



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 24, 2022 – 11:13 pm GMT

PDB ID : 6QTN  
Title : Tubulin-cyclostreptin complex  
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Deposited on : 2019-02-25  
Resolution : 1.90 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](mailto: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.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.4, 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 : 5.8.0267  
CCP4 : 7.1.010 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.27

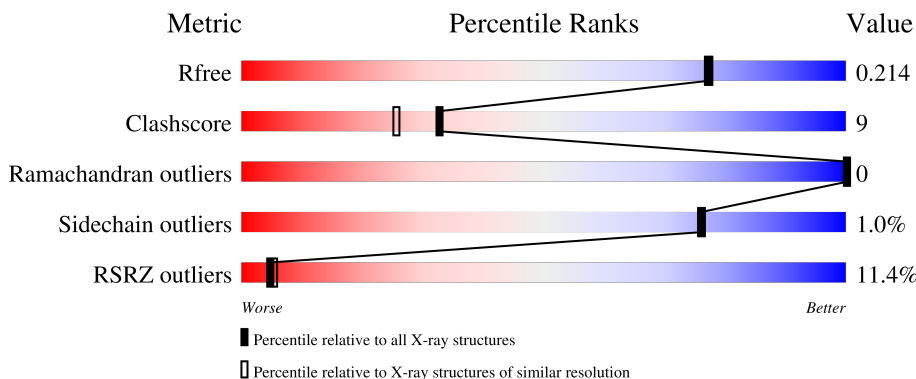
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 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.



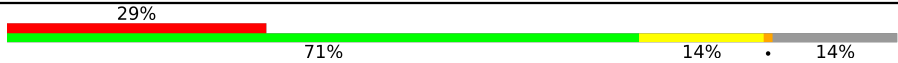
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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  $\geq 3$ , 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	
1	C	451	
2	B	445	
2	D	445	
3	E	143	

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Mol	Chain	Length	Quality of chain
4	F	384	 <p>29% 71% 14% 14%</p>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
12	GOL	B	505	-	X	-	-

## 2 Entry composition i

There are 14 unique types of molecules in this entry. The entry contains 18338 atoms, of which 50 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	5	0
			3434	2178	581	651	24			
1	C	440	Total	C	N	O	S	0	6	0
			3467	2196	586	661	24			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	429	Total	C	N	O	S	0	6	0
			3398	2133	579	659	27			
2	D	421	Total	C	N	O	S	0	2	0
			3315	2084	562	641	28			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	125	Total	C	N	O	S	0	0	0
			1031	634	188	204	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
			Total	C	N	O	S			
4	F	331	Total	C	N	O	S	0	0	0
			2708	1743	460	491	14			

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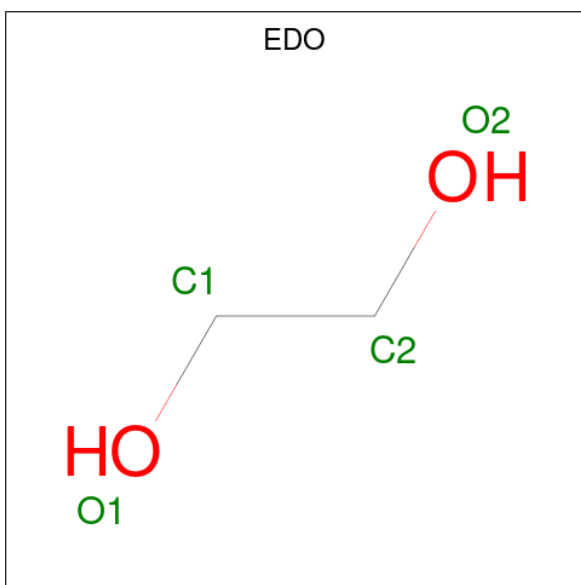
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	F	1	Total	Mg	0	0
			1	1		

- 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	C	1	Total	Ca	0	0
			1	1		

- Molecule 8 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



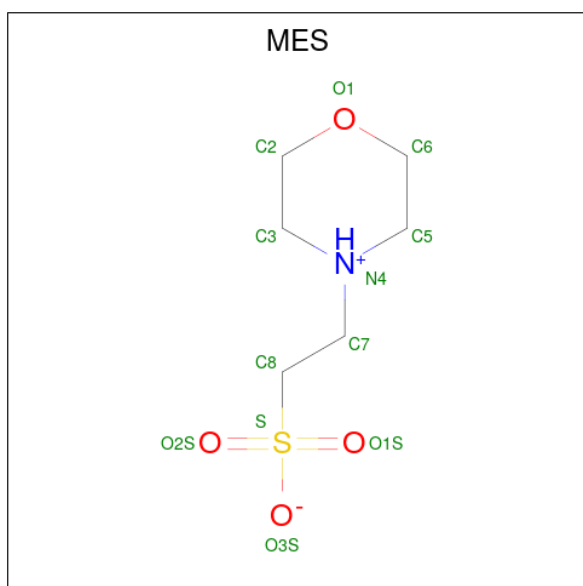
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total	C	H	O	0	0
			10	2	6	2		
8	C	1	Total	C	H	O	0	0
			10	2	6	2		

- Molecule 9 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: C<sub>10</sub>H<sub>15</sub>N<sub>5</sub>O<sub>11</sub>P<sub>2</sub>).



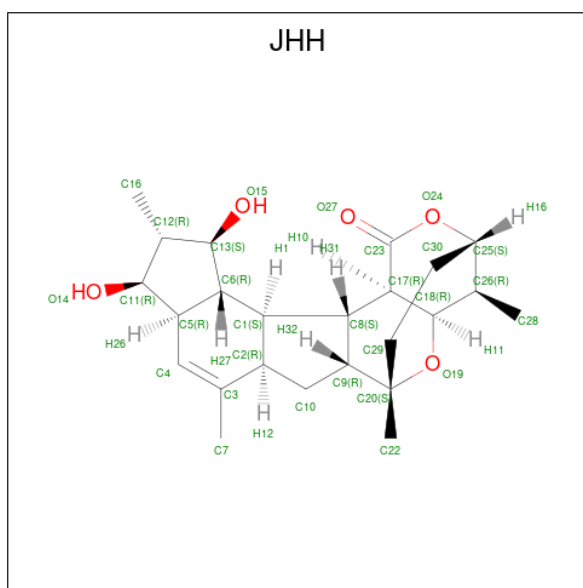
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
9	B	1	28	10	5	11	2	0	0
9	D	1	28	10	5	11	2	0	0

- Molecule 10 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



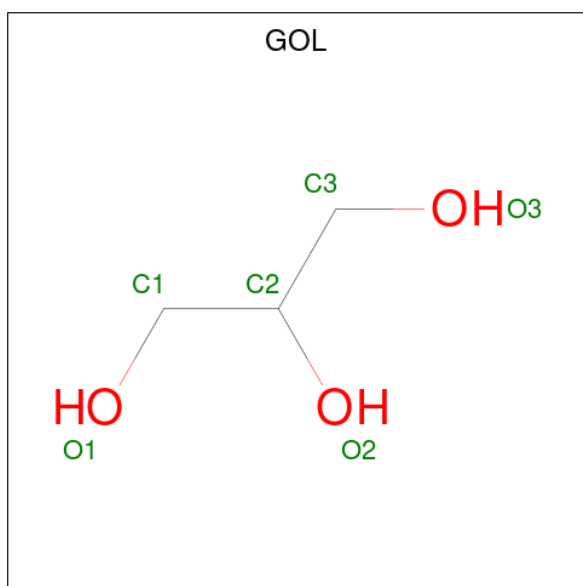
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
10	B	1	12	6	1	4	1	0	0

- Molecule 11 is Cyclostreptin (three-letter code: JHH) (formula:  $C_{24}H_{34}O_5$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
11	B	1	Total	C	O	0	0
			29	24	5		
11	D	1	Total	C	O	0	0
			29	24	5		

- Molecule 12 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



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

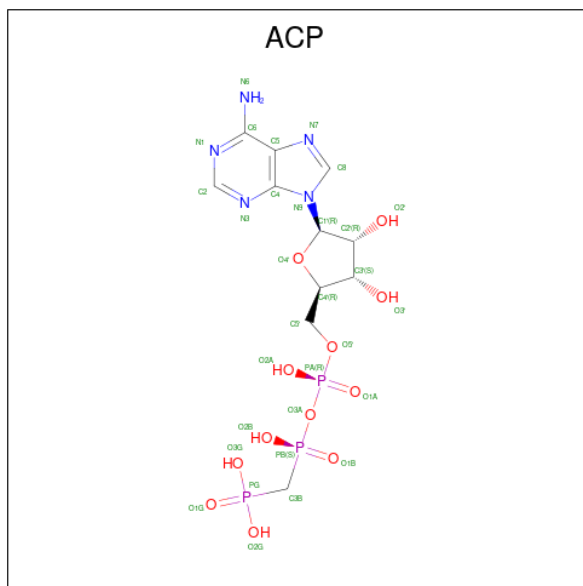
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
12	C	1	Total	C	H	O	0	0
			14	3	8	3		
12	C	1	Total	C	H	O	0	0
			14	3	8	3		

- 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	
13	F	1	Total	C	H	N	O	P	0	0
			45	11	14	5	12	3		

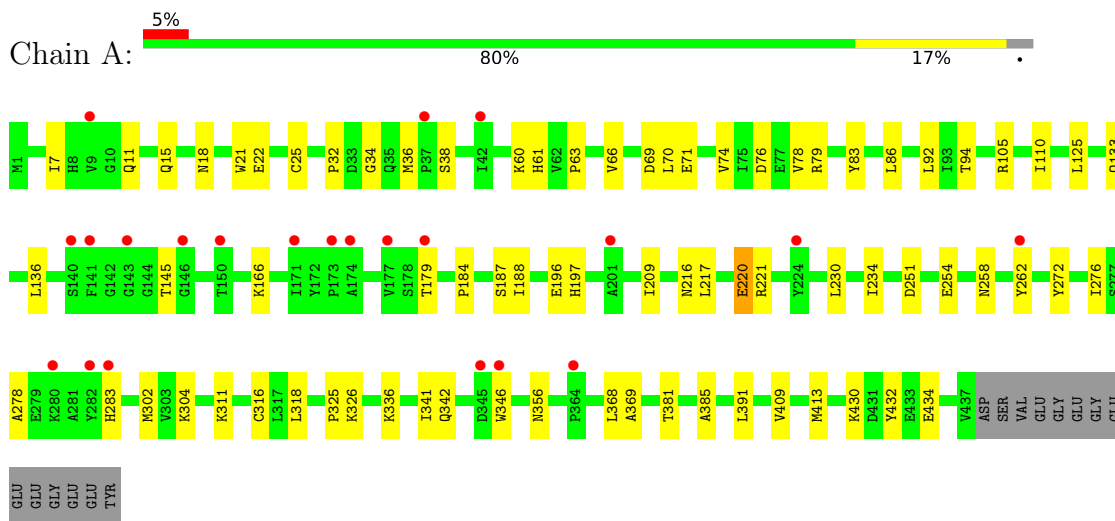
- Molecule 14 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
14	A	118	Total	O	0	0
			118	118		
14	B	141	Total	O	0	0
			141	141		
14	C	275	Total	O	0	0
			275	275		
14	D	70	Total	O	0	0
			70	70		
14	E	26	Total	O	0	0
			26	26		
14	F	51	Total	O	0	0
			51	51		

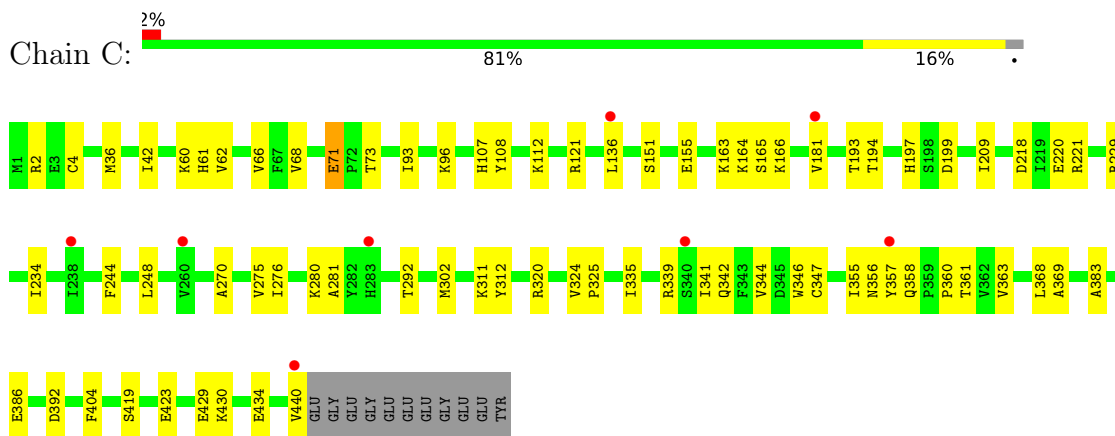
### 3 Residue-property plots [i](#)

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.

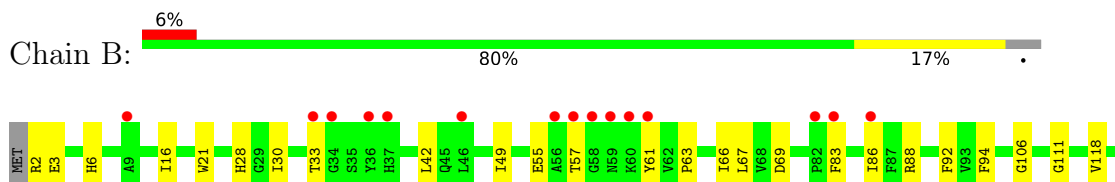
- Molecule 1: Tubulin alpha-1B chain

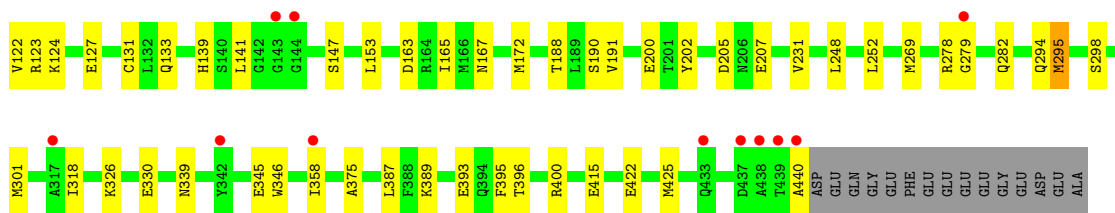


- Molecule 1: Tubulin alpha-1B chain



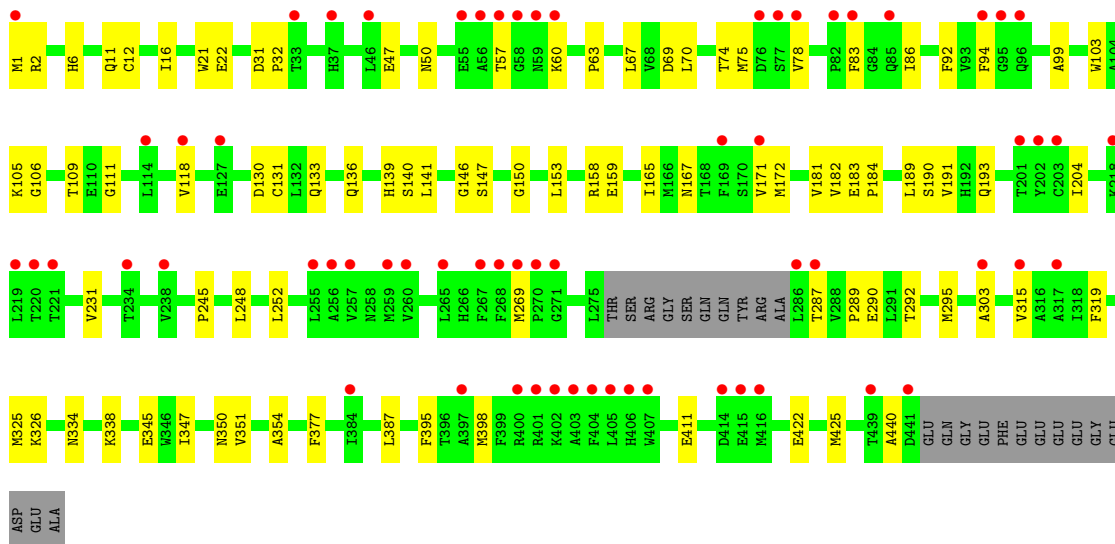
- Molecule 2: Tubulin beta-2B chain





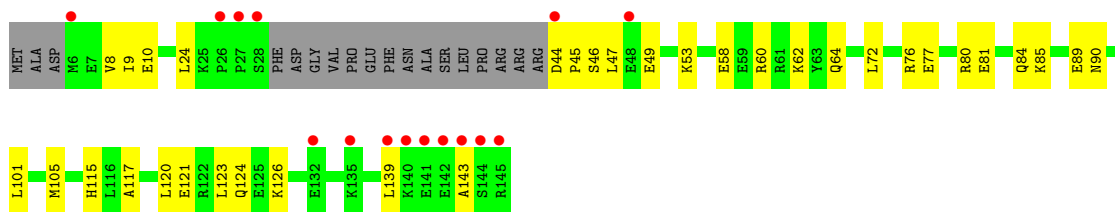
● Molecule 2: Tubulin beta-2B chain

Chain D: 14% 75% 20% 5%



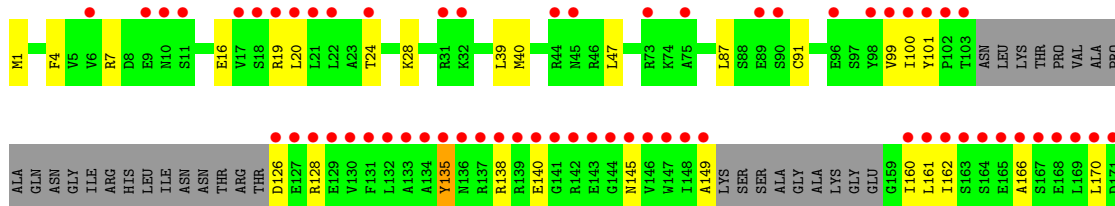
● Molecule 3: Stathmin-4

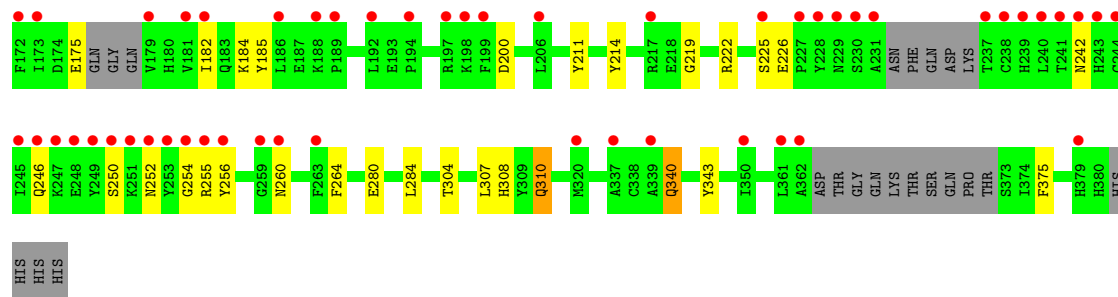
Chain E: 10% 64% 24% 13%



● Molecule 4: Tubulin-Tyrosine Ligase

Chain F: 29% 71% 14% 14%





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	104.58Å 158.36Å 179.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.66 – 1.90 49.66 – 1.90	Depositor EDS
% Data completeness (in resolution range)	100.0 (49.66-1.90) 100.0 (49.66-1.90)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.15 (at 1.90Å)	Xtriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, $R_{free}$	0.187 , 0.213 0.187 , 0.214	Depositor DCC
$R_{free}$ test set	11839 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	42.4	Xtriage
Anisotropy	0.187	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	(Not available) , (Not available)	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	18338	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.26% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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

### 5.1 Standard geometry

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

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	0.27	0/3527	0.46	0/4789
1	C	0.30	0/3557	0.49	0/4830
2	B	0.29	0/3488	0.46	0/4725
2	D	0.26	0/3394	0.43	0/4597
3	E	0.26	0/1039	0.38	0/1378
4	F	0.25	0/2769	0.42	0/3741
All	All	0.27	0/17774	0.45	0/24060

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3434	0	3365	54	0
1	C	3467	0	3387	59	0
2	B	3398	0	3282	61	0
2	D	3315	0	3199	68	0
3	E	1031	0	1047	23	0
4	F	2708	0	2674	51	0
5	A	32	0	12	0	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	C	1	0	0	0	0
8	A	4	6	6	0	0
8	C	4	6	6	0	0
9	B	28	0	12	0	0
9	D	28	0	12	1	0
10	B	12	0	12	1	0
11	B	29	0	0	0	0
11	D	29	0	0	0	0
12	B	6	8	8	0	0
12	C	12	16	16	0	0
13	F	31	14	14	1	0
14	A	118	0	0	5	0
14	B	141	0	0	5	0
14	C	275	0	0	5	0
14	D	70	0	0	4	0
14	E	26	0	0	0	0
14	F	51	0	0	2	0
All	All	18288	50	17064	302	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 9.

All (302) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:220:GLU:HG2	2:D:326:LYS:HD2	1.51	0.92
1:A:220:GLU:HG2	2:B:326:LYS:HD2	1.54	0.88
2:B:188:THR:HA	2:B:425:MET:HE1	1.55	0.86
4:F:149:ALA:HA	4:F:182:ILE:HD13	1.59	0.84
4:F:16:GLU:OE1	4:F:19:ARG:NH2	2.12	0.82
2:B:422:GLU:HG3	14:B:616:HOH:O	1.80	0.82
4:F:7:ARG:HD3	4:F:40:MET:HE3	1.63	0.81
2:B:42:LEU:HD22	2:B:358:ILE:HD11	1.65	0.77
2:D:1:MET:HG3	2:D:50:ASN:HD22	1.50	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:88:ARG:HH22	2:B:124:LYS:HE3	1.50	0.76
3:E:9:ILE:HG22	3:E:10:GLU:HG3	1.68	0.76
2:D:287:THR:HG23	2:D:290:GLU:H	1.50	0.75
1:C:276:ILE:CD1	1:C:369:ALA:HB3	2.16	0.75
1:C:218:ASP:OD2	1:C:280:LYS:NZ	2.20	0.74
1:C:4[B]:CYS:SG	1:C:136:LEU:HG	2.27	0.74
2:B:188:THR:HA	2:B:425:MET:CE	2.20	0.72
1:C:361:THR:HG23	14:C:771:HOH:O	1.90	0.72
1:A:76:ASP:OD1	1:A:79:ARG:NH1	2.23	0.71
2:B:269:MET:HE3	14:B:673:HOH:O	1.90	0.71
3:E:120:LEU:O	3:E:124:GLN:HG2	1.90	0.71
2:B:188:THR:HG23	2:B:425:MET:HE3	1.73	0.70
1:A:38:SER:O	14:A:601:HOH:O	2.09	0.70
2:D:47:GLU:HG2	2:D:245:PRO:HG3	1.74	0.69
1:A:326:LYS:HE2	1:A:326:LYS:H	1.56	0.69
4:F:100:ILE:HD12	4:F:128:ARG:HA	1.75	0.69
1:C:209:ILE:HD11	1:C:302:MET:HE3	1.74	0.68
1:A:209:ILE:HD11	1:A:302:MET:SD	2.32	0.68
1:C:276:ILE:HD13	1:C:281:ALA:HB2	1.75	0.68
1:A:304:LYS:HE3	4:F:308:HIS:HB3	1.76	0.68
2:D:75:MET:HE3	2:D:92:PHE:HD2	1.59	0.67
1:A:34:GLY:HA3	1:A:60:LYS:HG3	1.75	0.67
1:C:221:ARG:HG3	2:D:325:MET:HG2	1.76	0.67
2:D:106:GLY:O	2:D:111:GLY:HA3	1.95	0.67
2:B:294:GLN:OE1	14:B:601:HOH:O	2.12	0.67
1:C:324:VAL:HG22	1:C:325:PRO:HD2	1.77	0.66
1:C:163:LYS:HG3	3:E:90:ASN:OD1	1.95	0.66
2:B:83:PHE:O	2:B:86:ILE:HG22	1.95	0.65
1:A:217:LEU:HD21	1:A:368:LEU:HD23	1.79	0.65
2:D:136:GLN:HA	2:D:167:ASN:O	1.97	0.64
2:D:147:SER:HB2	2:D:190:SER:OG	1.97	0.64
2:B:163:ASP:OD1	14:B:602:HOH:O	2.15	0.64
1:C:276:ILE:HD12	1:C:276:ILE:O	1.98	0.64
2:D:57:THR:O	2:D:60:LYS:HE2	1.98	0.64
2:D:105:LYS:HA	2:D:109:THR:OG1	1.98	0.63
1:C:244:PHE:CD1	1:C:358:GLN:HG2	2.32	0.63
1:C:312:TYR:CD1	1:C:341:ILE:HG23	2.33	0.63
4:F:246:GLN:O	4:F:250:SER:HB2	1.98	0.63
1:C:220:GLU:CG	2:D:326:LYS:HD2	2.28	0.63
2:D:191:VAL:HG11	2:D:425:MET:HE2	1.80	0.63
4:F:310:GLN:HA	4:F:310:GLN:HE21	1.63	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:2:ARG:NH2	14:D:601:HOH:O	2.32	0.62
2:D:172:MET:HE2	2:D:387:LEU:HD21	1.81	0.62
1:C:430:LYS:NZ	1:C:434:GLU:OE1	2.27	0.62
2:D:1:MET:HG3	2:D:50:ASN:ND2	2.14	0.62
1:C:93:ILE:HD11	1:C:121:ARG:HG3	1.81	0.62
2:B:165:ILE:HD13	10:B:503:MES:H82	1.82	0.62
1:A:430:LYS:O	1:A:434:GLU:HG2	2.00	0.61
4:F:280:GLU:HA	4:F:284:LEU:HB2	1.81	0.61
1:C:209:ILE:HD11	1:C:302:MET:CE	2.30	0.61
2:D:172:MET:HG3	2:D:387:LEU:HD11	1.82	0.61
1:C:181[B]:VAL:HG12	14:D:625:HOH:O	1.99	0.61
1:C:248:LEU:HD12	1:C:357:TYR:OH	2.01	0.60
3:E:58:GLU:HG2	3:E:62:LYS:HE3	1.82	0.60
4:F:170:LEU:O	4:F:170:LEU:HD23	2.02	0.60
1:A:7:ILE:HG23	1:A:66[B]:VAL:HG23	1.84	0.60
2:B:345:GLU:HG2	2:B:440:ALA:HB3	1.85	0.59
3:E:44:ASP:HB3	3:E:45:PRO:HD3	1.83	0.59
1:A:166:LYS:HE2	1:A:197:HIS:O	2.03	0.59
1:A:105:ARG:NH1	1:A:110:ILE:HD11	2.17	0.59
2:B:295:MET:CE	2:B:375:ALA:HB1	2.32	0.59
2:D:287:THR:OG1	2:D:289:PRO:HD2	2.03	0.59
1:A:18:ASN:OD1	1:A:78:VAL:HG22	2.02	0.59
2:D:158:ARG:HG2	3:E:123:LEU:HD11	1.85	0.59
4:F:100:ILE:HG23	4:F:128:ARG:HB2	1.85	0.59
2:B:346:TRP:HB3	2:B:440:ALA:HB2	1.85	0.58
1:C:270:ALA:O	1:C:302:MET:HG2	2.03	0.58
1:A:336:LYS:HG2	3:E:24:LEU:HD23	1.86	0.57
4:F:138:ARG:HB2	4:F:145:ASN:HD22	1.68	0.57
2:B:106:GLY:O	2:B:111:GLY:HA3	2.05	0.57
2:D:334:ASN:OD1	2:D:338:LYS:HE2	2.04	0.57
1:C:248:LEU:HD13	1:C:355:ILE:HD12	1.85	0.57
4:F:225:SER:HB3	4:F:252:ASN:HB2	1.87	0.57
2:B:6:HIS:CD2	2:B:21:TRP:HE1	2.22	0.57
1:A:25:CYS:SG	1:A:86:LEU:HD21	2.45	0.57
1:A:254:GLU:HG2	1:A:258:ASN:ND2	2.21	0.56
2:D:69:ASP:O	2:D:94:PHE:HA	2.05	0.56
1:A:220:GLU:HG2	2:B:326:LYS:CD	2.29	0.56
2:B:279:GLY:O	2:B:282:GLN:HG2	2.06	0.56
4:F:126:ASP:N	14:F:501:HOH:O	2.38	0.56
4:F:99:VAL:O	4:F:100:ILE:HD13	2.07	0.55
4:F:184:LYS:HD3	4:F:185:TYR:N	2.21	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:69:ASP:O	2:B:94:PHE:HA	2.06	0.55
1:A:22:GLU:HG3	1:A:83:TYR:CE1	2.42	0.55
3:E:46:SER:OG	3:E:49:GLU:HG3	2.05	0.55
4:F:101:TYR:HD1	4:F:126:ASP:HB2	1.71	0.55
1:C:292:THR:HG22	1:C:335:ILE:CD1	2.36	0.55
2:B:167:ASN:HD22	2:B:200:GLU:HB2	1.72	0.54
2:B:172:MET:HE2	2:B:387:LEU:HD21	1.88	0.54
2:D:22:GLU:HG2	2:D:83:PHE:CD1	2.41	0.54
1:A:70:LEU:HD12	1:A:145:THR:OG1	2.07	0.54
4:F:200:ASP:OD1	4:F:222:ARG:HB2	2.08	0.54
2:B:298:SER:HA	2:B:301:MET:HG3	1.89	0.54
1:A:209:ILE:HG23	1:A:230:LEU:HD23	1.88	0.53
2:D:191:VAL:HB	2:D:425:MET:CE	2.37	0.53
1:C:320:ARG:HA	1:C:356:ASN:O	2.08	0.53
2:D:171:VAL:HA	2:D:204:ILE:O	2.08	0.53
2:D:6:HIS:CD2	2:D:21:TRP:HE1	2.26	0.53
4:F:149:ALA:O	4:F:160:ILE:HG23	2.08	0.53
2:D:12:CYS:HB2	9:D:501:GDP:C8	2.43	0.53
2:D:345:GLU:HG2	2:D:440:ALA:HB2	1.89	0.53
1:A:22:GLU:HG3	1:A:83:TYR:HE1	1.74	0.53
2:B:345:GLU:OE1	2:B:345:GLU:N	2.35	0.52
2:B:118:VAL:HG11	2:B:153:LEU:HD11	1.91	0.52
1:A:304:LYS:HE3	4:F:308:HIS:CB	2.40	0.52
1:A:184:PRO:O	1:A:188:ILE:HD13	2.10	0.52
4:F:40:MET:HE2	4:F:47:LEU:HG	1.92	0.51
4:F:246:GLN:HA	4:F:250:SER:OG	2.09	0.51
1:A:7:ILE:HG12	1:A:66[B]:VAL:CG2	2.40	0.51
2:D:21:TRP:CZ3	2:D:63:PRO:HB3	2.45	0.51
4:F:20:LEU:O	4:F:24:THR:HG23	2.10	0.51
2:D:74:THR:HB	14:D:617:HOH:O	2.10	0.51
1:C:280:LYS:HE2	14:C:616:HOH:O	2.10	0.51
1:C:320:ARG:HG3	1:C:360:PRO:HG3	1.92	0.51
2:B:2:ARG:HB3	2:B:133:GLN:CG	2.41	0.50
4:F:138:ARG:HB2	4:F:145:ASN:ND2	2.26	0.50
2:B:123:ARG:O	2:B:127:GLU:HG3	2.10	0.50
1:A:74:VAL:HB	14:A:607:HOH:O	2.12	0.50
1:A:276:ILE:HD12	1:A:283:HIS:CD2	2.47	0.50
2:B:191:VAL:HB	2:B:425:MET:CE	2.42	0.50
1:C:324:VAL:HG22	14:C:785:HOH:O	2.12	0.50
2:D:287:THR:HG22	2:D:290:GLU:CG	2.41	0.49
3:E:72:LEU:O	3:E:76:ARG:HG2	2.11	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:101:LEU:O	3:E:105:MET:HG2	2.12	0.49
4:F:128:ARG:CZ	4:F:170:LEU:HD11	2.42	0.49
1:A:187:SER:HB3	1:A:391:LEU:HD21	1.94	0.49
1:C:151:SER:HA	1:C:194[B]:THR:HG22	1.92	0.49
1:C:419:SER:O	1:C:423:GLU:HG3	2.11	0.49
1:C:107:HIS:HE1	1:C:155:GLU:OE1	1.95	0.49
4:F:101:TYR:CD1	4:F:126:ASP:HB2	2.47	0.49
1:A:262:TYR:CE2	1:A:346:TRP:CZ2	3.00	0.49
2:D:292:THR:HG22	2:D:319:PHE:CZ	2.48	0.49
2:B:2:ARG:HA	2:B:131:CYS:O	2.13	0.49
2:B:295:MET:HE3	2:B:375:ALA:HB1	1.94	0.49
4:F:226:GLU:OE2	4:F:250:SER:HB3	2.12	0.49
2:B:3:GLU:OE2	2:B:3:GLU:N	2.42	0.49
2:D:158:ARG:HD3	14:D:631:HOH:O	2.12	0.49
4:F:254:GLY:H	4:F:260:ASN:HD21	1.61	0.49
2:D:347:ILE:HG22	2:D:350:ASN:HB3	1.95	0.49
2:D:75:MET:HE3	2:D:92:PHE:CD2	2.44	0.48
1:A:311:LYS:HE3	1:A:342:GLN:HE21	1.77	0.48
1:C:36:MET:HB3	1:C:61:HIS:CE1	2.49	0.48
3:E:80:ARG:O	3:E:84:GLN:HG2	2.14	0.48
1:C:383:ALA:O	1:C:386[A]:GLU:HB2	2.13	0.48
3:E:8:VAL:O	3:E:9:ILE:HD13	2.14	0.48
4:F:87:LEU:O	4:F:91:CYS:HB2	2.13	0.48
4:F:340:GLN:HA	4:F:343:TYR:HD2	1.78	0.48
1:A:311:LYS:HG2	1:A:342:GLN:HG2	1.96	0.48
2:D:67:LEU:N	2:D:67:LEU:HD12	2.29	0.48
2:D:315:VAL:HB	2:D:351:VAL:HG22	1.95	0.48
1:A:216:ASN:ND2	14:A:604:HOH:O	2.47	0.48
2:D:83:PHE:O	2:D:86:ILE:HG22	2.14	0.48
2:D:395:PHE:CE1	2:D:422:GLU:HB2	2.49	0.48
1:A:336:LYS:NZ	1:A:341:ILE:O	2.47	0.47
2:D:287:THR:HG22	2:D:290:GLU:OE2	2.14	0.47
4:F:138:ARG:CB	4:F:145:ASN:HD22	2.27	0.47
4:F:162:ILE:HD13	4:F:185:TYR:CE1	2.49	0.47
1:C:42:ILE:HD12	1:C:42:ILE:N	2.30	0.47
1:C:96:LYS:NZ	2:D:130:ASP:OD1	2.34	0.47
1:C:165:SER:HA	1:C:199:ASP:OD2	2.14	0.47
1:A:234:ILE:HD12	1:A:272:TYR:HB2	1.97	0.47
4:F:160:ILE:HG22	4:F:161:LEU:N	2.30	0.47
1:A:32:PRO:HA	1:A:83:TYR:CD2	2.50	0.47
4:F:1:MET:CE	4:F:28:LYS:HB2	2.45	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:242:ASN:ND2	13:F:401:ACP:O2B	2.47	0.47
1:C:71:GLU:OE2	1:C:73:THR:HG23	2.15	0.47
1:A:69:ASP:O	1:A:94:THR:HA	2.15	0.46
2:B:30:ILE:HD12	2:B:30:ILE:N	2.30	0.46
2:B:172:MET:HG3	2:B:387:LEU:HD11	1.98	0.46
2:D:269:MET:HG3	2:D:303:ALA:HB3	1.97	0.46
2:B:141:LEU:HD12	2:B:172:MET:SD	2.56	0.46
2:B:395:PHE:CE1	2:B:422:GLU:HB2	2.51	0.46
3:E:117:ALA:O	3:E:121:GLU:HG3	2.14	0.46
2:D:16:ILE:HD12	2:D:231:VAL:HG11	1.97	0.46
2:B:2:ARG:HB3	2:B:133:GLN:HG2	1.98	0.46
2:B:88:ARG:NH2	2:B:124:LYS:HE3	2.27	0.46
2:B:318:ILE:N	2:B:318:ILE:HD12	2.31	0.46
2:D:183:GLU:N	2:D:184:PRO:HD2	2.31	0.46
3:E:49:GLU:O	3:E:53:LYS:HG3	2.15	0.46
1:A:409:VAL:HA	1:A:413:MET:O	2.16	0.46
1:A:79:ARG:HG2	1:A:92:LEU:HD12	1.99	0.45
1:C:2:ARG:HA	1:C:2:ARG:NE	2.32	0.45
4:F:100:ILE:HD12	4:F:128:ARG:CA	2.44	0.45
2:B:205:ASP:OD1	2:B:207[B]:GLU:HB3	2.15	0.45
4:F:255:ARG:NH1	14:F:505:HOH:O	2.49	0.45
2:D:70:LEU:HD12	2:D:99:ALA:HB2	1.99	0.45
2:D:109:THR:HG21	2:D:411:GLU:OE1	2.17	0.45
2:D:295:MET:CG	2:D:377:PHE:HB2	2.46	0.45
2:D:2:ARG:NH1	2:D:131:CYS:SG	2.90	0.45
1:A:179:THR:HA	2:B:248:LEU:HD11	1.98	0.45
1:C:234:ILE:HG12	1:C:302:MET:CE	2.47	0.45
3:E:47:LEU:HD23	3:E:47:LEU:O	2.16	0.45
1:A:196:GLU:HG2	14:A:638:HOH:O	2.17	0.45
2:D:287:THR:CG2	2:D:290:GLU:HG3	2.47	0.45
1:A:356:ASN:HB2	14:A:648:HOH:O	2.17	0.45
1:C:440:VAL:HG22	1:C:440:VAL:O	2.16	0.45
2:B:326:LYS:O	2:B:330:GLU:HG3	2.17	0.44
1:A:36:MET:HB3	1:A:61:HIS:CE1	2.53	0.44
2:B:67:LEU:HD22	2:B:92:PHE:CE2	2.52	0.44
4:F:4:PHE:HA	4:F:39:LEU:O	2.17	0.44
1:A:133:GLN:OE1	1:A:251:ASP:HB2	2.18	0.44
2:D:141:LEU:HD12	2:D:172:MET:HE3	1.99	0.44
1:C:108:TYR:O	1:C:112:LYS:HG2	2.18	0.44
3:E:60:ARG:O	3:E:64:GLN:HG3	2.16	0.44
4:F:214:TYR:HB3	4:F:375:PHE:HB3	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:276:ILE:HD12	1:C:369:ALA:HB3	1.95	0.44
3:E:85:LYS:O	3:E:89:GLU:HG3	2.17	0.44
4:F:1:MET:HE1	4:F:28:LYS:HB2	1.99	0.44
2:B:147[B]:SER:HB2	2:B:190:SER:HG	1.82	0.44
2:B:165:ILE:HG21	2:B:252:LEU:HB3	2.00	0.44
2:D:103:TRP:CE3	2:D:189:LEU:HD13	2.52	0.44
2:B:33:THR:HG22	2:B:33:THR:O	2.17	0.44
1:A:325:PRO:HD2	1:A:326:LYS:NZ	2.33	0.43
1:C:244:PHE:CE1	1:C:358:GLN:HG2	2.52	0.43
1:A:136:LEU:HD12	1:A:136:LEU:N	2.33	0.43
2:B:269:MET:HE2	2:B:301:MET:HE3	1.99	0.43
2:B:278:ARG:HD2	2:B:278:ARG:N	2.32	0.43
1:C:66:VAL:HG12	1:C:68[A]:VAL:HG23	2.00	0.43
2:D:1:MET:CG	2:D:50:ASN:HD22	2.26	0.43
2:B:66:ILE:HD12	2:B:122:VAL:HG22	1.99	0.43
1:C:276:ILE:HD13	1:C:369:ALA:HB3	1.97	0.43
4:F:161:LEU:HD12	4:F:161:LEU:O	2.18	0.43
1:A:11:GLN:O	1:A:15:GLN:HG3	2.17	0.43
2:D:287:THR:CG2	2:D:290:GLU:H	2.23	0.43
4:F:135:TYR:CE2	4:F:166:ALA:HB2	2.53	0.43
1:C:151:SER:HB2	1:C:193:THR:CG2	2.48	0.43
2:D:74:THR:O	2:D:78:VAL:HG23	2.19	0.43
2:D:193:GLN:HE22	3:E:126:LYS:NZ	2.16	0.43
2:D:248:LEU:HD23	2:D:354:ALA:HB2	2.01	0.43
4:F:225:SER:OG	4:F:260:ASN:ND2	2.49	0.43
4:F:100:ILE:CD1	4:F:128:ARG:HA	2.48	0.42
1:A:217:LEU:HD21	1:A:368:LEU:CD2	2.46	0.42
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.53	0.42
4:F:135:TYR:CD2	4:F:166:ALA:HB2	2.54	0.42
3:E:81:GLU:HA	3:E:84:GLN:HG2	2.02	0.42
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.55	0.42
4:F:7:ARG:CD	4:F:40:MET:HE3	2.40	0.42
1:A:66[A]:VAL:HG23	1:A:125:LEU:HD12	2.01	0.42
2:B:21:TRP:CZ3	2:B:63:PRO:HB3	2.54	0.42
2:B:415:GLU:OE2	14:B:603:H0H:O	2.21	0.42
3:E:124:GLN:HA	3:E:124:GLN:NE2	2.35	0.42
2:B:167:ASN:HD21	2:B:202:TYR:HE2	1.66	0.42
4:F:254:GLY:H	4:F:260:ASN:ND2	2.17	0.42
2:B:16:ILE:HD13	2:B:231:VAL:HG11	2.02	0.42
2:B:191:VAL:HB	2:B:425:MET:HE2	2.02	0.42
2:D:118:VAL:HG11	2:D:153:LEU:HD11	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:392:ASP:OD2	1:C:429:GLU:OE1	2.37	0.41
2:D:191:VAL:CG1	2:D:425:MET:HE2	2.47	0.41
1:C:181[B]:VAL:HG11	1:C:404:PHE:CZ	2.55	0.41
4:F:161:LEU:HD12	4:F:161:LEU:C	2.40	0.41
1:A:385:ALA:HB2	1:A:432:TYR:CG	2.55	0.41
2:B:55:GLU:HG3	2:B:61:TYR:CE1	2.55	0.41
2:B:88:ARG:HH22	2:B:124:LYS:CE	2.25	0.41
2:B:172:MET:HE2	2:B:172:MET:HB3	1.84	0.41
1:C:166:LYS:HE2	1:C:197:HIS:O	2.19	0.41
1:C:292:THR:HG22	1:C:335:ILE:HD12	2.03	0.41
2:D:387:LEU:HD23	2:D:387:LEU:C	2.40	0.41
1:C:164:LYS:HE2	1:C:164:LYS:HB2	1.83	0.41
2:D:146:GLY:O	2:D:150:GLY:HA3	2.20	0.41
2:D:182:VAL:HA	2:D:398:MET:HE1	2.03	0.41
4:F:304:THR:HG22	4:F:307:LEU:HD12	2.02	0.41
1:A:326:LYS:H	1:A:326:LYS:CE	2.29	0.41
1:C:275:VAL:HG13	1:C:368:LEU:HD21	2.03	0.41
1:C:234:ILE:HD12	1:C:234:ILE:N	2.35	0.41
2:D:11:GLN:HA	2:D:74:THR:HG21	2.02	0.41
2:D:159:GLU:HG3	3:E:123:LEU:HD13	2.01	0.41
2:B:28:HIS:HB3	2:B:49:ILE:HD13	2.01	0.41
1:C:311:LYS:HG2	1:C:342:GLN:NE2	2.35	0.41
14:C:644:HOH:O	3:E:115:HIS:HE1	2.03	0.41
2:D:181:VAL:HG13	2:D:182:VAL:HG13	2.03	0.41
4:F:175:GLU:OE1	4:F:175:GLU:N	2.54	0.41
4:F:255:ARG:HG3	4:F:256:TYR:CD2	2.56	0.41
2:B:396:THR:O	2:B:400:ARG:HG2	2.21	0.41
1:C:60:LYS:HG2	1:C:62:VAL:CG2	2.51	0.41
1:C:324:VAL:HG22	1:C:325:PRO:CD	2.47	0.41
4:F:219:GLY:HA3	4:F:264:PHE:CZ	2.56	0.41
1:A:66[B]:VAL:HG13	1:A:125:LEU:HD12	2.03	0.40
1:A:278:ALA:HA	1:A:369:ALA:HB2	2.02	0.40
1:A:316[B]:CYS:SG	1:A:318:LEU:HD21	2.61	0.40
2:B:42:LEU:HD22	2:B:358:ILE:CD1	2.44	0.40
1:C:229:ARG:HD2	14:C:610:HOH:O	2.20	0.40
2:D:287:THR:HG22	2:D:290:GLU:HG3	2.03	0.40
2:B:269:MET:HE2	2:B:301:MET:CE	2.52	0.40
2:B:389:LYS:O	2:B:393:GLU:HG3	2.21	0.40
1:C:229:ARG:NE	1:C:363:VAL:HG21	2.37	0.40
2:D:12:CYS:HB3	2:D:140:SER:HB3	2.03	0.40
2:D:165:ILE:HG21	2:D:252:LEU:HB3	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:139:LEU:O	3:E:143:ALA:HB3	2.21	0.40
1:A:70:LEU:HD22	1:A:110:ILE:CG2	2.50	0.40
2:D:31:ASP:HB2	2:D:32:PRO:CD	2.51	0.40
1:C:368:LEU:HD23	1:C:368:LEU:HA	1.95	0.40
2:D:2:ARG:HB3	2:D:133:GLN:CG	2.52	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	440/451 (98%)	434 (99%)	6 (1%)	0	100	100
1	C	444/451 (98%)	433 (98%)	11 (2%)	0	100	100
2	B	433/445 (97%)	428 (99%)	5 (1%)	0	100	100
2	D	419/445 (94%)	412 (98%)	7 (2%)	0	100	100
3	E	121/143 (85%)	121 (100%)	0	0	100	100
4	F	319/384 (83%)	305 (96%)	14 (4%)	0	100	100
All	All	2176/2319 (94%)	2133 (98%)	43 (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	373/379 (98%)	369 (99%)	4 (1%)	73	73
1	C	377/379 (100%)	374 (99%)	3 (1%)	81	82
2	B	376/383 (98%)	372 (99%)	4 (1%)	73	73
2	D	366/383 (96%)	365 (100%)	1 (0%)	92	93
3	E	112/127 (88%)	111 (99%)	1 (1%)	78	79
4	F	296/342 (86%)	291 (98%)	5 (2%)	60	57
All	All	1900/1993 (95%)	1882 (99%)	18 (1%)	76	79

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	71	GLU
1	A	220	GLU
1	A	221	ARG
1	A	381	THR
2	B	57	THR
2	B	139	HIS
2	B	295	MET
2	B	339	ASN
1	C	71	GLU
1	C	339	ARG
1	C	347	CYS
2	D	139	HIS
3	E	77	GLU
4	F	135	TYR
4	F	140	GLU
4	F	211	TYR
4	F	310	GLN
4	F	340	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	167	ASN
1	C	11	GLN
1	C	342	GLN
2	D	50	ASN
2	D	167	ASN
2	D	247	GLN
2	D	294	GLN

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Mol	Chain	Res	Type
3	E	124	GLN
4	F	145	ASN
4	F	252	ASN
4	F	260	ASN
4	F	310	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 20 ligands modelled in this entry, 7 are monoatomic - leaving 13 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
9	GDP	B	501	6	24,30,30	1.10	2 (8%)	31,47,47	1.90	7 (22%)
11	JHH	D	503	2	34,34,34	0.94	1 (2%)	38,57,57	1.62	5 (13%)
13	ACP	F	401	6	27,33,33	1.52	6 (22%)	32,52,52	1.71	5 (15%)
12	GOL	C	504	-	5,5,5	1.20	0	5,5,5	1.38	1 (20%)
8	EDO	C	506	-	3,3,3	0.54	0	2,2,2	0.11	0
9	GDP	D	501	6	24,30,30	1.18	2 (8%)	31,47,47	1.93	7 (22%)
11	JHH	B	504	2	34,34,34	0.93	1 (2%)	38,57,57	1.60	5 (13%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	GTP	A	501	6	26,34,34	0.92	1 (3%)	33,54,54	1.81	6 (18%)
12	GOL	C	505	-	5,5,5	0.90	0	5,5,5	0.96	0
5	GTP	C	501	6	26,34,34	0.97	1 (3%)	33,54,54	1.83	8 (24%)
10	MES	B	503	-	12,12,12	1.98	1 (8%)	14,16,16	1.87	3 (21%)
8	EDO	A	504	-	3,3,3	0.47	0	2,2,2	0.34	0
12	GOL	B	505	-	5,5,5	1.30	1 (20%)	5,5,5	1.19	1 (20%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
9	GDP	B	501	6	-	4/12/32/32	0/3/3/3
11	JHH	D	503	2	-	-	0/6/6/6
13	ACP	F	401	6	-	3/15/38/38	0/3/3/3
12	GOL	C	504	-	-	0/4/4/4	-
8	EDO	C	506	-	-	0/1/1/1	-
9	GDP	D	501	6	-	3/12/32/32	0/3/3/3
12	GOL	C	505	-	-	0/4/4/4	-
5	GTP	A	501	6	-	6/18/38/38	0/3/3/3
11	JHH	B	504	2	-	-	0/6/6/6
5	GTP	C	501	6	-	5/18/38/38	0/3/3/3
10	MES	B	503	-	-	1/6/14/14	0/1/1/1
8	EDO	A	504	-	-	0/1/1/1	-
12	GOL	B	505	-	-	4/4/4/4	-

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	B	503	MES	C8-S	-6.57	1.68	1.77
9	D	501	GDP	C5-C6	4.10	1.48	1.41
9	B	501	GDP	C5-C6	3.51	1.47	1.41
13	F	401	ACP	PB-O3A	3.48	1.62	1.58
5	A	501	GTP	C6-N1	3.03	1.38	1.33
13	F	401	ACP	PG-O2G	2.98	1.61	1.54
5	C	501	GTP	C6-N1	2.91	1.38	1.33
13	F	401	ACP	O4'-C1'	2.81	1.45	1.41
13	F	401	ACP	PG-O3G	2.76	1.61	1.54
13	F	401	ACP	C8-N7	-2.55	1.30	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	D	503	JHH	O24-C25	-2.51	1.43	1.46
11	B	504	JHH	O24-C25	-2.42	1.43	1.46
9	D	501	GDP	C5-C4	2.41	1.47	1.40
9	B	501	GDP	O4'-C1'	2.38	1.44	1.41
13	F	401	ACP	PB-O2B	2.07	1.61	1.56
12	B	505	GOL	O2-C2	-2.01	1.37	1.43

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	D	503	JHH	C22-C20-C29	-6.66	102.80	110.98
11	B	504	JHH	C22-C20-C29	-6.62	102.84	110.98
5	C	501	GTP	N3-C2-N1	-5.85	119.42	127.22
13	F	401	ACP	PB-O3A-PA	-5.68	114.55	132.56
5	A	501	GTP	N3-C2-N1	-5.34	120.10	127.22
9	D	501	GDP	C2-N3-C4	4.81	120.85	115.36
9	B	501	GDP	C4-C5-C6	-4.65	116.36	120.80
9	B	501	GDP	C2-N1-C6	4.43	122.96	115.93
10	B	503	MES	C5-N4-C3	4.31	118.54	108.83
5	A	501	GTP	C2-N3-C4	4.08	120.01	115.36
9	D	501	GDP	C4-C5-C6	-4.07	116.91	120.80
9	D	501	GDP	C2-N1-C6	4.06	122.39	115.93
9	D	501	GDP	C5-C6-N1	-4.00	117.96	123.43
9	B	501	GDP	C2-N3-C4	3.98	119.90	115.36
5	C	501	GTP	C2-N3-C4	3.98	119.90	115.36
9	B	501	GDP	C5-C6-N1	-3.93	118.05	123.43
9	B	501	GDP	N3-C2-N1	-3.74	122.24	127.22
13	F	401	ACP	N3-C2-N1	-3.59	123.07	128.68
10	B	503	MES	O1S-S-C8	3.51	111.15	106.92
5	C	501	GTP	C2-N1-C6	3.36	121.27	115.93
9	D	501	GDP	N3-C2-N1	-3.30	122.82	127.22
5	A	501	GTP	C5-C6-N1	-3.24	119.00	123.43
11	D	503	JHH	C16-C12-C13	-3.19	110.21	113.96
5	C	501	GTP	C5-C6-N1	-3.16	119.11	123.43
5	A	501	GTP	PB-O3B-PG	-3.07	122.30	132.83
10	B	503	MES	O3S-S-C8	3.03	110.66	105.77
13	F	401	ACP	C5'-C4'-C3'	-3.03	103.84	115.18
11	B	504	JHH	C16-C12-C13	-2.99	110.44	113.96
9	D	501	GDP	C4-C5-N7	-2.97	106.31	109.40
9	D	501	GDP	PA-O3A-PB	-2.95	122.71	132.83
5	A	501	GTP	C2-N1-C6	2.91	120.55	115.93
12	C	504	GOL	C3-C2-C1	-2.90	100.42	111.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	D	503	JHH	C16-C12-C11	-2.89	110.56	113.96
5	C	501	GTP	PB-O3B-PG	-2.88	122.93	132.83
13	F	401	ACP	C3'-C2'-C1'	2.85	105.27	100.98
11	B	504	JHH	C5-C6-C13	-2.64	100.08	103.66
5	C	501	GTP	PA-O3A-PB	-2.51	124.21	132.83
11	B	504	JHH	C16-C12-C11	-2.46	111.06	113.96
9	B	501	GDP	C1'-N9-C4	-2.43	122.38	126.64
11	D	503	JHH	C10-C2-C1	-2.34	100.56	104.62
11	D	503	JHH	C5-C6-C1	-2.33	107.70	117.40
12	B	505	GOL	C3-C2-C1	-2.31	102.73	111.70
9	B	501	GDP	PA-O3A-PB	-2.25	125.09	132.83
5	A	501	GTP	PA-O3A-PB	-2.21	125.24	132.83
13	F	401	ACP	C4-C5-N7	-2.20	107.11	109.40
11	B	504	JHH	C5-C6-C1	-2.15	108.46	117.40
5	C	501	GTP	C4-C5-C6	-2.12	118.78	120.80
5	C	501	GTP	N2-C2-N1	2.04	120.43	117.25

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O3G
5	A	501	GTP	C5'-O5'-PA-O1A
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	501	GTP	PB-O3B-PG-O3G
5	C	501	GTP	C5'-O5'-PA-O1A
5	C	501	GTP	C5'-O5'-PA-O2A
9	B	501	GDP	C5'-O5'-PA-O1A
9	B	501	GDP	C5'-O5'-PA-O2A
9	D	501	GDP	C5'-O5'-PA-O1A
9	D	501	GDP	C5'-O5'-PA-O2A
12	B	505	GOL	C1-C2-C3-O3
13	F	401	ACP	O4'-C4'-C5'-O5'
13	F	401	ACP	C3'-C4'-C5'-O5'
12	B	505	GOL	O1-C1-C2-C3
12	B	505	GOL	O2-C2-C3-O3
5	A	501	GTP	PB-O3B-PG-O2G
12	B	505	GOL	O1-C1-C2-O2
10	B	503	MES	C8-C7-N4-C3
5	C	501	GTP	PB-O3A-PA-O2A
5	A	501	GTP	PB-O3B-PG-O1G
5	A	501	GTP	C5'-O5'-PA-O3A

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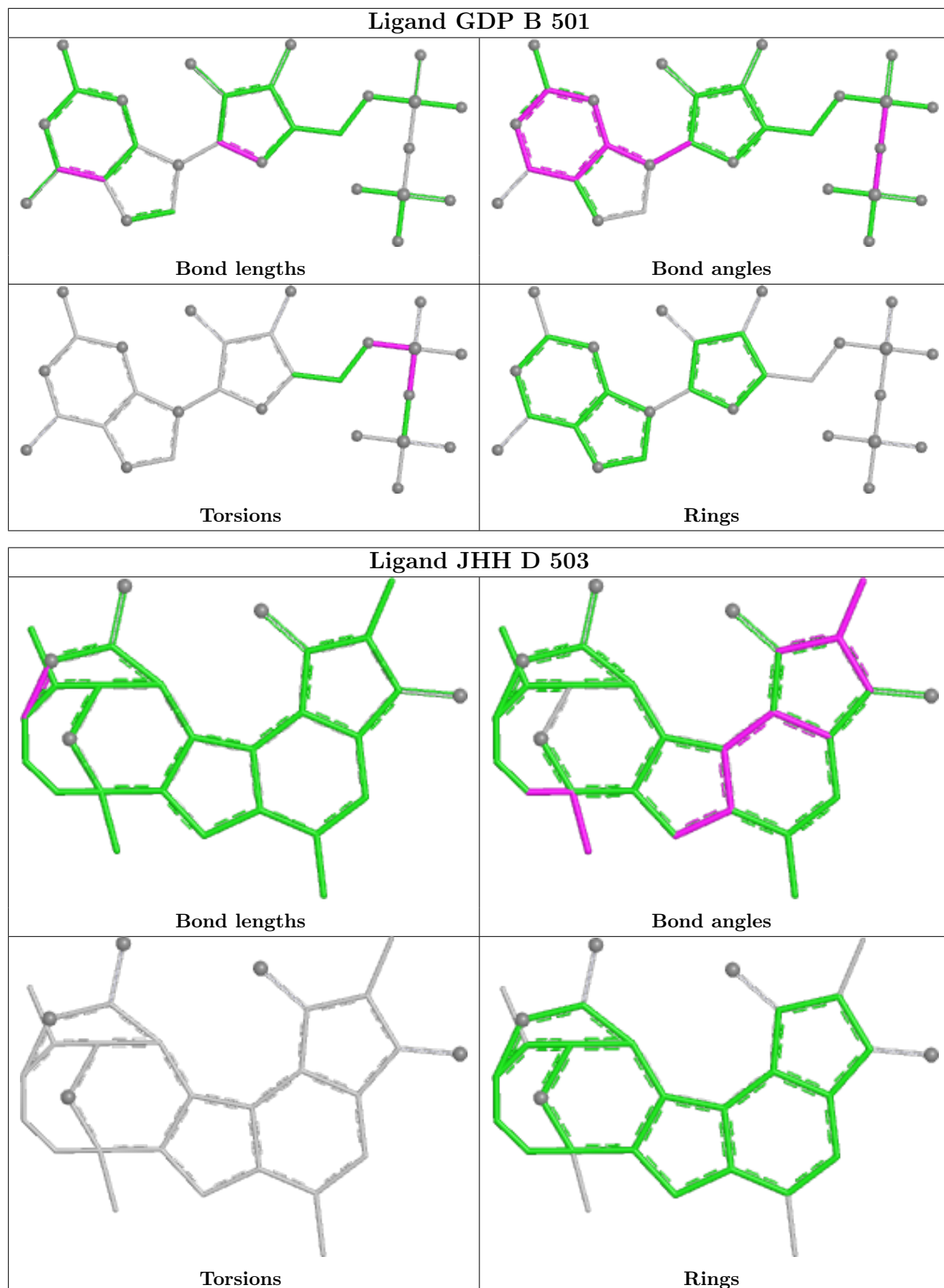
Mol	Chain	Res	Type	Atoms
5	C	501	GTP	C5'-O5'-PA-O3A
9	B	501	GDP	C5'-O5'-PA-O3A
9	D	501	GDP	C5'-O5'-PA-O3A
9	B	501	GDP	PB-O3A-PA-O2A
13	F	401	ACP	C5'-O5'-PA-O1A

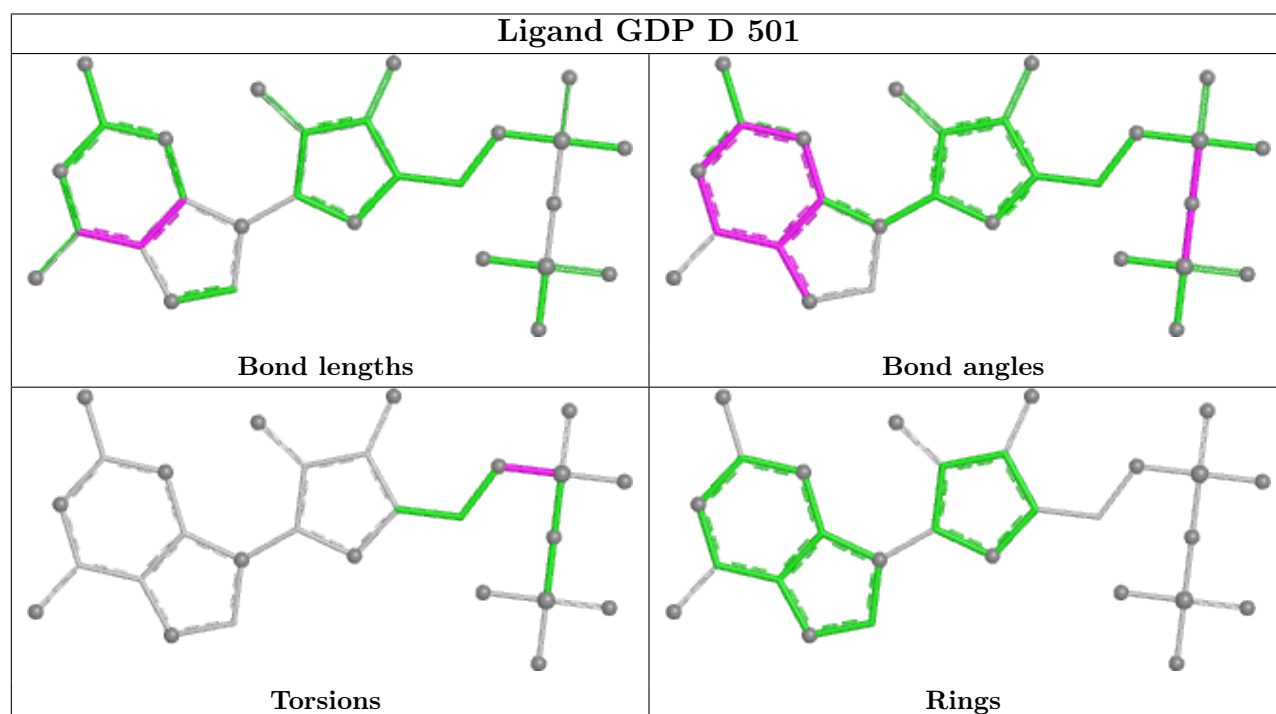
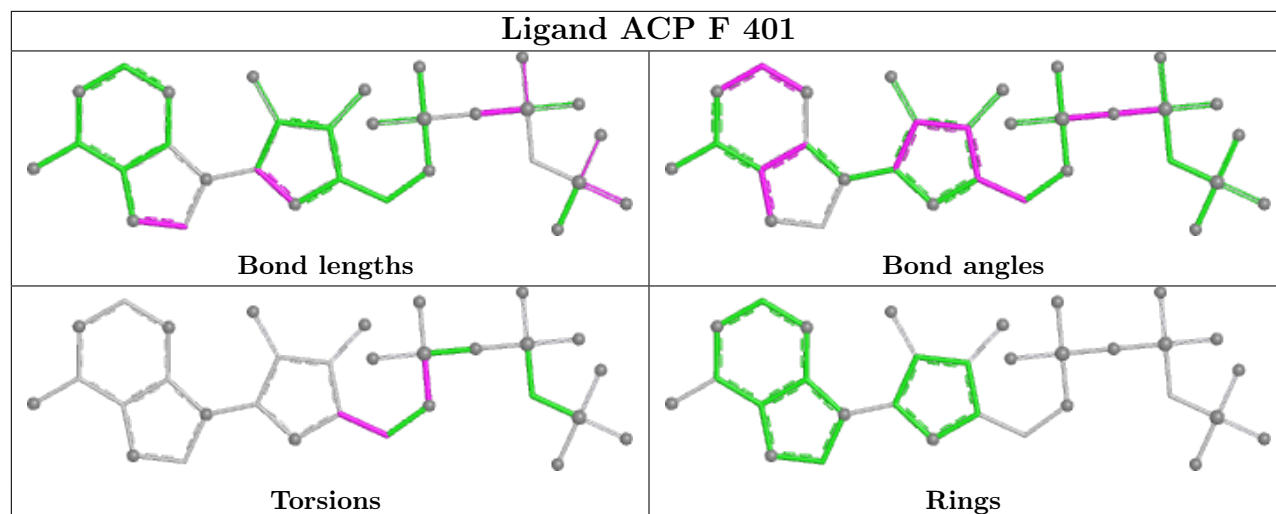
There are no ring outliers.

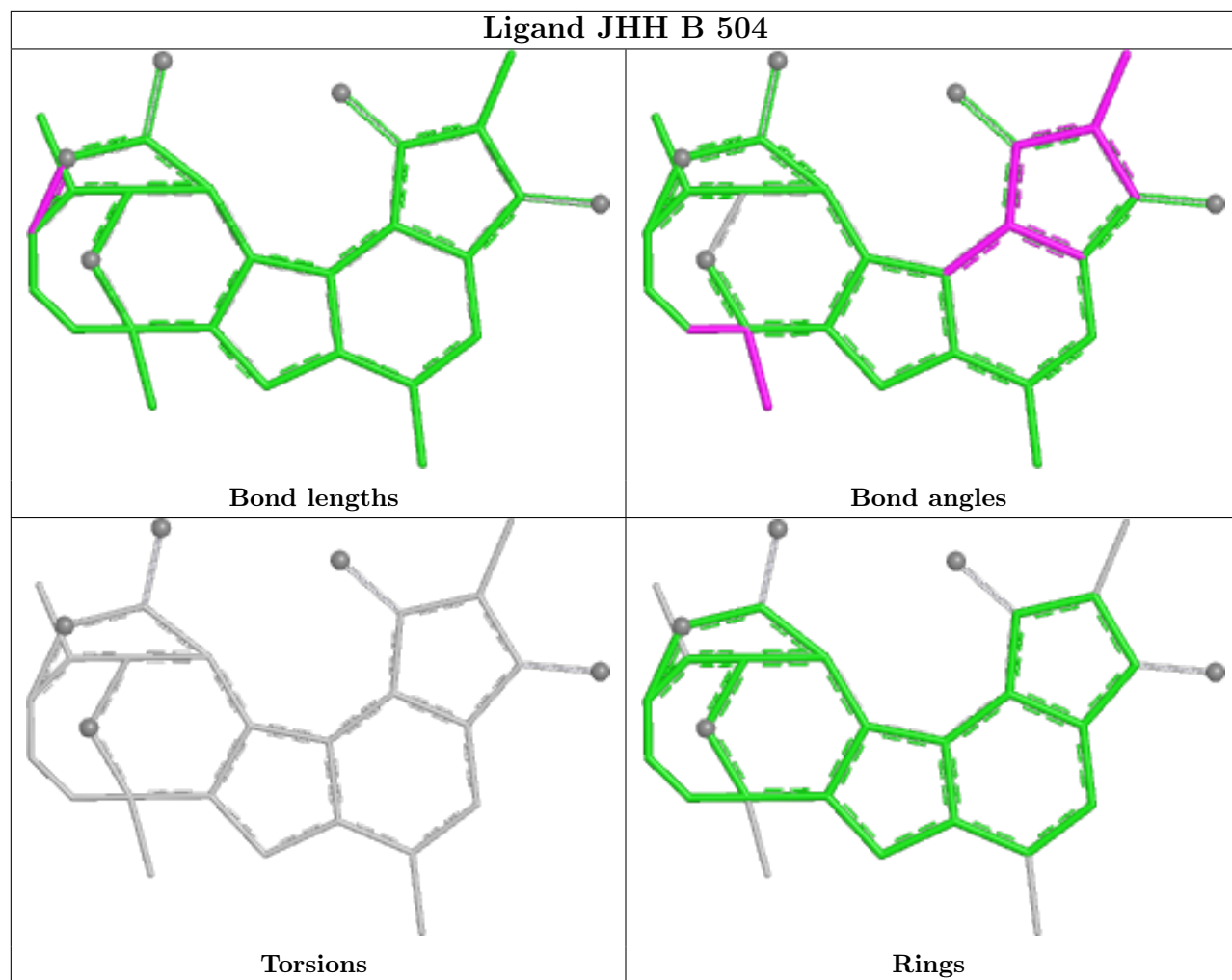
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
13	F	401	ACP	1	0
9	D	501	GDP	1	0
10	B	503	MES	1	0

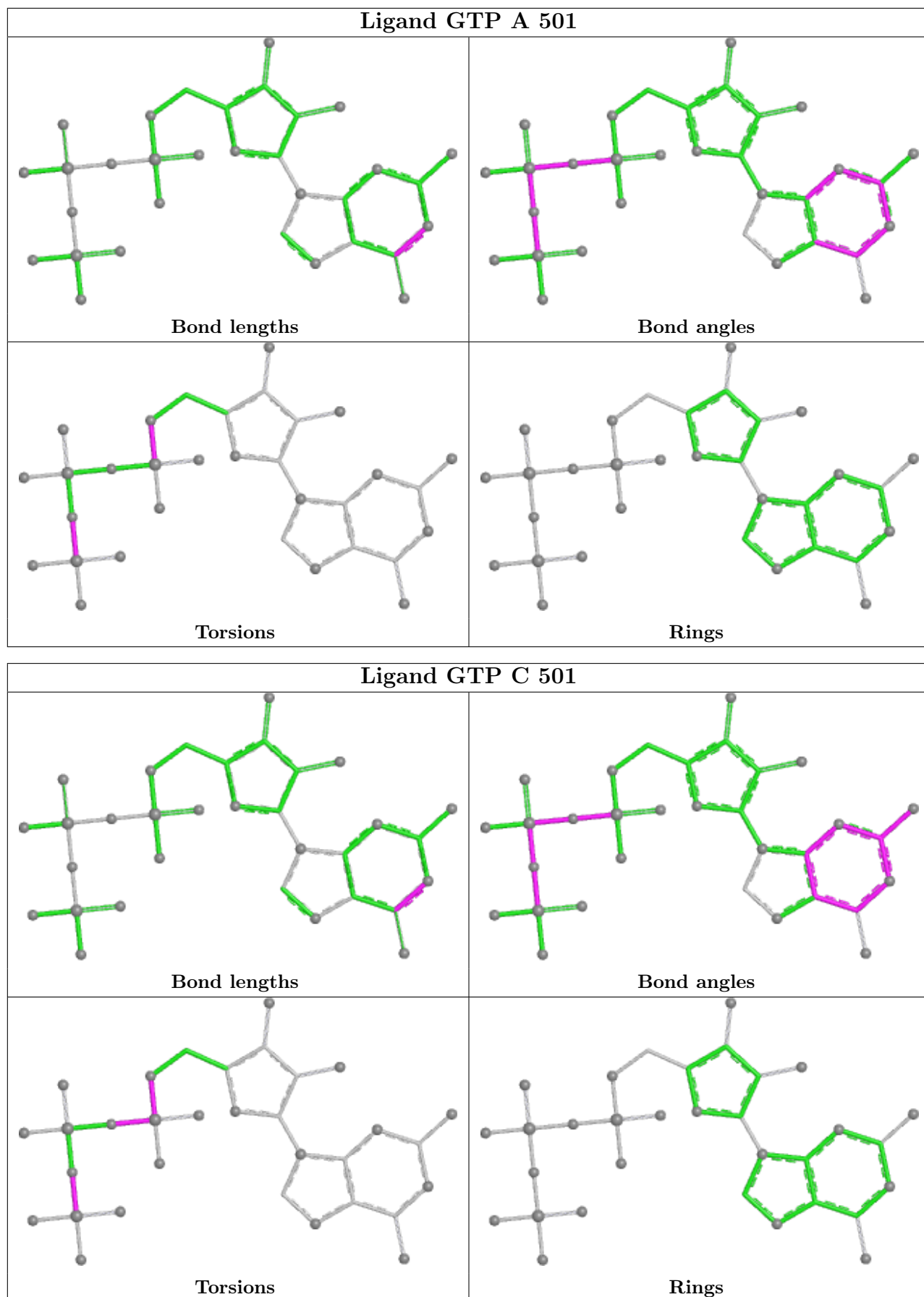
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	437/451 (96%)	0.49	22 (5%) 28 32	37, 56, 90, 140	0
1	C	440/451 (97%)	0.32	8 (1%) 68 71	28, 43, 71, 108	0
2	B	429/445 (96%)	0.49	26 (6%) 21 24	31, 51, 89, 121	0
2	D	421/445 (94%)	0.83	64 (15%) 2 2	37, 65, 96, 128	0
3	E	125/143 (87%)	0.77	15 (12%) 4 4	40, 71, 114, 142	0
4	F	331/384 (86%)	1.59	113 (34%) 0 0	45, 76, 139, 172	0
All	All	2183/2319 (94%)	0.70	248 (11%) 5 5	28, 57, 105, 172	0

All (248) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	161	LEU	11.8
4	F	169	LEU	8.9
4	F	173	ILE	8.6
2	B	439	THR	8.5
2	B	438	ALA	8.4
4	F	130	VAL	8.1
4	F	131	PHE	8.0
4	F	182	ILE	7.9
3	E	144	SER	7.6
4	F	132	LEU	7.6
4	F	244	CYS	7.5
4	F	253	TYR	7.4
4	F	135	TYR	7.3
2	D	57	THR	7.2
4	F	134	ALA	7.1
2	B	440	ALA	7.0
4	F	240	LEU	7.0
2	D	1	MET	6.7
4	F	250	SER	6.5

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
4	F	186	LEU	6.4
4	F	99	VAL	6.3
1	A	282	TYR	6.1
4	F	231	ALA	6.0
4	F	142	ARG	6.0
4	F	249	TYR	6.0
2	B	59	ASN	6.0
4	F	170	LEU	5.9
4	F	248	GLU	5.8
4	F	160	ILE	5.7
4	F	228	TYR	5.7
4	F	165	GLU	5.6
4	F	162	ILE	5.5
4	F	101	TYR	5.5
3	E	143	ALA	5.5
4	F	100	ILE	5.4
4	F	172	PHE	5.3
4	F	251	LYS	5.3
2	B	82	PRO	5.2
4	F	181	VAL	5.2
3	E	139	LEU	5.1
3	E	6	MET	5.1
4	F	230	SER	5.0
1	C	440	VAL	5.0
2	D	56	ALA	5.0
4	F	136	ASN	4.9
4	F	89	GLU	4.9
3	E	27	PRO	4.8
3	E	26	PRO	4.7
2	D	400	ARG	4.6
4	F	20	LEU	4.6
2	D	407	TRP	4.6
2	B	33	THR	4.5
3	E	145	ARG	4.5
4	F	163	SER	4.5
2	D	220	THR	4.5
2	B	57	THR	4.4
4	F	138	ARG	4.3
4	F	143	GLU	4.2
4	F	179	VAL	4.2
2	B	437	ASP	4.1
2	D	202	TYR	4.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
4	F	148	ILE	4.0
4	F	245	ILE	4.0
3	E	142	GLU	4.0
4	F	147	TRP	4.0
4	F	75	ALA	4.0
4	F	17	VAL	3.9
4	F	168	GLU	3.9
4	F	254	GLY	3.9
2	B	58	GLY	3.9
4	F	263	PHE	3.9
4	F	146	VAL	3.8
4	F	227	PRO	3.8
2	D	33	THR	3.8
4	F	103	THR	3.8
2	D	94	PHE	3.8
4	F	10	ASN	3.8
1	A	346	TRP	3.8
2	D	401	ARG	3.8
2	D	405	LEU	3.7
4	F	199	PHE	3.7
4	F	149	ALA	3.7
4	F	252	ASN	3.7
2	D	268	PHE	3.6
4	F	166	ALA	3.6
4	F	241	THR	3.6
2	D	37	HIS	3.6
2	D	82	PRO	3.6
4	F	361	LEU	3.5
4	F	21	LEU	3.5
4	F	90	SER	3.4
1	A	262	TYR	3.4
2	B	56	ALA	3.4
3	E	28	SER	3.3
4	F	225	SER	3.3
2	B	83	PHE	3.3
4	F	96	GLU	3.3
4	F	339	ALA	3.3
4	F	31	ARG	3.3
2	D	415	GLU	3.3
4	F	243	HIS	3.3
4	F	197	ARG	3.3
2	D	267	PHE	3.2

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	D	59	ASN	3.2
4	F	239	HIS	3.2
3	E	140	LYS	3.2
2	D	404	PHE	3.2
1	A	171	ILE	3.2
4	F	246	GLN	3.2
2	B	37	HIS	3.2
4	F	362	ALA	3.2
4	F	102	PRO	3.1
4	F	238	CYS	3.1
2	B	36	TYR	3.1
4	F	256	TYR	3.1
4	F	337	ALA	3.1
2	D	414	ASP	3.1
2	D	58	GLY	3.1
4	F	145	ASN	3.0
2	D	317	ALA	3.0
4	F	255	ARG	3.0
2	D	441	ASP	3.0
4	F	167	SER	3.0
4	F	171	ASP	3.0
4	F	139	ARG	2.9
2	D	83	PHE	2.9
1	A	177	VAL	2.9
2	D	118	VAL	2.9
3	E	141	GLU	2.9
4	F	137	ARG	2.9
2	B	144	GLY	2.9
1	A	280	LYS	2.9
1	A	283	HIS	2.9
4	F	320	MET	2.9
1	A	201	ALA	2.9
4	F	140	GLU	2.8
2	B	61	TYR	2.8
2	D	256	ALA	2.8
2	D	95	GLY	2.8
4	F	6	VAL	2.7
2	D	416	MET	2.7
4	F	126	ASP	2.7
1	A	42	ILE	2.7
2	B	86	ILE	2.7
2	D	265	LEU	2.7

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
4	F	194	PRO	2.7
2	D	85	GLN	2.7
2	D	402	LYS	2.6
4	F	259	GLY	2.6
2	D	55	GLU	2.6
4	F	144	GLY	2.6
4	F	229	ASN	2.6
4	F	22	LEU	2.6
4	F	129	GLU	2.6
2	D	127	GLU	2.6
1	A	141	PHE	2.6
4	F	379	HIS	2.6
2	D	270	PRO	2.6
2	B	358	ILE	2.6
2	D	287	THR	2.6
2	B	342	TYR	2.5
2	D	60	LYS	2.5
4	F	44	ARG	2.5
2	D	286	LEU	2.5
2	D	76	ASP	2.5
2	D	406	HIS	2.5
2	D	315	VAL	2.5
4	F	45	ASN	2.5
2	D	114	LEU	2.5
2	D	259	MET	2.5
2	D	201	THR	2.5
4	F	11	SER	2.5
4	F	242	ASN	2.5
3	E	132	GLU	2.5
2	D	255	LEU	2.5
2	D	219	LEU	2.4
2	D	96	GLN	2.4
4	F	217	ARG	2.4
4	F	247	LYS	2.4
4	F	141	GLY	2.4
2	D	234	THR	2.4
4	F	19	ARG	2.4
4	F	237	THR	2.4
1	A	143	GLY	2.4
4	F	164	SER	2.4
1	C	283	HIS	2.3
2	D	221	THR	2.3

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Mol	Chain	Res	Type	RSRZ
4	F	18	SER	2.3
4	F	128	ARG	2.3
2	D	269	MET	2.3
2	D	271	GLY	2.3
2	B	46	LEU	2.3
1	A	146	GLY	2.3
2	D	260	VAL	2.3
2	B	9	ALA	2.3
4	F	24	THR	2.3
1	C	340	SER	2.3
4	F	98	TYR	2.3
4	F	32	LYS	2.3
1	C	181[A]	VAL	2.3
2	D	77	SER	2.3
4	F	260	ASN	2.3
4	F	206	LEU	2.3
2	B	279	GLY	2.2
1	A	179	THR	2.2
2	B	433	GLN	2.2
2	B	317	ALA	2.2
1	A	345	ASP	2.2
2	D	78	VAL	2.2
2	D	171	VAL	2.2
2	D	46	LEU	2.2
4	F	188	LYS	2.2
4	F	192	LEU	2.2
1	A	37	PRO	2.2
1	A	364	PRO	2.2
2	D	303	ALA	2.2
3	E	135	LYS	2.2
3	E	44	ASP	2.2
2	B	143	GLY	2.2
1	A	9	VAL	2.2
1	A	140	SER	2.2
2	B	60	LYS	2.2
1	C	136	LEU	2.2
1	A	174	ALA	2.2
2	B	34	GLY	2.2
2	D	218	LYS	2.2
2	D	238	VAL	2.2
4	F	9	GLU	2.1
4	F	133	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
2	D	257	VAL	2.1
3	E	48	GLU	2.1
4	F	73	ARG	2.1
2	D	384	ILE	2.1
2	D	169	PHE	2.1
4	F	198	LYS	2.1
2	D	403	ALA	2.1
1	A	224	TYR	2.1
1	C	238	ILE	2.1
2	D	397	ALA	2.1
4	F	350	ILE	2.1
1	A	173	PRO	2.1
4	F	189	PRO	2.1
1	C	260	VAL	2.1
2	D	439	THR	2.0
1	C	357	TYR	2.0
4	F	127	GLU	2.0
2	D	203	CYS	2.0
1	A	150	THR	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, 95<sup>th</sup> 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.

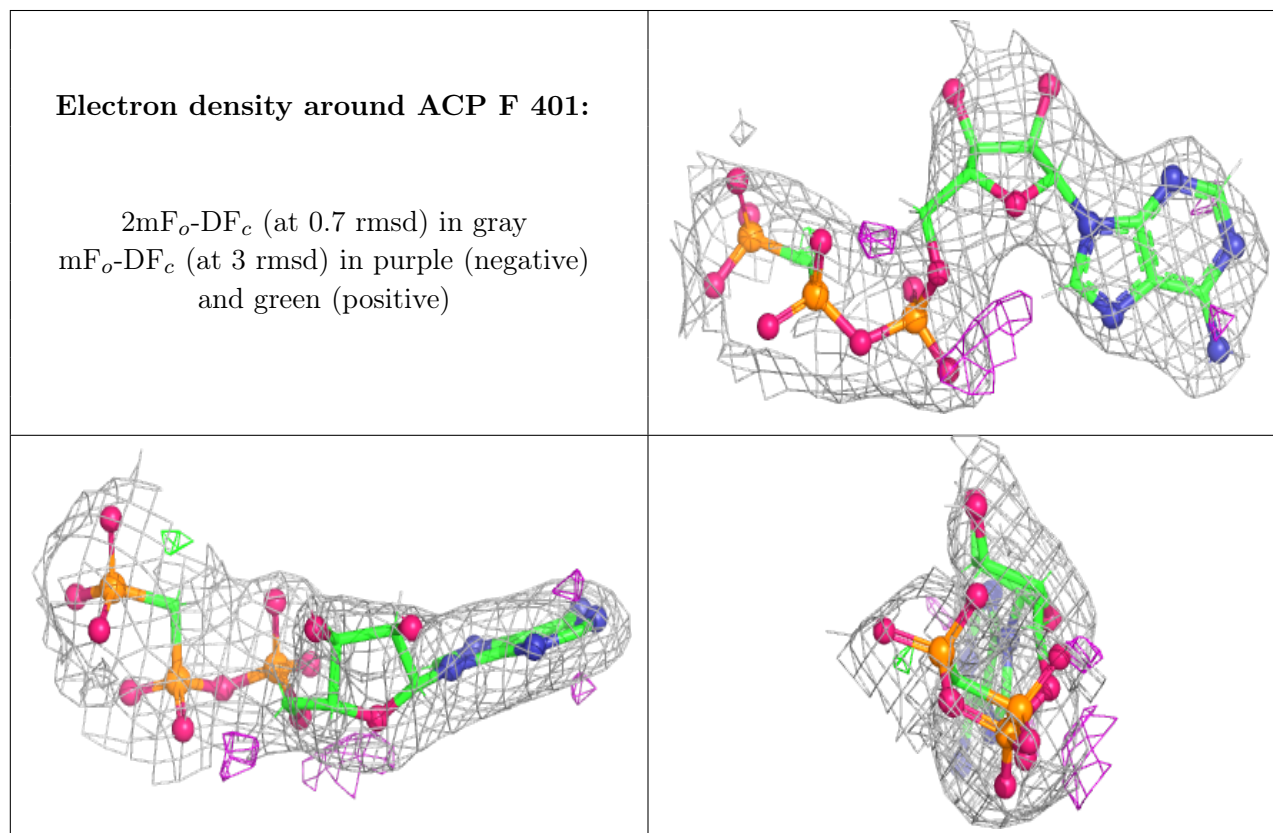
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
8	EDO	C	506	4/4	0.74	0.27	56,82,92,99	0
12	GOL	B	505	6/6	0.79	0.17	42,78,96,96	0
7	CA	A	503	1/1	0.83	0.05	68,68,68,68	0
12	GOL	C	504	6/6	0.87	0.14	55,80,100,109	0

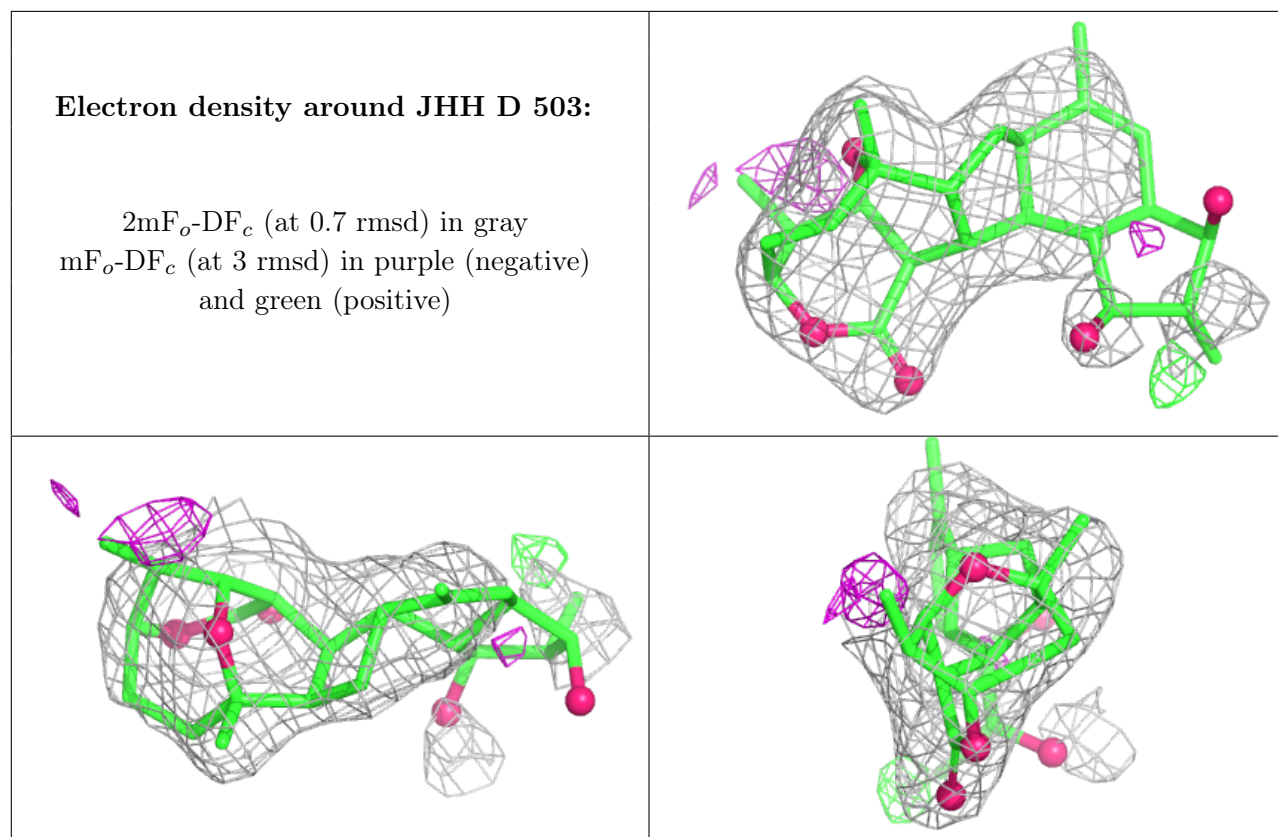
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
13	ACP	F	401	31/31	0.87	0.19	78,103,126,141	0
11	JHH	D	503	29/29	0.89	0.20	59,86,117,117	0
6	MG	D	502	1/1	0.89	0.06	62,62,62,62	0
12	GOL	C	505	6/6	0.90	0.16	66,84,101,101	0
8	EDO	A	504	4/4	0.90	0.20	72,86,92,94	0
11	JHH	B	504	29/29	0.91	0.22	49,77,118,119	0
6	MG	F	402	1/1	0.92	0.05	67,67,67,67	0
6	MG	A	502	1/1	0.94	0.12	38,38,38,38	0
9	GDP	D	501	28/28	0.96	0.10	51,55,64,70	0
10	MES	B	503	12/12	0.96	0.14	37,48,58,66	0
5	GTP	A	501	32/32	0.97	0.19	30,38,43,45	0
5	GTP	C	501	32/32	0.97	0.14	28,33,36,39	0
6	MG	C	502	1/1	0.98	0.10	33,33,33,33	0
9	GDP	B	501	28/28	0.98	0.15	31,35,39,42	0
7	CA	C	503	1/1	0.99	0.05	52,52,52,52	0
6	MG	B	502	1/1	0.99	0.21	27,27,27,27	0

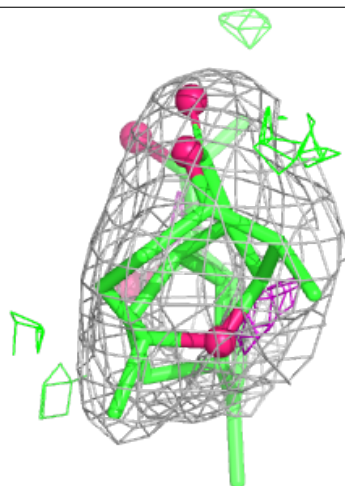
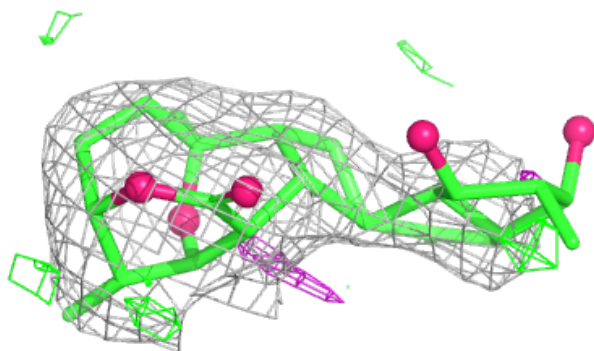
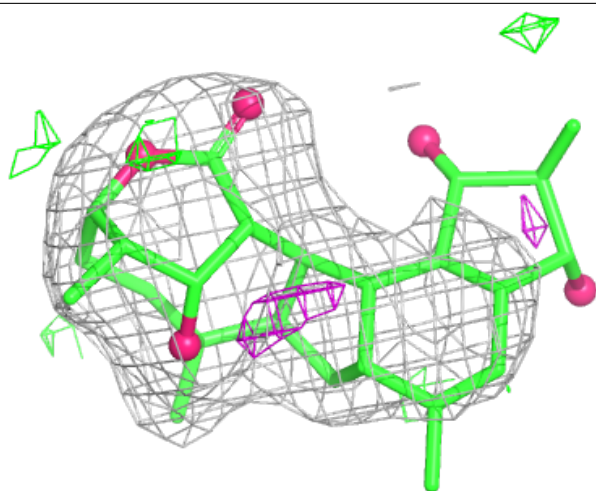
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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





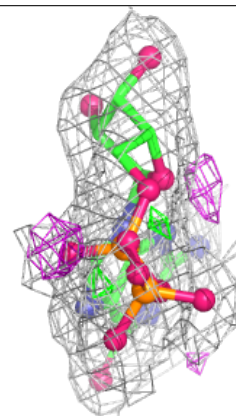
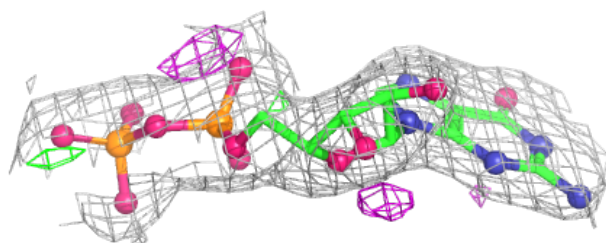
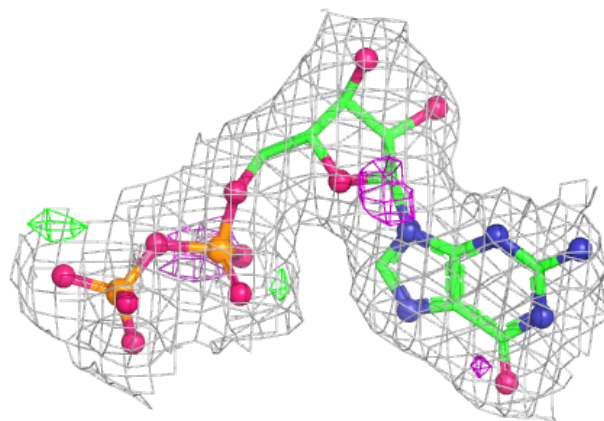
**Electron density around JHH B 504:**

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

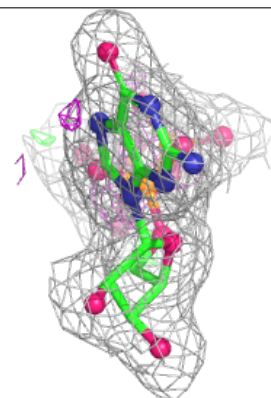
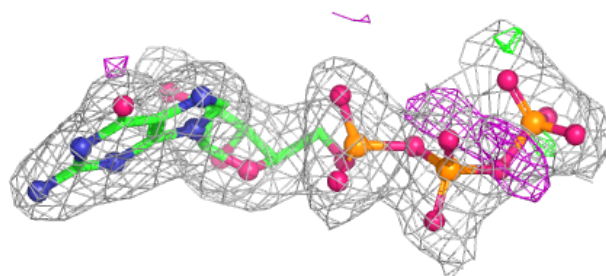
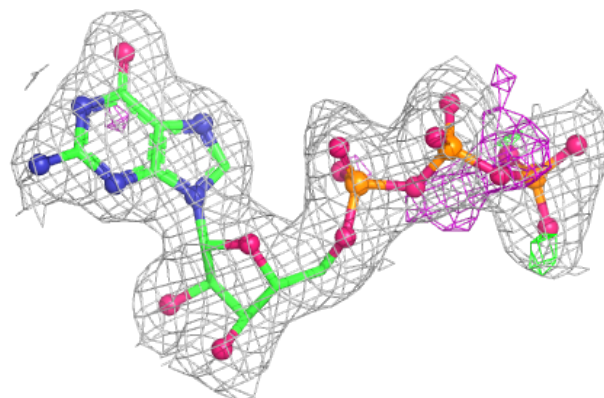


**Electron density around GDP D 501:**

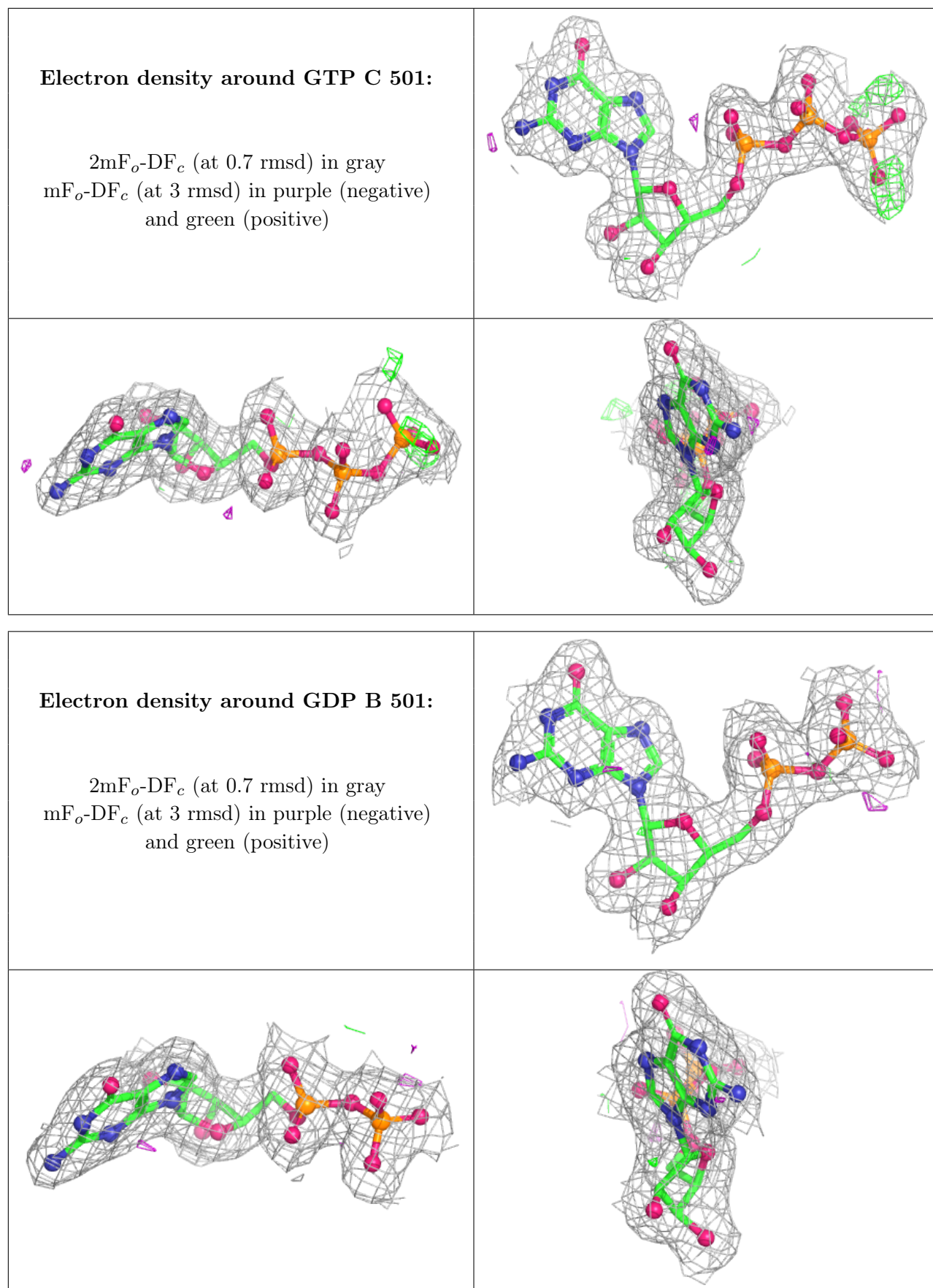
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**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.