



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2022 – 10:18 AM EST

PDB ID : 5SBD
Title : Tubulin-maytansinoid-5b-complex
Authors : Marzullo, P.; Boiarska, Z.; Perez-Pena, H.; Abel, A.-C.; Alvarez-Bernad, B.; Lucena-Agell, D.; Vasile, F.; Sironi, M.; Steinmetz, M.O.; Prota, A.E.; Diaz, J.F.; Pieraccini, S.; Passarella, D.
Deposited on : 2021-07-20
Resolution : 2.25 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.27
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.27

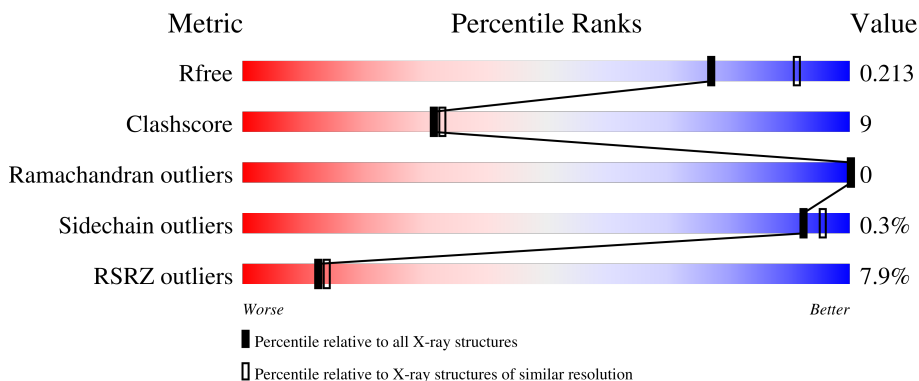
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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.



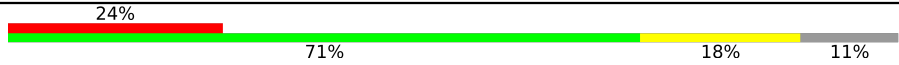
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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	451	 4% 79% 18%
1	C	451	 79% 18%
2	B	445	 5% 71% 24% 5%
2	D	445	 7% 76% 20%
3	E	143	 7% 73% 11% 15%

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Mol	Chain	Length	Quality of chain										
4	F	384	 <p>A horizontal bar chart showing the quality distribution of chain F. The bar is divided into four segments: a red segment (24%), a green segment (71%), a yellow segment (18%), and a grey segment (11%). The percentages are labeled above or below the corresponding segments.</p> <table border="1"><thead><tr><th>Quality Category</th><th>Percentage</th></tr></thead><tbody><tr><td>Red</td><td>24%</td></tr><tr><td>Green</td><td>71%</td></tr><tr><td>Yellow</td><td>18%</td></tr><tr><td>Grey</td><td>11%</td></tr></tbody></table>	Quality Category	Percentage	Red	24%	Green	71%	Yellow	18%	Grey	11%
Quality Category	Percentage												
Red	24%												
Green	71%												
Yellow	18%												
Grey	11%												

2 Entry composition i

There are 14 unique types of molecules in this entry. The entry contains 18541 atoms, of which 13 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 Tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	437	Total	C	N	O	S	0	3	0
			3434	2172	584	654	24			
1	C	440	Total	C	N	O	S	0	5	0
			3467	2194	589	661	23			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	423	Total	C	N	O	S	0	1	0
			3345	2102	572	644	27			
2	D	426	Total	C	N	O	S	0	0	0
			3343	2098	570	648	27			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	121	Total	C	N	O	S	0	1	0
			1008	622	182	198	6			

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

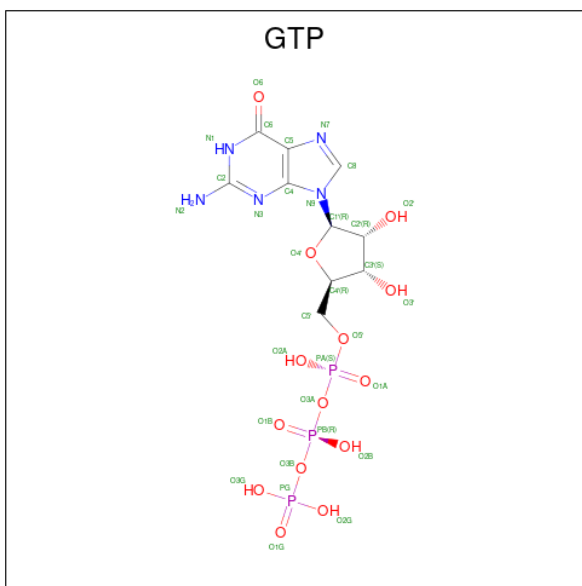
- Molecule 4 is a protein called Tubulin-Tyrosine Ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	F	341	Total	C	N	O	S	0	3	0
			2815	1806	481	513	15			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	379	HIS	-	expression tag	UNP E1BQ43
F	380	HIS	-	expression tag	UNP E1BQ43
F	381	HIS	-	expression tag	UNP E1BQ43
F	382	HIS	-	expression tag	UNP E1BQ43
F	383	HIS	-	expression tag	UNP E1BQ43
F	384	HIS	-	expression tag	UNP E1BQ43

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



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

- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Mg	0	0
			1	1		
6	B	1	Total	Mg	0	0
			1	1		
6	C	1	Total	Mg	0	0
			1	1		
6	D	1	Total	Mg	0	0
			1	1		

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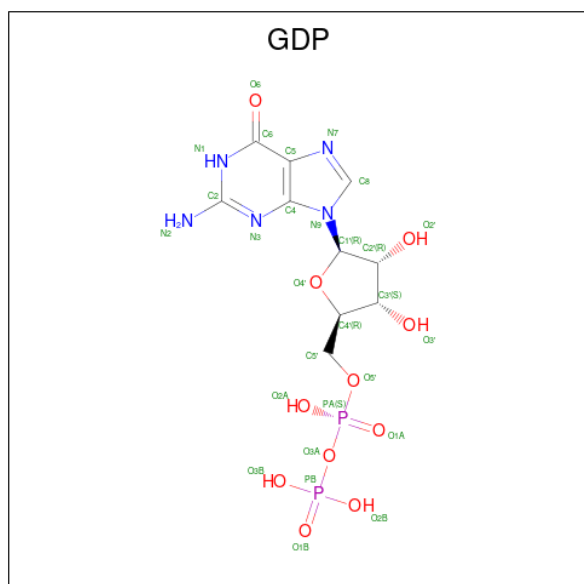
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	F	1	Total	Mg	0	0
			1	1		

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Ca	0	0
			1	1		
7	B	1	Total	Ca	0	0
			1	1		
7	C	1	Total	Ca	0	0
			1	1		
7	E	1	Total	Ca	0	0
			1	1		

- Molecule 8 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: C₁₀H₁₅N₅O₁₁P₂).



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

- Molecule 9 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C₆H₁₃NO₄S).



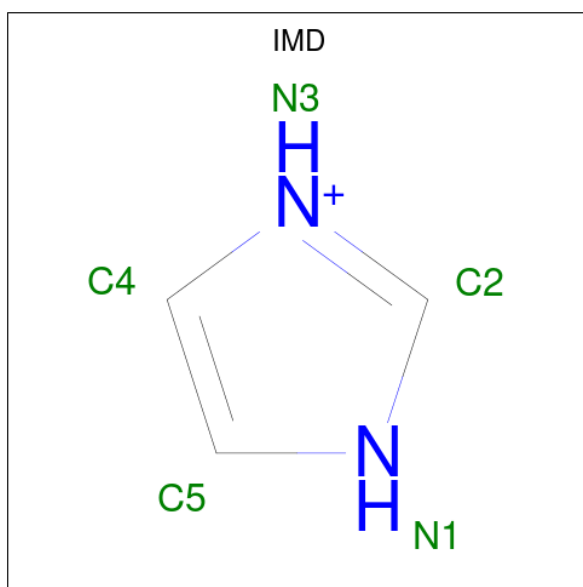
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
9	B	1	12	6	1	4	1	0	0

- Molecule 10 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



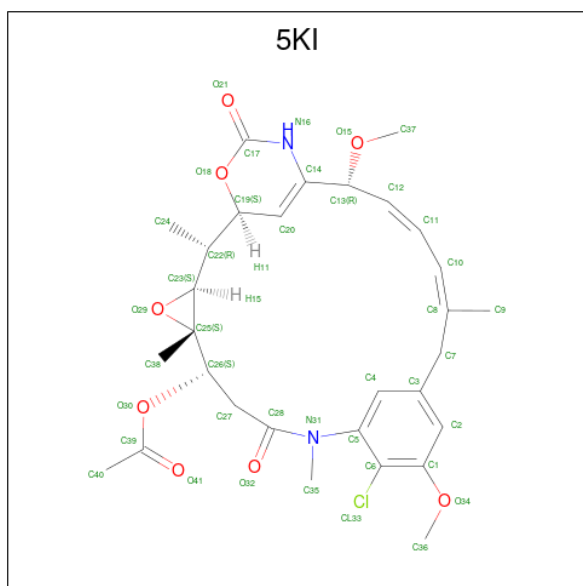
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
10	B	1	14	3	8	3	0	0

- Molecule 11 is IMIDAZOLE (three-letter code: IMD) (formula: C₃H₅N₂).



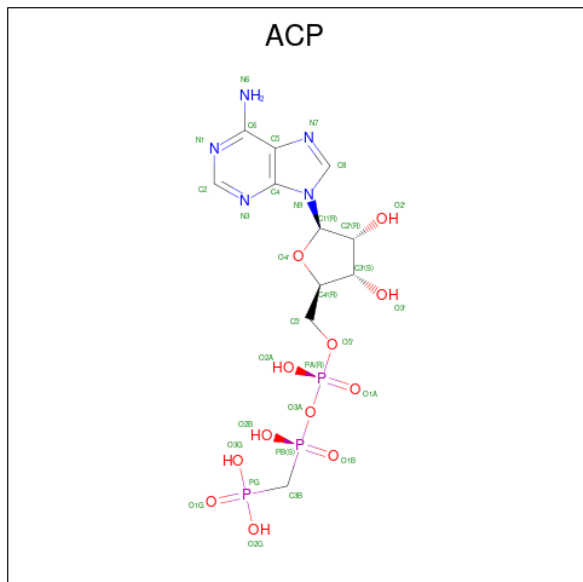
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	N		
11	C	1	10	3	5	2	0	0

- Molecule 12 is (1S,2R,3S,5S,6S,16E,18E,20R)-11-chloro-12,20-dimethoxy-2,5,9,16-tetramethyl-8,23-dioxo-4,24-dioxa-9,22-diazatetracyclo[19.3.1.1 10,14 .0 3,5]hexacosa-10(26),11,13,16,18,21(25)-hexaen-6-yl acetate (three-letter code: 5KI) (formula: C₃₀H₃₇ClN₂O₈) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	Cl	N	O		
12	D	1	41	30	1	2	8	0	0

- Molecule 13 is PHOSPHOMETHYLPHOSPHONIC ACID ADENYLATE ESTER (three-letter code: ACP) (formula: $C_{11}H_{18}N_5O_{12}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
13	F	1	31	11	5	12	3	0	0

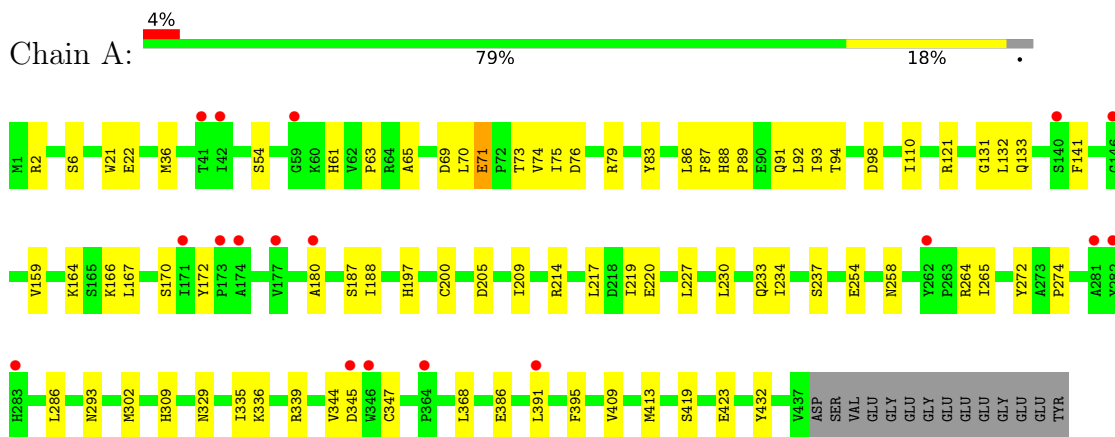
- Molecule 14 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
14	A	158	Total	O	0	0
			158	158		
14	B	196	Total	O	0	0
			196	196		
14	C	310	Total	O	0	0
			310	310		
14	D	127	Total	O	0	0
			127	127		
14	E	39	Total	O	0	0
			39	39		
14	F	62	Total	O	0	0
			62	62		

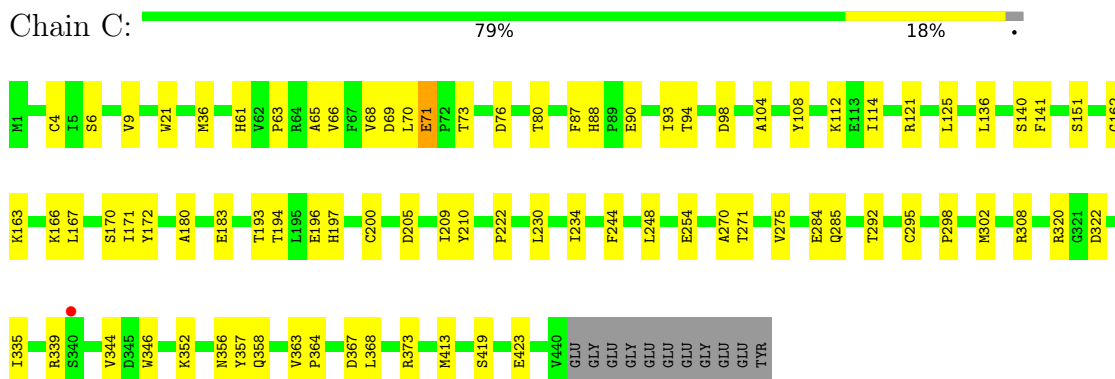
3 Residue-property plots [i](#)

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.

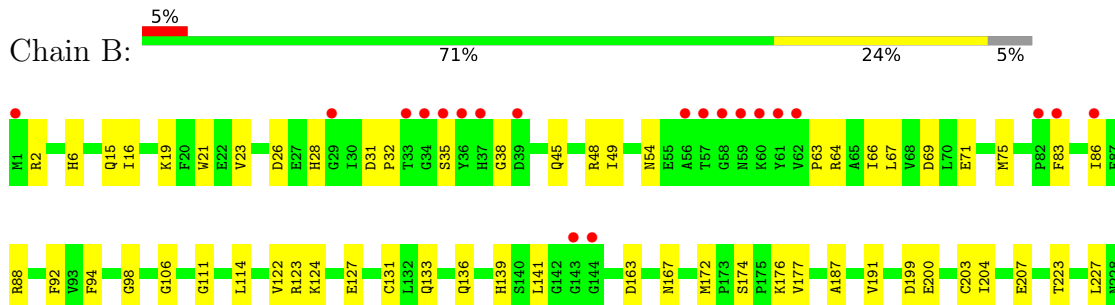
- Molecule 1: Tubulin alpha-1B chain

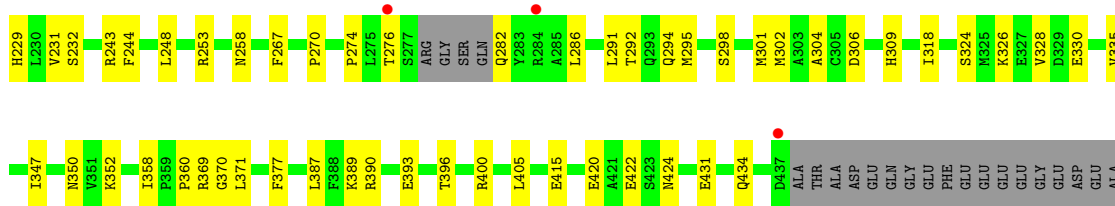


- Molecule 1: Tubulin alpha-1B chain

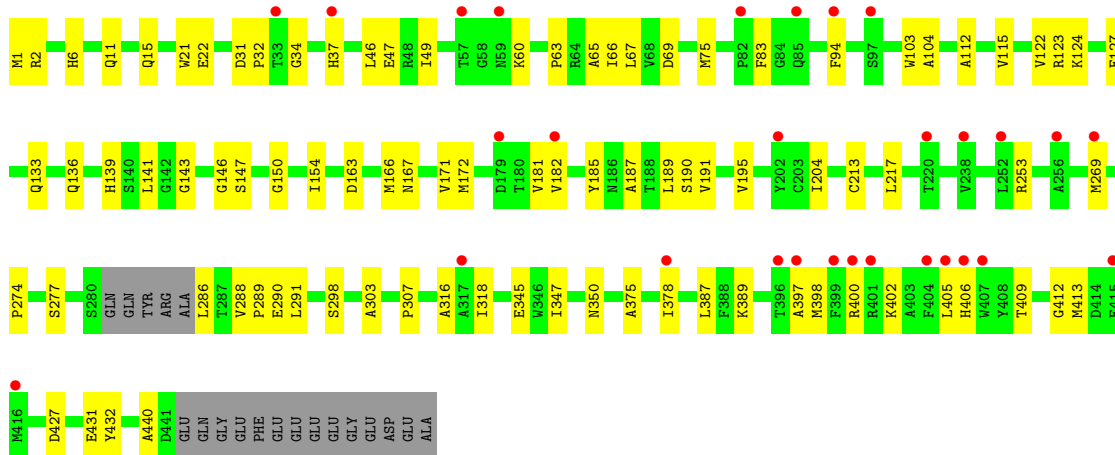
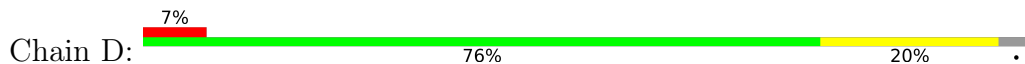


- Molecule 2: Tubulin beta-2B chain

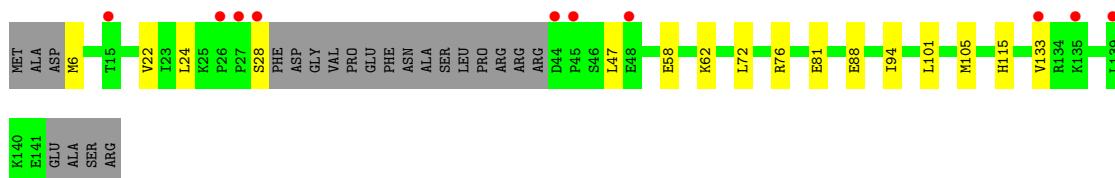




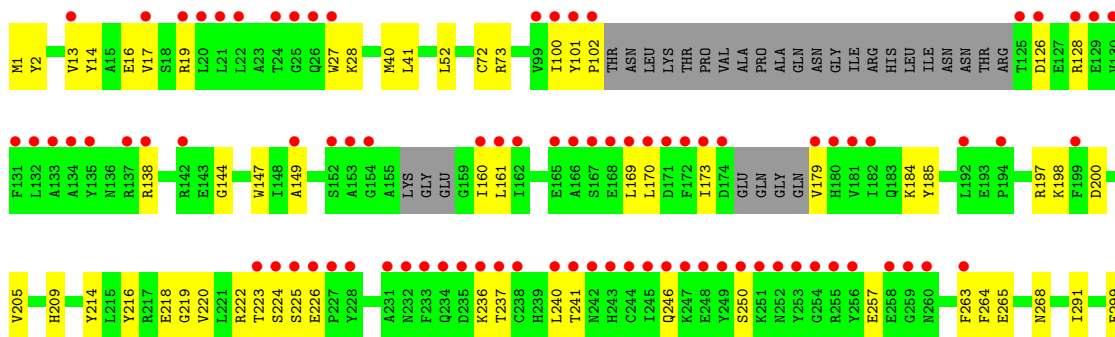
• Molecule 2: Tubulin beta-2B chain

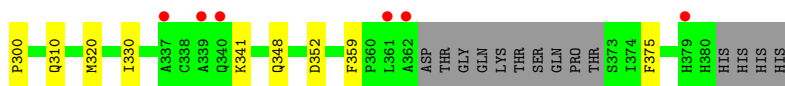


• Molecule 3: Stathmin-4



• 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	105.08Å 158.60Å 180.44Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.58 – 2.25 49.58 – 2.25	Depositor EDS
% Data completeness (in resolution range)	99.6 (49.58-2.25) 99.6 (49.58-2.25)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.60 (at 2.25Å)	Xtrriage
Refinement program	PHENIX 1.19.1_4122	Depositor
R, R_{free}	0.179 , 0.214 0.177 , 0.213	Depositor DCC
R_{free} test set	7151 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	42.6	Xtrriage
Anisotropy	0.208	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 42.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	18541	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.30% 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: MG, GTP, GDP, MES, CA, ACP, IMD, GOL, 5KI

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	0.24	0/3512	0.46	0/4767
1	C	0.24	0/3555	0.46	0/4828
2	B	0.24	0/3419	0.47	0/4629
2	D	0.24	0/3416	0.46	0/4626
3	E	0.23	0/1016	0.41	0/1347
4	F	0.24	0/2878	0.45	0/3886
All	All	0.24	0/17796	0.46	0/24083

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 [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	3434	0	3343	63	0
1	C	3467	0	3377	56	0
2	B	3345	0	3227	75	0
2	D	3343	0	3222	63	0
3	E	1008	0	1026	15	0
4	F	2815	0	2781	47	0
5	A	32	0	12	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	32	0	12	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
6	F	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
7	E	1	0	0	0	0
8	B	28	0	12	0	0
8	D	28	0	12	2	0
9	B	12	0	12	1	0
10	B	6	8	8	1	0
11	C	5	5	5	0	0
12	D	41	0	0	1	0
13	F	31	0	14	0	0
14	A	158	0	0	5	0
14	B	196	0	0	12	0
14	C	310	0	0	5	0
14	D	127	0	0	7	1
14	E	39	0	0	1	0
14	F	62	0	0	4	1
All	All	18528	13	17063	311	1

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 9.

All (311) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:335:ILE:HG23	1:A:339:ARG:HG3	1.61	0.83
1:A:71:GLU:OE2	1:A:73:THR:OG1	1.95	0.82
3:E:6:MET:HG3	3:E:24:LEU:HD23	1.63	0.80
1:A:336:LYS:HG3	3:E:24:LEU:HD13	1.66	0.77
4:F:102:PRO:HB3	4:F:173:ILE:HG22	1.72	0.72
2:D:136:GLN:HA	2:D:167:ASN:O	1.90	0.71
2:B:16:ILE:HD13	2:B:231:VAL:HG11	1.74	0.70
1:C:367:ASP:OD2	14:C:601:HOH:O	2.09	0.70
2:D:347:ILE:HG22	2:D:350:ASN:HB3	1.75	0.69
1:C:335:ILE:HG23	1:C:339:ARG:HG3	1.74	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:136:GLN:HA	2:B:167:ASN:O	1.93	0.68
2:B:276:THR:HG21	2:B:282:GLN:HA	1.76	0.68
2:D:431:GLU:OE1	14:D:601:HOH:O	2.10	0.67
1:C:93:ILE:HD11	1:C:121:ARG:HG3	1.75	0.67
1:A:76:ASP:OD1	1:A:79:ARG:NH1	2.27	0.67
1:C:322:ASP:OD1	14:C:602:HOH:O	2.14	0.66
4:F:236:LYS:HB3	4:F:240:LEU:HD13	1.78	0.66
2:D:172:MET:HG3	2:D:387:LEU:HD11	1.78	0.65
2:B:270:PRO:HG2	2:B:302:MET:HB2	1.79	0.64
3:E:81:GLU:OE1	14:E:301:HOH:O	2.14	0.64
2:D:47:GLU:HG3	14:D:716:HOH:O	1.98	0.64
2:B:420:GLU:OE1	14:B:601:HOH:O	2.15	0.64
1:C:76:ASP:O	1:C:80:THR:HG22	1.98	0.63
1:C:292:THR:HG22	1:C:335:ILE:CD1	2.28	0.63
1:C:21:TRP:CZ3	1:C:63:PRO:HB3	2.34	0.63
1:A:274:PRO:HB3	1:A:286:LEU:HD12	1.81	0.63
1:C:320:ARG:HA	1:C:356:ASN:O	1.99	0.63
2:B:422:GLU:HG3	14:B:618:HOH:O	1.99	0.62
3:E:58:GLU:HG2	3:E:62:LYS:HE3	1.82	0.62
2:D:147:SER:HB2	2:D:190:SER:OG	1.99	0.62
1:C:292:THR:HG22	1:C:335:ILE:HD12	1.82	0.62
4:F:72:CYS:O	4:F:73:ARG:HD2	2.00	0.61
2:D:432:TYR:OH	14:D:602:HOH:O	2.11	0.61
1:C:275:VAL:HG13	1:C:368:LEU:HD21	1.83	0.61
2:B:21:TRP:CZ3	2:B:63:PRO:HB3	2.36	0.61
1:A:172:TYR:HB3	1:A:205:ASP:HA	1.83	0.61
2:B:83:PHE:O	2:B:86:ILE:HG22	2.01	0.60
1:C:4[A]:CYS:SG	1:C:136:LEU:HG	2.41	0.60
1:C:209:ILE:HD11	1:C:302:MET:HE3	1.84	0.60
2:D:141:LEU:HA	2:D:147:SER:HB3	1.83	0.60
1:C:209:ILE:HD11	1:C:302:MET:CE	2.32	0.59
8:D:501:GDP:O3B	14:D:603:HOH:O	2.16	0.59
1:A:187:SER:HB3	1:A:391:LEU:HD21	1.85	0.59
2:D:217:LEU:HA	2:D:277:SER:HB3	1.85	0.59
1:C:162:GLY:HA2	3:E:94:ILE:HD11	1.83	0.59
2:D:345:GLU:HG2	2:D:440:ALA:HB2	1.85	0.59
1:A:220:GLU:HB3	2:B:326:LYS:HD3	1.85	0.59
2:D:21:TRP:CZ3	2:D:63:PRO:HB3	2.38	0.59
4:F:16:GLU:OE2	4:F:19:ARG:NH2	2.36	0.58
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.38	0.58
1:A:22:GLU:HG3	1:A:83:TYR:CE1	2.38	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:292:THR:HG22	2:B:335:VAL:HG21	1.85	0.58
2:B:163:ASP:OD1	14:B:602:HOH:O	2.18	0.58
1:C:298:PRO:HG2	1:C:308:ARG:NH2	2.19	0.57
2:B:67:LEU:HD22	2:B:92:PHE:CE2	2.40	0.57
2:B:2:ARG:HB3	2:B:133:GLN:CG	2.34	0.57
2:B:141:LEU:HD12	2:B:172:MET:SD	2.44	0.57
2:B:424:ASN:HB3	14:B:622:HOH:O	2.04	0.57
1:A:209:ILE:HG23	1:A:230:LEU:HD23	1.85	0.57
2:D:171:VAL:HA	2:D:204:ILE:O	2.06	0.56
1:A:79:ARG:HG2	1:A:92:LEU:HD12	1.86	0.56
2:B:123:ARG:O	2:B:127:GLU:HG3	2.06	0.56
1:A:309:HIS:HB3	14:F:560:HOH:O	2.06	0.56
2:B:71:GLU:HG3	2:B:98:GLY:HA2	1.87	0.56
1:A:88:HIS:HB2	1:A:89:PRO:HD2	1.89	0.55
2:D:269:MET:HG3	2:D:303:ALA:HB3	1.88	0.55
1:A:69:ASP:O	1:A:94:THR:HA	2.06	0.55
2:D:2:ARG:HB3	2:D:133:GLN:CG	2.37	0.55
2:B:2:ARG:NH1	2:B:131:CYS:SG	2.80	0.55
4:F:149:ALA:O	4:F:160:ILE:HG23	2.07	0.55
4:F:40:MET:HE3	4:F:52:LEU:HD21	1.88	0.54
2:B:106:GLY:O	2:B:111:GLY:HA3	2.07	0.54
1:C:254:GLU:HG2	1:C:352:LYS:HE2	1.89	0.54
2:D:123:ARG:O	2:D:127:GLU:HG3	2.08	0.54
4:F:205:VAL:HG21	4:F:291:ILE:HD13	1.89	0.54
1:A:345:ASP:HB3	3:E:28:SER:HB2	1.89	0.54
2:B:23:VAL:HG21	2:B:232:SER:HB3	1.90	0.54
2:B:69:ASP:O	2:B:94:PHE:HA	2.07	0.54
1:C:9:VAL:HG22	1:C:68[B]:VAL:CG2	2.38	0.53
1:A:217:LEU:HD21	1:A:368:LEU:HD23	1.89	0.53
1:A:2:ARG:HB3	1:A:131:GLY:O	2.08	0.53
4:F:237:THR:HG21	4:F:250:SER:HA	1.89	0.53
2:B:389:LYS:O	2:B:393:GLU:HG3	2.09	0.53
2:D:154:ILE:HG23	2:D:166:MET:HG2	1.91	0.53
4:F:197:ARG:NH1	4:F:257:GLU:OE2	2.38	0.53
2:B:176:LYS:HG3	14:B:748:HOH:O	2.08	0.53
1:A:75:ILE:HD12	1:A:94:THR:HG22	1.91	0.52
2:B:294:GLN:OE1	14:B:603:HOH:O	2.19	0.52
3:E:101:LEU:O	3:E:105[A]:MET:HG2	2.09	0.52
1:A:166:LYS:HE2	1:A:197:HIS:O	2.09	0.52
2:B:431:GLU:O	2:B:434:GLN:HG2	2.08	0.52
1:A:187:SER:CB	1:A:391:LEU:HD21	2.38	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:69:ASP:O	2:D:94:PHE:HA	2.10	0.52
1:A:386:GLU:OE2	14:A:601:HOH:O	2.19	0.52
2:B:244:PHE:CE1	2:B:358:ILE:HD12	2.45	0.52
2:B:298:SER:HA	2:B:301:MET:HG2	1.90	0.52
2:D:286:LEU:HD12	2:D:290:GLU:OE1	2.10	0.52
4:F:101:TYR:CE1	4:F:179:VAL:HG22	2.45	0.52
2:D:2:ARG:HB3	2:D:133:GLN:HG2	1.91	0.51
2:D:181:VAL:HB	2:D:398:MET:CE	2.39	0.51
1:A:329:ASN:HB3	3:E:6:MET:CE	2.40	0.51
2:B:38:GLY:HA3	2:B:45:GLN:OE1	2.11	0.51
1:A:329:ASN:HB3	3:E:6:MET:HE1	1.92	0.51
1:A:2:ARG:HB2	1:A:133:GLN:CG	2.41	0.51
2:D:37:HIS:HB2	14:D:701:HOH:O	2.09	0.51
2:D:298:SER:HB3	2:D:307:PRO:HD2	1.93	0.51
1:A:98:ASP:HB2	5:A:501:GTP:O2G	2.11	0.51
2:D:412:GLY:C	3:E:133:VAL:HG13	2.32	0.51
1:C:151:SER:HB2	1:C:193:THR:CG2	2.41	0.51
2:B:2:ARG:HB3	2:B:133:GLN:HG3	1.93	0.50
1:A:233:GLN:HG3	1:A:368:LEU:CD1	2.41	0.50
1:A:209:ILE:HD11	1:A:302:MET:SD	2.51	0.50
1:A:70:LEU:HD13	1:A:110:ILE:HG21	1.93	0.50
4:F:246:GLN:O	4:F:250:SER:HB3	2.12	0.50
1:C:180:ALA:O	1:C:183:GLU:HG3	2.10	0.50
2:D:1:MET:HA	2:D:1:MET:CE	2.41	0.50
2:D:191:VAL:O	2:D:195:VAL:HG23	2.11	0.50
1:A:209:ILE:HG22	1:A:227:LEU:HD22	1.94	0.49
2:B:15:GLN:O	2:B:19:LYS:HG2	2.12	0.49
4:F:2:TYR:CZ	4:F:359:PHE:HB3	2.47	0.49
1:A:74:VAL:HB	14:A:604:HOH:O	2.10	0.49
1:A:83:TYR:HB3	1:A:86:LEU:HD12	1.94	0.49
2:B:286:LEU:HD23	2:B:291:LEU:CD2	2.43	0.49
1:C:21:TRP:CE3	1:C:63:PRO:HB3	2.47	0.49
1:A:188:ILE:HD12	1:A:395:PHE:HB2	1.94	0.49
2:D:6:HIS:CD2	2:D:21:TRP:HE1	2.31	0.49
2:B:172:MET:HG3	2:B:387:LEU:HD11	1.94	0.49
4:F:265:GLU:O	14:F:501:HOH:O	2.19	0.49
2:B:177:VAL:HG13	10:B:505:GOL:H11	1.94	0.48
1:C:163:LYS:HD3	14:C:817:HOH:O	2.13	0.48
1:C:270:ALA:O	1:C:302:MET:HG2	2.12	0.48
2:D:103:TRP:CE3	2:D:189:LEU:HD13	2.48	0.48
4:F:348:GLN:NE2	4:F:352:ASP:OD1	2.45	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:285:GLN:NE2	1:C:373:ARG:HH22	2.11	0.48
3:E:72:LEU:O	3:E:76:ARG:HG2	2.13	0.48
4:F:101:TYR:N	4:F:126:ASP:OD1	2.26	0.48
4:F:226:GLU:HG3	4:F:237:THR:HG22	1.95	0.48
1:A:21:TRP:CE3	1:A:63:PRO:HB3	2.49	0.48
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.49	0.48
4:F:128:ARG:NH1	4:F:170:LEU:HD13	2.29	0.48
4:F:223:THR:OG1	4:F:257:GLU:OE2	2.31	0.48
1:C:88[A]:HIS:HE1	1:C:90:GLU:HG3	1.79	0.48
4:F:205:VAL:CG2	4:F:291:ILE:HD13	2.44	0.48
4:F:14:TYR:HB3	4:F:41:LEU:HD13	1.95	0.48
1:A:98:ASP:OD2	14:A:602:HOH:O	2.20	0.48
1:A:132:LEU:O	1:A:164:LYS:NZ	2.47	0.48
2:D:21:TRP:CE3	2:D:63:PRO:HB3	2.48	0.48
1:A:22:GLU:HG3	1:A:83:TYR:HE1	1.79	0.47
1:A:234:ILE:HD12	1:A:272:TYR:HB2	1.96	0.47
2:B:6:HIS:CD2	2:B:21:TRP:HE1	2.31	0.47
9:B:504:MES:H82	9:B:504:MES:H51	1.59	0.47
2:D:67:LEU:N	2:D:67:LEU:HD12	2.29	0.47
2:D:427:ASP:O	2:D:431:GLU:HG3	2.14	0.47
2:B:71:GLU:HG3	2:B:98:GLY:CA	2.45	0.47
4:F:160:ILE:HD12	4:F:160:ILE:N	2.30	0.47
4:F:160:ILE:HG22	4:F:161:LEU:N	2.29	0.47
2:B:347:ILE:HG22	2:B:350:ASN:HB3	1.95	0.47
2:B:390:ARG:NE	14:B:611:HOH:O	2.47	0.47
1:A:159:VAL:HG11	3:E:47:LEU:HB2	1.97	0.47
2:B:28:HIS:HB3	2:B:49:ILE:HD13	1.97	0.47
2:B:248:LEU:HD21	2:B:352:LYS:HB3	1.96	0.47
2:D:274:PRO:HB3	2:D:286:LEU:CD2	2.44	0.47
2:D:318:ILE:N	2:D:318:ILE:HD12	2.30	0.47
2:B:306:ASP:HB3	2:B:309:HIS:ND1	2.30	0.47
1:C:104:ALA:HB2	1:C:413:MET:SD	2.55	0.47
1:C:271:THR:HG21	1:C:295:CYS:O	2.14	0.47
2:D:1:MET:HA	2:D:1:MET:HE2	1.97	0.47
1:A:93:ILE:HD11	1:A:121:ARG:HG3	1.95	0.47
1:C:244:PHE:CD1	1:C:358:GLN:HG2	2.51	0.46
1:C:419:SER:O	1:C:423:GLU:HG3	2.15	0.46
2:D:288:VAL:HB	2:D:289:PRO:HD3	1.97	0.46
4:F:225:SER:OG	4:F:250:SER:OG	2.31	0.46
1:C:167:LEU:HG	1:C:200:CYS:HB3	1.95	0.46
1:C:335:ILE:HG23	1:C:339:ARG:CG	2.43	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:219:GLY:HA3	4:F:264:PHE:CZ	2.51	0.46
2:D:389:LYS:NZ	14:D:606:HOH:O	2.48	0.46
2:B:298:SER:HA	2:B:301:MET:CG	2.45	0.46
2:D:75:MET:N	14:D:604:HOH:O	2.37	0.46
2:B:318:ILE:N	2:B:318:ILE:HD12	2.31	0.46
1:A:36:MET:HB3	1:A:61:HIS:CE1	2.51	0.46
1:A:167:LEU:HG	1:A:200:CYS:HB3	1.98	0.46
1:C:166:LYS:HE2	1:C:197:HIS:O	2.16	0.46
2:D:291:LEU:HG	2:D:375:ALA:HB2	1.98	0.46
1:C:93:ILE:CD1	1:C:121:ARG:HG3	2.44	0.46
4:F:1:MET:SD	4:F:28:LYS:HB2	2.56	0.46
4:F:198:LYS:HE3	4:F:320:MET:CE	2.46	0.46
2:D:22:GLU:HG2	2:D:83:PHE:CD1	2.51	0.46
2:B:67:LEU:N	2:B:67:LEU:HD12	2.31	0.45
2:D:316:ALA:HB3	2:D:378:ILE:HB	1.98	0.45
2:D:406:HIS:HA	2:D:409:THR:OG1	2.16	0.45
4:F:200:ASP:OD1	4:F:222:ARG:HB2	2.16	0.45
2:B:370:GLY:O	2:B:371:LEU:HD23	2.16	0.45
2:D:397:ALA:HA	2:D:400:ARG:NH1	2.31	0.45
1:A:87:PHE:HA	1:A:91:GLN:OE1	2.15	0.45
2:B:326:LYS:O	2:B:330:GLU:HG3	2.16	0.45
4:F:299[B]:GLU:HB3	4:F:300:PRO:HD3	1.97	0.45
4:F:147:TRP:HB2	4:F:169:LEU:HD11	1.98	0.45
4:F:19:ARG:HD2	4:F:19:ARG:O	2.17	0.45
2:B:2:ARG:HH22	2:B:253[B]:ARG:HH12	1.65	0.45
1:C:210:TYR:CZ	1:C:222:PRO:HD2	2.51	0.45
2:D:213:CYS:HA	2:D:217:LEU:HB2	1.99	0.45
4:F:225:SER:HG	4:F:250:SER:HG	1.61	0.45
2:B:324:SER:O	2:B:328:VAL:HG23	2.18	0.45
1:C:66:VAL:HG12	1:C:68[B]:VAL:HG13	1.99	0.45
1:C:93:ILE:HG22	1:C:114:ILE:HD11	1.99	0.45
1:A:79:ARG:HG2	1:A:92:LEU:CD1	2.47	0.44
2:B:48:ARG:HB2	2:B:243:ARG:O	2.17	0.44
1:C:141:PHE:CE1	1:C:170:SER:HB3	2.52	0.44
1:C:172:TYR:HB3	1:C:205:ASP:HA	1.99	0.44
4:F:2:TYR:CE1	4:F:359:PHE:HB3	2.53	0.44
4:F:214:TYR:HB3	4:F:375:PHE:HB3	1.98	0.44
1:A:180:ALA:HA	2:B:258:ASN:OD1	2.17	0.44
1:A:214:ARG:HG2	1:A:219:ILE:O	2.17	0.44
1:A:254:GLU:HG2	1:A:258:ASN:ND2	2.33	0.44
1:C:66:VAL:HG23	1:C:125:LEU:CD1	2.47	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:143:GLY:HA3	8:D:501:GDP:O3A	2.18	0.44
1:A:6:SER:O	1:A:65:ALA:HA	2.18	0.44
4:F:197:ARG:HB2	4:F:224:SER:O	2.18	0.44
2:D:124:LYS:C	2:D:124:LYS:HD3	2.37	0.44
1:A:335:ILE:CG2	1:A:339:ARG:HG3	2.37	0.44
2:B:415:GLU:HG3	14:B:715:HOH:O	2.18	0.44
1:C:234:ILE:HD12	1:C:234:ILE:N	2.33	0.43
1:A:344:VAL:CG2	1:A:347:CYS:HB2	2.48	0.43
2:B:21:TRP:CE3	2:B:63:PRO:HB3	2.53	0.43
2:B:88:ARG:HD2	14:B:768:HOH:O	2.17	0.43
4:F:2:TYR:HB2	4:F:27:TRP:CD2	2.52	0.43
1:A:329:ASN:OD1	3:E:22:VAL:HG21	2.16	0.43
2:B:274:PRO:HB3	2:B:286:LEU:HD22	2.00	0.43
1:C:136:LEU:HD23	1:C:167:LEU:HB2	2.01	0.43
2:D:146:GLY:O	2:D:150:GLY:HA3	2.18	0.43
2:D:387:LEU:HD23	2:D:387:LEU:C	2.38	0.43
2:B:54:ASN:OD1	2:B:64:ARG:NH2	2.52	0.43
1:A:265:ILE:HG23	1:A:432:TYR:CE1	2.53	0.43
1:A:419:SER:O	1:A:423:GLU:HG3	2.19	0.43
2:B:31:ASP:HB2	2:B:32:PRO:CD	2.48	0.43
2:B:187:ALA:O	2:B:191:VAL:HG23	2.18	0.43
1:A:344:VAL:HG23	1:A:347:CYS:HB2	2.01	0.43
2:B:124:LYS:HD3	2:B:124:LYS:C	2.39	0.43
1:A:264:ARG:NH1	14:A:603:HOH:O	2.26	0.43
4:F:14:TYR:HA	4:F:17:VAL:HB	2.00	0.43
1:A:214:ARG:HA	1:A:219:ILE:O	2.19	0.43
2:B:295:MET:CG	2:B:377:PHE:HB2	2.48	0.43
1:C:69:ASP:O	1:C:94:THR:HA	2.19	0.43
2:D:34:GLY:O	2:D:60:LYS:HA	2.18	0.43
2:D:187:ALA:O	2:D:191:VAL:HG23	2.19	0.43
1:C:36:MET:HB3	1:C:61:HIS:CE1	2.53	0.43
2:B:75:MET:HE3	2:B:92:PHE:HD2	1.83	0.43
2:B:174:SER:OG	2:B:207:GLU:HB2	2.19	0.43
14:C:887:HOH:O	3:E:115:HIS:HB3	2.19	0.43
4:F:13:VAL:HG23	14:F:510:HOH:O	2.19	0.43
4:F:184:LYS:NZ	4:F:185:TYR:O	2.51	0.43
4:F:220:VAL:HG12	4:F:263:PHE:CE1	2.54	0.43
4:F:222:ARG:O	4:F:241:THR:HB	2.19	0.43
2:B:199:ASP:C	2:B:200:GLU:HG3	2.38	0.42
2:D:181:VAL:HB	2:D:398:MET:HE1	1.99	0.42
2:D:402:LYS:HB3	2:D:405:LEU:HD12	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:100:ILE:CD1	4:F:128:ARG:HA	2.49	0.42
4:F:216:TYR:CE2	4:F:218:GLU:HB2	2.54	0.42
2:B:360:PRO:HG3	14:B:737:HOH:O	2.18	0.42
1:C:194:THR:O	1:C:194:THR:HG22	2.19	0.42
1:A:409:VAL:HA	1:A:413:MET:O	2.20	0.42
2:B:204:ILE:HD13	2:B:231:VAL:HG13	2.00	0.42
1:C:140:SER:HA	1:C:171:ILE:HB	2.01	0.42
2:D:141:LEU:HD12	2:D:172:MET:SD	2.59	0.42
2:B:31:ASP:OD1	2:B:35:SER:N	2.44	0.42
1:C:88[A]:HIS:CE1	1:C:90:GLU:HG3	2.54	0.42
1:A:83:TYR:CD2	1:A:86:LEU:HD11	2.54	0.42
2:B:223:THR:O	2:B:227:LEU:HD13	2.20	0.42
2:B:248:LEU:CD2	2:B:352:LYS:HB3	2.50	0.42
2:B:203:CYS:SG	2:B:267:PHE:HB3	2.60	0.42
1:C:108:TYR:O	1:C:112:LYS:HG2	2.20	0.42
1:A:237[B]:SER:HB2	14:A:696:HOH:O	2.20	0.41
1:C:70:LEU:HB2	1:C:98:ASP:HA	2.01	0.41
2:D:11:GLN:O	2:D:15:GLN:HG2	2.19	0.41
2:D:104:ALA:HB2	2:D:413:MET:SD	2.61	0.41
2:B:396:THR:O	2:B:400:ARG:HG2	2.19	0.41
1:C:63:PRO:HG2	1:C:87:PHE:CE1	2.55	0.41
1:C:248:LEU:HD12	1:C:357:TYR:OH	2.20	0.41
1:C:363:VAL:HG13	1:C:364:PRO:HD2	2.02	0.41
2:D:181:VAL:HG22	12:D:503:5KI:C28	2.50	0.41
1:C:209:ILE:HG23	1:C:230:LEU:HD23	2.01	0.41
2:D:163:ASP:O	2:D:253:ARG:NH2	2.54	0.41
1:A:293:ASN:CG	1:A:339:ARG:HH21	2.23	0.41
2:B:229:HIS:ND1	14:B:607:HOH:O	2.37	0.41
1:C:196:GLU:HG2	14:C:701:HOH:O	2.20	0.41
4:F:138:ARG:NH1	4:F:144:GLY:O	2.54	0.41
4:F:320:MET:HG3	4:F:330:ILE:HD11	2.02	0.41
2:D:181:VAL:HB	2:D:398:MET:HE3	2.02	0.41
2:B:405:LEU:HD23	2:B:405:LEU:HA	1.93	0.41
1:C:234:ILE:HG12	1:C:302:MET:SD	2.61	0.41
2:D:112:ALA:O	2:D:115:VAL:HG12	2.20	0.41
1:A:54:SER:O	1:A:61:HIS:HA	2.21	0.41
2:B:75:MET:HE3	2:B:92:PHE:CD2	2.56	0.41
2:D:21:TRP:CZ2	2:D:65:ALA:HB2	2.56	0.41
3:E:88:GLU:OE1	3:E:88:GLU:HA	2.20	0.41
1:A:141:PHE:CE1	1:A:170:SER:HB3	2.56	0.41
1:A:274:PRO:CB	1:A:286:LEU:HD12	2.50	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:71:GLU:OE1	1:C:73:THR:OG1	2.38	0.40
2:B:26:ASP:OD2	2:B:369:ARG:HD2	2.21	0.40
2:B:66:ILE:HD12	2:B:122:VAL:HG22	2.03	0.40
2:D:345:GLU:CG	2:D:440:ALA:HB2	2.49	0.40
4:F:268:ASN:HB3	14:F:501:HOH:O	2.21	0.40
2:B:114:LEU:HG	2:B:114:LEU:O	2.21	0.40
2:B:304:ALA:N	14:B:619:HOH:O	2.54	0.40
2:D:31:ASP:HB2	2:D:32:PRO:CD	2.52	0.40
2:D:46:LEU:HA	2:D:49:ILE:HB	2.04	0.40
2:D:66:ILE:HD12	2:D:122:VAL:HG22	2.03	0.40
2:D:182:VAL:O	2:D:185:TYR:HB2	2.22	0.40
4:F:341:LYS:HG2	4:F:341:LYS:O	2.20	0.40
1:C:6:SER:O	1:C:65:ALA:HA	2.21	0.40
4:F:209:HIS:ND1	4:F:310[B]:GLN:OE1	2.52	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
14:D:606:HOH:O	14:F:555:HOH:O[3_545]	2.17	0.03

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	438/451 (97%)	431 (98%)	7 (2%)	0	100	100
1	C	443/451 (98%)	432 (98%)	11 (2%)	0	100	100
2	B	420/445 (94%)	416 (99%)	4 (1%)	0	100	100
2	D	422/445 (95%)	414 (98%)	8 (2%)	0	100	100
3	E	118/143 (82%)	118 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	F	334/384 (87%)	327 (98%)	7 (2%)	0	100	100
All	All	2175/2319 (94%)	2138 (98%)	37 (2%)	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 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	371/379 (98%)	370 (100%)	1 (0%)	92	95
1	C	376/379 (99%)	374 (100%)	2 (0%)	88	92
2	B	368/383 (96%)	367 (100%)	1 (0%)	92	95
2	D	368/383 (96%)	367 (100%)	1 (0%)	92	95
3	E	110/127 (87%)	110 (100%)	0	100	100
4	F	308/342 (90%)	308 (100%)	0	100	100
All	All	1901/1993 (95%)	1896 (100%)	5 (0%)	92	95

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	71	GLU
2	B	139	HIS
1	C	71	GLU
1	C	284	GLU
2	D	139	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	301	GLN
1	C	285	GLN
1	C	372	GLN

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Mol	Chain	Res	Type
2	D	167	ASN
2	D	294	GLN
4	F	348	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 9 are monoatomic - leaving 9 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
13	ACP	F	401	6	27,33,33	1.99	7 (25%)	32,52,52	1.27	4 (12%)
10	GOL	B	505	-	5,5,5	0.79	0	5,5,5	0.82	0
11	IMD	C	504	-	3,5,5	0.40	0	4,5,5	0.59	0
12	5KI	D	503	-	43,44,44	1.36	5 (11%)	46,65,65	1.85	11 (23%)
8	GDP	D	501	6	24,30,30	1.19	2 (8%)	31,47,47	1.94	7 (22%)
9	MES	B	504	-	12,12,12	2.24	1 (8%)	14,16,16	1.99	4 (28%)
8	GDP	B	501	6	24,30,30	1.17	2 (8%)	31,47,47	1.90	7 (22%)
5	GTP	C	501	6	26,34,34	0.95	1 (3%)	33,54,54	1.71	6 (18%)
5	GTP	A	501	6	26,34,34	0.97	1 (3%)	33,54,54	1.76	7 (21%)

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
13	ACP	F	401	6	-	6/15/38/38	0/3/3/3
10	GOL	B	505	-	-	2/4/4/4	-
11	IMD	C	504	-	-	-	0/1/1/1
12	5KI	D	503	-	-	12/44/68/68	0/2/4/4
8	GDP	D	501	6	-	3/12/32/32	0/3/3/3
9	MES	B	504	-	-	5/6/14/14	0/1/1/1
8	GDP	B	501	6	-	3/12/32/32	0/3/3/3
5	GTP	C	501	6	-	8/18/38/38	0/3/3/3
5	GTP	A	501	6	-	9/18/38/38	0/3/3/3

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	B	504	MES	C8-S	-7.48	1.66	1.77
13	F	401	ACP	PG-O1G	5.44	1.61	1.50
8	D	501	GDP	C5-C6	4.22	1.48	1.41
8	B	501	GDP	C5-C6	4.15	1.48	1.41
13	F	401	ACP	PB-O1B	4.12	1.61	1.51
12	D	503	5KI	C25-C23	3.72	1.51	1.47
12	D	503	5KI	O29-C23	-3.49	1.40	1.45
13	F	401	ACP	PB-O2B	-3.41	1.48	1.56
13	F	401	ACP	PB-O3A	3.30	1.62	1.58
5	A	501	GTP	C6-N1	3.17	1.38	1.33
12	D	503	5KI	C17-N16	3.09	1.42	1.35
5	C	501	GTP	C6-N1	2.97	1.38	1.33
13	F	401	ACP	PG-O2G	-2.88	1.48	1.54
12	D	503	5KI	C5-N31	-2.83	1.40	1.44
13	F	401	ACP	PG-O3G	2.77	1.61	1.54
12	D	503	5KI	C14-N16	2.65	1.44	1.37
8	D	501	GDP	C5-C4	2.44	1.47	1.40
13	F	401	ACP	C5-C4	2.43	1.47	1.40
8	B	501	GDP	C5-C4	2.36	1.47	1.40

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
12	D	503	5KI	C25-O29-C23	6.06	64.43	60.79

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	501	GTP	N3-C2-N1	-5.33	120.11	127.22
5	C	501	GTP	N3-C2-N1	-5.23	120.25	127.22
12	D	503	5KI	C6-C5-N31	5.16	126.00	120.71
8	D	501	GDP	C2-N3-C4	4.86	120.91	115.36
8	B	501	GDP	C2-N3-C4	4.76	120.79	115.36
12	D	503	5KI	O29-C25-C23	-4.29	56.49	59.38
5	A	501	GTP	C2-N3-C4	4.27	120.23	115.36
8	B	501	GDP	C4-C5-C6	-4.18	116.81	120.80
8	D	501	GDP	C2-N1-C6	4.11	122.45	115.93
8	B	501	GDP	C2-N1-C6	4.09	122.43	115.93
8	D	501	GDP	C5-C6-N1	-4.03	117.92	123.43
8	D	501	GDP	C4-C5-C6	-4.01	116.97	120.80
5	C	501	GTP	C2-N3-C4	3.95	119.87	115.36
8	B	501	GDP	C5-C6-N1	-3.94	118.04	123.43
9	B	504	MES	O1S-S-C8	3.74	111.42	106.92
9	B	504	MES	C5-N4-C3	3.59	116.90	108.83
8	B	501	GDP	N3-C2-N1	-3.40	122.68	127.22
8	D	501	GDP	N3-C2-N1	-3.35	122.76	127.22
5	A	501	GTP	PA-O3A-PB	-3.30	121.52	132.83
5	C	501	GTP	PA-O3A-PB	-3.16	121.98	132.83
8	D	501	GDP	PA-O3A-PB	-3.13	122.10	132.83
13	F	401	ACP	N3-C2-N1	-3.08	123.87	128.68
9	B	504	MES	C6-C5-N4	-3.05	105.48	110.10
12	D	503	5KI	O30-C39-C40	3.02	116.65	111.09
5	C	501	GTP	PB-O3B-PG	-3.00	122.53	132.83
5	C	501	GTP	C5-C6-N1	-2.97	119.36	123.43
13	F	401	ACP	C3'-C2'-C1'	2.92	105.38	100.98
5	A	501	GTP	C5-C6-N1	-2.91	119.46	123.43
12	D	503	5KI	C27-C28-N31	-2.90	115.62	118.89
5	A	501	GTP	PB-O3B-PG	-2.84	123.08	132.83
13	F	401	ACP	PB-O3A-PA	-2.78	123.75	132.56
8	B	501	GDP	PA-O3A-PB	-2.74	123.41	132.83
8	D	501	GDP	C4-C5-N7	-2.73	106.55	109.40
8	B	501	GDP	C4-C5-N7	-2.66	106.62	109.40
5	C	501	GTP	C2-N1-C6	2.66	120.15	115.93
5	A	501	GTP	C2-N1-C6	2.56	120.00	115.93
13	F	401	ACP	C4-C5-N7	-2.47	106.82	109.40
12	D	503	5KI	O30-C26-C25	2.41	110.92	105.48
12	D	503	5KI	O29-C25-C38	2.37	117.56	114.17
12	D	503	5KI	C5-C6-CL33	2.28	122.51	120.09
12	D	503	5KI	O34-C1-C2	-2.14	120.43	124.12
12	D	503	5KI	C4-C5-C6	-2.13	119.81	122.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
12	D	503	5KI	O34-C1-C6	2.12	118.04	115.53
9	B	504	MES	C7-N4-C5	2.07	116.53	111.23
5	A	501	GTP	N2-C2-N1	2.05	120.45	117.25

There are no chirality outliers.

All (48) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	C5'-O5'-PA-O1A
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	501	GTP	C5'-O5'-PA-O1A
5	C	501	GTP	C5'-O5'-PA-O2A
8	B	501	GDP	C5'-O5'-PA-O1A
8	B	501	GDP	C5'-O5'-PA-O2A
8	D	501	GDP	C5'-O5'-PA-O1A
8	D	501	GDP	C5'-O5'-PA-O2A
9	B	504	MES	C8-C7-N4-C5
10	B	505	GOL	C1-C2-C3-O3
12	D	503	5KI	C14-C13-O15-C37
12	D	503	5KI	C12-C13-O15-C37
12	D	503	5KI	C6-C1-O34-C36
13	F	401	ACP	PG-C3B-PB-O1B
13	F	401	ACP	PG-C3B-PB-O2B
13	F	401	ACP	PG-C3B-PB-O3A
13	F	401	ACP	C5'-O5'-PA-O1A
13	F	401	ACP	C5'-O5'-PA-O3A
12	D	503	5KI	C2-C1-O34-C36
9	B	504	MES	C7-C8-S-O3S
12	D	503	5KI	O18-C19-C22-C23
10	B	505	GOL	O2-C2-C3-O3
9	B	504	MES	C8-C7-N4-C3
12	D	503	5KI	O18-C19-C22-C24
5	A	501	GTP	PB-O3B-PG-O1G
5	A	501	GTP	C5'-O5'-PA-O3A
5	C	501	GTP	C5'-O5'-PA-O3A
12	D	503	5KI	C20-C19-C22-C24
5	C	501	GTP	PB-O3A-PA-O2A
13	F	401	ACP	C5'-O5'-PA-O2A
9	B	504	MES	C7-C8-S-O1S
9	B	504	MES	C7-C8-S-O2S
12	D	503	5KI	C20-C19-C22-C23
5	A	501	GTP	PB-O3A-PA-O2A

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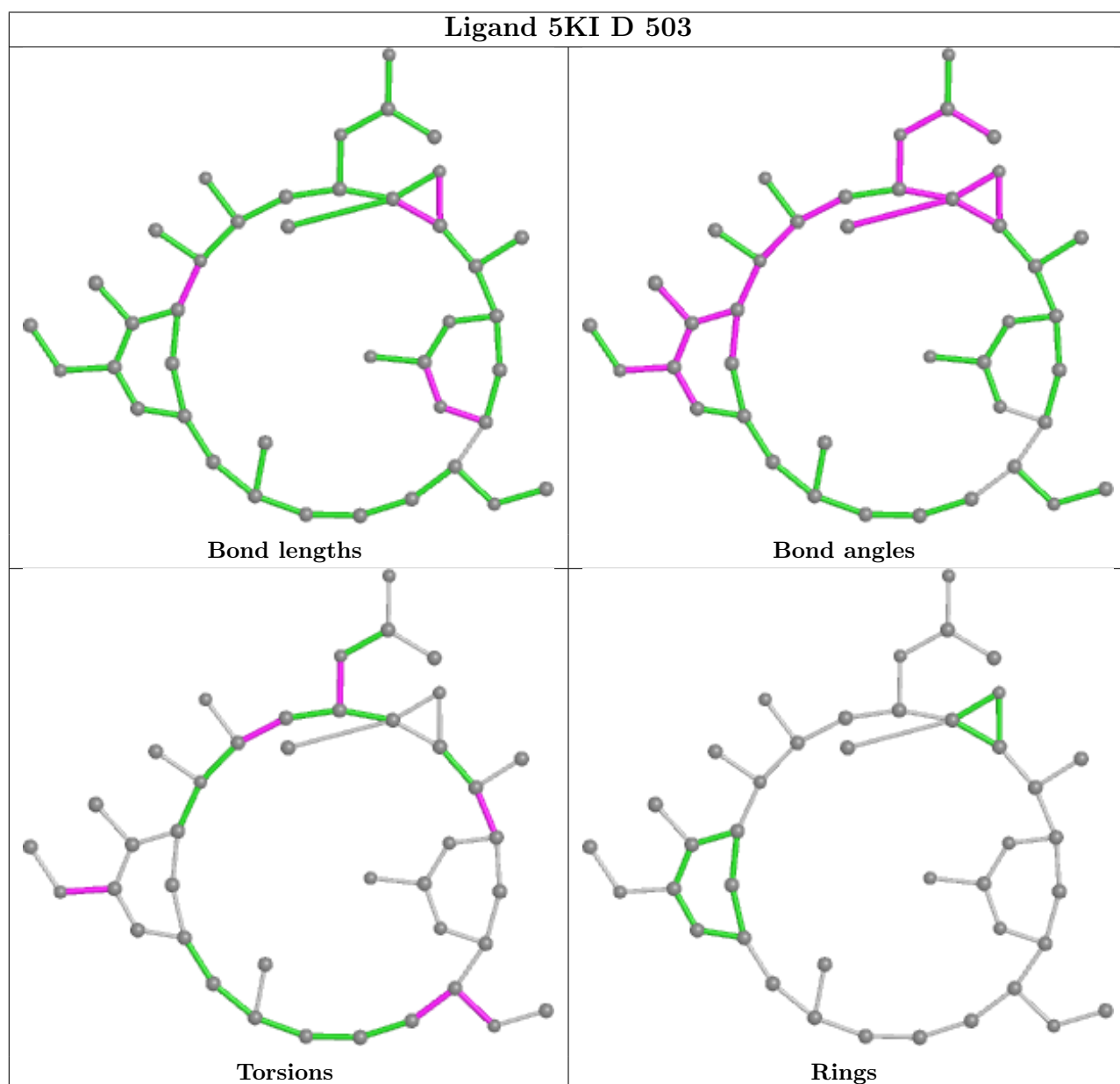
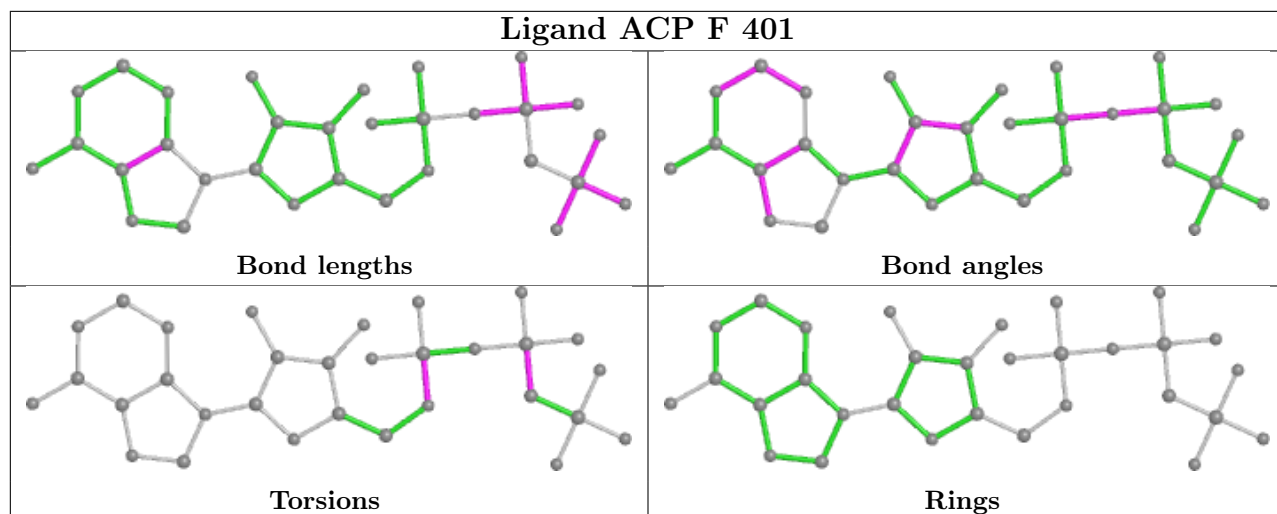
Mol	Chain	Res	Type	Atoms
5	C	501	GTP	C4'-C5'-O5'-PA
5	C	501	GTP	PB-O3B-PG-O1G
5	A	501	GTP	C4'-C5'-O5'-PA
12	D	503	5KI	C26-C27-C28-O32
12	D	503	5KI	C25-C26-O30-C39
5	A	501	GTP	PB-O3B-PG-O2G
5	A	501	GTP	PB-O3B-PG-O3G
5	C	501	GTP	PB-O3B-PG-O2G
5	C	501	GTP	PB-O3B-PG-O3G
8	B	501	GDP	C5'-O5'-PA-O3A
8	D	501	GDP	C5'-O5'-PA-O3A
5	A	501	GTP	PB-O3A-PA-O1A
12	D	503	5KI	C11-C12-C13-C14
12	D	503	5KI	C26-C27-C28-N31

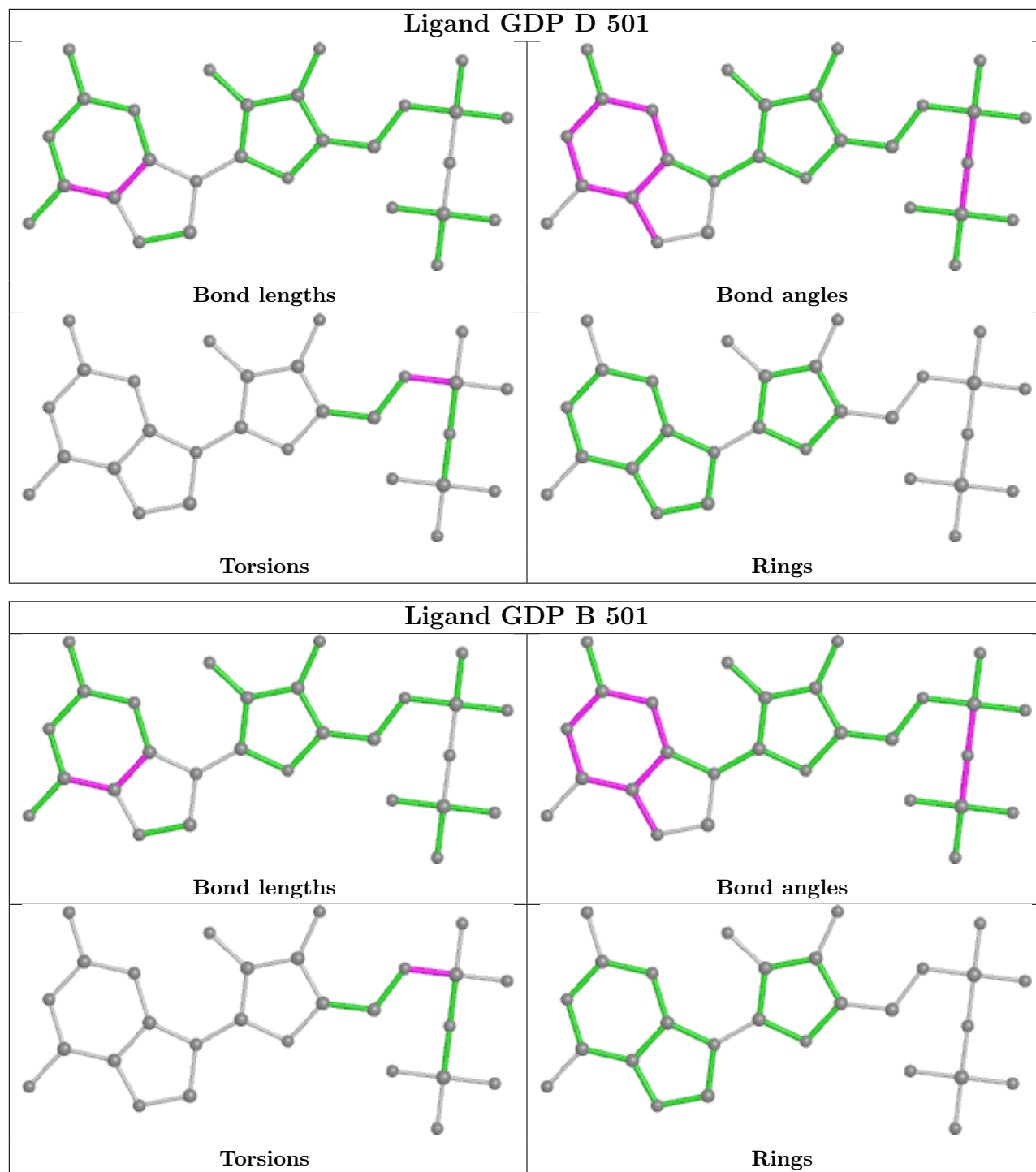
There are no ring outliers.

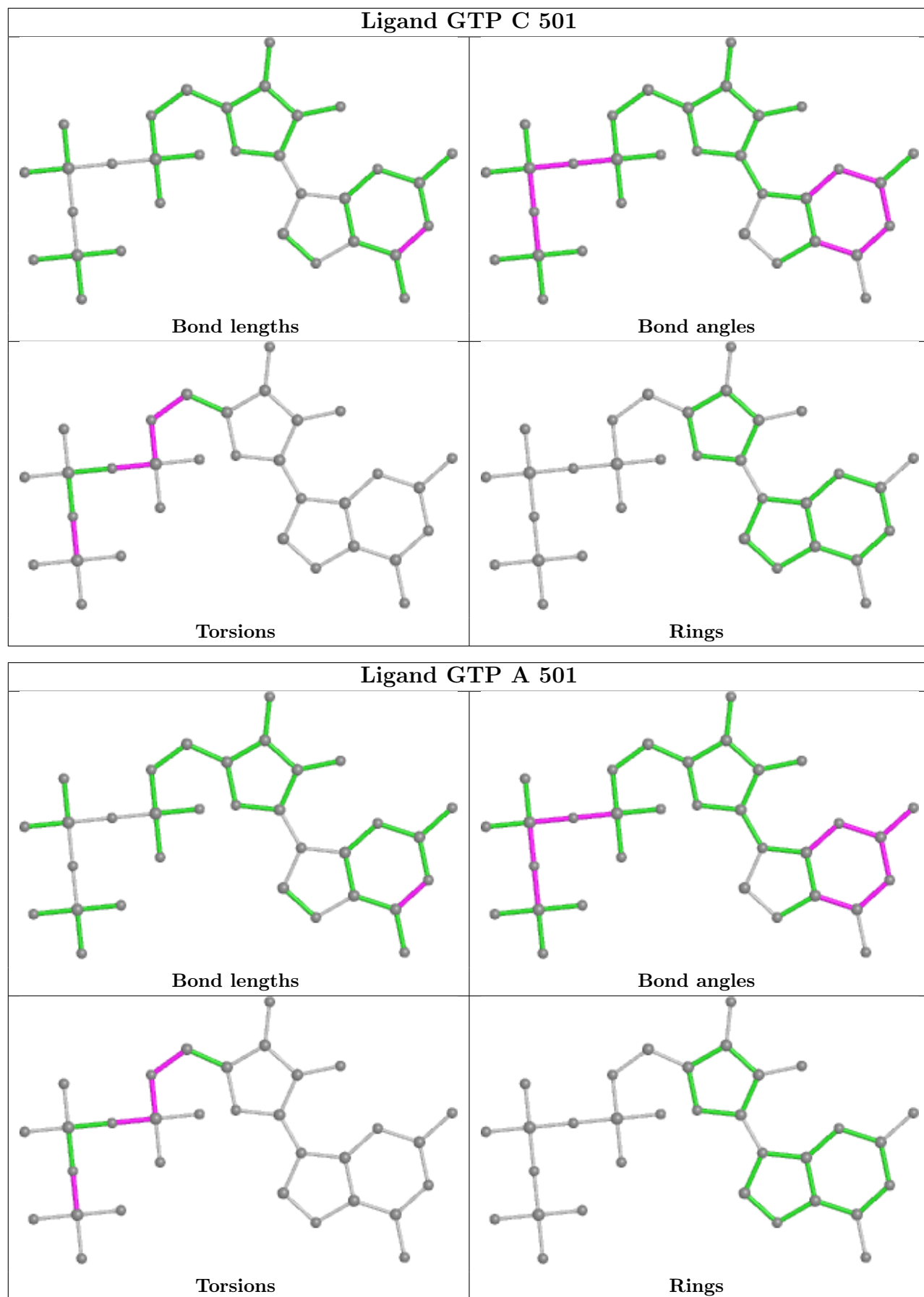
5 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	B	505	GOL	1	0
12	D	503	5KI	1	0
8	D	501	GDP	2	0
9	B	504	MES	1	0
5	A	501	GTP	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	437/451 (96%)	0.20	18 (4%) 37 40	32, 50, 79, 120	0
1	C	440/451 (97%)	-0.14	1 (0%) 95 96	27, 39, 63, 105	0
2	B	423/445 (95%)	0.16	23 (5%) 25 28	29, 48, 80, 114	0
2	D	426/445 (95%)	0.34	29 (6%) 17 18	32, 57, 88, 114	0
3	E	121/143 (84%)	0.39	10 (8%) 11 12	43, 63, 92, 105	0
4	F	341/384 (88%)	1.23	92 (26%) 0 0	44, 71, 125, 152	0
All	All	2188/2319 (94%)	0.32	173 (7%) 12 14	27, 52, 96, 152	0

All (173) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	251	LYS	8.1
4	F	250	SER	8.0
4	F	249	TYR	7.1
4	F	173	ILE	7.0
4	F	170	LEU	7.0
4	F	253	TYR	6.9
4	F	240	LEU	6.8
2	B	57	THR	6.7
4	F	244	CYS	6.7
4	F	161	LEU	6.5
4	F	99	VAL	6.4
4	F	130	VAL	6.2
4	F	243	HIS	5.9
2	B	59	ASN	5.7
4	F	259	GLY	5.6
4	F	166	ALA	5.6
3	E	139	LEU	5.5
4	F	132	LEU	5.4
3	E	27	PRO	5.2

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Mol	Chain	Res	Type	RSRZ
4	F	169	LEU	5.2
4	F	100	ILE	5.2
4	F	254	GLY	5.1
4	F	135	TYR	5.1
4	F	131	PHE	5.0
4	F	234	GLN	4.9
4	F	248	GLU	4.9
1	A	262	TYR	4.9
4	F	233	PHE	4.9
1	A	282	TYR	4.9
4	F	252	ASN	4.8
2	D	400	ARG	4.8
4	F	182	ILE	4.6
2	D	404	PHE	4.6
4	F	246	GLN	4.5
3	E	26	PRO	4.5
4	F	101	TYR	4.5
4	F	129	GLU	4.3
4	F	142	ARG	4.3
2	B	58	GLY	4.2
4	F	125	THR	4.2
4	F	256	TYR	4.2
4	F	134	ALA	4.2
4	F	225	SER	4.2
2	D	401	ARG	4.1
4	F	361	LEU	4.1
4	F	245	ILE	4.1
4	F	231	ALA	4.0
4	F	237	THR	4.0
2	B	37	HIS	4.0
4	F	21	LEU	4.0
4	F	168	GLU	4.0
4	F	247	LYS	3.9
4	F	255	ARG	3.9
4	F	232	ASN	3.9
4	F	179	VAL	3.9
2	B	1	MET	3.9
2	D	57	THR	3.8
2	B	33	THR	3.8
4	F	241	THR	3.8
4	F	194	PRO	3.8
4	F	153	ALA	3.7

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Mol	Chain	Res	Type	RSRZ
4	F	223	THR	3.6
4	F	20	LEU	3.6
4	F	152	SER	3.5
1	A	346	TRP	3.5
4	F	17	VAL	3.5
1	C	340	SER	3.5
4	F	181	VAL	3.4
3	E	45	PRO	3.4
4	F	24	THR	3.4
2	D	37	HIS	3.4
1	A	364	PRO	3.3
2	D	415	GLU	3.3
2	B	60	LYS	3.3
2	B	56	ALA	3.3
4	F	154	GLY	3.3
4	F	362	ALA	3.3
4	F	102	PRO	3.3
4	F	172	PHE	3.3
2	D	182	VAL	3.3
4	F	162	ILE	3.1
4	F	339	ALA	3.1
2	B	36	TYR	3.0
4	F	258	GLU	3.0
4	F	165	GLU	3.0
2	D	396	THR	3.0
4	F	133	ALA	3.0
2	D	407	TRP	2.9
1	A	41	THR	2.9
3	E	48	GLU	2.9
4	F	199	PHE	2.9
4	F	25	GLY	2.9
4	F	236	LYS	2.9
4	F	227	PRO	2.9
2	D	405	LEU	2.9
1	A	42	ILE	2.8
4	F	160	ILE	2.8
2	D	33	THR	2.8
1	A	177	VAL	2.8
2	D	59	ASN	2.8
4	F	174	ASP	2.8
2	B	437	ASP	2.8
2	D	406	HIS	2.7

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Mol	Chain	Res	Type	RSRZ
3	E	28	SER	2.7
4	F	242	ASN	2.7
4	F	167	SER	2.7
4	F	27	TRP	2.7
2	B	35	SER	2.7
2	B	82	PRO	2.6
4	F	226	GLU	2.6
3	E	135	LYS	2.6
4	F	260	ASN	2.6
1	A	171	ILE	2.6
1	A	283	HIS	2.6
2	D	378	ILE	2.6
4	F	180	HIS	2.6
4	F	340	GLN	2.6
4	F	137	ARG	2.5
4	F	126	ASP	2.5
2	D	416	MET	2.5
1	A	174	ALA	2.5
4	F	149	ALA	2.5
2	D	94	PHE	2.5
2	B	83	PHE	2.5
2	B	276	THR	2.5
2	B	144	GLY	2.5
4	F	238	CYS	2.4
2	D	202	TYR	2.4
3	E	44	ASP	2.4
2	D	85	GLN	2.4
2	D	399	PHE	2.4
4	F	26	GLN	2.4
4	F	235	ASP	2.4
4	F	128	ARG	2.3
1	A	345	ASP	2.3
4	F	13	VAL	2.3
2	B	39	ASP	2.3
2	D	179	ASP	2.3
2	B	29	GLY	2.3
1	A	281	ALA	2.3
2	D	252	LEU	2.2
4	F	228	TYR	2.2
4	F	171	ASP	2.2
2	D	238	VAL	2.2
1	A	59	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
2	D	256	ALA	2.2
2	D	317	ALA	2.2
2	D	397	ALA	2.2
3	E	15	THR	2.2
3	E	133	VAL	2.2
2	B	143	GLY	2.2
4	F	263	PHE	2.2
1	A	146	GLY	2.2
2	B	62	VAL	2.2
1	A	180	ALA	2.2
2	D	220	THR	2.2
1	A	391	LEU	2.2
2	D	97	SER	2.2
2	B	284	ARG	2.1
4	F	192	LEU	2.1
2	B	61	TYR	2.1
4	F	379	HIS	2.1
1	A	173	PRO	2.1
2	D	82	PRO	2.1
1	A	140	SER	2.1
2	B	34	GLY	2.1
4	F	224	SER	2.1
4	F	19	ARG	2.0
4	F	337	ALA	2.0
2	B	86	ILE	2.0
4	F	22	LEU	2.0
2	D	269	MET	2.0
4	F	138	ARG	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no monosaccharides 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,

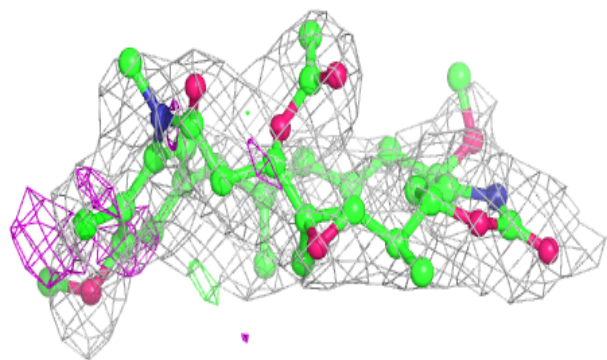
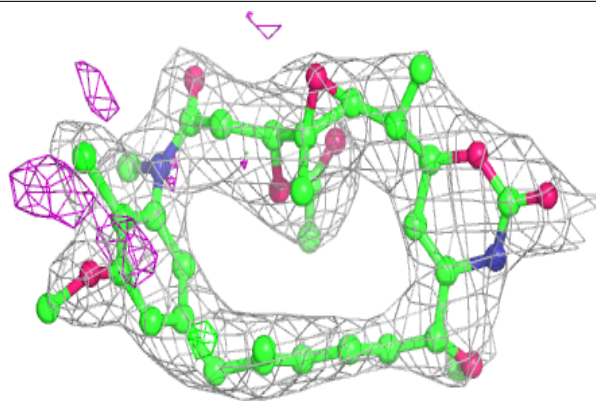
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
10	GOL	B	505	6/6	0.69	0.21	67,82,90,99	0
7	CA	B	503	1/1	0.80	0.24	95,95,95,95	0
12	5KI	D	503	41/41	0.85	0.28	55,72,83,89	0
11	IMD	C	504	5/5	0.88	0.14	54,64,76,80	0
7	CA	E	201	1/1	0.90	0.04	92,92,92,92	0
6	MG	D	502	1/1	0.92	0.15	65,65,65,65	0
13	ACP	F	401	31/31	0.92	0.17	64,82,96,106	0
6	MG	F	402	1/1	0.94	0.04	74,74,74,74	0
7	CA	A	503	1/1	0.95	0.06	60,60,60,60	0
8	GDP	D	501	28/28	0.96	0.12	46,54,64,79	0
7	CA	C	503	1/1	0.97	0.05	49,49,49,49	0
9	MES	B	504	12/12	0.97	0.12	40,51,60,70	0
5	GTP	A	501	32/32	0.97	0.21	22,34,42,45	0
5	GTP	C	501	32/32	0.98	0.15	26,31,37,39	0
6	MG	A	502	1/1	0.98	0.18	34,34,34,34	0
8	GDP	B	501	28/28	0.98	0.20	27,34,44,50	0
6	MG	C	502	1/1	0.99	0.14	29,29,29,29	0
6	MG	B	502	1/1	0.99	0.21	26,26,26,26	0

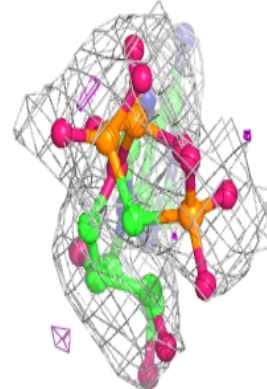
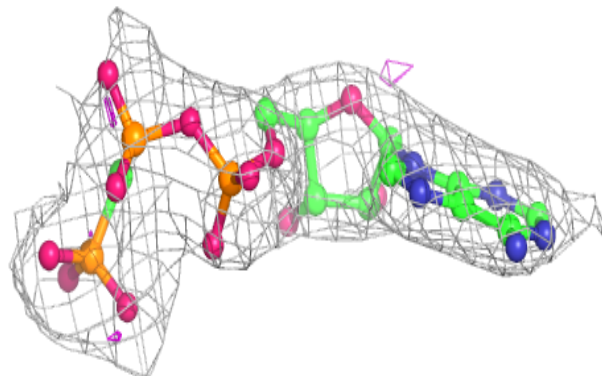
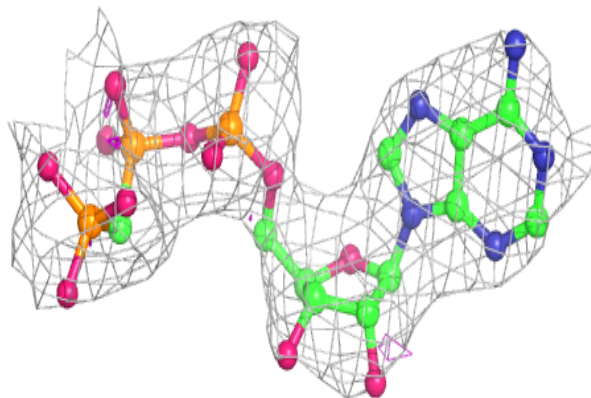
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 5KI D 503:

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

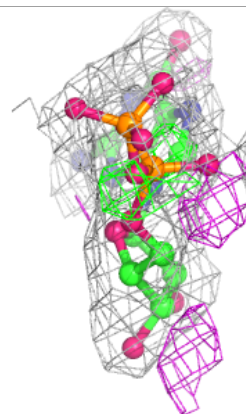
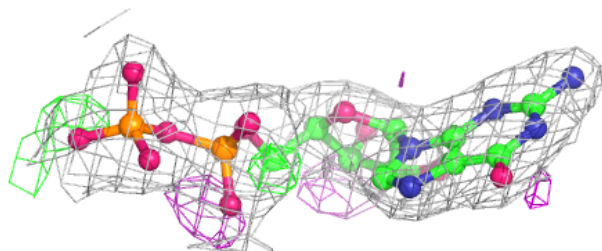
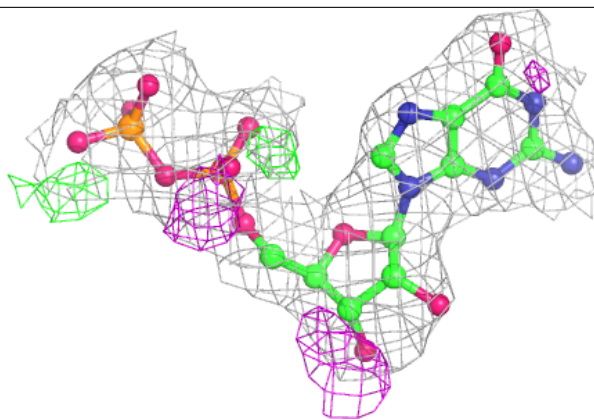
**Electron density around ACP F 401:**

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

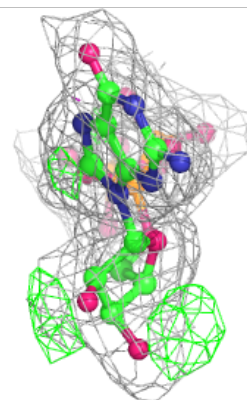
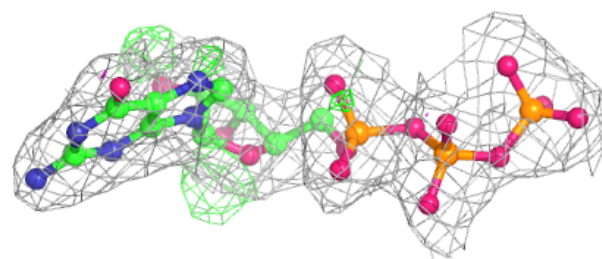
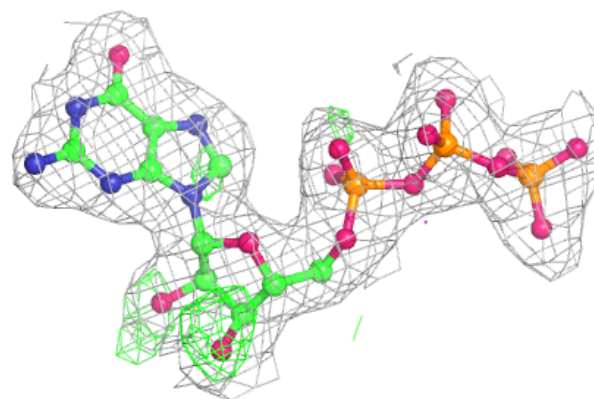


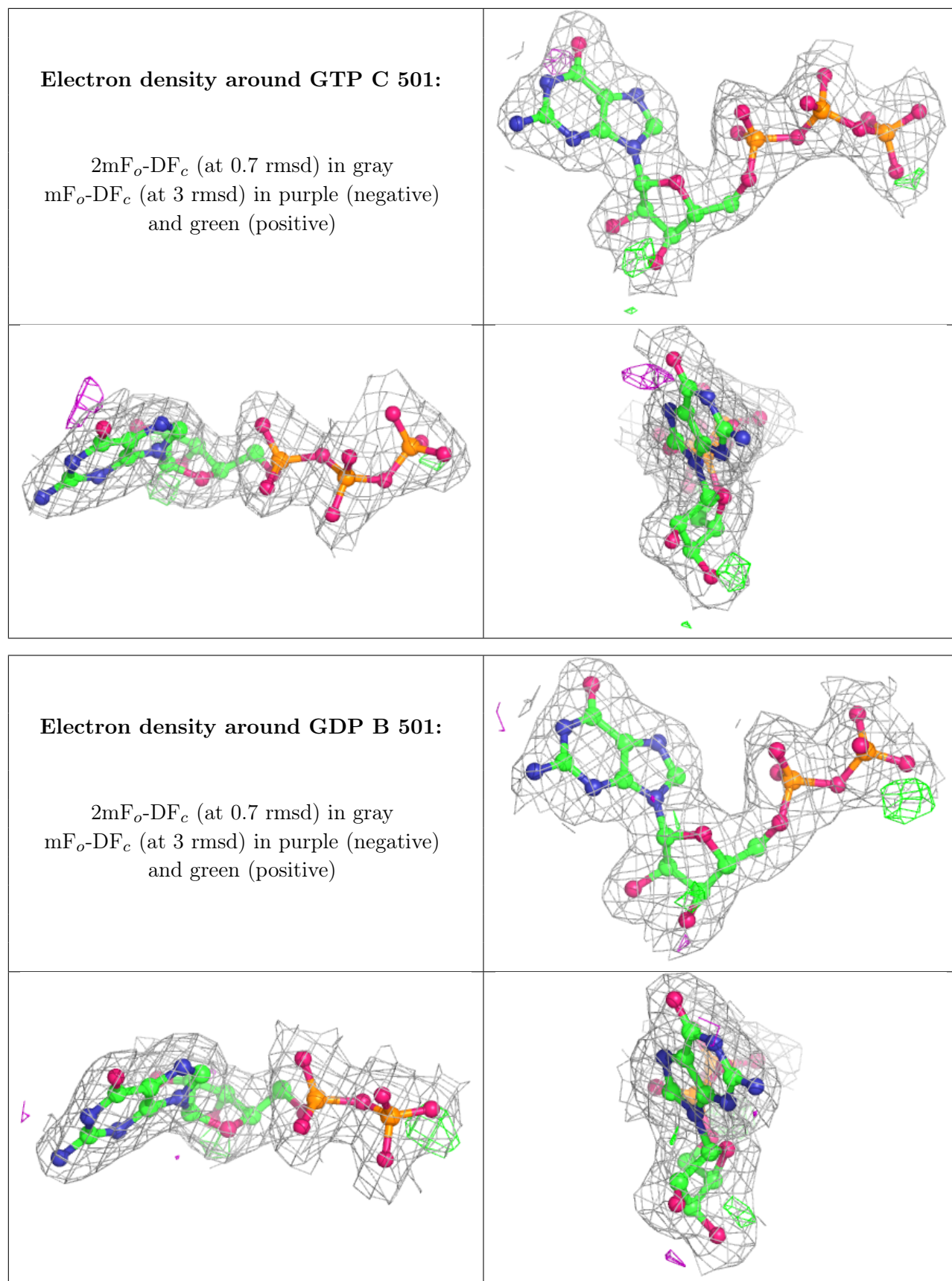
Electron density around GDP D 501:

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

**Electron density around 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)





6.5 Other polymers [i](#)

There are no such residues in this entry.