Full wwPDB X-ray Structure Validation Report ⓘ

Sep 9, 2025 – 12:54 AM JST

PDB ID	:	7VMG / pdb_00007vmg
Title	:	Crystal structure of tubulin with 17j
Authors	:	Jifa, Z.; Lun, T.
Deposited on	:	2021-10-08
Resolution	:	2.39 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

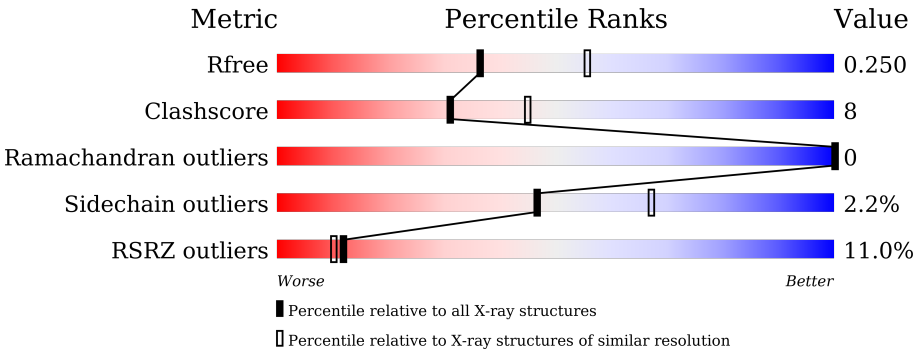
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.45.1

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.39 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	4642 (2.40-2.40)
Clashscore	180529	5218 (2.40-2.40)
Ramachandran outliers	177936	5158 (2.40-2.40)
Sidechain outliers	177891	5159 (2.40-2.40)
RSRZ outliers	164620	4642 (2.40-2.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	3% 86% 12% ·
1	C	450	3% 82% 14% ••
2	B	445	4% 82% 13% 5%
2	D	445	21% 66% 27% · 6%
3	E	143	13% 66% 20% · 14%
4	F	384	21% 70% 20% · 10%

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
8	CL	D	503	-	-	-	X

2 Entry composition (i)

There are 12 unique types of molecules in this entry. The entry contains 17851 atoms, of which 0 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	N	O	S	0	4	0
			3427	2170	580	653	24			
1	C	440	Total	C	N	O	S	0	9	0
			3468	2195	585	663	25			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	424	Total	C	N	O	S	0	4	0
			3364	2116	575	647	26			
2	D	420	Total	C	N	O	S	0	1	0
			3291	2069	557	639	26			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	123	Total	C	N	O	S	0	2	0
			1026	633	186	202	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

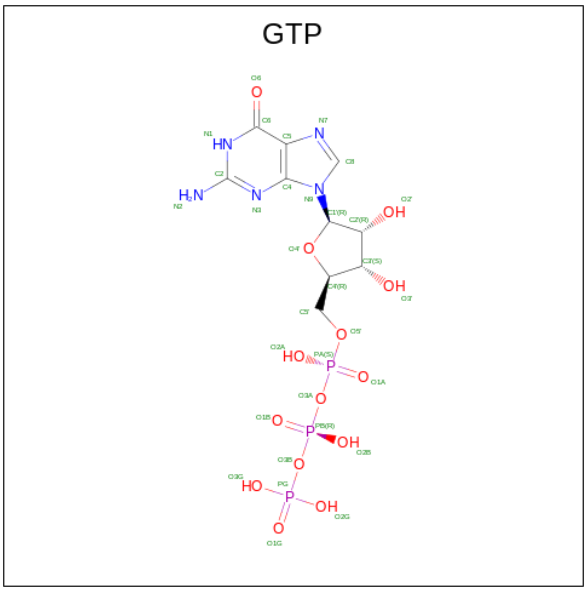
- Molecule 4 is a protein called TTL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	346	Total	C	N	O	S	0	5	0
			2856	1835	487	519	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 (CCD ID: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



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

- Molecule 6 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

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

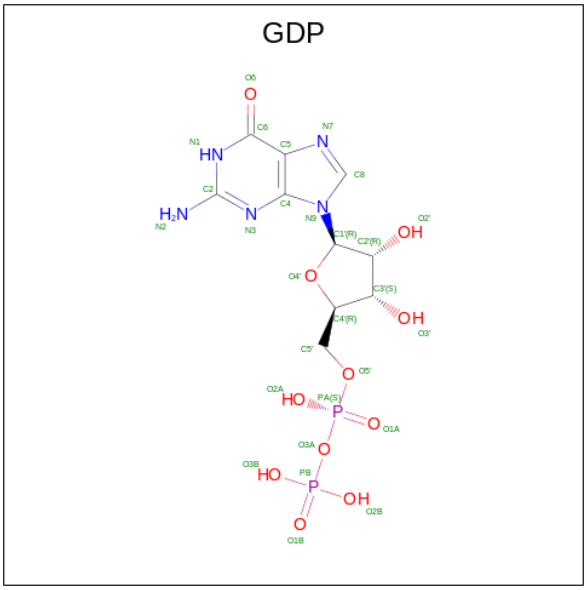
- Molecule 7 is CALCIUM ION (CCD ID: CA) (formula: Ca).

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

- Molecule 8 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

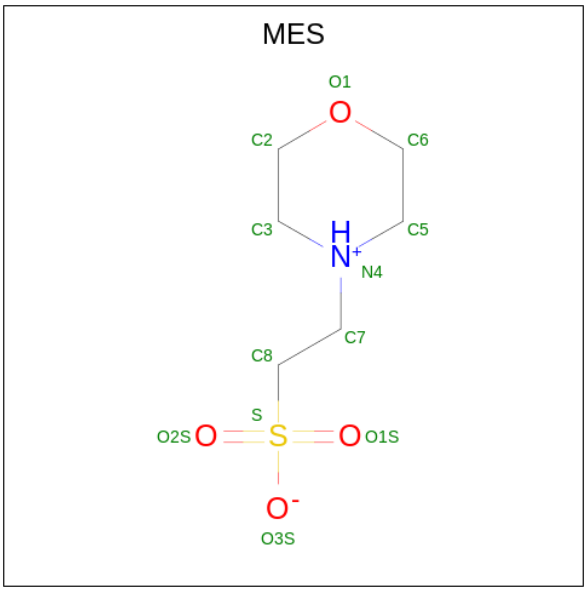
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total Cl 1 1	1	0
8	D	1	Total Cl 1 1	0	0

- Molecule 9 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



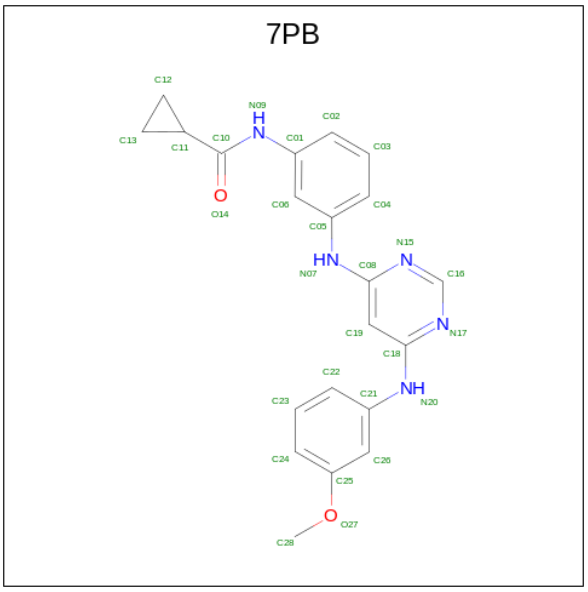
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	B	1	Total C N O P 28 10 5 11 2	0	0
9	D	1	Total C N O P 28 10 5 11 2	0	0

- Molecule 10 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: $C_6H_{13}NO_4S$).



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

- Molecule 11 is N-[3-[[6-[(3-methoxyphenyl)amino]pyrimidin-4-yl]amino]phenyl]cyclopropanecarboxamide (CCD ID: 7PB) (formula: $C_{21}H_{21}N_5O_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
11	B	1	Total	C	N	O	0	0
			28	21	5	2		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
11	D	1	Total	C	N	O	0	0
			28	21	5	2		

- Molecule 12 is water.

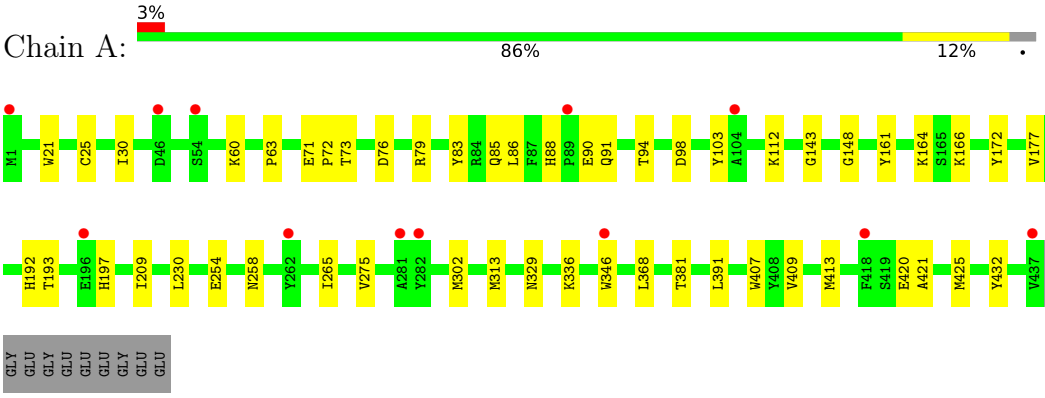
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	55	Total	O	0	0
			55	55		
12	B	51	Total	O	0	0
			51	51		
12	C	82	Total	O	0	0
			82	82		
12	D	4	Total	O	0	0
			4	4		
12	E	5	Total	O	0	0
			5	5		
12	F	15	Total	O	0	0
			15	15		

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.

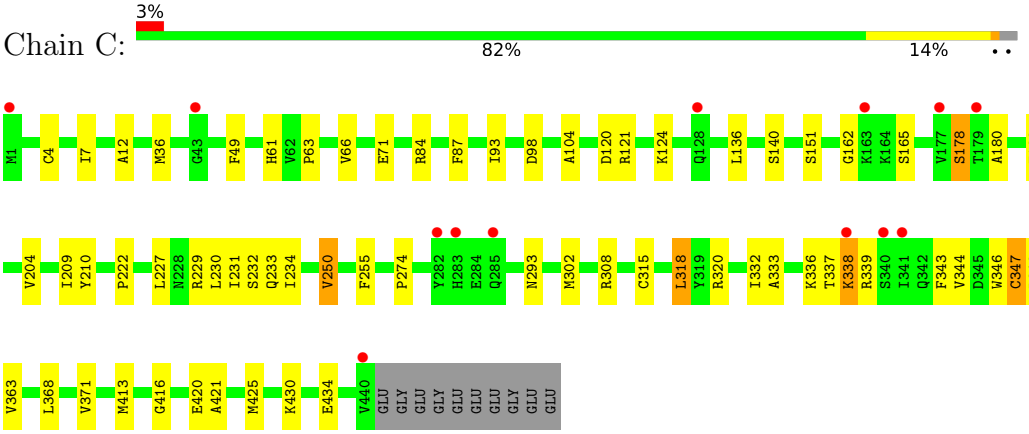
• Molecule 1: Tubulin alpha-1B chain

Chain A:



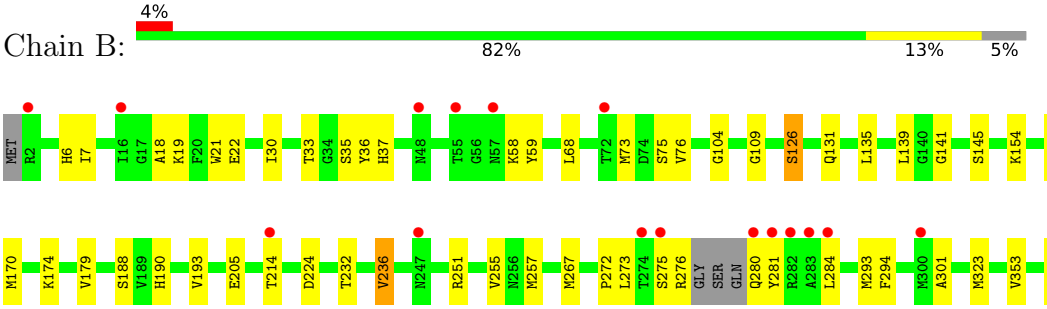
• Molecule 1: Tubulin alpha-1B chain

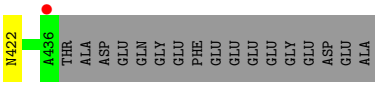
Chain C:



• Molecule 2: Tubulin beta-2B chain

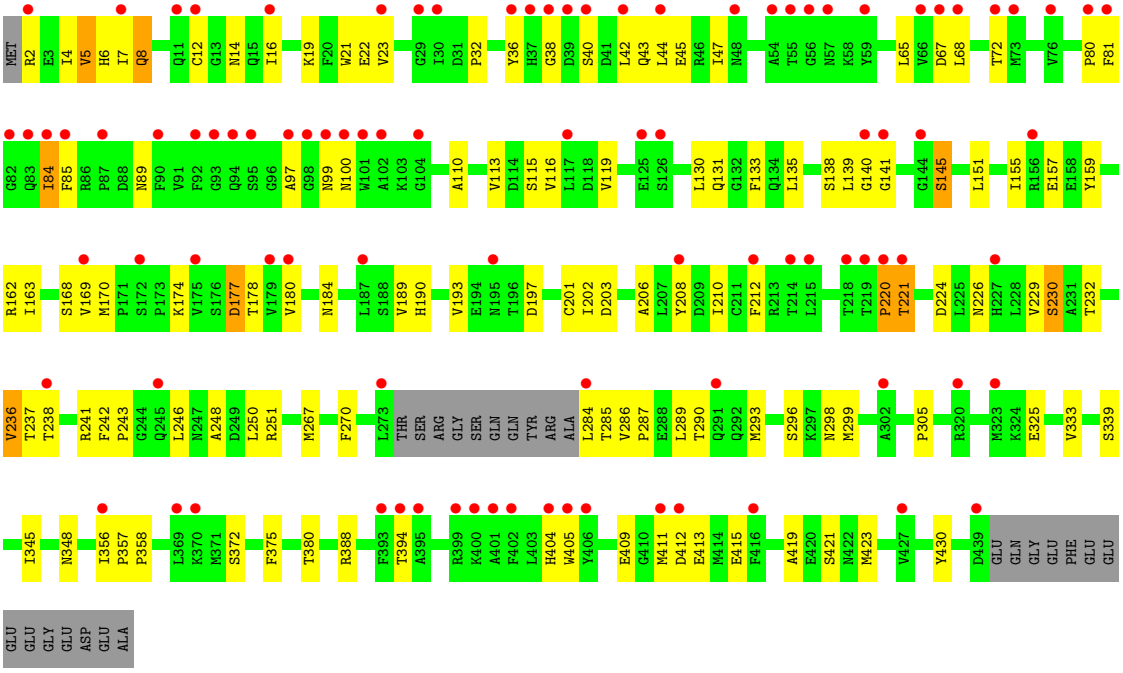
Chain B:





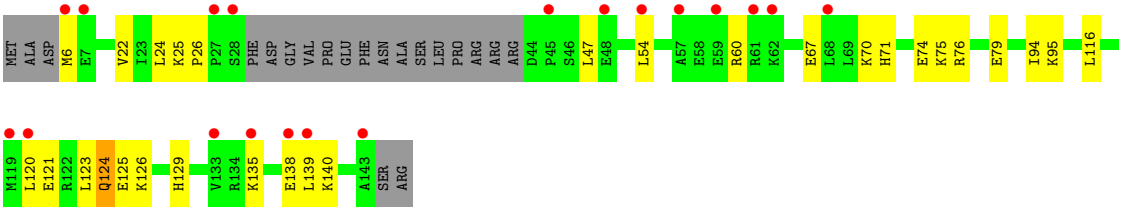
• Molecule 2: Tubulin beta-2B chain

Chain D:



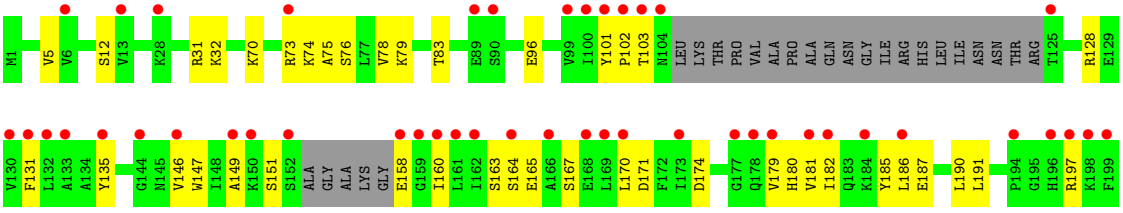
• Molecule 3: Stathmin-4

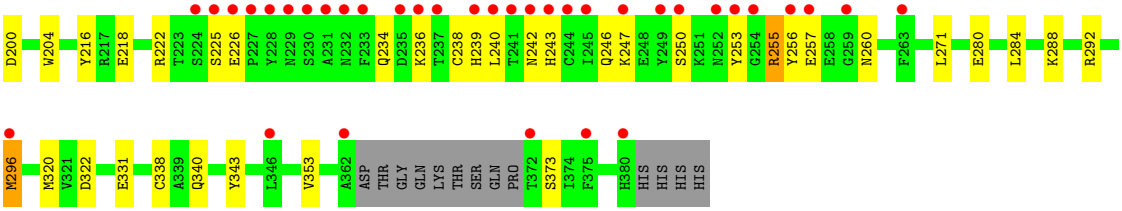
Chain E:



• Molecule 4: TTL

Chain F:




D200
W204
Y216
R217
E218
R222
T223
S224
S225
E226
P227
Y228
N229
S230
A231
N232
F233
Q234
D235
K236
T237
C238
H239
L240
T241
N242
H243
C244
I245
Q246
K247
E248
Y249
S250
K251
N252
Y253
G254
R255
Y256
E257
E258
G259
N260
F263
L271
E280
L284
K288
R292
M296
M320
V321
D322
E331
C338
A339
Q340
Y343
L346
V353
A362
ASP
THR
GLY
GLN
LYS
THR
SER
GLN
PRO
T372
S373
I374
F375
H380
HIS
HIS
HIS
HIS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	105.33Å 158.21Å 182.48Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	91.24 – 2.39 91.24 – 2.39	Depositor EDS
% Data completeness (in resolution range)	99.7 (91.24-2.39) 95.6 (91.24-2.39)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.15 (at 2.40Å)	Xtriage
Refinement program	PHENIX 1.19_4092	Depositor
R, R_{free}	0.210 , 0.250 0.212 , 0.250	Depositor DCC
R_{free} test set	2000 reflections (1.65%)	wwPDB-VP
Wilson B-factor (Å^2)	52.2	Xtriage
Anisotropy	0.276	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 49.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	17851	wwPDB-VP
Average B, all atoms (Å^2)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.25% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: GTP, MES, 7PB, CA, CL, GDP, MG

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	0.40	0/3517	0.59	0/4776
1	C	0.46	0/3570	0.65	1/4847 (0.0%)
2	B	0.45	0/3447	0.65	0/4667
2	D	0.45	0/3364	0.69	4/4560 (0.1%)
3	E	0.47	0/1041	0.66	0/1382
4	F	0.32	0/2935	0.56	0/3966
All	All	0.42	0/17874	0.63	5/24198 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
4	F	0	1

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	220	PRO	N-CA-C	7.55	128.03	112.47
1	C	338	LYS	CA-CB-CG	6.32	126.74	114.10
2	D	251	ARG	N-CA-C	5.99	117.89	111.36
2	D	242	PHE	CA-C-N	-5.33	114.43	119.76
2	D	242	PHE	C-N-CA	-5.33	114.43	119.76

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	F	234	GLN	Peptide

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3427	0	3340	36	0
1	C	3468	0	3388	42	0
2	B	3364	0	3249	43	0
2	D	3291	0	3155	88	0
3	E	1026	0	1042	31	0
4	F	2856	0	2837	52	0
5	A	32	0	12	2	0
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
7	A	1	0	0	0	0
7	C	1	0	0	0	0
8	A	1	0	0	0	0
8	D	1	0	0	0	0
9	B	28	0	12	1	0
9	D	28	0	12	1	0
10	B	24	0	26	4	0
11	B	28	0	0	1	0
11	D	28	0	0	2	0
12	A	55	0	0	1	0
12	B	51	0	0	0	0
12	C	82	0	0	2	0
12	D	4	0	0	1	0
12	E	5	0	0	0	0
12	F	15	0	0	0	0
All	All	17851	0	17085	282	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 8.

All (282) 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:251:ARG:NH2	10:B:503:MES:O1S	2.02	0.92
2:D:99:ASN:HD22	2:D:178:THR:HG21	1.39	0.87
1:A:112:LYS:HD2	3:E:54:LEU:HB3	1.56	0.87
2:D:131:GLN:HB2	2:D:250:LEU:HD12	1.57	0.86
1:A:88:HIS:NE2	1:A:90:GLU:HG3	1.98	0.79
2:B:36:TYR:O	2:B:37:HIS:ND1	2.15	0.79
1:C:229:ARG:HD2	1:C:363:VAL:HG11	1.64	0.78
4:F:128:ARG:HE	4:F:170:LEU:HD22	1.50	0.76
2:D:221:THR:HG23	2:D:224:ASP:H	1.51	0.76
4:F:128:ARG:HH21	4:F:170:LEU:HB3	1.52	0.73
2:D:206:ALA:O	2:D:210:ILE:HG13	1.87	0.73
4:F:186:LEU:HD12	4:F:320:MET:HE2	1.70	0.72
3:E:6:MET:HE2	3:E:24:LEU:CD2	2.20	0.71
1:A:60:LYS:NZ	1:A:85:GLN:O	2.23	0.71
1:C:36:MET:HE3	1:C:61:HIS:CD2	2.26	0.70
1:A:88:HIS:CD2	1:A:90:GLU:HG3	2.27	0.69
2:D:221:THR:HG22	2:D:224:ASP:HB2	1.75	0.68
4:F:31:ARG:HE	4:F:32:LYS:H	1.40	0.68
2:B:251:ARG:CZ	10:B:503:MES:O1S	2.08	0.68
1:A:161:TYR:HB3	1:A:164:LYS:HD3	1.75	0.67
4:F:135:TYR:OH	4:F:165:GLU:HA	1.93	0.67
2:D:67:ASP:OD2	2:D:72:THR:HG21	1.95	0.67
2:B:280:GLN:HG3	2:B:281:TYR:H	1.59	0.67
2:D:220:PRO:O	2:D:221:THR:HG22	1.96	0.66
2:B:73:MET:HA	2:B:76:VAL:HG12	1.78	0.66
3:E:6:MET:HE2	3:E:24:LEU:HD21	1.77	0.66
2:B:179:VAL:HG12	1:C:348:PRO:HG2	1.78	0.66
2:B:267:MET:HG3	2:B:301:ALA:HB3	1.80	0.64
2:D:99:ASN:ND2	2:D:178:THR:HG21	2.12	0.64
4:F:226:GLU:OE1	4:F:238:CYS:HB3	1.98	0.63
2:B:154:LYS:NZ	3:E:76:ARG:HD2	2.13	0.63
3:E:121:GLU:HA	3:E:124:GLN:HG2	1.81	0.62
2:D:65:LEU:HD11	2:D:85:PHE:HD2	1.64	0.61
4:F:246:GLN:O	4:F:250:SER:HB3	1.99	0.61
2:D:202:ILE:HD13	2:D:229:VAL:HG13	1.82	0.61
2:D:2:ARG:N	2:D:131:GLN:HG2	2.16	0.61
2:D:40:SER:H	2:D:43:GLN:HE22	1.49	0.61
2:D:236:VAL:O	11:D:502:7PB:N09	2.34	0.61
1:A:336:LYS:HG3	3:E:24:LEU:HD13	1.83	0.60
4:F:197:ARG:NH1	4:F:257:GLU:OE2	2.29	0.60
1:C:178:SER:HB2	1:C:183:GLU:OE2	2.00	0.60
2:D:141:GLY:HA3	9:D:501:GDP:O3A	2.01	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:139:LEU:HD21	2:D:168:SER:HB3	1.82	0.60
2:D:139:LEU:HA	2:D:145[A]:SER:HB3	1.82	0.60
2:B:170:MET:HG3	2:B:385:LEU:HD21	1.83	0.59
2:B:323:MET:SD	2:B:353:VAL:HG21	2.42	0.59
1:A:79:ARG:NH2	1:A:94:THR:OG1	2.35	0.58
4:F:128:ARG:HA	4:F:131:PHE:HB3	1.85	0.58
2:D:32:PRO:HB3	2:D:81:PHE:HA	1.86	0.58
2:D:221:THR:CG2	2:D:224:ASP:H	2.16	0.58
3:E:67:GLU:O	3:E:70:LYS:HE3	2.04	0.57
4:F:280:GLU:HA	4:F:284:LEU:HB2	1.84	0.57
1:C:4[A]:CYS:SG	1:C:136:LEU:HG	2.44	0.57
2:D:45:GLU:OE1	2:D:243:PRO:HG2	2.03	0.57
2:D:412:ASP:OD1	2:D:413:GLU:N	2.38	0.57
1:A:265:ILE:HG21	1:A:313:MET:HE1	1.86	0.57
4:F:103:THR:HG22	4:F:174:ASP:HB3	1.88	0.56
1:C:234:ILE:HD13	1:C:302:MET:SD	2.45	0.56
4:F:78:VAL:HG21	4:F:181:VAL:HG21	1.88	0.56
2:D:130:LEU:O	2:D:162:ARG:NH1	2.35	0.55
4:F:103:THR:N	4:F:174:ASP:OD1	2.39	0.55
2:D:44:LEU:HA	2:D:47:ILE:HB	1.87	0.55
4:F:236:LYS:HB2	4:F:240:LEU:HD22	1.87	0.55
2:D:285:THR:HB	2:D:287:PRO:HD2	1.87	0.55
4:F:340:GLN:HA	4:F:343:TYR:HD2	1.72	0.55
2:B:145:SER:HB2	2:B:188:SER:OG	2.07	0.55
2:B:104:GLY:O	2:B:109:GLY:HA3	2.06	0.55
2:D:140:GLY:O	2:D:184:ASN:ND2	2.31	0.54
2:B:190:HIS:O	2:B:193:VAL:HG12	2.06	0.54
2:D:19:LYS:O	2:D:23:VAL:HG23	2.08	0.54
4:F:5:VAL:HG13	4:F:32:LYS:HA	1.89	0.54
2:B:174:LYS:HD2	2:B:205:GLU:OE1	2.08	0.54
2:D:16:ILE:HD11	2:D:169:VAL:HG21	1.89	0.53
2:B:236:VAL:O	11:B:505:7PB:N09	2.42	0.52
1:A:209:ILE:HD11	1:A:302:MET:SD	2.49	0.52
2:B:154:LYS:HZ3	3:E:76:ARG:HD2	1.74	0.52
2:B:224:ASP:OD1	2:B:276:ARG:NH2	2.41	0.52
1:C:162:GLY:HA2	3:E:94:ILE:HD11	1.92	0.52
2:D:293:MET:HE2	2:D:375:PHE:HB2	1.92	0.52
2:B:18:ALA:O	2:B:22:GLU:HG3	2.10	0.52
2:D:189:VAL:HG11	2:D:423:MET:HG3	1.91	0.52
2:D:44:LEU:HD23	2:D:47:ILE:HD13	1.91	0.52
2:D:248:ALA:HB1	11:D:502:7PB:N07	2.24	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:126:SER:O	2:B:126:SER:OG	2.23	0.52
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.45	0.51
2:D:36:TYR:CD2	2:D:44:LEU:HD11	2.46	0.51
3:E:139:LEU:C	3:E:140:LYS:HD3	2.34	0.51
4:F:190:LEU:HB2	4:F:322:ASP:O	2.10	0.51
2:D:155:ILE:O	2:D:159:TYR:N	2.40	0.51
2:D:270:PHE:O	2:D:298:ASN:HB3	2.11	0.51
2:B:275:SER:OG	2:B:276:ARG:N	2.44	0.51
3:E:60:ARG:HG3	3:E:60:ARG:HH11	1.76	0.51
2:D:65:LEU:HD11	2:D:85:PHE:CD2	2.46	0.51
3:E:47:LEU:HD12	3:E:47:LEU:O	2.11	0.51
4:F:79:LYS:O	4:F:83:THR:OG1	2.20	0.51
1:A:172:TYR:CE2	1:A:391:LEU:HD22	2.46	0.50
1:A:83:TYR:HD2	1:A:86:LEU:HD22	1.77	0.50
2:D:67:ASP:OD1	2:D:68:LEU:N	2.45	0.49
2:D:232:THR:O	2:D:236:VAL:HG13	2.12	0.49
2:D:174:LYS:HD2	2:D:208:TYR:CD2	2.47	0.49
4:F:31:ARG:NE	4:F:32:LYS:H	2.09	0.49
1:C:84:ARG:HG2	1:C:84:ARG:HH11	1.77	0.49
4:F:151:SER:HB3	4:F:180:HIS:CE1	2.47	0.49
4:F:31:ARG:HE	4:F:31:ARG:HA	1.78	0.49
1:A:275:VAL:HG13	1:A:368:LEU:HD21	1.94	0.49
2:D:19:LYS:NZ	2:D:22:GLU:OE1	2.36	0.49
2:D:22:GLU:OE2	2:D:80:PRO:HG2	2.13	0.49
2:D:409:GLU:OE1	2:D:409:GLU:HA	2.12	0.49
1:A:346:TRP:H	1:A:346:TRP:CD1	2.30	0.49
1:A:177:VAL:O	1:A:177:VAL:HG22	2.12	0.48
1:C:227:LEU:O	1:C:231:ILE:HG13	2.13	0.48
3:E:116:LEU:O	3:E:120:LEU:HD12	2.13	0.48
2:B:281:TYR:O	2:B:281:TYR:CD1	2.66	0.48
1:C:210:TYR:CZ	1:C:222:PRO:HD2	2.49	0.48
3:E:70:LYS:HD2	3:E:71:HIS:N	2.28	0.48
3:E:124:GLN:HG3	3:E:125:GLU:N	2.28	0.48
4:F:74:LYS:NZ	4:F:331:GLU:OE1	2.46	0.48
3:E:25:LYS:C	3:E:25:LYS:HD3	2.38	0.48
3:E:60:ARG:HG3	3:E:60:ARG:NH1	2.29	0.48
4:F:247:LYS:NZ	4:F:253:TYR:OH	2.46	0.48
1:C:71:GLU:HG2	1:C:98:ASP:HB3	1.96	0.48
1:C:430:LYS:O	1:C:434:GLU:HG3	2.13	0.48
4:F:102:PRO:HA	4:F:174:ASP:OD1	2.14	0.48
1:A:83:TYR:CD2	1:A:86:LEU:HD22	2.49	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:31:ARG:HE	4:F:32:LYS:N	2.11	0.48
1:A:420:GLU:OE1	12:A:601:HOH:O	2.20	0.47
1:A:25:CYS:HB3	1:A:30:ILE:O	2.15	0.47
2:D:89:ASN:HA	2:D:119:VAL:HG11	1.95	0.47
3:E:70:LYS:O	3:E:74:GLU:HG3	2.13	0.47
3:E:75:LYS:O	3:E:79:GLU:HG3	2.14	0.47
1:A:188:ILE:HG23	1:A:425:MET:HG3	1.96	0.47
2:B:35:SER:OG	2:B:58:LYS:HE2	2.14	0.47
2:B:139:LEU:HA	2:B:145:SER:HB3	1.95	0.47
4:F:73:ARG:O	4:F:76:SER:HB2	2.14	0.47
1:C:250:VAL:HG22	1:C:255:PHE:CZ	2.48	0.47
1:C:255:PHE:CZ	1:C:318:LEU:HD22	2.50	0.47
1:A:166:LYS:HE2	1:A:197:HIS:O	2.14	0.47
4:F:292:ARG:NH1	4:F:296[B]:MET:SD	2.88	0.47
1:A:143:GLY:HA3	5:A:501:GTP:O3A	2.14	0.47
1:C:416:GLY:O	1:C:420[B]:GLU:HB2	2.15	0.47
2:D:4:ILE:HG12	2:D:250:LEU:HD11	1.97	0.47
1:A:103:TYR:CE1	1:A:148:GLY:HA2	2.50	0.46
1:C:209:ILE:HG23	1:C:230:LEU:HD23	1.97	0.46
2:D:246:LEU:HD23	2:D:246:LEU:HA	1.67	0.46
2:D:290:THR:HG22	2:D:333:VAL:HG21	1.96	0.46
4:F:103:THR:CG2	4:F:174:ASP:HB3	2.44	0.46
3:E:25:LYS:HD3	3:E:26:PRO:O	2.15	0.46
4:F:167:SER:O	4:F:171:ASP:HB2	2.15	0.46
1:C:204:VAL:HG13	1:C:302:MET:HG3	1.98	0.46
2:D:110:ALA:O	2:D:113:VAL:HG12	2.16	0.46
2:D:2:ARG:C	2:D:131:GLN:HE21	2.24	0.46
2:D:170:MET:HE1	2:D:201:CYS:C	2.41	0.46
2:D:170:MET:HE1	2:D:202:ILE:N	2.30	0.46
2:D:356:ILE:HD12	2:D:357:PRO:HD2	1.96	0.46
2:B:6:HIS:CD2	2:B:21:TRP:HE1	2.33	0.46
2:B:7:ILE:O	2:B:135:LEU:HA	2.15	0.46
1:C:188:ILE:HG13	1:C:425:MET:HG3	1.98	0.46
3:E:25:LYS:NZ	3:E:26:PRO:O	2.41	0.46
1:C:36:MET:HE1	1:C:49:PHE:CE1	2.52	0.45
2:D:12:CYS:CB	2:D:138:SER:HB3	2.46	0.45
2:D:170:MET:HB2	2:D:170:MET:HE2	1.55	0.45
2:D:36:TYR:CZ	2:D:38:GLY:HA3	2.51	0.45
2:D:100:ASN:ND2	2:D:405:TRP:HB3	2.32	0.45
4:F:75:ALA:O	4:F:79:LYS:HG3	2.16	0.45
4:F:260:ASN:N	4:F:260:ASN:HD22	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:332:ILE:O	1:C:336:LYS:HG2	2.16	0.45
4:F:151:SER:HB3	4:F:180:HIS:NE2	2.32	0.45
2:D:68:LEU:HD12	2:D:97:ALA:HB2	1.98	0.45
2:D:81:PHE:O	2:D:84:ILE:HG22	2.16	0.45
1:C:274:PRO:HG2	1:C:371:VAL:HG11	1.99	0.45
4:F:200:ASP:OD1	4:F:222:ARG:HB2	2.17	0.45
1:A:391:LEU:HD12	1:A:391:LEU:HA	1.89	0.44
4:F:255[B]:ARG:HD3	4:F:256:TYR:CE1	2.52	0.44
1:C:104:ALA:HB2	1:C:413:MET:SD	2.57	0.44
1:C:320:ARG:HA	1:C:356:ASN:O	2.18	0.44
2:D:237:THR:O	2:D:241:ARG:HG3	2.17	0.44
1:A:98:ASP:HB2	5:A:501:GTP:O2G	2.17	0.44
1:A:192:HIS:CG	1:A:421:ALA:HA	2.53	0.44
2:D:203:ASP:OD2	2:D:388:ARG:NH1	2.44	0.44
4:F:31:ARG:NE	4:F:31:ARG:HA	2.32	0.44
4:F:243:HIS:ND1	4:F:243:HIS:O	2.50	0.44
1:A:72:PRO:HB2	1:A:76:ASP:OD2	2.17	0.44
1:A:265:ILE:HG23	1:A:432:TYR:CE1	2.52	0.44
2:B:154:LYS:HZ1	3:E:76:ARG:HD2	1.81	0.44
2:B:294:PHE:HB3	10:B:504:MES:H31	1.98	0.44
1:C:229:ARG:O	1:C:232:SER:OG	2.34	0.44
2:D:6:HIS:CE1	2:D:21:TRP:HE1	2.35	0.44
3:E:70:LYS:HD2	3:E:70:LYS:C	2.42	0.44
4:F:284:LEU:O	4:F:288:LYS:HG3	2.17	0.44
2:D:7:ILE:O	2:D:135:LEU:HD12	2.17	0.44
2:D:163:ILE:HA	2:D:197:ASP:OD2	2.17	0.44
2:D:212:PHE:CD1	2:D:212:PHE:C	2.95	0.44
1:C:229:ARG:HD2	1:C:363:VAL:CG1	2.40	0.44
4:F:158:GLU:N	4:F:160:ILE:HD11	2.33	0.44
1:A:71:GLU:OE1	1:A:73:THR:OG1	2.29	0.44
1:C:233:GLN:HG3	1:C:368:LEU:HD12	2.00	0.43
2:D:221:THR:HG22	2:D:224:ASP:CB	2.45	0.43
1:A:409:VAL:HA	1:A:413:MET:O	2.18	0.43
2:B:293:MET:HE3	2:B:373:ALA:HB1	1.99	0.43
3:E:135:LYS:O	3:E:138:GLU:HG3	2.18	0.43
4:F:200:ASP:OD1	4:F:222:ARG:NE	2.49	0.43
1:C:12:ALA:HB3	1:C:140:SER:HB3	2.00	0.43
1:A:88:HIS:HB3	1:A:91:GLN:OE1	2.18	0.43
2:B:159:TYR:HB3	2:B:162[B]:ARG:HG2	2.00	0.43
2:B:68:LEU:HA	2:B:68:LEU:HD23	1.74	0.43
2:D:404:HIS:CD2	2:D:405:TRP:HD1	2.36	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:146:VAL:HG23	4:F:187:GLU:OE2	2.18	0.43
1:C:293[A]:ASN:CG	1:C:339:ARG:HH21	2.26	0.43
2:B:30:ILE:HD13	2:B:59:TYR:HB2	2.01	0.43
2:D:8:GLN:NE2	2:D:14:ASN:HA	2.33	0.43
4:F:101:TYR:CD2	4:F:179:VAL:HG22	2.54	0.43
2:B:139:LEU:HD12	2:B:170:MET:SD	2.59	0.43
2:D:411:MET:HE2	2:D:411:MET:HB3	1.71	0.43
4:F:191:LEU:HD23	4:F:197:ARG:C	2.44	0.43
2:D:22:GLU:HG3	2:D:81:PHE:CD1	2.53	0.43
4:F:163:SER:OG	4:F:164:SER:N	2.51	0.43
1:C:93:ILE:HD11	1:C:121:ARG:HG3	2.00	0.42
1:C:308:ARG:HD2	12:C:664:HOH:O	2.19	0.42
2:D:296:SER:HB3	2:D:305:PRO:HD2	2.01	0.42
2:D:190:HIS:ND1	2:D:419:ALA:HA	2.34	0.42
4:F:340:GLN:HA	4:F:343:TYR:CD2	2.53	0.42
1:A:254:GLU:HG2	1:A:258:ASN:ND2	2.34	0.42
1:A:329:ASN:OD1	3:E:22:VAL:HG21	2.19	0.42
4:F:96:GLU:HG2	4:F:147:TRP:HH2	1.83	0.42
1:C:333:ALA:O	1:C:337:THR:HG23	2.20	0.42
2:D:5:VAL:HG13	2:D:133:PHE:CD2	2.55	0.42
2:D:5:VAL:HG12	2:D:130:LEU:HD11	2.02	0.42
2:D:267:MET:HE3	2:D:267:MET:HB2	1.88	0.42
2:D:286:VAL:HB	2:D:325:GLU:HG2	2.01	0.42
2:D:157:GLU:HA	3:E:123:LEU:HD13	2.01	0.42
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.55	0.42
1:C:120[B]:ASP:CG	1:C:124:LYS:HZ1	2.27	0.42
2:D:68:LEU:HD23	2:D:68:LEU:HA	1.90	0.42
2:D:345:ILE:HG22	2:D:348:ASN:HB3	2.01	0.42
2:B:190:HIS:CD2	2:B:422:ASN:OD1	2.73	0.42
2:B:272:PRO:HB3	2:B:284:LEU:HD22	2.02	0.42
1:C:192:HIS:CG	1:C:421:ALA:HA	2.55	0.42
2:D:380:THR:HA	2:D:430:TYR:CD1	2.55	0.42
3:E:6:MET:HE2	3:E:24:LEU:HD22	2.01	0.42
2:D:65:LEU:HD21	2:D:85:PHE:CE2	2.55	0.42
4:F:242:ASN:OD1	4:F:242:ASN:N	2.52	0.41
2:D:415:GLU:OE1	3:E:129:HIS:NE2	2.48	0.41
4:F:216:TYR:CE2	4:F:218:GLU:HB2	2.55	0.41
2:D:358:PRO:HB2	12:D:602:HOH:O	2.20	0.41
2:B:33:THR:O	2:B:58:LYS:NZ	2.42	0.41
2:B:141:GLY:HA3	9:B:501:GDP:O3A	2.21	0.41
4:F:246:GLN:NE2	4:F:260:ASN:OD1	2.41	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:180:ALA:HB3	1:C:183:GLU:HG3	2.02	0.41
4:F:149:ALA:HB2	4:F:182:ILE:HG22	2.03	0.41
1:C:302:MET:N	1:C:302:MET:HE2	2.35	0.41
2:D:40:SER:N	2:D:43:GLN:HE22	2.16	0.41
1:A:72:PRO:HA	1:A:94:THR:HG21	2.02	0.41
2:B:267:MET:HE3	2:B:267:MET:HB2	1.68	0.41
1:C:356:ASN:ND2	12:C:607:HOH:O	2.53	0.41
2:D:40:SER:HB3	2:D:42:LEU:H	1.85	0.41
1:A:88:HIS:CD2	1:A:90:GLU:H	2.38	0.41
2:B:257:MET:HE3	2:B:257:MET:HB3	1.79	0.41
2:B:280:GLN:HG3	2:B:281:TYR:N	2.30	0.41
2:D:65:LEU:HD21	2:D:85:PHE:CD2	2.56	0.41
3:E:139:LEU:HB3	3:E:140:LYS:HE3	2.01	0.41
4:F:70:LYS:HB2	4:F:70:LYS:HE3	1.78	0.41
4:F:185:TYR:OH	4:F:239:HIS:HB3	2.21	0.41
1:A:209:ILE:HG23	1:A:230:LEU:HD23	2.03	0.41
2:D:296:SER:HA	2:D:299:MET:HG2	2.03	0.41
3:E:67:GLU:O	3:E:70:LYS:HG3	2.20	0.41
1:C:7:ILE:HG23	1:C:66:VAL:HG13	2.02	0.40
2:D:12:CYS:SG	2:D:138:SER:HB3	2.61	0.40
1:A:407:TRP:CE2	2:B:255:VAL:HA	2.56	0.40
1:C:63:PRO:HG2	1:C:87:PHE:CE1	2.56	0.40
1:C:343:PHE:HD2	1:C:347[A]:CYS:SG	2.43	0.40
2:D:36:TYR:CE1	2:D:38:GLY:HA3	2.56	0.40
2:D:151:LEU:O	2:D:155:ILE:HG13	2.21	0.40
2:D:177:ASP:OD1	2:D:177:ASP:N	2.48	0.40
2:D:226:ASN:O	2:D:230:SER:HB2	2.22	0.40
4:F:204:TRP:CZ2	4:F:338:CYS:HA	2.56	0.40
1:C:210:TYR:CE1	1:C:222:PRO:HD2	2.56	0.40
2:B:19:LYS:HE3	2:B:19:LYS:HB3	1.66	0.40
2:B:273:LEU:HD23	2:B:273:LEU:HA	1.57	0.40
2:B:232:THR:O	2:B:236:VAL:HG13	2.22	0.40
1:C:338:LYS:HG2	1:C:338:LYS:O	2.22	0.40
3:E:95:LYS:HA	3:E:95:LYS:HD2	1.92	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	439/450 (98%)	427 (97%)	12 (3%)	0	100	100
1	C	446/450 (99%)	437 (98%)	9 (2%)	0	100	100
2	B	424/445 (95%)	412 (97%)	12 (3%)	0	100	100
2	D	416/445 (94%)	397 (95%)	19 (5%)	0	100	100
3	E	121/143 (85%)	119 (98%)	2 (2%)	0	100	100
4	F	343/384 (89%)	322 (94%)	21 (6%)	0	100	100
All	All	2189/2317 (94%)	2114 (97%)	75 (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	371/378 (98%)	368 (99%)	3 (1%)	79	90
1	C	379/378 (100%)	368 (97%)	11 (3%)	37	58
2	B	370/383 (97%)	365 (99%)	5 (1%)	62	79
2	D	361/383 (94%)	342 (95%)	19 (5%)	19	33
3	E	112/127 (88%)	110 (98%)	2 (2%)	54	73
4	F	315/342 (92%)	305 (97%)	10 (3%)	34	54
All	All	1908/1991 (96%)	1858 (97%)	50 (3%)	47	62

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	193[A]	THR
1	A	193[B]	THR
1	A	381	THR
2	B	75	SER
2	B	126	SER
2	B	131	GLN
2	B	214	THR
2	B	236	VAL
1	C	151[A]	SER
1	C	151[B]	SER
1	C	165[A]	SER
1	C	165[B]	SER
1	C	178	SER
1	C	250	VAL
1	C	315[A]	CYS
1	C	315[B]	CYS
1	C	318	LEU
1	C	347[A]	CYS
1	C	347[B]	CYS
2	D	5	VAL
2	D	8	GLN
2	D	84	ILE
2	D	115	SER
2	D	116	VAL
2	D	145[A]	SER
2	D	177	ASP
2	D	180	VAL
2	D	193	VAL
2	D	221	THR
2	D	230	SER
2	D	236	VAL
2	D	238	THR
2	D	284	LEU
2	D	289	LEU
2	D	339	SER
2	D	372	SER
2	D	394	THR
2	D	421	SER
3	E	124	GLN
3	E	126	LYS
4	F	12	SER
4	F	225	SER

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Mol	Chain	Res	Type
4	F	255[A]	ARG
4	F	255[B]	ARG
4	F	271[A]	LEU
4	F	271[B]	LEU
4	F	296[A]	MET
4	F	296[B]	MET
4	F	353	VAL
4	F	373	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	11	GLN
1	A	356	ASN
2	B	48	ASN
2	B	165	ASN
2	B	191	GLN
2	B	332	ASN
2	B	347	ASN
2	B	383	GLN
2	B	434	GLN
1	C	15	GLN
1	C	283	HIS
2	D	6	HIS
2	D	8	GLN
2	D	99	ASN
2	D	100	ASN
2	D	195	ASN
2	D	292	GLN
2	D	329	GLN
3	E	71	HIS
3	E	92	ASN
3	E	103	GLN
4	F	310	GLN

5.3.3 RNA

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 15 ligands modelled in this entry, 7 are monoatomic - leaving 8 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	GTP	C	501	6	26,34,34	1.14	2 (7%)	32,54,54	1.41	4 (12%)
5	GTP	A	501	6	26,34,34	1.07	2 (7%)	32,54,54	1.32	5 (15%)
11	7PB	B	505	-	31,31,31	2.46	11 (35%)	42,42,42	3.38	13 (30%)
10	MES	B	504	-	12,12,12	1.51	1 (8%)	14,16,16	2.80	8 (57%)
9	GDP	D	501	-	24,30,30	0.90	1 (4%)	30,47,47	1.35	4 (13%)
11	7PB	D	502	-	31,31,31	3.22	17 (54%)	42,42,42	4.77	21 (50%)
10	MES	B	503	-	12,12,12	1.05	1 (8%)	14,16,16	3.11	4 (28%)
9	GDP	B	501	6	24,30,30	0.94	1 (4%)	30,47,47	1.47	5 (16%)

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
5	GTP	C	501	6	-	7/18/38/38	0/3/3/3
5	GTP	A	501	6	-	6/18/38/38	0/3/3/3
11	7PB	B	505	-	-	1/18/20/20	0/4/4/4
10	MES	B	504	-	-	0/6/14/14	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
9	GDP	D	501	-	-	4/12/32/32	0/3/3/3
11	7PB	D	502	-	-	0/18/20/20	0/4/4/4
10	MES	B	503	-	-	3/6/14/14	0/1/1/1
9	GDP	B	501	6	-	3/12/32/32	0/3/3/3

All (36) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	D	502	7PB	C08-N07	8.01	1.52	1.38
11	D	502	7PB	O27-C25	6.91	1.52	1.37
11	B	505	7PB	C08-N07	6.50	1.50	1.38
11	B	505	7PB	O27-C25	5.83	1.49	1.37
11	D	502	7PB	C21-N20	5.54	1.53	1.40
11	D	502	7PB	C10-N09	5.49	1.48	1.35
11	D	502	7PB	C18-N20	5.49	1.48	1.38
11	B	505	7PB	C21-N20	5.38	1.52	1.40
11	D	502	7PB	C01-N09	4.68	1.51	1.41
10	B	504	MES	C8-S	4.30	1.83	1.77
11	B	505	7PB	C18-N20	3.87	1.45	1.38
11	B	505	7PB	C10-N09	3.77	1.44	1.35
11	D	502	7PB	C05-N07	3.61	1.48	1.40
5	C	501	GTP	C5-C6	-3.61	1.40	1.47
11	D	502	7PB	C23-C22	3.46	1.46	1.38
5	A	501	GTP	C5-C6	-3.43	1.40	1.47
11	D	502	7PB	O27-C28	3.27	1.52	1.42
11	D	502	7PB	C16-N15	2.92	1.39	1.33
11	B	505	7PB	C05-N07	2.87	1.47	1.40
11	B	505	7PB	C23-C24	2.83	1.44	1.38
11	D	502	7PB	C23-C24	2.66	1.44	1.38
11	D	502	7PB	C06-C05	2.66	1.43	1.39
11	D	502	7PB	C13-C12	2.64	1.58	1.48
11	D	502	7PB	C03-C04	2.56	1.44	1.38
11	D	502	7PB	C02-C01	2.42	1.43	1.39
11	D	502	7PB	C16-N17	2.40	1.38	1.33
10	B	503	MES	C8-S	2.35	1.80	1.77
11	B	505	7PB	O27-C28	2.25	1.49	1.42
5	A	501	GTP	C2-N3	2.19	1.38	1.33
5	C	501	GTP	C2-N3	2.18	1.38	1.33
11	B	505	7PB	C16-N15	2.18	1.38	1.33
11	B	505	7PB	C01-N09	2.18	1.46	1.41
11	D	502	7PB	O14-C10	2.17	1.27	1.23
9	D	501	GDP	C6-N1	-2.13	1.34	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	B	505	7PB	C23-C22	2.11	1.43	1.38
9	B	501	GDP	C2'-C1'	-2.00	1.50	1.53

All (64) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
11	D	502	7PB	C13-C11-C10	-24.01	94.73	117.21
11	B	505	7PB	C12-C11-C10	-13.19	104.86	117.21
11	B	505	7PB	C13-C11-C10	-10.99	106.92	117.21
11	D	502	7PB	C12-C11-C10	-9.61	108.21	117.21
11	B	505	7PB	N17-C16-N15	-7.94	116.18	128.60
10	B	503	MES	O3S-S-O1S	-7.76	92.31	111.27
11	D	502	7PB	N17-C16-N15	-7.17	117.38	128.60
11	D	502	7PB	C04-C05-C06	6.19	126.98	119.65
10	B	503	MES	O3S-S-C8	5.54	114.73	105.77
10	B	504	MES	C5-N4-C3	5.11	120.33	108.83
11	B	505	7PB	O14-C10-C11	-5.08	115.50	122.12
11	D	502	7PB	C23-C22-C21	-4.91	113.85	119.72
10	B	503	MES	O1S-S-C8	4.90	112.82	106.92
11	D	502	7PB	C05-C06-C01	-4.47	112.86	119.64
11	D	502	7PB	C28-O27-C25	-4.30	108.17	117.51
10	B	504	MES	O3S-S-O2S	-4.17	101.09	111.27
11	D	502	7PB	C01-N09-C10	-4.08	117.64	127.40
11	B	505	7PB	C11-C10-N09	3.92	120.78	115.02
10	B	504	MES	C6-C5-N4	3.90	116.02	110.10
10	B	504	MES	O2S-S-C8	3.73	111.41	106.92
9	D	501	GDP	PA-O3A-PB	-3.64	120.34	132.83
5	A	501	GTP	C8-N7-C5	3.63	109.91	102.99
11	D	502	7PB	C02-C01-N09	-3.52	108.56	120.40
11	B	505	7PB	C04-C05-C06	3.44	123.73	119.65
11	D	502	7PB	C02-C01-C06	3.40	123.68	119.65
5	C	501	GTP	C8-N7-C5	3.40	109.46	102.99
11	D	502	7PB	C11-C10-N09	3.22	119.75	115.02
11	D	502	7PB	C04-C05-N07	-3.08	110.34	120.64
5	C	501	GTP	C5-C6-N1	3.00	119.26	113.95
11	D	502	7PB	C03-C04-C05	-2.95	116.20	119.72
9	B	501	GDP	O6-C6-C5	-2.94	118.64	124.37
10	B	503	MES	C5-N4-C3	2.90	115.35	108.83
10	B	504	MES	C7-N4-C5	-2.87	103.91	111.23
9	B	501	GDP	C8-N7-C5	2.87	108.45	102.99
9	B	501	GDP	PA-O3A-PB	-2.86	123.01	132.83
10	B	504	MES	C2-C3-N4	2.85	114.42	110.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
10	B	504	MES	O3S-S-C8	2.82	110.33	105.77
10	B	504	MES	C7-N4-C3	-2.77	104.16	111.23
11	B	505	7PB	C02-C01-C06	2.76	122.92	119.65
11	B	505	7PB	C05-C06-C01	-2.76	115.45	119.64
11	B	505	7PB	C21-N20-C18	-2.75	121.52	128.74
11	D	502	7PB	C22-C23-C24	2.74	124.14	120.25
5	C	501	GTP	C2-N1-C6	-2.70	120.12	125.10
9	B	501	GDP	C5-C6-N1	2.53	118.42	113.95
9	D	501	GDP	C8-N7-C5	2.51	107.77	102.99
5	A	501	GTP	C5'-C4'-C3'	-2.49	105.87	115.18
11	D	502	7PB	O14-C10-C11	-2.45	118.92	122.12
11	D	502	7PB	C21-N20-C18	-2.45	122.30	128.74
11	B	505	7PB	C16-N15-C08	2.45	123.37	115.25
5	A	501	GTP	C5-C6-N1	2.37	118.14	113.95
11	B	505	7PB	C19-C08-N15	-2.37	119.45	122.75
11	B	505	7PB	C05-N07-C08	-2.34	122.61	128.74
11	B	505	7PB	C01-N09-C10	-2.33	121.83	127.40
11	D	502	7PB	C06-C01-N09	2.32	127.76	120.18
11	D	502	7PB	C16-N15-C08	2.31	122.92	115.25
11	D	502	7PB	C21-C26-C25	2.27	122.74	119.17
5	C	501	GTP	PA-O3A-PB	-2.17	125.39	132.83
9	D	501	GDP	C5-C6-N1	2.15	117.75	113.95
9	B	501	GDP	O2B-PB-O3A	2.14	111.81	104.64
11	D	502	7PB	C19-C08-N15	-2.11	119.80	122.75
5	A	501	GTP	PB-O3B-PG	-2.10	125.62	132.83
5	A	501	GTP	C2-N1-C6	-2.07	121.29	125.10
9	D	501	GDP	C3'-C2'-C1'	2.03	104.03	100.98
11	D	502	7PB	C19-C08-N07	2.01	126.61	120.24

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	C5'-O5'-PA-O1A
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	501	GTP	C5'-O5'-PA-O1A
5	C	501	GTP	C5'-O5'-PA-O2A
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
10	B	503	MES	C7-C8-S-O3S

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Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O1G
9	D	501	GDP	PA-O3A-PB-O3B
5	A	501	GTP	C5'-O5'-PA-O3A
10	B	503	MES	C7-C8-S-O1S
10	B	503	MES	C7-C8-S-O2S
5	C	501	GTP	C4'-C5'-O5'-PA
5	A	501	GTP	C4'-C5'-O5'-PA
11	B	505	7PB	C19-C08-N07-C05
5	A	501	GTP	PB-O3B-PG-O3G
5	C	501	GTP	PB-O3B-PG-O2G
5	C	501	GTP	PB-O3B-PG-O3G
5	C	501	GTP	C5'-O5'-PA-O3A
9	B	501	GDP	C5'-O5'-PA-O3A
9	D	501	GDP	C5'-O5'-PA-O3A
5	C	501	GTP	PB-O3A-PA-O2A

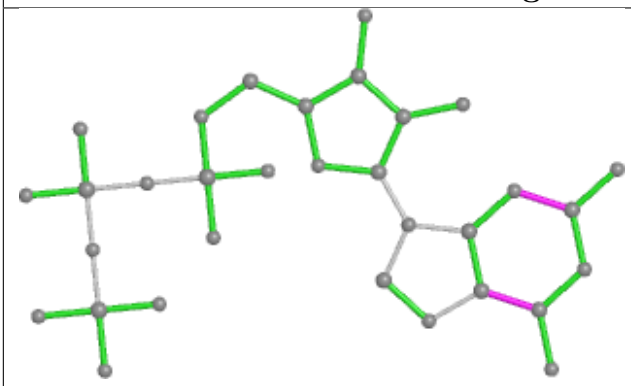
There are no ring outliers.

7 monomers are involved in 11 short contacts:

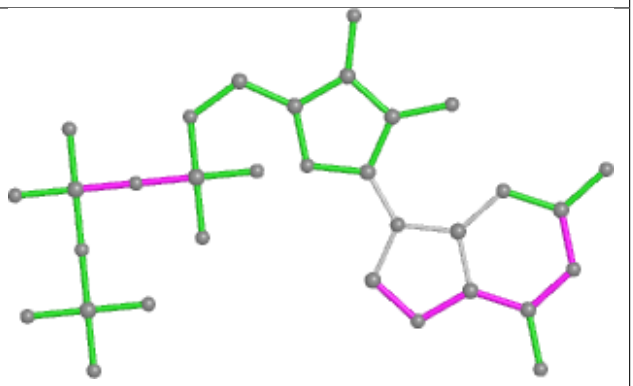
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	501	GTP	2	0
11	B	505	7PB	1	0
10	B	504	MES	1	0
9	D	501	GDP	1	0
11	D	502	7PB	2	0
10	B	503	MES	3	0
9	B	501	GDP	1	0

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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

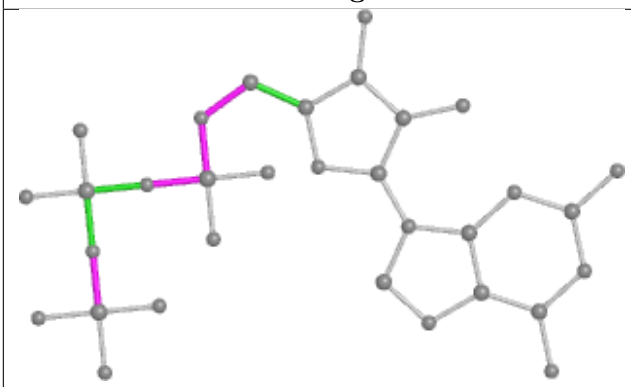
Ligand GTP C 501



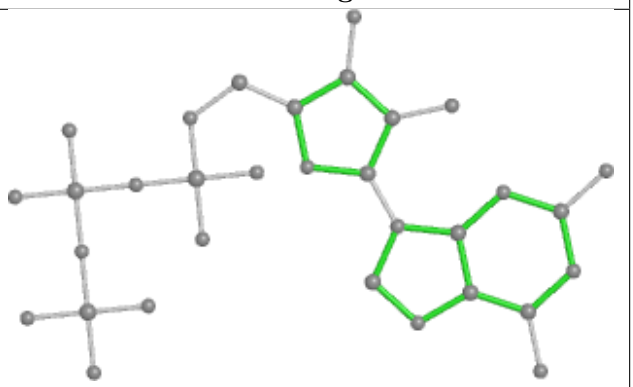
Bond lengths



Bond angles

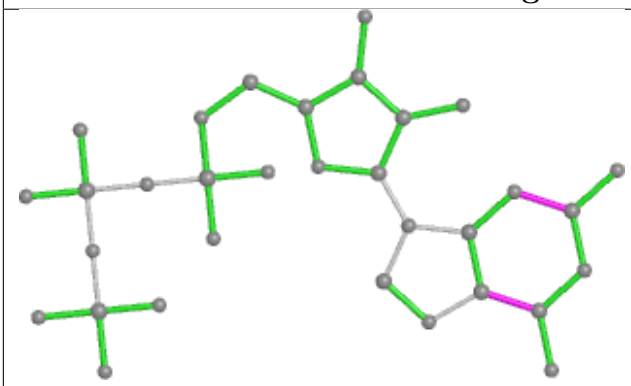


Torsions



Rings

Ligand GTP A 501



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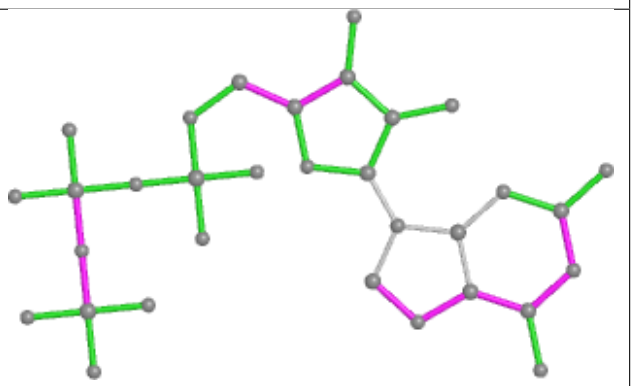
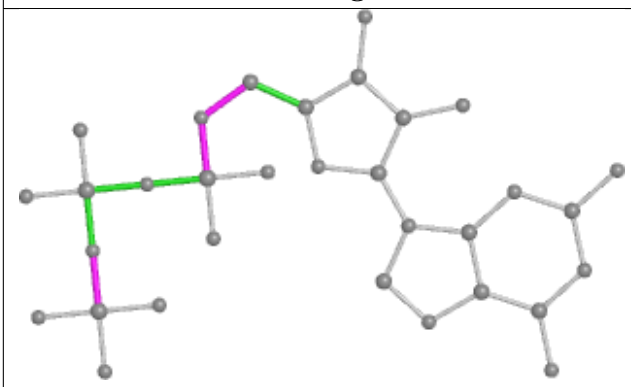


Bond angles



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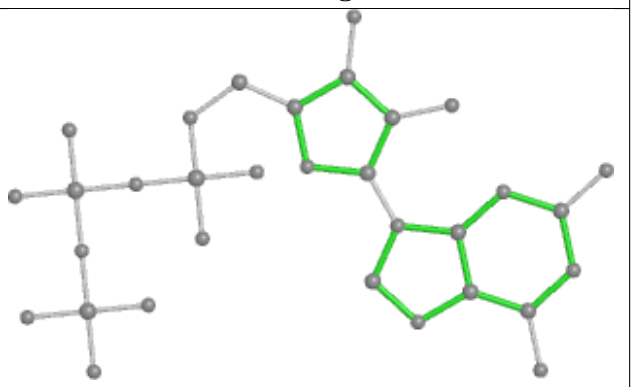
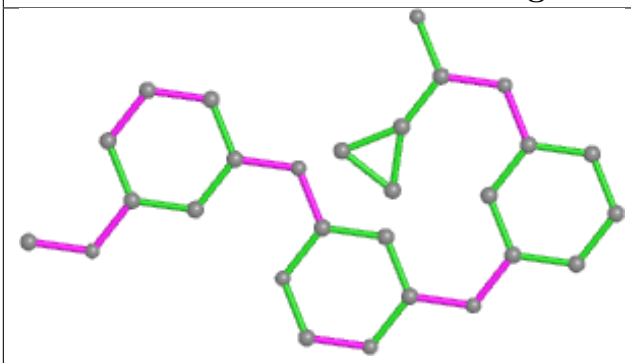
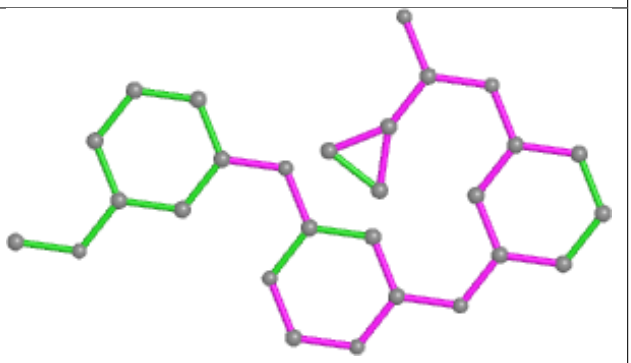


Rings

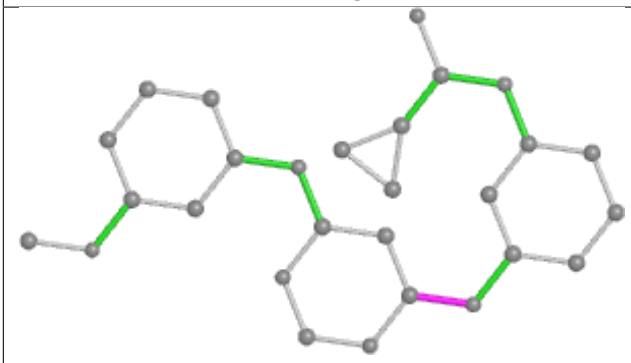
Ligand 7PB B 505



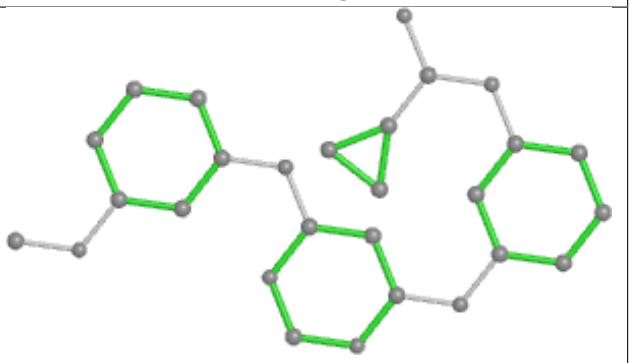
Bond lengths



Bond angles

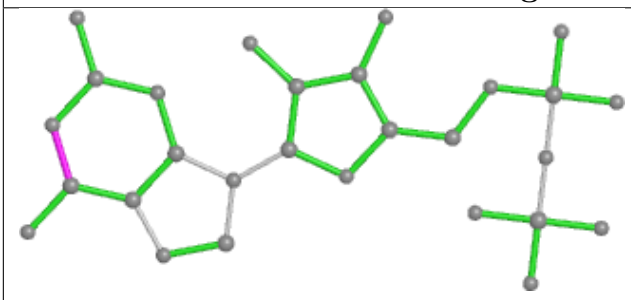


Torsions

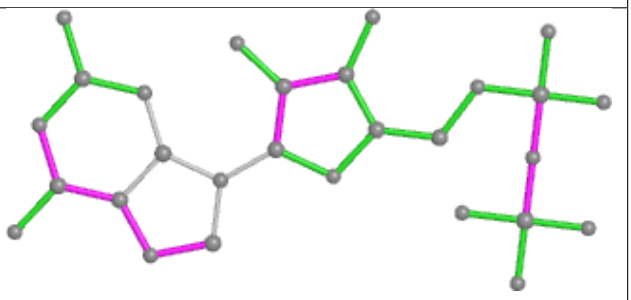


Rings

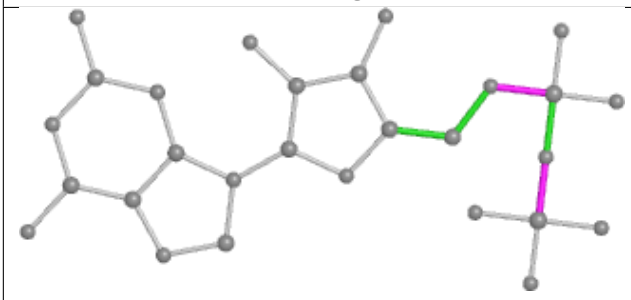
Ligand GDP D 501



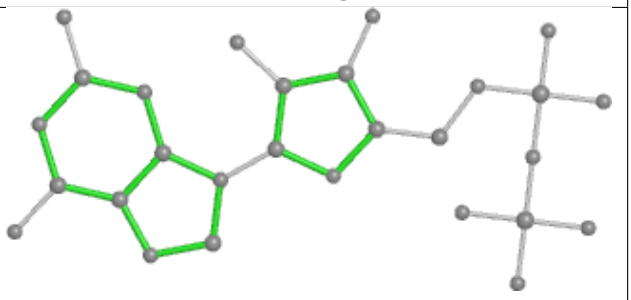
Bond lengths



Bond angles

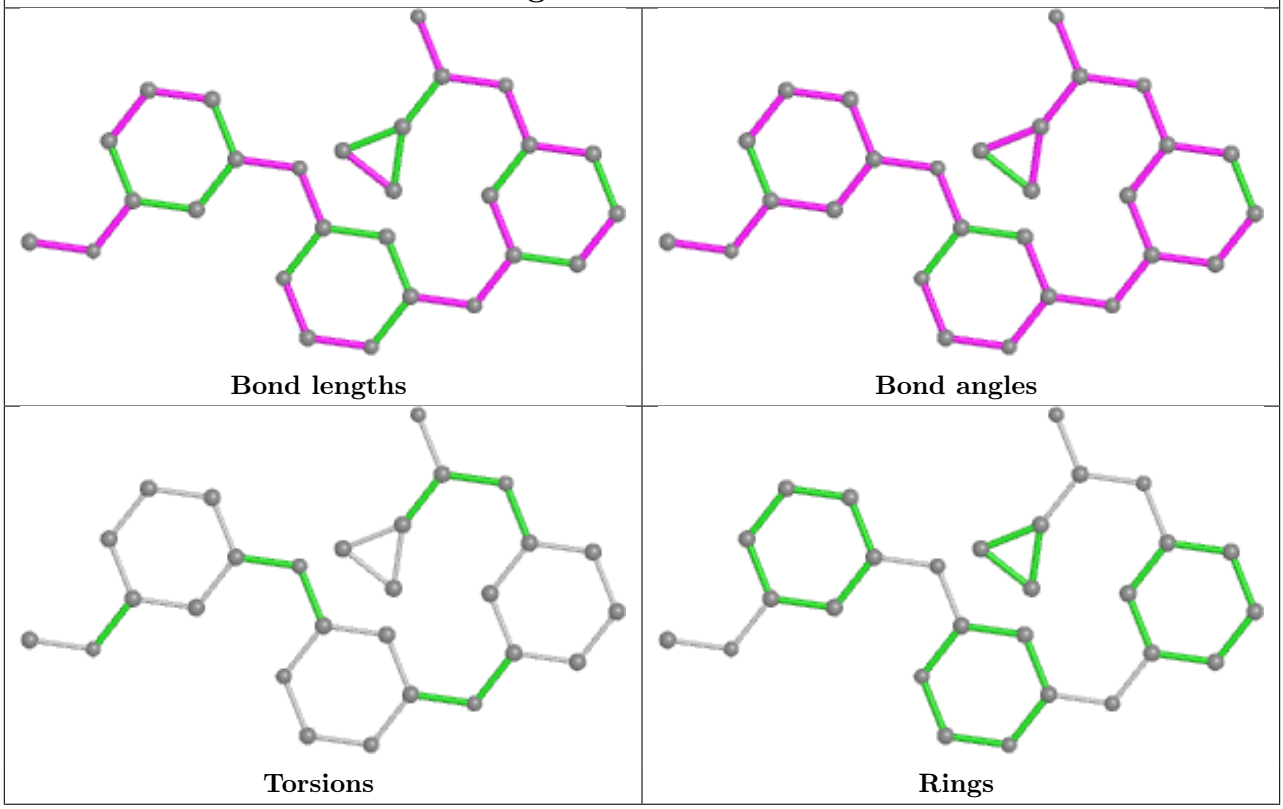


Torsions

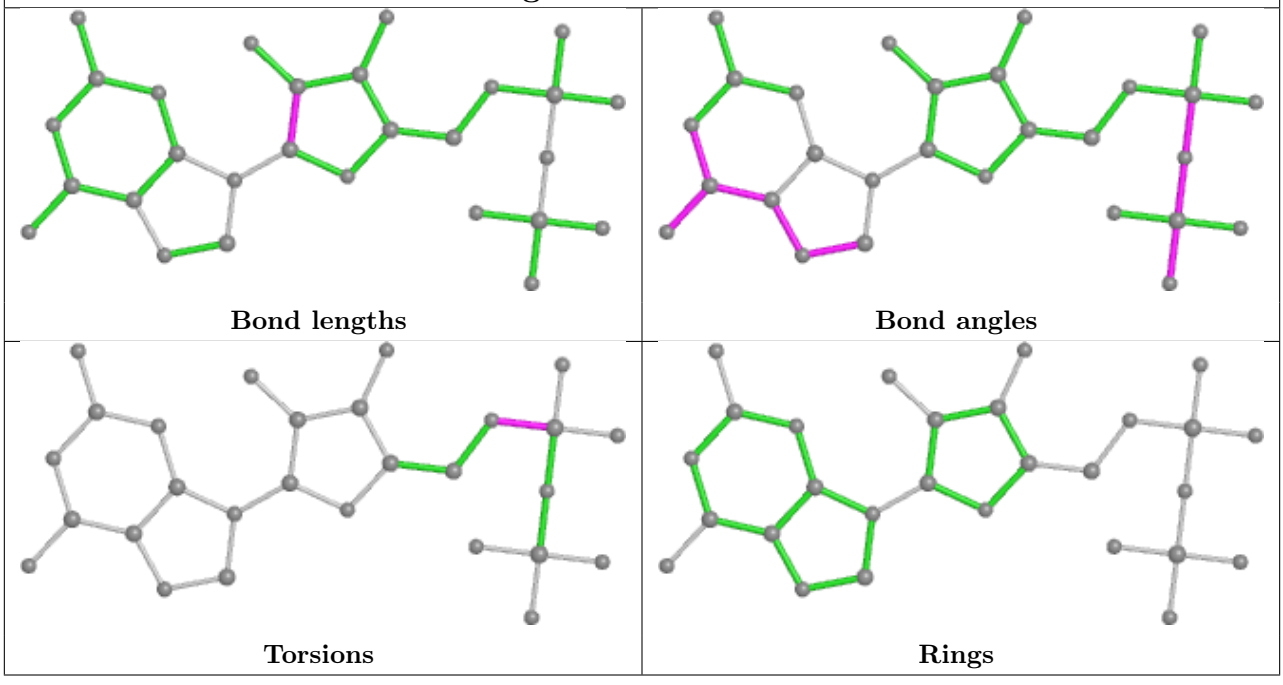


Rings

Ligand 7PB D 502



Ligand GDP B 501



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	437/450 (97%)	0.34	13 (2%)	52	49	31, 53, 74, 89	4 (0%)
1	C	440/450 (97%)	0.11	14 (3%)	50	47	27, 46, 68, 88	8 (1%)
2	B	424/445 (95%)	0.31	17 (4%)	43	40	26, 51, 78, 116	7 (1%)
2	D	420/445 (94%)	1.32	95 (22%)	3	3	44, 75, 99, 126	2 (0%)
3	E	123/143 (86%)	1.21	19 (15%)	6	6	35, 74, 104, 130	2 (1%)
4	F	346/384 (90%)	1.18	82 (23%)	2	2	36, 77, 142, 163	5 (1%)
All	All	2190/2317 (94%)	0.66	240 (10%)	12	10	26, 59, 104, 163	28 (1%)

All (240) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	169	LEU	7.7
2	D	402	PHE	5.3
2	B	57	ASN	5.2
4	F	225	SER	5.1
3	E	143	ALA	4.6
2	D	140	GLY	4.5
4	F	240	LEU	4.5
2	B	281	TYR	4.5
2	D	73	MET	4.5
4	F	245	ILE	4.3
2	D	39	ASP	4.2
1	C	338	LYS	4.2
1	A	262	TYR	4.1
2	D	54	ALA	4.1
2	D	72	THR	4.0
4	F	166	ALA	4.0
3	E	28	SER	4.0
1	C	340	SER	3.9
4	F	161	LEU	3.9

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Mol	Chain	Res	Type	RSRZ
4	F	125	THR	3.9
4	F	173	ILE	3.8
2	D	401	ALA	3.8
2	D	37	HIS	3.8
4	F	239	HIS	3.8
1	C	282	TYR	3.7
4	F	170	LEU	3.7
2	D	99	ASN	3.7
2	D	284	LEU	3.7
3	E	6	MET	3.7
2	D	55	THR	3.6
4	F	372	THR	3.6
2	D	219	THR	3.6
2	D	92	PHE	3.5
4	F	146	VAL	3.5
2	B	247	ASN	3.5
4	F	132	LEU	3.4
2	D	411	MET	3.4
1	C	283	HIS	3.4
4	F	380	HIS	3.4
2	D	84	ILE	3.4
2	B	283	ALA	3.3
2	D	36	TYR	3.3
2	D	141	GLY	3.3
4	F	362	ALA	3.3
4	F	249	TYR	3.3
4	F	158	GLU	3.2
2	D	175	VAL	3.2
2	D	212	PHE	3.2
3	E	61	ARG	3.2
4	F	233	PHE	3.2
4	F	244	CYS	3.1
4	F	237	THR	3.1
1	A	196	GLU	3.1
2	D	16	ILE	3.1
2	D	394	THR	3.1
3	E	62	LYS	3.1
1	C	440	VAL	3.0
4	F	179	VAL	3.0
2	B	436	ALA	3.0
4	F	100	ILE	3.0
4	F	242	ASN	3.0

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Mol	Chain	Res	Type	RSRZ
2	D	416	PHE	3.0
2	D	215	LEU	2.9
2	D	97	ALA	2.9
4	F	102	PRO	2.9
2	D	117	LEU	2.9
2	D	101	TRP	2.9
4	F	28	LYS	2.9
4	F	228	TYR	2.9
4	F	90	SER	2.9
4	F	144	GLY	2.9
4	F	252	ASN	2.9
2	D	44	LEU	2.8
2	D	93	GLY	2.8
4	F	346	LEU	2.8
2	D	220	PRO	2.8
4	F	168	GLU	2.8
2	D	405	TRP	2.7
2	B	72	THR	2.7
2	D	395	ALA	2.7
4	F	231	ALA	2.7
2	D	404	HIS	2.7
4	F	186	LEU	2.7
2	D	439	ASP	2.7
4	F	101	TYR	2.7
2	D	302	ALA	2.7
2	B	274	THR	2.7
2	D	57	ASN	2.7
4	F	229	ASN	2.7
4	F	160	ILE	2.6
4	F	99	VAL	2.6
2	B	282	ARG	2.6
2	B	275	SER	2.6
2	D	245	GLN	2.6
1	A	104	ALA	2.6
1	C	43	GLY	2.6
2	D	82	GLY	2.6
1	A	1	MET	2.6
3	E	119	MET	2.6
2	D	29	GLY	2.6
2	D	81	PHE	2.6
1	C	163	LYS	2.6
2	D	80	PRO	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	346	TRP	2.6
2	B	2	ARG	2.6
2	D	85	PHE	2.5
2	D	180	VAL	2.5
4	F	130	VAL	2.5
4	F	375	PHE	2.5
2	D	369	LEU	2.5
1	A	282	TYR	2.5
1	C	341	ILE	2.5
2	D	227	HIS	2.5
2	D	412	ASP	2.5
2	D	66	VAL	2.5
2	D	76	VAL	2.5
2	D	427	VAL	2.5
4	F	133	ALA	2.5
4	F	263	PHE	2.5
2	D	273	LEU	2.5
3	E	68	LEU	2.5
4	F	103	THR	2.5
4	F	253	TYR	2.5
4	F	162	ILE	2.5
2	D	126	SER	2.5
4	F	235	ASP	2.5
2	D	98	GLY	2.5
2	D	48	ASN	2.5
2	D	144	GLY	2.5
2	B	55	THR	2.5
2	D	100	ASN	2.5
2	B	280	GLN	2.5
2	D	320	ARG	2.5
3	E	139	LEU	2.4
2	D	399	ARG	2.4
2	D	30	ILE	2.4
2	D	156	ARG	2.4
4	F	131	PHE	2.4
4	F	199	PHE	2.4
4	F	241	THR	2.4
4	F	259	GLY	2.4
2	D	2	ARG	2.4
2	D	102	ALA	2.4
2	D	214	THR	2.4
4	F	150	LYS	2.4

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Mol	Chain	Res	Type	RSRZ
4	F	247	LYS	2.4
4	F	182	ILE	2.4
1	A	46	ASP	2.4
4	F	256	TYR	2.4
2	D	38	GLY	2.4
2	D	195	ASN	2.4
3	E	57	ALA	2.4
4	F	149	ALA	2.4
1	A	179	THR	2.3
1	A	418	PHE	2.3
2	B	214	THR	2.3
4	F	226	GLU	2.3
2	D	208	TYR	2.3
2	D	56	GLY	2.3
2	D	104	GLY	2.3
1	C	177	VAL	2.3
2	D	221	THR	2.3
3	E	48	GLU	2.3
3	E	135	LYS	2.3
4	F	194	PRO	2.3
1	C	128	GLN	2.3
4	F	177	GLY	2.3
4	F	164	SER	2.3
4	F	250	SER	2.3
2	D	11	GLN	2.3
4	F	296[A]	MET	2.3
2	D	90	PHE	2.3
4	F	159	GLY	2.3
4	F	232	ASN	2.2
2	D	23	VAL	2.2
4	F	224	SER	2.2
2	D	323	MET	2.2
4	F	89	GLU	2.2
3	E	120	LEU	2.2
4	F	104	ASN	2.2
2	D	218	THR	2.2
2	D	169	VAL	2.2
4	F	13	VAL	2.2
2	D	94	GLN	2.2
2	D	172	SER	2.2
2	D	356	ILE	2.2
3	E	138	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
4	F	135	TYR	2.2
3	E	27	PRO	2.2
4	F	227	PRO	2.2
2	D	179	VAL	2.2
2	D	12	CYS	2.2
4	F	230	SER	2.2
2	D	42	LEU	2.2
2	D	406	TYR	2.2
4	F	178	GLN	2.2
1	A	54	SER	2.1
2	B	16[A]	ILE	2.1
4	F	197	ARG	2.1
2	B	284	LEU	2.1
2	D	238	THR	2.1
2	D	393	PHE	2.1
1	C	1	MET	2.1
2	D	67	ASP	2.1
1	A	89	PRO	2.1
2	D	87	PRO	2.1
2	D	83	GLN	2.1
2	D	370	LYS	2.1
1	A	281	ALA	2.1
4	F	181	VAL	2.1
2	D	125	GLU	2.1
3	E	59	GLU	2.1
4	F	257	GLU	2.1
4	F	254	GLY	2.1
2	D	7	ILE	2.1
4	F	243	HIS	2.1
2	D	68	LEU	2.1
2	D	187	LEU	2.1
1	C	285	GLN	2.1
4	F	198	LYS	2.1
1	A	437	VAL	2.1
3	E	7	GLU	2.1
2	D	95	SER	2.1
4	F	152	SER	2.1
4	F	196	HIS	2.1
4	F	236	LYS	2.1
2	D	291	GLN	2.1
3	E	45	PRO	2.1
1	C	179	THR	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	357	TYR	2.0
2	D	59	TYR	2.0
4	F	184	LYS	2.0
2	B	300	MET	2.0
4	F	73	ARG	2.0
3	E	133	VAL	2.0
4	F	6	VAL	2.0
2	D	40	SER	2.0
2	D	400	LYS	2.0
2	B	48	ASN	2.0
3	E	54	LEU	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 oligosaccharides in this entry.

6.4 Ligands (i)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
8	CL	D	503	1/1	0.72	0.47	120,120,120,120	0
9	GDP	D	501	28/28	0.86	0.14	67,74,85,88	0
10	MES	B	503	12/12	0.90	0.12	45,59,77,81	0
11	7PB	D	502	28/28	0.93	0.12	51,63,68,70	0
11	7PB	B	505	28/28	0.95	0.11	38,49,57,58	0
7	CA	A	503	1/1	-	-	73,73,73,73	1
10	MES	B	504	12/12	0.96	0.10	57,65,71,80	0
8	CL	A	504	1/1	-	-	74,74,74,74	1
7	CA	C	503	1/1	0.96	0.04	59,59,59,59	0
6	MG	B	502	1/1	0.96	0.05	36,36,36,36	0
5	GTP	A	501	32/32	0.97	0.06	35,43,47,51	0
9	GDP	B	501	28/28	0.98	0.06	34,42,47,51	0

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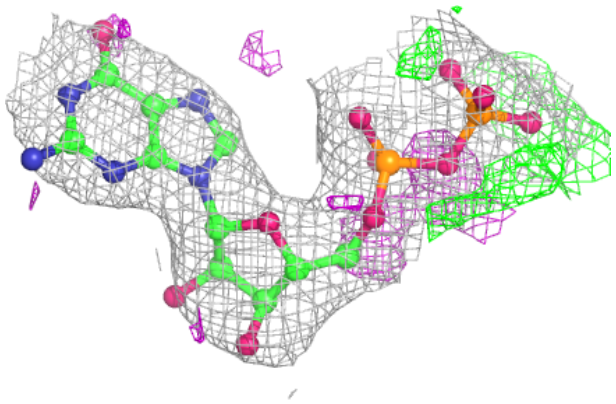
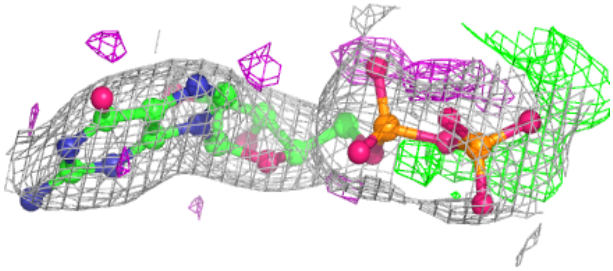
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	GTP	C	501	32/32	0.98	0.05	33,40,43,49	0
6	MG	A	502	1/1	0.99	0.04	47,47,47,47	0
6	MG	C	502	1/1	0.99	0.02	41,41,41,41	0

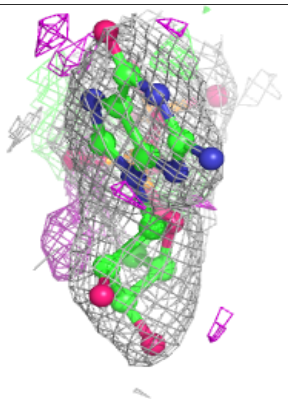
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 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)

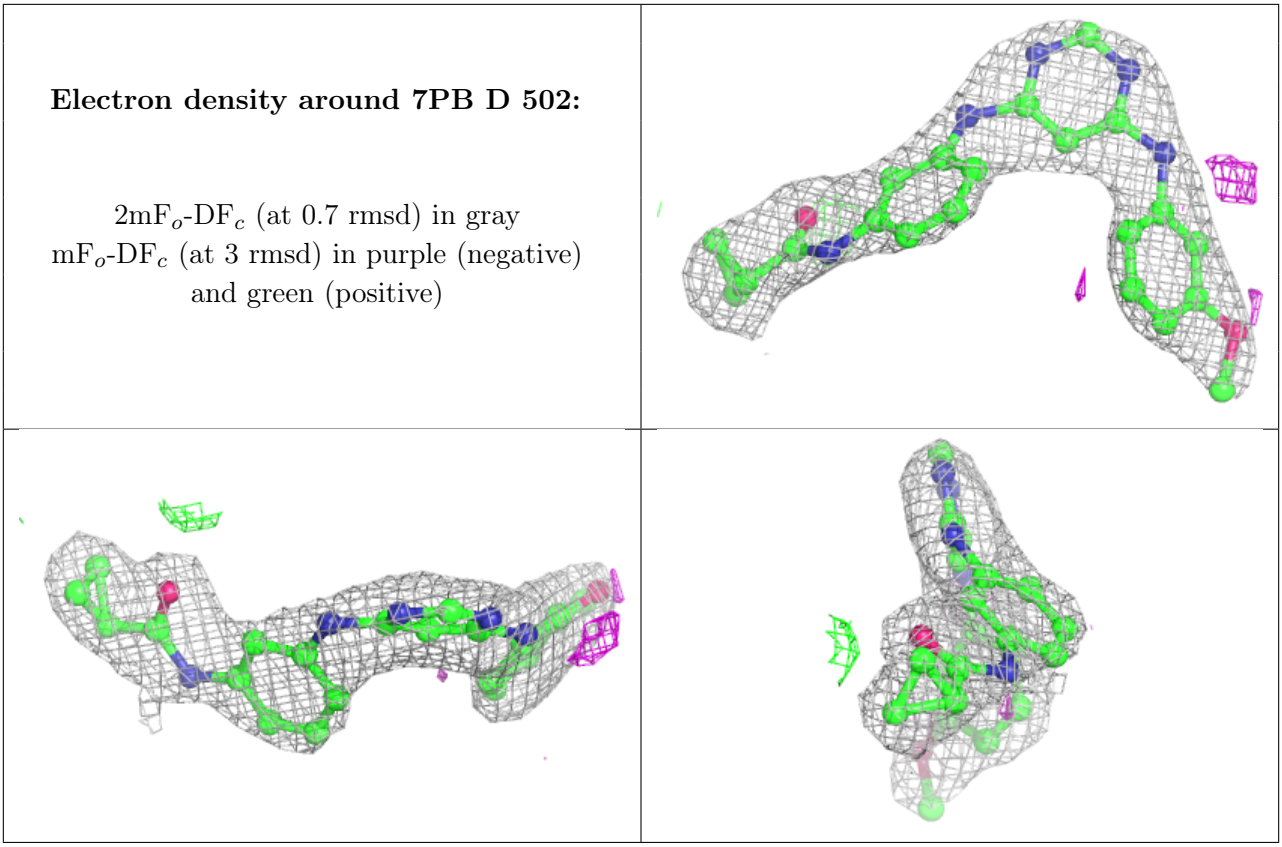






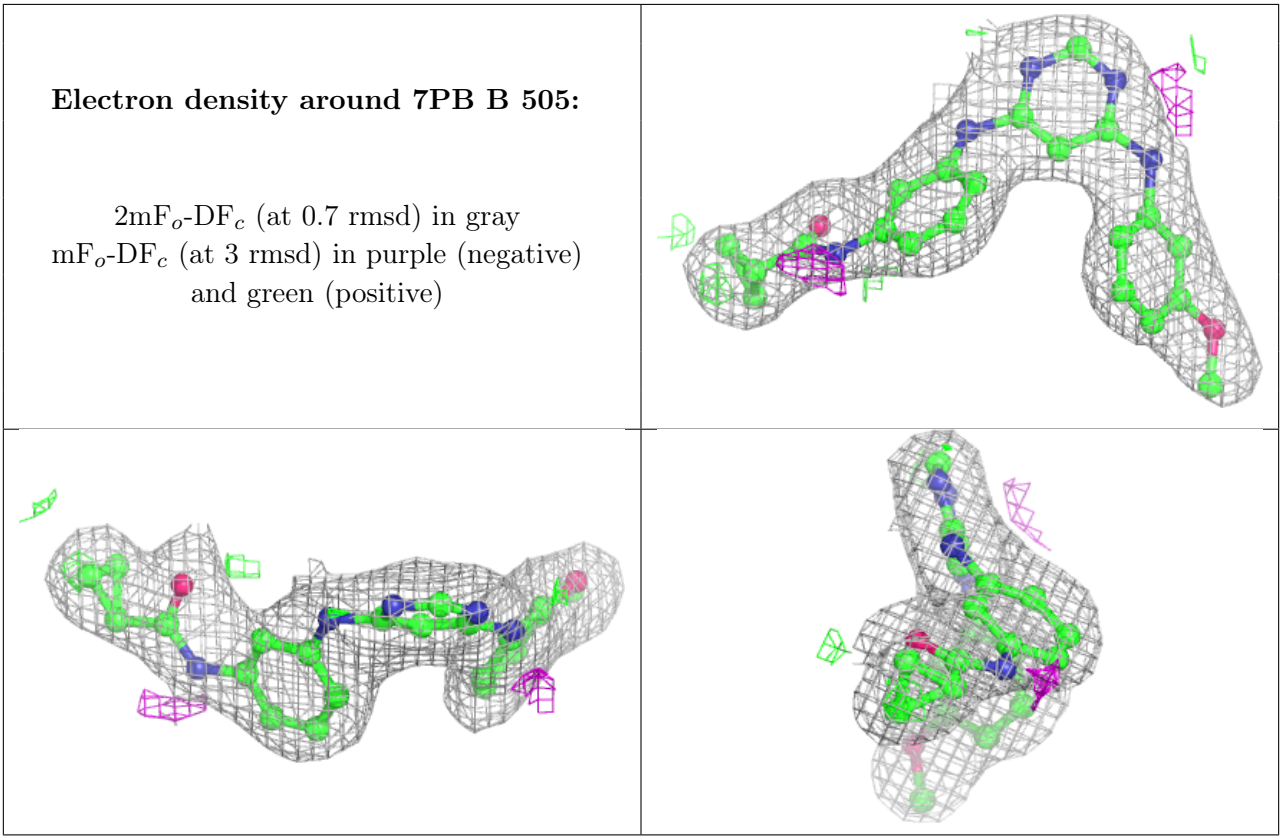
Electron density around 7PB D 502:

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



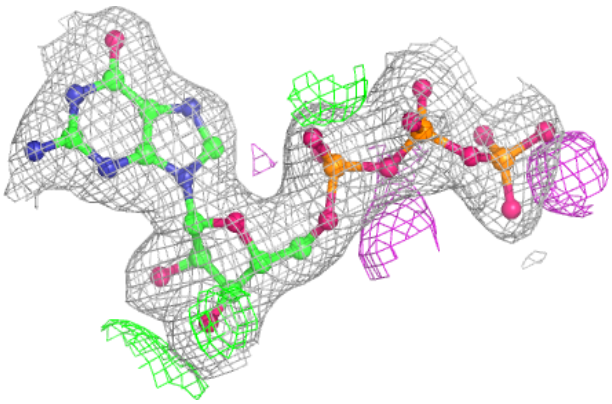
Electron density around 7PB B 505:

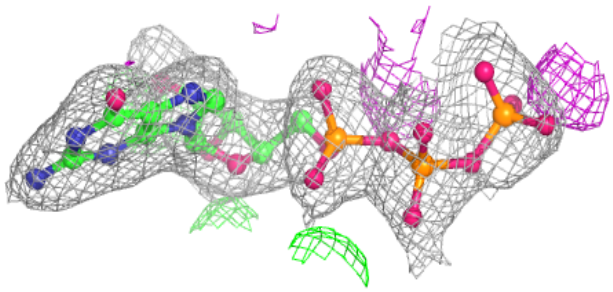
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

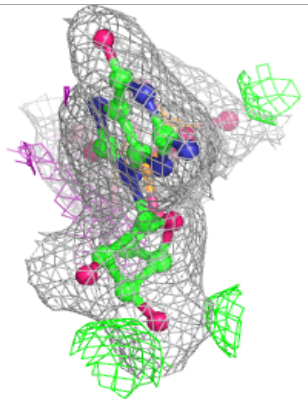


Electron density around GTP A 501:

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

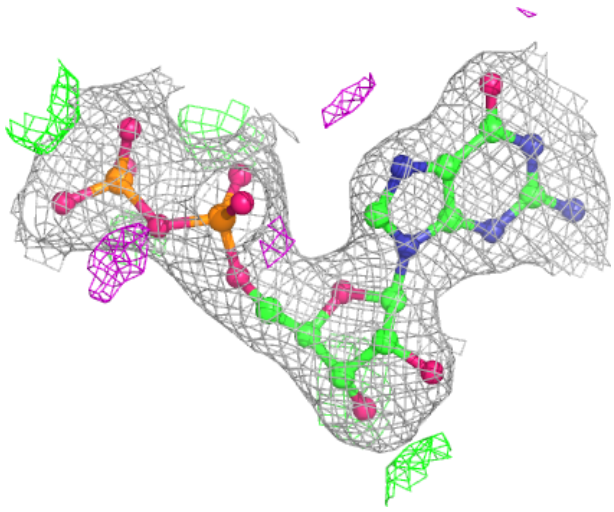


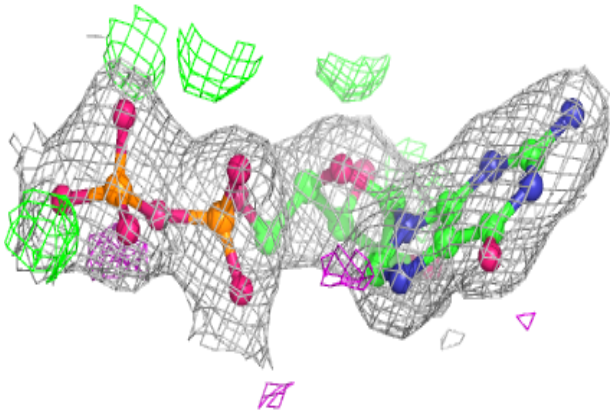


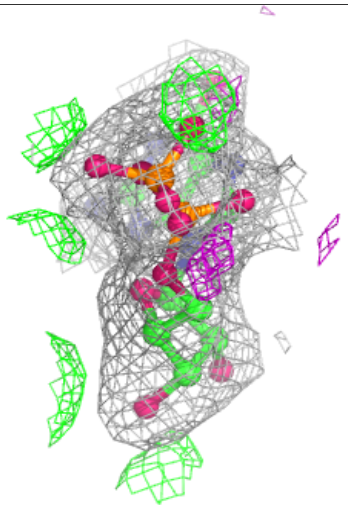


Electron density around GDP B 501:

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

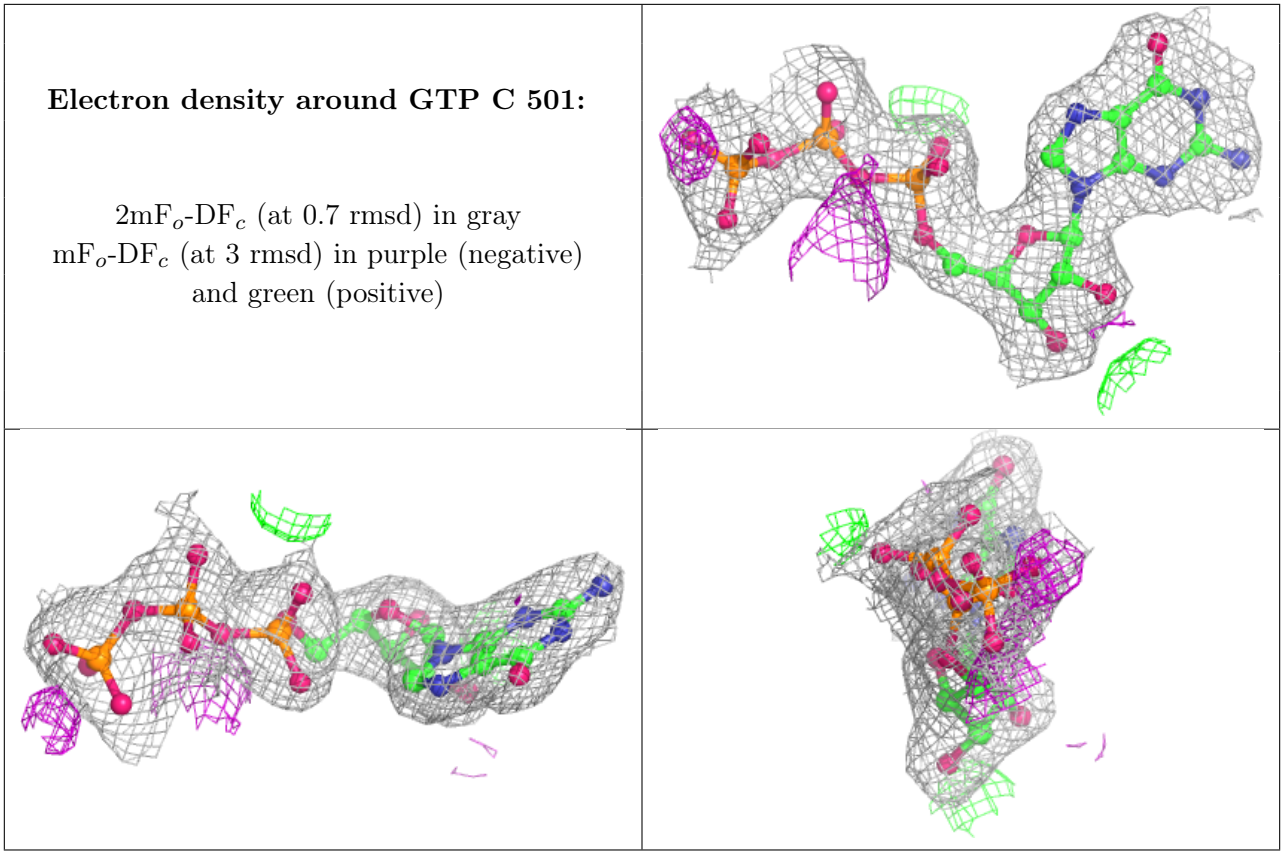






Electron density around GTP C 501:

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



6.5 Other polymers

There are no such residues in this entry.