



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 02:32 PM UTC

PDB ID : 6BS2 / pdb_00006bs2
Title : Tubulin-RB3_SLD-TTL in complex with heterocyclic pyrimidine compound 8b
Authors : Kumar, G.; Wang, Y.; Li, W.; White, S.W.
Deposited on : 2017-12-01
Resolution : 2.65 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

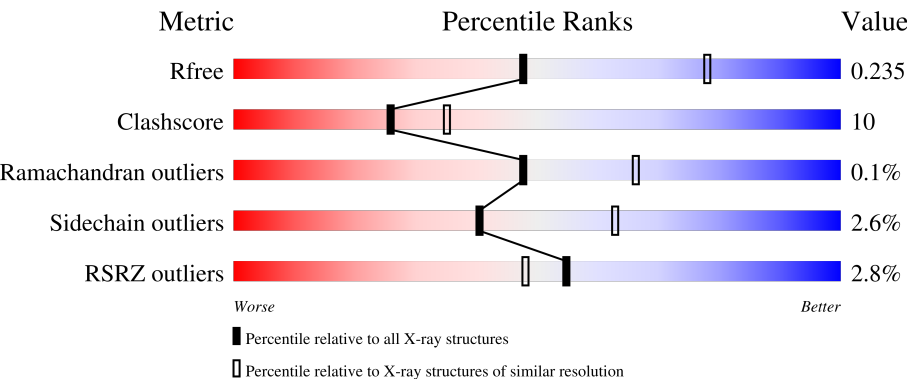
MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance i

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

The reported resolution of this entry is 2.65 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}	180053	1110 (2.66-2.66)
Clashscore	190562	1141 (2.66-2.66)
Ramachandran outliers	187476	1126 (2.66-2.66)
Sidechain outliers	187428	1126 (2.66-2.66)
RSRZ outliers	180081	1110 (2.66-2.66)

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	<div><div>81%16%.</div></div>
1	C	450	<div><div>80%17%.</div></div>
2	B	445	<div><div>78%16%..</div></div>
2	D	445	<div><div>3%73%21%5%</div></div>
3	E	143	<div><div>2%67%17%.15%</div></div>

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Mol	Chain	Length	Quality of chain
4	F	384	<div><div></div><div>8%</div><div>64%</div><div>21%</div><div>•</div><div>14%</div></div>

2 Entry composition [i](#)

There are 12 unique types of molecules in this entry. The entry contains 17633 atoms, of which 14 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	437	Total	C	N	O	S	0	0	0
			3404	2155	579	648	22			
1	C	440	Total	C	N	O	S	0	0	0
			3437	2175	584	656	22			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	427	Total	C	N	O	S	0	0	0
			3355	2107	573	649	26			
2	D	421	Total	C	N	O	S	0	0	0
			3307	2079	562	639	27			

- Molecule 3 is a protein called Stathmin-4.

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

There are 2 discrepancies between the modelled and reference sequences:

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

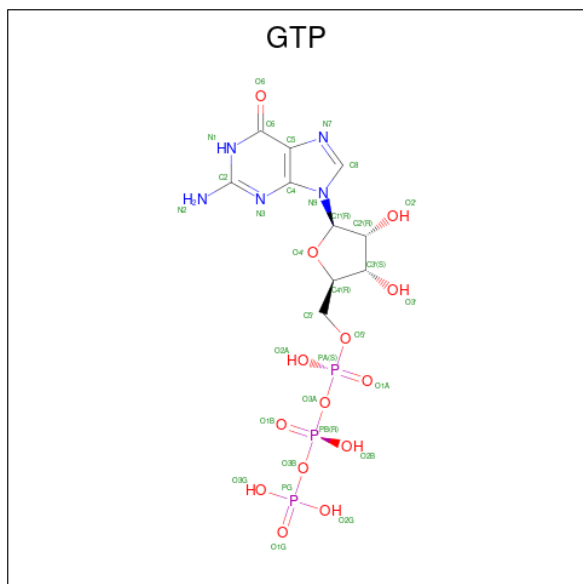
- Molecule 4 is a protein called Tubulin tyrosine ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	332	Total	C	N	O	S	0	0	0
			2707	1741	464	488	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 (CCD ID: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



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

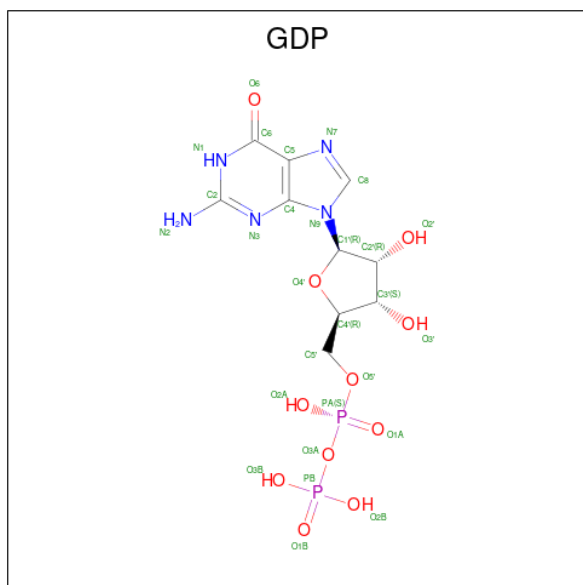
- Molecule 6 is CALCIUM ION (CCD ID: CA) (formula: Ca).

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

- Molecule 7 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

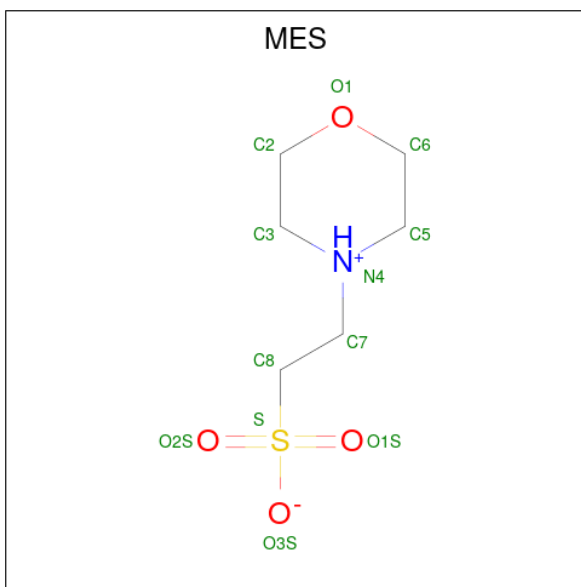
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total Mg 1 1	0	0
7	B	1	Total Mg 1 1	0	0
7	C	1	Total Mg 1 1	0	0
7	F	1	Total Mg 1 1	0	0

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



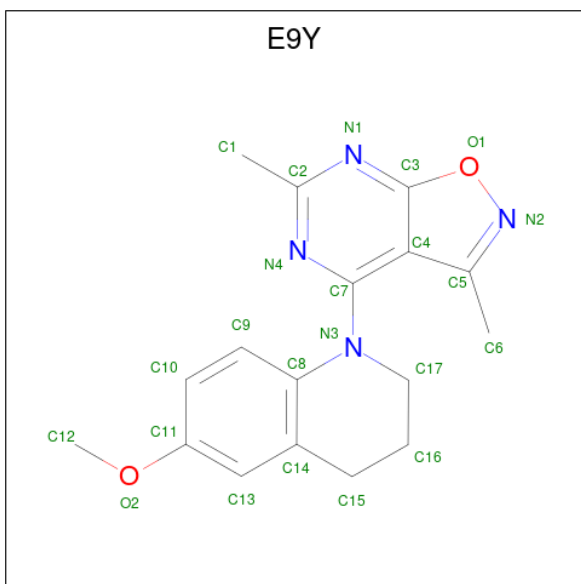
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C N O P 28 10 5 11 2	0	0
8	D	1	Total C N O P 28 10 5 11 2	0	0

- Molecule 9 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: $C_6H_{13}NO_4S$).



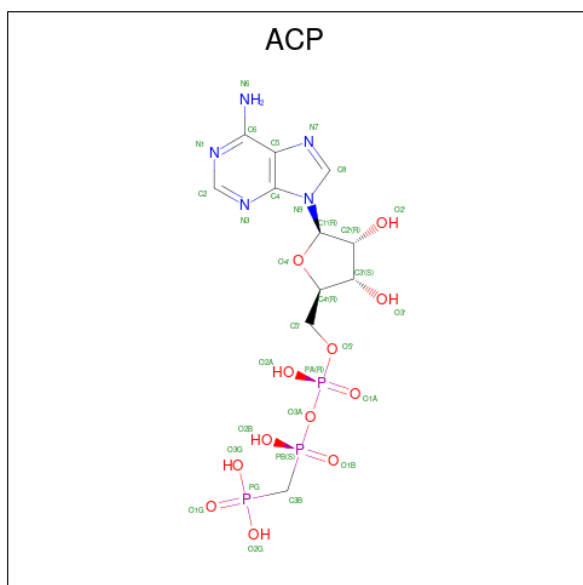
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	B	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
9	B	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
9	C	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 10 is 1-(3,6-dimethyl[1,2]oxazolo[5,4-d]pyrimidin-4-yl)-6-methoxy-1,2,3,4-tetrahydroquinoline (CCD ID: E9Y) (formula: C₁₇H₁₈N₄O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
10	B	1	Total	C	N	O	0	0
			23	17	4	2		
10	D	1	Total	C	N	O	0	0
			23	17	4	2		

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



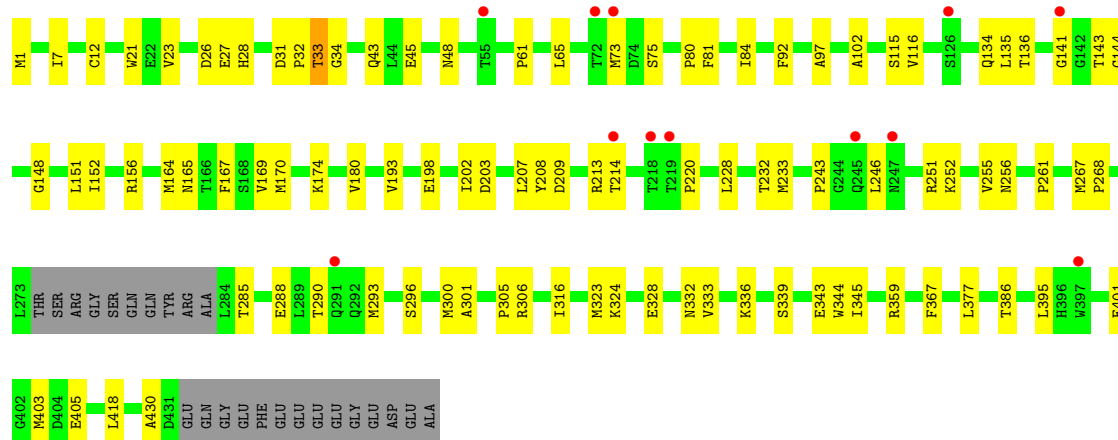
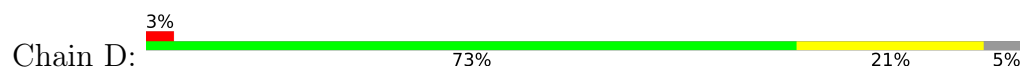
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
11	F	1	Total	C	H	N	O	P	0	0
			45	11	14	5	12	3		

- Molecule 12 is water.

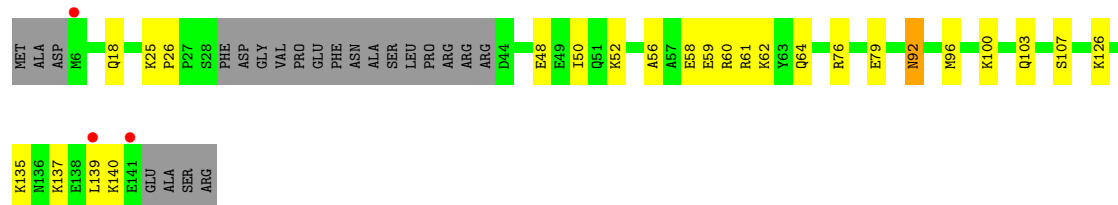
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	40	Total	O	0	0
			40	40		
12	B	37	Total	O	0	0
			37	37		
12	C	56	Total	O	0	0
			56	56		
12	D	23	Total	O	0	0
			23	23		
12	E	2	Total	O	0	0
			2	2		
12	F	12	Total	O	0	0
			12	12		



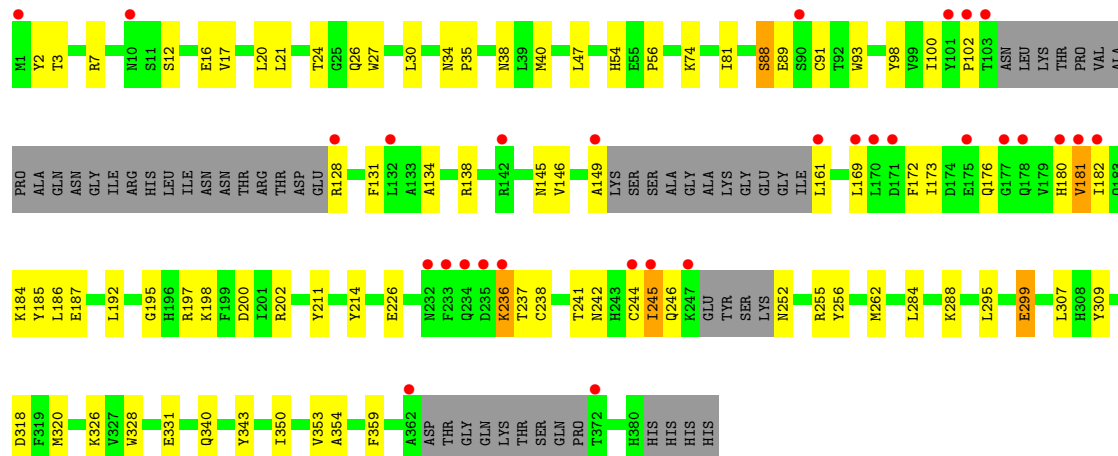
• Molecule 2: Tubulin beta-2B chain



• 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	105.10Å 157.60Å 181.51Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.75 – 2.65 49.75 – 2.65	Depositor EDS
% Data completeness (in resolution range)	97.2 (49.75-2.65) 97.2 (49.75-2.65)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.28 (at 2.65Å)	Xtriage
Refinement program	PHENIX 1.11.1 _2575	Depositor
R, R_{free}	0.181 , 0.234 0.182 , 0.235	Depositor DCC
R_{free} test set	4223 reflections (4.79%)	wwPDB-VP
Wilson B-factor (Å ²)	41.4	Xtriage
Anisotropy	0.063	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 38.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	17633	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.53% 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: MES, E9Y, GDP, GTP, MG, ACP, CA

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.34	0/3482	0.59	0/4730
1	C	0.40	0/3515	0.63	0/4772
2	B	0.37	0/3430	0.59	0/4647
2	D	0.31	0/3380	0.55	0/4578
3	E	0.36	0/1008	0.49	0/1337
4	F	0.28	0/2769	0.51	0/3743
All	All	0.35	0/17584	0.57	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	3404	0	3305	59	0
1	C	3437	0	3349	57	0
2	B	3355	0	3227	72	0
2	D	3307	0	3184	69	0
3	E	1000	0	1018	20	0
4	F	2707	0	2667	65	0
5	A	32	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	32	0	12	0	0
6	A	1	0	0	0	0
6	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	F	1	0	0	0	0
8	B	28	0	12	0	0
8	D	28	0	12	3	0
9	B	24	0	24	1	0
9	C	12	0	12	2	0
10	B	23	0	0	2	0
10	D	23	0	0	0	0
11	F	31	14	14	0	0
12	A	40	0	0	0	0
12	B	37	0	0	0	0
12	C	56	0	0	1	0
12	D	23	0	0	1	0
12	E	2	0	0	0	0
12	F	12	0	0	2	0
All	All	17619	14	16848	327	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 10.

All (327) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:283:ALA:HA	2:B:362:LYS:HE3	1.21	1.09
2:B:321:MET:HB3	2:B:363:MET:HE1	1.36	1.04
2:D:170:MET:HE2	2:D:377:LEU:HD21	1.38	1.03
1:C:30:ILE:HG12	1:C:36:MET:HE3	1.46	0.97
2:B:186:THR:HA	2:B:415:MET:HE1	1.46	0.95
4:F:24:THR:HG23	4:F:26:GLN:H	1.33	0.93
1:C:221:ARG:HD2	2:D:323:MET:HG2	1.48	0.92
1:A:71:GLU:OE1	1:A:73:THR:HB	1.70	0.90
1:C:381:THR:HG22	1:C:383:ALA:H	1.36	0.89
2:B:283:ALA:CA	2:B:362:LYS:HE3	2.03	0.88
1:C:30:ILE:CG1	1:C:36:MET:HE3	2.04	0.88
2:B:189:VAL:HB	2:B:415:MET:HE2	1.58	0.86
1:A:109:THR:HG21	1:A:411:GLU:OE2	1.78	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:246:LEU:O	2:B:247:ASN:ND2	2.15	0.79
2:B:362:LYS:HD2	2:B:363:MET:CG	2.13	0.78
1:C:221:ARG:CD	2:D:323:MET:HG2	2.13	0.78
4:F:21:LEU:O	4:F:24:THR:HG22	1.84	0.77
4:F:149:ALA:HB2	4:F:161:LEU:HB3	1.68	0.76
4:F:172:PHE:O	4:F:176:GLN:HG2	1.86	0.74
2:D:228:LEU:HB3	2:D:300:MET:HE1	1.68	0.74
1:A:262:TYR:HE2	1:A:346:TRP:CZ2	2.06	0.73
1:A:88:HIS:N	1:A:91:GLN:OE1	2.19	0.73
2:D:343:GLU:HG3	2:D:430:ALA:HB2	1.71	0.73
1:C:254:GLU:HG2	1:C:352:LYS:HE2	1.70	0.73
1:A:285:GLN:HG3	1:A:372:GLN:NE2	2.05	0.71
1:A:349:THR:OG1	3:E:25:LYS:HE3	1.88	0.71
1:A:36:MET:HE3	1:A:61:HIS:CE1	2.25	0.70
1:C:28:HIS:O	1:C:36:MET:HE2	1.92	0.70
2:D:232:THR:OG1	2:D:300:MET:HE2	1.92	0.70
2:B:186:THR:HA	2:B:415:MET:CE	2.21	0.70
2:B:134:GLN:HA	2:B:165:ASN:O	1.92	0.69
1:C:209:ILE:HD11	1:C:302:MET:HE3	1.73	0.69
4:F:245:ILE:HG22	4:F:245:ILE:O	1.91	0.69
1:A:88:HIS:CE1	1:A:90:GLU:HG3	2.28	0.68
2:B:321:MET:HE2	2:B:363:MET:CE	2.23	0.68
4:F:149:ALA:O	4:F:180:HIS:ND1	2.26	0.68
4:F:242:ASN:HB2	4:F:245:ILE:HB	1.76	0.67
1:C:427:ALA:HA	1:C:430:LYS:HE3	1.76	0.67
1:A:221:ARG:HE	2:B:323:MET:HE2	1.58	0.67
4:F:149:ALA:CB	4:F:161:LEU:HB3	2.24	0.67
2:B:2:ARG:NH2	2:B:131:GLN:HB3	2.11	0.66
3:E:56:ALA:O	3:E:59:GLU:HG3	1.96	0.66
1:A:166:LYS:HE2	1:A:197:HIS:O	1.95	0.66
4:F:226:GLU:OE1	4:F:252:ASN:HB2	1.97	0.65
2:B:362:LYS:HD2	2:B:363:MET:HG3	1.77	0.65
1:C:209:ILE:HD11	1:C:302:MET:CE	2.27	0.64
2:D:143:THR:HB	8:D:501:GDP:O1B	1.97	0.64
1:A:430:LYS:NZ	1:A:434:GLU:OE1	2.30	0.64
2:B:283:ALA:HA	2:B:362:LYS:CE	2.14	0.63
4:F:98:TYR:O	4:F:181:VAL:HG23	1.98	0.63
1:A:188:ILE:HD12	1:A:425:MET:HG3	1.80	0.63
2:D:80:PRO:O	2:D:81:PHE:HB2	1.98	0.62
4:F:7:ARG:CD	4:F:40:MET:HE2	2.29	0.62
1:C:264:ARG:HD3	9:C:503:MES:H81	1.81	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:323:MET:SD	2:B:353:VAL:HG21	2.39	0.62
2:D:134:GLN:HA	2:D:165:ASN:O	1.99	0.62
4:F:24:THR:HG21	4:F:27:TRP:HD1	1.64	0.61
1:A:109:THR:CG2	1:A:411:GLU:HB3	2.30	0.61
2:D:324:LYS:O	2:D:328:GLU:HG3	2.01	0.61
2:D:285:THR:OG1	2:D:288:GLU:HG3	1.99	0.61
1:A:71:GLU:HG2	1:A:72:PRO:HD2	1.82	0.61
4:F:340:GLN:HA	4:F:343:TYR:HD2	1.65	0.61
1:C:71:GLU:HG2	1:C:72:PRO:HD2	1.81	0.61
2:D:97:ALA:HB2	2:D:143:THR:OG1	2.01	0.61
2:B:284:LEU:H	2:B:362:LYS:CE	2.14	0.60
3:E:25:LYS:HD2	3:E:26:PRO:O	2.01	0.60
2:B:362:LYS:HD2	2:B:363:MET:HG2	1.82	0.60
1:A:11:GLN:HG3	1:A:74:VAL:HG21	1.84	0.60
1:C:147:SER:O	1:C:190:THR:HG23	2.02	0.60
2:D:34:GLY:HA2	2:D:84:ILE:HD11	1.84	0.60
2:B:316:ILE:HG23	2:B:366:THR:HB	1.84	0.60
2:D:316:ILE:N	2:D:316:ILE:HD12	2.15	0.60
2:B:283:ALA:HB1	2:B:362:LYS:HD3	1.84	0.60
2:D:1:MET:HA	2:D:48:ASN:ND2	2.17	0.59
4:F:146:VAL:HG12	4:F:187:GLU:OE2	2.02	0.59
1:C:335:ILE:HG23	1:C:339:ARG:HG3	1.84	0.59
3:E:92:ASN:OD1	3:E:96:MET:HE3	2.01	0.59
1:A:349:THR:HB	3:E:25:LYS:HG3	1.84	0.59
2:B:280:GLN:HG3	2:B:280:GLN:O	2.02	0.59
2:B:283:ALA:CB	2:B:362:LYS:HD3	2.33	0.59
2:D:401:GLU:HA	3:E:137:LYS:CD	2.33	0.58
4:F:186:LEU:HD12	4:F:320:MET:HG2	1.84	0.58
1:A:346:TRP:CZ3	1:A:347:CYS:SG	2.97	0.58
1:A:209:ILE:HG22	1:A:227:LEU:HD22	1.86	0.58
1:C:88:HIS:HE1	1:C:90:GLU:HG3	1.69	0.58
2:D:21:TRP:CZ3	2:D:61:PRO:HB3	2.38	0.58
1:A:179:THR:HA	2:B:350:LYS:HD2	1.86	0.58
2:B:321:MET:HE2	2:B:363:MET:HE2	1.84	0.58
2:B:285:THR:OG1	2:B:288:GLU:HG3	2.04	0.57
2:B:362:LYS:CD	2:B:363:MET:HG3	2.34	0.57
1:C:88:HIS:CE1	1:C:90:GLU:HG3	2.39	0.57
2:B:321:MET:HE2	2:B:363:MET:HE1	1.86	0.57
1:C:36:MET:HB3	1:C:61:HIS:CE1	2.39	0.57
1:C:234:ILE:HG12	1:C:302:MET:HE2	1.86	0.57
2:D:73:MET:SD	2:D:92:PHE:HB3	2.44	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:56:ALA:HA	3:E:59:GLU:HG2	1.87	0.57
4:F:245:ILE:O	4:F:245:ILE:CG2	2.53	0.56
4:F:138:ARG:HB3	4:F:145:ASN:ND2	2.20	0.56
1:C:100:ALA:HA	2:D:252:LYS:HG2	1.88	0.56
1:A:39:ASP:OD1	1:A:61:HIS:HE1	1.87	0.56
2:B:190:HIS:ND1	2:B:414:ASN:ND2	2.54	0.56
2:B:284:LEU:H	2:B:362:LYS:HE2	1.71	0.56
2:D:156:ARG:HD3	12:D:612:HOH:O	2.04	0.56
2:D:395:LEU:HD21	2:D:405:GLU:HG2	1.88	0.55
1:A:36:MET:HE1	1:A:49:PHE:CE1	2.41	0.55
4:F:34:ASN:OD1	4:F:35:PRO:HD2	2.04	0.55
1:C:1:MET:HB3	1:C:130:THR:OG1	2.07	0.55
2:D:377:LEU:C	2:D:377:LEU:HD23	2.31	0.55
2:B:169:VAL:HA	2:B:202:ILE:O	2.06	0.55
4:F:2:TYR:CZ	4:F:359:PHE:HB3	2.42	0.55
1:A:187:SER:CB	1:A:391:LEU:HD21	2.37	0.55
2:B:158:GLU:HG2	2:B:159:TYR:CE2	2.41	0.55
4:F:2:TYR:CE1	4:F:359:PHE:HB3	2.42	0.55
1:A:36:MET:CE	1:A:61:HIS:CE1	2.89	0.54
4:F:211:TYR:CE2	4:F:299:GLU:HG2	2.43	0.54
1:A:265:ILE:HG23	1:A:432:TYR:CE1	2.43	0.54
2:D:401:GLU:HA	3:E:137:LYS:HD3	1.88	0.54
4:F:192:LEU:HD13	4:F:262:MET:HE1	1.88	0.54
2:B:189:VAL:CB	2:B:415:MET:HE2	2.36	0.54
1:A:161:TYR:HB3	1:A:164:LYS:CG	2.38	0.54
2:B:46:ARG:NH1	2:B:242:PHE:O	2.40	0.54
2:D:290:THR:HG22	2:D:333:VAL:HG21	1.89	0.53
1:C:71:GLU:HB2	1:C:98:ASP:HB3	1.89	0.53
4:F:89:GLU:C	4:F:91:CYS:H	2.16	0.53
4:F:184:LYS:NZ	12:F:501:HOH:O	2.40	0.53
4:F:169:LEU:O	4:F:173:ILE:HG13	2.08	0.53
2:D:213:ARG:O	2:D:214:THR:HB	2.09	0.53
4:F:195:GLY:C	4:F:197:ARG:HG3	2.34	0.53
1:A:221:ARG:NE	2:B:323:MET:HE2	2.24	0.53
1:A:100:ALA:HA	2:B:252:LYS:HG2	1.91	0.52
1:A:262:TYR:CE2	1:A:346:TRP:CH2	2.97	0.52
1:C:292:THR:HG22	1:C:335:ILE:CD1	2.40	0.52
4:F:146:VAL:HG12	4:F:187:GLU:CD	2.35	0.52
1:C:221:ARG:NE	2:D:323:MET:HG2	2.25	0.52
1:C:63:PRO:HG2	1:C:87:PHE:CE2	2.45	0.51
1:A:187:SER:HB3	1:A:391:LEU:HD21	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:227:LEU:O	1:A:231:ILE:HG13	2.11	0.51
4:F:16:GLU:O	4:F:20:LEU:HD23	2.11	0.50
2:B:64:ILE:CD1	2:B:120:VAL:HG22	2.40	0.50
1:A:262:TYR:CE2	1:A:346:TRP:CZ2	2.93	0.50
1:C:104:ALA:HB2	1:C:413:MET:SD	2.52	0.50
1:A:178:SER:HB2	1:A:183:GLU:OE1	2.12	0.50
2:B:246:LEU:C	2:B:247:ASN:HD22	2.15	0.50
3:E:140:LYS:HG3	3:E:140:LYS:O	2.11	0.50
2:B:237:THR:O	2:B:241:ARG:HG3	2.11	0.50
2:D:81:PHE:O	2:D:84:ILE:HG22	2.11	0.50
2:B:166:THR:OG1	2:B:199:THR:HB	2.11	0.50
1:A:155:GLU:HB3	3:E:50:ILE:HD11	1.94	0.50
2:B:65:LEU:HD22	2:B:90:PHE:CE2	2.47	0.50
1:C:270:ALA:O	1:C:302:MET:HG2	2.12	0.50
4:F:3:THR:O	4:F:38:ASN:HB2	2.12	0.50
1:A:161:TYR:HB3	1:A:164:LYS:HG2	1.93	0.49
4:F:17:VAL:O	4:F:21:LEU:HG	2.12	0.49
1:A:141:PHE:O	1:A:147:SER:HB3	2.12	0.49
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.47	0.49
10:B:505:E9Y:C9	10:B:505:E9Y:C6	2.90	0.49
1:C:165:SER:HA	1:C:199:ASP:OD1	2.12	0.49
2:D:332:ASN:HD21	2:D:336:LYS:HE3	1.76	0.49
3:E:58:GLU:HG3	3:E:61:ARG:NH2	2.28	0.49
2:B:186:THR:HG23	2:B:415:MET:HE3	1.95	0.49
2:D:33:THR:O	2:D:33:THR:CG2	2.61	0.49
1:A:141:PHE:CE1	1:A:170:SER:HB3	2.48	0.48
1:A:390:ARG:HD2	4:F:54:HIS:CD2	2.48	0.48
2:B:238:THR:HG21	2:B:318:ARG:HD3	1.94	0.48
3:E:56:ALA:O	3:E:59:GLU:CG	2.60	0.48
1:C:361:THR:HG22	1:C:362:VAL:N	2.28	0.48
9:B:503:MES:H51	9:B:503:MES:H81	1.61	0.48
1:C:166:LYS:HE2	1:C:197:HIS:O	2.14	0.48
2:D:169:VAL:HA	2:D:202:ILE:O	2.13	0.48
3:E:59:GLU:HG3	3:E:60:ARG:N	2.28	0.48
1:C:7:ILE:HG21	1:C:153:LEU:HD21	1.96	0.48
3:E:100:LYS:O	3:E:103:GLN:HG3	2.13	0.48
1:C:248:LEU:HD12	1:C:357:TYR:OH	2.14	0.48
2:D:174:LYS:HD2	2:D:208:TYR:CD2	2.49	0.48
3:E:59:GLU:HG3	3:E:60:ARG:H	1.78	0.48
2:B:247:ASN:CG	2:B:247:ASN:O	2.57	0.48
2:B:219:THR:HG21	1:C:326:LYS:HA	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:268:PRO:HA	2:B:367:PHE:O	2.14	0.47
2:D:116:VAL:HG11	2:D:151:LEU:HD21	1.95	0.47
4:F:146:VAL:HG13	4:F:185:TYR:HB3	1.97	0.47
1:A:209:ILE:HG23	1:A:230:LEU:HD23	1.97	0.47
4:F:255:ARG:HD2	4:F:256:TYR:CE1	2.49	0.47
1:A:398:MET:CE	1:A:404:PHE:CD2	2.97	0.47
2:D:116:VAL:CG1	2:D:151:LEU:HD21	2.45	0.47
4:F:146:VAL:CG1	4:F:187:GLU:HG2	2.45	0.47
4:F:200:ASP:OD2	4:F:241:THR:OG1	2.24	0.47
2:D:21:TRP:CH2	2:D:61:PRO:HB3	2.50	0.47
2:D:203:ASP:O	2:D:207:LEU:HG	2.15	0.47
2:D:141:GLY:HA3	8:D:501:GDP:O3A	2.14	0.47
1:C:255:PHE:CE1	1:C:352:LYS:HG2	2.50	0.46
2:D:293:MET:HE2	2:D:367:PHE:HB2	1.97	0.46
4:F:186:LEU:CD1	4:F:320:MET:HG2	2.45	0.46
2:D:208:TYR:CE1	2:D:220:PRO:HD2	2.50	0.46
1:C:83:TYR:HD1	1:C:86:LEU:HD22	1.81	0.46
1:C:234:ILE:HG12	1:C:302:MET:CE	2.45	0.46
1:A:36:MET:HB3	1:A:61:HIS:CD2	2.51	0.46
4:F:56:PRO:HD2	12:F:503:HOH:O	2.16	0.46
1:A:241:SER:HB2	1:A:249:ASN:O	2.16	0.45
2:B:377:LEU:HD23	2:B:381:ILE:HD12	1.98	0.45
1:C:391:LEU:HA	1:C:391:LEU:HD23	1.69	0.45
2:D:267:MET:HG3	2:D:301:ALA:HB3	1.99	0.45
4:F:7:ARG:HD2	4:F:40:MET:HE2	1.98	0.45
4:F:211:TYR:CE2	4:F:299:GLU:CG	3.00	0.45
1:A:265:ILE:HG23	1:A:432:TYR:CZ	2.51	0.45
1:C:320:ARG:HA	1:C:356:ASN:O	2.16	0.45
2:B:283:ALA:CA	2:B:362:LYS:CE	2.85	0.45
2:B:360:GLY:O	2:B:361:LEU:HD23	2.16	0.45
2:D:144:GLY:O	2:D:148:GLY:HA3	2.16	0.45
1:A:36:MET:HB3	1:A:61:HIS:NE2	2.32	0.45
2:B:317:PHE:HB2	2:B:353:VAL:HG12	1.97	0.45
4:F:16:GLU:HG3	4:F:20:LEU:HD23	1.98	0.45
2:B:2:ARG:HG2	2:B:2:ARG:HH11	1.81	0.45
1:C:180:ALA:HB3	1:C:183:GLU:HG3	1.98	0.45
1:C:406:HIS:CG	2:D:261:PRO:HD3	2.51	0.45
2:D:23:VAL:O	2:D:27:GLU:HG3	2.16	0.45
1:C:83:TYR:CD1	1:C:86:LEU:HD22	2.52	0.45
2:D:167:PHE:CG	2:D:233:MET:HE3	2.52	0.45
2:B:211:CYS:HA	2:B:215:LEU:HB2	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:251:ARG:O	2:D:255:VAL:HG23	2.17	0.45
2:B:201:CYS:SG	2:B:265:PHE:HB3	2.56	0.45
2:D:268:PRO:HA	2:D:367:PHE:O	2.17	0.45
1:A:88:HIS:HE1	1:A:90:GLU:HG3	1.77	0.45
1:C:141:PHE:HB3	1:C:187:SER:OG	2.17	0.45
2:D:102:ALA:HB2	2:D:403:MET:SD	2.57	0.45
1:C:254:GLU:HG2	1:C:352:LYS:CE	2.44	0.44
4:F:81:ILE:O	4:F:88:SER:HB2	2.18	0.44
1:A:27:GLU:CD	1:A:320:ARG:HH22	2.26	0.44
2:B:6:HIS:CD2	2:B:21:TRP:HE1	2.35	0.44
2:B:19:LYS:HB3	2:B:19:LYS:HE3	1.80	0.44
4:F:131:PHE:CE1	4:F:182:ILE:HD11	2.53	0.44
4:F:309:TYR:C	4:F:309:TYR:CD2	2.94	0.44
1:A:51:THR:HG22	1:A:52:PHE:CD1	2.53	0.44
2:D:296:SER:HB2	2:D:305:PRO:HD2	2.00	0.44
2:B:27:GLU:CD	2:B:318:ARG:HH22	2.26	0.44
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.53	0.44
2:D:28:HIS:HA	2:D:43:GLN:HB3	2.00	0.44
1:A:6:SER:O	1:A:65:ALA:HA	2.18	0.44
2:B:73:MET:CE	2:B:92:PHE:HD1	2.31	0.44
1:C:177:VAL:HG23	12:C:642:HOH:O	2.18	0.44
3:E:48:GLU:O	3:E:52:LYS:HB2	2.18	0.44
1:C:28:HIS:HB3	1:C:36:MET:CE	2.47	0.43
1:C:316:CYS:O	1:C:377:MET:HG3	2.18	0.43
1:A:192:HIS:CG	1:A:421:ALA:HA	2.53	0.43
2:D:34:GLY:CA	2:D:84:ILE:HD11	2.46	0.43
4:F:88:SER:OG	4:F:89:GLU:HB2	2.18	0.43
2:B:23:VAL:O	2:B:27:GLU:HG3	2.17	0.43
2:D:12:CYS:HB2	8:D:501:GDP:C8	2.53	0.43
2:D:246:LEU:HD23	2:D:246:LEU:HA	1.78	0.43
3:E:135:LYS:HG2	3:E:139:LEU:HD13	2.00	0.43
2:B:362:LYS:H	2:B:362:LYS:HG3	1.62	0.43
1:C:227:LEU:O	1:C:231:ILE:HG13	2.19	0.43
4:F:91:CYS:SG	4:F:93:TRP:CE2	3.11	0.43
2:B:314:ALA:HB3	2:B:368:ILE:HB	2.01	0.43
1:C:174:ALA:HB1	1:C:207:GLU:HB2	1.99	0.43
2:D:65:LEU:N	2:D:65:LEU:HD12	2.34	0.43
2:D:170:MET:HE3	2:D:170:MET:HB3	1.75	0.43
2:B:65:LEU:N	2:B:65:LEU:HD12	2.34	0.43
3:E:60:ARG:O	3:E:64:GLN:HG3	2.19	0.43
1:A:2:ARG:CB	1:A:133:GLN:HG2	2.48	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:298:PRO:HA	1:A:301:GLN:CD	2.43	0.43
2:D:344:TRP:CE3	2:D:345:ILE:HG13	2.54	0.43
4:F:202:ARG:NE	4:F:318:ASP:OD1	2.42	0.43
2:D:152:ILE:HG23	2:D:164:MET:HG2	2.00	0.43
1:A:249:ASN:N	1:A:254:GLU:OE2	2.53	0.42
2:D:7:ILE:O	2:D:135:LEU:HA	2.18	0.42
2:B:403:MET:HE2	2:B:403:MET:HB3	1.92	0.42
1:C:210:TYR:CZ	1:C:222:PRO:HD2	2.54	0.42
2:D:26:ASP:CG	2:D:359:ARG:HE	2.26	0.42
2:B:2:ARG:CZ	2:B:131:GLN:HB3	2.49	0.42
2:B:31:ASP:HB2	2:B:32:PRO:CD	2.48	0.42
2:B:362:LYS:HZ3	2:B:363:MET:HB2	1.84	0.42
2:D:193:VAL:CG2	2:D:418:LEU:HD22	2.49	0.42
2:B:247:ASN:ND2	2:B:247:ASN:O	2.52	0.42
2:B:377:LEU:HD23	2:B:377:LEU:C	2.45	0.42
4:F:181:VAL:CG2	4:F:182:ILE:N	2.81	0.42
4:F:295:LEU:HD23	4:F:295:LEU:HA	1.88	0.42
1:C:221:ARG:HE	2:D:323:MET:CG	2.32	0.42
2:D:165:ASN:HA	2:D:198:GLU:O	2.20	0.42
4:F:185:TYR:OH	4:F:198:LYS:NZ	2.53	0.42
1:A:147:SER:HB2	1:A:190:THR:HB	2.02	0.42
10:B:505:E9Y:C6	10:B:505:E9Y:C8	2.98	0.42
2:D:12:CYS:SG	2:D:169:VAL:HG21	2.60	0.42
4:F:326:LYS:HD3	4:F:328:TRP:CZ2	2.55	0.42
1:C:147:SER:O	1:C:190:THR:CG2	2.68	0.42
4:F:89:GLU:C	4:F:91:CYS:N	2.78	0.42
4:F:244:CYS:C	4:F:246:GLN:H	2.28	0.42
2:B:28:HIS:HB3	2:B:47:ILE:HD12	2.01	0.42
2:D:84:ILE:HD12	2:D:84:ILE:HA	1.93	0.42
4:F:284:LEU:O	4:F:288:LYS:HG3	2.20	0.42
2:D:45:GLU:OE1	2:D:243:PRO:HG3	2.19	0.41
1:A:134:GLY:HA3	1:A:165:SER:O	2.19	0.41
2:B:284:LEU:N	2:B:362:LYS:HE2	2.34	0.41
2:B:377:LEU:CD2	2:B:381:ILE:HD12	2.50	0.41
1:C:298:PRO:HA	1:C:301:GLN:CD	2.44	0.41
4:F:47:LEU:C	4:F:47:LEU:HD23	2.46	0.41
1:A:70:LEU:HD23	1:A:70:LEU:HA	1.80	0.41
1:C:250:VAL:HG11	1:C:352:LYS:HE3	2.02	0.41
4:F:3:THR:HB	4:F:30:LEU:HD11	2.02	0.41
2:B:67:ASP:O	2:B:92:PHE:HA	2.21	0.41
2:D:31:ASP:HB2	2:D:32:PRO:CD	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:161:TYR:HB3	1:A:164:LYS:HG3	2.03	0.41
2:B:215:LEU:HD23	2:B:215:LEU:HA	1.82	0.41
2:D:174:LYS:HE3	2:D:209:ASP:OD1	2.21	0.41
3:E:76:ARG:HD3	3:E:79:GLU:OE1	2.20	0.41
1:A:71:GLU:OE1	1:A:73:THR:CB	2.55	0.41
1:A:285:GLN:HE21	1:A:372:GLN:HG3	1.86	0.41
1:C:174:ALA:CB	1:C:207:GLU:HB2	2.51	0.41
2:D:343:GLU:CG	2:D:430:ALA:HB2	2.45	0.41
4:F:100:ILE:CD1	4:F:128:ARG:HA	2.51	0.41
4:F:340:GLN:HA	4:F:343:TYR:CD2	2.50	0.41
1:A:51:THR:HG22	1:A:52:PHE:HD1	1.86	0.41
1:C:271:THR:HG23	1:C:300:ASN:O	2.20	0.41
2:D:193:VAL:HG21	2:D:418:LEU:HD22	2.03	0.41
4:F:88:SER:HA	4:F:89:GLU:HA	1.79	0.41
4:F:236:LYS:HE3	4:F:236:LYS:HB2	1.90	0.41
1:C:431:ASP:HB3	9:C:503:MES:H51	2.04	0.40
2:D:136:THR:HG22	2:D:167:PHE:HB2	2.03	0.40
4:F:350:ILE:O	4:F:354:ALA:HB3	2.22	0.40
2:B:73:MET:HE2	2:B:92:PHE:CD1	2.57	0.40
2:B:163:ILE:HG21	2:B:250:LEU:HB3	2.04	0.40
3:E:58:GLU:HG3	3:E:61:ARG:HH21	1.85	0.40
4:F:74:LYS:NZ	4:F:331:GLU:HG3	2.36	0.40
4:F:181:VAL:HG22	4:F:182:ILE:N	2.35	0.40
4:F:214:TYR:CE2	4:F:353:VAL:HG11	2.56	0.40
1:C:181:VAL:HG12	2:D:256:ASN:OD1	2.22	0.40
4:F:24:THR:HG23	4:F:26:GLN:N	2.17	0.40
4:F:134:ALA:O	4:F:138:ARG:HB2	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	435/450 (97%)	426 (98%)	9 (2%)	0	100	100
1	C	438/450 (97%)	428 (98%)	9 (2%)	1 (0%)	43	60
2	B	425/445 (96%)	412 (97%)	13 (3%)	0	100	100
2	D	417/445 (94%)	404 (97%)	13 (3%)	0	100	100
3	E	117/143 (82%)	116 (99%)	1 (1%)	0	100	100
4	F	322/384 (84%)	299 (93%)	21 (6%)	2 (1%)	21	34
All	All	2154/2317 (93%)	2085 (97%)	66 (3%)	3 (0%)	48	66

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	162	GLY
4	F	102	PRO
4	F	245	ILE

5.3.2 Protein sidechains ⓘ

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	365/378 (97%)	360 (99%)	5 (1%)	59	76
1	C	371/378 (98%)	363 (98%)	8 (2%)	45	67
2	B	368/383 (96%)	352 (96%)	16 (4%)	26	44
2	D	363/383 (95%)	356 (98%)	7 (2%)	50	71
3	E	109/127 (86%)	104 (95%)	5 (5%)	24	41
4	F	294/342 (86%)	286 (97%)	8 (3%)	39	61
All	All	1870/1991 (94%)	1821 (97%)	49 (3%)	40	63

All (49) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	66	VAL
1	A	109	THR

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Mol	Chain	Res	Type
1	A	250	VAL
1	A	253	THR
1	A	381	THR
2	B	47	ILE
2	B	75	SER
2	B	77	ARG
2	B	84	ILE
2	B	115	SER
2	B	162	ARG
2	B	199	THR
2	B	225	LEU
2	B	247	ASN
2	B	278	SER
2	B	291	GLN
2	B	316	ILE
2	B	353	VAL
2	B	362	LYS
2	B	363	MET
2	B	413	SER
1	C	2	ARG
1	C	178	SER
1	C	190	THR
1	C	251	ASP
1	C	256	GLN
1	C	293	ASN
1	C	384	ILE
1	C	391	LEU
2	D	33	THR
2	D	75	SER
2	D	115	SER
2	D	180	VAL
2	D	306	ARG
2	D	339	SER
2	D	386	THR
3	E	18	GLN
3	E	62	LYS
3	E	92	ASN
3	E	107	SER
3	E	126	LYS
4	F	12	SER
4	F	88	SER
4	F	181	VAL

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Mol	Chain	Res	Type
4	F	236	LYS
4	F	237	THR
4	F	238	CYS
4	F	299	GLU
4	F	307	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	GLN
1	A	31	GLN
1	A	61	HIS
1	A	285	GLN
1	A	372	GLN
1	A	393	HIS
2	B	165	ASN
1	C	285	GLN
2	D	15	GLN
2	D	165	ASN
2	D	347	ASN
4	F	183	GLN
4	F	269	GLN
4	F	310	GLN
4	F	333	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 16 ligands modelled in this entry, 6 are monoatomic - leaving 10 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	E9Y	D	502	-	25,26,26	1.09	1 (4%)	29,38,38	2.28	3 (10%)
8	GDP	B	501	7	29,30,30	1.21	3 (10%)	45,47,47	1.66	6 (13%)
5	GTP	C	501	7	33,34,34	0.91	2 (6%)	50,54,54	1.58	9 (18%)
9	MES	C	503	-	12,12,12	1.95	1 (8%)	15,16,16	1.86	3 (20%)
5	GTP	A	501	7	33,34,34	1.03	2 (6%)	50,54,54	1.54	10 (20%)
10	E9Y	B	505	-	25,26,26	1.10	1 (4%)	29,38,38	2.18	2 (6%)
11	ACP	F	402	7	31,33,33	5.47	10 (32%)	47,52,52	1.74	9 (19%)
9	MES	B	502	-	12,12,12	2.16	1 (8%)	15,16,16	2.08	2 (13%)
9	MES	B	503	-	12,12,12	2.17	1 (8%)	15,16,16	1.78	3 (20%)
8	GDP	D	501	-	29,30,30	1.35	4 (13%)	45,47,47	1.84	7 (15%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	E9Y	D	502	-	-	3/5/16/16	0/4/4/4
8	GDP	B	501	7	-	3/16/32/32	0/3/3/3
5	GTP	C	501	7	-	6/22/38/38	0/3/3/3
9	MES	C	503	-	-	1/6/14/14	0/1/1/1
5	GTP	A	501	7	-	6/22/38/38	0/3/3/3
10	E9Y	B	505	-	-	2/5/16/16	0/4/4/4
11	ACP	F	402	7	-	4/19/38/38	0/3/3/3
9	MES	B	502	-	-	2/6/14/14	0/1/1/1
9	MES	B	503	-	-	1/6/14/14	0/1/1/1
8	GDP	D	501	-	-	5/16/32/32	0/3/3/3

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	F	402	ACP	PB-O3A	27.32	1.88	1.58
11	F	402	ACP	PA-O5'	8.36	1.92	1.59
9	B	503	MES	C8-S	-7.17	1.67	1.77
9	B	502	MES	C8-S	-7.05	1.67	1.77
9	C	503	MES	C8-S	-6.32	1.68	1.77
11	F	402	ACP	PA-O3A	-5.44	1.53	1.59
10	B	505	E9Y	C7-N3	4.49	1.43	1.37
10	D	502	E9Y	C7-N3	4.46	1.43	1.37
11	F	402	ACP	C5'-C4'	4.05	1.63	1.51
8	D	501	GDP	PA-O3A	3.37	1.63	1.59
11	F	402	ACP	O5'-C5'	-3.13	1.32	1.44
11	F	402	ACP	C2-N1	3.05	1.39	1.33
8	D	501	GDP	C5-C4	3.01	1.47	1.38
11	F	402	ACP	C8-N7	2.95	1.37	1.31
8	B	501	GDP	C5-C4	2.89	1.46	1.38
11	F	402	ACP	C8-N9	2.82	1.42	1.37
5	A	501	GTP	PB-O3A	2.76	1.62	1.59
8	D	501	GDP	C6-N1	-2.68	1.33	1.38
8	B	501	GDP	C6-N1	-2.61	1.34	1.38
8	D	501	GDP	C5-N7	-2.54	1.34	1.39
11	F	402	ACP	C5-C4	2.42	1.43	1.39
5	C	501	GTP	PB-O3B	2.39	1.62	1.59
11	F	402	ACP	O3'-C3'	-2.38	1.37	1.43
8	B	501	GDP	PA-O3A	2.29	1.62	1.59
5	A	501	GTP	PA-O3A	2.25	1.61	1.59
5	C	501	GTP	C2-N3	2.13	1.38	1.33

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	D	502	E9Y	O1-C3-N1	11.21	129.26	119.96
10	B	505	E9Y	O1-C3-N1	10.67	128.81	119.96
9	B	502	MES	C5-N4-C3	6.59	123.04	108.84
8	D	501	GDP	C5-C4-N3	-6.49	118.06	128.39
8	B	501	GDP	C5-C4-N3	-5.33	119.90	128.39
11	F	402	ACP	O5'-PA-O1A	-5.14	88.55	108.94
8	D	501	GDP	C2-N3-C4	4.97	120.86	112.30
9	C	503	MES	C5-N4-C3	4.81	119.21	108.84
11	F	402	ACP	O1B-PB-C3B	4.81	121.72	109.05
8	B	501	GDP	C2-N3-C4	4.69	120.38	112.30
8	D	501	GDP	N9-C4-N3	4.65	135.25	125.95
9	B	503	MES	C5-N4-C3	4.61	118.77	108.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	501	GTP	C5-C4-N3	-4.49	121.24	128.39
5	A	501	GTP	C2-N3-C4	4.33	119.77	112.30
5	C	501	GTP	C2-N3-C4	4.33	119.75	112.30
8	B	501	GDP	N9-C4-N3	4.24	134.44	125.95
5	A	501	GTP	C5-C4-N3	-4.04	121.96	128.39
11	F	402	ACP	O1G-PG-C3B	-3.98	102.70	111.37
11	F	402	ACP	O2A-PA-O3A	3.54	116.85	107.27
11	F	402	ACP	O3A-PA-O1A	3.46	121.10	110.70
8	B	501	GDP	C6-C5-N7	3.33	136.35	130.29
5	A	501	GTP	O2G-PG-O3B	3.31	115.73	104.64
11	F	402	ACP	O2A-PA-O5'	-3.05	93.73	107.57
9	C	503	MES	O3S-S-C8	3.04	111.94	106.00
8	D	501	GDP	C6-C5-N7	2.98	135.72	130.29
8	D	501	GDP	C4-C5-N7	-2.90	106.08	110.67
5	C	501	GTP	O3B-PB-O1B	-2.83	102.19	110.70
5	C	501	GTP	N9-C8-N7	-2.80	108.20	113.40
5	A	501	GTP	N9-C8-N7	-2.72	108.35	113.40
5	C	501	GTP	C8-N7-C5	2.70	109.07	104.26
5	C	501	GTP	N9-C4-N3	2.69	131.34	125.95
9	B	503	MES	O3S-S-C8	2.60	111.08	106.00
5	C	501	GTP	O2B-PB-O3B	2.57	114.23	107.27
5	A	501	GTP	C2-N1-C6	-2.55	120.49	125.11
5	C	501	GTP	C2-N1-C6	-2.54	120.50	125.11
5	A	501	GTP	O6-C6-C5	-2.49	119.95	126.53
8	D	501	GDP	O3B-PB-O3A	2.44	112.81	104.64
10	D	502	E9Y	C4-C7-N4	-2.42	119.55	123.53
10	B	505	E9Y	C4-C7-N4	-2.42	119.55	123.53
9	B	502	MES	O1S-S-C8	2.39	110.34	106.73
8	B	501	GDP	O6-C6-C5	-2.37	120.29	126.53
5	A	501	GTP	C8-N7-C5	2.36	108.47	104.26
5	A	501	GTP	C5-C6-N1	2.25	118.98	113.25
5	A	501	GTP	N9-C4-N3	2.25	130.45	125.95
8	D	501	GDP	C8-N7-C5	2.23	108.24	104.26
5	A	501	GTP	N2-C2-N1	2.19	121.39	116.76
8	B	501	GDP	C4-C5-N7	-2.16	107.25	110.67
11	F	402	ACP	O4'-C1'-N9	-2.11	104.03	108.09
5	C	501	GTP	C5-C6-N1	2.09	118.58	113.25
10	D	502	E9Y	O1-N2-C5	2.07	108.40	106.25
11	F	402	ACP	O2B-PB-C3B	2.05	115.22	106.73
9	C	503	MES	O2S-S-C8	2.03	109.80	106.73
9	B	503	MES	O1S-S-C8	2.03	109.79	106.73
11	F	402	ACP	C2-N1-C6	-2.01	115.42	118.73

There are no chirality outliers.

All (33) 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-O3A
5	A	501	GTP	C5'-O5'-PA-O1A
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	501	GTP	PB-O3B-PG-O3G
5	C	501	GTP	C5'-O5'-PA-O3A
5	C	501	GTP	C5'-O5'-PA-O2A
8	B	501	GDP	C5'-O5'-PA-O3A
8	B	501	GDP	C5'-O5'-PA-O1A
8	B	501	GDP	C5'-O5'-PA-O2A
8	D	501	GDP	PA-O3A-PB-O2B
8	D	501	GDP	C5'-O5'-PA-O3A
8	D	501	GDP	C5'-O5'-PA-O1A
8	D	501	GDP	C5'-O5'-PA-O2A
9	B	503	MES	C8-C7-N4-C5
11	F	402	ACP	PG-C3B-PB-O1B
11	F	402	ACP	C5'-O5'-PA-O2A
10	D	502	E9Y	N4-C7-N3-C17
10	D	502	E9Y	C4-C7-N3-C17
10	B	505	E9Y	N4-C7-N3-C17
10	B	505	E9Y	C4-C7-N3-C17
9	B	502	MES	C8-C7-N4-C3
9	C	503	MES	N4-C7-C8-S
5	C	501	GTP	C5'-O5'-PA-O1A
10	D	502	E9Y	N4-C7-N3-C8
11	F	402	ACP	C5'-O5'-PA-O1A
11	F	402	ACP	C5'-O5'-PA-O3A
9	B	502	MES	C8-C7-N4-C5
5	A	501	GTP	PB-O3B-PG-O1G
5	C	501	GTP	PB-O3B-PG-O1G
8	D	501	GDP	PA-O3A-PB-O1B
5	A	501	GTP	PB-O3B-PG-O3G
5	C	501	GTP	PB-O3B-PG-O2G

There are no ring outliers.

4 monomers are involved in 8 short contacts:

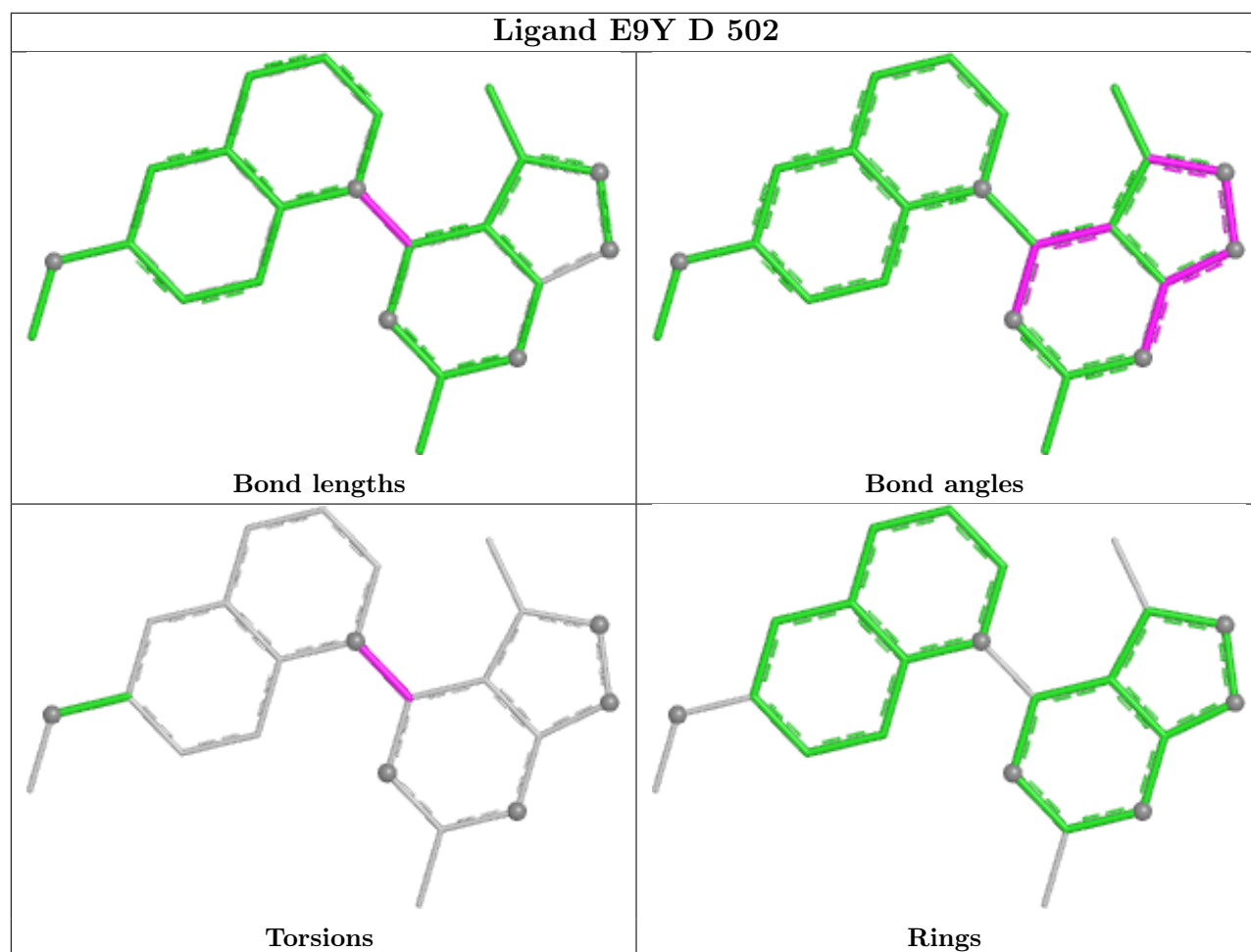
Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	C	503	MES	2	0
10	B	505	E9Y	2	0

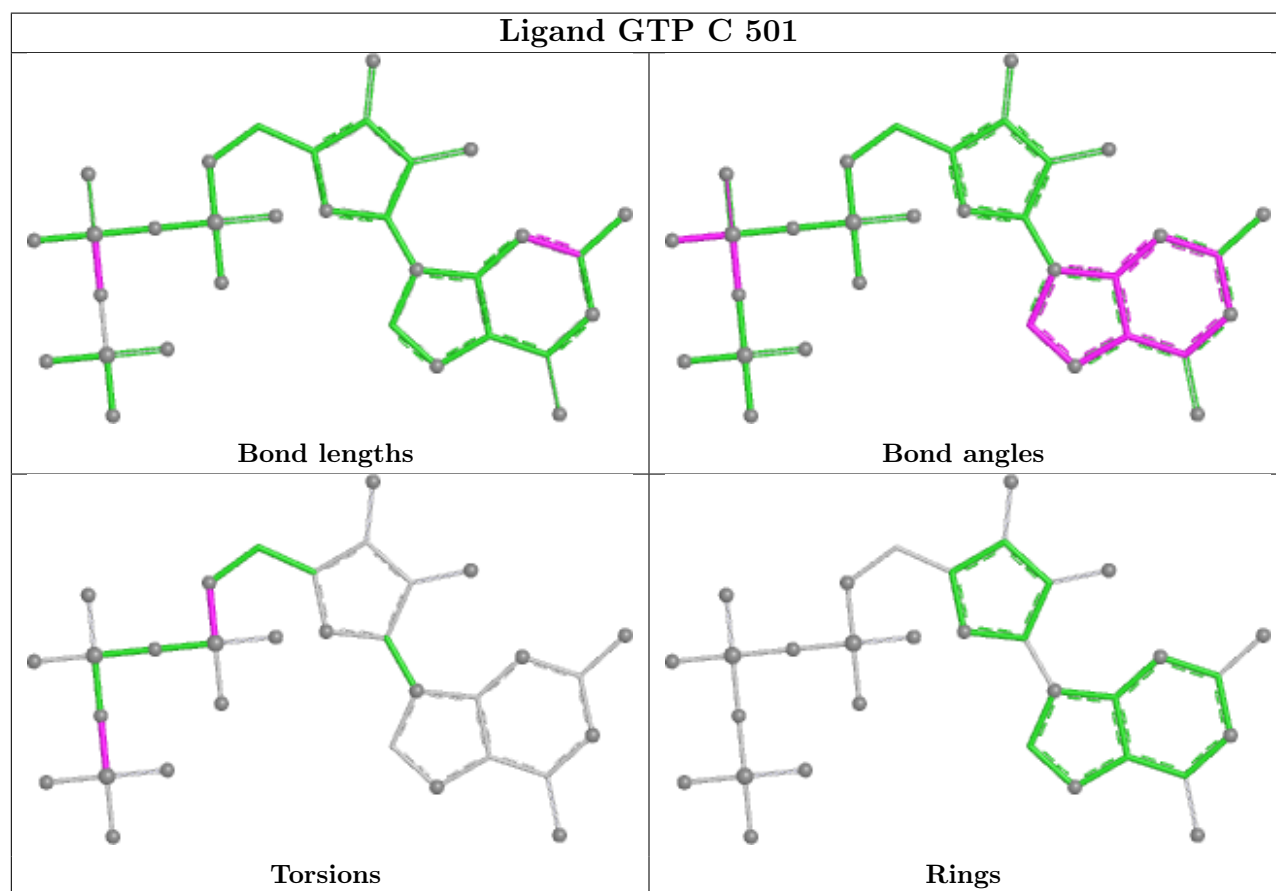
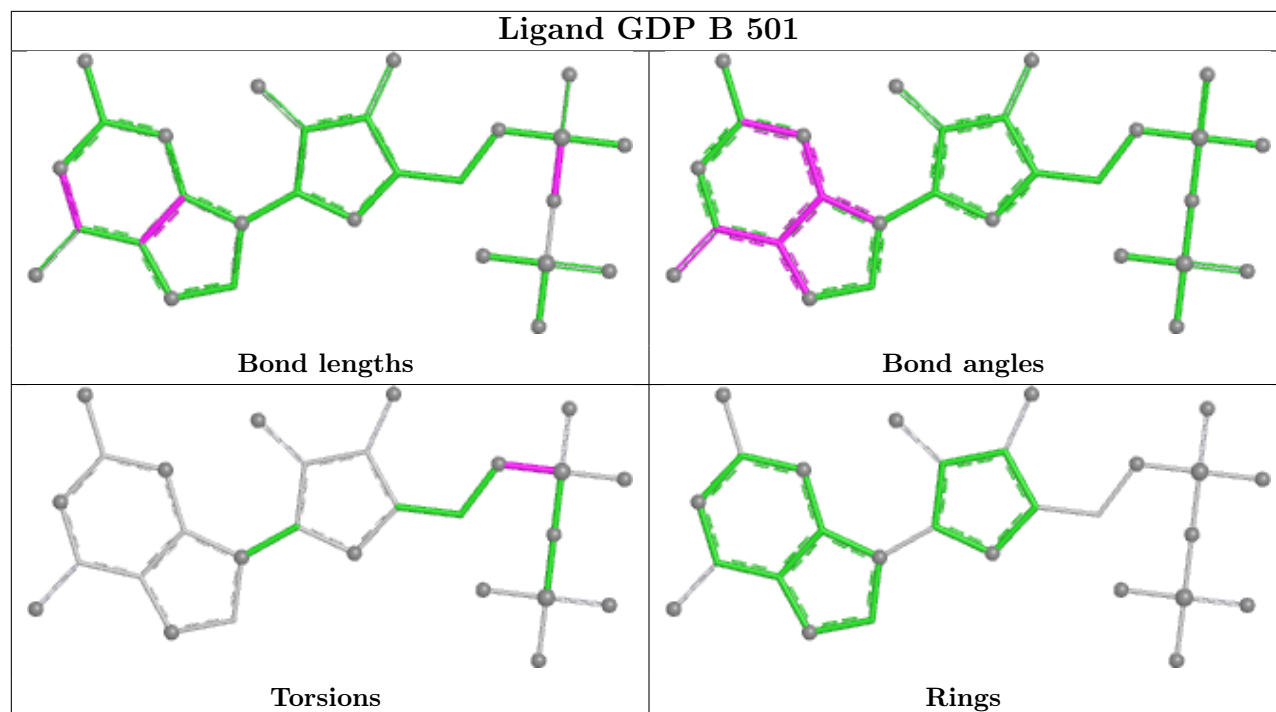
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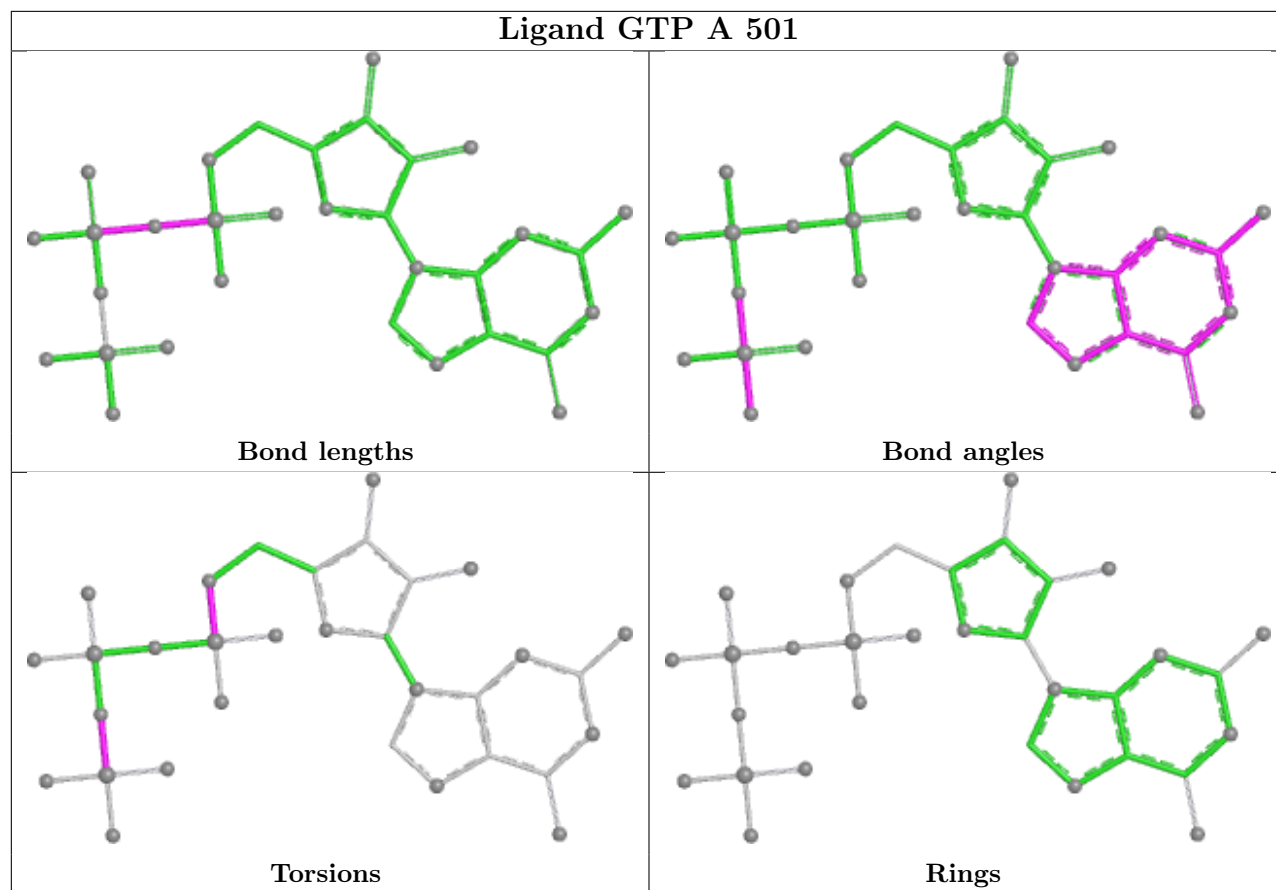
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	B	503	MES	1	0
8	D	501	GDP	3	0

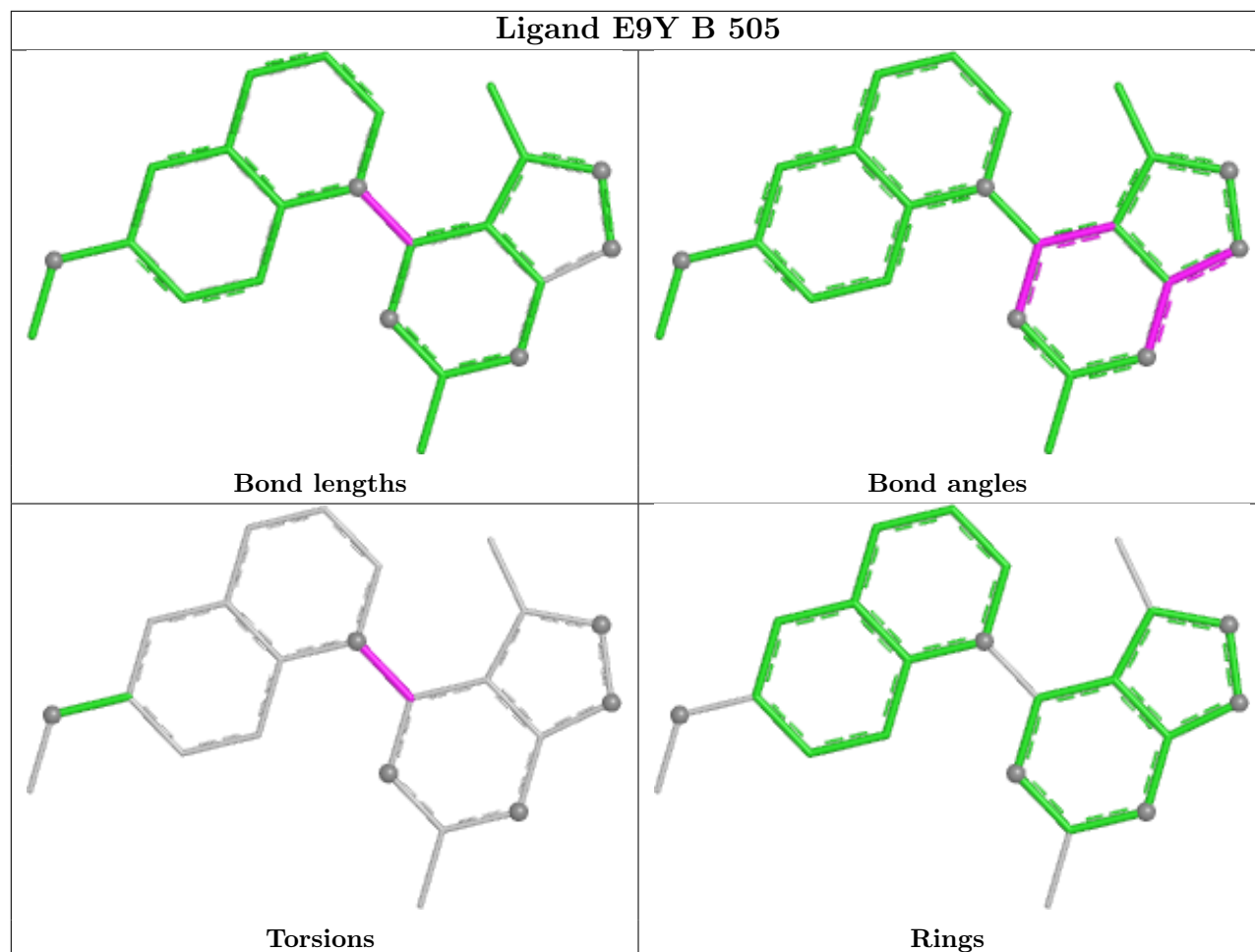
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



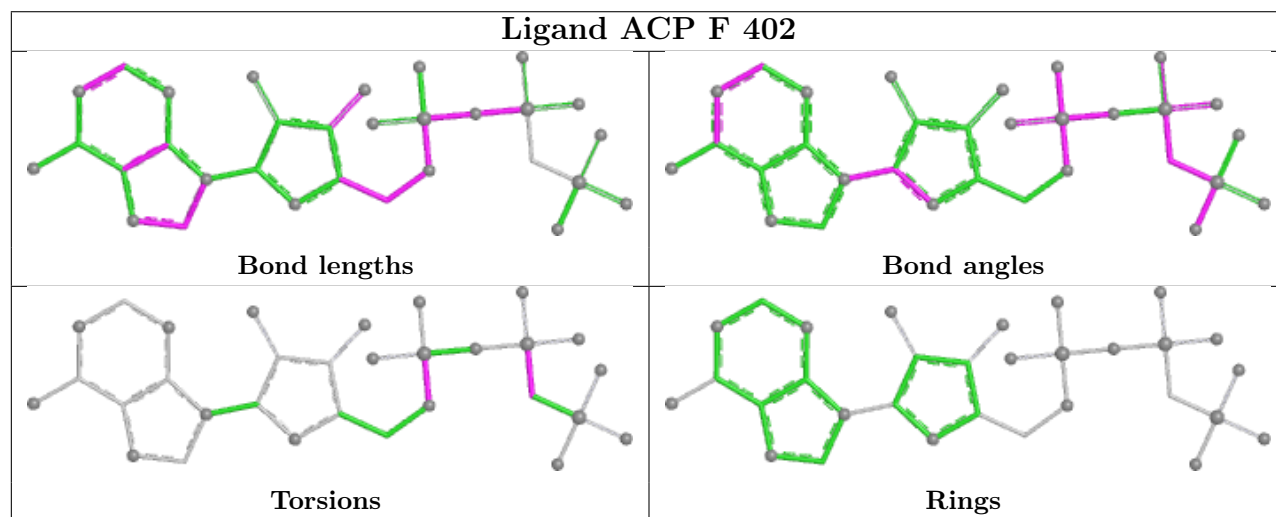


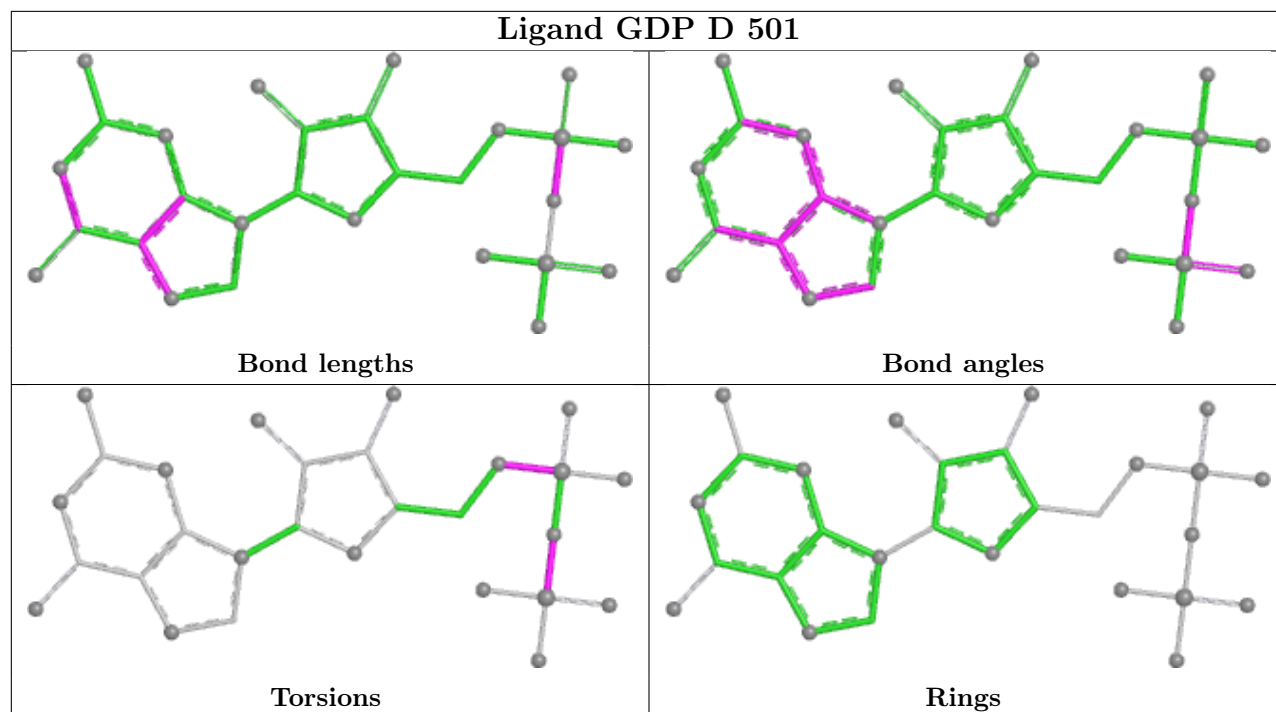


Ligand E9Y B 505



Ligand ACP F 402





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%)	-0.45	5 (1%) 78 75	22, 39, 69, 97	0
1	C	440/450 (97%)	-0.64	4 (0%) 81 78	16, 28, 54, 86	0
2	B	427/445 (95%)	-0.39	6 (1%) 73 69	18, 36, 75, 124	0
2	D	421/445 (94%)	-0.01	12 (2%) 53 46	25, 53, 90, 135	0
3	E	121/143 (84%)	0.06	3 (2%) 58 52	28, 51, 85, 109	0
4	F	332/384 (86%)	0.27	30 (9%) 15 12	30, 60, 124, 148	0
All	All	2178/2317 (94%)	-0.25	60 (2%) 55 48	16, 42, 89, 148	0

All (60) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	437	VAL	4.9
4	F	180	HIS	4.9
4	F	161	LEU	4.5
2	D	247	ASN	4.1
2	D	72	THR	4.1
2	D	219	THR	4.1
2	D	397	TRP	3.9
4	F	103	THR	3.9
4	F	372	THR	3.8
4	F	90	SER	3.8
3	E	6	MET	3.8
4	F	175	GLU	3.6
2	D	73	MET	3.5
1	A	262	TYR	3.4
4	F	169	LEU	3.4
2	B	362	LYS	3.4
1	A	179	THR	3.3
2	D	55	THR	3.3
2	B	279	GLN	3.3

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Mol	Chain	Res	Type	RSRZ
2	B	247	ASN	3.2
4	F	101	TYR	3.1
1	C	245	ASP	3.0
4	F	247	LYS	3.0
4	F	177	GLY	3.0
1	C	440	VAL	3.0
2	D	126	SER	2.9
2	B	245	GLN	2.9
4	F	182	ILE	2.8
1	C	357	TYR	2.8
2	D	141	GLY	2.8
4	F	102	PRO	2.8
1	C	284	GLU	2.7
4	F	132	LEU	2.6
4	F	232	ASN	2.6
4	F	178	GLN	2.6
4	F	236	LYS	2.5
4	F	171	ASP	2.5
3	E	141	GLU	2.5
4	F	244	CYS	2.5
4	F	245	ILE	2.5
4	F	1	MET	2.5
2	B	280	GLN	2.5
4	F	234	GLN	2.4
4	F	362	ALA	2.4
4	F	181	VAL	2.4
4	F	142	ARG	2.4
2	D	214	THR	2.4
4	F	149	ALA	2.4
4	F	10	ASN	2.3
1	A	120	ASP	2.3
3	E	139	LEU	2.3
1	A	282	TYR	2.3
4	F	235	ASP	2.3
2	B	55	THR	2.2
2	D	245	GLN	2.2
4	F	128	ARG	2.1
2	D	291	GLN	2.1
4	F	170	LEU	2.1
2	D	218	THR	2.0
4	F	233	PHE	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

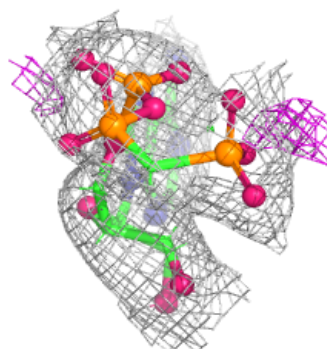
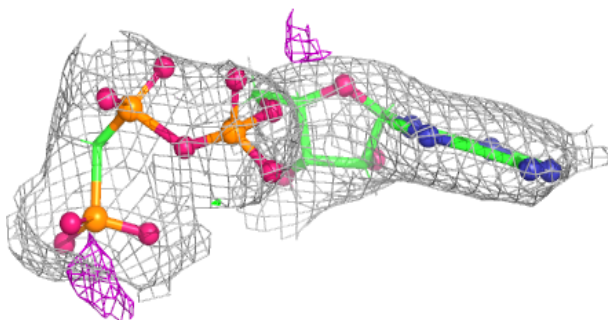
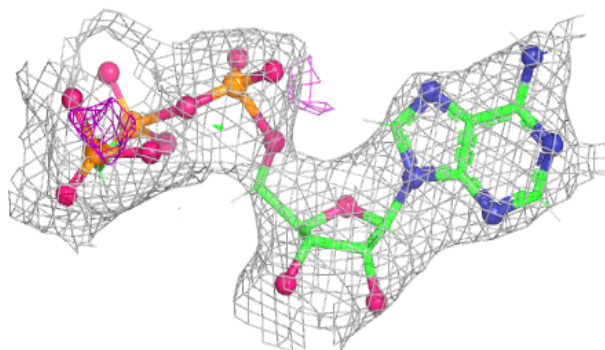
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
7	MG	F	401	1/1	0.83	0.12	59,59,59,59	0
9	MES	C	503	12/12	0.85	0.27	61,66,96,102	12
11	ACP	F	402	31/31	0.87	0.10	59,76,94,109	0
8	GDP	D	501	28/28	0.91	0.09	34,40,57,60	0
9	MES	B	503	12/12	0.93	0.11	59,64,68,72	0
10	E9Y	B	505	23/23	0.96	0.08	27,37,52,62	0
10	E9Y	D	502	23/23	0.96	0.09	30,38,63,69	0
6	CA	A	502	1/1	0.96	0.06	59,59,59,59	0
9	MES	B	502	12/12	0.97	0.07	28,34,56,56	0
7	MG	B	504	1/1	0.98	0.08	22,22,22,22	0
7	MG	C	504	1/1	0.98	0.05	18,18,18,18	0
8	GDP	B	501	28/28	0.99	0.04	18,22,28,31	0
5	GTP	C	501	32/32	0.99	0.05	17,25,27,27	0
5	GTP	A	501	32/32	0.99	0.04	20,26,30,30	0
7	MG	A	503	1/1	0.99	0.02	18,18,18,18	0
6	CA	C	502	1/1	1.00	0.01	37,37,37,37	0

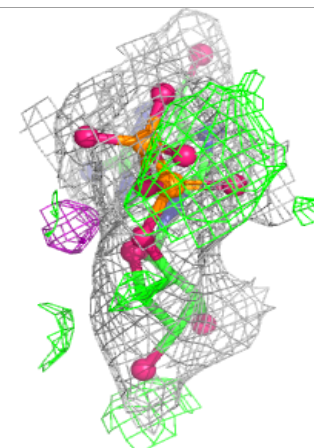
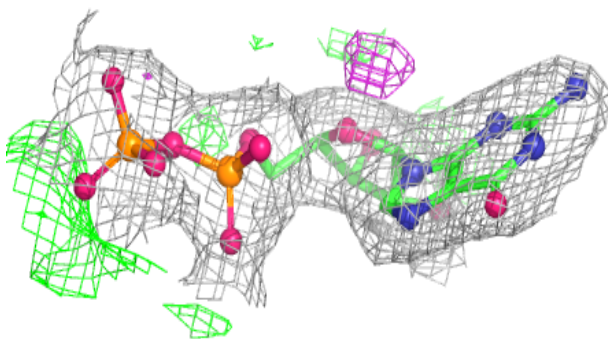
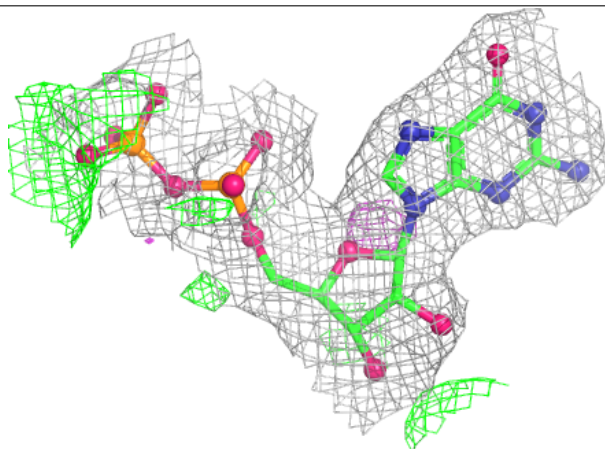
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

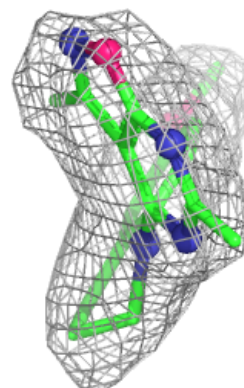
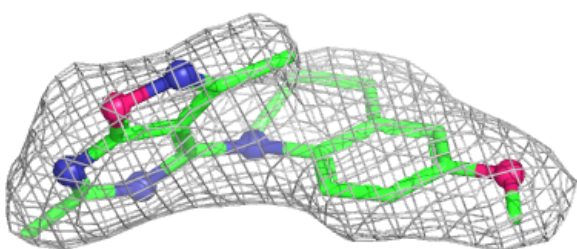
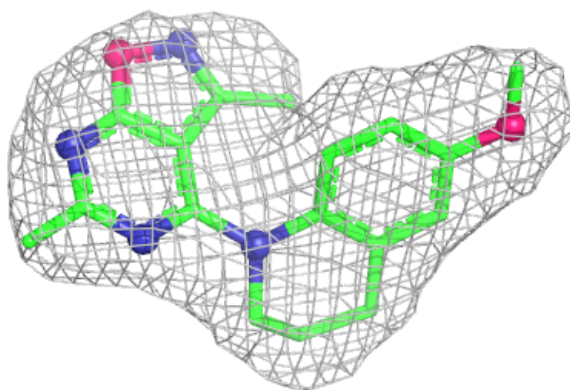
**Electron density around GDP D 501:**

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

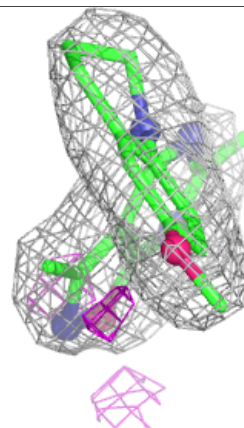
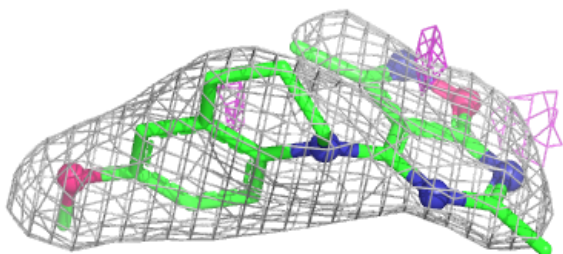
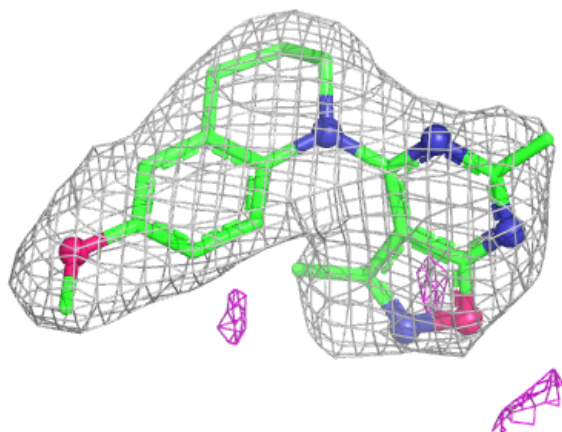


Electron density around E9Y B 505:

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

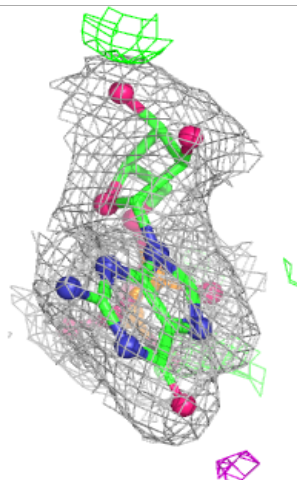
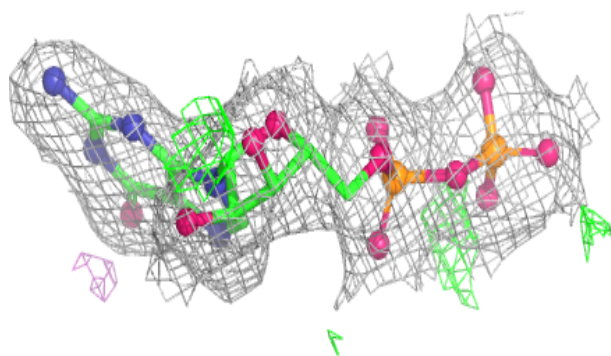
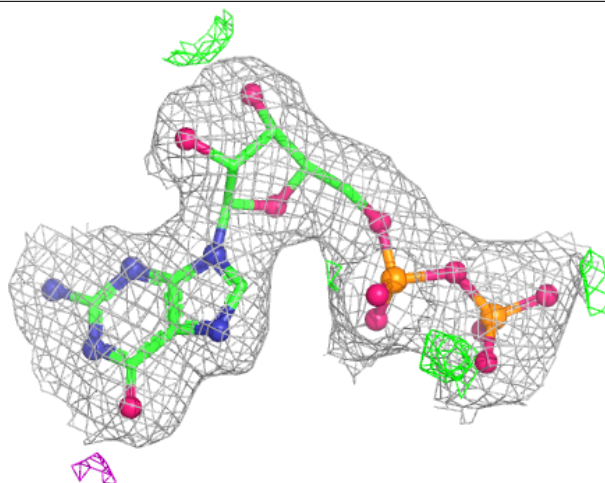
**Electron density around E9Y D 502:**

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



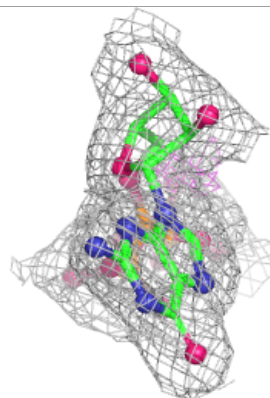
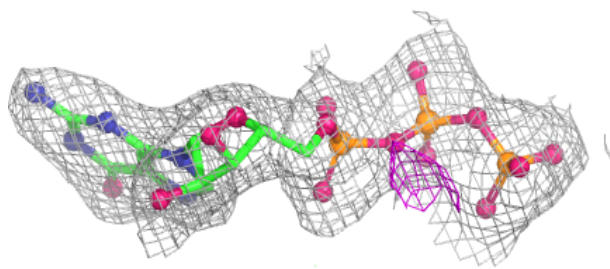
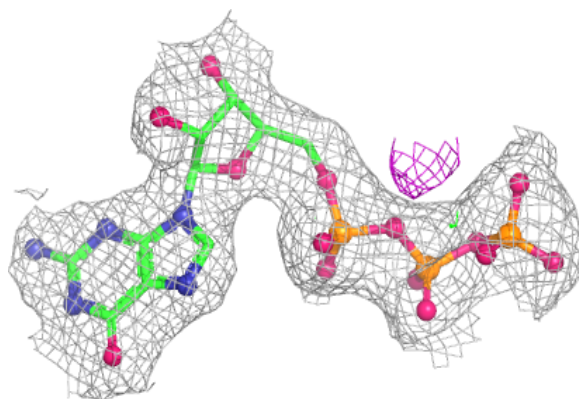
Electron density around GDP B 501:

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

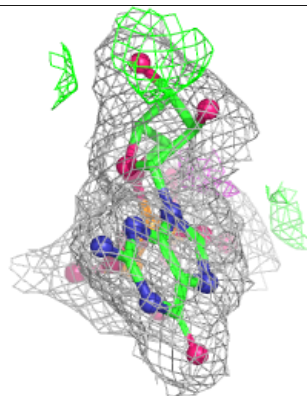
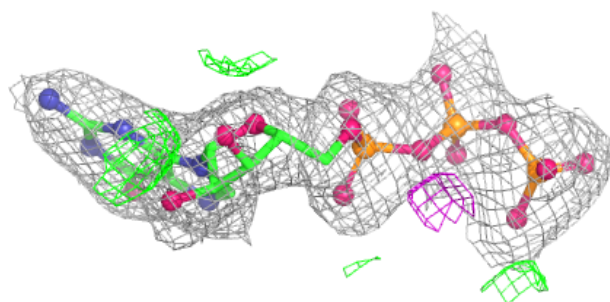
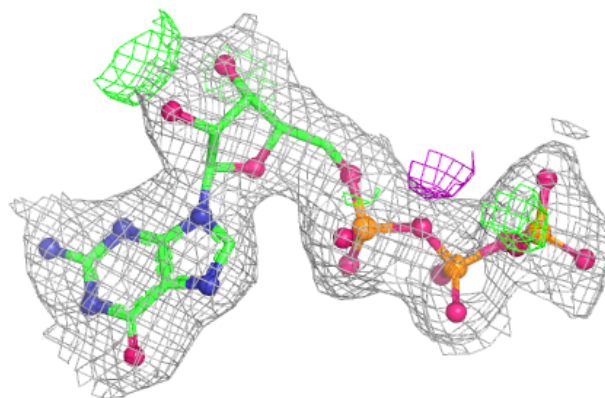


Electron density around GTP C 501:

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

**Electron density around GTP A 501:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.