



Full wwPDB EM Validation Report ⓘ

Mar 6, 2026 – 07:37 PM UTC

PDB ID : 7NJK / pdb_00007njk
EMDB ID : EMD-12377
Title : Mycobacterium smegmatis ATP synthase state 1a
Authors : Montgomery, M.G.; Petri, J.; Spikes, T.E.; Walker, J.E.
Deposited on : 2021-02-17
Resolution : 2.52 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

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:

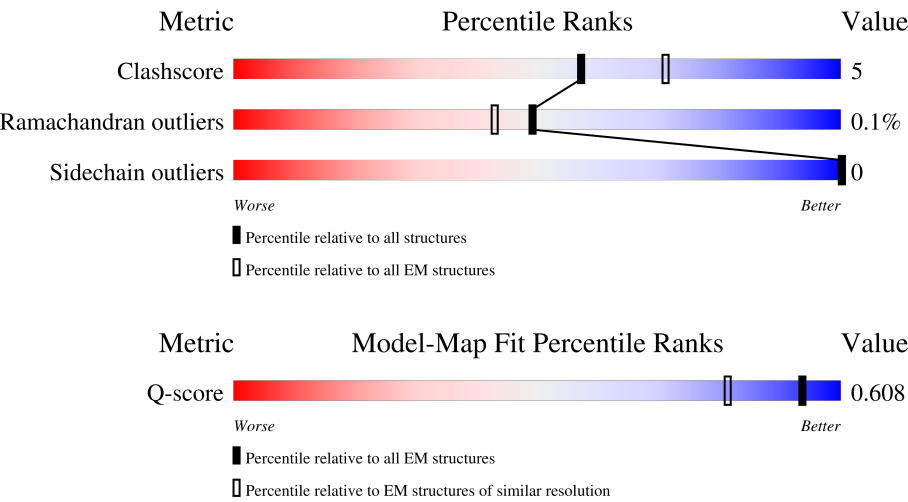
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data 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 i

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

The reported resolution of this entry is 2.52 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.



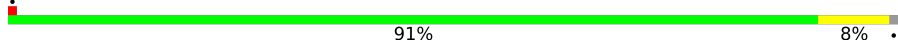
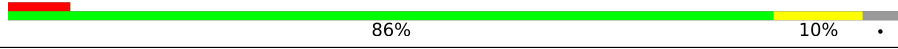
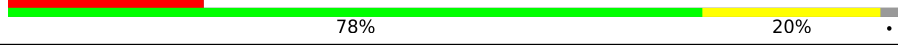
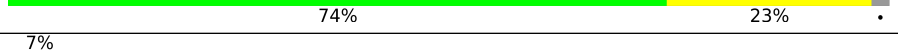
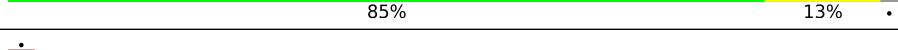
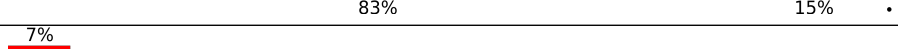
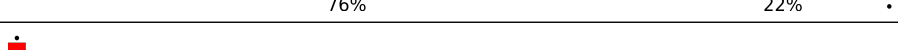
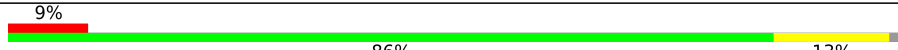
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	7226 (2.02 - 3.02)

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	548	84% 9% 7%
1	B	548	6% 84% 8% 8%

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Mol	Chain	Length	Quality of chain
2	E	475	
2	F	475	
3	G	307	
4	H	121	
5	L	86	
5	M	86	
5	N	86	
5	O	86	
5	P	86	
5	Q	86	
5	R	86	
5	S	86	
5	T	86	
6	a	252	
7	b	180	
8	d	445	

2 Entry composition [i](#)

There are 12 unique types of molecules in this entry. The entry contains 74722 atoms, of which 37431 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	A	507	Total	C	H	N	O	S	1	0
			7691	2413	3851	664	753	10		
1	B	504	Total	C	H	N	O	S	0	0
			7628	2395	3818	658	747	10		
1	C	531	Total	C	H	N	O	S	0	0
			8041	2521	4026	694	790	10		

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

Mol	Chain	Residues	Atoms						AltConf	Trace
2	D	468	Total	C	H	N	O	S	2	0
			7162	2265	3573	616	695	13		
2	E	464	Total	C	H	N	O	S	0	0
			7087	2243	3533	609	689	13		
2	F	469	Total	C	H	N	O	S	0	0
			7166	2266	3577	616	694	13		

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

Mol	Chain	Residues	Atoms						AltConf	Trace
3	G	296	Total	C	H	N	O	S	0	0
			4551	1413	2281	411	440	6		

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

Mol	Chain	Residues	Atoms						AltConf	Trace
4	H	118	Total	C	H	N	O	S	0	0
			1802	565	891	161	184	1		

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

Mol	Chain	Residues	Atoms						AltConf	Trace
5	L	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		
5	M	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		
5	N	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		
5	O	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		
5	P	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		
5	Q	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		
5	R	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		
5	S	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		
5	T	84	Total	C	H	N	O	S	0	0
			1192	387	603	96	104	2		

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

Mol	Chain	Residues	Atoms						AltConf	Trace
6	a	238	Total	C	H	N	O	S	0	0
			3767	1252	1916	292	301	6		

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

Mol	Chain	Residues	Atoms						AltConf	Trace
7	b	145	Total	C	H	N	O	S	0	0
			2172	667	1095	194	214	2		

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
b	171	HIS	-	expression tag	UNP A0R204
b	172	HIS	-	expression tag	UNP A0R204
b	173	HIS	-	expression tag	UNP A0R204
b	174	HIS	-	expression tag	UNP A0R204
b	175	HIS	-	expression tag	UNP A0R204
b	176	HIS	-	expression tag	UNP A0R204
b	177	HIS	-	expression tag	UNP A0R204
b	178	HIS	-	expression tag	UNP A0R204
b	179	HIS	-	expression tag	UNP A0R204

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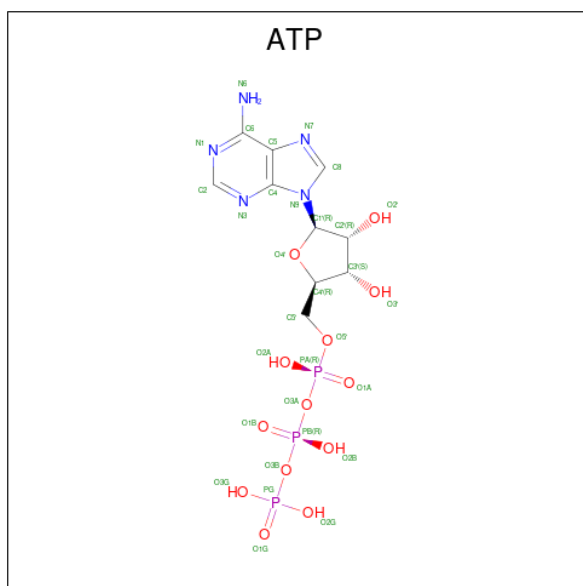
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Chain	Residue	Modelled	Actual	Comment	Reference
b	180	HIS	-	expression tag	UNP A0R204

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

Mol	Chain	Residues	Atoms						AltConf	Trace
8	d	438	Total	C	H	N	O	S	0	0
			6656	2034	3371	597	649	5		

- Molecule 9 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms						AltConf
9	A	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
9	B	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
9	C	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	
9	F	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	

- Molecule 10 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

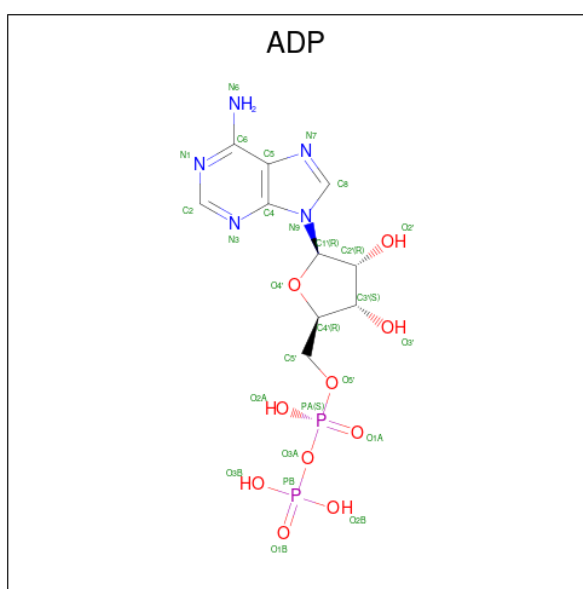
Mol	Chain	Residues	Atoms		AltConf
10	A	1	Total	Mg	0
			1	1	

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

- Molecule 11 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms						AltConf
11	D	1	Total	C	H	N	O	P	0
			39	10	12	5	10	2	
11	E	1	Total	C	H	N	O	P	0
			39	10	12	5	10	2	

- Molecule 12 is water.

Mol	Chain	Residues	Atoms		AltConf
12	A	3	Total	O	0
			3	3	
12	B	3	Total	O	0
			3	3	
12	C	3	Total	O	0
			3	3	

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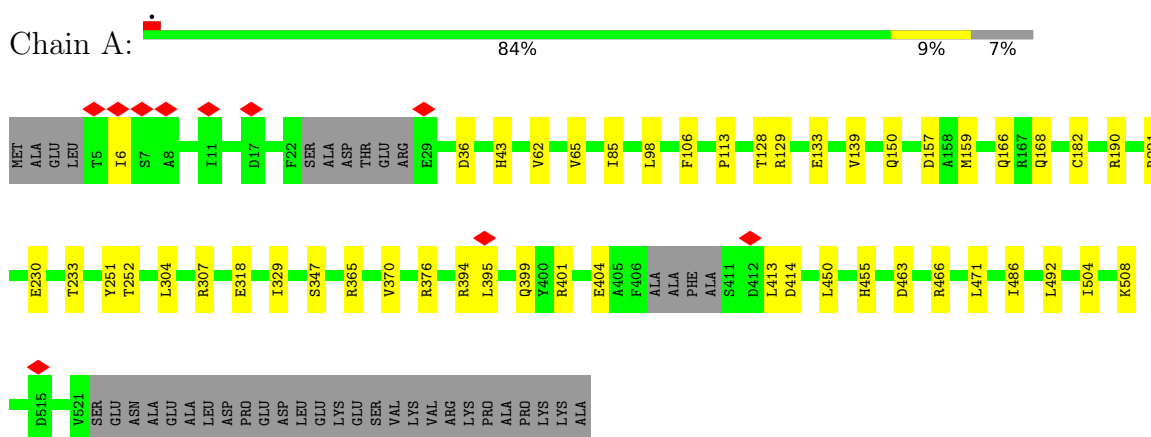
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Mol	Chain	Residues	Atoms		AltConf
12	D	4	Total	O	0
			4	4	
12	F	3	Total	O	0
			3	3	

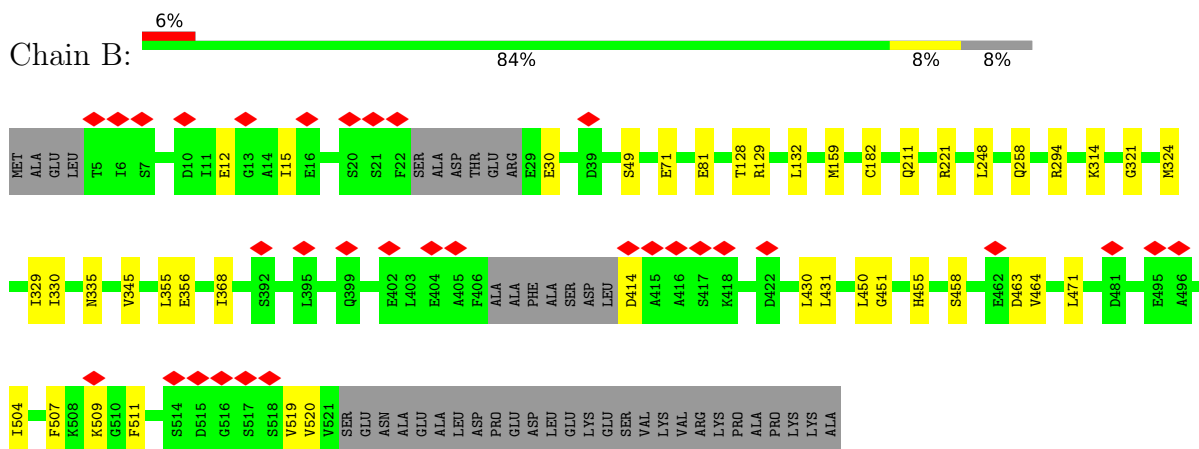
3 Residue-property plots

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.

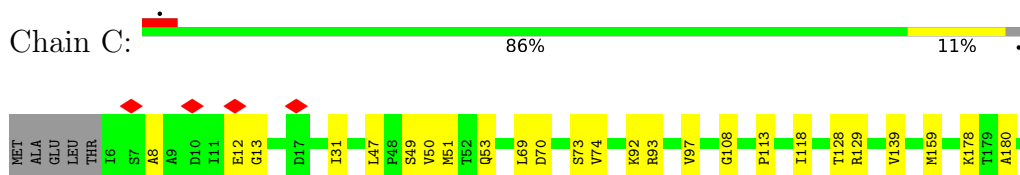
- Molecule 1: ATP synthase subunit alpha

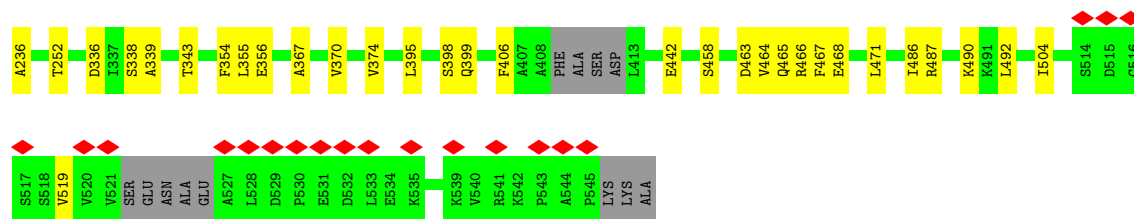


- Molecule 1: ATP synthase subunit alpha



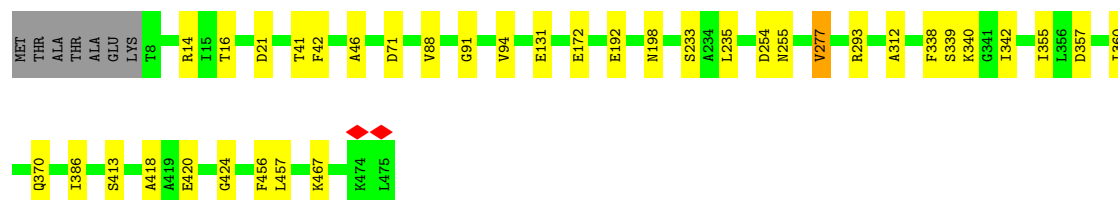
- Molecule 1: ATP synthase subunit alpha





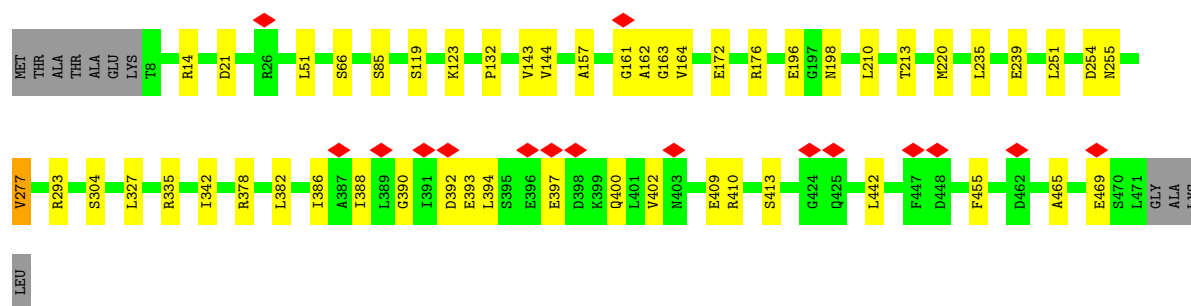
• Molecule 2: ATP synthase subunit beta

Chain D: 91% 8% .



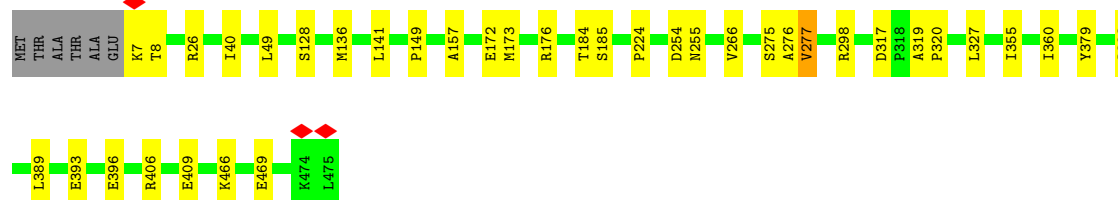
• Molecule 2: ATP synthase subunit beta

Chain E: 87% 11% .



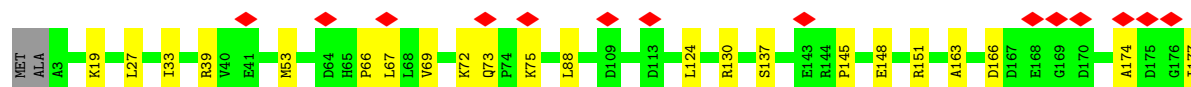
• Molecule 2: ATP synthase subunit beta

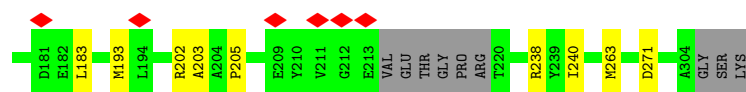
Chain F: 91% 8% .



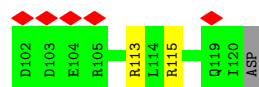
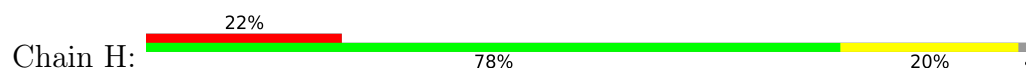
• Molecule 3: ATP synthase gamma chain

Chain G: 7% 86% 10% .

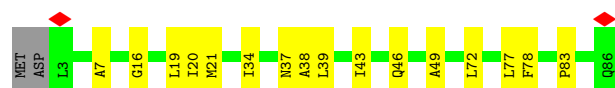
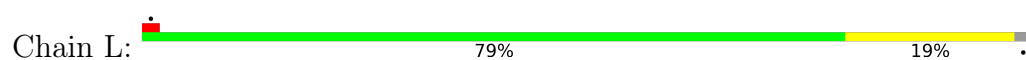




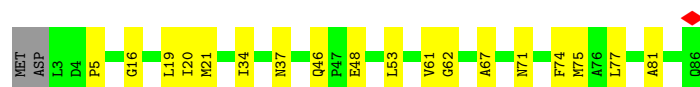
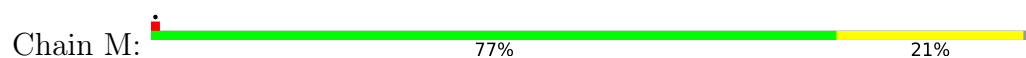
- Molecule 4: ATP synthase epsilon chain



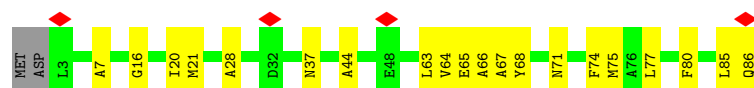
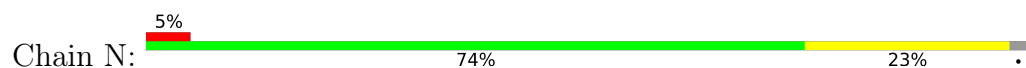
- Molecule 5: ATP synthase subunit c



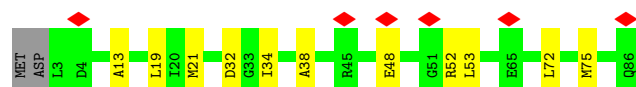
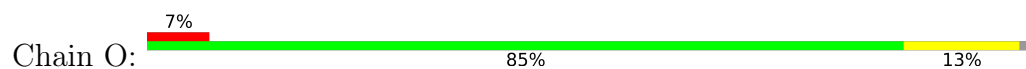
- Molecule 5: ATP synthase subunit c



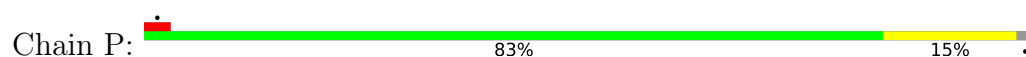
- Molecule 5: ATP synthase subunit c



- Molecule 5: ATP synthase subunit c

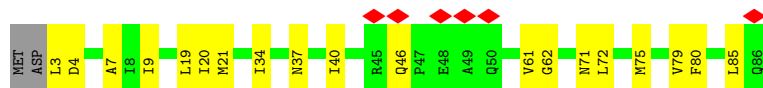
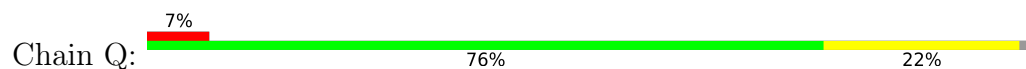


- Molecule 5: ATP synthase subunit c

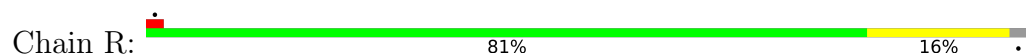




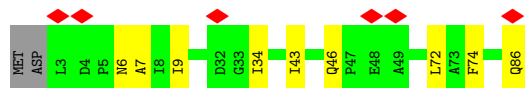
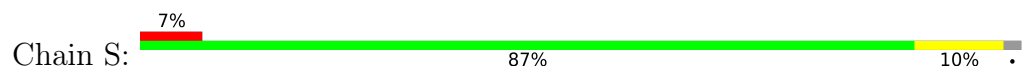
- Molecule 5: ATP synthase subunit c



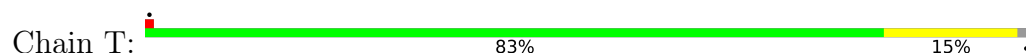
- Molecule 5: ATP synthase subunit c



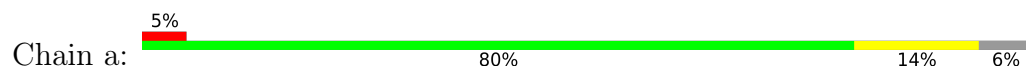
- Molecule 5: ATP synthase subunit c



- Molecule 5: ATP synthase subunit c



- Molecule 6: ATP synthase subunit a

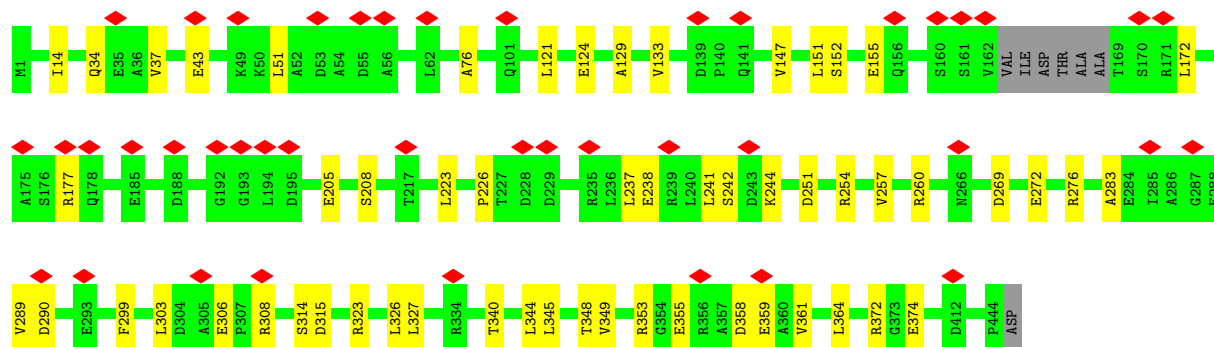
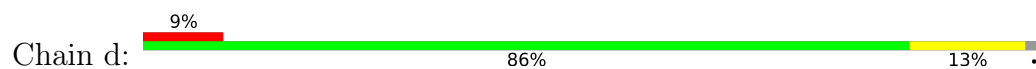


- Molecule 7: ATP synthase subunit b





- Molecule 8: ATP synthase subunit b-delta



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	23804	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 ($e^-/\text{\AA}^2$)	59.86	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	0.091	Depositor
Minimum map value	0.000	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.0146	Depositor
Map size (Å)	415.0, 415.0, 415.0	wwPDB
Map dimensions	500, 500, 500	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.83, 0.83, 0.83	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.18	0/3900	0.27	0/5277
1	B	0.18	0/3867	0.27	0/5233
1	C	0.18	0/4075	0.29	0/5515
2	D	0.19	0/3659	0.28	0/4961
2	E	0.17	0/3619	0.28	0/4908
2	F	0.19	0/3654	0.28	0/4953
3	G	0.16	0/2299	0.26	0/3107
4	H	0.14	0/922	0.28	0/1252
5	L	0.18	0/600	0.30	0/814
5	M	0.19	0/600	0.31	0/814
5	N	0.18	0/600	0.29	0/814
5	O	0.17	0/600	0.29	0/814
5	P	0.17	0/600	0.28	0/814
5	Q	0.17	0/600	0.29	0/814
5	R	0.17	0/600	0.27	0/814
5	S	0.18	0/600	0.29	0/814
5	T	0.17	0/600	0.28	0/814
6	a	0.15	0/1905	0.29	0/2602
7	b	0.16	0/1086	0.30	0/1467
8	d	0.13	0/3314	0.25	0/4488
All	All	0.17	0/37700	0.28	0/51089

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	3840	3851	3851	32	0
1	B	3810	3818	3818	26	0
1	C	4015	4026	4026	41	0
2	D	3589	3573	3567	30	0
2	E	3554	3533	3533	36	0
2	F	3589	3577	3577	24	0
3	G	2270	2281	2281	20	0
4	H	911	891	891	20	0
5	L	589	603	603	13	0
5	M	589	603	603	19	0
5	N	589	603	603	22	0
5	O	589	603	603	12	0
5	P	589	603	603	12	0
5	Q	589	603	603	16	0
5	R	589	603	603	13	0
5	S	589	603	603	11	0
5	T	589	603	603	11	0
6	a	1851	1916	1916	25	0
7	b	1077	1095	1095	21	0
8	d	3285	3371	3371	42	0
9	A	31	12	12	0	0
9	B	31	12	12	0	0
9	C	31	12	12	1	0
9	F	31	12	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
10	F	1	0	0	0	0
11	D	27	12	12	0	0
11	E	27	12	12	0	0
12	A	3	0	0	0	0
12	B	3	0	0	1	0
12	C	3	0	0	0	0
12	D	4	0	0	1	0
12	F	3	0	0	0	0
All	All	37291	37431	37425	359	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 5.

All (359) 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:C:53:GLN:NE2	2:D:71:ASP:OD1	2.11	0.82
2:E:157:ALA:HB2	2:E:327:LEU:HD13	1.62	0.82
1:C:487:ARG:O	1:C:490:LYS:NZ	2.14	0.81
8:d:172:LEU:O	8:d:177:ARG:NH2	2.14	0.80
5:Q:46:GLN:OE1	5:R:45:ARG:NH2	2.16	0.78
5:R:46:GLN:OE1	5:R:52:ARG:NH2	2.17	0.77
4:H:33:GLY:O	5:T:46:GLN:NE2	2.19	0.76
1:A:6:ILE:O	8:d:244:LYS:NZ	2.19	0.76
5:M:67:ALA:O	5:M:71:ASN:ND2	2.19	0.75
5:R:52:ARG:NH1	5:S:43:ILE:O	2.19	0.74
2:F:128:SER:O	2:F:298:ARG:NH2	2.21	0.73
5:Q:3:LEU:O	5:Q:3:LEU:HD23	1.88	0.73
1:A:182:CYS:SG	1:A:329:ILE:HD11	2.29	0.73
1:A:190:ARG:NH1	1:A:230:GLU:OE2	2.23	0.71
1:B:15:ILE:HD12	8:d:308:ARG:NH1	2.07	0.69
8:d:372:ARG:NH2	8:d:374:GLU:OE1	2.26	0.69
6:a:152:ARG:NH1	6:a:247:LEU:O	2.25	0.68
2:F:26:ARG:NH1	8:d:358:ASP:OD2	2.25	0.68
1:C:113:PRO:O	1:C:252:THR:OG1	2.06	0.68
4:H:75:GLU:OE1	4:H:75:GLU:N	2.26	0.68
1:B:221:ARG:NH1	2:E:132:PRO:O	2.26	0.67
3:G:238:ARG:NH1	4:H:67:GLY:O	2.28	0.67
5:Q:9:ILE:HD11	5:R:7:ALA:HA	1.77	0.66
1:A:133:GLU:OE1	1:A:307:ARG:NH1	2.29	0.66
6:a:153:ARG:NH1	6:a:246:GLU:O	2.29	0.66
1:B:211:GLN:OE1	12:B:701:HOH:O	2.14	0.65
5:N:28:ALA:HB2	5:N:68:TYR:HB2	1.79	0.65
4:H:98:ASP:OD2	4:H:113:ARG:NH2	2.30	0.65
2:D:342:ILE:HG23	2:D:413:SER:HB3	1.77	0.65
4:H:26:ARG:NH2	5:M:48:GLU:OE2	2.30	0.64
4:H:39:ILE:HG22	5:S:46:GLN:HE22	1.62	0.64
1:A:450:LEU:HD11	1:A:471:LEU:HD23	1.78	0.64
2:E:85:SER:OG	2:E:119:SER:OG	2.17	0.63
1:B:81:GLU:OE2	2:E:123:LYS:NZ	2.31	0.63
5:S:6:ASN:ND2	5:S:86:GLN:O	2.32	0.63
8:d:272:GLU:OE2	8:d:276:ARG:NH2	2.30	0.63
1:A:221:ARG:NH2	2:D:131:GLU:OE2	2.32	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:b:67:THR:HG21	8:d:43:GLU:OE1	1.99	0.63
7:b:138:ASP:OD1	7:b:141:ARG:NH2	2.32	0.63
1:A:159:MET:HE2	1:A:370:VAL:CG1	2.29	0.63
2:D:14:ARG:NE	2:D:21:ASP:OD2	2.31	0.63
2:E:235:LEU:HD21	2:E:293:ARG:HB2	1.80	0.63
1:C:336:ASP:OD1	1:C:338:SER:OG	2.13	0.62
4:H:73:THR:HG22	4:H:74:GLU:H	1.65	0.62
5:R:9:ILE:HD11	5:S:7:ALA:HA	1.81	0.62
5:L:7:ALA:HA	5:T:9:ILE:HD11	1.80	0.62
3:G:33:ILE:HG21	3:G:193:MET:HE1	1.80	0.62
4:H:89:GLU:N	4:H:89:GLU:OE1	2.33	0.62
1:A:318:GLU:N	1:A:318:GLU:OE1	2.33	0.61
5:R:74:PHE:CE2	5:S:72:LEU:HD11	2.35	0.61
2:E:465:ALA:O	2:E:469:GLU:OE1	2.18	0.61
8:d:241:LEU:HD12	8:d:241:LEU:O	2.00	0.61
8:d:344:LEU:HD21	8:d:364:LEU:HD22	1.81	0.61
1:B:258:GLN:HG3	1:B:324:MET:HE1	1.82	0.61
1:B:355:LEU:CD2	1:B:368:ILE:HD13	2.31	0.61
1:A:113:PRO:O	1:A:252:THR:OG1	2.19	0.60
8:d:147:VAL:O	8:d:151:LEU:HD23	2.01	0.60
3:G:148:GLU:OE1	3:G:151:ARG:NH2	2.34	0.60
2:D:192:GLU:OE1	12:D:701:HOH:O	2.16	0.60
5:M:21:MET:HG2	5:M:75:MET:SD	2.42	0.60
2:E:157:ALA:HB2	2:E:327:LEU:CD1	2.31	0.59
3:G:53:MET:HE2	4:H:71:SER:HB2	1.84	0.59
7:b:165:ASN:OD1	7:b:166:SER:N	2.35	0.59
5:P:86:GLN:NE2	5:Q:4:ASP:OD2	2.35	0.59
7:b:95:GLN:O	7:b:99:LEU:HD23	2.02	0.59
2:D:16:THR:HG23	2:D:16:THR:O	2.02	0.59
1:C:442:GLU:OE2	1:C:487:ARG:NE	2.35	0.59
4:H:86:PHE:O	4:H:90:ILE:HD12	2.02	0.58
1:B:71:GLU:N	1:B:71:GLU:OE1	2.33	0.58
5:N:64:VAL:HG12	5:O:32:ASP:HB2	1.84	0.58
1:C:374:VAL:HG11	2:D:338:PHE:HZ	1.69	0.58
2:D:235:LEU:HD21	2:D:293:ARG:HB2	1.86	0.58
7:b:139:GLN:NE2	7:b:140:VAL:HG13	2.19	0.58
8:d:151:LEU:O	8:d:155:GLU:OE1	2.22	0.57
2:F:157:ALA:HB3	2:F:327:LEU:HD13	1.87	0.57
5:O:48:GLU:OE2	5:O:52:ARG:NH1	2.38	0.57
1:A:365:ARG:NH2	2:D:370:GLN:OE1	2.35	0.57
4:H:65:VAL:HG13	4:H:81:VAL:HG12	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:d:129:ALA:O	8:d:133:VAL:HG23	2.05	0.57
3:G:166:ASP:OD1	3:G:174:ALA:N	2.37	0.56
6:a:110:PRO:C	6:a:111:LEU:HD22	2.29	0.56
1:A:376:ARG:NH1	2:E:196:GLU:OE2	2.39	0.56
4:H:48:ASP:OD1	4:H:115:ARG:NH1	2.38	0.56
8:d:344:LEU:CD2	8:d:364:LEU:HD13	2.35	0.56
1:A:347:SER:O	2:E:220:MET:HE1	2.06	0.56
5:N:77:LEU:HD22	7:b:25:LEU:HD12	1.88	0.56
8:d:358:ASP:OD1	8:d:359:GLU:N	2.39	0.56
8:d:283:ALA:HB2	8:d:340:THR:HG21	1.88	0.56
1:A:159:MET:HE1	1:A:394:ARG:HA	1.88	0.56
1:B:12:GLU:N	1:B:12:GLU:OE1	2.40	0.55
1:C:139:VAL:O	2:D:198:ASN:ND2	2.37	0.55
7:b:148:VAL:HG21	8:d:124:GLU:HG3	1.88	0.55
1:B:507:PHE:O	1:B:511:PHE:N	2.37	0.55
5:M:53:LEU:HD21	5:N:44:ALA:HB2	1.88	0.55
2:F:172:GLU:OE2	2:F:176:ARG:NE	2.39	0.55
2:D:456:PHE:O	2:D:467:LYS:NZ	2.40	0.55
6:a:105:TRP:O	6:a:108:VAL:HG12	2.06	0.55
7:b:149:ASP:OD1	7:b:150:GLY:N	2.39	0.54
1:B:314:LYS:NZ	1:B:321:GLY:O	2.40	0.54
5:L:46:GLN:OE1	5:L:49:ALA:HB2	2.07	0.54
1:A:62:VAL:HG11	1:A:85:ILE:HD11	1.88	0.54
2:E:14:ARG:NH1	2:E:21:ASP:OD2	2.40	0.54
2:F:389:LEU:HD13	2:F:393:GLU:HG3	1.90	0.54
5:L:34:ILE:HG22	5:M:37:ASN:HB2	1.89	0.53
1:A:471:LEU:HD21	1:A:504:ILE:HG12	1.90	0.53
5:M:34:ILE:HG22	5:N:37:ASN:HB2	1.90	0.53
3:G:39:ARG:NH1	3:G:145:PRO:O	2.35	0.52
4:H:52:ARG:NH1	4:H:54:GLU:OE2	2.43	0.52
1:C:191:GLU:O	1:C:195:THR:HG23	2.09	0.52
4:H:39:ILE:HG22	5:S:46:GLN:NE2	2.25	0.52
5:T:6:ASN:ND2	5:T:86:GLN:O	2.41	0.52
2:F:275:SER:OG	2:F:276:ALA:N	2.41	0.52
3:G:73:GLN:OE1	3:G:75:LYS:NZ	2.37	0.52
2:E:239:GLU:OE1	2:E:293:ARG:NH2	2.37	0.52
8:d:223:LEU:HD21	8:d:237:LEU:HD21	1.91	0.52
2:D:357:ASP:OD1	2:D:360:ILE:HD13	2.10	0.51
2:E:162:ALA:O	2:E:335:ARG:NH2	2.43	0.51
6:a:173:ILE:O	6:a:177:GLU:OE1	2.29	0.51
8:d:251:ASP:O	8:d:254:ARG:HG2	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:S:9:ILE:HD12	5:T:10:THR:OG1	2.10	0.51
4:H:34:ILE:HG21	4:H:77:VAL:HG21	1.93	0.51
1:C:395:LEU:HD21	2:D:457:LEU:HD11	1.93	0.50
2:D:357:ASP:OD1	2:D:357:ASP:N	2.44	0.50
7:b:129:ALA:O	7:b:133:LEU:HD13	2.11	0.50
7:b:147:SER:O	7:b:151:LEU:HD23	2.10	0.50
3:G:202:ARG:NH1	3:G:205:PRO:O	2.45	0.50
2:E:161:GLY:O	2:E:164:VAL:HG22	2.11	0.50
2:F:141:LEU:HD12	2:F:173:MET:CE	2.41	0.50
5:S:9:ILE:HD11	5:T:7:ALA:HA	1.92	0.50
1:C:51:MET:HE3	1:C:97:VAL:HG13	1.93	0.50
2:E:277:VAL:HG12	2:E:277:VAL:O	2.11	0.50
1:A:251:TYR:OH	1:A:304:LEU:HD12	2.12	0.50
4:H:73:THR:HG22	4:H:74:GLU:N	2.27	0.50
6:a:95:THR:HG21	7:b:42:LEU:HD13	1.94	0.50
5:L:16:GLY:O	5:L:20:ILE:HG12	2.12	0.50
7:b:121:GLU:OE2	7:b:122:VAL:HG23	2.11	0.50
2:E:409:GLU:OE2	2:E:410:ARG:NH1	2.45	0.50
3:G:67:LEU:HD11	3:G:240:ILE:HD12	1.93	0.50
1:A:455:HIS:O	1:A:508:LYS:NZ	2.45	0.49
1:A:139:VAL:O	2:E:198:ASN:ND2	2.43	0.49
3:G:72:LYS:O	3:G:73:GLN:NE2	2.44	0.49
1:A:159:MET:HE2	1:A:370:VAL:HG11	1.94	0.49
5:N:20:ILE:CD1	5:O:21:MET:HB2	2.42	0.49
1:A:395:LEU:O	1:A:399:GLN:HG3	2.13	0.49
1:B:335:ASN:ND2	1:B:356:GLU:OE2	2.45	0.49
5:N:21:MET:SD	5:N:75:MET:HE2	2.52	0.49
1:C:178:LYS:HG2	1:C:355:LEU:HD12	1.95	0.49
5:Q:34:ILE:HG22	5:R:37:ASN:HB2	1.94	0.49
5:N:80:PHE:CD2	6:a:13:VAL:HG21	2.48	0.49
6:a:188:ARG:O	6:a:192:ASN:ND2	2.46	0.49
6:a:142:PHE:HA	6:a:145:TYR:CE1	2.47	0.48
6:a:59:PRO:O	8:d:34:GLN:NE2	2.46	0.48
8:d:327:LEU:HD21	8:d:345:LEU:HG	1.94	0.48
1:B:294:ARG:NH2	2:F:317:ASP:OD1	2.45	0.48
1:C:159:MET:HE1	1:C:370:VAL:HG22	1.95	0.48
5:N:16:GLY:O	5:N:20:ILE:HG12	2.13	0.48
8:d:327:LEU:HD22	8:d:349:VAL:HG21	1.95	0.48
5:R:59:ILE:O	5:R:63:LEU:HD23	2.14	0.48
1:C:31:ILE:HG22	1:C:92:LYS:HD3	1.96	0.48
1:C:49:SER:OG	1:C:93:ARG:NH1	2.47	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:M:16:GLY:O	5:M:20:ILE:HG12	2.14	0.48
8:d:315:ASP:O	8:d:323:ARG:NH1	2.47	0.48
2:E:172:GLU:OE2	2:E:176:ARG:NE	2.46	0.47
2:E:442:LEU:HD21	2:E:455:PHE:HE1	1.79	0.47
2:D:91:GLY:O	2:D:94:VAL:HG22	2.13	0.47
2:E:386:ILE:HG13	2:E:394:LEU:HD11	1.96	0.47
1:A:450:LEU:HD21	1:A:471:LEU:CD2	2.45	0.47
5:N:63:LEU:O	5:N:66:ALA:HB3	2.14	0.47
6:a:91:PRO:HA	6:a:94:VAL:HG12	1.96	0.47
6:a:176:VAL:O	6:a:180:ALA:N	2.43	0.47
2:F:466:LYS:NZ	2:F:469:GLU:OE1	2.42	0.47
2:E:386:ILE:HD11	2:E:402:VAL:HG21	1.96	0.47
2:E:392:ASP:OD1	2:E:393:GLU:N	2.46	0.47
5:M:5:PRO:HB3	5:N:7:ALA:HB2	1.97	0.47
5:N:64:VAL:HG12	5:O:32:ASP:CB	2.45	0.47
5:M:21:MET:CG	5:M:75:MET:SD	3.03	0.47
5:R:21:MET:HG2	5:R:75:MET:HG3	1.97	0.47
1:B:330:ILE:HD11	1:B:345:VAL:HG21	1.96	0.47
1:B:458:SER:OG	1:B:519:VAL:O	2.28	0.47
2:E:388:ILE:HD12	3:G:27:LEU:HD13	1.95	0.47
3:G:19:LYS:HD2	3:G:271:ASP:OD1	2.15	0.47
5:O:53:LEU:HD21	5:P:44:ALA:HB2	1.96	0.47
6:a:194:PHE:CE2	6:a:198:ILE:HD11	2.49	0.47
6:a:177:GLU:OE1	6:a:177:GLU:N	2.37	0.46
5:L:78:PHE:CZ	5:M:75:MET:CE	2.98	0.46
1:C:471:LEU:HD11	1:C:504:ILE:HG12	1.97	0.46
4:H:39:ILE:HG23	5:T:45:ARG:O	2.16	0.46
5:N:64:VAL:HG23	5:N:65:GLU:N	2.31	0.46
3:G:263:MET:HA	3:G:263:MET:HE2	1.96	0.46
5:L:37:ASN:HB2	5:T:34:ILE:HG22	1.96	0.46
1:B:12:GLU:HA	1:B:15:ILE:HG12	1.97	0.46
1:C:406:PHE:CE1	2:D:386:ILE:HG21	2.50	0.46
5:L:21:MET:HE1	5:L:72:LEU:HA	1.98	0.46
2:F:277:VAL:HG12	2:F:277:VAL:O	2.15	0.46
8:d:314:SER:O	8:d:314:SER:OG	2.26	0.46
1:B:30:GLU:OE2	1:B:49:SER:OG	2.25	0.45
2:E:378:ARG:NH2	2:E:382:LEU:HD11	2.30	0.45
2:D:355:ILE:HB	2:D:360:ILE:HG21	1.98	0.45
2:E:386:ILE:CG1	2:E:394:LEU:HD11	2.45	0.45
3:G:183:LEU:O	3:G:203:ALA:N	2.49	0.45
1:B:132:LEU:HD12	1:B:248:LEU:HD11	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:339:ALA:O	1:C:343:THR:HG23	2.17	0.45
5:P:57:PHE:HA	5:Q:40:ILE:HD11	1.98	0.45
1:A:36:ASP:OD1	1:A:43:HIS:ND1	2.46	0.45
5:P:74:PHE:CD1	5:Q:75:MET:HE1	2.52	0.45
1:C:97:VAL:HG22	2:D:42:PHE:HE2	1.82	0.45
1:C:343:THR:HG21	2:D:312:ALA:HB2	1.99	0.45
2:D:254:ASP:HA	2:D:255:ASN:HA	1.83	0.45
4:H:4:LEU:HD12	4:H:77:VAL:HG23	1.99	0.45
5:S:34:ILE:HG22	5:T:37:ASN:HB2	1.98	0.45
8:d:344:LEU:HD23	8:d:364:LEU:HD13	1.96	0.45
6:a:21:GLU:OE2	6:a:24:GLY:N	2.49	0.45
2:F:157:ALA:HB2	2:F:327:LEU:HD22	1.99	0.45
8:d:205:GLU:O	8:d:208:SER:OG	2.32	0.44
8:d:306:GLU:OE1	8:d:306:GLU:N	2.50	0.44
5:O:19:LEU:HD13	5:P:19:LEU:HG	2.00	0.44
5:Q:79:VAL:HG23	5:Q:80:PHE:N	2.32	0.44
5:O:13:ALA:HB2	5:P:14:LEU:HD13	1.99	0.44
6:a:159:PRO:HA	6:a:162:VAL:HG22	2.00	0.44
1:B:450:LEU:HD11	1:B:471:LEU:HD22	2.00	0.44
2:D:277:VAL:HG12	2:D:277:VAL:O	2.17	0.44
3:G:66:PRO:HA	3:G:69:VAL:HG22	1.99	0.44
8:d:353:ARG:N	8:d:355:GLU:OE1	2.50	0.44
1:B:182:CYS:SG	1:B:329:ILE:HD11	2.57	0.44
1:C:8:ALA:O	1:C:12:GLU:OE1	2.35	0.44
5:Q:19:LEU:HD13	5:R:19:LEU:HG	2.00	0.44
1:B:414:ASP:OD1	1:B:414:ASP:N	2.51	0.44
3:G:163:ALA:HB1	3:G:177:ILE:HG13	2.00	0.44
5:Q:71:ASN:O	5:Q:72:LEU:C	2.61	0.44
7:b:132:GLN:OE1	7:b:133:LEU:HD12	2.17	0.44
3:G:88:LEU:HD12	3:G:263:MET:HE1	1.99	0.43
5:P:34:ILE:HG22	5:Q:37:ASN:HB2	1.98	0.43
6:a:59:PRO:CD	8:d:37:VAL:HG11	2.48	0.43
1:A:486:ILE:HD11	1:A:492:LEU:HD13	2.00	0.43
5:S:74:PHE:HE2	5:T:72:LEU:HD11	1.83	0.43
2:E:342:ILE:HG23	2:E:413:SER:HB3	2.00	0.43
2:F:136:MET:HE3	2:F:149:PRO:HB3	1.98	0.43
5:M:74:PHE:CD2	5:N:21:MET:HE1	2.54	0.43
6:a:219:LYS:HB2	8:d:14:ILE:HD11	1.99	0.43
1:B:159:MET:HE2	1:B:431:LEU:HD13	2.01	0.43
8:d:237:LEU:HD11	8:d:257:VAL:HG21	2.00	0.43
2:E:51:LEU:HD23	2:E:66:SER:HA	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:N:65:GLU:O	5:N:66:ALA:C	2.61	0.43
2:E:388:ILE:CD1	3:G:27:LEU:HD13	2.48	0.43
1:C:398:SER:OG	2:D:339:SER:O	2.36	0.43
2:F:184:THR:HG22	2:F:185:SER:N	2.34	0.43
2:E:397:GLU:O	2:E:400:GLN:HG3	2.19	0.43
5:L:20:ILE:CD1	5:M:21:MET:HB2	2.49	0.43
7:b:144:LEU:HD13	8:d:121:LEU:HD12	2.00	0.43
8:d:345:LEU:HD13	8:d:361:VAL:HG22	2.00	0.43
2:D:42:PHE:O	2:D:46:ALA:N	2.52	0.43
2:F:355:ILE:HB	2:F:360:ILE:HG21	2.01	0.43
5:L:21:MET:HB2	5:T:20:ILE:HG12	2.01	0.43
5:M:20:ILE:HD13	5:N:21:MET:HB2	2.00	0.43
5:T:21:MET:HG2	5:T:75:MET:HG3	2.00	0.42
8:d:289:VAL:HG13	8:d:290:ASP:N	2.33	0.42
5:O:38:ALA:HB2	5:P:37:ASN:OD1	2.19	0.42
6:a:30:ASP:OD1	6:a:30:ASP:N	2.50	0.42
8:d:326:LEU:HD23	8:d:326:LEU:C	2.44	0.42
1:A:65:VAL:HG21	1:A:98:LEU:HD11	2.01	0.42
1:A:413:LEU:N	1:A:413:LEU:HD12	2.34	0.42
1:C:51:MET:HE3	1:C:97:VAL:CG1	2.49	0.42
4:H:29:ALA:O	5:M:46:GLN:NE2	2.52	0.42
5:R:5:PRO:HB3	5:S:7:ALA:HB2	2.00	0.42
5:R:49:ALA:HB2	5:R:52:ARG:HH21	1.84	0.42
6:a:141:VAL:O	6:a:145:TYR:CD1	2.72	0.42
6:a:177:GLU:HA	6:a:180:ALA:HB3	2.01	0.42
1:B:128:THR:OG1	1:B:129:ARG:N	2.52	0.42
1:B:430:LEU:HD22	1:B:451:GLY:HA3	2.00	0.42
2:F:396:GLU:OE1	3:G:130:ARG:NH1	2.47	0.42
5:P:55:THR:HB	5:P:56:PRO:HD3	2.00	0.42
1:C:466:ARG:O	1:C:467:PHE:C	2.63	0.42
2:D:41:THR:O	2:D:41:THR:HG22	2.18	0.42
2:D:235:LEU:HD21	2:D:293:ARG:CB	2.48	0.42
1:A:128:THR:OG1	1:A:129:ARG:N	2.52	0.42
1:A:401:ARG:O	1:A:404:GLU:HG2	2.19	0.42
2:F:406:ARG:O	2:F:409:GLU:HG2	2.19	0.42
5:N:74:PHE:CZ	5:O:72:LEU:HD11	2.54	0.42
6:a:111:LEU:HD12	6:a:123:LEU:HD12	2.01	0.42
8:d:348:THR:HG21	8:d:364:LEU:HD11	2.02	0.42
1:A:414:ASP:OD2	2:E:390:GLY:N	2.53	0.42
2:E:442:LEU:HD21	2:E:455:PHE:CE1	2.55	0.42
5:L:19:LEU:HD13	5:M:19:LEU:HG	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:a:209:TYR:O	6:a:212:TRP:NE1	2.47	0.42
7:b:70:ASP:C	7:b:70:ASP:OD1	2.63	0.42
1:B:455:HIS:CD2	1:B:504:ILE:HG21	2.55	0.42
7:b:108:ARG:HA	7:b:111:VAL:HG12	2.02	0.42
1:A:463:ASP:OD2	1:A:466:ARG:NH2	2.46	0.42
2:F:157:ALA:CB	2:F:327:LEU:HD13	2.48	0.42
2:F:254:ASP:HA	2:F:255:ASN:HA	1.86	0.42
5:N:85:LEU:O	5:N:86:GLN:C	2.63	0.42
5:Q:61:VAL:O	5:Q:62:GLY:C	2.63	0.42
1:C:12:GLU:O	1:C:13:GLY:C	2.61	0.42
1:C:70:ASP:OD1	1:C:73:SER:O	2.37	0.42
2:E:210:LEU:HA	2:E:213:THR:HG22	2.01	0.42
5:N:66:ALA:O	5:N:67:ALA:C	2.63	0.42
1:C:118:ILE:HD11	1:C:236:ALA:HB3	2.00	0.41
1:C:128:THR:OG1	1:C:129:ARG:N	2.53	0.41
2:E:254:ASP:HA	2:E:255:ASN:HA	1.84	0.41
2:F:224:PRO:HB2	2:F:266:VAL:HG23	2.02	0.41
2:F:319:ALA:HB3	2:F:320:PRO:CD	2.50	0.41
8:d:299:PHE:O	8:d:303:LEU:HD23	2.20	0.41
2:E:163:GLY:O	2:E:335:ARG:NH2	2.53	0.41
2:F:7:LYS:CD	2:F:8:THR:H	2.33	0.41
4:H:81:VAL:HG21	4:H:84:ALA:HB2	2.02	0.41
1:A:166:GLN:NE2	1:A:168:GLN:OE1	2.53	0.41
5:P:5:PRO:HB3	5:Q:7:ALA:HB2	2.02	0.41
7:b:96:ALA:HB1	8:d:76:ALA:HB2	2.03	0.41
7:b:124:GLN:O	7:b:127:THR:HG22	2.19	0.41
1:C:354:PHE:CE2	1:C:356:GLU:OE2	2.74	0.41
1:C:463:ASP:O	1:C:464:VAL:C	2.63	0.41
2:F:379:TYR:O	2:F:383:GLN:HG2	2.21	0.41
5:M:20:ILE:CD1	5:N:21:MET:HB2	2.50	0.41
5:O:34:ILE:HG22	5:P:37:ASN:HB2	2.02	0.41
8:d:238:GLU:O	8:d:242:SER:HB2	2.21	0.41
1:A:106:PHE:O	1:A:233:THR:OG1	2.31	0.41
1:C:180:ALA:N	9:C:600:ATP:O2A	2.52	0.41
1:C:467:PHE:O	1:C:468:GLU:C	2.63	0.41
5:M:61:VAL:O	5:M:62:GLY:C	2.64	0.41
7:b:118:ALA:O	7:b:121:GLU:HG3	2.20	0.41
1:A:150:GLN:NE2	1:A:157:ASP:OD2	2.53	0.41
2:D:172:GLU:OE1	2:D:418:ALA:N	2.50	0.41
1:C:108:GLY:C	1:C:229:MET:HE3	2.46	0.41
1:C:395:LEU:CD2	2:D:457:LEU:HD11	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:88:VAL:HG11	2:D:233:SER:HB3	2.03	0.41
2:E:251:LEU:O	2:E:304:SER:HA	2.20	0.41
6:a:125:LYS:NZ	6:a:129:SER:OG	2.31	0.41
1:C:47:LEU:HB3	1:C:50:VAL:HB	2.02	0.41
1:C:458:SER:OG	1:C:519:VAL:O	2.33	0.41
2:E:397:GLU:OE2	2:E:400:GLN:NE2	2.53	0.41
2:F:40:ILE:HD11	2:F:49:LEU:HD11	2.03	0.41
5:N:74:PHE:CD1	5:O:75:MET:HE1	2.56	0.41
8:d:152:SER:HA	8:d:155:GLU:OE1	2.21	0.41
8:d:269:ASP:OD1	8:d:353:ARG:NH2	2.54	0.41
1:C:464:VAL:O	1:C:465:GLN:C	2.64	0.41
1:C:486:ILE:HD11	1:C:492:LEU:HD13	2.03	0.41
2:F:141:LEU:HD12	2:F:173:MET:HE1	2.03	0.41
5:M:77:LEU:HD12	5:M:81:ALA:HB3	2.01	0.41
6:a:174:ASN:O	6:a:177:GLU:OE1	2.39	0.41
7:b:73:LYS:HZ2	8:d:51:LEU:HG	1.86	0.41
1:C:399:GLN:OE1	2:D:340:LYS:O	2.38	0.40
5:L:38:ALA:HB2	5:M:37:ASN:OD1	2.20	0.40
8:d:226:PRO:HB2	8:d:260:ARG:CZ	2.52	0.40
1:C:69:LEU:HD23	1:C:74:VAL:HG13	2.04	0.40
2:E:143:VAL:HG13	2:E:144:VAL:N	2.35	0.40
3:G:124:LEU:HD11	3:G:137:SER:OG	2.21	0.40
5:P:20:ILE:HG23	5:P:71:ASN:OD1	2.22	0.40
1:C:47:LEU:HD22	1:C:93:ARG:HG3	2.03	0.40
1:C:355:LEU:HA	1:C:367:ALA:O	2.22	0.40
2:D:420:GLU:O	2:D:424:GLY:N	2.43	0.40
5:L:77:LEU:HD21	5:L:83:PRO:HG3	2.03	0.40
5:Q:21:MET:HG2	5:Q:75:MET:HG3	2.03	0.40
7:b:51:PRO:HB2	7:b:52:PRO:HD3	2.02	0.40
1:B:509:LYS:HA	1:B:520:VAL:HG22	2.04	0.40
5:L:39:LEU:O	5:L:43:ILE:HG12	2.21	0.40
5:Q:9:ILE:HG21	5:Q:85:LEU:HD23	2.04	0.40
5:Q:20:ILE:HG12	5:R:21:MET:HB2	2.04	0.40
1:B:463:ASP:O	1:B:464:VAL:C	2.65	0.40
5:N:71:ASN:ND2	5:O:21:MET:HE3	2.36	0.40

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	502/548 (92%)	488 (97%)	14 (3%)	0	100	100
1	B	498/548 (91%)	485 (97%)	13 (3%)	0	100	100
1	C	525/548 (96%)	512 (98%)	13 (2%)	0	100	100
2	D	468/475 (98%)	458 (98%)	9 (2%)	1 (0%)	43	62
2	E	462/475 (97%)	454 (98%)	7 (2%)	1 (0%)	43	62
2	F	467/475 (98%)	456 (98%)	10 (2%)	1 (0%)	43	62
3	G	292/307 (95%)	290 (99%)	2 (1%)	0	100	100
4	H	116/121 (96%)	110 (95%)	6 (5%)	0	100	100
5	L	82/86 (95%)	78 (95%)	4 (5%)	0	100	100
5	M	82/86 (95%)	79 (96%)	3 (4%)	0	100	100
5	N	82/86 (95%)	76 (93%)	6 (7%)	0	100	100
5	O	82/86 (95%)	79 (96%)	3 (4%)	0	100	100
5	P	82/86 (95%)	80 (98%)	2 (2%)	0	100	100
5	Q	82/86 (95%)	75 (92%)	7 (8%)	0	100	100
5	R	82/86 (95%)	82 (100%)	0	0	100	100
5	S	82/86 (95%)	79 (96%)	3 (4%)	0	100	100
5	T	82/86 (95%)	81 (99%)	1 (1%)	0	100	100
6	a	236/252 (94%)	232 (98%)	4 (2%)	0	100	100
7	b	143/180 (79%)	138 (96%)	5 (4%)	0	100	100
8	d	434/445 (98%)	431 (99%)	3 (1%)	0	100	100
All	All	4881/5148 (95%)	4763 (98%)	115 (2%)	3 (0%)	49	67

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	E	277	VAL

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Mol	Chain	Res	Type
2	D	277	VAL
2	F	277	VAL

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	410/441 (93%)	410 (100%)	0	100	100
1	B	406/441 (92%)	406 (100%)	0	100	100
1	C	428/441 (97%)	428 (100%)	0	100	100
2	D	384/388 (99%)	384 (100%)	0	100	100
2	E	381/388 (98%)	381 (100%)	0	100	100
2	F	384/388 (99%)	384 (100%)	0	100	100
3	G	230/238 (97%)	230 (100%)	0	100	100
4	H	94/96 (98%)	94 (100%)	0	100	100
5	L	54/56 (96%)	54 (100%)	0	100	100
5	M	54/56 (96%)	54 (100%)	0	100	100
5	N	54/56 (96%)	54 (100%)	0	100	100
5	O	54/56 (96%)	54 (100%)	0	100	100
5	P	54/56 (96%)	54 (100%)	0	100	100
5	Q	54/56 (96%)	54 (100%)	0	100	100
5	R	54/56 (96%)	54 (100%)	0	100	100
5	S	54/56 (96%)	54 (100%)	0	100	100
5	T	54/56 (96%)	54 (100%)	0	100	100
6	a	191/200 (96%)	191 (100%)	0	100	100
7	b	111/134 (83%)	111 (100%)	0	100	100
8	d	342/347 (99%)	342 (100%)	0	100	100
All	All	3847/4006 (96%)	3847 (100%)	0	100	100

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

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	141	GLN
1	A	258	GLN
1	A	399	GLN
1	B	135	GLN
1	B	305	HIS
1	B	505	ASN
1	C	53	GLN
1	C	453	GLN
1	C	455	HIS
1	C	512	GLN
2	D	37	HIS
2	E	261	GLN
2	F	97	HIS
2	F	403	ASN
3	G	149	ASN
4	H	85	GLN
5	L	6	ASN
5	M	46	GLN
5	M	71	ASN
5	R	6	ASN
6	a	15	HIS
6	a	63	GLN
6	a	75	GLN
7	b	77	GLN
8	d	78	GLN
8	d	338	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 11 ligands modelled in this entry, 5 are monoatomic - leaving 6 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
9	ATP	C	600	10	32,33,33	0.61	1 (3%)	48,52,52	0.68	0
11	ADP	E	600	-	28,29,29	1.37	4 (14%)	43,45,45	1.91	10 (23%)
9	ATP	A	600	10	32,33,33	0.54	0	48,52,52	0.68	1 (2%)
9	ATP	F	600	10	32,33,33	0.64	2 (6%)	48,52,52	0.68	0
11	ADP	D	600	10	28,29,29	1.34	5 (17%)	43,45,45	1.87	11 (25%)
9	ATP	B	600	10	32,33,33	0.53	0	48,52,52	0.71	1 (2%)

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
9	ATP	C	600	10	-	1/22/38/38	0/3/3/3
11	ADP	E	600	-	-	1/16/32/32	0/3/3/3
9	ATP	A	600	10	-	0/22/38/38	0/3/3/3
9	ATP	F	600	10	-	2/22/38/38	0/3/3/3
11	ADP	D	600	10	-	4/16/32/32	0/3/3/3
9	ATP	B	600	10	-	0/22/38/38	0/3/3/3

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	E	600	ADP	C5-C4	4.52	1.47	1.39
11	D	600	ADP	C5-C4	4.21	1.46	1.39
11	E	600	ADP	C5-C6	2.57	1.48	1.41
11	D	600	ADP	C5-N7	-2.56	1.34	1.39
11	D	600	ADP	C5-C6	2.46	1.47	1.41
11	E	600	ADP	C5-N7	-2.38	1.34	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	E	600	ADP	C8-N7	2.28	1.36	1.31
9	F	600	ATP	PB-O3B	-2.24	1.57	1.59
11	D	600	ADP	C4-N9	-2.19	1.33	1.37
11	D	600	ADP	C8-N7	2.12	1.35	1.31
9	C	600	ATP	PA-O3A	-2.06	1.57	1.59
9	F	600	ATP	PA-O3A	-2.02	1.57	1.59

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	E	600	ADP	C5-C4-N3	-5.94	118.54	126.72
11	D	600	ADP	C5-C4-N3	-5.60	119.00	126.72
11	E	600	ADP	N3-C4-N9	4.82	135.37	127.17
11	D	600	ADP	N3-C4-N9	4.61	135.01	127.17
11	E	600	ADP	C2-N3-C4	3.91	121.39	111.83
11	D	600	ADP	C2-N3-C4	3.82	121.16	111.83
11	D	600	ADP	N3-C2-N1	-3.81	122.81	128.58
11	E	600	ADP	N3-C2-N1	-3.69	122.99	128.58
11	E	600	ADP	C4-C5-N7	-3.38	106.72	110.58
11	D	600	ADP	C4-C5-N7	-3.29	106.82	110.58
11	D	600	ADP	C4-N9-C8	3.19	109.09	105.74
11	E	600	ADP	C4-N9-C8	2.92	108.80	105.74
11	D	600	ADP	C2'-C1'-N9	-2.81	106.33	113.30
11	E	600	ADP	C5-N7-C8	2.65	107.61	103.45
11	D	600	ADP	C5-N7-C8	2.63	107.59	103.45
11	E	600	ADP	C3'-C2'-C1'	2.49	106.18	101.46
11	D	600	ADP	N9-C8-N7	-2.41	110.52	113.94
11	E	600	ADP	N9-C8-N7	-2.23	110.77	113.94
11	D	600	ADP	C2-N1-C6	2.16	122.28	118.73
11	D	600	ADP	C6-C5-N7	2.13	136.20	132.09
9	A	600	ATP	O3'-C3'-C2'	-2.11	105.06	111.82
9	B	600	ATP	O2'-C2'-C3'	-2.07	105.18	111.82
11	E	600	ADP	C6-C5-N7	2.04	136.02	132.09

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
11	D	600	ADP	C5'-O5'-PA-O3A
11	E	600	ADP	O4'-C4'-C5'-O5'
9	F	600	ATP	PA-O3A-PB-O1B
9	C	600	ATP	C5'-O5'-PA-O1A

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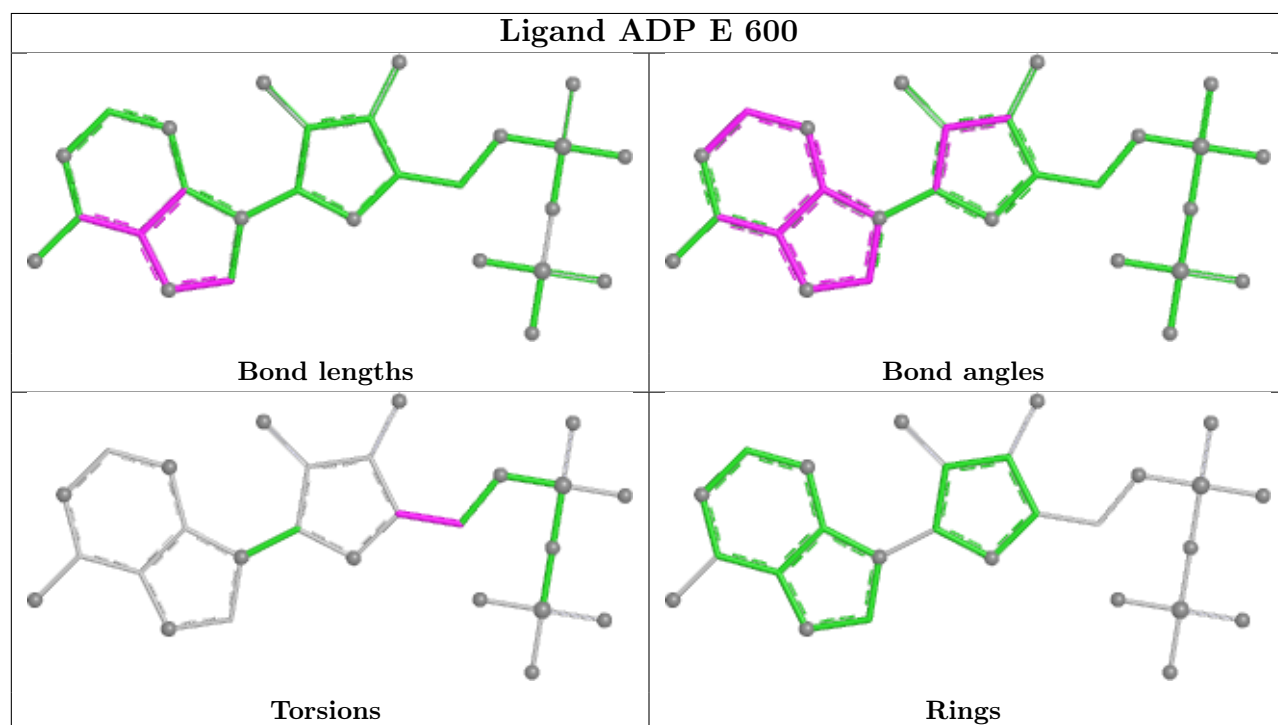
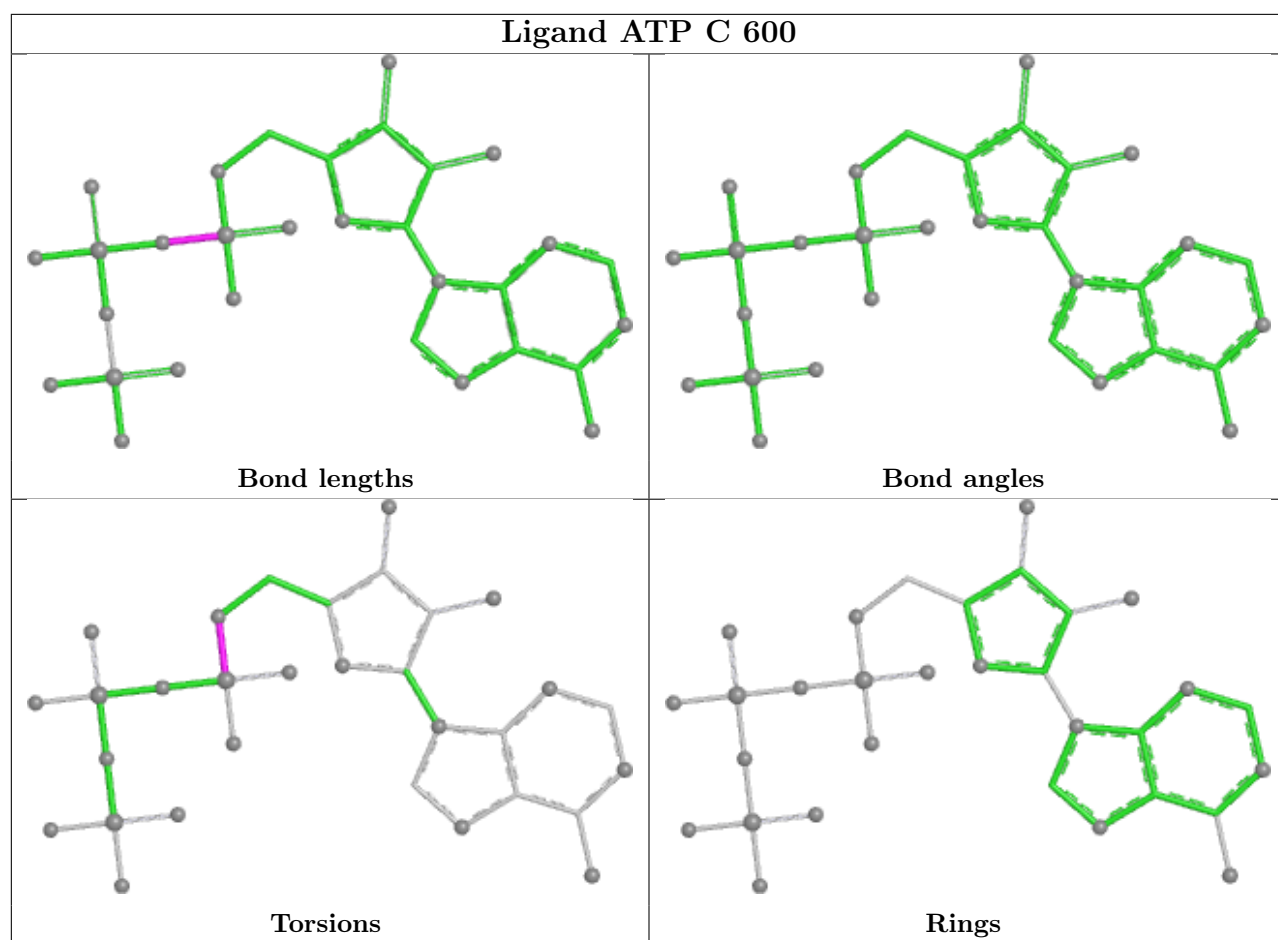
Mol	Chain	Res	Type	Atoms
11	D	600	ADP	C5'-O5'-PA-O1A
11	D	600	ADP	C5'-O5'-PA-O2A
9	F	600	ATP	PA-O3A-PB-O2B
11	D	600	ADP	PB-O3A-PA-O2A

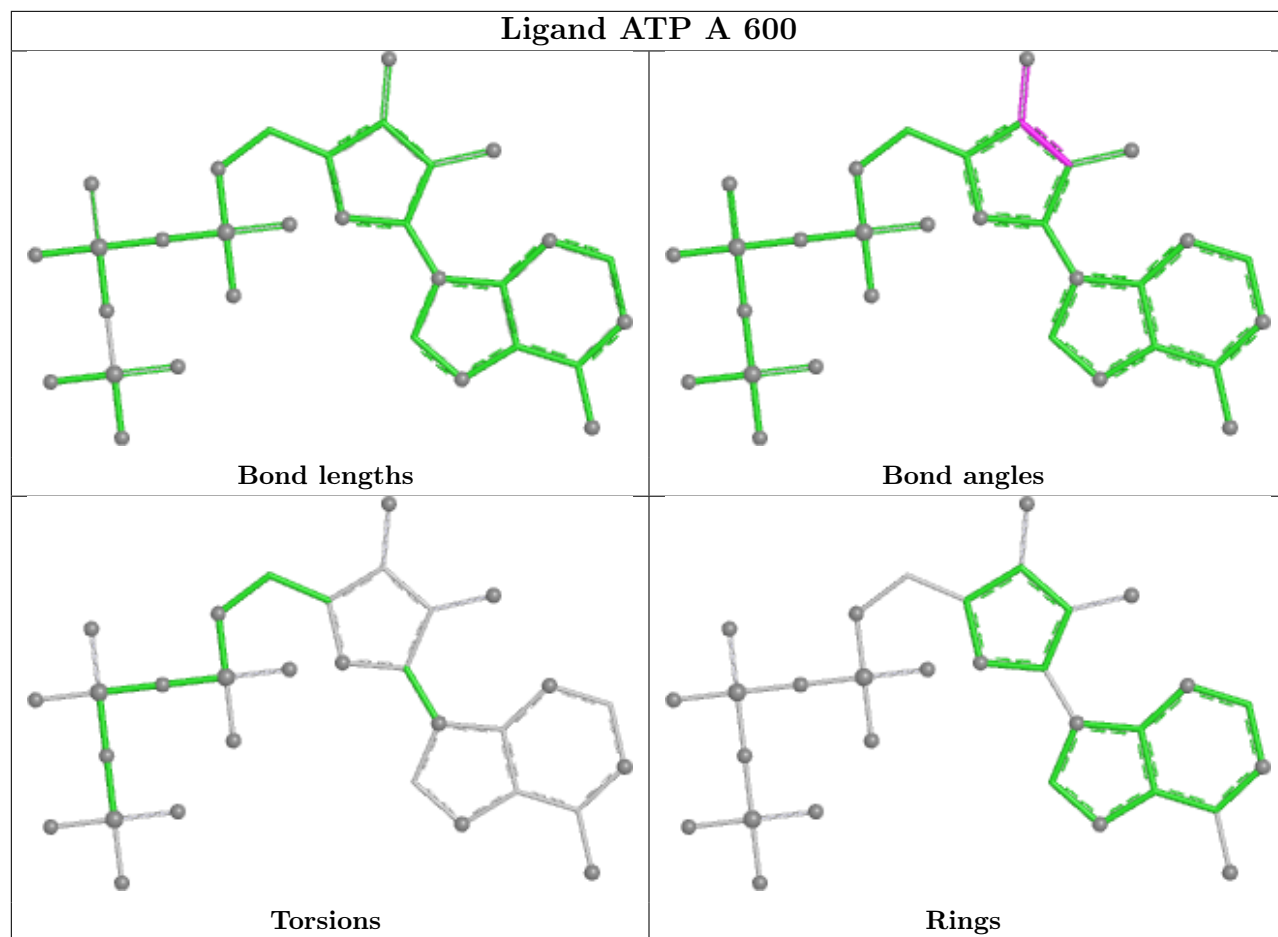
There are no ring outliers.

1 monomer is involved in 1 short contact:

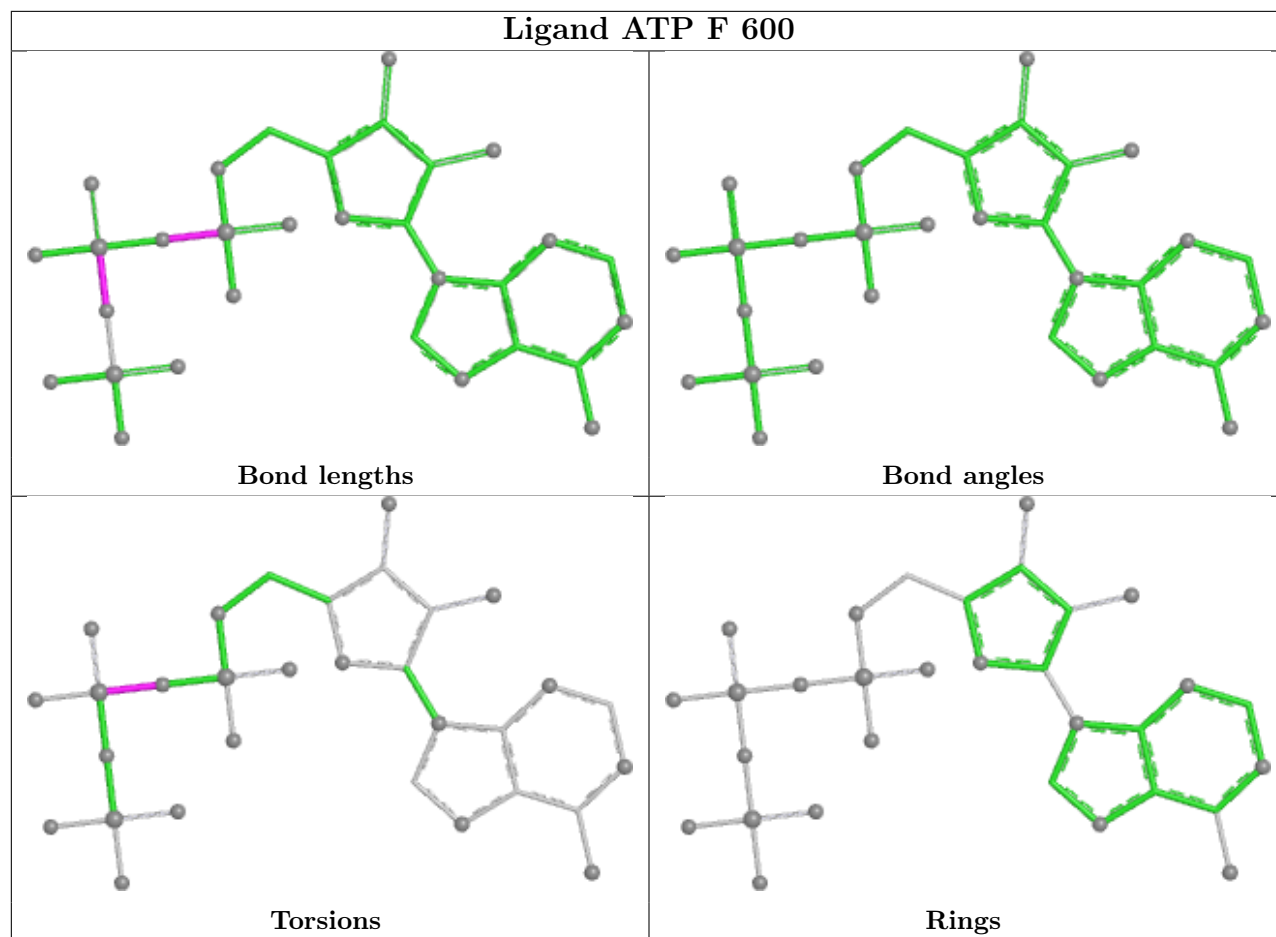
Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	C	600	ATP	1	0

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.

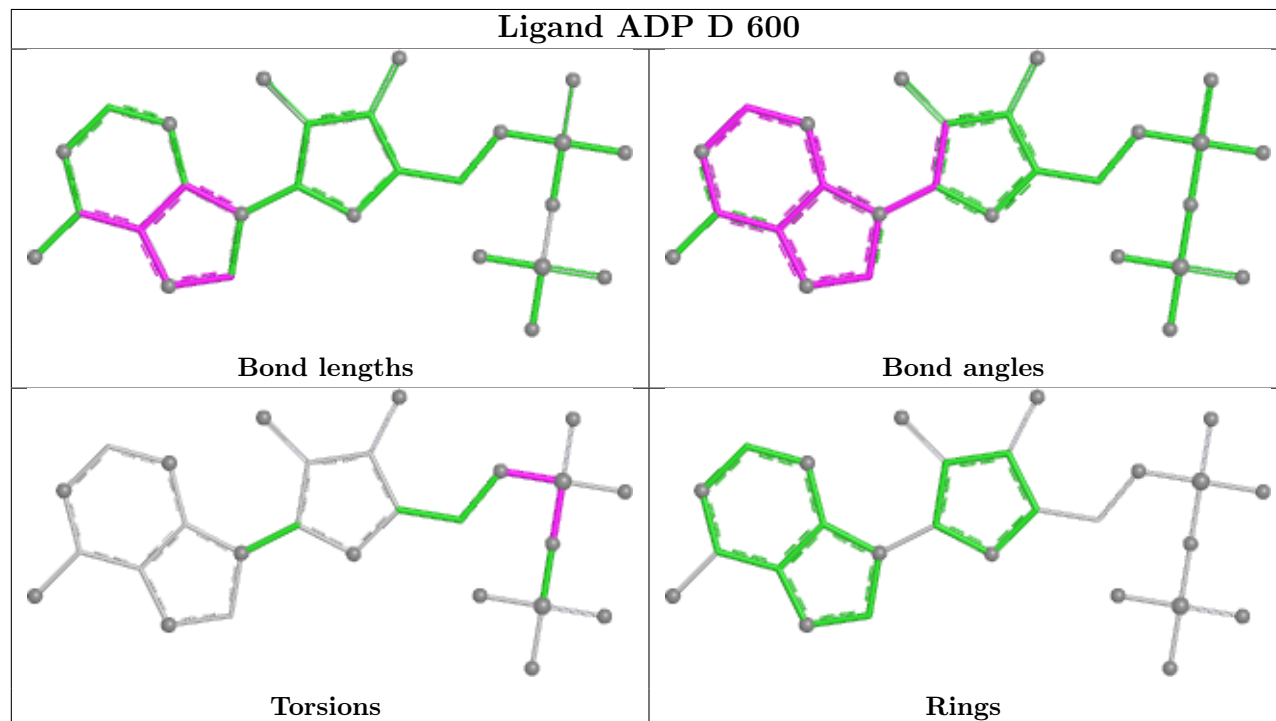


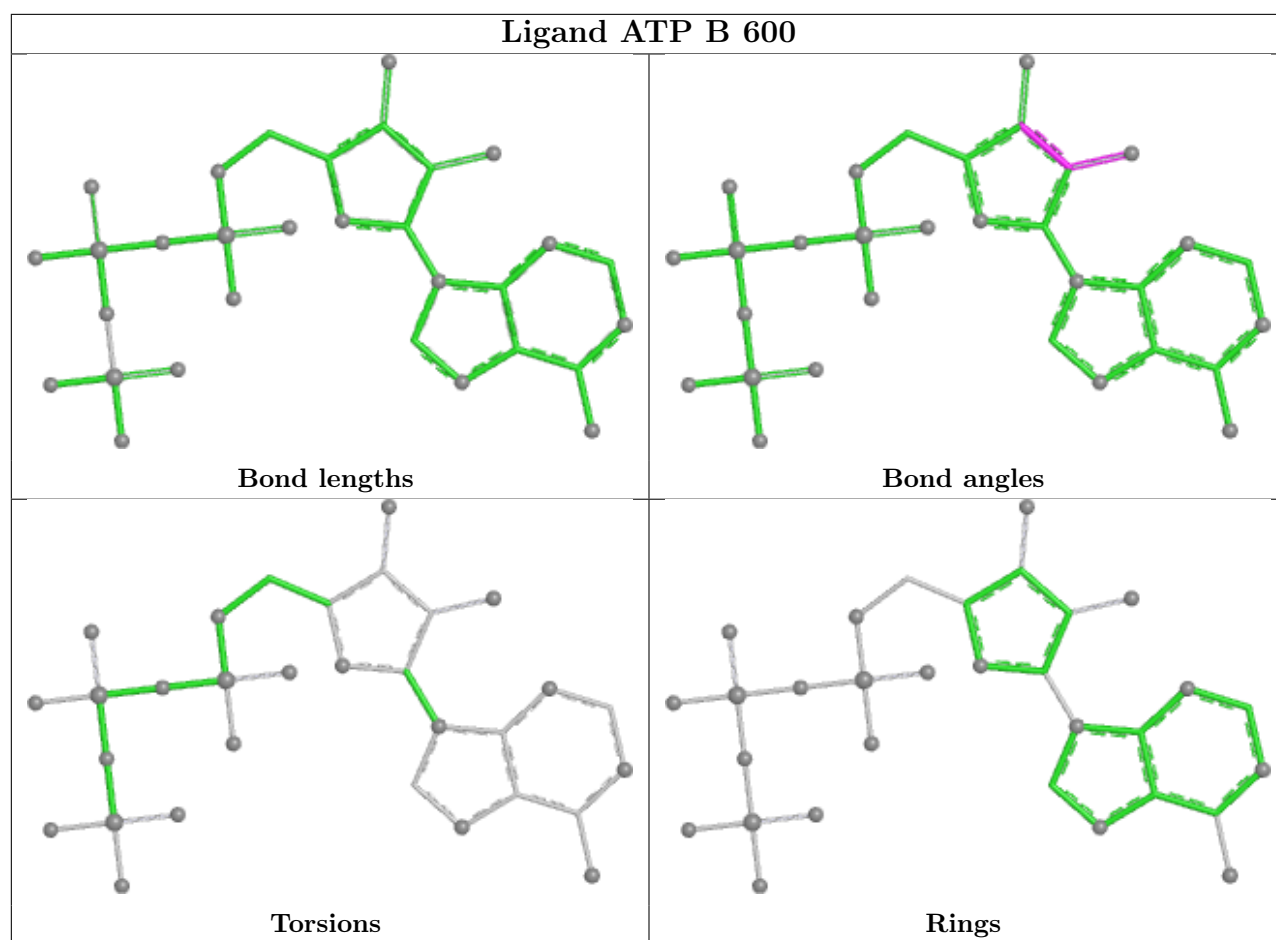


Ligand ATP F 600



Ligand ADP D 600





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.

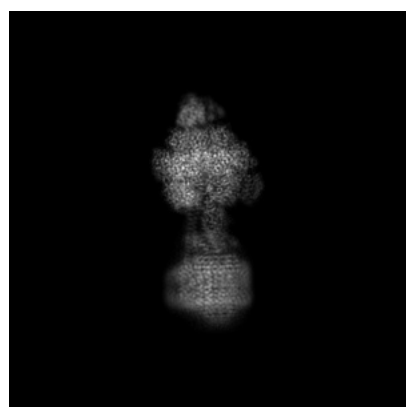
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12377. These allow visual inspection of the internal detail of the map and identification of artifacts.

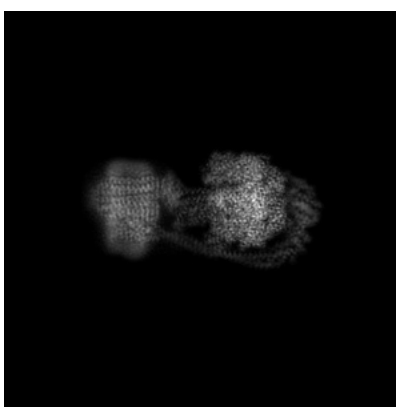
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

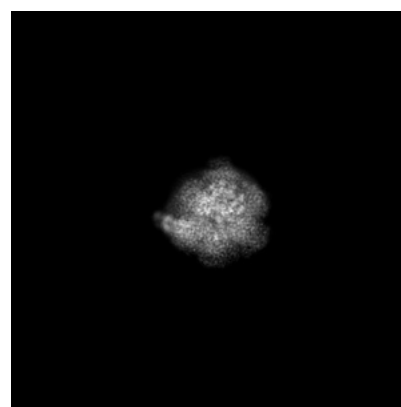
6.1.1 Primary map



X



Y

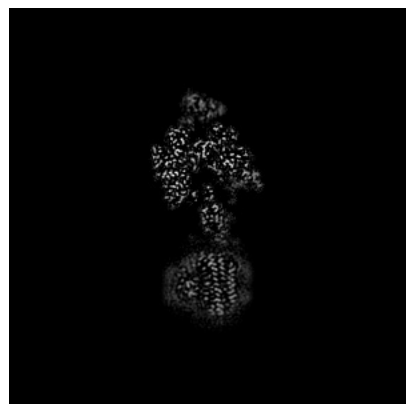


Z

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

6.2 Central slices [i](#)

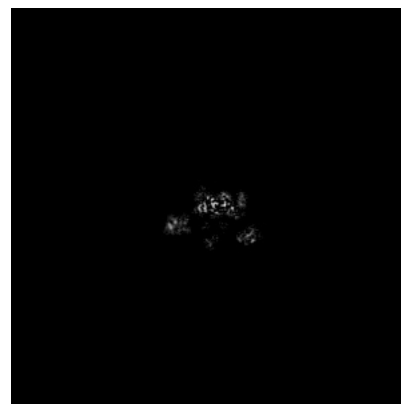
6.2.1 Primary map



X Index: 250



Y Index: 250

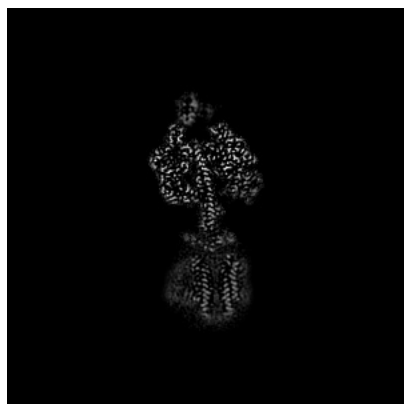


Z Index: 250

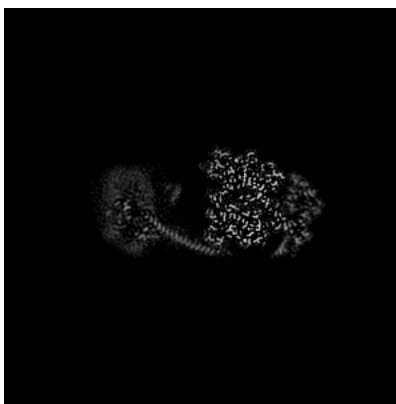
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

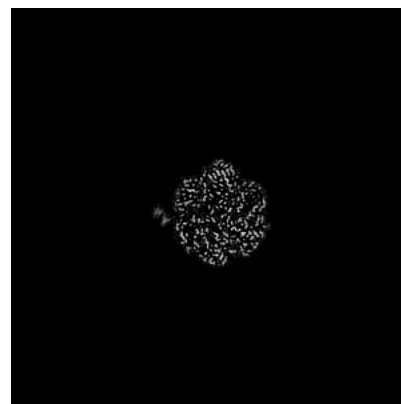
6.3.1 Primary map



X Index: 263



Y Index: 223

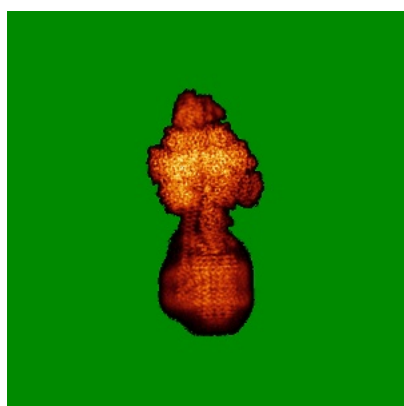


Z Index: 313

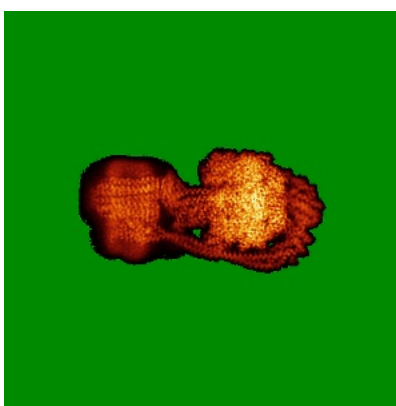
The images above show the largest variance slices of the map in three orthogonal directions.

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

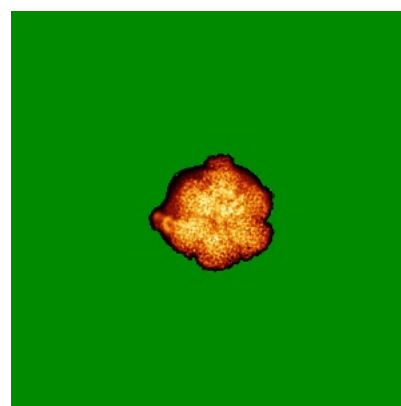
6.4.1 Primary map



X



Y



Z

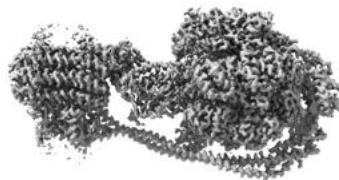
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

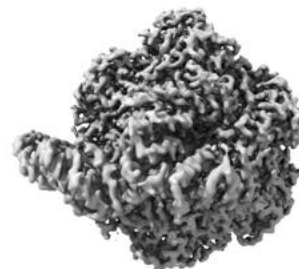
6.5.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0146. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

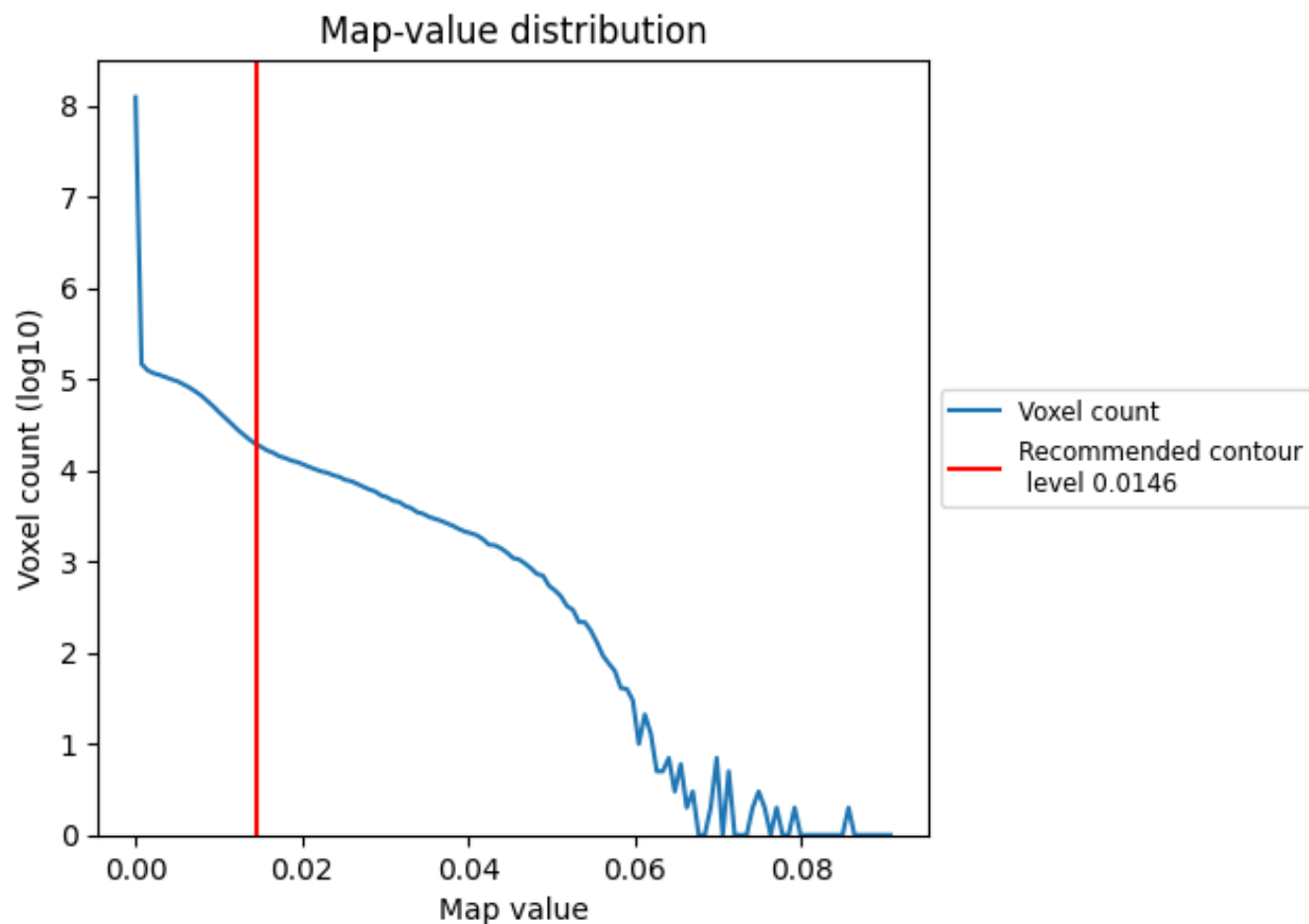
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

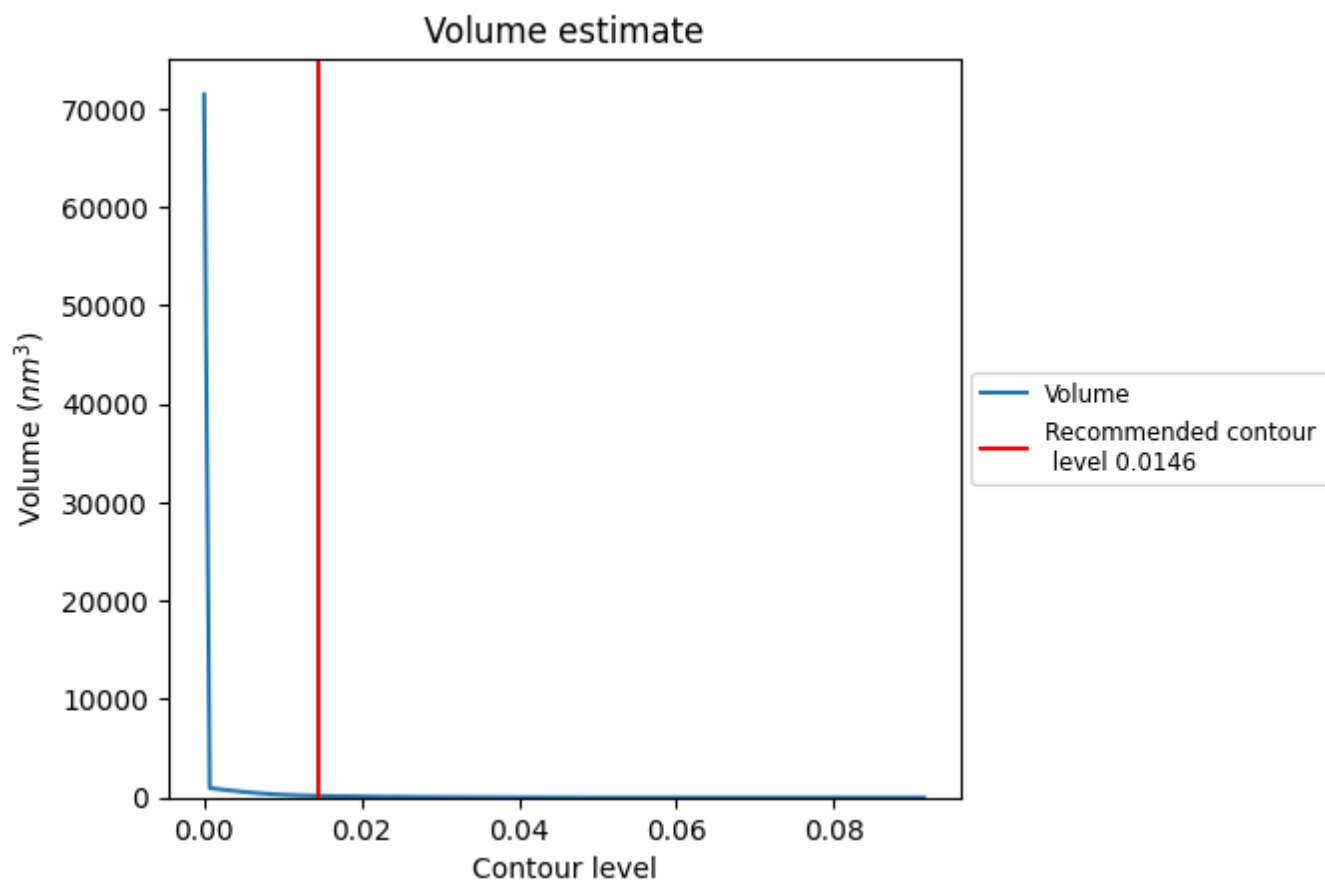
This section contains the results of statistical analysis of the map.

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.

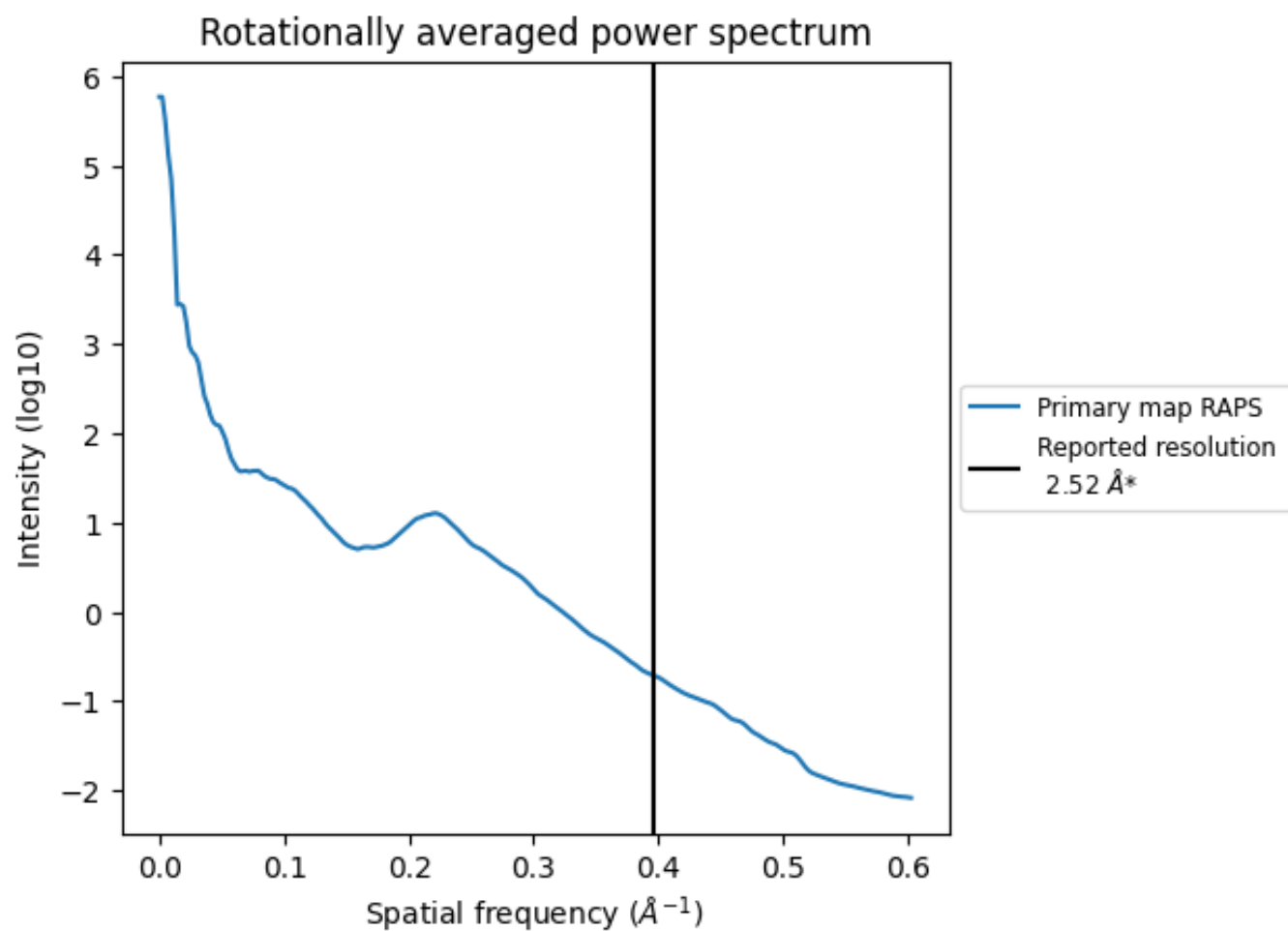
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 172 nm³; this corresponds to an approximate mass of 155 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 0.397 Å⁻¹

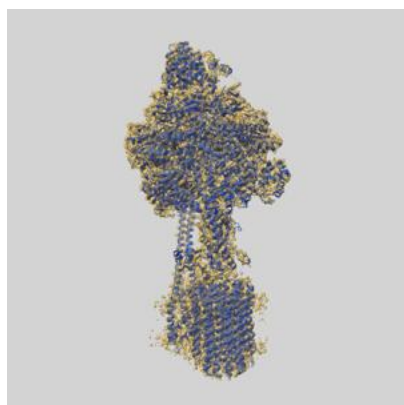
8 Fourier-Shell correlation ⓘ

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

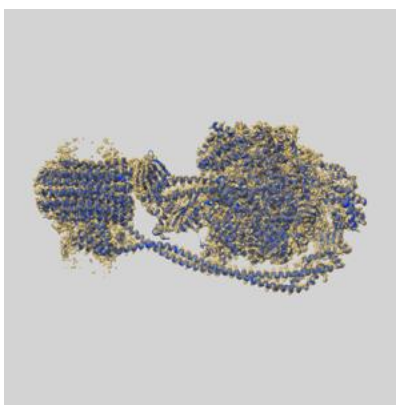
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-12377 and PDB model 7NJK. Per-residue inclusion information can be found in section 3 on page 9.

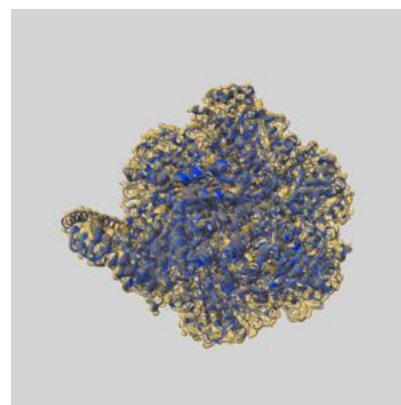
9.1 Map-model overlay [i](#)



X



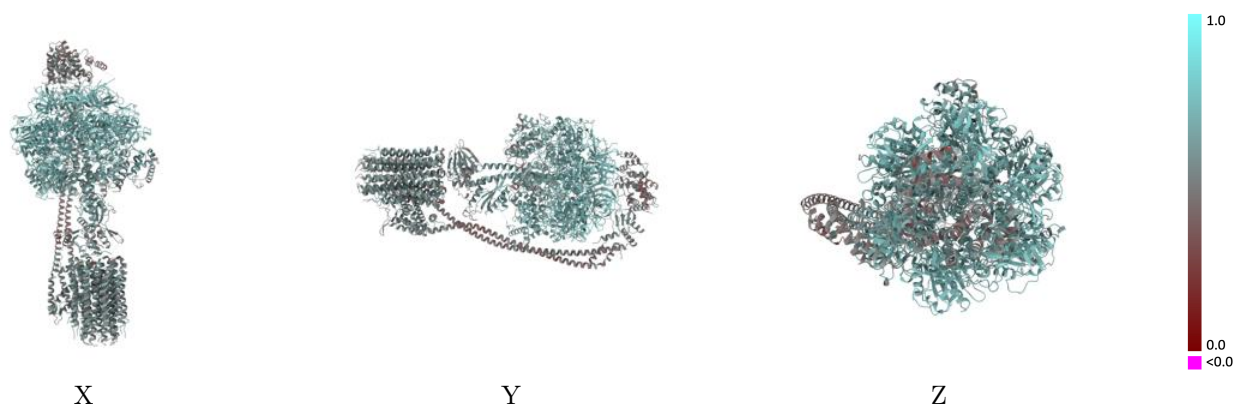
Y



Z

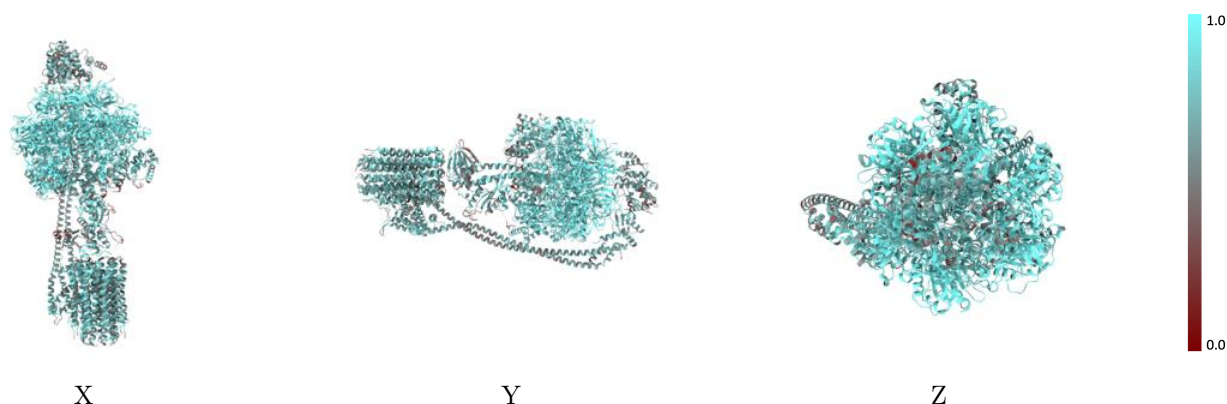
The images above show the 3D surface view of the map at the recommended contour level 0.0146 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



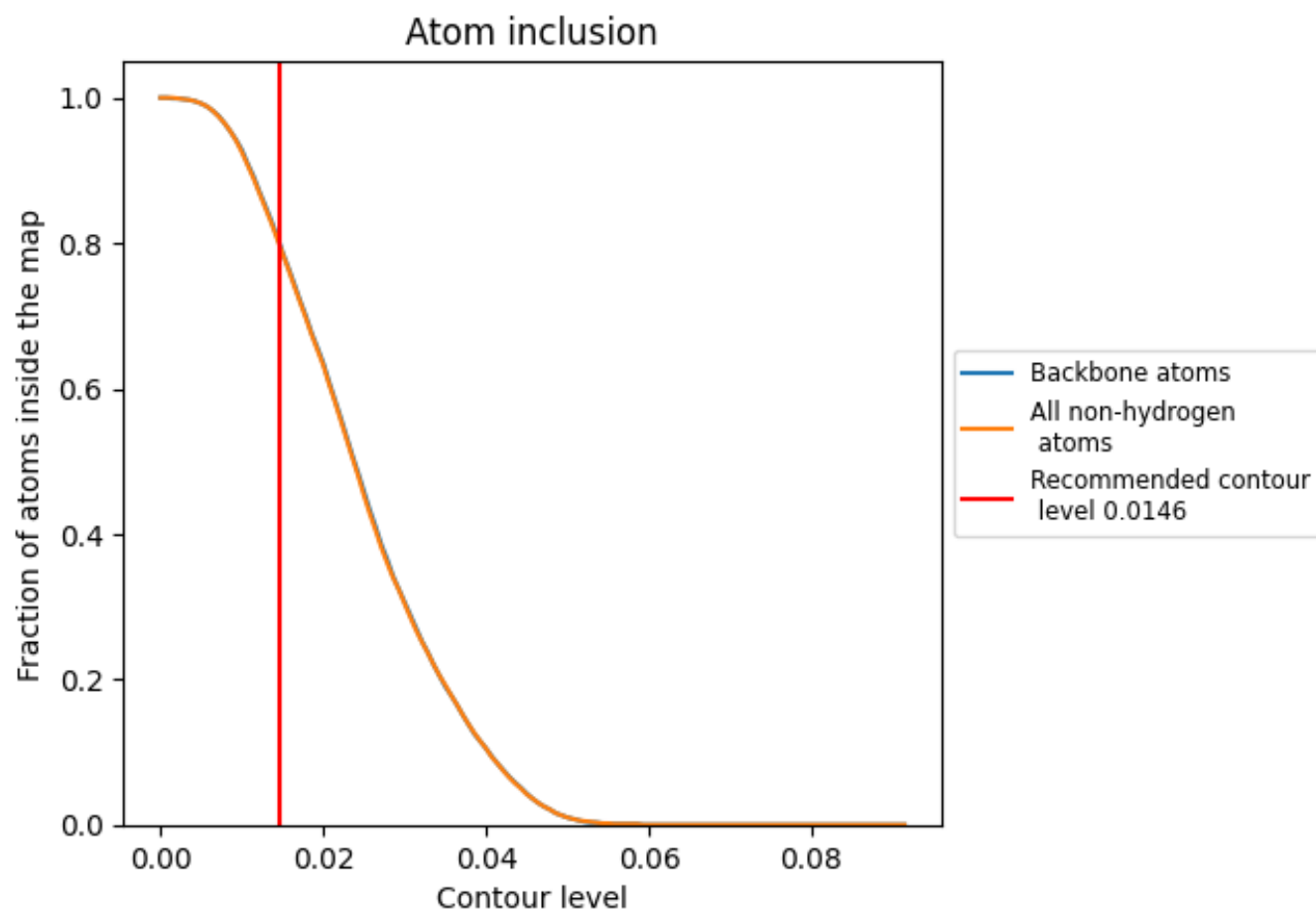
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0146).

9.4 Atom inclusion [i](#)



At the recommended contour level, 80% of all backbone atoms, 80% 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 (0.0146) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7980	 0.6080
A	 0.8890	 0.6630
B	 0.8430	 0.6430
C	 0.8650	 0.6560
D	 0.9240	 0.6830
E	 0.8530	 0.6500
F	 0.9190	 0.6800
G	 0.7510	 0.5910
H	 0.5890	 0.5170
L	 0.6990	 0.5440
M	 0.7040	 0.5510
N	 0.7070	 0.5520
O	 0.6710	 0.5390
P	 0.6660	 0.5330
Q	 0.6560	 0.5300
R	 0.6710	 0.5320
S	 0.6950	 0.5440
T	 0.7190	 0.5370
a	 0.7030	 0.5360
b	 0.6180	 0.4600
d	 0.6380	 0.4750

