



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 27, 2025 – 09:00 PM JST

PDB ID : 9K7E / pdb_00009k7e
Title : Crystal structure of T2R-TTL-taccalonolide Y8 complex
Authors : Yu, Q.W.; Wang, Y.X.
Deposited on : 2024-10-23
Resolution : 2.45 Å(reported)

This is a Full wwPDB X-ray Structure 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/XrayValidationReportHelp>

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:

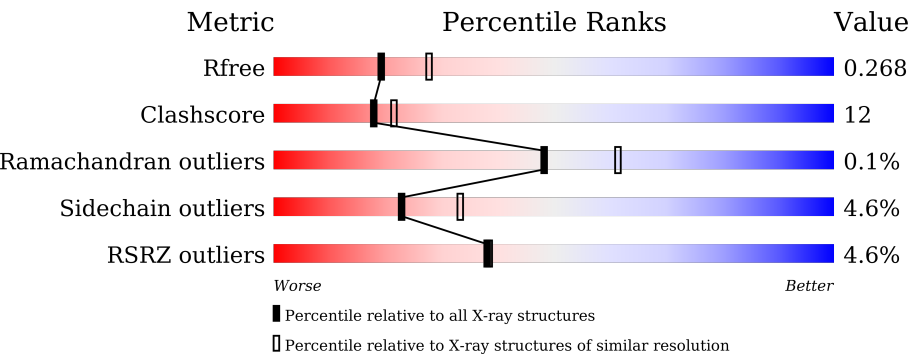
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.45 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)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1096 (2.46-2.46)
Clashscore	180529	1178 (2.46-2.46)
Ramachandran outliers	177936	1170 (2.46-2.46)
Sidechain outliers	177891	1170 (2.46-2.46)
RSRZ outliers	164620	1096 (2.46-2.46)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower 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 electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	440	2% 76% 22% ..
1	C	440	% 81% 18% .
2	B	431	2% 80% 18% ..
2	D	431	6% 65% 30% ..
3	E	143	6% 65% 16% . 15%
4	F	380	11% 58% 26% . 14%

2 Entry composition

There are 12 unique types of molecules in this entry. The entry contains 17393 atoms, of which 33 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 Detyrosinated tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	437	Total	C	N	O	S	0	0	0
			3405	2154	580	649	22			
1	C	440	Total	C	N	O	S	0	0	0
			3433	2172	583	656	22			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	427	Total	C	N	O	S	0	0	0
			3351	2104	572	649	26			
2	D	421	Total	C	N	O	S	0	0	0
			3300	2076	559	638	27			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	121	Total	C	N	O	S	0	0	0
			1000	617	181	197	5			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	3	MET	-	initiating methionine	UNP P63043
E	4	ALA	-	expression tag	UNP P63043

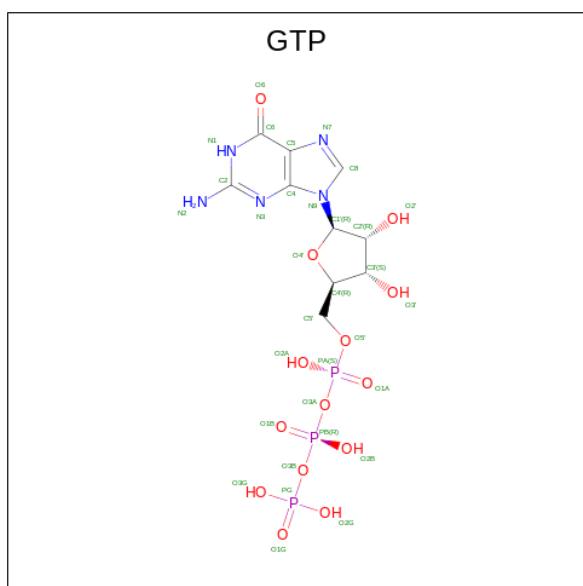
- Molecule 4 is a protein called Tubulin-tyrosine ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	326	Total	C	N	O	S	0	0	0
			2658	1708	453	483	14			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	379	HIS	-	expression tag	UNP A0A8C9FGJ1
F	380	HIS	-	expression tag	UNP A0A8C9FGJ1

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



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	32	0
			32	10	5	14	3		
5	C	1	Total	C	N	O	P	32	0
			32	10	5	14	3		

- Molecule 6 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Ca	1	0
			1	1		
6	C	1	Total	Ca	1	0
			1	1		

- Molecule 7 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

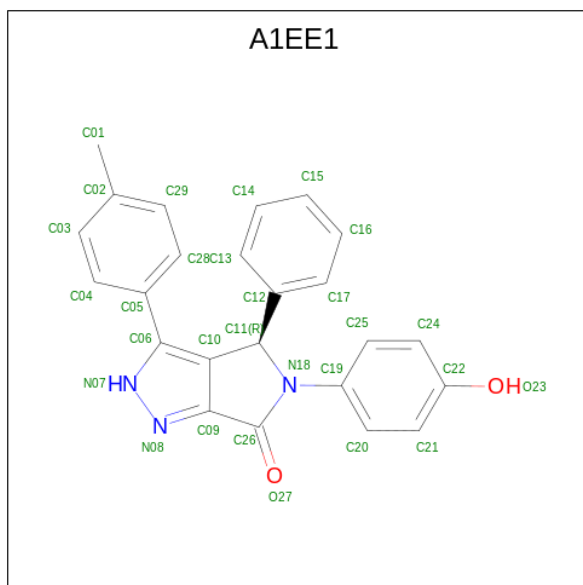
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Mg	1	0
			1	1		
7	B	1	Total	Mg	1	0
			1	1		

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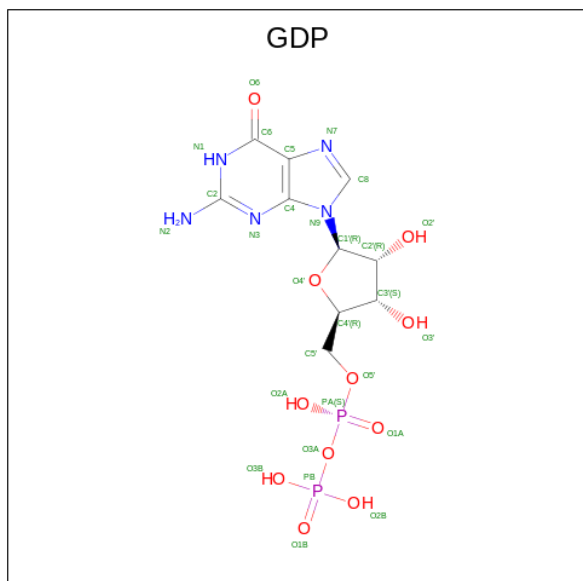
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	1	Total	Mg	1	0
			1	1		

- Molecule 8 is (4 {R})-5-(4-hydroxyphenyl)-3-(4-methylphenyl)-4-phenyl-2,4-dihydropyrrolo [3,4-c]pyrazol-6-one (CCD ID: A1EE1) (formula: C₂₄H₁₉N₃O₂).



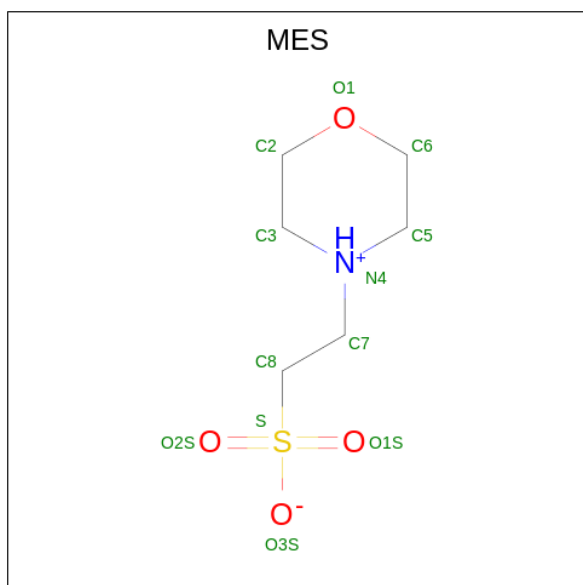
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
8	B	1	Total	C	H	N	O	0	0
			48	24	19	3	2		

- Molecule 9 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: C₁₀H₁₅N₅O₁₁P₂).



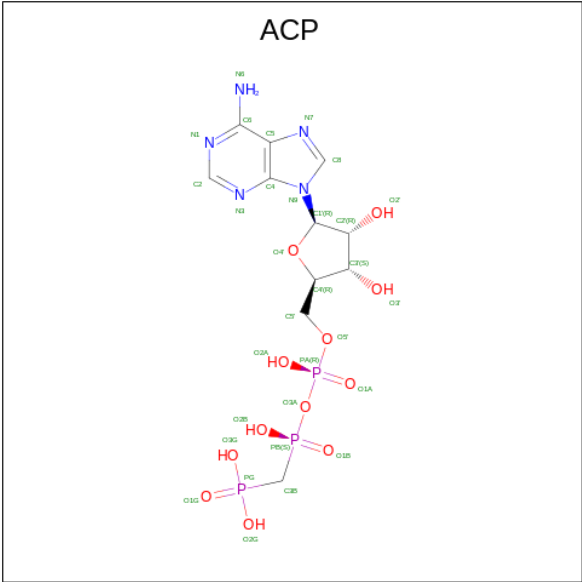
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	B	1	Total	C	N	O	P	28	0
			28	10	5	11	2		
9	D	1	Total	C	N	O	P	28	0
			28	10	5	11	2		

- Molecule 10 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: C₆H₁₃NO₄S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
10	B	1	Total	C	N	O	S	12	0
			12	6	1	4	1		
10	B	1	Total	C	N	O	S	12	0
			12	6	1	4	1		

- Molecule 11 is PHOSPHOMETHYLPHOSPHONIC ACID ADENYLATE ESTER (CCD ID: ACP) (formula: C₁₁H₁₈N₅O₁₂P₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
11	F	1	Total	C	H	N	O	P	
			45	11	14	5	12	3	

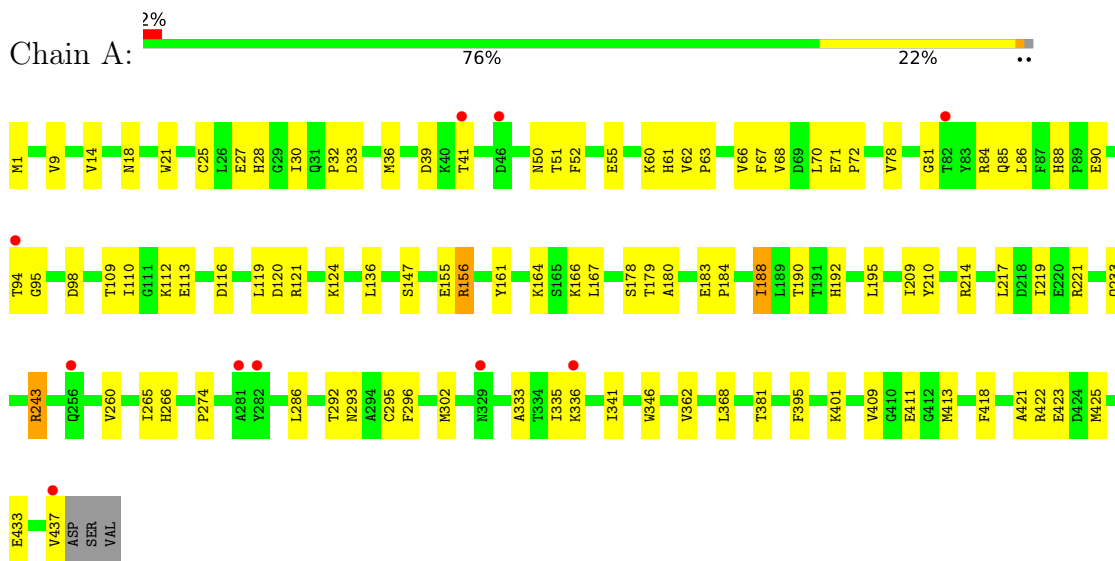
- Molecule 12 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	B	4	Total	O		
			4	4	0	0

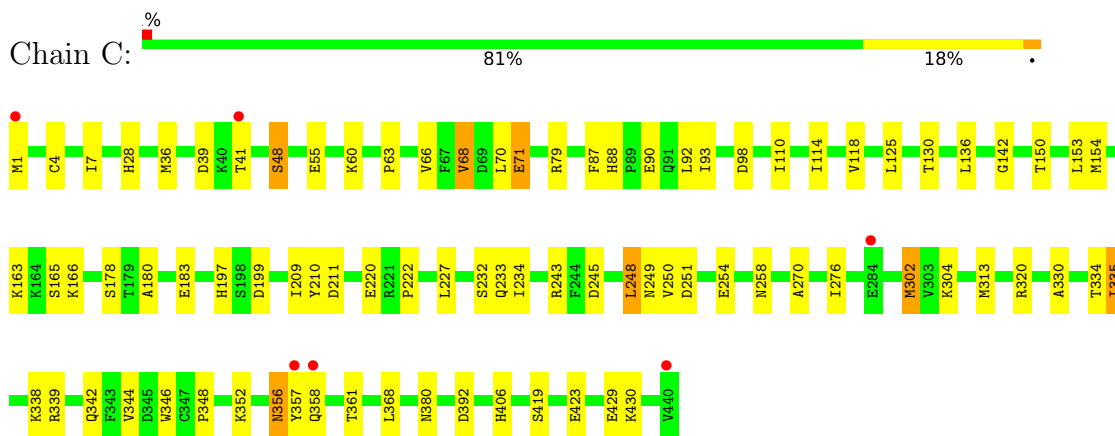
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron 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 dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

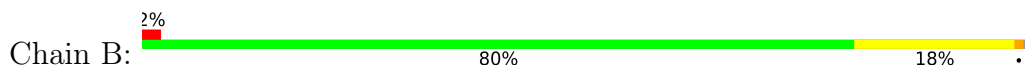
- Molecule 1: Detyrosinated tubulin alpha-1B chain

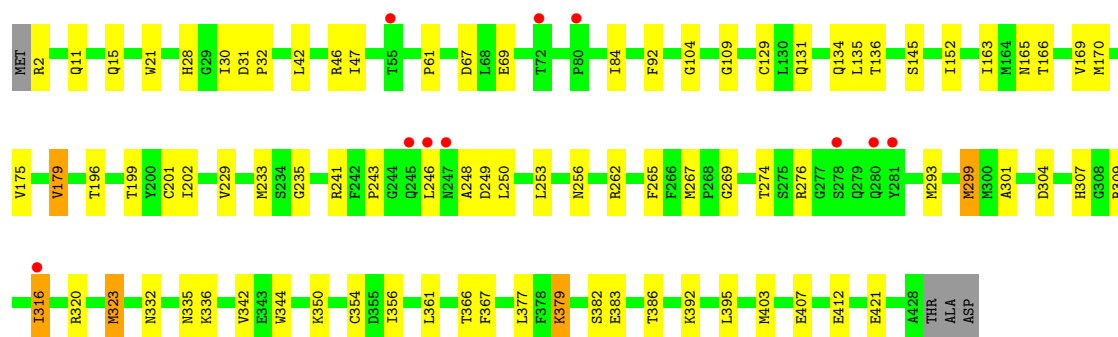


- Molecule 1: Detyrosinated tubulin alpha-1B chain

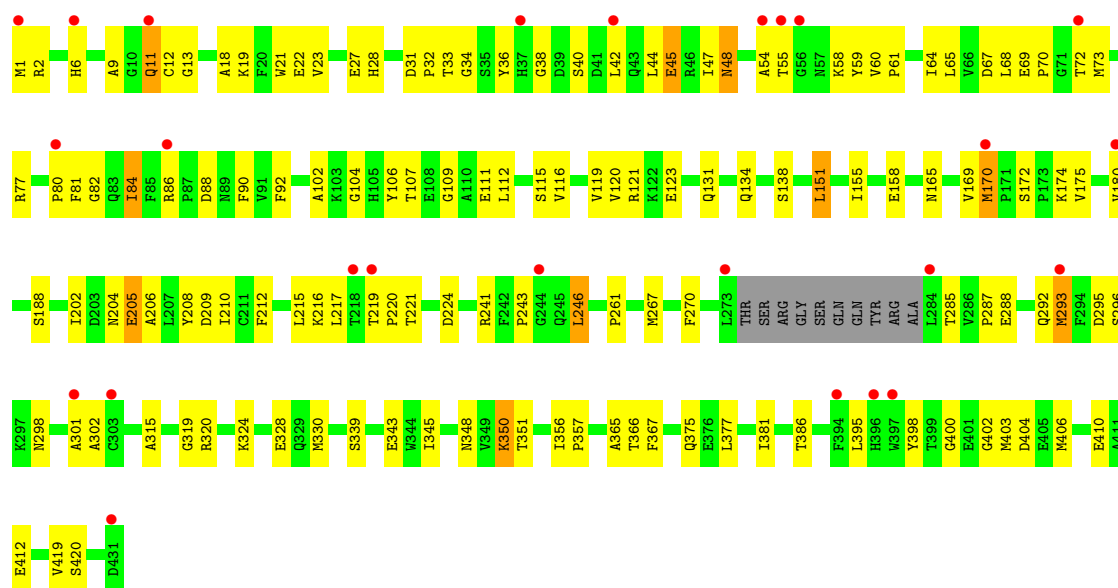


- Molecule 2: Tubulin beta-2B chain

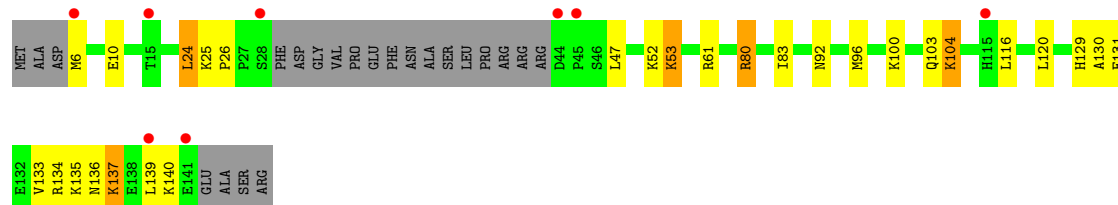




• Molecule 2: Tubulin beta-2B chain

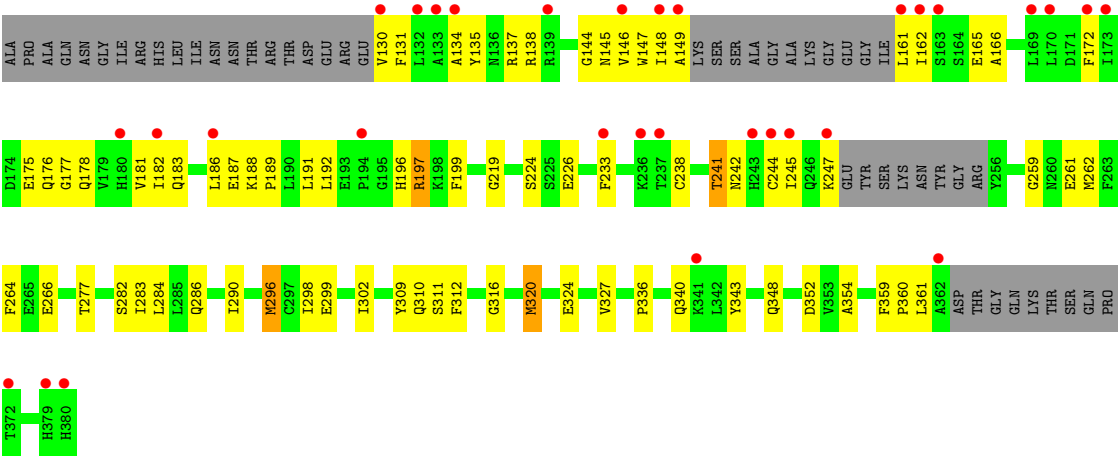


• Molecule 3: Stathmin-4



• Molecule 4: Tubulin-tyrosine ligase





4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	104.83Å 157.19Å 181.65Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	52.43 – 2.45 52.43 – 2.45	Depositor EDS
% Data completeness (in resolution range)	100.0 (52.43-2.45) 99.9 (52.43-2.45)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.94 (at 2.45Å)	Xtriage
Refinement program	PHENIX (1.21_5207: ???)	Depositor
R, R_{free}	0.214 , 0.267 0.214 , 0.268	Depositor DCC
R_{free} test set	2000 reflections (1.81%)	wwPDB-VP
Wilson B-factor (Å ²)	52.0	Xtriage
Anisotropy	0.159	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 41.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	17393	wwPDB-VP
Average B, all atoms (Å ²)	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.52% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GTP, A1EE1, MES, MG, GDP, ACP, CA

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	0.37	0/3482	0.53	0/4728
1	C	0.45	0/3511	0.61	0/4768
2	B	0.43	0/3426	0.55	0/4643
2	D	0.29	0/3373	0.47	0/4570
3	E	0.40	0/1008	0.52	0/1337
4	F	0.28	0/2719	0.43	0/3678
All	All	0.37	0/17519	0.53	0/23724

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

Mol	Chain	#Chirality outliers	#Planarity outliers
2	D	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	D	55	THR	Peptide

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within

the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3405	0	3313	84	0
1	C	3433	0	3337	53	0
2	B	3351	0	3216	66	0
2	D	3300	0	3175	130	0
3	E	1000	0	1018	22	0
4	F	2658	0	2609	78	0
5	A	32	0	12	0	0
5	C	32	0	12	0	0
6	A	1	0	0	0	0
6	C	1	0	0	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
8	B	29	19	0	5	0
9	B	28	0	12	0	0
9	D	28	0	12	0	0
10	B	24	0	26	0	0
11	F	31	14	14	0	0
12	B	4	0	0	2	0
All	All	17360	33	16756	410	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 12.

All (410) 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:D:267:MET:HG3	2:D:301:ALA:HB3	1.40	1.02
1:A:336:LYS:HD2	3:E:24:LEU:HD23	1.45	0.98
1:C:249:ASN:OD1	1:C:356:ASN:ND2	1.98	0.95
2:D:60:VAL:HG11	2:D:86:ARG:HG3	1.49	0.94
4:F:186:LEU:HD12	4:F:320:MET:HG2	1.56	0.86
2:D:31:ASP:OD1	2:D:33:THR:HG22	1.76	0.84
2:D:285:THR:HG23	2:D:287:PRO:HD2	1.59	0.84
2:B:350:LYS:HG3	8:B:501:A1EE1:C29	2.09	0.83
2:B:262:ARG:NH1	2:B:421:GLU:OE1	2.12	0.82
1:A:109:THR:HG21	1:A:411:GLU:OE1	1.78	0.82
2:D:73:MET:HG3	2:D:92:PHE:HB3	1.60	0.81
2:B:299:MET:HA	2:B:299:MET:HE2	1.62	0.81
4:F:348:GLN:NE2	4:F:352:ASP:OD1	2.12	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:74:LYS:HB3	4:F:181:VAL:HG11	1.64	0.80
4:F:16:GLU:O	4:F:20:LEU:HD12	1.81	0.79
4:F:172:PHE:HE1	4:F:176:GLN:HE21	1.29	0.78
1:C:71:GLU:HG2	1:C:98:ASP:HB3	1.64	0.77
4:F:138:ARG:HB2	4:F:145:ASN:HD21	1.49	0.77
2:B:170:MET:HE2	2:B:377:LEU:HD21	1.67	0.76
2:D:134:GLN:HA	2:D:165:ASN:O	1.86	0.76
1:A:72:PRO:HB3	1:A:94:THR:HG21	1.66	0.75
2:D:221:THR:HG23	2:D:224:ASP:H	1.52	0.74
2:D:81:PHE:O	2:D:84:ILE:HG22	1.87	0.74
2:D:293:MET:HE3	2:D:365:ALA:HB1	1.70	0.74
3:E:92:ASN:OD1	3:E:96:MET:HE2	1.89	0.73
1:C:209:ILE:HG22	1:C:227:LEU:HD22	1.71	0.73
2:D:206:ALA:HB2	2:D:302:ALA:HB2	1.69	0.72
2:D:23:VAL:O	2:D:27:GLU:HG3	1.90	0.72
2:B:170:MET:HG3	2:B:377:LEU:HD11	1.69	0.72
2:D:267:MET:HG3	2:D:301:ALA:CB	2.19	0.71
4:F:135:TYR:CE2	4:F:166:ALA:HB2	2.26	0.71
2:D:293:MET:CE	2:D:365:ALA:HB1	2.20	0.71
2:D:293:MET:HG3	2:D:367:PHE:HB2	1.72	0.71
2:D:106:TYR:CD1	3:E:133:VAL:HG11	2.26	0.71
4:F:192:LEU:HD11	4:F:199:PHE:CD1	2.25	0.70
4:F:149:ALA:CB	4:F:161:LEU:HB3	2.21	0.70
2:D:330:MET:HG3	2:D:351:THR:HG21	1.73	0.70
4:F:135:TYR:CD2	4:F:166:ALA:HB2	2.27	0.70
1:C:248:LEU:HD12	1:C:357:TYR:HE2	1.57	0.69
1:A:27:GLU:OE1	1:A:243:ARG:NH2	2.24	0.69
2:D:12:CYS:HB3	2:D:138:SER:HB3	1.73	0.69
2:B:316:ILE:HG23	2:B:366:THR:HB	1.73	0.69
4:F:73:ARG:HB2	4:F:76:SER:HB2	1.73	0.68
2:D:210:ILE:HG22	2:D:215:LEU:CD2	2.23	0.68
2:B:332:ASN:O	2:B:336:LYS:HG3	1.94	0.68
2:B:179:VAL:HG12	1:C:348:PRO:CG	2.24	0.68
2:D:319:GLY:HA2	2:D:357:PRO:HG3	1.74	0.68
4:F:224:SER:OG	4:F:238:CYS:HA	1.94	0.68
4:F:219:GLY:HA3	4:F:264:PHE:CZ	2.29	0.68
2:B:179:VAL:HG12	1:C:348:PRO:HG2	1.77	0.67
1:A:94:THR:HG22	1:A:95:GLY:O	1.95	0.67
4:F:137:ARG:O	4:F:137:ARG:NH1	2.20	0.67
2:D:61:PRO:HD3	2:D:84:ILE:HG13	1.77	0.67
2:D:285:THR:CG2	2:D:287:PRO:HD2	2.24	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:19:LYS:O	2:D:23:VAL:HG23	1.94	0.67
4:F:138:ARG:NH1	4:F:144:GLY:O	2.28	0.67
2:D:80:PRO:O	2:D:81:PHE:HB2	1.94	0.67
2:B:316:ILE:CG2	2:B:366:THR:HB	2.25	0.66
2:D:330:MET:HE2	2:D:351:THR:CG2	2.25	0.66
2:D:320:ARG:NH1	2:D:320:ARG:HB3	2.11	0.66
2:D:221:THR:HG22	2:D:224:ASP:OD2	1.97	0.65
4:F:148:ILE:HD12	4:F:149:ALA:H	1.61	0.65
1:C:248:LEU:HD12	1:C:357:TYR:CE2	2.30	0.65
4:F:186:LEU:CD1	4:F:320:MET:HG2	2.26	0.64
2:D:6:HIS:HD1	2:D:134:GLN:HE21	1.45	0.64
4:F:149:ALA:HB3	4:F:161:LEU:HB3	1.79	0.64
4:F:3:THR:HG22	4:F:28:LYS:HG3	1.79	0.64
1:C:254:GLU:HG2	1:C:352:LYS:HE2	1.79	0.64
2:D:107:THR:O	2:D:111:GLU:HG3	1.97	0.64
1:A:39:ASP:OD1	1:A:41:THR:HG22	1.98	0.63
1:C:48:SER:OG	1:C:245:ASP:OD1	2.15	0.63
2:D:67:ASP:HB2	2:D:73:MET:HE3	1.79	0.63
2:D:406:MET:O	2:D:410:GLU:HG3	1.97	0.63
1:A:1:MET:HE2	1:A:50:ASN:HB2	1.80	0.63
2:D:400:GLY:O	3:E:137:LYS:HG3	1.99	0.63
1:A:401:LYS:HG3	2:B:344:TRP:CE3	2.34	0.63
1:A:71:GLU:HB3	1:A:98:ASP:HB3	1.81	0.62
1:A:209:ILE:HD11	1:A:302:MET:SD	2.39	0.62
1:A:161:TYR:HB3	1:A:164:LYS:CG	2.30	0.62
1:A:362:VAL:HG11	1:A:368:LEU:O	1.99	0.62
4:F:131:PHE:CG	4:F:182:ILE:HD11	2.35	0.61
2:D:170:MET:CE	2:D:377:LEU:HD21	2.29	0.61
4:F:262:MET:HE2	4:F:266:GLU:OE2	2.01	0.61
1:A:32:PRO:O	1:A:85:GLN:HB2	2.01	0.60
2:D:320:ARG:HB3	2:D:320:ARG:HH11	1.65	0.60
2:B:320:ARG:HH11	2:B:320:ARG:HG2	1.65	0.60
2:D:45:GLU:HG2	2:D:243:PRO:HG3	1.82	0.60
2:D:44:LEU:HA	2:D:47:ILE:HB	1.83	0.60
2:D:67:ASP:CB	2:D:73:MET:HE3	2.32	0.60
2:B:67:ASP:O	2:B:92:PHE:HA	2.02	0.60
2:D:64:ILE:HD12	2:D:119:VAL:CG1	2.32	0.60
1:A:120:ASP:O	1:A:124:LYS:HG2	2.02	0.59
2:D:315:ALA:HB3	2:D:351:THR:HG22	1.83	0.59
1:A:36:MET:HB3	1:A:61:HIS:CE1	2.36	0.59
2:D:285:THR:HG23	2:D:287:PRO:CD	2.31	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:269:GLY:HA3	2:B:299:MET:CE	2.33	0.59
2:D:172:SER:HB2	2:D:205:GLU:HB2	1.84	0.59
1:A:109:THR:HG22	3:E:61:ARG:NH1	2.18	0.58
2:D:9:ALA:O	2:D:13:GLY:HA3	2.02	0.58
3:E:130:ALA:HA	3:E:133:VAL:HG12	1.86	0.58
1:C:1:MET:HG2	1:C:130:THR:OG1	2.02	0.58
1:A:336:LYS:CD	3:E:24:LEU:HD23	2.27	0.58
2:D:1:MET:CB	2:D:48:ASN:HD22	2.16	0.58
4:F:148:ILE:CD1	4:F:161:LEU:HB2	2.34	0.58
2:D:208:TYR:HD1	2:D:220:PRO:HG2	1.69	0.57
2:D:324:LYS:O	2:D:328:GLU:HG3	2.05	0.57
4:F:12:SER:HB2	4:F:343:TYR:OH	2.04	0.57
2:D:208:TYR:CD1	2:D:220:PRO:HG2	2.39	0.57
2:D:285:THR:HG22	2:D:288:GLU:CG	2.34	0.57
1:A:28:HIS:O	1:A:36:MET:HE3	2.05	0.57
2:B:104:GLY:O	2:B:109:GLY:HA3	2.05	0.57
1:C:48:SER:HB3	1:C:243:ARG:O	2.05	0.57
1:A:33:ASP:HA	1:A:85:GLN:CB	2.35	0.57
4:F:138:ARG:HB2	4:F:145:ASN:ND2	2.19	0.57
1:C:180:ALA:O	1:C:183:GLU:HG3	2.05	0.56
2:D:386:THR:HG22	2:D:412:GLU:OE2	2.04	0.56
2:B:386:THR:HG22	2:B:412:GLU:OE2	2.05	0.56
2:D:65:LEU:HD22	2:D:90:PHE:CE2	2.39	0.56
4:F:135:TYR:HD1	4:F:135:TYR:O	1.88	0.56
4:F:135:TYR:OH	4:F:165:GLU:HA	2.05	0.56
4:F:149:ALA:HB2	4:F:161:LEU:HB3	1.87	0.56
2:D:60:VAL:CG1	2:D:86:ARG:HG3	2.30	0.56
4:F:74:LYS:HB3	4:F:181:VAL:CG1	2.35	0.56
3:E:129:HIS:O	3:E:133:VAL:HG12	2.06	0.56
4:F:283:ILE:HG23	4:F:327:VAL:CG2	2.35	0.56
2:B:299:MET:HE1	2:B:367:PHE:CD1	2.39	0.56
1:C:4:CYS:HB3	1:C:136:LEU:CD1	2.36	0.55
3:E:130:ALA:HA	3:E:133:VAL:CG1	2.36	0.55
1:A:210:TYR:OH	1:A:221:ARG:HD2	2.06	0.55
2:D:206:ALA:O	2:D:210:ILE:HG13	2.06	0.55
4:F:199:PHE:HA	4:F:241:THR:HG21	1.88	0.55
2:B:31:ASP:HB2	2:B:32:PRO:CD	2.36	0.55
2:B:134:GLN:HA	2:B:165:ASN:O	2.07	0.55
2:B:335:ASN:OD1	4:F:36:ARG:NH1	2.39	0.55
2:D:174:LYS:HE3	2:D:209:ASP:OD1	2.06	0.55
1:A:51:THR:HG22	1:A:52:PHE:CD1	2.42	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:226:GLU:HB2	4:F:238:CYS:HB3	1.88	0.55
1:C:270:ALA:HB3	1:C:302:MET:HG2	1.89	0.55
2:D:270:PHE:O	2:D:298:ASN:HB3	2.07	0.55
2:D:285:THR:HG22	2:D:288:GLU:HG3	1.87	0.55
4:F:316:GLY:N	4:F:336:PRO:HG3	2.22	0.55
4:F:131:PHE:CD1	4:F:182:ILE:HD11	2.41	0.55
2:D:64:ILE:HD12	2:D:119:VAL:HG12	1.88	0.54
1:A:195:LEU:HD12	1:A:266:HIS:CE1	2.43	0.54
1:A:109:THR:HG22	3:E:61:ARG:CZ	2.38	0.54
2:D:375:GLN:HB2	2:D:419:VAL:HG13	1.88	0.54
4:F:135:TYR:HE2	4:F:166:ALA:N	2.05	0.54
3:E:6:MET:HE2	3:E:24:LEU:HG	1.89	0.54
4:F:91:CYS:O	4:F:92:THR:OG1	2.16	0.54
1:A:51:THR:HG22	1:A:52:PHE:HD1	1.73	0.53
1:A:119:LEU:HD11	1:A:156:ARG:HB3	1.89	0.53
2:D:293:MET:HE3	2:D:365:ALA:CB	2.37	0.53
4:F:134:ALA:O	4:F:137:ARG:HB3	2.08	0.53
1:A:81:GLY:O	1:A:84:ARG:NH1	2.42	0.53
1:A:70:LEU:HD13	1:A:110:ILE:HG21	1.88	0.53
1:A:179:THR:HG23	2:B:246:LEU:HD21	1.90	0.53
4:F:144:GLY:HA3	4:F:187:GLU:OE1	2.08	0.53
1:C:320:ARG:HA	1:C:356:ASN:O	2.09	0.53
2:D:170:MET:HE2	2:D:377:LEU:HD21	1.90	0.53
2:D:246:LEU:HD12	2:D:246:LEU:O	2.08	0.53
4:F:148:ILE:CD1	4:F:149:ALA:H	2.20	0.53
1:A:178:SER:OG	2:B:350:LYS:HE2	2.09	0.53
2:D:12:CYS:CB	2:D:138:SER:HB3	2.37	0.53
2:D:18:ALA:O	2:D:22:GLU:HG3	2.08	0.53
1:C:166:LYS:HE2	1:C:197:HIS:O	2.09	0.52
4:F:78:VAL:HG21	4:F:181:VAL:HG21	1.91	0.52
4:F:81:ILE:HG23	4:F:91:CYS:SG	2.48	0.52
2:B:2:ARG:HA	2:B:129:CYS:O	2.08	0.52
1:C:209:ILE:HD11	1:C:302:MET:SD	2.49	0.52
1:A:161:TYR:HB3	1:A:164:LYS:HG2	1.91	0.52
2:B:235:GLY:HA3	2:B:366:THR:OG1	2.09	0.52
1:C:66:VAL:HG23	1:C:125:LEU:HD11	1.91	0.52
2:B:293:MET:HE2	2:B:367:PHE:HB2	1.91	0.52
2:B:46:ARG:HB2	2:B:241:ARG:O	2.10	0.52
2:D:210:ILE:HG22	2:D:215:LEU:HD23	1.91	0.52
1:C:93:ILE:HG22	1:C:114:ILE:HD11	1.91	0.52
2:D:102:ALA:HB2	2:D:403:MET:SD	2.50	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1:MET:HE2	1:A:50:ASN:CB	2.39	0.51
2:D:170:MET:HE3	2:D:381:ILE:HD11	1.91	0.51
2:D:172:SER:CB	2:D:205:GLU:HB2	2.40	0.51
2:B:267:MET:HG2	2:B:301:ALA:HB3	1.92	0.51
1:C:63:PRO:HG2	1:C:87:PHE:CE1	2.45	0.51
2:B:2:ARG:NH1	2:B:129:CYS:SG	2.83	0.51
1:A:70:LEU:HD13	1:A:110:ILE:CG2	2.41	0.51
1:A:155:GLU:OE1	3:E:53:LYS:NZ	2.43	0.51
2:D:221:THR:HG23	2:D:224:ASP:N	2.24	0.51
1:A:62:VAL:HG13	1:A:86:LEU:O	2.11	0.51
2:B:196:THR:OG1	2:B:199:THR:HG23	2.11	0.51
4:F:130:VAL:HG12	4:F:130:VAL:O	2.11	0.51
1:A:233:GLN:HG3	1:A:368:LEU:HD12	1.93	0.51
2:B:332:ASN:OD1	2:B:336:LYS:HE3	2.11	0.51
1:C:330:ALA:O	1:C:334:THR:HG23	2.11	0.51
1:A:214:ARG:HG2	1:A:219:ILE:O	2.11	0.51
2:D:31:ASP:HB2	2:D:32:PRO:CD	2.41	0.51
2:D:121:ARG:NE	2:D:158:GLU:OE2	2.38	0.51
1:A:39:ASP:OD1	1:A:41:THR:CG2	2.59	0.51
1:A:233:GLN:HG3	1:A:368:LEU:CD1	2.40	0.50
2:B:392:LYS:N	2:B:392:LYS:HD2	2.25	0.50
2:D:345:ILE:HG22	2:D:348:ASN:HB3	1.94	0.50
1:C:178:SER:OG	2:D:350:LYS:HE2	2.11	0.50
2:D:36:TYR:HB2	2:D:59:TYR:HE2	1.75	0.50
1:A:296:PHE:CE2	1:A:341:ILE:HD11	2.47	0.50
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.46	0.50
2:D:67:ASP:O	2:D:92:PHE:HA	2.12	0.50
4:F:283:ILE:HG23	4:F:327:VAL:HG21	1.94	0.50
2:B:304:ASP:HB3	2:B:307:HIS:ND1	2.27	0.50
2:B:379:LYS:O	2:B:383:GLU:HG3	2.11	0.50
1:C:392:ASP:OD2	1:C:429:GLU:OE2	2.30	0.50
2:D:151:LEU:CD2	2:D:155:ILE:HD11	2.41	0.50
1:A:166:LYS:C	1:A:167:LEU:HD12	2.37	0.50
2:D:106:TYR:CE1	3:E:133:VAL:HG11	2.47	0.50
4:F:189:PRO:HG2	4:F:191:LEU:HD21	1.94	0.50
1:A:25:CYS:HB3	1:A:30:ILE:O	2.11	0.50
3:E:103:GLN:OE1	3:E:104:LYS:HE2	2.11	0.50
4:F:102:PRO:HG3	4:F:178:GLN:O	2.12	0.50
2:D:6:HIS:CD2	2:D:21:TRP:HE1	2.30	0.50
2:D:216:LYS:O	2:D:217:LEU:HD23	2.11	0.50
2:D:295:ASP:OD1	2:D:296:SER:N	2.44	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:72:PRO:HA	1:A:94:THR:CG2	2.43	0.49
1:A:260:VAL:HG11	1:A:266:HIS:HB3	1.95	0.49
2:B:201:CYS:SG	2:B:265:PHE:HB3	2.53	0.49
1:C:88:HIS:HE1	1:C:90:GLU:HG3	1.77	0.49
1:C:209:ILE:HG22	1:C:227:LEU:CD2	2.42	0.49
1:A:119:LEU:HD11	1:A:156:ARG:CB	2.42	0.49
2:B:274:THR:HG21	2:B:361:LEU:HD21	1.94	0.49
1:A:14:VAL:HG13	1:A:67:PHE:HD2	1.78	0.49
1:C:335:ILE:O	1:C:339:ARG:HB2	2.13	0.49
2:D:69:GLU:HG3	2:D:70:PRO:HD2	1.94	0.49
2:D:288:GLU:O	2:D:292:GLN:HG3	2.12	0.49
2:D:330:MET:HE2	2:D:351:THR:HG22	1.95	0.49
1:C:419:SER:O	1:C:423:GLU:HG3	2.13	0.48
1:A:72:PRO:CB	1:A:94:THR:HG21	2.38	0.48
1:A:180:ALA:HA	2:B:256:ASN:OD1	2.13	0.48
1:A:192:HIS:CG	1:A:421:ALA:HA	2.49	0.48
1:A:333:ALA:HA	3:E:6:MET:HE1	1.94	0.48
1:C:233:GLN:HG3	1:C:368:LEU:CD1	2.43	0.48
4:F:296:MET:HE3	4:F:299:GLU:OE1	2.13	0.48
1:A:72:PRO:HA	1:A:94:THR:HG23	1.94	0.48
1:A:179:THR:HG23	12:B:601:HOH:O	2.12	0.48
1:A:274:PRO:HB3	1:A:286:LEU:HD12	1.95	0.48
2:D:285:THR:HG23	2:D:288:GLU:H	1.79	0.48
1:C:66:VAL:HG23	1:C:125:LEU:CD1	2.44	0.48
2:B:382:SER:O	2:B:386:THR:HG23	2.14	0.48
4:F:148:ILE:HD13	4:F:162:ILE:CG1	2.42	0.48
1:C:211:ASP:OD2	1:C:304:LYS:HE3	2.14	0.48
1:C:406:HIS:CG	2:D:261:PRO:HD3	2.48	0.48
4:F:277:THR:HG21	4:F:282:SER:HB3	1.95	0.48
1:A:346:TRP:H	1:A:346:TRP:CD1	2.31	0.48
2:D:104:GLY:O	2:D:109:GLY:HA3	2.14	0.48
2:D:285:THR:CG2	2:D:288:GLU:H	2.27	0.48
1:A:217:LEU:HD21	1:A:368:LEU:HD23	1.95	0.48
1:C:88:HIS:CE1	1:C:90:GLU:HG3	2.49	0.48
1:C:28:HIS:O	1:C:36:MET:HE3	2.14	0.47
2:D:19:LYS:HD2	2:D:22:GLU:OE1	2.15	0.47
2:D:77:ARG:O	2:D:82:GLY:HA3	2.14	0.47
4:F:242:ASN:HB2	4:F:245:ILE:HG12	1.96	0.47
1:A:18:ASN:OD1	1:A:78:VAL:HG22	2.14	0.47
2:B:42:LEU:HD12	2:B:356:ILE:HD11	1.95	0.47
1:A:188:ILE:HG13	1:A:425:MET:HG3	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:61:PRO:CD	2:D:84:ILE:HG13	2.43	0.47
1:A:179:THR:HG21	12:B:604:HOH:O	2.14	0.47
1:A:265:ILE:O	1:A:265:ILE:HG22	2.13	0.47
1:A:147:SER:HB2	1:A:190:THR:HB	1.96	0.47
1:A:413:MET:HE2	1:A:418:PHE:CE2	2.49	0.47
4:F:197:ARG:HB3	4:F:224:SER:O	2.14	0.47
1:A:413:MET:CE	1:A:418:PHE:CE2	2.98	0.47
4:F:47:LEU:C	4:F:47:LEU:HD23	2.40	0.47
4:F:259:GLY:O	4:F:261:GLU:HG3	2.15	0.47
1:A:88:HIS:ND1	1:A:90:GLU:HB2	2.29	0.47
2:D:64:ILE:CD1	2:D:119:VAL:HG12	2.45	0.47
2:D:116:VAL:CG1	2:D:151:LEU:HD11	2.45	0.47
2:B:135:LEU:CD2	2:B:152:ILE:HD11	2.45	0.47
1:A:116:ASP:OD1	1:A:156:ARG:NH2	2.48	0.47
2:D:219:THR:O	2:D:219:THR:HG22	2.13	0.47
2:B:42:LEU:HD22	2:B:243:PRO:HG2	1.96	0.46
2:B:309:ARG:NH2	2:B:342:VAL:HA	2.30	0.46
1:A:33:ASP:HA	1:A:85:GLN:HB2	1.95	0.46
2:B:248:ALA:HA	8:B:501:A1EE1:O27	2.16	0.46
2:D:73:MET:HG3	2:D:92:PHE:CB	2.39	0.46
1:A:98:ASP:C	1:A:98:ASP:OD1	2.59	0.46
4:F:138:ARG:CB	4:F:145:ASN:ND2	2.78	0.46
2:D:212:PHE:O	2:D:216:LYS:HA	2.16	0.46
4:F:148:ILE:HD13	4:F:162:ILE:HG13	1.96	0.46
1:C:234:ILE:HD12	1:C:234:ILE:N	2.31	0.46
2:B:323:MET:HE3	2:B:323:MET:HB2	1.64	0.46
2:D:45:GLU:CG	2:D:243:PRO:HG3	2.46	0.46
4:F:191:LEU:HD12	4:F:196:HIS:CE1	2.51	0.46
1:A:293:ASN:CA	1:A:335:ILE:HD11	2.46	0.46
1:C:39:ASP:OD1	1:C:41:THR:OG1	2.33	0.46
2:D:64:ILE:HD11	2:D:123:GLU:HG3	1.98	0.46
4:F:298:ILE:CD1	4:F:302:ILE:HD13	2.45	0.46
1:C:313:MET:HE3	1:C:380:ASN:CG	2.41	0.46
1:A:395:PHE:CD1	1:A:422:ARG:HD3	2.51	0.46
1:C:165:SER:HA	1:C:199:ASP:OD2	2.15	0.46
4:F:102:PRO:HG2	4:F:177:GLY:O	2.16	0.46
1:A:161:TYR:HB3	1:A:164:LYS:HG3	1.98	0.45
4:F:37:PHE:CZ	4:F:40:MET:HE3	2.51	0.45
4:F:148:ILE:HD12	4:F:161:LEU:HB2	1.97	0.45
2:D:54:ALA:HB3	2:D:58:LYS:HB2	1.98	0.45
4:F:14:TYR:HA	4:F:17:VAL:HB	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:148:ILE:HG13	4:F:149:ALA:N	2.31	0.45
2:D:12:CYS:SG	2:D:169:VAL:HG21	2.56	0.45
2:D:67:ASP:OD2	2:D:72:THR:OG1	2.29	0.45
2:B:350:LYS:CG	8:B:501:A1EE1:C29	2.87	0.45
1:A:109:THR:HG22	3:E:61:ARG:HD3	1.97	0.45
2:D:2:ARG:HB3	2:D:131:GLN:CG	2.47	0.45
1:A:41:THR:HG23	1:A:41:THR:O	2.16	0.45
2:D:172:SER:O	2:D:175:VAL:HG12	2.17	0.45
2:B:392:LYS:HG3	2:B:395:LEU:HD12	1.97	0.45
2:D:169:VAL:HA	2:D:202:ILE:O	2.17	0.44
1:A:90:GLU:O	1:A:121:ARG:HG2	2.17	0.44
2:D:64:ILE:HD12	2:D:119:VAL:HG11	1.99	0.44
2:D:80:PRO:O	2:D:81:PHE:CB	2.65	0.44
4:F:99:VAL:O	4:F:99:VAL:HG23	2.17	0.44
2:B:131:GLN:OE1	2:B:249:ASP:HB2	2.17	0.44
2:B:169:VAL:HA	2:B:202:ILE:O	2.17	0.44
1:C:68:VAL:HG11	1:C:118:VAL:HG21	2.00	0.44
2:D:68:LEU:HD23	2:D:112:LEU:HD22	2.00	0.44
2:D:293:MET:HE2	2:D:366:THR:C	2.43	0.44
3:E:116:LEU:O	3:E:120:LEU:HD23	2.17	0.44
2:B:135:LEU:HD22	2:B:152:ILE:HD11	2.00	0.44
2:D:1:MET:HB3	2:D:48:ASN:ND2	2.33	0.44
1:A:9:VAL:HG22	1:A:68:VAL:CG1	2.49	0.43
1:A:112:LYS:O	1:A:112:LYS:HG2	2.17	0.43
2:D:33:THR:HG23	2:D:58:LYS:NZ	2.33	0.43
4:F:147:TRP:HA	4:F:183:GLN:O	2.18	0.43
2:B:166:THR:OG1	2:B:199:THR:HG22	2.17	0.43
2:B:256:ASN:HB3	8:B:501:A1EE1:C28	2.48	0.43
2:D:151:LEU:HD23	2:D:155:ILE:HD11	1.98	0.43
4:F:309:TYR:C	4:F:310:GLN:HG2	2.43	0.43
4:F:312:PHE:CG	4:F:354:ALA:HB1	2.52	0.43
2:B:28:HIS:HB3	2:B:47:ILE:CD1	2.47	0.43
2:B:21:TRP:CZ3	2:B:61:PRO:HB3	2.53	0.43
2:B:253:LEU:HB2	8:B:501:A1EE1:C25	2.49	0.43
2:B:335:ASN:OD1	4:F:36:ARG:HD3	2.18	0.43
1:C:210:TYR:CZ	1:C:222:PRO:HD2	2.54	0.43
3:E:131:GLU:OE2	3:E:134:ARG:NH2	2.50	0.43
1:A:292:THR:O	1:A:295:CYS:HB2	2.19	0.43
2:D:170:MET:CE	2:D:381:ILE:HD11	2.48	0.43
2:B:229:VAL:O	2:B:233:MET:HG3	2.19	0.43
1:A:183:GLU:N	1:A:184:PRO:CD	2.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:409:VAL:HA	1:A:413:MET:O	2.19	0.43
4:F:64:TYR:O	4:F:311:SER:HB3	2.18	0.43
2:B:179:VAL:HG22	1:C:258:ASN:OD1	2.18	0.43
4:F:286:GLN:O	4:F:290:ILE:HG13	2.19	0.43
2:B:246:LEU:HD23	2:B:246:LEU:HA	1.68	0.42
1:C:70:LEU:HD13	1:C:110:ILE:CG2	2.49	0.42
2:D:31:ASP:HB2	2:D:32:PRO:HD2	2.00	0.42
2:D:34:GLY:O	2:D:58:LYS:HA	2.19	0.42
3:E:47:LEU:HD23	3:E:47:LEU:O	2.18	0.42
1:C:79:ARG:NH2	1:C:92:LEU:O	2.52	0.42
3:E:25:LYS:HD2	3:E:26:PRO:HD2	2.01	0.42
2:B:31:ASP:HB2	2:B:32:PRO:HD3	2.01	0.42
2:D:42:LEU:HD13	2:D:243:PRO:HG2	2.00	0.42
1:A:55:GLU:HA	1:A:60:LYS:O	2.19	0.42
4:F:146:VAL:HG21	4:F:233:PHE:CZ	2.54	0.42
1:C:248:LEU:CD1	1:C:357:TYR:OH	2.68	0.42
1:C:220:GLU:HB2	2:D:324:LYS:HD2	2.00	0.42
1:C:250:VAL:HG11	1:C:352:LYS:HE3	2.02	0.42
2:B:163:ILE:HG21	2:B:250:LEU:HB3	2.01	0.42
1:C:48:SER:HB3	1:C:243:ARG:C	2.45	0.42
2:D:170:MET:HE2	2:D:377:LEU:HD11	2.02	0.42
2:D:215:LEU:N	2:D:215:LEU:HD22	2.34	0.42
1:A:180:ALA:O	1:A:183:GLU:HG3	2.19	0.41
2:D:1:MET:HB2	2:D:48:ASN:HD22	1.83	0.41
2:D:151:LEU:HD23	2:D:155:ILE:CD1	2.50	0.41
2:D:215:LEU:HD22	2:D:215:LEU:H	1.85	0.41
2:D:402:GLY:C	3:E:133:VAL:HG23	2.45	0.41
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.55	0.41
2:D:47:ILE:HD12	2:D:47:ILE:HA	1.89	0.41
2:D:116:VAL:O	2:D:120:VAL:HG23	2.19	0.41
1:A:293:ASN:HA	1:A:335:ILE:HD11	2.02	0.41
2:D:36:TYR:CE1	2:D:38:GLY:HA3	2.55	0.41
4:F:148:ILE:CG1	4:F:149:ALA:N	2.82	0.41
2:D:267:MET:HE3	2:D:267:MET:HB2	1.80	0.41
2:D:395:LEU:HD23	2:D:395:LEU:HA	1.89	0.41
4:F:2:TYR:HB2	4:F:27:TRP:CD2	2.55	0.41
4:F:192:LEU:HD12	4:F:192:LEU:H	1.86	0.41
2:B:377:LEU:C	2:B:377:LEU:HD23	2.45	0.41
2:B:30:ILE:HD12	2:B:30:ILE:N	2.36	0.41
2:B:42:LEU:CD1	2:B:356:ILE:HD11	2.51	0.41
1:C:163:LYS:HD3	1:C:163:LYS:HA	1.64	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:302:MET:HE2	1:C:302:MET:N	2.36	0.41
2:D:404:ASP:OD2	2:D:406:MET:HG2	2.20	0.41
1:A:433:GLU:O	1:A:437:VAL:HG13	2.20	0.41
2:D:28:HIS:NE2	2:D:241:ARG:HB3	2.36	0.41
3:E:80:ARG:HA	3:E:83:ILE:HG22	2.02	0.41
2:B:403:MET:CE	2:B:407:GLU:HG2	2.50	0.41
4:F:138:ARG:CB	4:F:145:ASN:HD21	2.25	0.41
4:F:192:LEU:HD12	4:F:192:LEU:N	2.35	0.41
2:B:136:THR:HG21	2:B:233:MET:HE1	2.03	0.41
1:C:150:THR:O	1:C:154:MET:HG2	2.21	0.41
2:D:172:SER:OG	2:D:205:GLU:OE1	2.38	0.41
1:A:167:LEU:HD12	1:A:167:LEU:N	2.36	0.41
2:D:65:LEU:N	2:D:65:LEU:HD12	2.36	0.41
2:D:175:VAL:HG11	2:D:204:ASN:HD22	1.86	0.41
2:D:330:MET:HE2	2:D:351:THR:HG21	2.00	0.41
4:F:360:PRO:C	4:F:361:LEU:HD23	2.46	0.40
2:D:180:VAL:HG22	2:D:398:TYR:OH	2.21	0.40
4:F:2:TYR:CZ	4:F:359:PHE:HB3	2.55	0.40
4:F:16:GLU:OE2	4:F:19:ARG:NE	2.51	0.40
1:C:142:GLY:HA3	1:C:183:GLU:OE1	2.21	0.40
4:F:284:LEU:HD12	4:F:284:LEU:HA	1.98	0.40
1:A:70:LEU:HD23	1:A:70:LEU:HA	1.81	0.40
2:B:170:MET:HB3	2:B:170:MET:HE3	1.47	0.40
1:A:136:LEU:HD12	1:A:136:LEU:N	2.37	0.40
2:B:309:ARG:HH21	2:B:342:VAL:HA	1.87	0.40
1:C:7:ILE:HG21	1:C:153:LEU:HD21	2.03	0.40
1:C:55:GLU:HA	1:C:60:LYS:O	2.21	0.40
2:D:36:TYR:HB2	2:D:59:TYR:CE2	2.55	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 X-ray entries followed by that with respect to entries of similar resolution.

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	435/440 (99%)	418 (96%)	17 (4%)	0	100	100
1	C	438/440 (100%)	423 (97%)	15 (3%)	0	100	100
2	B	425/431 (99%)	413 (97%)	12 (3%)	0	100	100
2	D	417/431 (97%)	399 (96%)	17 (4%)	1 (0%)	44	54
3	E	117/143 (82%)	114 (97%)	3 (3%)	0	100	100
4	F	316/380 (83%)	299 (95%)	16 (5%)	1 (0%)	37	45
All	All	2148/2265 (95%)	2066 (96%)	80 (4%)	2 (0%)	48	61

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	F	102	PRO
2	D	11	GLN

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 X-ray entries followed by that with respect to entries of similar resolution.

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	366/371 (99%)	359 (98%)	7 (2%)	52	67
1	C	370/371 (100%)	355 (96%)	15 (4%)	26	39
2	B	367/372 (99%)	354 (96%)	13 (4%)	31	45
2	D	362/372 (97%)	344 (95%)	18 (5%)	20	29
3	E	109/127 (86%)	97 (89%)	12 (11%)	5	4
4	F	290/338 (86%)	269 (93%)	21 (7%)	12	14
All	All	1864/1951 (96%)	1778 (95%)	86 (5%)	23	33

All (86) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	66	VAL
1	A	113	GLU
1	A	156	ARG

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Mol	Chain	Res	Type
1	A	188	ILE
1	A	243	ARG
1	A	381	THR
1	A	423	GLU
2	B	11	GLN
2	B	15	GLN
2	B	69	GLU
2	B	84	ILE
2	B	145	SER
2	B	175	VAL
2	B	179	VAL
2	B	276	ARG
2	B	299	MET
2	B	316	ILE
2	B	323	MET
2	B	354	CYS
2	B	379	LYS
1	C	48	SER
1	C	68	VAL
1	C	71	GLU
1	C	232	SER
1	C	248	LEU
1	C	251	ASP
1	C	276	ILE
1	C	302	MET
1	C	335	ILE
1	C	338	LYS
1	C	342	GLN
1	C	356	ASN
1	C	358	GLN
1	C	361	THR
1	C	430	LYS
2	D	11	GLN
2	D	40	SER
2	D	45	GLU
2	D	48	ASN
2	D	84	ILE
2	D	88	ASP
2	D	115	SER
2	D	151	LEU
2	D	170	MET
2	D	188	SER

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Mol	Chain	Res	Type
2	D	205	GLU
2	D	246	LEU
2	D	293	MET
2	D	339	SER
2	D	343	GLU
2	D	350	LYS
2	D	356	ILE
2	D	420	SER
3	E	10	GLU
3	E	24	LEU
3	E	52	LYS
3	E	53	LYS
3	E	80	ARG
3	E	100	LYS
3	E	104	LYS
3	E	135	LYS
3	E	136	ASN
3	E	137	LYS
3	E	139	LEU
3	E	140	LYS
4	F	1	MET
4	F	12	SER
4	F	17	VAL
4	F	20	LEU
4	F	28	LYS
4	F	31	ARG
4	F	32	LYS
4	F	44	ARG
4	F	45	ASN
4	F	70	LYS
4	F	88	SER
4	F	175	GLU
4	F	188	LYS
4	F	197	ARG
4	F	241	THR
4	F	244	CYS
4	F	247	LYS
4	F	296	MET
4	F	320	MET
4	F	324	GLU
4	F	340	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25)

such sidechains are listed below:

Mol	Chain	Res	Type
1	A	35	GLN
1	A	61	HIS
1	A	85	GLN
1	A	101	ASN
1	A	285	GLN
2	B	83	GLN
2	B	329	GLN
2	B	347	ASN
2	B	375	GLN
1	C	61	HIS
1	C	101	ASN
1	C	216	ASN
1	C	283	HIS
1	C	372	GLN
2	D	48	ASN
2	D	134	GLN
2	D	329	GLN
4	F	26	GLN
4	F	145	ASN
4	F	178	GLN
4	F	242	ASN
4	F	260	ASN
4	F	269	GLN
4	F	310	GLN
4	F	379	HIS

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 13 ligands modelled in this entry, 5 are monoatomic - leaving 8 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	$\# Z > 2$
11	ACP	F	401	-	27,33,33	2.18	3 (11%)	32,52,52	1.14	3 (9%)
5	GTP	C	501	7	26,34,34	1.11	2 (7%)	32,54,54	1.59	7 (21%)
5	GTP	A	501	7	26,34,34	1.12	2 (7%)	32,54,54	1.59	7 (21%)
8	A1EE1	B	501	-	32,33,33	1.78	4 (12%)	38,48,48	2.30	10 (26%)
10	MES	B	504	-	12,12,12	1.14	1 (8%)	14,16,16	0.87	1 (7%)
10	MES	B	503	-	12,12,12	1.14	1 (8%)	14,16,16	0.87	1 (7%)
9	GDP	B	502	-	24,30,30	0.95	1 (4%)	30,47,47	1.30	4 (13%)
9	GDP	D	501	-	24,30,30	0.94	1 (4%)	30,47,47	1.34	4 (13%)

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
11	ACP	F	401	-	-	2/15/38/38	0/3/3/3
5	GTP	C	501	7	-	6/18/38/38	0/3/3/3
5	GTP	A	501	7	-	8/18/38/38	0/3/3/3
8	A1EE1	B	501	-	-	2/12/28/28	0/5/5/5
10	MES	B	504	-	-	0/6/14/14	0/1/1/1
10	MES	B	503	-	-	1/6/14/14	0/1/1/1
9	GDP	B	502	-	-	3/12/32/32	0/3/3/3
9	GDP	D	501	-	-	2/12/32/32	0/3/3/3

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	F	401	ACP	PB-O3A	10.09	1.69	1.58

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	501	A1EE1	C05-C06	-6.68	1.41	1.49
5	C	501	GTP	C5-C6	-4.00	1.39	1.47
5	A	501	GTP	C5-C6	-3.98	1.39	1.47
8	B	501	A1EE1	C11-N18	-3.90	1.43	1.47
8	B	501	A1EE1	C26-N18	3.25	1.44	1.38
10	B	503	MES	C8-S	3.07	1.81	1.77
10	B	504	MES	C8-S	3.07	1.81	1.77
8	B	501	A1EE1	C09-C26	2.73	1.55	1.49
9	B	502	GDP	C6-N1	-2.41	1.34	1.37
9	D	501	GDP	C6-N1	-2.33	1.34	1.37
11	F	401	ACP	PB-O2B	-2.23	1.51	1.56
5	A	501	GTP	C2-N3	2.21	1.38	1.33
11	F	401	ACP	C8-N7	-2.20	1.30	1.34
5	C	501	GTP	C2-N3	2.19	1.38	1.33

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	B	501	A1EE1	C06-C10-C09	6.28	108.60	103.07
8	B	501	A1EE1	C12-C11-N18	-6.12	105.14	112.74
8	B	501	A1EE1	C05-C06-N07	4.99	129.32	120.78
8	B	501	A1EE1	C20-C19-N18	4.49	125.09	120.13
8	B	501	A1EE1	C25-C19-N18	-4.40	115.28	120.13
8	B	501	A1EE1	C11-N18-C26	-4.31	108.28	112.08
9	D	501	GDP	PA-O3A-PB	-3.72	120.06	132.83
5	A	501	GTP	PB-O3B-PG	-3.67	120.23	132.83
5	C	501	GTP	PB-O3B-PG	-3.60	120.48	132.83
5	C	501	GTP	PA-O3A-PB	-3.45	121.00	132.83
5	A	501	GTP	PA-O3A-PB	-3.42	121.10	132.83
9	B	502	GDP	PA-O3A-PB	-3.34	121.37	132.83
5	A	501	GTP	C5-C6-N1	3.22	119.65	113.95
9	B	502	GDP	C3'-C2'-C1'	3.20	105.80	100.98
5	C	501	GTP	C5-C6-N1	3.20	119.60	113.95
8	B	501	A1EE1	C19-N18-C11	3.08	125.02	121.79
9	D	501	GDP	C3'-C2'-C1'	3.07	105.61	100.98
5	A	501	GTP	C8-N7-C5	3.04	108.78	102.99
5	A	501	GTP	C3'-C2'-C1'	3.03	105.54	100.98
5	C	501	GTP	C8-N7-C5	3.03	108.76	102.99
5	C	501	GTP	C3'-C2'-C1'	3.01	105.50	100.98
11	F	401	ACP	O2B-PB-O1B	2.93	119.86	110.07
5	A	501	GTP	C2-N1-C6	-2.86	119.83	125.10
5	C	501	GTP	C2-N1-C6	-2.83	119.88	125.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	F	401	ACP	PB-O3A-PA	-2.70	124.01	132.56
11	F	401	ACP	O1G-PG-C3B	-2.69	105.45	111.24
8	B	501	A1EE1	C10-C11-C12	-2.65	103.92	111.95
9	D	501	GDP	C8-N7-C5	2.34	107.46	102.99
9	B	502	GDP	C8-N7-C5	2.32	107.41	102.99
8	B	501	A1EE1	C13-C12-C11	-2.29	116.00	120.70
9	B	502	GDP	C5-C6-N1	2.28	117.98	113.95
9	D	501	GDP	C5-C6-N1	2.25	117.92	113.95
5	A	501	GTP	O6-C6-C5	-2.13	120.21	124.37
5	C	501	GTP	O6-C6-C5	-2.11	120.24	124.37
10	B	504	MES	O2S-S-C8	-2.11	104.37	106.92
8	B	501	A1EE1	C10-C09-C26	-2.10	107.54	108.88
10	B	503	MES	O2S-S-C8	-2.07	104.42	106.92

There are no chirality outliers.

All (24) torsion outliers are listed below:

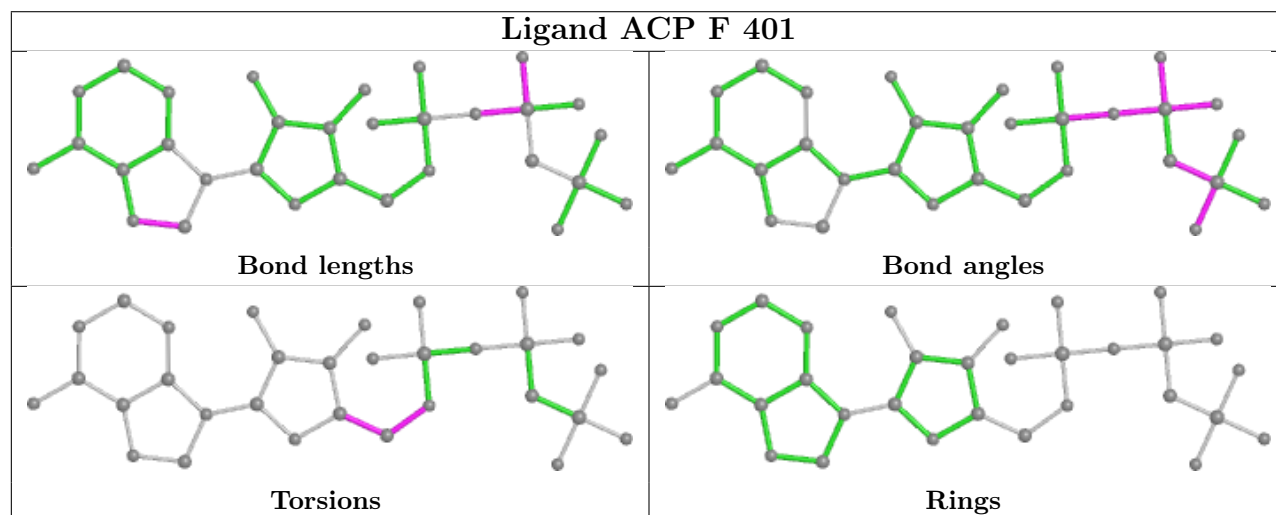
Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O2G
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	501	GTP	C5'-O5'-PA-O1A
5	C	501	GTP	C5'-O5'-PA-O2A
9	B	502	GDP	C5'-O5'-PA-O1A
9	B	502	GDP	C5'-O5'-PA-O2A
9	D	501	GDP	C5'-O5'-PA-O3A
8	B	501	A1EE1	C28-C05-C06-C10
8	B	501	A1EE1	C04-C05-C06-C10
5	A	501	GTP	O4'-C4'-C5'-O5'
5	A	501	GTP	C3'-C4'-C5'-O5'
5	C	501	GTP	C4'-C5'-O5'-PA
5	A	501	GTP	C4'-C5'-O5'-PA
5	A	501	GTP	C5'-O5'-PA-O3A
5	C	501	GTP	C5'-O5'-PA-O3A
5	A	501	GTP	C5'-O5'-PA-O1A
9	D	501	GDP	C5'-O5'-PA-O1A
5	C	501	GTP	C3'-C4'-C5'-O5'
11	F	401	ACP	C4'-C5'-O5'-PA
10	B	503	MES	C7-C8-S-O3S
5	C	501	GTP	O4'-C4'-C5'-O5'
5	A	501	GTP	PB-O3B-PG-O3G
9	B	502	GDP	C5'-O5'-PA-O3A
11	F	401	ACP	O4'-C4'-C5'-O5'

There are no ring outliers.

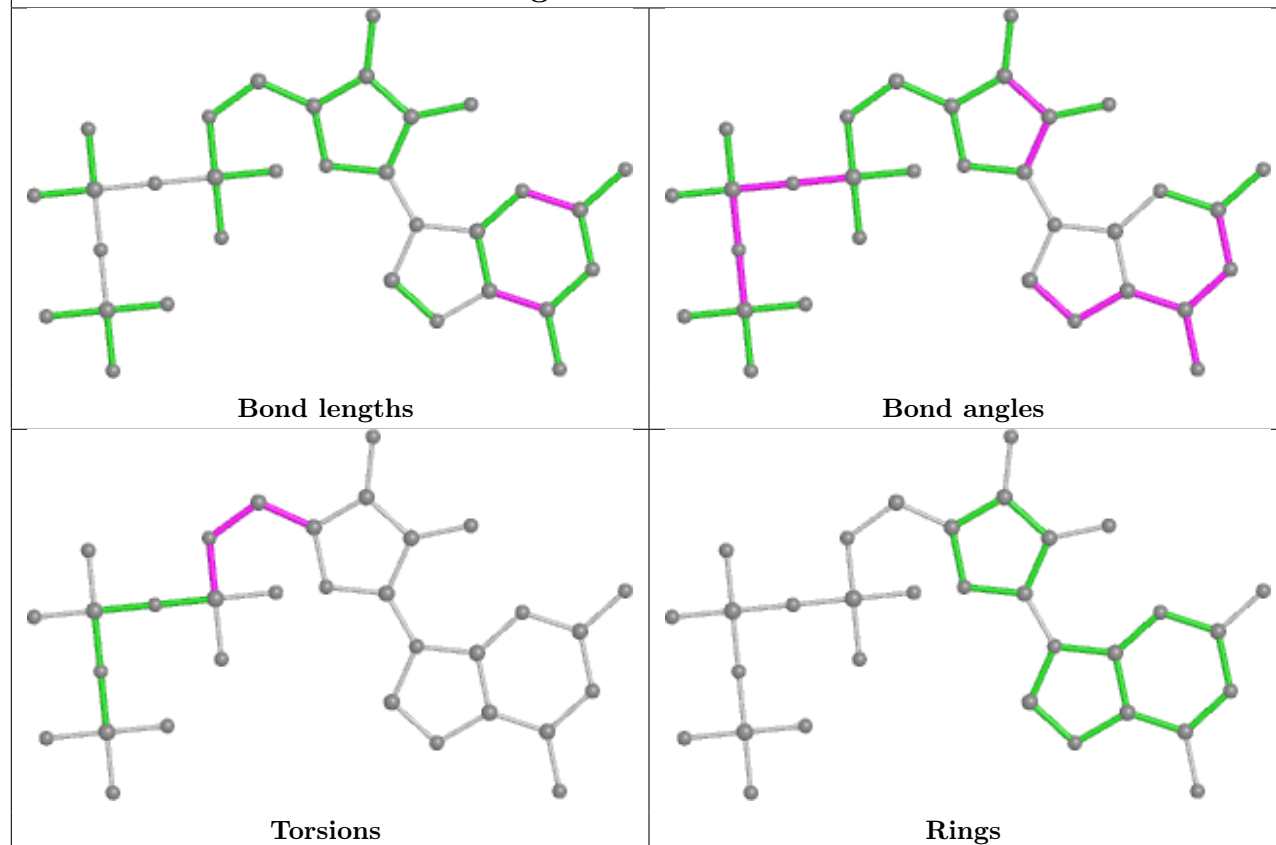
1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	501	A1EE1	5	0

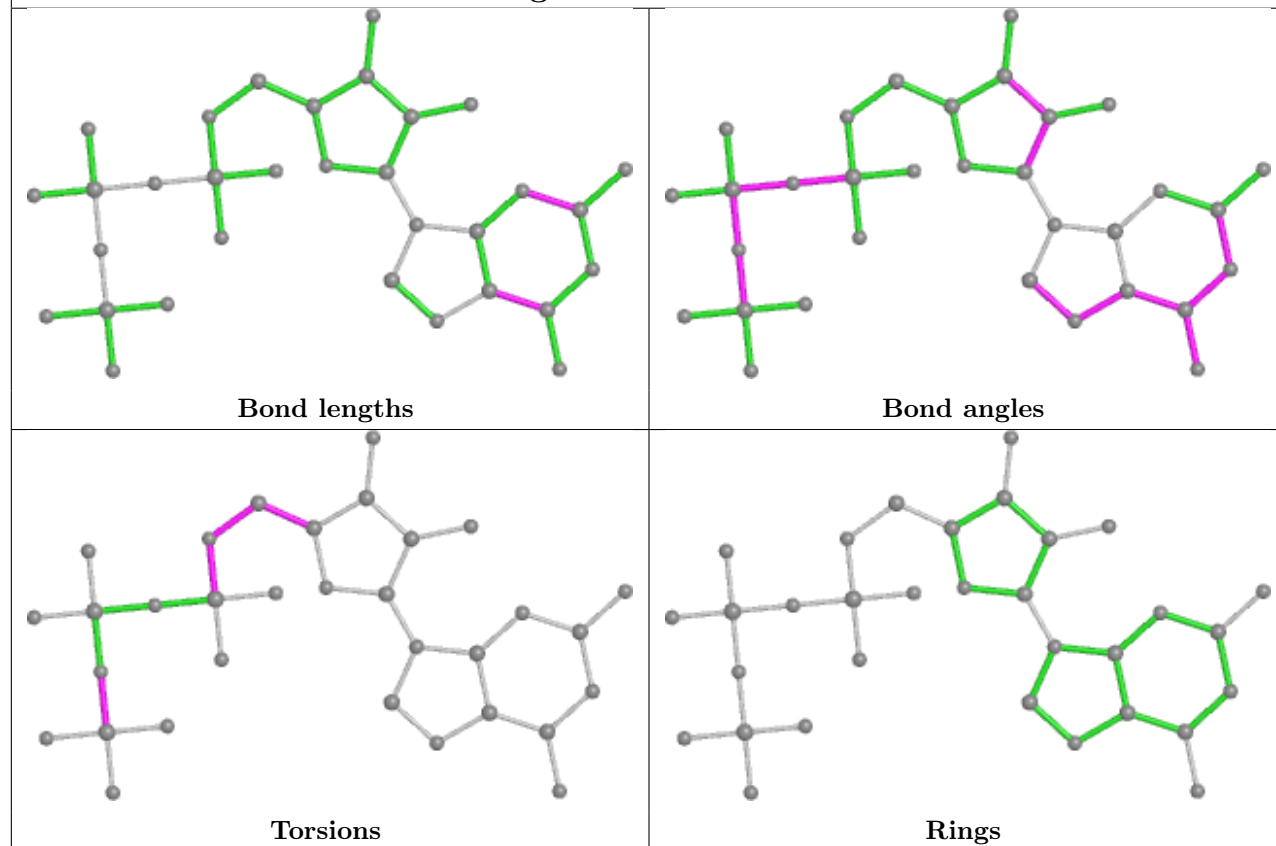
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



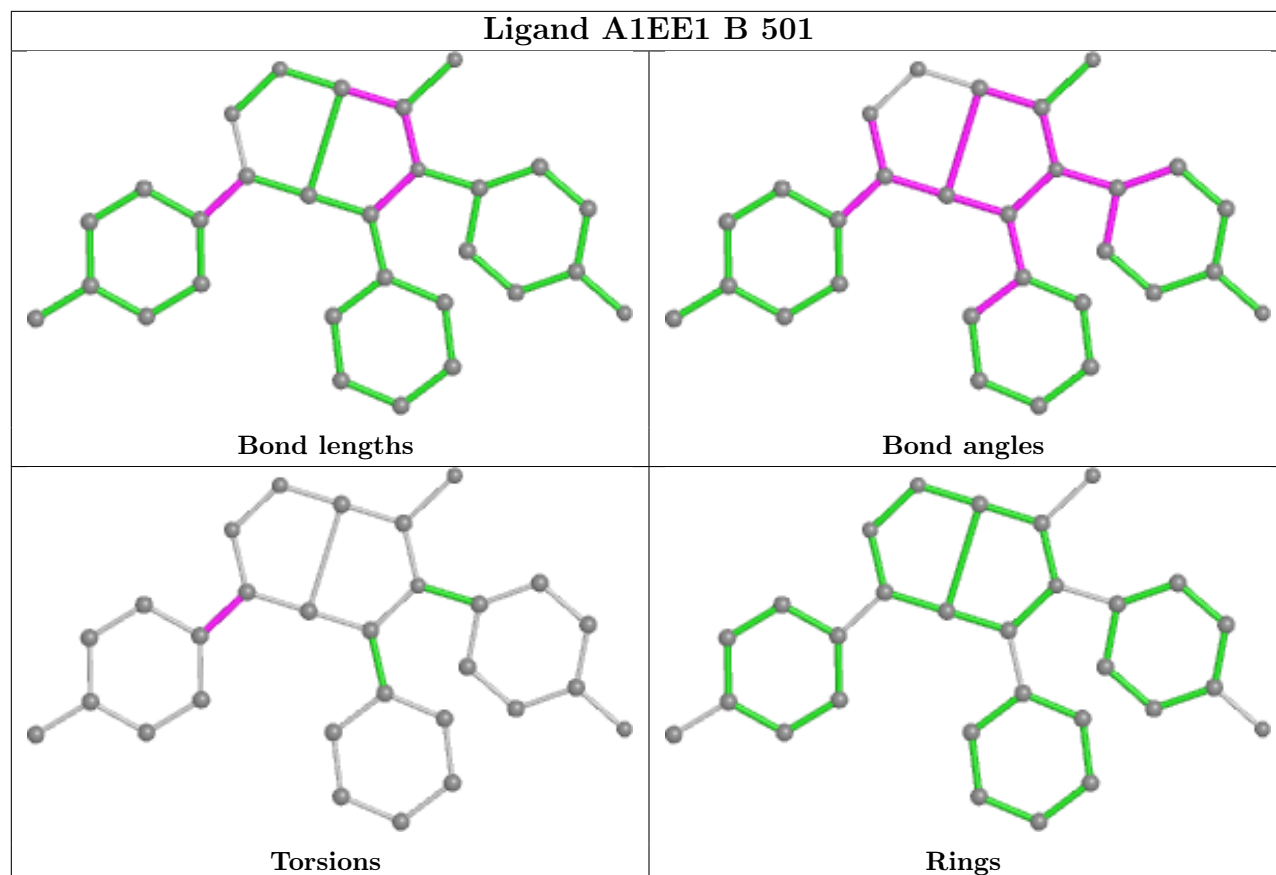
Ligand GTP C 501



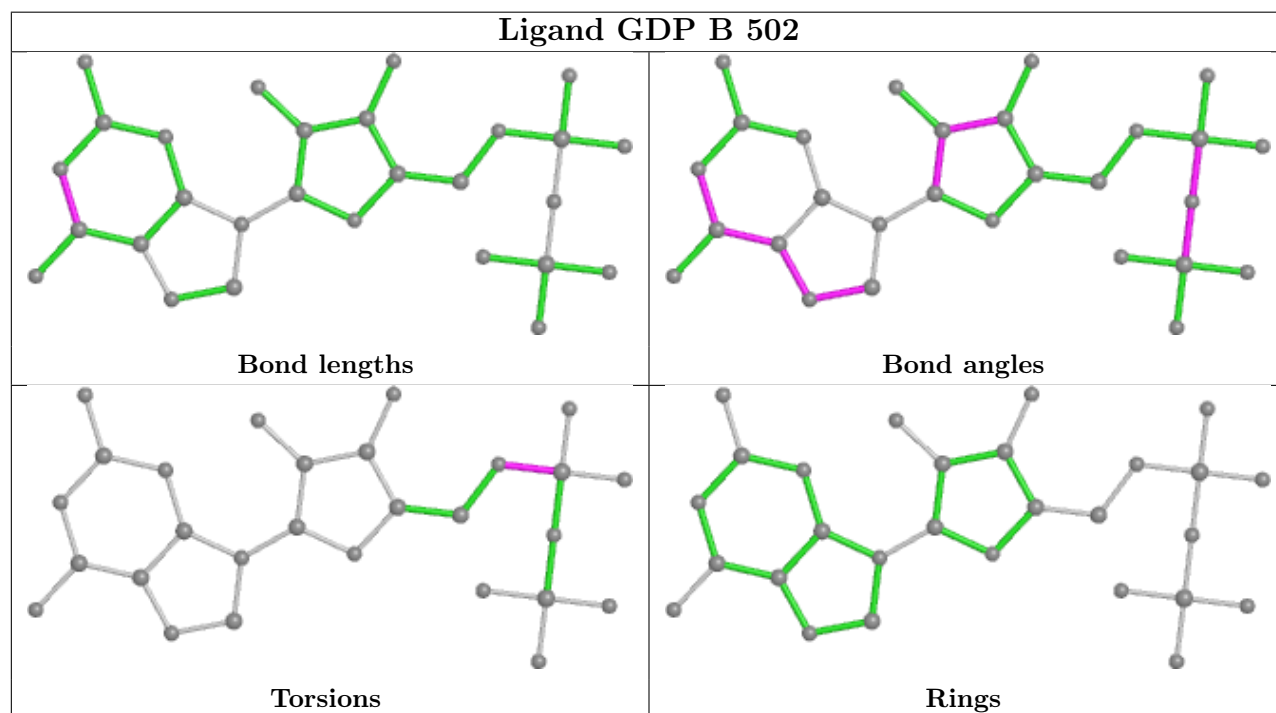
Ligand GTP A 501

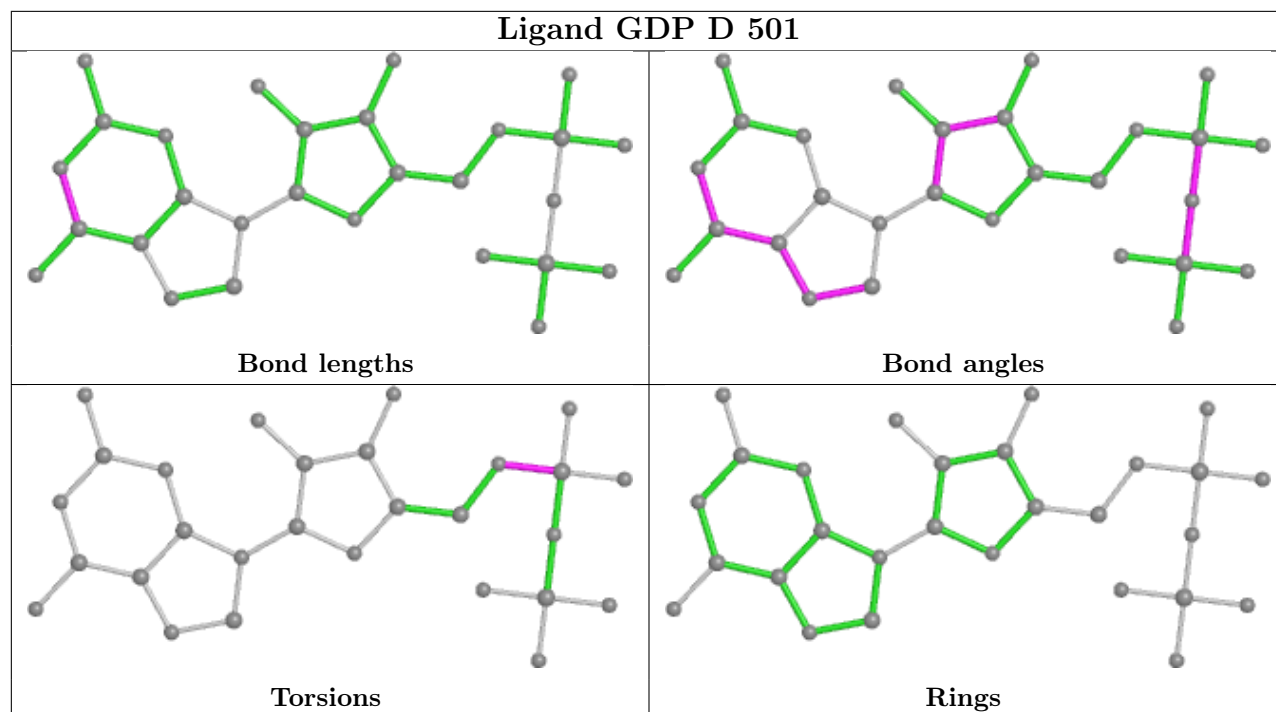


Ligand A1EE1 B 501



Ligand GDP B 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.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	437/440 (99%)	0.10	10 (2%) 61 63	41, 58, 90, 108	0
1	C	440/440 (100%)	-0.19	6 (1%) 73 75	31, 46, 68, 90	0
2	B	427/431 (99%)	0.04	10 (2%) 61 63	35, 53, 87, 139	0
2	D	421/431 (97%)	0.53	25 (5%) 29 29	45, 74, 107, 144	0
3	E	121/143 (84%)	0.56	8 (6%) 26 26	47, 66, 100, 121	0
4	F	326/380 (85%)	0.82	40 (12%) 9 9	52, 84, 144, 167	0
All	All	2172/2265 (95%)	0.25	99 (4%) 38 38	31, 61, 109, 167	0

All (99) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	161	LEU	4.6
4	F	372	THR	4.3
4	F	173	ILE	4.3
4	F	149	ALA	4.3
4	F	362	ALA	4.2
2	D	397	TRP	4.2
2	D	1	MET	3.9
2	D	55	THR	3.8
1	C	440	VAL	3.8
4	F	233	PHE	3.8
1	A	437	VAL	3.7
2	D	431	ASP	3.7
4	F	130	VAL	3.6
4	F	132	LEU	3.5
4	F	100	ILE	3.3
3	E	45	PRO	3.3
4	F	162	ILE	3.3
1	A	281	ALA	3.3
2	B	245	GLN	3.2

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Mol	Chain	Res	Type	RSRZ
4	F	172	PHE	3.1
2	D	86	ARG	3.1
2	B	246	LEU	3.1
4	F	146	VAL	3.0
1	C	1	MET	3.0
4	F	169	LEU	3.0
4	F	237	THR	3.0
4	F	244	CYS	2.9
4	F	148	ILE	2.9
1	C	284	GLU	2.9
3	E	115	HIS	2.9
4	F	99	VAL	2.9
4	F	247	LYS	2.9
2	D	284	LEU	2.8
4	F	180	HIS	2.8
2	B	55	THR	2.8
2	D	170	MET	2.8
4	F	133	ALA	2.8
4	F	103	THR	2.7
2	D	37	HIS	2.7
4	F	74	LYS	2.7
4	F	163	SER	2.7
4	F	245	ILE	2.6
2	D	301	ALA	2.6
4	F	379	HIS	2.6
4	F	89	GLU	2.6
2	D	56	GLY	2.6
3	E	28	SER	2.6
4	F	90	SER	2.5
2	B	316	ILE	2.5
1	A	82	THR	2.5
4	F	341	LYS	2.5
4	F	186	LEU	2.5
4	F	194	PRO	2.5
2	B	280	GLN	2.5
4	F	91	CYS	2.4
2	D	180	VAL	2.4
2	D	80	PRO	2.4
4	F	70	LYS	2.4
4	F	170	LEU	2.4
2	D	72	THR	2.4
3	E	15	THR	2.4

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Mol	Chain	Res	Type	RSRZ
3	E	139	LEU	2.3
3	E	6	MET	2.3
2	B	72	THR	2.3
1	A	336	LYS	2.3
2	D	6	HIS	2.3
2	D	218	THR	2.3
4	F	182	ILE	2.3
2	D	273	LEU	2.2
1	A	41	THR	2.2
2	D	219	THR	2.2
1	C	358	GLN	2.2
2	D	54	ALA	2.2
2	B	278	SER	2.2
2	D	394	PHE	2.2
3	E	44	ASP	2.2
1	C	357	TYR	2.2
2	D	396	HIS	2.2
4	F	380	HIS	2.2
1	A	46	ASP	2.2
2	B	247	ASN	2.2
2	D	293	MET	2.1
2	D	42	LEU	2.1
2	B	80	PRO	2.1
1	A	282	TYR	2.1
4	F	139	ARG	2.0
4	F	134	ALA	2.0
2	D	244	GLY	2.0
2	B	281	TYR	2.0
1	A	94	THR	2.0
1	C	41	THR	2.0
4	F	236	LYS	2.0
1	A	256	GLN	2.0
2	D	11	GLN	2.0
4	F	88	SER	2.0
4	F	243	HIS	2.0
2	D	303	CYS	2.0
1	A	329	ASN	2.0
3	E	141	GLU	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

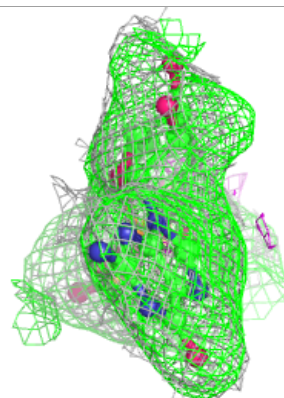
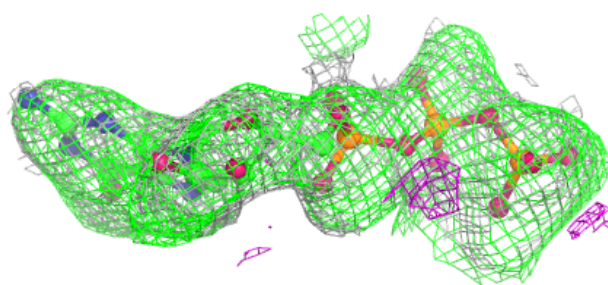
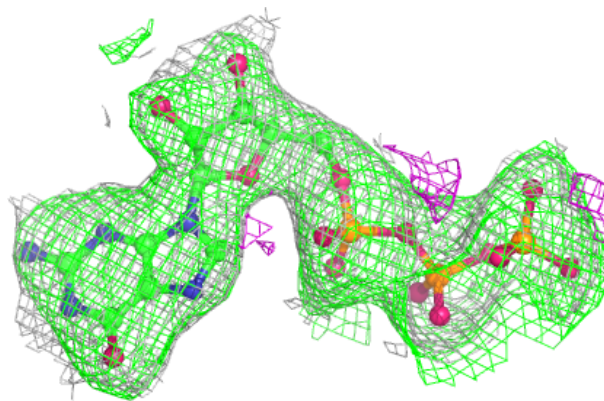
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	GTP	A	501	32/32	-	-	45,47,49,50	32
5	GTP	C	501	32/32	-	-	37,39,41,44	32
6	CA	A	502	1/1	-	-	88,88,88,88	1
6	CA	C	502	1/1	-	-	64,64,64,64	1
7	MG	A	503	1/1	-	-	51,51,51,51	1
7	MG	B	505	1/1	-	-	45,45,45,45	1
7	MG	C	503	1/1	-	-	41,41,41,41	1
8	A1EE1	B	501	29/29	0.83	0.15	51,60,74,77	0
9	GDP	B	502	28/28	-	-	38,42,44,45	28
9	GDP	D	501	28/28	-	-	76,81,85,86	28
10	MES	B	503	12/12	-	-	47,49,51,51	12
10	MES	B	504	12/12	-	-	60,62,64,64	12
11	ACP	F	401	31/31	-	-	94,109,136,138	45

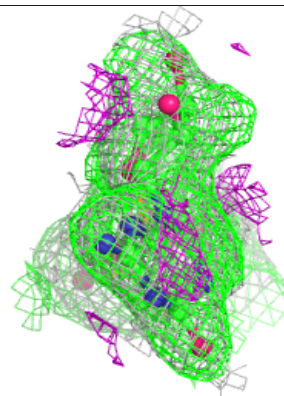
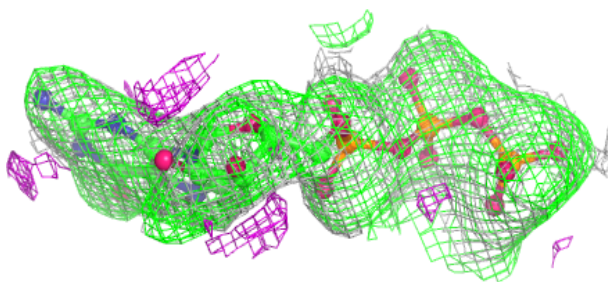
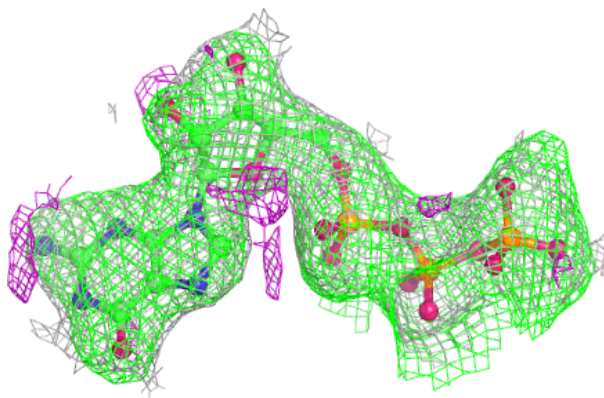
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around GTP A 501:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

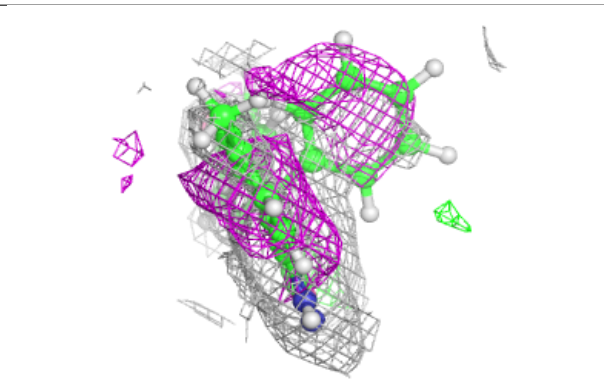
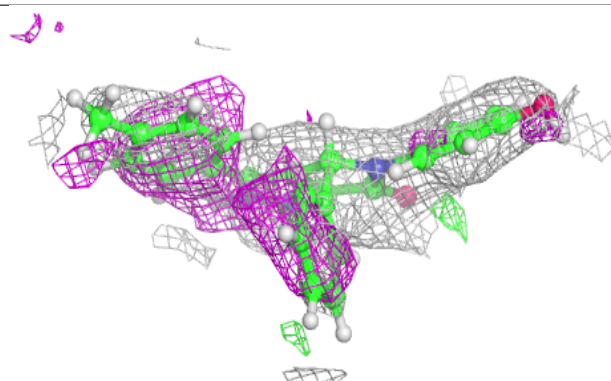
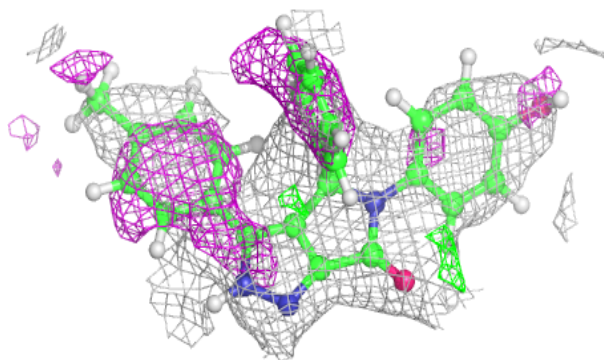
**Electron density around GTP C 501:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

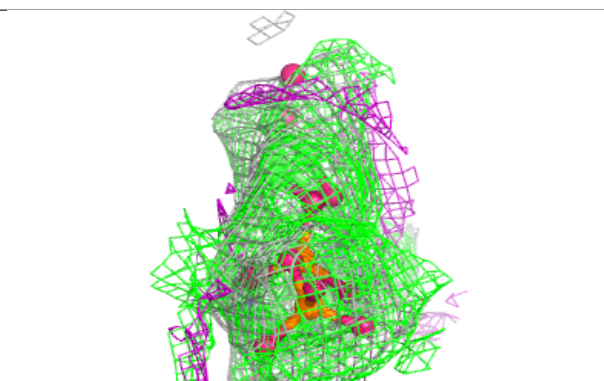
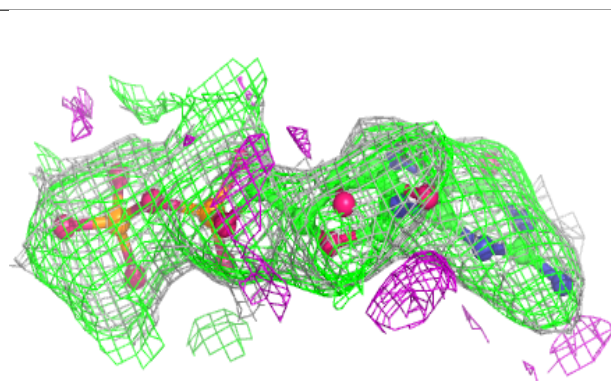
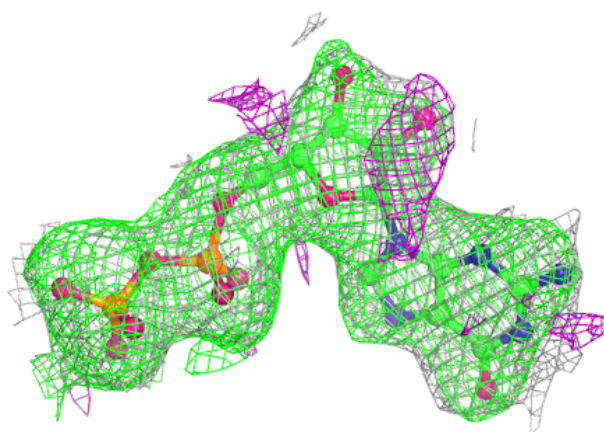


Electron density around A1EE1 B 501:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

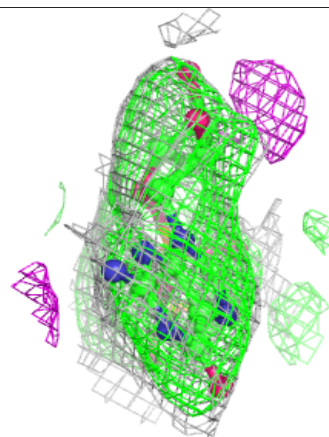
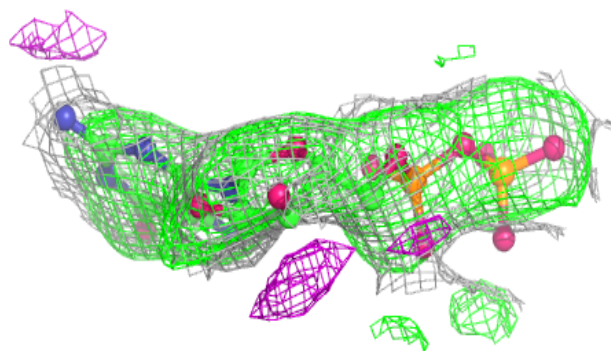
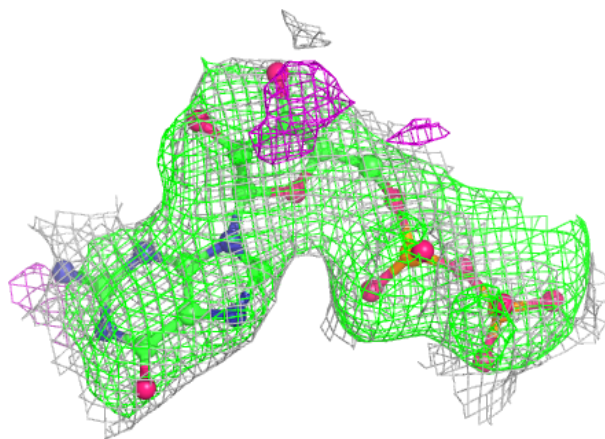
**Electron density around GDP B 502:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

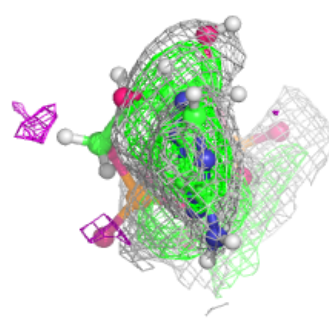
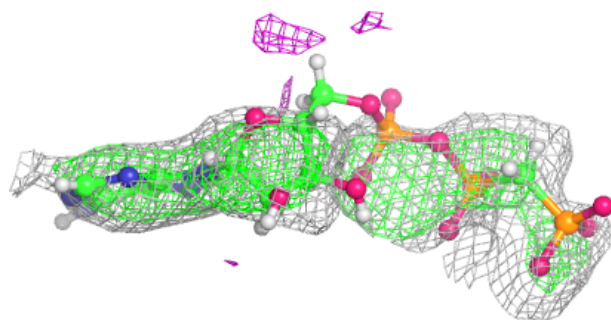
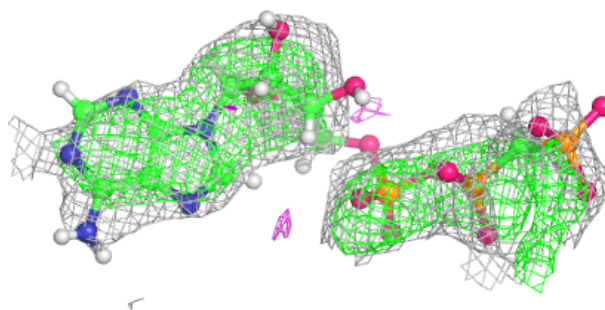


Electron density around GDP D 501:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around ACP F 401:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.