Full wwPDB X-ray Structure Validation Report ⓘ

Nov 20, 2024 – 06:11 pm GMT

PDB ID	:	8R6O
Title	:	Tubulin-4AZA2996 complex
Authors	:	Herman, J.; Vanstreels, E.; Bardiot, D.; Prota, A.E.; Olieric, N.; Gao, L.-J.; Vercruysse, T.; Daems, T.; Waer, M.; Herdewijn, P.; Louat, T.; Steinmetz, M.O.; De Jonghe, S.; Sprangers, B.; Daelemans, D.
Deposited on	:	2023-11-22
Resolution	:	2.20 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:

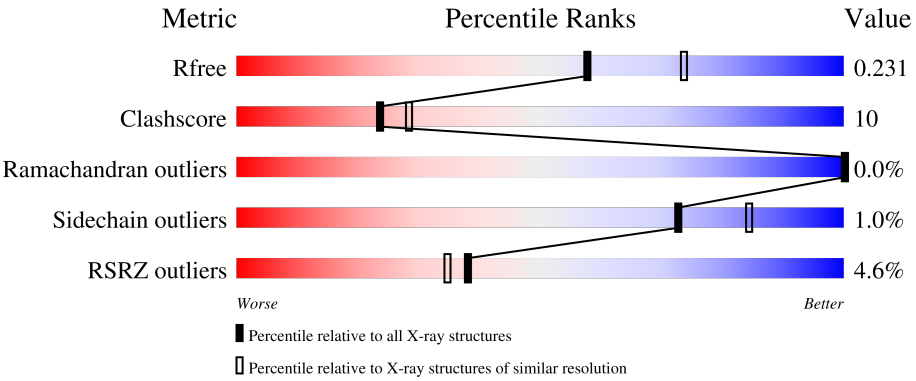
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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 2.20 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	5791 (2.20-2.20)
Clashscore	180529	6634 (2.20-2.20)
Ramachandran outliers	177936	6560 (2.20-2.20)
Sidechain outliers	177891	6561 (2.20-2.20)
RSRZ outliers	164620	5791 (2.20-2.20)

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	451	3% 76% 21% •
1	C	451	2% 80% 17% •
2	B	445	3% 75% 21% •
2	D	445	5% 70% 24% • 5%

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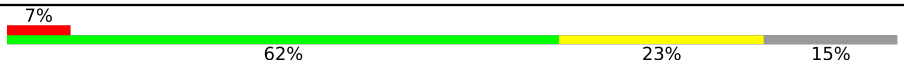
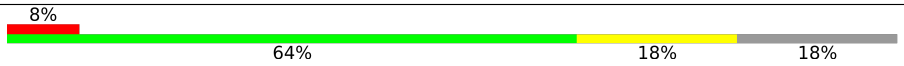
Mol	Chain	Length	Quality of chain
3	E	143	
4	F	384	

2 Entry composition (i)

There are 12 unique types of molecules in this entry. The entry contains 17733 atoms, of which 46 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 Detyrosinated tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	437	Total	C	N	O	S	0	2	0
			3422	2167	581	650	24			
1	C	440	Total	C	N	O	S	0	4	0
			3451	2184	585	658	24			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	428	Total	C	N	O	S	0	0	0
			3357	2110	573	647	27			
2	D	422	Total	C	N	O	S	0	0	0
			3316	2084	563	642	27			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	121	Total	C	N	O	S	0	0	0
			1000	617	181	197	5			

There are 2 discrepancies between the modelled and reference sequences:

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

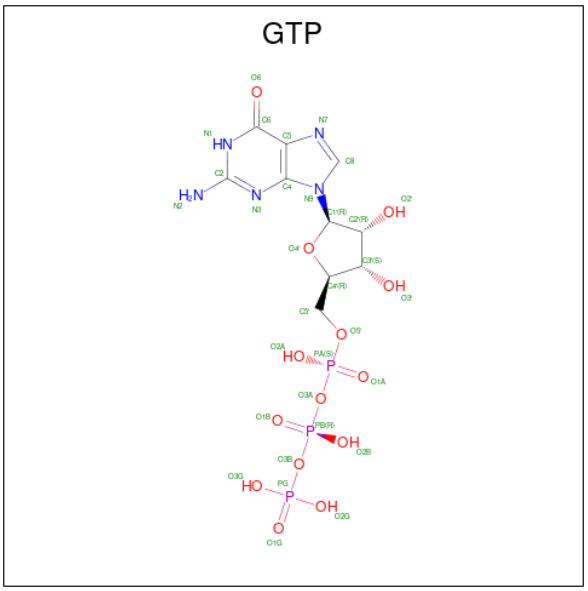
- Molecule 4 is a protein called Tubulin tyrosine ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	314	Total	C	N	O	S	0	0	0
			2576	1662	432	468	14			

There are 39 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	?	-	ALA	deletion	UNP A0A8V0Z8P0
F	?	-	GLU	deletion	UNP A0A8V0Z8P0
F	?	-	MET	deletion	UNP A0A8V0Z8P0
F	?	-	GLN	deletion	UNP A0A8V0Z8P0
F	?	-	GLN	deletion	UNP A0A8V0Z8P0
F	?	-	GLN	deletion	UNP A0A8V0Z8P0
F	?	-	LEU	deletion	UNP A0A8V0Z8P0
F	?	-	LEU	deletion	UNP A0A8V0Z8P0
F	?	-	GLU	deletion	UNP A0A8V0Z8P0
F	?	-	GLY	deletion	UNP A0A8V0Z8P0
F	?	-	ASP	deletion	UNP A0A8V0Z8P0
F	?	-	GLN	deletion	UNP A0A8V0Z8P0
F	?	-	THR	deletion	UNP A0A8V0Z8P0
F	?	-	LEU	deletion	UNP A0A8V0Z8P0
F	?	-	VAL	deletion	UNP A0A8V0Z8P0
F	?	-	LEU	deletion	UNP A0A8V0Z8P0
F	?	-	ALA	deletion	UNP A0A8V0Z8P0
F	?	-	SER	deletion	UNP A0A8V0Z8P0
F	?	-	SER	deletion	UNP A0A8V0Z8P0
F	?	-	THR	deletion	UNP A0A8V0Z8P0
F	?	-	HIS	deletion	UNP A0A8V0Z8P0
F	?	-	PRO	deletion	UNP A0A8V0Z8P0
F	?	-	GLU	deletion	UNP A0A8V0Z8P0
F	?	-	SER	deletion	UNP A0A8V0Z8P0
F	?	-	VAL	deletion	UNP A0A8V0Z8P0
F	?	-	ASP	deletion	UNP A0A8V0Z8P0
F	?	-	SER	deletion	UNP A0A8V0Z8P0
F	?	-	ASP	deletion	UNP A0A8V0Z8P0
F	?	-	LYS	deletion	UNP A0A8V0Z8P0
F	?	-	ASN	deletion	UNP A0A8V0Z8P0
F	?	-	HIS	deletion	UNP A0A8V0Z8P0
F	?	-	GLY	deletion	UNP A0A8V0Z8P0
F	?	-	PHE	deletion	UNP A0A8V0Z8P0
F	379	HIS	-	expression tag	UNP A0A8V0Z8P0
F	380	HIS	-	expression tag	UNP A0A8V0Z8P0
F	381	HIS	-	expression tag	UNP A0A8V0Z8P0
F	382	HIS	-	expression tag	UNP A0A8V0Z8P0
F	383	HIS	-	expression tag	UNP A0A8V0Z8P0
F	384	HIS	-	expression tag	UNP A0A8V0Z8P0

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



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C 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 (three-letter code: 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
6	D	1	Total Mg 1 1	0	0
6	F	1	Total Mg 1 1	0	0

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

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

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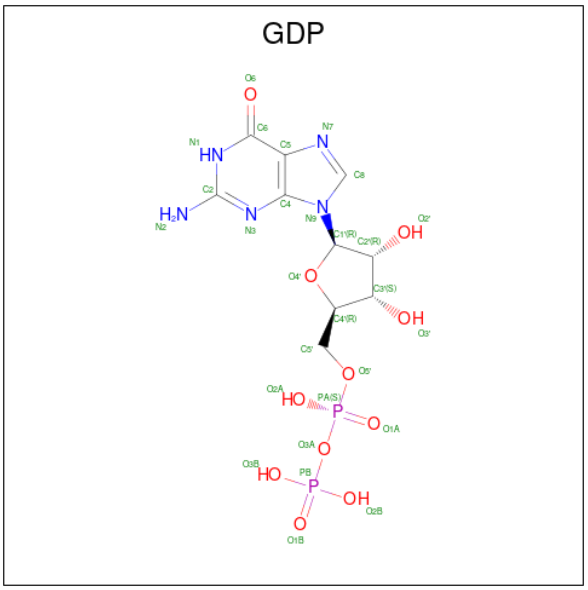
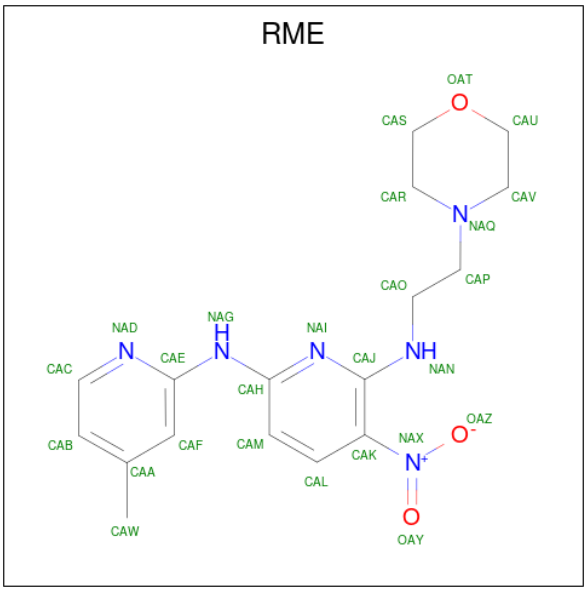
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	C	1	Total Ca 1 1	0	0

- Molecule 8 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



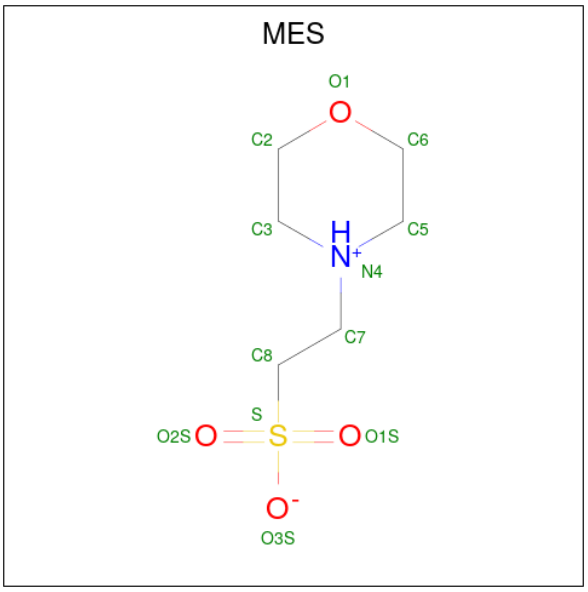
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C N O P 28 10 5 11 2	0	0
8	D	1	Total C N O P 28 10 5 11 2	0	0

- Molecule 9 is N6-(4-methylpyridin-2-yl)-N2-(2-morpholinoethyl)-3-nitropyridine-2,6-diamine (three-letter code: RME) (formula: $C_{17}H_{22}N_6O_3$) (labeled as "Ligand of Interest" by depositor).



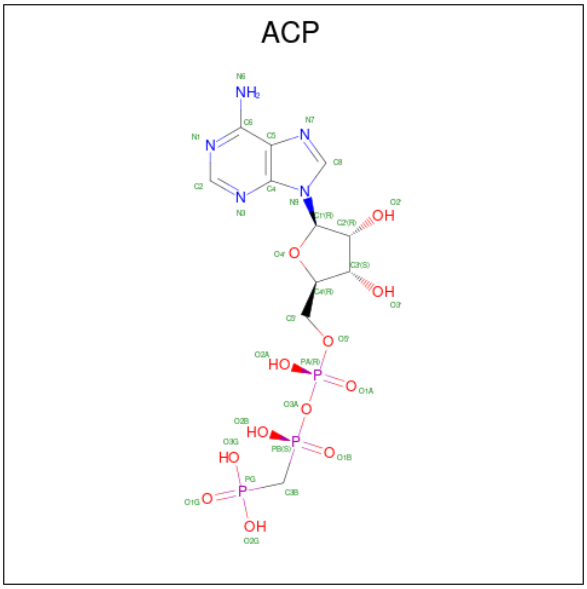
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	B	1	Total	C	H	N	O	0	0
			49	17	23	6	3		
9	D	1	Total	C	H	N	O	0	0
			49	17	23	6	3		

- Molecule 10 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: 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		

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



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

- Molecule 12 is water.

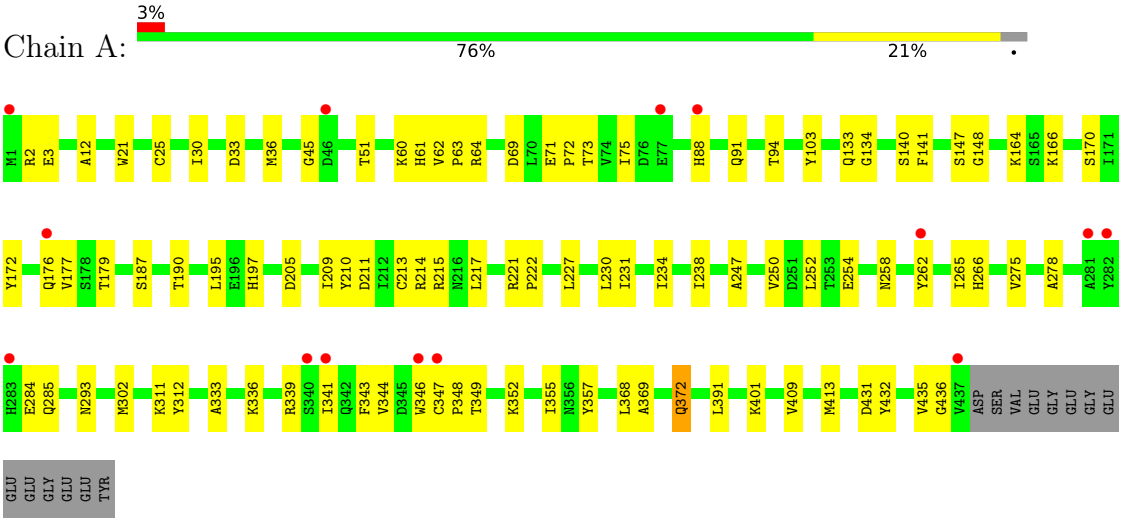
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	53	Total	O	0	0
			53	53		
12	B	76	Total	O	0	0
			76	76		
12	C	150	Total	O	0	0
			150	150		
12	D	26	Total	O	0	0
			26	26		
12	E	14	Total	O	0	0
			14	14		
12	F	23	Total	O	0	0
			23	23		

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.

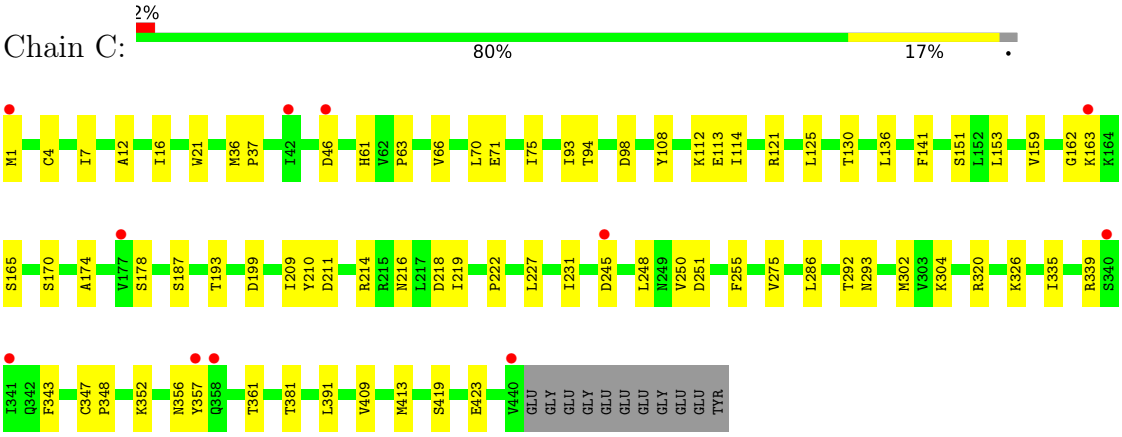
• Molecule 1: Detyrosinated tubulin alpha-1B chain

Chain A:



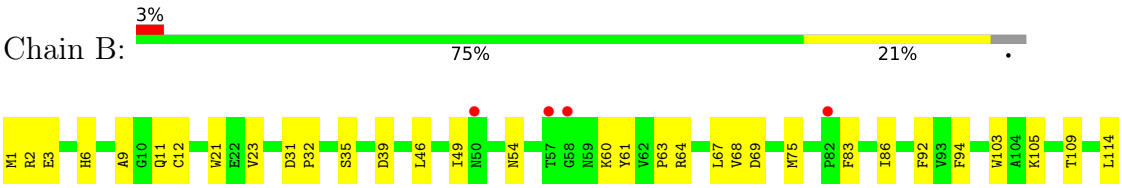
• Molecule 1: Detyrosinated tubulin alpha-1B chain

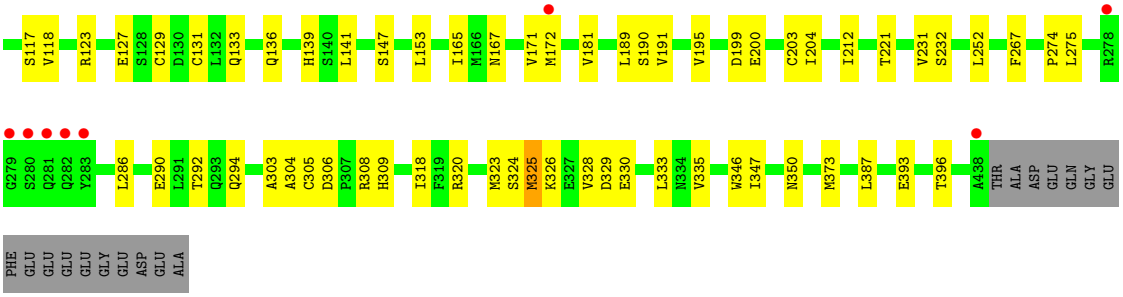
Chain C:



• Molecule 2: Tubulin beta-2B chain

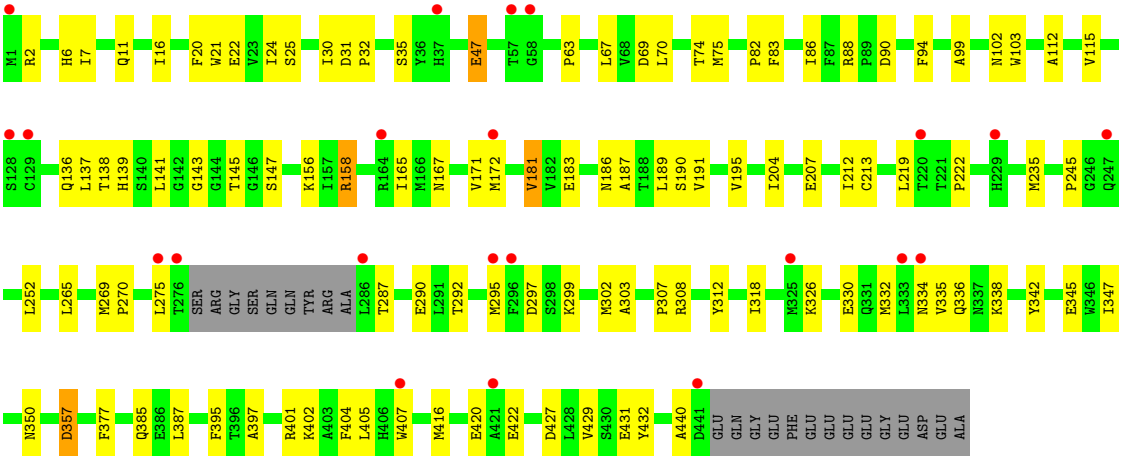
Chain B:





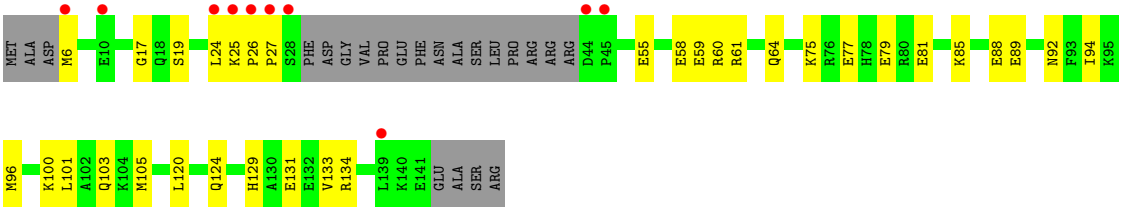
• Molecule 2: Tubulin beta-2B chain

Chain D:



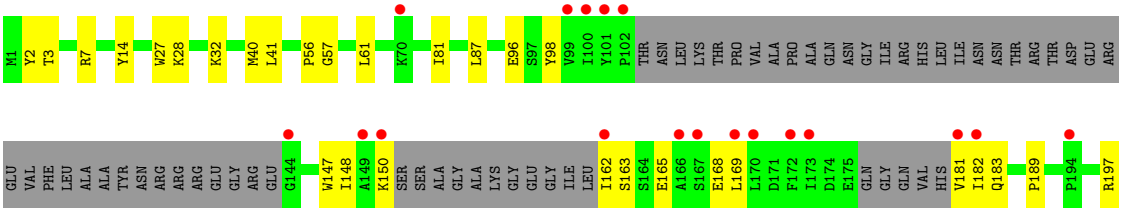
• Molecule 3: Stathmin-4

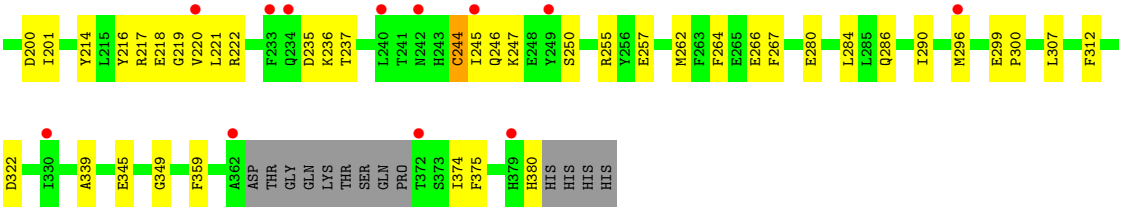
Chain E:



• Molecule 4: Tubulin tyrosine ligase

Chain F:




D200
I201
Y214
L215
Y216
R217
E218
G219
V220
L221
R222
F233
Q234
D235
K236
T237
L240
T241
N242
H243
C244
I245
Q246
K247
E248
Y249
S250
R255
Y256
E257
M262
F263
F264
E265
E266
F267
E280
L284
L285
Q286
I290
M296
E299
P300
L307
F312
D322
I330
A339
E345
G349
F359
A362
ASP
THR
GLY
GLN
LYS
THR
SER
GLN
PRO
T372
S373
I374
F375
H379
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 158.18Å 182.68Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.20 – 2.20 48.20 – 2.20	Depositor EDS
% Data completeness (in resolution range)	95.9 (48.20-2.20) 99.2 (48.20-2.20)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.27 (at 2.20Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874, PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.208 , 0.233 0.204 , 0.231	Depositor DCC
R_{free} test set	7684 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	49.6	Xtriage
Anisotropy	0.131	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 37.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	17733	wwPDB-VP
Average B, all atoms (Å^2)	69.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.48% 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: RME, ACP, GTP, MES, GDP, MG, CA

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|>5$	RMSZ	#$\|Z\|>5$
1	A	0.24	0/3506	0.41	0/4759
1	C	0.25	0/3541	0.41	0/4808
2	B	0.24	0/3432	0.41	0/4650
2	D	0.24	0/3389	0.41	0/4591
3	E	0.23	0/1008	0.34	0/1337
4	F	0.24	0/2636	0.39	0/3562
All	All	0.24	0/17512	0.40	0/23707

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	3422	0	3340	78	0
1	C	3451	0	3369	55	0
2	B	3357	0	3227	70	0
2	D	3316	0	3196	81	0
3	E	1000	0	1018	30	0
4	F	2576	0	2552	46	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	B	1	0	0	0	0
7	C	1	0	0	0	0
8	B	28	0	12	1	0
8	D	28	0	12	3	0
9	B	26	23	0	1	0
9	D	26	23	0	1	0
10	B	12	0	12	0	0
11	F	31	0	14	0	0
12	A	53	0	0	2	0
12	B	76	0	0	1	0
12	C	150	0	0	3	0
12	D	26	0	0	3	0
12	E	14	0	0	0	0
12	F	23	0	0	0	0
All	All	17687	46	16776	340	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 10.

All (340) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:209:ILE:HG22	1:C:227:LEU:HD22	1.48	0.95
2:B:292:THR:HG22	2:B:335:VAL:HG11	1.57	0.85
2:B:1:MET:N	2:B:131:CYS:SG	2.48	0.85
2:D:47:GLU:HG2	2:D:245:PRO:HG3	1.61	0.81
2:D:295:MET:HE2	2:D:377:PHE:HB2	1.61	0.81
2:D:292:THR:HG22	2:D:335:VAL:HG21	1.63	0.78
4:F:7:ARG:HD3	4:F:40:MET:HE3	1.65	0.78
2:D:270:PRO:HG2	2:D:302:MET:HB2	1.67	0.77
2:B:3:GLU:HG3	2:B:129:CYS:SG	2.25	0.76
3:E:120:LEU:O	3:E:124:GLN:HG2	1.87	0.75
4:F:201:ILE:HG12	4:F:221:LEU:CD2	2.18	0.74
2:B:11:GLN:OE1	12:B:601:HOH:O	2.07	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:93:ILE:HD11	1:C:121:ARG:HG3	1.70	0.73
4:F:221:LEU:HD11	4:F:267:PHE:CG	2.23	0.73
2:B:172:MET:HG3	2:B:387:LEU:HD11	1.69	0.72
1:C:335:ILE:HG23	1:C:339:ARG:HG3	1.73	0.71
2:B:221:THR:HG21	1:C:326:LYS:HA	1.72	0.71
2:D:136:GLN:HA	2:D:167:ASN:O	1.90	0.70
1:A:211:ASP:HB3	1:A:215:ARG:NH1	2.07	0.70
2:D:83:PHE:O	2:D:86:ILE:HG22	1.91	0.70
1:A:36:MET:HB3	1:A:61:HIS:CE1	2.29	0.68
1:A:333:ALA:HB2	3:E:6:MET:HE3	1.75	0.68
2:B:181:VAL:HG23	1:C:348:PRO:CG	2.24	0.68
4:F:217:ARG:NH2	4:F:345:GLU:OE2	2.26	0.68
1:C:4[A]:CYS:SG	1:C:136:LEU:HG	2.34	0.67
2:B:23:VAL:HG21	2:B:232:SER:OG	1.94	0.67
2:B:83:PHE:O	2:B:86:ILE:HG12	1.95	0.67
2:B:323:MET:HB3	2:B:373:MET:HE1	1.78	0.66
2:D:219:LEU:HD12	2:D:219:LEU:O	1.95	0.66
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.31	0.66
4:F:197:ARG:NH1	4:F:257:GLU:OE2	2.28	0.65
2:B:333:LEU:HD13	4:F:57:GLY:HA3	1.78	0.65
2:D:147:SER:HB2	2:D:190:SER:OG	1.96	0.65
2:D:213:CYS:HB3	2:D:219:LEU:HD11	1.79	0.65
2:B:136:GLN:HA	2:B:167:ASN:O	1.97	0.64
1:A:71:GLU:OE2	1:A:73:THR:HB	1.96	0.64
1:A:210:TYR:CE2	1:A:214:ARG:HD2	2.32	0.64
2:B:323:MET:HB3	2:B:373:MET:CE	2.28	0.64
1:C:1:MET:HG2	1:C:130:THR:OG1	1.98	0.63
1:C:320:ARG:HA	1:C:356:ASN:O	1.98	0.63
1:C:21:TRP:CZ3	1:C:63:PRO:HB3	2.35	0.62
2:D:70:LEU:HD12	2:D:99:ALA:HB2	1.81	0.62
2:D:7:ILE:O	2:D:137:LEU:HD12	1.99	0.62
1:A:210:TYR:CE1	1:A:222:PRO:HD2	2.34	0.62
2:D:347:ILE:HG22	2:D:350:ASN:HB3	1.82	0.62
4:F:200:ASP:OD1	4:F:222:ARG:HB2	1.99	0.62
4:F:201:ILE:HG12	4:F:221:LEU:HD23	1.82	0.62
1:A:285:GLN:HG3	1:A:372:GLN:OE1	2.00	0.62
2:D:416:MET:O	2:D:420:GLU:HG3	2.00	0.61
1:A:179:THR:HG21	12:A:643:HOH:O	2.01	0.61
2:B:9:ALA:HA	2:B:68:VAL:O	2.00	0.61
2:D:427:ASP:O	2:D:431:GLU:HG3	2.01	0.61
1:A:311:LYS:HG3	1:A:436:GLY:HA2	1.81	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:96:GLU:OE2	4:F:98:TYR:OH	2.18	0.61
1:C:292:THR:HG22	1:C:335:ILE:CD1	2.30	0.61
3:E:25:LYS:HD2	3:E:26:PRO:HD2	1.83	0.60
1:A:187:SER:HB3	1:A:391:LEU:HD21	1.83	0.60
9:B:503:RME:OAZ	9:B:503:RME:NAN	2.31	0.60
1:A:75:ILE:HD12	1:A:94:THR:HG22	1.83	0.60
1:A:221:ARG:NH1	2:B:329:ASP:OD2	2.34	0.60
1:A:409:VAL:HA	1:A:413:MET:O	2.02	0.60
3:E:92:ASN:O	3:E:96:MET:HG2	2.02	0.60
1:A:187:SER:CB	1:A:391:LEU:HD21	2.31	0.60
1:C:162:GLY:HA2	3:E:94:ILE:HD11	1.84	0.60
2:D:22:GLU:OE2	2:D:82:PRO:HG2	2.02	0.59
2:D:88:ARG:NH1	2:D:90:ASP:HB2	2.17	0.59
4:F:81:ILE:HG12	4:F:87:LEU:HD13	1.84	0.59
2:B:35:SER:HB3	2:B:60:LYS:NZ	2.17	0.59
1:A:45:GLY:HA3	12:A:621:HOH:O	2.03	0.59
1:C:250:VAL:HG11	1:C:352:LYS:HE3	1.84	0.59
1:C:292:THR:HG22	1:C:335:ILE:HD12	1.85	0.59
1:A:250:VAL:HG22	1:A:254:GLU:OE1	2.03	0.58
2:B:21:TRP:CZ3	2:B:63:PRO:HB3	2.38	0.58
2:D:171:VAL:HA	2:D:204:ILE:O	2.03	0.58
1:C:75:ILE:HD12	1:C:94:THR:HG22	1.84	0.58
2:B:292:THR:HG22	2:B:335:VAL:CG1	2.30	0.58
2:B:69:ASP:O	2:B:94:PHE:HA	2.04	0.58
2:B:333:LEU:CD1	4:F:57:GLY:HA3	2.33	0.58
4:F:147:TRP:HB3	4:F:182:ILE:HD11	1.86	0.58
2:D:143:GLY:HA3	8:D:501:GDP:O3A	2.05	0.57
2:D:385:GLN:HB2	2:D:429:VAL:HG13	1.86	0.57
4:F:148:ILE:O	4:F:182:ILE:HD12	2.03	0.57
1:C:210:TYR:CZ	1:C:222:PRO:HD2	2.40	0.57
1:C:209:ILE:HD11	1:C:302:MET:SD	2.44	0.56
2:D:7:ILE:O	2:D:137:LEU:HA	2.06	0.56
1:C:211:ASP:OD2	1:C:304:LYS:NZ	2.29	0.56
4:F:262:MET:SD	4:F:266:GLU:HG2	2.45	0.56
2:B:123:ARG:O	2:B:127:GLU:HG3	2.06	0.56
1:C:187:SER:HB3	1:C:391:LEU:HD21	1.88	0.55
9:D:503:RME:OAZ	9:D:503:RME:NAN	2.34	0.55
2:B:12:CYS:HB2	8:B:501:GDP:C8	2.42	0.55
2:D:47:GLU:CG	2:D:245:PRO:HG3	2.35	0.55
2:B:6:HIS:CD2	2:B:21:TRP:HE1	2.25	0.54
1:A:209:ILE:HD11	1:A:302:MET:SD	2.46	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:419:SER:O	1:C:423:GLU:HG3	2.08	0.54
3:E:85:LYS:HE2	3:E:89:GLU:OE2	2.08	0.54
3:E:100:LYS:O	3:E:103:GLN:HG3	2.07	0.54
1:A:21:TRP:CH2	1:A:63:PRO:HB3	2.43	0.54
3:E:25:LYS:HG3	3:E:26:PRO:HD2	1.90	0.54
2:B:181:VAL:HG23	1:C:348:PRO:HG3	1.90	0.54
3:E:25:LYS:CD	3:E:26:PRO:HD2	2.37	0.54
2:B:147:SER:HB2	2:B:190:SER:OG	2.08	0.54
2:B:326:LYS:O	2:B:330:GLU:HG3	2.08	0.53
2:D:103:TRP:CE3	2:D:189:LEU:HD13	2.43	0.53
2:D:11:GLN:HA	2:D:74:THR:HG21	1.90	0.53
2:B:306:ASP:HB3	2:B:309:HIS:CD2	2.44	0.53
2:D:158:ARG:NH2	12:D:602:HOH:O	2.35	0.53
1:A:344:VAL:CG2	1:A:347:CYS:HB2	2.39	0.53
2:D:318:ILE:HD13	12:D:613:HOH:O	2.08	0.53
4:F:286:GLN:O	4:F:290:ILE:HG13	2.09	0.53
1:A:209:ILE:HG22	1:A:227:LEU:HD22	1.91	0.53
2:D:69:ASP:OD2	2:D:74:THR:OG1	2.26	0.53
1:A:213:CYS:O	1:A:217:LEU:HB2	2.09	0.53
1:A:211:ASP:HB3	1:A:215:ARG:HH12	1.72	0.52
2:D:397:ALA:O	2:D:401:ARG:HD3	2.10	0.52
1:C:163:LYS:NZ	12:C:605:HOH:O	2.42	0.52
2:D:2:ARG:NH2	12:D:603:HOH:O	2.42	0.52
2:D:6:HIS:CD2	2:D:21:TRP:HE1	2.28	0.52
1:A:348:PRO:HB3	3:E:27:PRO:HD3	1.91	0.51
2:D:395:PHE:CE1	2:D:422:GLU:HB2	2.45	0.51
1:C:37:PRO:HD2	12:C:713:HOH:O	2.11	0.51
4:F:2:TYR:CE1	4:F:359:PHE:HB3	2.45	0.51
1:C:165:SER:HA	1:C:199:ASP:OD2	2.11	0.51
2:D:25:SER:HB3	2:D:30:ILE:HD11	1.92	0.51
1:C:214:ARG:HG2	1:C:219:ILE:O	2.11	0.51
3:E:101:LEU:O	3:E:105:MET:HG2	2.11	0.51
2:B:141:LEU:HA	2:B:147:SER:HB3	1.93	0.51
1:C:108:TYR:CE1	3:E:105:MET:HE1	2.46	0.51
4:F:169:LEU:HD13	4:F:182:ILE:HD13	1.92	0.51
1:A:25:CYS:HB3	1:A:30:ILE:O	2.11	0.51
1:C:248:LEU:HD12	1:C:357:TYR:OH	2.11	0.51
2:B:274:PRO:HB3	2:B:286:LEU:HD21	1.93	0.51
2:D:187:ALA:O	2:D:191:VAL:HG23	2.11	0.51
2:D:219:LEU:CD1	2:D:222:PRO:HB3	2.41	0.50
1:A:69:ASP:O	1:A:94:THR:HA	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:333:ALA:HB2	3:E:6:MET:CE	2.39	0.50
2:B:35:SER:HB3	2:B:60:LYS:HZ1	1.75	0.50
1:C:361:THR:HG23	12:C:622:HOH:O	2.12	0.50
4:F:220:VAL:HG11	4:F:339:ALA:HB2	1.94	0.50
2:B:46:LEU:HA	2:B:49:ILE:HB	1.94	0.50
2:D:112:ALA:O	2:D:115:VAL:HG12	2.10	0.50
2:D:307:PRO:HB3	2:D:312:TYR:OH	2.11	0.50
2:D:21:TRP:CZ3	2:D:63:PRO:HB3	2.46	0.50
3:E:75:LYS:O	3:E:79:GLU:HG3	2.11	0.50
1:A:221:ARG:HE	2:B:325:MET:HG2	1.76	0.50
1:A:285:GLN:HG3	1:A:372:GLN:CD	2.32	0.50
2:B:2:ARG:O	2:B:133:GLN:NE2	2.42	0.50
2:D:326:LYS:O	2:D:330:GLU:HG3	2.12	0.50
2:B:347:ILE:HG22	2:B:350:ASN:HB3	1.94	0.50
2:D:287:THR:OG1	2:D:290:GLU:HG3	2.12	0.50
2:B:171:VAL:HA	2:B:204:ILE:O	2.12	0.50
1:A:71:GLU:HG2	1:A:72:PRO:N	2.27	0.49
4:F:349:GLY:HA3	4:F:374:ILE:HD11	1.94	0.49
3:E:129:HIS:O	3:E:133:VAL:HG23	2.11	0.49
4:F:14:TYR:HB3	4:F:41:LEU:HD13	1.93	0.49
1:A:343:PHE:CD1	1:A:349:THR:HG23	2.47	0.49
1:C:210:TYR:CE1	1:C:222:PRO:HD2	2.46	0.49
2:B:191:VAL:O	2:B:195:VAL:HG23	2.12	0.49
3:E:25:LYS:CG	3:E:26:PRO:HD2	2.42	0.49
2:D:25:SER:CB	2:D:30:ILE:HD11	2.43	0.49
2:B:204:ILE:HD13	2:B:231:VAL:HG13	1.94	0.49
1:C:293[B]:ASN:OD1	1:C:335:ILE:HG12	2.13	0.49
2:B:114:LEU:O	2:B:114:LEU:HG	2.12	0.48
4:F:148:ILE:HG13	4:F:162:ILE:HG12	1.95	0.48
1:A:141:PHE:CE1	1:A:170:SER:HB3	2.48	0.48
1:C:93:ILE:HG22	1:C:114:ILE:HD11	1.95	0.48
1:C:159:VAL:HA	3:E:94:ILE:HG23	1.95	0.48
1:A:258:ASN:OD1	1:A:352:LYS:NZ	2.38	0.48
2:D:25:SER:HB3	2:D:30:ILE:CD1	2.44	0.48
2:B:167:ASN:HD22	2:B:200:GLU:HB2	1.78	0.48
2:B:199:ASP:C	2:B:200:GLU:HG3	2.33	0.48
2:B:320:ARG:O	2:B:373:MET:HA	2.14	0.48
1:A:3:GLU:HG2	1:A:64:ARG:CZ	2.43	0.47
1:C:286:LEU:N	1:C:286:LEU:HD12	2.28	0.47
1:A:147:SER:HB2	1:A:190:THR:HB	1.96	0.47
1:C:216:ASN:HB3	1:C:275:VAL:O	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:387:LEU:HD23	2:D:387:LEU:C	2.34	0.47
4:F:296:MET:SD	4:F:380:HIS:HB2	2.55	0.47
2:B:393:GLU:HA	2:B:396:THR:HG22	1.97	0.47
1:C:7:ILE:HG21	1:C:153:LEU:HD21	1.97	0.47
2:D:191:VAL:O	2:D:195:VAL:HG23	2.14	0.47
4:F:61:LEU:HD11	4:F:312:PHE:HD2	1.79	0.47
2:B:118:VAL:HG11	2:B:153:LEU:HD11	1.96	0.47
2:B:165:ILE:HG21	2:B:252:LEU:HB3	1.96	0.47
2:D:31:ASP:HB2	2:D:32:PRO:HD2	1.97	0.47
4:F:216:TYR:CE2	4:F:218:GLU:HB2	2.49	0.47
1:A:21:TRP:CE3	1:A:63:PRO:HB3	2.49	0.47
2:B:39:ASP:N	2:B:39:ASP:OD1	2.48	0.47
2:D:165:ILE:HG21	2:D:252:LEU:HB3	1.97	0.47
1:C:151[A]:SER:HB2	1:C:193:THR:CG2	2.45	0.47
2:D:172:MET:HG3	2:D:387:LEU:HD11	1.96	0.47
2:B:303:ALA:O	2:B:305:CYS:N	2.45	0.46
3:E:60:ARG:O	3:E:64:GLN:HG3	2.15	0.46
4:F:2:TYR:HB2	4:F:27:TRP:CD2	2.50	0.46
4:F:214:TYR:HB3	4:F:375:PHE:HB3	1.96	0.46
2:B:203:CYS:SG	2:B:267:PHE:HB3	2.55	0.46
1:C:112:LYS:NZ	1:C:113:GLU:OE2	2.48	0.46
2:D:31:ASP:HB2	2:D:32:PRO:CD	2.45	0.46
2:D:141:LEU:HA	2:D:147:SER:HB3	1.97	0.46
2:D:297:ASP:OD2	2:D:299:LYS:HE2	2.15	0.46
1:A:134:GLY:HA2	1:A:164:LYS:HB3	1.98	0.46
4:F:280:GLU:HA	4:F:284:LEU:HB2	1.97	0.46
2:D:212:ILE:HG23	2:D:275:LEU:HD13	1.98	0.46
1:A:265:ILE:HG23	1:A:432:TYR:CZ	2.50	0.46
1:A:2:ARG:O	1:A:51:THR:HG23	2.15	0.46
1:A:262:TYR:CE1	1:A:346:TRP:CH2	3.04	0.46
1:A:209:ILE:HG23	1:A:230:LEU:HD23	1.98	0.45
2:B:31:ASP:HB2	2:B:32:PRO:CD	2.46	0.45
2:D:265:LEU:HD22	2:D:432:TYR:CZ	2.51	0.45
1:A:2:ARG:HB3	1:A:133:GLN:HG3	1.98	0.45
1:A:2:ARG:CB	1:A:133:GLN:HG3	2.46	0.45
1:A:12:ALA:CB	1:A:140:SER:HB3	2.46	0.45
1:A:262:TYR:HE1	1:A:346:TRP:CH2	2.35	0.45
1:C:151[B]:SER:HB3	1:C:193:THR:CG2	2.46	0.45
2:B:21:TRP:CE3	2:B:63:PRO:HB3	2.52	0.45
2:D:30:ILE:HA	2:D:35:SER:O	2.17	0.45
2:D:136:GLN:HB2	2:D:167:ASN:HD22	1.80	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:67:LEU:N	2:B:67:LEU:HD12	2.31	0.45
1:C:70:LEU:HB2	1:C:98:ASP:HA	1.98	0.45
4:F:237:THR:O	4:F:246:GLN:NE2	2.50	0.45
4:F:284:LEU:HD12	4:F:284:LEU:HA	1.74	0.45
1:C:36:MET:HB3	1:C:61:HIS:CE1	2.52	0.45
4:F:219:GLY:HA3	4:F:264:PHE:CZ	2.52	0.45
4:F:165:GLU:HB3	4:F:168:GLU:HG3	1.99	0.45
2:B:31:ASP:HB2	2:B:32:PRO:HD2	1.99	0.45
2:D:20:PHE:CZ	2:D:24:ILE:HD13	2.52	0.45
2:D:345:GLU:HG2	2:D:440:ALA:HB2	1.99	0.45
2:D:183:GLU:OE1	8:D:501:GDP:O3'	2.34	0.45
1:A:88:HIS:CD2	1:A:91:GLN:HG3	2.52	0.44
1:A:176:GLN:CD	4:F:56:PRO:HG3	2.37	0.44
1:A:344:VAL:HG23	1:A:347:CYS:HB2	1.99	0.44
2:D:269:MET:HG3	2:D:303:ALA:HB3	1.99	0.44
1:A:311:LYS:CG	1:A:436:GLY:HA2	2.46	0.44
2:D:295:MET:HE2	2:D:377:PHE:CB	2.42	0.44
1:A:166:LYS:HE2	1:A:197:HIS:O	2.17	0.44
1:C:409:VAL:HA	1:C:413:MET:O	2.18	0.44
2:D:67:LEU:N	2:D:67:LEU:HD12	2.32	0.44
4:F:247:LYS:HE3	4:F:247:LYS:HB2	1.78	0.44
2:B:318:ILE:N	2:B:318:ILE:HD12	2.33	0.44
1:C:21:TRP:CE3	1:C:63:PRO:HB3	2.52	0.44
2:D:143:GLY:O	2:D:186:ASN:ND2	2.51	0.44
4:F:150:LYS:O	4:F:181:VAL:N	2.51	0.44
1:A:195:LEU:HD12	1:A:266:HIS:HE1	1.83	0.44
2:B:83:PHE:HB3	2:B:86:ILE:HD13	2.00	0.44
2:B:103:TRP:CE3	2:B:189:LEU:HD13	2.52	0.44
2:D:141:LEU:HD12	2:D:172:MET:SD	2.58	0.44
2:D:332:MET:O	2:D:336:GLN:HG3	2.17	0.44
1:A:12:ALA:HB3	1:A:140:SER:HB3	2.00	0.44
1:A:431:ASP:O	1:A:435:VAL:HG23	2.18	0.44
1:C:66:VAL:HG23	1:C:125:LEU:CD1	2.48	0.44
1:C:214:ARG:O	1:C:218:ASP:HA	2.18	0.44
2:D:334:ASN:HD21	2:D:338:LYS:HE3	1.83	0.44
1:A:265:ILE:HG23	1:A:432:TYR:CE1	2.53	0.44
2:D:402:LYS:HB3	2:D:405:LEU:HD12	1.99	0.44
4:F:169:LEU:HD13	4:F:182:ILE:CD1	2.48	0.44
1:A:71:GLU:HG2	1:A:72:PRO:HD2	2.00	0.43
1:A:103:TYR:CE2	1:A:148:GLY:HA2	2.53	0.43
1:A:172:TYR:HB3	1:A:205:ASP:HA	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:293:ASN:ND2	1:A:339:ARG:HH21	2.16	0.43
1:C:46:ASP:OD1	1:C:46:ASP:N	2.50	0.43
4:F:148:ILE:HG22	4:F:183:GLN:O	2.18	0.43
4:F:246:GLN:O	4:F:250:SER:HB2	2.18	0.43
1:A:336:LYS:HG2	3:E:24:LEU:HD13	2.00	0.43
1:A:401:LYS:HG3	2:B:346:TRP:CD2	2.53	0.43
2:D:156:LYS:HD2	2:D:156:LYS:HA	1.81	0.43
1:A:341:ILE:N	1:A:341:ILE:HD12	2.33	0.43
1:C:187:SER:CB	1:C:391:LEU:HD21	2.47	0.43
2:D:69:ASP:O	2:D:94:PHE:HA	2.19	0.43
2:D:334:ASN:ND2	2:D:338:LYS:HE3	2.34	0.43
4:F:307:LEU:HD23	4:F:307:LEU:HA	1.85	0.43
2:B:141:LEU:HD12	2:B:172:MET:SD	2.59	0.42
2:D:292:THR:CG2	2:D:335:VAL:HG21	2.40	0.42
2:B:274:PRO:HB3	2:B:286:LEU:CD2	2.49	0.42
2:D:219:LEU:HD11	2:D:222:PRO:HB3	2.01	0.42
1:A:312:TYR:CD2	1:A:341:ILE:HG23	2.55	0.42
2:B:54:ASN:OD1	2:B:64:ARG:NH2	2.50	0.42
3:E:105:MET:HE2	3:E:105:MET:N	2.35	0.42
2:B:212:ILE:HG23	2:B:275:LEU:HD13	2.01	0.42
2:D:21:TRP:CE3	2:D:63:PRO:HB3	2.54	0.42
3:E:25:LYS:HD2	3:E:26:PRO:CD	2.48	0.42
4:F:163:SER:HB3	4:F:169:LEU:HD21	2.00	0.42
1:A:103:TYR:CD2	1:A:148:GLY:HA2	2.55	0.42
1:C:12:ALA:O	1:C:16:ILE:HG13	2.20	0.42
4:F:299:GLU:N	4:F:300:PRO:HD2	2.34	0.42
1:C:141:PHE:CE1	1:C:170:SER:HB3	2.55	0.42
2:D:308:ARG:HG2	2:D:342:TYR:CZ	2.55	0.42
2:B:181:VAL:HG23	1:C:348:PRO:CD	2.48	0.42
2:B:323:MET:HB3	2:B:373:MET:HE2	2.01	0.42
1:C:151[B]:SER:HB3	1:C:193:THR:HG21	2.01	0.42
4:F:3:THR:HA	4:F:28:LYS:O	2.19	0.42
1:C:227:LEU:O	1:C:231:ILE:HG13	2.20	0.42
3:E:131:GLU:OE2	3:E:134:ARG:NH2	2.40	0.42
1:A:71:GLU:HG2	1:A:72:PRO:CD	2.50	0.42
1:A:357:TYR:CE2	3:E:17:GLY:HA2	2.55	0.42
1:C:343:PHE:HD2	1:C:347[B]:CYS:SG	2.43	0.42
2:D:16:ILE:HD11	2:D:138:THR:HB	2.01	0.42
3:E:58:GLU:HG3	3:E:61:ARG:NH2	2.35	0.42
3:E:88:GLU:OE1	3:E:88:GLU:HA	2.20	0.42
1:A:75:ILE:HD12	1:A:94:THR:CG2	2.49	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:67:LEU:HD22	2:B:92:PHE:CE2	2.55	0.41
2:B:105:LYS:HA	2:B:109:THR:OG1	2.20	0.41
2:D:102:ASN:ND2	2:D:407:TRP:HB3	2.35	0.41
2:B:75:MET:HE3	2:B:92:PHE:HD2	1.85	0.41
1:C:162:GLY:CA	3:E:94:ILE:HD11	2.48	0.41
3:E:55:GLU:O	3:E:59:GLU:HG2	2.21	0.41
1:A:221:ARG:NE	2:B:325:MET:HG2	2.36	0.41
1:A:227:LEU:O	1:A:231:ILE:HG13	2.21	0.41
4:F:32:LYS:HE3	4:F:32:LYS:HB2	1.82	0.41
2:B:54:ASN:O	2:B:61:TYR:HA	2.20	0.41
1:A:60:LYS:HG2	1:A:62:VAL:HG13	2.02	0.41
2:B:324:SER:O	2:B:328:VAL:HG23	2.20	0.41
2:D:357:ASP:OD2	2:D:357:ASP:N	2.47	0.41
3:E:77:GLU:O	3:E:81:GLU:HG3	2.21	0.41
1:A:133:GLN:OE1	1:A:252:LEU:N	2.41	0.41
1:A:247:ALA:HB3	3:E:19:SER:OG	2.21	0.41
1:A:355:ILE:O	3:E:17:GLY:HA3	2.21	0.41
1:A:177:VAL:HG12	1:A:177:VAL:O	2.21	0.41
1:A:234:ILE:O	1:A:238:ILE:HG13	2.21	0.41
1:A:278:ALA:HA	1:A:369:ALA:HB2	2.02	0.41
2:B:204:ILE:HG21	2:B:231:VAL:HG22	2.02	0.41
2:D:181:VAL:HG21	2:D:404:PHE:CE2	2.55	0.41
2:B:290:GLU:O	2:B:294:GLN:HG3	2.21	0.41
1:C:151[A]:SER:HB2	1:C:193:THR:HG21	2.02	0.41
2:D:25:SER:OG	2:D:30:ILE:HD11	2.21	0.41
2:D:75:MET:SD	2:D:94:PHE:HB3	2.60	0.41
1:A:344:VAL:HG22	1:A:347:CYS:HB2	2.02	0.40
2:D:345:GLU:OE1	2:D:345:GLU:N	2.43	0.40
4:F:244:CYS:SG	4:F:245:ILE:N	2.93	0.40
1:A:344:VAL:HG21	1:A:346:TRP:CE2	2.56	0.40
2:B:3:GLU:HG3	2:B:129:CYS:CB	2.52	0.40
2:D:235:MET:HB3	2:D:235:MET:HE2	1.82	0.40
1:C:174:ALA:O	1:C:178:SER:HB3	2.22	0.40
2:D:312:TYR:CE1	2:D:377:PHE:HZ	2.40	0.40
4:F:189:PRO:HA	4:F:322:ASP:HA	2.02	0.40
2:D:145:THR:N	8:D:501:GDP:O3B	2.36	0.40
4:F:163:SER:HB3	4:F:169:LEU:CD2	2.52	0.40
1:A:275:VAL:HG13	1:A:368:LEU:HD21	2.04	0.40
1:C:255:PHE:CD1	1:C:352:LYS:HG2	2.57	0.40
2:D:82:PRO:O	2:D:83:PHE:HB2	2.21	0.40
4:F:235:ASP:O	4:F:236:LYS:HB2	2.21	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%)	428 (98%)	9 (2%)	0	100	100
1	C	442/451 (98%)	433 (98%)	9 (2%)	0	100	100
2	B	426/445 (96%)	417 (98%)	8 (2%)	1 (0%)	44	52
2	D	418/445 (94%)	411 (98%)	7 (2%)	0	100	100
3	E	117/143 (82%)	117 (100%)	0	0	100	100
4	F	304/384 (79%)	295 (97%)	9 (3%)	0	100	100
All	All	2144/2319 (92%)	2101 (98%)	42 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	304	ALA

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%)	367 (99%)	3 (1%)	79	88
1	C	375/379 (99%)	371 (99%)	4 (1%)	70	82
2	B	366/383 (96%)	362 (99%)	4 (1%)	70	82

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
2	D	365/383 (95%)	359 (98%)	6 (2%)	58 73
3	E	109/127 (86%)	109 (100%)	0	100 100
4	F	285/342 (83%)	283 (99%)	2 (1%)	81 90
All	All	1870/1993 (94%)	1851 (99%)	19 (1%)	73 84

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

Mol	Chain	Res	Type
1	A	33	ASP
1	A	284	GLU
1	A	372	GLN
2	B	117	SER
2	B	139	HIS
2	B	308	ARG
2	B	325	MET
1	C	71	GLU
1	C	245	ASP
1	C	251	ASP
1	C	381	THR
2	D	47	GLU
2	D	139	HIS
2	D	158	ARG
2	D	181	VAL
2	D	207	GLU
2	D	357	ASP
4	F	244	CYS
4	F	255	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	309	HIS
2	B	424	ASN
2	D	101	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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 16 ligands modelled in this entry, 8 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	A	501	6	26,34,34	1.12	2 (7%)	32,54,54	1.44	5 (15%)
10	MES	B	504	-	12,12,12	2.22	1 (8%)	14,16,16	2.01	4 (28%)
8	GDP	B	501	-	24,30,30	0.95	1 (4%)	30,47,47	1.11	3 (10%)
8	GDP	D	501	6	24,30,30	0.95	1 (4%)	30,47,47	1.22	4 (13%)
11	ACP	F	701	6	27,33,33	1.51	6 (22%)	32,52,52	1.78	4 (12%)
9	RME	D	503	-	27,28,28	1.85	6 (22%)	33,37,37	2.01	9 (27%)
5	GTP	C	501	6	26,34,34	1.12	2 (7%)	32,54,54	1.41	5 (15%)
9	RME	B	503	-	27,28,28	1.81	5 (18%)	33,37,37	2.09	10 (30%)

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	A	501	6	-	7/18/38/38	0/3/3/3
10	MES	B	504	-	-	4/6/14/14	0/1/1/1
8	GDP	B	501	-	-	5/12/32/32	0/3/3/3
8	GDP	D	501	6	-	4/12/32/32	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
11	ACP	F	701	6	-	6/15/38/38	0/3/3/3
9	RME	D	503	-	-	0/11/22/22	0/3/3/3
5	GTP	C	501	6	-	8/18/38/38	0/3/3/3
9	RME	B	503	-	-	0/11/22/22	0/3/3/3

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	B	504	MES	C8-S	-7.43	1.66	1.77
9	D	503	RME	CAK-NAX	-6.72	1.33	1.45
9	B	503	RME	CAK-NAX	-6.51	1.33	1.45
5	C	501	GTP	C5-C6	-3.98	1.39	1.47
5	A	501	GTP	C5-C6	-3.88	1.39	1.47
9	D	503	RME	CAW-CAA	-3.52	1.38	1.51
9	B	503	RME	CAW-CAA	-3.51	1.38	1.51
11	F	701	ACP	O4'-C1'	3.35	1.45	1.41
11	F	701	ACP	PB-O3A	3.12	1.61	1.58
9	D	503	RME	CAH-NAG	-3.05	1.33	1.38
9	B	503	RME	CAH-NAG	-3.01	1.33	1.38
11	F	701	ACP	PG-O2G	2.89	1.61	1.54
11	F	701	ACP	PG-O3G	2.88	1.61	1.54
9	D	503	RME	CAE-NAG	-2.45	1.34	1.38
8	D	501	GDP	C6-N1	-2.39	1.34	1.37
8	B	501	GDP	C6-N1	-2.38	1.34	1.37
9	B	503	RME	CAJ-NAN	-2.36	1.30	1.34
11	F	701	ACP	C8-N7	-2.35	1.30	1.34
9	B	503	RME	CAE-NAG	-2.33	1.34	1.38
9	D	503	RME	CAJ-NAN	-2.31	1.31	1.34
5	A	501	GTP	C2-N3	2.17	1.38	1.33
11	F	701	ACP	PB-O2B	2.08	1.61	1.56
5	C	501	GTP	C2-N3	2.06	1.38	1.33
9	D	503	RME	CAC-NAD	2.03	1.38	1.34

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
11	F	701	ACP	PB-O3A-PA	-7.73	108.06	132.56
9	B	503	RME	CAL-CAK-NAX	5.59	122.44	116.47
9	D	503	RME	CAL-CAK-NAX	5.13	121.96	116.47
10	B	504	MES	C5-N4-C3	5.06	120.23	108.83
9	B	503	RME	CAC-NAD-CAE	4.05	122.96	117.22
11	F	701	ACP	N3-C2-N1	-3.92	122.55	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
9	D	503	RME	CAC-NAD-CAE	3.88	122.73	117.22
9	B	503	RME	CAF-CAE-NAD	-3.49	117.89	122.75
9	D	503	RME	CAB-CAC-NAD	-3.46	119.66	123.96
9	B	503	RME	CAB-CAC-NAD	-3.45	119.68	123.96
9	D	503	RME	CAF-CAE-NAD	-3.32	118.12	122.75
5	A	501	GTP	C5-C6-N1	3.17	119.54	113.95
5	C	501	GTP	C8-N7-C5	3.06	108.83	102.99
5	A	501	GTP	C8-N7-C5	3.05	108.79	102.99
8	D	501	GDP	PA-O3A-PB	-3.04	122.38	132.83
5	A	501	GTP	PA-O3A-PB	-3.03	122.42	132.83
5	C	501	GTP	C5-C6-N1	3.02	119.29	113.95
9	B	503	RME	CAF-CAE-NAG	2.99	129.72	120.24
5	C	501	GTP	PB-O3B-PG	-2.94	122.73	132.83
5	A	501	GTP	PB-O3B-PG	-2.93	122.76	132.83
9	B	503	RME	NAG-CAH-NAI	2.92	125.18	116.95
5	C	501	GTP	PA-O3A-PB	-2.88	122.95	132.83
9	D	503	RME	NAG-CAH-NAI	2.86	125.02	116.95
5	A	501	GTP	C2-N1-C6	-2.83	119.89	125.10
9	D	503	RME	CAF-CAE-NAG	2.81	129.15	120.24
9	D	503	RME	CAO-NAN-CAJ	-2.73	118.32	122.95
5	C	501	GTP	C2-N1-C6	-2.71	120.11	125.10
8	D	501	GDP	C3'-C2'-C1'	2.62	104.92	100.98
8	B	501	GDP	PA-O3A-PB	-2.62	123.84	132.83
9	B	503	RME	CAO-NAN-CAJ	-2.60	118.55	122.95
10	B	504	MES	O3S-S-C8	2.59	109.96	105.77
9	B	503	RME	CAM-CAH-NAI	-2.58	118.81	123.16
9	D	503	RME	CAM-CAH-NAI	-2.51	118.92	123.16
11	F	701	ACP	PA-O5'-C5'	-2.46	107.24	121.68
8	B	501	GDP	C8-N7-C5	2.42	107.59	102.99
11	F	701	ACP	C4-C5-N7	-2.35	106.95	109.40
8	B	501	GDP	C5-C6-N1	2.34	118.08	113.95
10	B	504	MES	C7-N4-C3	2.31	117.15	111.23
8	D	501	GDP	C8-N7-C5	2.31	107.39	102.99
9	D	503	RME	CAH-NAI-CAJ	2.29	121.54	117.91
8	D	501	GDP	C5-C6-N1	2.29	117.99	113.95
9	B	503	RME	CAH-NAI-CAJ	2.20	121.40	117.91
10	B	504	MES	O2S-S-C8	2.12	109.47	106.92
9	B	503	RME	CAK-CAJ-NAI	2.06	122.24	119.90

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O2G
5	A	501	GTP	C5'-O5'-PA-O1A
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
10	B	504	MES	C8-C7-N4-C3
11	F	701	ACP	C5'-O5'-PA-O1A
11	F	701	ACP	C5'-O5'-PA-O2A
11	F	701	ACP	C5'-O5'-PA-O3A
11	F	701	ACP	O4'-C4'-C5'-O5'
11	F	701	ACP	C3'-C4'-C5'-O5'
10	B	504	MES	C7-C8-S-O3S
5	C	501	GTP	C5'-O5'-PA-O3A
5	C	501	GTP	PB-O3A-PA-O2A
5	A	501	GTP	C5'-O5'-PA-O2A
10	B	504	MES	C7-C8-S-O1S
5	A	501	GTP	PB-O3A-PA-O2A
8	B	501	GDP	PB-O3A-PA-O2A
5	C	501	GTP	C4'-C5'-O5'-PA
5	C	501	GTP	PB-O3B-PG-O1G
11	F	701	ACP	PB-O3A-PA-O2A
5	A	501	GTP	C4'-C5'-O5'-PA
5	C	501	GTP	PB-O3B-PG-O2G
5	C	501	GTP	PB-O3B-PG-O3G
5	A	501	GTP	C5'-O5'-PA-O3A
8	B	501	GDP	C5'-O5'-PA-O3A
8	D	501	GDP	C5'-O5'-PA-O3A
5	A	501	GTP	PB-O3A-PA-O1A
8	B	501	GDP	PB-O3A-PA-O1A
8	D	501	GDP	PB-O3A-PA-O2A
10	B	504	MES	C7-C8-S-O2S

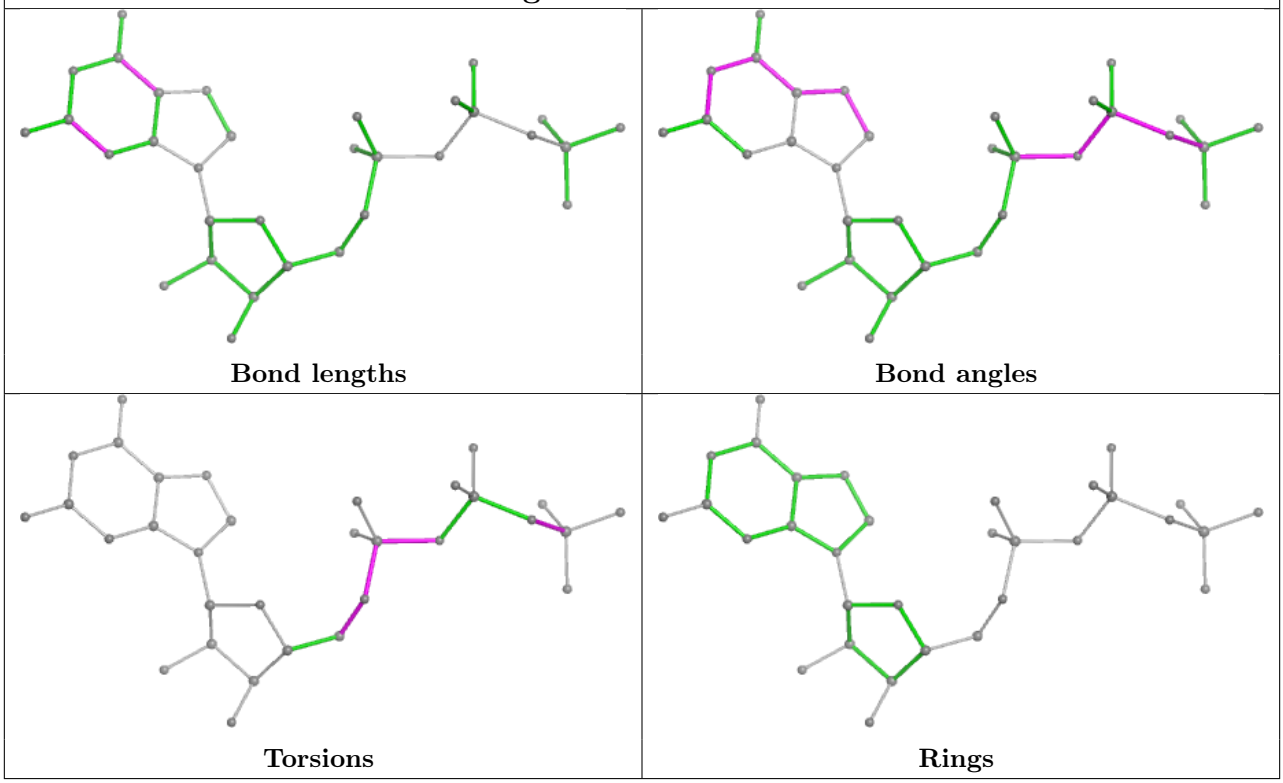
There are no ring outliers.

4 monomers are involved in 6 short contacts:

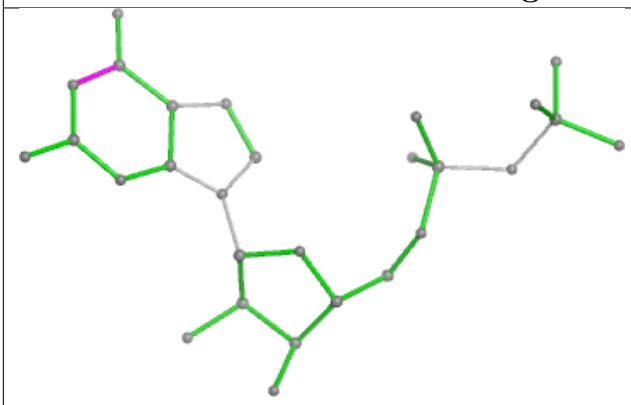
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	501	GDP	1	0
8	D	501	GDP	3	0
9	D	503	RME	1	0
9	B	503	RME	1	0

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.

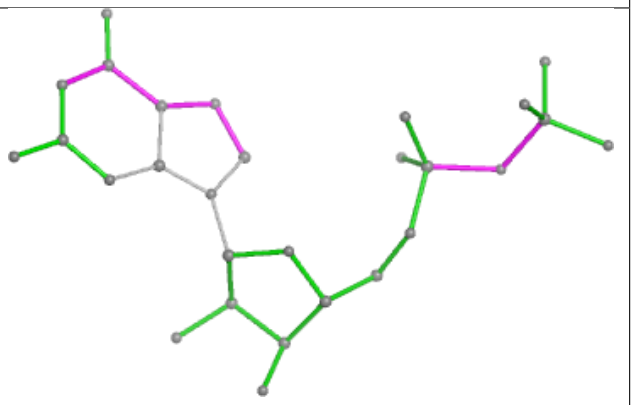
Ligand GTP A 501



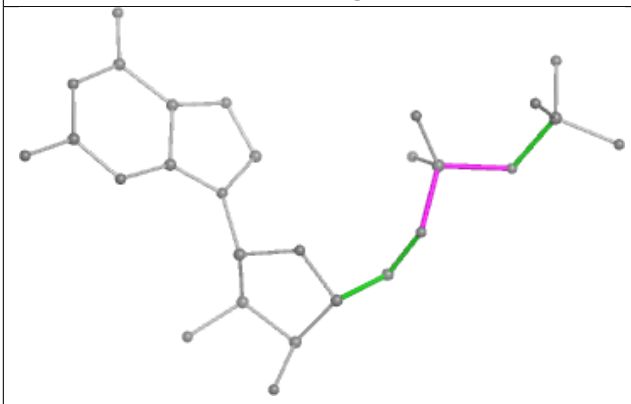
Ligand GDP B 501



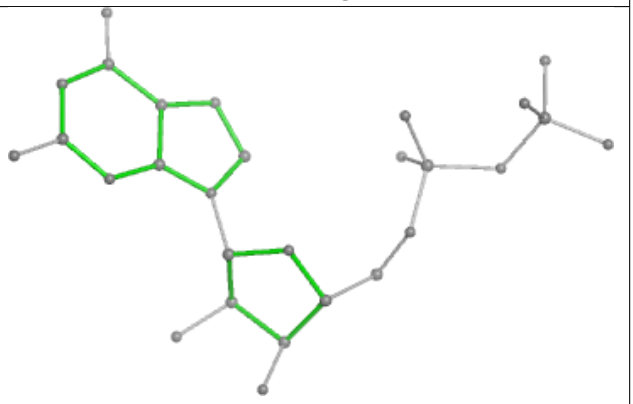
Bond lengths



Bond angles

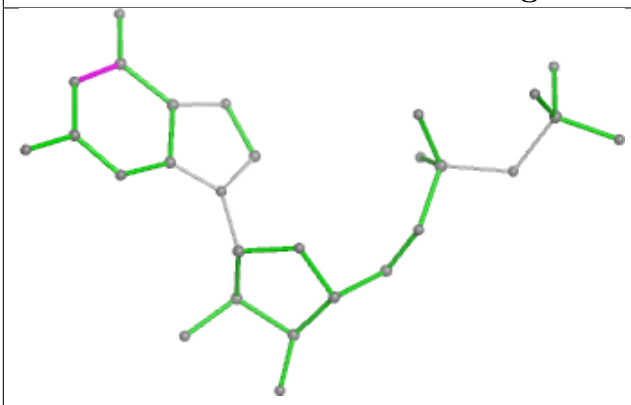


Torsions

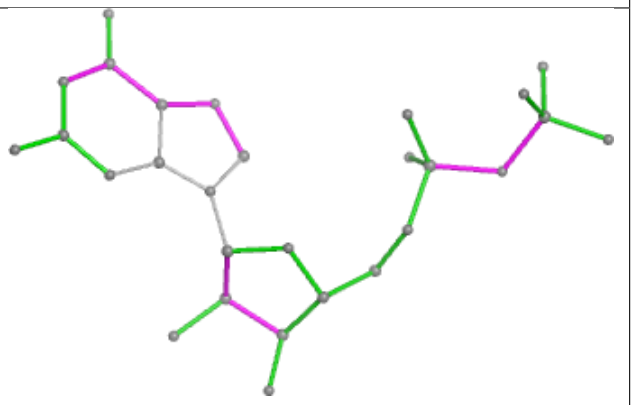


Rings

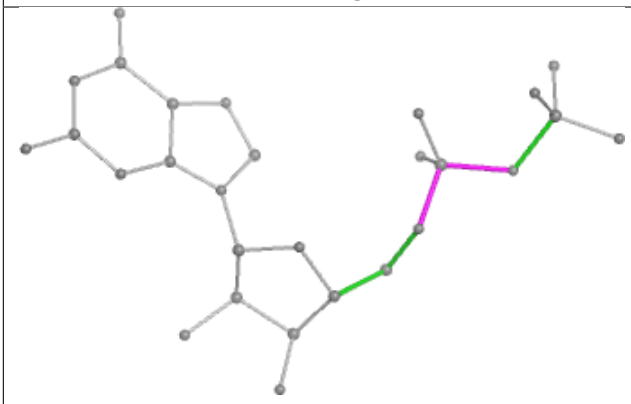
Ligand GDP D 501



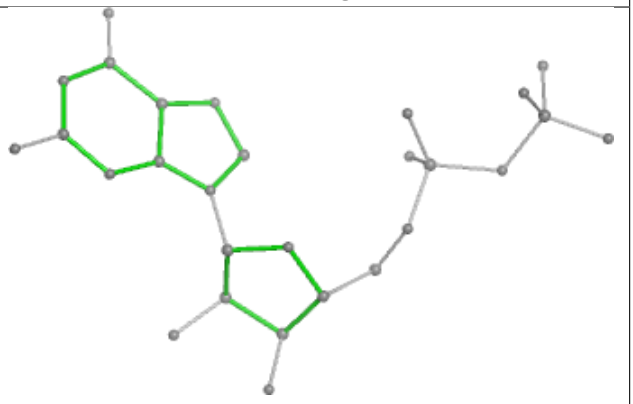
Bond lengths



Bond angles

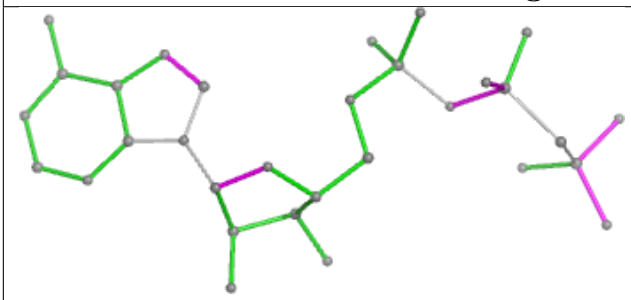


Torsions

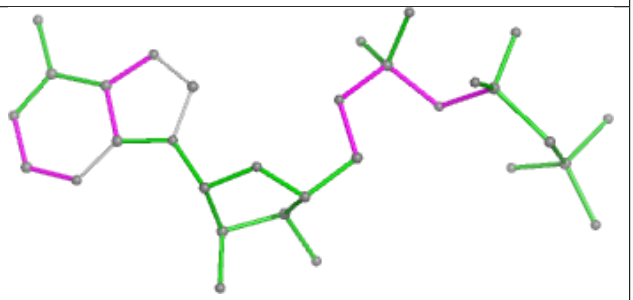


Rings

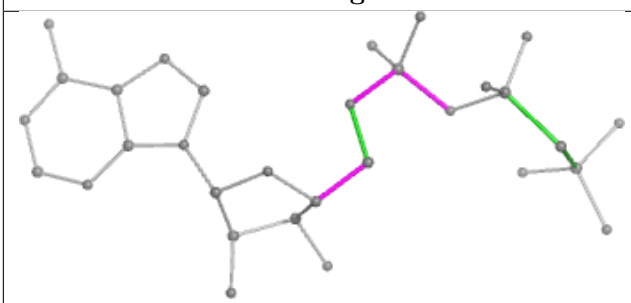
Ligand ACP F 701



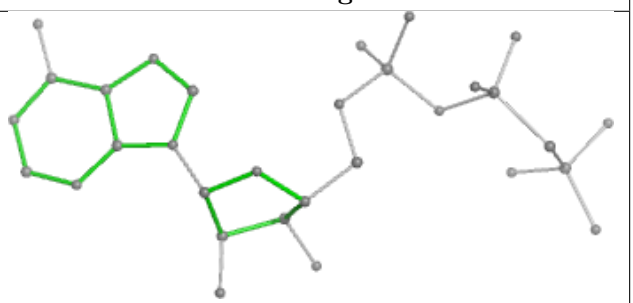
Bond lengths



Bond angles

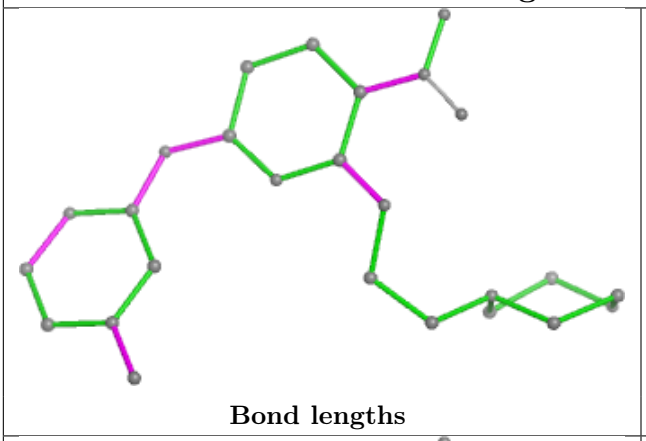


Torsions

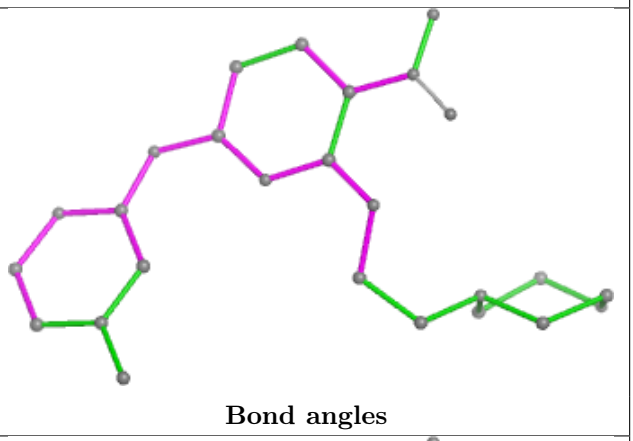


Rings

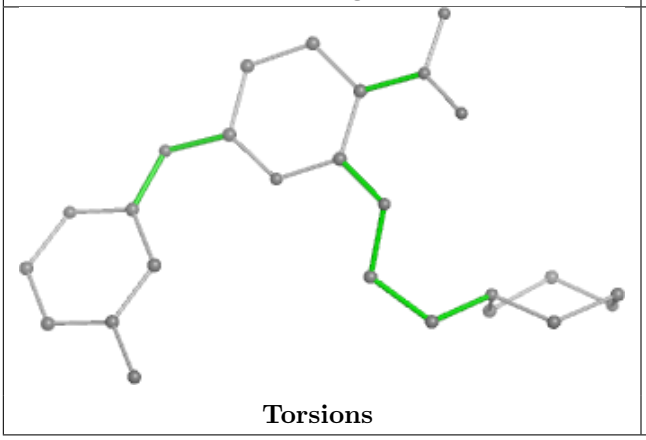
Ligand RME D 503



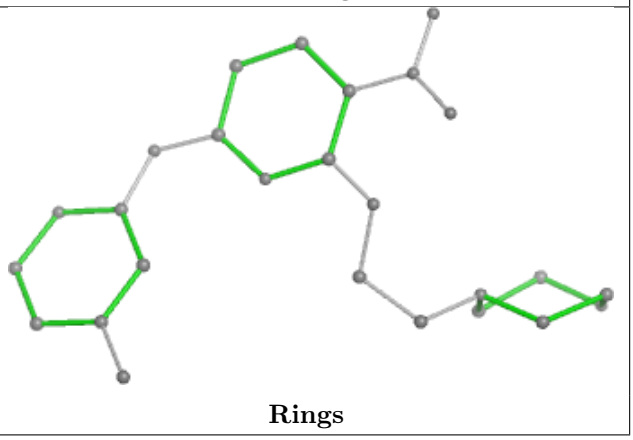
Bond lengths



Bond angles

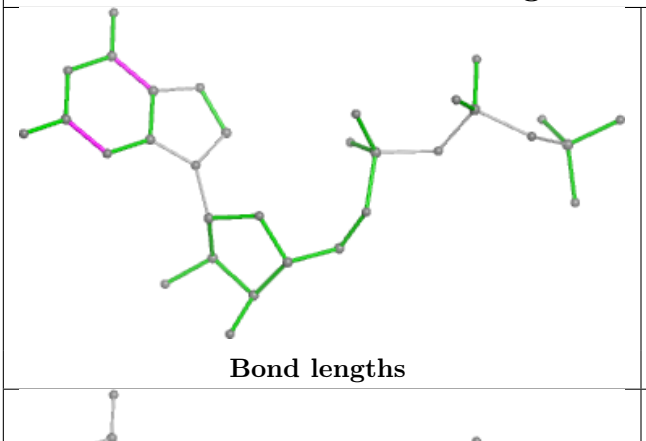


Torsions

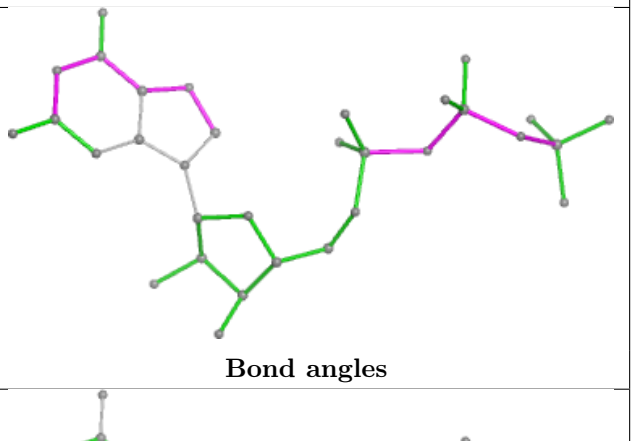


Rings

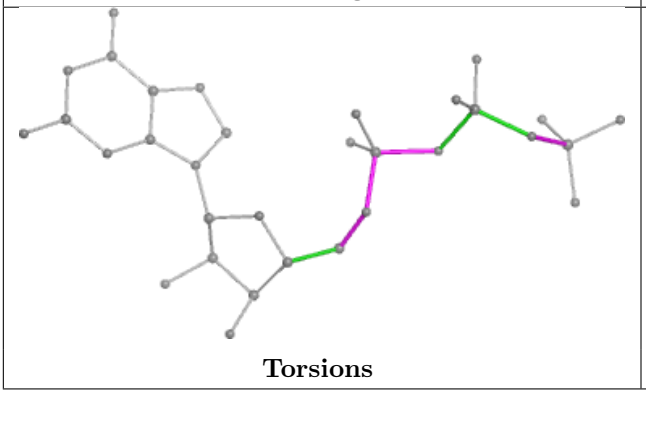
Ligand GTP C 501



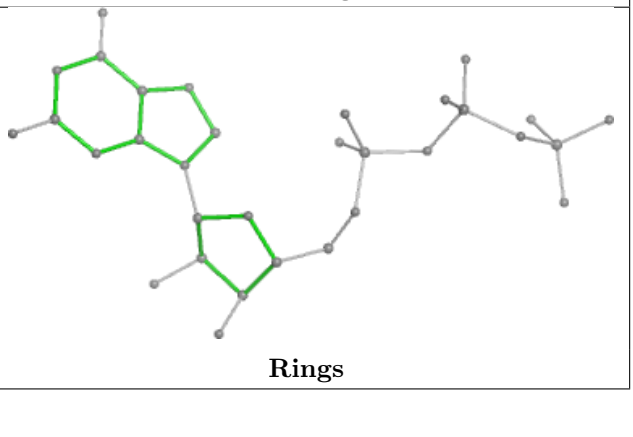
Bond lengths



Bond angles

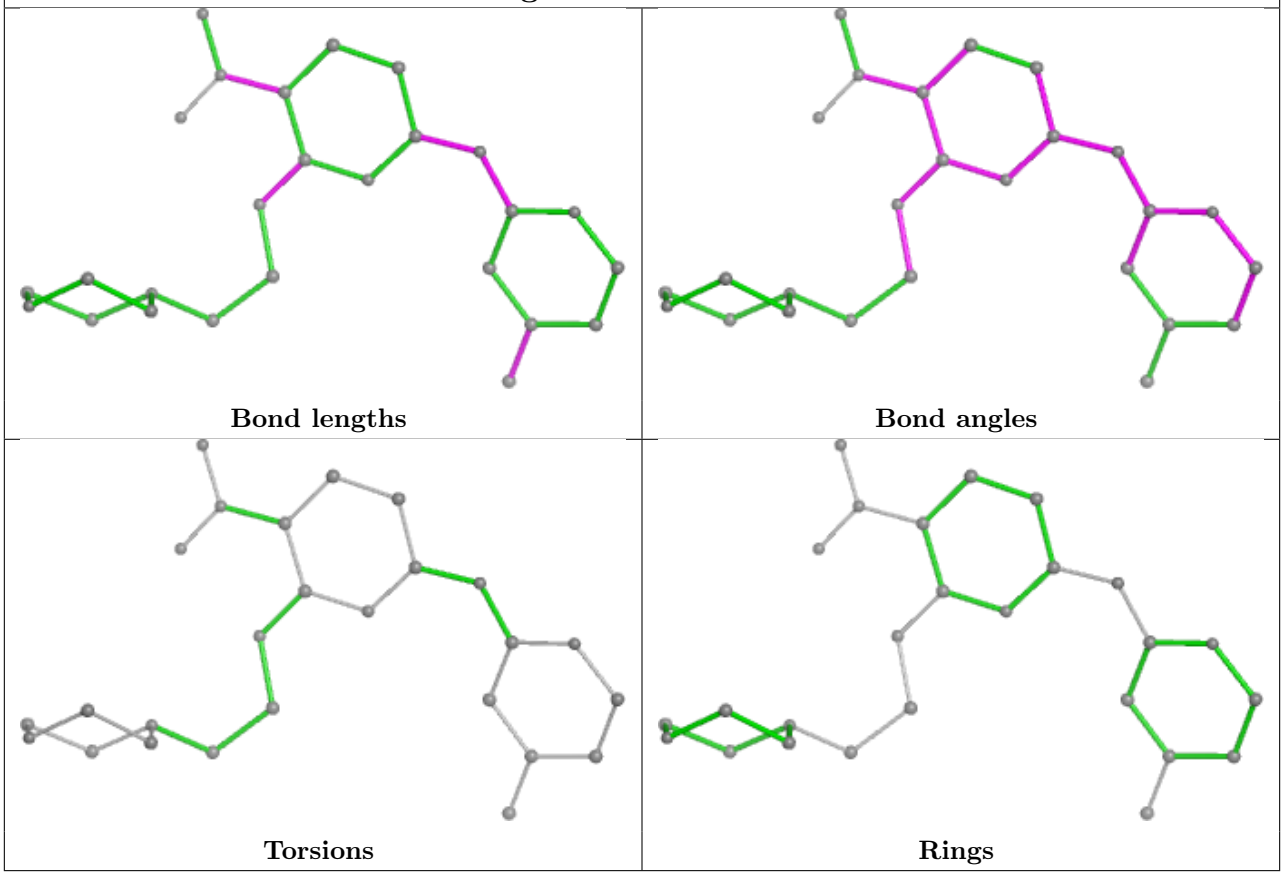


Torsions



Rings

Ligand RME B 503



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	437/451 (96%)	0.21	14 (3%)	50	47	37, 64, 102, 175	2 (0%)
1	C	440/451 (97%)	-0.17	11 (2%)	58	55	28, 48, 76, 109	4 (0%)
2	B	428/445 (96%)	0.08	12 (2%)	55	52	37, 56, 89, 138	0
2	D	422/445 (94%)	0.51	22 (5%)	34	30	44, 78, 110, 156	0
3	E	121/143 (84%)	0.64	10 (8%)	19	16	47, 74, 123, 145	0
4	F	314/384 (81%)	0.73	30 (9%)	15	12	56, 89, 156, 177	0
All	All	2162/2319 (93%)	0.27	99 (4%)	38	35	28, 65, 115, 177	6 (0%)

All (99) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	1	MET	4.8
1	A	340	SER	4.4
4	F	362	ALA	4.1
4	F	102	PRO	3.9
2	B	57	THR	3.7
2	B	282	GLN	3.7
4	F	170	LEU	3.5
4	F	173	ILE	3.4
1	A	281	ALA	3.4
2	B	279	GLY	3.4
1	A	282	TYR	3.3
1	A	437	VAL	3.3
4	F	172	PHE	3.3
2	D	276	THR	3.2
1	A	262	TYR	3.2
4	F	149	ALA	3.2
4	F	182	ILE	3.2
2	B	280	SER	3.2
2	D	128	SER	3.2

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Mol	Chain	Res	Type	RSRZ
1	A	88	HIS	3.1
4	F	100	ILE	3.1
3	E	24	LEU	3.1
4	F	99	VAL	3.1
2	D	407	TRP	3.0
1	C	340	SER	3.0
3	E	45	PRO	3.0
4	F	372	THR	2.9
2	B	283	TYR	2.9
1	A	1	MET	2.8
1	C	163	LYS	2.8
2	B	82	PRO	2.8
2	B	278	ARG	2.8
4	F	166	ALA	2.8
2	D	333	LEU	2.8
1	A	283	HIS	2.8
3	E	10	GLU	2.7
4	F	245	ILE	2.7
1	C	440	VAL	2.7
3	E	6	MET	2.7
4	F	144	GLY	2.7
1	A	346	TRP	2.7
2	D	334	ASN	2.6
3	E	28	SER	2.6
4	F	379	HIS	2.6
4	F	296	MET	2.6
2	D	441	ASP	2.6
1	A	77	GLU	2.5
2	B	50	ASN	2.5
1	C	357	TYR	2.5
4	F	150	LYS	2.5
4	F	234	GLN	2.5
1	A	46	ASP	2.5
2	D	57	THR	2.5
3	E	25	LYS	2.5
4	F	169	LEU	2.5
2	B	438	ALA	2.5
2	B	281	GLN	2.4
1	C	358	GLN	2.4
2	D	286	LEU	2.4
4	F	162	ILE	2.4
1	A	347	CYS	2.4

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Mol	Chain	Res	Type	RSRZ
4	F	167	SER	2.3
3	E	139	LEU	2.3
2	D	129	CYS	2.3
2	D	325	MET	2.3
1	C	245	ASP	2.3
3	E	44	ASP	2.3
2	B	58	GLY	2.3
4	F	249	TYR	2.3
1	C	1	MET	2.3
4	F	242	ASN	2.3
2	D	164	ARG	2.3
1	A	176	GLN	2.3
1	C	46	ASP	2.2
1	A	341	ILE	2.2
3	E	26	PRO	2.2
2	D	421	ALA	2.2
4	F	194	PRO	2.1
2	D	247	GLN	2.1
4	F	181	VAL	2.1
4	F	220	VAL	2.1
2	D	296	PHE	2.1
2	B	172	MET	2.1
2	D	37	HIS	2.1
3	E	27	PRO	2.1
4	F	70	LYS	2.1
2	D	275	LEU	2.1
4	F	240	LEU	2.1
2	D	220	THR	2.1
2	D	172	MET	2.1
4	F	101	TYR	2.1
1	C	341	ILE	2.1
4	F	330	ILE	2.1
2	D	295	MET	2.1
1	C	42	ILE	2.0
1	C	177	VAL	2.0
2	D	58	GLY	2.0
4	F	233	PHE	2.0
2	D	229	HIS	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)

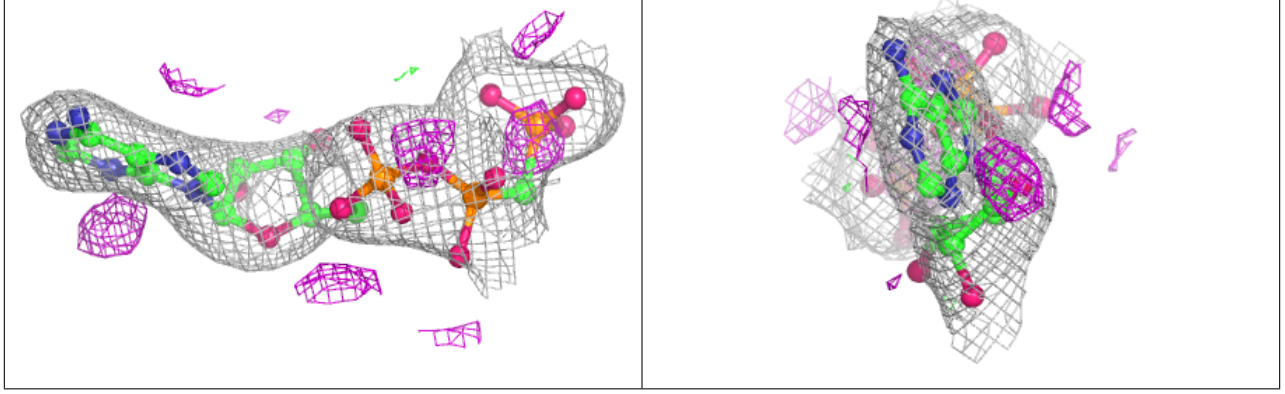
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
6	MG	F	702	1/1	0.67	0.16	93,93,93,93	0
6	MG	D	502	1/1	0.72	0.24	80,80,80,80	0
11	ACP	F	701	31/31	0.83	0.14	101,109,115,117	0
7	CA	B	505	1/1	0.91	0.12	92,92,92,92	0
8	GDP	D	501	28/28	0.92	0.13	70,75,80,81	0
10	MES	B	504	12/12	0.95	0.09	48,56,63,66	0
6	MG	B	502	1/1	0.96	0.07	57,57,57,57	0
9	RME	D	503	26/26	0.96	0.07	45,54,64,65	0
5	GTP	A	501	32/32	0.97	0.07	39,46,51,56	0
9	RME	B	503	26/26	0.97	0.07	44,48,57,58	0
5	GTP	C	501	32/32	0.97	0.06	34,38,43,45	0
7	CA	C	503	1/1	0.97	0.05	74,74,74,74	0
8	GDP	B	501	28/28	0.97	0.07	37,43,47,49	0
7	CA	A	503	1/1	0.98	0.05	96,96,96,96	0
6	MG	A	502	1/1	0.99	0.03	51,51,51,51	0
6	MG	C	502	1/1	1.00	0.02	40,40,40,40	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.

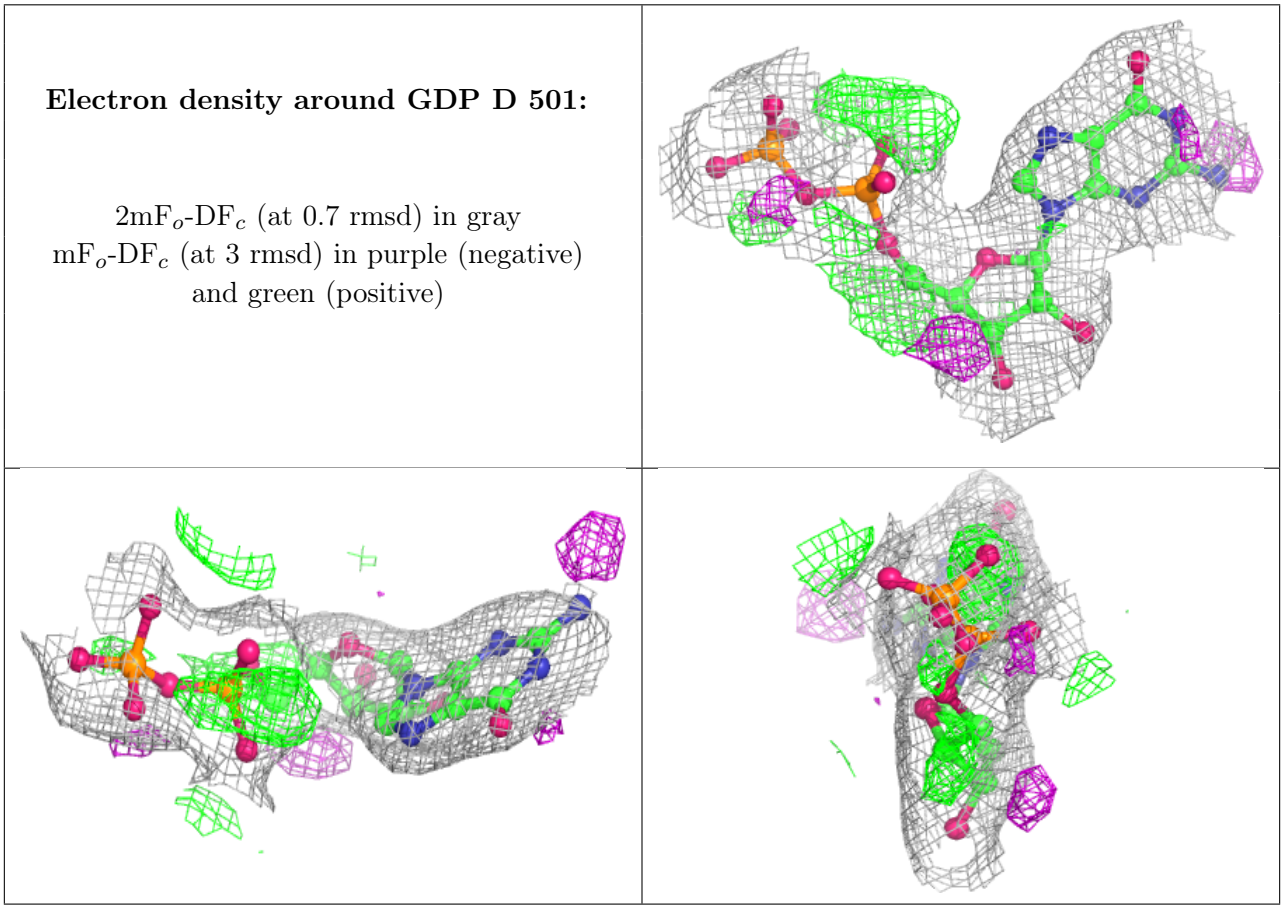
Electron density around ACP F 701:

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



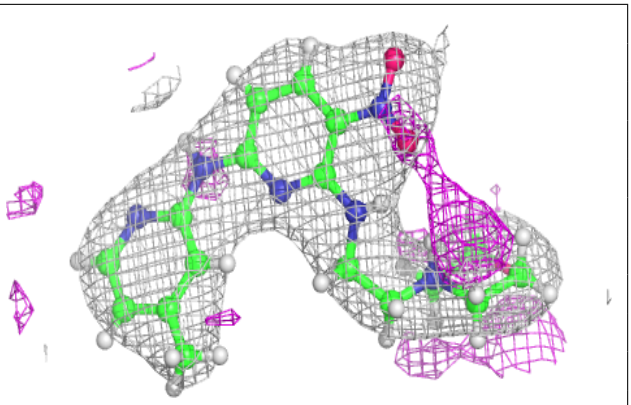
Electron density around GDP D 501:

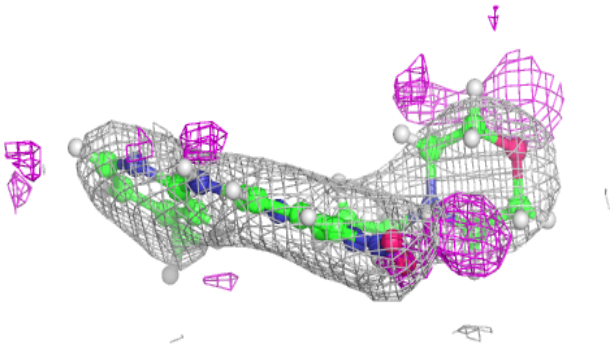
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

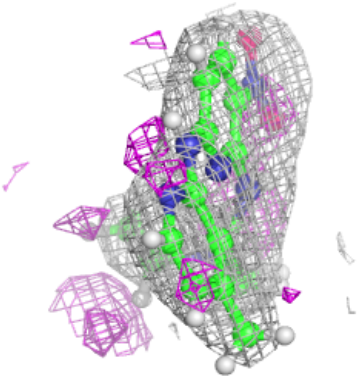


Electron density around RME D 503:

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

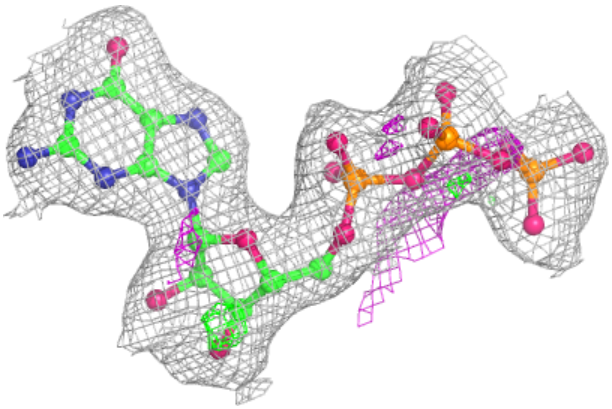


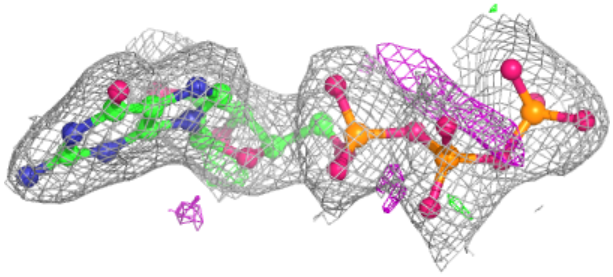


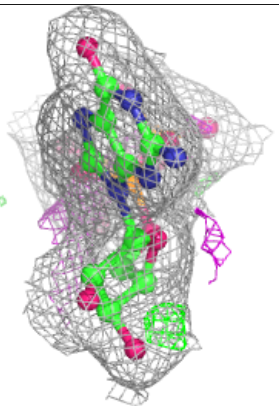


Electron density around GTP A 501:

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

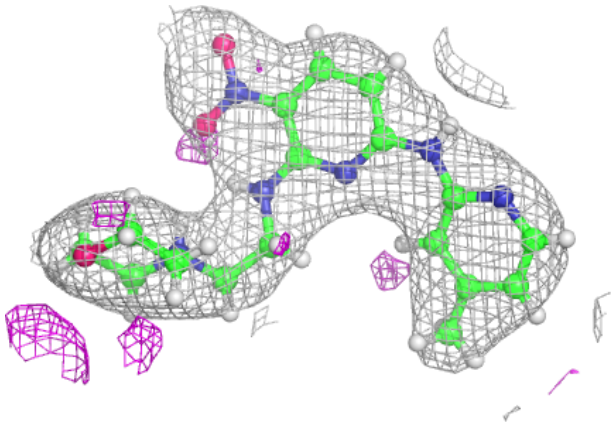


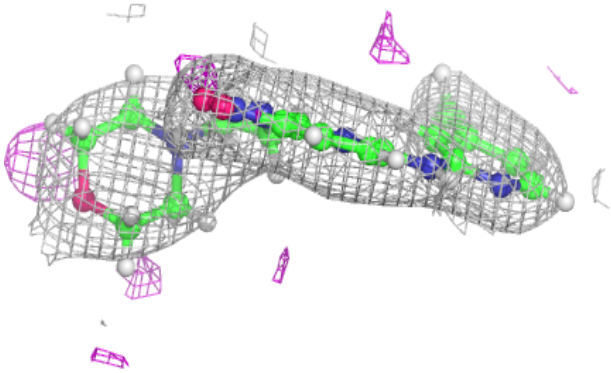


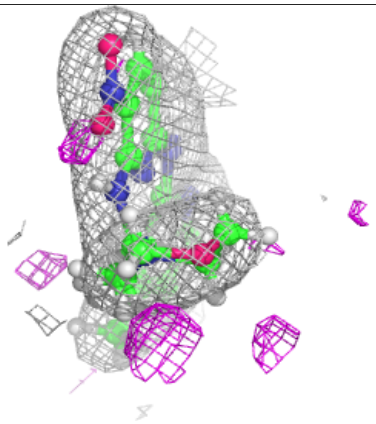


Electron density around RME B 503:

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

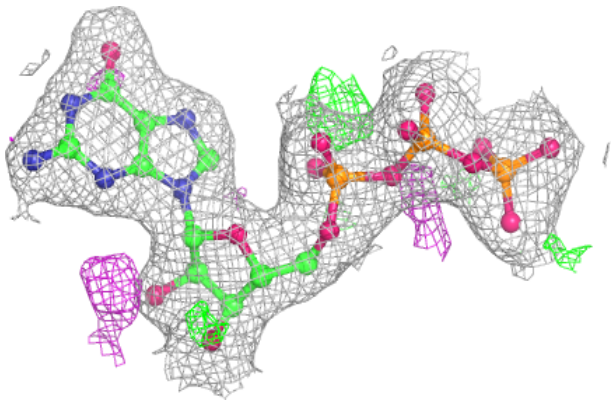


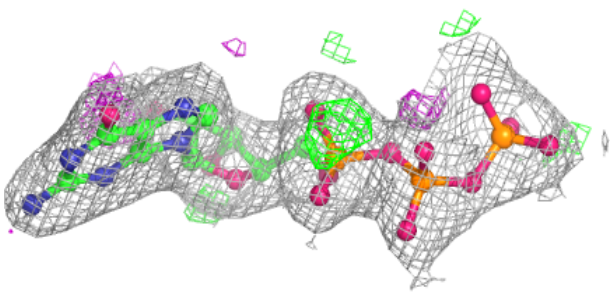


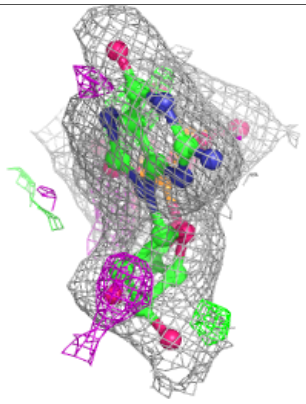


Electron density around GTP C 501:

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

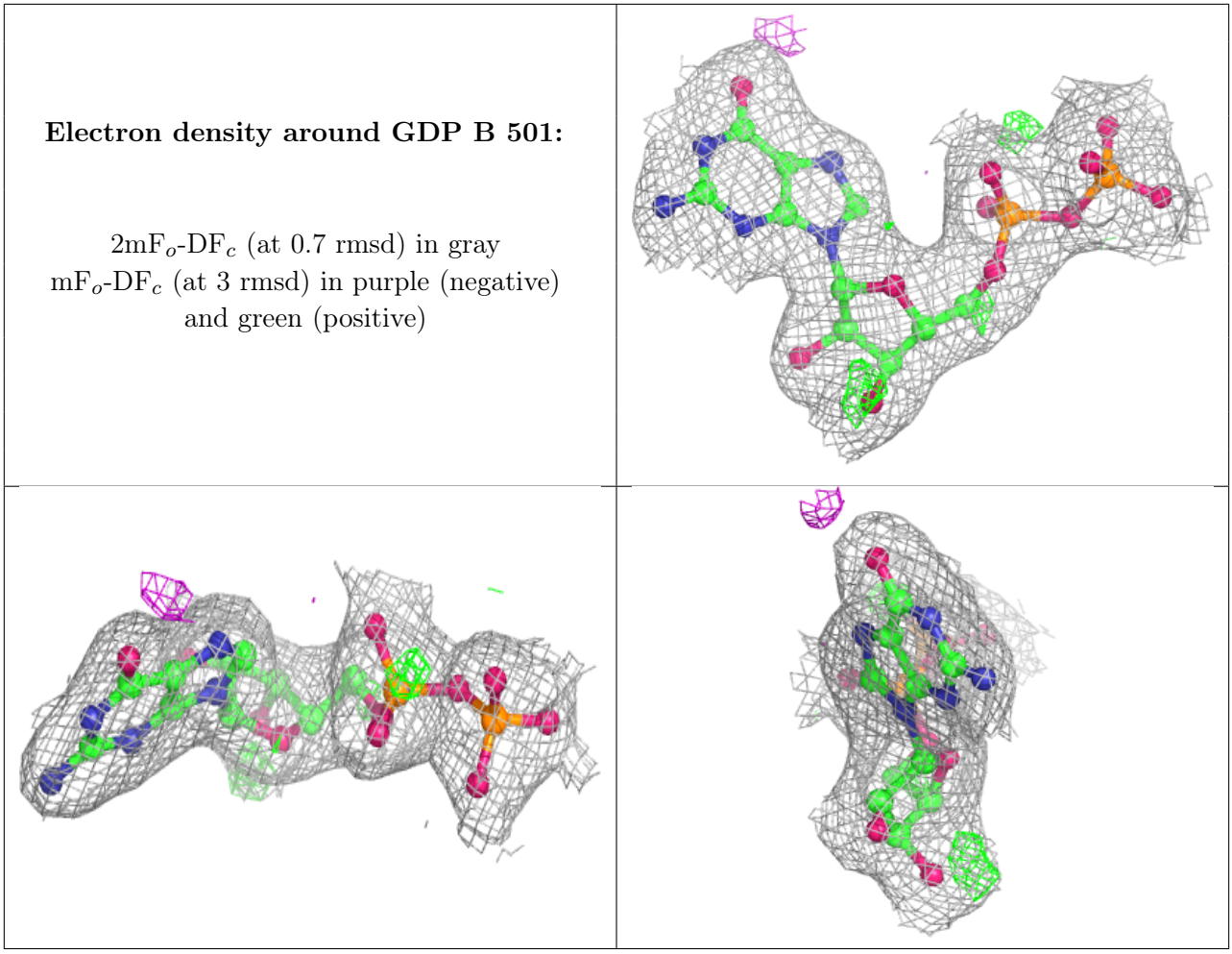






Electron density around GDP B 501:

$2mF_o$-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

There are no such residues in this entry.