WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Oct 31, 2023 – 10:23 AM JST

PDB ID	:	5BMV
Title	:	CRYSTAL STRUCTURE OF TUBULIN-STATHMIN-TTL-Vinblastine COMPLEX
Authors	:	Wang, Y.; Chen, Q.; Zhang, R.
Deposited on	:	2015-05-23
Resolution	:	2.50 Å(reported)

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

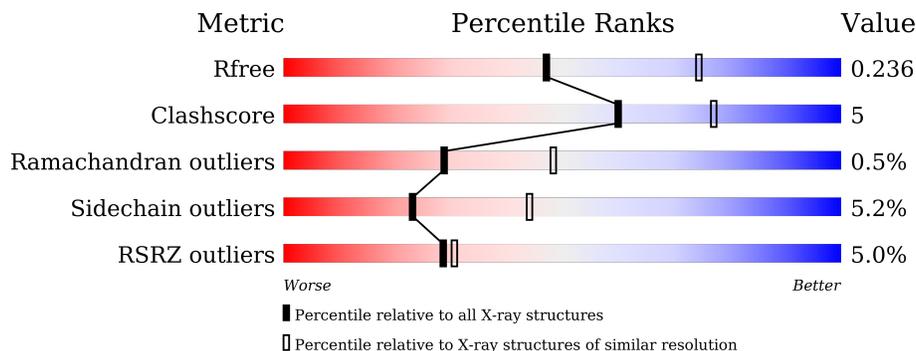|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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 2.50 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	Percentile Ranks	Value
Rfree		0.236
Clashscore		5
Ramachandran outliers		0.5%
Sidechain outliers		5.2%
RSRZ outliers		5.0%

Worse — *Better*

▌Percentile relative to all X-ray structures

▯Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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

Mol	Chain	Length	Quality of chain
1	A	451	2% / 90% ... 7% ·
1	C	451	88% ... 9% ·
2	B	445	% / 80% ... 14% · ·
2	D	445	7% / 76% ... 17% · 5%
3	E	143	10% / 73% ... 10% · 14%
4	F	384	13% / 74% ... 14% · 10%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	GOL	C	504	-	-	X	-
8	GOL	C	505	-	-	X	X

2 Entry composition ⓘ

There are 13 unique types of molecules in this entry. The entry contains 17912 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	439	Total 3430	C 2170	N 583	O 655	S 22	0	0	0
1	C	440	Total 3446	C 2180	N 585	O 659	S 22	0	1	0

- Molecule 2 is a protein called Tubulin beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	427	Total 3360	C 2111	N 576	O 647	S 26	0	0	0
2	D	422	Total 3311	C 2082	N 563	O 640	S 26	0	0	0

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	123	Total 1014	C 625	N 183	O 201	S 5	0	0	0

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 Uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	346	Total 2849	C 1825	N 492	O 518	S 14	0	0	0

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: $C_{10}H_{16}N_5O_{14}P_3$).
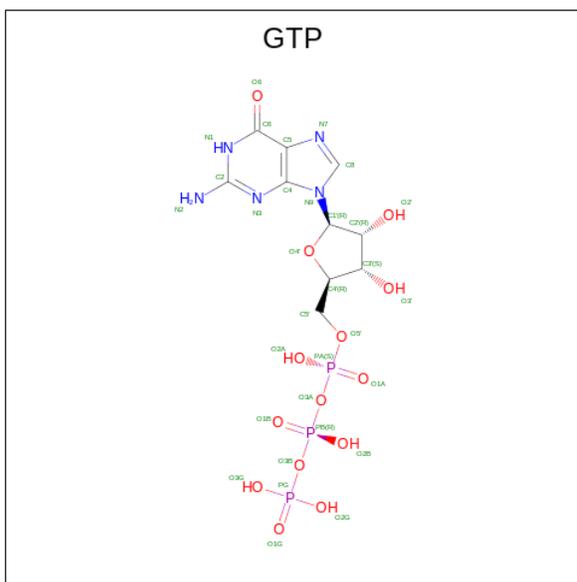
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			32	10	5	14	3		
5	C	1	Total	C	N	O	P	0	0
			32	10	5	14	3		

- 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	D	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 1	Ca 1	0	0
7	B	1	Total 1	Ca 1	0	0
7	C	1	Total 1	Ca 1	0	0

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).
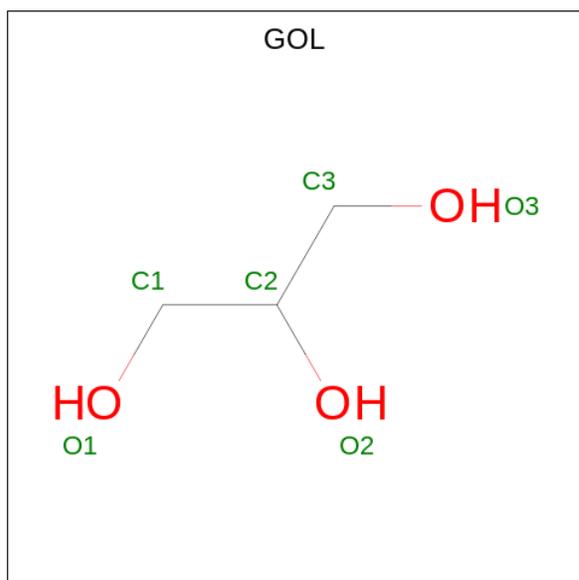
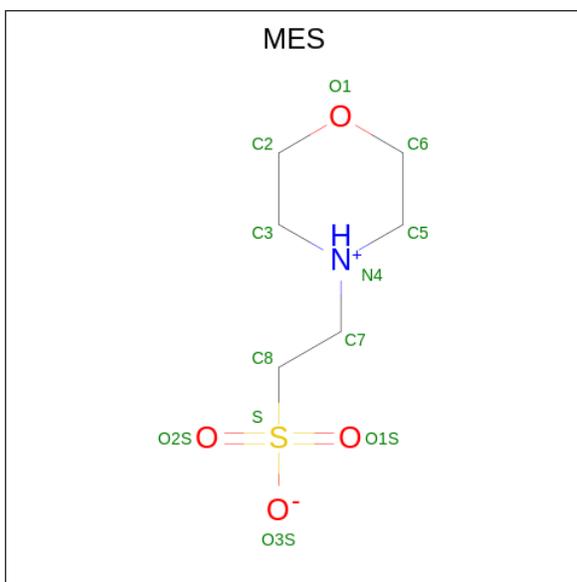| Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total 6	C 3	O 3	0	0
8	A	1	Total 6	C 3	O 3	0	0
8	A	1	Total 6	C 3	O 3	0	0
8	B	1	Total 6	C 3	O 3	0	0
8	C	1	Total 6	C 3	O 3	0	0
8	C	1	Total 6	C 3	O 3	0	0
8	C	1	Total 6	C 3	O 3	0	0

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

$C_{10}H_{15}N_5O_{11}P_2$).
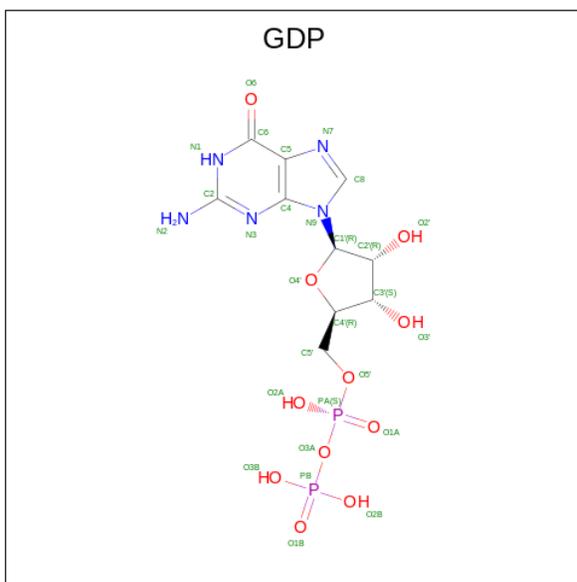
GDP

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
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: $C_6H_{13}NO_4S$).

MES

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

- Molecule 11 is (2ALPHA,2'BETA,3BETA,4ALPHA,5BETA)-VINCALEUKOBLASTINE (three-letter code: VLB) (formula: $C_{46}H_{58}N_4O_9$).
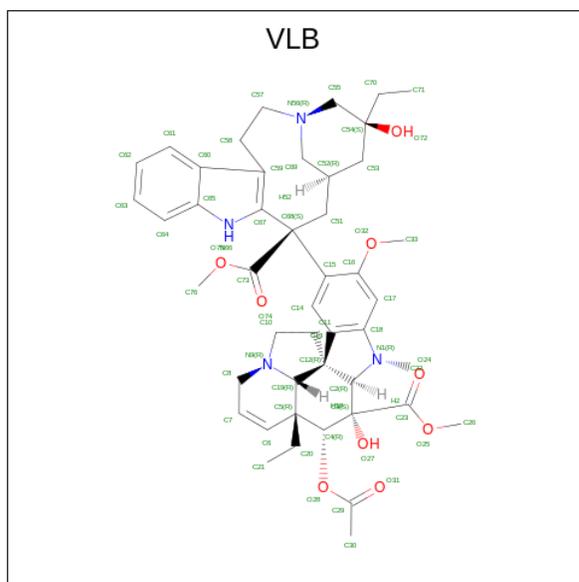
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
11	C	1	Total	C	N	O	0	0
			59	46	4	9		

- Molecule 12 is PHOSPHOMETHYLPHOSPHONIC ACID ADENYLATE ESTER (three-letter code: ACP) (formula: $C_{11}H_{18}N_5O_{12}P_3$).
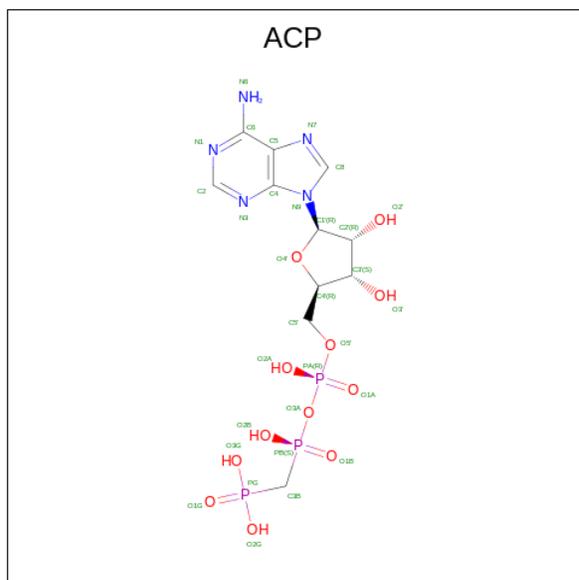
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
12	F	1	Total 31	C 11	N 5	O 12	P 3	0	0

- Molecule 13 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
13	A	47	Total 47	O 47	0	0
13	B	56	Total 56	O 56	0	0
13	C	83	Total 83	O 83	0	0
13	D	8	Total 8	O 8	0	0
13	E	1	Total 1	O 1	0	0
13	F	24	Total 24	O 24	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.
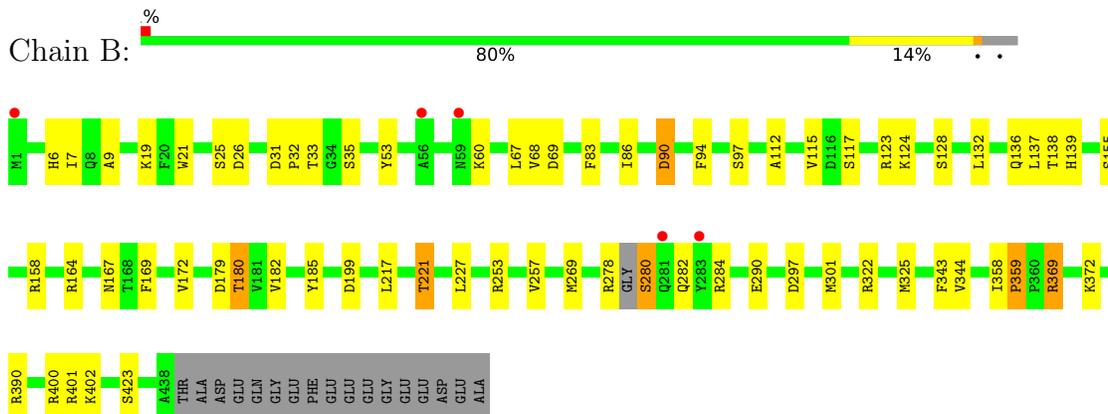
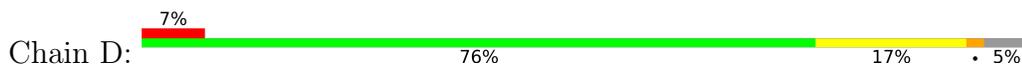- Molecule 1: Tubulin alpha-1B chain
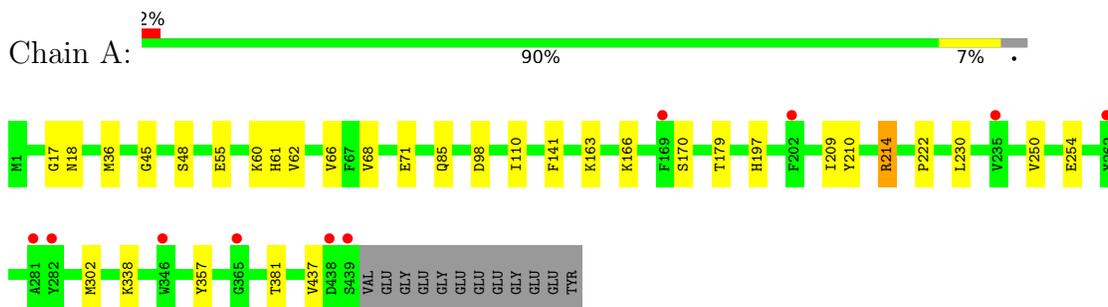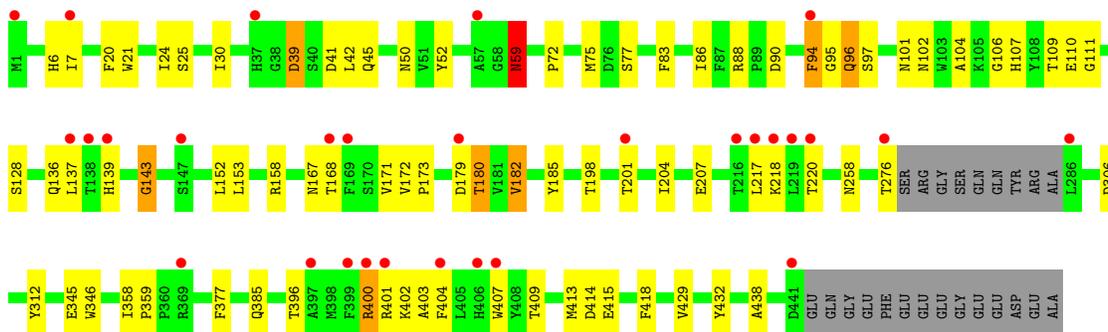
Chain A:

- Molecule 1: Tubulin alpha-1B chain

Chain C:
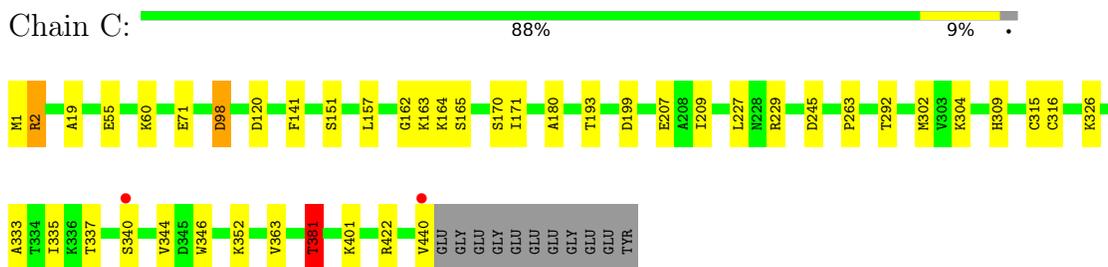
- Molecule 2: Tubulin beta chain

Chain B:
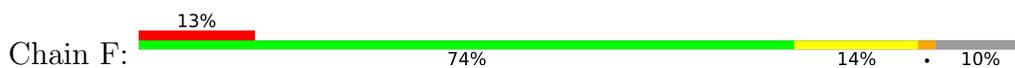
- Molecule 2: Tubulin beta chain

Chain D:

• Molecule 3: Stathmin-4

Chain E:
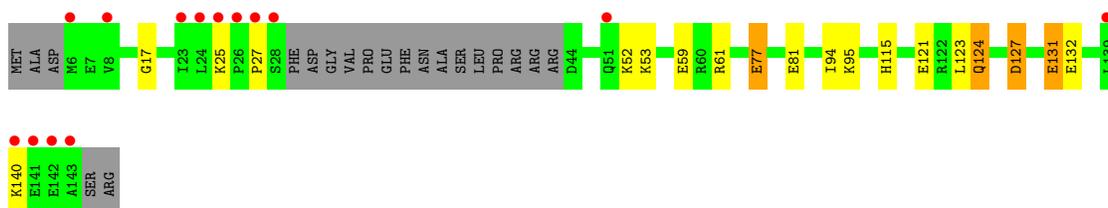
• Molecule 4: Uncharacterized protein

Chain F:
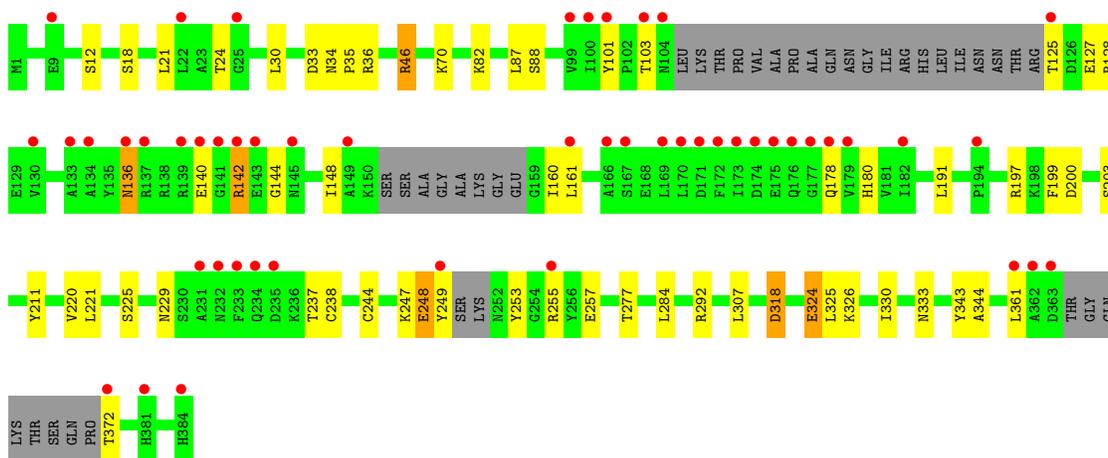
4   Data and refinement statistics   ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	105.47Å 157.42Å 183.18Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50 39.91 – 2.55	Depositor EDS
% Data completeness (in resolution range)	99.5 (50.00-2.50) 99.5 (39.91-2.55)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.90 (at 2.54Å)	Xtriage
Refinement program	REFMAC 5.8.0049	Depositor
R, R_{free}	0.184 , 0.235 0.192 , 0.236	Depositor DCC
R_{free} test set	4906 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å^2)	48.0	Xtriage
Anisotropy	0.055	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 35.5	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	17912	wwPDB-VP
Average B, all atoms (Å^2)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.91% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MES, VLB, ACP, MG, GDP, GOL, GTP, 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	0.71	0/3508	0.82	1/4762 (0.0%)
1	C	0.78	0/3524	0.85	4/4785 (0.1%)
2	B	0.80	1/3434 (0.0%)	0.87	7/4651 (0.2%)
2	D	0.68	2/3384 (0.1%)	0.81	4/4586 (0.1%)
3	E	0.71	0/1022	0.81	1/1356 (0.1%)
4	F	0.59	0/2916	0.78	3/3940 (0.1%)
All	All	0.72	3/17788 (0.0%)	0.83	20/24080 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1
4	F	0	1
All	All	0	2

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	179	ASP	CB-CG	-6.36	1.38	1.51
2	D	173	PRO	N-CD	5.23	1.55	1.47
2	D	359	PRO	N-CD	5.20	1.55	1.47

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	61	ARG	NE-CZ-NH1	6.99	123.79	120.30
1	C	98	ASP	CB-CG-OD2	-6.31	112.62	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	306	ASP	CB-CG-OD1	6.28	123.95	118.30
2	D	359	PRO	C-N-CD	6.27	141.58	128.40
2	B	179	ASP	CB-CG-OD1	-6.21	112.71	118.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	163	LYS	Peptide
4	F	136	ASN	Peptide

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3430	0	3340	16	0
1	C	3446	0	3354	33	0
2	B	3360	0	3242	40	0
2	D	3311	0	3192	40	0
3	E	1014	0	1029	9	0
4	F	2849	0	2796	22	0
5	A	32	0	12	1	0
5	C	32	0	12	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
8	A	18	0	24	0	0
8	B	6	0	8	1	0
8	C	18	0	24	12	0
9	B	28	0	12	0	0
9	D	28	0	12	1	0
10	B	24	0	26	4	0
11	C	59	0	58	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
12	F	31	0	14	2	0
13	A	47	0	0	1	0
13	B	56	0	0	1	0
13	C	83	0	0	6	0
13	D	8	0	0	2	0
13	E	1	0	0	0	0
13	F	24	0	0	1	0
All	All	17912	0	17155	159	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 5.

The worst 5 of 159 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:35:SER:OG	2:B:60:LYS:NZ	1.65	1.30
2:D:432:TYR:OH	13:D:601:HOH:O	1.71	1.09
11:C:507:VLB:H582	11:C:507:VLB:H511	1.43	1.01
2:B:33:THR:HG22	2:B:60:LYS:HE3	1.58	0.85
2:B:83:PHE:O	2:B:86:ILE:HG22	1.79	0.82

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	437/451 (97%)	417 (95%)	20 (5%)	0	100	100
1	C	439/451 (97%)	423 (96%)	14 (3%)	2 (0%)	29	48
2	B	423/445 (95%)	417 (99%)	6 (1%)	0	100	100
2	D	418/445 (94%)	390 (93%)	23 (6%)	5 (1%)	13	24

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	E	119/143 (83%)	111 (93%)	7 (6%)	1 (1%)	19	35
4	F	336/384 (88%)	306 (91%)	27 (8%)	3 (1%)	17	31
All	All	2172/2319 (94%)	2064 (95%)	97 (4%)	11 (0%)	29	48

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	402	LYS
3	E	27	PRO
1	C	2	ARG
1	C	164	LYS
2	D	143	GLY

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	370/379 (98%)	360 (97%)	10 (3%)	44	71
1	C	372/379 (98%)	365 (98%)	7 (2%)	57	80
2	B	368/381 (97%)	347 (94%)	21 (6%)	20	39
2	D	363/381 (95%)	341 (94%)	22 (6%)	18	36
3	E	110/127 (87%)	99 (90%)	11 (10%)	7	15
4	F	312/342 (91%)	284 (91%)	28 (9%)	9	19
All	All	1895/1989 (95%)	1796 (95%)	99 (5%)	23	44

5 of 99 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	396	THR
4	F	12	SER
2	D	409	THR
3	E	95	LYS
4	F	46	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
3	E	18	GLN
4	F	229	ASN
4	F	269	GLN
2	D	96	GLN
2	B	281	GLN

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 monosaccharides in this entry.

5.6　Ligand geometry ⓘ

Of 22 ligands modelled in this entry, 7 are monoatomic - leaving 15 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	504	-	12,12,12	2.27	3 (25%)	14,16,16	6.61	7 (50%)
8	GOL	A	504	-	5,5,5	0.48	0	5,5,5	0.52	0
10	MES	B	505	-	12,12,12	2.35	1 (8%)	14,16,16	1.49	1 (7%)
8	GOL	C	506	-	5,5,5	0.37	0	5,5,5	0.62	0
8	GOL	B	506	-	5,5,5	0.41	0	5,5,5	0.32	0
9	GDP	B	501	6	24,30,30	1.28	2 (8%)	30,47,47	1.21	2 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
9	GDP	D	501	6	24,30,30	1.14	3 (12%)	30,47,47	1.46	7 (23%)
8	GOL	A	506	-	5,5,5	0.74	0	5,5,5	0.51	0
11	VLB	C	507	-	63,67,67	2.96	17 (26%)	79,108,108	2.28	22 (27%)
5	GTP	C	501	6	26,34,34	1.29	3 (11%)	32,54,54	1.22	3 (9%)
8	GOL	C	505	-	5,5,5	0.66	0	5,5,5	0.74	0
5	GTP	A	501	6	26,34,34	0.94	1 (3%)	32,54,54	1.67	7 (21%)
12	ACP	F	401	-	27,33,33	2.13	9 (33%)	32,52,52	1.25	2 (6%)
8	GOL	A	505	-	5,5,5	0.45	0	5,5,5	1.09	0
8	GOL	C	504	-	5,5,5	0.62	0	5,5,5	1.02	0

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	504	-	-	5/6/14/14	0/1/1/1
8	GOL	A	504	-	-	2/4/4/4	-
10	MES	B	505	-	-	0/6/14/14	0/1/1/1
8	GOL	C	506	-	-	2/4/4/4	-
8	GOL	B	506	-	-	2/4/4/4	-
9	GDP	B	501	6	-	3/12/32/32	0/3/3/3
9	GDP	D	501	6	-	3/12/32/32	0/3/3/3
8	GOL	A	506	-	-	2/4/4/4	-
11	VLB	C	507	-	-	6/38/131/131	0/7/9/9
5	GTP	C	501	6	-	6/18/38/38	0/3/3/3
8	GOL	C	505	-	-	1/4/4/4	-
5	GTP	A	501	6	-	3/18/38/38	0/3/3/3
12	ACP	F	401	-	-	6/15/38/38	0/3/3/3
8	GOL	A	505	-	-	2/4/4/4	-
8	GOL	C	504	-	-	2/4/4/4	-

The worst 5 of 39 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	C	507	VLB	C6-C7	11.72	1.54	1.32
11	C	507	VLB	C68-C73	-9.90	1.45	1.53
11	C	507	VLB	C68-C67	-9.42	1.44	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	B	505	MES	C8-S	-7.78	1.66	1.77
10	B	504	MES	C8-S	-6.58	1.68	1.77

The worst 5 of 51 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
10	B	504	MES	O3S-S-O1S	-12.81	79.98	111.27
10	B	504	MES	O1S-S-C8	12.24	121.66	106.92
10	B	504	MES	O3S-S-C8	-11.81	86.66	105.77
10	B	504	MES	O3S-S-O2S	-8.31	90.97	111.27
11	C	507	VLB	C8-C7-C6	-8.13	109.72	123.02

There are no chirality outliers.

5 of 45 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	C5'-O5'-PA-O1A
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	501	GTP	PB-O3B-PG-O3G
5	C	501	GTP	C5'-O5'-PA-O1A
5	C	501	GTP	C5'-O5'-PA-O2A

There are no ring outliers.

9 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	B	504	MES	4	0
8	C	506	GOL	2	0
8	B	506	GOL	1	0
9	D	501	GDP	1	0
11	C	507	VLB	5	0
8	C	505	GOL	5	0
5	A	501	GTP	1	0
12	F	401	ACP	2	0
8	C	504	GOL	5	0

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

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

Ligand GDP B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP D 501

Bond lengths

Bond angles

Torsions

Rings

Ligand VLB C 507

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP C 501

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ACP F 401

Bond lengths

Bond angles

Torsions

Rings
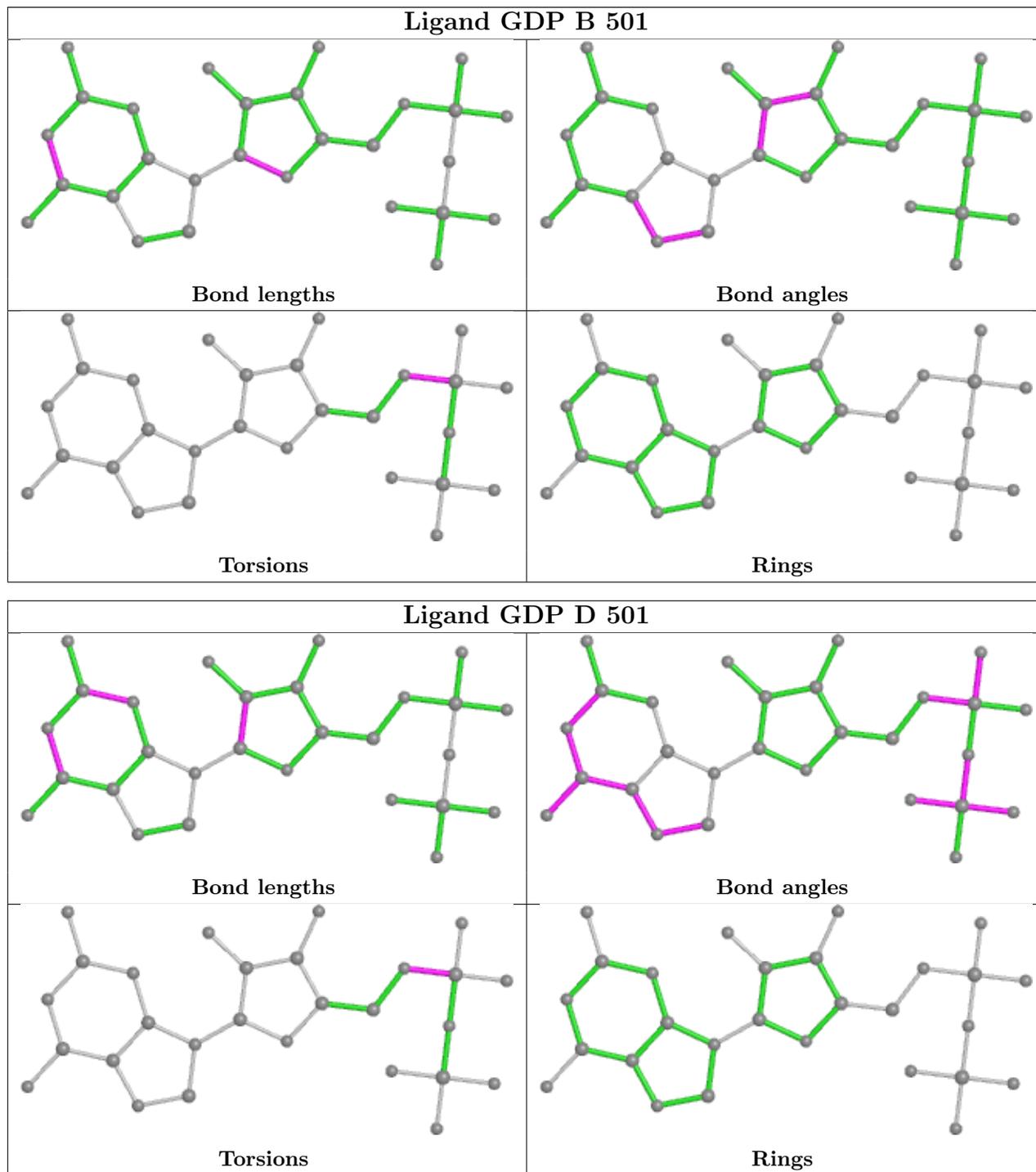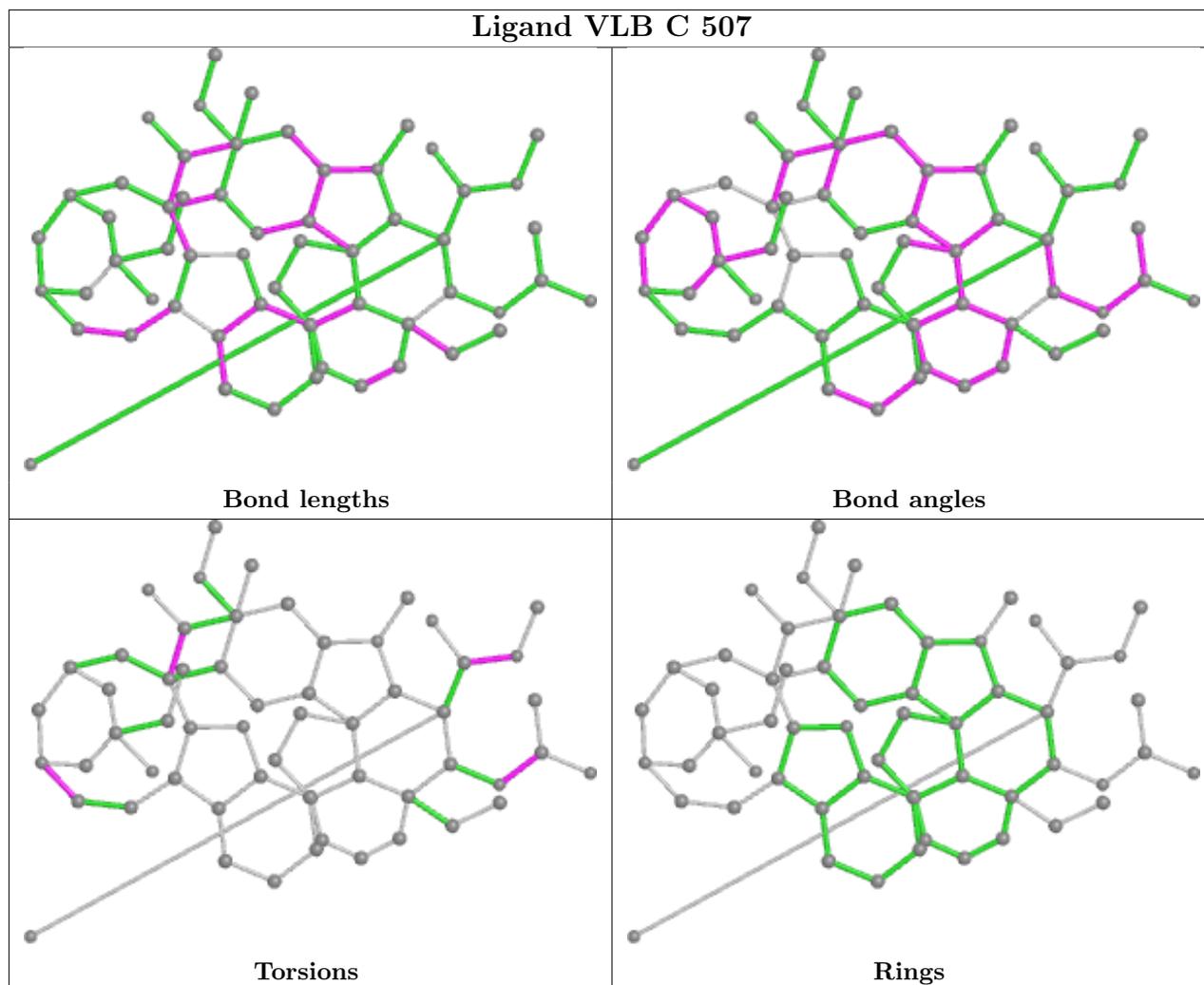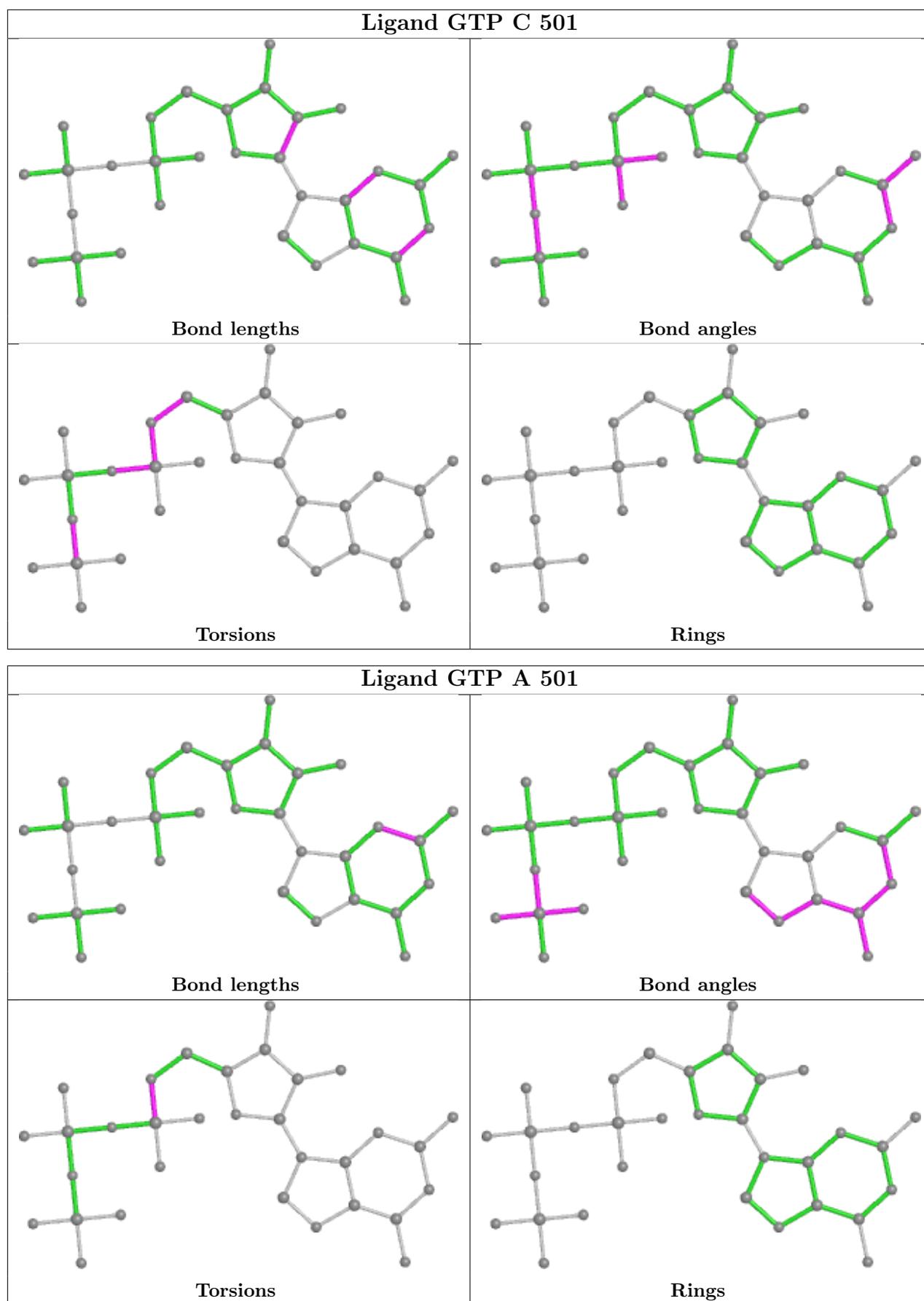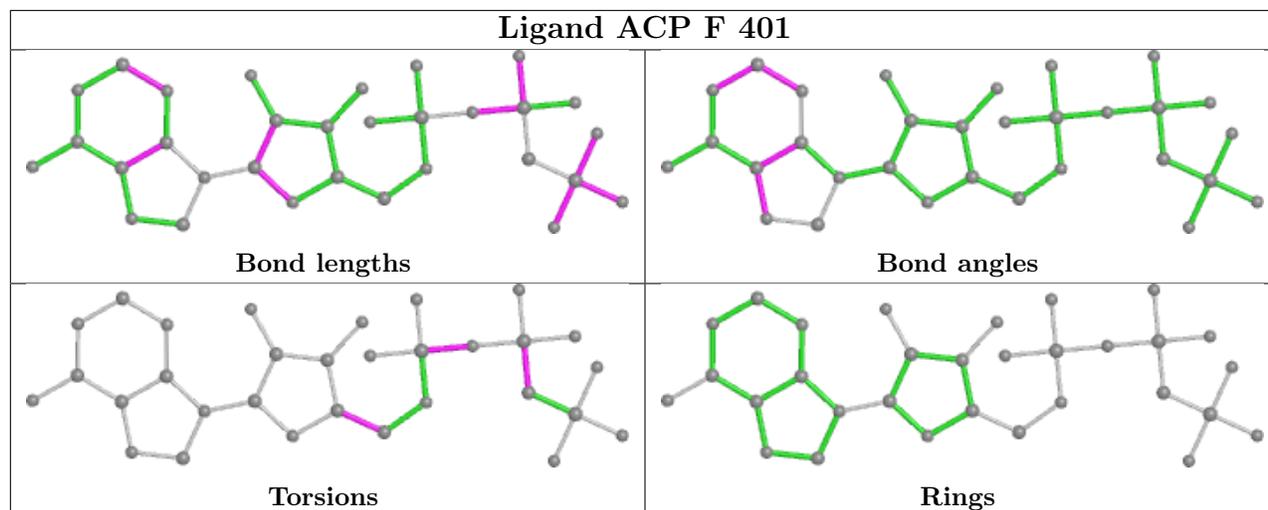
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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(Å²)	Q<0.9
1	A	439/451 (97%)	0.03	10 (2%)	60	63	26, 45, 74, 106	0
1	C	440/451 (97%)	-0.25	2 (0%)	91	91	24, 38, 66, 97	0
2	B	427/445 (95%)	-0.14	5 (1%)	79	80	24, 38, 75, 109	0
2	D	422/445 (94%)	0.23	29 (6%)	16	17	33, 58, 89, 111	0
3	E	123/143 (86%)	0.50	14 (11%)	5	4	35, 62, 101, 125	0
4	F	346/384 (90%)	0.49	50 (14%)	2	2	33, 68, 121, 136	0
All	All	2197/2319 (94%)	0.08	110 (5%)	28	30	24, 49, 95, 136	0

The worst 5 of 110 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	104	ASN	7.7
3	E	143	ALA	6.9
4	F	177	GLY	5.3
1	A	282	TYR	5.2
4	F	139	ARG	5.0

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

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
6	MG	B	502	1/1	0.54	0.33	74,74,74,74	0
8	GOL	C	505	6/6	0.63	0.67	81,96,107,130	0
8	GOL	A	504	6/6	0.76	0.22	70,74,80,86	0
8	GOL	A	506	6/6	0.80	0.29	56,64,70,71	0
8	GOL	C	504	6/6	0.84	0.35	55,69,70,72	0
8	GOL	B	506	6/6	0.84	0.23	80,84,88,88	0
6	MG	D	502	1/1	0.87	0.43	53,53,53,53	0
10	MES	B	504	12/12	0.91	0.17	53,63,74,82	0
8	GOL	A	505	6/6	0.92	0.13	61,65,68,69	0
12	ACP	F	401	31/31	0.92	0.14	72,85,113,115	0
8	GOL	C	506	6/6	0.93	0.21	49,62,65,74	0
10	MES	B	505	12/12	0.95	0.14	65,71,76,76	0
9	GDP	D	501	28/28	0.95	0.13	44,48,60,67	0
11	VLB	C	507	59/59	0.96	0.12	28,35,44,49	0
6	MG	C	502	1/1	0.98	0.07	28,28,28,28	0
7	CA	B	503	1/1	0.98	0.07	76,76,76,76	0
9	GDP	B	501	28/28	0.99	0.14	23,26,28,29	0
7	CA	A	503	1/1	0.99	0.04	62,62,62,62	0
5	GTP	A	501	32/32	0.99	0.15	25,30,34,34	0
7	CA	C	503	1/1	0.99	0.02	49,49,49,49	0
5	GTP	C	501	32/32	0.99	0.12	25,28,32,33	0
6	MG	A	502	1/1	0.99	0.07	36,36,36,36	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 401:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
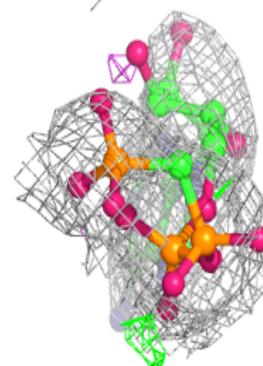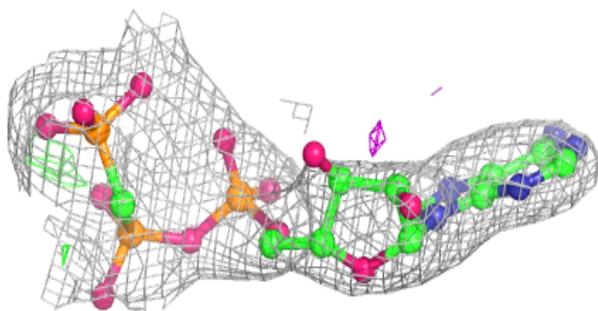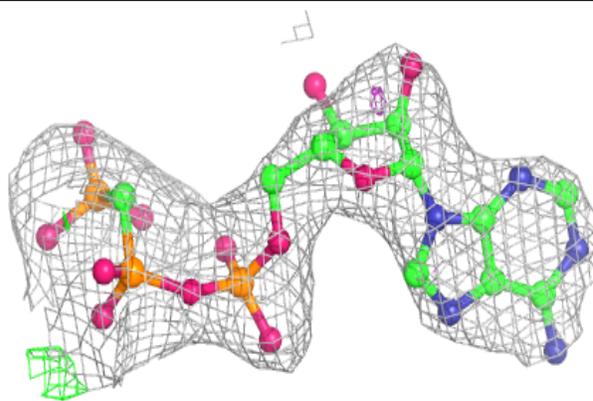
Electron density around GDP D 501:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
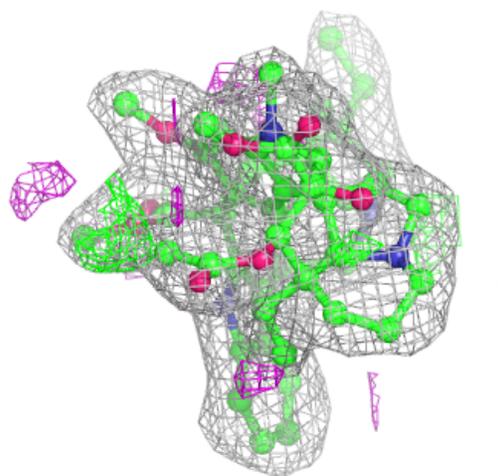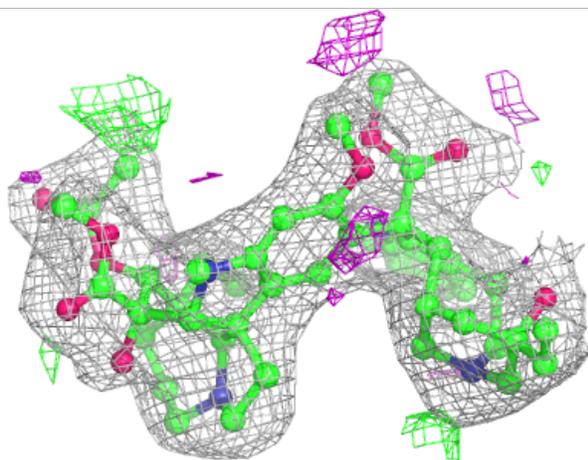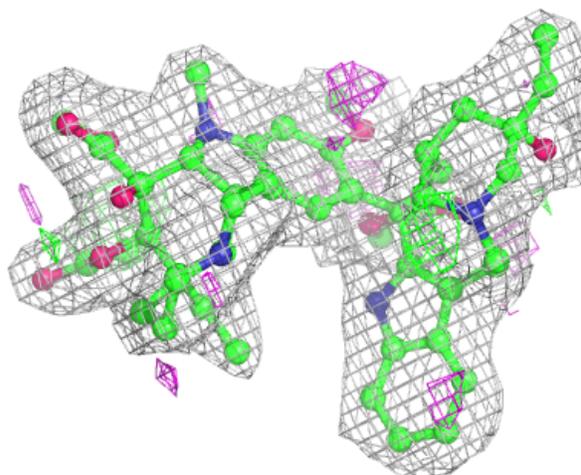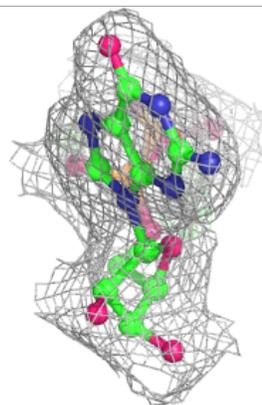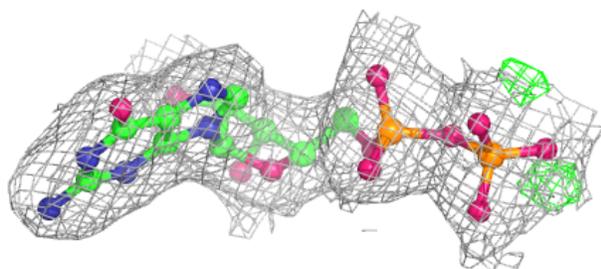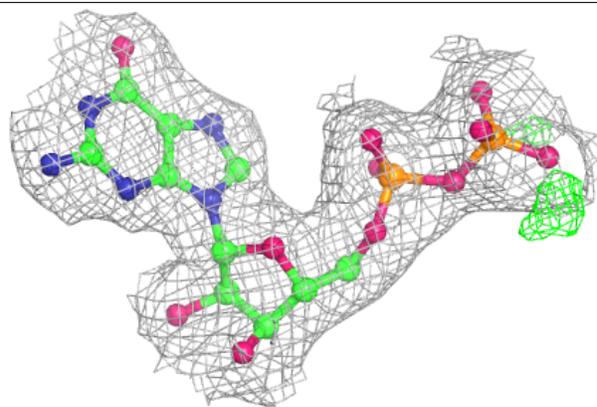$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
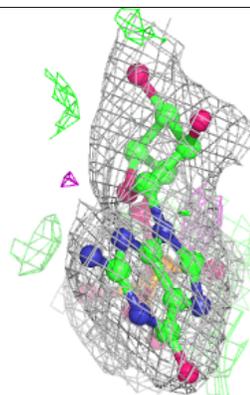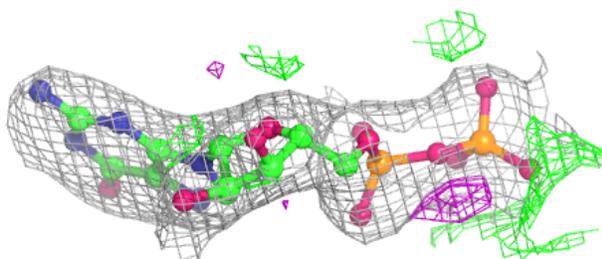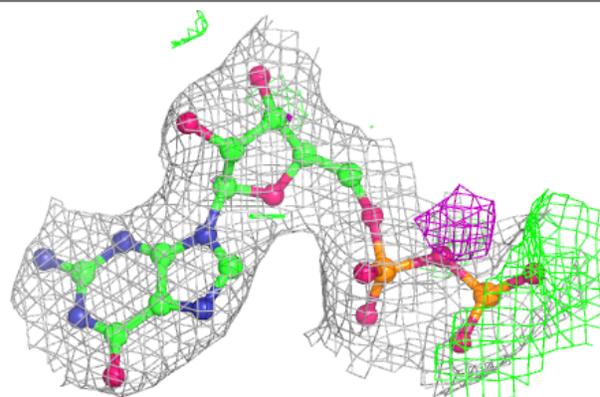
Electron density around VLB C 507:

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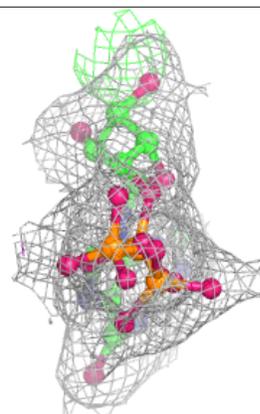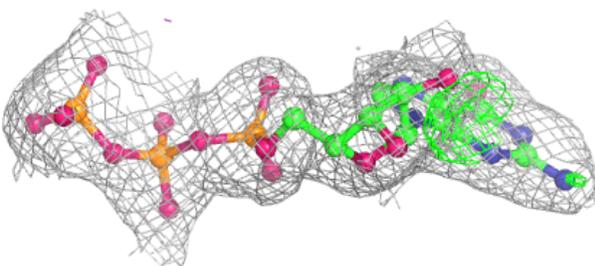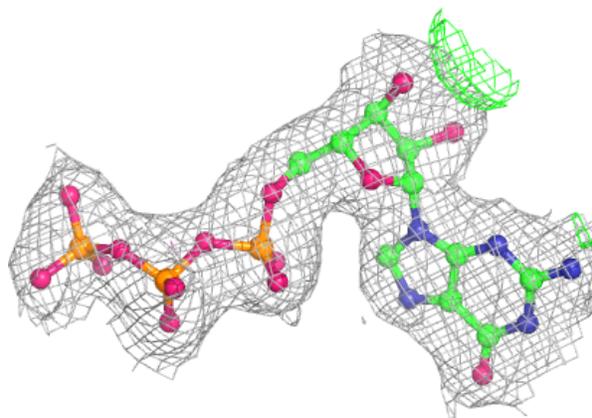mF_o-DF_c (at 3 rmsd) in purple (negative)
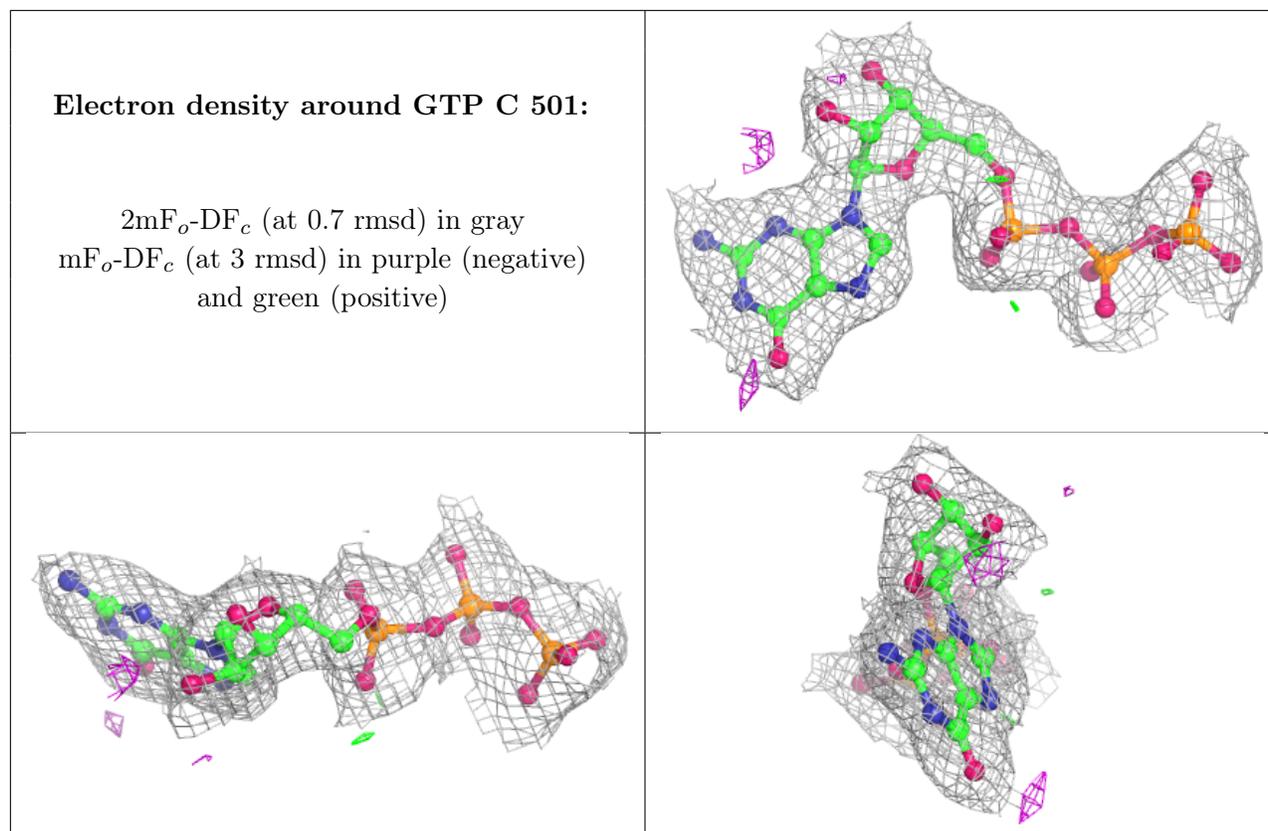and green (positive)

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 A 501:

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

Electron density around GTP C 501:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.