



wwPDB EM Validation Summary Report ⓘ

Mar 9, 2026 – 04:57 AM UTC

PDB ID : 7S4M / pdb_00007s4m
EMDB ID : EMD-24831
Title : CryoEM structure of Methylocystis sp. str. Rockwell pMMO in a POPC nanodisc at 2.42 Angstrom resolution
Authors : Koo, C.W.; Rosenzweig, A.C.
Deposited on : 2021-09-09
Resolution : 2.42 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:

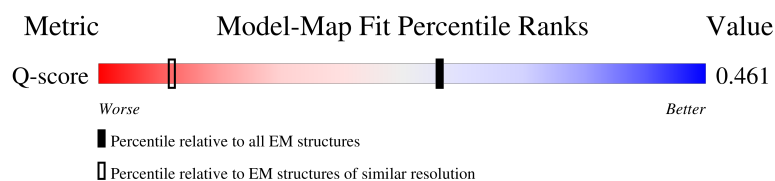
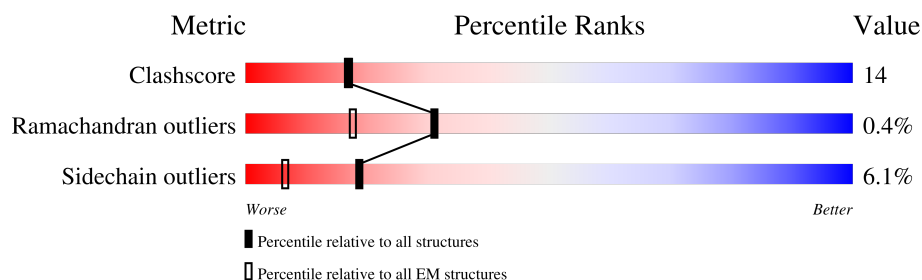
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data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

1 Overall quality at a glance

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

The reported resolution of this entry is 2.42 Å.

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



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

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

Mol	Chain	Length	Quality of chain
1	A	388	14% 78% 20% .
1	E	388	16% 76% 20% .
1	I	388	15% 79% 19% .
2	B	244	8% 64% 35% .

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Mol	Chain	Length	Quality of chain
2	F	244	
2	J	244	
3	C	241	
3	G	241	
3	K	241	
4	D	19	
4	H	19	
4	N	19	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
7	D10	B	303	-	-	X	-
7	D10	F	303	-	-	X	-
7	D10	G	305	-	-	X	-
7	D10	J	303	-	-	X	-
7	D10	K	305	-	-	X	-

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 22419 atoms, of which 690 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Particulate methane monooxygenase alpha subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	388	Total	C	N	O	S	0	0
			3026	1946	521	555	4		
1	E	388	Total	C	N	O	S	0	0
			3026	1946	521	555	4		
1	I	388	Total	C	N	O	S	0	0
			3026	1946	521	555	4		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
2	F	244	Total	C	N	O	S	0	0
			1974	1336	311	316	11		
2	B	244	Total	C	N	O	S	0	0
			1974	1336	311	316	11		
2	J	244	Total	C	N	O	S	0	0
			1974	1336	311	316	11		

- Molecule 3 is a protein called Ammonia monooxygenase/methane monooxygenase, subunit C family protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	241	Total	C	N	O	S	0	0
			1982	1337	311	325	9		
3	C	241	Total	C	N	O	S	0	0
			1982	1337	311	325	9		
3	K	241	Total	C	N	O	S	0	0
			1982	1337	311	325	9		

- Molecule 4 is a protein called Unidentified Helix.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	D	19	Total	C	N	O	0	0
			95	57	19	19		

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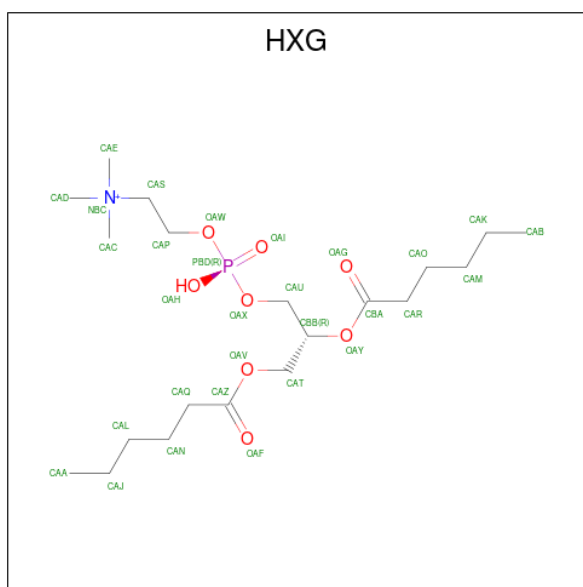
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Mol	Chain	Residues	Atoms				AltConf	Trace
4	N	19	Total	C	N	O	0	0
			95	57	19	19		
4	H	19	Total	C	N	O	0	0
			95	57	19	19		

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

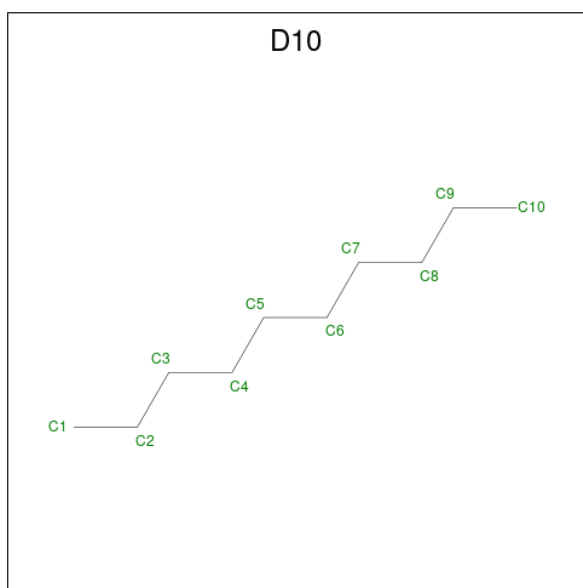
Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Cu	0
			1	1	
5	G	1	Total	Cu	0
			1	1	
5	C	1	Total	Cu	0
			1	1	
5	K	1	Total	Cu	0
			1	1	
5	E	1	Total	Cu	0
			1	1	
5	I	1	Total	Cu	0
			1	1	

- Molecule 6 is 1,2-dihexanoyl-sn-glycero-3-phosphocholine (CCD ID: HXG) (formula: C₂₀H₄₁NO₈P) (labeled as "Ligand of Interest" by depositor).



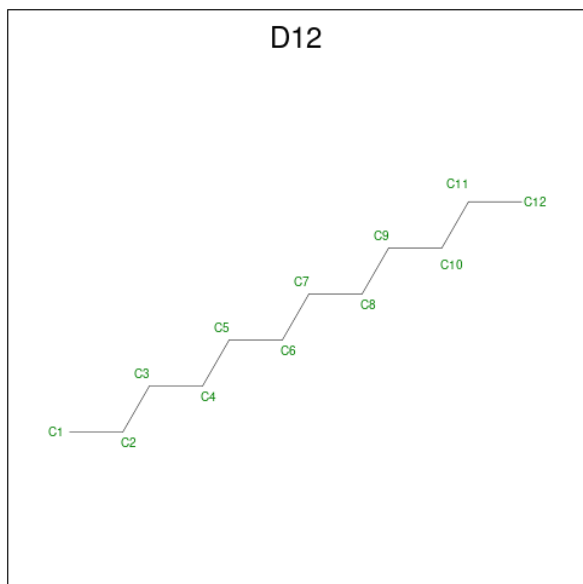
Mol	Chain	Residues	Atoms						AltConf
6	F	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	F	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	B	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	B	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	J	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	J	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	G	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	G	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	C	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	C	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	K	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	
6	K	1	Total	C	H	N	O	P	0
			70	20	40	1	8	1	

- Molecule 7 is DECANE (CCD ID: D10) (formula: $C_{10}H_{22}$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf
7	F	1	Total	C	H	0
			32	10	22	
7	B	1	Total	C	H	0
			32	10	22	
7	J	1	Total	C	H	0
			32	10	22	
7	G	1	Total	C	H	0
			32	10	22	
7	C	1	Total	C	H	0
			32	10	22	
7	K	1	Total	C	H	0
			32	10	22	

- Molecule 8 is DODECANE (CCD ID: D12) (formula: $C_{12}H_{26}$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf
8	G	1	Total	C	H	0
			38	12	26	
8	C	1	Total	C	H	0
			38	12	26	
8	K	1	Total	C	H	0
			38	12	26	

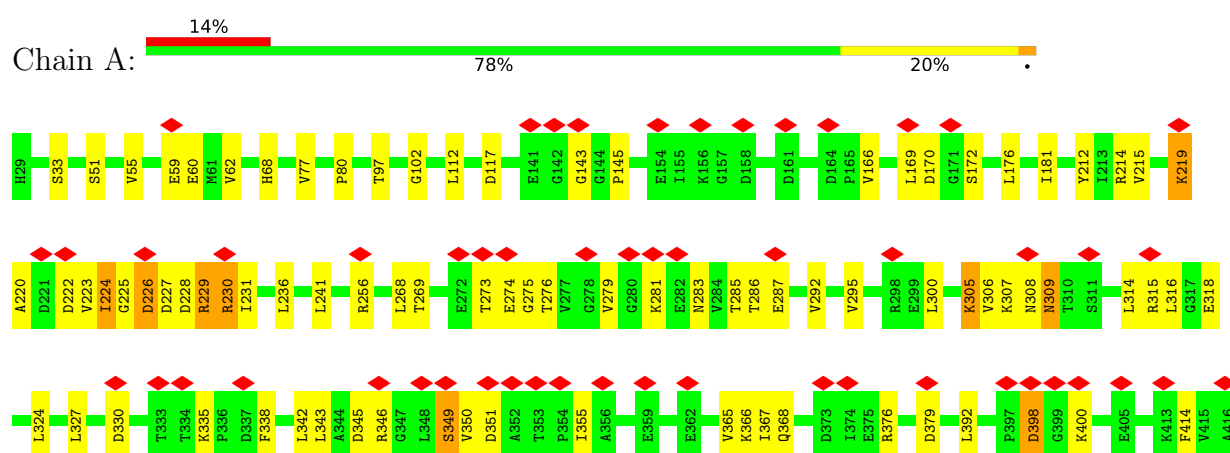
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		AltConf
9	A	6	Total 6	O 6	0
9	F	3	Total 3	O 3	0
9	B	4	Total 4	O 4	0
9	J	6	Total 6	O 6	0
9	G	1	Total 1	O 1	0
9	C	1	Total 1	O 1	0
9	K	2	Total 2	O 2	0
9	N	3	Total 3	O 3	0
9	E	5	Total 5	O 5	0
9	I	5	Total 5	O 5	0

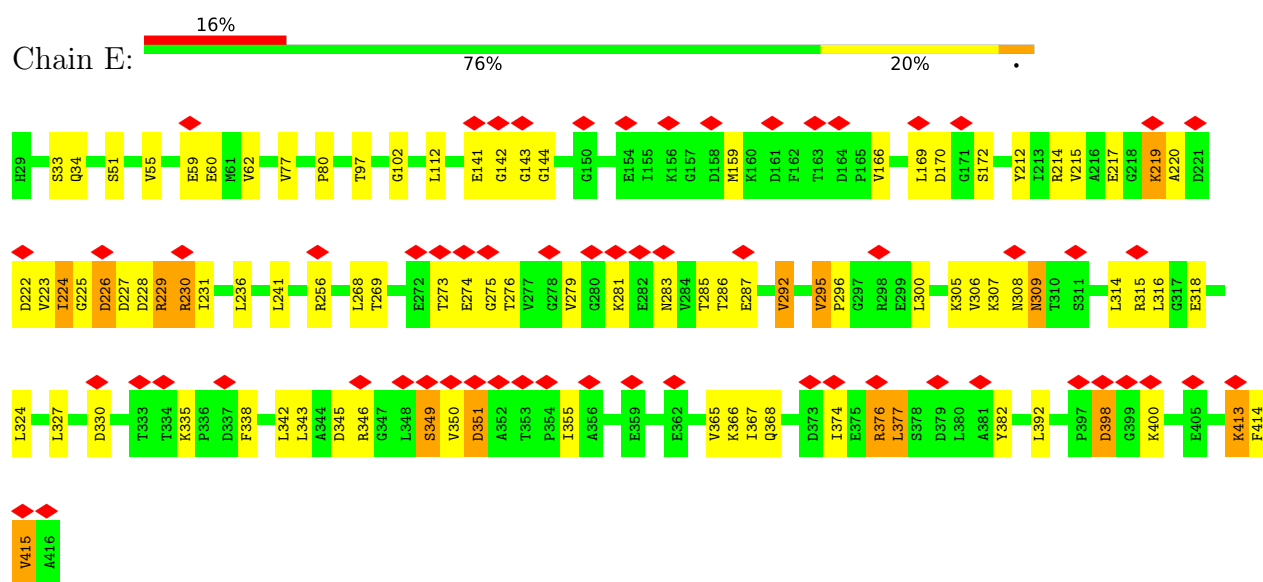
3 Residue-property plots

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

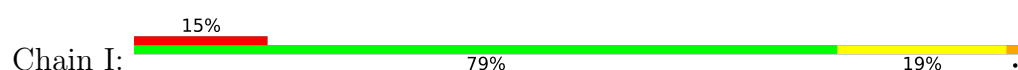
- Molecule 1: Particulate methane monooxygenase alpha subunit

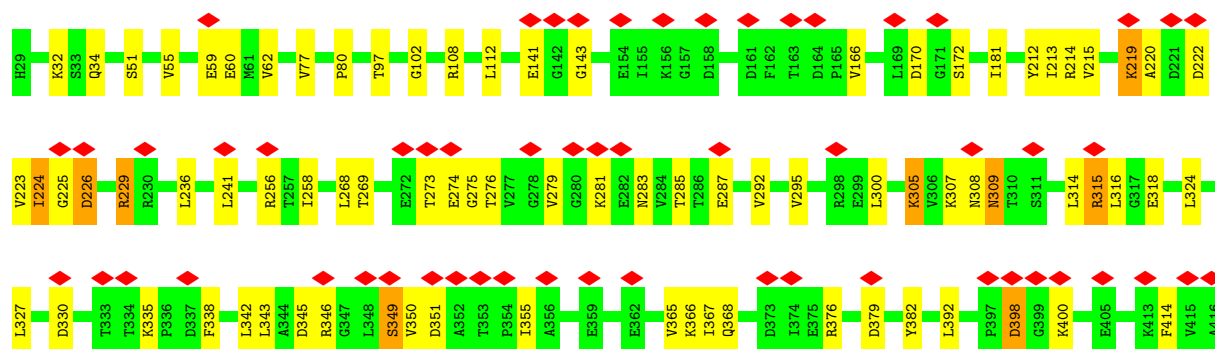


- Molecule 1: Particulate methane monooxygenase alpha subunit

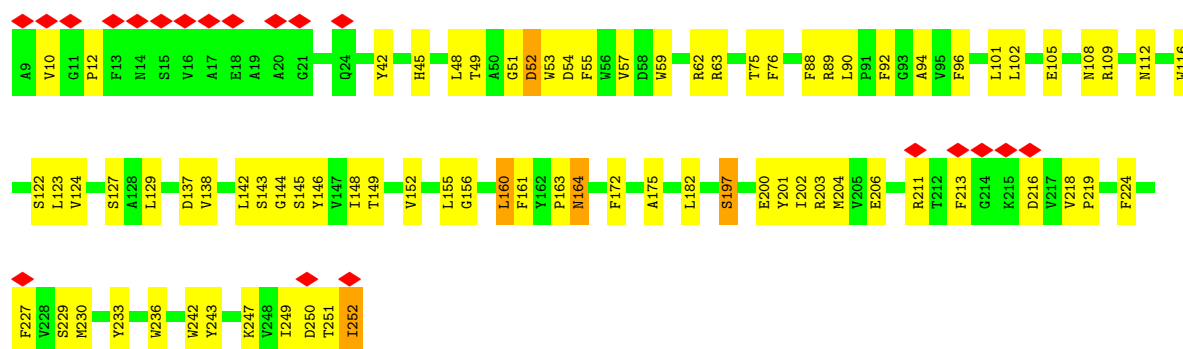


- Molecule 1: Particulate methane monooxygenase alpha subunit

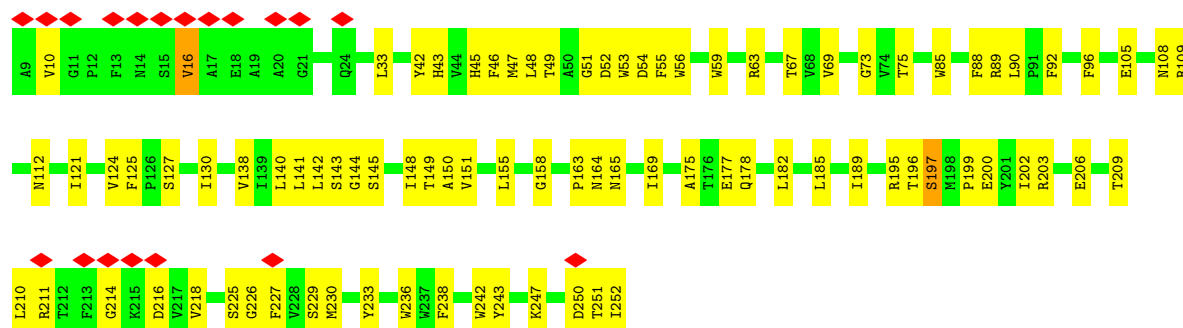




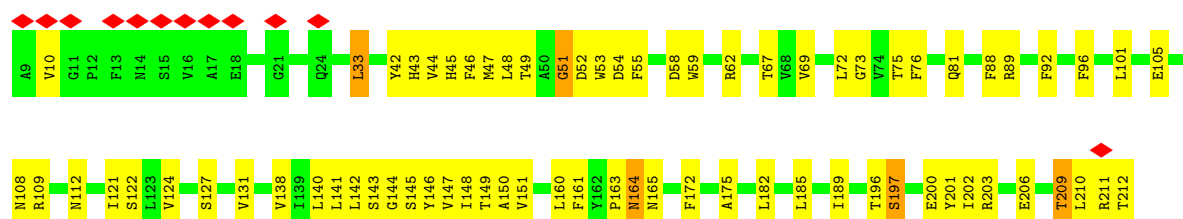
• Molecule 2: Particulate methane monooxygenase beta subunit



• Molecule 2: Particulate methane monooxygenase beta subunit

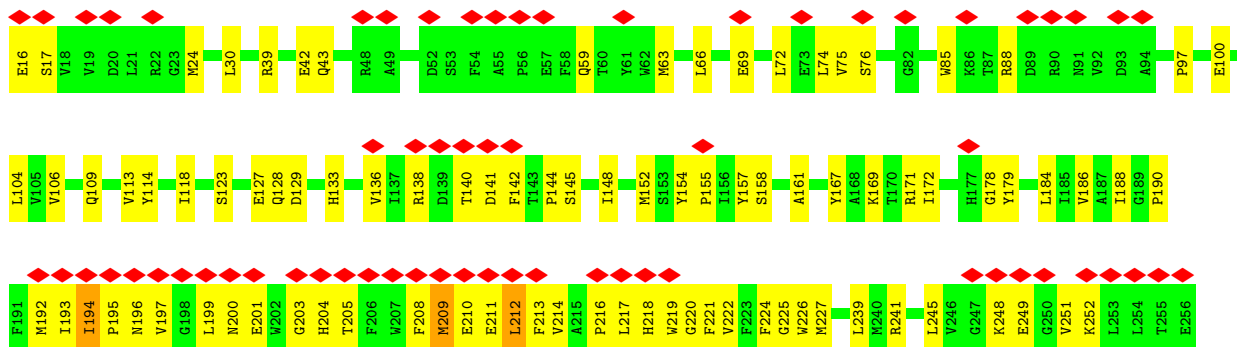


• Molecule 2: Particulate methane monooxygenase beta subunit

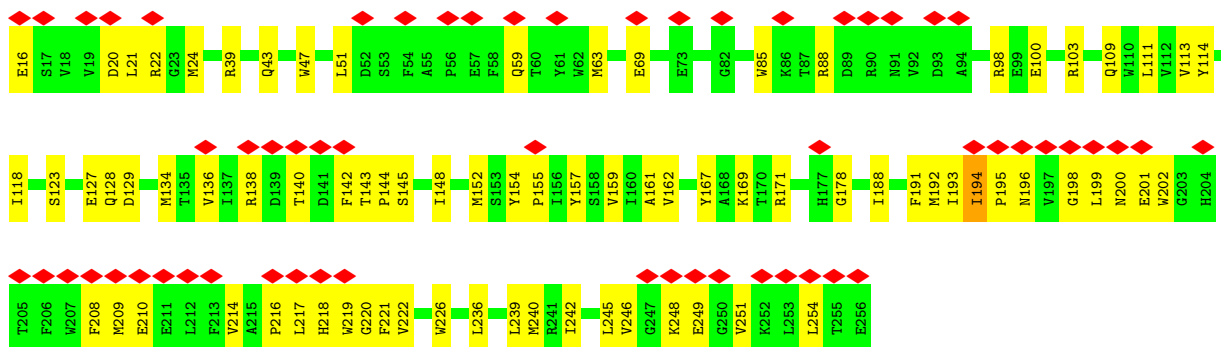




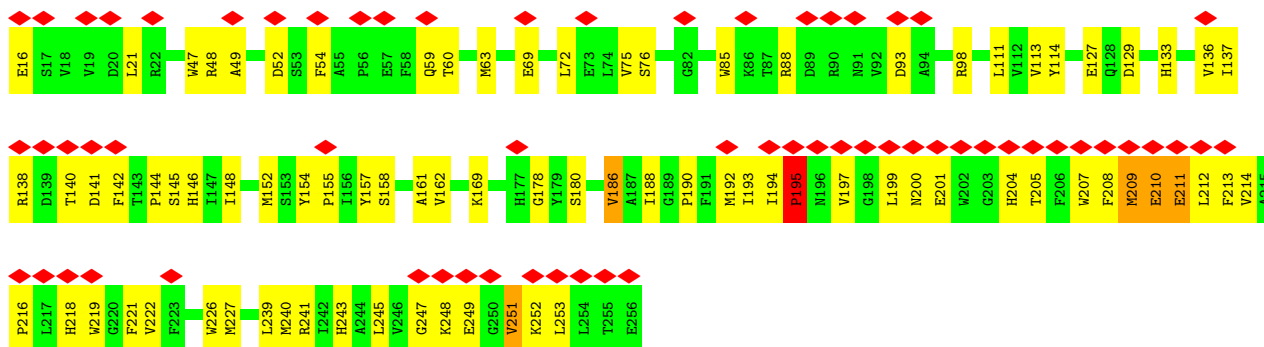
- Molecule 3: Ammonia monooxygenase/methane monooxygenase, subunit C family protein



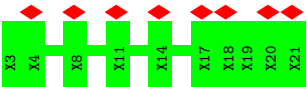
- Molecule 3: Ammonia monooxygenase/methane monooxygenase, subunit C family protein



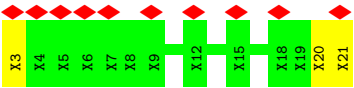
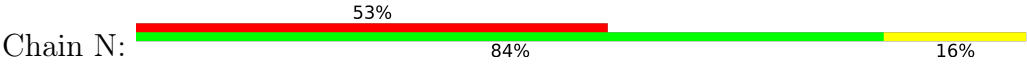
- Molecule 3: Ammonia monooxygenase/methane monooxygenase, subunit C family protein



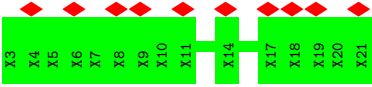
- Molecule 4: Unidentified Helix



• Molecule 4: Unidentified Helix



• Molecule 4: Unidentified Helix



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	490196	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 ($e^-/\text{\AA}^2$)	1.02	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.419	Depositor
Minimum map value	-0.339	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.020	Depositor
Recommended contour level	0.0758	Depositor
Map size (Å)	199.68, 199.68, 199.68	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.52, 0.52, 0.52	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CU, D12, D10, HXG

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	0.49	0/3103	0.67	0/4227
1	E	0.51	0/3103	0.70	1/4227 (0.0%)
1	I	0.50	0/3103	0.67	0/4227
2	B	0.23	0/2052	0.42	0/2814
2	F	0.23	0/2052	0.42	0/2814
2	J	0.23	0/2052	0.44	2/2814 (0.1%)
3	C	0.20	0/2052	0.42	0/2801
3	G	0.22	0/2052	0.44	0/2801
3	K	0.31	0/2052	0.60	6/2801 (0.2%)
All	All	0.38	0/21621	0.56	9/29526 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	E	0	2
1	I	0	2
All	All	0	6

There are no bond length outliers.

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	K	208	PHE	CB-CA-C	8.46	124.12	109.65
3	K	195	PRO	CB-CA-C	-7.50	99.19	111.56
3	K	195	PRO	N-CA-CB	-5.85	97.11	103.25
3	K	209	MET	N-CA-C	5.60	119.42	112.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	377	LEU	N-CA-C	-5.32	106.63	113.23

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	226	ASP	Peptide
1	A	308	ASN	Peptide
1	E	226	ASP	Peptide
1	E	308	ASN	Peptide
1	I	226	ASP	Peptide

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	3026	0	3015	44	0
1	E	3026	0	3015	56	0
1	I	3026	0	3015	51	0
2	B	1974	0	1932	100	0
2	F	1974	0	1932	95	0
2	J	1974	0	1932	116	0
3	C	1982	0	1960	73	0
3	G	1982	0	1960	106	0
3	K	1982	0	1960	70	0
4	D	95	0	21	0	0
4	H	95	0	21	0	0
4	N	95	0	22	6	0
5	A	1	0	0	0	0
5	C	1	0	0	0	0
5	E	1	0	0	0	0
5	G	1	0	0	0	0
5	I	1	0	0	0	0
5	K	1	0	0	0	0
6	B	60	80	80	4	0
6	C	60	80	80	3	0
6	F	60	80	80	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	G	60	80	80	10	0
6	J	60	80	80	3	0
6	K	60	80	80	11	0
7	B	10	22	22	11	0
7	C	10	22	22	1	0
7	F	10	22	22	10	0
7	G	10	22	22	9	0
7	J	10	22	22	10	0
7	K	10	22	22	10	0
8	C	12	26	26	0	0
8	G	12	26	26	2	0
8	K	12	26	26	2	0
9	A	6	0	0	0	0
9	B	4	0	0	3	0
9	C	1	0	0	6	0
9	E	5	0	0	0	0
9	F	3	0	0	0	0
9	G	1	0	0	0	0
9	I	5	0	0	2	0
9	J	6	0	0	7	0
9	K	2	0	0	0	0
9	N	3	0	0	5	0
All	All	21729	690	21475	599	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 14.

The worst 5 of 599 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:J:214:GLY:HA2	9:J:404:HOH:O	1.38	1.19
2:J:252:ILE:CD1	6:K:302:HXG:H11	1.80	1.12
2:J:252:ILE:HD11	6:K:302:HXG:H11	1.12	1.10
2:F:243:TYR:CZ	7:F:303:D10:H101	1.91	1.05
9:J:402:HOH:O	3:G:209:MET:SD	2.14	1.05

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	386/388 (100%)	359 (93%)	24 (6%)	3 (1%)	16	23
1	E	386/388 (100%)	357 (92%)	26 (7%)	3 (1%)	16	23
1	I	386/388 (100%)	357 (92%)	26 (7%)	3 (1%)	16	23
2	B	242/244 (99%)	232 (96%)	10 (4%)	0	100	100
2	F	242/244 (99%)	233 (96%)	9 (4%)	0	100	100
2	J	242/244 (99%)	233 (96%)	9 (4%)	0	100	100
3	C	239/241 (99%)	228 (95%)	11 (5%)	0	100	100
3	G	239/241 (99%)	224 (94%)	15 (6%)	0	100	100
3	K	239/241 (99%)	223 (93%)	14 (6%)	2 (1%)	16	23
All	All	2601/2619 (99%)	2446 (94%)	144 (6%)	11 (0%)	31	42

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	309	ASN
1	A	351	ASP
1	E	309	ASN
1	E	351	ASP
1	I	309	ASN

5.3.2 Protein sidechains

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	319/319 (100%)	291 (91%)	28 (9%)	9	14
1	E	319/319 (100%)	286 (90%)	33 (10%)	7	10
1	I	319/319 (100%)	292 (92%)	27 (8%)	10	15
2	B	202/202 (100%)	198 (98%)	4 (2%)	48	68
2	F	202/202 (100%)	196 (97%)	6 (3%)	36	56
2	J	202/202 (100%)	198 (98%)	4 (2%)	48	68
3	C	205/205 (100%)	198 (97%)	7 (3%)	32	52
3	G	205/205 (100%)	197 (96%)	8 (4%)	28	46
3	K	205/205 (100%)	190 (93%)	15 (7%)	13	21
All	All	2178/2178 (100%)	2046 (94%)	132 (6%)	19	28

5 of 132 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	I	285	THR
1	I	305	LYS
1	I	355	ILE
3	G	212	LEU
3	G	209	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
3	K	243	HIS
1	E	178	HIS
1	E	139	ASN
1	E	261	GLN
2	B	112	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 27 ligands modelled in this entry, 6 are monoatomic - leaving 21 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	$\# Z > 2$
8	D12	C	303	-	11,11,11	0.89	0	10,10,10	0.08	0
6	HXG	B	302	-	29,29,29	0.80	0	35,37,37	0.77	2 (5%)
6	HXG	C	304	-	29,29,29	0.86	0	35,37,37	0.81	2 (5%)
7	D10	J	303	-	9,9,9	0.10	0	8,8,8	0.07	0
7	D10	B	303	-	9,9,9	0.10	0	8,8,8	0.07	0
7	D10	G	305	-	9,9,9	0.11	0	8,8,8	0.23	0
8	D12	K	303	-	11,11,11	0.91	0	10,10,10	0.17	0
6	HXG	K	304	-	29,29,29	0.84	0	35,37,37	0.78	2 (5%)
6	HXG	J	302	-	29,29,29	0.78	0	35,37,37	0.75	1 (2%)
6	HXG	F	301	-	29,29,29	0.81	0	35,37,37	0.91	2 (5%)
6	HXG	K	302	-	29,29,29	0.34	0	35,37,37	0.49	0
6	HXG	B	301	-	29,29,29	0.81	0	35,37,37	0.92	2 (5%)
6	HXG	F	302	-	29,29,29	0.84	0	35,37,37	0.57	0
6	HXG	C	302	-	29,29,29	0.34	0	35,37,37	0.49	0
7	D10	K	305	-	9,9,9	0.12	0	8,8,8	0.23	0
7	D10	F	303	-	9,9,9	0.10	0	8,8,8	0.07	0
8	D12	G	303	-	11,11,11	0.85	0	10,10,10	0.15	0
6	HXG	G	304	-	29,29,29	0.87	0	35,37,37	0.68	0
6	HXG	J	301	-	29,29,29	0.81	0	35,37,37	0.90	2 (5%)
7	D10	C	305	-	9,9,9	0.12	0	8,8,8	0.23	0
6	HXG	G	302	-	29,29,29	0.34	0	35,37,37	0.49	0

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
8	D12	C	303	-	-	1/9/9/9	-
6	HXG	B	302	-	-	9/33/33/33	-
6	HXG	C	304	-	-	12/33/33/33	-
7	D10	J	303	-	-	2/7/7/7	-
7	D10	B	303	-	-	2/7/7/7	-
7	D10	G	305	-	-	2/7/7/7	-
8	D12	K	303	-	-	1/9/9/9	-
6	HXG	K	304	-	-	12/33/33/33	-
6	HXG	J	302	-	-	5/33/33/33	-
6	HXG	F	301	-	-	9/33/33/33	-
6	HXG	K	302	-	-	9/33/33/33	-
6	HXG	B	301	-	-	9/33/33/33	-
6	HXG	F	302	-	-	6/33/33/33	-
6	HXG	C	302	-	-	9/33/33/33	-
7	D10	K	305	-	-	2/7/7/7	-
7	D10	F	303	-	-	2/7/7/7	-
8	D12	G	303	-	-	0/9/9/9	-
6	HXG	G	304	-	-	6/33/33/33	-
6	HXG	J	301	-	-	9/33/33/33	-
7	D10	C	305	-	-	2/7/7/7	-
6	HXG	G	302	-	-	9/33/33/33	-

There are no bond length outliers.

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	301	HXG	OAY-CBA-CAR	3.66	119.39	111.48
6	F	301	HXG	OAY-CBA-CAR	3.64	119.36	111.48
6	J	301	HXG	OAY-CBA-CAR	3.56	119.19	111.48
6	K	304	HXG	OAY-CBA-CAR	2.86	117.66	111.48
6	J	302	HXG	OAY-CBA-CAR	2.83	117.60	111.48

There are no chirality outliers.

5 of 118 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	F	301	HXG	CAR-CBA-OAY-CBB

Continued on next page...

Continued from previous page...

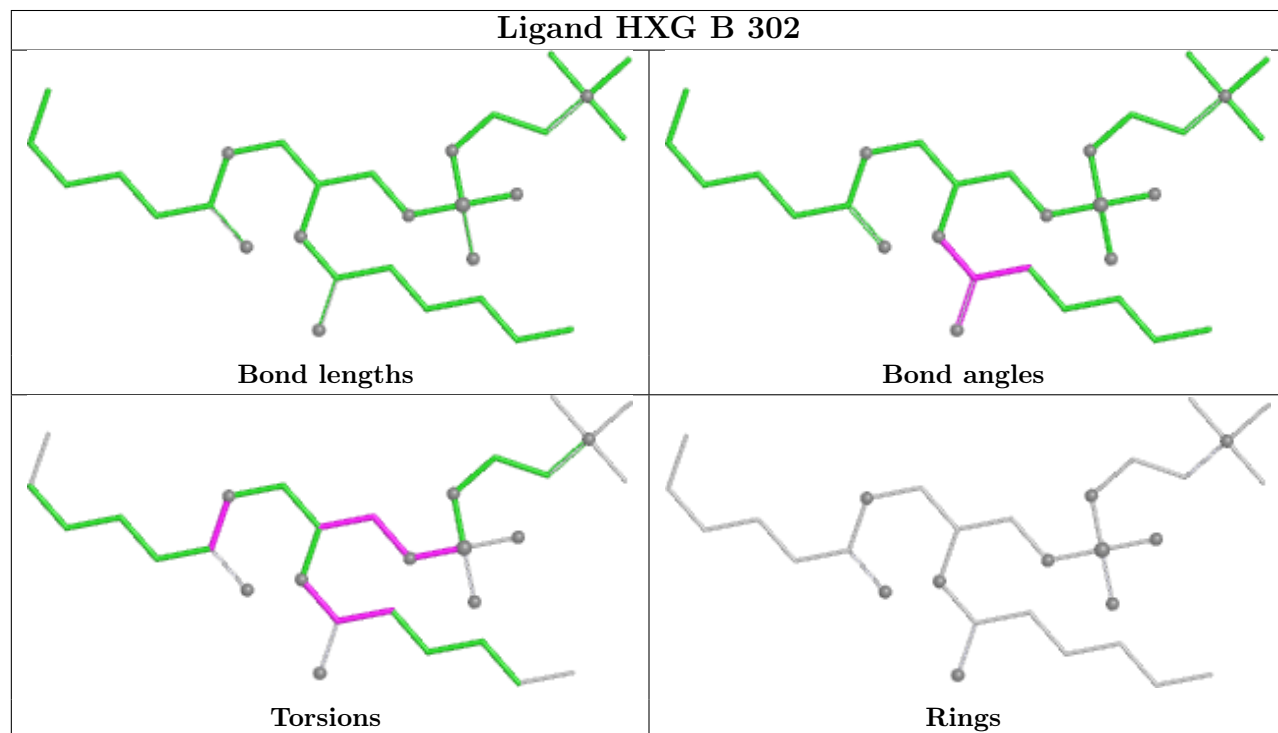
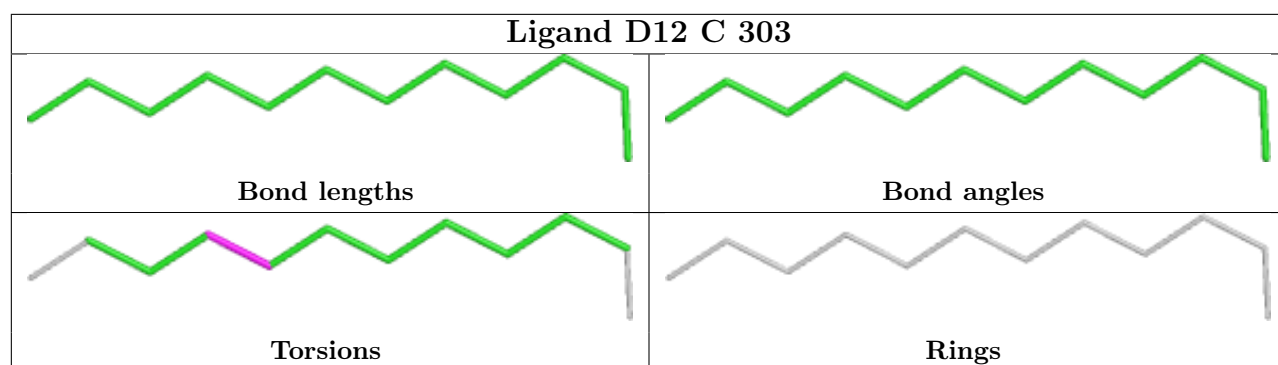
Mol	Chain	Res	Type	Atoms
6	F	301	HXG	CAU-OAX-PBD-OAH
6	F	301	HXG	CAU-OAX-PBD-OAW
6	B	301	HXG	CAR-CBA-OAY-CBB
6	B	301	HXG	CAU-OAX-PBD-OAH

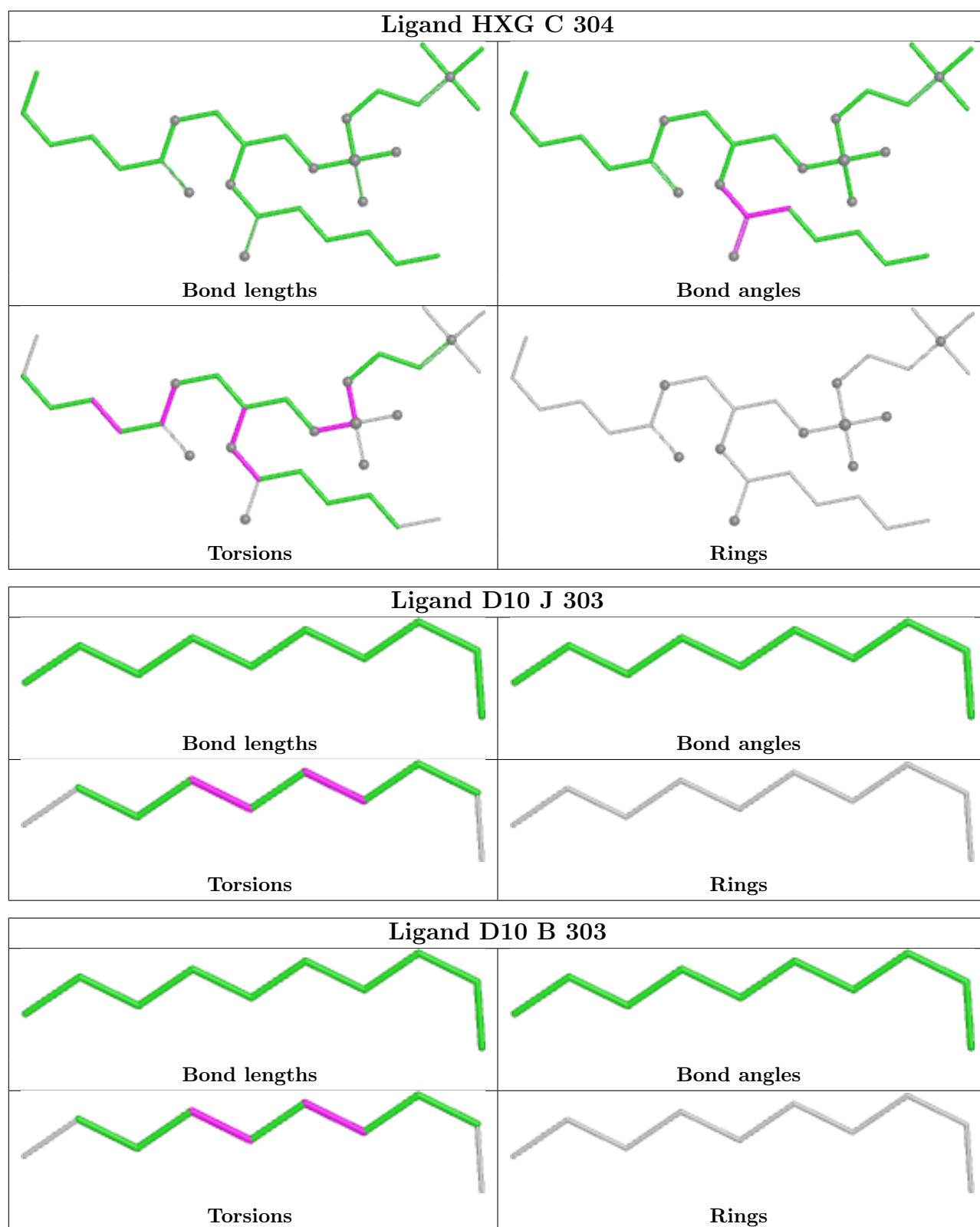
There are no ring outliers.

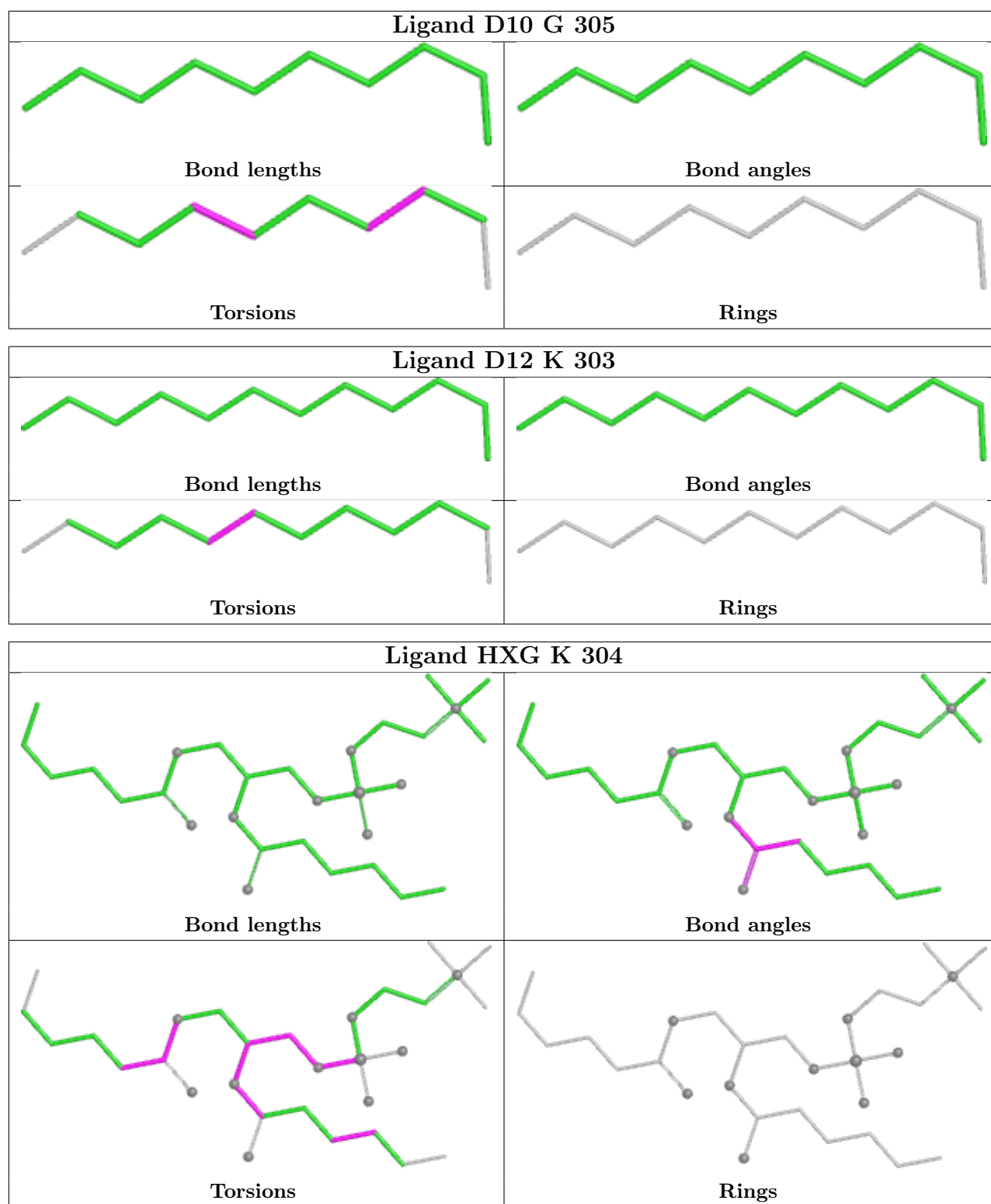
18 monomers are involved in 88 short contacts:

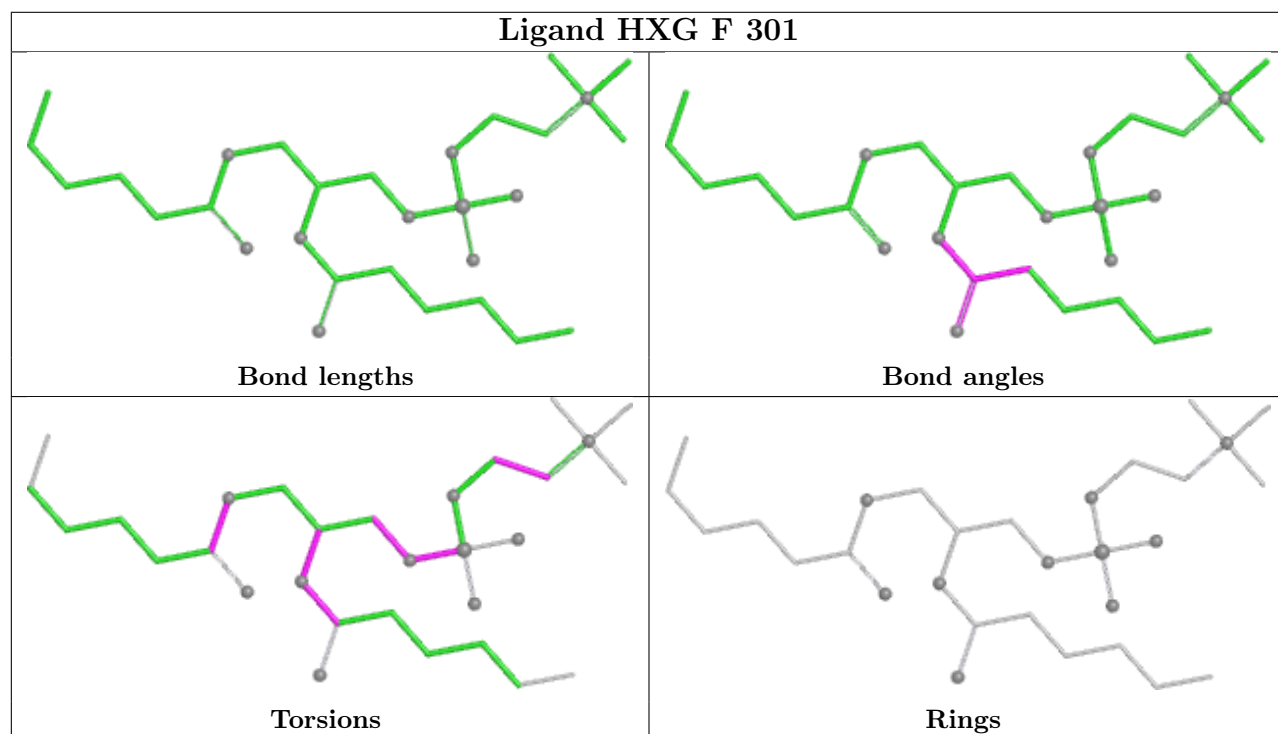
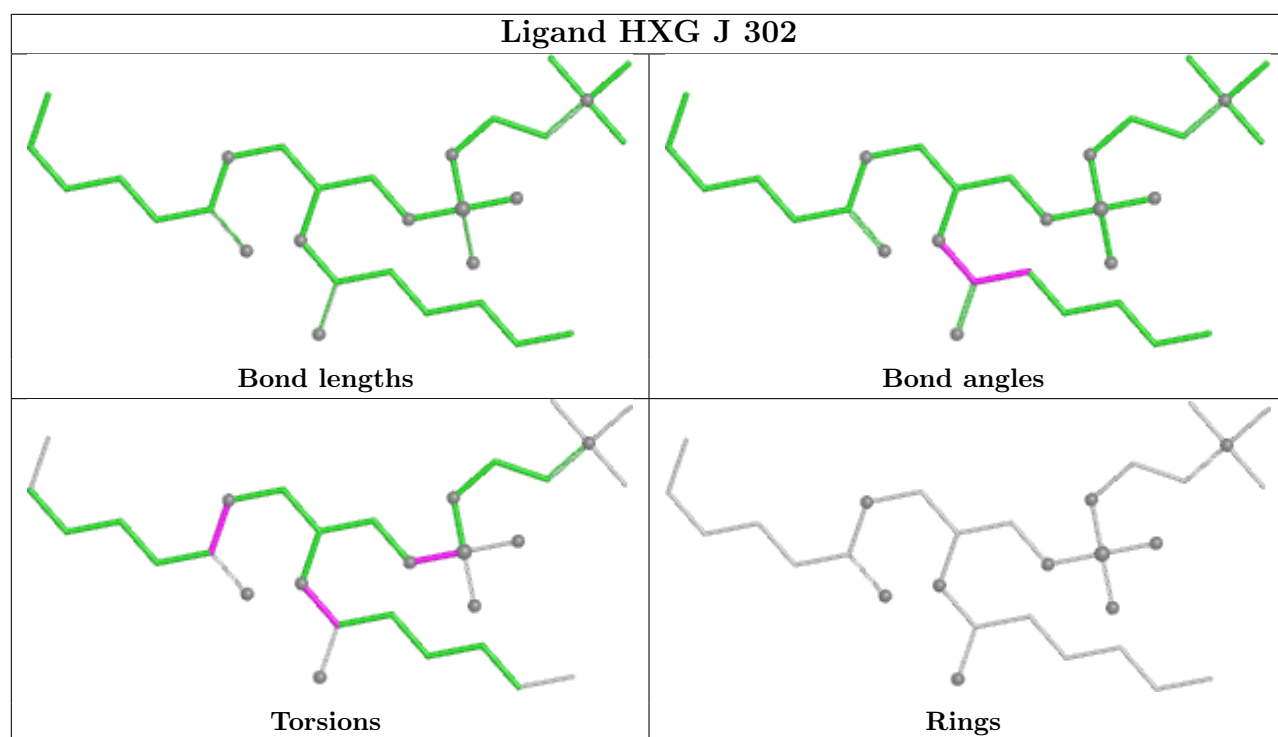
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	302	HXG	1	0
6	C	304	HXG	1	0
7	J	303	D10	10	0
7	B	303	D10	11	0
7	G	305	D10	9	0
8	K	303	D12	2	0
6	K	304	HXG	1	0
6	F	301	HXG	2	0
6	K	302	HXG	10	0
6	B	301	HXG	3	0
6	C	302	HXG	2	0
7	K	305	D10	10	0
7	F	303	D10	10	0
8	G	303	D12	2	0
6	G	304	HXG	2	0
6	J	301	HXG	3	0
7	C	305	D10	1	0
6	G	302	HXG	8	0

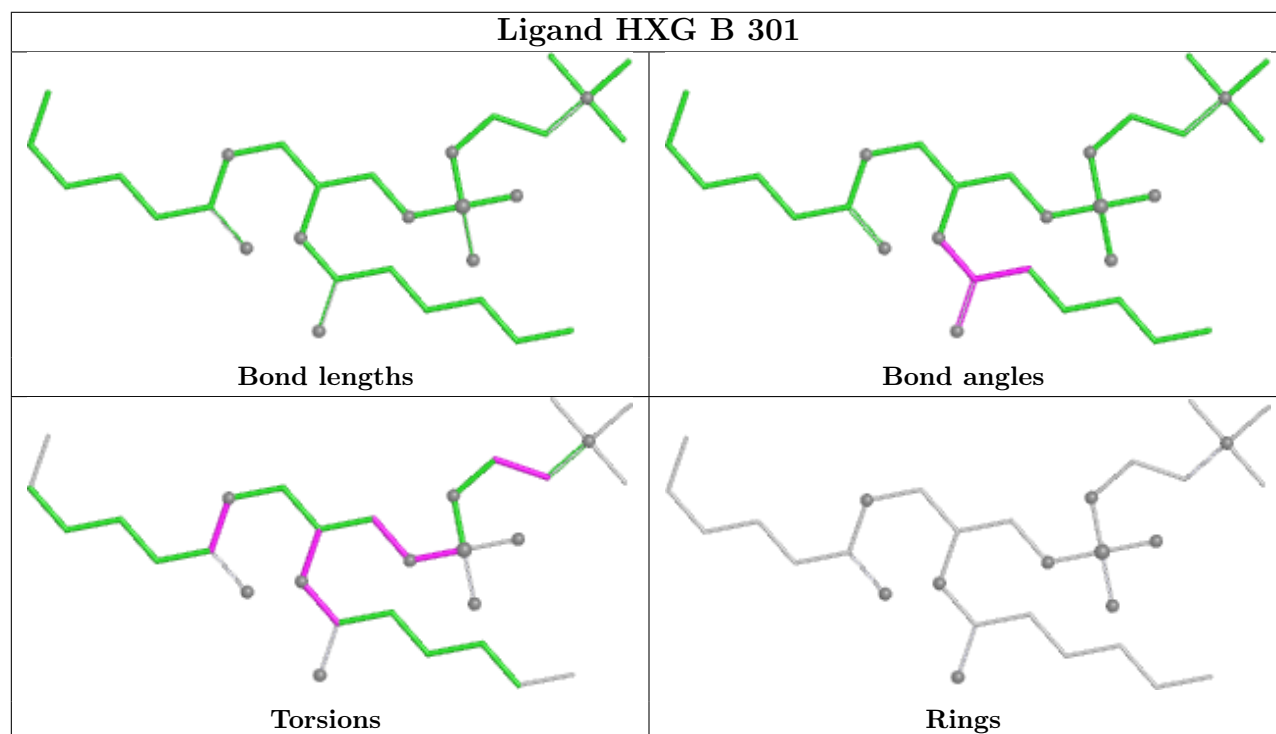
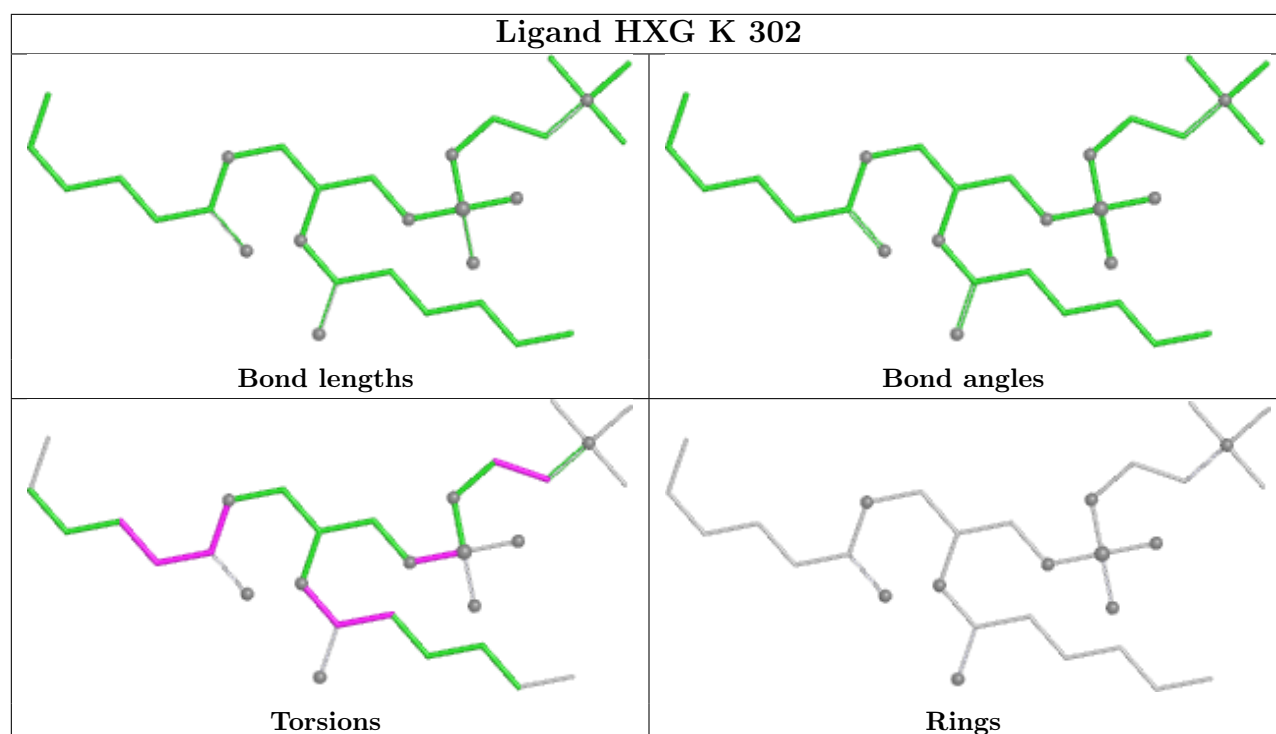
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

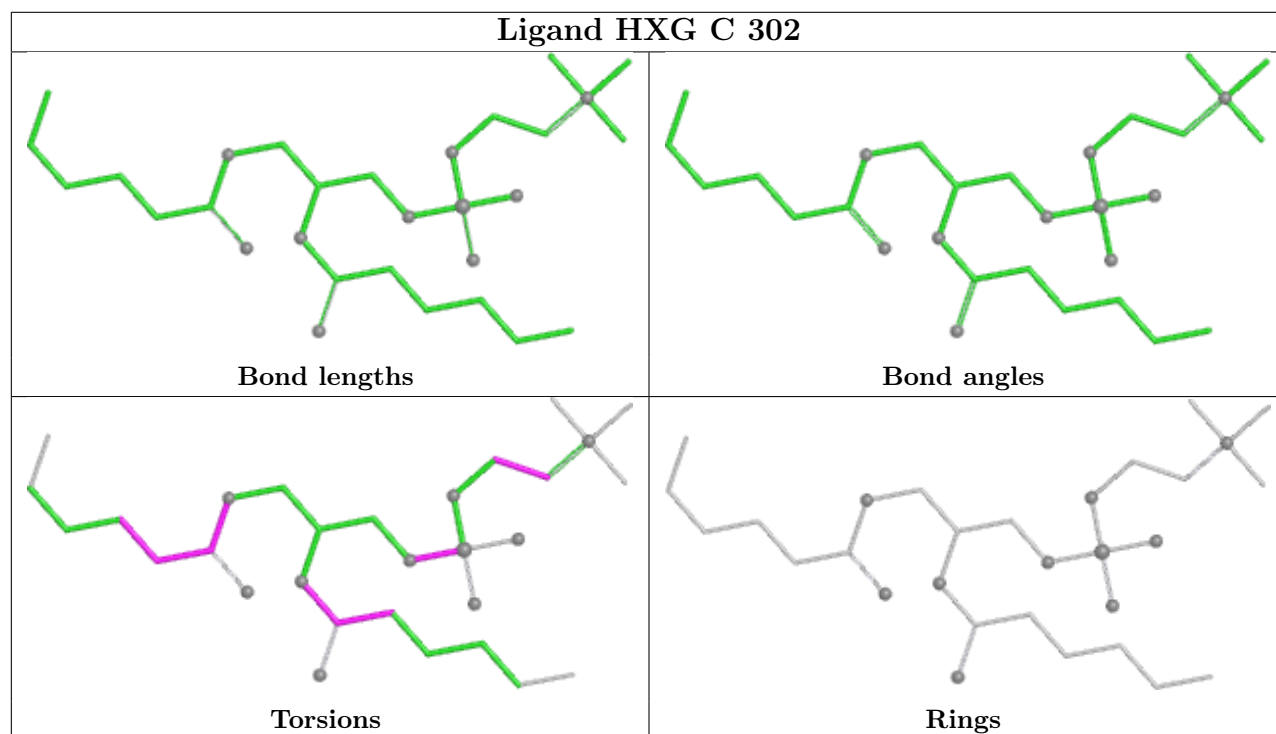
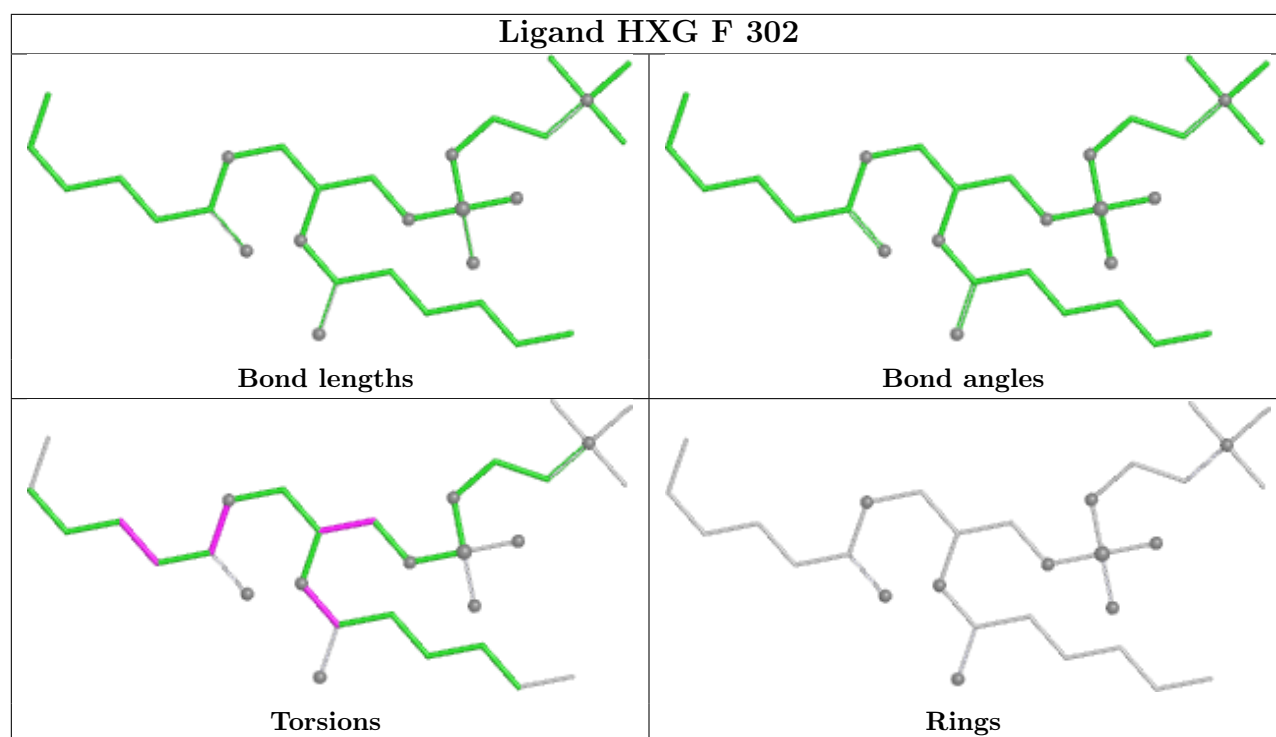


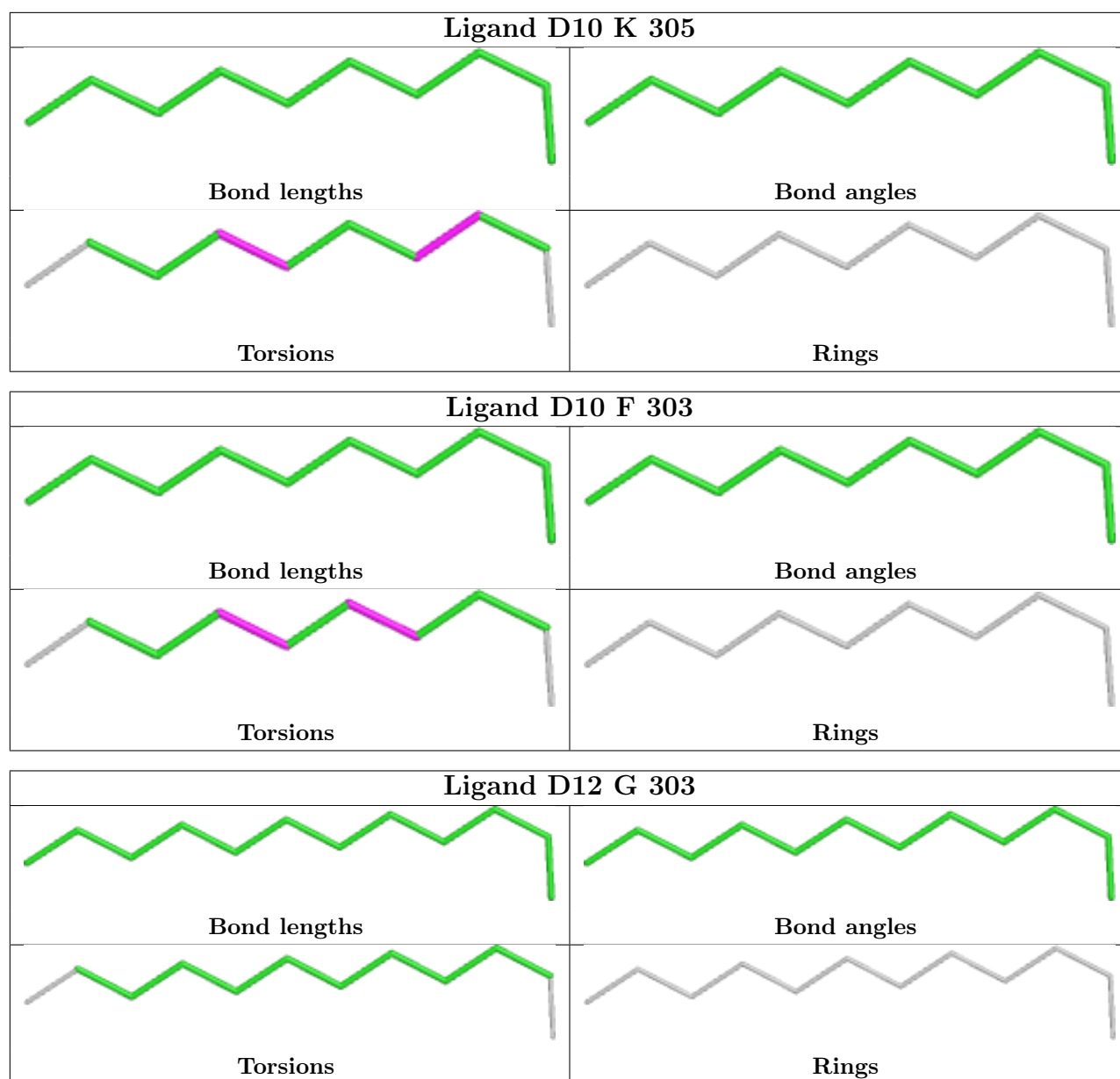


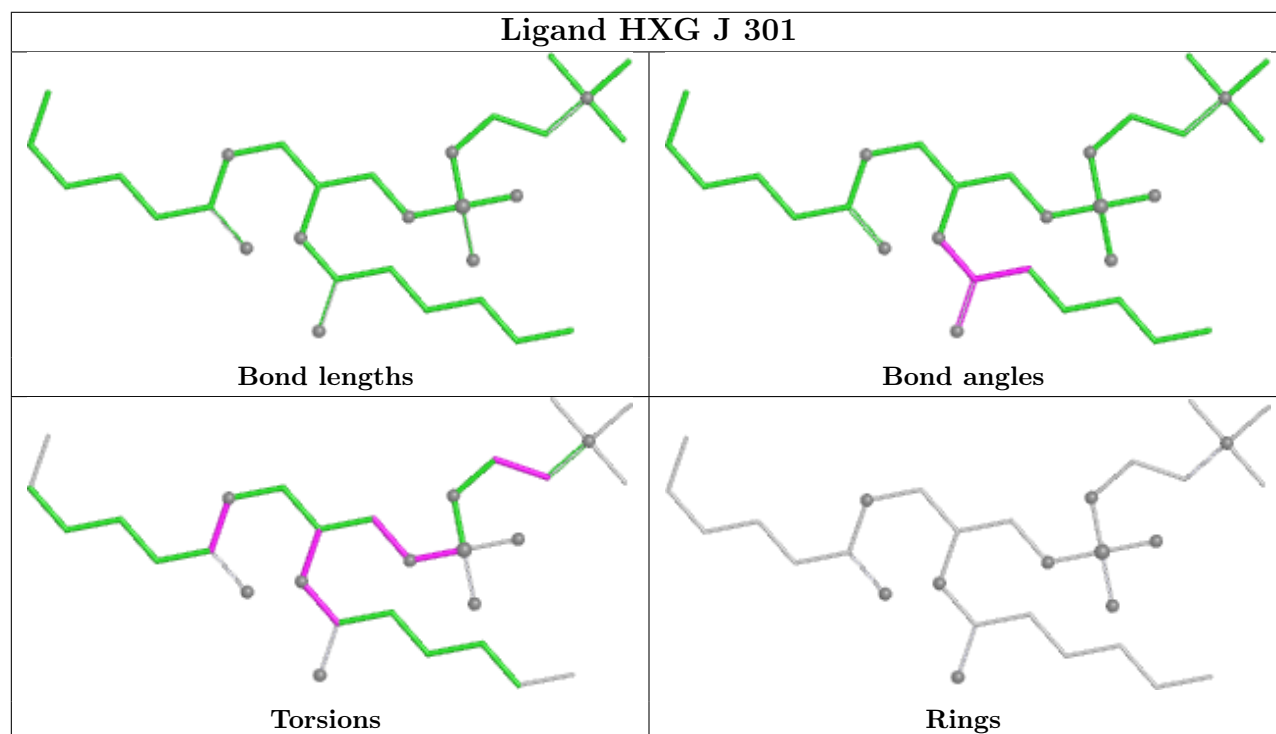
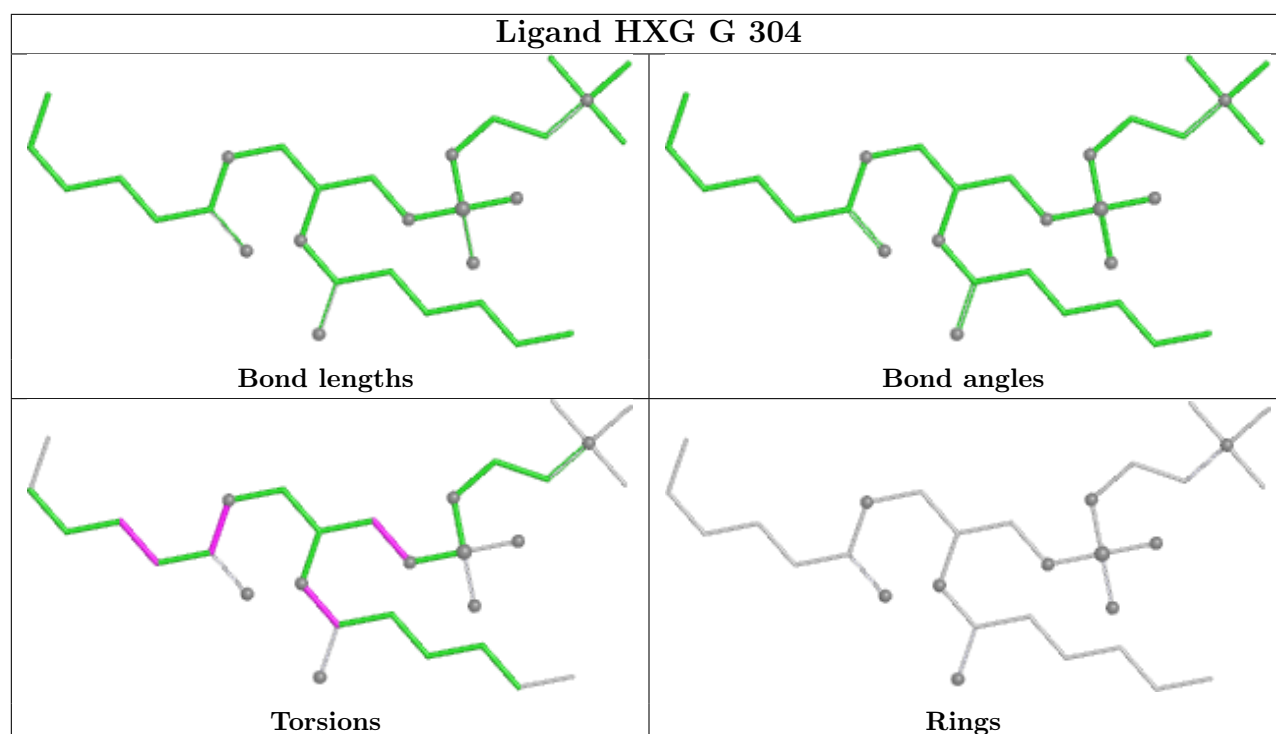


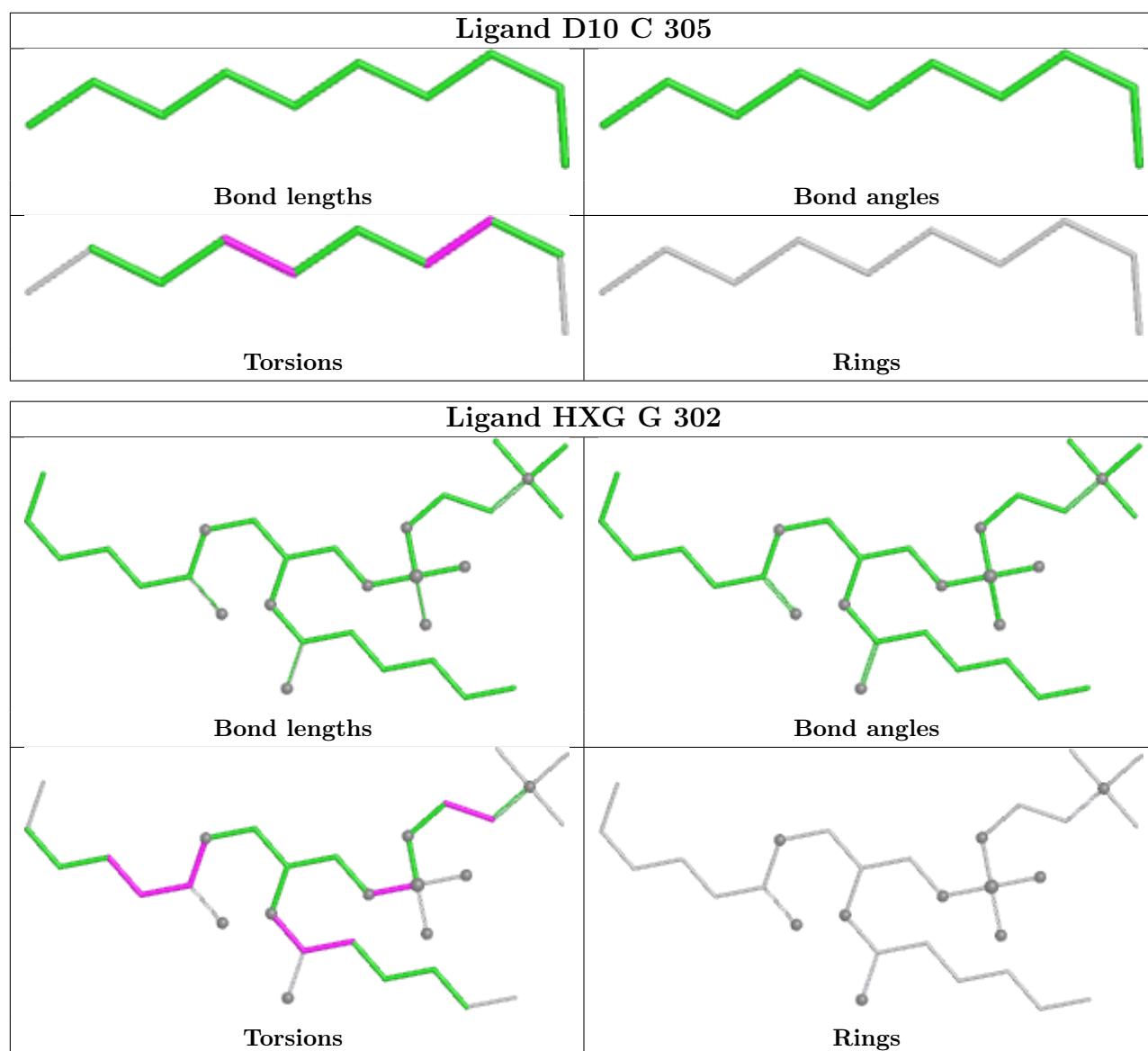












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

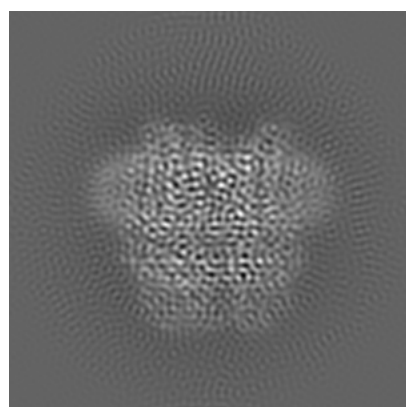
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-24831. These allow visual inspection of the internal detail of the map and identification of artifacts.

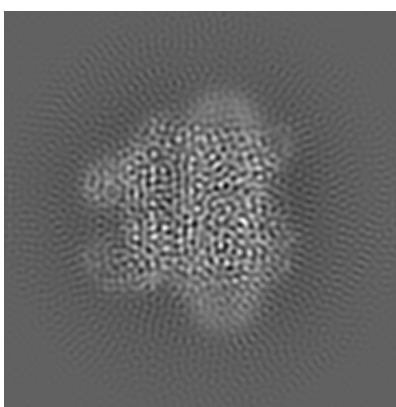
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

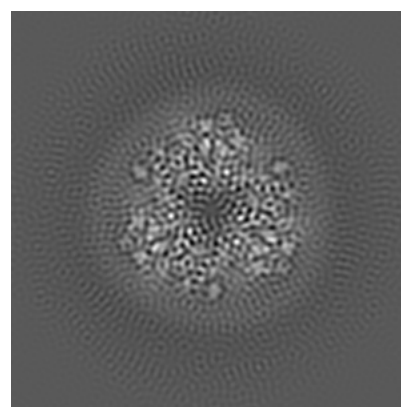
6.1.1 Primary map



X



Y

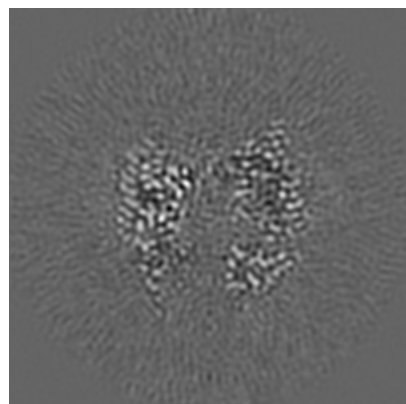


Z

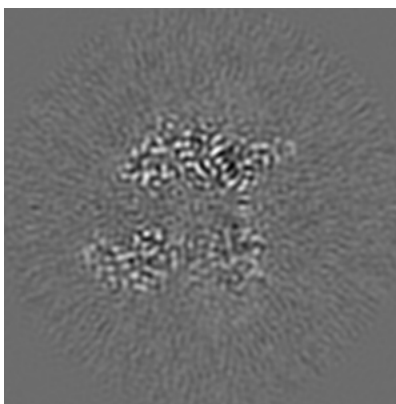
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

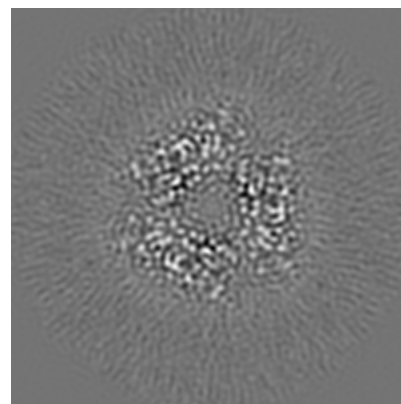
6.2.1 Primary map



X Index: 192



Y Index: 192

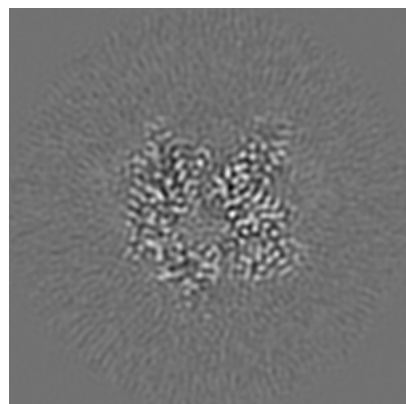


Z Index: 192

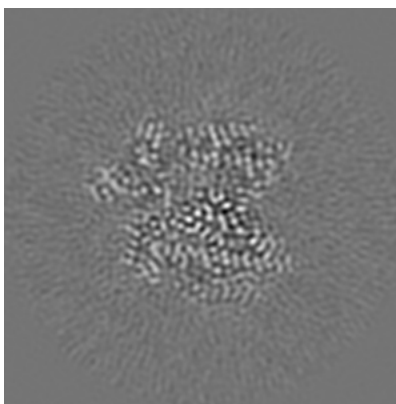
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

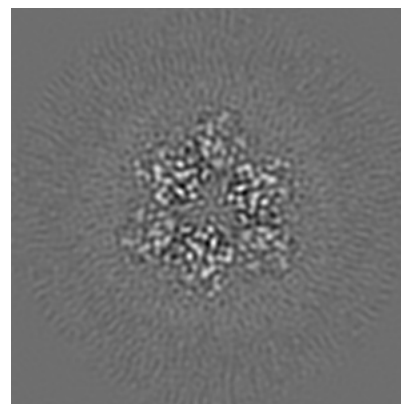
6.3.1 Primary map



X Index: 165



Y Index: 158

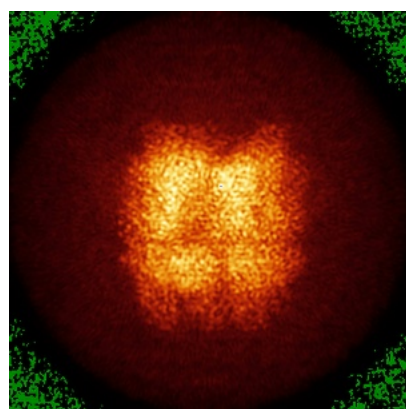


Z Index: 213

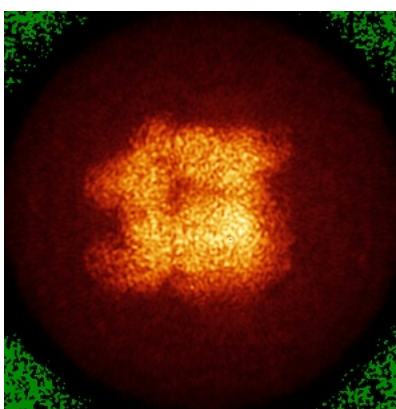
The images above show the largest variance slices of the map in three orthogonal directions.

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

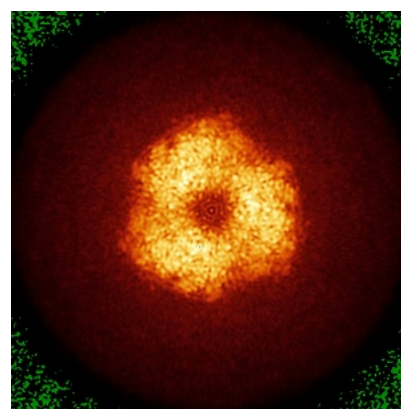
6.4.1 Primary map



X



Y



Z

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

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0758. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

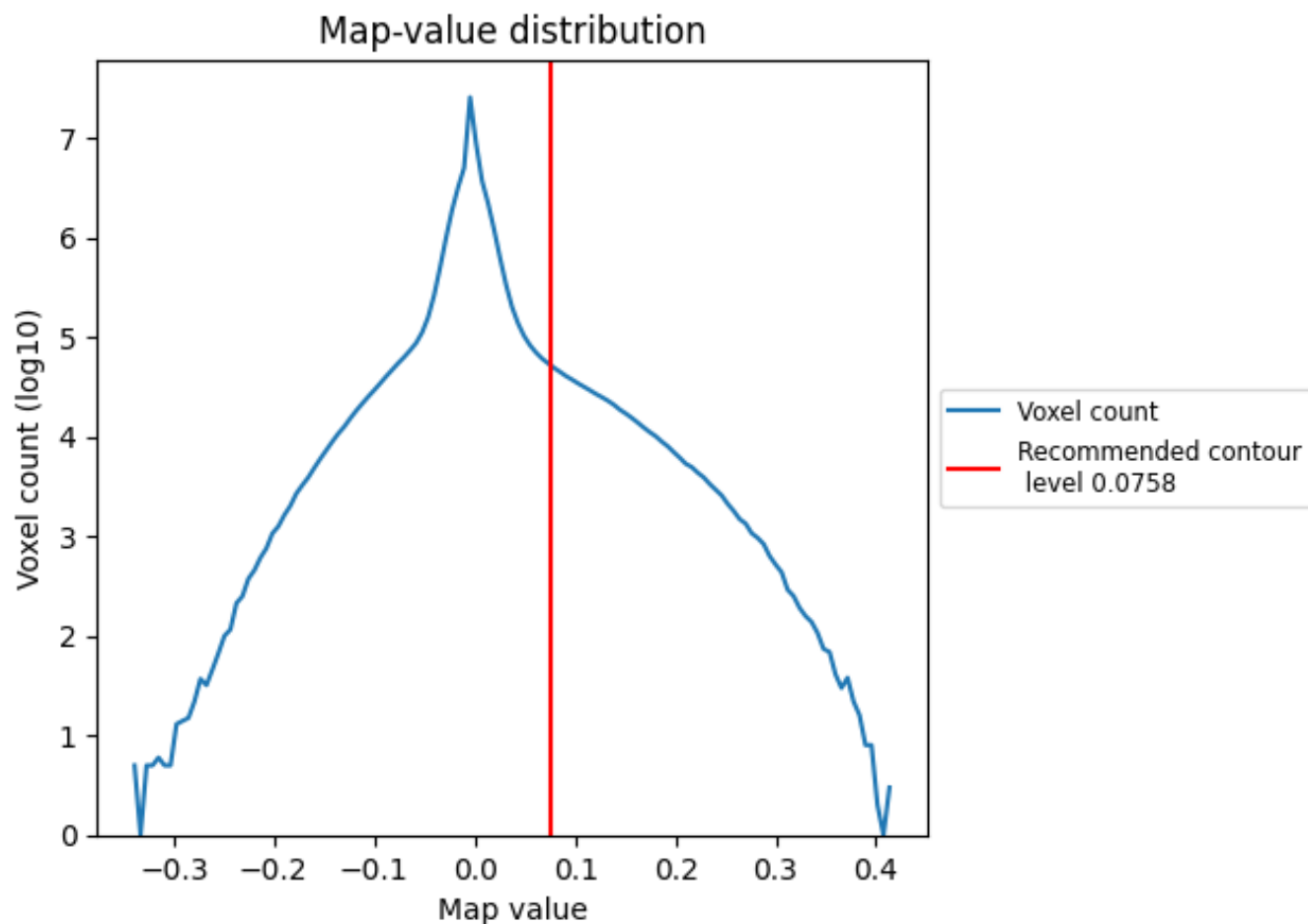
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

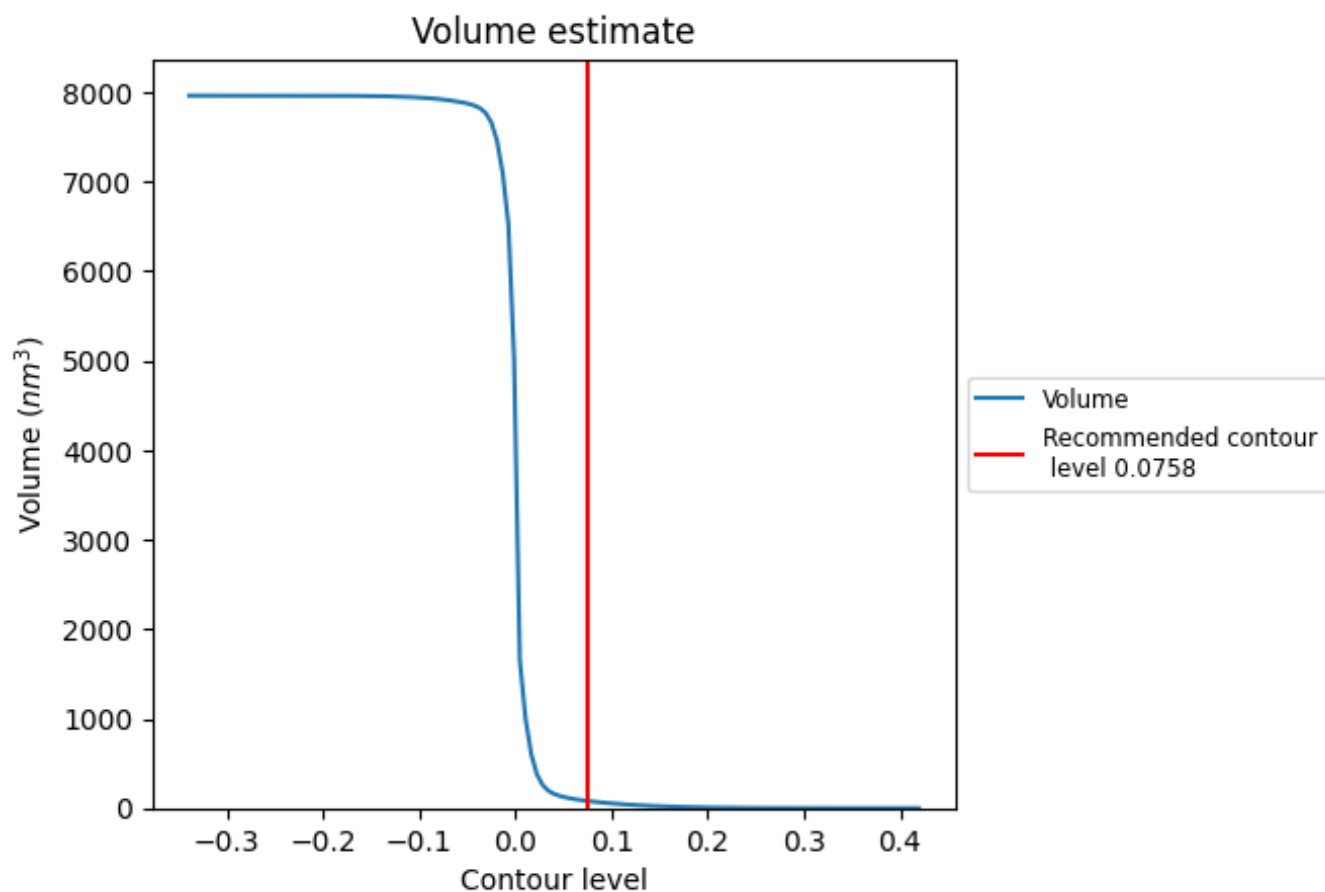
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

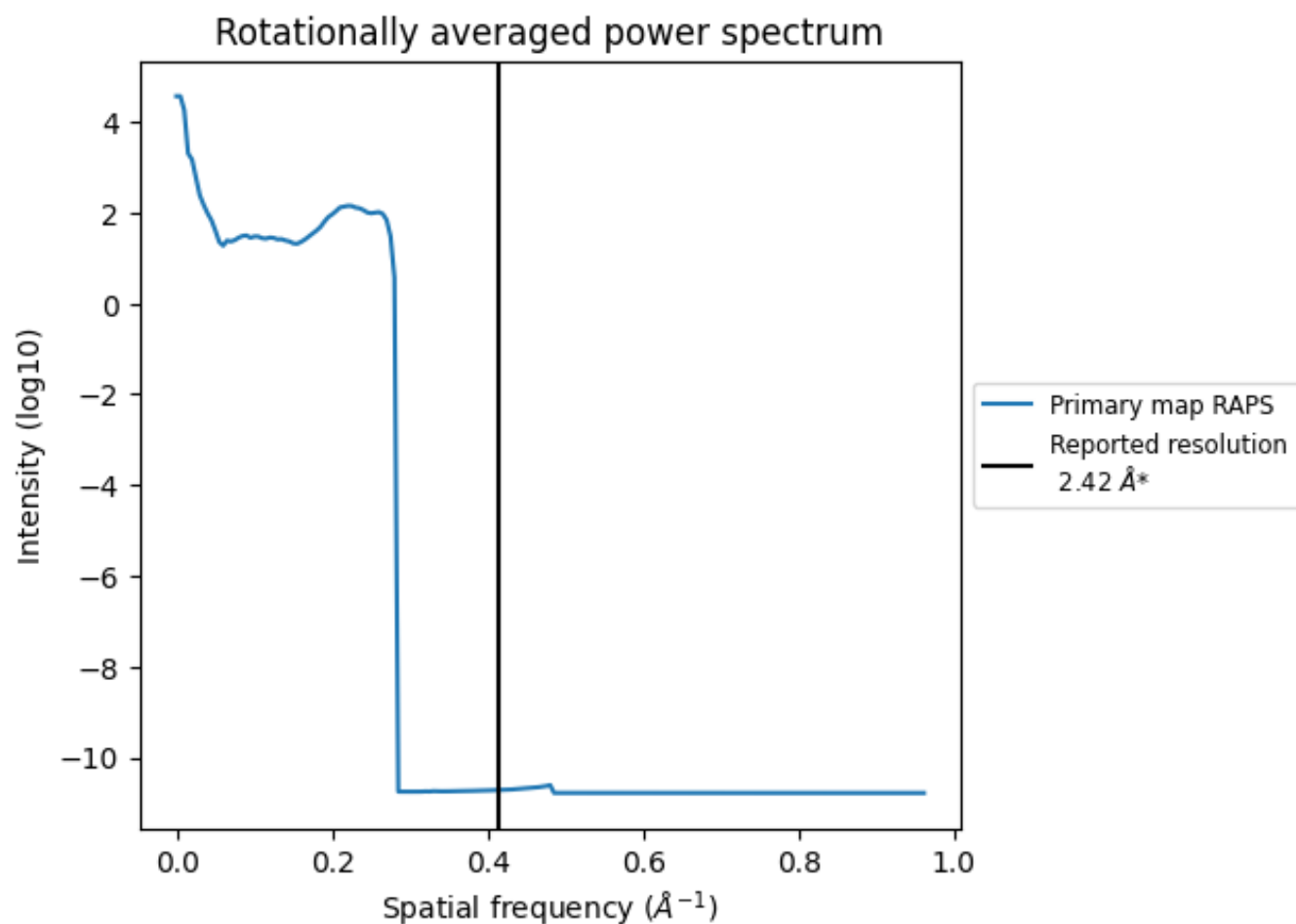
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 79 nm³; this corresponds to an approximate mass of 71 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 ⓘ

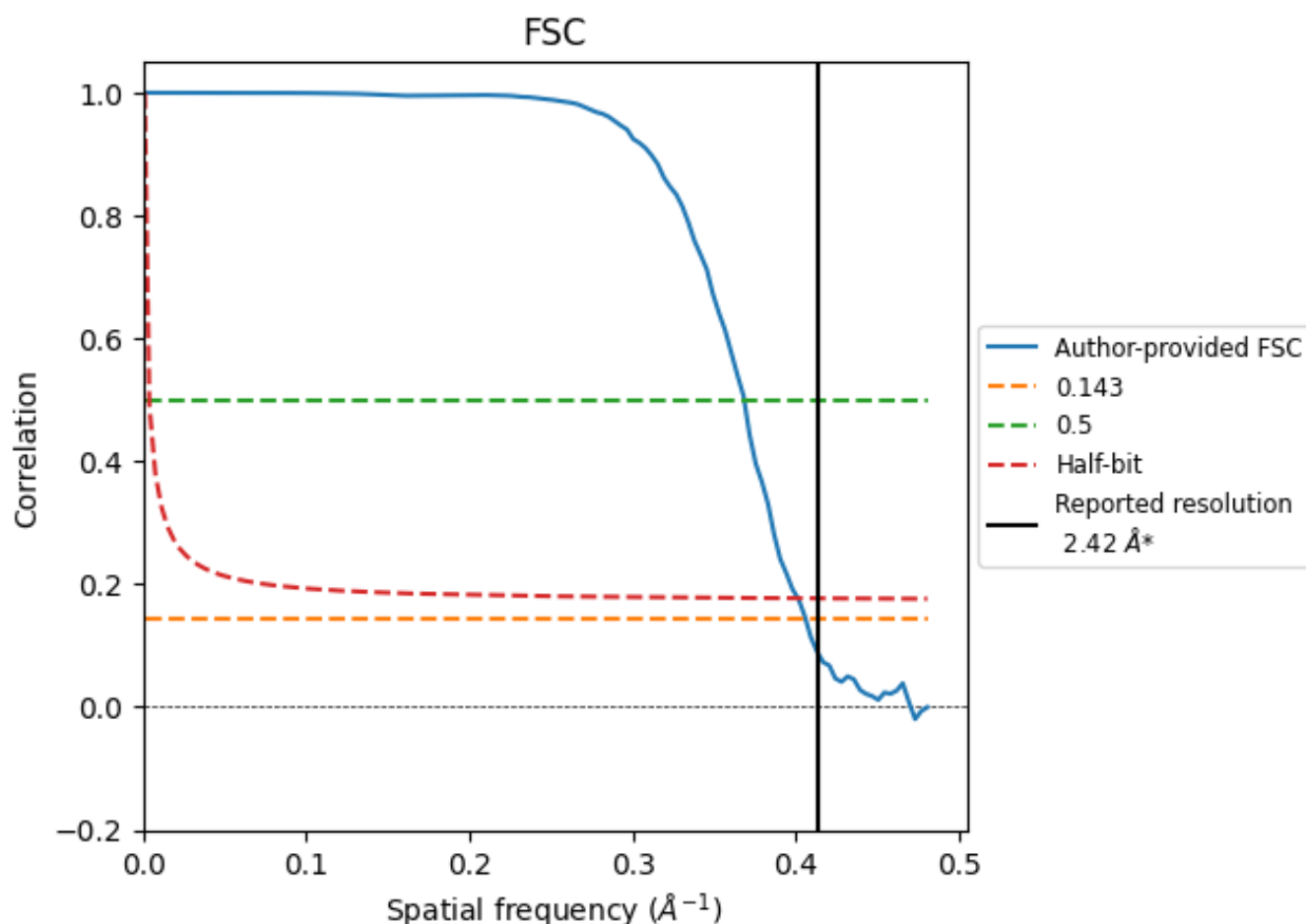


*Reported resolution corresponds to spatial frequency of 0.413 Å⁻¹

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



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

8.2 Resolution estimates [i](#)

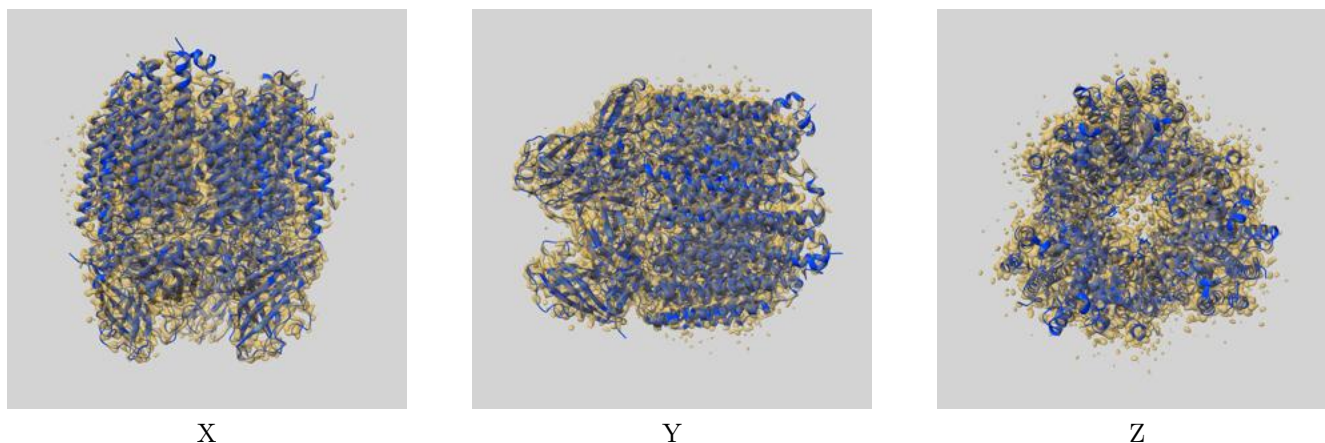
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.42	-	-
Author-provided FSC curve	2.46	2.71	2.49
Unmasked-calculated*	-	-	-

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

9 Map-model fit [i](#)

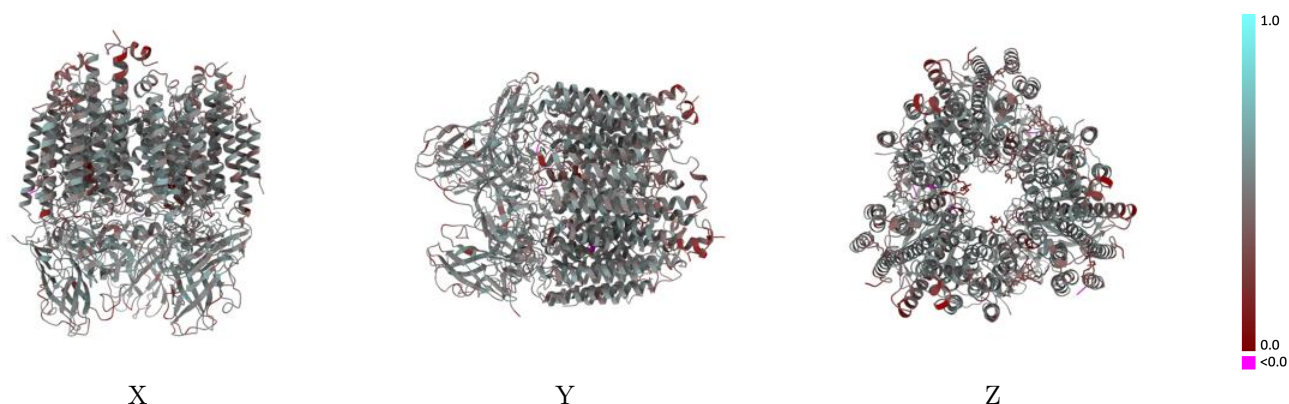
This section contains information regarding the fit between EMDB map EMD-24831 and PDB model 7S4M. Per-residue inclusion information can be found in section [3](#) on page [9](#).

9.1 Map-model overlay [i](#)



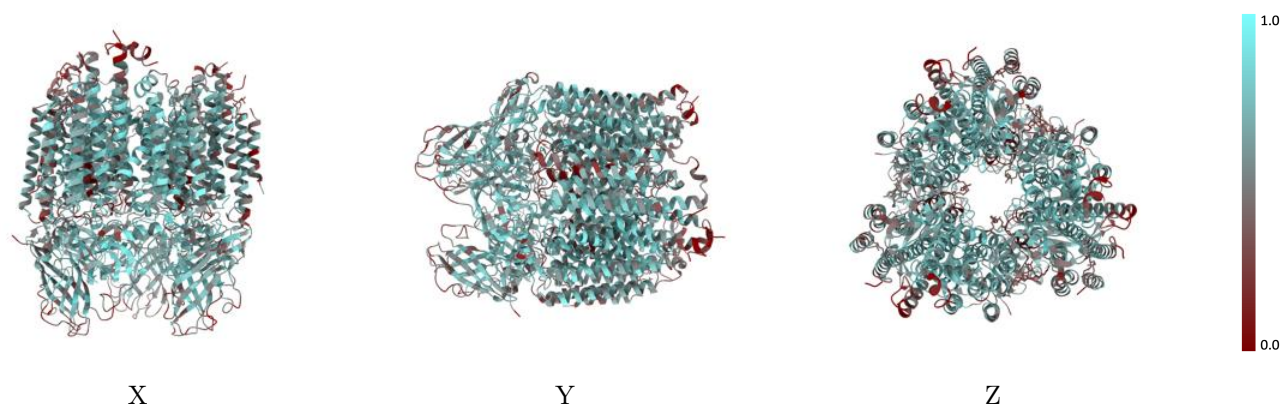
The images above show the 3D surface view of the map at the recommended contour level 0.0758 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



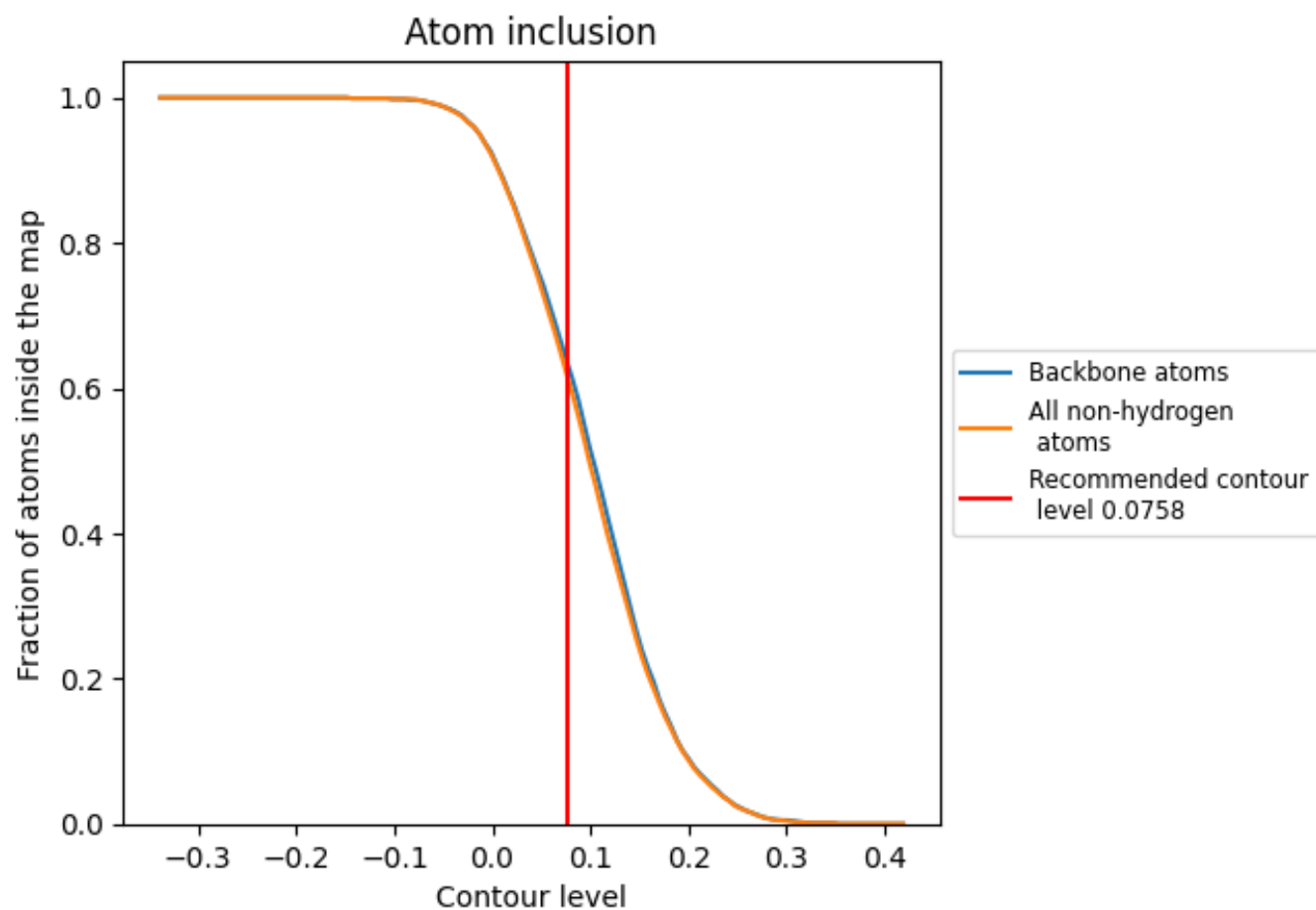
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0758).

9.4 Atom inclusion [i](#)



At the recommended contour level, 64% of all backbone atoms, 62% 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 (0.0758) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6200	0.4610
A	0.6200	0.4750
B	0.7130	0.4790
C	0.5570	0.4310
D	0.5260	0.4600
E	0.6150	0.4700
F	0.7070	0.4740
G	0.5440	0.4260
H	0.4740	0.4510
I	0.6180	0.4730
J	0.7140	0.4780
K	0.5490	0.4280
N	0.4630	0.4100

1.0

0.0

<0.0