



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:09 PM UTC

PDB ID : 7YY1 / pdb_00007yy1
Title : Mycobacterium abscessus Phosphopantetheine adenylyltransferase ternary complex with 4'-phosphopantetheine & non-hydrolyzable ATP analogue (AMPCPP)
Authors : Thomas, S.E.; Coyne, A.G.; Blundell, T.L.
Deposited on : 2022-02-17
Resolution : 1.70 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

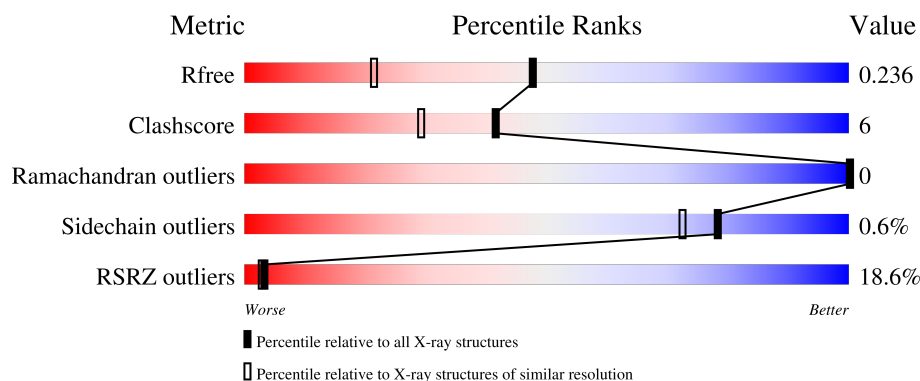
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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	5551 (1.70-1.70)
Clashscore	190562	5924 (1.70-1.70)
Ramachandran outliers	187476	5846 (1.70-1.70)
Sidechain outliers	187428	5846 (1.70-1.70)
RSRZ outliers	180081	5554 (1.70-1.70)

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	162	7% 86% 10% .
1	B	162	10% 86% 10% .
1	C	162	36% 80% 14% • 5%

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.

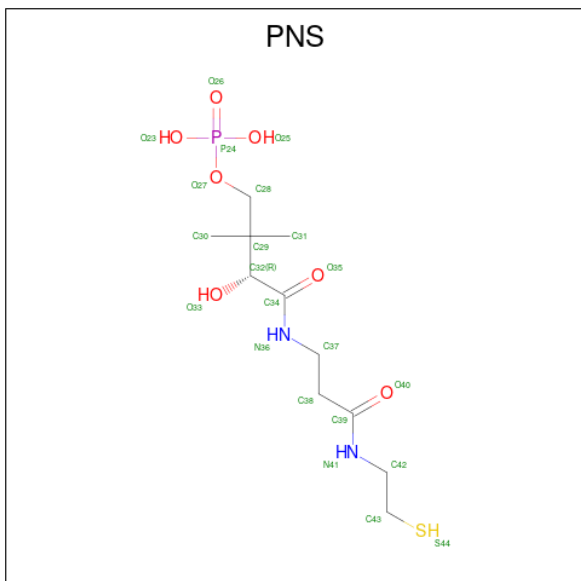
- Molecule 1 is a protein called Phosphopantetheine adenylyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	157	Total 1201	C 761	N 204	O 230	S 6	0	4	0
1	B	157	Total 1181	C 750	N 201	O 223	S 7	0	2	0
1	C	154	Total 1134	C 721	N 194	O 214	S 5	0	1	0

There are 3 discrepancies between the modelled and reference sequences:

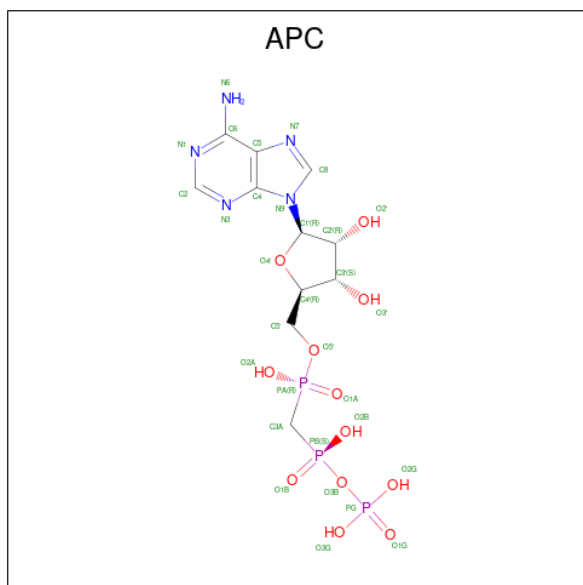
Chain	Residue	Modelled	Actual	Comment	Reference
A	0	SER	-	expression tag	UNP B1MDL6
B	0	SER	-	expression tag	UNP B1MDL6
C	0	SER	-	expression tag	UNP B1MDL6

- Molecule 2 is 4'-PHOSPHOPANTETHEINE (CCD ID: PNS) (formula: $\text{C}_{11}\text{H}_{23}\text{N}_2\text{O}_7\text{PS}$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	S	0	0
			22	11	2	7	1	1		
2	B	1	Total	C	N	O	P	S	0	0
			22	11	2	7	1	1		
2	C	1	Total	C	N	O	P	S	0	0
			22	11	2	7	1	1		

- Molecule 3 is DIPHOSPHOMETHYLPHOSPHONIC ACID ADENOSYL ESTER (CCD ID: APC) (formula: $C_{11}H_{18}N_5O_{12}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	1
			62	22	10	24	6		
3	B	1	Total	C	N	O	P	0	1
			62	22	10	24	6		
3	C	1	Total	C	N	O	P	0	1
			62	22	10	24	6		

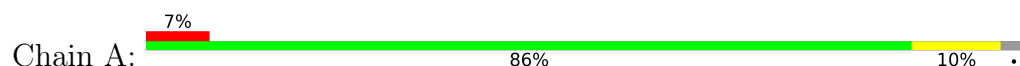
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	100	Total	O	0	0
			100	100		
4	B	85	Total	O	0	0
			85	85		
4	C	60	Total	O	0	0
			60	60		

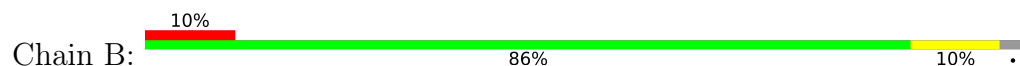
3 Residue-property plots [i](#)

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.

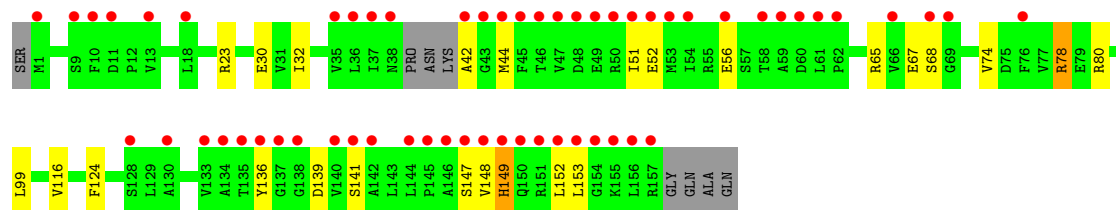
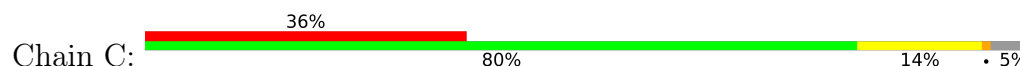
- Molecule 1: Phosphopantetheine adenylyltransferase



- Molecule 1: Phosphopantetheine adenylyltransferase



- Molecule 1: Phosphopantetheine adenylyltransferase



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	75.65Å 125.47Å 118.69Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	64.79 – 1.70 64.79 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.2 (64.79-1.70) 99.2 (64.79-1.70)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.72 (at 1.70Å)	Xtriage
Refinement program	PHENIX 1.9	Depositor
R, R_{free}	0.199 , 0.225 0.212 , 0.236	Depositor DCC
R_{free} test set	3140 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	24.7	Xtriage
Anisotropy	0.597	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 31.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.015 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.026 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4013	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.44% 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: APC, PNS

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	0.69	0/1233	0.83	0/1673
1	B	0.78	1/1207 (0.1%)	0.88	2/1637 (0.1%)
1	C	0.68	0/1155	0.89	1/1566 (0.1%)
All	All	0.72	1/3595 (0.0%)	0.87	3/4876 (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	A	0	1
1	B	0	1
1	C	0	1
All	All	0	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	95	PHE	C-O	-5.09	1.18	1.24

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	144	LEU	CA-C-N	-5.42	114.66	120.03
1	B	144	LEU	C-N-CA	-5.42	114.66	120.03
1	C	149	HIS	CA-CB-CG	-5.03	108.77	113.80

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	151	ARG	Sidechain
1	B	78	ARG	Sidechain
1	C	78	ARG	Sidechain

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	1201	0	1201	15	0
1	B	1181	0	1173	12	0
1	C	1134	0	1106	15	0
2	A	22	0	21	3	0
2	B	22	0	21	1	0
2	C	22	0	21	1	0
3	A	62	0	26	5	0
3	B	62	0	27	3	0
3	C	62	0	27	3	0
4	A	100	0	0	4	0
4	B	85	0	0	3	0
4	C	60	0	0	1	0
All	All	4013	0	3623	47	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 6.

All (47) 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)
3:C:202[A]:APC:H8	3:C:202[A]:APC:O2B	1.72	0.90
3:C:202[A]:APC:O2B	3:C:202[A]:APC:H3'	1.77	0.84
1:A:6[B]:CYS:SG	4:A:374:HOH:O	2.36	0.84
2:A:201:PNS:N36	2:A:201:PNS:O40	2.11	0.79
1:B:65:ARG:NH1	1:B:67:GLU:OE2	2.22	0.72
1:B:156:LEU:HB2	1:B:157:ARG:NH2	2.11	0.65
1:C:149:HIS:CE1	1:C:153:LEU:HD11	2.32	0.65
1:B:87:LYS:NZ	1:B:98:GLU:OE1	2.21	0.65
1:A:17:HIS:NE2	3:A:202[B]:APC:O2B	2.31	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:42:ALA:N	4:C:301:HOH:O	2.32	0.63
1:C:44:MET:HE1	1:C:152:LEU:HD12	1.81	0.62
1:A:90:ARG:NE	4:A:301:HOH:O	2.31	0.62
1:C:23:ARG:NH2	1:C:116:VAL:HG22	2.14	0.61
1:A:71:GLY:O	2:A:201:PNS:H372	2.03	0.59
1:A:127:SER:N	3:A:202[B]:APC:O1B	2.34	0.59
1:C:51:ILE:HD11	1:C:68:SER:HB3	1.85	0.57
1:C:147:SER:OG	1:C:148:VAL:N	2.35	0.57
1:A:106:LYS:NZ	4:A:303:HOH:O	2.39	0.55
1:B:67:GLU:HG2	4:B:356:HOH:O	2.07	0.54
1:A:72:LEU:HG	1:C:136:TYR:HB2	1.91	0.53
1:B:65:ARG:HH12	1:B:67:GLU:CD	2.15	0.52
1:C:32:ILE:HD13	1:C:80:ARG:HD3	1.92	0.51
1:B:149:HIS:O	1:B:153:LEU:HG	2.11	0.51
1:C:30:GLU:OE2	1:C:65:ARG:NH1	2.40	0.50
1:B:156:LEU:HB2	1:B:157:ARG:HH21	1.74	0.50
2:C:201:PNS:O23	3:C:202[A]:APC:H5'2	2.12	0.49
1:A:90:ARG:HD2	1:A:123:SER:O	2.12	0.49
1:B:87:LYS:HE2	2:B:201:PNS:O23	2.11	0.49
1:C:74:VAL:O	1:C:78:ARG:HG3	2.13	0.49
1:A:90:ARG:CZ	4:A:301:HOH:O	2.61	0.49
1:A:100:GLN:HG3	1:C:124:PHE:HA	1.95	0.48
1:B:56:GLU:OE2	1:B:147:SER:HB2	2.14	0.48
1:B:126:SER:HB2	3:B:202[A]:APC:O2B	2.14	0.48
1:C:52:GLU:O	1:C:56:GLU:HG3	2.16	0.46
1:B:9:SER:OG	3:B:202[B]:APC:O1B	2.26	0.46
3:B:202[A]:APC:H3A2	4:B:308:HOH:O	2.16	0.45
1:A:87:LYS:NZ	1:A:98:GLU:OE1	2.42	0.43
1:A:101:MET:HE1	2:A:201:PNS:H281	1.99	0.43
1:B:6[A]:CYS:SG	4:B:339:HOH:O	2.53	0.43
1:C:67:GLU:OE1	1:C:80:ARG:NE	2.43	0.43
3:A:202[B]:APC:O2B	3:A:202[B]:APC:H8	2.18	0.43
1:A:32:ILE:HD13	1:A:82:LEU:HD11	2.01	0.43
1:A:17:HIS:CE1	3:A:202[B]:APC:O2B	2.72	0.42
1:C:139:ASP:OD1	1:C:141:SER:HB3	2.19	0.42
1:A:2:THR:O	1:A:29:ASP:HB2	2.20	0.42
3:A:202[B]:APC:H8	3:A:202[B]:APC:O3B	2.19	0.42
1:C:44:MET:HE1	1:C:152:LEU:CD1	2.48	0.41

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	159/162 (98%)	156 (98%)	3 (2%)	0	100	100
1	B	157/162 (97%)	152 (97%)	5 (3%)	0	100	100
1	C	151/162 (93%)	147 (97%)	4 (3%)	0	100	100
All	All	467/486 (96%)	455 (97%)	12 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	129/130 (99%)	129 (100%)	0	100	100
1	B	124/130 (95%)	123 (99%)	1 (1%)	73	65
1	C	114/130 (88%)	113 (99%)	1 (1%)	70	62
All	All	367/390 (94%)	365 (100%)	2 (0%)	78	76

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

Mol	Chain	Res	Type
1	B	99	LEU
1	C	99	LEU

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	107	HIS
1	B	100	GLN
1	C	100	GLN
1	C	149	HIS

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 ⓘ

9 ligands are modelled in this entry.

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	APC	A	202[B]	-	29,33,33	2.76	10 (34%)	44,52,52	1.83	11 (25%)
2	PNS	C	201	-	18,21,21	1.91	3 (16%)	25,29,29	1.30	1 (4%)
2	PNS	A	201	-	18,21,21	1.89	3 (16%)	25,29,29	1.39	3 (12%)
3	APC	B	202[A]	-	29,33,33	2.73	10 (34%)	44,52,52	1.82	10 (22%)
3	APC	B	202[B]	-	29,33,33	2.71	10 (34%)	44,52,52	1.81	10 (22%)
3	APC	C	202[A]	-	29,33,33	2.80	10 (34%)	44,52,52	1.76	9 (20%)
2	PNS	B	201	-	18,21,21	1.92	3 (16%)	25,29,29	1.11	1 (4%)
3	APC	C	202[B]	-	29,33,33	2.78	10 (34%)	44,52,52	1.84	10 (22%)
3	APC	A	202[A]	-	29,33,33	2.76	10 (34%)	44,52,52	1.83	10 (22%)

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	APC	A	202[B]	-	-	3/19/38/38	0/3/3/3
2	PNS	C	201	-	-	0/27/27/27	-
2	PNS	A	201	-	-	17/27/27/27	-
3	APC	B	202[A]	-	-	3/19/38/38	0/3/3/3
3	APC	B	202[B]	-	-	5/19/38/38	0/3/3/3
3	APC	C	202[A]	-	-	3/19/38/38	0/3/3/3
2	PNS	B	201	-	-	3/27/27/27	-
3	APC	C	202[B]	-	-	6/19/38/38	0/3/3/3
3	APC	A	202[A]	-	-	4/19/38/38	0/3/3/3

All (69) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	202[A]	APC	C2'-C3'	-7.33	1.33	1.53
3	A	202[A]	APC	C2'-C3'	-7.28	1.33	1.53
3	C	202[B]	APC	C2'-C3'	-7.26	1.33	1.53
3	B	202[A]	APC	C2'-C3'	-7.25	1.33	1.53
3	A	202[B]	APC	C2'-C3'	-7.25	1.33	1.53
3	B	202[B]	APC	C2'-C3'	-7.20	1.33	1.53
3	C	202[A]	APC	O4'-C4'	7.16	1.60	1.45
3	C	202[B]	APC	O4'-C4'	7.14	1.60	1.45
3	A	202[B]	APC	O4'-C4'	7.12	1.60	1.45
3	A	202[A]	APC	O4'-C4'	7.05	1.60	1.45
3	B	202[A]	APC	O4'-C4'	6.95	1.60	1.45
3	B	202[B]	APC	O4'-C4'	6.93	1.60	1.45
3	C	202[A]	APC	C5'-C4'	-5.35	1.35	1.51
3	C	202[B]	APC	C5'-C4'	-5.33	1.35	1.51
3	A	202[B]	APC	C5'-C4'	-5.29	1.35	1.51
3	B	202[A]	APC	C5'-C4'	-5.24	1.35	1.51
3	B	202[B]	APC	C5'-C4'	-5.21	1.35	1.51
3	A	202[A]	APC	C5'-C4'	-5.21	1.35	1.51
2	C	201	PNS	C34-N36	4.99	1.45	1.33
3	C	202[A]	APC	O4'-C1'	-4.95	1.30	1.42
3	C	202[B]	APC	O4'-C1'	-4.95	1.30	1.42
3	A	202[A]	APC	O4'-C1'	-4.93	1.30	1.42
3	B	202[A]	APC	O4'-C1'	-4.79	1.30	1.42
3	B	202[B]	APC	O4'-C1'	-4.78	1.31	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	202[B]	APC	O4'-C1'	-4.77	1.31	1.42
3	C	202[A]	APC	C2'-C1'	4.76	1.68	1.53
3	A	202[B]	APC	C2'-C1'	4.71	1.68	1.53
3	C	202[B]	APC	C2'-C1'	4.71	1.68	1.53
2	B	201	PNS	C34-N36	4.65	1.44	1.33
3	A	202[A]	APC	C2'-C1'	4.64	1.68	1.53
3	B	202[A]	APC	C2'-C1'	4.44	1.67	1.53
3	B	202[B]	APC	C2'-C1'	4.41	1.67	1.53
2	A	201	PNS	C34-N36	4.36	1.43	1.33
2	B	201	PNS	C39-N41	4.18	1.43	1.33
2	C	201	PNS	C39-N41	3.91	1.42	1.33
2	A	201	PNS	C39-N41	3.83	1.42	1.33
2	A	201	PNS	C38-C39	3.47	1.58	1.51
3	B	202[B]	APC	PA-O2A	-3.47	1.47	1.56
3	C	202[B]	APC	PA-O2A	-3.45	1.48	1.56
3	B	202[A]	APC	PA-O2A	-3.44	1.48	1.56
2	B	201	PNS	C38-C39	3.43	1.58	1.51
3	C	202[A]	APC	PA-O2A	-3.42	1.48	1.56
2	C	201	PNS	C38-C39	3.41	1.58	1.51
3	A	202[A]	APC	PA-O2A	-3.28	1.48	1.56
3	A	202[B]	APC	PA-O2A	-3.21	1.48	1.56
3	A	202[A]	APC	C6-N6	2.37	1.40	1.34
3	A	202[B]	APC	C6-N6	2.37	1.40	1.34
3	B	202[B]	APC	C1'-N9	-2.26	1.40	1.46
3	B	202[A]	APC	C1'-N9	-2.24	1.40	1.46
3	C	202[A]	APC	O3'-C3'	2.20	1.48	1.43
3	C	202[B]	APC	C8-N7	2.20	1.35	1.31
3	C	202[B]	APC	C1'-N9	-2.19	1.40	1.46
3	C	202[B]	APC	O3'-C3'	2.19	1.48	1.43
3	A	202[B]	APC	O3'-C3'	2.19	1.48	1.43
3	B	202[B]	APC	C6-N6	2.17	1.39	1.34
3	A	202[A]	APC	O3'-C3'	2.14	1.48	1.43
3	B	202[A]	APC	C6-N6	2.14	1.39	1.34
3	C	202[B]	APC	C6-N6	2.12	1.39	1.34
3	A	202[A]	APC	C1'-N9	-2.12	1.40	1.46
3	C	202[A]	APC	C6-N6	2.12	1.39	1.34
3	A	202[A]	APC	C8-N7	2.11	1.35	1.31
3	C	202[A]	APC	C1'-N9	-2.11	1.40	1.46
3	C	202[A]	APC	C8-N7	2.10	1.35	1.31
3	A	202[B]	APC	C8-N7	2.09	1.35	1.31
3	B	202[A]	APC	C8-N7	2.08	1.35	1.31
3	A	202[B]	APC	C1'-N9	-2.06	1.40	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	202[B]	APC	O3'-C3'	2.04	1.48	1.43
3	B	202[A]	APC	O3'-C3'	2.01	1.47	1.43
3	B	202[B]	APC	C8-N7	2.01	1.35	1.31

All (65) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	202[A]	APC	C5-C4-N3	-5.19	119.58	126.72
3	C	202[B]	APC	C5-C4-N3	-5.15	119.62	126.72
3	A	202[B]	APC	C5-C4-N3	-5.07	119.73	126.72
3	A	202[A]	APC	C5-C4-N3	-5.02	119.81	126.72
3	B	202[A]	APC	C5-C4-N3	-4.73	120.20	126.72
3	B	202[B]	APC	C5-C4-N3	-4.67	120.28	126.72
3	C	202[B]	APC	N3-C2-N1	-4.16	122.29	128.58
3	C	202[A]	APC	N3-C2-N1	-4.10	122.38	128.58
3	A	202[A]	APC	N3-C2-N1	-4.09	122.39	128.58
3	B	202[A]	APC	N3-C2-N1	-4.04	122.46	128.58
3	A	202[B]	APC	N3-C2-N1	-4.02	122.50	128.58
3	B	202[B]	APC	N3-C2-N1	-4.01	122.51	128.58
3	B	202[A]	APC	C4-C5-N7	-3.86	106.17	110.58
3	B	202[B]	APC	C4-C5-N7	-3.86	106.17	110.58
3	C	202[B]	APC	N3-C4-N9	3.78	133.60	127.17
2	A	201	PNS	C38-C37-N36	-3.74	104.04	112.00
3	A	202[A]	APC	N3-C4-N9	3.67	133.41	127.17
3	C	202[A]	APC	N3-C4-N9	3.66	133.39	127.17
3	A	202[B]	APC	N3-C4-N9	3.64	133.36	127.17
2	C	201	PNS	O27-C28-C29	-3.64	104.70	110.55
3	C	202[B]	APC	C2-N3-C4	3.62	120.68	111.83
3	C	202[A]	APC	C2-N3-C4	3.59	120.60	111.83
3	A	202[A]	APC	C4-C5-N7	-3.58	106.49	110.58
3	A	202[B]	APC	C4-C5-N7	-3.58	106.49	110.58
3	C	202[A]	APC	C4-C5-N7	-3.51	106.57	110.58
3	B	202[B]	APC	C5-N7-C8	3.51	108.97	103.45
3	C	202[B]	APC	C4-C5-N7	-3.50	106.58	110.58
3	A	202[B]	APC	C2-N3-C4	3.46	120.28	111.83
3	B	202[A]	APC	C5-N7-C8	3.46	108.89	103.45
3	A	202[A]	APC	C2-N3-C4	3.46	120.28	111.83
3	A	202[A]	APC	C5-N7-C8	3.42	108.83	103.45
3	A	202[A]	APC	N9-C8-N7	-3.36	109.16	113.94
3	B	202[A]	APC	C2-N3-C4	3.35	120.02	111.83
3	B	202[B]	APC	N9-C8-N7	-3.32	109.23	113.94
3	B	202[B]	APC	C2-N3-C4	3.32	119.93	111.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	202[A]	APC	N3-C4-N9	3.29	132.77	127.17
3	A	202[B]	APC	C5-N7-C8	3.29	108.62	103.45
3	B	202[A]	APC	N9-C8-N7	-3.28	109.29	113.94
3	B	202[B]	APC	N3-C4-N9	3.25	132.70	127.17
3	C	202[B]	APC	C5-N7-C8	3.24	108.54	103.45
3	C	202[B]	APC	N9-C8-N7	-3.09	109.56	113.94
3	A	202[B]	APC	N9-C8-N7	-3.06	109.59	113.94
2	A	201	PNS	O35-C34-N36	-3.04	116.55	122.98
3	C	202[A]	APC	C5-N7-C8	3.04	108.23	103.45
3	A	202[A]	APC	C4-N9-C8	2.86	108.74	105.74
3	B	202[A]	APC	C4-N9-C8	2.74	108.62	105.74
3	B	202[B]	APC	C4-N9-C8	2.73	108.60	105.74
3	C	202[B]	APC	C4-N9-C8	2.66	108.53	105.74
3	C	202[A]	APC	N9-C8-N7	-2.64	110.19	113.94
2	A	201	PNS	C37-C38-C39	-2.60	108.06	112.39
3	C	202[B]	APC	PB-O3B-PG	-2.59	123.17	132.45
3	A	202[B]	APC	C4-N9-C8	2.52	108.39	105.74
3	B	202[A]	APC	PB-O3B-PG	-2.47	123.59	132.45
3	B	202[B]	APC	C6-C5-N7	2.47	136.84	132.09
3	B	202[A]	APC	C6-C5-N7	2.45	136.81	132.09
2	B	201	PNS	C38-C37-N36	-2.39	106.92	112.00
3	B	202[B]	APC	PB-O3B-PG	-2.22	124.51	132.45
3	C	202[B]	APC	C6-C5-N7	2.21	136.36	132.09
3	A	202[B]	APC	PB-O3B-PG	-2.17	124.67	132.45
3	A	202[A]	APC	C3'-C2'-C1'	2.17	105.57	101.46
3	C	202[A]	APC	C6-C5-N7	2.14	136.22	132.09
3	C	202[A]	APC	C4-N9-C8	2.14	107.99	105.74
3	A	202[A]	APC	C6-C5-N7	2.09	136.12	132.09
3	A	202[B]	APC	C4'-O4'-C1'	-2.07	104.90	109.47
3	A	202[B]	APC	C6-C5-N7	2.05	136.04	132.09

There are no chirality outliers.

All (44) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	201	PNS	C28-O27-P24-O23
2	A	201	PNS	C28-O27-P24-O25
2	A	201	PNS	C28-O27-P24-O26
2	A	201	PNS	C29-C28-O27-P24
2	A	201	PNS	O27-C28-C29-C30
2	A	201	PNS	O27-C28-C29-C31
2	A	201	PNS	O27-C28-C29-C32

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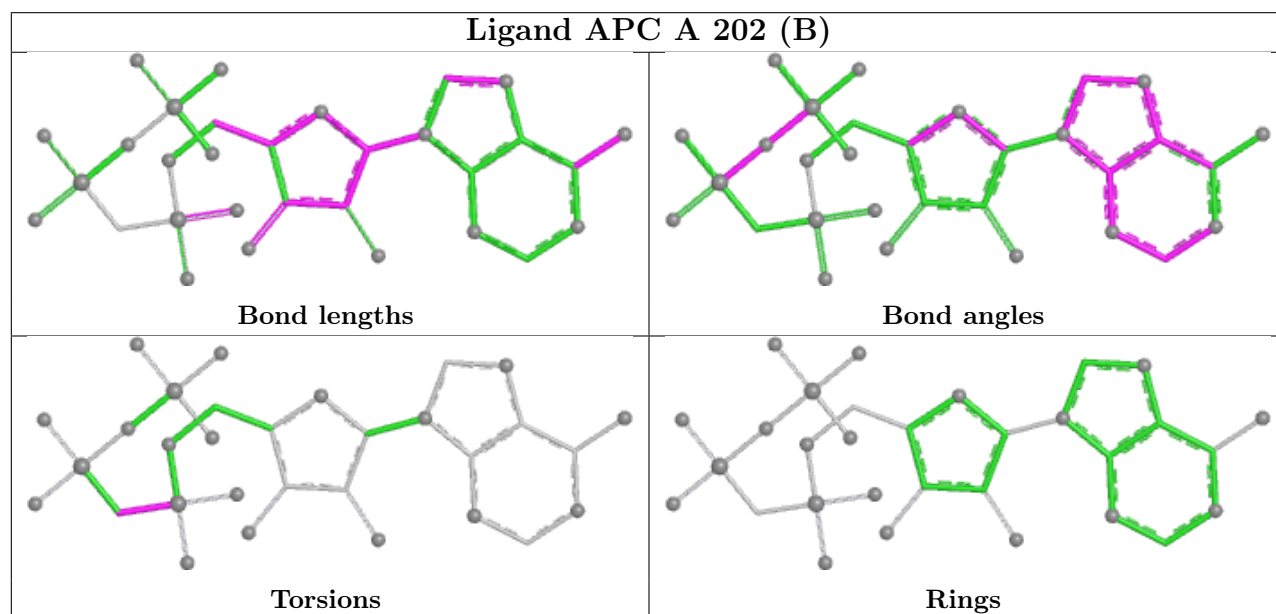
Mol	Chain	Res	Type	Atoms
2	A	201	PNS	O33-C32-C34-O35
2	A	201	PNS	C32-C34-N36-C37
2	A	201	PNS	N36-C37-C38-C39
2	B	201	PNS	O27-C28-C29-C30
2	B	201	PNS	O27-C28-C29-C31
2	B	201	PNS	O27-C28-C29-C32
3	A	202[B]	APC	PB-C3A-PA-O1A
3	B	202[A]	APC	PA-C3A-PB-O1B
3	B	202[A]	APC	PA-C3A-PB-O2B
3	B	202[B]	APC	PA-C3A-PB-O3B
3	B	202[B]	APC	PB-C3A-PA-O1A
3	B	202[B]	APC	PB-C3A-PA-O2A
3	B	202[B]	APC	PB-C3A-PA-O5'
3	C	202[A]	APC	C5'-O5'-PA-O1A
3	C	202[B]	APC	PA-C3A-PB-O1B
3	C	202[B]	APC	PA-C3A-PB-O2B
3	C	202[B]	APC	PA-C3A-PB-O3B
2	A	201	PNS	O35-C34-N36-C37
3	C	202[B]	APC	O4'-C4'-C5'-O5'
2	A	201	PNS	C30-C29-C32-O33
2	A	201	PNS	O33-C32-C34-N36
3	C	202[B]	APC	C3'-C4'-C5'-O5'
3	C	202[B]	APC	C5'-O5'-PA-O1A
2	A	201	PNS	C28-C29-C32-O33
3	A	202[A]	APC	PA-C3A-PB-O2B
3	A	202[B]	APC	PB-C3A-PA-O2A
3	A	202[B]	APC	PB-C3A-PA-O5'
3	B	202[A]	APC	PA-C3A-PB-O3B
3	B	202[B]	APC	PA-C3A-PB-O2B
2	A	201	PNS	C29-C32-C34-O35
2	A	201	PNS	C29-C32-C34-N36
3	C	202[A]	APC	C5'-O5'-PA-O2A
3	A	202[A]	APC	PB-O3B-PG-O1G
3	A	202[A]	APC	PB-O3B-PG-O2G
3	A	202[A]	APC	PB-O3B-PG-O3G
2	A	201	PNS	C31-C29-C32-O33
3	C	202[A]	APC	C5'-O5'-PA-C3A

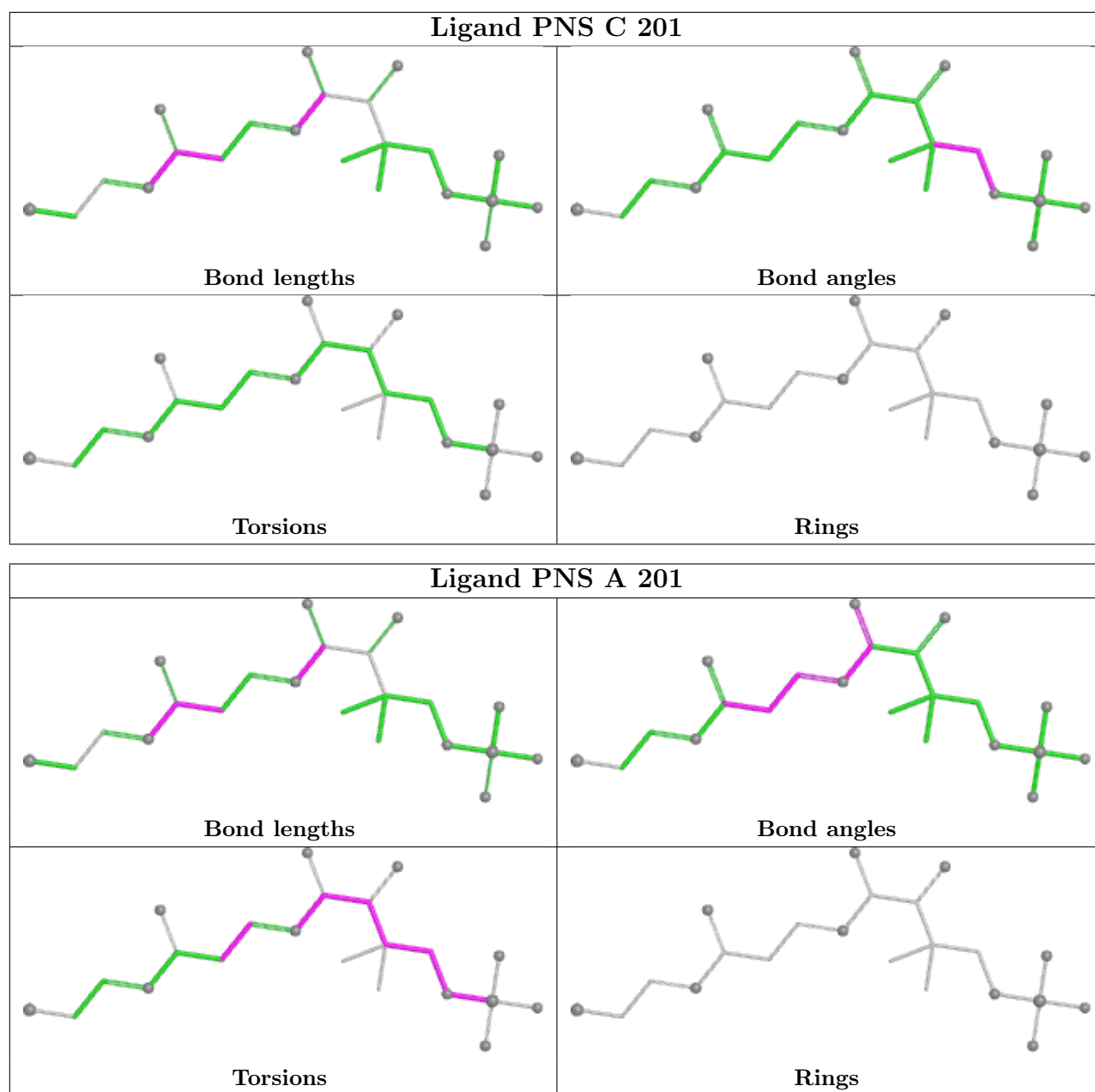
There are no ring outliers.

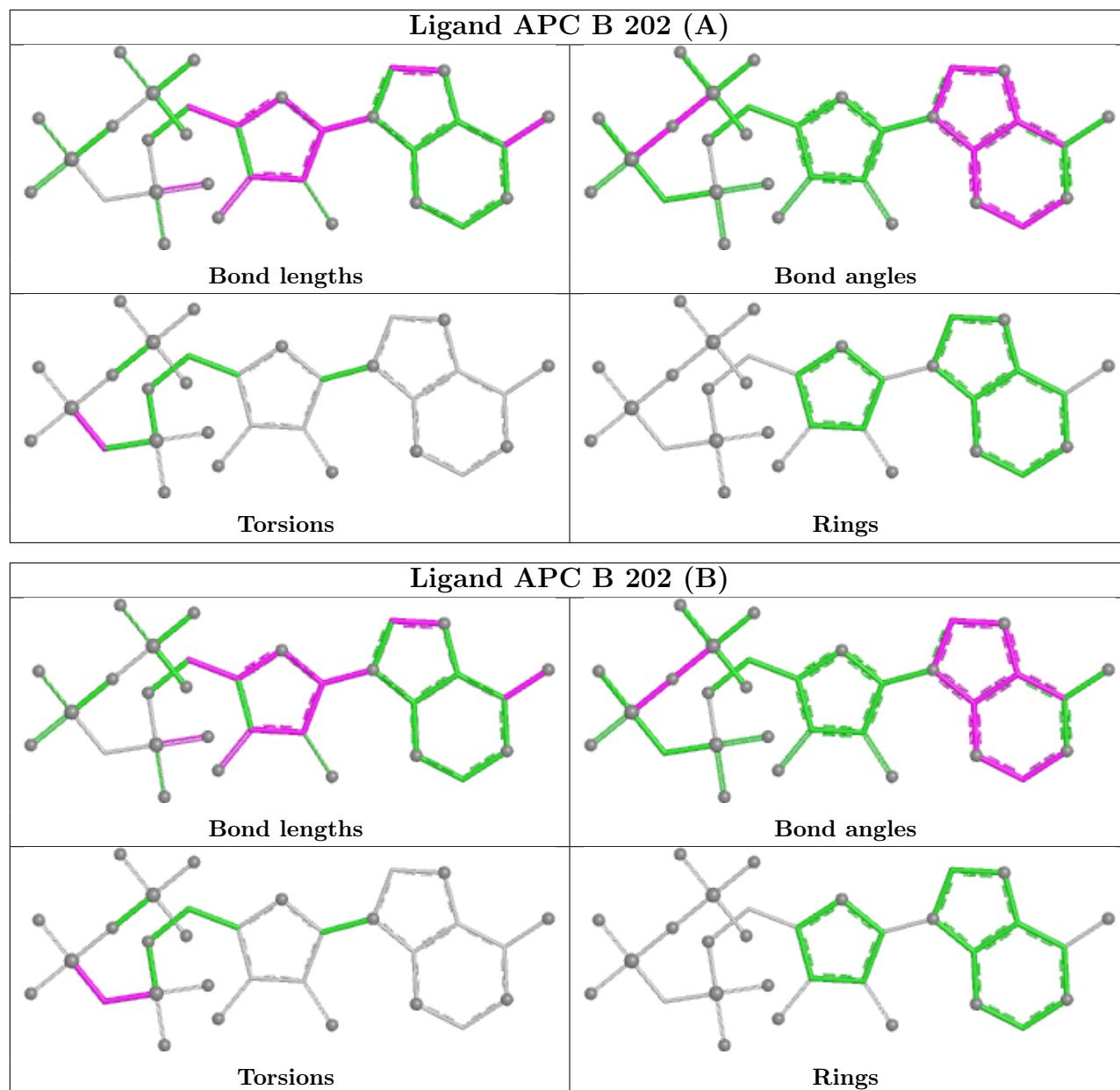
7 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	202[B]	APC	5	0
2	C	201	PNS	1	0
2	A	201	PNS	3	0
3	B	202[A]	APC	2	0
3	B	202[B]	APC	1	0
3	C	202[A]	APC	3	0
2	B	201	PNS	1	0

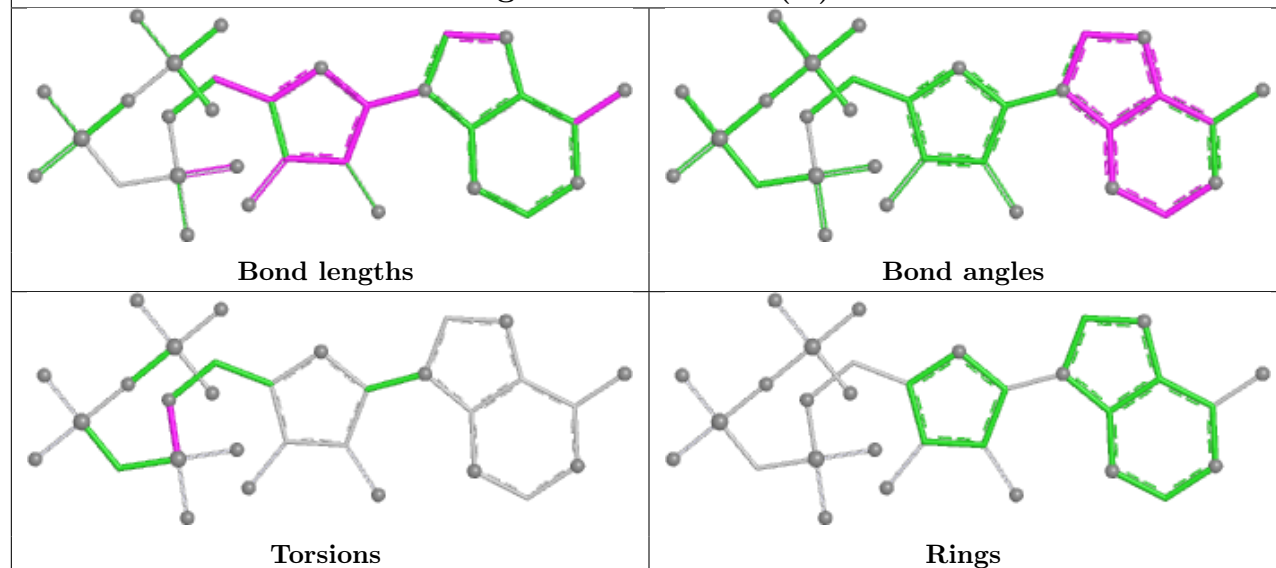
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



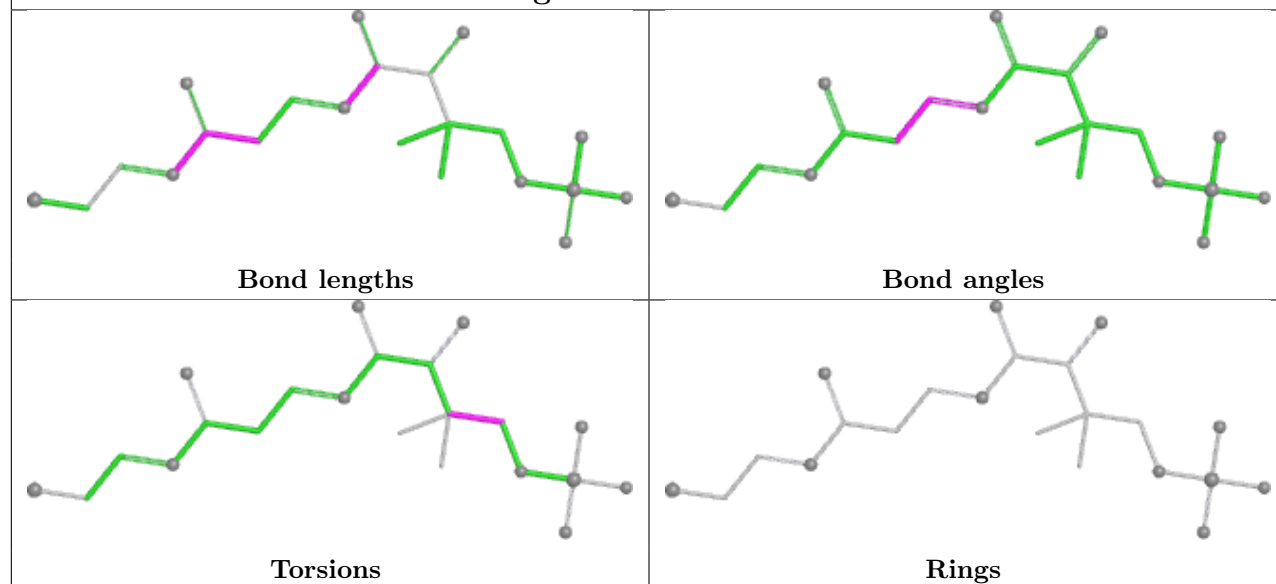


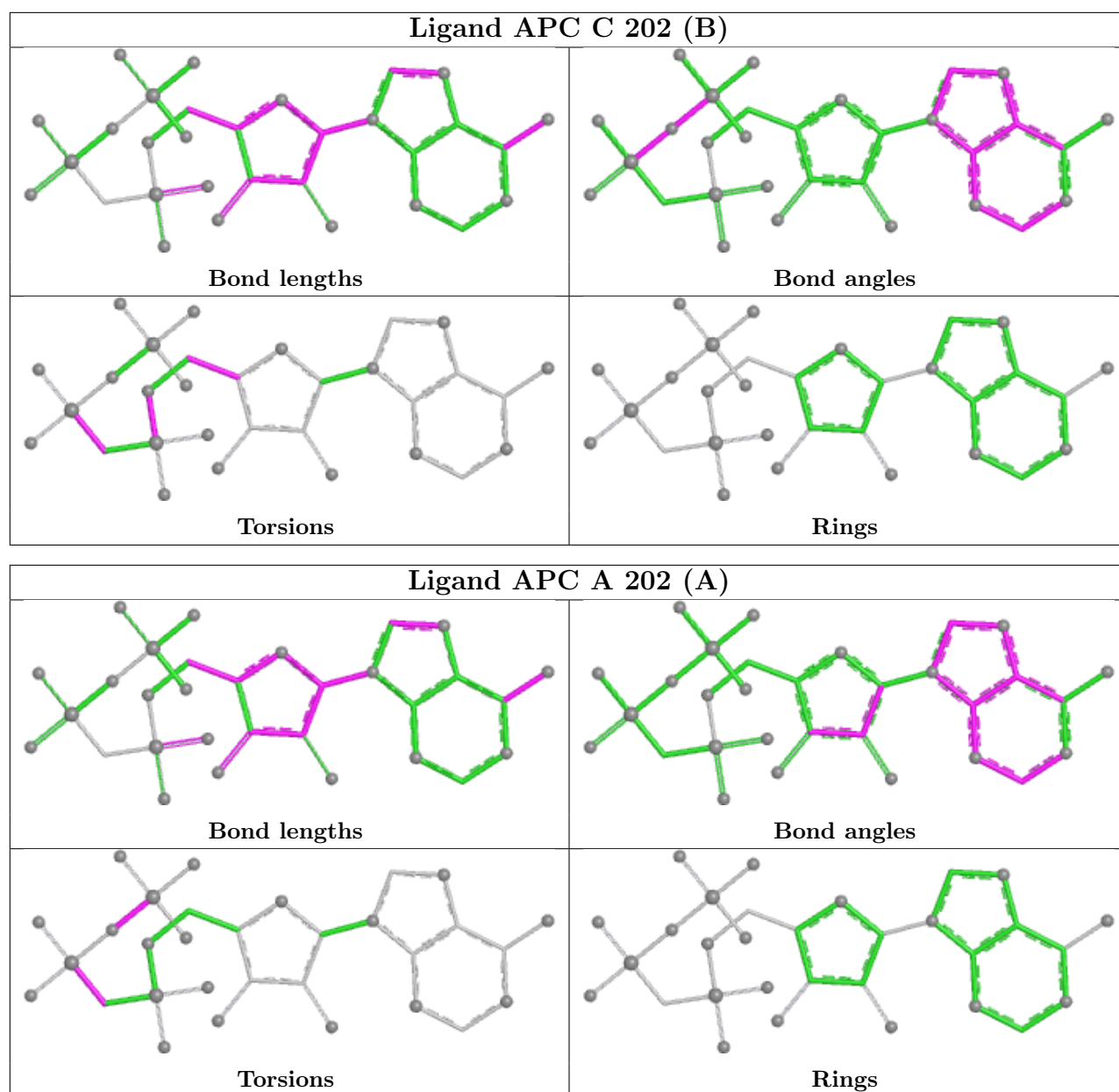


Ligand APC C 202 (A)



Ligand PNS B 201





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	157/162 (96%)	0.46	12 (7%)	20 21	13, 25, 41, 56	4 (2%)
1	B	157/162 (96%)	0.75	17 (10%)	11 11	14, 26, 55, 86	2 (1%)
1	C	154/162 (95%)	1.79	58 (37%)	1 0	21, 37, 70, 80	1 (0%)
All	All	468/486 (96%)	1.00	87 (18%)	3 3	13, 29, 62, 86	7 (1%)

All (87) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	38	ASN	7.1
1	C	37	ILE	6.6
1	C	42	ALA	6.2
1	C	45	PHE	6.0
1	C	47	VAL	5.7
1	C	134	ALA	5.2
1	C	135	THR	5.2
1	C	152	LEU	5.0
1	C	38	ASN	5.0
1	B	149	HIS	4.8
1	C	154	GLY	4.7
1	C	43	GLY	4.6
1	B	41	LYS	4.6
1	C	36	LEU	4.5
1	C	153	LEU	4.5
1	C	156	LEU	4.2
1	B	39	PRO	4.2
1	B	37	ILE	4.2
1	B	42	ALA	4.2
1	C	13	VAL	4.1
1	C	146	ALA	4.1
1	B	40	ASN	4.0
1	C	136	TYR	3.9

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Mol	Chain	Res	Type	RSRZ
1	B	1	MET	3.8
1	C	149	HIS	3.8
1	C	147	SER	3.8
1	C	148	VAL	3.7
1	B	153	LEU	3.7
1	C	61	LEU	3.4
1	C	140	VAL	3.4
1	C	46	THR	3.4
1	C	62	PRO	3.4
1	C	44	MET	3.4
1	C	51	ILE	3.4
1	C	66	VAL	3.4
1	B	156	LEU	3.3
1	C	1	MET	3.3
1	C	144	LEU	3.3
1	C	130	ALA	3.3
1	C	150	GLN	3.2
1	C	58	THR	3.1
1	B	157	ARG	3.0
1	C	151	ARG	3.0
1	C	59	ALA	3.0
1	C	11	ASP	3.0
1	B	36	LEU	3.0
1	C	128[A]	SER	2.9
1	C	69	GLY	2.9
1	A	1	MET	2.9
1	C	141	SER	2.9
1	C	49	GLU	2.8
1	C	9	SER	2.8
1	C	142	ALA	2.7
1	C	133	VAL	2.7
1	C	155	LYS	2.7
1	C	157	ARG	2.6
1	A	42	ALA	2.6
1	A	2	THR	2.5
1	C	60	ASP	2.5
1	C	145	PRO	2.4
1	C	48	ASP	2.4
1	A	41	LYS	2.3
1	A	59	ALA	2.3
1	C	56	GLU	2.3
1	C	35	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	137	GLY	2.3
1	A	39	PRO	2.3
1	C	52	GLU	2.3
1	A	40	ASN	2.3
1	C	10	PHE	2.3
1	C	54	ILE	2.3
1	C	53	MET	2.3
1	B	150	GLN	2.2
1	B	136	TYR	2.2
1	C	18	LEU	2.2
1	C	137	GLY	2.2
1	C	138	GLY	2.2
1	C	76	PHE	2.2
1	B	146	ALA	2.2
1	A	153	LEU	2.2
1	A	150	GLN	2.1
1	C	50	ARG	2.1
1	C	68	SER	2.1
1	A	97	TYR	2.1
1	B	152	LEU	2.1
1	A	157	ARG	2.0
1	A	43	GLY	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.

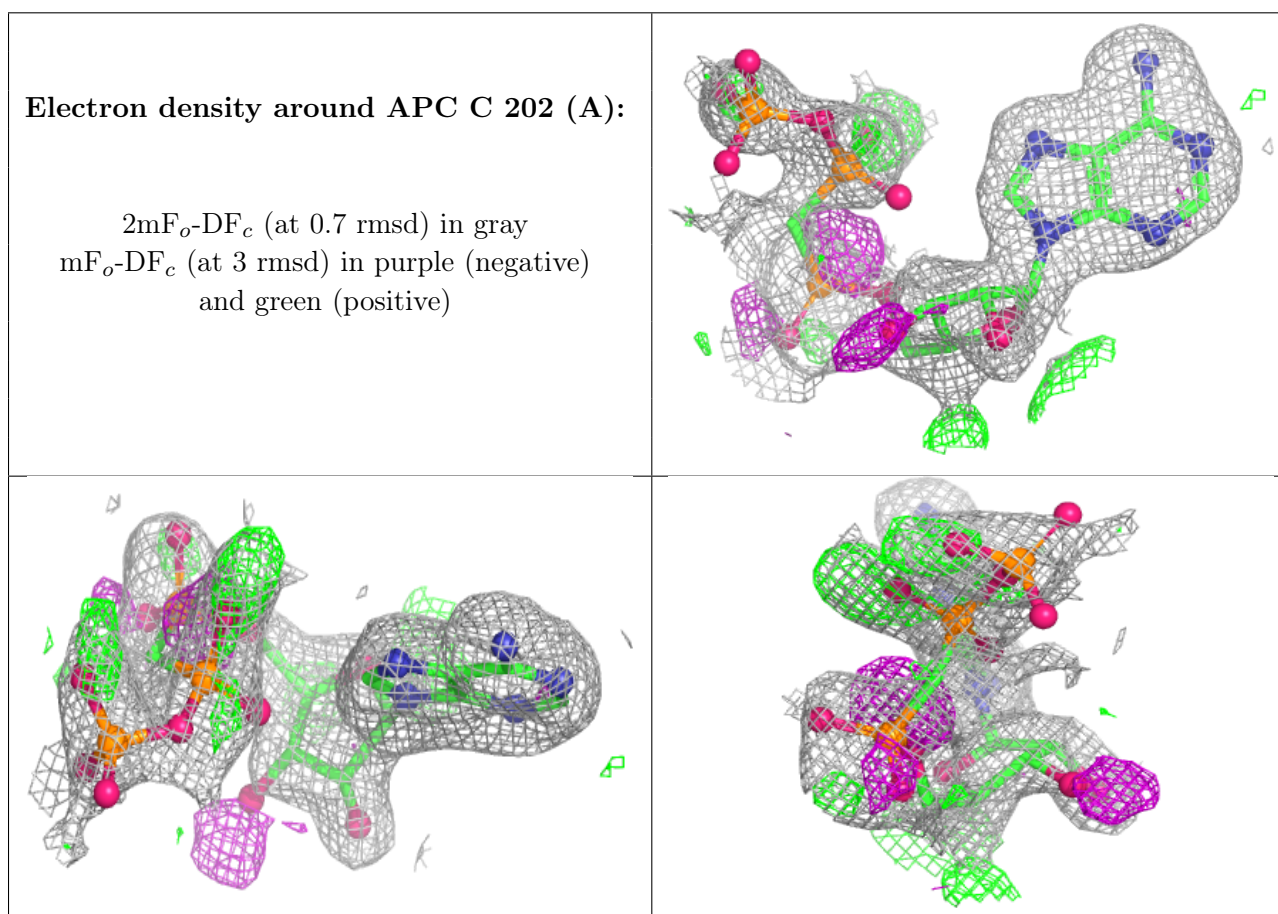
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	APC	C	202[A]	31/31	0.62	0.21	34,50,71,75	31

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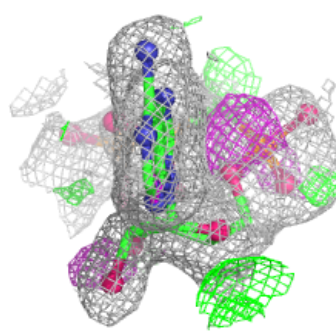
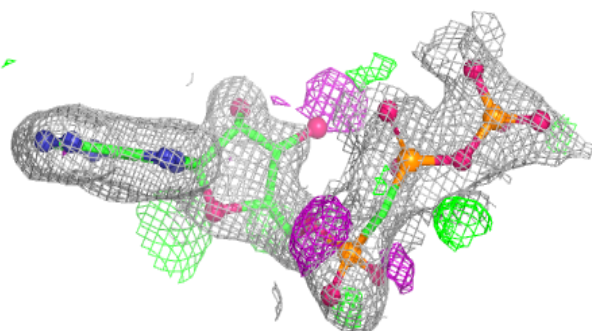
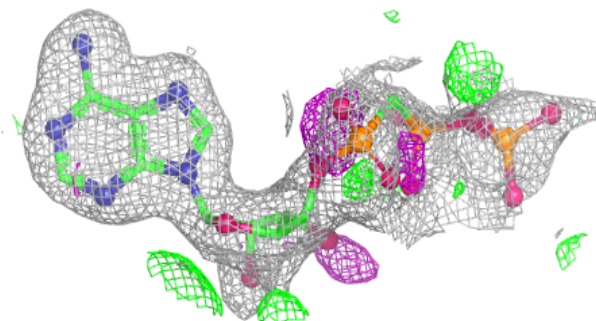
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	APC	C	202[B]	31/31	0.62	0.21	34,51,76,78	31
3	APC	A	202[A]	31/31	0.74	0.19	27,35,60,64	31
3	APC	A	202[B]	31/31	0.74	0.19	27,36,57,59	31
3	APC	B	202[A]	31/31	0.76	0.20	25,31,63,71	31
3	APC	B	202[B]	31/31	0.76	0.20	25,31,72,73	31
2	PNS	A	201	22/22	0.78	0.19	34,57,71,91	0
2	PNS	B	201	22/22	0.87	0.14	30,45,68,80	0
2	PNS	C	201	22/22	0.88	0.14	36,47,69,98	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.

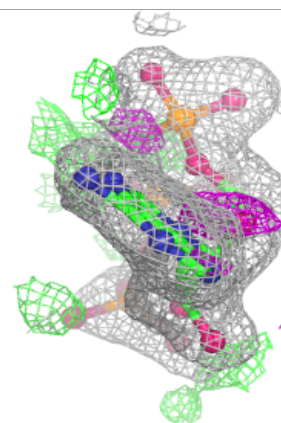
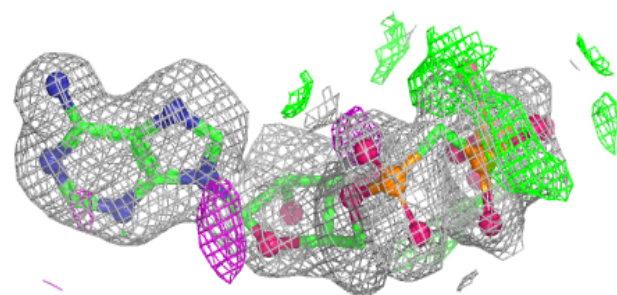
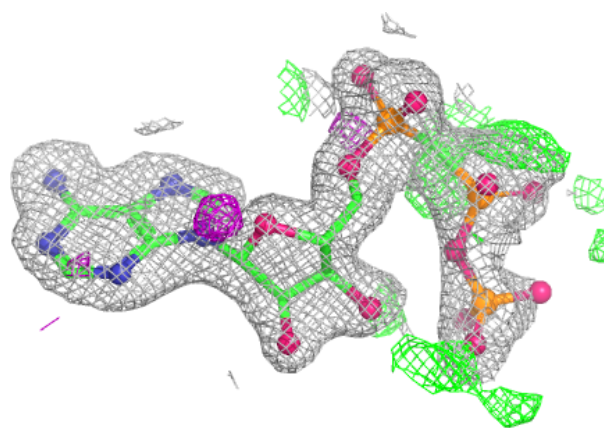


Electron density around APC C 202 (B):

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

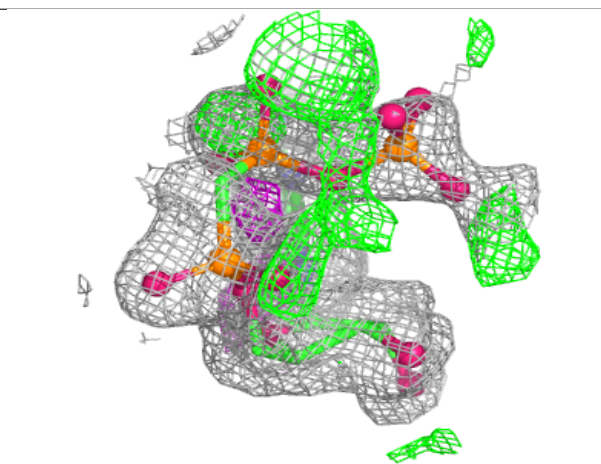
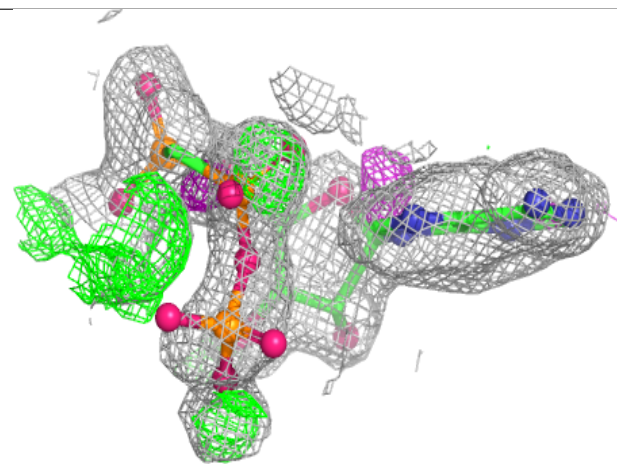
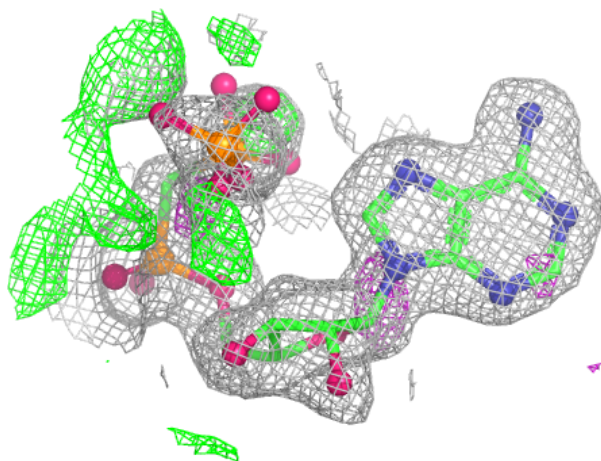
**Electron density around APC A 202 (A):**

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



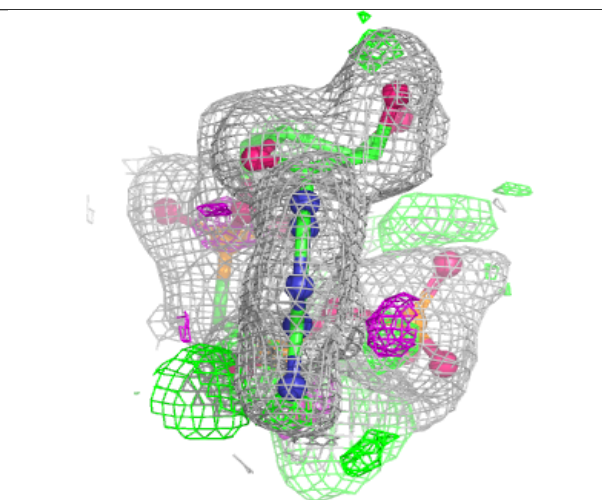
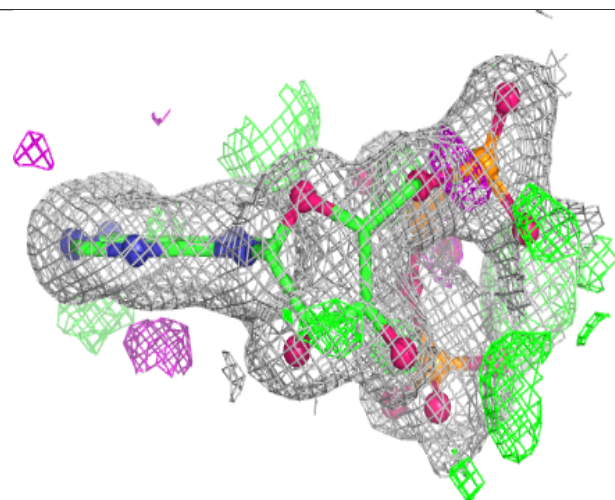
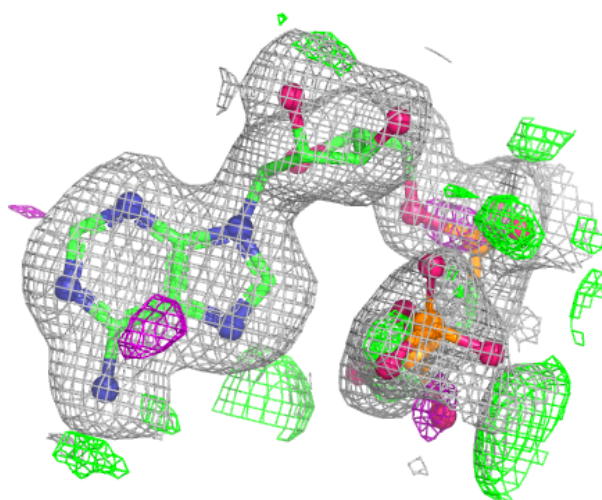
Electron density around APC A 202 (B):

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



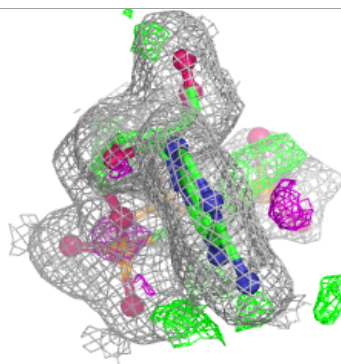
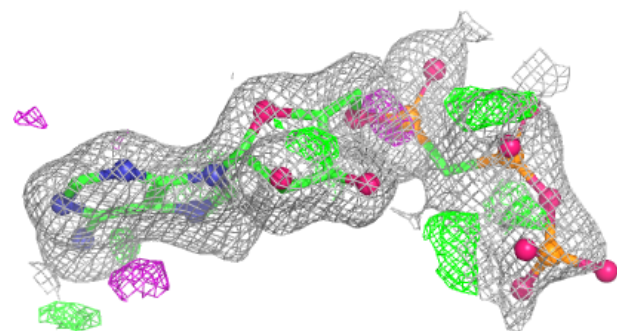
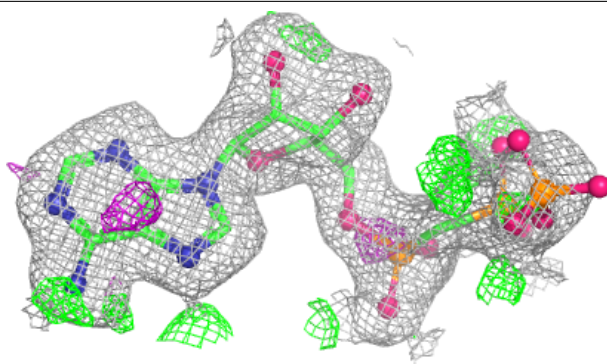
Electron density around APC B 202 (A):

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



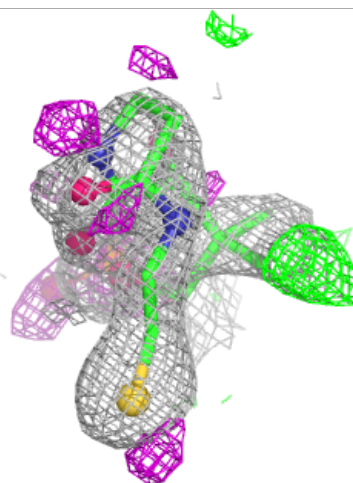
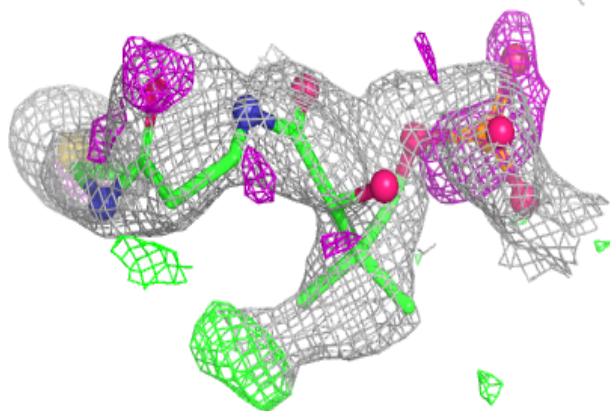
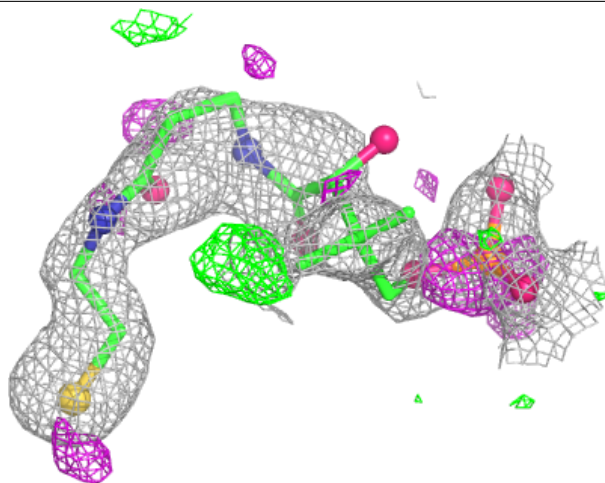
Electron density around APC B 202 (B):

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



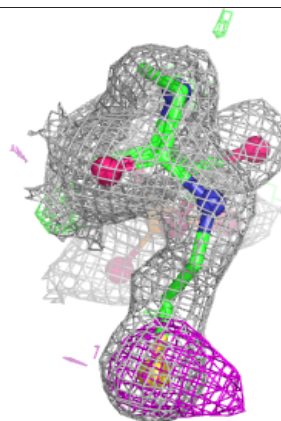
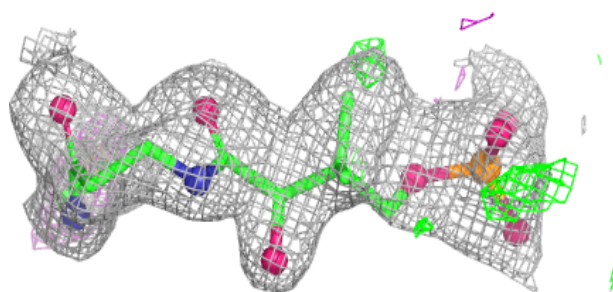
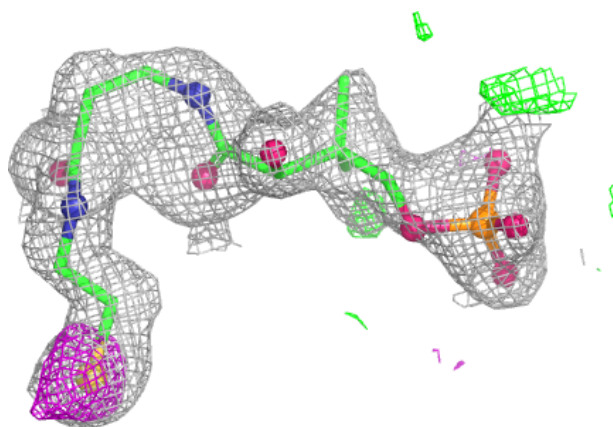
Electron density around PNS A 201:

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

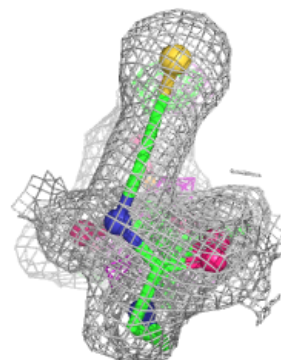
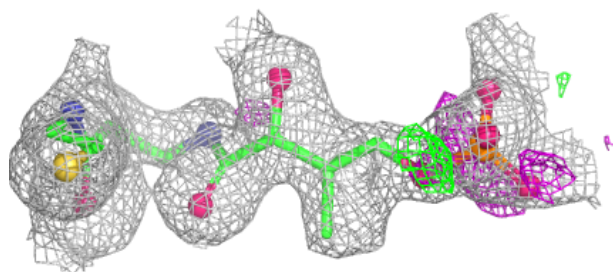
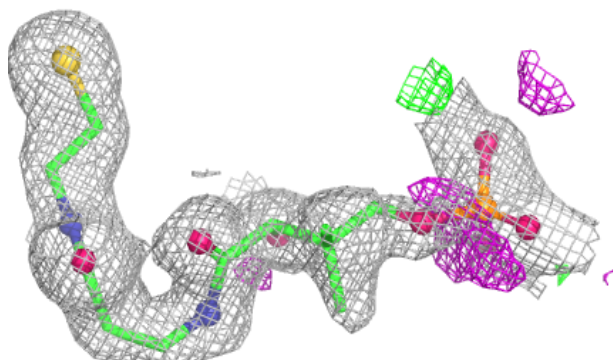


Electron density around PNS B 201:

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

**Electron density around PNS C 201:**

$2mF_o-DF_c$ (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.