



# Full wwPDB X-ray Structure Validation Report ⓘ

May 18, 2020 – 10:03 am BST

PDB ID : 1J7L  
Title : Crystal Structure of 3',5"-Aminoglycoside Phosphotransferase Type IIIa ADP Complex  
Authors : Burk, D.L.; Hon, W.C.; Leung, A.K.-W.; Berghuis, A.M.  
Deposited on : 2001-05-17  
Resolution : 2.20 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](mailto: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.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

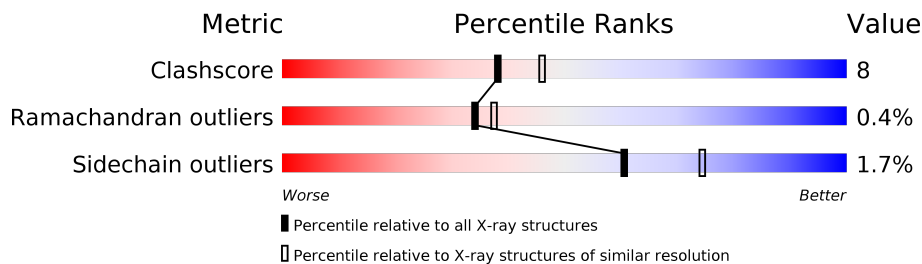
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.20 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))
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	264	 81% 18%
1	B	264	 82% 17%

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4695 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.

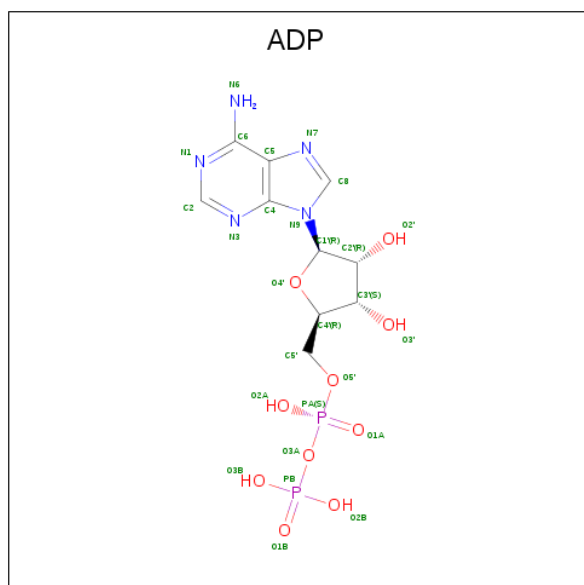
- Molecule 1 is a protein called AMINOGLYCOSIDE 3'-PHOSPHOTRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	263	Total 2170	C 1385	N 344	O 429	S 12	68	0	0
1	B	263	Total 2170	C 1385	N 344	O 429	S 12	58	0	0

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	2	Total 2	Mg 2	0	0
2	A	2	Total 2	Mg 2	0	0

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: C<sub>10</sub>H<sub>15</sub>N<sub>5</sub>O<sub>10</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 4 is water.

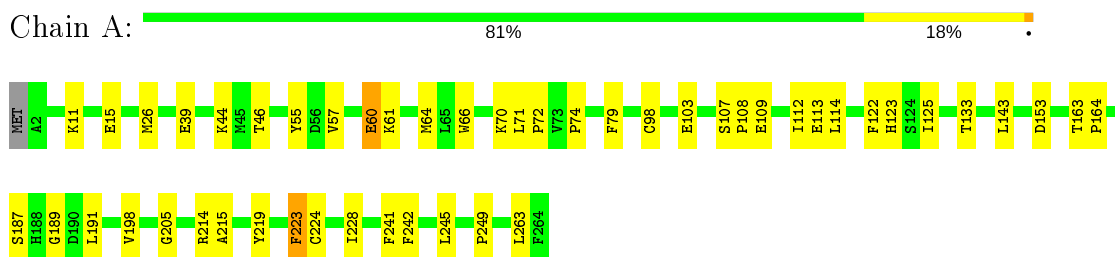
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	162	Total	O	0	0
			162	162		
4	B	135	Total	O	0	0
			135	135		

### 3 Residue-property plots [i](#)

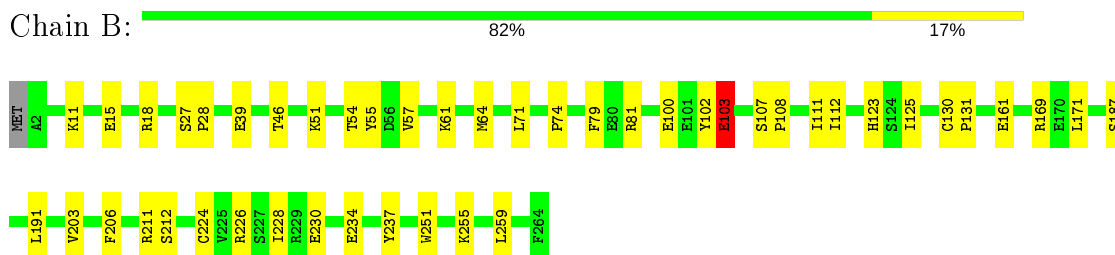
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according 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. 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.

Note EDS was not executed.

- Molecule 1: AMINOGLYCOSIDE 3'-PHOSPHOTRANSFERASE



- Molecule 1: AMINOGLYCOSIDE 3'-PHOSPHOTRANSFERASE



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	49.71Å 91.25Å 131.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.47 – 2.20	Depositor
% Data completeness (in resolution range)	96.5 (37.47-2.20)	Depositor
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.220 , 0.279	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	4695	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

## 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: MG, ADP

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	0.70	6/2218 (0.3%)	0.62	1/2991 (0.0%)
1	B	0.33	0/2218	0.59	0/2991
All	All	0.55	6/4436 (0.1%)	0.61	1/5982 (0.0%)

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	60	GLU	CD-OE2	-15.93	1.08	1.25
1	A	60	GLU	CA-C	14.41	1.90	1.52
1	A	60	GLU	N-CA	-11.19	1.24	1.46
1	A	60	GLU	CG-CD	10.17	1.67	1.51
1	A	60	GLU	CB-CG	-10.16	1.32	1.52
1	A	60	GLU	CD-OE1	-7.66	1.17	1.25

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	60	GLU	OE1-CD-OE2	-11.04	110.06	123.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2170	0	2094	34	0
1	B	2170	0	2094	30	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	27	0	12	0	0
3	B	27	0	12	0	0
4	A	162	0	0	2	0
4	B	135	0	0	2	0
All	All	4695	0	4212	63	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 8.

All (63) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:60:GLU:C	1:A:60:GLU:CA	1.90	1.38
1:B:51:LYS:HE3	1:B:81:ARG:HH12	1.42	0.84
1:A:98:CYS:SG	1:A:198:VAL:HG23	2.18	0.84
1:B:123:HIS:HE1	4:B:424:HOH:O	1.78	0.67
1:A:108:PRO:O	1:A:112:ILE:HG12	1.95	0.66
1:A:46:THR:HG23	1:A:57:VAL:HG13	1.78	0.66
1:A:60:GLU:N	1:A:60:GLU:C	2.46	0.66
1:A:98:CYS:SG	1:A:114:LEU:HD21	2.38	0.64
1:A:44:LYS:HD3	1:A:60:GLU:OE1	1.99	0.63
1:B:71:LEU:HD21	1:B:125:ILE:HD11	1.80	0.63
1:A:189:GLY:HA2	1:A:219:TYR:HE2	1.64	0.62
1:B:251:TRP:O	1:B:255:LYS:HG2	2.00	0.61
1:B:171:LEU:HD11	1:B:259:LEU:HG	1.84	0.58
1:A:98:CYS:SG	1:A:198:VAL:CG2	2.91	0.58
1:A:219:TYR:CZ	1:A:223:PHE:HE1	2.22	0.58
1:A:223:PHE:HD2	4:A:593:HOH:O	1.86	0.57
1:A:11:LYS:O	1:A:15:GLU:HG3	2.05	0.56
1:B:102:TYR:HB2	1:B:111:ILE:HD11	1.87	0.55
1:A:187:SER:CB	1:A:215:ALA:HB3	2.37	0.55
1:B:27:SER:HB2	1:B:28:PRO:HD2	1.88	0.55
1:B:61:LYS:HD3	1:B:79:PHE:CG	2.42	0.55
1:B:191:LEU:HD23	1:B:224:CYS:SG	2.47	0.54
1:B:46:THR:HG23	1:B:57:VAL:HG13	1.91	0.53
1:B:226:ARG:O	1:B:230:GLU:HG2	2.07	0.53
1:A:46:THR:HG21	1:A:55:TYR:O	2.10	0.51
1:B:107:SER:N	1:B:108:PRO:HD3	2.26	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:108:PRO:O	1:B:112:ILE:HG12	2.11	0.50
4:A:599:HOH:O	1:B:169:ARG:HG3	2.11	0.50
1:B:203:VAL:HG21	1:B:206:PHE:CZ	2.47	0.49
1:B:108:PRO:HB2	1:B:237:TYR:CE2	2.48	0.48
1:B:211:ARG:NH2	4:B:597:HOH:O	2.47	0.47
1:B:54:THR:HB	1:B:211:ARG:HG2	1.96	0.47
1:B:234:GLU:HB2	1:B:237:TYR:HD1	1.80	0.47
1:A:98:CYS:HG	1:A:198:VAL:HG23	1.77	0.47
1:B:11:LYS:O	1:B:15:GLU:HG3	2.16	0.46
1:A:109:GLU:O	1:A:113:GLU:HG3	2.16	0.46
1:B:51:LYS:HE3	1:B:81:ARG:NH1	2.22	0.46
1:A:46:THR:CG2	1:A:57:VAL:HG13	2.45	0.46
1:A:98:CYS:SG	1:A:114:LEU:CD2	3.04	0.46
1:A:61:LYS:HD3	1:A:79:PHE:CG	2.52	0.45
1:A:72:PRO:HB2	1:A:205:GLY:HA2	1.98	0.44
1:A:163:THR:HA	1:A:164:PRO:HD3	1.86	0.44
1:A:15:GLU:HB3	1:B:161:GLU:HB2	1.98	0.44
1:B:64:MET:SD	1:B:74:PRO:HG2	2.58	0.44
1:A:66:TRP:CE2	1:A:70:LYS:NZ	2.85	0.43
1:A:133:THR:HA	1:A:214:ARG:HB2	2.01	0.43
1:A:191:LEU:HD23	1:A:224:CYS:SG	2.58	0.43
1:A:143:LEU:HD21	1:A:263:LEU:HD12	2.01	0.43
1:B:224:CYS:O	1:B:228:ILE:HG13	2.19	0.43
1:A:187:SER:HB2	1:A:215:ALA:HB3	2.00	0.43
1:A:71:LEU:HD21	1:A:125:ILE:HD11	2.01	0.42
1:A:122:PHE:HA	1:A:125:ILE:HD12	2.02	0.41
1:A:242:PHE:CG	1:A:249:PRO:HG3	2.54	0.41
1:B:71:LEU:CD2	1:B:125:ILE:HD11	2.49	0.41
1:B:112:ILE:HD11	1:B:237:TYR:HB3	2.01	0.41
1:A:107:SER:N	1:A:108:PRO:HD3	2.35	0.41
1:A:112:ILE:CD1	1:A:228:ILE:HG12	2.51	0.41
1:B:46:THR:HG21	1:B:55:TYR:O	2.21	0.41
1:A:64:MET:SD	1:A:74:PRO:HG2	2.61	0.40
1:B:187:SER:O	1:B:212:SER:HA	2.21	0.40
1:A:241:PHE:CZ	1:A:245:LEU:HD11	2.56	0.40
1:B:100:GLU:O	1:B:103:GLU:HB2	2.21	0.40
1:B:130:CYS:HA	1:B:131:PRO:HD3	1.85	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	261/264 (99%)	252 (97%)	8 (3%)	1 (0%)	34	37
1	B	261/264 (99%)	246 (94%)	14 (5%)	1 (0%)	34	37
All	All	522/528 (99%)	498 (95%)	22 (4%)	2 (0%)	34	37

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	103	GLU
1	B	103	GLU

### 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	241/242 (100%)	236 (98%)	5 (2%)	53	67
1	B	241/242 (100%)	238 (99%)	3 (1%)	71	83
All	All	482/484 (100%)	474 (98%)	8 (2%)	60	74

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	26	MET
1	A	39	GLU
1	A	123	HIS
1	A	153	ASP

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Mol	Chain	Res	Type
1	A	223	PHE
1	B	18	ARG
1	B	39	GLU
1	B	103	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	82	HIS
1	A	123	HIS
1	B	123	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 4 are monoatomic - leaving 2 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	ADP	B	304	2	24,29,29	0.94	1 (4%)	29,45,45	1.23	3 (10%)
3	ADP	A	303	2	24,29,29	0.94	1 (4%)	29,45,45	1.26	3 (10%)

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	ADP	B	304	2	-	1/12/32/32	0/3/3/3
3	ADP	A	303	2	-	1/12/32/32	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	303	ADP	C8-N7	-2.19	1.30	1.34
3	B	304	ADP	C8-N7	-2.18	1.30	1.34

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	303	ADP	O4'-C1'-C2'	-4.13	100.89	106.93
3	B	304	ADP	O4'-C1'-C2'	-3.82	101.34	106.93
3	B	304	ADP	C3'-C2'-C1'	2.76	105.14	100.98
3	A	303	ADP	C3'-C2'-C1'	2.45	104.67	100.98
3	A	303	ADP	O2B-PB-O1B	2.20	119.31	110.68
3	B	304	ADP	O2B-PB-O1B	2.10	118.90	110.68

There are no chirality outliers.

All (2) torsion outliers are listed below:

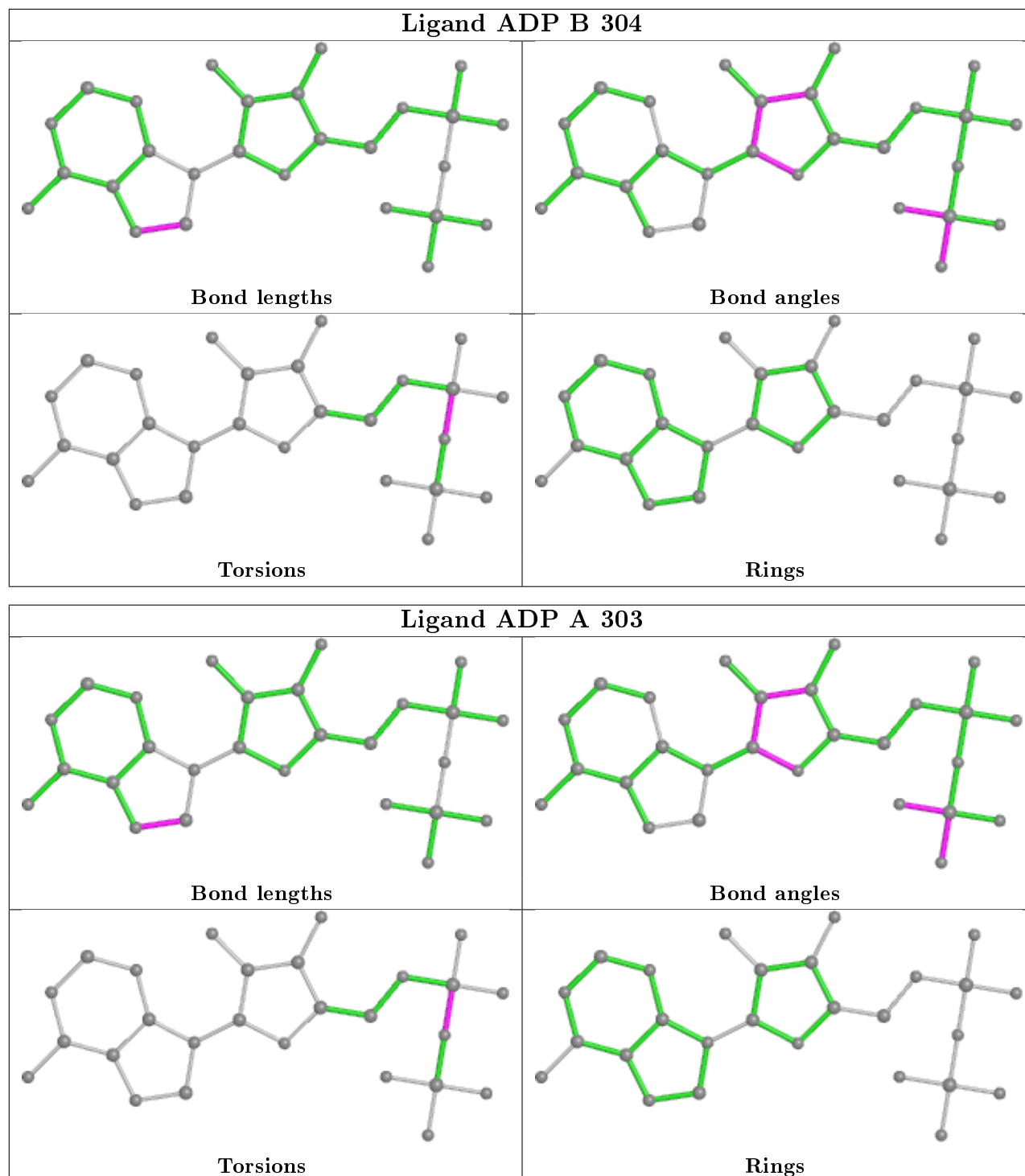
Mol	Chain	Res	Type	Atoms
3	B	304	ADP	PB-O3A-PA-O2A
3	A	303	ADP	PB-O3A-PA-O1A

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

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



## 5.7 Other polymers ⓘ

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 [i](#)

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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.