



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 20, 2023 – 06:59 PM JST

PDB ID : 7DBD
Title : 444 in complex with tubulin
Authors : Wu, C.Y.; Wang, Y.X.
Deposited on : 2020-10-19
Resolution : 3.09 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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

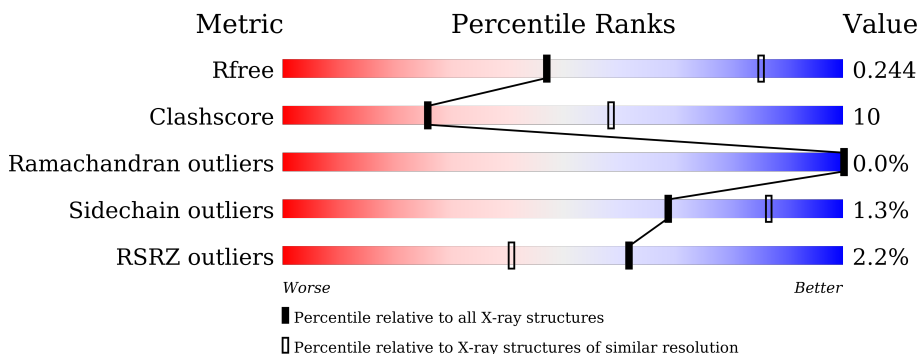
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.09 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1094 (3.10-3.10)
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	451	74% (green), 23% (yellow), 3% (grey), 2% (red)
1	C	451	76% (green), 22% (yellow), 2% (grey), 2% (red)
2	B	445	77% (green), 19% (yellow), 2% (grey), 2% (red)
2	D	445	66% (green), 28% (yellow), 6% (grey), 2% (red)
3	E	143	77% (green), 8% (yellow), 14% (grey), 3% (red)
4	F	384	67% (green), 19% (yellow), 12% (grey), 7% (red)

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
9	GDP	D	502	-	-	X	-

2 Entry composition i

There are 11 unique types of molecules in this entry. The entry contains 17563 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
			Total	C	N	O	S			
1	A	438	Total	C	N	O	S	0	2	0
			3430	2171	582	653	24			
1	C	441	Total	C	N	O	S	0	4	0
			3452	2182	586	662	22			

- Molecule 2 is a protein called Tubulin beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	429	Total	C	N	O	S	0	0	0
			3376	2119	578	652	27			
2	D	420	Total	C	N	O	S	0	0	0
			3285	2065	558	635	27			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
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	1	MET	-	initiating methionine	UNP P63042
E	2	ALA	-	expression tag	UNP P63042

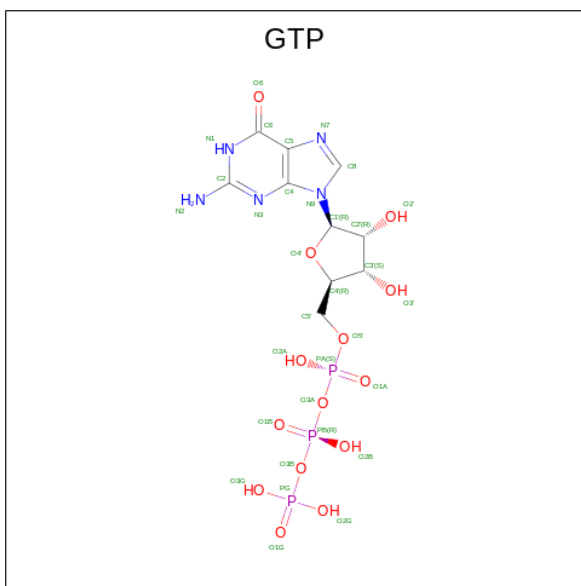
- Molecule 4 is a protein called Tubulin tyrosine ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	F	339	Total	C	N	O	S	0	0	0
			2763	1774	472	503	14			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	379	HIS	-	expression tag	UNP E1BQ43
F	380	HIS	-	expression tag	UNP E1BQ43
F	381	HIS	-	expression tag	UNP E1BQ43
F	382	HIS	-	expression tag	UNP E1BQ43
F	383	HIS	-	expression tag	UNP E1BQ43
F	384	HIS	-	expression tag	UNP E1BQ43

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



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

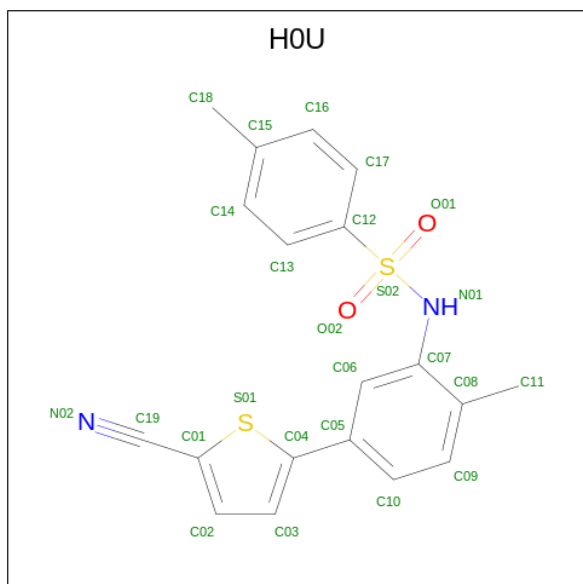
- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

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

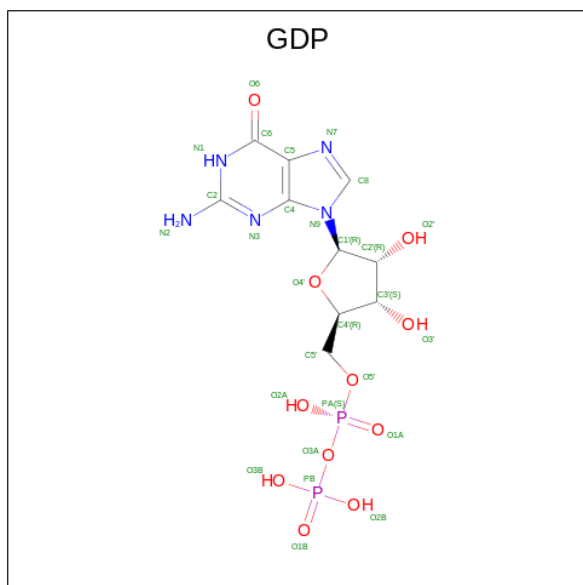
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total Ca 1 1	0	0
7	C	1	Total Ca 1 1	0	0

- Molecule 8 is {N}-[5-(5-cyanothiophen-2-yl)-2-methyl-phenyl]-4-methyl-benzenesulfonamide (three-letter code: H0U) (formula: C₁₉H₁₆N₂O₂S₂) (labeled as "Ligand of Interest" by depositor).



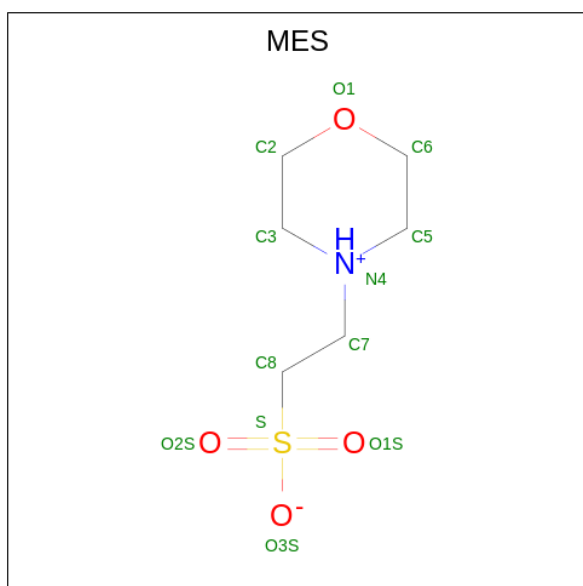
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C N O S 25 19 2 2 2	0	0
8	D	1	Total C N O S 25 19 2 2 2	0	0

- Molecule 9 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: C₁₀H₁₅N₅O₁₁P₂).



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

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



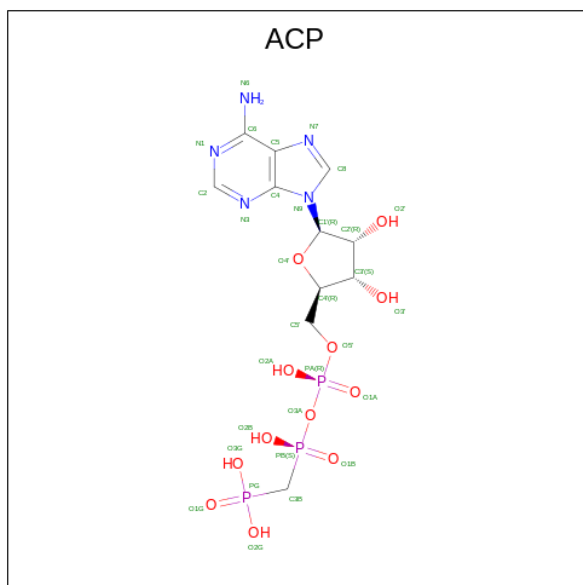
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
10	B	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

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

- Molecule 11 is PHOSPHOMETHYLPHOSPHONIC ACID ADENYLATE ESTER (three-letter code: ACP) (formula: C₁₁H₁₈N₅O₁₂P₃).

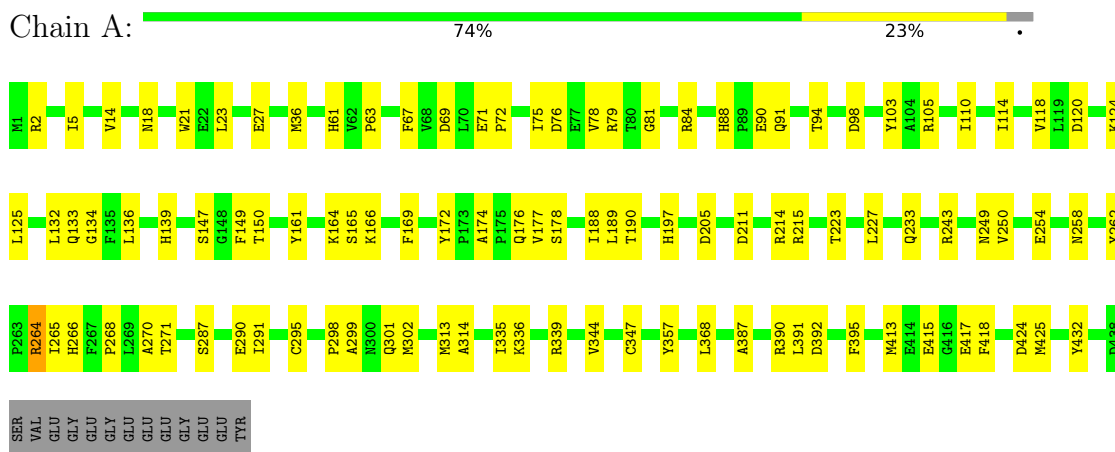


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
11	F	1	31	11	5	12	3	0	0

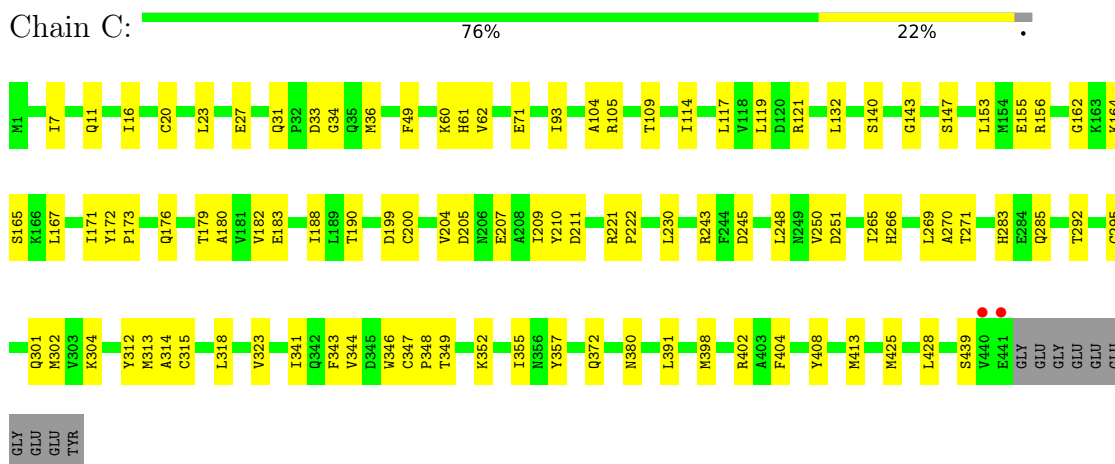
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

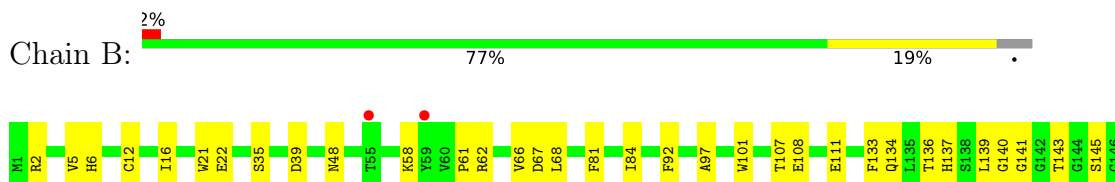
- Molecule 1: Tubulin alpha-1B chain



- Molecule 1: Tubulin alpha-1B chain

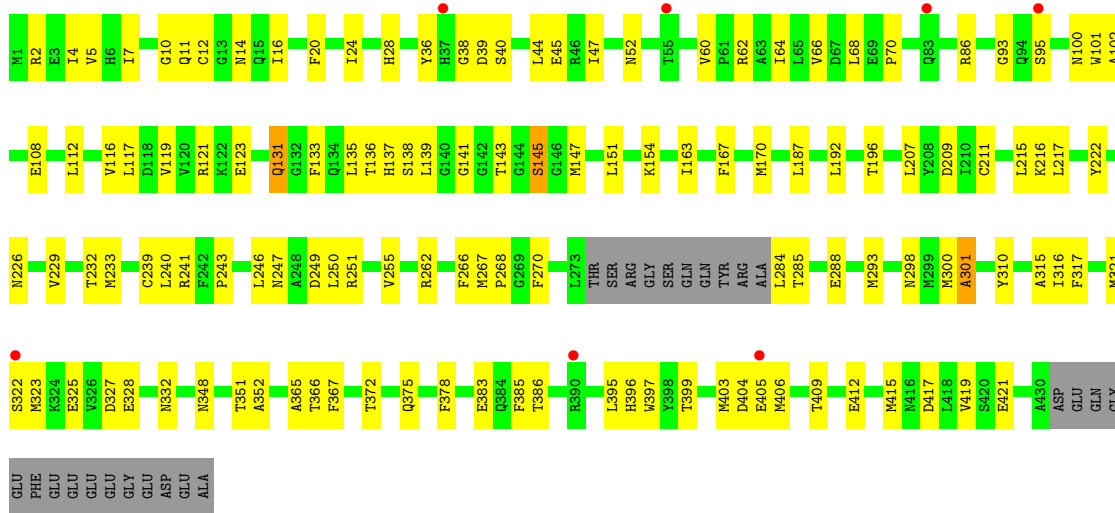


- Molecule 2: Tubulin beta chain

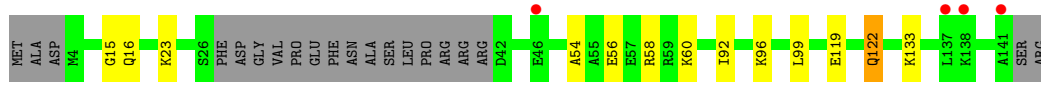
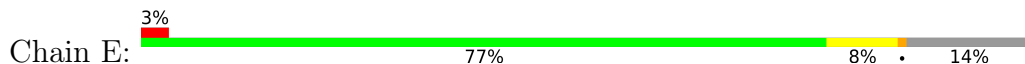




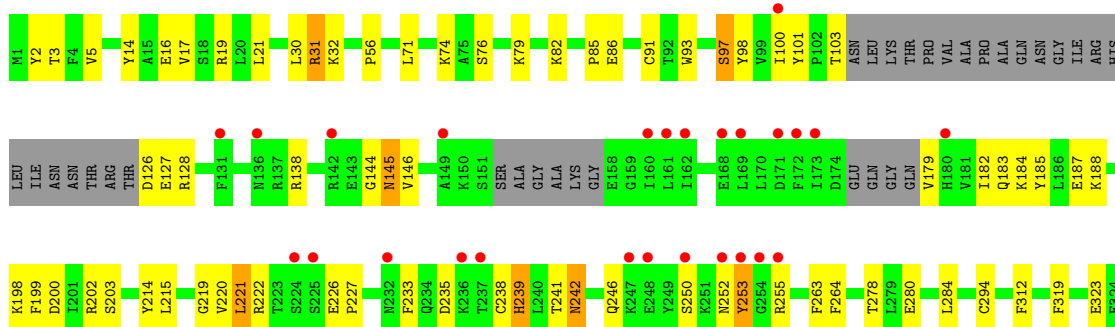
• Molecule 2: Tubulin beta chain



• Molecule 3: Stathmin-4



• Molecule 4: Tubulin tyrosine ligase



L326	W328	P336	Y343	A354	F359	A362	ASP	THR	GLY	GLN	LYS	THR	SER	GLN	PRO	T372	F375	H380	HIS	HIS	HIS	HIS
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4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	104.64Å 158.29Å 182.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.87 – 3.09 49.87 – 3.09	Depositor EDS
% Data completeness (in resolution range)	94.2 (49.87-3.09) 94.2 (49.87-3.09)	Depositor EDS
R_{merge}	0.30	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.54 (at 3.07Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, R_{free}	0.190 , 0.244 0.191 , 0.244	Depositor DCC
R_{free} test set	2000 reflections (3.80%)	wwPDB-VP
Wilson B-factor (Å ²)	65.6	Xtrriage
Anisotropy	0.069	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 38.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	17563	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.83% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	0.55	0/3514	0.70	1/4770 (0.0%)
1	C	0.57	0/3538	0.74	0/4803
2	B	0.54	1/3451 (0.0%)	0.70	0/4674
2	D	0.51	0/3358	0.70	2/4553 (0.0%)
3	E	0.56	0/1041	0.63	0/1382
4	F	0.50	0/2825	0.65	1/3818 (0.0%)
All	All	0.54	1/17727 (0.0%)	0.70	4/24000 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	111	GLU	CG-CD	5.72	1.60	1.51

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	177	VAL	CG1-CB-CG2	8.94	125.21	110.90
4	F	221	LEU	CB-CG-CD2	-5.29	102.01	111.00
2	D	131	GLN	CB-CA-C	-5.12	100.17	110.40
2	D	301	ALA	CB-CA-C	5.04	117.66	110.10

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3430	0	3345	70	0
1	C	3452	0	3361	67	0
2	B	3376	0	3257	58	0
2	D	3285	0	3148	113	0
3	E	1026	0	1042	9	0
4	F	2763	0	2718	52	0
5	A	32	0	12	0	0
5	C	32	0	12	2	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	F	1	0	0	0	0
7	A	1	0	0	0	0
7	C	1	0	0	0	0
8	B	25	0	0	0	0
8	D	25	0	0	1	0
9	B	28	0	12	2	0
9	D	28	0	12	14	0
10	B	24	0	24	4	0
11	F	31	0	14	6	0
All	All	17563	0	16957	361	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 (361) 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)
11:F:401:ACP:H8	11:F:401:ACP:H5'2	1.43	0.98
2:D:226:ASN:ND2	9:D:502:GDP:HN1	1.62	0.96
11:F:401:ACP:O2G	11:F:401:ACP:O2B	1.83	0.94
2:D:16:ILE:HG13	2:D:226:ASN:OD1	1.71	0.90
2:D:226:ASN:CG	9:D:502:GDP:HN1	1.77	0.87
2:D:66:VAL:HG12	2:D:147:MET:HE1	1.57	0.87
2:B:2:ARG:HH11	2:B:48:ASN:HB2	1.42	0.85
2:D:66:VAL:HG11	2:D:147:MET:HE3	1.58	0.85
11:F:401:ACP:H8	11:F:401:ACP:C5'	2.07	0.84
4:F:31:ARG:HD3	4:F:32:LYS:H	1.43	0.82
2:D:315:ALA:HB3	2:D:351:THR:HG22	1.63	0.81
1:C:221:ARG:NE	2:D:323:MET:HB3	1.97	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:226:ASN:ND2	9:D:502:GDP:N1	2.28	0.79
1:A:188:ILE:HD12	1:A:425:MET:HG3	1.62	0.79
2:B:174:LYS:HD2	2:B:205:GLU:HG3	1.65	0.78
1:C:176:GLN:HE22	1:C:207:GLU:HG3	1.50	0.76
2:D:211:CYS:HA	2:D:215:LEU:HD12	1.66	0.76
2:D:66:VAL:CG1	2:D:147:MET:CE	2.64	0.75
2:B:296:SER:HA	2:B:299:MET:HG3	1.68	0.75
2:B:190:HIS:HD2	2:B:411:ALA:HA	1.51	0.74
1:A:265:ILE:HG23	1:A:432:TYR:CZ	2.22	0.74
2:D:10:GLY:O	2:D:14:ASN:ND2	2.20	0.74
2:D:66:VAL:CG1	2:D:147:MET:HE1	2.18	0.74
2:D:66:VAL:HG11	2:D:147:MET:CE	2.19	0.73
11:F:401:ACP:O2B	11:F:401:ACP:O1A	2.05	0.73
2:D:232:THR:HG21	2:D:300:MET:HG3	1.72	0.72
1:A:264:ARG:NH2	1:A:424:ASP:OD1	2.22	0.71
2:B:317:PHE:HE1	2:B:330:MET:HE3	1.56	0.71
2:D:239:CYS:SG	2:D:316:ILE:HD13	2.30	0.71
4:F:76:SER:HA	4:F:79:LYS:HG2	1.72	0.70
4:F:16:GLU:OE1	4:F:19:ARG:NH1	2.25	0.69
1:C:167:LEU:HD22	1:C:200:CYS:HB3	1.74	0.68
2:D:372:THR:O	2:D:375:GLN:HB3	1.93	0.68
2:D:143:THR:N	9:D:502:GDP:O3B	2.22	0.68
2:D:5:VAL:HG22	2:D:133:PHE:HD1	1.59	0.68
4:F:31:ARG:HD3	4:F:32:LYS:N	2.09	0.68
2:B:170:MET:HG2	2:B:377:LEU:HD21	1.76	0.67
1:C:221:ARG:HE	2:D:323:MET:HB3	1.59	0.67
2:D:226:ASN:ND2	9:D:502:GDP:O6	2.28	0.67
2:D:285:THR:HG23	2:D:288:GLU:H	1.60	0.66
1:A:264:ARG:HH11	1:A:264:ARG:HG3	1.61	0.65
2:D:2:ARG:HB3	2:D:131:GLN:HG2	1.77	0.65
1:A:118:VAL:HG21	1:A:149:PHE:HZ	1.62	0.65
4:F:280:GLU:HA	4:F:284:LEU:HB2	1.77	0.65
2:B:306:ARG:HE	10:B:505:MES:H51	1.62	0.64
4:F:138:ARG:NH1	4:F:144:GLY:O	2.30	0.64
4:F:82:LYS:HZ1	4:F:98:TYR:HD1	1.46	0.64
1:C:176:GLN:NE2	1:C:207:GLU:OE1	2.30	0.64
2:D:222:TYR:O	2:D:226:ASN:ND2	2.29	0.64
1:A:136:LEU:HD23	1:A:169:PHE:HE2	1.64	0.63
2:D:36:TYR:CZ	2:D:38:GLY:HA3	2.33	0.63
1:A:387:ALA:HA	1:A:390:ARG:HD3	1.80	0.63
4:F:138:ARG:HG2	4:F:145:ASN:HD21	1.64	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:172:TYR:HB3	1:A:205:ASP:HA	1.80	0.62
2:D:226:ASN:OD1	9:D:502:GDP:N1	2.32	0.62
1:A:118:VAL:HG21	1:A:149:PHE:CZ	2.36	0.61
2:D:226:ASN:ND2	9:D:502:GDP:C6	2.64	0.61
2:D:141:GLY:HA3	9:D:502:GDP:O5'	2.01	0.61
4:F:97:SER:OG	4:F:183:GLN:NE2	2.31	0.61
2:B:6:HIS:CD2	2:B:21:TRP:HE1	2.19	0.61
2:B:170:MET:HE1	2:B:201:CYS:HA	1.81	0.61
1:A:36:MET:HB3	1:A:61:HIS:CE1	2.37	0.60
4:F:138:ARG:HH11	4:F:145:ASN:ND2	1.99	0.60
1:A:27:GLU:OE2	1:A:243:ARG:NH2	2.34	0.60
2:B:163:ILE:HG21	2:B:250:LEU:HB3	1.84	0.60
2:D:5:VAL:HG22	2:D:133:PHE:CD1	2.37	0.60
2:D:66:VAL:HG12	2:D:147:MET:CE	2.27	0.60
2:B:317:PHE:CE1	2:B:330:MET:HE3	2.37	0.59
1:C:269:LEU:HD11	1:C:301:GLN:HB3	1.84	0.59
3:E:119:GLU:HA	3:E:122:GLN:HG2	1.83	0.59
2:D:396:HIS:HA	2:D:399:THR:HG22	1.85	0.59
2:B:345:ILE:HG22	2:B:348:ASN:HB3	1.83	0.59
2:D:385:PHE:CE1	2:D:412:GLU:HB2	2.37	0.58
1:A:215:ARG:NH2	1:A:299:ALA:O	2.37	0.58
1:A:264:ARG:HH11	1:A:264:ARG:CG	2.16	0.58
2:B:190:HIS:CD2	2:B:411:ALA:HA	2.36	0.58
1:A:71:GLU:HG2	1:A:72:PRO:HD2	1.86	0.58
2:D:163:ILE:HG21	2:D:250:LEU:HB3	1.85	0.58
1:A:79:ARG:HH22	1:A:94:THR:HG23	1.68	0.57
1:A:413:MET:HE3	1:A:417:GLU:HB3	1.84	0.57
2:D:143:THR:HB	9:D:502:GDP:O3B	2.04	0.57
1:C:179:THR:HG23	2:D:246:LEU:HD22	1.85	0.57
1:C:210:TYR:CZ	1:C:222:PRO:HD2	2.39	0.57
4:F:100:ILE:HG13	4:F:182:ILE:HD13	1.88	0.56
2:D:64:ILE:HD12	2:D:119:VAL:HG12	1.88	0.56
1:C:402:ARG:HG2	1:C:402:ARG:HH21	1.70	0.56
2:D:192:LEU:O	2:D:196:THR:HG22	2.06	0.56
2:D:266:PHE:O	2:D:268:PRO:HD3	2.06	0.56
2:D:44:LEU:HA	2:D:47:ILE:HB	1.88	0.56
1:C:271:THR:HG21	1:C:295:CYS:O	2.07	0.56
1:A:265:ILE:HD13	1:A:265:ILE:N	2.21	0.55
2:D:375:GLN:HG3	2:D:419:VAL:HG13	1.87	0.55
4:F:3:THR:HB	4:F:30:LEU:HD11	1.87	0.55
1:C:105:ARG:HA	1:C:109:THR:HB	1.89	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:172:TYR:HB3	1:C:205:ASP:HA	1.89	0.55
1:A:147:SER:HB2	1:A:190:THR:HB	1.89	0.55
1:C:176:GLN:HE22	1:C:207:GLU:CG	2.19	0.55
2:B:343:GLU:OE1	2:B:429:THR:HG23	2.06	0.55
1:C:211[A]:ASP:OD2	1:C:304:LYS:NZ	2.35	0.55
2:D:12:CYS:HB2	9:D:502:GDP:O2A	2.07	0.55
2:D:12:CYS:SG	2:D:138:SER:HB3	2.47	0.54
2:D:240:LEU:HD21	2:D:249:ASP:HA	1.90	0.54
2:D:68:LEU:HD23	2:D:112:LEU:HD23	1.90	0.54
1:A:114:ILE:O	1:A:118:VAL:HG23	2.08	0.54
1:C:36:MET:HE1	1:C:49:PHE:CE1	2.42	0.54
1:C:285:GLN:OE1	1:C:372:GLN:NE2	2.41	0.54
2:D:207:LEU:HD11	2:D:229:VAL:HG23	1.88	0.54
4:F:144:GLY:HA3	4:F:187:GLU:OE2	2.08	0.54
2:D:16:ILE:CG1	2:D:226:ASN:OD1	2.50	0.54
2:D:226:ASN:CG	9:D:502:GDP:N1	2.56	0.54
2:D:36:TYR:OH	2:D:40:SER:O	2.26	0.53
2:B:22:GLU:HG2	2:B:81:PHE:CD1	2.42	0.53
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.44	0.53
4:F:146:VAL:HG21	4:F:233:PHE:CZ	2.44	0.53
1:A:14:VAL:HG13	1:A:67:PHE:HD2	1.73	0.53
1:C:60:LYS:HG2	1:C:62:VAL:HG22	1.91	0.53
1:C:245:ASP:OD1	1:C:245:ASP:N	2.41	0.53
2:D:60:VAL:HG11	2:D:86:ARG:HB2	1.91	0.53
2:D:136:THR:HG22	2:D:167:PHE:HB2	1.90	0.53
1:C:250:VAL:HG11	1:C:352:LYS:HE3	1.90	0.53
2:B:134:GLN:HA	2:B:165:ASN:O	2.09	0.52
1:C:312:TYR:CD1	1:C:341:ILE:HG13	2.44	0.52
1:C:165:SER:HA	1:C:199:ASP:OD2	2.09	0.52
4:F:14:TYR:HA	4:F:17:VAL:HB	1.91	0.52
2:B:170:MET:HE2	2:B:170:MET:H	1.75	0.52
4:F:235:ASP:HB3	4:F:238:CYS:SG	2.49	0.52
2:D:11:GLN:HB2	9:D:502:GDP:O2B	2.09	0.52
3:E:54:ALA:O	3:E:58:ARG:HG3	2.10	0.52
2:B:12:CYS:HB2	9:B:503:GDP:C8	2.45	0.52
11:F:401:ACP:C5'	11:F:401:ACP:C8	2.85	0.52
1:A:335:ILE:HG23	1:A:339:ARG:HG3	1.92	0.52
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.44	0.51
1:A:71:GLU:HB2	1:A:98:ASP:HB3	1.91	0.51
2:D:285:THR:HG22	2:D:288:GLU:HB2	1.92	0.51
2:D:39:ASP:N	2:D:39:ASP:OD1	2.38	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:284:LEU:HD12	2:D:285:THR:H	1.75	0.51
1:C:7:ILE:HG21	1:C:153:LEU:HD21	1.93	0.51
2:D:28:HIS:NE2	2:D:241:ARG:HB3	2.26	0.51
1:C:93:ILE:HG22	1:C:114:ILE:HD11	1.93	0.50
2:B:21:TRP:CZ3	2:B:61:PRO:HB3	2.46	0.50
1:C:117:LEU:HD11	1:C:121:ARG:NH2	2.25	0.50
2:B:391:ARG:NH1	1:C:439:SER:OG	2.42	0.50
2:D:293:MET:HG3	2:D:367:PHE:HB2	1.92	0.50
1:A:264:ARG:CG	1:A:264:ARG:NH1	2.73	0.50
1:A:287:SER:OG	1:A:290:GLU:HG3	2.11	0.50
2:D:139:LEU:HA	2:D:145:SER:HB3	1.92	0.50
1:A:75:ILE:O	1:A:79:ARG:HG3	2.11	0.50
2:B:201:CYS:SG	2:B:265:PHE:HB3	2.52	0.50
2:D:117:LEU:HD11	2:D:154:LYS:HB3	1.92	0.50
2:B:141:GLY:HA3	9:B:503:GDP:O3A	2.12	0.50
4:F:74:LYS:NZ	11:F:401:ACP:H3B1	2.27	0.50
2:B:68:LEU:HD12	2:B:97:ALA:HB2	1.94	0.50
4:F:126:ASP:OD1	4:F:127:GLU:N	2.45	0.50
1:A:88:HIS:CD2	1:A:90:GLU:HB2	2.48	0.49
1:C:172:TYR:CE2	1:C:391:LEU:HD22	2.48	0.49
1:A:174:ALA:O	1:A:178:SER:HB3	2.12	0.49
2:D:404:ASP:OD1	2:D:405:GLU:N	2.46	0.49
2:D:207:LEU:HD11	2:D:229:VAL:CG2	2.43	0.49
1:A:2:ARG:HB3	1:A:133:GLN:HG3	1.94	0.49
1:C:147:SER:HB2	1:C:190:THR:HB	1.93	0.49
2:B:261:PRO:O	2:B:264:HIS:ND1	2.41	0.49
1:C:173:PRO:HB3	1:C:183:GLU:OE2	2.13	0.49
2:D:310:TYR:CE1	2:D:367:PHE:HZ	2.30	0.49
4:F:202:ARG:HB3	4:F:220:VAL:HG12	1.95	0.49
2:B:48:ASN:O	2:B:62:ARG:NH2	2.32	0.48
1:C:210:TYR:CE1	1:C:222:PRO:HD2	2.48	0.48
1:C:221:ARG:HD2	2:D:327:ASP:OD2	2.13	0.48
2:D:4:ILE:HD11	2:D:240:LEU:HD13	1.95	0.48
1:A:215:ARG:NH2	1:A:299:ALA:HB1	2.28	0.48
1:C:36:MET:HB3	1:C:61:HIS:CE1	2.48	0.48
2:D:285:THR:CG2	2:D:288:GLU:HB2	2.43	0.48
4:F:278:THR:HG22	4:F:280:GLU:H	1.77	0.48
2:D:417:ASP:O	2:D:421:GLU:HG3	2.14	0.48
4:F:103:THR:HG23	4:F:128:ARG:HH22	1.78	0.48
2:D:325:GLU:HA	2:D:328:GLU:HG2	1.95	0.48
4:F:2:TYR:CZ	4:F:359:PHE:HB3	2.47	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:199:PHE:CG	4:F:221:LEU:HD21	2.48	0.48
1:C:248:LEU:HD12	1:C:357:TYR:OH	2.14	0.48
1:C:292:THR:O	1:C:295:CYS:HB2	2.14	0.48
1:A:211:ASP:OD1	1:A:214:ARG:NH2	2.42	0.48
2:B:242:PHE:CD1	2:B:356:ILE:HD12	2.49	0.48
2:B:390:ARG:NH1	1:C:439:SER:OG	2.47	0.48
1:C:71:GLU:OE2	2:D:247:ASN:ND2	2.47	0.48
2:D:117:LEU:HB3	2:D:121:ARG:HH22	1.78	0.48
2:B:232:THR:HG21	2:B:268:PRO:HB2	1.95	0.48
1:A:223:THR:O	1:A:227:LEU:HG	2.13	0.48
4:F:138:ARG:CG	4:F:145:ASN:HD21	2.26	0.48
4:F:214:TYR:HB3	4:F:375:PHE:HB3	1.95	0.48
2:B:5:VAL:HB	2:B:133:PHE:CD1	2.49	0.47
2:D:151:LEU:HD23	2:D:151:LEU:HA	1.66	0.47
2:D:383:GLU:O	2:D:386:THR:HG22	2.14	0.47
2:D:12:CYS:O	2:D:16:ILE:HD12	2.14	0.47
2:D:246:LEU:HD13	8:D:501:H0U:N01	2.29	0.47
2:D:270:PHE:O	2:D:298:ASN:HB3	2.14	0.47
1:A:271:THR:HG21	1:A:295:CYS:O	2.14	0.47
1:A:357:TYR:OH	3:E:16:GLN:HG3	2.15	0.47
2:B:290:THR:HG22	2:B:333:VAL:HG21	1.97	0.47
4:F:226:GLU:HA	4:F:227:PRO:HD3	1.79	0.47
2:D:64:ILE:HD11	2:D:123:GLU:HG3	1.97	0.47
2:D:378:PHE:HD1	2:D:415:MET:HE3	1.79	0.47
4:F:238:CYS:HB2	4:F:239:HIS:ND1	2.29	0.47
4:F:86:GLU:OE1	4:F:86:GLU:N	2.41	0.47
2:B:2:ARG:NH1	2:B:48:ASN:HB2	2.21	0.47
2:B:178:THR:O	2:B:181:GLU:HG3	2.14	0.47
4:F:199:PHE:CD1	4:F:221:LEU:HD21	2.49	0.47
2:B:101:TRP:HD1	2:B:145:SER:OG	1.97	0.47
2:B:214:THR:HG22	2:B:215:LEU:HD23	1.97	0.47
2:D:95:SER:HB2	2:D:108:GLU:OE2	2.15	0.47
4:F:91:CYS:SG	4:F:93:TRP:CE2	3.08	0.46
1:A:176:GLN:NE2	4:F:56:PRO:HB3	2.30	0.46
1:A:81:GLY:O	1:A:84:ARG:HG3	2.16	0.46
2:D:5:VAL:CG2	2:D:133:PHE:HD1	2.27	0.46
4:F:185:TYR:OH	4:F:239:HIS:HB3	2.16	0.46
4:F:200:ASP:OD1	4:F:222:ARG:NH1	2.33	0.46
2:B:107:THR:OG1	2:B:108:GLU:N	2.48	0.46
2:D:415:MET:O	2:D:419:VAL:HG23	2.16	0.46
1:A:105:ARG:HH11	1:A:110:ILE:HD11	1.81	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:143:GLY:N	5:C:501:GTP:H5'	2.31	0.46
4:F:325:LEU:HA	4:F:325:LEU:HD23	1.74	0.46
1:A:125:LEU:HD23	1:A:125:LEU:HA	1.65	0.45
1:C:11:GLN:HB3	5:C:501:GTP:O2A	2.15	0.45
1:C:34:GLY:HA3	1:C:60:LYS:HG3	1.98	0.45
1:A:18:ASN:HD21	1:A:78:VAL:HG22	1.80	0.45
1:A:161:TYR:HB3	1:A:164:LYS:HG2	1.98	0.45
2:D:101:TRP:CE3	2:D:187:LEU:HD13	2.51	0.45
1:A:166:LYS:HE2	1:A:197:HIS:O	2.16	0.45
2:B:66:VAL:HG12	2:B:147:MET:HE1	1.97	0.45
2:D:375:GLN:HG3	2:D:419:VAL:CG1	2.46	0.45
2:D:64:ILE:HD12	2:D:119:VAL:CG1	2.46	0.45
2:D:378:PHE:HD1	2:D:415:MET:CE	2.29	0.45
2:D:139:LEU:HD12	2:D:170:MET:SD	2.57	0.45
2:B:197:ASP:OD1	10:B:504:MES:H71	2.17	0.45
2:D:20:PHE:CD1	2:D:233:MET:HE2	2.52	0.45
1:C:180:ALA:HB3	1:C:183:GLU:HG3	1.98	0.45
2:D:11:GLN:HB3	9:D:502:GDP:O1A	2.17	0.45
2:D:405:GLU:O	2:D:409:THR:HG23	2.16	0.45
4:F:250:SER:OG	4:F:253:TYR:HB2	2.17	0.45
1:A:88:HIS:HB3	1:A:91:GLN:HG3	1.99	0.45
2:B:210:ILE:HG23	2:B:273:LEU:HD13	1.99	0.45
1:C:343:PHE:CD1	1:C:349:THR:HG22	2.52	0.45
2:D:267:MET:HG3	2:D:301:ALA:HB3	1.98	0.45
2:B:61:PRO:HG2	2:B:84:ILE:HG23	2.00	0.44
1:C:398:MET:HE2	1:C:404:PHE:CD2	2.52	0.44
4:F:203:SER:HB3	4:F:215:LEU:HD11	1.99	0.44
2:D:70:PRO:HG3	2:D:93:GLY:O	2.17	0.44
2:B:67:ASP:O	2:B:92:PHE:HA	2.18	0.44
4:F:32:LYS:HB2	4:F:32:LYS:HE3	1.75	0.44
1:C:182:VAL:HB	1:C:408:TYR:OH	2.18	0.44
2:D:52:ASN:HD21	2:D:62:ARG:HG3	1.82	0.44
4:F:101:TYR:HD1	4:F:179:VAL:HG22	1.82	0.44
1:C:119:LEU:HD11	1:C:156:ARG:HB3	2.00	0.44
2:B:285:THR:HG22	2:B:288:GLU:CG	2.47	0.44
2:D:395:LEU:HD23	2:D:395:LEU:HA	1.81	0.44
4:F:242:ASN:O	4:F:246:GLN:HG2	2.18	0.44
1:A:344:VAL:HG23	1:A:347:CYS:HB2	2.00	0.44
2:B:301:ALA:O	2:B:303:CYS:N	2.43	0.44
2:D:251:ARG:O	2:D:255:VAL:HG23	2.18	0.44
4:F:312:PHE:CG	4:F:354:ALA:HB1	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:140:SER:HA	1:C:171:ILE:HB	2.00	0.43
1:C:162:GLY:HA2	3:E:92:ILE:HD11	2.01	0.43
4:F:71:LEU:HD11	4:F:294:CYS:HB3	2.01	0.43
1:A:233:GLN:HG3	1:A:368:LEU:HD22	2.00	0.43
1:A:298:PRO:HA	1:A:301:GLN:CD	2.39	0.43
2:B:293:MET:HE2	2:B:367:PHE:HB2	2.01	0.43
2:D:102:ALA:HB2	2:D:403:MET:SD	2.58	0.43
1:C:207:GLU:HG2	1:C:304:LYS:HD2	2.01	0.43
1:C:318:LEU:HD12	1:C:318:LEU:N	2.33	0.43
2:D:24:ILE:HD13	2:D:24:ILE:HA	1.82	0.43
2:B:152:ILE:HG23	2:B:164:MET:HG2	2.00	0.43
1:C:314:ALA:HB3	1:C:380:ASN:HB3	1.99	0.43
1:C:398:MET:HE2	1:C:404:PHE:HD2	1.84	0.43
2:D:404:ASP:OD2	2:D:406:MET:HB2	2.18	0.43
4:F:85:PRO:HD2	4:F:86:GLU:OE1	2.19	0.43
2:D:2:ARG:HB3	2:D:131:GLN:CG	2.45	0.43
2:D:348:ASN:OD1	2:D:348:ASN:N	2.50	0.43
2:D:11:GLN:CB	9:D:502:GDP:O1A	2.67	0.43
2:D:167:PHE:CE1	2:D:233:MET:HG2	2.54	0.43
3:E:133:LYS:HA	3:E:133:LYS:HD3	1.81	0.43
1:A:258:ASN:O	1:A:314:ALA:HB1	2.19	0.43
2:B:67:ASP:HA	2:B:143:THR:HG21	2.00	0.43
1:C:200:CYS:HA	1:C:266:HIS:HB2	1.99	0.43
1:C:209:ILE:HG23	1:C:230:LEU:HD23	2.01	0.43
2:D:101:TRP:HD1	2:D:145:SER:HB2	1.83	0.43
2:D:322:SER:OG	2:D:325:GLU:HB2	2.19	0.43
3:E:56:GLU:O	3:E:60:LYS:HG3	2.19	0.43
1:A:413:MET:CE	1:A:417:GLU:HB3	2.49	0.42
4:F:219:GLY:HA3	4:F:264:PHE:CZ	2.54	0.42
1:A:103:TYR:CD2	1:A:189:LEU:HD13	2.54	0.42
4:F:2:TYR:CE2	4:F:359:PHE:HB3	2.54	0.42
1:A:134:GLY:HA3	1:A:165:SER:O	2.18	0.42
1:A:291:ILE:HD13	1:A:291:ILE:HG21	1.83	0.42
2:D:268:PRO:HG2	2:D:300:MET:HB2	2.00	0.42
1:A:139:HIS:CD2	1:A:150:THR:HG21	2.55	0.42
1:A:250:VAL:HG12	1:A:254:GLU:OE1	2.19	0.42
2:B:198:GLU:OE2	2:B:254:ALA:HB2	2.19	0.42
2:D:45:GLU:OE2	2:D:243:PRO:HG3	2.18	0.42
2:D:66:VAL:HG11	2:D:116:VAL:HG21	2.01	0.42
1:A:392:ASP:O	1:A:395:PHE:HB3	2.20	0.42
1:C:16:ILE:O	1:C:20:CYS:SG	2.73	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:23:LEU:HD12	1:A:23:LEU:HA	1.79	0.42
1:C:27:GLU:OE2	1:C:243:ARG:NH2	2.43	0.42
4:F:17:VAL:O	4:F:21:LEU:HG	2.19	0.42
1:A:139:HIS:CG	1:A:150:THR:HG21	2.55	0.42
2:B:140:GLY:O	2:B:184:ASN:ND2	2.43	0.42
2:B:139:LEU:HD22	2:B:188:SER:HB3	2.00	0.42
2:D:100:ASN:ND2	2:D:397:TRP:O	2.42	0.42
1:A:21:TRP:CH2	1:A:63:PRO:HB3	2.55	0.42
1:A:69:ASP:O	1:A:94:THR:HA	2.20	0.42
1:A:266:HIS:O	1:A:268:PRO:HD3	2.19	0.42
1:C:323:VAL:HG12	1:C:355:ILE:HD13	2.02	0.42
2:D:317:PHE:HB3	2:D:321:MET:SD	2.60	0.42
2:B:306:ARG:NE	10:B:505:MES:H51	2.33	0.41
1:C:23:LEU:HD12	1:C:23:LEU:HA	1.87	0.41
1:C:104:ALA:HB2	1:C:413:MET:SD	2.60	0.41
2:D:7:ILE:O	2:D:135:LEU:HD12	2.20	0.41
1:A:415:GLU:O	1:A:418:PHE:HB2	2.21	0.41
1:C:265:ILE:HG21	1:C:313:MET:HE3	2.01	0.41
1:A:120:ASP:O	1:A:124:LYS:HG2	2.20	0.41
1:A:336:LYS:NZ	3:E:23:LYS:HE2	2.34	0.41
2:B:170:MET:HE1	2:B:201:CYS:CA	2.48	0.41
2:D:216:LYS:O	2:D:217:LEU:HD23	2.19	0.41
2:D:246:LEU:CD1	2:D:352:ALA:HB2	2.49	0.41
1:A:298:PRO:HA	1:A:301:GLN:NE2	2.35	0.41
2:B:35:SER:OG	2:B:58:LYS:NZ	2.48	0.41
2:B:190:HIS:O	2:B:193:VAL:HG12	2.20	0.41
2:B:273:LEU:HA	2:B:273:LEU:HD23	1.51	0.41
1:C:31:GLN:HB2	1:C:33:ASP:OD1	2.20	0.41
4:F:198:LYS:HD3	4:F:239:HIS:HA	2.02	0.41
2:B:16:ILE:HD11	2:B:136:THR:HB	2.03	0.41
1:C:347:CYS:HA	1:C:348:PRO:HD3	1.97	0.41
1:A:270:ALA:HB3	1:A:302:MET:HG3	2.01	0.41
1:A:313:MET:HE3	1:A:313:MET:HB2	1.96	0.41
2:D:138:SER:O	2:D:139:LEU:HD23	2.21	0.41
2:D:262:ARG:NE	2:D:421:GLU:OE1	2.53	0.41
2:D:293:MET:SD	2:D:365:ALA:HB1	2.60	0.41
4:F:5:VAL:HG12	4:F:30:LEU:HB2	2.02	0.41
1:C:171:ILE:HD13	1:C:204:VAL:HB	2.03	0.41
1:C:270:ALA:O	1:C:302:MET:HG2	2.20	0.41
4:F:255:ARG:HD2	4:F:255:ARG:HA	1.57	0.41
1:A:5:ILE:HG13	1:A:132:LEU:HD11	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:246:LEU:HD12	2:D:352:ALA:HB2	2.02	0.41
4:F:188:LYS:O	4:F:323:GLU:HG2	2.21	0.41
1:A:76:ASP:OD1	1:A:79:ARG:NH1	2.52	0.41
1:A:391:LEU:HA	1:A:391:LEU:HD12	1.72	0.41
2:B:197:ASP:OD1	10:B:504:MES:H22	2.20	0.41
2:D:316:ILE:CG2	2:D:366:THR:HB	2.51	0.41
2:B:101:TRP:CD1	2:B:145:SER:OG	2.74	0.40
1:C:155:GLU:OE1	3:E:99:LEU:HD13	2.21	0.40
4:F:220:VAL:HG23	4:F:263:PHE:CE1	2.56	0.40
4:F:241:THR:HA	4:F:246:GLN:HE21	1.85	0.40
1:A:249:ASN:OD1	1:A:258:ASN:ND2	2.50	0.40
1:A:249:ASN:N	1:A:254:GLU:OE2	2.54	0.40
2:B:39:ASP:OD1	2:B:39:ASP:N	2.51	0.40
1:C:132:LEU:HG	1:C:164:LYS:HD3	2.04	0.40
2:D:316:ILE:HG23	2:D:366:THR:HB	2.03	0.40
4:F:319:PHE:HA	4:F:328:TRP:O	2.22	0.40
1:A:357:TYR:CE2	3:E:15:GLY:HA2	2.56	0.40
2:B:267:MET:HG2	2:B:301:ALA:HB3	2.03	0.40
1:C:117:LEU:HD11	1:C:121:ARG:HH21	1.86	0.40
1:C:188:ILE:HG13	1:C:425:MET:HG3	2.02	0.40
1:C:428:LEU:HD12	1:C:428:LEU:HA	1.90	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	438/451 (97%)	407 (93%)	31 (7%)	0	100	100
1	C	442/451 (98%)	429 (97%)	13 (3%)	0	100	100
2	B	427/445 (96%)	405 (95%)	22 (5%)	0	100	100
2	D	416/445 (94%)	382 (92%)	34 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	E	121/143 (85%)	117 (97%)	4 (3%)	0	100	100
4	F	329/384 (86%)	312 (95%)	16 (5%)	1 (0%)	41	73
All	All	2173/2319 (94%)	2052 (94%)	120 (6%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	F	336	PRO

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	371/379 (98%)	369 (100%)	2 (0%)	88	94
1	C	374/379 (99%)	371 (99%)	3 (1%)	81	92
2	B	371/383 (97%)	367 (99%)	4 (1%)	73	89
2	D	359/383 (94%)	355 (99%)	4 (1%)	73	89
3	E	112/127 (88%)	110 (98%)	2 (2%)	59	82
4	F	301/342 (88%)	292 (97%)	9 (3%)	41	71
All	All	1888/1993 (95%)	1864 (99%)	24 (1%)	69	87

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	262	TYR
1	A	264	ARG
2	B	137	HIS
2	B	162	ARG
2	B	281	TYR
2	B	299	MET
1	C	251	ASP
1	C	283	HIS
1	C	315	CYS

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Mol	Chain	Res	Type
2	D	137	HIS
2	D	145	SER
2	D	209	ASP
2	D	332	ASN
3	E	96	LYS
3	E	122	GLN
4	F	31	ARG
4	F	97	SER
4	F	145	ASN
4	F	184	LYS
4	F	239	HIS
4	F	242	ASN
4	F	252	ASN
4	F	253	TYR
4	F	343	TYR

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

Mol	Chain	Res	Type
1	A	15	GLN
1	C	176	GLN
2	D	347	ASN
4	F	145	ASN
4	F	183	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 15 ligands modelled in this entry, 6 are monoatomic - leaving 9 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
10	MES	B	505	-	12,12,12	4.31	7 (58%)	14,16,16	2.07	6 (42%)
11	ACP	F	401	6	27,33,33	1.57	7 (25%)	32,52,52	1.76	6 (18%)
5	GTP	C	501	6	26,34,34	1.34	2 (7%)	32,54,54	1.55	7 (21%)
8	HOU	B	501	-	23,27,27	6.86	6 (26%)	30,39,39	2.61	9 (30%)
9	GDP	B	503	6	24,30,30	1.12	1 (4%)	30,47,47	1.38	5 (16%)
10	MES	B	504	-	12,12,12	4.55	7 (58%)	14,16,16	2.00	4 (28%)
5	GTP	A	501	6	26,34,34	1.19	3 (11%)	32,54,54	1.75	7 (21%)
9	GDP	D	502	-	24,30,30	1.98	7 (29%)	30,47,47	2.10	11 (36%)
8	HOU	D	501	-	23,27,27	7.21	6 (26%)	30,39,39	2.08	7 (23%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	MES	B	505	-	-	4/6/14/14	0/1/1/1
11	ACP	F	401	6	-	10/15/38/38	0/3/3/3
5	GTP	C	501	6	-	1/18/38/38	0/3/3/3
8	HOU	B	501	-	-	0/15/17/17	0/3/3/3
9	GDP	B	503	6	-	6/12/32/32	0/3/3/3
10	MES	B	504	-	-	5/6/14/14	0/1/1/1
5	GTP	A	501	6	-	6/18/38/38	0/3/3/3
9	GDP	D	502	-	-	2/12/32/32	0/3/3/3
8	HOU	D	501	-	-	0/15/17/17	0/3/3/3

All (46) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	D	501	H0U	O02-S02	21.70	1.68	1.43
8	B	501	H0U	O02-S02	21.57	1.68	1.43
8	D	501	H0U	O01-S02	21.32	1.67	1.43
8	B	501	H0U	O01-S02	18.87	1.65	1.43
8	B	501	H0U	C19-N02	13.50	1.46	1.14
8	D	501	H0U	C19-N02	13.46	1.45	1.14
10	B	504	MES	C7-N4	-8.28	1.28	1.47
10	B	505	MES	C7-N4	-7.73	1.29	1.47
10	B	504	MES	O1S-S	7.55	1.67	1.45
10	B	504	MES	O2S-S	7.45	1.67	1.45
10	B	505	MES	O1S-S	7.01	1.65	1.45
10	B	505	MES	O2S-S	6.68	1.64	1.45
8	D	501	H0U	C01-C19	6.15	1.56	1.45
8	B	501	H0U	S02-N01	5.72	1.73	1.63
10	B	504	MES	O3S-S	5.63	1.67	1.47
8	B	501	H0U	C01-C19	5.34	1.54	1.45
8	D	501	H0U	S02-N01	5.22	1.72	1.63
10	B	505	MES	O3S-S	5.04	1.65	1.47
10	B	505	MES	C8-S	5.00	1.84	1.77
9	D	502	GDP	C6-N1	-4.56	1.31	1.37
5	C	501	GTP	C5-C6	-4.56	1.38	1.47
10	B	504	MES	C8-S	4.22	1.83	1.77
9	D	502	GDP	C2'-C1'	-3.85	1.47	1.53
5	A	501	GTP	C5-C6	-3.64	1.40	1.47
11	F	401	ACP	C4-N3	-3.13	1.31	1.35
9	D	502	GDP	O4'-C4'	-3.10	1.38	1.45
11	F	401	ACP	C2'-C1'	-2.83	1.49	1.53
10	B	505	MES	C5-N4	-2.77	1.39	1.46
10	B	505	MES	C3-N4	-2.76	1.39	1.46
10	B	504	MES	C3-N4	-2.70	1.39	1.46
9	D	502	GDP	C3'-C4'	-2.66	1.46	1.53
11	F	401	ACP	PB-O1B	-2.64	1.45	1.51
9	D	502	GDP	C2-N1	-2.61	1.31	1.37
10	B	504	MES	C5-N4	-2.54	1.39	1.46
11	F	401	ACP	PG-O2G	2.45	1.60	1.54
9	D	502	GDP	PB-O2B	-2.36	1.45	1.54
9	B	503	GDP	C2'-C1'	-2.35	1.50	1.53
11	F	401	ACP	O4'-C4'	-2.30	1.39	1.45
5	A	501	GTP	C2-N3	2.28	1.38	1.33
11	F	401	ACP	C5-N7	-2.26	1.31	1.39
8	D	501	H0U	C12-S02	2.17	1.79	1.76
5	A	501	GTP	PG-O1G	2.15	1.57	1.50
8	B	501	H0U	C07-N01	2.14	1.46	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	501	GTP	C2-N3	2.14	1.38	1.33
11	F	401	ACP	PG-O1G	-2.02	1.46	1.50
9	D	502	GDP	O5'-C5'	-2.02	1.37	1.44

All (62) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	B	501	H0U	O02-S02-O01	-8.29	109.36	119.55
8	D	501	H0U	O02-S02-O01	-7.19	110.71	119.55
8	B	501	H0U	O01-S02-C12	-6.73	99.68	107.97
8	B	501	H0U	C12-S02-N01	5.64	113.93	106.83
9	D	502	GDP	O4'-C1'-C2'	-5.27	99.23	106.93
8	D	501	H0U	O02-S02-C12	-4.64	102.25	107.97
11	F	401	ACP	PB-O3A-PA	-4.41	118.58	132.56
10	B	504	MES	O2S-S-C8	4.26	112.05	106.92
5	C	501	GTP	PB-O3B-PG	-4.24	118.29	132.83
10	B	505	MES	O2S-S-C8	4.21	111.98	106.92
5	A	501	GTP	PB-O3B-PG	-3.96	119.23	132.83
9	D	502	GDP	O3'-C3'-C4'	-3.76	100.17	111.05
5	A	501	GTP	C2-N1-C6	-3.65	118.38	125.10
11	F	401	ACP	C3'-C2'-C1'	3.60	106.41	100.98
11	F	401	ACP	C4-C5-N7	-3.58	105.67	109.40
10	B	504	MES	C5-N4-C3	3.55	116.82	108.83
10	B	504	MES	C6-C5-N4	3.40	115.26	110.10
5	A	501	GTP	C5-C6-N1	3.37	119.90	113.95
8	B	501	H0U	C08-C07-N01	3.31	123.80	120.38
9	D	502	GDP	O2A-PA-O5'	3.30	123.05	107.75
5	C	501	GTP	C8-N7-C5	3.28	109.25	102.99
5	A	501	GTP	PA-O3A-PB	-3.28	121.56	132.83
9	D	502	GDP	O2B-PB-O3A	-3.17	94.00	104.64
5	C	501	GTP	PA-O3A-PB	-3.13	122.08	132.83
10	B	505	MES	O3S-S-C8	3.12	110.82	105.77
8	D	501	H0U	O01-S02-C12	3.12	111.81	107.97
9	D	502	GDP	O3B-PB-O2B	3.03	119.21	107.64
10	B	504	MES	C2-C3-N4	2.89	114.49	110.10
9	D	502	GDP	C2-N1-C6	-2.89	119.78	125.10
5	A	501	GTP	C3'-C2'-C1'	2.81	105.21	100.98
8	B	501	H0U	C13-C12-S02	-2.81	116.71	119.77
11	F	401	ACP	O2A-PA-O1A	2.77	125.94	112.24
9	B	503	GDP	PA-O3A-PB	-2.76	123.34	132.83
11	F	401	ACP	N3-C2-N1	-2.76	124.37	128.68
9	D	502	GDP	C5-C6-N1	2.71	118.74	113.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	D	502	GDP	C8-N7-C5	2.70	108.13	102.99
9	D	502	GDP	O5'-C5'-C4'	-2.67	99.79	108.99
5	A	501	GTP	C8-N7-C5	2.61	107.97	102.99
9	D	502	GDP	O4'-C4'-C5'	-2.58	100.88	109.37
5	C	501	GTP	C2-N1-C6	-2.57	120.36	125.10
8	D	501	H0U	C08-C07-N01	2.54	123.00	120.38
8	D	501	H0U	O01-S02-N01	2.44	112.83	106.73
9	D	502	GDP	O6-C6-N1	-2.34	117.89	120.65
5	C	501	GTP	C5-C6-N1	2.32	118.06	113.95
5	C	501	GTP	O6-C6-C5	-2.28	119.92	124.37
8	B	501	H0U	O02-S02-N01	2.26	112.39	106.73
10	B	505	MES	C6-C5-N4	2.26	113.53	110.10
8	B	501	H0U	C07-N01-S02	-2.25	116.10	123.41
10	B	505	MES	C2-C3-N4	2.24	113.50	110.10
5	C	501	GTP	O3'-C3'-C4'	-2.18	104.74	111.05
8	B	501	H0U	O01-S02-N01	2.18	112.18	106.73
8	D	501	H0U	C02-C01-C19	2.17	130.54	126.94
5	A	501	GTP	O3G-PG-O1G	2.16	119.16	110.68
8	D	501	H0U	C12-S02-N01	2.14	109.53	106.83
9	B	503	GDP	O5'-PA-O1A	2.14	117.43	109.07
9	B	503	GDP	C8-N7-C5	2.13	107.06	102.99
8	B	501	H0U	C09-C10-C05	-2.13	118.06	121.13
10	B	505	MES	O1S-S-C8	2.12	109.47	106.92
9	B	503	GDP	O6-C6-C5	-2.09	120.28	124.37
11	F	401	ACP	O3G-PG-C3B	2.05	111.38	106.40
9	B	503	GDP	O3B-PB-O3A	2.05	111.52	104.64
10	B	505	MES	C5-N4-C3	2.03	113.40	108.83

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-O2A
9	B	503	GDP	PA-O3A-PB-O3B
9	B	503	GDP	C5'-O5'-PA-O1A
9	D	502	GDP	C5'-O5'-PA-O2A
10	B	504	MES	C7-C8-S-O2S
10	B	505	MES	N4-C7-C8-S
10	B	505	MES	C7-C8-S-O2S
11	F	401	ACP	PB-C3B-PG-O1G
11	F	401	ACP	PB-C3B-PG-O2G

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Mol	Chain	Res	Type	Atoms
11	F	401	ACP	PB-C3B-PG-O3G
11	F	401	ACP	PG-C3B-PB-O1B
11	F	401	ACP	PG-C3B-PB-O3A
11	F	401	ACP	O4'-C4'-C5'-O5'
11	F	401	ACP	C3'-C4'-C5'-O5'
5	A	501	GTP	C3'-C4'-C5'-O5'
5	A	501	GTP	C5'-O5'-PA-O3A
5	A	501	GTP	O4'-C4'-C5'-O5'
5	A	501	GTP	C5'-O5'-PA-O1A
9	B	503	GDP	C5'-O5'-PA-O2A
11	F	401	ACP	C5'-O5'-PA-O1A
10	B	504	MES	C7-C8-S-O1S
10	B	505	MES	C7-C8-S-O1S
11	F	401	ACP	PG-C3B-PB-O2B
10	B	505	MES	C7-C8-S-O3S
10	B	504	MES	N4-C7-C8-S
10	B	504	MES	C8-C7-N4-C5
5	C	501	GTP	C4'-C5'-O5'-PA
10	B	504	MES	C7-C8-S-O3S
9	B	503	GDP	C3'-C4'-C5'-O5'
9	B	503	GDP	PA-O3A-PB-O2B
9	B	503	GDP	C5'-O5'-PA-O3A
9	D	502	GDP	C5'-O5'-PA-O3A
11	F	401	ACP	C5'-O5'-PA-O3A

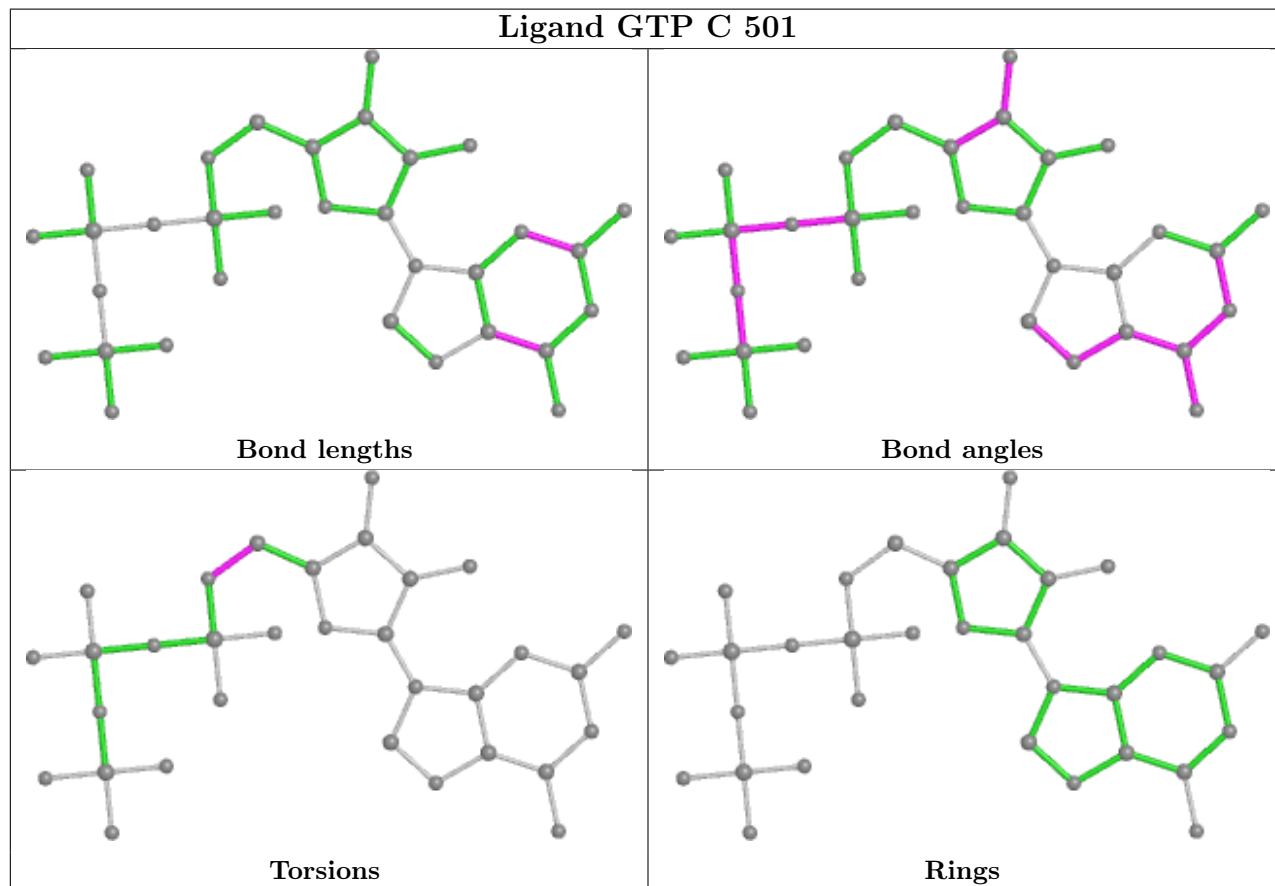
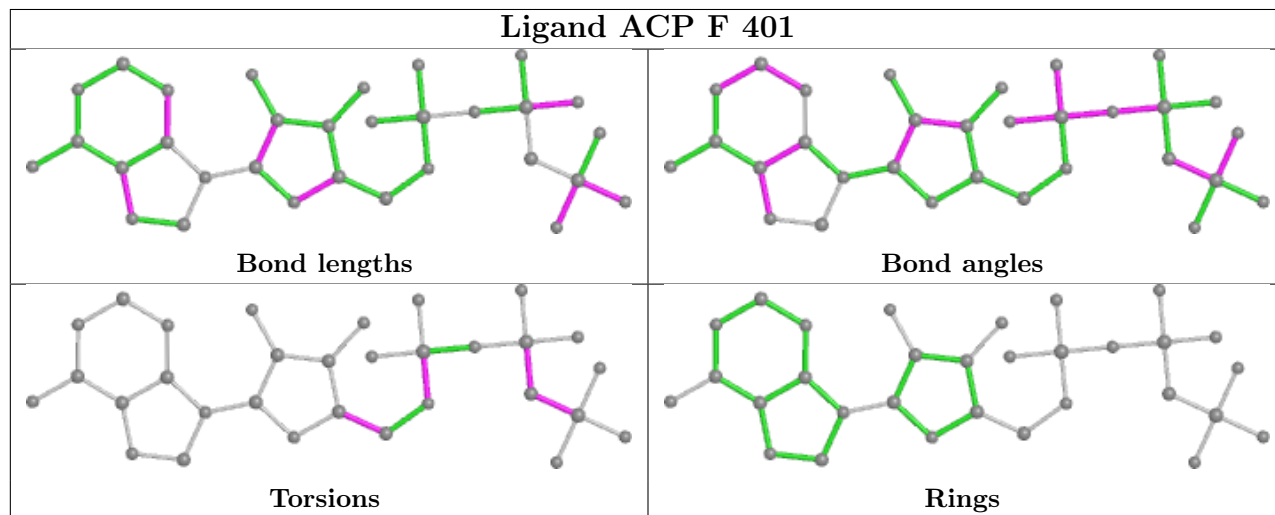
There are no ring outliers.

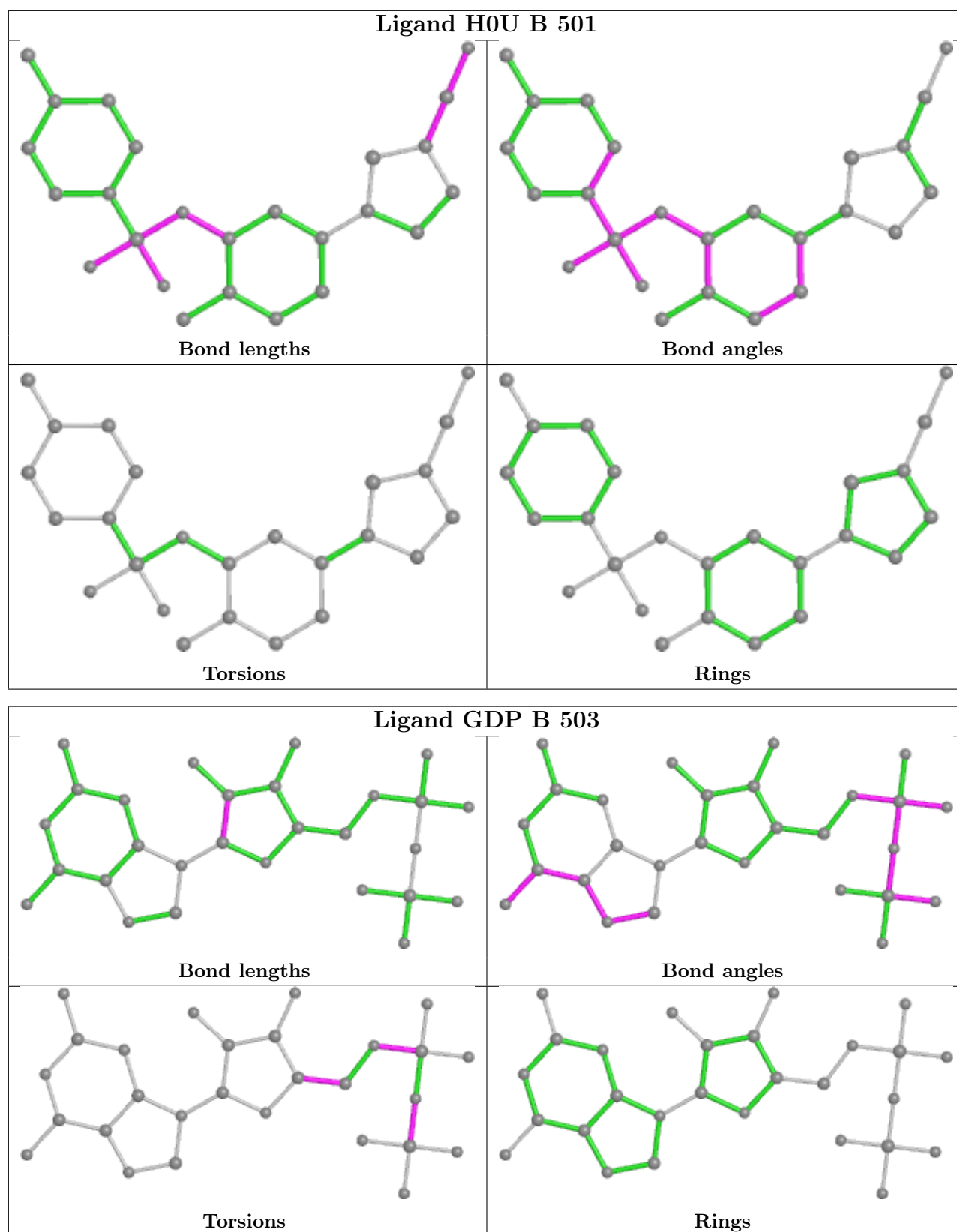
7 monomers are involved in 29 short contacts:

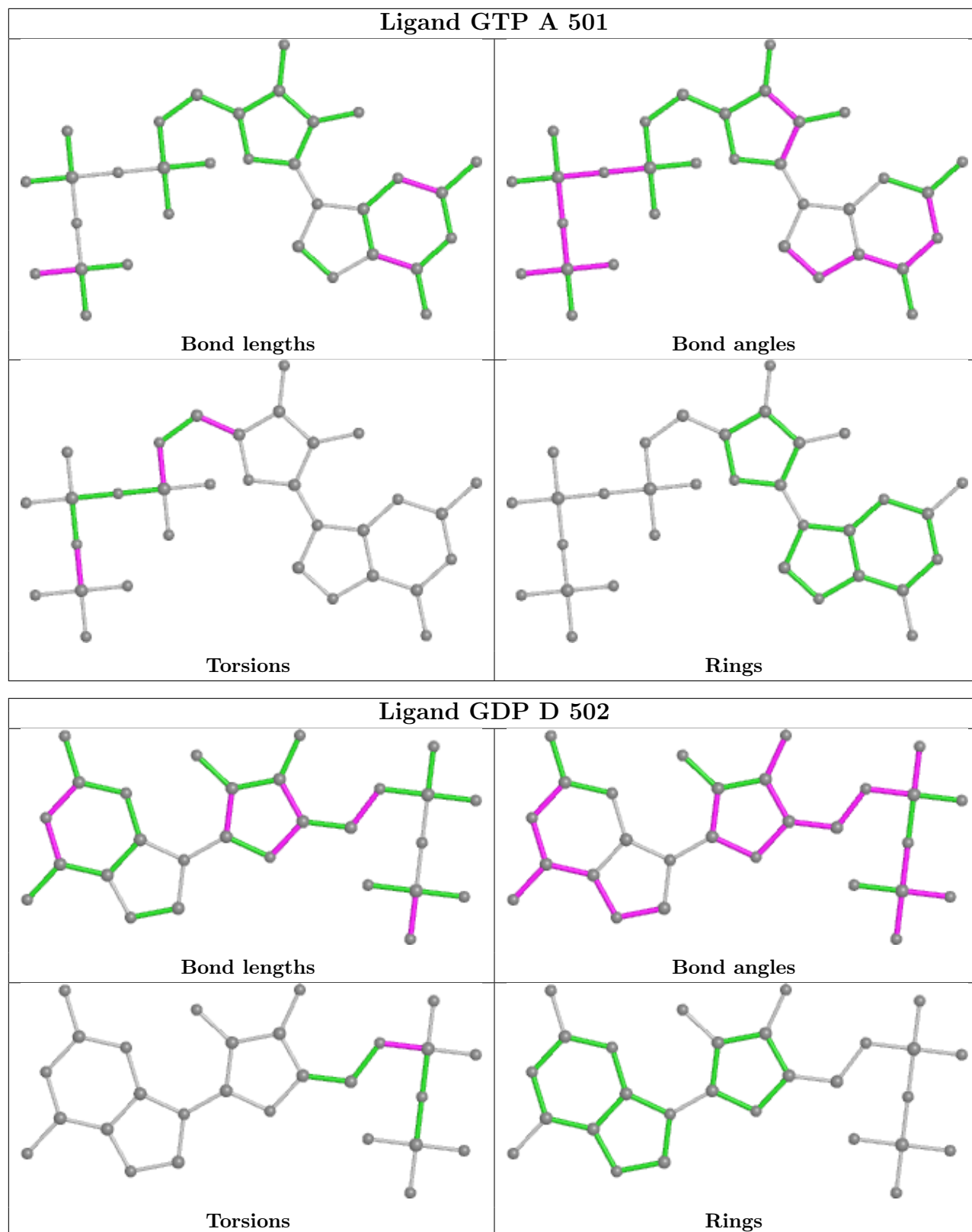
Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	B	505	MES	2	0
11	F	401	ACP	6	0
5	C	501	GTP	2	0
9	B	503	GDP	2	0
10	B	504	MES	2	0
9	D	502	GDP	14	0
8	D	501	HOU	1	0

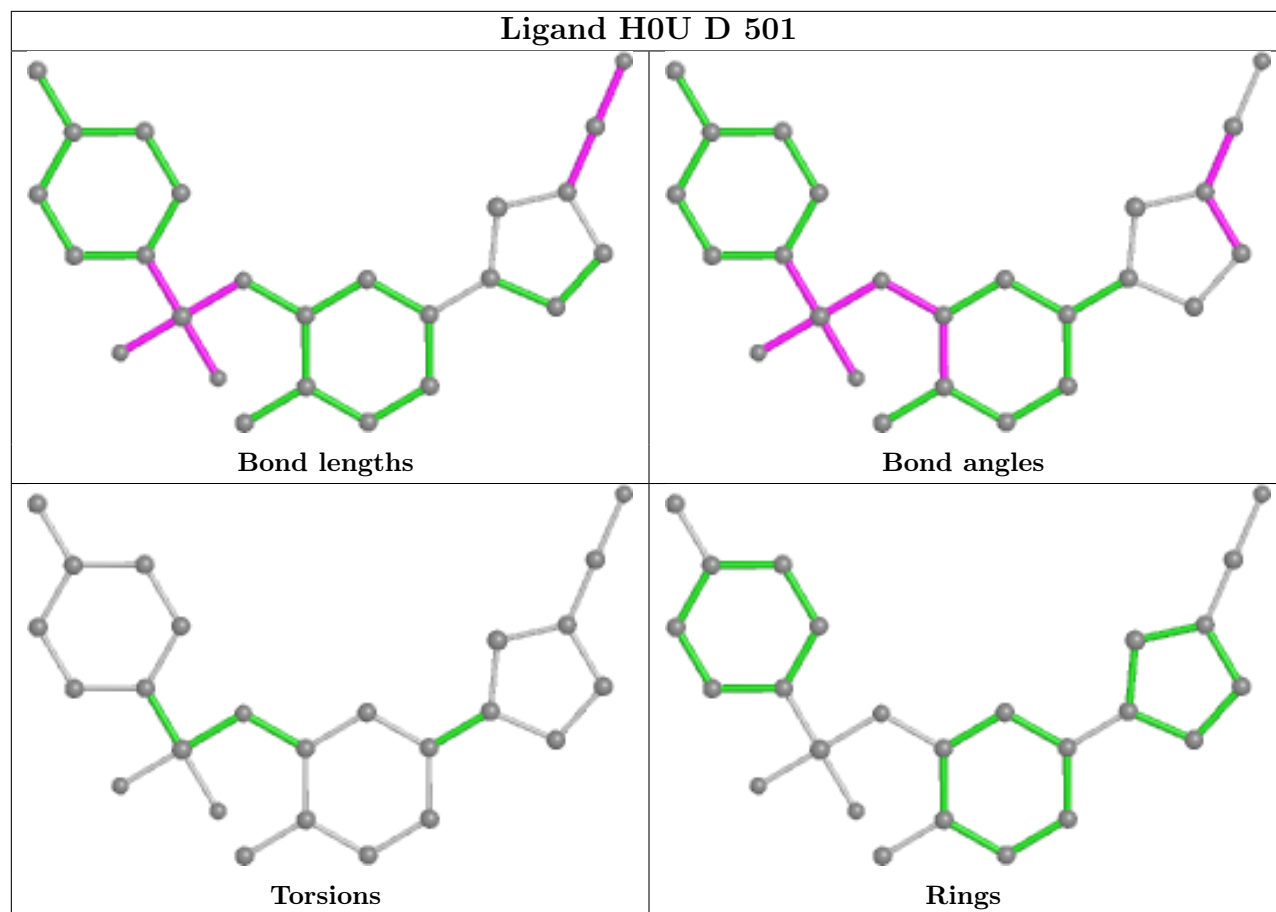
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

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









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

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, 95th 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	438/451 (97%)	-0.37	0 100 100	38, 53, 76, 90	0
1	C	441/451 (97%)	-0.49	2 (0%) 91 81	32, 45, 65, 100	1 (0%)
2	B	429/445 (96%)	-0.29	9 (2%) 63 43	33, 53, 86, 120	1 (0%)
2	D	420/445 (94%)	-0.09	7 (1%) 70 49	30, 74, 110, 129	3 (0%)
3	E	123/143 (86%)	-0.14	4 (3%) 46 24	39, 66, 112, 131	0
4	F	339/384 (88%)	0.17	26 (7%) 13 5	42, 76, 130, 146	0
All	All	2190/2319 (94%)	-0.23	48 (2%) 62 41	30, 58, 109, 146	5 (0%)

All (48) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	277	GLY	5.2
4	F	172	PHE	4.6
3	E	141	ALA	4.6
4	F	162	ILE	4.4
2	B	279	GLN	3.4
4	F	169	LEU	3.3
4	F	171	ASP	3.2
4	F	100	ILE	3.1
2	B	275	SER	3.1
3	E	46	GLU	3.1
4	F	168	GLU	3.0
4	F	131	PHE	2.9
4	F	225	SER	2.9
4	F	224	SER	2.8
4	F	255	ARG	2.8
2	D	95	SER	2.8
2	B	278	SER	2.8
2	B	429	THR	2.7
4	F	252	ASN	2.7

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Mol	Chain	Res	Type	RSRZ
2	D	83	GLN	2.6
2	B	59	TYR	2.6
2	D	405	GLU	2.5
3	E	138	LYS	2.5
4	F	236	LYS	2.4
1	C	441	GLU	2.4
2	D	322	SER	2.4
4	F	149	ALA	2.3
4	F	180	HIS	2.3
4	F	173	ILE	2.3
2	B	55	THR	2.3
4	F	254	GLY	2.3
2	B	427	ASP	2.2
2	D	37	HIS	2.2
4	F	247	LYS	2.2
4	F	232	ASN	2.2
4	F	237	THR	2.2
3	E	137	LEU	2.1
2	B	428	ALA	2.1
4	F	250	SER	2.1
1	C	440	VAL	2.1
4	F	161	LEU	2.1
2	D	390	ARG	2.0
4	F	142	ARG	2.0
4	F	160	ILE	2.0
4	F	248	GLU	2.0
2	D	55	THR	2.0
4	F	253	TYR	2.0
4	F	136	ASN	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

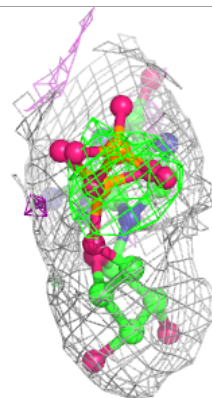
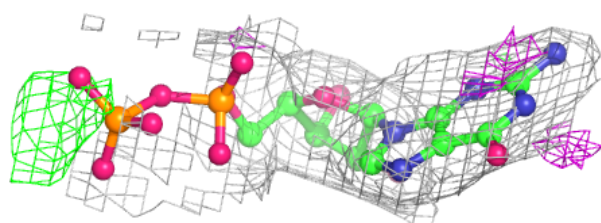
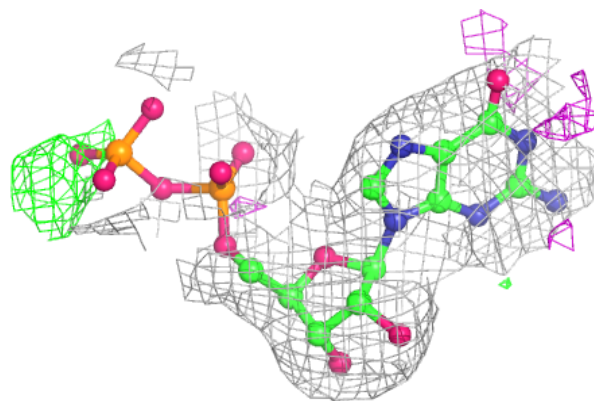
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	B	502	1/1	0.87	0.63	54,54,54,54	0
6	MG	C	502	1/1	0.87	0.50	47,47,47,47	0
6	MG	F	402	1/1	0.87	0.23	97,97,97,97	0
6	MG	A	502	1/1	0.89	0.45	50,50,50,50	0
9	GDP	D	502	28/28	0.91	0.16	65,75,85,89	0
10	MES	B	504	12/12	0.91	0.18	52,67,80,86	0
11	ACP	F	401	31/31	0.91	0.16	85,91,116,123	0
10	MES	B	505	12/12	0.93	0.23	67,83,92,95	0
7	CA	A	503	1/1	0.93	0.34	73,73,73,73	0
7	CA	C	503	1/1	0.95	0.34	59,59,59,59	0
8	H0U	B	501	25/25	0.95	0.23	50,56,67,69	0
8	H0U	D	501	25/25	0.96	0.23	47,57,81,96	0
9	GDP	B	503	28/28	0.96	0.20	30,41,46,55	0
5	GTP	C	501	32/32	0.96	0.20	31,40,46,48	0
5	GTP	A	501	32/32	0.97	0.23	36,46,52,56	0

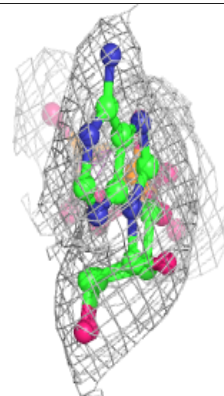
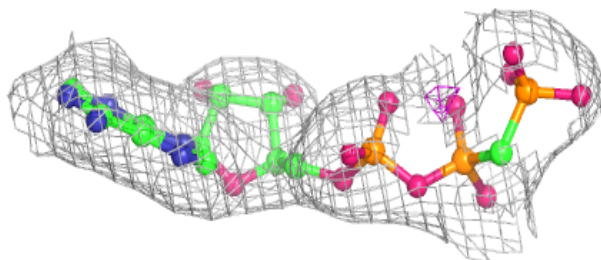
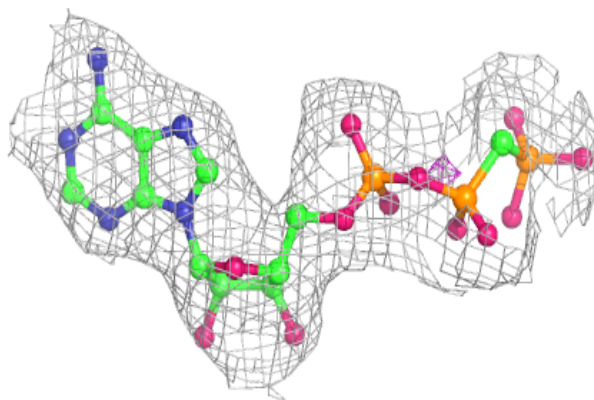
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around GDP D 502:

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

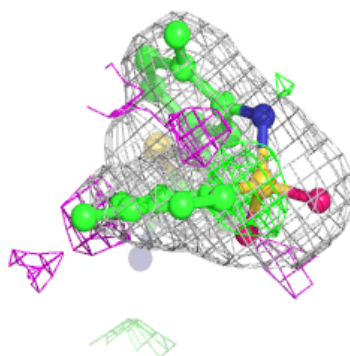
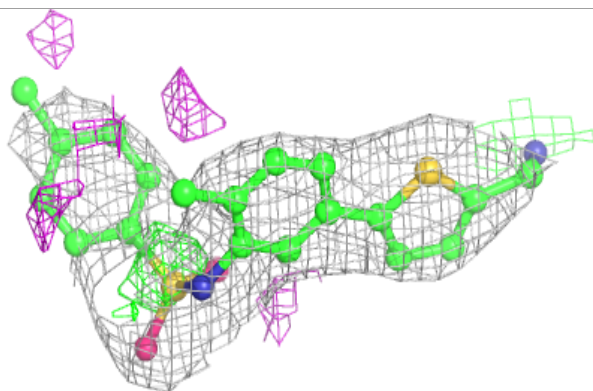
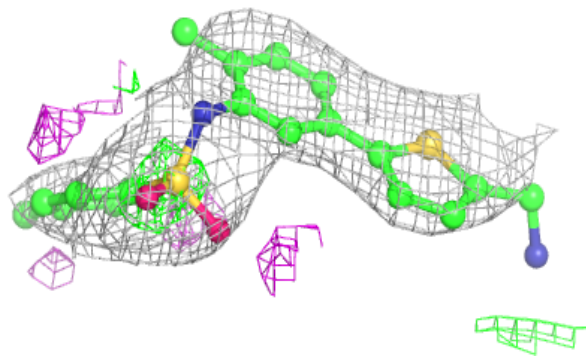
**Electron density around ACP F 401:**

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

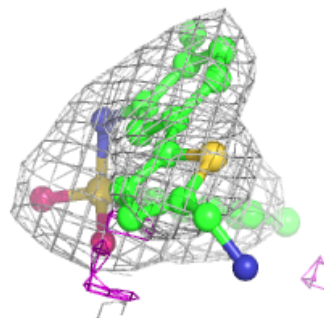
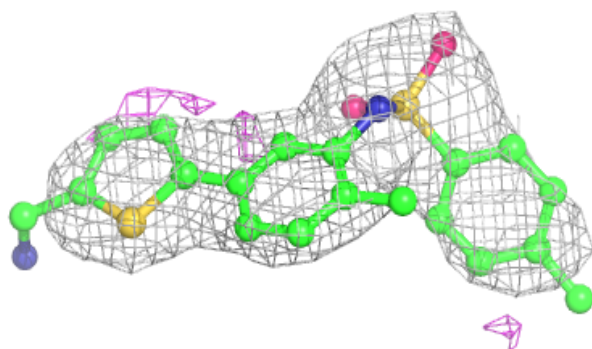
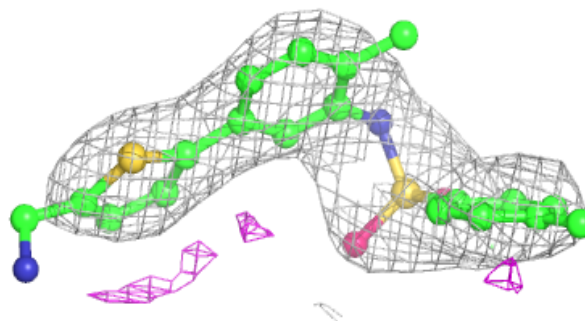


Electron density around H0U B 501:

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

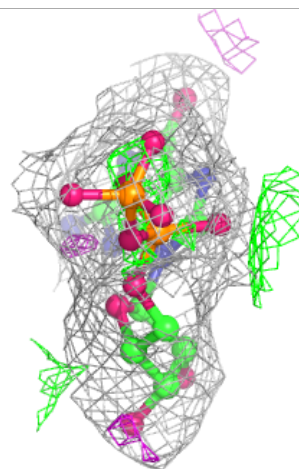
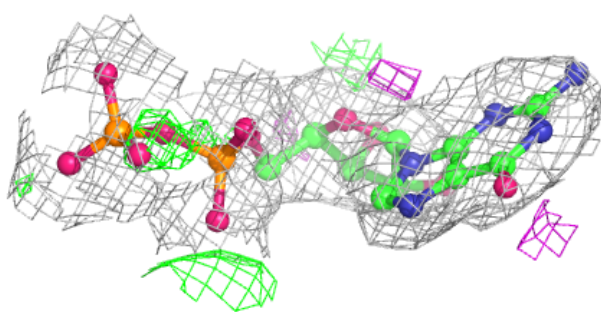
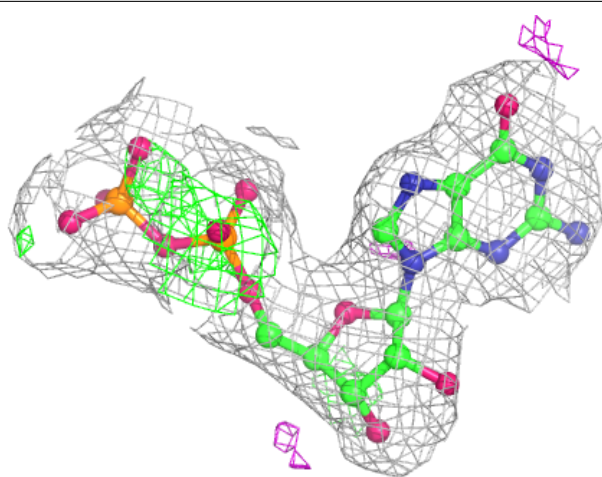
**Electron density around H0U D 501:**

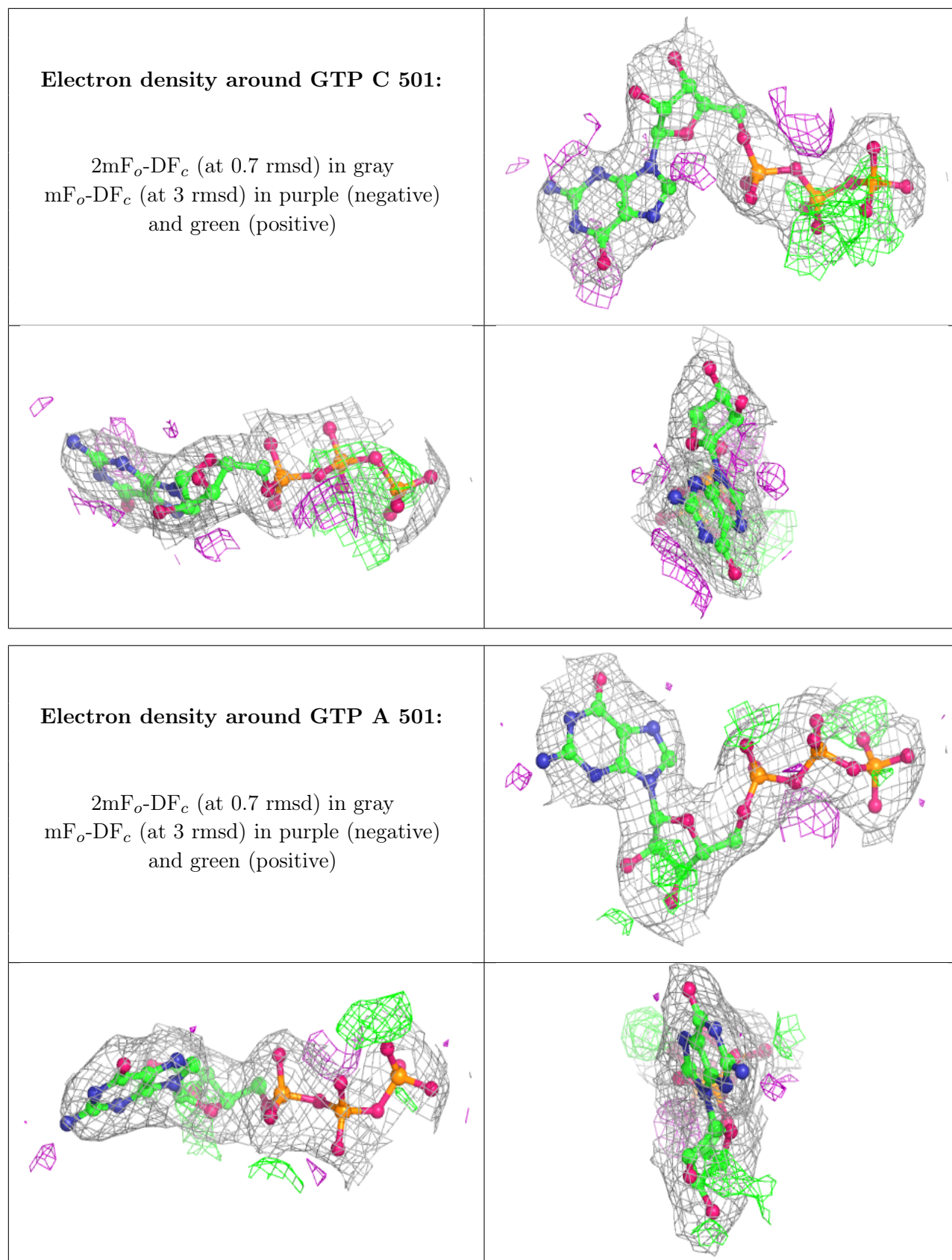
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around GDP 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)





6.5 Other polymers [i](#)

There are no such residues in this entry.