



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 10, 2023 – 10:26 PM EDT

PDB ID : 6X1E
Title : Tubulin-RB3_SLD-TTL in complex with compound 5l
Authors : White, S.W.; Yun, M.
Deposited on : 2020-05-18
Resolution : 2.90 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 : 2.35.1
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) : 2.35.1

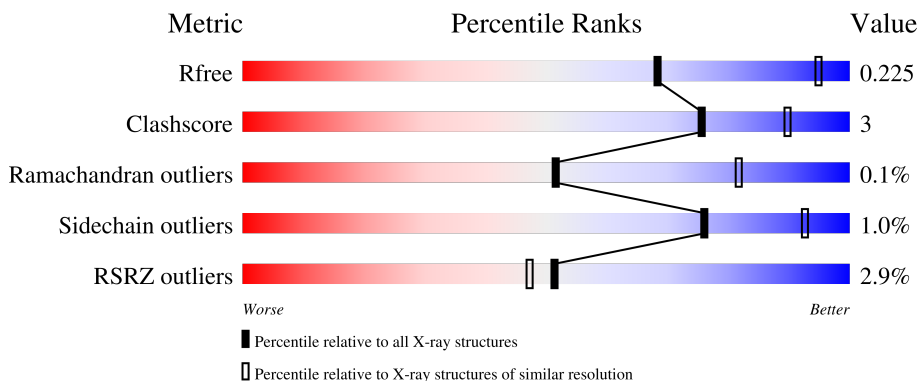
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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.



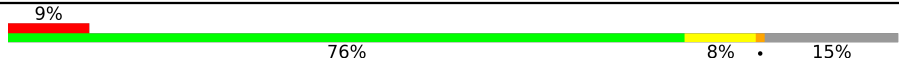
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	450	87% (green), 10% (yellow), 3% (grey), 0% (red)
1	C	450	93% (green), 5% (yellow), 2% (grey), 0% (red)
2	B	445	2% (red), 84% (green), 12% (yellow), 2% (grey)
2	D	445	4% (red), 87% (green), 8% (yellow), 5% (grey)
3	E	143	0% (red), 80% (green), 15% (yellow), 5% (grey)

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Mol	Chain	Length	Quality of chain
4	F	384	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a red segment at the beginning labeled '9%', a large green segment labeled '76%', a yellow segment labeled '8%', and a grey segment at the end labeled '15%'.</p>

2 Entry composition [i](#)

There are 12 unique types of molecules in this entry. The entry contains 17543 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	437	Total	C	N	O	S	0	0	0
			3416	2163	581	650	22			
1	C	440	Total	C	N	O	S	0	1	0
			3443	2179	585	657	22			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	427	Total	C	N	O	S	0	0	0
			3361	2110	576	649	26			
2	D	421	Total	C	N	O	S	0	0	0
			3303	2077	562	638	26			

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	121	Total	C	N	O	S	0	2	0
			1012	626	183	197	6			

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
			Total	C	N	O	S			
4	F	327	Total	C	N	O	S	0	2	0
			2667	1717	460	476	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		
5	D	1	Total	C	N	O	P	0	0
			32	10	5	14	3		

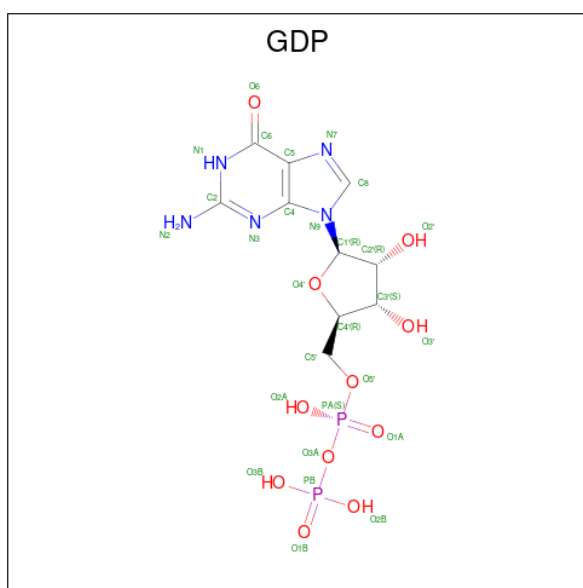
- Molecule 6 is CALCIUM ION (three-letter code: CA) (formula: Ca).

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

- Molecule 7 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

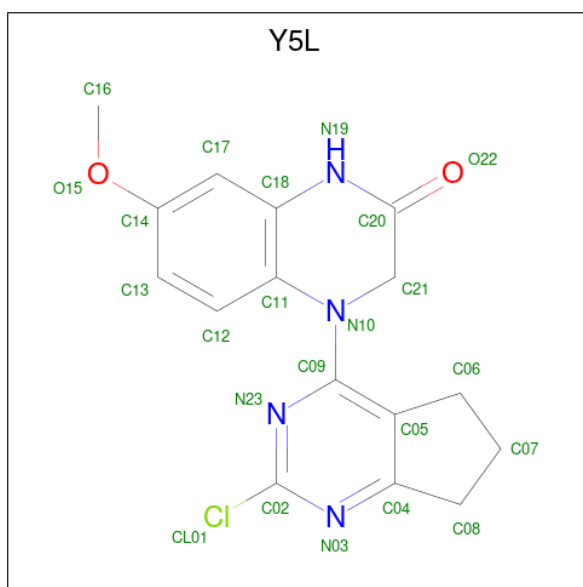
- Molecule 8 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).





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

- Molecule 10 is 4-(2-chloro-6,7-dihydro-5H-cyclopenta[d]pyrimidin-4-yl)-7-methoxy-3,4-dihydroquinoxalin-2(1H)-one (three-letter code: Y5L) (formula: C₁₆H₁₅ClN₄O₂) (labeled as "Ligand of Interest" by depositor).



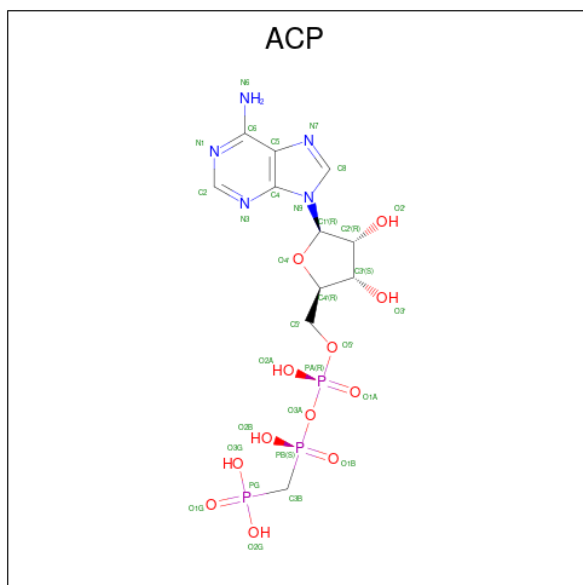
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	Cl	N	O			
10	B	1	Total	23	16	1	4	2	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Cl	N			O
10	D	1	23	16	1	4	2	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

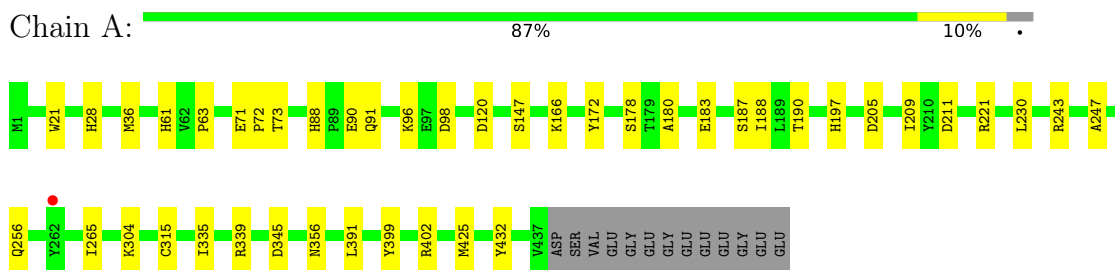
- Molecule 12 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	20	Total	O	0	0
			20	20		
12	B	27	Total	O	0	0
			27	27		
12	C	46	Total	O	0	0
			46	46		
12	D	6	Total	O	0	0
			6	6		
12	E	4	Total	O	0	0
			4	4		
12	F	6	Total	O	0	0
			6	6		

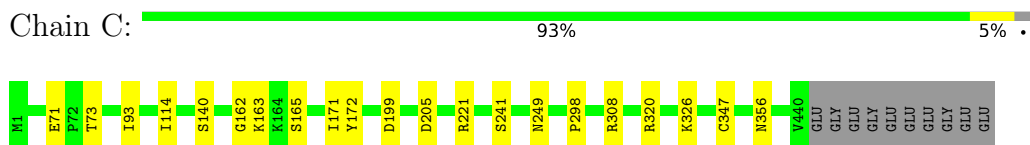
3 Residue-property plots [i](#)

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

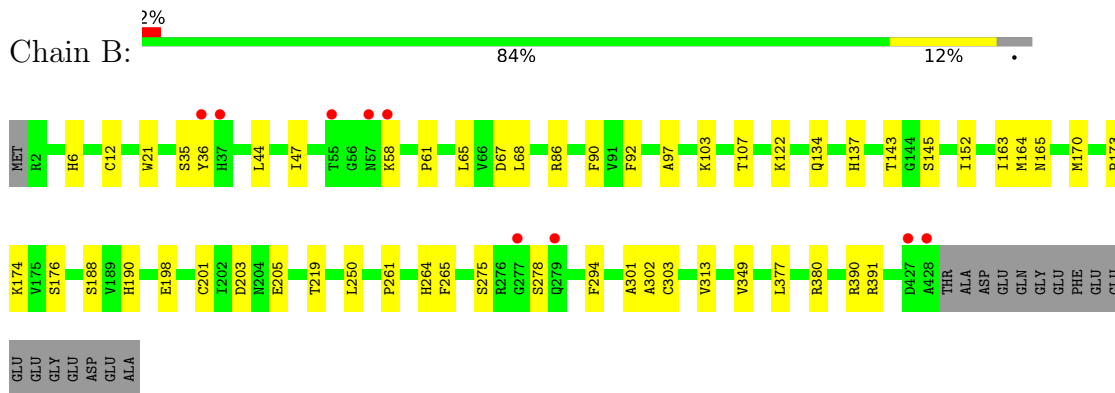
- Molecule 1: Tubulin alpha-1B chain



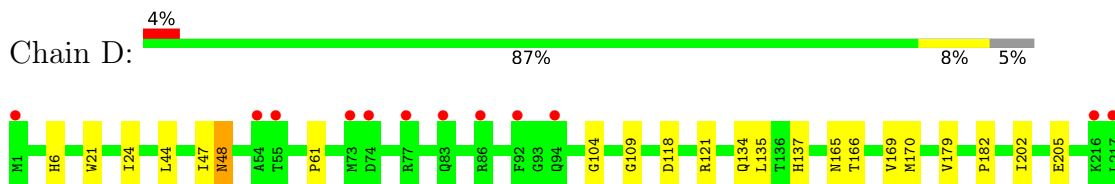
- Molecule 1: Tubulin alpha-1B chain

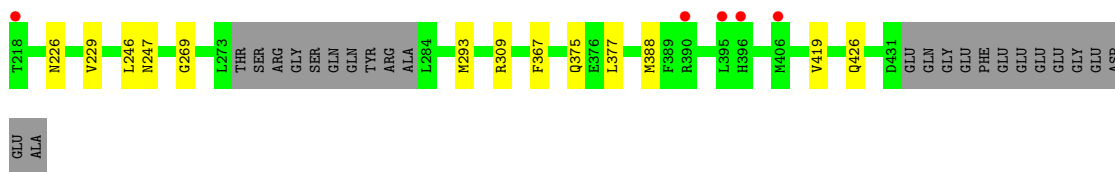


- Molecule 2: Tubulin beta-2B chain

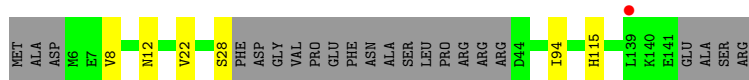
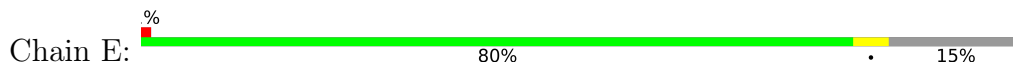


- Molecule 2: Tubulin beta-2B chain

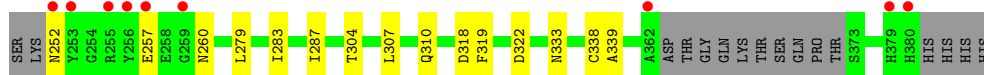
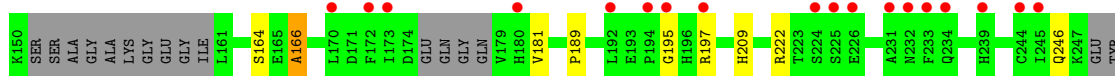
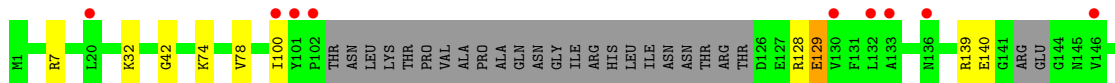
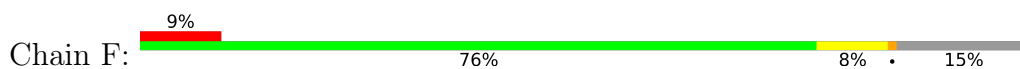




● Molecule 3: Stathmin-4



● Molecule 4: Tubulin Tyrosine Ligase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	105.36Å 157.74Å 182.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.91 – 2.90 49.91 – 2.90	Depositor EDS
% Data completeness (in resolution range)	98.8 (49.91-2.90) 93.8 (49.91-2.90)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.52 (at 2.91Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, R_{free}	0.170 , 0.224 0.172 , 0.225	Depositor DCC
R_{free} test set	2000 reflections (2.98%)	wwPDB-VP
Wilson B-factor (Å ²)	47.0	Xtrriage
Anisotropy	0.024	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 47.6	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	0.94	EDS
Total number of atoms	17543	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.65% 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: Y5L, CA, GDP, ACP, GTP, MES, MG

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.25	0/3494	0.42	0/4743
1	C	0.26	0/3524	0.43	0/4785
2	B	0.25	0/3436	0.43	0/4654
2	D	0.25	0/3376	0.41	0/4574
3	E	0.23	0/1027	0.35	0/1362
4	F	0.25	0/2732	0.41	0/3689
All	All	0.25	0/17589	0.42	0/23807

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3416	0	3330	24	0
1	C	3443	0	3356	13	0
2	B	3361	0	3238	30	0
2	D	3303	0	3174	20	0
3	E	1012	0	1034	4	0
4	F	2667	0	2627	19	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
5	D	32	0	12	1	0
6	A	1	0	0	0	0
6	C	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
7	D	1	0	0	0	0
7	F	1	0	0	0	0
8	B	28	0	12	1	0
9	B	24	0	24	2	0
10	B	23	0	0	0	0
10	D	23	0	0	0	0
11	F	31	0	13	1	0
12	A	20	0	0	0	0
12	B	27	0	0	1	0
12	C	46	0	0	0	0
12	D	6	0	0	0	0
12	E	4	0	0	0	0
12	F	6	0	0	0	0
All	All	17543	0	16844	106	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 3.

All (106) 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:241:SER:HA	1:C:249:ASN:HD21	1.51	0.76
2:D:170:MET:HG3	2:D:377:LEU:HD11	1.73	0.69
4:F:304:THR:O	4:F:310:GLN:NE2	2.25	0.68
2:D:375:GLN:HB2	2:D:419:VAL:HG13	1.78	0.66
2:B:165:ASN:HD22	2:B:198:GLU:HB2	1.62	0.65
4:F:246:GLN:OE1	4:F:260:ASN:ND2	2.31	0.64
4:F:222:ARG:NH1	4:F:318:ASP:OD2	2.32	0.62
2:B:86:ARG:HH22	2:B:122:LYS:HE2	1.66	0.61
1:A:345:ASP:HB3	3:E:28:SER:HB3	1.83	0.60
2:B:170:MET:HG3	2:B:377:LEU:HD21	1.85	0.58
2:D:134:GLN:HA	2:D:165:ASN:O	2.04	0.56
2:B:6:HIS:CD2	2:B:21:TRP:HE1	2.24	0.56
4:F:304:THR:HG22	4:F:307:LEU:HD12	1.87	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:173:PRO:HA	2:B:176:SER:HB2	1.89	0.54
1:A:71:GLU:OE1	1:A:73:THR:OG1	2.21	0.53
1:A:187:SER:HB3	1:A:391:LEU:HD21	1.91	0.53
1:A:88:HIS:O	1:A:91:GLN:HG2	2.08	0.53
2:B:219:THR:HG21	1:C:326:LYS:HA	1.91	0.53
4:F:197:ARG:NH1	4:F:257:GLU:OE1	2.42	0.52
2:B:301:ALA:O	2:B:303:CYS:N	2.43	0.52
2:B:134:GLN:HA	2:B:165:ASN:O	2.09	0.51
1:A:209:ILE:HG23	1:A:230:LEU:HD23	1.93	0.50
1:A:399:TYR:O	1:A:402:ARG:NH1	2.44	0.50
2:B:21:TRP:CZ3	2:B:61:PRO:HB3	2.47	0.50
1:A:147:SER:HB2	1:A:190:THR:HB	1.93	0.49
1:C:172:TYR:HB3	1:C:205:ASP:HA	1.92	0.49
2:B:203:ASP:OD2	2:B:380:ARG:NH1	2.40	0.49
2:D:135:LEU:HB3	2:D:166:THR:HG22	1.94	0.49
2:B:35:SER:HG	2:B:58:LYS:HZ3	1.56	0.49
2:B:145:SER:HG	2:B:188:SER:HG	1.60	0.49
1:C:71:GLU:HG2	1:C:73:THR:H	1.78	0.49
2:D:6:HIS:CD2	2:D:21:TRP:HE1	2.31	0.49
1:A:247:ALA:HB2	3:E:12:ASN:HD22	1.78	0.49
1:C:71:GLU:OE2	2:D:247:ASN:ND2	2.46	0.48
2:B:163:ILE:HG21	2:B:250:LEU:HB3	1.94	0.48
2:B:201:CYS:SG	2:B:265:PHE:HB3	2.54	0.48
4:F:74:LYS:NZ	11:F:402:ACP:O1A	2.47	0.48
1:A:71:GLU:HB2	1:A:98:ASP:HB3	1.95	0.48
2:B:275:SER:HG	2:B:278:SER:HG	1.62	0.47
2:D:179:VAL:O	2:D:388:MET:HE1	2.13	0.47
4:F:189:PRO:HA	4:F:322:ASP:HA	1.95	0.47
2:B:44:LEU:HA	2:B:47:ILE:HB	1.95	0.47
2:B:67:ASP:O	2:B:92:PHE:HA	2.15	0.47
4:F:338:CYS:SG	4:F:339:ALA:N	2.86	0.47
1:A:71:GLU:HG2	1:A:72:PRO:HD2	1.96	0.47
4:F:7:ARG:HB2	4:F:42:GLY:HA2	1.96	0.47
4:F:140:GLU:OE1	4:F:140:GLU:N	2.48	0.47
2:D:202:ILE:HD13	2:D:229:VAL:HG13	1.98	0.46
1:A:28:HIS:HE1	1:A:243:ARG:HD2	1.80	0.46
4:F:78:VAL:HG21	4:F:181:VAL:HG11	1.97	0.46
2:B:68:LEU:HD12	2:B:97:ALA:HB2	1.98	0.46
1:A:88:HIS:ND1	1:A:90:GLU:HB2	2.31	0.46
2:B:67:ASP:HA	2:B:143:THR:HG21	1.98	0.46
2:D:169:VAL:HA	2:D:202:ILE:O	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:279:LEU:HD12	4:F:283:ILE:HB	1.98	0.45
2:D:226:ASN:OD1	5:D:501:GTP:N1	2.35	0.45
1:A:178:SER:HB2	1:A:183:GLU:OE1	2.16	0.45
1:A:265:ILE:HG23	1:A:432:TYR:CZ	2.51	0.45
2:B:174:LYS:HD2	2:B:205:GLU:HG3	1.99	0.45
2:D:44:LEU:HA	2:D:47:ILE:HB	1.98	0.45
1:C:140:SER:HA	1:C:171:ILE:HB	2.00	0.44
1:C:165:SER:HA	1:C:199:ASP:OD2	2.17	0.44
1:A:211:ASP:OD2	1:A:304:LYS:NZ	2.43	0.44
2:B:261:PRO:O	2:B:264:HIS:ND1	2.47	0.44
2:B:313:VAL:HB	2:B:349:VAL:HG22	1.98	0.44
4:F:209:HIS:HB2	4:F:310:GLN:CG	2.48	0.44
2:B:65:LEU:HD22	2:B:90:PHE:CE2	2.52	0.44
1:A:180:ALA:HB3	1:A:183:GLU:HG3	1.99	0.43
2:B:294:PHE:O	9:B:503:MES:H82	2.18	0.43
4:F:195:GLY:HA3	4:F:197:ARG:HD2	2.00	0.43
2:B:12:CYS:HB2	8:B:501:GDP:C8	2.54	0.43
2:D:48:ASN:H	2:D:48:ASN:ND2	2.16	0.43
2:D:269:GLY:HA3	2:D:367:PHE:HB3	1.99	0.43
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.53	0.43
1:A:96:LYS:HA	1:A:96:LYS:HD3	1.83	0.42
2:B:36:TYR:CE2	2:B:44:LEU:HD11	2.54	0.42
1:C:298:PRO:HG2	1:C:308:ARG:NH2	2.34	0.42
1:A:172:TYR:HB3	1:A:205:ASP:HA	2.01	0.42
1:A:335:ILE:HG23	1:A:339:ARG:HD2	2.01	0.42
3:E:8:VAL:HG22	3:E:22:VAL:HG22	2.01	0.42
1:C:249:ASN:ND2	1:C:356:ASN:OD1	2.51	0.42
1:C:162:GLY:HA2	3:E:94:ILE:HD11	2.01	0.42
2:D:309:ARG:NH1	2:D:426:GLN:O	2.51	0.42
2:D:21:TRP:CE3	2:D:24:ILE:HD11	2.55	0.42
9:B:503:MES:H51	9:B:503:MES:H81	1.88	0.41
1:C:320:ARG:HA	1:C:356:ASN:O	2.19	0.41
4:F:100:ILE:HD12	4:F:128:ARG:HG3	2.02	0.41
2:B:103:LYS:NZ	12:B:603:HOH:O	2.48	0.41
2:D:21:TRP:CZ3	2:D:61:PRO:HB3	2.54	0.41
2:D:179:VAL:O	2:D:182:PRO:HD2	2.21	0.41
1:A:166:LYS:HE2	1:A:197:HIS:O	2.20	0.41
1:C:163:LYS:HD3	1:C:163:LYS:HA	1.84	0.41
2:D:293:MET:CG	2:D:367:PHE:HB2	2.51	0.41
2:B:152:ILE:HG23	2:B:164:MET:HG2	2.03	0.41
2:B:390:ARG:HG3	2:B:391:ARG:HG2	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:118:ASP:OD1	2:D:121:ARG:NH1	2.42	0.41
1:A:28:HIS:HE1	1:A:243:ARG:HH11	1.69	0.41
1:A:36:MET:HB3	1:A:61:HIS:CE1	2.56	0.41
4:F:287:ILE:HG23	4:F:319:PHE:CE2	2.56	0.40
4:F:32:LYS:HB3	4:F:32:LYS:HE2	1.84	0.40
1:C:93:ILE:HG22	1:C:114:ILE:HD11	2.03	0.40
2:D:104:GLY:O	2:D:109:GLY:HA3	2.21	0.40
4:F:164:SER:O	4:F:166:ALA:N	2.50	0.40
1:A:188:ILE:HG13	1:A:425:MET:HG3	2.02	0.40
2:B:103:LYS:HA	2:B:107:THR:OG1	2.21	0.40
4:F:129:GLU:H	4:F:129:GLU:HG3	1.60	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	435/450 (97%)	427 (98%)	8 (2%)	0	100	100
1	C	439/450 (98%)	433 (99%)	6 (1%)	0	100	100
2	B	425/445 (96%)	416 (98%)	8 (2%)	1 (0%)	47	78
2	D	417/445 (94%)	406 (97%)	11 (3%)	0	100	100
3	E	119/143 (83%)	118 (99%)	1 (1%)	0	100	100
4	F	315/384 (82%)	302 (96%)	12 (4%)	1 (0%)	41	71
All	All	2150/2317 (93%)	2102 (98%)	46 (2%)	2 (0%)	51	82

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	302	ALA
4	F	166	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	368/378 (97%)	363 (99%)	5 (1%)	67	89
1	C	372/378 (98%)	370 (100%)	2 (0%)	88	96
2	B	369/383 (96%)	367 (100%)	2 (0%)	88	96
2	D	361/383 (94%)	357 (99%)	4 (1%)	73	92
3	E	111/127 (87%)	109 (98%)	2 (2%)	59	85
4	F	288/342 (84%)	284 (99%)	4 (1%)	67	89
All	All	1869/1991 (94%)	1850 (99%)	19 (1%)	76	92

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

Mol	Chain	Res	Type
1	A	120	ASP
1	A	221	ARG
1	A	256	GLN
1	A	315	CYS
1	A	356	ASN
2	B	137	HIS
2	B	190	HIS
1	C	221	ARG
1	C	347	CYS
2	D	48	ASN
2	D	137	HIS
2	D	205	GLU
2	D	246	LEU
3	E	115[A]	HIS
3	E	115[B]	HIS
4	F	129	GLU
4	F	139	ARG
4	F	252	ASN
4	F	333	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	HIS
1	A	301	GLN
2	B	15	GLN
2	B	165	ASN
1	C	31	GLN
1	C	249	ASN
1	C	356	ASN
2	D	8	GLN
2	D	48	ASN
2	D	247	ASN
2	D	292	GLN
3	E	12	ASN
3	E	51	GLN
4	F	180	HIS
4	F	183	GLN
4	F	243	HIS
4	F	252	ASN
4	F	310	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 16 ligands modelled in this entry, 7 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
8	GDP	B	501	7	24,30,30	0.96	1 (4%)	30,47,47	1.08	3 (10%)
9	MES	B	502	-	12,12,12	2.25	1 (8%)	14,16,16	1.78	3 (21%)
10	Y5L	D	503	-	26,26,26	2.99	9 (34%)	32,38,38	2.37	11 (34%)
9	MES	B	503	-	12,12,12	2.33	1 (8%)	14,16,16	1.91	5 (35%)
5	GTP	C	501	7	26,34,34	1.14	2 (7%)	32,54,54	1.48	5 (15%)
10	Y5L	B	505	-	26,26,26	3.05	9 (34%)	32,38,38	2.31	11 (34%)
5	GTP	A	501	7	26,34,34	1.16	2 (7%)	32,54,54	1.44	6 (18%)
5	GTP	D	501	7	26,34,34	1.11	2 (7%)	32,54,54	1.47	6 (18%)
11	ACP	F	402	7	27,33,33	1.90	5 (18%)	32,52,52	1.40	3 (9%)

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
8	GDP	B	501	7	-	3/12/32/32	0/3/3/3
9	MES	B	502	-	-	4/6/14/14	0/1/1/1
10	Y5L	D	503	-	-	2/5/24/24	0/4/4/4
9	MES	B	503	-	-	4/6/14/14	0/1/1/1
5	GTP	C	501	7	-	7/18/38/38	0/3/3/3
10	Y5L	B	505	-	-	2/5/24/24	0/4/4/4
5	GTP	A	501	7	-	6/18/38/38	0/3/3/3
5	GTP	D	501	7	-	7/18/38/38	0/3/3/3
11	ACP	F	402	7	-	6/15/38/38	0/3/3/3

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	B	505	Y5L	C20-N19	9.17	1.45	1.35
10	D	503	Y5L	C20-N19	8.72	1.44	1.35
9	B	503	MES	C8-S	-7.82	1.66	1.77
9	B	502	MES	C8-S	-7.52	1.66	1.77
11	F	402	ACP	PB-O3A	6.56	1.65	1.58
10	D	503	Y5L	C08-C04	5.90	1.55	1.50
10	B	505	Y5L	C08-C04	5.88	1.55	1.50
10	D	503	Y5L	C09-N10	5.74	1.45	1.37
10	B	505	Y5L	C09-N10	5.37	1.44	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	B	505	Y5L	C18-N19	5.37	1.49	1.39
10	D	503	Y5L	C18-N19	5.12	1.48	1.39
5	A	501	GTP	C5-C6	-4.07	1.39	1.47
5	C	501	GTP	C5-C6	-4.01	1.39	1.47
10	B	505	Y5L	C21-N10	-3.70	1.42	1.46
10	D	503	Y5L	C21-N10	-3.68	1.42	1.46
10	D	503	Y5L	C21-C20	3.50	1.55	1.51
5	D	501	GTP	C5-C6	-3.49	1.40	1.47
10	B	505	Y5L	C21-C20	3.47	1.55	1.51
10	D	503	Y5L	C11-N10	3.30	1.45	1.40
10	B	505	Y5L	C11-N10	3.14	1.45	1.40
11	F	402	ACP	C6-N6	3.00	1.45	1.34
11	F	402	ACP	O3'-C3'	-2.97	1.36	1.43
5	D	501	GTP	C2-N3	2.77	1.39	1.33
11	F	402	ACP	C5-C4	-2.71	1.33	1.40
8	B	501	GDP	C6-N1	-2.46	1.34	1.37
10	D	503	Y5L	O22-C20	-2.42	1.18	1.23
10	B	505	Y5L	C18-C11	-2.30	1.38	1.40
10	B	505	Y5L	O22-C20	-2.29	1.18	1.23
11	F	402	ACP	C2-N3	2.18	1.35	1.32
5	C	501	GTP	C2-N3	2.16	1.38	1.33
10	D	503	Y5L	C18-C11	-2.09	1.38	1.40
5	A	501	GTP	C2-N3	2.04	1.38	1.33

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	F	402	ACP	N3-C2-N1	-5.17	120.59	128.68
10	D	503	Y5L	N23-C02-N03	-4.86	121.00	129.57
10	B	505	Y5L	C08-C04-N03	4.70	129.99	123.41
10	D	503	Y5L	C07-C08-C04	4.65	107.32	103.93
10	B	505	Y5L	N23-C02-N03	-4.58	121.49	129.57
10	D	503	Y5L	C18-N19-C20	-4.56	118.85	124.49
9	B	503	MES	C5-N4-C3	4.55	119.07	108.83
9	B	502	MES	C5-N4-C3	4.48	118.91	108.83
10	D	503	Y5L	C08-C04-N03	4.31	129.44	123.41
10	B	505	Y5L	C05-C04-N03	-4.11	121.29	125.80
10	B	505	Y5L	C07-C08-C04	4.10	106.92	103.93
10	D	503	Y5L	C02-N23-C09	4.04	122.36	110.86
10	D	503	Y5L	C05-C04-N03	-3.99	121.42	125.80
10	B	505	Y5L	C02-N23-C09	3.85	121.81	110.86
5	D	501	GTP	PB-O3B-PG	-3.76	119.91	132.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	B	505	Y5L	C18-N19-C20	-3.71	119.89	124.49
5	D	501	GTP	C8-N7-C5	3.49	109.63	102.99
10	B	505	Y5L	C08-C04-C05	-3.29	108.72	111.09
11	F	402	ACP	C5-C6-N6	3.24	125.28	120.35
10	B	505	Y5L	CL01-C02-N03	3.19	119.71	115.15
5	A	501	GTP	C5-C6-N1	3.16	119.53	113.95
5	A	501	GTP	C8-N7-C5	3.10	108.89	102.99
10	D	503	Y5L	CL01-C02-N23	3.08	119.55	115.15
5	C	501	GTP	PB-O3B-PG	-3.07	122.30	132.83
5	C	501	GTP	C5-C6-N1	3.05	119.33	113.95
5	C	501	GTP	C8-N7-C5	3.04	108.77	102.99
10	D	503	Y5L	C07-C06-C05	3.03	107.52	103.52
5	C	501	GTP	PA-O3A-PB	-3.02	122.46	132.83
10	D	503	Y5L	CL01-C02-N03	3.01	119.46	115.15
8	B	501	GDP	PA-O3A-PB	-2.81	123.17	132.83
5	A	501	GTP	C2-N1-C6	-2.80	119.94	125.10
10	D	503	Y5L	C08-C04-C05	-2.71	109.14	111.09
5	C	501	GTP	C2-N1-C6	-2.70	120.12	125.10
5	D	501	GTP	PA-O3A-PB	-2.67	123.68	132.83
5	A	501	GTP	PB-O3B-PG	-2.65	123.73	132.83
5	D	501	GTP	C2-N1-C6	-2.60	120.31	125.10
10	B	505	Y5L	CL01-C02-N23	2.55	118.80	115.15
10	B	505	Y5L	C07-C06-C05	2.54	106.86	103.52
5	D	501	GTP	C5-C6-N1	2.47	118.32	113.95
9	B	503	MES	C6-C5-N4	-2.44	106.41	110.10
9	B	502	MES	O3S-S-C8	2.40	109.65	105.77
8	B	501	GDP	C8-N7-C5	2.39	107.54	102.99
10	D	503	Y5L	C05-C09-N23	-2.39	118.93	122.61
5	A	501	GTP	PA-O3A-PB	-2.29	124.95	132.83
8	B	501	GDP	C5-C6-N1	2.22	117.87	113.95
5	A	501	GTP	O6-C6-C5	-2.19	120.08	124.37
11	F	402	ACP	N6-C6-N1	-2.16	114.09	118.57
9	B	502	MES	O2S-S-C8	2.15	109.50	106.92
10	B	505	Y5L	C05-C09-N23	-2.15	119.30	122.61
9	B	503	MES	O3S-S-C8	2.12	109.20	105.77
5	D	501	GTP	C3'-C2'-C1'	2.09	104.13	100.98
9	B	503	MES	O1S-S-C8	2.09	109.43	106.92
9	B	503	MES	O2S-S-C8	2.05	109.39	106.92

There are no chirality outliers.

All (41) torsion outliers are listed below:

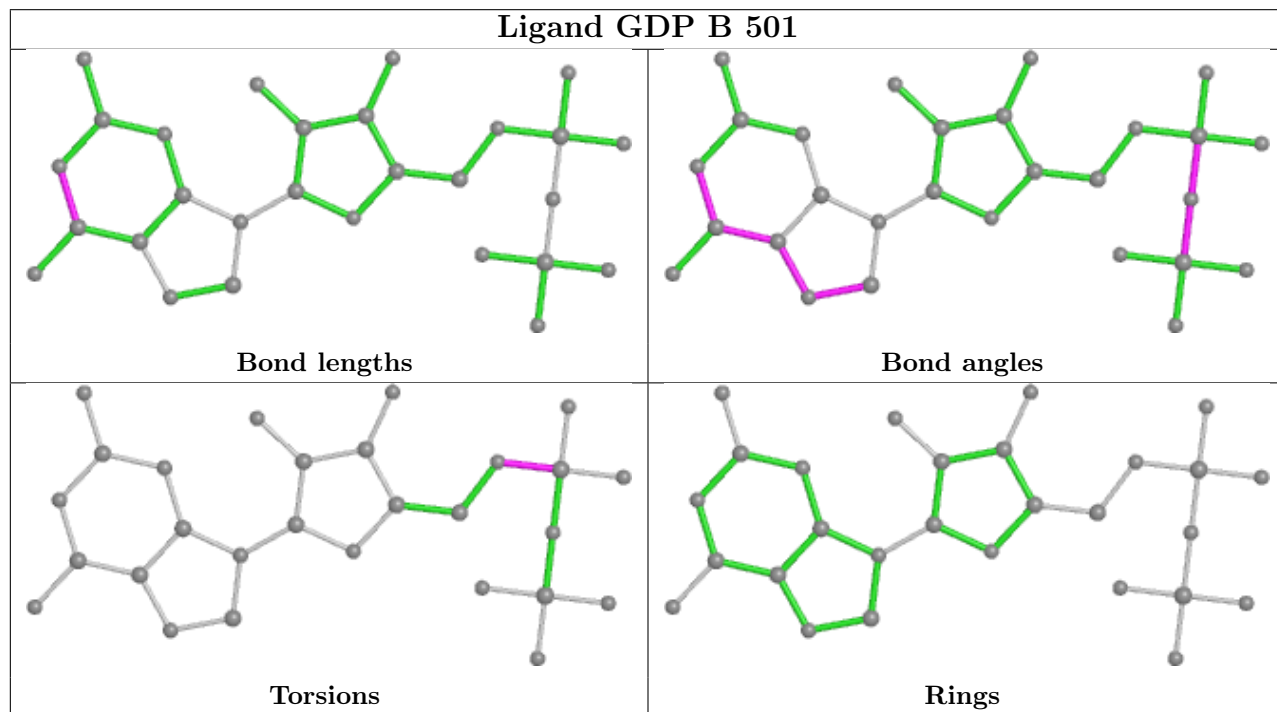
Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O2G
5	A	501	GTP	C5'-O5'-PA-O1A
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	501	GTP	PB-O3B-PG-O2G
5	C	501	GTP	PB-O3B-PG-O3G
5	C	501	GTP	C5'-O5'-PA-O2A
5	D	501	GTP	PB-O3B-PG-O2G
5	D	501	GTP	PB-O3B-PG-O3G
5	D	501	GTP	C5'-O5'-PA-O1A
5	D	501	GTP	C5'-O5'-PA-O2A
8	B	501	GDP	C5'-O5'-PA-O1A
8	B	501	GDP	C5'-O5'-PA-O2A
11	F	402	ACP	PB-C3B-PG-O1G
11	F	402	ACP	PB-C3B-PG-O2G
11	F	402	ACP	PB-C3B-PG-O3G
11	F	402	ACP	PG-C3B-PB-O1B
9	B	502	MES	C7-C8-S-O3S
9	B	503	MES	C7-C8-S-O3S
10	B	505	Y5L	N23-C09-N10-C21
10	D	503	Y5L	N23-C09-N10-C21
10	D	503	Y5L	C05-C09-N10-C21
10	B	505	Y5L	C05-C09-N10-C21
9	B	502	MES	C8-C7-N4-C3
5	A	501	GTP	C5'-O5'-PA-O3A
5	C	501	GTP	C5'-O5'-PA-O3A
5	D	501	GTP	C5'-O5'-PA-O3A
11	F	402	ACP	C5'-O5'-PA-O3A
5	C	501	GTP	C5'-O5'-PA-O1A
9	B	502	MES	C7-C8-S-O1S
9	B	502	MES	C7-C8-S-O2S
9	B	503	MES	C7-C8-S-O1S
9	B	503	MES	C7-C8-S-O2S
11	F	402	ACP	PG-C3B-PB-O2B
9	B	503	MES	C8-C7-N4-C3
5	D	501	GTP	O4'-C4'-C5'-O5'
5	D	501	GTP	C3'-C4'-C5'-O5'
5	A	501	GTP	PB-O3B-PG-O3G
8	B	501	GDP	C5'-O5'-PA-O3A
5	A	501	GTP	PB-O3A-PA-O1A
5	C	501	GTP	PB-O3A-PA-O2A
5	C	501	GTP	PB-O3B-PG-O1G

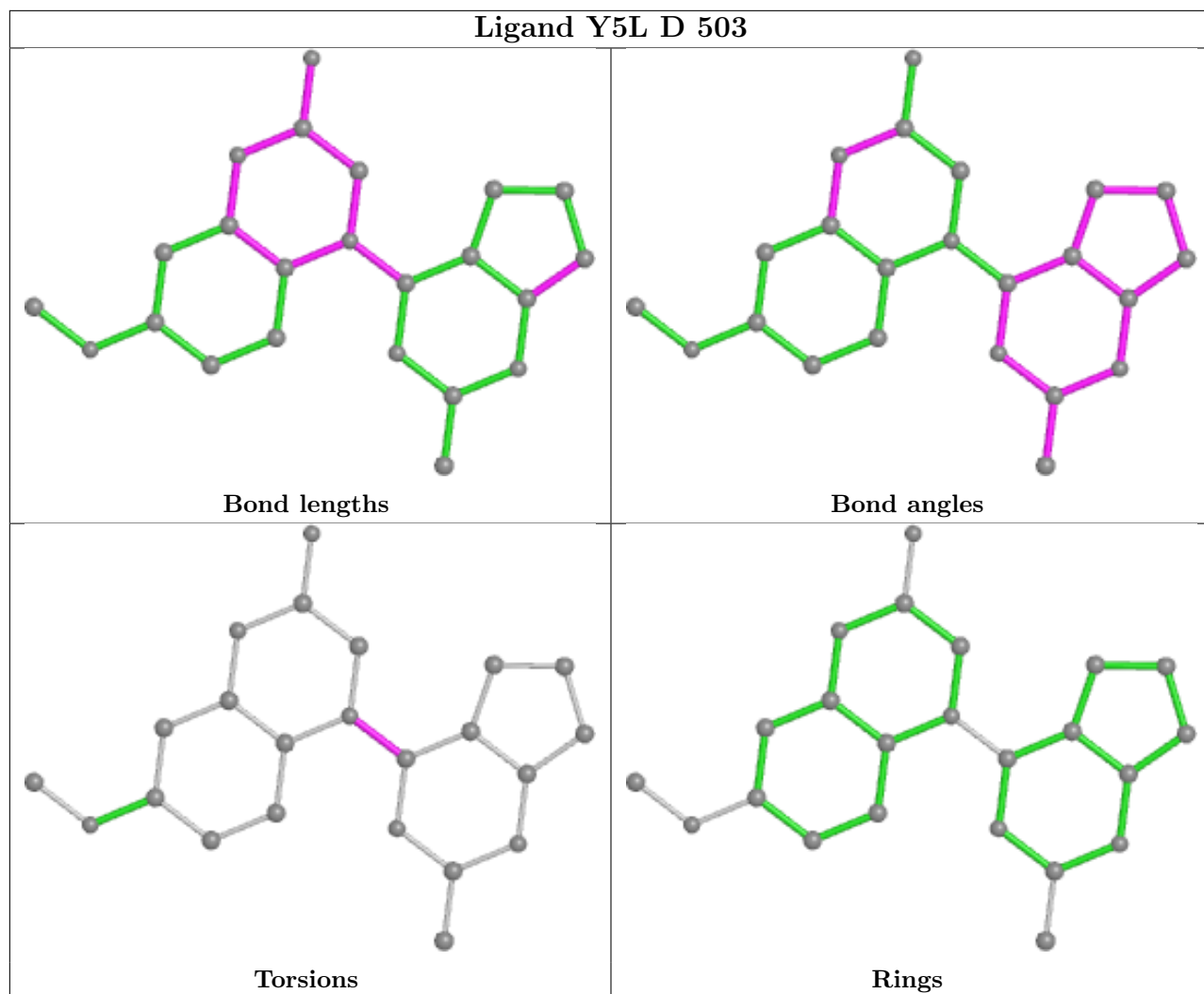
There are no ring outliers.

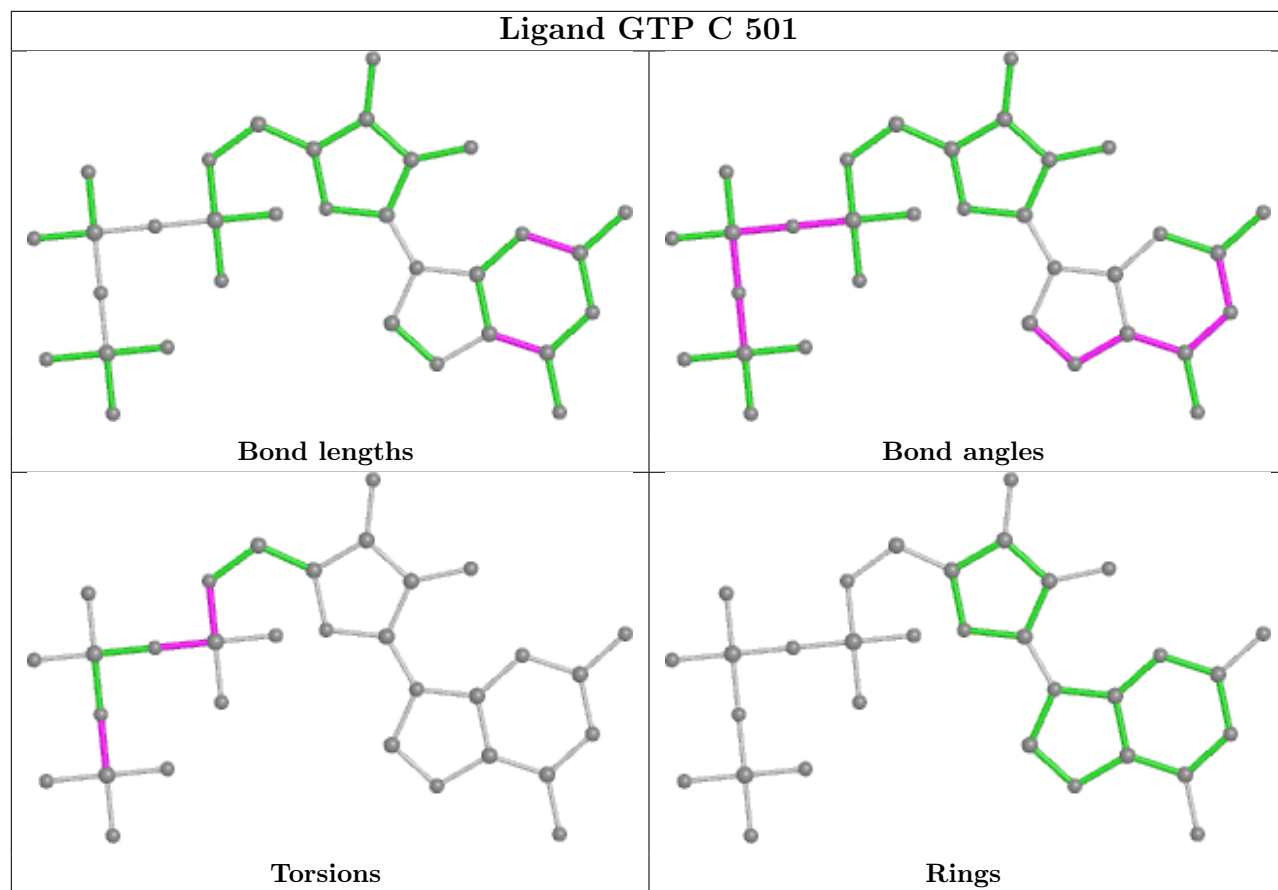
4 monomers are involved in 5 short contacts:

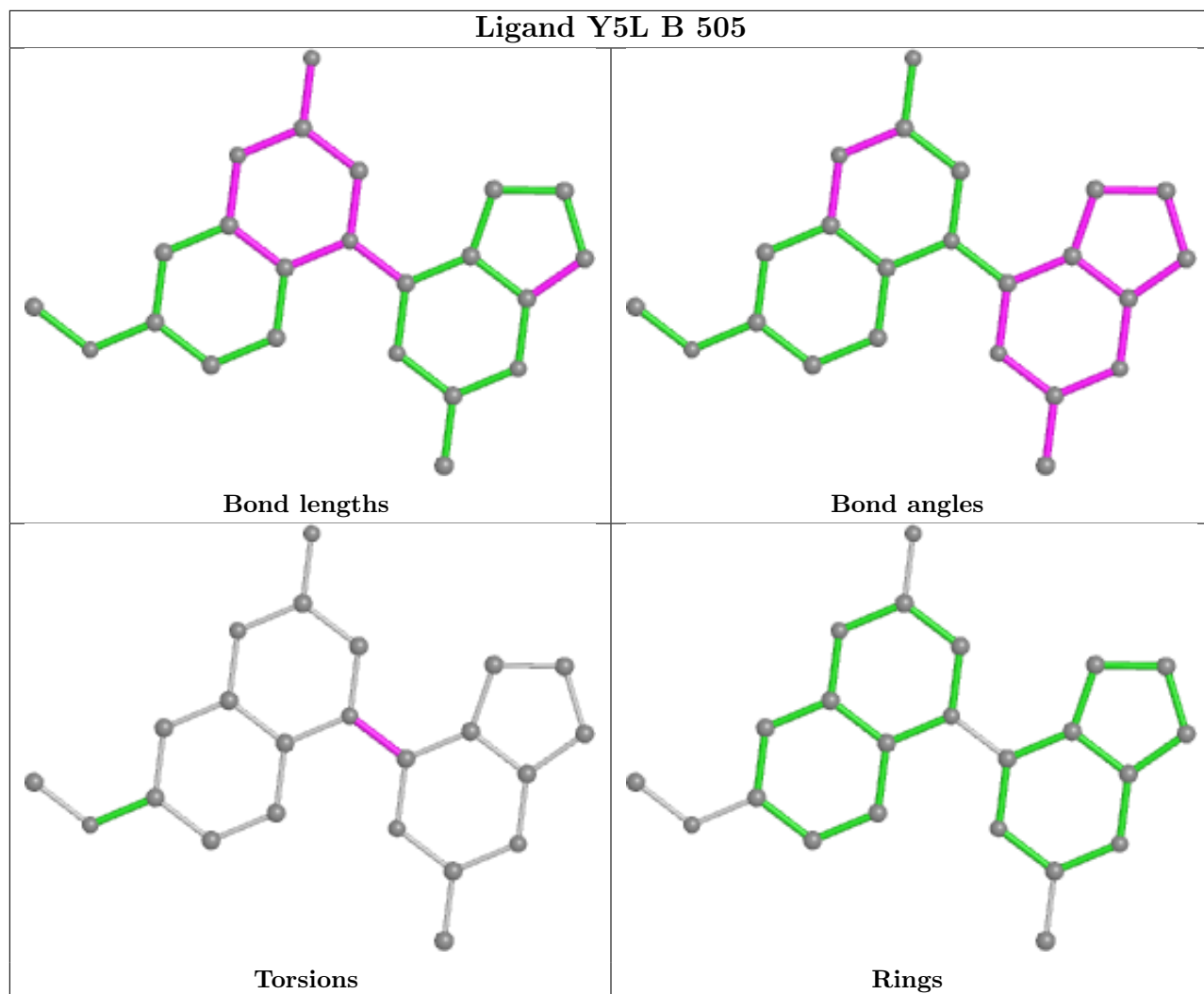
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	501	GDP	1	0
9	B	503	MES	2	0
5	D	501	GTP	1	0
11	F	402	ACP	1	0

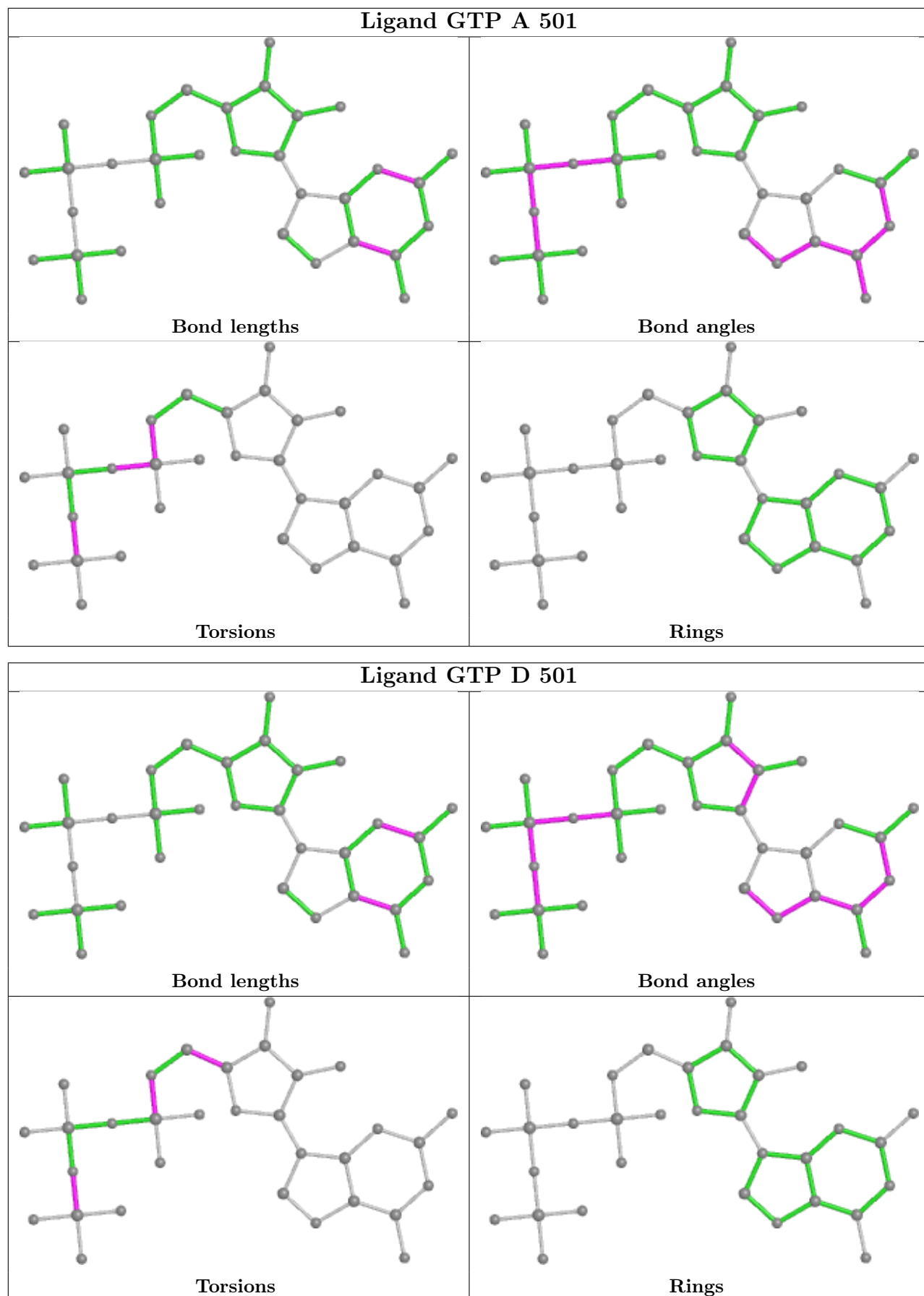
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

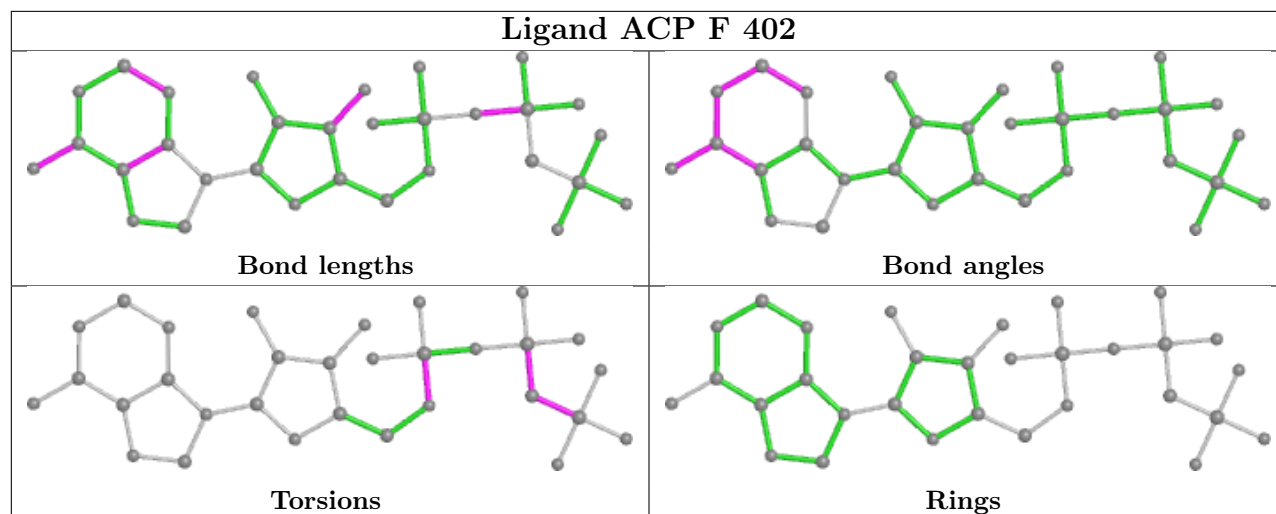












5.7 Other polymers [i](#)

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	437/450 (97%)	-0.44	1 (0%) 95 95	27, 45, 77, 99	0
1	C	440/450 (97%)	-0.57	0 100 100	18, 34, 65, 108	0
2	B	427/445 (95%)	-0.32	9 (2%) 63 61	21, 43, 84, 153	0
2	D	421/445 (94%)	-0.05	17 (4%) 38 33	32, 69, 112, 138	0
3	E	121/143 (84%)	-0.15	1 (0%) 86 86	34, 63, 103, 123	0
4	F	327/384 (85%)	0.43	36 (11%) 5 4	37, 75, 134, 156	0
All	All	2173/2317 (93%)	-0.22	64 (2%) 51 47	18, 51, 109, 156	0

All (64) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	173	ILE	4.3
4	F	234	GLN	4.3
4	F	101	TYR	4.1
4	F	233	PHE	4.1
2	B	57	ASN	4.1
2	D	92	PHE	3.9
2	B	37	HIS	3.7
4	F	244	CYS	3.7
2	B	427	ASP	3.7
4	F	136	ASN	3.6
2	D	1	MET	3.5
4	F	225	SER	3.4
2	D	218	THR	3.4
4	F	253	TYR	3.3
2	B	277	GLY	3.3
4	F	100	ILE	3.2
2	D	55	THR	3.1
2	D	406	MET	3.1
4	F	245	ILE	3.1

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Mol	Chain	Res	Type	RSRZ
4	F	194	PRO	3.1
4	F	256	TYR	3.0
4	F	379	HIS	3.0
4	F	226	GLU	2.9
4	F	232	ASN	2.9
4	F	252	ASN	2.8
4	F	132	LEU	2.8
2	D	94	GLN	2.8
2	D	73	MET	2.8
4	F	172	PHE	2.7
4	F	257	GLU	2.7
2	B	55	THR	2.7
2	D	217	LEU	2.7
4	F	192	LEU	2.7
2	D	390	ARG	2.7
4	F	380	HIS	2.6
4	F	180	HIS	2.6
4	F	133	ALA	2.6
2	B	58	LYS	2.6
3	E	139	LEU	2.5
4	F	195	GLY	2.5
2	D	395	LEU	2.5
2	B	428	ALA	2.4
2	D	74	ASP	2.4
2	D	86	ARG	2.4
4	F	231	ALA	2.4
4	F	239	HIS	2.4
4	F	255	ARG	2.3
2	B	36	TYR	2.2
4	F	146	VAL	2.2
4	F	170	LEU	2.2
4	F	362	ALA	2.2
1	A	262	TYR	2.2
2	D	54	ALA	2.2
4	F	130	VAL	2.2
4	F	20	LEU	2.1
4	F	224	SER	2.1
4	F	102	PRO	2.1
4	F	197	ARG	2.1
2	B	279	GLN	2.1
2	D	216	LYS	2.1
4	F	259	GLY	2.1

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Mol	Chain	Res	Type	RSRZ
2	D	396	HIS	2.1
2	D	77	ARG	2.1
2	D	83	GLN	2.1

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

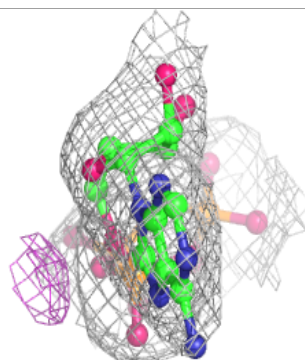
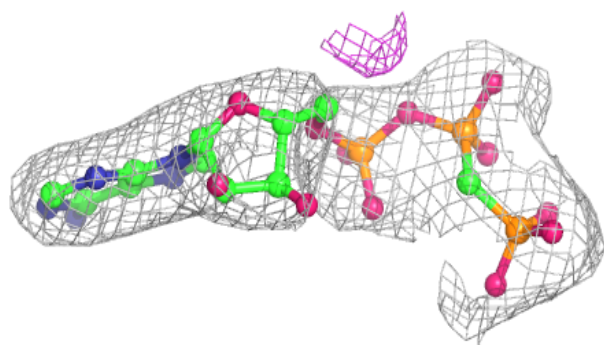
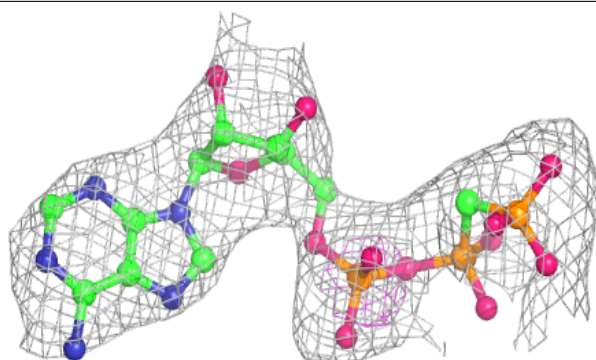
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	MG	D	502	1/1	0.71	0.11	68,68,68,68	0
7	MG	F	401	1/1	0.91	0.19	97,97,97,97	0
11	ACP	F	402	31/31	0.92	0.18	78,93,124,131	0
5	GTP	D	501	32/32	0.94	0.14	47,63,113,116	0
6	CA	C	502	1/1	0.95	0.05	51,51,51,51	0
9	MES	B	503	12/12	0.96	0.15	53,66,73,81	0
9	MES	B	502	12/12	0.96	0.16	29,48,82,95	0
7	MG	B	504	1/1	0.97	0.23	51,51,51,51	0
10	Y5L	D	503	23/23	0.97	0.18	26,42,66,101	0
6	CA	A	502	1/1	0.97	0.04	72,72,72,72	0
5	GTP	C	501	32/32	0.98	0.15	16,29,40,54	0
10	Y5L	B	505	23/23	0.98	0.16	21,33,53,70	0
8	GDP	B	501	28/28	0.98	0.16	7,29,39,43	0
5	GTP	A	501	32/32	0.98	0.17	19,29,44,50	0
7	MG	A	503	1/1	0.99	0.10	28,28,28,28	0
7	MG	C	503	1/1	0.99	0.10	30,30,30,30	0

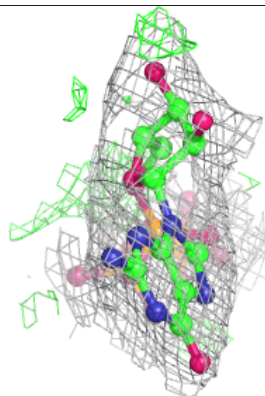
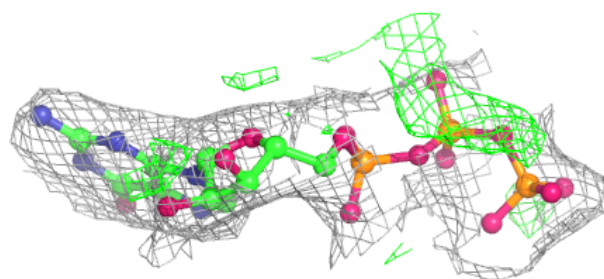
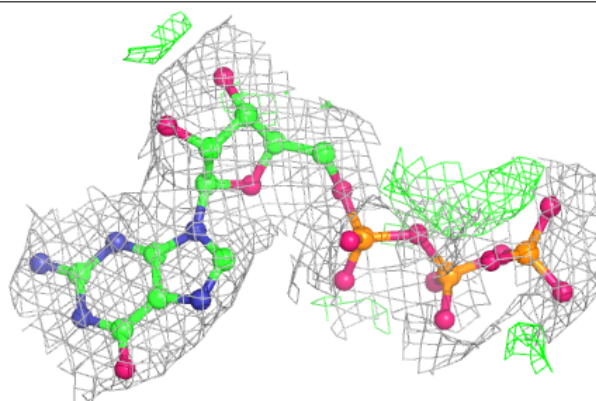
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ACP F 402:

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

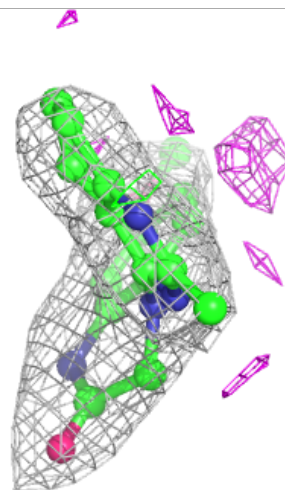
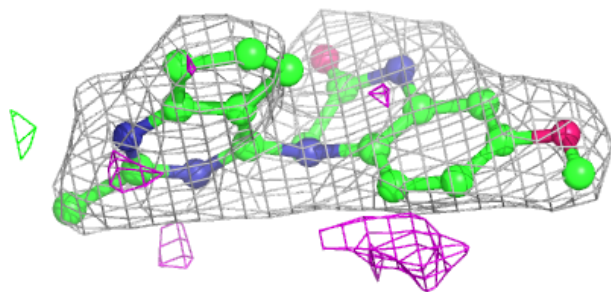
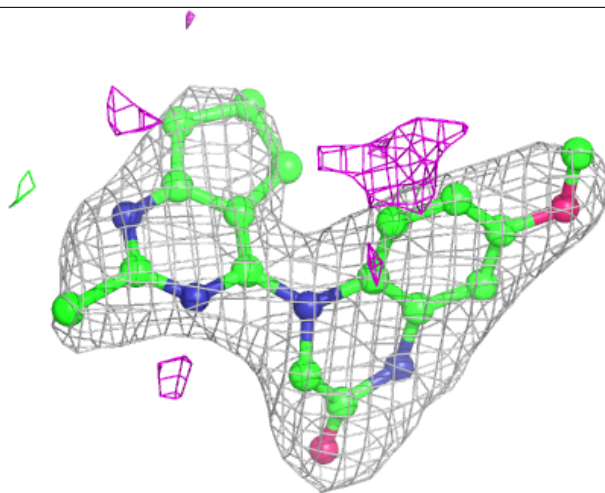
**Electron density around GTP D 501:**

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



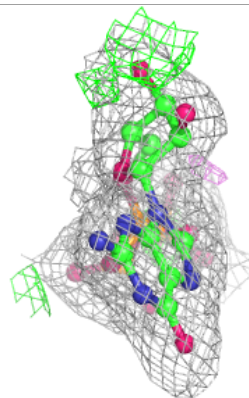
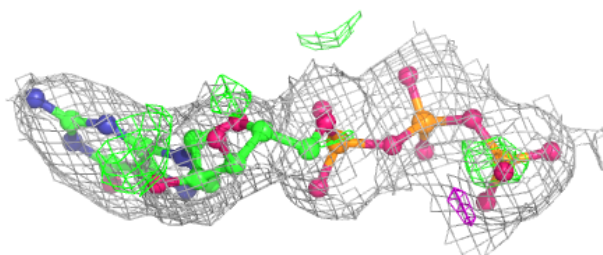
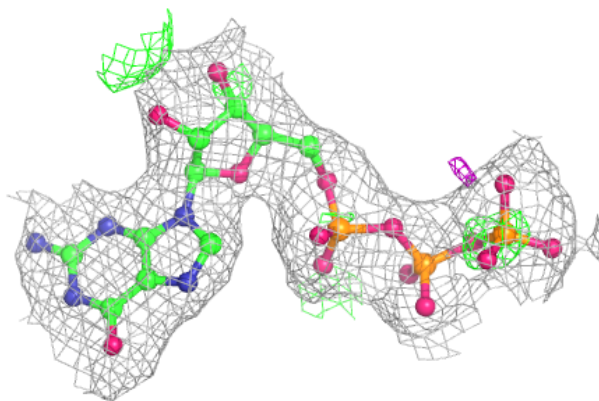
Electron density around Y5L D 503:

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

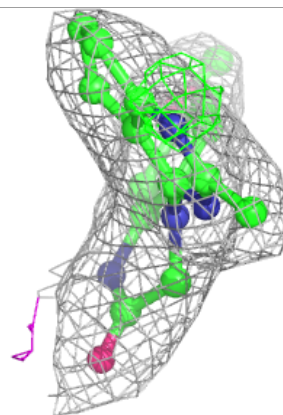
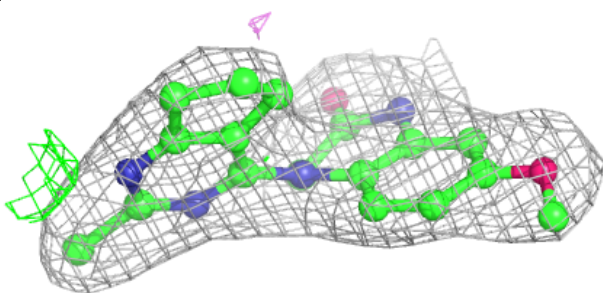
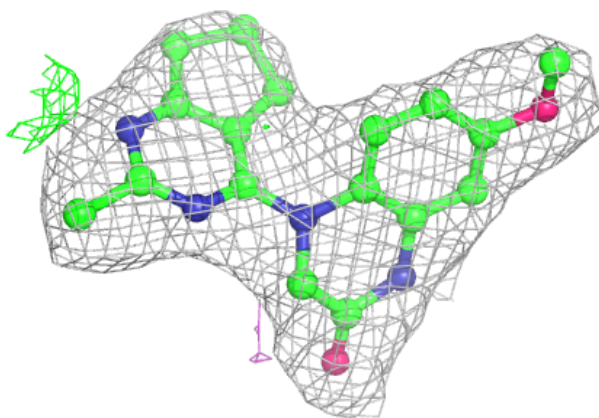


Electron density around GTP C 501:

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

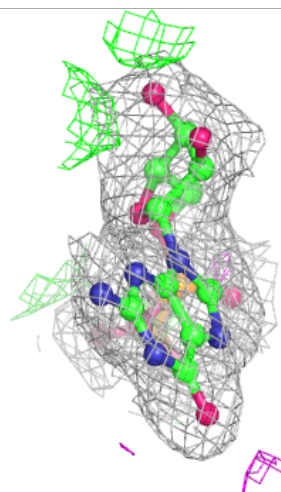
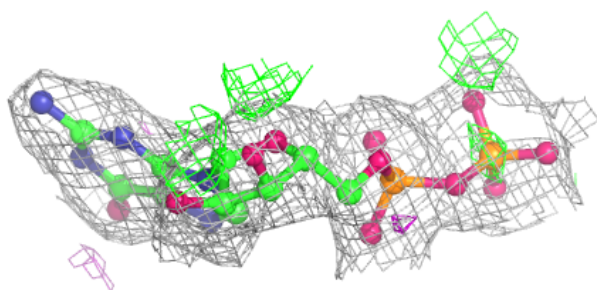
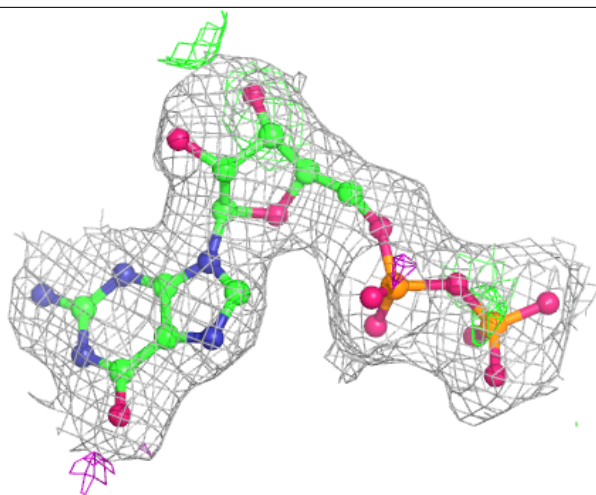
**Electron density around Y5L B 505:**

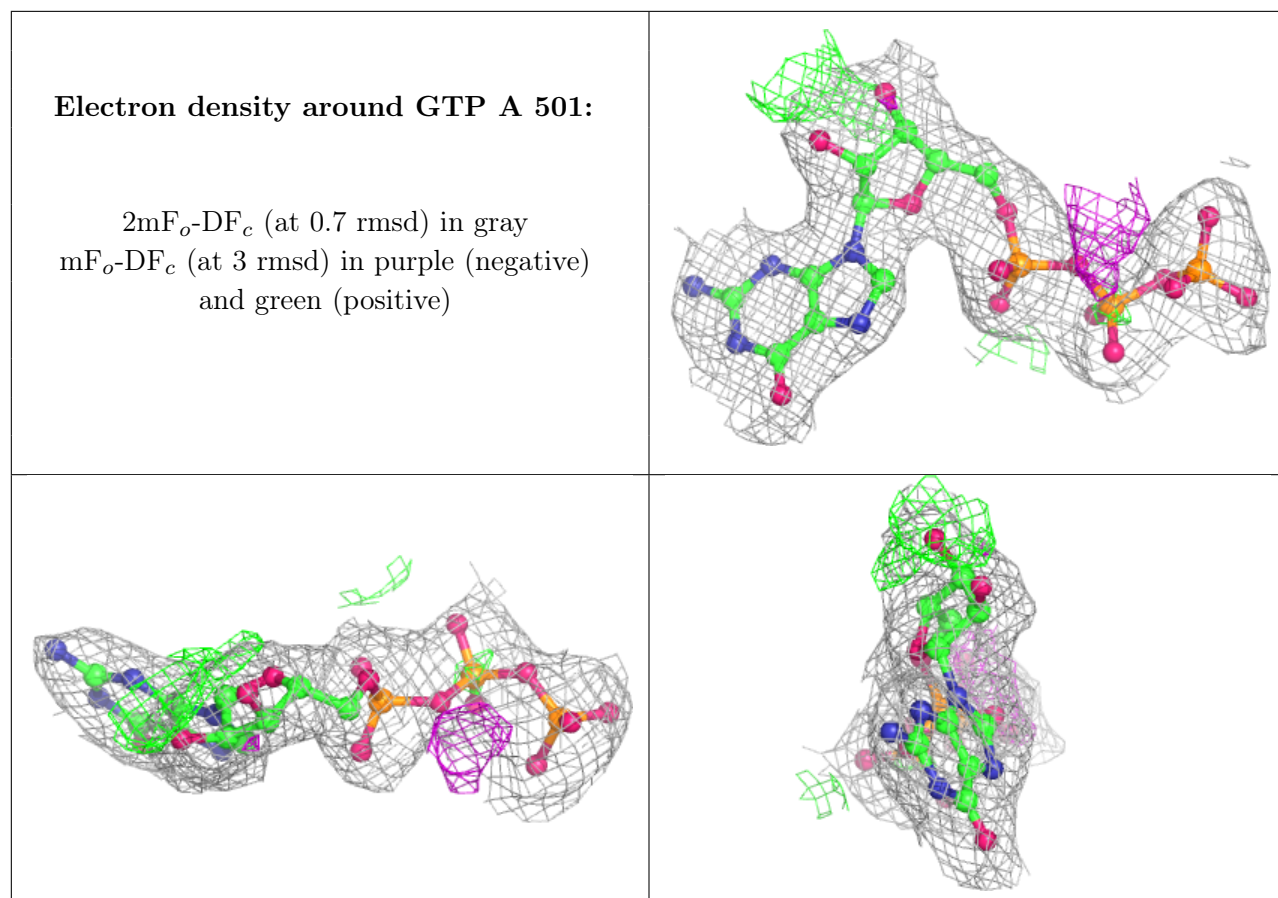
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around GDP B 501:

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





6.5 Other polymers [i](#)

There are no such residues in this entry.