Full wwPDB EM Validation Report ⓘ

Jul 8, 2025 – 02:29 PM JST

PDB ID	:	8IXB / pdb_00008ixb
EMDB ID	:	EMD-35790
Title	:	GMPCPP-Alpha1A/Beta2A-microtubule decorated with kinesin seam region
Authors	:	Zheng, W.; Zhao, Q.Y.; Diao, L.; Bao, L.; Cong, Y.
Deposited on	:	2023-03-31
Resolution	:	4.20 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:

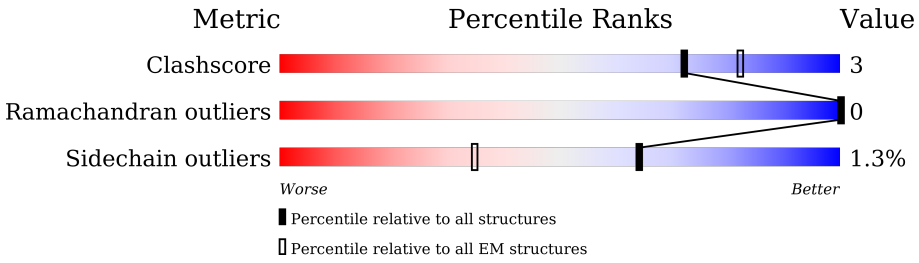
EMDB validation analysis	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

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 4.20 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	457	87% 6% 7%
1	E	457	86% 7% 7%
1	F	457	87% 7% 7%
1	H	457	88% 5% 7%
2	Q	457	84% 10% 7%
2	U	457	85% 8% 7%
2	V	457	84% 9% 7%
2	W	457	85% 9% 7%
3	g	372	80% 8% 13%

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Mol	Chain	Length	Quality of chain
3	k	372	
3	l	372	
3	m	372	

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 37372 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Tubulin alpha-1A chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	H	427	Total	C	N	O	S	0	0
			3350	2124	570	635	21		
1	A	427	Total	C	N	O	S	0	0
			3350	2124	570	635	21		
1	E	427	Total	C	N	O	S	0	0
			3350	2124	570	635	21		
1	F	427	Total	C	N	O	S	0	0
			3350	2124	570	635	21		

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	43	HIS	-	insertion	UNP P68369
H	44	HIS	-	insertion	UNP P68369
H	45	HIS	-	insertion	UNP P68369
H	46	HIS	-	insertion	UNP P68369
H	47	HIS	-	insertion	UNP P68369
H	48	HIS	-	insertion	UNP P68369
A	43	HIS	-	insertion	UNP P68369
A	44	HIS	-	insertion	UNP P68369
A	45	HIS	-	insertion	UNP P68369
A	46	HIS	-	insertion	UNP P68369
A	47	HIS	-	insertion	UNP P68369
A	48	HIS	-	insertion	UNP P68369
E	43	HIS	-	insertion	UNP P68369
E	44	HIS	-	insertion	UNP P68369
E	45	HIS	-	insertion	UNP P68369
E	46	HIS	-	insertion	UNP P68369
E	47	HIS	-	insertion	UNP P68369
E	48	HIS	-	insertion	UNP P68369
F	43	HIS	-	insertion	UNP P68369
F	44	HIS	-	insertion	UNP P68369
F	45	HIS	-	insertion	UNP P68369
F	46	HIS	-	insertion	UNP P68369

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Chain	Residue	Modelled	Actual	Comment	Reference
F	47	HIS	-	insertion	UNP P68369
F	48	HIS	-	insertion	UNP P68369

- Molecule 2 is a protein called Tubulin beta-2A chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	W	426	Total	C	N	O	S	0	0
			3354	2107	575	646	26		
2	Q	426	Total	C	N	O	S	0	0
			3354	2107	575	646	26		
2	U	426	Total	C	N	O	S	0	0
			3354	2107	575	646	26		
2	V	426	Total	C	N	O	S	0	0
			3354	2107	575	646	26		

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
W	446	GLY	-	expression tag	UNP Q7TMM9
W	447	GLY	-	expression tag	UNP Q7TMM9
W	448	SER	-	expression tag	UNP Q7TMM9
W	449	GLY	-	expression tag	UNP Q7TMM9
W	450	GLY	-	expression tag	UNP Q7TMM9
W	451	ASP	-	expression tag	UNP Q7TMM9
W	452	TYR	-	expression tag	UNP Q7TMM9
W	453	LYS	-	expression tag	UNP Q7TMM9
W	454	ASP	-	expression tag	UNP Q7TMM9
W	455	ASP	-	expression tag	UNP Q7TMM9
W	456	ASP	-	expression tag	UNP Q7TMM9
W	457	LYS	-	expression tag	UNP Q7TMM9
Q	446	GLY	-	expression tag	UNP Q7TMM9
Q	447	GLY	-	expression tag	UNP Q7TMM9
Q	448	SER	-	expression tag	UNP Q7TMM9
Q	449	GLY	-	expression tag	UNP Q7TMM9
Q	450	GLY	-	expression tag	UNP Q7TMM9
Q	451	ASP	-	expression tag	UNP Q7TMM9
Q	452	TYR	-	expression tag	UNP Q7TMM9
Q	453	LYS	-	expression tag	UNP Q7TMM9
Q	454	ASP	-	expression tag	UNP Q7TMM9
Q	455	ASP	-	expression tag	UNP Q7TMM9
Q	456	ASP	-	expression tag	UNP Q7TMM9
Q	457	LYS	-	expression tag	UNP Q7TMM9

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Chain	Residue	Modelled	Actual	Comment	Reference
U	446	GLY	-	expression tag	UNP Q7TMM9
U	447	GLY	-	expression tag	UNP Q7TMM9
U	448	SER	-	expression tag	UNP Q7TMM9
U	449	GLY	-	expression tag	UNP Q7TMM9
U	450	GLY	-	expression tag	UNP Q7TMM9
U	451	ASP	-	expression tag	UNP Q7TMM9
U	452	TYR	-	expression tag	UNP Q7TMM9
U	453	LYS	-	expression tag	UNP Q7TMM9
U	454	ASP	-	expression tag	UNP Q7TMM9
U	455	ASP	-	expression tag	UNP Q7TMM9
U	456	ASP	-	expression tag	UNP Q7TMM9
U	457	LYS	-	expression tag	UNP Q7TMM9
V	446	GLY	-	expression tag	UNP Q7TMM9
V	447	GLY	-	expression tag	UNP Q7TMM9
V	448	SER	-	expression tag	UNP Q7TMM9
V	449	GLY	-	expression tag	UNP Q7TMM9
V	450	GLY	-	expression tag	UNP Q7TMM9
V	451	ASP	-	expression tag	UNP Q7TMM9
V	452	TYR	-	expression tag	UNP Q7TMM9
V	453	LYS	-	expression tag	UNP Q7TMM9
V	454	ASP	-	expression tag	UNP Q7TMM9
V	455	ASP	-	expression tag	UNP Q7TMM9
V	456	ASP	-	expression tag	UNP Q7TMM9
V	457	LYS	-	expression tag	UNP Q7TMM9

- Molecule 3 is a protein called Kinesin-1 heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	l	325	Total	C	N	O	S	0	0
			2544	1585	438	506	15		
3	g	325	Total	C	N	O	S	0	0
			2544	1585	438	506	15		
3	k	325	Total	C	N	O	S	0	0
			2544	1585	438	506	15		
3	m	325	Total	C	N	O	S	0	0
			2544	1585	438	506	15		

There are 96 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
l	-22	MET	-	initiating methionine	UNP P33176
l	-21	GLY	-	expression tag	UNP P33176

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Chain	Residue	Modelled	Actual	Comment	Reference
l	-20	SER	-	expression tag	UNP P33176
l	-19	SER	-	expression tag	UNP P33176
l	-18	HIS	-	expression tag	UNP P33176
l	-17	HIS	-	expression tag	UNP P33176
l	-16	HIS	-	expression tag	UNP P33176
l	-15	HIS	-	expression tag	UNP P33176
l	-14	HIS	-	expression tag	UNP P33176
l	-13	HIS	-	expression tag	UNP P33176
l	-12	SER	-	expression tag	UNP P33176
l	-11	SER	-	expression tag	UNP P33176
l	-10	GLY	-	expression tag	UNP P33176
l	-9	LEU	-	expression tag	UNP P33176
l	-8	VAL	-	expression tag	UNP P33176
l	-7	PRO	-	expression tag	UNP P33176
l	-6	ARG	-	expression tag	UNP P33176
l	-5	GLY	-	expression tag	UNP P33176
l	-4	SER	-	expression tag	UNP P33176
l	-3	HIS	-	expression tag	UNP P33176
l	-2	MET	-	expression tag	UNP P33176
l	-1	ALA	-	expression tag	UNP P33176
l	0	SER	-	expression tag	UNP P33176
l	236	ALA	GLU	conflict	UNP P33176
g	-22	MET	-	initiating methionine	UNP P33176
g	-21	GLY	-	expression tag	UNP P33176
g	-20	SER	-	expression tag	UNP P33176
g	-19	SER	-	expression tag	UNP P33176
g	-18	HIS	-	expression tag	UNP P33176
g	-17	HIS	-	expression tag	UNP P33176
g	-16	HIS	-	expression tag	UNP P33176
g	-15	HIS	-	expression tag	UNP P33176
g	-14	HIS	-	expression tag	UNP P33176
g	-13	HIS	-	expression tag	UNP P33176
g	-12	SER	-	expression tag	UNP P33176
g	-11	SER	-	expression tag	UNP P33176
g	-10	GLY	-	expression tag	UNP P33176
g	-9	LEU	-	expression tag	UNP P33176
g	-8	VAL	-	expression tag	UNP P33176
g	-7	PRO	-	expression tag	UNP P33176
g	-6	ARG	-	expression tag	UNP P33176
g	-5	GLY	-	expression tag	UNP P33176
g	-4	SER	-	expression tag	UNP P33176
g	-3	HIS	-	expression tag	UNP P33176

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Chain	Residue	Modelled	Actual	Comment	Reference
g	-2	MET	-	expression tag	UNP P33176
g	-1	ALA	-	expression tag	UNP P33176
g	0	SER	-	expression tag	UNP P33176
g	236	ALA	GLU	conflict	UNP P33176
k	-22	MET	-	initiating methionine	UNP P33176
k	-21	GLY	-	expression tag	UNP P33176
k	-20	SER	-	expression tag	UNP P33176
k	-19	SER	-	expression tag	UNP P33176
k	-18	HIS	-	expression tag	UNP P33176
k	-17	HIS	-	expression tag	UNP P33176
k	-16	HIS	-	expression tag	UNP P33176
k	-15	HIS	-	expression tag	UNP P33176
k	-14	HIS	-	expression tag	UNP P33176
k	-13	HIS	-	expression tag	UNP P33176
k	-12	SER	-	expression tag	UNP P33176
k	-11	SER	-	expression tag	UNP P33176
k	-10	GLY	-	expression tag	UNP P33176
k	-9	LEU	-	expression tag	UNP P33176
k	-8	VAL	-	expression tag	UNP P33176
k	-7	PRO	-	expression tag	UNP P33176
k	-6	ARG	-	expression tag	UNP P33176
k	-5	GLY	-	expression tag	UNP P33176
k	-4	SER	-	expression tag	UNP P33176
k	-3	HIS	-	expression tag	UNP P33176
k	-2	MET	-	expression tag	UNP P33176
k	-1	ALA	-	expression tag	UNP P33176
k	0	SER	-	expression tag	UNP P33176
k	236	ALA	GLU	conflict	UNP P33176
m	-22	MET	-	initiating methionine	UNP P33176
m	-21	GLY	-	expression tag	UNP P33176
m	-20	SER	-	expression tag	UNP P33176
m	-19	SER	-	expression tag	UNP P33176
m	-18	HIS	-	expression tag	UNP P33176
m	-17	HIS	-	expression tag	UNP P33176
m	-16	HIS	-	expression tag	UNP P33176
m	-15	HIS	-	expression tag	UNP P33176
m	-14	HIS	-	expression tag	UNP P33176
m	-13	HIS	-	expression tag	UNP P33176
m	-12	SER	-	expression tag	UNP P33176
m	-11	SER	-	expression tag	UNP P33176
m	-10	GLY	-	expression tag	UNP P33176
m	-9	LEU	-	expression tag	UNP P33176

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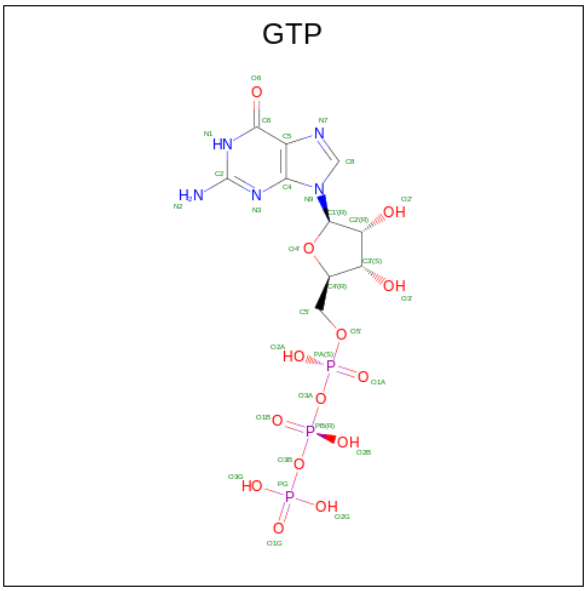
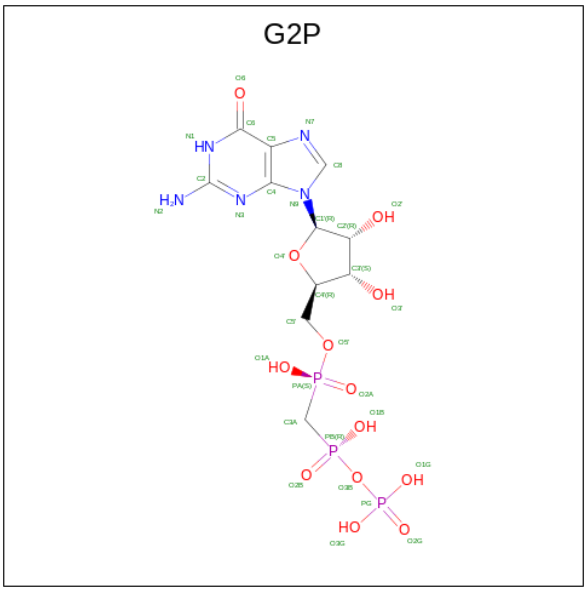
Chain	Residue	Modelled	Actual	Comment	Reference
m	-8	VAL	-	expression tag	UNP P33176
m	-7	PRO	-	expression tag	UNP P33176
m	-6	ARG	-	expression tag	UNP P33176
m	-5	GLY	-	expression tag	UNP P33176
m	-4	SER	-	expression tag	UNP P33176
m	-3	HIS	-	expression tag	UNP P33176
m	-2	MET	-	expression tag	UNP P33176
m	-1	ALA	-	expression tag	UNP P33176
m	0	SER	-	expression tag	UNP P33176
m	236	ALA	GLU	conflict	UNP P33176

- Molecule 4 is GUANOSINE-5'-TRIPHOSPHATE (CCD ID: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



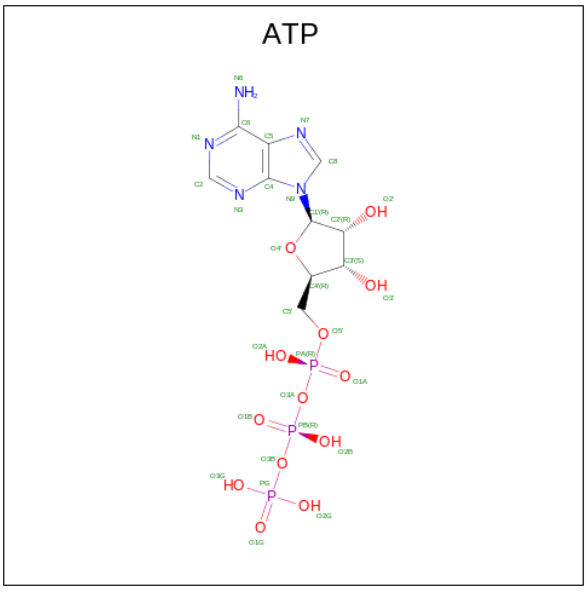
Mol	Chain	Residues	Atoms					AltConf
4	W	1	Total	C	N	O	P	0
			32	10	5	14	3	
4	Q	1	Total	C	N	O	P	0
			32	10	5	14	3	
4	U	1	Total	C	N	O	P	0
			32	10	5	14	3	
4	V	1	Total	C	N	O	P	0
			32	10	5	14	3	

- Molecule 5 is PHOSPHOMETHYLPHOSPHONIC ACID GUANYLATE ESTER (CCD ID: G2P) (formula: $C_{11}H_{18}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					AltConf
5	W	1	Total	C	N	O	P	0
			32	11	5	13	3	
5	Q	1	Total	C	N	O	P	0
			32	11	5	13	3	
5	U	1	Total	C	N	O	P	0
			32	11	5	13	3	
5	V	1	Total	C	N	O	P	0
			32	11	5	13	3	

- Molecule 6 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



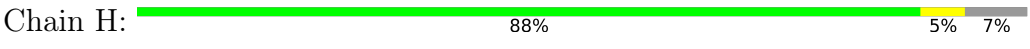
Mol	Chain	Residues	Atoms					AltConf
6	l	1	Total	C	N	O	P	0
			31	10	5	13	3	
6	g	1	Total	C	N	O	P	0
			31	10	5	13	3	
6	k	1	Total	C	N	O	P	0
			31	10	5	13	3	
6	m	1	Total	C	N	O	P	0
			31	10	5	13	3	

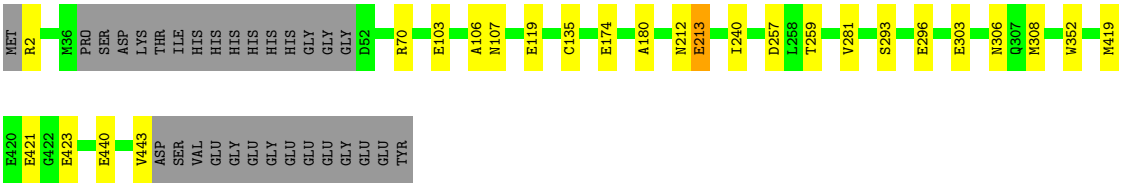
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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: Tubulin alpha-1A chain

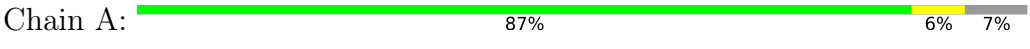
Chain H:

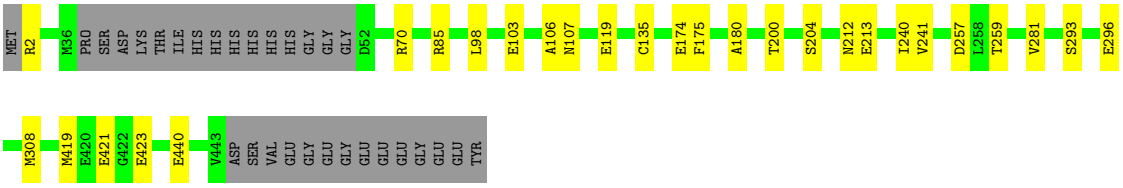




• Molecule 1: Tubulin alpha-1A chain

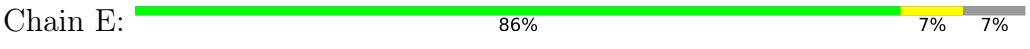
Chain A:

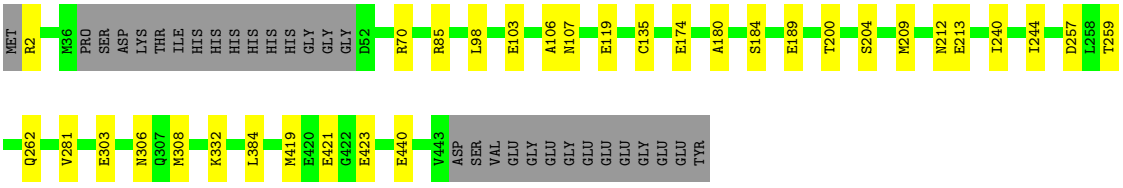




• Molecule 1: Tubulin alpha-1A chain

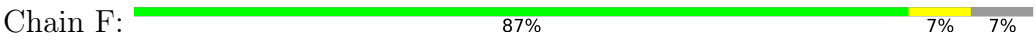
Chain E:

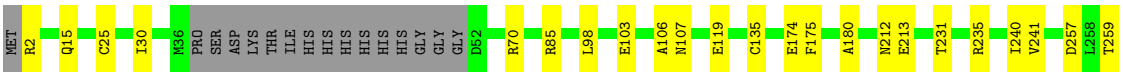


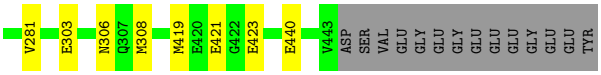


• Molecule 1: Tubulin alpha-1A chain

Chain F:

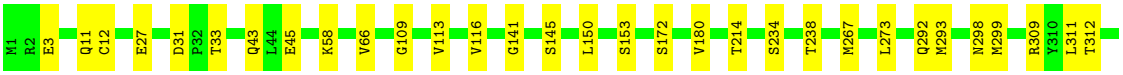


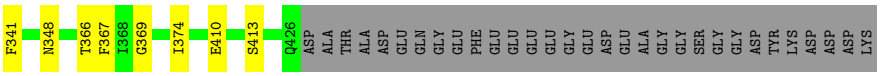




• Molecule 2: Tubulin beta-2A chain

Chain W:



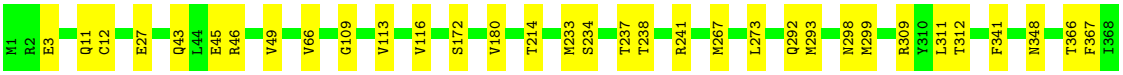


• Molecule 2: Tubulin beta-2A chain

Chain Q:

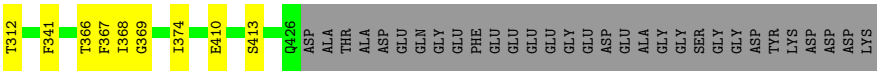
• Molecule 2: Tubulin beta-2A chain

Chain U:



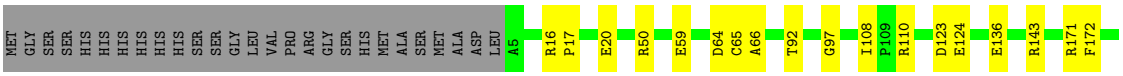
• Molecule 2: Tubulin beta-2A chain

Chain V:



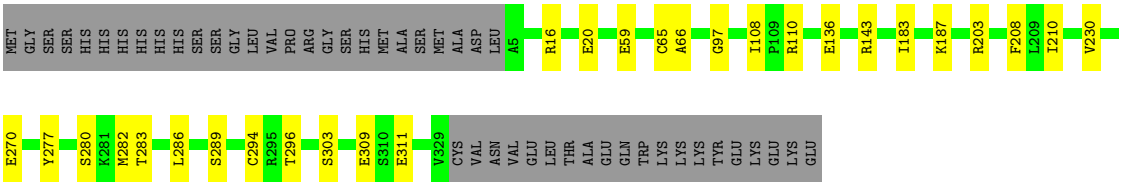
• Molecule 3: Kinesin-1 heavy chain

Chain l:



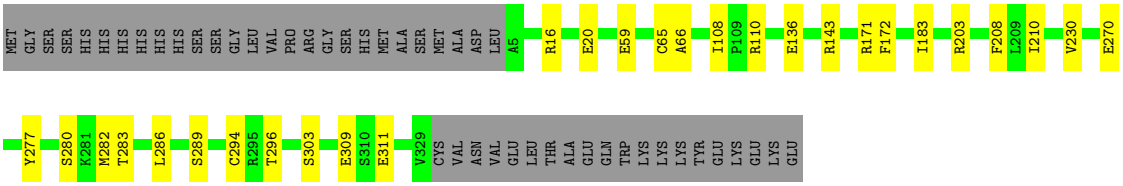
• Molecule 3: Kinesin-1 heavy chain

Chain g:



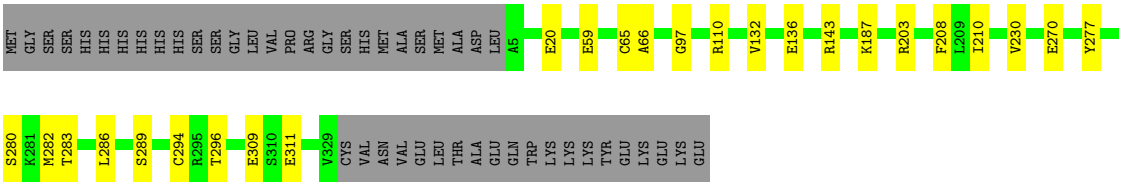
• Molecule 3: Kinesin-1 heavy chain

Chain k:



• Molecule 3: Kinesin-1 heavy chain

Chain m:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	19287	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	36	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GTP, G2P, ATP

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|$ >5	RMSZ	#$\|Z\|$ >5
1	A	0.23	0/3426	0.42	0/4651
1	E	0.23	0/3426	0.41	0/4651
1	F	0.23	0/3426	0.42	0/4651
1	H	0.23	0/3426	0.42	0/4651
2	Q	0.22	0/3429	0.41	0/4643
2	U	0.22	0/3429	0.41	0/4643
2	V	0.22	0/3429	0.40	0/4643
2	W	0.21	0/3429	0.40	0/4643
3	g	0.21	0/2583	0.38	0/3482
3	k	0.21	0/2583	0.38	0/3482
3	l	0.21	0/2583	0.38	0/3482
3	m	0.21	0/2583	0.38	0/3482
All	All	0.22	0/37752	0.40	0/51104

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	3350	0	3262	12	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	3350	0	3262	16	0
1	F	3350	0	3262	14	0
1	H	3350	0	3262	13	0
2	Q	3354	0	3239	30	0
2	U	3354	0	3239	27	0
2	V	3354	0	3239	29	0
2	W	3354	0	3239	29	0
3	g	2544	0	2523	16	0
3	k	2544	0	2523	16	0
3	l	2544	0	2523	20	0
3	m	2544	0	2523	15	0
4	Q	32	0	12	2	0
4	U	32	0	12	2	0
4	V	32	0	12	2	0
4	W	32	0	12	2	0
5	Q	32	0	14	8	0
5	U	32	0	14	8	0
5	V	32	0	14	8	0
5	W	32	0	14	8	0
6	g	31	0	12	1	0
6	k	31	0	12	1	0
6	l	31	0	12	2	0
6	m	31	0	12	1	0
All	All	37372	0	36248	236	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 3.

All (236) 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:W:11:GLN:HB2	5:W:502:G2P:O2B	1.23	1.33
2:U:11:GLN:HB2	5:U:502:G2P:O2B	1.17	1.29
2:Q:11:GLN:HB2	5:Q:502:G2P:O2B	1.24	1.28
2:V:11:GLN:HB2	5:V:502:G2P:O2B	1.18	1.27
2:U:11:GLN:CB	5:U:502:G2P:O2B	1.91	1.18
2:Q:11:GLN:CB	5:Q:502:G2P:O2B	1.94	1.15
2:V:11:GLN:CB	5:V:502:G2P:O2B	1.95	1.14
2:W:11:GLN:CB	5:W:502:G2P:O2B	1.96	1.12
2:V:11:GLN:HB3	5:V:502:G2P:O1A	1.70	0.90
2:W:11:GLN:HB3	5:W:502:G2P:O1A	1.70	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:U:11:GLN:HB3	5:U:502:G2P:O1A	1.73	0.88
2:Q:11:GLN:HB3	5:Q:502:G2P:O1A	1.74	0.86
2:Q:267:MET:HE1	2:Q:374:ILE:HD13	1.60	0.83
2:V:267:MET:HE1	2:V:374:ILE:HD13	1.60	0.83
2:W:267:MET:HE1	2:W:374:ILE:HD13	1.60	0.82
2:U:267:MET:HE1	2:U:374:ILE:HD13	1.62	0.81
2:Q:11:GLN:OE1	5:Q:502:G2P:O2A	2.02	0.78
1:F:70:ARG:NH2	1:F:135:CYS:SG	2.67	0.68
1:A:70:ARG:NH2	1:A:135:CYS:SG	2.68	0.67
2:W:11:GLN:OE1	5:W:502:G2P:O2A	2.12	0.66
3:m:203:ARG:NH2	6:m:401:ATP:O3G	2.29	0.66
3:m:289:SER:O	3:m:296:THR:OG1	2.14	0.66
2:Q:11:GLN:HB3	5:Q:502:G2P:O2B	1.94	0.66
3:g:203:ARG:NH2	6:g:401:ATP:O3G	2.29	0.66
1:E:70:ARG:NH2	1:E:135:CYS:SG	2.68	0.66
2:U:11:GLN:OE1	5:U:502:G2P:O2A	2.14	0.65
3:m:65:CYS:SG	3:m:66:ALA:N	2.69	0.65
1:H:70:ARG:NH2	1:H:135:CYS:SG	2.70	0.65
3:k:289:SER:O	3:k:296:THR:OG1	2.15	0.65
3:k:65:CYS:SG	3:k:66:ALA:N	2.70	0.65
2:W:33:THR:O	2:W:58:LYS:NZ	2.30	0.65
3:l:203:ARG:NH2	6:l:401:ATP:O3G	2.30	0.65
3:g:289:SER:O	3:g:296:THR:OG1	2.14	0.65
3:g:65:CYS:SG	3:g:66:ALA:N	2.70	0.65
3:k:203:ARG:NH2	6:k:401:ATP:O3G	2.30	0.65
1:A:106:ALA:N	4:Q:501:GTP:O2G	2.30	0.64
2:Q:33:THR:O	2:Q:58:LYS:NZ	2.30	0.64
3:l:65:CYS:SG	3:l:66:ALA:N	2.70	0.64
1:H:106:ALA:N	4:W:501:GTP:O2G	2.31	0.64
2:V:11:GLN:HB3	5:V:502:G2P:PA	2.38	0.64
3:l:289:SER:O	3:l:296:THR:OG1	2.15	0.64
2:U:292:GLN:NE2	2:U:298:ASN:OD1	2.31	0.64
2:W:292:GLN:NE2	2:W:298:ASN:OD1	2.31	0.63
2:V:292:GLN:NE2	2:V:298:ASN:OD1	2.31	0.63
2:Q:292:GLN:NE2	2:Q:298:ASN:OD1	2.31	0.63
1:F:106:ALA:N	4:V:501:GTP:O2G	2.32	0.63
2:Q:12:CYS:N	5:Q:502:G2P:O1A	2.32	0.62
1:E:106:ALA:N	4:U:501:GTP:O2G	2.33	0.62
2:U:11:GLN:HB3	5:U:502:G2P:PA	2.40	0.62
2:W:141:GLY:O	2:W:145:SER:OG	2.14	0.61
2:Q:11:GLN:HB3	5:Q:502:G2P:PA	2.41	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:U:11:GLN:HB3	5:U:502:G2P:O2B	1.96	0.60
2:U:12:CYS:N	5:U:502:G2P:O1A	2.34	0.60
2:Q:309:ARG:NH2	2:Q:341:PHE:O	2.35	0.60
2:U:309:ARG:NH2	2:U:341:PHE:O	2.34	0.59
2:W:11:GLN:HB3	5:W:502:G2P:PA	2.43	0.59
2:V:309:ARG:NH2	2:V:341:PHE:O	2.34	0.59
2:W:309:ARG:NH2	2:W:341:PHE:O	2.36	0.59
1:F:240:ILE:HD13	1:F:308:MET:HE3	1.85	0.58
2:Q:141:GLY:O	2:Q:145:SER:OG	2.15	0.58
2:W:11:GLN:HB3	5:W:502:G2P:O2B	1.99	0.58
2:V:11:GLN:OE1	5:V:502:G2P:O2A	2.21	0.58
2:W:27:GLU:O	2:W:43:GLN:NE2	2.37	0.58
2:V:12:CYS:N	5:V:502:G2P:O1A	2.36	0.58
1:E:332:LYS:NZ	2:V:211:CYS:SG	2.77	0.57
2:U:27:GLU:O	2:U:43:GLN:NE2	2.38	0.57
1:E:257:ASP:OD2	1:E:259:THR:OG1	2.20	0.57
1:H:240:ILE:HD13	1:H:308:MET:HE3	1.86	0.56
2:V:293:MET:HE3	2:V:367:PHE:HB2	1.87	0.56
2:Q:293:MET:HE3	2:Q:367:PHE:HB2	1.87	0.56
1:E:240:ILE:HD13	1:E:308:MET:HE3	1.86	0.56
2:W:12:CYS:N	5:W:502:G2P:O1A	2.39	0.56
2:U:293:MET:HE3	2:U:367:PHE:HB2	1.88	0.55
1:A:240:ILE:HD13	1:A:308:MET:HE3	1.87	0.55
2:Q:27:GLU:O	2:Q:43:GLN:NE2	2.40	0.55
3:k:59:GLU:OE1	3:k:110:ARG:NH1	2.39	0.55
3:g:277:TYR:O	3:g:283:THR:OG1	2.17	0.54
2:W:293:MET:HE3	2:W:367:PHE:HB2	1.88	0.54
2:V:27:GLU:O	2:V:43:GLN:NE2	2.41	0.54
3:l:59:GLU:OE1	3:l:110:ARG:NH1	2.40	0.54
2:V:11:GLN:HB3	5:V:502:G2P:O2B	2.03	0.54
3:m:97:GLY:O	3:m:187:LYS:NZ	2.41	0.53
2:V:11:GLN:CB	5:V:502:G2P:O1A	2.51	0.52
1:F:257:ASP:OD2	1:F:259:THR:OG1	2.25	0.52
2:W:11:GLN:CB	5:W:502:G2P:O1A	2.53	0.52
3:k:277:TYR:O	3:k:283:THR:OG1	2.29	0.51
1:H:107:ASN:ND2	4:W:501:GTP:O1G	2.43	0.51
3:l:277:TYR:O	3:l:283:THR:OG1	2.16	0.51
3:m:208:PHE:CZ	3:m:210:ILE:HD11	2.47	0.50
2:Q:45:GLU:N	2:Q:45:GLU:OE1	2.44	0.50
2:U:45:GLU:OE1	2:U:45:GLU:N	2.45	0.50
3:g:20:GLU:N	3:g:20:GLU:OE1	2.44	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:U:237:THR:O	2:U:241:ARG:NE	2.44	0.50
2:V:234:SER:O	2:V:238:THR:OG1	2.29	0.50
3:m:20:GLU:OE1	3:m:20:GLU:N	2.44	0.50
3:g:230:VAL:HG11	3:g:282:MET:HE1	1.94	0.50
3:g:59:GLU:OE1	3:g:110:ARG:NH1	2.44	0.49
3:k:208:PHE:CZ	3:k:210:ILE:HD11	2.47	0.49
2:W:234:SER:O	2:W:238:THR:OG1	2.30	0.49
3:l:311:GLU:N	3:l:311:GLU:OE1	2.45	0.49
2:V:45:GLU:N	2:V:45:GLU:OE1	2.46	0.49
2:W:410:GLU:O	2:W:413:SER:OG	2.29	0.49
3:l:230:VAL:HG11	3:l:282:MET:HE1	1.94	0.49
3:k:20:GLU:N	3:k:20:GLU:OE1	2.45	0.49
3:l:20:GLU:N	3:l:20:GLU:OE1	2.45	0.49
3:g:311:GLU:N	3:g:311:GLU:OE1	2.45	0.49
2:U:234:SER:O	2:U:238:THR:OG1	2.30	0.49
1:F:107:ASN:ND2	4:V:501:GTP:O1G	2.45	0.49
2:W:45:GLU:N	2:W:45:GLU:OE1	2.45	0.49
2:Q:262:ARG:NH1	2:Q:414:ASN:OD1	2.46	0.49
3:g:208:PHE:CZ	3:g:210:ILE:HD11	2.48	0.49
2:U:11:GLN:CB	5:U:502:G2P:O1A	2.54	0.49
2:U:3:GLU:N	2:U:3:GLU:OE1	2.46	0.48
1:A:85:ARG:NH2	1:A:98:LEU:O	2.45	0.48
3:m:280:SER:O	3:m:283:THR:OG1	2.30	0.48
1:E:174:GLU:N	1:E:174:GLU:OE1	2.47	0.48
2:W:311:LEU:O	2:W:348:ASN:ND2	2.46	0.48
2:Q:31:ASP:OD2	2:Q:33:THR:OG1	2.24	0.48
3:k:171:ARG:NH1	3:k:172:PHE:O	2.47	0.48
2:V:3:GLU:N	2:V:3:GLU:OE1	2.47	0.48
3:m:230:VAL:HG11	3:m:282:MET:HE1	1.96	0.48
3:k:280:SER:O	3:k:283:THR:OG1	2.31	0.48
2:V:141:GLY:O	2:V:145:SER:OG	2.17	0.48
1:F:174:GLU:N	1:F:174:GLU:OE1	2.47	0.48
2:W:31:ASP:OD2	2:W:33:THR:OG1	2.21	0.47
1:H:293:SER:OG	1:H:296:GLU:OE1	2.27	0.47
3:l:280:SER:O	3:l:283:THR:OG1	2.32	0.47
2:Q:299:MET:SD	2:Q:299:MET:N	2.87	0.47
3:g:280:SER:O	3:g:283:THR:OG1	2.31	0.47
2:V:214:THR:OG1	2:V:273:LEU:O	2.32	0.47
3:m:277:TYR:O	3:m:283:THR:OG1	2.21	0.47
2:W:299:MET:SD	2:W:299:MET:N	2.87	0.47
2:Q:11:GLN:CB	5:Q:502:G2P:O1A	2.55	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:m:59:GLU:OE1	3:m:110:ARG:NH1	2.48	0.47
3:l:208:PHE:CZ	3:l:210:ILE:HD11	2.50	0.47
2:Q:234:SER:O	2:Q:238:THR:OG1	2.33	0.47
2:U:109:GLY:O	2:U:113:VAL:HG13	2.14	0.47
3:k:311:GLU:N	3:k:311:GLU:OE1	2.47	0.47
3:m:311:GLU:OE1	3:m:311:GLU:N	2.46	0.47
1:H:174:GLU:N	1:H:174:GLU:OE1	2.47	0.47
1:A:174:GLU:N	1:A:174:GLU:OE1	2.48	0.47
2:U:299:MET:SD	2:U:299:MET:N	2.87	0.47
2:V:299:MET:SD	2:V:299:MET:N	2.88	0.47
1:A:293:SER:OG	1:A:296:GLU:OE1	2.27	0.46
1:H:419:MET:HE3	1:H:423:GLU:OE2	2.15	0.46
2:W:109:GLY:O	2:W:113:VAL:HG13	2.15	0.46
2:Q:214:THR:OG1	2:Q:273:LEU:O	2.33	0.46
3:l:286:LEU:O	3:l:289:SER:OG	2.31	0.46
1:E:180:ALA:HB2	1:E:212:ASN:OD1	2.16	0.46
2:W:3:GLU:N	2:W:3:GLU:OE1	2.49	0.46
2:Q:109:GLY:O	2:Q:113:VAL:HG13	2.15	0.46
2:Q:3:GLU:N	2:Q:3:GLU:OE1	2.49	0.46
2:U:267:MET:CE	2:U:374:ILE:HD13	2.38	0.46
2:U:267:MET:N	2:U:369:GLY:O	2.46	0.46
1:F:85:ARG:NH2	1:F:98:LEU:O	2.49	0.46
1:H:180:ALA:HB2	1:H:212:ASN:OD1	2.16	0.45
3:g:286:LEU:O	3:g:289:SER:OG	2.32	0.45
2:Q:267:MET:CE	2:Q:374:ILE:HD13	2.38	0.45
1:A:180:ALA:HB2	1:A:212:ASN:OD1	2.17	0.45
1:E:200:THR:O	1:E:204:SER:OG	2.29	0.45
1:F:419:MET:HE3	1:F:423:GLU:OE2	2.16	0.45
2:W:267:MET:CE	2:W:374:ILE:HD13	2.38	0.45
2:Q:237:THR:O	2:Q:241:ARG:NE	2.50	0.45
1:H:303:GLU:OE1	1:H:306:ASN:N	2.50	0.45
1:A:257:ASP:OD2	1:A:259:THR:OG1	2.27	0.45
1:A:419:MET:HE3	1:A:423:GLU:OE2	2.16	0.45
2:U:410:GLU:O	2:U:413:SER:OG	2.26	0.45
2:V:267:MET:N	2:V:369:GLY:O	2.47	0.45
3:m:286:LEU:O	3:m:289:SER:OG	2.32	0.45
1:F:180:ALA:HB2	1:F:212:ASN:OD1	2.17	0.45
3:k:136:GLU:O	3:k:143:ARG:N	2.49	0.44
2:W:267:MET:N	2:W:369:GLY:O	2.47	0.44
2:Q:267:MET:N	2:Q:369:GLY:O	2.47	0.44
3:k:230:VAL:HG11	3:k:282:MET:HE1	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:V:237:THR:O	2:V:241:ARG:NE	2.50	0.44
2:W:113:VAL:HG11	2:W:150:LEU:HD23	1.99	0.44
3:l:136:GLU:O	3:l:143:ARG:N	2.49	0.44
2:U:214:THR:OG1	2:U:273:LEU:O	2.34	0.44
1:E:209:MET:SD	1:E:209:MET:N	2.90	0.44
1:E:244:ILE:HD13	1:E:384:LEU:HD23	2.00	0.44
3:m:309:GLU:OE1	3:m:309:GLU:N	2.47	0.44
3:l:309:GLU:OE1	3:l:309:GLU:N	2.47	0.44
3:g:136:GLU:O	3:g:143:ARG:N	2.49	0.44
1:A:107:ASN:ND2	4:Q:501:GTP:O1G	2.51	0.44
3:g:309:GLU:OE1	3:g:309:GLU:N	2.47	0.44
1:E:107:ASN:ND2	4:U:501:GTP:O1G	2.51	0.44
2:V:267:MET:CE	2:V:374:ILE:HD13	2.38	0.44
2:V:66:VAL:HG11	2:V:116:VAL:HG21	2.00	0.44
1:E:184:SER:OG	1:E:189:GLU:OE2	2.30	0.43
2:U:66:VAL:HG11	2:U:116:VAL:HG21	1.99	0.43
2:U:233:MET:O	2:U:237:THR:HG22	2.17	0.43
2:W:150:LEU:O	2:W:153:SER:OG	2.28	0.43
3:k:16:ARG:NH2	3:k:303:SER:OG	2.52	0.43
2:V:410:GLU:O	2:V:413:SER:OG	2.29	0.43
3:k:309:GLU:OE1	3:k:309:GLU:N	2.48	0.43
2:V:109:GLY:O	2:V:113:VAL:HG13	2.17	0.43
2:W:66:VAL:HG11	2:W:116:VAL:HG21	2.01	0.43
1:F:303:GLU:OE1	1:F:306:ASN:N	2.51	0.43
3:l:50:ARG:NH1	3:l:64:ASP:OD2	2.50	0.43
3:m:136:GLU:O	3:m:143:ARG:N	2.51	0.43
3:k:286:LEU:O	3:k:289:SER:OG	2.34	0.43
2:Q:410:GLU:O	2:Q:413:SER:OG	2.26	0.42
3:l:97:GLY:O	3:l:187:LYS:NZ	2.51	0.42
1:H:257:ASP:OD2	1:H:259:THR:OG1	2.33	0.42
2:Q:66:VAL:HG11	2:Q:116:VAL:HG21	2.02	0.42
2:W:214:THR:OG1	2:W:273:LEU:O	2.37	0.42
1:E:303:GLU:OE1	1:E:306:ASN:N	2.52	0.42
2:V:33:THR:O	2:V:58:LYS:NZ	2.50	0.42
1:H:352:TRP:NE1	1:H:443:VAL:O	2.52	0.42
1:H:296:GLU:OE1	1:H:296:GLU:N	2.49	0.42
2:Q:46:ARG:O	2:Q:49:VAL:HG22	2.19	0.42
3:g:16:ARG:NH2	3:g:303:SER:OG	2.53	0.41
3:l:108:ILE:HG21	3:l:183:ILE:HD12	2.02	0.41
1:E:419:MET:HE3	1:E:423:GLU:OE2	2.20	0.41
2:Q:311:LEU:O	2:Q:348:ASN:ND2	2.52	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:g:108:ILE:HG21	3:g:183:ILE:HD12	2.02	0.41
1:A:175:PHE:CE1	1:A:241:VAL:HG12	2.56	0.41
1:E:85:ARG:NH2	1:E:98:LEU:O	2.52	0.41
3:k:108:ILE:HG21	3:k:183:ILE:HD12	2.02	0.41
2:V:46:ARG:O	2:V:49:VAL:HG22	2.21	0.41
3:m:132:VAL:HG12	3:m:210:ILE:HD12	2.03	0.41
1:H:212:ASN:OD1	1:H:213:GLU:N	2.54	0.41
3:l:123:ASP:OD1	3:l:124:GLU:N	2.54	0.41
1:E:212:ASN:OD1	1:E:213:GLU:N	2.54	0.41
3:l:16:ARG:NH1	3:l:17:PRO:O	2.51	0.41
3:l:92:THR:OG1	6:l:401:ATP:O1A	2.38	0.41
2:U:46:ARG:O	2:U:49:VAL:HG22	2.21	0.41
2:U:311:LEU:O	2:U:348:ASN:ND2	2.52	0.41
3:l:171:ARG:NH1	3:l:172:PHE:O	2.54	0.40
3:g:97:GLY:O	3:g:187:LYS:NZ	2.53	0.40
1:A:200:THR:O	1:A:204:SER:OG	2.33	0.40
1:F:231:THR:O	1:F:235:ARG:NH1	2.54	0.40
2:V:236:VAL:HG22	2:V:368:ILE:HD11	2.02	0.40
1:F:25:CYS:O	1:F:30:ILE:N	2.53	0.40
1:F:175:PHE:CE1	1:F:241:VAL:HG12	2.56	0.40
1:F:212:ASN:OD1	1:F:213:GLU:N	2.54	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	423/457 (93%)	414 (98%)	9 (2%)	0	100	100
1	E	423/457 (93%)	412 (97%)	11 (3%)	0	100	100
1	F	423/457 (93%)	411 (97%)	12 (3%)	0	100	100
1	H	423/457 (93%)	413 (98%)	10 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	Q	424/457 (93%)	412 (97%)	12 (3%)	0	100	100
2	U	424/457 (93%)	412 (97%)	12 (3%)	0	100	100
2	V	424/457 (93%)	411 (97%)	13 (3%)	0	100	100
2	W	424/457 (93%)	410 (97%)	14 (3%)	0	100	100
3	g	323/372 (87%)	313 (97%)	10 (3%)	0	100	100
3	k	323/372 (87%)	313 (97%)	10 (3%)	0	100	100
3	l	323/372 (87%)	312 (97%)	11 (3%)	0	100	100
3	m	323/372 (87%)	312 (97%)	11 (3%)	0	100	100
All	All	4680/5144 (91%)	4545 (97%)	135 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	360/384 (94%)	353 (98%)	7 (2%)	52	69
1	E	360/384 (94%)	353 (98%)	7 (2%)	52	69
1	F	360/384 (94%)	353 (98%)	7 (2%)	52	69
1	H	360/384 (94%)	353 (98%)	7 (2%)	52	69
2	Q	368/390 (94%)	363 (99%)	5 (1%)	62	75
2	U	368/390 (94%)	364 (99%)	4 (1%)	70	79
2	V	368/390 (94%)	364 (99%)	4 (1%)	70	79
2	W	368/390 (94%)	364 (99%)	4 (1%)	70	79
3	g	289/330 (88%)	287 (99%)	2 (1%)	81	86
3	k	289/330 (88%)	287 (99%)	2 (1%)	81	86
3	l	289/330 (88%)	288 (100%)	1 (0%)	91	92
3	m	289/330 (88%)	287 (99%)	2 (1%)	81	86
All	All	4068/4416 (92%)	4016 (99%)	52 (1%)	64	76

All (52) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	2	ARG
1	H	103	GLU
1	H	119	GLU
1	H	213	GLU
1	H	281	VAL
1	H	421	GLU
1	H	440	GLU
2	W	172	SER
2	W	180	VAL
2	W	312	THR
2	W	366	THR
3	l	270	GLU
1	A	2	ARG
1	A	103	GLU
1	A	119	GLU
1	A	213	GLU
1	A	281	VAL
1	A	421	GLU
1	A	440	GLU
2	Q	125	GLU
2	Q	172	SER
2	Q	180	VAL
2	Q	312	THR
2	Q	366	THR
3	g	270	GLU
3	g	294	CYS
1	E	2	ARG
1	E	103	GLU
1	E	119	GLU
1	E	262	GLN
1	E	281	VAL
1	E	421	GLU
1	E	440	GLU
2	U	172	SER
2	U	180	VAL
2	U	312	THR
2	U	366	THR
3	k	270	GLU
3	k	294	CYS
1	F	2	ARG
1	F	15	GLN
1	F	103	GLU

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Mol	Chain	Res	Type
1	F	119	GLU
1	F	281	VAL
1	F	421	GLU
1	F	440	GLU
2	V	172	SER
2	V	180	VAL
2	V	312	THR
2	V	366	THR
3	m	270	GLU
3	m	294	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	H	97	GLN
2	W	11	GLN
2	W	43	GLN
1	A	97	GLN
2	Q	11	GLN
2	Q	43	GLN
1	E	97	GLN
2	U	11	GLN
2	U	43	GLN
2	V	11	GLN
2	V	43	GLN

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 (i)

12 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	G2P	U	502	-	27,34,34	6.06	12 (44%)	33,54,54	1.91	8 (24%)
4	GTP	V	501	-	26,34,34	1.11	2 (7%)	32,54,54	1.63	8 (25%)
6	ATP	k	401	-	26,33,33	0.94	1 (3%)	31,52,52	1.68	5 (16%)
4	GTP	U	501	-	26,34,34	1.11	2 (7%)	32,54,54	1.64	8 (25%)
4	GTP	Q	501	-	26,34,34	1.12	2 (7%)	32,54,54	1.62	8 (25%)
5	G2P	W	502	-	27,34,34	6.07	12 (44%)	33,54,54	1.90	8 (24%)
6	ATP	l	401	-	26,33,33	0.93	1 (3%)	31,52,52	1.69	6 (19%)
5	G2P	Q	502	-	27,34,34	6.06	12 (44%)	33,54,54	1.91	8 (24%)
6	ATP	g	401	-	26,33,33	0.93	1 (3%)	31,52,52	1.67	6 (19%)
4	GTP	W	501	-	26,34,34	1.11	2 (7%)	32,54,54	1.64	8 (25%)
6	ATP	m	401	-	26,33,33	0.94	1 (3%)	31,52,52	1.66	6 (19%)
5	G2P	V	502	-	27,34,34	6.06	12 (44%)	33,54,54	1.91	8 (24%)

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	G2P	U	502	-	-	8/15/38/38	0/3/3/3
4	GTP	V	501	-	-	2/18/38/38	0/3/3/3
6	ATP	k	401	-	-	0/18/38/38	0/3/3/3
4	GTP	U	501	-	-	2/18/38/38	0/3/3/3
4	GTP	Q	501	-	-	2/18/38/38	0/3/3/3
5	G2P	W	502	-	-	8/15/38/38	0/3/3/3
6	ATP	l	401	-	-	0/18/38/38	0/3/3/3
5	G2P	Q	502	-	-	8/15/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	ATP	g	401	-	-	1/18/38/38	0/3/3/3
4	GTP	W	501	-	-	2/18/38/38	0/3/3/3
6	ATP	m	401	-	-	1/18/38/38	0/3/3/3
5	G2P	V	502	-	-	8/15/38/38	0/3/3/3

All (60) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	W	502	G2P	C2'-C1'	-17.43	1.27	1.53
5	V	502	G2P	C2'-C1'	-17.42	1.27	1.53
5	U	502	G2P	C2'-C1'	-17.41	1.27	1.53
5	Q	502	G2P	C2'-C1'	-17.40	1.27	1.53
5	U	502	G2P	PB-O3B	14.84	1.74	1.58
5	V	502	G2P	PB-O3B	14.80	1.74	1.58
5	W	502	G2P	PB-O3B	14.80	1.74	1.58
5	Q	502	G2P	PB-O3B	14.76	1.74	1.58
5	Q	502	G2P	O4'-C1'	11.58	1.57	1.41
5	W	502	G2P	O4'-C1'	11.54	1.57	1.41
5	U	502	G2P	O4'-C1'	11.52	1.57	1.41
5	V	502	G2P	O4'-C1'	11.51	1.57	1.41
5	W	502	G2P	C3'-C4'	-10.08	1.27	1.53
5	Q	502	G2P	C3'-C4'	-10.06	1.27	1.53
5	U	502	G2P	C3'-C4'	-10.06	1.27	1.53
5	V	502	G2P	C3'-C4'	-10.05	1.27	1.53
5	W	502	G2P	C2-N2	9.73	1.53	1.33
5	Q	502	G2P	C2-N2	9.70	1.53	1.33
5	U	502	G2P	C2-N2	9.70	1.53	1.33
5	V	502	G2P	C2-N2	9.70	1.53	1.33
5	W	502	G2P	PA-O5'	6.01	1.66	1.57
5	V	502	G2P	PA-O5'	5.98	1.66	1.57
5	U	502	G2P	PA-O5'	5.97	1.66	1.57
5	Q	502	G2P	PA-O5'	5.95	1.66	1.57
5	Q	502	G2P	C2'-C3'	5.15	1.67	1.53
5	V	502	G2P	C2'-C3'	5.14	1.67	1.53
5	W	502	G2P	C2'-C3'	5.13	1.67	1.53
5	U	502	G2P	C2'-C3'	5.12	1.67	1.53
5	W	502	G2P	O4'-C4'	4.99	1.56	1.45
5	U	502	G2P	O4'-C4'	4.98	1.56	1.45
5	Q	502	G2P	O4'-C4'	4.98	1.56	1.45
5	V	502	G2P	O4'-C4'	4.96	1.56	1.45
5	U	502	G2P	PA-O1A	-4.34	1.46	1.56
5	W	502	G2P	PA-O1A	-4.33	1.46	1.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	V	502	G2P	PA-O1A	-4.33	1.46	1.56
5	Q	502	G2P	PA-O1A	-4.33	1.46	1.56
4	Q	501	GTP	C5-C6	-4.08	1.39	1.47
4	W	501	GTP	C5-C6	-4.04	1.39	1.47
4	V	501	GTP	C5-C6	-4.04	1.39	1.47
4	U	501	GTP	C5-C6	-4.03	1.39	1.47
5	Q	502	G2P	C5-C6	-2.64	1.36	1.41
5	V	502	G2P	C5-C6	-2.64	1.36	1.41
5	U	502	G2P	C5-C6	-2.64	1.36	1.41
5	W	502	G2P	C5-C6	-2.61	1.36	1.41
5	V	502	G2P	C5-C4	-2.59	1.34	1.40
5	W	502	G2P	C5-C4	-2.57	1.34	1.40
5	U	502	G2P	C5-C4	-2.56	1.34	1.40
5	Q	502	G2P	C5-C4	-2.54	1.34	1.40
6	g	401	ATP	C5-C4	2.43	1.47	1.40
6	l	401	ATP	C5-C4	2.42	1.47	1.40
6	k	401	ATP	C5-C4	2.41	1.47	1.40
6	m	401	ATP	C5-C4	2.40	1.47	1.40
5	V	502	G2P	PB-O1B	-2.36	1.50	1.56
5	U	502	G2P	PB-O1B	-2.35	1.50	1.56
5	Q	502	G2P	PB-O1B	-2.35	1.50	1.56
5	W	502	G2P	PB-O1B	-2.34	1.50	1.56
4	Q	501	GTP	C2-N3	2.23	1.38	1.33
4	V	501	GTP	C2-N3	2.21	1.38	1.33
4	U	501	GTP	C2-N3	2.14	1.38	1.33
4	W	501	GTP	C2-N3	2.14	1.38	1.33

All (87) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	Q	502	G2P	N3-C2-N1	-5.72	119.59	127.22
5	V	502	G2P	N3-C2-N1	-5.72	119.59	127.22
5	U	502	G2P	N3-C2-N1	-5.71	119.61	127.22
5	W	502	G2P	N3-C2-N1	-5.69	119.64	127.22
5	U	502	G2P	C2-N3-C4	4.30	120.27	115.36
5	Q	502	G2P	C2-N3-C4	4.29	120.25	115.36
5	W	502	G2P	C2-N3-C4	4.27	120.23	115.36
5	V	502	G2P	C2-N3-C4	4.26	120.22	115.36
6	k	401	ATP	PA-O3A-PB	-4.03	118.99	132.83
6	l	401	ATP	PA-O3A-PB	-3.99	119.14	132.83
4	U	501	GTP	PA-O3A-PB	-3.99	119.15	132.83
4	W	501	GTP	PA-O3A-PB	-3.97	119.22	132.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	g	401	ATP	PA-O3A-PB	-3.90	119.44	132.83
6	m	401	ATP	PA-O3A-PB	-3.86	119.59	132.83
6	l	401	ATP	PB-O3B-PG	-3.77	119.88	132.83
6	k	401	ATP	PB-O3B-PG	-3.76	119.92	132.83
4	V	501	GTP	PA-O3A-PB	-3.76	119.94	132.83
5	Q	502	G2P	N2-C2-N1	3.69	123.00	117.25
6	m	401	ATP	N3-C2-N1	-3.69	122.91	128.68
4	Q	501	GTP	PA-O3A-PB	-3.69	120.18	132.83
5	V	502	G2P	N2-C2-N1	3.67	122.97	117.25
6	g	401	ATP	PB-O3B-PG	-3.66	120.26	132.83
5	U	502	G2P	N2-C2-N1	3.66	122.94	117.25
6	k	401	ATP	N3-C2-N1	-3.66	122.96	128.68
6	g	401	ATP	N3-C2-N1	-3.66	122.97	128.68
5	W	502	G2P	N2-C2-N1	3.65	122.93	117.25
6	l	401	ATP	N3-C2-N1	-3.65	122.97	128.68
6	m	401	ATP	PB-O3B-PG	-3.59	120.50	132.83
5	Q	502	G2P	C1'-N9-C4	-3.43	120.61	126.64
5	V	502	G2P	C1'-N9-C4	-3.41	120.65	126.64
5	W	502	G2P	C1'-N9-C4	-3.40	120.67	126.64
5	U	502	G2P	C1'-N9-C4	-3.40	120.67	126.64
4	V	501	GTP	C5-C6-N1	3.39	119.94	113.95
6	m	401	ATP	C3'-C2'-C1'	3.39	106.08	100.98
6	l	401	ATP	C3'-C2'-C1'	3.37	106.06	100.98
4	Q	501	GTP	C5-C6-N1	3.37	119.89	113.95
4	W	501	GTP	C5-C6-N1	3.36	119.89	113.95
6	k	401	ATP	C3'-C2'-C1'	3.35	106.03	100.98
4	Q	501	GTP	PB-O3B-PG	-3.31	121.45	132.83
4	V	501	GTP	PB-O3B-PG	-3.30	121.51	132.83
4	U	501	GTP	C5-C6-N1	3.30	119.77	113.95
4	U	501	GTP	PB-O3B-PG	-3.25	121.68	132.83
6	g	401	ATP	C3'-C2'-C1'	3.21	105.81	100.98
4	W	501	GTP	PB-O3B-PG	-3.16	122.00	132.83
5	U	502	G2P	C3'-C2'-C1'	3.13	105.69	100.98
5	V	502	G2P	C3'-C2'-C1'	3.12	105.67	100.98
5	Q	502	G2P	C3'-C2'-C1'	3.11	105.67	100.98
5	W	502	G2P	C3'-C2'-C1'	3.11	105.67	100.98
4	V	501	GTP	C2-N1-C6	-3.06	119.46	125.10
4	W	501	GTP	C2-N1-C6	-3.06	119.47	125.10
4	Q	501	GTP	C2-N1-C6	-3.04	119.50	125.10
4	V	501	GTP	C8-N7-C5	3.01	108.73	102.99
4	U	501	GTP	C2-N1-C6	-3.01	119.56	125.10
4	U	501	GTP	C8-N7-C5	3.01	108.72	102.99

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	Q	501	GTP	C8-N7-C5	3.00	108.71	102.99
4	W	501	GTP	C8-N7-C5	2.99	108.68	102.99
4	U	501	GTP	C3'-C2'-C1'	2.96	105.43	100.98
4	Q	501	GTP	C3'-C2'-C1'	2.94	105.41	100.98
4	V	501	GTP	C3'-C2'-C1'	2.90	105.34	100.98
4	W	501	GTP	C3'-C2'-C1'	2.88	105.32	100.98
5	V	502	G2P	C2-N1-C6	2.80	120.38	115.93
5	Q	502	G2P	C2-N1-C6	2.79	120.36	115.93
6	l	401	ATP	C4-C5-N7	-2.79	106.49	109.40
5	U	502	G2P	C2-N1-C6	2.78	120.34	115.93
5	W	502	G2P	C2-N1-C6	2.76	120.31	115.93
6	m	401	ATP	C4-C5-N7	-2.73	106.56	109.40
6	k	401	ATP	C4-C5-N7	-2.72	106.56	109.40
6	g	401	ATP	C4-C5-N7	-2.70	106.58	109.40
5	V	502	G2P	PB-O3B-PG	-2.59	123.49	132.62
5	U	502	G2P	PB-O3B-PG	-2.59	123.50	132.62
5	W	502	G2P	PB-O3B-PG	-2.59	123.50	132.62
5	Q	502	G2P	PB-O3B-PG	-2.58	123.53	132.62
5	V	502	G2P	C5-C6-N1	-2.52	119.98	123.43
5	U	502	G2P	C5-C6-N1	-2.48	120.03	123.43
5	Q	502	G2P	C5-C6-N1	-2.46	120.07	123.43
5	W	502	G2P	C5-C6-N1	-2.45	120.07	123.43
4	W	501	GTP	O3G-PG-O3B	2.29	112.33	104.64
4	U	501	GTP	O3G-PG-O3B	2.27	112.26	104.64
4	Q	501	GTP	O3G-PG-O3B	2.24	112.14	104.64
4	W	501	GTP	O6-C6-C5	-2.18	120.11	124.37
4	V	501	GTP	O3G-PG-O3B	2.18	111.96	104.64
4	V	501	GTP	O6-C6-C5	-2.15	120.17	124.37
4	Q	501	GTP	O6-C6-C5	-2.13	120.21	124.37
4	U	501	GTP	O6-C6-C5	-2.10	120.26	124.37
6	m	401	ATP	C2-N1-C6	2.02	122.22	118.75
6	g	401	ATP	C2-N1-C6	2.01	122.20	118.75
6	l	401	ATP	C2-N1-C6	2.01	122.19	118.75

There are no chirality outliers.

All (42) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	W	502	G2P	PB-O3B-PG-O3G
5	W	502	G2P	PB-C3A-PA-O1A
5	W	502	G2P	PB-C3A-PA-O2A
5	W	502	G2P	PB-C3A-PA-O5'

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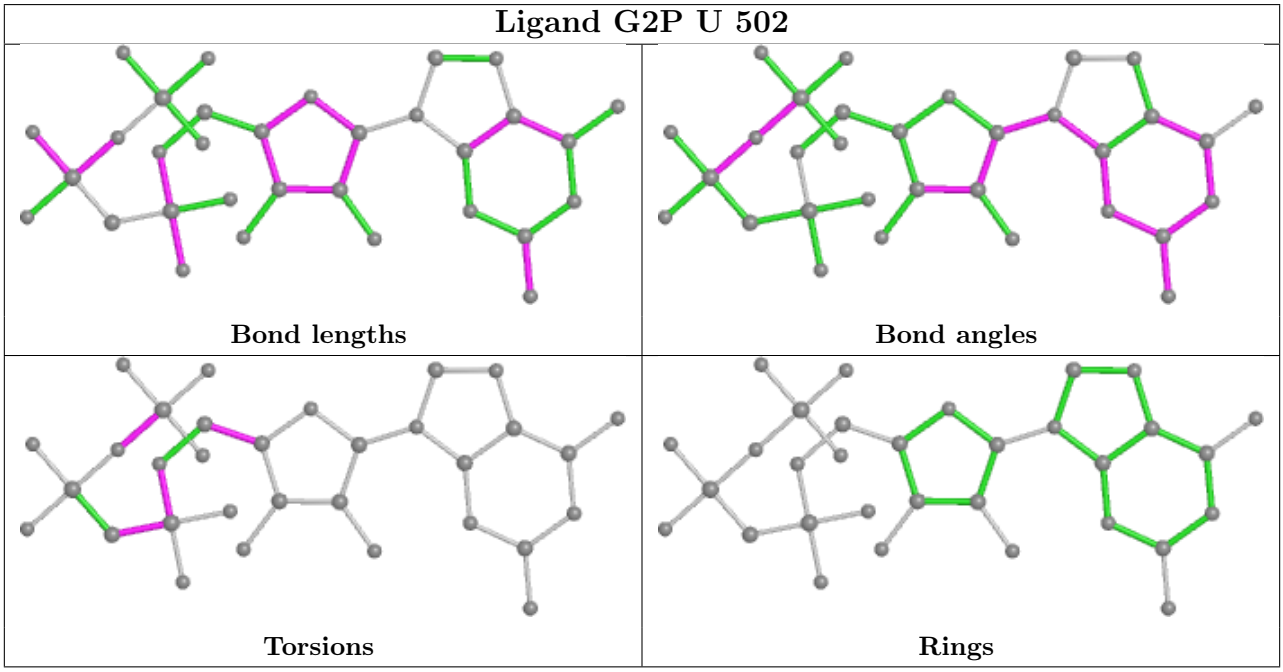
Mol	Chain	Res	Type	Atoms
5	W	502	G2P	O4'-C4'-C5'-O5'
5	Q	502	G2P	PB-O3B-PG-O3G
5	Q	502	G2P	PB-C3A-PA-O1A
5	Q	502	G2P	PB-C3A-PA-O2A
5	Q	502	G2P	PB-C3A-PA-O5'
5	Q	502	G2P	O4'-C4'-C5'-O5'
5	U	502	G2P	PB-O3B-PG-O3G
5	U	502	G2P	PB-C3A-PA-O1A
5	U	502	G2P	PB-C3A-PA-O2A
5	U	502	G2P	PB-C3A-PA-O5'
5	U	502	G2P	O4'-C4'-C5'-O5'
5	V	502	G2P	PB-O3B-PG-O3G
5	V	502	G2P	PB-C3A-PA-O1A
5	V	502	G2P	PB-C3A-PA-O2A
5	V	502	G2P	PB-C3A-PA-O5'
5	V	502	G2P	O4'-C4'-C5'-O5'
5	W	502	G2P	C3'-C4'-C5'-O5'
5	Q	502	G2P	C3'-C4'-C5'-O5'
5	U	502	G2P	C3'-C4'-C5'-O5'
5	V	502	G2P	C3'-C4'-C5'-O5'
4	W	501	GTP	C4'-C5'-O5'-PA
4	U	501	GTP	C4'-C5'-O5'-PA
5	W	502	G2P	C5'-O5'-PA-C3A
5	Q	502	G2P	C5'-O5'-PA-C3A
5	U	502	G2P	C5'-O5'-PA-C3A
5	V	502	G2P	C5'-O5'-PA-C3A
4	Q	501	GTP	C4'-C5'-O5'-PA
4	V	501	GTP	C4'-C5'-O5'-PA
5	W	502	G2P	C5'-O5'-PA-O2A
5	Q	502	G2P	C5'-O5'-PA-O2A
5	U	502	G2P	C5'-O5'-PA-O2A
5	V	502	G2P	C5'-O5'-PA-O2A
4	W	501	GTP	C5'-O5'-PA-O3A
4	Q	501	GTP	C5'-O5'-PA-O3A
4	U	501	GTP	C5'-O5'-PA-O3A
4	V	501	GTP	C5'-O5'-PA-O3A
6	g	401	ATP	PA-O3A-PB-O1B
6	m	401	ATP	PA-O3A-PB-O2B

There are no ring outliers.

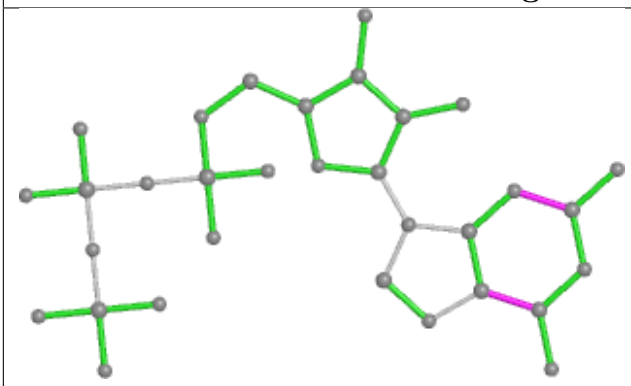
12 monomers are involved in 45 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	U	502	G2P	8	0
4	V	501	GTP	2	0
6	k	401	ATP	1	0
4	U	501	GTP	2	0
4	Q	501	GTP	2	0
5	W	502	G2P	8	0
6	l	401	ATP	2	0
5	Q	502	G2P	8	0
6	g	401	ATP	1	0
4	W	501	GTP	2	0
6	m	401	ATP	1	0
5	V	502	G2P	8	0

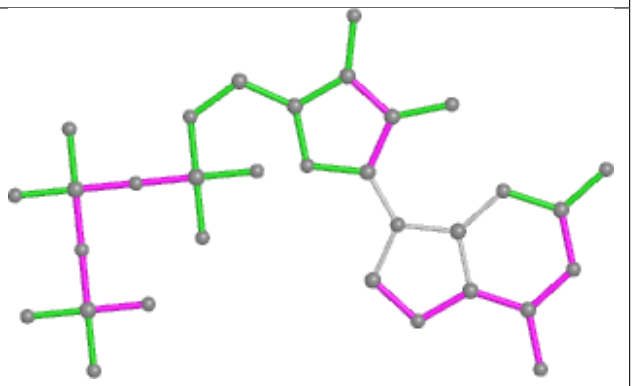
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



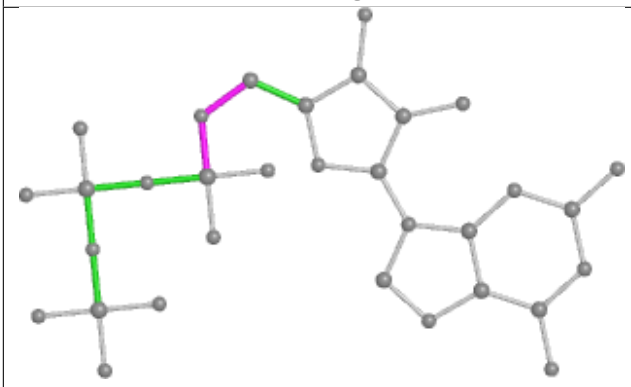
Ligand GTP V 501



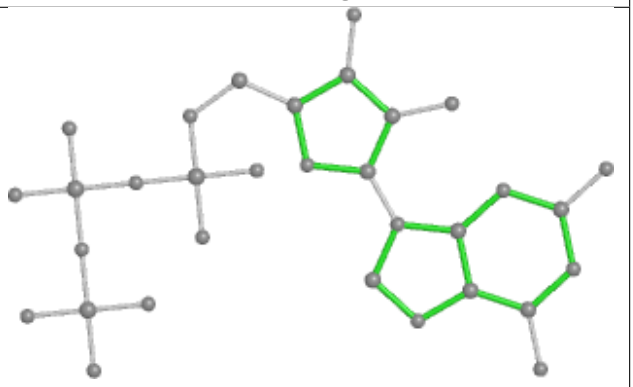
Bond lengths



Bond angles

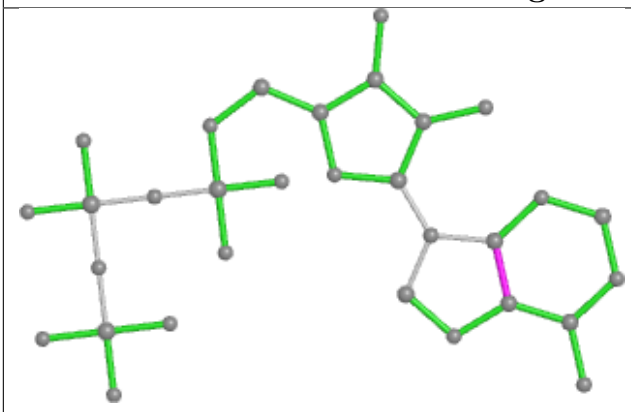


Torsions

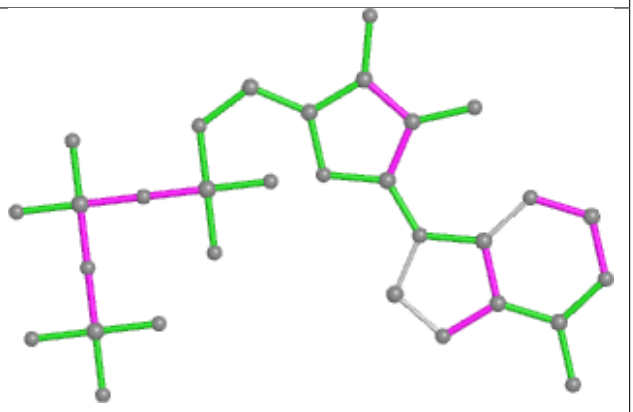


Rings

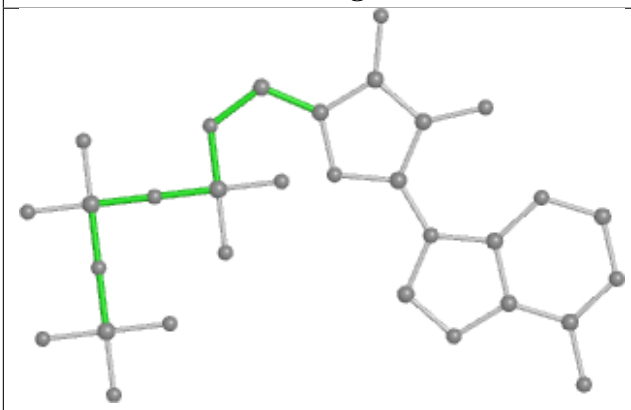
Ligand ATP k 401



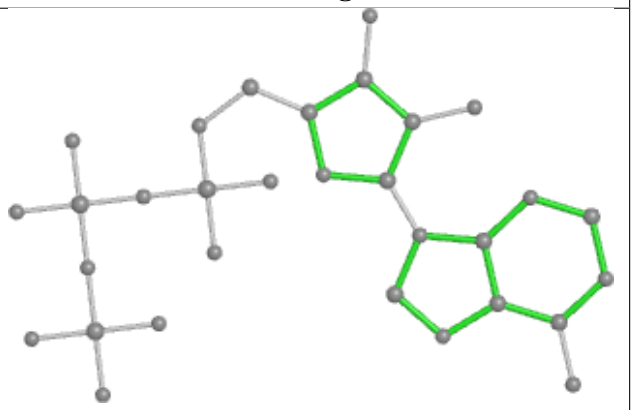
Bond lengths



Bond angles

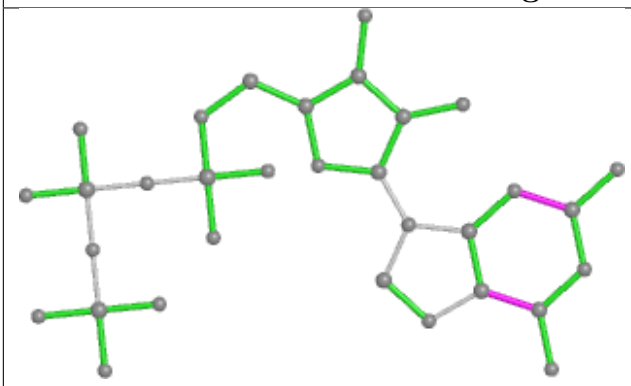


Torsions

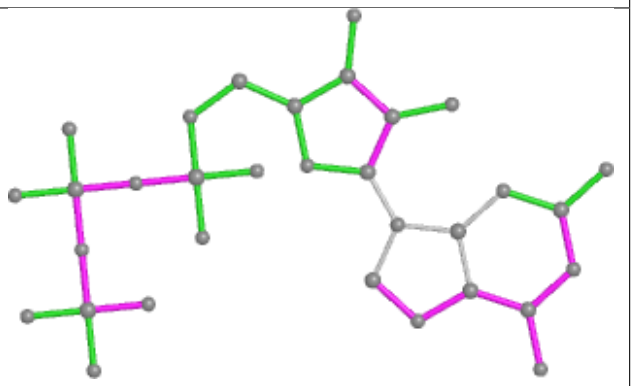


Rings

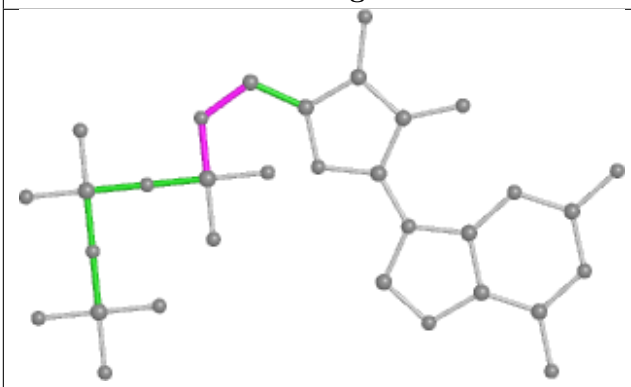
Ligand GTP U 501



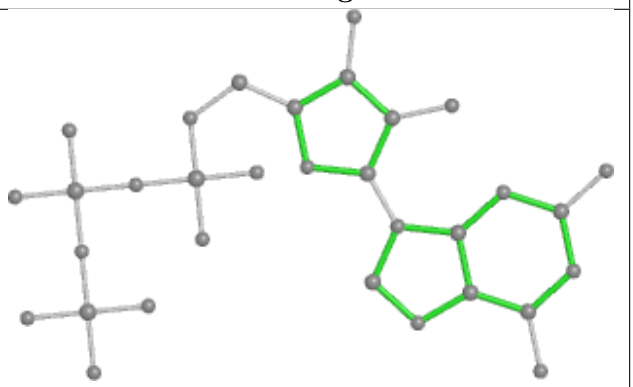
Bond lengths



Bond angles

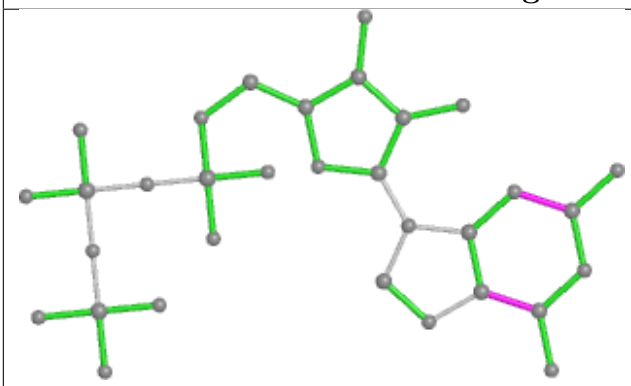


Torsions

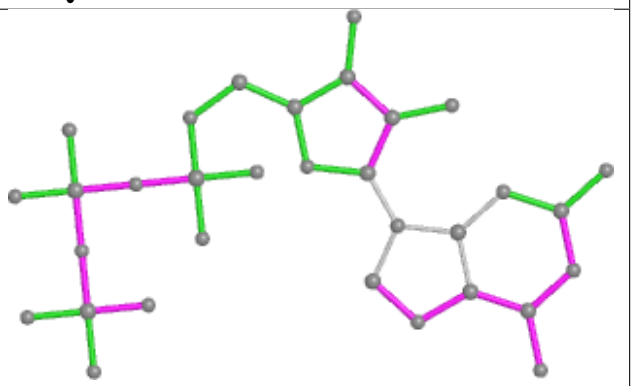


Rings

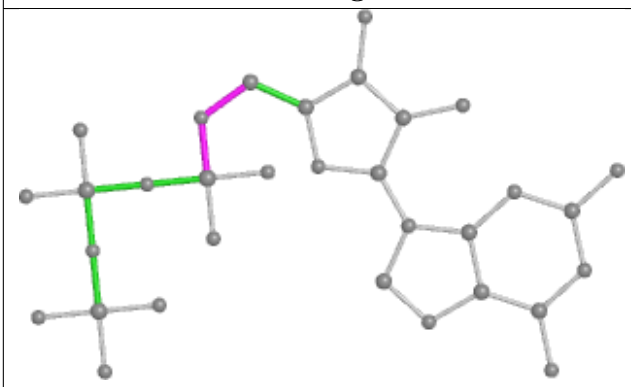
Ligand GTP Q 501



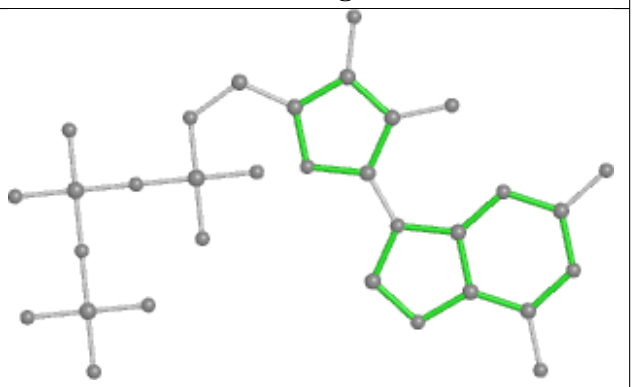
Bond lengths



Bond angles

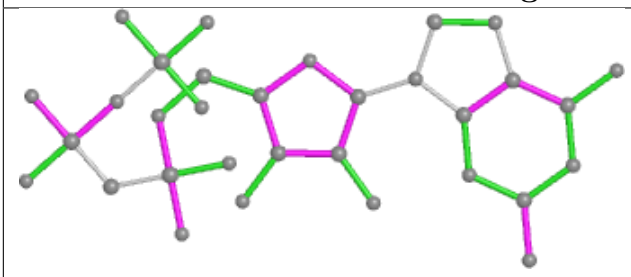


Torsions

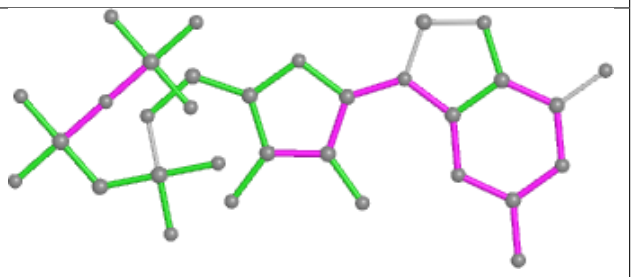


Rings

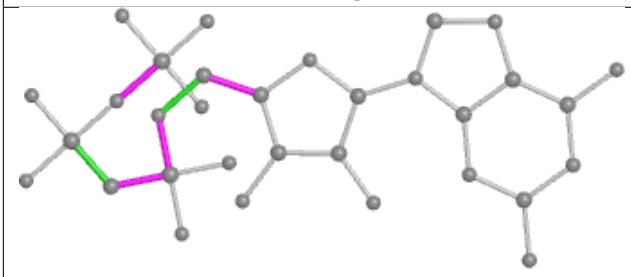
Ligand G2P W 502



Bond lengths



Bond angles



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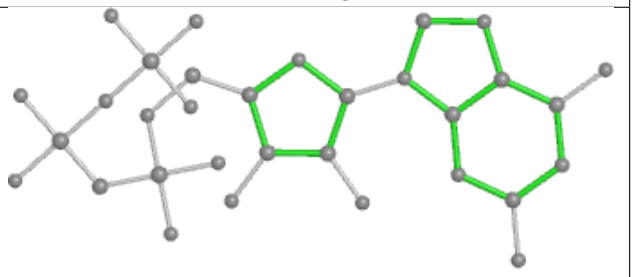
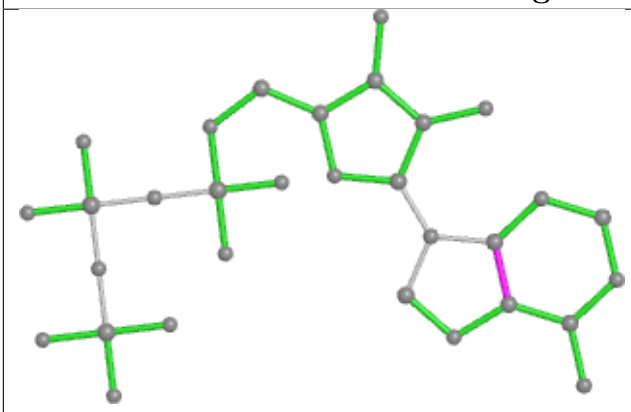


Rings

Ligand ATP l 401



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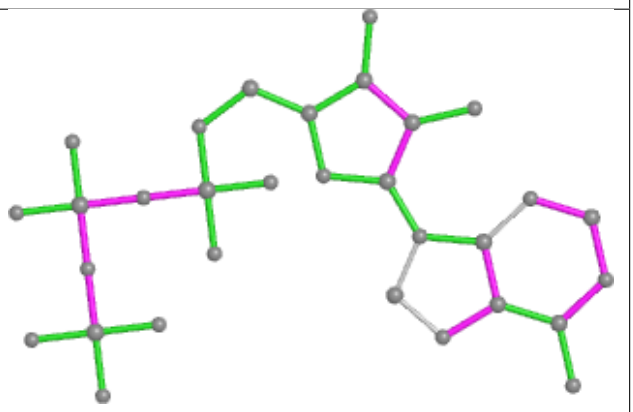
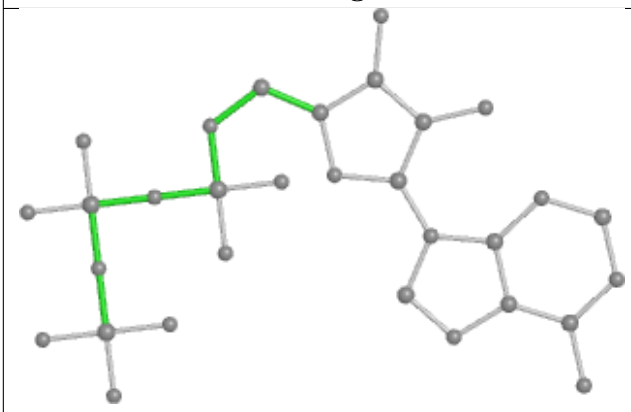


Bond angles



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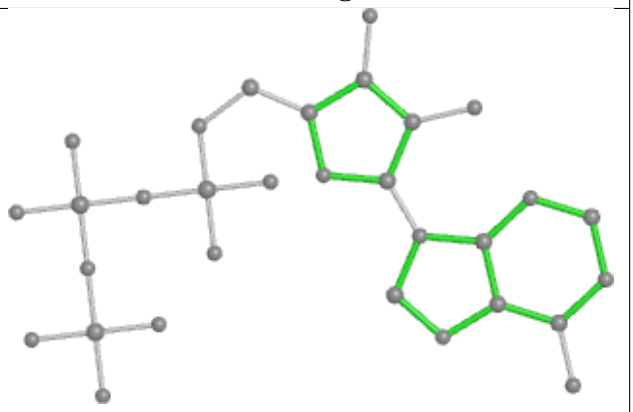
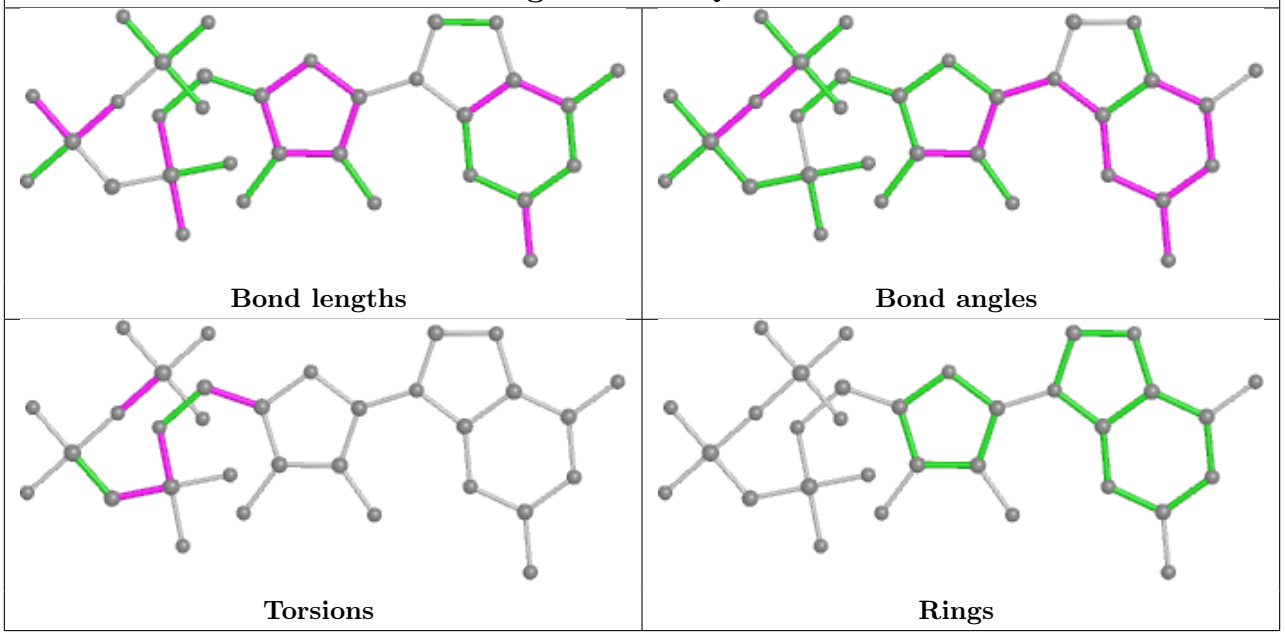
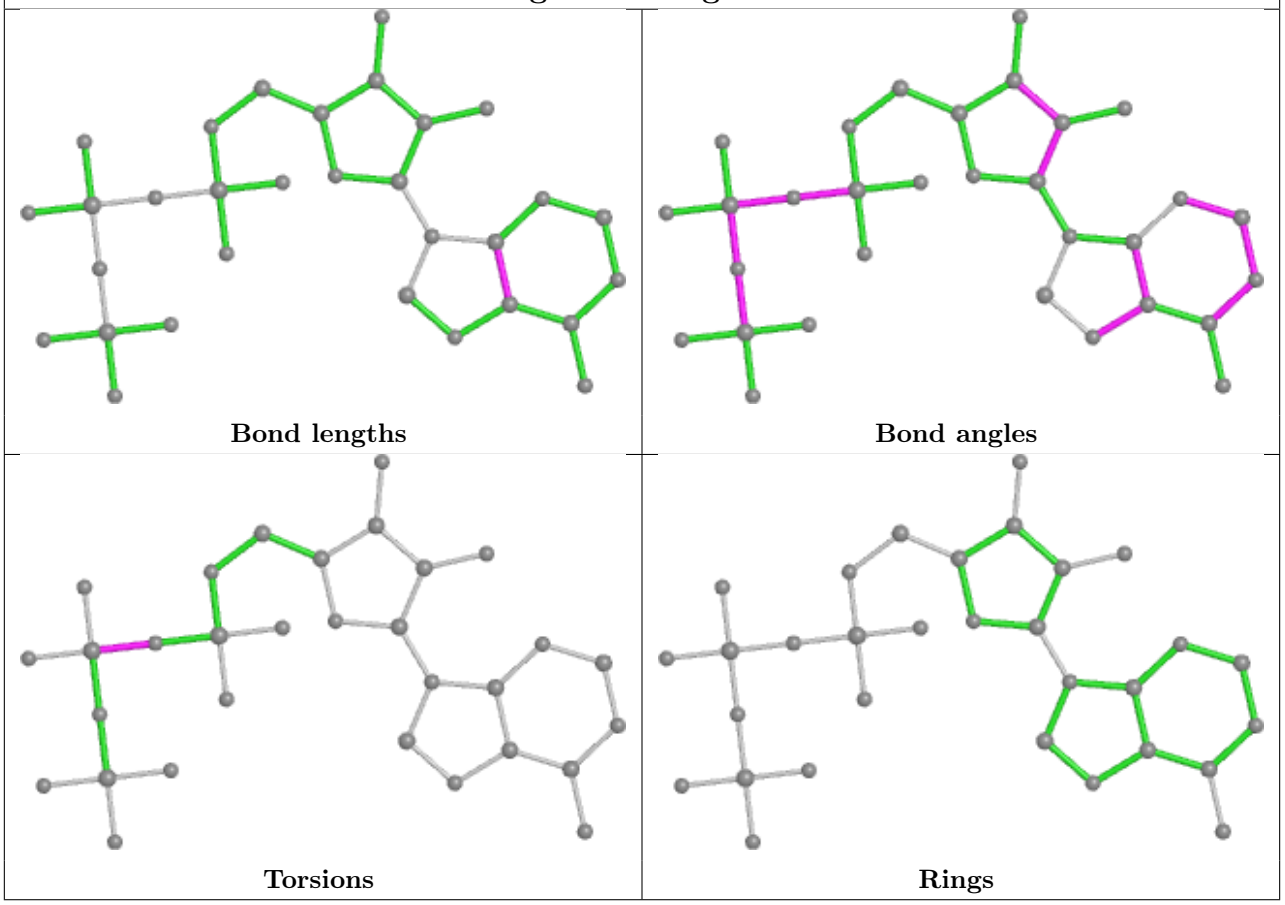


Rings

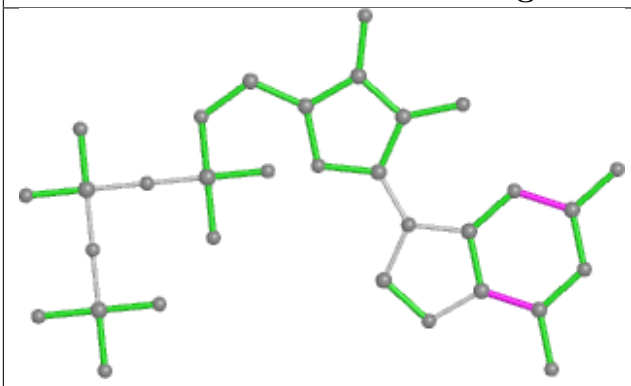
Ligand G2P Q 502



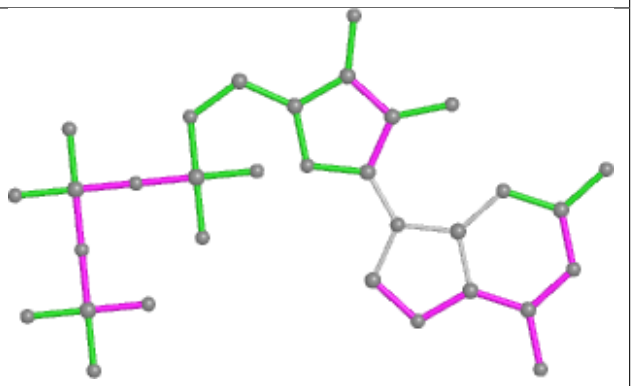
Ligand ATP g 401



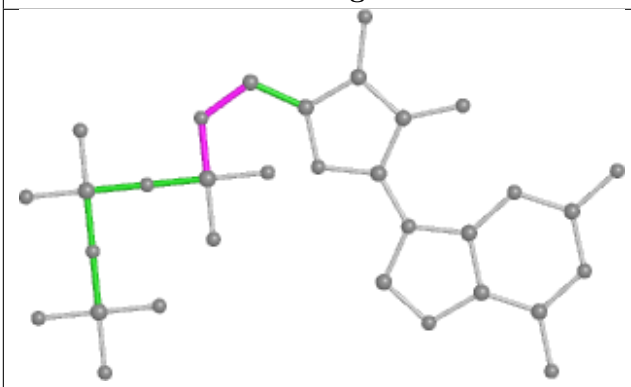
Ligand GTP W 501



Bond lengths



Bond angles



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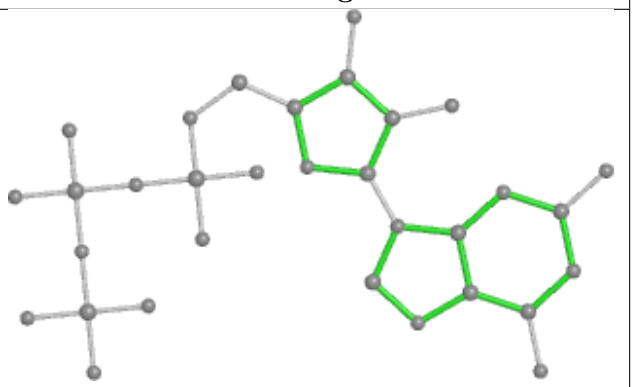
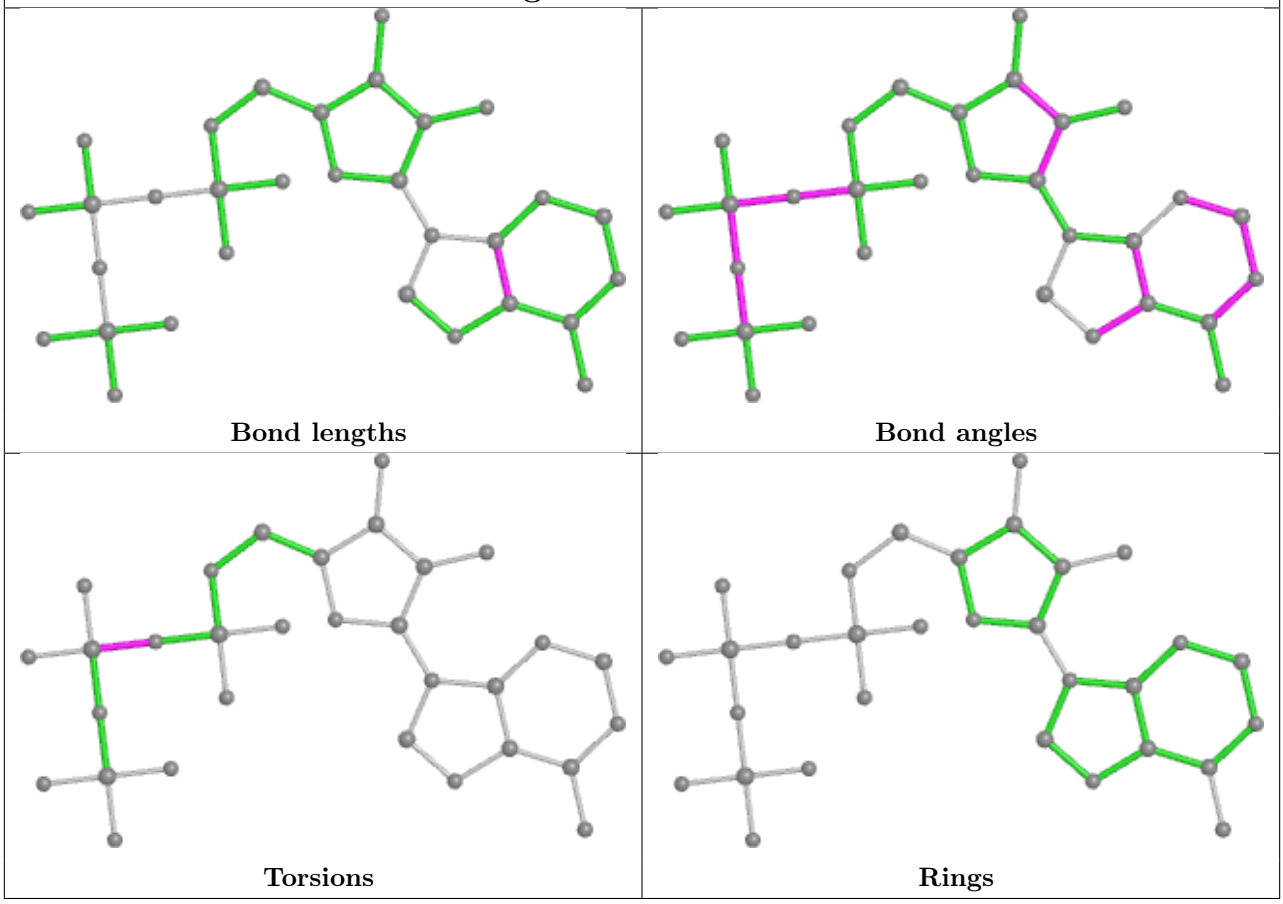
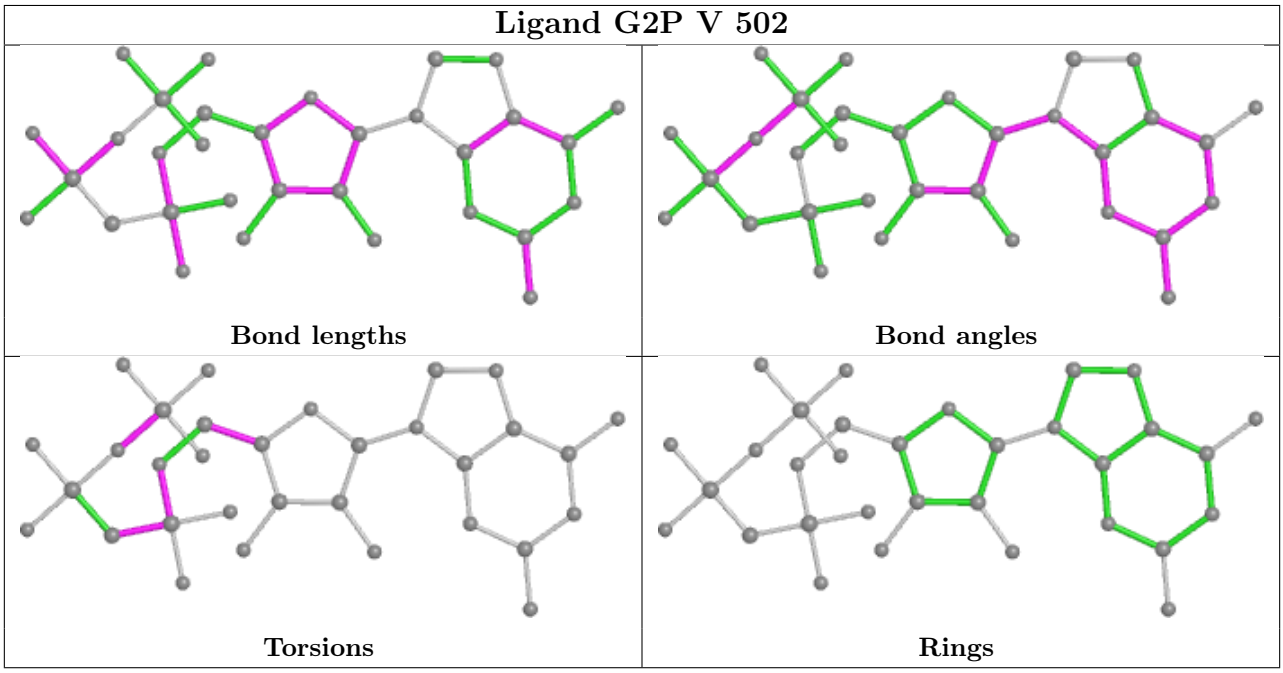


Rings

Ligand ATP m 401



Ligand G2P V 502



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.