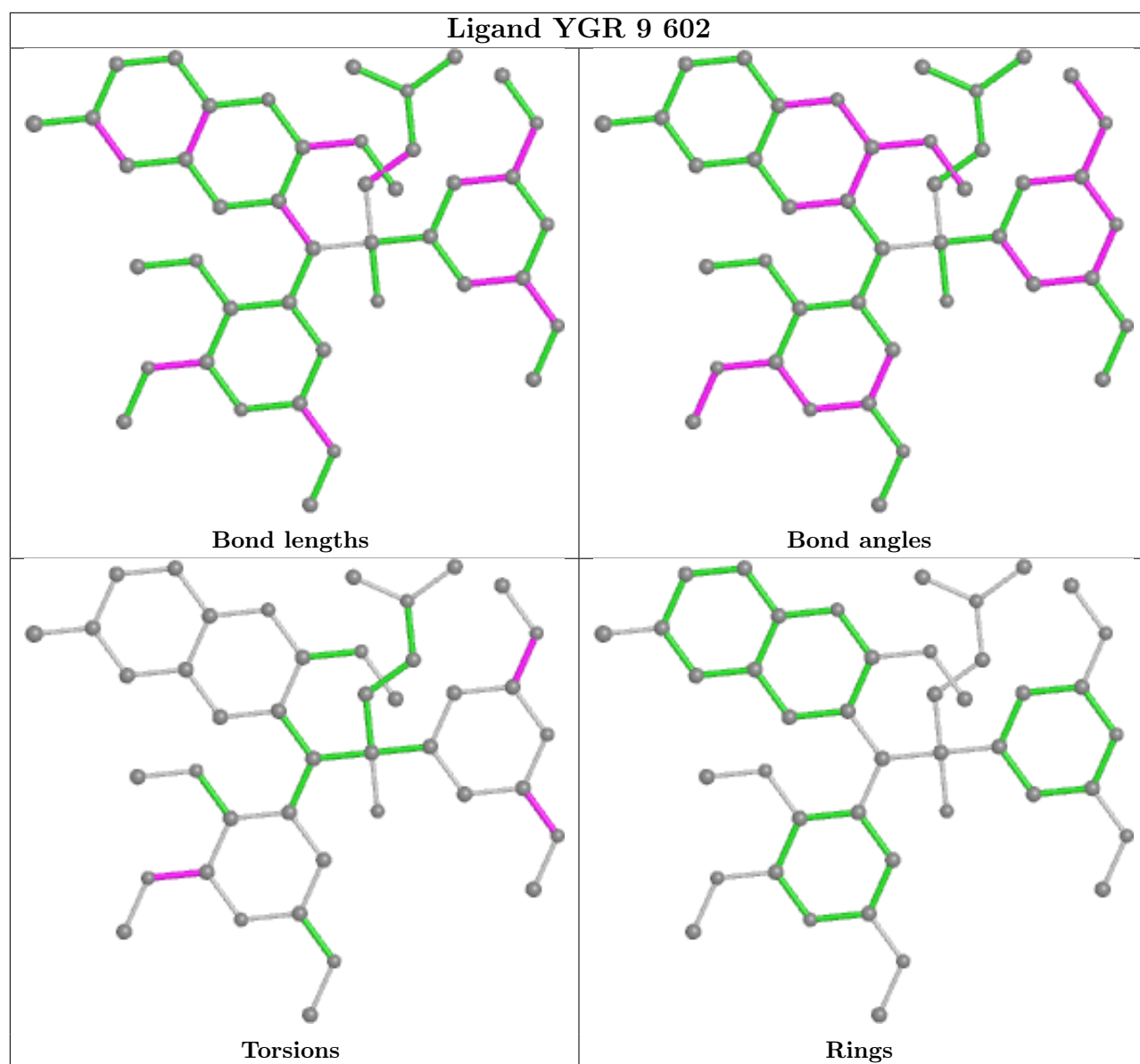


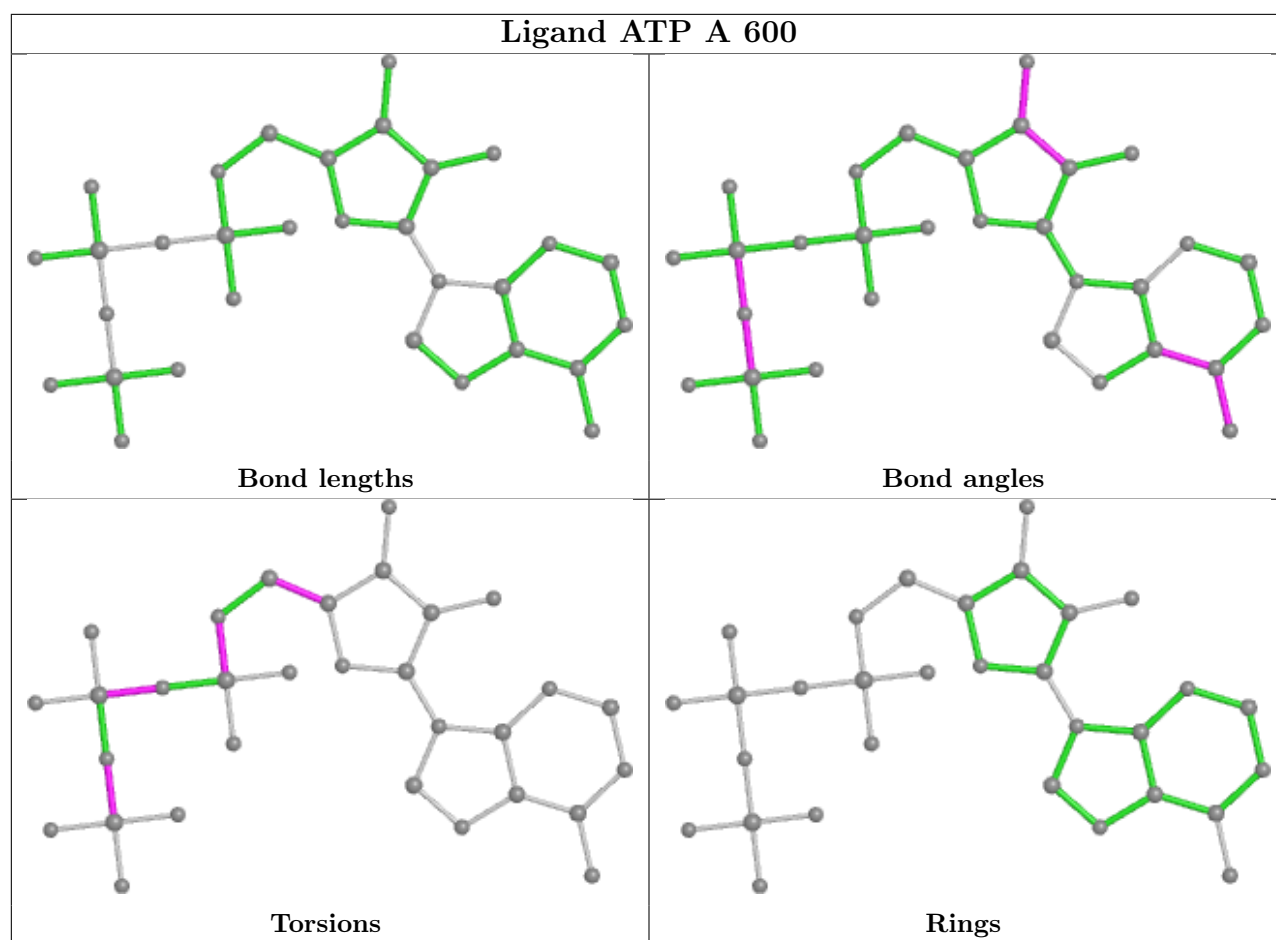












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

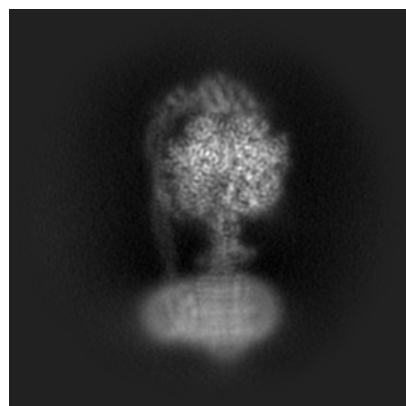
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-29654. These allow visual inspection of the internal detail of the map and identification of artifacts.

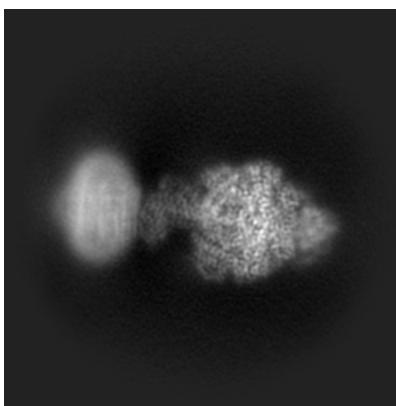
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

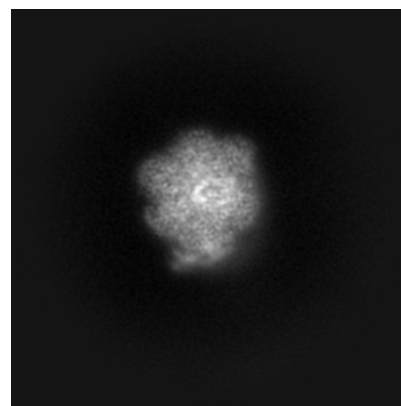
#### 6.1.1 Primary map



X

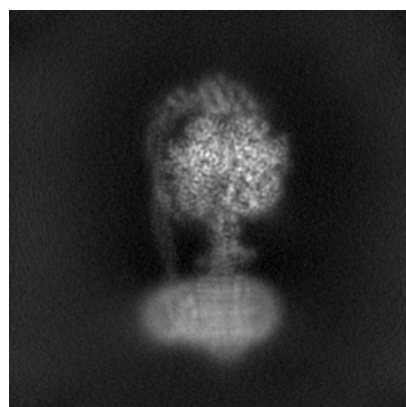


Y

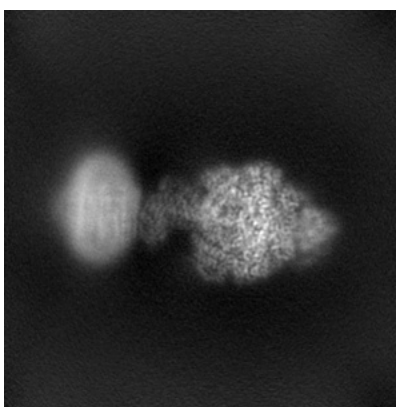


Z

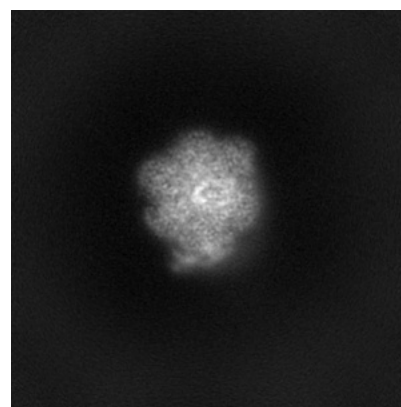
#### 6.1.2 Raw map



X



Y

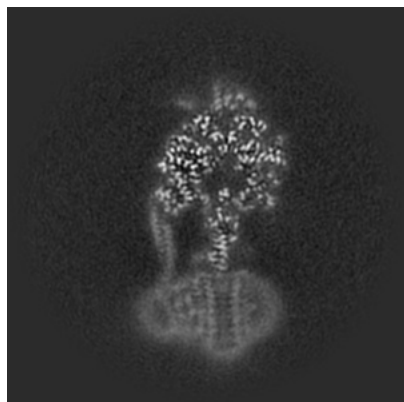


Z

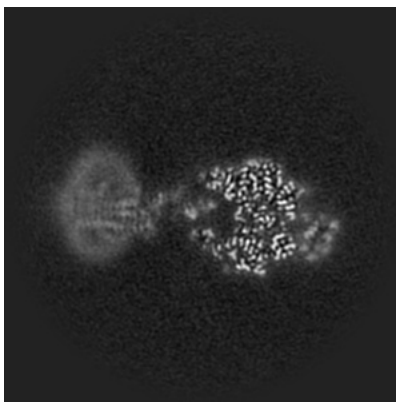
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

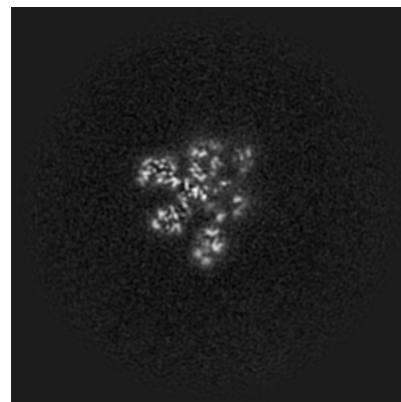
### 6.2.1 Primary map



X Index: 160

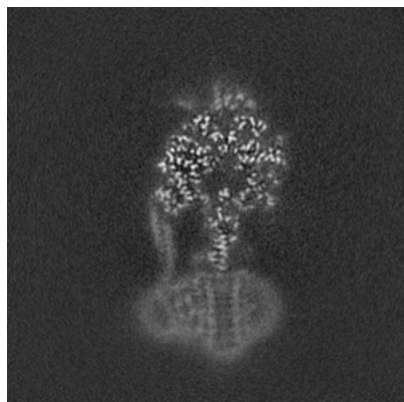


Y Index: 160

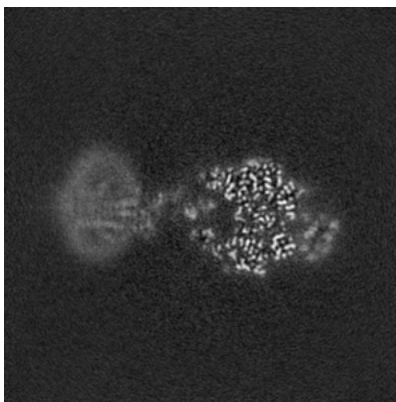


Z Index: 160

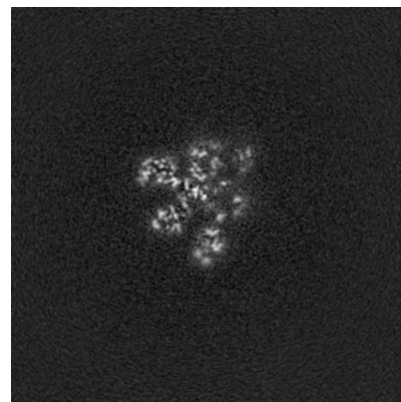
### 6.2.2 Raw map



X Index: 160



Y Index: 160

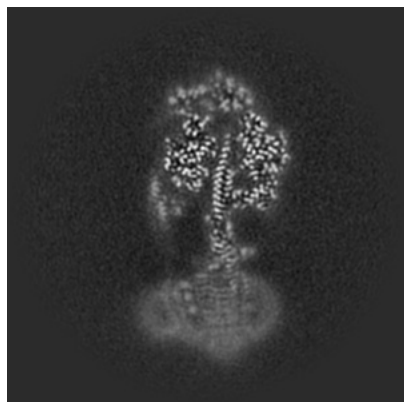


Z Index: 160

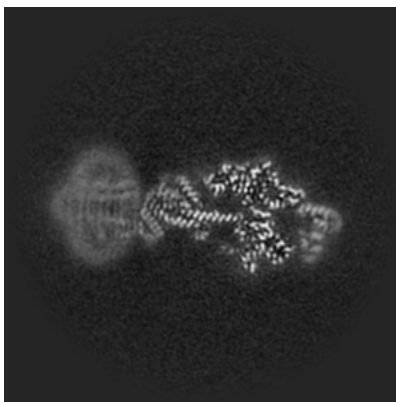
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

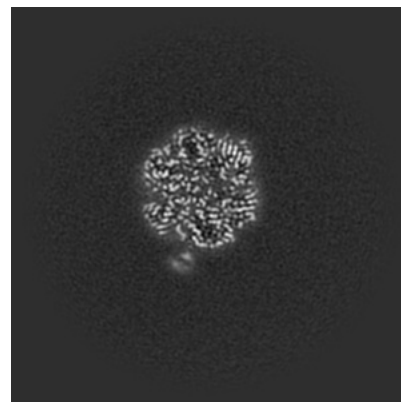
### 6.3.1 Primary map



X Index: 151

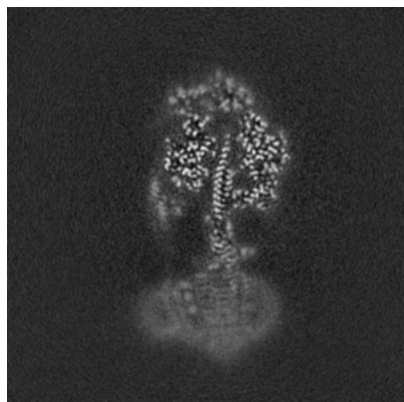


Y Index: 167

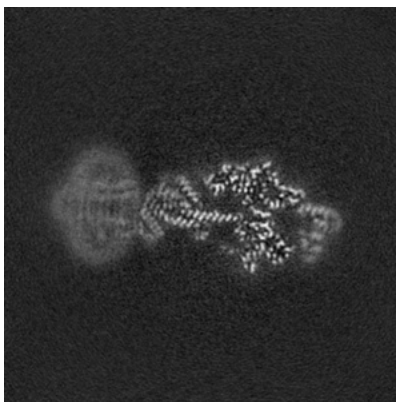


Z Index: 203

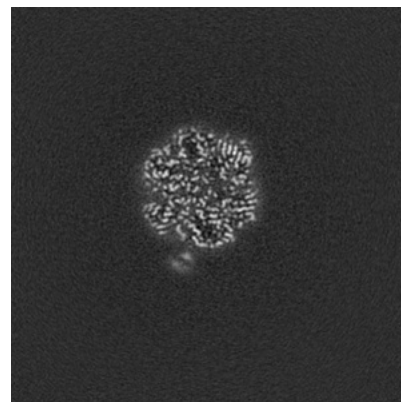
### 6.3.2 Raw map



X Index: 151



Y Index: 167



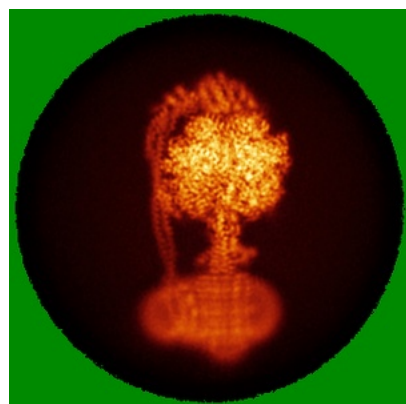
Z Index: 203

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

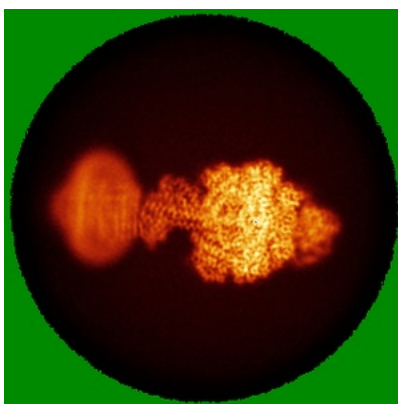


## 6.4 Orthogonal standard-deviation projections (False-color) ⓘ

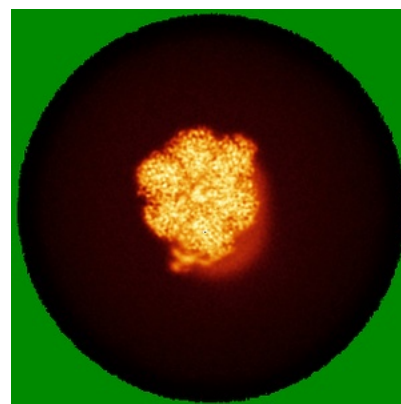
### 6.4.1 Primary map



X

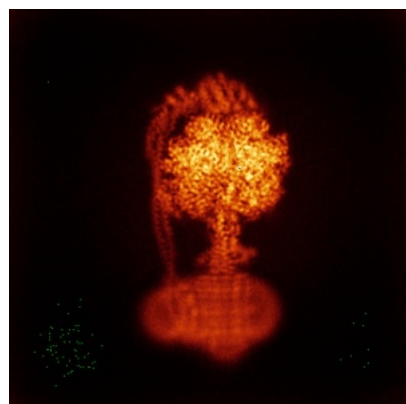


Y

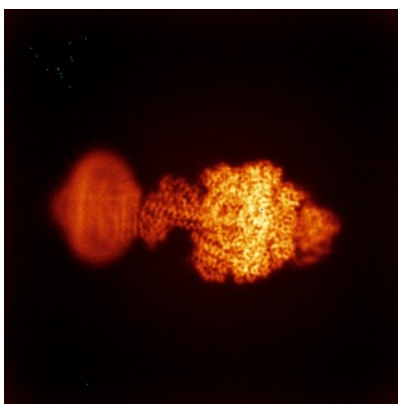


Z

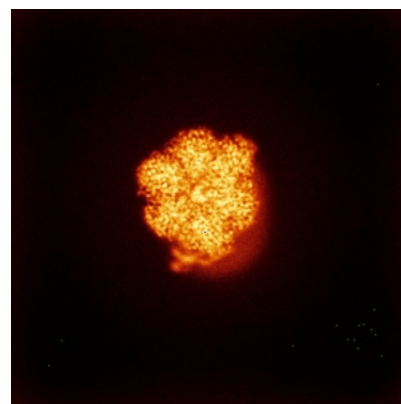
### 6.4.2 Raw map



X



Y



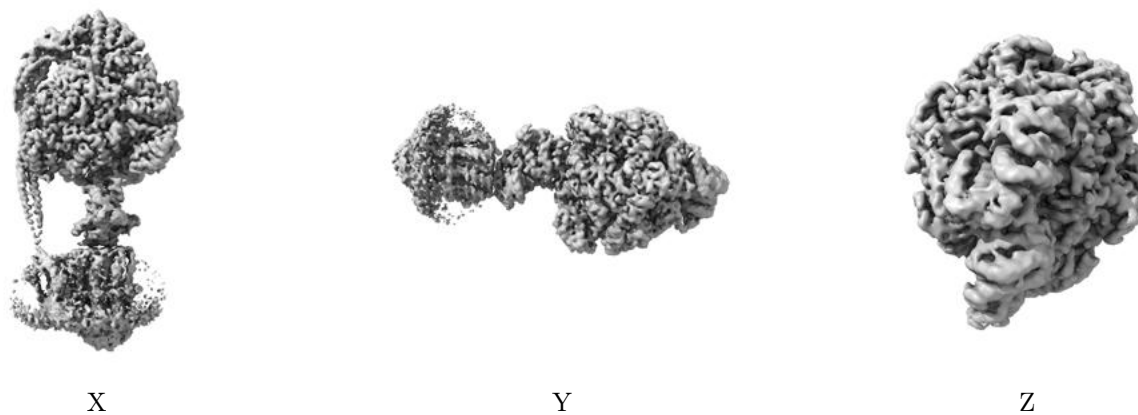
Z

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



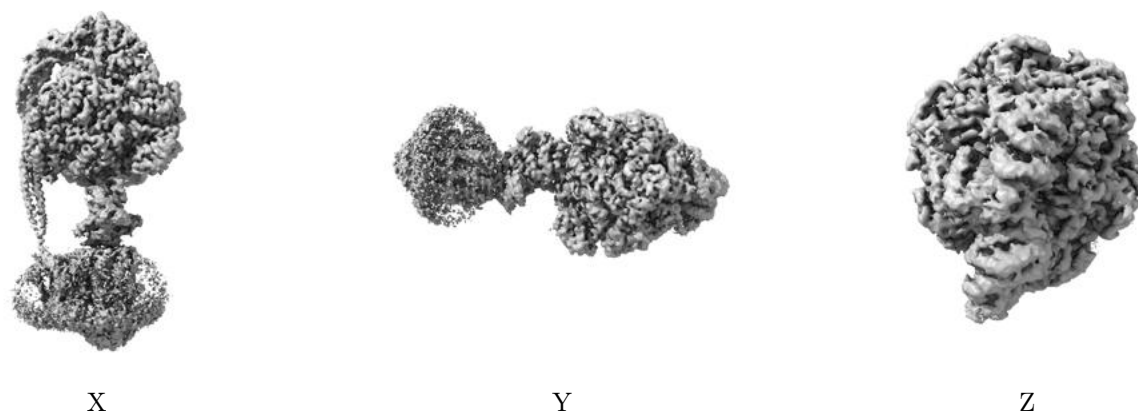
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.6. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



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

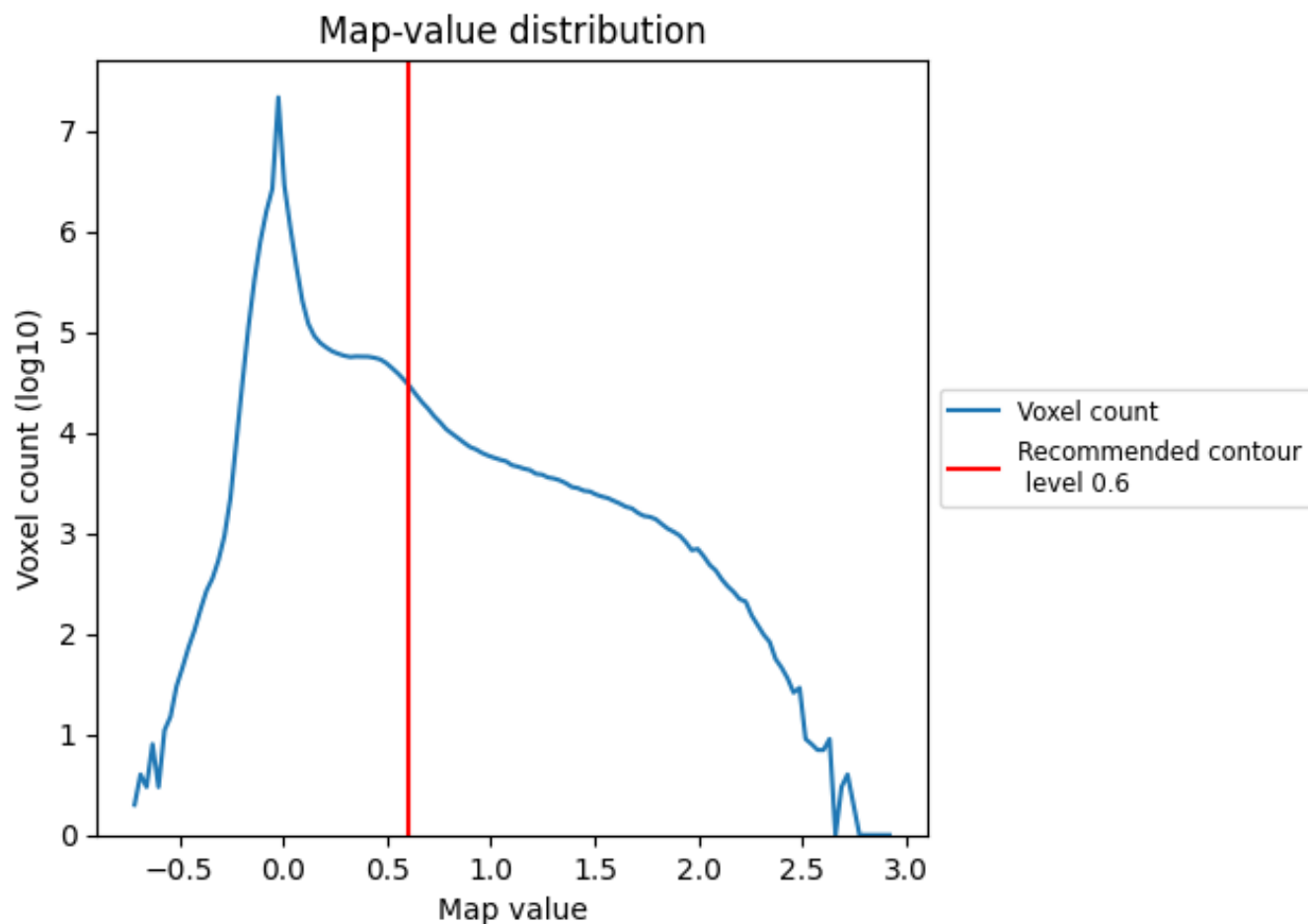
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

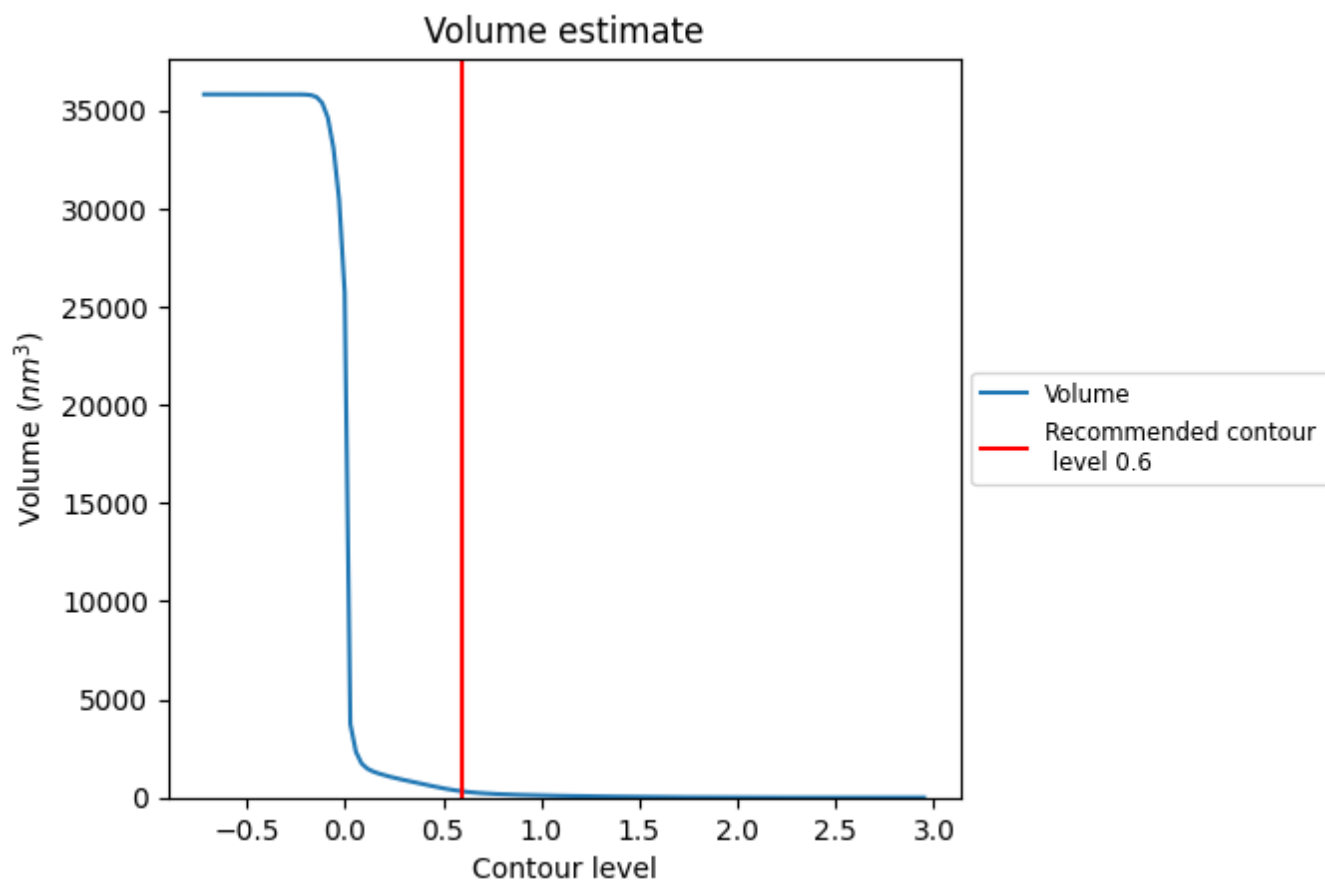
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



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

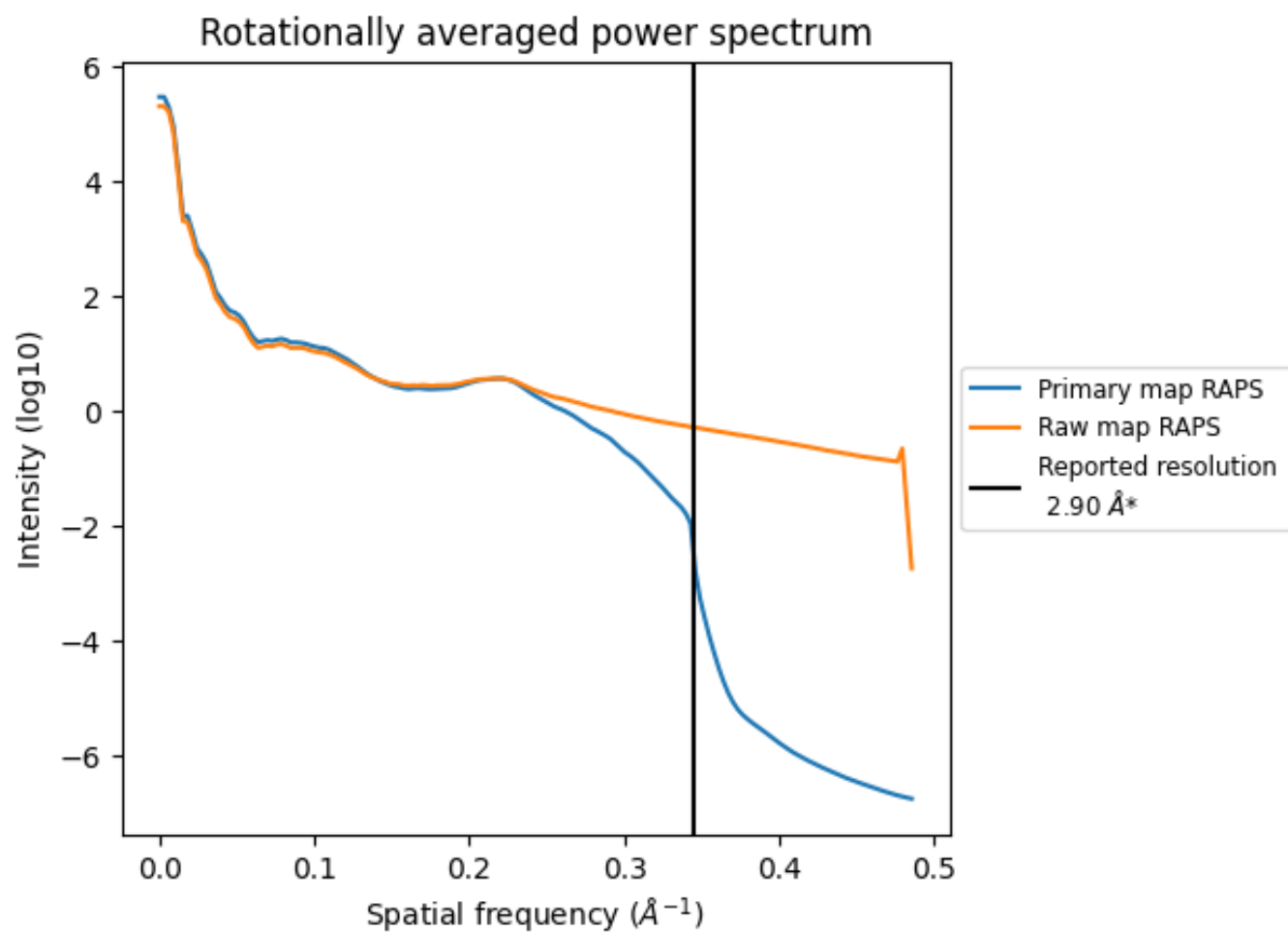
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 315 nm<sup>3</sup>; this corresponds to an approximate mass of 285 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 ⓘ

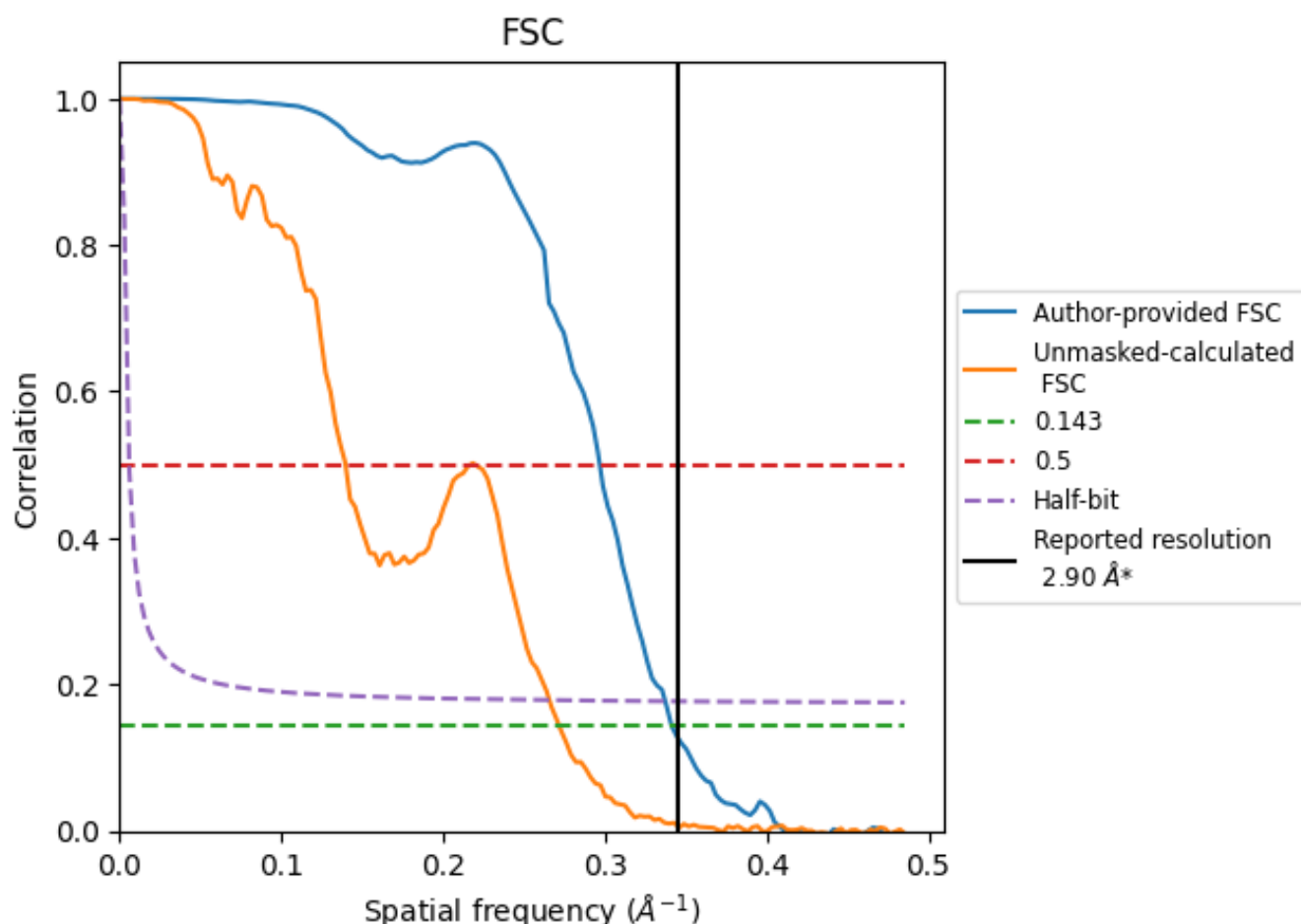


\*Reported resolution corresponds to spatial frequency of  $0.345 \text{ \AA}^{-1}$

## 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 0.345 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

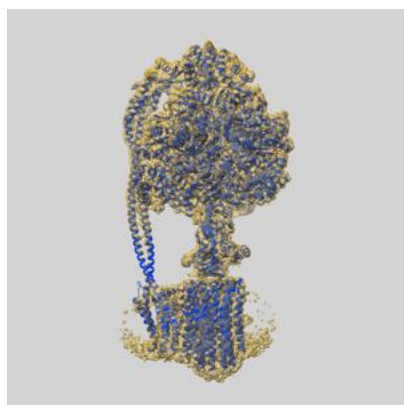
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.90	-	-
Author-provided FSC curve	2.93	3.37	2.96
Unmasked-calculated*	3.68	7.16	3.76

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.68 differs from the reported value 2.9 by more than 10 %

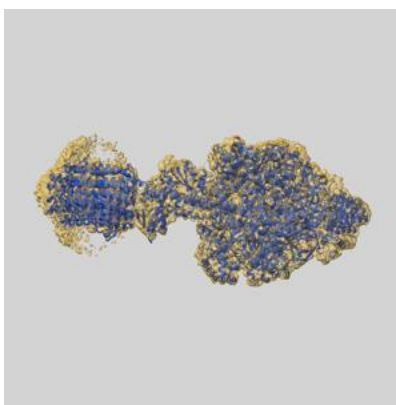
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-29654 and PDB model 8G0D. Per-residue inclusion information can be found in section 3 on page 9.

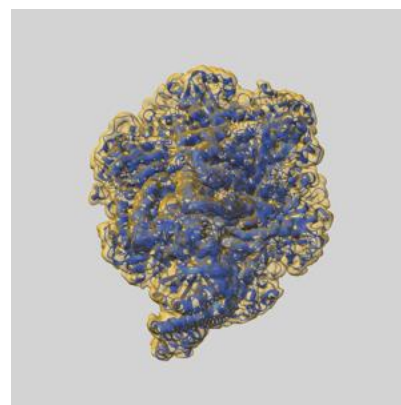
### 9.1 Map-model overlay [i](#)



X



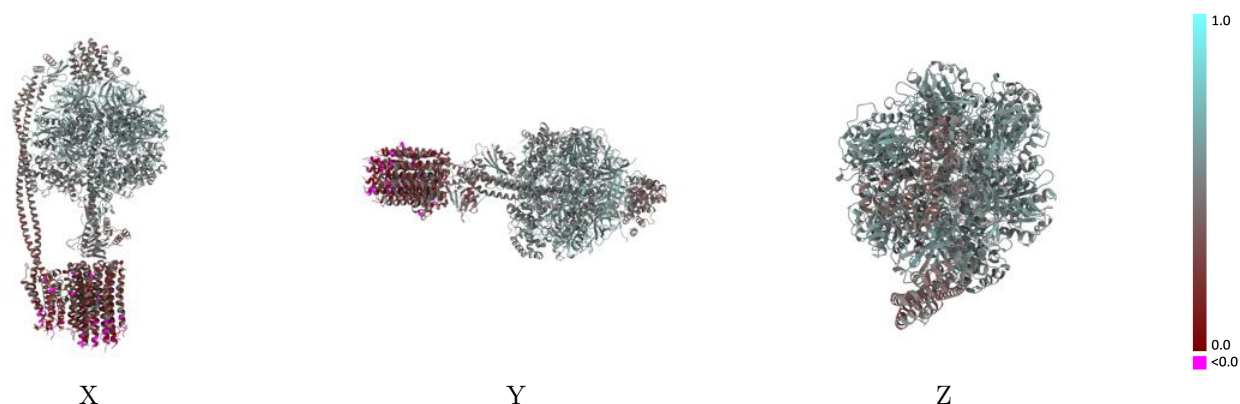
Y



Z

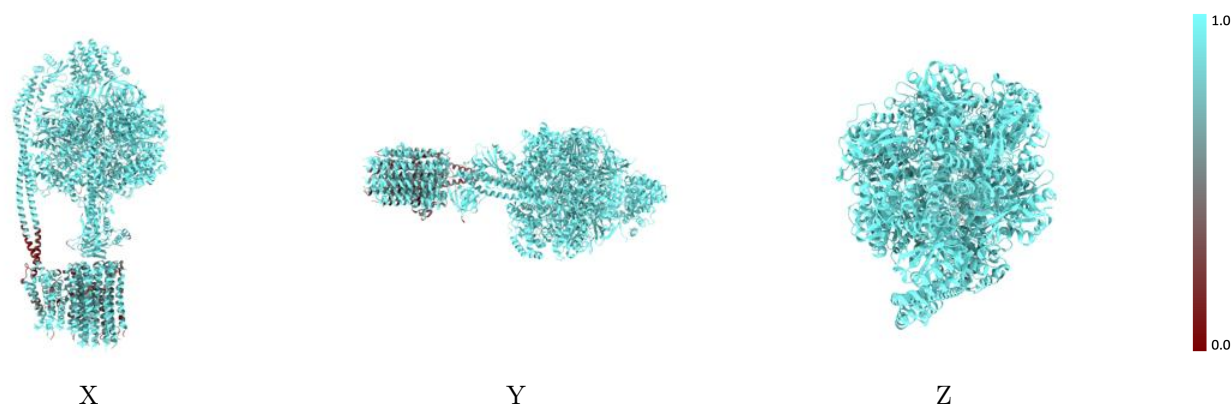
The images above show the 3D surface view of the map at the recommended contour level 0.6 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 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.

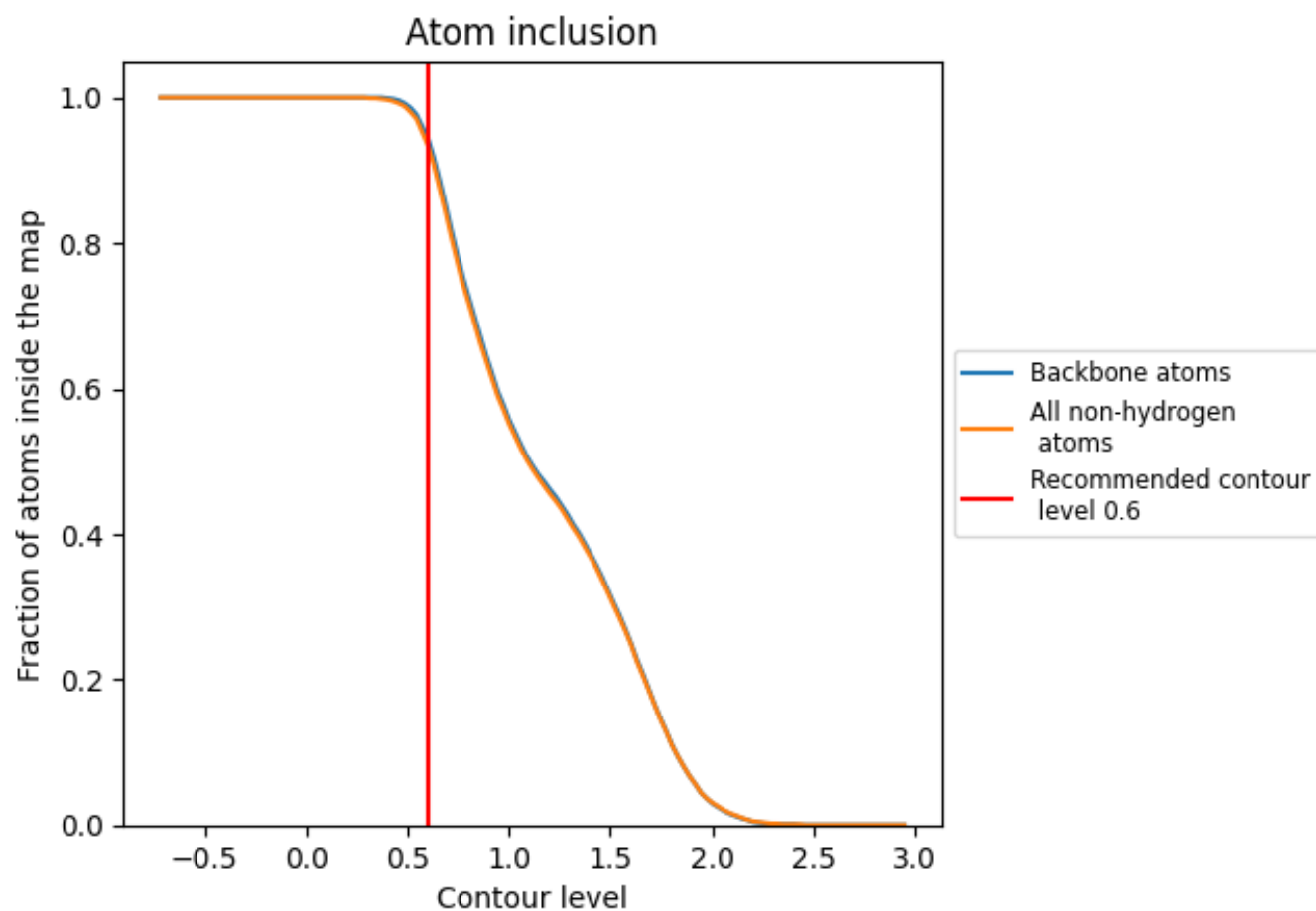
## 9.3 Atom inclusion mapped to coordinate model [i](#)



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 (0.6).













































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 94% 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 (0.6) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9350	 0.4580
1	 0.8020	 0.2780
2	 0.6710	 0.2360
3	 0.7350	 0.2580
4	 0.7850	 0.2770
5	 0.8520	 0.2740
6	 0.8310	 0.2500
7	 0.8300	 0.2310
8	 0.7170	 0.2240
9	 0.6660	 0.2060
A	 0.9880	 0.5300
B	 0.9920	 0.5390
C	 0.9930	 0.5380
D	 0.9970	 0.5450
E	 0.9980	 0.5470
F	 0.9950	 0.5450
G	 0.9750	 0.4880
H	 0.9120	 0.4380
a	 0.8120	 0.2560
b	 0.8030	 0.3600
d	 0.9460	 0.4140

