



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 30, 2025 – 04:14 PM EDT

PDB ID : 9MG5 / pdb_00009mg5
Title : Structure of *Saccharomyces cerevisiae* mRNA cap (guanine-N7) methyltransferase, Abd1, in complex with sinefungin and GTP
Authors : Nilson, D.J.; Fedorov, E.; Ghosh, A.
Deposited on : 2024-12-10
Resolution : 1.45 Å(reported)

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

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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 Phenix2.0rc1
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0rc1
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.006 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

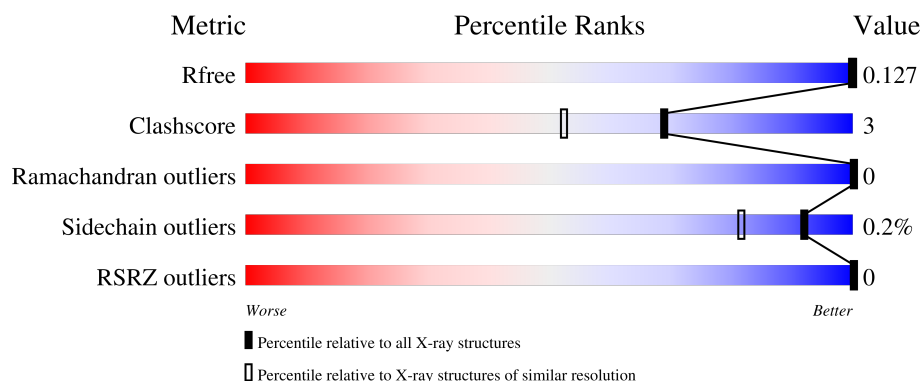
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.45 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1556 (1.46-1.46)
Clashscore	180529	1653 (1.46-1.46)
Ramachandran outliers	177936	1635 (1.46-1.46)
Sidechain outliers	177891	1635 (1.46-1.46)
RSRZ outliers	164620	1556 (1.46-1.46)

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	319	
1	B	319	

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
5	EDO	B	512	-	-	X	-

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 10970 atoms, of which 5144 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.

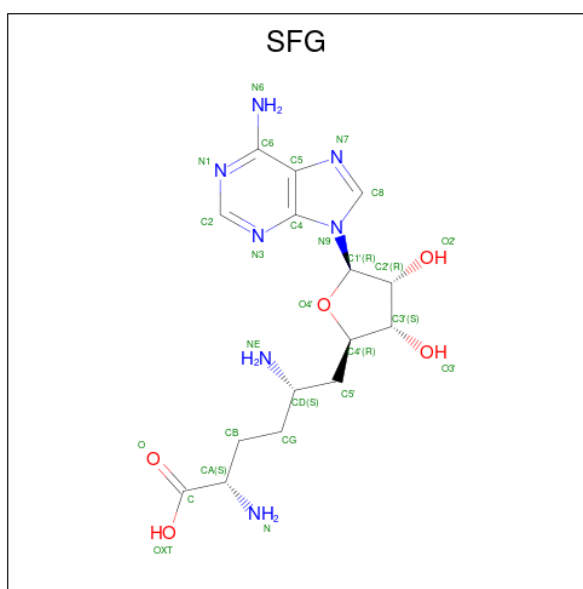
- Molecule 1 is a protein called mRNA cap guanine-N7 methyltransferase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	296	Total	C	H	N	O	S	0	15	0
			4946	1610	2462	400	459	15			
1	B	295	Total	C	H	N	O	S	0	12	0
			4898	1595	2440	397	452	14			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	118	SER	-	expression tag	UNP A6ZLH5
B	118	SER	-	expression tag	UNP A6ZLH5

- Molecule 2 is SINEFUNGIN (CCD ID: SFG) (formula: C₁₅H₂₃N₇O₅) (labeled as "Ligand of Interest" by depositor).



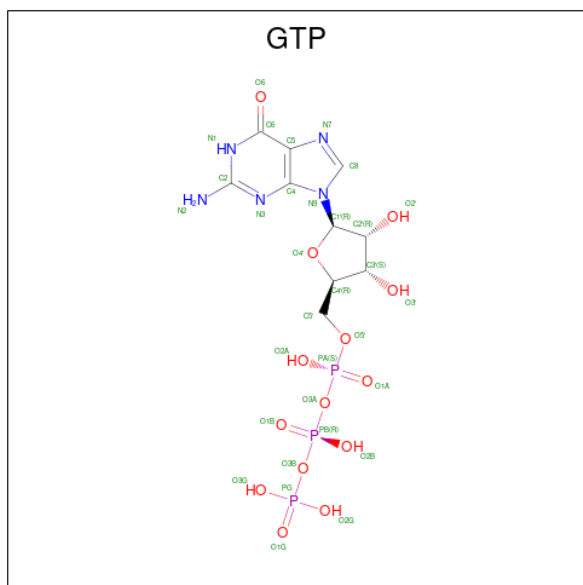
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	H	N	O	0	0
			34	15	7	7	5		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	H	N	O	0	0
			34	15	7	7	5		

- Molecule 3 is GUANOSINE-5'-TRIPHOSPHATE (CCD ID: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$) (labeled as "Ligand of Interest" by depositor).



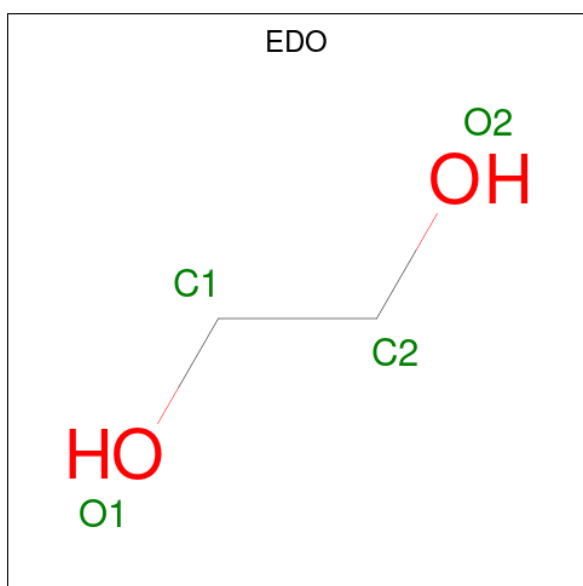
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	H	N	O	P	0	1
			82	20	18	10	28	6		
3	B	1	Total	C	H	N	O	P	0	1
			82	20	18	10	28	6		

- Molecule 4 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	H	O	0	0
			17	4	10	3		
4	A	1	Total	C	H	O	0	0
			17	4	10	3		

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



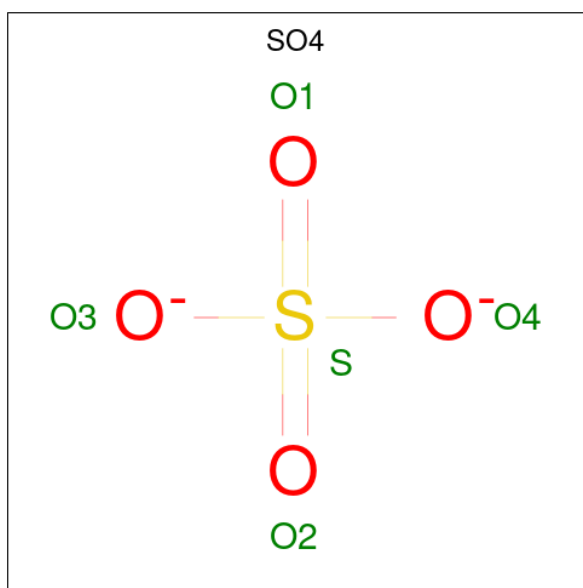
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		

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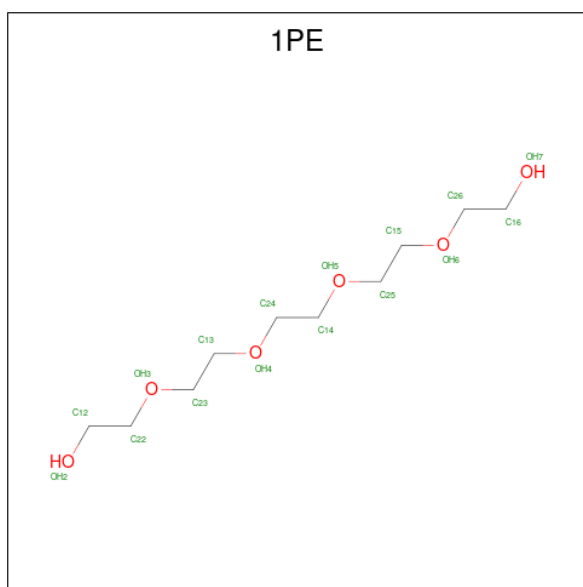
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	1
			20	4	12	4		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	1
			20	4	12	4		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		

- Molecule 6 is SULFATE ION (CCD ID: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	O	S	0	0
			5	4	1		
6	A	1	Total	O	S	0	0
			5	4	1		
6	A	1	Total	O	S	0	0
			5	4	1		
6	A	1	Total	O	S	0	0
			5	4	1		
6	B	1	Total	O	S	0	0
			5	4	1		
6	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 7 is PENTAETHYLENE GLYCOL (CCD ID: 1PE) (formula: $C_{10}H_{22}O_6$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total	C	H	O	
			38	10	22	6	
						0	0

- Molecule 8 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	B	1	Total	Cl		
			1	1	0	0

- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	268	Total	O		
			270	270	0	2
9	B	262	Total	O		
			266	266	0	4

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.

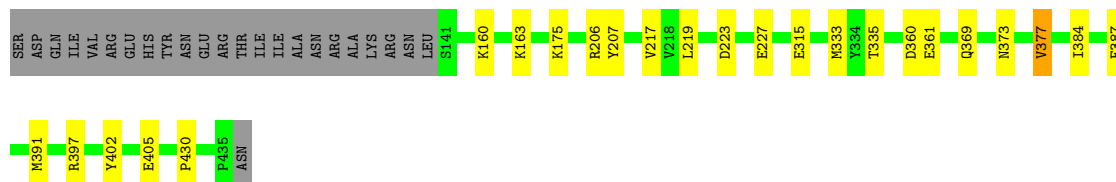
- Molecule 1: mRNA cap guanine-N7 methyltransferase

Chain A: 



- Molecule 1: mRNA cap guanine-N7 methyltransferase

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 63	Depositor
Cell constants a, b, c, α , β , γ	95.73Å 95.73Å 129.26Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	29.87 – 1.45 29.87 – 1.45	Depositor EDS
% Data completeness (in resolution range)	99.0 (29.87-1.45) 99.2 (29.87-1.45)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.35 (at 1.45Å)	Xtriage
Refinement program	PHENIX (1.21.2 _5419)	Depositor
R, R_{free}	0.107 , 0.127 0.107 , 0.127	Depositor DCC
R_{free} test set	5876 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	12.4	Xtriage
Anisotropy	0.475	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.42 , 36.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.24$	Xtriage
Estimated twinning fraction	0.438 for h,-h-k,-l	Xtriage
Reported twinning fraction	0.422 for h,-h-k,-l	Depositor
Outliers	0 of 117658 reflections	Xtriage
F_o, F_c correlation	0.99	EDS
Total number of atoms	10970	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.32% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 1PE, CL, SFG, SO4, GTP, EDO, PEG

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	0.31	0/2594	0.51	0/3498
1	B	0.31	0/2558	0.52	0/3450
All	All	0.31	0/5152	0.52	0/6948

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2484	2462	2462	12	0
1	B	2458	2440	2440	19	0
2	A	27	7	22	1	0
2	B	27	7	22	0	0
3	A	64	18	24	0	0
3	B	64	18	24	0	0
4	A	14	20	20	2	0
5	A	36	54	54	2	0
5	B	64	96	96	8	0
6	A	25	0	0	1	0
6	B	10	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	B	16	22	22	5	0
8	B	1	0	0	0	0
9	A	270	0	0	4	0
9	B	266	0	0	4	0
All	All	5826	5144	5186	36	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 (36) 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)
7:B:503:1PE:H261	9:B:807:HOH:O	1.80	0.82
7:B:503:1PE:C26	9:B:807:HOH:O	2.29	0.79
7:B:503:1PE:H262	9:B:807:HOH:O	2.00	0.58
1:B:217[B]:VAL:HG12	1:B:219:LEU:HG	1.86	0.58
9:A:606:HOH:O	5:B:508[A]:EDO:H11	2.06	0.55
1:A:266[B]:LEU:HD23	1:A:358:LEU:HB3	1.89	0.55
1:B:373:ASN:O	1:B:377[B]:VAL:HG23	2.07	0.54
1:B:384:ILE:HD11	1:B:402:TYR:CZ	2.42	0.54
1:B:163:LYS:NZ	9:B:602:HOH:O	2.40	0.54
1:A:180:ARG:CD	9:A:610:HOH:O	2.56	0.53
1:A:180:ARG:HD2	9:A:610:HOH:O	2.07	0.53
1:B:361:GLU:HG2	5:B:512:EDO:C1	2.39	0.53
1:A:346[B]:PRO:HG2	9:A:606:HOH:O	2.08	0.52
1:B:361:GLU:OE2	5:B:512:EDO:H12	2.11	0.50
1:B:360:ASP:OD1	5:B:507:EDO:H21	2.13	0.49
1:A:422:ARG:HD3	6:A:517:SO4:O2	2.12	0.49
1:B:160:LYS:NZ	7:B:503:1PE:H151	2.30	0.47
1:B:430:PRO:CD	5:B:512:EDO:H22	2.45	0.47
1:B:369:GLN:H	7:B:503:1PE:H232	1.80	0.47
1:B:387:PHE:CE1	1:B:391[A]:MET:HE2	2.50	0.47
1:B:430:PRO:HD3	5:B:512:EDO:H22	1.97	0.47
1:A:206:ARG:O	1:A:210:MET:HG3	2.15	0.46
1:B:397:ARG:NH1	1:B:405:GLU:HB3	2.30	0.46
1:A:356:ARG:HH11	4:A:503:PEG:H31	1.81	0.46
1:B:217[B]:VAL:CG1	1:B:219:LEU:HG	2.47	0.44
1:B:335:THR:HG23	5:B:510:EDO:H22	2.00	0.43
1:B:207:TYR:CD1	1:B:217[B]:VAL:HG21	2.54	0.42
1:B:315:GLU:CD	1:B:333[A]:MET:HE2	2.43	0.42
1:A:266[A]:LEU:HD11	1:A:355:LEU:HD12	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:356:ARG:HD2	4:A:503:PEG:H31	2.01	0.41
1:A:377:VAL:HG23	5:A:508:EDO:H12	2.03	0.41
2:A:501:SFG:H8	5:B:508[B]:EDO:H12	2.01	0.41
1:A:388:SER:OG	5:A:507:EDO:H21	2.20	0.41
1:B:223:ASP:O	1:B:227:GLU:HG2	2.21	0.41
1:B:175:LYS:O	1:B:206:ARG:HD2	2.22	0.40
1:A:380:ILE:CG2	1:A:381:PRO:HD3	2.52	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	309/319 (97%)	300 (97%)	9 (3%)	0	100	100
1	B	305/319 (96%)	298 (98%)	7 (2%)	0	100	100
All	All	614/638 (96%)	598 (97%)	16 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	275/281 (98%)	275 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	271/281 (96%)	269 (99%)	2 (1%)	81	62
All	All	546/562 (97%)	544 (100%)	2 (0%)	92	78

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	377[A]	VAL
1	B	377[B]	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	150	ASN
1	A	197	ASN
1	B	150	ASN
1	B	201	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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 42 ligands modelled in this entry, 1 is monoatomic - leaving 41 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	$\# Z > 2$
3	GTP	B	502[A]	-	29,34,34	1.34	4 (13%)	35,54,54	1.23	4 (11%)
3	GTP	B	502[B]	-	29,34,34	1.55	4 (13%)	35,54,54	1.38	6 (17%)
5	EDO	B	515	-	3,3,3	0.25	0	2,2,2	0.46	0
5	EDO	B	516	-	3,3,3	0.28	0	2,2,2	0.04	0
5	EDO	A	511	-	3,3,3	0.26	0	2,2,2	0.38	0
5	EDO	A	513	-	3,3,3	0.28	0	2,2,2	0.34	0
5	EDO	B	512	-	3,3,3	0.25	0	2,2,2	0.46	0
5	EDO	B	514[A]	-	3,3,3	0.25	0	2,2,2	0.28	0
5	EDO	B	514[B]	-	3,3,3	0.26	0	2,2,2	0.32	0
6	SO4	A	515	-	4,4,4	0.66	0	6,6,6	0.07	0
6	SO4	A	518	-	4,4,4	0.63	0	6,6,6	0.19	0
5	EDO	B	507	-	3,3,3	0.25	0	2,2,2	0.21	0
5	EDO	B	508[A]	-	3,3,3	0.32	0	2,2,2	0.16	0
5	EDO	B	508[B]	-	3,3,3	0.25	0	2,2,2	0.36	0
5	EDO	B	517	-	3,3,3	0.27	0	2,2,2	0.31	0
6	SO4	A	516	-	4,4,4	0.65	0	6,6,6	0.14	0
2	SFG	B	501	-	24,29,29	0.84	1 (4%)	20,42,42	0.81	1 (5%)
5	EDO	A	507	-	3,3,3	0.28	0	2,2,2	0.43	0
5	EDO	A	506	-	3,3,3	0.29	0	2,2,2	0.52	0
6	SO4	B	519	-	4,4,4	0.64	0	6,6,6	0.17	0
6	SO4	B	518	-	4,4,4	0.61	0	6,6,6	0.08	0
5	EDO	A	505	-	3,3,3	0.25	0	2,2,2	0.40	0
5	EDO	B	510	-	3,3,3	0.26	0	2,2,2	0.17	0
4	PEG	A	503	-	6,6,6	0.27	0	5,5,5	0.31	0
5	EDO	A	510	-	3,3,3	0.26	0	2,2,2	0.34	0
5	EDO	B	509	-	3,3,3	0.26	0	2,2,2	0.43	0
5	EDO	B	504	-	3,3,3	0.28	0	2,2,2	0.43	0
6	SO4	A	517	-	4,4,4	0.54	0	6,6,6	0.15	0
4	PEG	A	504	-	6,6,6	0.26	0	5,5,5	0.38	0
7	1PE	B	503	-	15,15,15	0.28	0	14,14,14	0.61	0
5	EDO	A	509	-	3,3,3	0.28	0	2,2,2	0.30	0
3	GTP	A	502[A]	-	29,34,34	1.45	5 (17%)	35,54,54	1.33	4 (11%)
3	GTP	A	502[B]	-	29,34,34	1.30	3 (10%)	35,54,54	1.26	5 (14%)
5	EDO	A	512	-	3,3,3	0.27	0	2,2,2	0.43	0
5	EDO	B	506	-	3,3,3	0.23	0	2,2,2	0.39	0
6	SO4	A	514	-	4,4,4	0.61	0	6,6,6	0.11	0
2	SFG	A	501	-	24,29,29	0.81	1 (4%)	20,42,42	0.84	1 (5%)
5	EDO	B	513	-	3,3,3	0.30	0	2,2,2	0.62	0
5	EDO	B	511	-	3,3,3	0.26	0	2,2,2	0.49	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	EDO	B	505	-	3,3,3	0.28	0	2,2,2	0.24	0
5	EDO	A	508	-	3,3,3	0.32	0	2,2,2	0.67	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
3	GTP	B	502[A]	-	-	5/18/38/38	0/3/3/3
3	GTP	B	502[B]	-	-	1/18/38/38	0/3/3/3
5	EDO	B	515	-	-	1/1/1/1	-
5	EDO	B	516	-	-	0/1/1/1	-
5	EDO	A	511	-	-	1/1/1/1	-
5	EDO	A	513	-	-	1/1/1/1	-
5	EDO	B	512	-	-	1/1/1/1	-
5	EDO	B	514[A]	-	-	0/1/1/1	-
5	EDO	B	514[B]	-	-	1/1/1/1	-
5	EDO	B	507	-	-	1/1/1/1	-
5	EDO	B	508[A]	-	-	1/1/1/1	-
5	EDO	B	508[B]	-	-	1/1/1/1	-
5	EDO	B	517	-	-	1/1/1/1	-
2	SFG	B	501	-	-	4/13/33/33	0/3/3/3
5	EDO	A	507	-	-	1/1/1/1	-
5	EDO	A	506	-	-	1/1/1/1	-
5	EDO	A	505	-	-	1/1/1/1	-
5	EDO	B	510	-	-	1/1/1/1	-
4	PEG	A	503	-	-	3/4/4/4	-
5	EDO	A	510	-	-	0/1/1/1	-
5	EDO	B	509	-	-	1/1/1/1	-
5	EDO	B	504	-	-	1/1/1/1	-
4	PEG	A	504	-	-	3/4/4/4	-
7	1PE	B	503	-	-	5/13/13/13	-
5	EDO	A	509	-	-	1/1/1/1	-
3	GTP	A	502[A]	-	-	2/18/38/38	0/3/3/3
3	GTP	A	502[B]	-	-	3/18/38/38	0/3/3/3
5	EDO	A	512	-	-	0/1/1/1	-
5	EDO	B	506	-	-	0/1/1/1	-
2	SFG	A	501	-	-	4/13/33/33	0/3/3/3
5	EDO	B	513	-	-	0/1/1/1	-
5	EDO	B	511	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	B	505	-	-	0/1/1/1	-
5	EDO	A	508	-	-	0/1/1/1	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	502[B]	GTP	C5-C6	-4.17	1.39	1.47
3	B	502[B]	GTP	PB-O3A	4.11	1.63	1.59
3	A	502[B]	GTP	C5-C6	-4.05	1.39	1.47
3	B	502[A]	GTP	C5-C6	-4.05	1.39	1.47
3	A	502[A]	GTP	C5-C6	-3.88	1.39	1.47
3	B	502[B]	GTP	PA-O3A	3.69	1.63	1.59
3	A	502[A]	GTP	PB-O3B	3.23	1.63	1.59
3	A	502[A]	GTP	PA-O3A	2.64	1.62	1.59
3	A	502[A]	GTP	O4'-C1'	2.34	1.44	1.40
2	B	501	SFG	OXT-C	-2.29	1.23	1.30
3	A	502[B]	GTP	PB-O3A	2.27	1.61	1.59
3	A	502[A]	GTP	PB-O3A	2.21	1.61	1.59
3	B	502[A]	GTP	O4'-C1'	2.14	1.43	1.40
3	B	502[A]	GTP	PB-O3B	2.07	1.61	1.59
3	B	502[B]	GTP	C2-N3	2.03	1.38	1.33
2	A	501	SFG	OXT-C	-2.02	1.24	1.30
3	A	502[B]	GTP	PA-O3A	2.01	1.61	1.59
3	B	502[A]	GTP	PA-O3A	2.01	1.61	1.59

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	502[A]	GTP	C8-N7-C5	3.80	109.03	102.55
3	B	502[B]	GTP	C8-N7-C5	3.72	108.89	102.55
3	A	502[A]	GTP	C8-N7-C5	3.70	108.85	102.55
3	A	502[B]	GTP	C8-N7-C5	3.66	108.78	102.55
3	B	502[B]	GTP	O2A-PA-O3A	2.86	115.01	107.27
3	B	502[B]	GTP	C5-C6-N1	2.77	119.36	114.07
3	B	502[A]	GTP	C5-C6-N1	2.73	119.28	114.07
3	A	502[A]	GTP	O2A-PA-O3A	2.65	114.44	107.27
2	A	501	SFG	C5-C6-N6	2.64	124.33	120.31
3	A	502[B]	GTP	C5-C6-N1	2.56	118.96	114.07
3	A	502[A]	GTP	O2B-PB-O3B	2.56	114.19	107.27
3	B	502[B]	GTP	C2-N1-C6	-2.49	120.56	125.11
3	B	502[B]	GTP	O3B-PB-O1B	-2.40	103.49	110.70
3	A	502[B]	GTP	C2-N1-C6	-2.40	120.72	125.11

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	SFG	C5-C6-N6	2.38	123.94	120.31
3	A	502[A]	GTP	C5-C6-N1	2.37	118.60	114.07
3	B	502[A]	GTP	C2-N1-C6	-2.25	120.99	125.11
3	A	502[B]	GTP	O3G-PG-O3B	2.06	111.53	104.64
3	B	502[A]	GTP	O3G-PG-O3B	2.03	111.45	104.64
3	A	502[B]	GTP	O2A-PA-O3A	2.02	112.74	107.27
3	B	502[B]	GTP	O2B-PB-O3A	2.00	112.68	107.27

There are no chirality outliers.

All (47) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501	SFG	C5'-CD-CG-CB
3	B	502[A]	GTP	C5'-O5'-PA-O1A
3	B	502[B]	GTP	PB-O3A-PA-O5'
7	B	503	1PE	C13-C23-OH3-C22
7	B	503	1PE	OH4-C13-C23-OH3
4	A	503	PEG	O2-C3-C4-O4
4	A	504	PEG	O2-C3-C4-O4
4	A	503	PEG	O1-C1-C2-O2
5	A	507	EDO	O1-C1-C2-O2
5	A	509	EDO	O1-C1-C2-O2
5	B	507	EDO	O1-C1-C2-O2
5	B	508[A]	EDO	O1-C1-C2-O2
5	B	512	EDO	O1-C1-C2-O2
3	B	502[A]	GTP	PB-O3A-PA-O1A
5	B	515	EDO	O1-C1-C2-O2
4	A	504	PEG	C1-C2-O2-C3
3	B	502[A]	GTP	PG-O3B-PB-O2B
7	B	503	1PE	OH7-C16-C26-OH6
2	A	501	SFG	NE-CD-CG-CB
2	A	501	SFG	C5'-CD-CG-CB
2	B	501	SFG	NE-CD-CG-CB
3	A	502[B]	GTP	PB-O3B-PG-O1G
7	B	503	1PE	C24-C14-OH5-C25
5	B	508[B]	EDO	O1-C1-C2-O2
7	B	503	1PE	OH5-C14-C24-OH4
5	A	506	EDO	O1-C1-C2-O2
4	A	504	PEG	O1-C1-C2-O2
3	A	502[A]	GTP	PG-O3B-PB-O1B
3	A	502[A]	GTP	PG-O3B-PB-O2B
5	A	511	EDO	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
5	B	504	EDO	O1-C1-C2-O2
5	B	510	EDO	O1-C1-C2-O2
4	A	503	PEG	C1-C2-O2-C3
2	A	501	SFG	OXT-C-CA-CB
2	B	501	SFG	O-C-CA-CB
5	A	505	EDO	O1-C1-C2-O2
5	A	513	EDO	O1-C1-C2-O2
5	B	509	EDO	O1-C1-C2-O2
5	B	514[B]	EDO	O1-C1-C2-O2
5	B	517	EDO	O1-C1-C2-O2
3	A	502[B]	GTP	PA-O3A-PB-O1B
3	B	502[A]	GTP	PG-O3B-PB-O1B
3	B	502[A]	GTP	PB-O3A-PA-O2A
2	B	501	SFG	OXT-C-CA-CB
5	B	511	EDO	O1-C1-C2-O2
2	A	501	SFG	O-C-CA-CB
3	A	502[B]	GTP	PA-O3A-PB-O2B

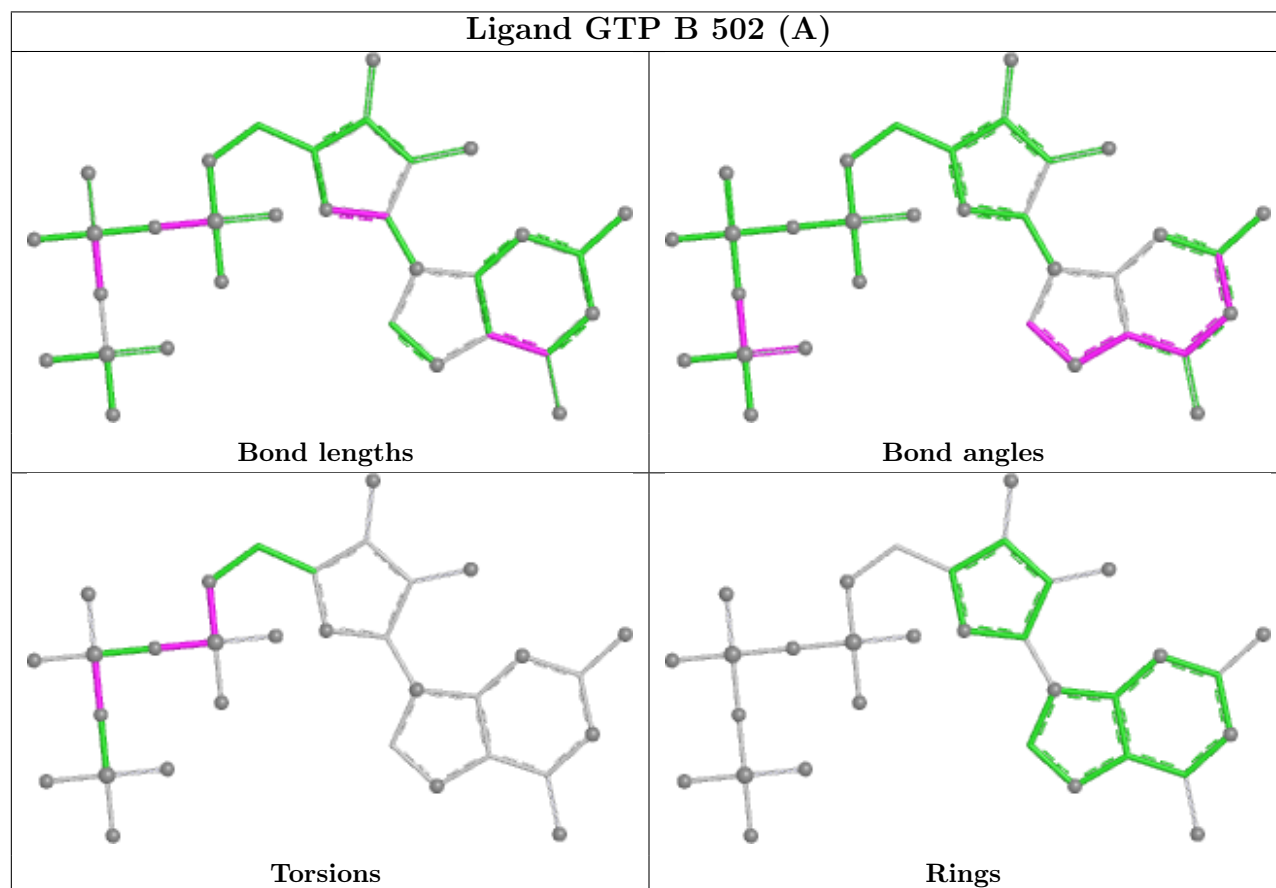
There are no ring outliers.

11 monomers are involved in 18 short contacts:

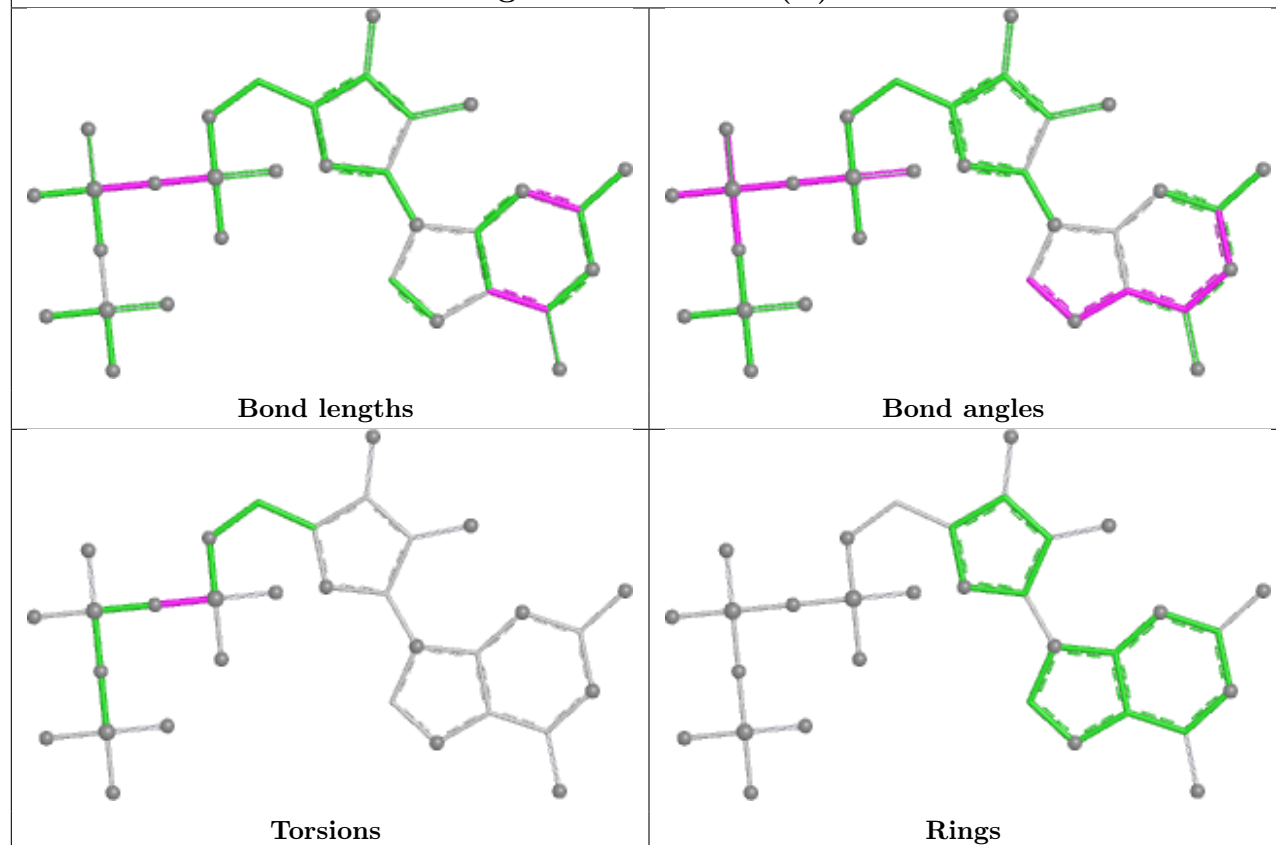
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	512	EDO	4	0
5	B	507	EDO	1	0
5	B	508[A]	EDO	1	0
5	B	508[B]	EDO	1	0
5	A	507	EDO	1	0
5	B	510	EDO	1	0
4	A	503	PEG	2	0
6	A	517	SO4	1	0
7	B	503	1PE	5	0
2	A	501	SFG	1	0
5	A	508	EDO	1	0

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

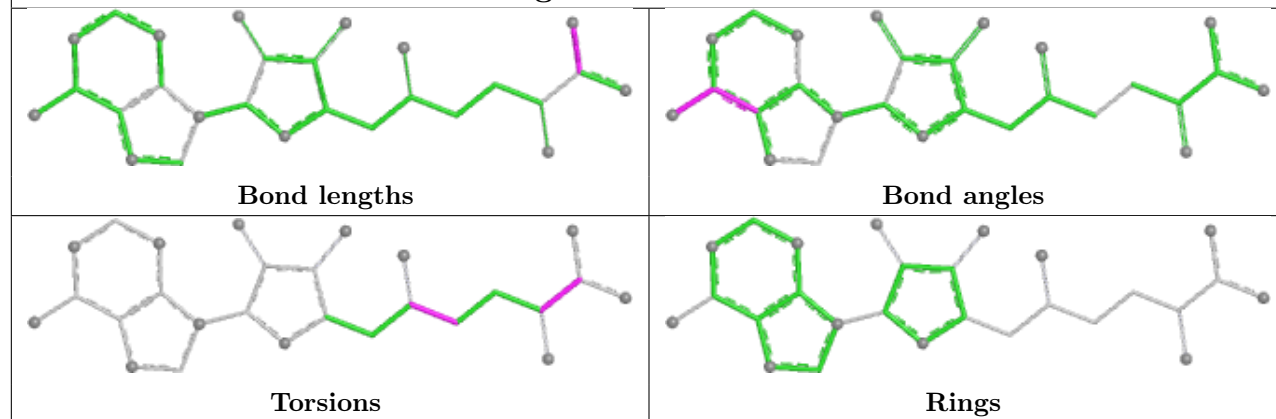
average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



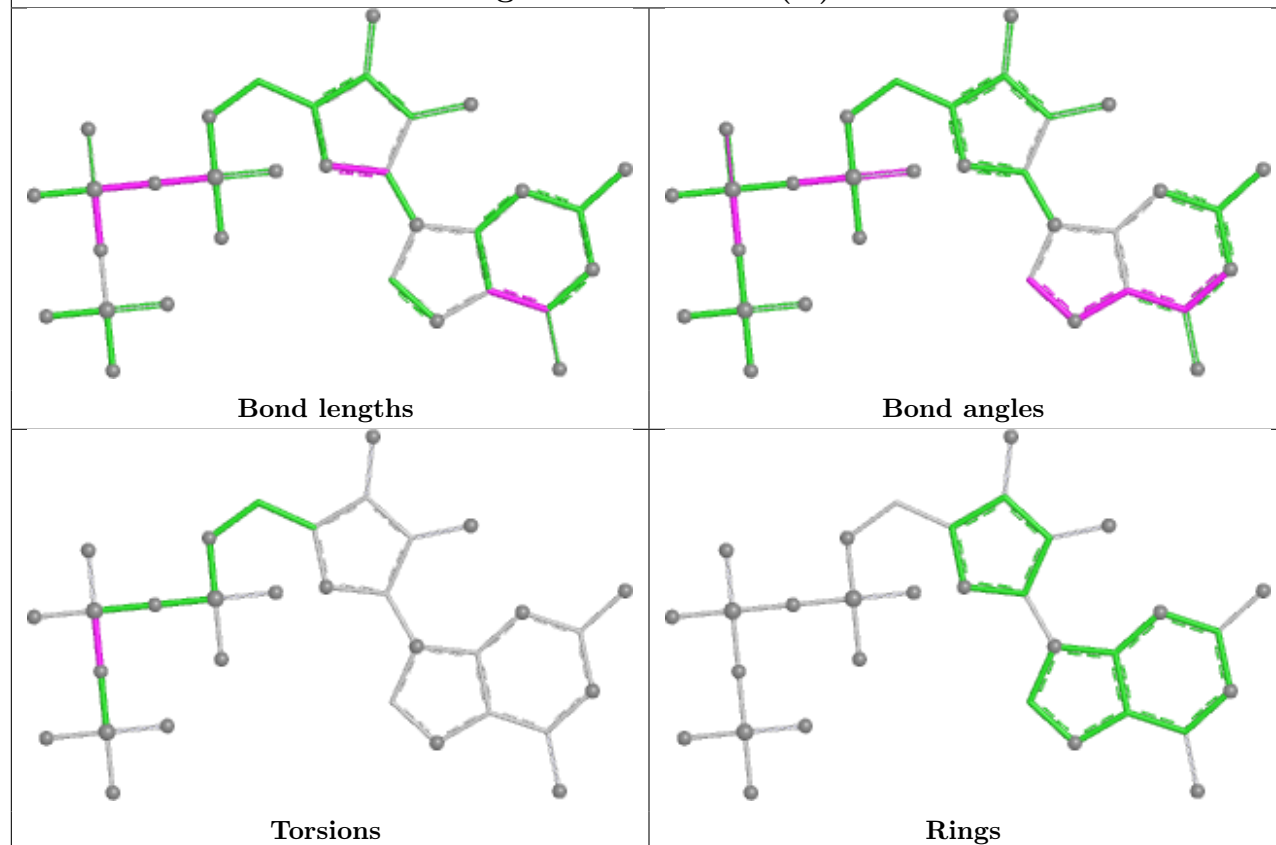
Ligand GTP B 502 (B)



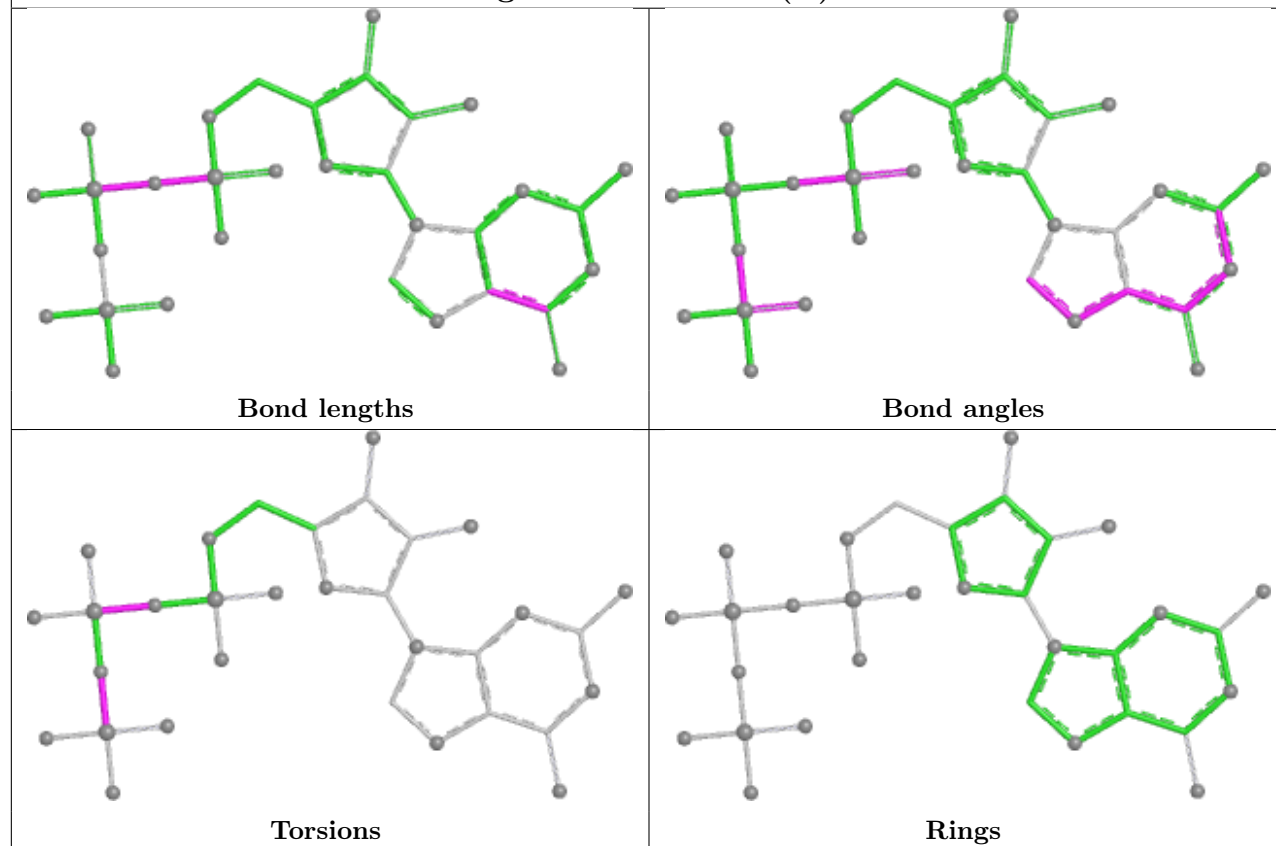
Ligand SFG B 501

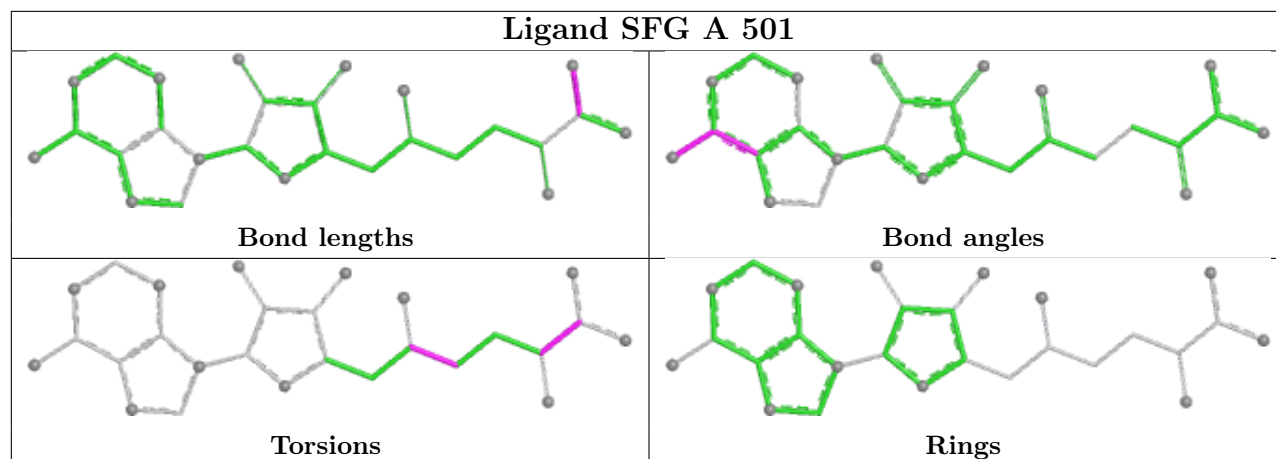


Ligand GTP A 502 (A)



Ligand GTP A 502 (B)





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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	296/319 (92%)	-1.50	0 100 100	6, 15, 34, 62	15 (5%)
1	B	295/319 (92%)	-1.49	0 100 100	6, 16, 36, 59	12 (4%)
All	All	591/638 (92%)	-1.49	0 100 100	6, 15, 36, 62	27 (4%)

There are no RSRZ outliers to report.

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(Å ²)	Q<0.9
7	1PE	B	503	16/16	0.95	0.08	47,57,58,58	0
5	EDO	A	513	4/4	0.96	0.05	46,55,55,55	0
5	EDO	B	508[A]	4/4	0.96	0.06	11,14,14,15	10
5	EDO	B	508[B]	4/4	0.96	0.06	18,22,22,23	10
5	EDO	A	512	4/4	0.96	0.06	39,47,47,47	0
5	EDO	B	507	4/4	0.97	0.06	36,43,43,43	0
5	EDO	A	509	4/4	0.97	0.06	41,49,49,49	0

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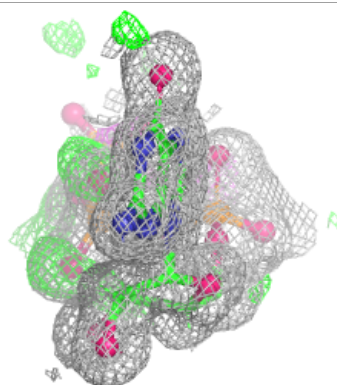
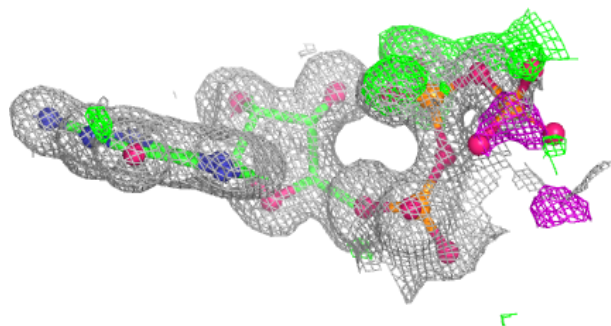
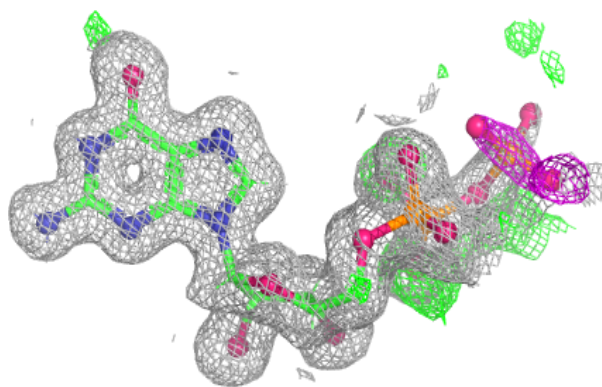
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	PEG	A	503	7/7	0.97	0.06	41,49,51,51	0
5	EDO	B	509	4/4	0.97	0.07	49,59,59,59	0
5	EDO	B	510	4/4	0.97	0.05	32,38,38,38	0
5	EDO	B	514[A]	4/4	0.97	0.04	39,46,47,47	10
5	EDO	B	514[B]	4/4	0.97	0.04	36,44,44,44	10
5	EDO	B	515	4/4	0.97	0.06	40,48,48,48	0
6	SO4	A	514	5/5	0.97	0.07	59,59,59,59	0
6	SO4	A	515	5/5	0.97	0.05	87,87,87,87	0
5	EDO	A	507	4/4	0.97	0.06	28,33,34,34	0
5	EDO	B	506	4/4	0.98	0.04	28,34,34,34	0
5	EDO	A	511	4/4	0.98	0.04	34,40,41,41	0
4	PEG	A	504	7/7	0.98	0.04	43,51,52,53	0
5	EDO	B	517	4/4	0.98	0.06	33,40,45,54	0
5	EDO	A	510	4/4	0.98	0.06	37,44,44,44	0
5	EDO	B	504	4/4	0.98	0.05	46,55,55,55	0
6	SO4	A	516	5/5	0.98	0.08	60,60,60,60	0
6	SO4	A	518	5/5	0.98	0.07	48,48,48,48	5
6	SO4	B	519	5/5	0.98	0.05	60,60,60,60	0
5	EDO	B	505	4/4	0.98	0.04	39,46,47,47	0
5	EDO	B	513	4/4	0.99	0.05	35,43,43,43	0
5	EDO	A	506	4/4	0.99	0.03	34,41,41,41	0
3	GTP	A	502[B]	32/32	0.99	0.03	11,14,18,18	41
5	EDO	A	508	4/4	0.99	0.03	21,25,26,26	0
5	EDO	B	516	4/4	0.99	0.04	30,44,53,53	0
3	GTP	B	502[A]	32/32	0.99	0.03	10,14,34,35	41
3	GTP	B	502[B]	32/32	0.99	0.03	11,13,17,17	41
2	SFG	A	501	27/27	0.99	0.02	9,10,12,13	0
3	GTP	A	502[A]	32/32	0.99	0.03	9,12,26,26	41
6	SO4	A	517	5/5	0.99	0.03	28,28,28,28	5
5	EDO	A	505	4/4	0.99	0.04	40,48,48,48	0
5	EDO	B	511	4/4	0.99	0.05	30,36,37,37	0
5	EDO	B	512	4/4	0.99	0.05	33,40,41,41	10
8	CL	B	520	1/1	0.99	0.08	56,56,56,56	0
6	SO4	B	518	5/5	1.00	0.03	35,36,36,36	0
2	SFG	B	501	27/27	1.00	0.02	10,11,13,14	0

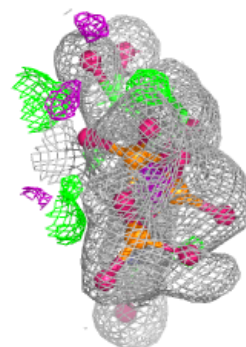
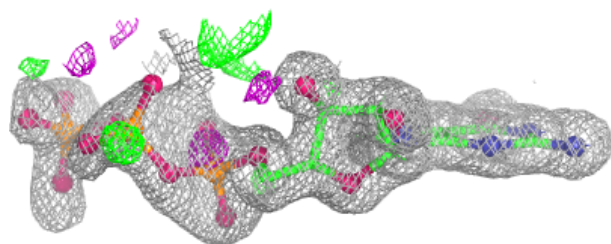
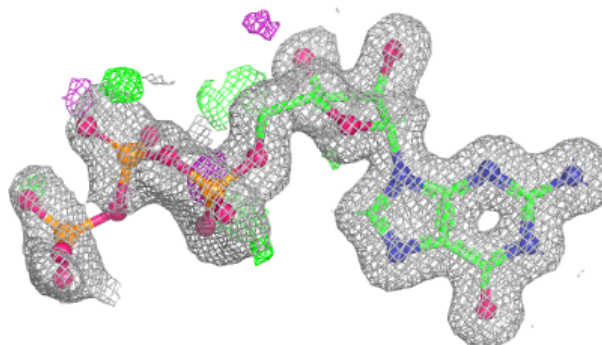
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around GTP A 502 (B):

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

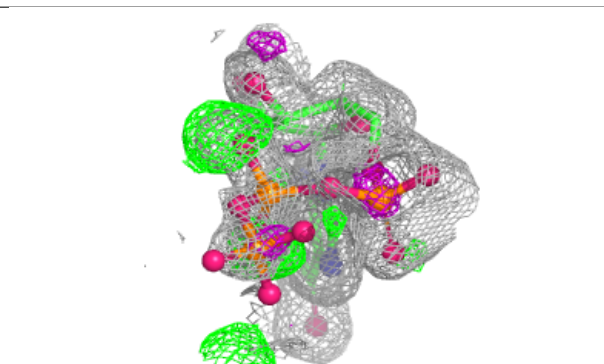
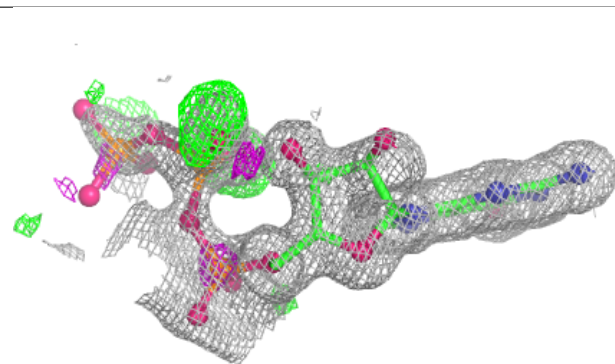
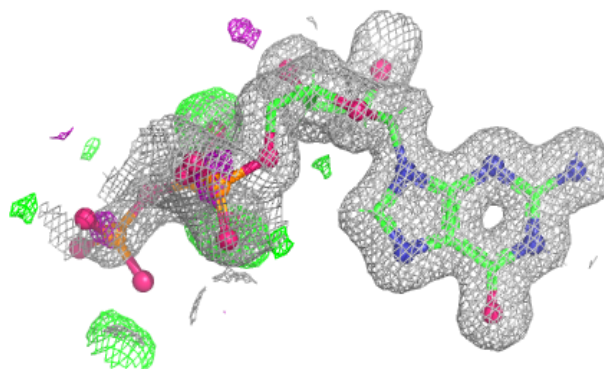
**Electron density around GTP B 502 (A):**

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

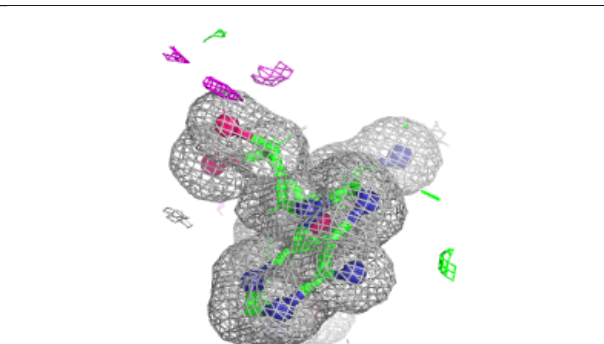
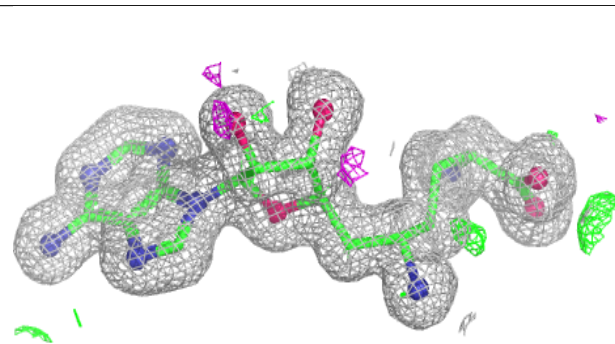
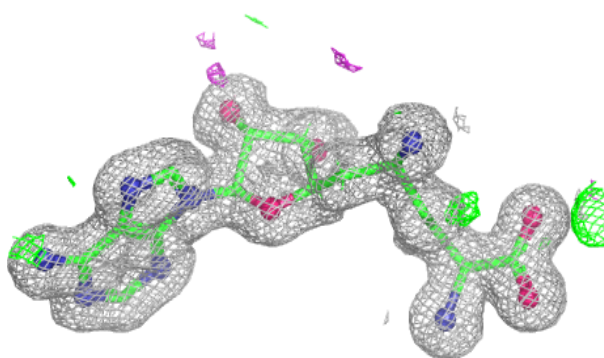


Electron density around GTP B 502 (B):

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

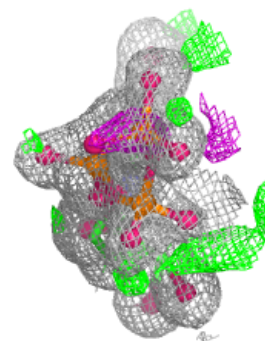
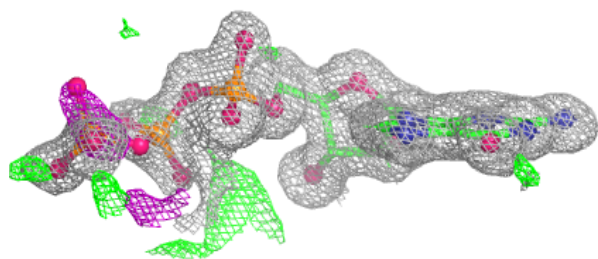
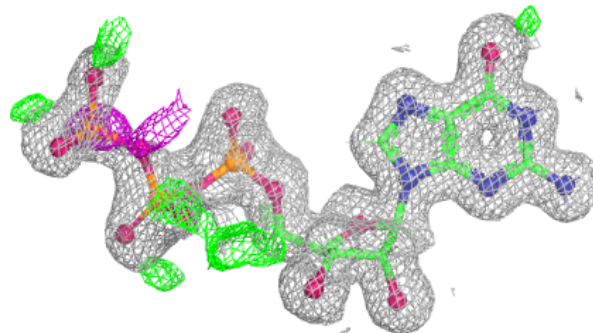
**Electron density around SFG A 501:**

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

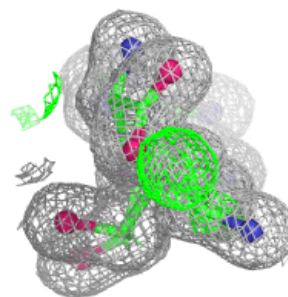
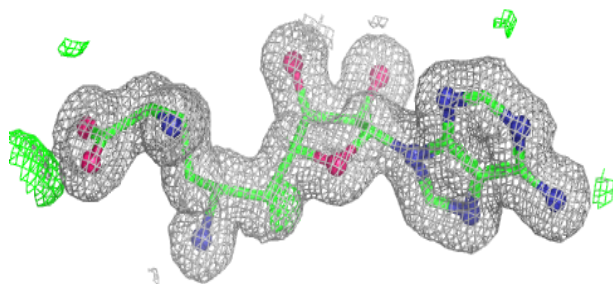
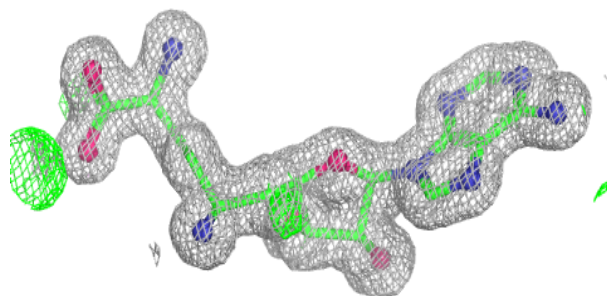


Electron density around GTP A 502 (A):

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

**Electron density around SFG 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.