



Full wwPDB EM Validation Report ⓘ

Nov 13, 2022 – 05:16 PM EST

PDB ID : 7JY6
EMDB ID : EMD-22522
Title : Analysis of a strand exchange reaction with a mini filament of 9-RecA, oligo(dT)27 primary ssDNA, non-homologous 120 bp dsDNA and ATPgammaS
Authors : Pavletich, N.P.
Deposited on : 2020-08-29
Resolution : 2.50 Å (reported)
Based on initial model : 3CMW

This is a Full wwPDB EM Validation 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

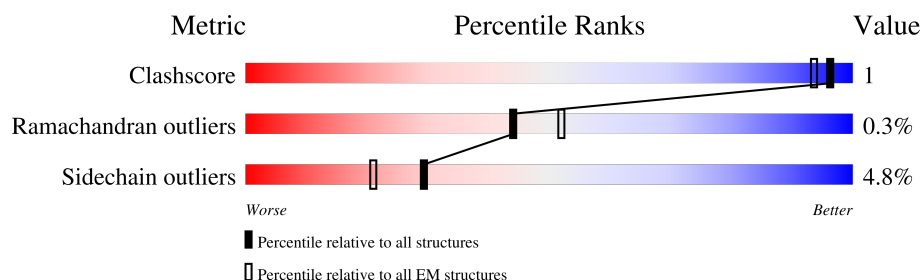
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.50 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
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	334	<div> <div>60%</div> <div>96%</div> <div>.</div> </div>
1	B	334	<div> <div>12%</div> <div>95%</div> <div>.</div> </div>
1	C	334	<div> <div>5%</div> <div>95%</div> <div>5%</div> </div>
1	D	334	<div> <div>90%</div> <div>9%</div> <div>.</div> </div>
1	E	334	<div> <div>92%</div> <div>6%</div> <div>.</div> </div>
1	F	334	<div> <div>5%</div> <div>93%</div> <div>6%</div> <div>.</div> </div>
1	G	334	<div> <div>13%</div> <div>94%</div> <div>6%</div> </div>
1	H	334	<div> <div>34%</div> <div>96%</div> <div>.</div> </div>

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	I	334	<div><div></div><div>89%</div><div></div><div>83%</div><div>7%</div><div>10%</div></div>
2	S	27	<div><div></div><div>26%</div><div></div><div>78%</div><div>19%</div><div></div></div>
3	U	45	<div><div></div><div>98%</div><div></div><div>100%</div><div></div><div></div></div>

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 47966 atoms, of which 23916 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 Protein RecA.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	333	Total	C	H	N	O	S	0	0
			5085	1575	2577	435	486	12		
1	B	333	Total	C	H	N	O	S	0	0
			5085	1575	2577	435	486	12		
1	C	333	Total	C	H	N	O	S	0	0
			5085	1575	2577	435	486	12		
1	D	333	Total	C	H	N	O	S	0	0
			5085	1575	2577	435	486	12		
1	E	333	Total	C	H	N	O	S	0	0
			5085	1575	2577	435	486	12		
1	F	333	Total	C	H	N	O	S	0	0
			5085	1575	2577	435	486	12		
1	G	333	Total	C	H	N	O	S	0	0
			5085	1575	2577	435	486	12		
1	H	333	Total	C	H	N	O	S	0	0
			5085	1575	2577	435	486	12		
1	I	300	Total	C	H	N	O	S	0	0
			4575	1421	2317	388	438	11		

- Molecule 2 is a DNA chain called DNA (27-MER).

Mol	Chain	Residues	Atoms						AltConf	Trace
2	S	27	Total	C	H	N	O	P	0	0
			865	270	325	54	189	27		

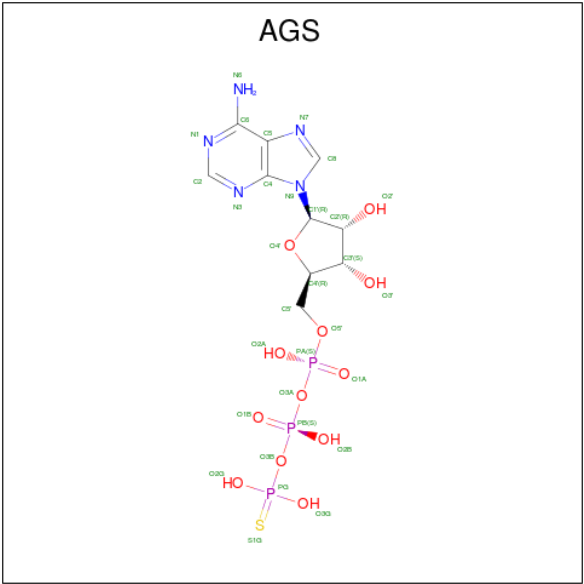
- Molecule 3 is a DNA chain called DNA (45-MER).

Mol	Chain	Residues	Atoms						AltConf	Trace
3	U	45	Total	C	H	N	O	P	0	0
			1441	450	541	90	315	45		

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

- Molecule 5 is PHOSPHOTHIOPHOSPHORIC ACID-ADENYLATE ESTER (three-letter code: AGS) (formula: C₁₀H₁₆N₅O₁₂P₃S).



Mol	Chain	Residues	Atoms							AltConf
5	A	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	
5	B	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	

Continued on next page...

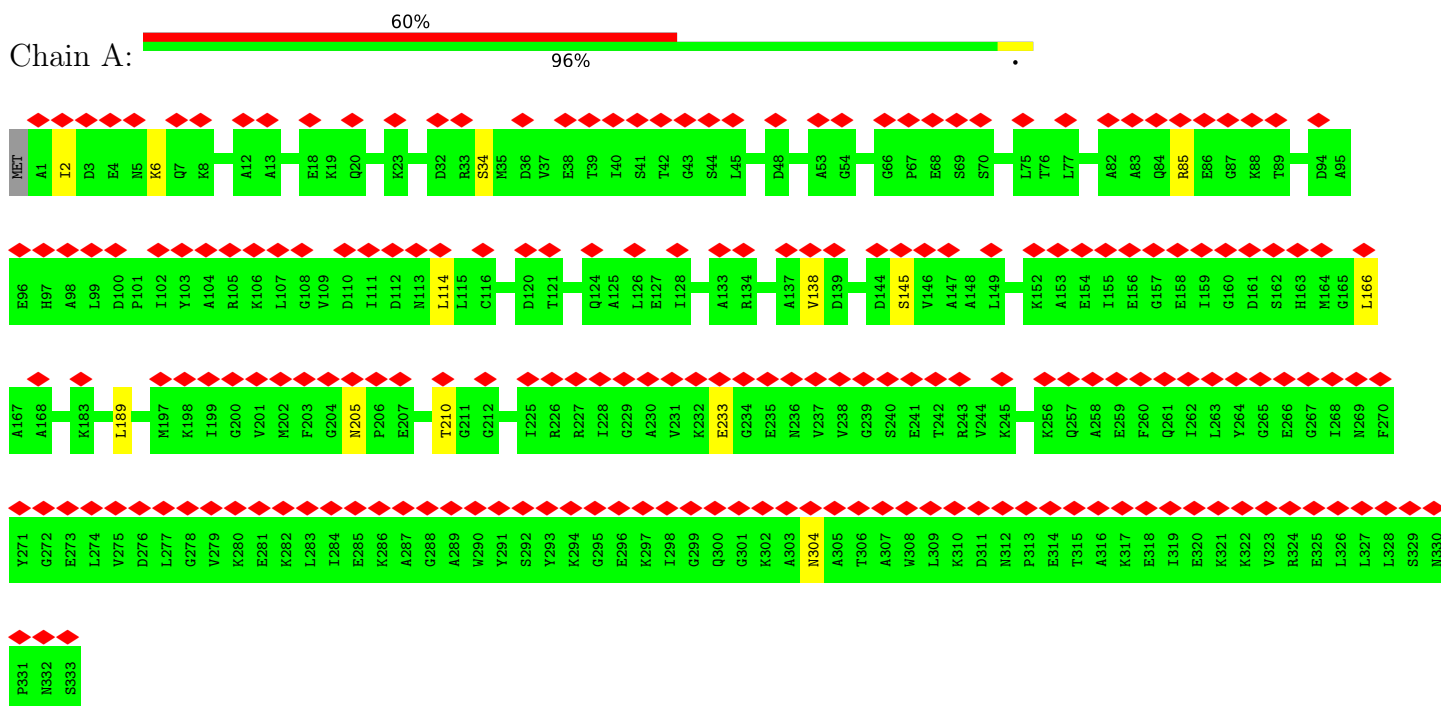
Continued from previous page...

Mol	Chain	Residues	Atoms							AltConf
5	C	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	
5	D	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	
5	E	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	
5	F	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	
5	G	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	
5	H	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	
5	I	1	Total	C	H	N	O	P	S	0
			44	10	13	5	12	3	1	

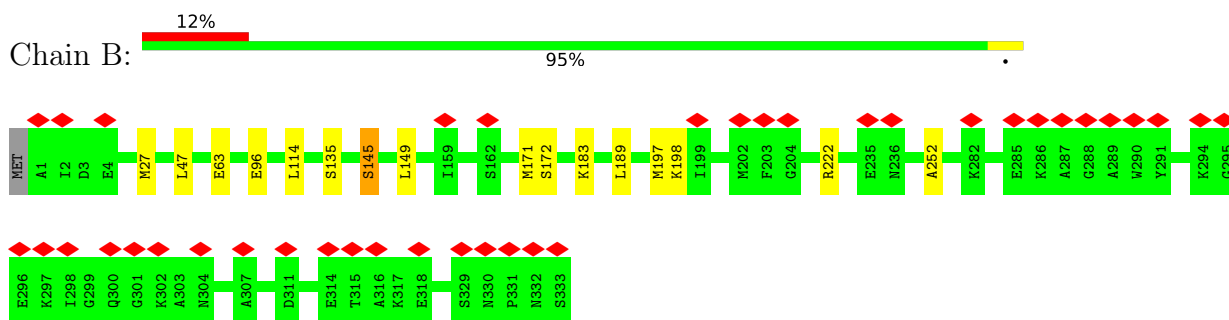
3 Residue-property plots

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: Protein RecA

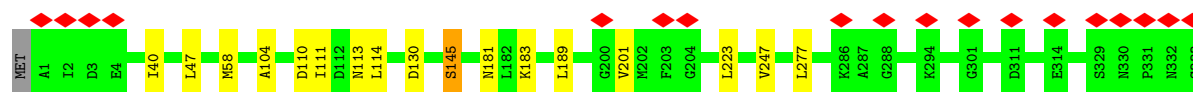


• Molecule 1: Protein RecA

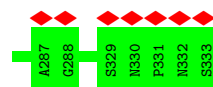
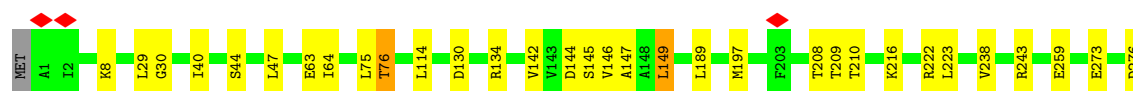


• Molecule 1: Protein RecA





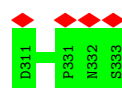
- Molecule 1: Protein RecA



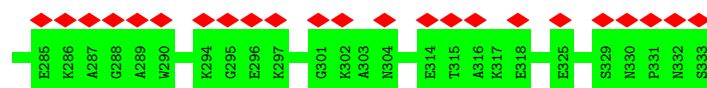
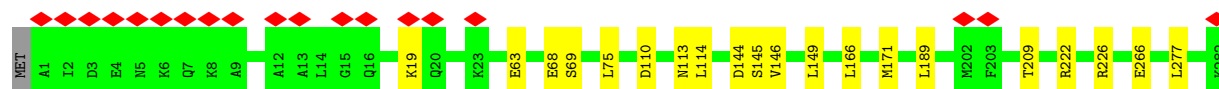
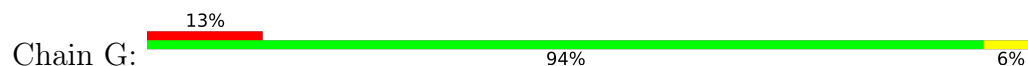
- Molecule 1: Protein RecA



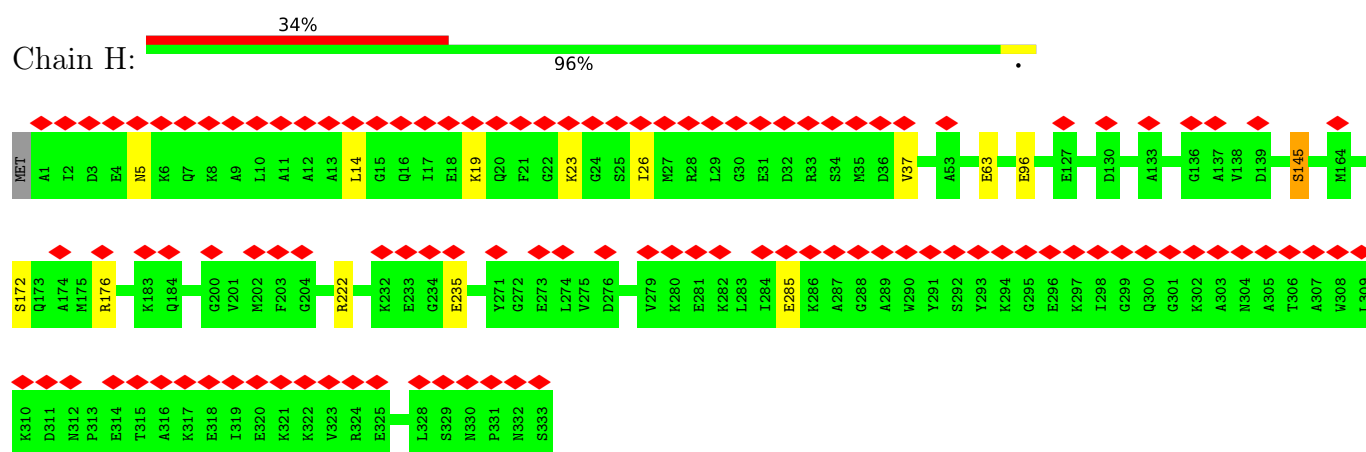
- Molecule 1: Protein RecA



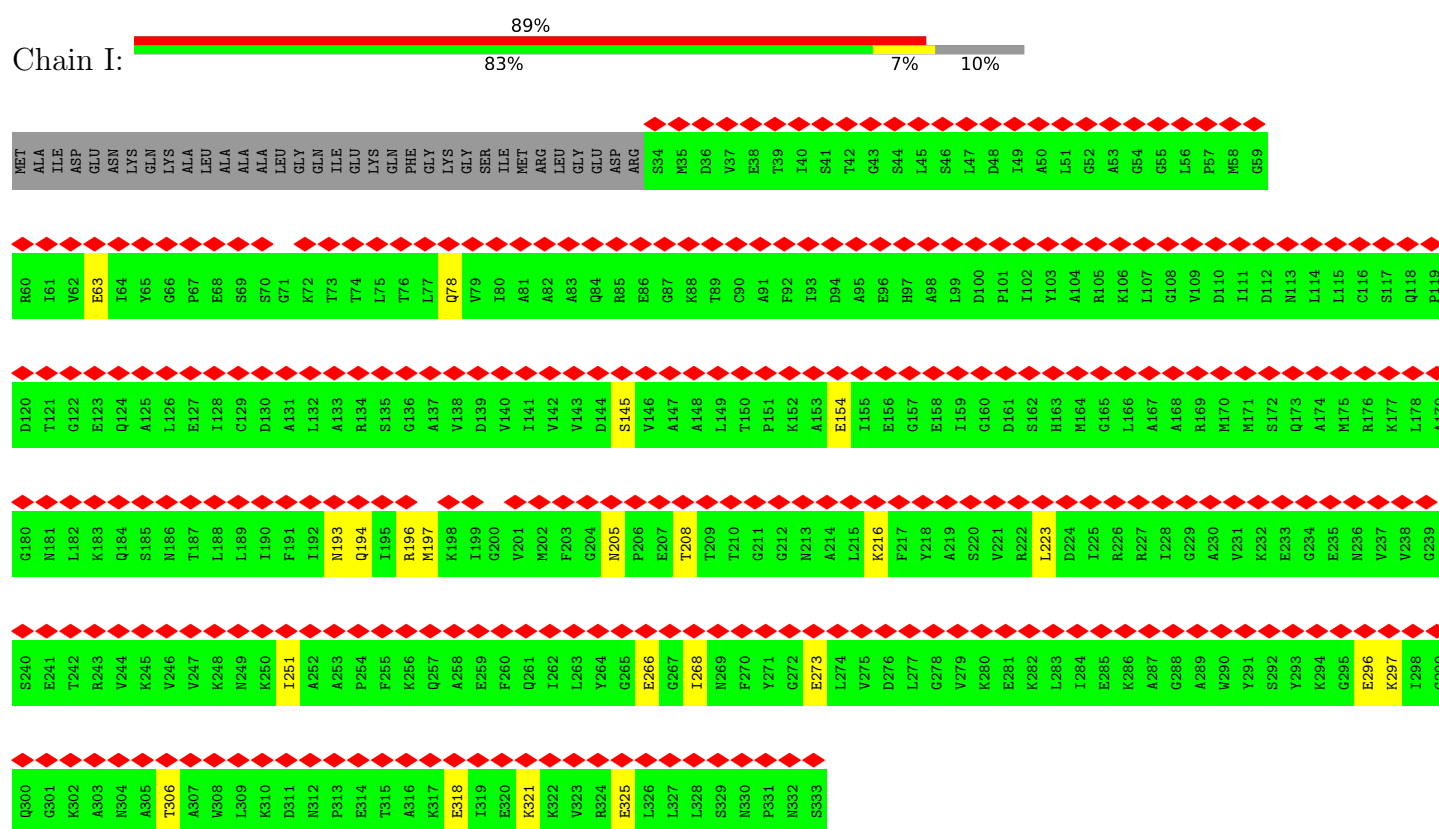
- Molecule 1: Protein RecA



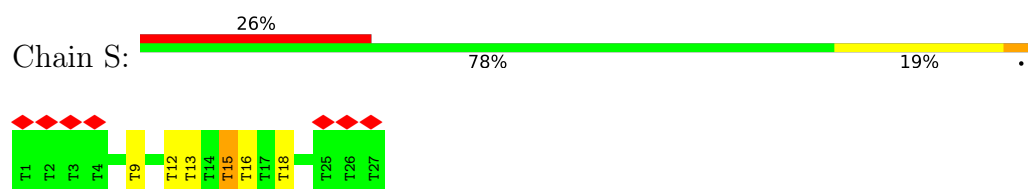
- Molecule 1: Protein RecA



• Molecule 1: Protein RecA



• Molecule 2: DNA (27-MER)



• Molecule 3: DNA (45-MER)



T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23	T24	T25	T26	T27	T28	T29	T30	T31	T32	T33	T34	T35	T36	T37	T38	T39	T40	T41	T42	T43	T44	T45
----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	1592037	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 ($e^-/\text{\AA}^2$)	54	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	0.585	Depositor
Minimum map value	-0.288	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.009	Depositor
Recommended contour level	0.025	Depositor
Map size (\AA)	275.968, 275.968, 275.968	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.078, 1.078, 1.078	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: AGS, MG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z > 5$	RMSZ	# $ Z > 5$
1	A	0.72	0/2537	0.80	0/3413
1	B	0.68	0/2537	0.81	0/3413
1	C	0.68	0/2537	0.84	0/3413
1	D	0.70	0/2537	0.87	0/3413
1	E	0.70	0/2537	0.90	2/3413 (0.1%)
1	F	0.69	0/2537	0.85	1/3413 (0.0%)
1	G	0.70	1/2537 (0.0%)	0.85	1/3413 (0.0%)
1	H	0.70	0/2537	0.81	0/3413
1	I	0.73	0/2286	0.81	0/3081
2	S	0.77	2/593 (0.3%)	1.11	7/914 (0.8%)
3	U	0.26	0/989	0.79	0/1526
All	All	0.69	3/24164 (0.0%)	0.85	11/32825 (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	B	0	1
1	D	0	1
1	E	0	1
1	F	0	1
All	All	0	4

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	S	12	DT	O3'-P	-7.73	1.51	1.61
1	G	68	GLU	CD-OE1	5.27	1.31	1.25
2	S	15	DT	O3'-P	-5.26	1.54	1.61

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	S	9	DT	C1'-O4'-C4'	-6.98	103.12	110.10
1	G	144	ASP	C-N-CA	6.44	137.80	121.70
2	S	16	DT	O5'-P-OP1	6.29	118.25	110.70
2	S	12	DT	C1'-O4'-C4'	-6.25	103.85	110.10
2	S	13	DT	O5'-P-OP1	5.71	117.55	110.70
2	S	18	DT	C1'-O4'-C4'	-5.62	104.48	110.10
1	E	144	ASP	C-N-CA	5.38	135.15	121.70
1	E	222	ARG	NE-CZ-NH2	-5.22	117.69	120.30
1	F	144	ASP	C-N-CA	5.18	134.65	121.70
2	S	12	DT	O5'-P-OP2	-5.12	101.09	105.70
2	S	12	DT	O5'-P-OP1	5.04	116.75	110.70

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	145	SER	Peptide
1	D	144	ASP	Peptide
1	E	144	ASP	Peptide
1	F	144	ASP	Peptide

5.2 Too-close contacts [i](#)

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	2508	2577	2576	0	0
1	B	2508	2577	2576	2	0
1	C	2508	2577	2576	5	0
1	D	2508	2577	2576	11	0
1	E	2508	2577	2576	10	0
1	F	2508	2577	2576	7	0
1	G	2508	2577	2576	3	0
1	H	2508	2577	2576	4	0
1	I	2258	2317	2313	2	0
2	S	540	325	325	1	0
3	U	900	541	541	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
4	G	1	0	0	0	0
4	H	1	0	0	0	0
4	I	1	0	0	0	0
5	A	31	13	12	0	0
5	B	31	13	12	0	0
5	C	31	13	12	0	0
5	D	31	13	12	0	0
5	E	31	13	12	0	0
5	F	31	13	12	0	0
5	G	31	13	12	0	0
5	H	31	13	12	0	0
5	I	31	13	12	0	0
All	All	24050	23916	23895	40	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 (40) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:147:ALA:HA	1:D:210:THR:HG21	1.73	0.71
1:H:63:GLU:OE1	1:H:222:ARG:NH1	2.33	0.60
1:G:63:GLU:OE1	1:G:222:ARG:HD2	2.06	0.56
1:D:216:LYS:HB3	1:E:68:GLU:HG2	1.89	0.55
1:E:146:VAL:HA	1:E:149:LEU:HD22	1.90	0.54
1:H:96:GLU:HG3	1:H:145:SER:HB2	1.91	0.52
1:D:146:VAL:HA	1:D:149:LEU:HD22	1.91	0.51
1:F:110:ASP:OD1	1:F:113:ASN:ND2	2.43	0.51
1:G:110:ASP:OD1	1:G:113:ASN:ND2	2.43	0.51
1:E:63:GLU:OE1	1:E:222:ARG:NH1	2.35	0.49
1:E:198:LYS:HA	2:S:15:DT:H72	1.94	0.49
1:D:130:ASP:OD2	1:D:134:ARG:NH1	2.47	0.47
1:G:63:GLU:OE1	1:G:222:ARG:NH1	2.31	0.47
1:E:40:ILE:HG12	1:E:58:MET:SD	2.55	0.45
1:C:130:ASP:OD1	1:C:181:ASN:ND2	2.50	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:80:ILE:HD11	1:F:142:VAL:HG13	1.99	0.45
1:C:110:ASP:OD1	1:C:113:ASN:ND2	2.50	0.44
1:D:63:GLU:HB3	1:D:222:ARG:HG2	1.98	0.44
1:D:30:GLY:CA	1:E:111:ILE:HG22	2.48	0.44
1:C:40:ILE:HG12	1:C:58:MET:SD	2.57	0.44
1:B:63:GLU:OE1	1:B:222:ARG:HD2	2.15	0.44
1:D:44:SER:OG	1:D:273:GLU:OE2	2.31	0.44
1:E:63:GLU:HB3	1:E:222:ARG:HG2	2.00	0.44
1:H:176:ARG:NH1	1:I:154:GLU:OE1	2.47	0.43
1:E:96:GLU:CD	1:E:145:SER:HB2	2.39	0.43
1:F:40:ILE:CG1	1:F:58:MET:SD	3.06	0.43
1:D:243:ARG:NH1	1:D:259:GLU:OE2	2.52	0.43
1:D:63:GLU:OE1	1:D:222:ARG:NH1	2.40	0.42
1:D:64:ILE:HD13	1:D:75:LEU:HD22	2.00	0.42
1:F:222:ARG:HG3	1:F:248:LYS:HB3	2.01	0.42
1:D:76:THR:CG2	1:D:142:VAL:HG11	2.49	0.42
1:H:14:LEU:CD2	1:H:26:ILE:HG21	2.50	0.42
1:I:194:GLN:HE21	1:I:196:ARG:HH12	1.67	0.42
1:B:96:GLU:HG3	1:B:145:SER:HB2	2.02	0.42
1:C:40:ILE:CG1	1:C:58:MET:SD	3.07	0.42
1:C:104:ALA:HB3	1:C:111:ILE:HD11	2.02	0.42
1:E:30:GLY:CA	1:F:111:ILE:HG22	2.50	0.42
1:E:193:ASN:ND2	1:E:209:THR:HG23	2.35	0.41
1:F:40:ILE:HG12	1:F:58:MET:SD	2.60	0.41
1:F:146:VAL:HA	1:F:149:LEU:HD22	2.03	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	331/334 (99%)	315 (95%)	15 (4%)	1 (0%)	41 61

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	331/334 (99%)	319 (96%)	11 (3%)	1 (0%)	41	61
1	C	331/334 (99%)	318 (96%)	12 (4%)	1 (0%)	41	61
1	D	331/334 (99%)	318 (96%)	12 (4%)	1 (0%)	41	61
1	E	331/334 (99%)	320 (97%)	10 (3%)	1 (0%)	41	61
1	F	331/334 (99%)	316 (96%)	14 (4%)	1 (0%)	41	61
1	G	331/334 (99%)	323 (98%)	7 (2%)	1 (0%)	41	61
1	H	331/334 (99%)	316 (96%)	14 (4%)	1 (0%)	41	61
1	I	298/334 (89%)	282 (95%)	14 (5%)	2 (1%)	22	39
All	All	2946/3006 (98%)	2827 (96%)	109 (4%)	10 (0%)	44	61

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	145	SER
1	E	145	SER
1	F	145	SER
1	G	145	SER
1	C	145	SER
1	B	252	ALA
1	I	145	SER
1	A	145	SER
1	H	145	SER
1	I	266	GLU

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	262/263 (100%)	250 (95%)	12 (5%)	27	50
1	B	262/263 (100%)	251 (96%)	11 (4%)	30	54
1	C	262/263 (100%)	253 (97%)	9 (3%)	37	63
1	D	262/263 (100%)	248 (95%)	14 (5%)	22	43

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	262/263 (100%)	246 (94%)	16 (6%)	18	36
1	F	262/263 (100%)	249 (95%)	13 (5%)	24	46
1	G	262/263 (100%)	249 (95%)	13 (5%)	24	46
1	H	262/263 (100%)	255 (97%)	7 (3%)	44	71
1	I	238/263 (90%)	221 (93%)	17 (7%)	14	28
All	All	2334/2367 (99%)	2222 (95%)	112 (5%)	29	48

All (112) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	ILE
1	A	6	LYS
1	A	34	SER
1	A	85	ARG
1	A	114	LEU
1	A	138	VAL
1	A	166	LEU
1	A	189	LEU
1	A	205	ASN
1	A	210	THR
1	A	233	GLU
1	A	304	ASN
1	B	27	MET
1	B	47	LEU
1	B	114	LEU
1	B	135	SER
1	B	149	LEU
1	B	171	MET
1	B	172	SER
1	B	183	LYS
1	B	189	LEU
1	B	197	MET
1	B	198	LYS
1	C	47	LEU
1	C	114	LEU
1	C	145	SER
1	C	183	LYS
1	C	189	LEU
1	C	201	VAL
1	C	223	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	247	VAL
1	C	277	LEU
1	D	8	LYS
1	D	29	LEU
1	D	40	ILE
1	D	47	LEU
1	D	76	THR
1	D	114	LEU
1	D	149	LEU
1	D	189	LEU
1	D	197	MET
1	D	208	THR
1	D	209	THR
1	D	223	LEU
1	D	238	VAL
1	D	276	ASP
1	E	4	GLU
1	E	16	GLN
1	E	23	LYS
1	E	29	LEU
1	E	68	GLU
1	E	114	LEU
1	E	145	SER
1	E	149	LEU
1	E	166	LEU
1	E	172	SER
1	E	183	LYS
1	E	189	LEU
1	E	208	THR
1	E	209	THR
1	E	247	VAL
1	E	315	THR
1	F	47	LEU
1	F	102	ILE
1	F	114	LEU
1	F	142	VAL
1	F	149	LEU
1	F	166	LEU
1	F	189	LEU
1	F	208	THR
1	F	209	THR
1	F	247	VAL

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	F	257	GLN
1	F	277	LEU
1	F	285	GLU
1	G	19	LYS
1	G	69	SER
1	G	75	LEU
1	G	114	LEU
1	G	146	VAL
1	G	149	LEU
1	G	166	LEU
1	G	171	MET
1	G	189	LEU
1	G	209	THR
1	G	226	ARG
1	G	266	GLU
1	G	277	LEU
1	H	5	ASN
1	H	19	LYS
1	H	23	LYS
1	H	37	VAL
1	H	172	SER
1	H	235	GLU
1	H	285	GLU
1	I	63	GLU
1	I	78	GLN
1	I	193	ASN
1	I	197	MET
1	I	205	ASN
1	I	208	THR
1	I	216	LYS
1	I	223	LEU
1	I	251	ILE
1	I	268	ILE
1	I	273	GLU
1	I	296	GLU
1	I	297	LYS
1	I	306	THR
1	I	318	GLU
1	I	321	LYS
1	I	325	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	20	GLN
1	A	113	ASN
1	A	300	GLN
1	A	304	ASN
1	B	7	GLN
1	B	20	GLN
1	B	236	ASN
1	D	20	GLN
1	D	332	ASN
1	E	16	GLN
1	E	20	GLN
1	E	257	GLN
1	H	7	GLN
1	H	78	GLN
1	H	124	GLN
1	H	236	ASN
1	H	304	ASN
1	I	193	ASN
1	I	194	GLN
1	I	205	ASN
1	I	257	GLN
1	I	312	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](#)

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 [i](#)

Of 18 ligands modelled in this entry, 9 are monoatomic - leaving 9 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
5	AGS	H	402	4	26,33,33	1.64	4 (15%)	26,52,52	1.66	5 (19%)
5	AGS	D	402	4	26,33,33	1.68	3 (11%)	26,52,52	1.45	4 (15%)
5	AGS	A	402	4	26,33,33	1.92	4 (15%)	26,52,52	1.51	5 (19%)
5	AGS	E	402	4	26,33,33	1.53	3 (11%)	26,52,52	1.54	6 (23%)
5	AGS	C	402	4	26,33,33	1.77	7 (26%)	26,52,52	1.41	4 (15%)
5	AGS	B	402	4	26,33,33	1.63	4 (15%)	26,52,52	1.58	4 (15%)
5	AGS	I	402	4	26,33,33	1.86	5 (19%)	26,52,52	1.41	4 (15%)
5	AGS	F	402	4	26,33,33	1.67	3 (11%)	26,52,52	1.55	4 (15%)
5	AGS	G	402	4	26,33,33	1.57	4 (15%)	26,52,52	1.39	4 (15%)

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
5	AGS	H	402	4	-	1/17/38/38	0/3/3/3
5	AGS	D	402	4	-	1/17/38/38	0/3/3/3
5	AGS	A	402	4	-	2/17/38/38	0/3/3/3
5	AGS	E	402	4	-	1/17/38/38	0/3/3/3
5	AGS	C	402	4	-	0/17/38/38	0/3/3/3
5	AGS	B	402	4	-	0/17/38/38	0/3/3/3
5	AGS	I	402	4	-	0/17/38/38	0/3/3/3
5	AGS	F	402	4	-	2/17/38/38	0/3/3/3
5	AGS	G	402	4	-	1/17/38/38	0/3/3/3

All (37) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	402	AGS	PG-S1G	7.94	2.07	1.90
5	I	402	AGS	PG-S1G	7.28	2.06	1.90
5	B	402	AGS	PG-S1G	6.06	2.03	1.90
5	C	402	AGS	PG-S1G	5.78	2.03	1.90
5	H	402	AGS	PG-S1G	5.61	2.02	1.90

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	402	AGS	PG-S1G	4.91	2.01	1.90
5	D	402	AGS	PG-O2G	-4.68	1.39	1.54
5	E	402	AGS	PG-S1G	4.57	2.00	1.90
5	F	402	AGS	PG-S1G	4.38	2.00	1.90
5	F	402	AGS	PG-O2G	-4.29	1.41	1.54
5	G	402	AGS	PG-S1G	4.13	1.99	1.90
5	E	402	AGS	PG-O2G	-4.00	1.42	1.54
5	G	402	AGS	PG-O2G	-3.96	1.42	1.54
5	H	402	AGS	C2-N3	3.16	1.37	1.32
5	C	402	AGS	PG-O2G	-3.05	1.45	1.54
5	H	402	AGS	PG-O2G	-3.01	1.45	1.54
5	C	402	AGS	C5-C4	2.93	1.48	1.40
5	I	402	AGS	C5-C4	2.70	1.48	1.40
5	F	402	AGS	PB-O2B	-2.64	1.42	1.55
5	A	402	AGS	C5-C4	2.63	1.47	1.40
5	B	402	AGS	PG-O2G	-2.53	1.46	1.54
5	B	402	AGS	C5-C4	2.49	1.47	1.40
5	I	402	AGS	C2-N3	2.42	1.36	1.32
5	B	402	AGS	C2-N3	2.41	1.36	1.32
5	G	402	AGS	C5-N7	-2.35	1.31	1.39
5	C	402	AGS	C2-N3	2.31	1.35	1.32
5	G	402	AGS	PB-O2B	-2.29	1.44	1.55
5	E	402	AGS	PB-O2B	-2.29	1.44	1.55
5	I	402	AGS	PG-O2G	-2.24	1.47	1.54
5	A	402	AGS	C2-N3	2.23	1.35	1.32
5	C	402	AGS	C2-N1	2.20	1.38	1.33
5	I	402	AGS	O4'-C1'	2.15	1.44	1.41
5	D	402	AGS	PB-O2B	-2.10	1.45	1.55
5	H	402	AGS	C5-C4	2.06	1.46	1.40
5	A	402	AGS	PG-O2G	-2.06	1.48	1.54
5	C	402	AGS	PB-O2B	-2.01	1.45	1.55
5	C	402	AGS	C2'-C1'	-2.01	1.50	1.53

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	F	402	AGS	N3-C2-N1	-4.48	121.68	128.68
5	B	402	AGS	N3-C2-N1	-4.11	122.25	128.68
5	A	402	AGS	N3-C2-N1	-3.95	122.50	128.68
5	E	402	AGS	N3-C2-N1	-3.92	122.54	128.68
5	I	402	AGS	N3-C2-N1	-3.83	122.69	128.68
5	D	402	AGS	N3-C2-N1	-3.70	122.90	128.68

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	H	402	AGS	O3G-PG-O3B	3.66	116.86	104.64
5	H	402	AGS	N3-C2-N1	-3.65	122.97	128.68
5	C	402	AGS	N3-C2-N1	-3.43	123.31	128.68
5	H	402	AGS	C5-C6-N6	-3.21	115.47	120.35
5	B	402	AGS	PA-O3A-PB	-3.03	122.42	132.83
5	C	402	AGS	O3G-PG-O3B	3.03	114.75	104.64
5	G	402	AGS	N3-C2-N1	-2.98	124.02	128.68
5	H	402	AGS	N6-C6-N1	2.90	124.59	118.57
5	A	402	AGS	C3'-C2'-C1'	2.76	105.14	100.98
5	F	402	AGS	O3G-PG-O3B	2.74	113.78	104.64
5	A	402	AGS	C4-C5-N7	-2.70	106.58	109.40
5	E	402	AGS	C4-C5-N7	-2.66	106.63	109.40
5	G	402	AGS	C3'-C2'-C1'	2.63	104.94	100.98
5	B	402	AGS	O3G-PG-O3B	2.60	113.31	104.64
5	E	402	AGS	O3G-PG-O3B	2.59	113.29	104.64
5	A	402	AGS	PA-O3A-PB	-2.58	123.97	132.83
5	I	402	AGS	C4-C5-N7	-2.57	106.72	109.40
5	G	402	AGS	O3G-PG-O3B	2.55	113.14	104.64
5	C	402	AGS	N6-C6-N1	2.46	123.69	118.57
5	F	402	AGS	N6-C6-N1	2.44	123.64	118.57
5	D	402	AGS	C4-C5-N7	-2.40	106.90	109.40
5	B	402	AGS	C4-C5-N7	-2.38	106.92	109.40
5	F	402	AGS	C5-C6-N6	-2.33	116.82	120.35
5	D	402	AGS	C1'-N9-C4	-2.30	122.59	126.64
5	C	402	AGS	C1'-N9-C4	-2.26	122.67	126.64
5	I	402	AGS	C3'-C2'-C1'	2.23	104.34	100.98
5	I	402	AGS	PA-O3A-PB	-2.23	125.17	132.83
5	E	402	AGS	O2B-PB-O1B	2.22	123.21	112.24
5	G	402	AGS	O4'-C1'-C2'	-2.09	103.87	106.93
5	D	402	AGS	O2B-PB-O1B	2.09	122.58	112.24
5	A	402	AGS	C2-N1-C6	2.07	122.30	118.75
5	E	402	AGS	O3'-C3'-C4'	2.07	117.02	111.05
5	H	402	AGS	C1'-N9-C4	-2.05	123.03	126.64
5	E	402	AGS	C2-N1-C6	2.01	122.19	118.75

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	402	AGS	PB-O3B-PG-O2G
5	D	402	AGS	PB-O3B-PG-O2G
5	E	402	AGS	PB-O3B-PG-O2G

Continued on next page...

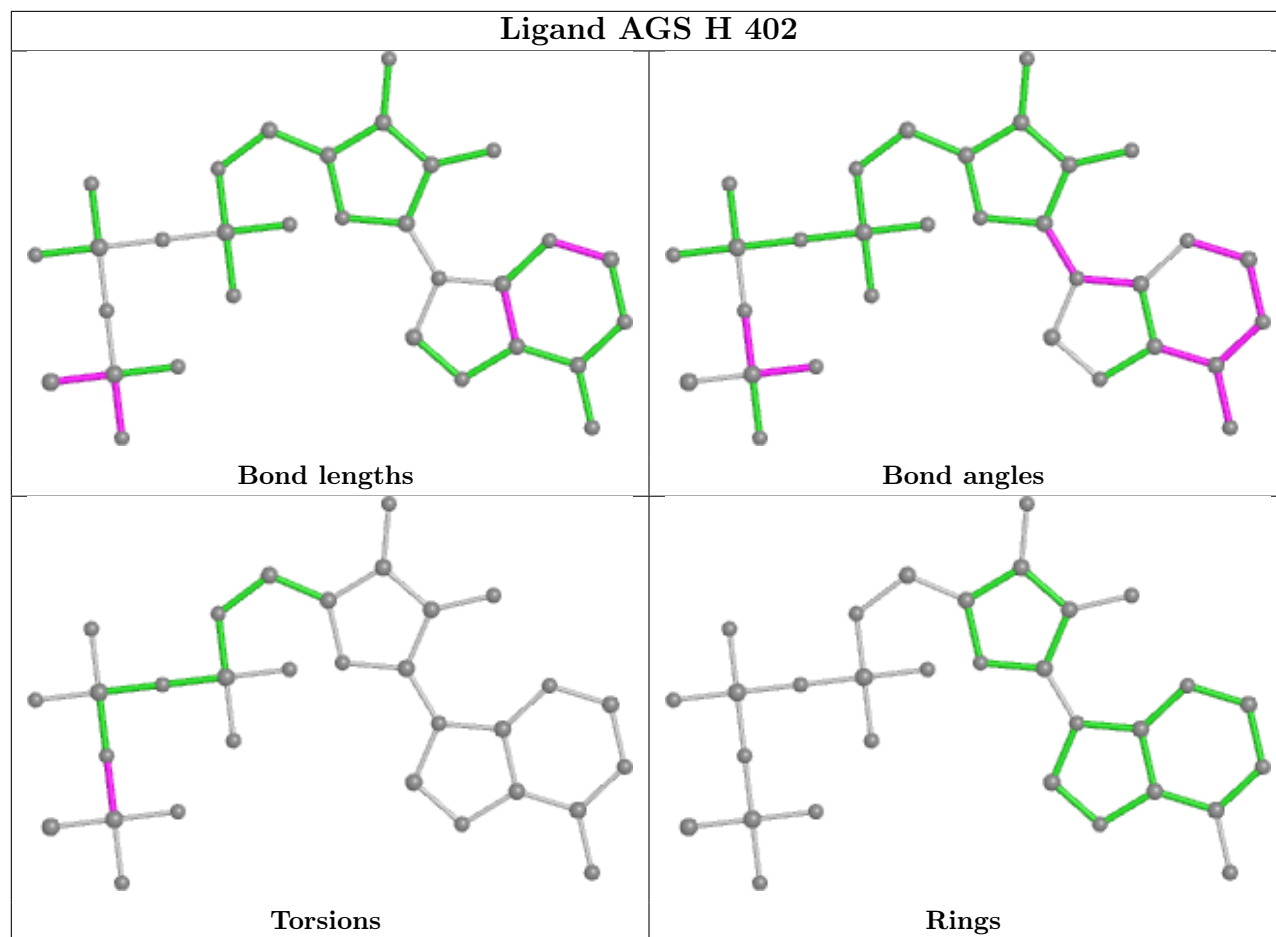
Continued from previous page...

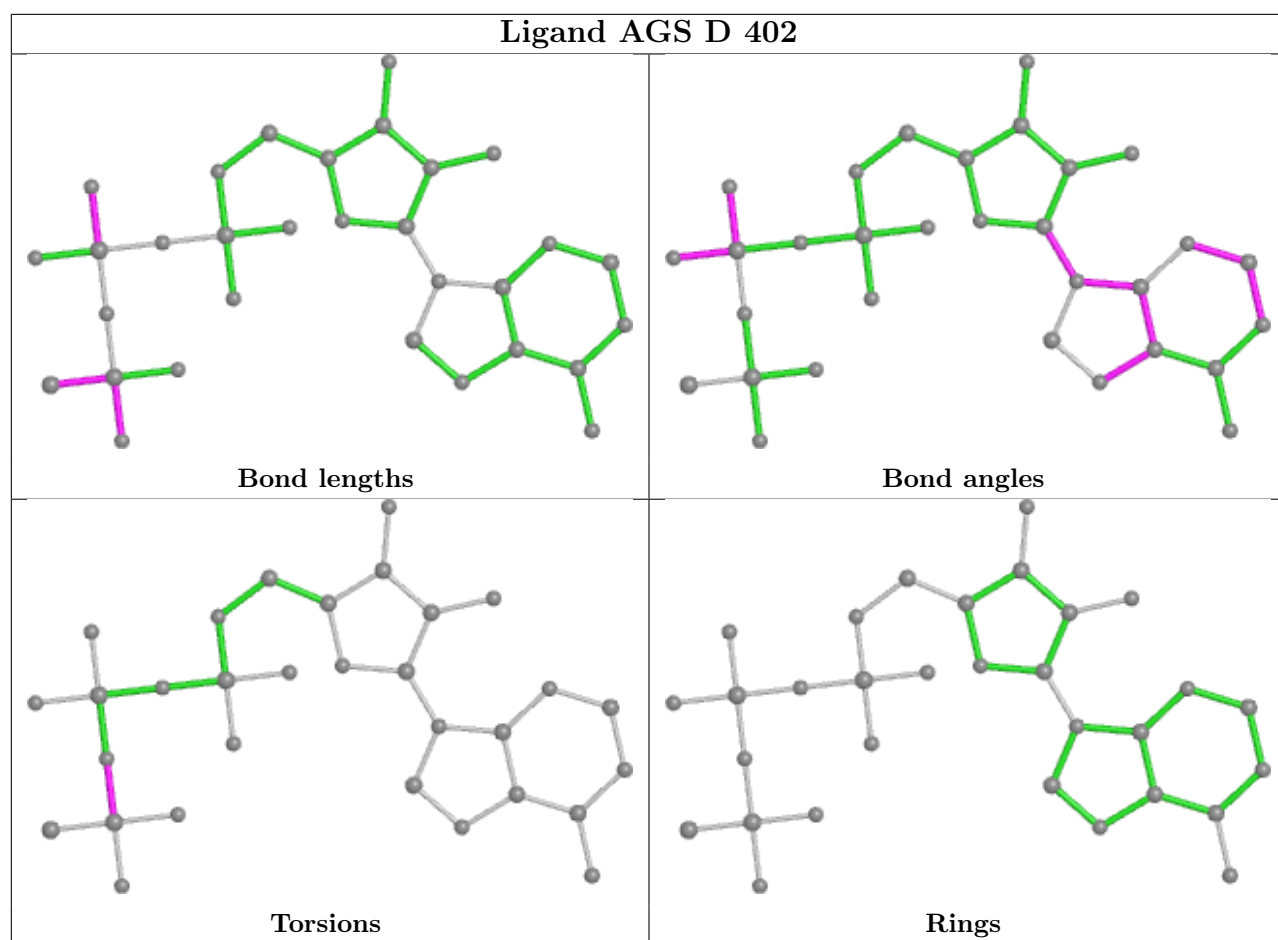
Mol	Chain	Res	Type	Atoms
5	F	402	AGS	PB-O3B-PG-O2G
5	F	402	AGS	PB-O3B-PG-O3G
5	G	402	AGS	PB-O3B-PG-O2G
5	H	402	AGS	PB-O3B-PG-O2G
5	A	402	AGS	PB-O3B-PG-O3G

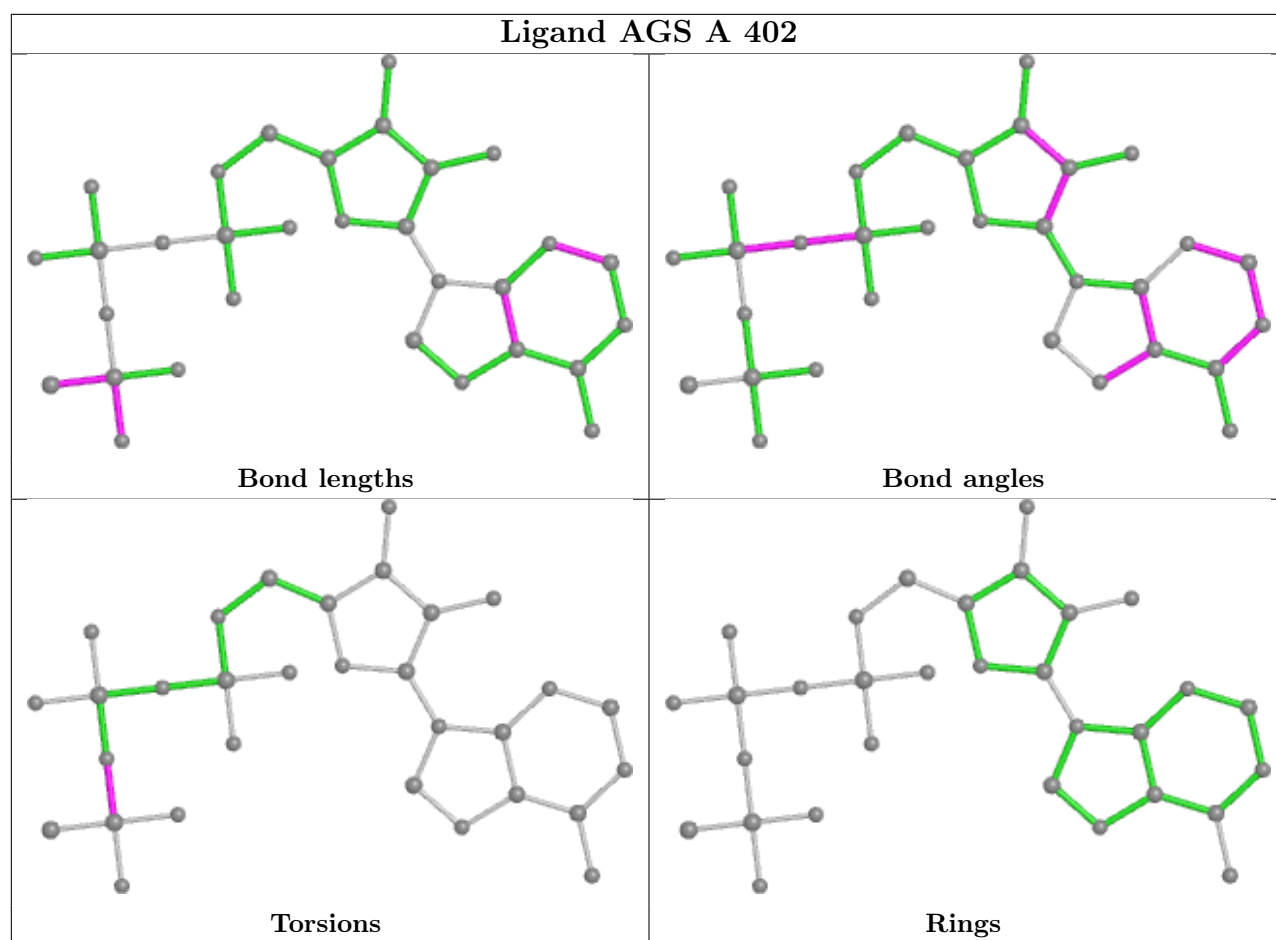
There are no ring outliers.

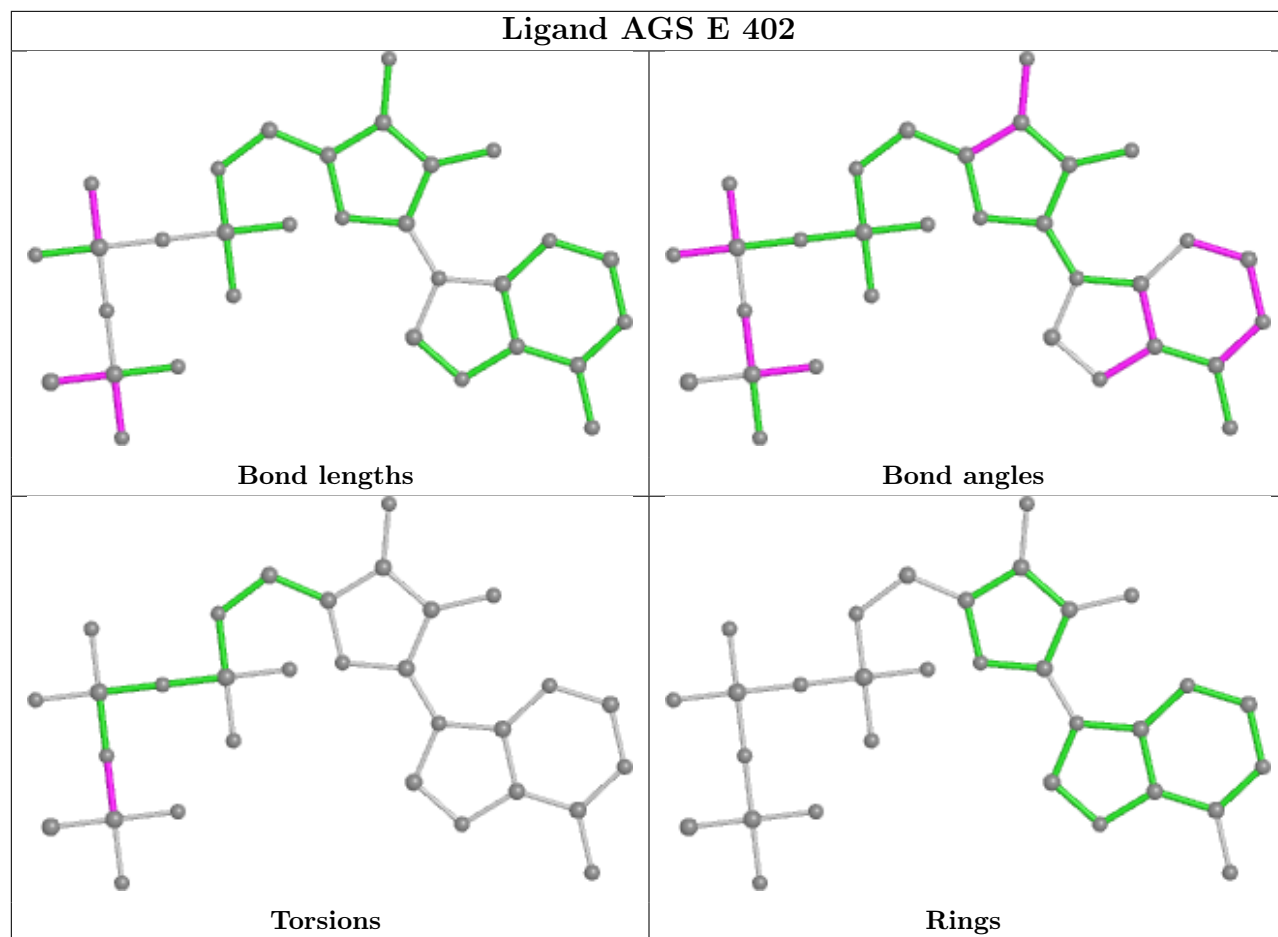
No monomer is involved in short contacts.

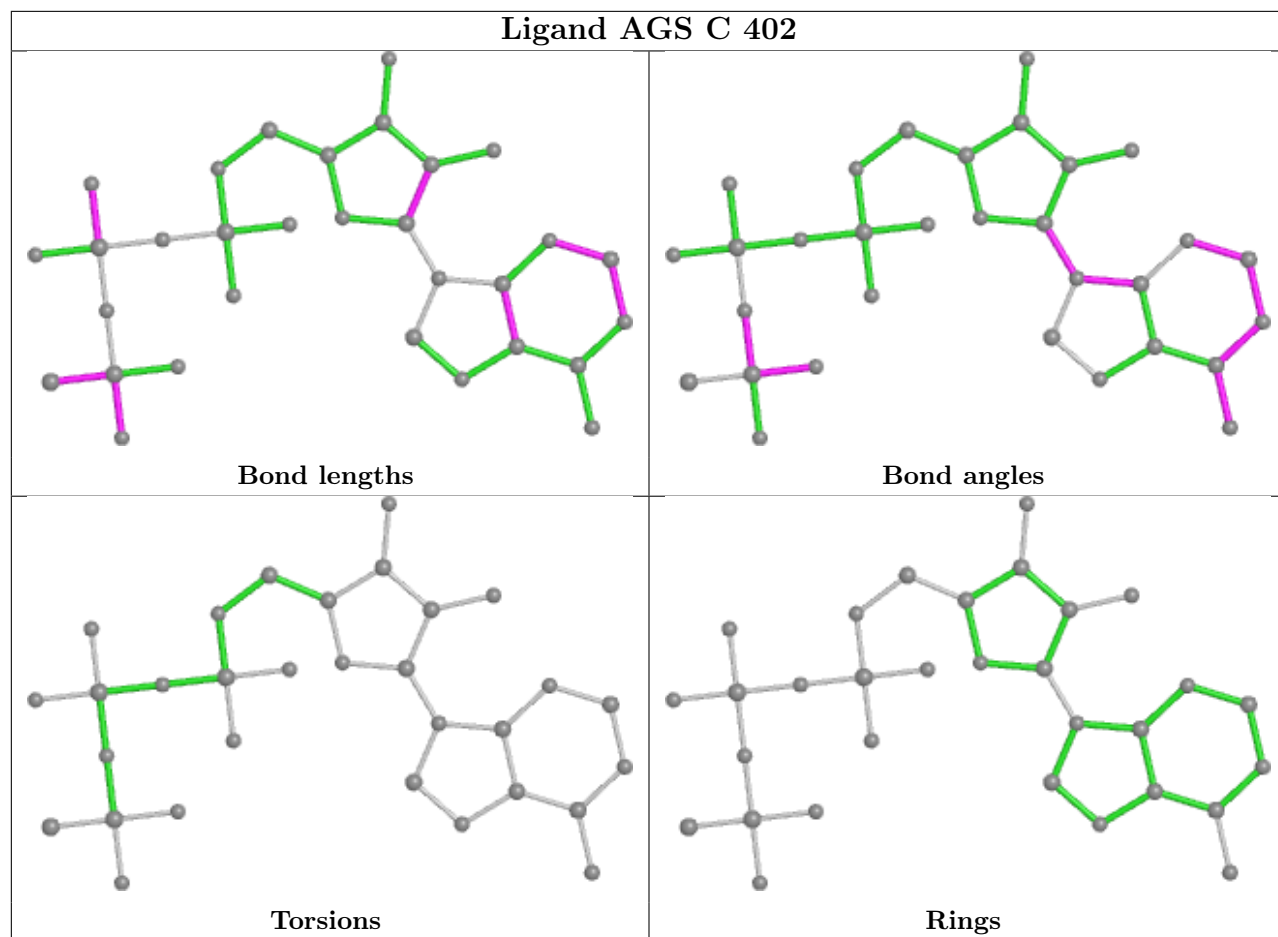
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

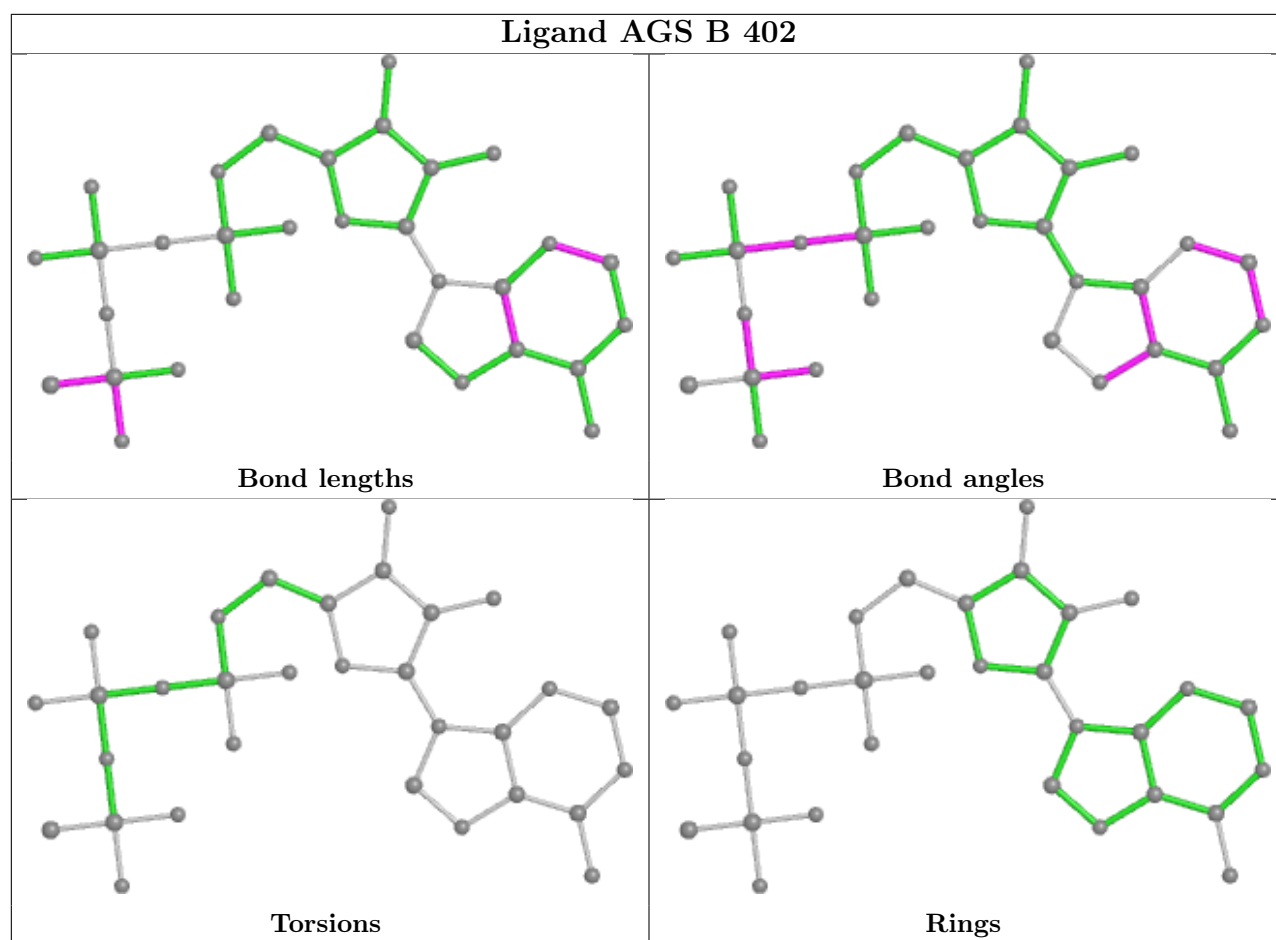


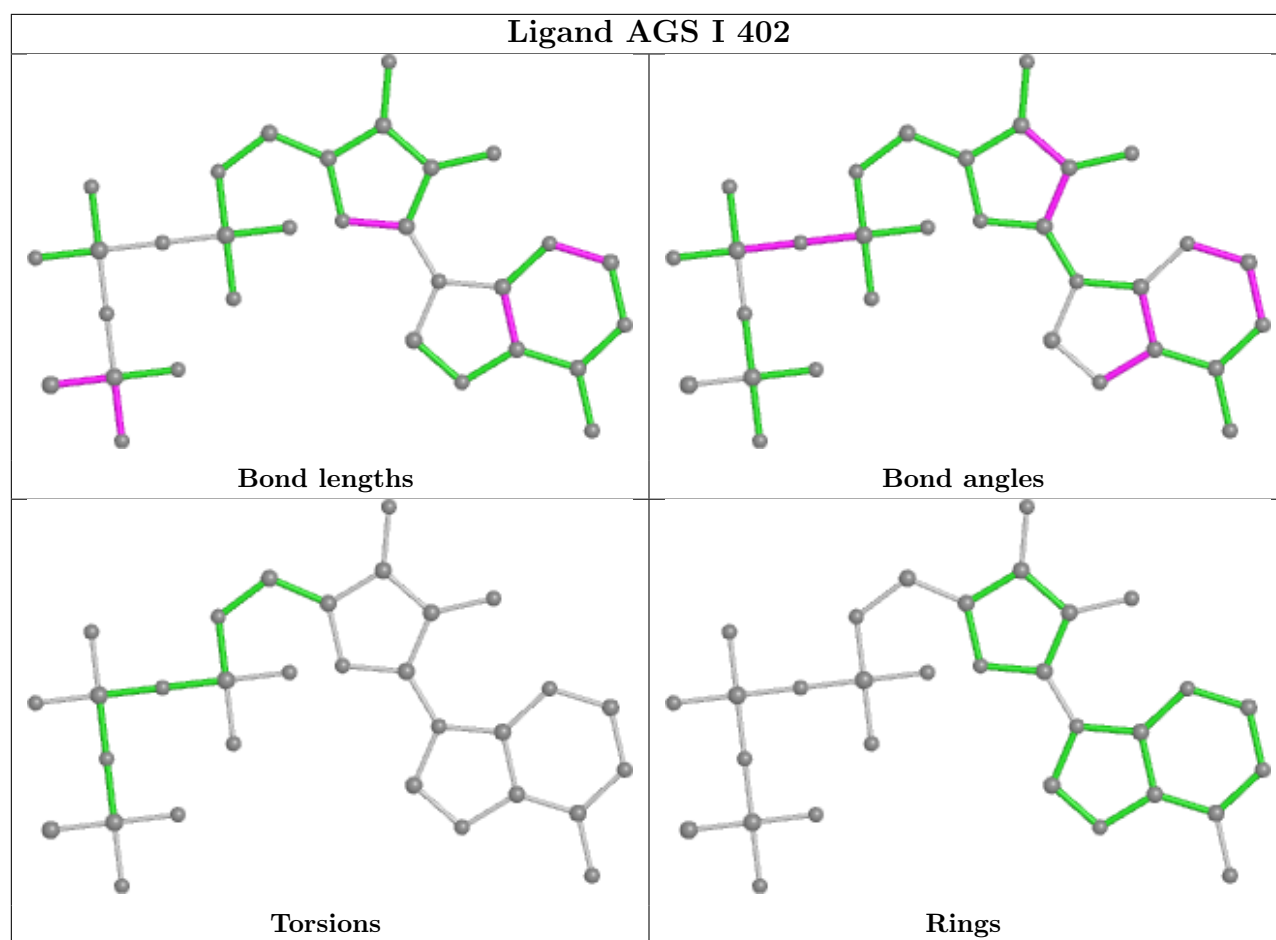


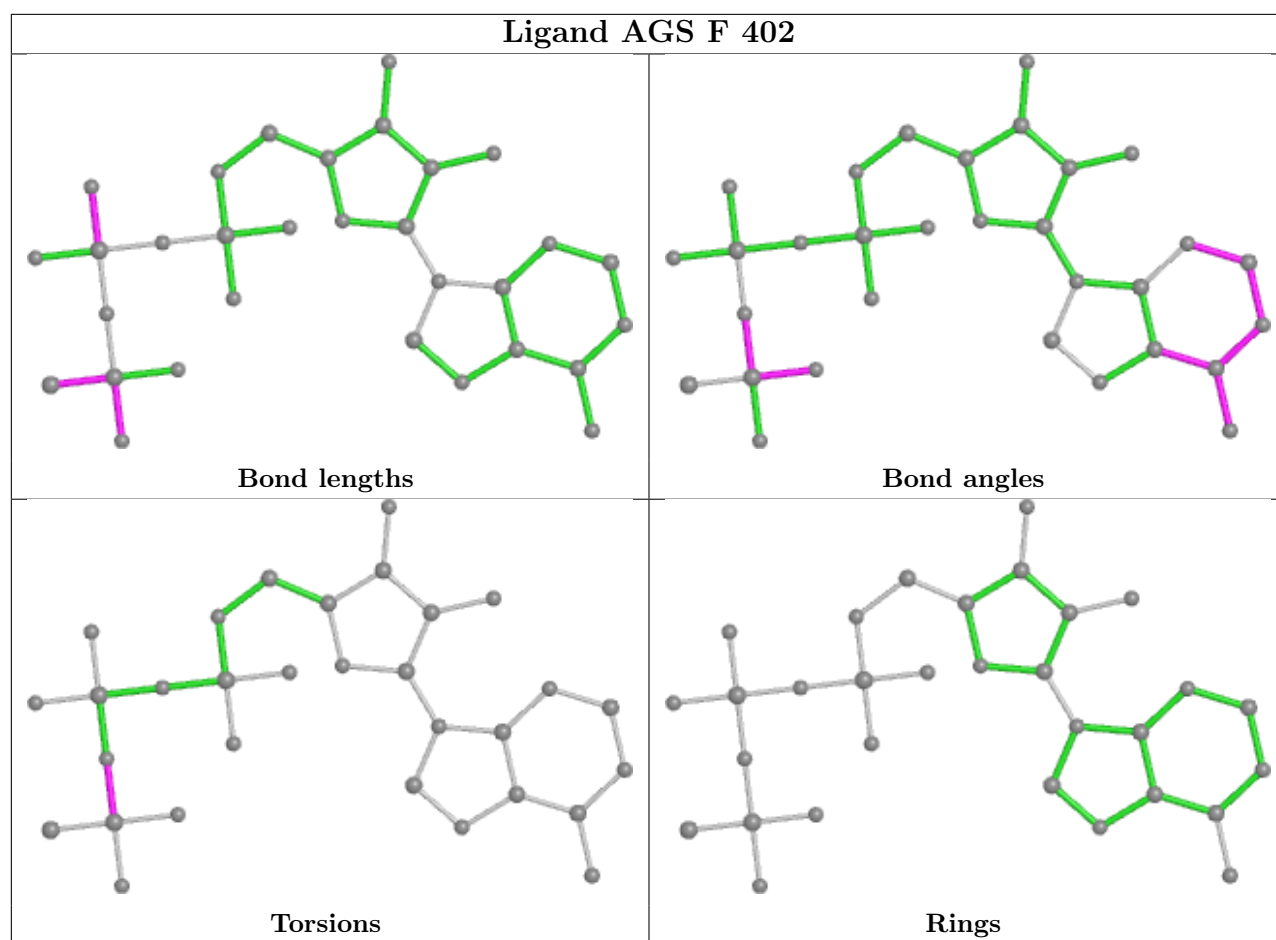


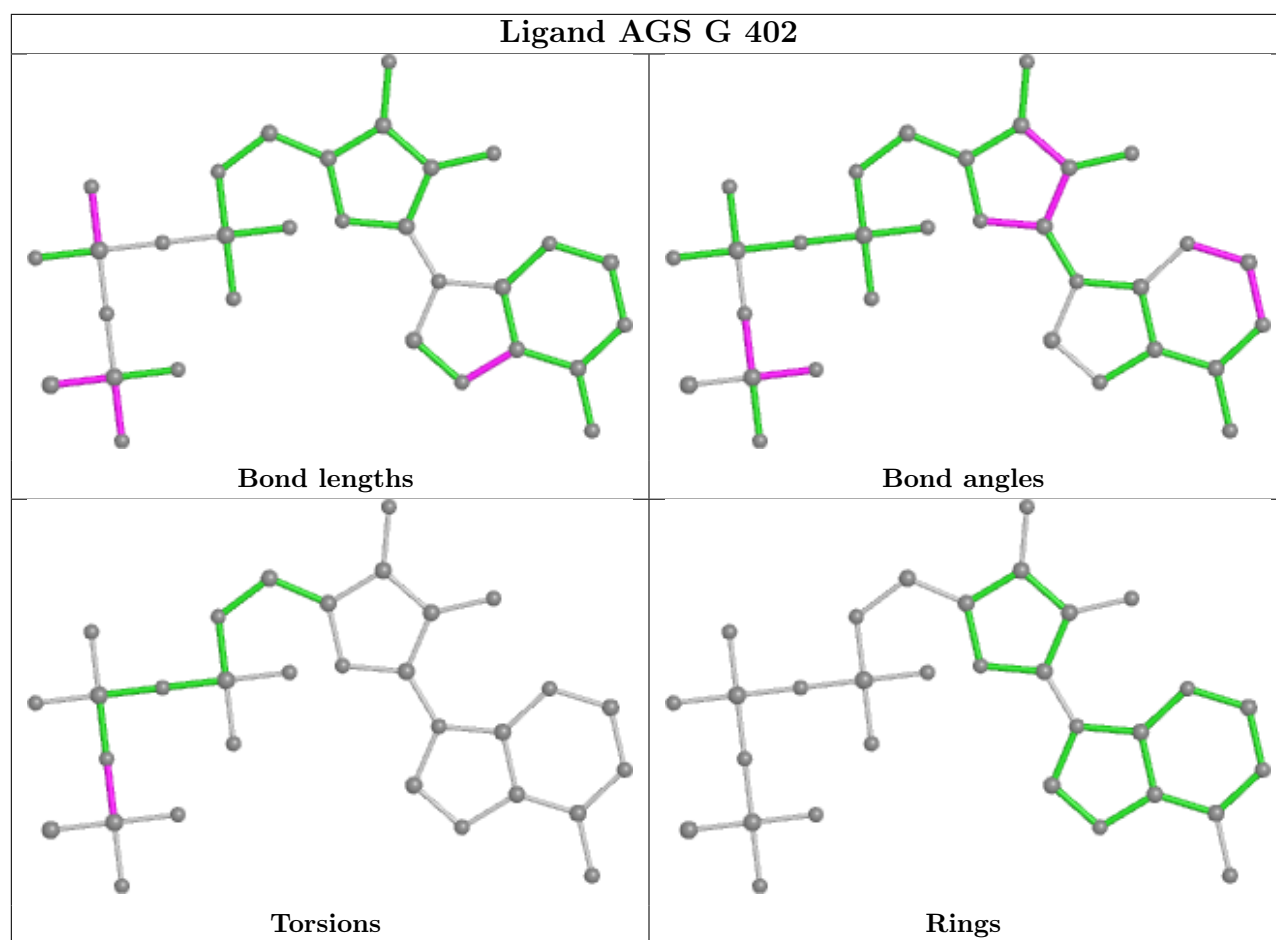












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

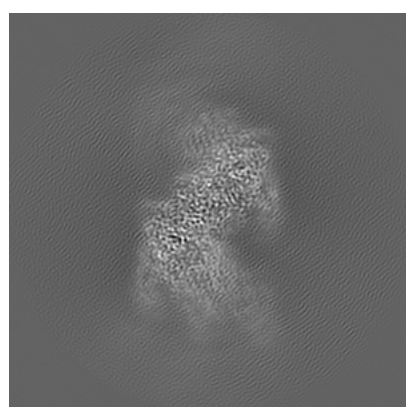
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-22522. These allow visual inspection of the internal detail of the map and identification of artifacts.

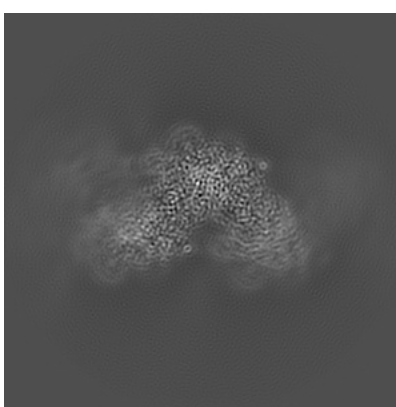
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

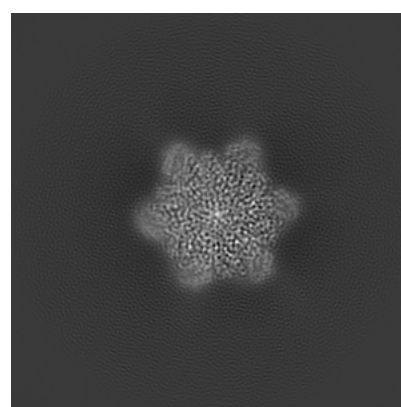
6.1.1 Primary map



X



Y

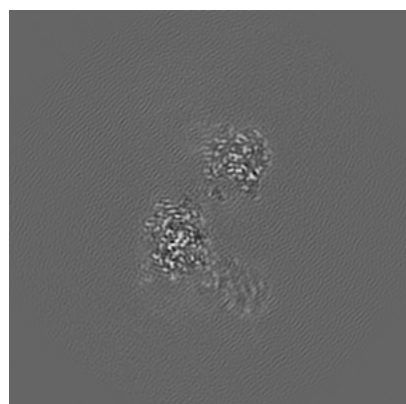


Z

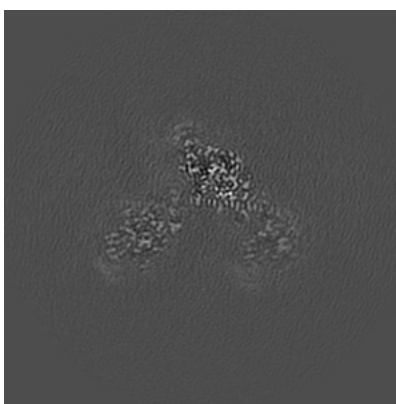
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

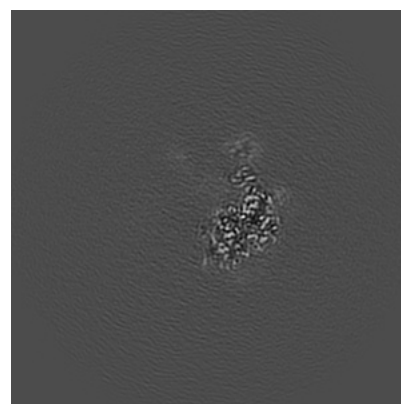
6.2.1 Primary map



X Index: 128



Y Index: 128

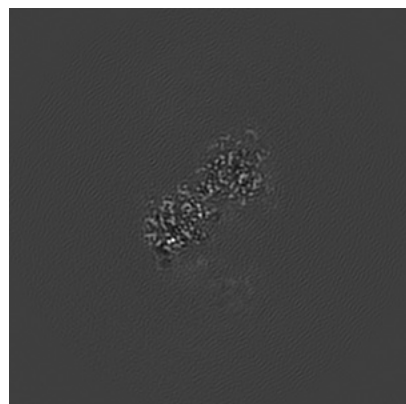


Z Index: 128

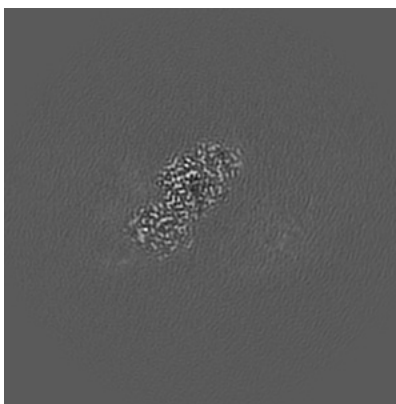
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

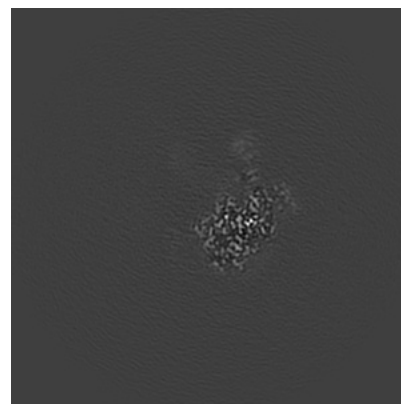
6.3.1 Primary map



X Index: 137



Y Index: 110



Z Index: 123

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

6.4 Orthogonal surface views [i](#)

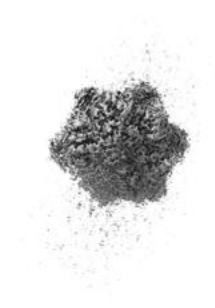
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.025. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

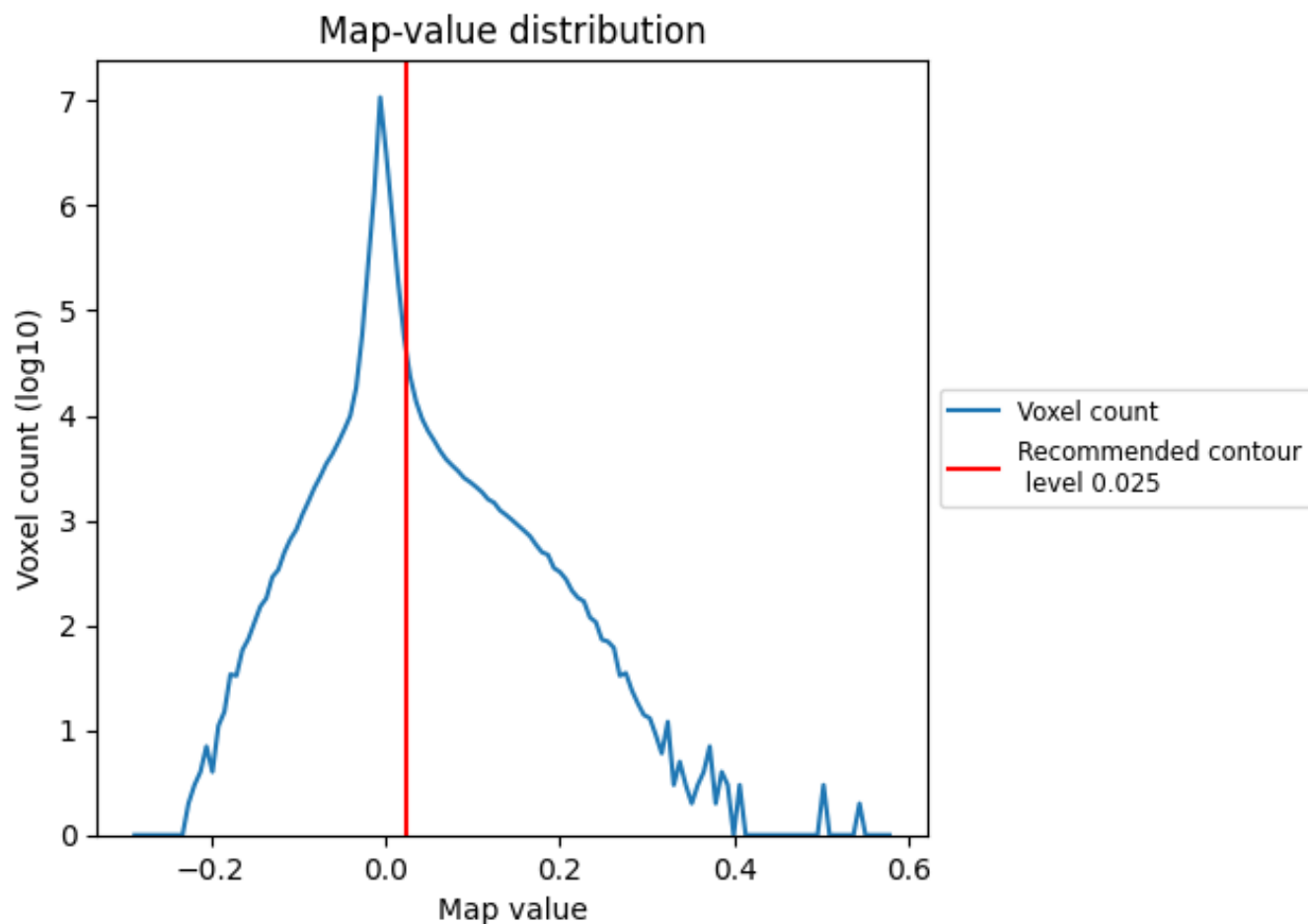
6.5 Mask visualisation

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

7 Map analysis [i](#)

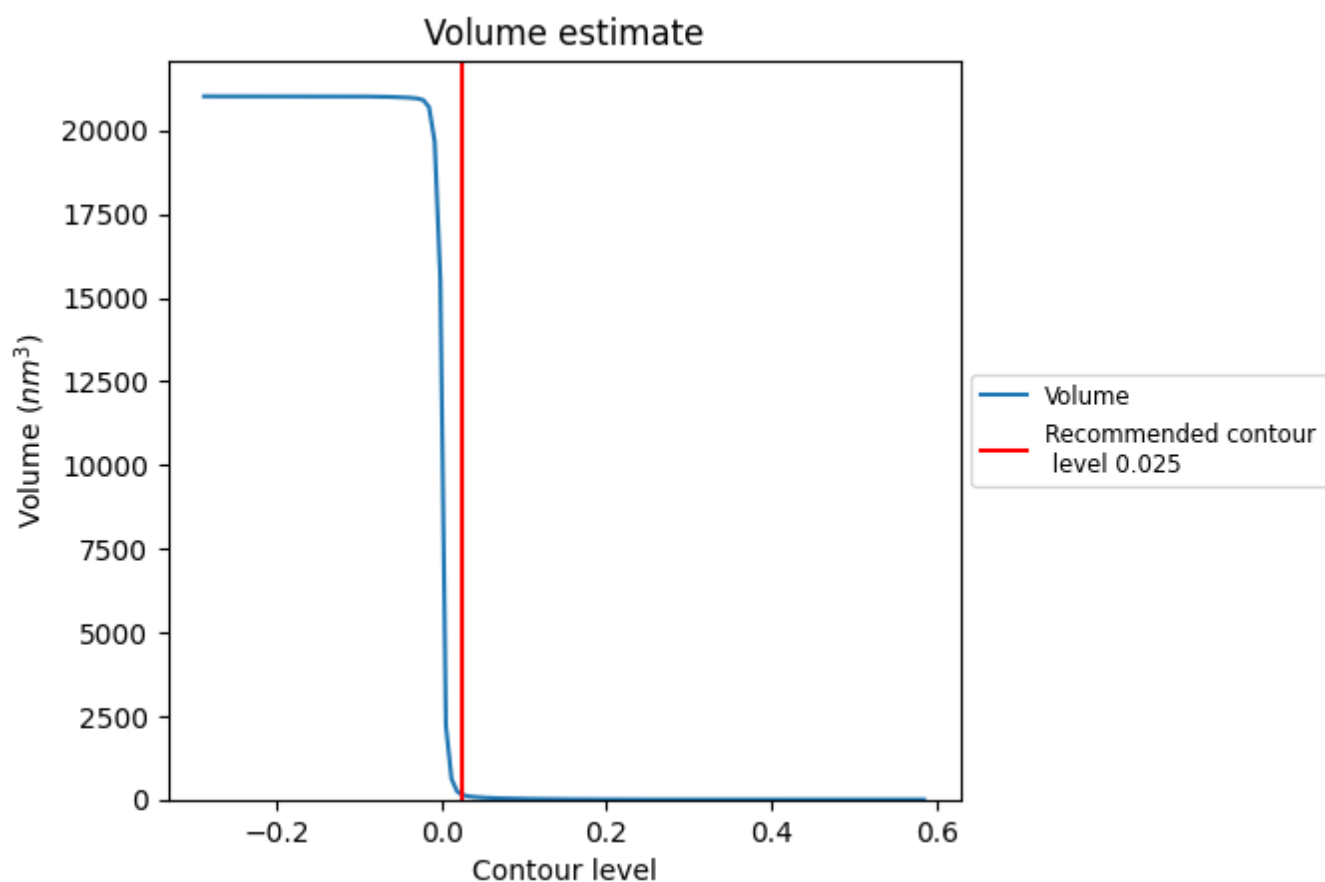
This section contains the results of statistical analysis of the map.

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.

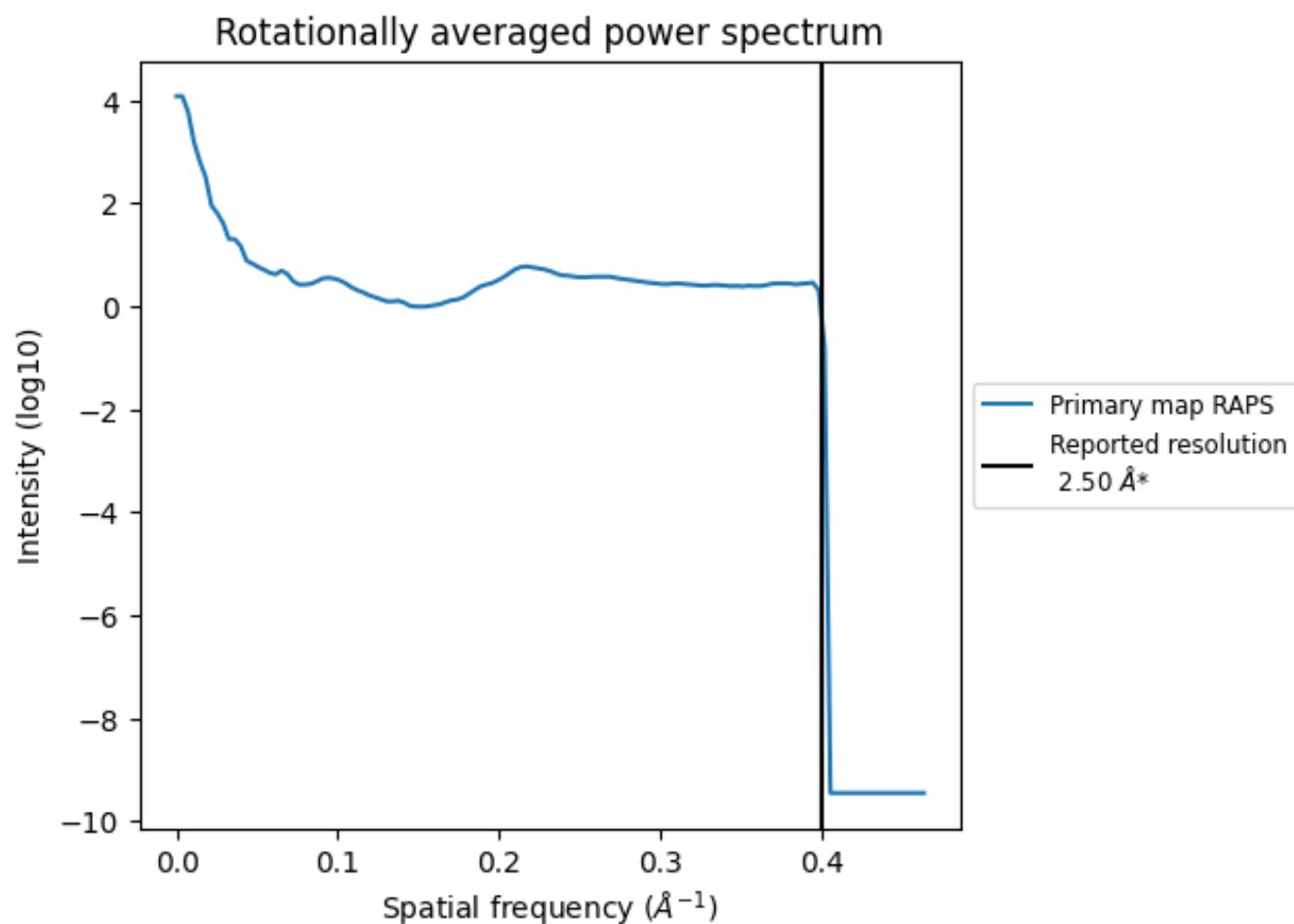
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 150 nm^3 ; this corresponds to an approximate mass of 135 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 0.400 Å⁻¹

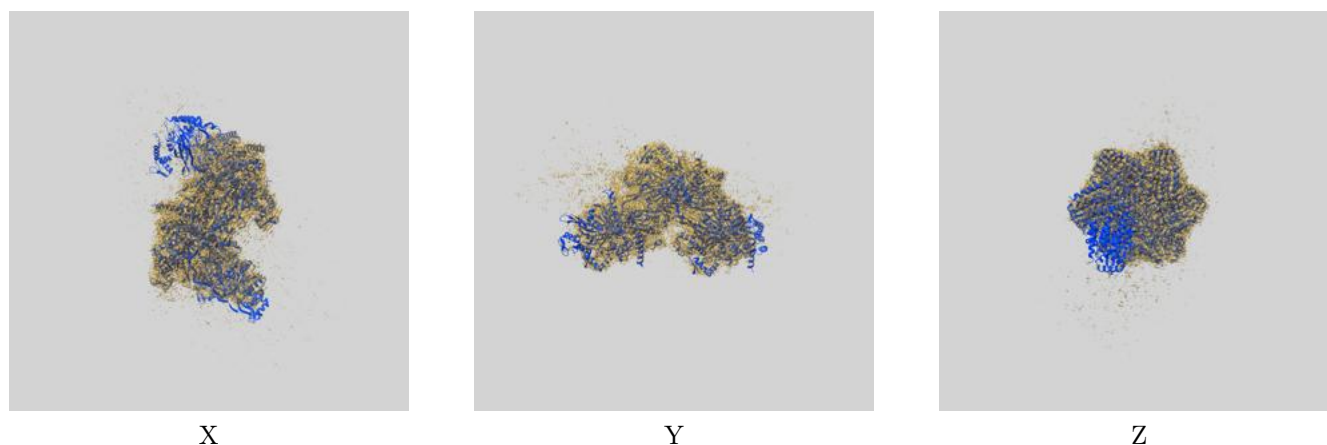
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

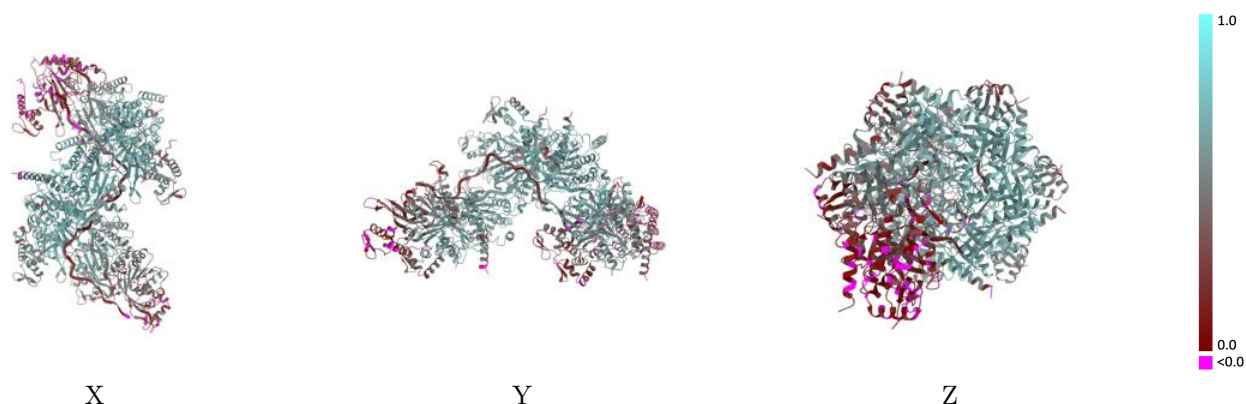
This section contains information regarding the fit between EMDB map EMD-22522 and PDB model 7JY6. Per-residue inclusion information can be found in section [3](#) on page [7](#).

9.1 Map-model overlay [i](#)



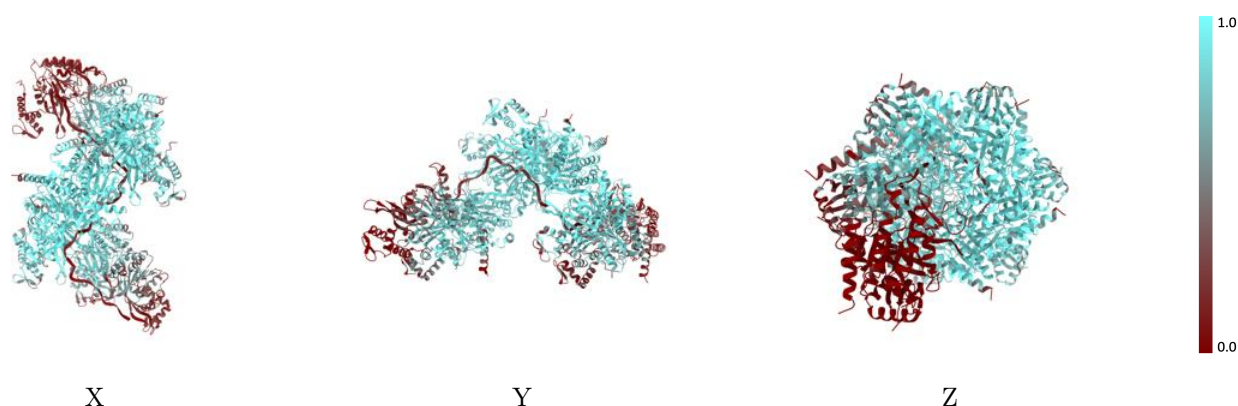
The images above show the 3D surface view of the map at the recommended contour level 0.025 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



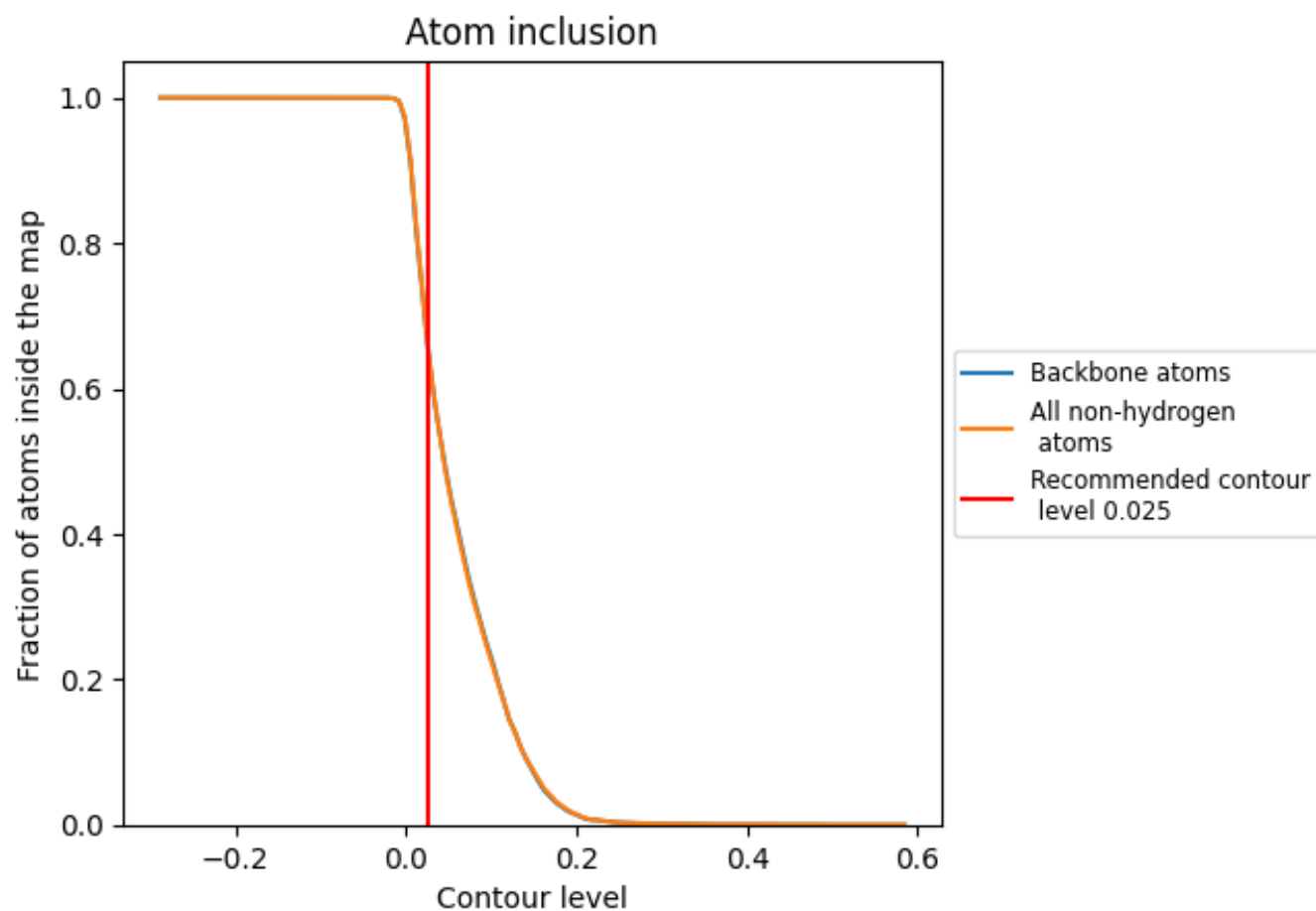
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.025).

























9.4 Atom inclusion ⓘ



At the recommended contour level, 66% of all backbone atoms, 67% 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 (0.025) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6653	 0.4960
A	 0.3268	 0.3510
B	 0.7743	 0.5530
C	 0.8833	 0.6060
D	 0.9105	 0.6350
E	 0.9181	 0.6390
F	 0.8929	 0.6200
G	 0.8110	 0.5610
H	 0.5561	 0.4290
I	 0.0377	 0.1500
S	 0.7556	 0.5300
U	 0.0889	 0.1550

