



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 25, 2020 – 06:50 pm BST

PDB ID : 5XLT  
Title : The crystal structure of tubulin in complex with 4'-demethylepipodophyllotoxin  
Authors : Yu, Y.; Chen, Q.  
Deposited on : 2017-05-11  
Resolution : 2.81 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
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)	:	2.11

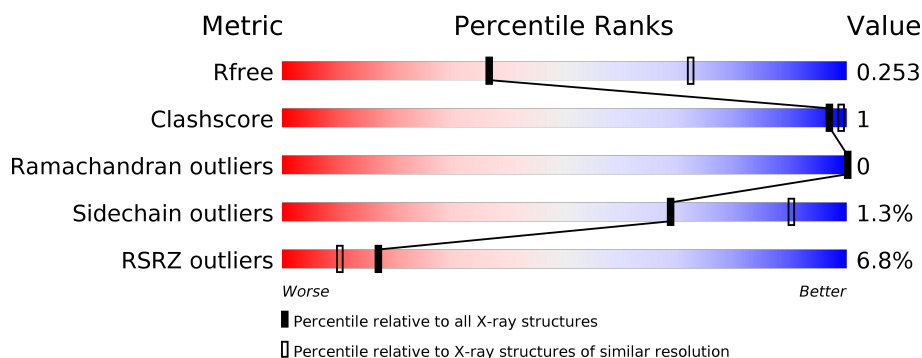
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.81 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	3617 (2.84-2.80)
Clashscore	141614	4060 (2.84-2.80)
Ramachandran outliers	138981	3978 (2.84-2.80)
Sidechain outliers	138945	3980 (2.84-2.80)
RSRZ outliers	127900	3552 (2.84-2.80)

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 on 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	450	<div> <div></div> <div>95%</div> <div>• •</div> </div>
1	C	450	<div> <div></div> <div>96%</div> <div>• •</div> </div>
2	B	445	<div> <div>2%</div> <div>92%</div> <div>• •</div> </div>
2	D	445	<div> <div>8%</div> <div>90%</div> <div>• 5%</div> </div>
3	E	143	<div> <div>6%</div> <div>83%</div> <div>• 15%</div> </div>
4	F	384	<div> <div>23%</div> <div>83%</div> <div>• 13%</div> </div>

## 2 Entry composition [i](#)

There are 12 unique types of molecules in this entry. The entry contains 34508 atoms, of which 16893 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
1	A	437	Total	C	H	N	O	S	0	0	0
			6734	2163	3318	581	650	22			
1	C	440	Total	C	H	N	O	S	0	1	0
			6789	2180	3344	585	657	23			

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

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	427	Total	C	H	N	O	S	0	1	0
			6604	2115	3235	577	650	27			
2	D	421	Total	C	H	N	O	S	0	0	0
			6488	2080	3179	562	640	27			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
3	E	121	Total	C	H	N	O	S	0	0	0
			2014	617	1014	181	197	5			

There are 2 discrepancies between the modelled and reference sequences:

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

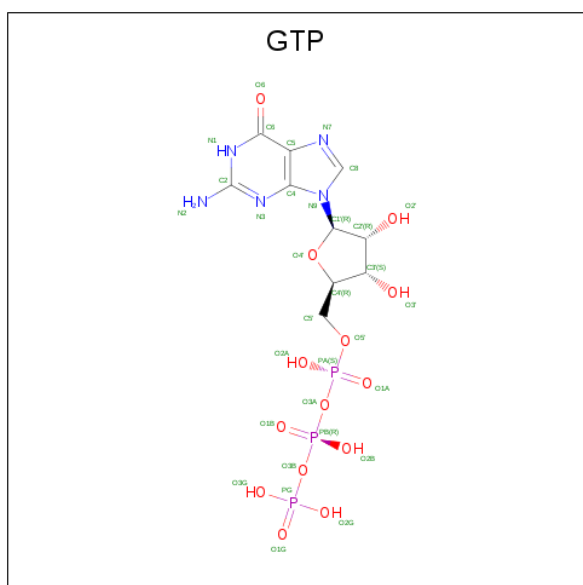
- Molecule 4 is a protein called Tubulin tyrosine ligase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
4	F	334	Total	C	H	N	O	S	0	0	0
			5442	1761	2698	470	499	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
5	A	1	Total	C	H	N	O	P	0	0
			42	10	10	5	14	3		
5	C	1	Total	C	H	N	O	P	0	0
			42	10	10	5	14	3		

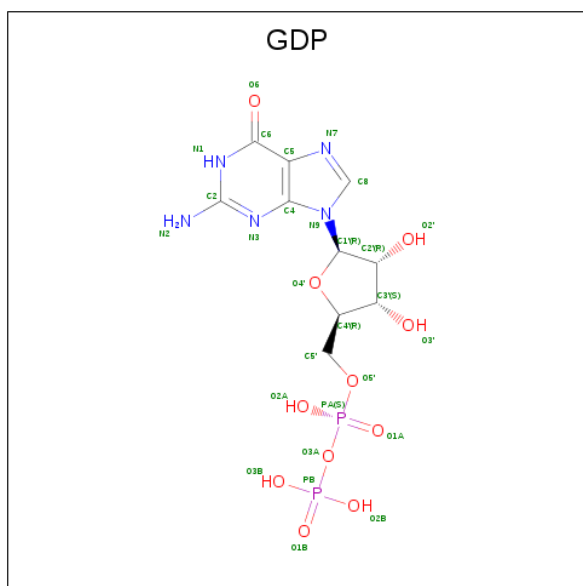
- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

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

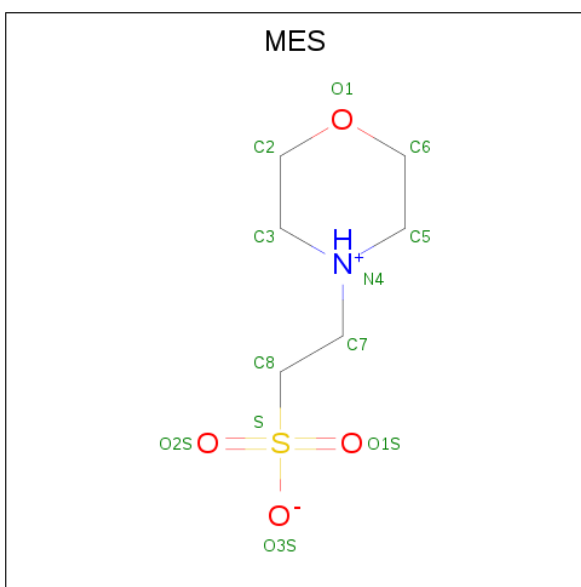
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Ca	0	0
			1	1		
7	C	1	Total	Ca	0	0
			1	1		

- Molecule 8 is 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>).



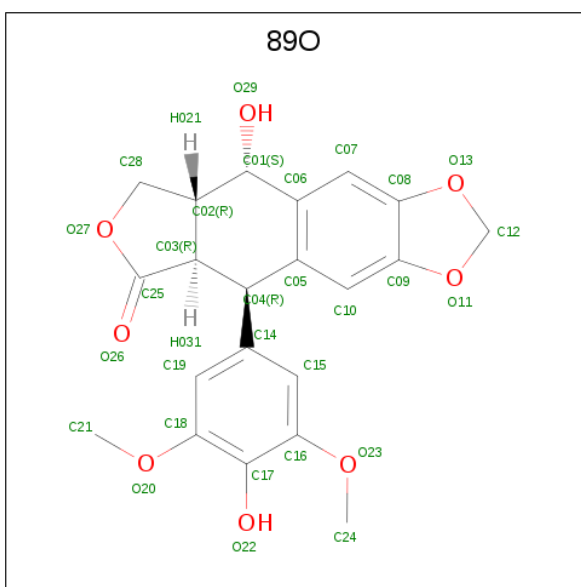
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
8	B	1	Total 38	C 10	H 10	N 5	O 11	P 2	0	0
8	D	1	Total 38	C 10	H 10	N 5	O 11	P 2	0	0

- Molecule 9 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
9	B	1	Total	C	H	N	O	S	0	0
			24	6	12	1	4	1		
9	B	1	Total	C	H	N	O	S	0	0
			25	6	13	1	4	1		

- Molecule 10 is (5S,5aR,8aR,9R)-9-(3,5-dimethoxy-4-oxidanyl-phenyl)-5-oxidanyl-5a,6,8a,9-tetrahydro-5H-[2]benzofuro[6,5-f][1,3]benzodioxol-8-one (three-letter code: 89O) (formula: C<sub>21</sub>H<sub>20</sub>O<sub>8</sub>).



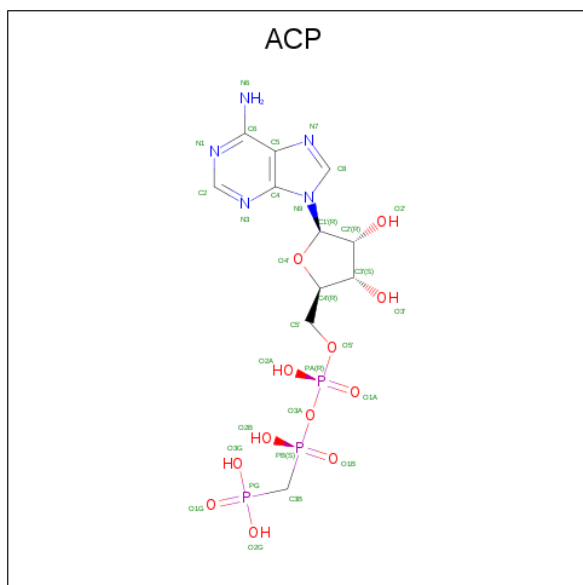
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
10	B	1	Total	C	H	O	0	0
			49	21	20	8		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
10	D	1	Total	C	H	O	0	0
			49	21	20	8		

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



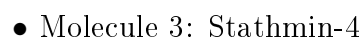
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
11	F	1	Total	C	N	O	P	0	0
			31	11	5	12	3		

- Molecule 12 is water.

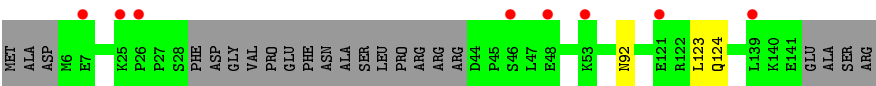
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	25	Total	O	0	0
			25	25		
12	B	16	Total	O	0	0
			16	16		
12	C	37	Total	O	0	0
			37	37		
12	D	9	Total	O	0	0
			9	9		
12	E	2	Total	O	0	0
			2	2		
12	F	4	Total	O	0	0
			4	4		



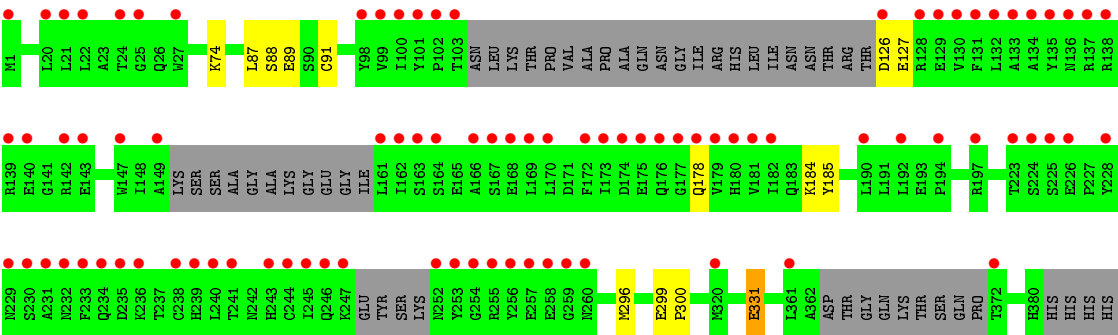
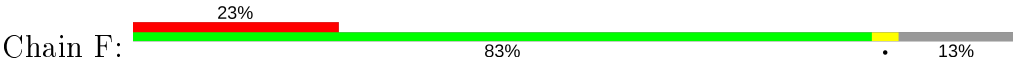
- Molecule 1: Tubulin alpha-1B chain







● 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, $\alpha$ , $\beta$ , $\gamma$	105.47Å 156.93Å 180.87Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.86 – 2.81 49.65 – 2.81	Depositor EDS
% Data completeness (in resolution range)	96.4 (46.86-2.81) 96.5 (49.65-2.81)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.19 (at 2.81Å)	Xtriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, $R_{free}$	0.206 , 0.249 0.211 , 0.253	Depositor DCC
$R_{free}$ test set	1043 reflections (1.47%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	49.6	Xtriage
Anisotropy	0.165	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 45.3	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	0.93	EDS
Total number of atoms	34508	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.59% 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GDP, MG, CA, GTP, ACP, MES, 89O

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	0.22	0/3494	0.37	0/4743
1	C	0.22	0/3523	0.37	0/4782
2	B	0.22	0/3444	0.37	0/4664
2	D	0.22	0/3382	0.36	0/4581
3	E	0.21	0/1008	0.31	0/1337
4	F	0.21	0/2806	0.35	0/3791
All	All	0.22	0/17657	0.36	0/23898

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	3416	3318	3330	3	0
1	C	3445	3344	3356	2	0
2	B	3369	3235	3246	9	0
2	D	3309	3179	3189	10	0
3	E	1000	1014	1018	1	0
4	F	2744	2698	2709	7	0
5	A	32	10	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	32	10	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
7	A	1	0	0	0	0
7	C	1	0	0	0	0
8	B	28	10	12	0	0
8	D	28	10	12	0	0
9	B	24	25	25	1	0
10	B	29	20	0	1	0
10	D	29	20	0	2	0
11	F	31	0	14	1	0
12	A	25	0	0	0	0
12	B	16	0	0	1	0
12	C	37	0	0	0	0
12	D	9	0	0	1	0
12	E	2	0	0	0	0
12	F	4	0	0	0	0
All	All	17615	16893	16935	32	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 1.

The worst 5 of 32 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)
10:B:505:89O:O27	10:B:505:89O:C25	1.65	1.32
10:D:502:89O:O27	10:D:502:89O:C25	1.65	1.28
1:A:221:ARG:NH2	2:B:327:ASP:OD2	2.35	0.60
2:D:404:ASP:OD1	2:D:405:GLU:N	2.36	0.58
4:F:178:GLN:OE1	4:F:178:GLN:N	2.38	0.57

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	435/450 (97%)	419 (96%)	16 (4%)	0	100	100
1	C	439/450 (98%)	430 (98%)	9 (2%)	0	100	100
2	B	426/445 (96%)	413 (97%)	13 (3%)	0	100	100
2	D	417/445 (94%)	407 (98%)	10 (2%)	0	100	100
3	E	117/143 (82%)	117 (100%)	0	0	100	100
4	F	324/384 (84%)	314 (97%)	10 (3%)	0	100	100
All	All	2158/2317 (93%)	2100 (97%)	58 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	368/378 (97%)	364 (99%)	4 (1%)	73	91
1	C	372/378 (98%)	367 (99%)	5 (1%)	69	90
2	B	370/383 (97%)	367 (99%)	3 (1%)	81	94
2	D	364/383 (95%)	358 (98%)	6 (2%)	62	87
3	E	109/127 (86%)	107 (98%)	2 (2%)	59	85
4	F	301/342 (88%)	297 (99%)	4 (1%)	69	90
All	All	1884/1991 (95%)	1860 (99%)	24 (1%)	69	90

5 of 24 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	245	ASP
2	D	137	HIS
4	F	296	MET
1	C	251	ASP
2	D	41	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	D	165	ASN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 15 ligands modelled in this entry, 6 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	$\# Z  > 2$
11	ACP	F	401	-	27,33,33	2.79	12 (44%)	32,52,52	4.13	11 (34%)
10	89O	D	502	-	33,33,33	5.42	19 (57%)	50,50,50	3.63	18 (36%)
9	MES	B	503	-	12,12,12	2.32	1 (8%)	14,16,16	2.43	6 (42%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
10	89O	B	505	-	33,33,33	5.36	18 (54%)	50,50,50	3.60	16 (32%)
5	GTP	A	501	6	26,34,34	0.97	1 (3%)	33,54,54	1.76	7 (21%)
8	GDP	B	501	6	24,30,30	1.12	2 (8%)	31,47,47	1.98	8 (25%)
5	GTP	C	501	6	26,34,34	0.97	1 (3%)	33,54,54	1.79	7 (21%)
8	GDP	D	501	6	24,30,30	1.15	2 (8%)	31,47,47	1.97	8 (25%)
9	MES	B	504	-	12,12,12	2.24	1 (8%)	14,16,16	1.37	3 (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
11	ACP	F	401	-	-	5/15/38/38	0/3/3/3
10	89O	D	502	-	-	4/8/43/43	0/5/5/5
9	MES	B	503	-	-	1/6/14/14	0/1/1/1
10	89O	B	505	-	-	4/8/43/43	0/5/5/5
5	GTP	A	501	6	-	10/18/38/38	0/3/3/3
8	GDP	B	501	6	-	3/12/32/32	0/3/3/3
5	GTP	C	501	6	-	9/18/38/38	0/3/3/3
8	GDP	D	501	6	-	2/12/32/32	0/3/3/3
9	MES	B	504	-	-	3/6/14/14	0/1/1/1

The worst 5 of 57 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	D	502	89O	O27-C25	13.81	1.65	1.35
10	B	505	89O	O27-C25	13.67	1.65	1.35
10	D	502	89O	C06-C05	12.08	1.61	1.40
10	B	505	89O	C05-C04	12.06	1.68	1.51
10	B	505	89O	C06-C05	12.05	1.61	1.40

The worst 5 of 84 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	D	502	89O	O27-C25-O26	17.48	139.55	121.42
10	B	505	89O	O27-C25-O26	17.38	139.44	121.42
11	F	401	ACP	O4'-C4'-C3'	-13.98	77.44	105.11
11	F	401	ACP	O4'-C1'-C2'	-13.11	87.77	106.93

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	D	502	89O	O27-C25-C03	-9.16	96.40	109.52

There are no chirality outliers.

5 of 41 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	D	501	GDP	C5'-O5'-PA-O1A
9	B	503	MES	C8-C7-N4-C5
11	F	401	ACP	O4'-C4'-C5'-O5'
5	A	501	GTP	PB-O3B-PG-O2G
5	A	501	GTP	C5'-O5'-PA-O1A

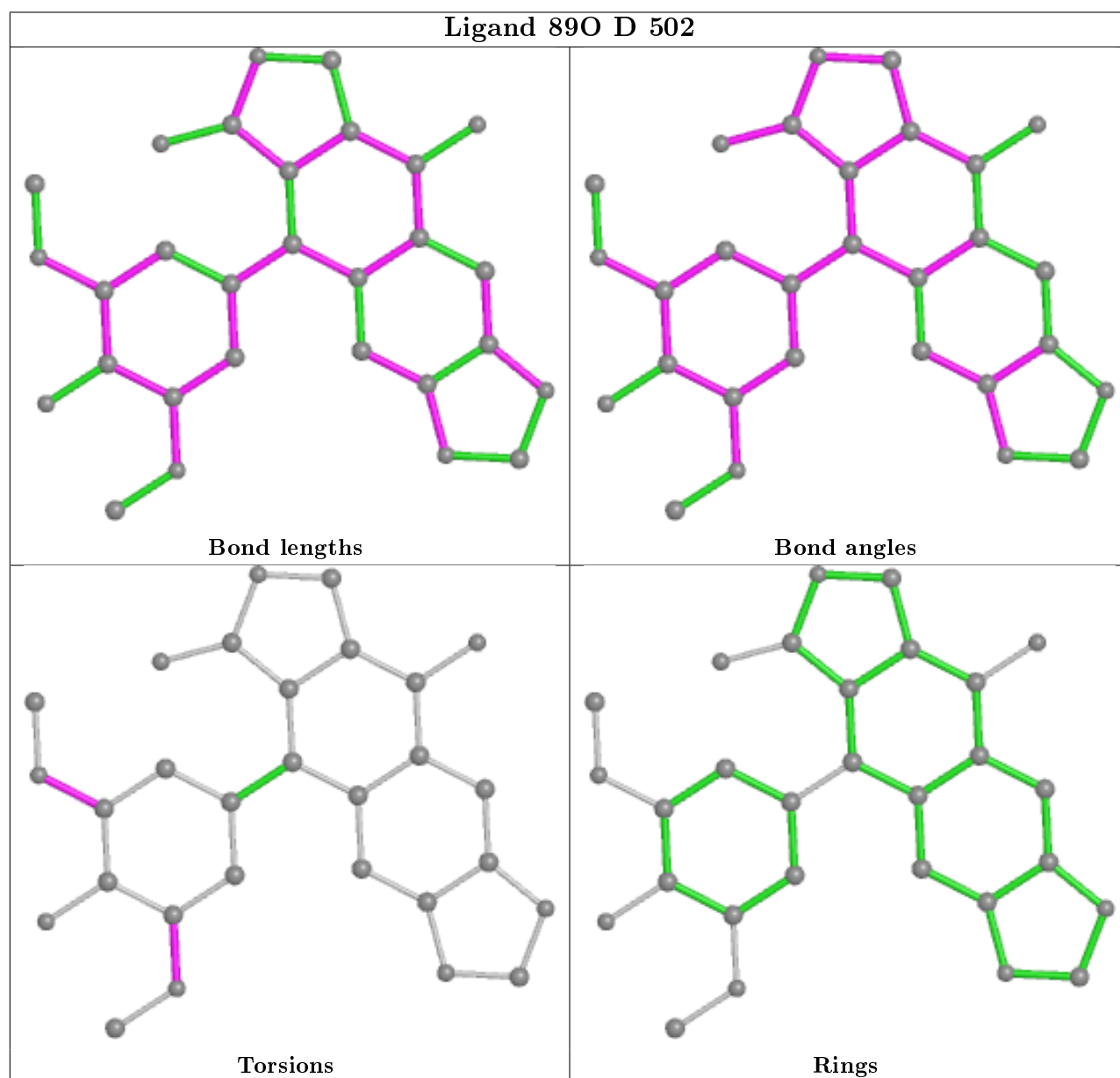
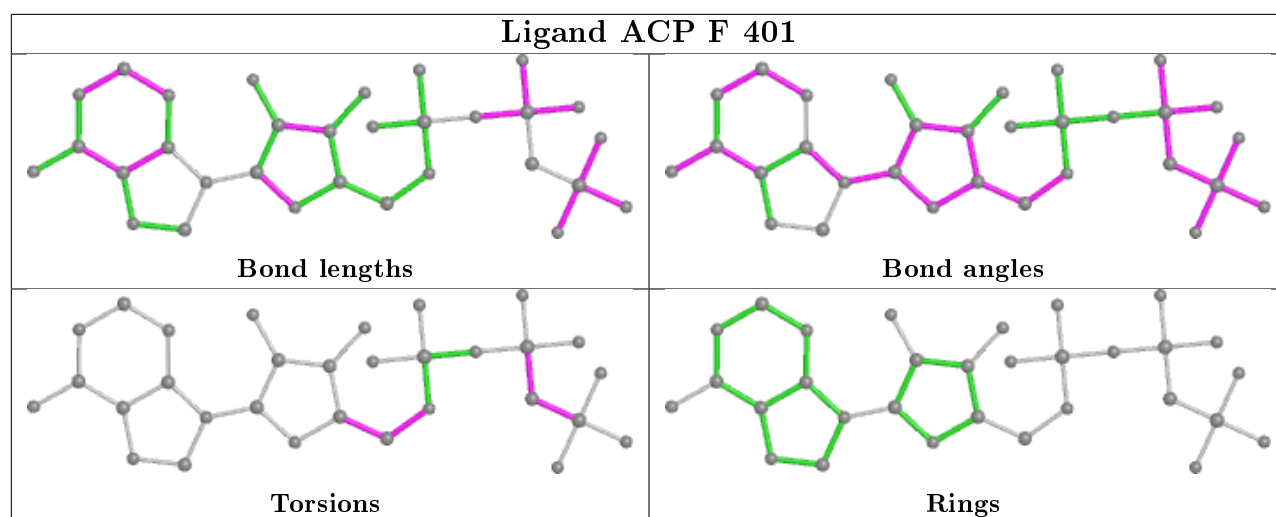
There are no ring outliers.

4 monomers are involved in 5 short contacts:

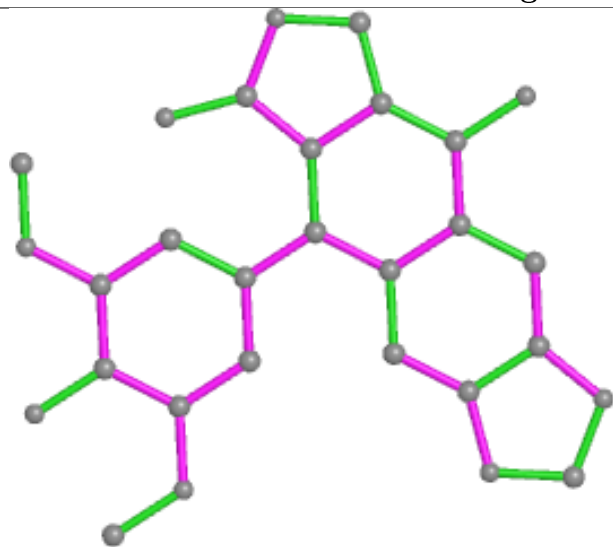
Mol	Chain	Res	Type	Clashes	Symm-Clashes
11	F	401	ACP	1	0
10	D	502	89O	2	0
10	B	505	89O	1	0
9	B	504	MES	1	0

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.

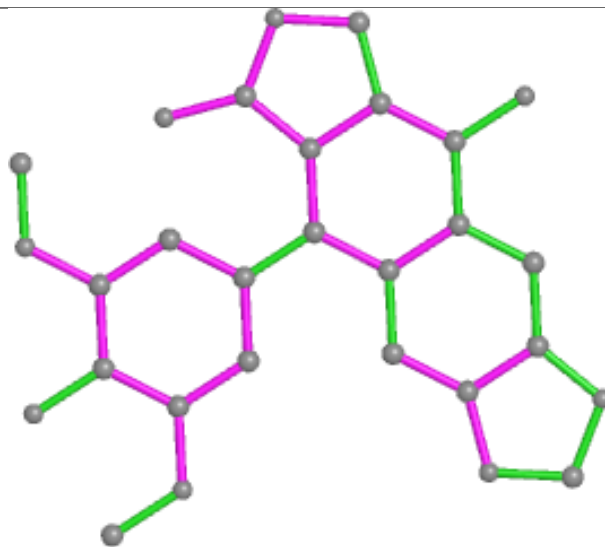




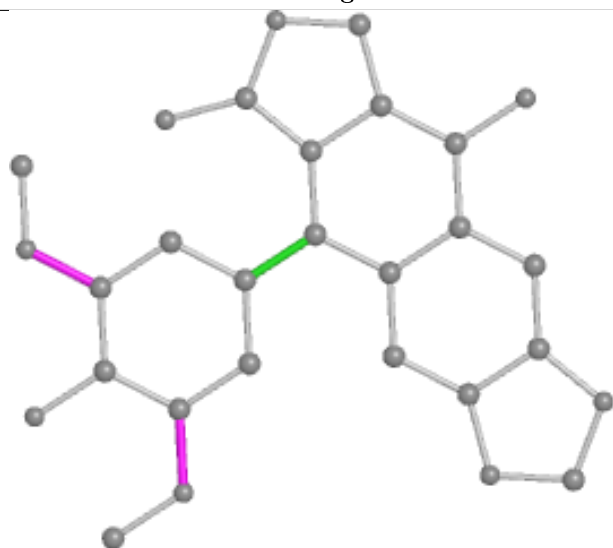
## Ligand 89O B 505



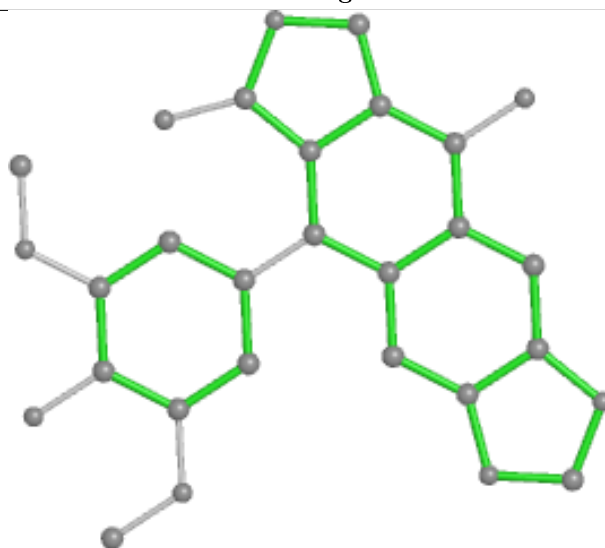
Bond lengths



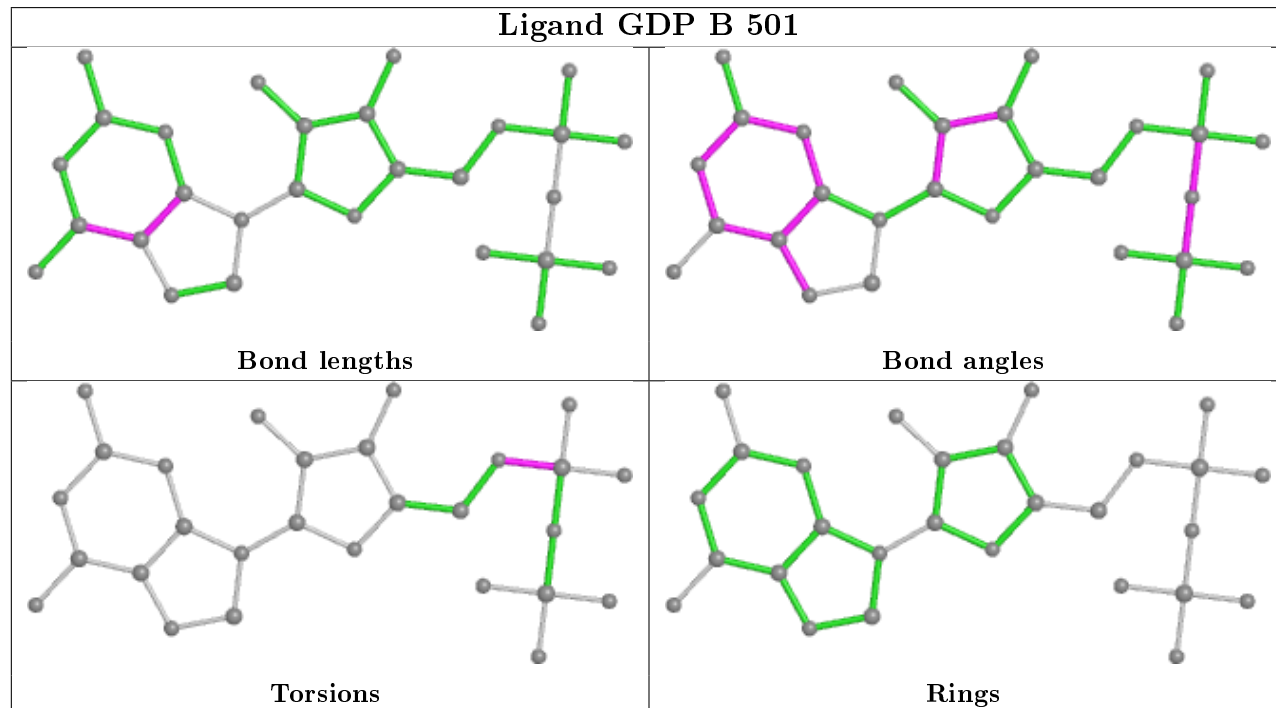
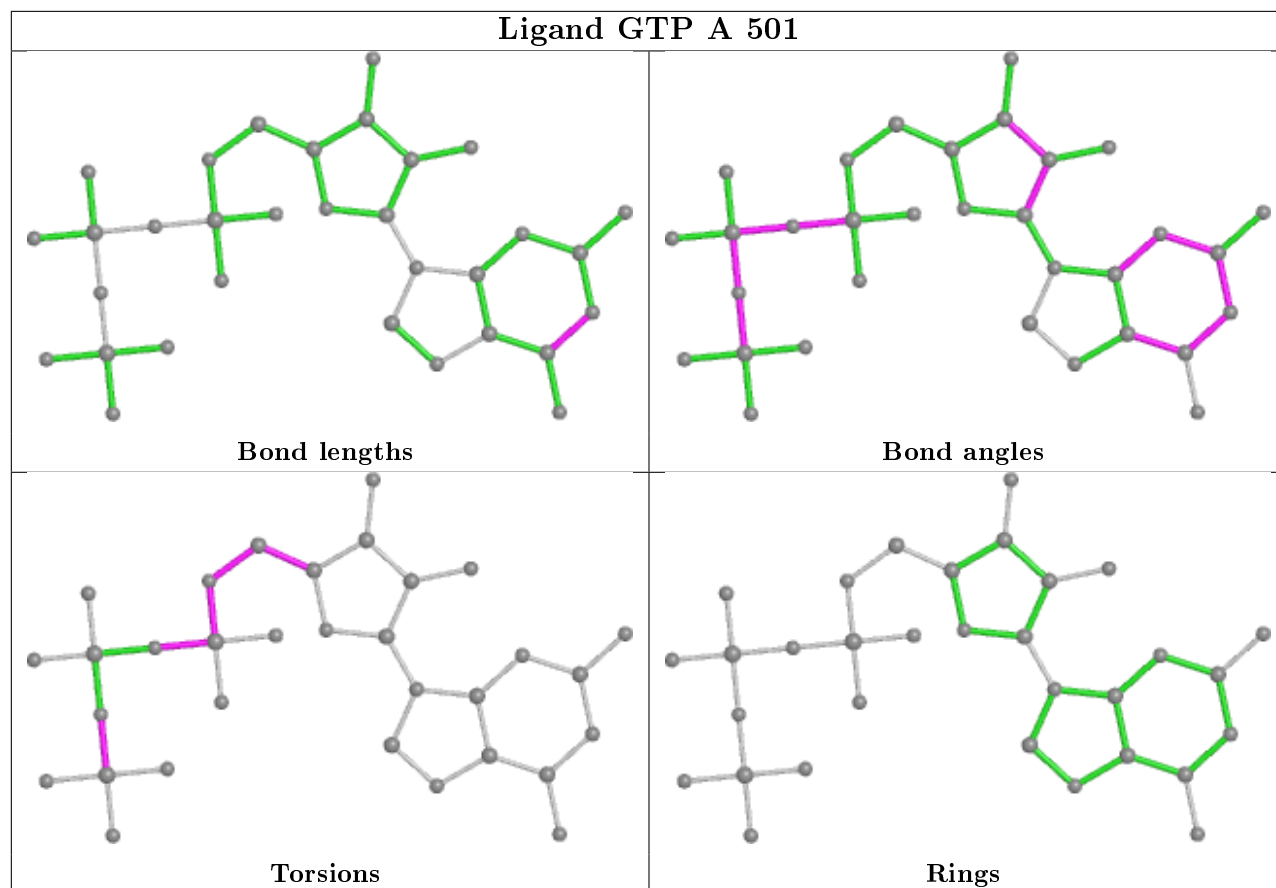
Bond angles

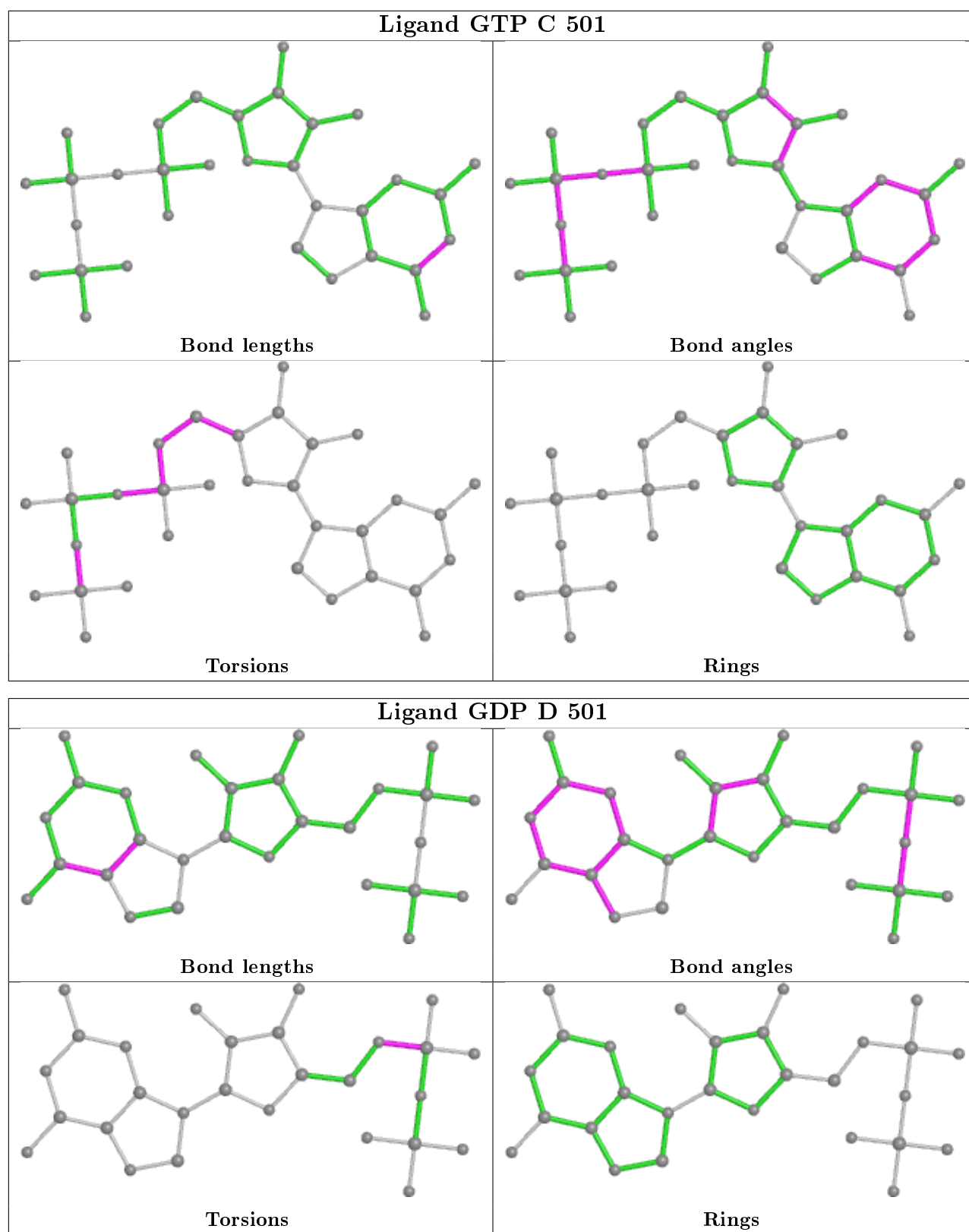


Torsions



Rings





## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues ⓘ

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	437/450 (97%)	0.14	4 (0%) 84 80	23, 43, 76, 101	0
1	C	440/450 (97%)	-0.17	2 (0%) 91 88	17, 32, 60, 79	0
2	B	427/445 (95%)	0.10	10 (2%) 60 50	20, 41, 75, 132	0
2	D	421/445 (94%)	0.51	36 (8%) 10 5	28, 60, 95, 117	0
3	E	121/143 (84%)	0.45	8 (6%) 18 11	29, 59, 94, 105	0
4	F	334/384 (86%)	1.24	89 (26%) 0 0	33, 70, 134, 151	0
All	All	2180/2317 (94%)	0.33	149 (6%) 17 10	17, 48, 99, 151	0

The worst 5 of 149 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	177	GLY	7.5
4	F	173	ILE	7.1
4	F	231	ALA	6.8
4	F	233	PHE	6.3
4	F	170	LEU	6.1

### 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 carbohydrates in this entry.

## 6.4 Ligands

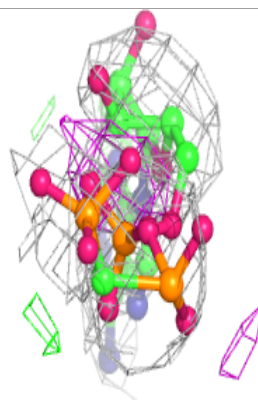
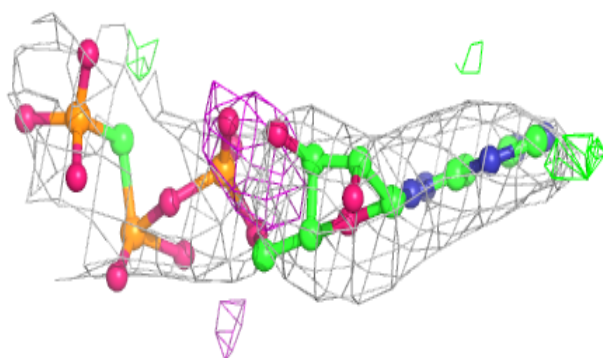
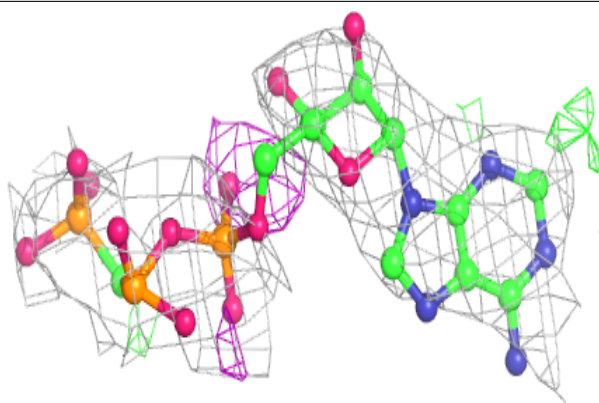
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
11	ACP	F	401	31/31	0.76	0.30	87,104,134,140	0
6	MG	D	503	1/1	0.77	0.12	53,53,53,53	0
10	89O	B	505	29/29	0.92	0.28	26,44,62,67	0
8	GDP	D	501	28/28	0.92	0.20	42,61,78,82	0
10	89O	D	502	29/29	0.92	0.28	37,55,69,73	0
9	MES	B	504	12/12	0.93	0.29	59,72,80,83	0
7	CA	A	503	1/1	0.95	0.08	86,86,86,86	0
9	MES	B	503	12/12	0.95	0.19	27,46,67,75	0
6	MG	A	502	1/1	0.96	0.23	22,22,22,22	0
8	GDP	B	501	28/28	0.97	0.23	14,26,36,49	0
5	GTP	C	501	32/32	0.98	0.18	12,24,39,50	0
5	GTP	A	501	32/32	0.98	0.23	18,29,39,45	0
6	MG	B	502	1/1	0.98	0.37	30,30,30,30	0
7	CA	C	503	1/1	0.98	0.09	42,42,42,42	0
6	MG	C	502	1/1	0.99	0.23	22,22,22,22	0

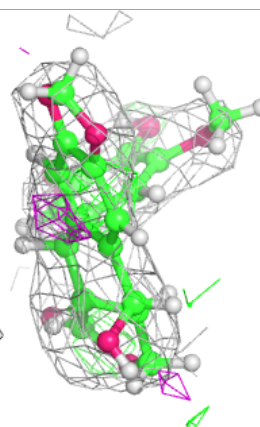
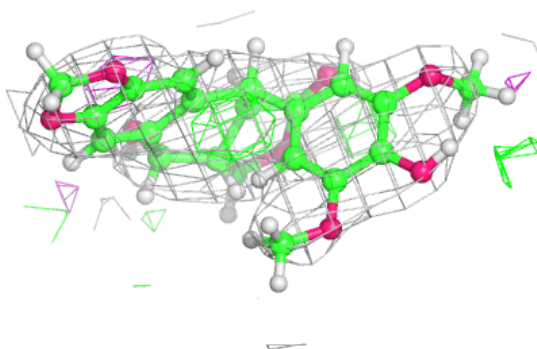
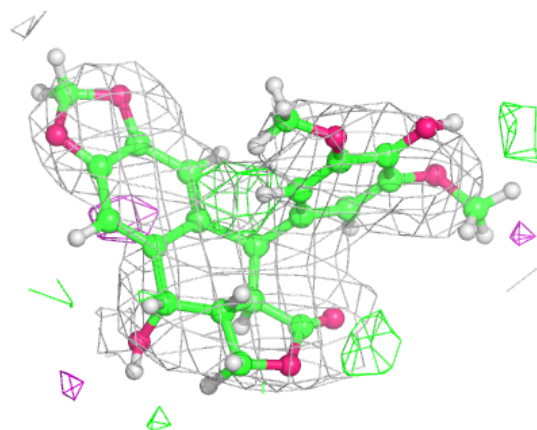
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around 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 89O B 505:**

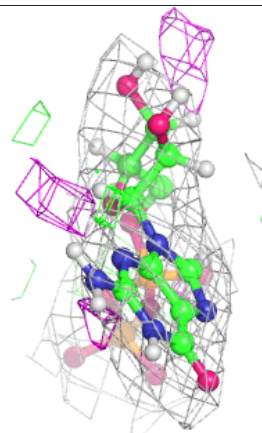
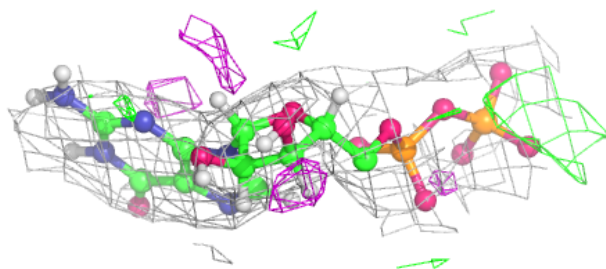
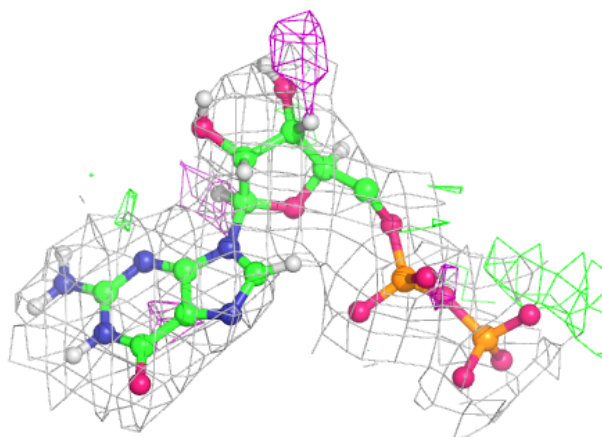
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





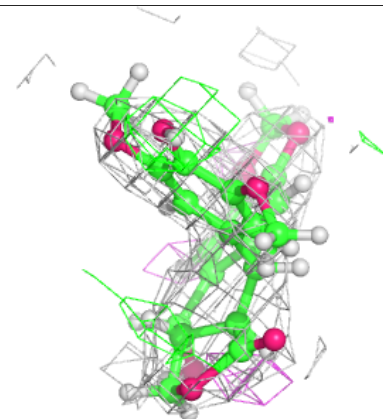
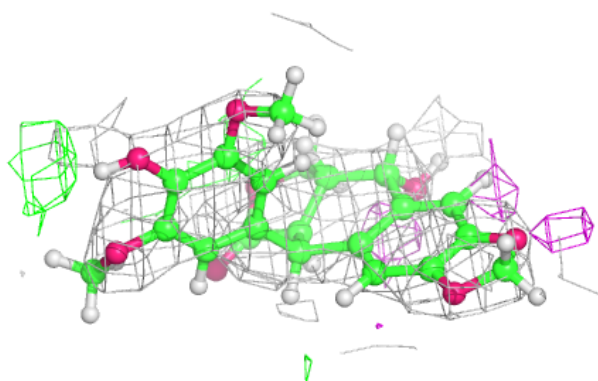
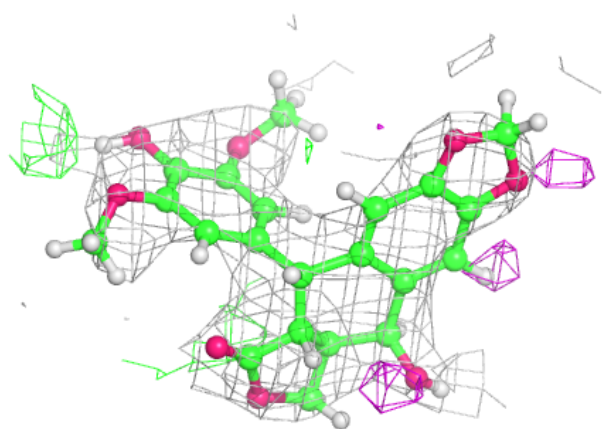
**Electron density around GDP D 501:**

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



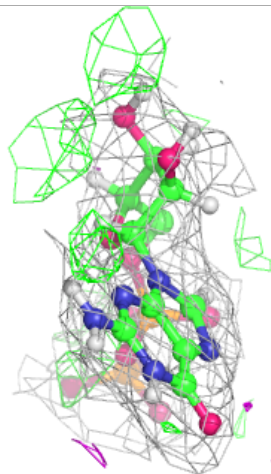
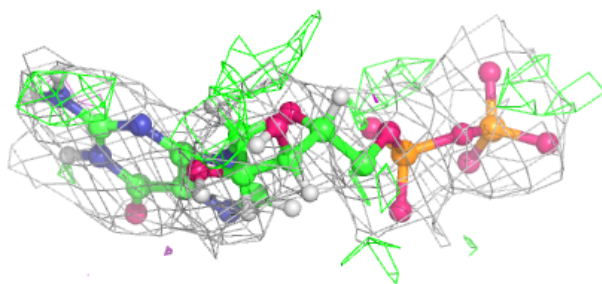
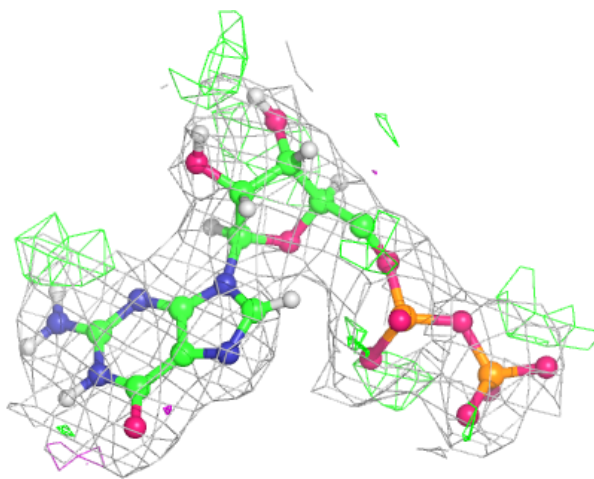
**Electron density around 89O D 502:**

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



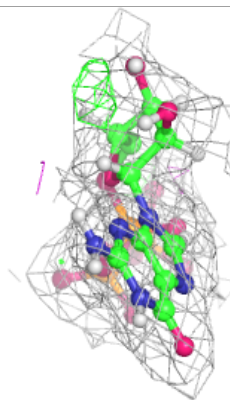
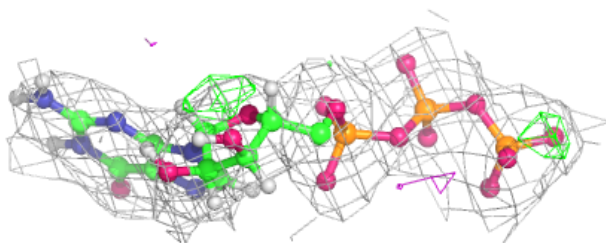
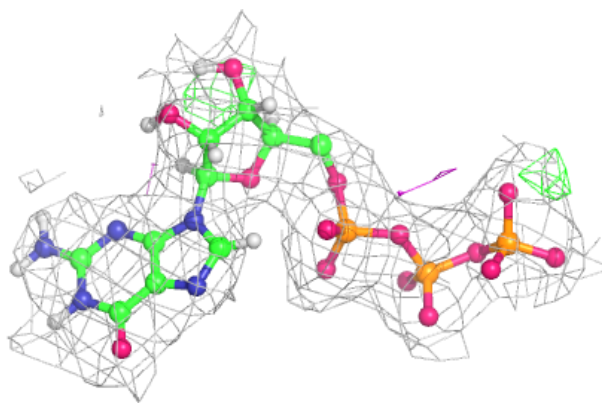
**Electron density around GDP B 501:**

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

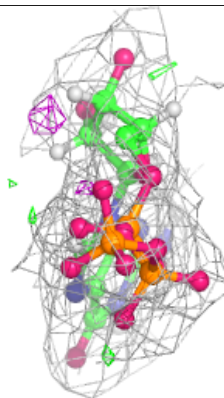
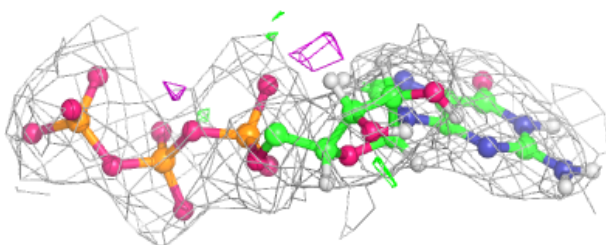
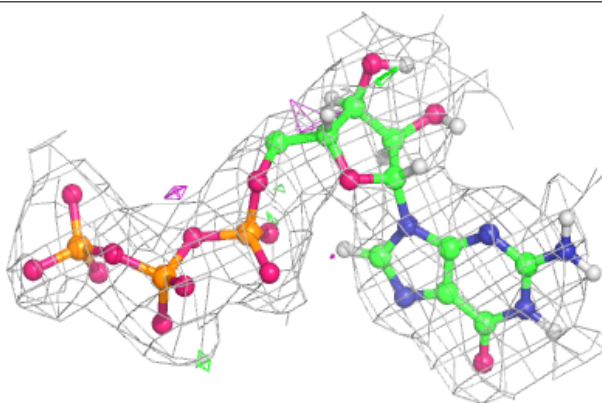


**Electron density around GTP C 501:**

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

**Electron density around 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.