



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 20, 2022 – 12:55 pm GMT

PDB ID : 8C0F  
Title : Tubulin-PTC596 complex  
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Deposited on : 2022-12-16  
Resolution : 2.10 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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 : 2.31.3  
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) : 2.31.3

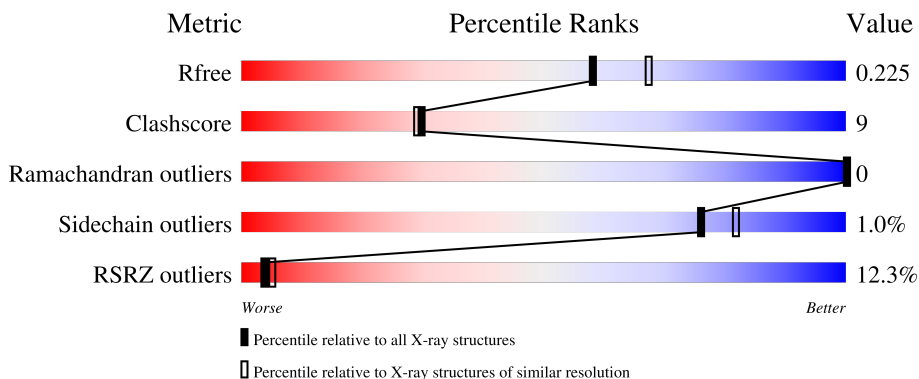
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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	

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
13	IMD	E	901	-	-	X	-

## 2 Entry composition [i](#)

There are 15 unique types of molecules in this entry. The entry contains 18253 atoms, of which 32 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	2	0
			3431	2171	584	653	23			
1	C	440	Total	C	N	O	S	0	8	0
			3494	2209	591	670	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	424	Total	C	N	O	S	0	5	0
			3385	2124	585	650	26			
2	D	420	Total	C	N	O	S	0	2	0
			3321	2086	566	643	26			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	122	Total	C	N	O	S	0	1	0
			1017	627	183	202	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 beta-2B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	F	337	Total	C	N	O	S	0	1	0
			2777	1785	474	503	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
			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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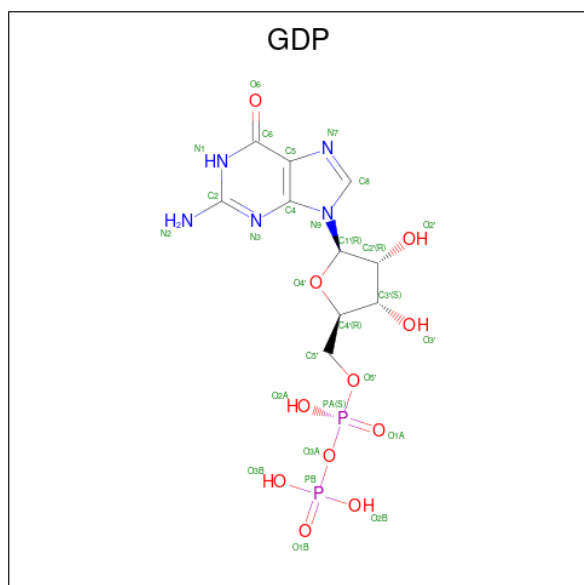
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	F	1	Total	Mg	0	0
			1	1		

- 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 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	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: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



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: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



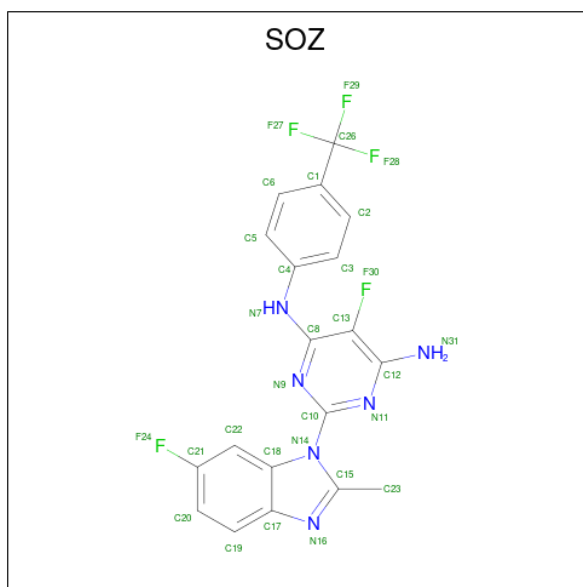
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
10	B	1	6	3	3	0	0
10	C	1	6	3	3	0	0
10	C	1	6	3	3	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
10	C	1	Total	C	O	0	0	
			6	3	3			
10	C	1	Total	C	H	O	0	0
			14	3	8	3		

- Molecule 11 is 5-fluoranyl-2-(6-fluoranyl-2-methyl-benzimidazol-1-yl)- {N}4-[4-(trifluoromethyl)phenyl]pyrimidine-4,6-diamine (three-letter code: SOZ) (formula: C<sub>19</sub>H<sub>13</sub>F<sub>5</sub>N<sub>6</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
11	B	1	Total	C	F	H	N	0	0
			43	19	5	13	6		

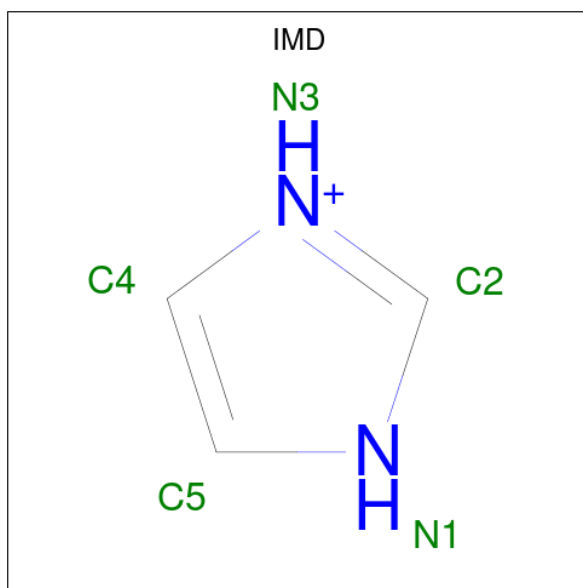
- Molecule 12 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).





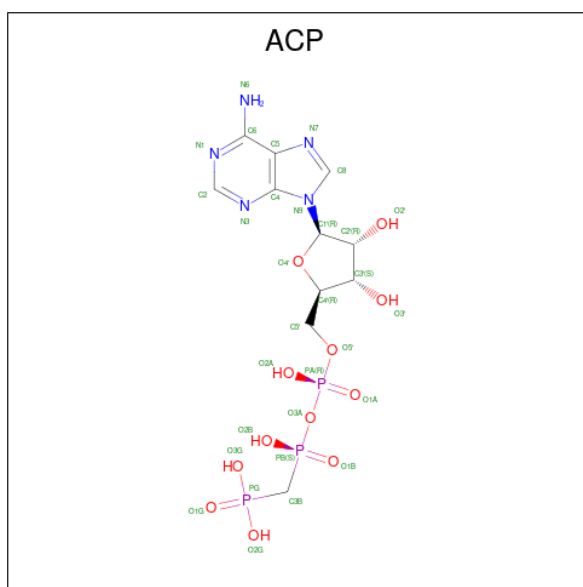
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
12	C	1	10	2	6	2	0	0

- Molecule 13 is IMIDAZOLE (three-letter code: IMD) (formula:  $C_3H_5N_2$ ).



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

- Molecule 14 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		
14	F	1	31	11	5	12	3	0	0

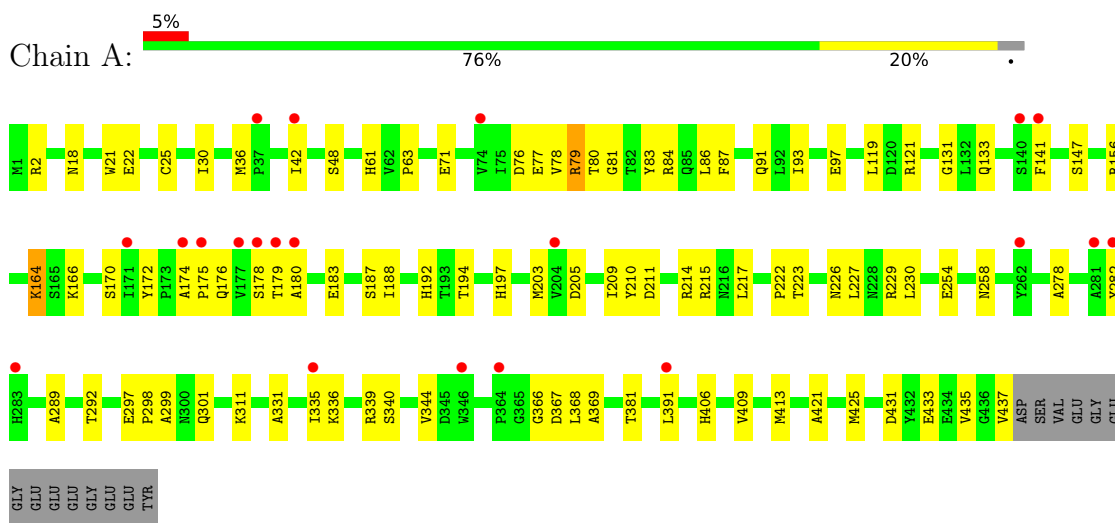
- Molecule 15 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	A	98	Total	O	0	0
			98	98		
15	B	116	Total	O	0	0
			116	116		
15	C	236	Total	O	0	0
			236	236		
15	D	67	Total	O	0	0
			67	67		
15	E	21	Total	O	0	0
			21	21		
15	F	19	Total	O	0	0
			19	19		

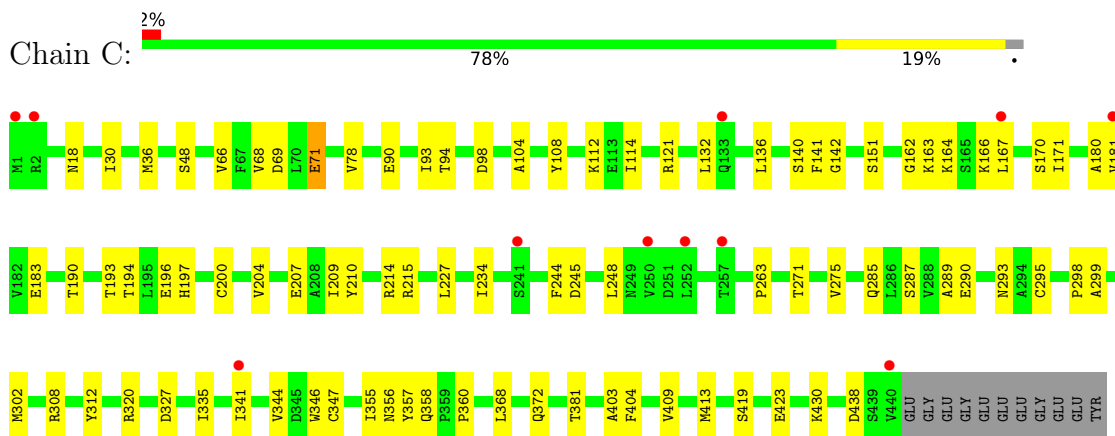
### 3 Residue-property plots [i](#)

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.

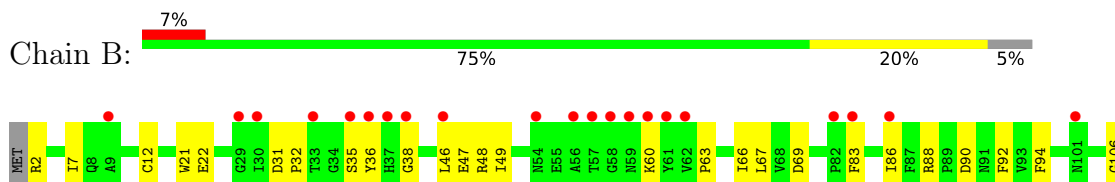
- Molecule 1: Tubulin alpha-1B chain

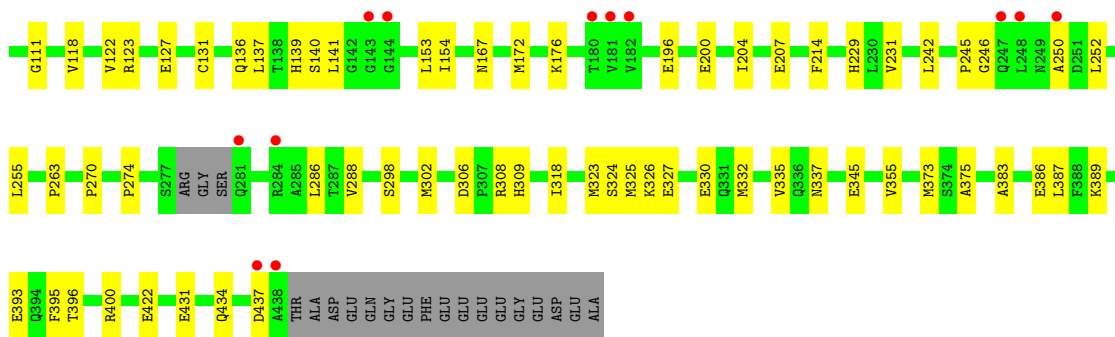


- Molecule 1: Tubulin alpha-1B chain

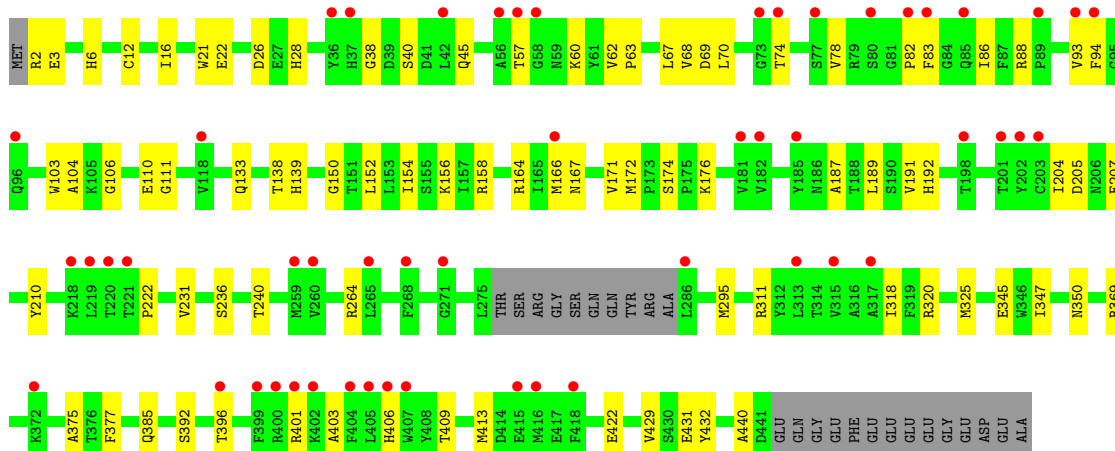
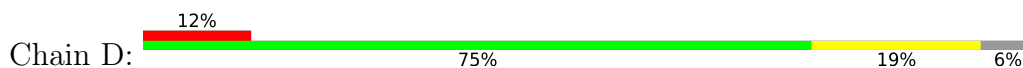


- Molecule 2: Tubulin beta-2B chain





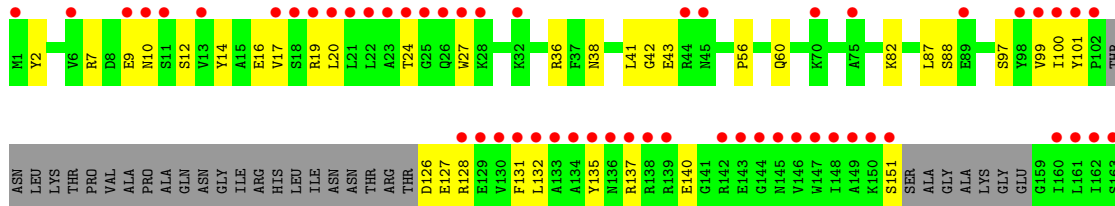
• Molecule 2: Tubulin beta-2B chain

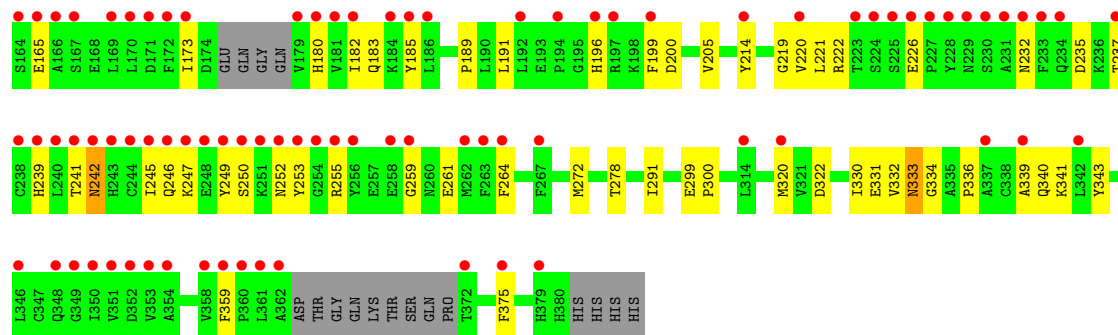


• Molecule 3: Stathmin-4



• Molecule 4: Tubulin beta-2B chain





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	104.68Å 158.26Å 180.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.55 – 2.10 49.55 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.8 (49.55-2.10) 99.8 (49.55-2.10)	Depositor EDS
$R_{merge}$	0.14	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.12 (at 2.10Å)	Xtrriage
Refinement program	PHENIX 1.15.2_3472	Depositor
R, $R_{free}$	0.194 , 0.225 0.194 , 0.225	Depositor DCC
$R_{free}$ test set	8650 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	47.6	Xtrriage
Anisotropy	0.198	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 57.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	18253	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	70.0	wwPDB-VP

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

<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: MG, MES, GTP, ACP, CA, GOL, GDP, IMD, SOZ, 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	0.25	0/3509	0.42	0/4763
1	C	0.26	0/3575	0.43	0/4854
2	B	0.25	0/3459	0.43	0/4683
2	D	0.25	0/3394	0.41	0/4597
3	E	0.24	0/1025	0.35	0/1360
4	F	0.24	0/2840	0.40	0/3834
All	All	0.25	0/17802	0.41	0/24091

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	3431	0	3342	64	0
1	C	3494	0	3395	59	0
2	B	3385	0	3255	69	0
2	D	3321	0	3194	61	0
3	E	1017	0	1029	18	0
4	F	2777	0	2750	62	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	B	28	0	12	0	0
8	D	28	0	12	1	0
9	B	12	0	12	0	0
10	B	6	0	8	0	0
10	C	24	8	32	1	0
11	B	30	13	0	1	0
12	C	4	6	6	1	0
13	E	5	5	5	4	0
14	F	31	0	14	0	0
15	A	98	0	0	4	0
15	B	116	0	0	4	0
15	C	236	0	0	9	0
15	D	67	0	0	7	0
15	E	21	0	0	2	0
15	F	19	0	0	0	0
All	All	18221	32	17090	327	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 (327) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:176:LYS:HD2	2:B:207:GLU:HG3	1.39	1.05
1:C:204:VAL:HG13	1:C:302[B]:MET:HE2	1.63	0.79
4:F:320:MET:HB2	4:F:330:ILE:HD11	1.65	0.77
1:C:234:ILE:HG21	1:C:302[B]:MET:SD	2.26	0.76
2:B:437:ASP:OD1	15:B:601:HOH:O	2.04	0.75
2:B:83:PHE:O	2:B:86:ILE:HG22	1.89	0.71
1:C:190:THR:O	1:C:194:THR:HG23	1.89	0.71
1:C:93:ILE:HD11	1:C:121:ARG:HG3	1.73	0.71
2:B:288:VAL:HG22	2:B:323:MET:HE2	1.72	0.70
2:B:288:VAL:HG22	2:B:323:MET:CE	2.22	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:275:VAL:HG13	1:C:368:LEU:HD21	1.74	0.69
1:C:327:ASP:OD2	15:C:601:HOH:O	2.10	0.69
2:D:406:HIS:HA	2:D:409:THR:HG22	1.73	0.69
2:D:432:TYR:OH	15:D:601:HOH:O	2.10	0.69
3:E:137:LYS:O	3:E:141:GLU:HG2	1.93	0.68
1:A:188:ILE:HD12	1:A:425:MET:HG3	1.75	0.68
2:D:311[B]:ARG:NH2	2:D:345[B]:GLU:OE1	2.27	0.68
4:F:333:ASN:ND2	4:F:336:PRO:HB3	2.08	0.68
2:D:325:MET:HE2	15:D:636:HOH:O	1.94	0.67
2:B:242:LEU:HA	2:B:250:ALA:CB	2.25	0.67
2:B:383:ALA:O	2:B:386:GLU:HG2	1.95	0.66
1:C:90[A]:GLU:OE1	15:C:602:HOH:O	2.13	0.66
3:E:105:MET:HB2	13:E:901:IMD:N1	2.09	0.66
1:A:217:LEU:HD21	1:A:368:LEU:HD23	1.77	0.66
1:A:78:VAL:HG23	15:A:601:HOH:O	1.94	0.65
2:B:35:SER:HB2	2:B:60:LYS:NZ	2.11	0.65
2:B:136:GLN:HA	2:B:167[A]:ASN:O	1.96	0.64
2:B:176:LYS:HD2	2:B:207:GLU:CG	2.22	0.64
3:E:129:HIS:O	3:E:133:VAL:HG23	1.98	0.64
4:F:82:LYS:NZ	4:F:97:SER:O	2.29	0.64
2:D:22:GLU:HG2	2:D:83:PHE:CD1	2.33	0.64
1:C:210:TYR:CE2	1:C:214:ARG:HD2	2.33	0.63
1:C:271:THR:HG21	1:C:295:CYS:O	1.98	0.63
2:D:295:MET:CG	2:D:377:PHE:HB2	2.29	0.63
2:D:347:ILE:HG22	2:D:350:ASN:HB3	1.80	0.63
1:A:76:ASP:HA	1:A:79:ARG:CD	2.29	0.63
4:F:173:ILE:HD12	4:F:180:HIS:HB2	1.80	0.63
2:B:196:GLU:HG2	15:B:703:HOH:O	1.99	0.62
1:A:76:ASP:HA	1:A:79:ARG:HD2	1.81	0.62
2:B:229:HIS:ND1	15:B:604:HOH:O	2.30	0.62
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.34	0.62
1:C:320:ARG:HA	1:C:356:ASN:O	1.99	0.62
1:C:438:ASP:OD1	15:C:603:HOH:O	2.16	0.62
1:A:36:MET:HB3	1:A:61:HIS:CE1	2.37	0.60
2:D:264:ARG:NE	2:D:431:GLU:OE2	2.35	0.60
4:F:100:ILE:HD11	4:F:128:ARG:HA	1.82	0.60
1:C:293:ASN:HA	1:C:335:ILE:HD11	1.82	0.60
2:D:176:LYS:HD2	2:D:207:GLU:HG3	1.84	0.59
1:C:163:LYS:HG3	3:E:90:ASN:OD1	2.02	0.59
3:E:78:HIS:HA	3:E:81[B]:GLU:HG2	1.84	0.59
1:C:30:ILE:HD11	1:C:36:MET:HE2	1.84	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:326:LYS:O	2:B:330:GLU:HG3	2.03	0.58
1:A:48:SER:HB2	15:A:684:HOH:O	2.02	0.58
4:F:151:SER:HB3	4:F:180:HIS:CD2	2.38	0.58
2:B:306:ASP:HB3	2:B:309:HIS:ND1	2.19	0.58
1:C:360:PRO:HB2	15:C:767:HOH:O	2.03	0.58
4:F:101:TYR:N	4:F:126:ASP:OD1	2.26	0.57
1:C:215:ARG:NH2	1:C:299:ALA:HB1	2.19	0.57
3:E:105:MET:HB2	13:E:901:IMD:C2	2.35	0.57
1:C:180:ALA:O	1:C:183:GLU:HG3	2.04	0.57
1:A:226:ASN:ND2	1:A:367:ASP:OD2	2.37	0.57
2:B:389:LYS:O	2:B:393:GLU:HG2	2.04	0.57
2:D:69:ASP:O	2:D:94:PHE:HA	2.04	0.57
1:A:210:TYR:CE2	1:A:214:ARG:HD2	2.40	0.56
2:D:40:SER:O	2:D:45:GLN:HG2	2.05	0.56
1:A:119:LEU:HD11	1:A:156:ARG:HB3	1.87	0.56
1:C:248:LEU:HD12	1:C:357:TYR:OH	2.05	0.56
4:F:100:ILE:HD11	4:F:128:ARG:HG3	1.86	0.56
1:A:211:ASP:HB3	1:A:215:ARG:NH1	2.21	0.56
2:B:298:SER:HB3	2:B:308[A]:ARG:HH12	1.70	0.56
15:C:816:HOH:O	3:E:115:HIS:HB3	2.04	0.56
4:F:252:ASN:HB3	4:F:255:ARG:HB2	1.87	0.56
1:A:22:GLU:HG3	1:A:83:TYR:CE2	2.41	0.56
1:A:297:GLU:OE2	1:A:339:ARG:NH2	2.25	0.56
1:A:254:GLU:HG2	1:A:258:ASN:ND2	2.21	0.56
2:D:6:HIS:CD2	2:D:21:TRP:HE1	2.24	0.55
2:B:36:TYR:CD1	2:B:46:LEU:HD21	2.41	0.55
2:B:21:TRP:CZ3	2:B:63:PRO:HB3	2.42	0.55
2:B:88:ARG:NH1	2:B:90:ASP:HB2	2.22	0.55
2:D:396:THR:HG22	2:D:422:GLU:OE2	2.07	0.55
2:D:57:THR:O	2:D:60:LYS:HE2	2.06	0.55
4:F:259:GLY:O	4:F:261:GLU:HG3	2.07	0.55
2:D:21:TRP:CZ3	2:D:63:PRO:HB3	2.42	0.55
1:C:419:SER:O	1:C:423[A]:GLU:HG3	2.06	0.54
2:D:104:ALA:HB2	2:D:413:MET:SD	2.47	0.54
1:A:164:LYS:HD2	1:A:164:LYS:N	2.23	0.54
4:F:245:ILE:O	4:F:249:TYR:HB2	2.08	0.54
2:B:323:MET:HB3	2:B:373:MET:HE2	1.90	0.54
2:B:69:ASP:O	2:B:94:PHE:HA	2.08	0.54
2:B:324:SER:OG	2:B:327:GLU:HG3	2.08	0.54
2:B:325:MET:SD	2:B:355:VAL:HG11	2.47	0.54
4:F:220:VAL:HG11	4:F:339:ALA:HB2	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:2:ARG:NH1	2:B:131:CYS:SG	2.79	0.53
2:D:240:THR:HG21	2:D:320:ARG:HD2	1.91	0.53
1:C:104:ALA:HB2	1:C:413:MET:SD	2.49	0.53
1:A:433:GLU:O	1:A:437:VAL:HG13	2.09	0.53
4:F:331:GLU:HG2	4:F:332:VAL:H	1.74	0.53
4:F:14:TYR:HB3	4:F:41:LEU:HD13	1.90	0.53
4:F:222:ARG:O	4:F:241:THR:HB	2.09	0.53
2:B:47:GLU:HB3	2:B:245:PRO:HG3	1.91	0.52
4:F:221:LEU:O	4:F:261:GLU:HA	2.09	0.52
3:E:92:ASN:O	3:E:96:MET:HG2	2.08	0.52
1:A:180:ALA:O	1:A:183:GLU:HG3	2.09	0.52
1:C:248:LEU:HD13	1:C:355:ILE:HD12	1.89	0.52
2:D:21:TRP:CE3	2:D:63:PRO:HB3	2.44	0.52
2:B:337:ASN:OD1	4:F:36:ARG:HD3	2.08	0.52
2:D:236:SER:O	2:D:240:THR:HG23	2.10	0.52
3:E:44:ASP:HB3	3:E:45:PRO:HD2	1.91	0.52
2:B:396:THR:O	2:B:400:ARG:HG3	2.10	0.52
4:F:331:GLU:HG2	4:F:332:VAL:N	2.25	0.52
2:D:406:HIS:HA	2:D:409:THR:CG2	2.40	0.52
2:B:106:GLY:O	2:B:111:GLY:HA3	2.10	0.51
2:D:187:ALA:O	2:D:191:VAL:HG23	2.10	0.51
4:F:173:ILE:HD12	4:F:180:HIS:CB	2.41	0.51
4:F:20:LEU:O	4:F:24:THR:HG23	2.10	0.51
4:F:43:GLU:OE1	4:F:43:GLU:N	2.29	0.51
2:B:35:SER:HB2	2:B:60:LYS:HZ2	1.74	0.51
1:C:151:SER:HB2	1:C:193:THR:CG2	2.40	0.51
2:B:323:MET:HB3	2:B:373:MET:CE	2.41	0.51
2:D:106:GLY:O	2:D:111:GLY:HA3	2.11	0.51
2:B:242:LEU:HA	2:B:250:ALA:HB1	1.92	0.51
3:E:72:LEU:O	3:E:76:ARG:HG2	2.11	0.51
4:F:247:LYS:HG2	4:F:253:TYR:CZ	2.46	0.51
2:D:167:ASN:ND2	15:D:603:HOH:O	2.44	0.50
1:A:431:ASP:O	1:A:435:VAL:HG23	2.11	0.50
4:F:2:TYR:CZ	4:F:359:PHE:HB3	2.45	0.50
1:C:141:PHE:CE1	1:C:170:SER:HB3	2.47	0.50
2:D:401:ARG:HG3	2:D:403:ALA:HB2	1.93	0.50
1:C:244:PHE:CD1	1:C:358:GLN:HG2	2.46	0.50
3:E:139:LEU:O	3:E:143:ALA:HB2	2.12	0.50
1:A:22:GLU:HG3	1:A:83:TYR:HE2	1.77	0.50
1:C:298:PRO:HG2	1:C:308:ARG:NH2	2.26	0.50
2:D:22:GLU:OE2	2:D:82:PRO:HG2	2.13	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:2:TYR:CE1	4:F:359:PHE:HB3	2.47	0.49
4:F:272:MET:CE	4:F:278:THR:HG22	2.42	0.49
1:A:192:HIS:CG	1:A:421:ALA:HA	2.48	0.49
1:A:336:LYS:HD3	3:E:24:LEU:HD12	1.94	0.49
4:F:242:ASN:OD1	4:F:242:ASN:N	2.39	0.49
1:A:187:SER:HB3	1:A:391:LEU:HD21	1.94	0.49
1:C:66:VAL:HG12	1:C:68[B]:VAL:HG23	1.94	0.49
15:C:712:HOH:O	13:E:901:IMD:H2	2.13	0.49
2:D:152:LEU:O	2:D:156:LYS:HG2	2.13	0.49
4:F:14:TYR:HA	4:F:17:VAL:HB	1.94	0.49
1:A:215:ARG:NH2	1:A:299:ALA:O	2.45	0.49
2:D:83:PHE:O	2:D:86:ILE:HG22	2.13	0.49
2:D:295:MET:HG3	2:D:377:PHE:HB2	1.95	0.49
1:A:176:GLN:HG3	4:F:56:PRO:HB3	1.94	0.48
2:B:141:LEU:HD12	2:B:172:MET:SD	2.53	0.48
2:D:26:ASP:OD2	2:D:369:ARG:HD3	2.13	0.48
1:A:2:ARG:HB2	1:A:133:GLN:CG	2.43	0.48
1:A:172:TYR:HB3	1:A:205:ASP:HA	1.96	0.48
1:C:204:VAL:HG22	1:C:302[B]:MET:CE	2.42	0.48
1:C:312:TYR:CE1	1:C:341:ILE:HG23	2.48	0.48
1:A:21:TRP:CE3	1:A:63:PRO:HB3	2.48	0.48
2:B:431:GLU:O	2:B:434:GLN:HG2	2.14	0.48
2:D:16:ILE:HD11	2:D:138:THR:HB	1.95	0.48
1:A:166:LYS:HE2	1:A:197:HIS:O	2.13	0.48
1:A:210:TYR:CE1	1:A:222:PRO:HD2	2.48	0.48
3:E:11:LEU:HD11	3:E:18:GLN:OE1	2.14	0.48
2:B:318:ILE:HG12	11:B:505:SOZ:C20	2.44	0.48
1:C:151:SER:HA	1:C:194:THR:HG22	1.95	0.48
2:D:62:VAL:HG11	2:D:88:ARG:HG3	1.96	0.48
1:A:406:HIS:CD2	2:B:263:PRO:HG3	2.49	0.48
2:D:38:GLY:HA3	2:D:45:GLN:OE1	2.14	0.48
3:E:78:HIS:O	3:E:81[B]:GLU:HG2	2.14	0.48
2:D:150:GLY:O	2:D:154:ILE:HG12	2.14	0.47
4:F:2:TYR:HB2	4:F:27:TRP:CD2	2.48	0.47
1:C:287:SER:OG	1:C:290:GLU:HG3	2.14	0.47
1:C:430:LYS:HD2	15:C:744:HOH:O	2.15	0.47
2:D:295:MET:HG2	2:D:377:PHE:HB2	1.97	0.47
4:F:7:ARG:HB2	4:F:42:GLY:HA2	1.95	0.47
1:A:76:ASP:OD1	1:A:79:ARG:HD3	2.15	0.47
1:C:30:ILE:HG12	1:C:36:MET:HE3	1.96	0.47
4:F:334:GLY:C	4:F:336:PRO:HD3	2.35	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:31:ASP:HB2	2:B:32:PRO:CD	2.44	0.47
2:B:66:ILE:HD12	2:B:122:VAL:HG22	1.97	0.47
2:D:171:VAL:HA	2:D:204:ILE:O	2.15	0.47
1:A:298:PRO:HA	1:A:301:GLN:CD	2.35	0.47
2:B:172:MET:HG3	2:B:387:LEU:HD11	1.97	0.47
1:C:108:TYR:O	1:C:112:LYS:HG2	2.16	0.46
4:F:87:LEU:O	4:F:88:SER:HB3	2.15	0.46
1:A:223:THR:O	1:A:227:LEU:HG	2.15	0.46
4:F:135:TYR:OH	4:F:165:GLU:HA	2.14	0.46
4:F:137:ARG:HA	4:F:140:GLU:HG2	1.98	0.46
4:F:191:LEU:HD12	4:F:196:HIS:CE1	2.51	0.46
2:D:57:THR:O	2:D:60:LYS:HG3	2.16	0.46
2:D:70:LEU:HD13	2:D:110:GLU:HB2	1.98	0.46
2:B:31:ASP:OD1	2:B:35:SER:N	2.47	0.46
2:D:164:ARG:HA	2:D:164:ARG:HD3	1.71	0.46
1:A:209:ILE:HG23	1:A:230:LEU:HD23	1.96	0.46
2:B:22:GLU:HG3	2:B:83:PHE:CE1	2.50	0.46
1:C:30:ILE:HD11	1:C:36:MET:CE	2.45	0.46
4:F:237:THR:HG21	4:F:250:SER:HA	1.98	0.46
4:F:299:GLU:N	4:F:300:PRO:HD2	2.31	0.46
4:F:100:ILE:CD1	4:F:128:ARG:HA	2.46	0.45
2:B:172:MET:CE	2:B:387:LEU:HD21	2.46	0.45
4:F:9:GLU:HG2	4:F:10:ASN:OD1	2.16	0.45
2:B:204:ILE:HD13	2:B:231:VAL:HG13	1.97	0.45
2:D:174:SER:CB	2:D:207:GLU:HB2	2.47	0.45
1:A:174:ALA:O	1:A:178:SER:N	2.49	0.45
1:C:289:ALA:O	1:C:293:ASN:ND2	2.48	0.45
2:D:345[B]:GLU:HB2	2:D:440:ALA:HB2	1.98	0.45
1:C:167:LEU:HG	1:C:200:CYS:HB3	1.98	0.45
1:A:409:VAL:HA	1:A:413:MET:O	2.17	0.45
4:F:99:VAL:O	4:F:127:GLU:HB2	2.17	0.45
1:A:141:PHE:CE1	1:A:170:SER:HB3	2.52	0.45
2:B:118:VAL:HG11	2:B:153:LEU:HD11	1.98	0.45
2:D:392:SER:O	2:D:396:THR:HG23	2.17	0.45
2:B:67:LEU:N	2:B:67:LEU:HD12	2.32	0.45
1:A:179:THR:HG21	15:A:626:HOH:O	2.17	0.45
2:D:67:LEU:N	2:D:67:LEU:HD12	2.31	0.45
1:A:76:ASP:O	1:A:80:THR:HG22	2.17	0.45
1:A:87:PHE:HA	1:A:91:GLN:OE1	2.17	0.45
2:B:46:LEU:HA	2:B:49:ILE:HB	1.98	0.44
2:B:345:GLU:OE1	2:B:345:GLU:N	2.41	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:207:GLU:OE2	15:C:604:HOH:O	2.20	0.44
1:A:278:ALA:HA	1:A:369:ALA:HB2	1.99	0.44
1:C:142:GLY:HA3	1:C:183:GLU:OE1	2.18	0.44
2:D:3:GLU:OE1	2:D:3:GLU:N	2.49	0.44
2:B:167[A]:ASN:ND2	15:B:609:HOH:O	2.50	0.44
1:C:136:LEU:HD12	1:C:136:LEU:N	2.32	0.44
1:C:196:GLU:HG2	15:C:662:HOH:O	2.17	0.44
4:F:272:MET:HE3	4:F:278:THR:HG22	1.99	0.44
1:C:108:TYR:CE2	13:E:901:IMD:H5	2.52	0.44
2:D:28:HIS:HA	2:D:45:GLN:HB2	2.00	0.44
1:A:93:ILE:HD11	1:A:121:ARG:HG3	2.00	0.44
1:A:141:PHE:O	1:A:147:SER:HB3	2.18	0.44
1:C:209:ILE:HG22	1:C:227:LEU:HD22	1.99	0.44
1:C:285:GLN:OE1	1:C:372:GLN:NE2	2.50	0.44
2:D:103:TRP:CE3	2:D:189:LEU:HD13	2.52	0.44
2:D:133:GLN:HG3	15:D:627:HOH:O	2.18	0.44
2:D:295:MET:SD	2:D:375:ALA:HB1	2.58	0.44
1:C:181[B]:VAL:HG21	1:C:404:PHE:CZ	2.52	0.44
4:F:38:ASN:O	4:F:60:GLN:HA	2.18	0.44
4:F:185:TYR:OH	4:F:239:HIS:HB3	2.18	0.44
4:F:200:ASP:OD1	4:F:222:ARG:HB2	2.18	0.44
4:F:214:TYR:HB3	4:F:375:PHE:HB3	1.99	0.43
4:F:232:ASN:ND2	4:F:235:ASP:HB2	2.33	0.43
1:A:2:ARG:HB3	1:A:131:GLY:O	2.18	0.43
1:A:77:GLU:HA	1:A:80:THR:HG22	2.00	0.43
2:B:31:ASP:HB2	2:B:32:PRO:HD2	2.00	0.43
3:E:105:MET:HE3	15:E:1007:HOH:O	2.18	0.43
1:A:194:THR:O	1:A:194:THR:HG22	2.18	0.43
2:B:167[B]:ASN:ND2	2:B:252:LEU:HD22	2.33	0.43
2:D:74:THR:HB	15:D:607:HOH:O	2.17	0.43
4:F:131:PHE:CZ	4:F:182:ILE:HG21	2.54	0.43
2:B:67:LEU:HD22	2:B:92:PHE:CE2	2.53	0.43
2:B:200:GLU:OE2	2:B:255:LEU:HG	2.18	0.43
2:B:270:PRO:HG2	2:B:302:MET:HB2	2.00	0.43
1:C:409:VAL:HG21	12:C:508:EDO:H22	2.00	0.43
2:B:36:TYR:CZ	2:B:38:GLY:HA3	2.54	0.43
2:B:274:PRO:HB3	2:B:286:LEU:HD21	2.00	0.43
4:F:246:GLN:O	4:F:250:SER:HB3	2.19	0.43
2:B:21:TRP:CE3	2:B:63:PRO:HB3	2.53	0.43
2:B:395:PHE:CE1	2:B:422:GLU:HB2	2.53	0.43
1:C:71:GLU:HG2	1:C:98:ASP:HB3	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:97:SER:OG	4:F:183:GLN:NE2	2.45	0.43
2:B:66:ILE:CD1	2:B:122:VAL:HG22	2.49	0.43
4:F:340:GLN:HA	4:F:343:TYR:HD2	1.84	0.43
1:A:25:CYS:SG	1:A:86:LEU:HD11	2.59	0.42
1:A:217:LEU:HD21	1:A:368:LEU:CD2	2.48	0.42
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.54	0.42
4:F:189:PRO:HA	4:F:322:ASP:HA	2.00	0.42
1:C:93:ILE:HG22	1:C:114:ILE:HD11	2.00	0.42
4:F:128:ARG:O	4:F:132:LEU:HG	2.19	0.42
1:C:132:LEU:HG	1:C:164:LYS:HD3	2.00	0.42
2:D:210:TYR:CE2	2:D:222:PRO:HG2	2.54	0.42
4:F:199:PHE:HA	4:F:241:THR:HG21	2.01	0.42
4:F:226:GLU:OE2	4:F:237:THR:HG21	2.20	0.42
2:D:12:CYS:HB2	8:D:501:GDP:C8	2.54	0.42
2:B:172:MET:HE2	2:B:387:LEU:HD21	2.00	0.42
1:C:166:LYS:HE2	1:C:197:HIS:O	2.19	0.42
1:C:312:TYR:CD1	1:C:341:ILE:HG23	2.55	0.42
2:D:204:ILE:HD13	2:D:231:VAL:HG13	2.02	0.42
1:A:42:ILE:HA	15:A:670:HOH:O	2.18	0.42
1:A:175:PRO:HA	1:A:178:SER:CB	2.50	0.42
2:D:172:MET:HB2	2:D:205:ASP:HA	2.01	0.42
2:D:318:ILE:HD11	15:D:662:HOH:O	2.19	0.42
1:A:119:LEU:HD11	1:A:156:ARG:CB	2.50	0.42
4:F:205:VAL:HG21	4:F:291:ILE:HD13	2.02	0.42
1:A:81:GLY:O	1:A:84:ARG:HG2	2.20	0.42
1:A:25:CYS:HB3	1:A:30:ILE:O	2.20	0.42
1:A:141:PHE:HB3	1:A:187:SER:OG	2.20	0.42
1:C:48:SER:OG	1:C:245:ASP:OD1	2.38	0.42
4:F:333:ASN:HD21	4:F:336:PRO:HB3	1.83	0.42
3:E:7:GLU:O	3:E:22:VAL:HA	2.20	0.41
4:F:9:GLU:H	4:F:9:GLU:CD	2.21	0.41
4:F:341:LYS:HG2	4:F:341:LYS:O	2.20	0.41
1:A:175:PRO:HA	1:A:178:SER:HB2	2.02	0.41
2:B:48:ARG:NH2	2:B:246:GLY:H	2.18	0.41
1:A:292:THR:HG22	1:A:335:ILE:HD12	2.03	0.41
2:D:385:GLN:HB2	2:D:429:VAL:HG13	2.02	0.41
4:F:320:MET:HB2	4:F:330:ILE:CD1	2.42	0.41
1:A:298:PRO:HA	1:A:301:GLN:NE2	2.36	0.41
2:B:387:LEU:C	2:B:387:LEU:HD23	2.41	0.41
2:D:68:VAL:HA	2:D:93:VAL:O	2.20	0.41
2:B:172:MET:HE2	2:B:172:MET:HB3	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:332:MET:O	2:B:335:VAL:HG12	2.20	0.41
2:D:2:ARG:NH1	15:D:602:HOH:O	2.40	0.41
2:B:318:ILE:O	2:B:375:ALA:HA	2.20	0.41
1:C:18:ASN:HD21	1:C:78:VAL:CG2	2.34	0.41
1:C:140:SER:HA	1:C:171:ILE:HB	2.03	0.41
1:C:162:GLY:HA2	3:E:94:ILE:HD11	2.02	0.41
4:F:219:GLY:HA3	4:F:264:PHE:CZ	2.56	0.41
1:C:263:PRO:HG2	10:C:506:GOL:H31	2.03	0.41
4:F:16:GLU:OE1	4:F:19:ARG:HD3	2.19	0.41
1:A:187:SER:CB	1:A:391:LEU:HD21	2.50	0.41
1:A:289:ALA:HA	1:A:331:ALA:CB	2.51	0.41
2:B:123:ARG:O	2:B:127:GLU:HG3	2.21	0.41
1:C:403:ALA:O	1:C:404:PHE:HB2	2.21	0.41
2:D:3:GLU:O	2:D:133:GLN:HB3	2.20	0.41
2:D:74:THR:O	2:D:78:VAL:HG23	2.20	0.41
2:D:154:ILE:HG23	2:D:166:MET:HG2	2.03	0.41
3:E:108:ASN:HB2	15:E:1013:HOH:O	2.20	0.41
2:B:137:LEU:HD23	2:B:154:ILE:HD11	2.02	0.40
4:F:131:PHE:CE1	4:F:182:ILE:HG21	2.57	0.40
1:A:18:ASN:OD1	1:A:78:VAL:HG22	2.21	0.40
1:A:97:GLU:HG3	2:B:2:ARG:CZ	2.51	0.40
1:A:229:ARG:NH1	1:A:366:GLY:HA2	2.36	0.40
1:A:311:LYS:HB3	1:A:344:VAL:HG13	2.03	0.40
2:B:242:LEU:HA	2:B:250:ALA:HB2	1.99	0.40
1:C:69:ASP:O	1:C:94:THR:HA	2.22	0.40
1:C:93:ILE:CD1	1:C:121:ARG:HG3	2.46	0.40
2:D:12:CYS:SG	2:D:171:VAL:HG21	2.61	0.40
2:D:189:LEU:O	2:D:192:HIS:HB3	2.20	0.40
2:B:7:ILE:O	2:B:137:LEU:HA	2.22	0.40
2:B:12:CYS:HB3	2:B:140:SER:HB3	2.04	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	437/451 (97%)	425 (97%)	12 (3%)	0	100	100
1	C	446/451 (99%)	437 (98%)	9 (2%)	0	100	100
2	B	425/445 (96%)	414 (97%)	11 (3%)	0	100	100
2	D	418/445 (94%)	408 (98%)	10 (2%)	0	100	100
3	E	119/143 (83%)	118 (99%)	1 (1%)	0	100	100
4	F	328/384 (85%)	315 (96%)	13 (4%)	0	100	100
All	All	2173/2319 (94%)	2117 (97%)	56 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	370/379 (98%)	363 (98%)	7 (2%)	57	63
1	C	379/379 (100%)	375 (99%)	4 (1%)	73	79
2	B	370/383 (97%)	368 (100%)	2 (0%)	88	92
2	D	365/383 (95%)	363 (100%)	2 (0%)	88	92
3	E	110/127 (87%)	109 (99%)	1 (1%)	78	84
4	F	305/342 (89%)	302 (99%)	3 (1%)	76	82
All	All	1899/1993 (95%)	1880 (99%)	19 (1%)	76	82

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	71	GLU
1	A	79	ARG
1	A	164	LYS
1	A	203	MET

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Mol	Chain	Res	Type
1	A	282	TYR
1	A	340	SER
1	A	381	THR
2	B	139	HIS
2	B	214	PHE
1	C	71	GLU
1	C	347[A]	CYS
1	C	347[B]	CYS
1	C	381	THR
2	D	139	HIS
2	D	158	ARG
3	E	75	LYS
4	F	12	SER
4	F	242	ASN
4	F	333	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	88	HIS
1	A	101	ASN
1	C	300	ASN
4	F	269	GLN
4	F	333	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 21 ligands modelled in this entry, 7 are monoatomic - leaving 14 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
10	GOL	C	505	-	5,5,5	0.92	0	5,5,5	0.97	0
10	GOL	B	504	-	5,5,5	0.93	0	5,5,5	0.94	0
5	GTP	C	501	6	26,34,34	1.11	1 (3%)	32,54,54	1.35	5 (15%)
10	GOL	C	507	-	5,5,5	0.89	0	5,5,5	0.90	0
12	EDO	C	508	-	3,3,3	0.48	0	2,2,2	0.24	0
14	ACP	F	701	6	27,33,33	1.48	6 (22%)	32,52,52	1.77	4 (12%)
9	MES	B	503	-	12,12,12	2.16	1 (8%)	14,16,16	1.92	3 (21%)
10	GOL	C	506	-	5,5,5	0.91	0	5,5,5	0.99	0
10	GOL	C	504	-	5,5,5	0.91	0	5,5,5	1.00	0
11	SOZ	B	505	-	32,33,33	1.56	5 (15%)	40,50,50	1.27	4 (10%)
13	IMD	E	901	-	3,5,5	0.43	0	4,5,5	0.55	0
8	GDP	B	501	6	24,30,30	0.91	1 (4%)	30,47,47	1.08	4 (13%)
8	GDP	D	501	6	24,30,30	0.95	1 (4%)	30,47,47	1.17	3 (10%)
5	GTP	A	501	6	26,34,34	1.11	2 (7%)	32,54,54	1.44	5 (15%)

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
10	GOL	C	505	-	-	1/4/4/4	-
10	GOL	B	504	-	-	2/4/4/4	-
5	GTP	C	501	6	-	6/18/38/38	0/3/3/3
10	GOL	C	507	-	-	2/4/4/4	-
12	EDO	C	508	-	-	0/1/1/1	-
14	ACP	F	701	6	-	4/15/38/38	0/3/3/3
9	MES	B	503	-	-	1/6/14/14	0/1/1/1
10	GOL	C	506	-	-	0/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	GOL	C	504	-	-	0/4/4/4	-
11	SOZ	B	505	-	-	0/10/14/14	0/4/4/4
13	IMD	E	901	-	-	-	0/1/1/1
8	GDP	B	501	6	-	5/12/32/32	0/3/3/3
8	GDP	D	501	6	-	4/12/32/32	0/3/3/3
5	GTP	A	501	6	-	7/18/38/38	0/3/3/3

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	B	503	MES	C8-S	-7.21	1.67	1.77
11	B	505	SOZ	C8-N7	4.54	1.44	1.36
11	B	505	SOZ	C15-N14	4.18	1.43	1.37
5	C	501	GTP	C5-C6	-3.96	1.39	1.47
5	A	501	GTP	C5-C6	-3.87	1.39	1.47
14	F	701	ACP	O4'-C1'	3.11	1.45	1.41
14	F	701	ACP	PB-O3A	2.97	1.61	1.58
14	F	701	ACP	PG-O2G	2.89	1.61	1.54
14	F	701	ACP	PG-O3G	2.82	1.61	1.54
14	F	701	ACP	C8-N7	-2.34	1.30	1.34
11	B	505	SOZ	C20-C21	2.34	1.41	1.37
8	D	501	GDP	C6-N1	-2.30	1.34	1.37
11	B	505	SOZ	C12-N31	2.29	1.39	1.34
8	B	501	GDP	C6-N1	-2.21	1.34	1.37
11	B	505	SOZ	C4-N7	2.19	1.45	1.40
14	F	701	ACP	PB-O2B	2.12	1.61	1.56
5	A	501	GTP	C2-N3	2.06	1.38	1.33

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
14	F	701	ACP	PB-O3A-PA	-7.27	109.51	132.56
9	B	503	MES	C5-N4-C3	5.33	120.82	108.83
14	F	701	ACP	N3-C2-N1	-3.96	122.48	128.68
11	B	505	SOZ	C22-C18-C17	3.49	123.99	120.54
11	B	505	SOZ	N9-C10-N14	3.29	117.98	115.24
5	A	501	GTP	C5-C6-N1	3.14	119.50	113.95
8	D	501	GDP	PA-O3A-PB	-3.09	122.22	132.83
5	A	501	GTP	C8-N7-C5	3.08	108.86	102.99
5	C	501	GTP	C8-N7-C5	3.01	108.72	102.99
5	C	501	GTP	C5-C6-N1	2.97	119.19	113.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	501	GTP	PA-O3A-PB	-2.91	122.83	132.83
5	C	501	GTP	PA-O3A-PB	-2.86	123.01	132.83
5	C	501	GTP	PB-O3B-PG	-2.76	123.35	132.83
9	B	503	MES	O3S-S-C8	2.72	110.17	105.77
14	F	701	ACP	PA-O5'-C5'	-2.66	106.09	121.68
11	B	505	SOZ	C21-C22-C18	-2.63	114.70	118.22
5	A	501	GTP	C2-N1-C6	-2.57	120.37	125.10
5	A	501	GTP	PB-O3B-PG	-2.46	124.37	132.83
8	B	501	GDP	PA-O3A-PB	-2.45	124.43	132.83
9	B	503	MES	C7-N4-C3	2.40	117.36	111.23
8	B	501	GDP	C5-C6-N1	2.39	118.17	113.95
5	C	501	GTP	C2-N1-C6	-2.38	120.72	125.10
8	B	501	GDP	C8-N7-C5	2.30	107.36	102.99
8	D	501	GDP	C8-N7-C5	2.30	107.36	102.99
8	D	501	GDP	C5-C6-N1	2.26	117.94	113.95
14	F	701	ACP	C4-C5-N7	-2.20	107.11	109.40
11	B	505	SOZ	C20-C19-C17	-2.05	118.26	120.84
8	B	501	GDP	O6-C6-C5	-2.02	120.43	124.37

There are no chirality outliers.

All (32) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O2G
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	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	503	MES	C8-C7-N4-C3
10	C	507	GOL	C1-C2-C3-O3
10	C	507	GOL	O2-C2-C3-O3
14	F	701	ACP	C5'-O5'-PA-O1A
14	F	701	ACP	C5'-O5'-PA-O2A
14	F	701	ACP	C5'-O5'-PA-O3A
10	B	504	GOL	O2-C2-C3-O3
10	B	504	GOL	C1-C2-C3-O3
10	C	505	GOL	O1-C1-C2-C3

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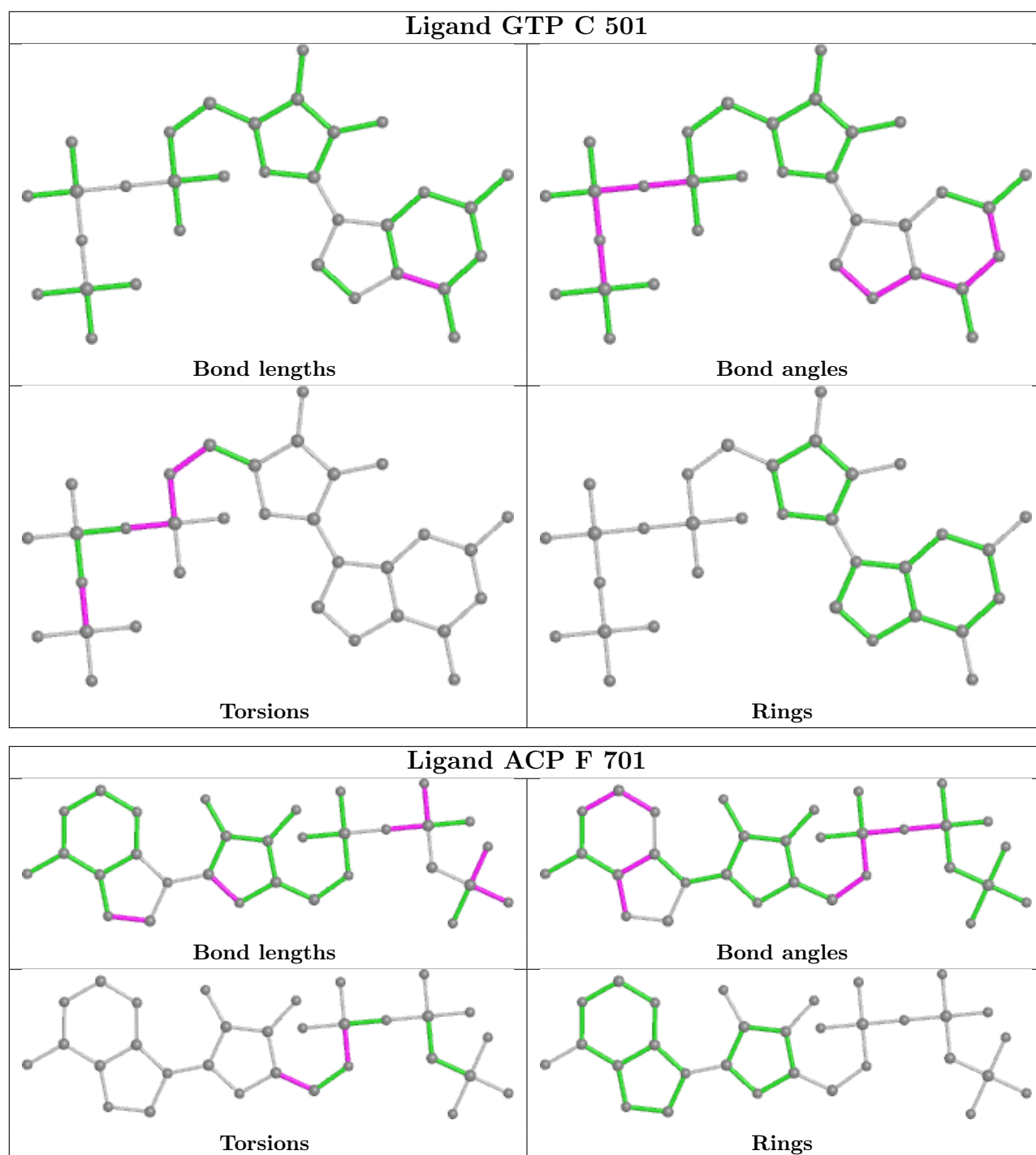
Mol	Chain	Res	Type	Atoms
5	C	501	GTP	PB-O3B-PG-O3G
5	A	501	GTP	PB-O3A-PA-O2A
5	C	501	GTP	PB-O3A-PA-O2A
8	D	501	GDP	PB-O3A-PA-O2A
5	A	501	GTP	PB-O3B-PG-O1G
5	A	501	GTP	C5'-O5'-PA-O3A
5	C	501	GTP	C5'-O5'-PA-O3A
8	B	501	GDP	C5'-O5'-PA-O3A
8	D	501	GDP	C5'-O5'-PA-O3A
5	C	501	GTP	C4'-C5'-O5'-PA
14	F	701	ACP	O4'-C4'-C5'-O5'
8	B	501	GDP	PB-O3A-PA-O1A
8	B	501	GDP	PB-O3A-PA-O2A

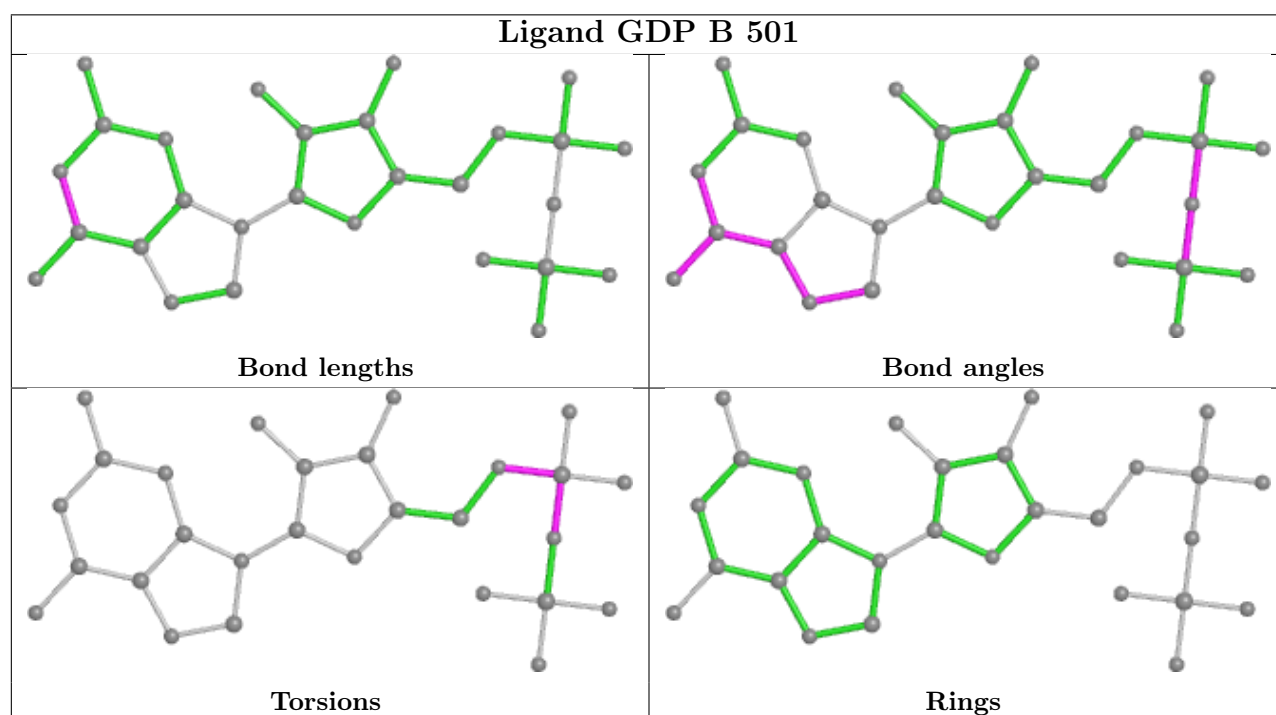
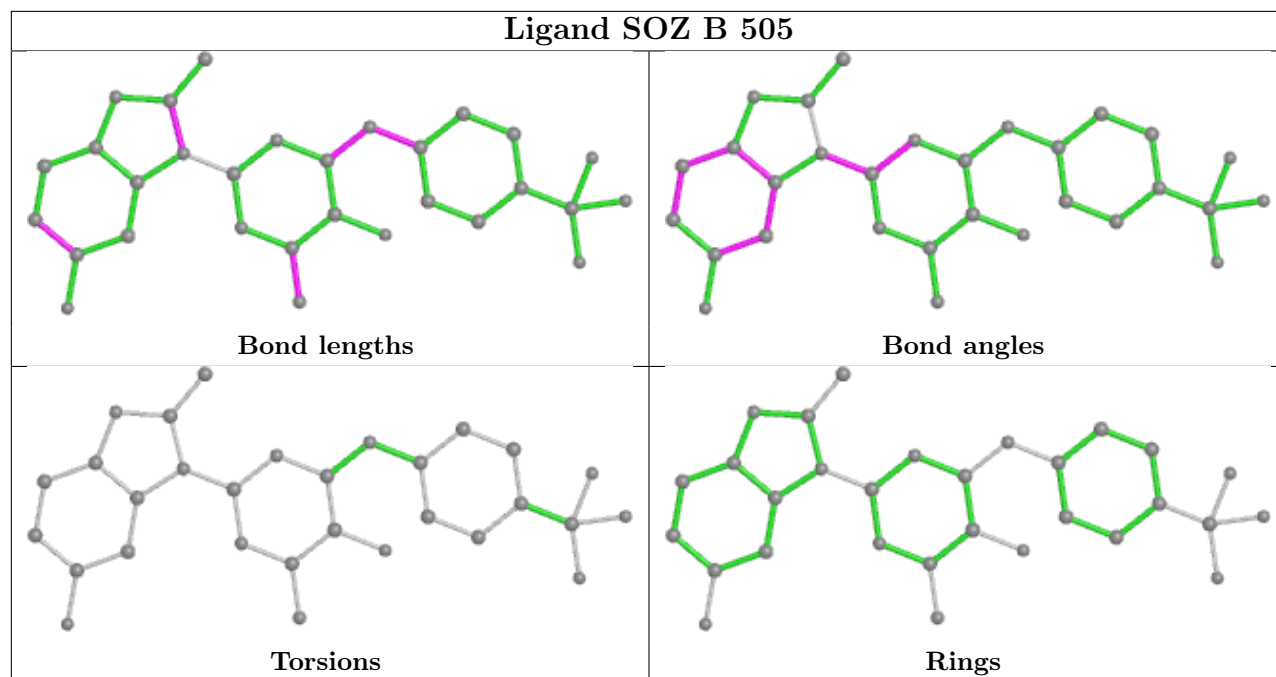
There are no ring outliers.

5 monomers are involved in 8 short contacts:

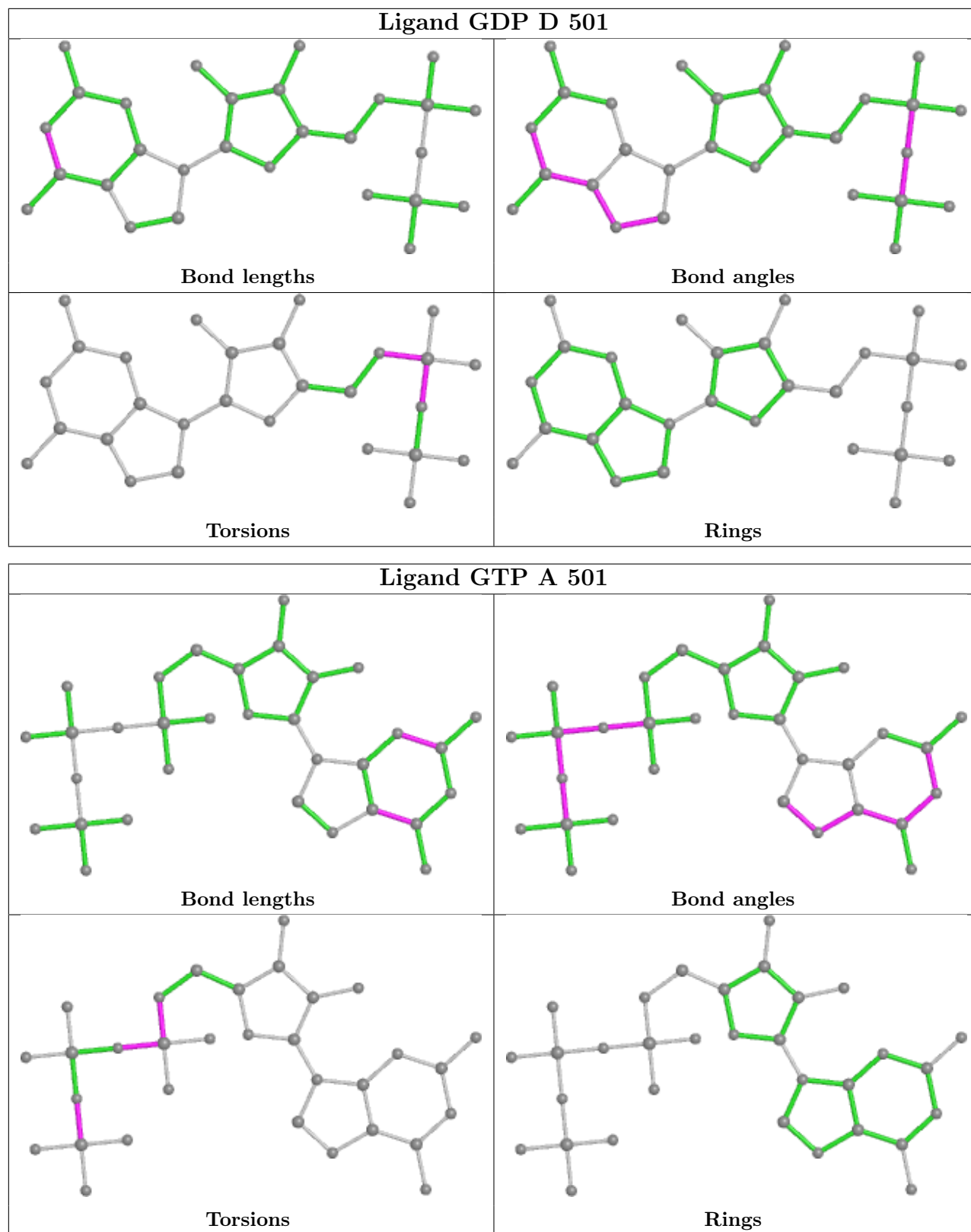
Mol	Chain	Res	Type	Clashes	Symm-Clashes
12	C	508	EDO	1	0
10	C	506	GOL	1	0
11	B	505	SOZ	1	0
13	E	901	IMD	4	0
8	D	501	GDP	1	0

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

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%)	0.48	21 (4%) 30 36	42, 63, 99, 176	0
1	C	440/451 (97%)	0.25	11 (2%) 57 62	33, 46, 76, 111	0
2	B	424/445 (95%)	0.55	33 (7%) 13 17	36, 58, 99, 156	0
2	D	420/445 (94%)	0.67	52 (12%) 4 5	40, 71, 112, 150	0
3	E	122/143 (85%)	0.60	15 (12%) 4 5	48, 76, 123, 164	0
4	F	337/384 (87%)	1.83	137 (40%) 0 0	55, 96, 163, 187	0
All	All	2180/2319 (94%)	0.70	269 (12%) 4 5	33, 65, 125, 187	0

All (269) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	99	VAL	9.2
4	F	182	ILE	9.0
4	F	249	TYR	8.5
4	F	173	ILE	8.4
2	B	438	ALA	8.4
4	F	20	LEU	8.2
4	F	233	PHE	8.1
4	F	100	ILE	7.6
4	F	169	LEU	7.6
4	F	132	LEU	7.3
4	F	161	LEU	6.6
4	F	162	ILE	6.5
4	F	251	LYS	6.2
4	F	248	GLU	6.1
4	F	231	ALA	6.0
4	F	244	CYS	6.0
4	F	21	LEU	5.7
4	F	361	LEU	5.6
4	F	181	VAL	5.6

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	282	TYR	5.5
4	F	170	LEU	5.4
4	F	130	VAL	5.3
4	F	252	ASN	5.3
4	F	250	SER	5.3
4	F	362	ALA	5.3
4	F	134	ALA	5.2
4	F	131	PHE	5.2
4	F	142	ARG	5.1
3	E	26	PRO	5.1
1	A	178	SER	5.1
4	F	240	LEU	5.0
4	F	253	TYR	5.0
4	F	179	VAL	4.9
4	F	230	SER	4.9
2	D	94	PHE	4.8
4	F	256	TYR	4.8
4	F	22	LEU	4.8
4	F	101	TYR	4.8
3	E	139	LEU	4.7
2	B	36	TYR	4.7
4	F	17	VAL	4.7
4	F	145	ASN	4.7
4	F	149	ALA	4.7
1	A	177	VAL	4.6
2	B	59	ASN	4.5
4	F	138	ARG	4.5
4	F	234	GLN	4.5
4	F	254	GLY	4.4
3	E	143	ALA	4.4
4	F	160	ILE	4.4
2	D	405	LEU	4.3
2	D	400	ARG	4.3
4	F	133	ALA	4.3
4	F	25	GLY	4.2
4	F	232	ASN	4.2
4	F	172	PHE	4.1
3	E	24	LEU	4.1
4	F	238	CYS	4.0
4	F	24	THR	4.0
4	F	146	VAL	4.0
4	F	186	LEU	4.0

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
4	F	239	HIS	4.0
4	F	163	SER	4.0
2	D	82	PRO	3.8
2	B	37	HIS	3.8
4	F	148	ILE	3.8
2	D	404	PHE	3.8
4	F	259	GLY	3.8
1	A	346	TRP	3.7
4	F	192	LEU	3.7
2	B	437	ASP	3.7
2	D	57	THR	3.7
4	F	255	ARG	3.7
3	E	6	MET	3.6
4	F	194	PRO	3.6
4	F	151	SER	3.6
4	F	102	PRO	3.6
2	D	37	HIS	3.6
1	A	283	HIS	3.5
1	A	179	THR	3.5
4	F	27	TRP	3.5
2	D	401	ARG	3.5
4	F	129	GLU	3.5
4	F	237	THR	3.5
4	F	136	ASN	3.5
4	F	227	PRO	3.4
4	F	342	LEU	3.4
2	B	57	THR	3.3
4	F	26	GLN	3.3
2	B	83	PHE	3.3
4	F	379	HIS	3.3
4	F	167	SER	3.3
4	F	98	TYR	3.3
2	D	407	TRP	3.2
4	F	246	GLN	3.2
4	F	263	PHE	3.2
1	C	440	VAL	3.2
2	D	182	VAL	3.2
2	D	58	GLY	3.2
2	D	202	TYR	3.2
2	B	33	THR	3.2
4	F	351	VAL	3.2
4	F	247	LYS	3.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
4	F	241	THR	3.1
4	F	166	ALA	3.1
1	A	74	VAL	3.1
4	F	197	ARG	3.1
4	F	214	TYR	3.1
3	E	15	THR	3.0
1	A	262	TYR	3.0
3	E	45	PRO	3.0
4	F	228	TYR	3.0
4	F	143	GLU	3.0
2	B	284	ARG	3.0
4	F	128	ARG	3.0
4	F	70	LYS	2.9
4	F	353	VAL	2.9
4	F	245	ILE	2.9
2	D	317	ALA	2.9
4	F	1	MET	2.9
2	D	220	THR	2.9
2	D	406	HIS	2.9
4	F	19	ARG	2.9
2	D	83	PHE	2.9
2	B	56	ALA	2.9
4	F	144	GLY	2.8
4	F	89	GLU	2.8
4	F	164	SER	2.8
2	B	58	GLY	2.8
4	F	45	ASN	2.8
2	D	74	THR	2.8
4	F	349	GLY	2.8
2	D	372	LYS	2.8
4	F	184	LYS	2.8
4	F	226	GLU	2.8
4	F	75	ALA	2.8
4	F	23	ALA	2.8
4	F	346	LEU	2.8
4	F	6	VAL	2.8
2	D	265	LEU	2.7
4	F	147	TRP	2.7
2	D	77	SER	2.7
4	F	18	SER	2.7
3	E	142	GLU	2.7
2	B	61	TYR	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	204	VAL	2.7
4	F	196	HIS	2.7
2	D	118	VAL	2.7
1	A	42	ILE	2.7
2	D	268	PHE	2.7
4	F	359	PHE	2.7
4	F	44	ARG	2.7
3	E	141	GLU	2.7
1	A	364	PRO	2.7
3	E	140	LYS	2.6
2	D	259	MET	2.6
4	F	223	THR	2.6
4	F	135	TYR	2.6
2	D	85	GLN	2.6
4	F	180	HIS	2.6
1	A	171	ILE	2.6
2	B	38	GLY	2.6
1	C	257	THR	2.6
4	F	11	SER	2.6
4	F	225	SER	2.6
4	F	320	MET	2.6
2	D	218	LYS	2.6
2	B	281	GLN	2.6
4	F	150	LYS	2.6
2	B	143	GLY	2.6
2	B	82	PRO	2.6
3	E	25	LYS	2.5
1	C	341	ILE	2.5
4	F	139	ARG	2.5
2	B	29	GLY	2.5
4	F	262	MET	2.5
1	A	335	ILE	2.5
2	D	415	GLU	2.5
2	D	315	VAL	2.5
2	D	286	LEU	2.5
2	B	180	THR	2.5
4	F	339	ALA	2.4
1	C	252	LEU	2.4
4	F	165	GLU	2.4
4	F	229	ASN	2.4
1	C	241	SER	2.4
2	D	80	SER	2.4

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Mol	Chain	Res	Type	RSRZ
4	F	354	ALA	2.4
1	A	140	SER	2.4
4	F	13	VAL	2.4
4	F	258	GLU	2.4
2	D	219	LEU	2.4
1	C	1	MET	2.4
4	F	350	ILE	2.4
2	D	402	LYS	2.4
2	B	248	LEU	2.4
4	F	264	PHE	2.4
2	D	42	LEU	2.3
1	A	281	ALA	2.3
3	E	27	PRO	2.3
1	C	250	VAL	2.3
2	B	250	ALA	2.3
4	F	243	HIS	2.3
4	F	375	PHE	2.3
2	B	144	GLY	2.3
2	B	181	VAL	2.3
2	D	260	VAL	2.3
4	F	199	PHE	2.3
2	D	56	ALA	2.3
2	D	221	THR	2.3
4	F	314	LEU	2.3
2	D	399	PHE	2.3
4	F	372	THR	2.3
4	F	224	SER	2.3
4	F	337	ALA	2.2
4	F	32	LYS	2.2
2	D	418	PHE	2.2
2	B	101	ASN	2.2
1	C	167	LEU	2.2
1	A	175	PRO	2.2
1	C	181[A]	VAL	2.2
4	F	171	ASP	2.2
2	D	201	THR	2.2
1	C	133	GLN	2.2
2	B	62	VAL	2.2
4	F	185	TYR	2.2
4	F	267	PHE	2.2
3	E	96	MET	2.2
1	A	180	ALA	2.2

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	D	396	THR	2.2
2	D	185	TYR	2.1
2	D	203	CYS	2.1
2	D	73	GLY	2.1
2	D	198	THR	2.1
2	D	89	PRO	2.1
4	F	360	PRO	2.1
2	B	46	LEU	2.1
2	B	182	VAL	2.1
2	D	416	MET	2.1
1	A	174	ALA	2.1
3	E	138	GLU	2.1
2	B	54	ASN	2.1
4	F	137	ARG	2.1
2	D	271	GLY	2.1
4	F	358	VAL	2.1
2	B	35	SER	2.1
2	B	9	ALA	2.1
2	D	36	TYR	2.1
2	D	96	GLN	2.1
2	D	181	VAL	2.1
1	A	141	PHE	2.1
1	A	391	LEU	2.1
4	F	9	GLU	2.1
4	F	10	ASN	2.1
4	F	352	ASP	2.1
2	B	60	LYS	2.1
1	C	2	ARG	2.0
2	B	86	ILE	2.0
4	F	242	ASN	2.0
4	F	348	GLN	2.0
2	D	93	VAL	2.0
4	F	220	VAL	2.0
4	F	28	LYS	2.0
2	D	166	MET	2.0
2	B	247	GLN	2.0
1	A	37	PRO	2.0
2	B	30	ILE	2.0
2	D	313	LEU	2.0
3	E	135	LYS	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](#)

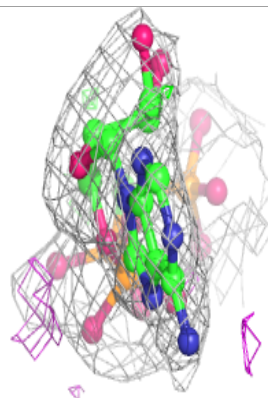
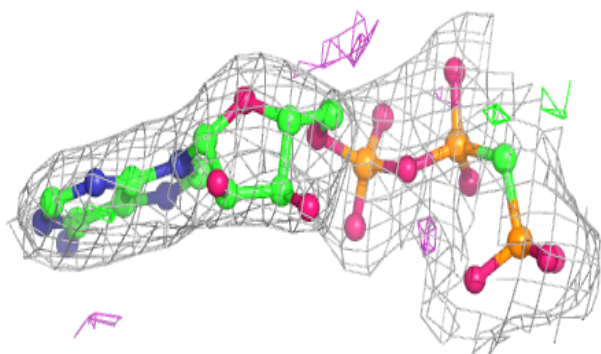
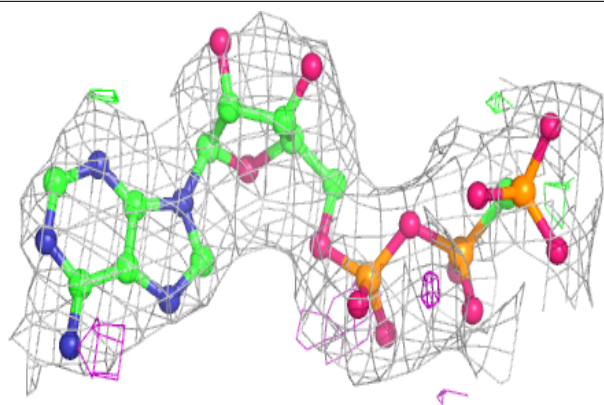
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	MG	D	502	1/1	0.72	0.09	74,74,74,74	0
10	GOL	B	504	6/6	0.78	0.28	56,79,84,89	0
10	GOL	C	507	6/6	0.85	0.21	101,122,129,135	0
12	EDO	C	508	4/4	0.85	0.16	96,115,122,123	0
14	ACP	F	701	31/31	0.86	0.15	86,96,132,133	0
10	GOL	C	505	6/6	0.87	0.29	54,78,80,85	0
11	SOZ	B	505	30/30	0.88	0.24	50,64,79,87	43
6	MG	A	502	1/1	0.90	0.16	46,46,46,46	0
13	IMD	E	901	5/5	0.90	0.31	75,86,104,104	0
10	GOL	C	506	6/6	0.90	0.25	69,79,83,84	0
6	MG	F	702	1/1	0.91	0.07	93,93,93,93	0
10	GOL	C	504	6/6	0.95	0.15	63,72,79,92	0
8	GDP	D	501	28/28	0.96	0.11	56,63,78,81	0
6	MG	C	502	1/1	0.97	0.14	37,37,37,37	0
7	CA	A	503	1/1	0.97	0.05	80,80,80,80	0
5	GTP	A	501	32/32	0.97	0.21	36,46,53,54	0
8	GDP	B	501	28/28	0.98	0.19	34,42,50,51	0
5	GTP	C	501	32/32	0.98	0.16	32,37,42,43	0
9	MES	B	503	12/12	0.98	0.12	49,51,59,61	0
6	MG	B	502	1/1	0.99	0.24	34,34,34,34	0
7	CA	C	503	1/1	0.99	0.04	64,64,64,64	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.

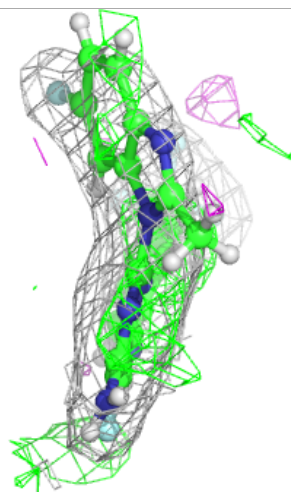
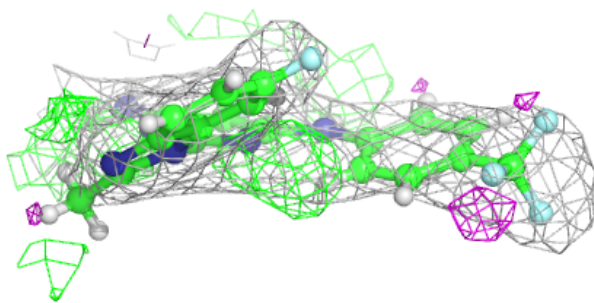
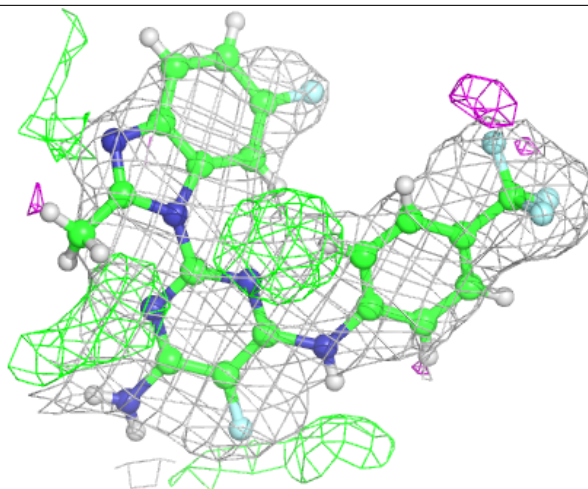
**Electron density around ACP F 701:**

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



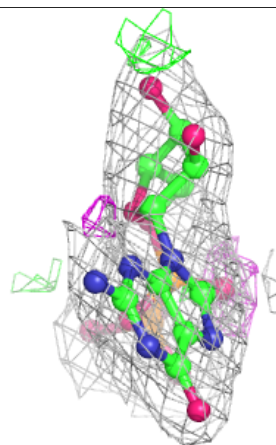
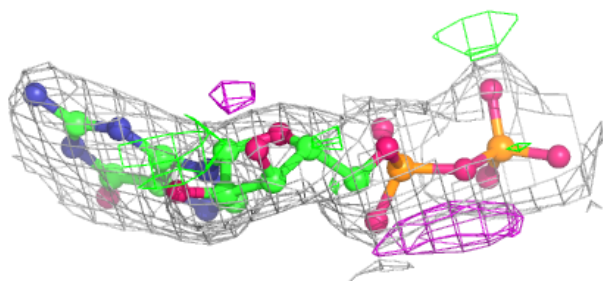
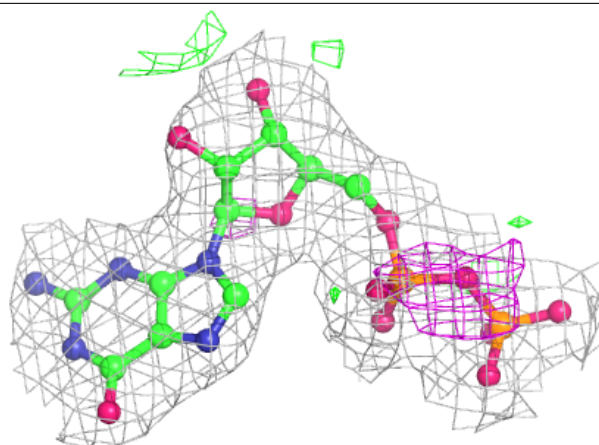
**Electron density around SOZ B 505:**

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

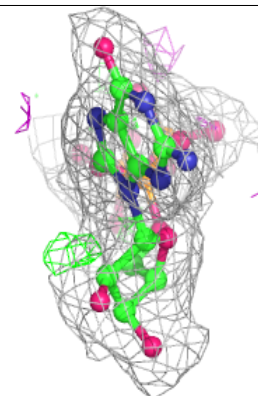
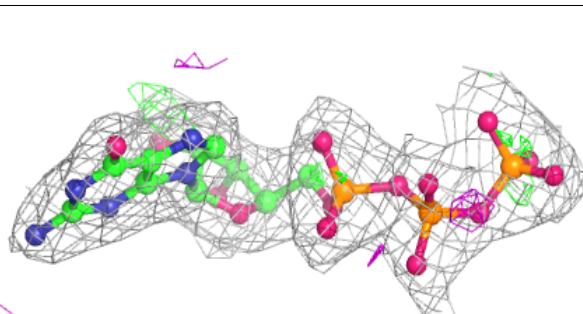
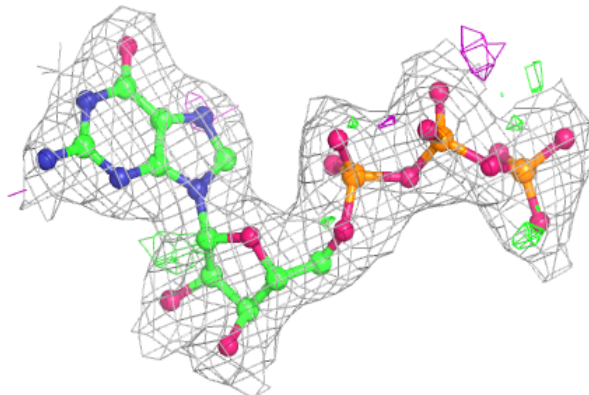


**Electron density around GDP D 501:**

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

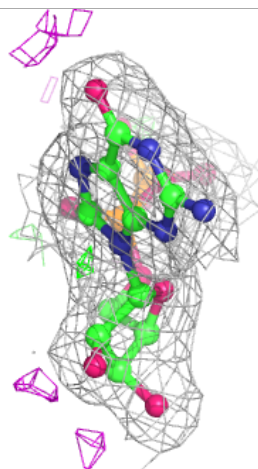
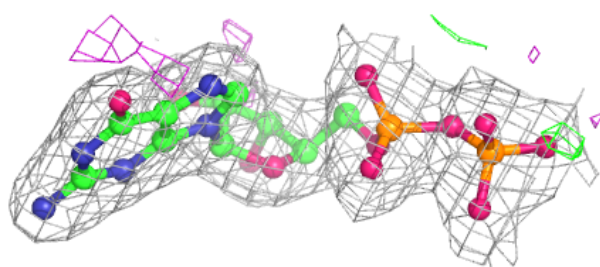
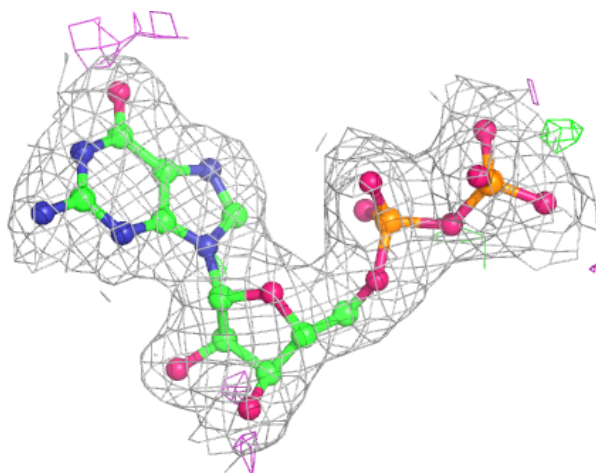
**Electron density around GTP A 501:**

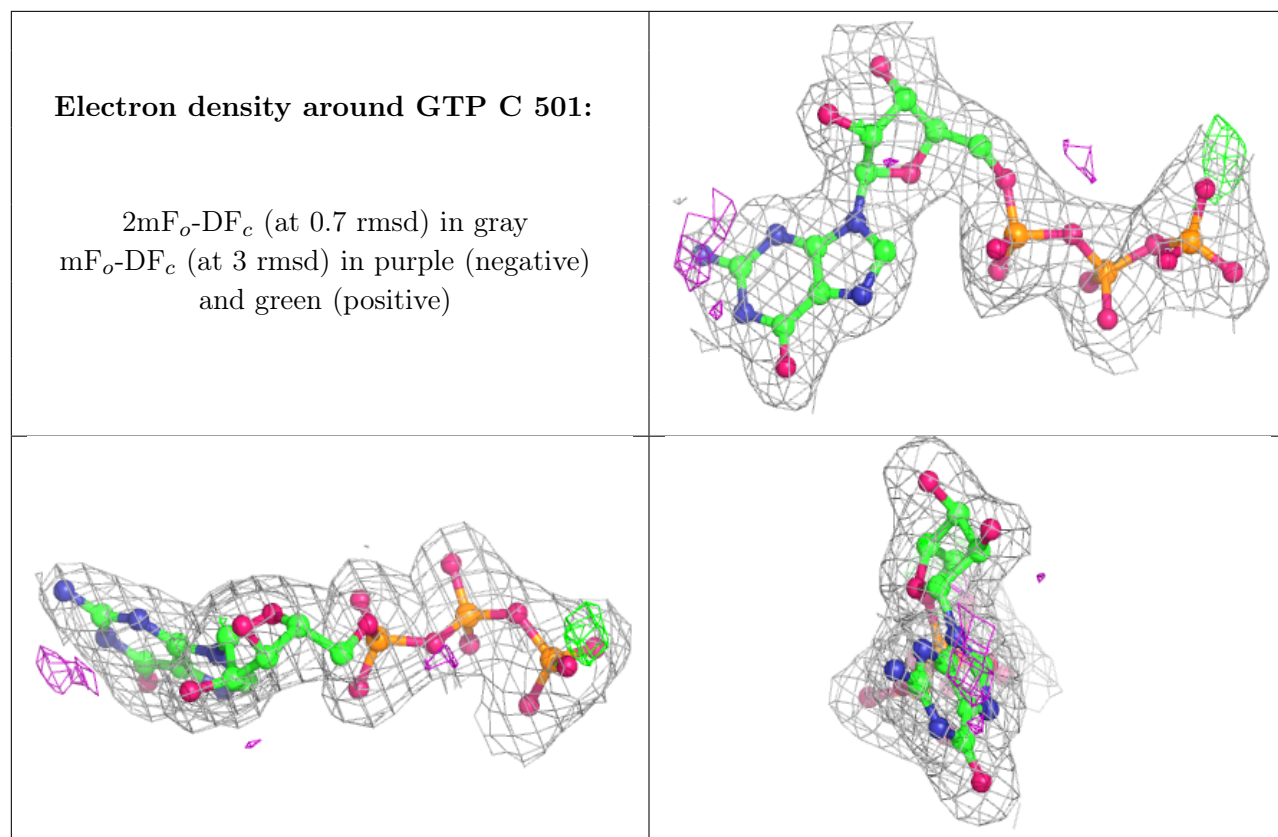
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around GDP B 501:**

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





## 6.5 Other polymers [i](#)

There are no such residues in this entry.