



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 3, 2023 – 10:38 am GMT

PDB ID : 2JLV  
Title : Dengue virus 4 NS3 helicase in complex with ssRNA and AMPPNP  
Authors : Luo, D.H.; Xu, T.; Watson, R.P.; Becker, D.S.; Sampath, A.; Jahnke, W.;  
Yeong, S.S.; Wang, C.H.; Lim, S.P.; Vasudevan, S.G.; Lescar, J.  
Deposited on : 2008-09-15  
Resolution : 1.90 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.

The types of validation reports are described at

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

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

MolProbity : **FAILED**  
Mogul : 1.8.4, 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

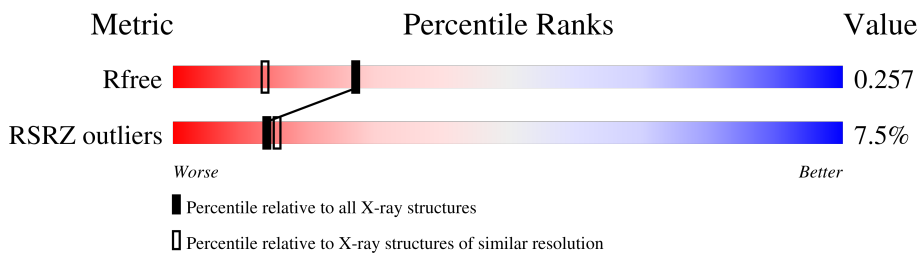
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 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))
$R_{free}$	130704	6207 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

MolProbity failed to run properly - the sequence quality summary graphics cannot be shown.

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 8294 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 SERINE PROTEASE SUBUNIT NS3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	451	3622	2282	647	675	18	0	2	0
1	B	451	3622	2282	647	675	18	0	2	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	250	ASP	GLU	conflict	UNP Q2YHF0
A	292	CYS	SER	conflict	UNP Q2YHF0
A	321	SER	THR	conflict	UNP Q2YHF0
A	322	ILE	THR	conflict	UNP Q2YHF0
A	381	ARG	LYS	conflict	UNP Q2YHF0
A	480	LYS	ARG	conflict	UNP Q2YHF0
B	250	ASP	GLU	conflict	UNP Q2YHF0
B	292	CYS	SER	conflict	UNP Q2YHF0
B	321	SER	THR	conflict	UNP Q2YHF0
B	322	ILE	THR	conflict	UNP Q2YHF0
B	381	ARG	LYS	conflict	UNP Q2YHF0
B	480	LYS	ARG	conflict	UNP Q2YHF0

- Molecule 2 is a RNA chain called 5'-R(\*AP\*GP\*AP\*CP\*UP\*AP\*AP\*CP\*AP\*AP\*CP\*U)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	C	7	128	58	20	44	6	0	0	0
2	D	7	128	58	20	44	6	0	0	0

- Molecule 3 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (three-letter code: ANP) (formula: C<sub>10</sub>H<sub>17</sub>N<sub>6</sub>O<sub>12</sub>P<sub>3</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	31	10	6	12	3	0	0
3	B	1	31	10	6	12	3	0	0

- Molecule 4 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mn		
4	A	1	1	1	0	0
4	B	1	1	1	0	0

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total Cl 1 1	0	0
6	B	1	Total Cl 1 1	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	349	Total O 349 349	0	0
7	B	339	Total O 339 339	0	0
7	C	17	Total O 17 17	0	0
7	D	11	Total O 11 11	0	0

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### 3 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	132.66Å 105.19Å 72.44Å 90.00° 117.66° 90.00°	Depositor
Resolution (Å)	20.00 – 1.90 19.83 – 1.90	Depositor EDS
% Data completeness (in resolution range)	87.6 (20.00-1.90) 87.2 (19.83-1.90)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.60 (at 1.90Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.190 , 0.248 0.202 , 0.257	Depositor DCC
$R_{free}$ test set	3105 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	23.1	Xtrriage
Anisotropy	0.019	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 48.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	8294	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	25.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.51% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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.

## 4 Model quality [i](#)

### 4.1 Standard geometry [i](#)

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

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### 4.3 Torsion angles [i](#)

#### 4.3.1 Protein backbone [i](#)

MolProbity failed to run properly - this section is therefore empty.

#### 4.3.2 Protein sidechains [i](#)

MolProbity failed to run properly - this section is therefore empty.

#### 4.3.3 RNA [i](#)

MolProbity failed to run properly - this section is therefore empty.

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

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

### 4.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 4.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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
5	GOL	B	1621	-	5,5,5	0.43	0	5,5,5	0.50	0
3	ANP	A	1619	4	29,33,33	1.75	8 (27%)	31,52,52	1.95	4 (12%)
3	ANP	B	1619	4	29,33,33	1.72	7 (24%)	31,52,52	1.57	6 (19%)
5	GOL	A	1621	-	5,5,5	0.25	0	5,5,5	0.71	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
5	GOL	B	1621	-	-	0/4/4/4	-
3	ANP	A	1619	4	-	2/14/38/38	0/3/3/3
3	ANP	B	1619	4	-	3/14/38/38	0/3/3/3
5	GOL	A	1621	-	-	4/4/4/4	-

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1619	ANP	PG-N3B	4.11	1.74	1.63
3	B	1619	ANP	PB-N3B	3.98	1.73	1.63
3	A	1619	ANP	PG-N3B	3.90	1.73	1.63
3	A	1619	ANP	PB-N3B	3.85	1.73	1.63
3	A	1619	ANP	PB-O1B	3.80	1.52	1.46
3	B	1619	ANP	PG-O1G	3.09	1.51	1.46
3	A	1619	ANP	PG-O1G	2.87	1.50	1.46
3	B	1619	ANP	PB-O1B	2.68	1.50	1.46
3	A	1619	ANP	C5-C4	2.52	1.47	1.40
3	B	1619	ANP	C5-C4	2.41	1.47	1.40
3	B	1619	ANP	C2-N3	2.18	1.35	1.32
3	A	1619	ANP	C2-N3	2.09	1.35	1.32
3	A	1619	ANP	PB-O3A	2.08	1.61	1.59
3	B	1619	ANP	PG-O3G	-2.06	1.51	1.56
3	A	1619	ANP	PG-O2G	-2.04	1.51	1.56

All (10) bond angle outliers are listed below:



Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1619	ANP	O1G-PG-N3B	-7.92	100.11	111.77
3	B	1619	ANP	N3-C2-N1	-3.83	122.69	128.68
3	A	1619	ANP	N3-C2-N1	-3.66	122.95	128.68
3	A	1619	ANP	O2B-PB-O1B	3.49	117.24	109.92
3	B	1619	ANP	O2G-PG-O3G	3.30	116.42	107.64
3	B	1619	ANP	O2B-PB-O1B	3.00	116.20	109.92
3	B	1619	ANP	O1B-PB-N3B	-2.84	107.58	111.77
3	A	1619	ANP	C4-C5-N7	-2.24	107.07	109.40
3	B	1619	ANP	C4-C5-N7	-2.11	107.20	109.40
3	B	1619	ANP	O1G-PG-N3B	-2.08	108.71	111.77

There are no chirality outliers.

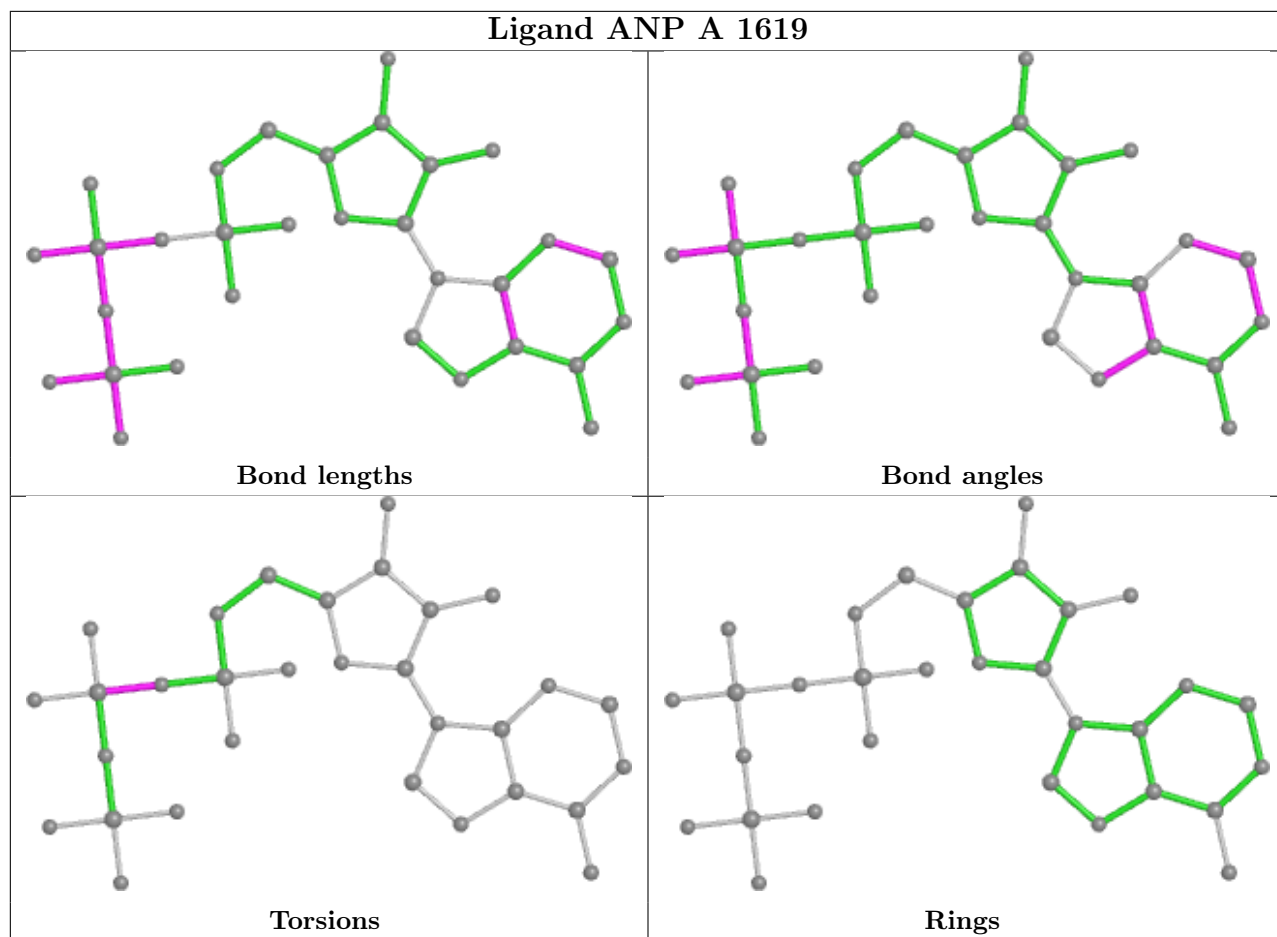
All (9) torsion outliers are listed below:

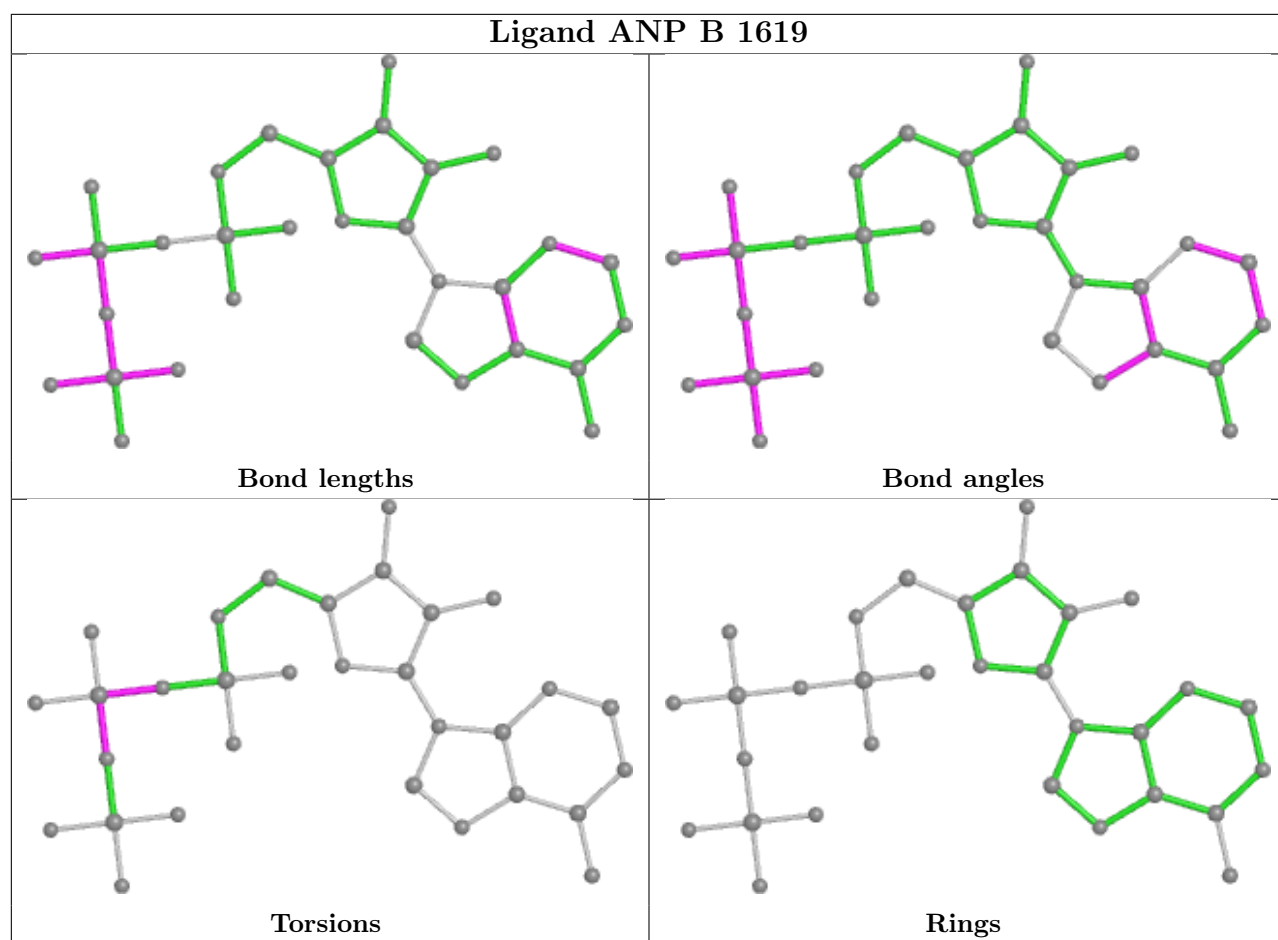
Mol	Chain	Res	Type	Atoms
3	A	1619	ANP	PA-O3A-PB-O1B
3	A	1619	ANP	PA-O3A-PB-O2B
3	B	1619	ANP	PG-N3B-PB-O1B
3	B	1619	ANP	PA-O3A-PB-O1B
3	B	1619	ANP	PA-O3A-PB-O2B
5	A	1621	GOL	O1-C1-C2-O2
5	A	1621	GOL	O1-C1-C2-C3
5	A	1621	GOL	C1-C2-C3-O3
5	A	1621	GOL	O2-C2-C3-O3

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.





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

There are no such residues in this entry.

#### 4.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 5 Fit of model and data [i](#)

### 5.1 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	451/451 (100%)	0.72	32 (7%) 16 17	16, 23, 33, 42	0
1	B	451/451 (100%)	0.58	36 (7%) 12 13	12, 23, 33, 43	0
2	C	7/12 (58%)	0.17	1 (14%) 2 2	21, 23, 33, 37	0
2	D	7/12 (58%)	0.19	0 100 100	19, 21, 32, 35	0
All	All	916/926 (98%)	0.64	69 (7%) 14 15	12, 23, 33, 43	0

All (69) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	519	ILE	6.7
1	A	249	SER	6.4
1	B	272	SER	6.4
1	A	250	ASP	6.3
1	A	400	THR	5.9
1	B	273	THR	5.8
1	A	273	THR	5.6
1	A	519	ILE	5.5
1	A	171[A]	MET	5.4
1	A	399	LEU	5.4
1	A	518	ALA	4.6
1	A	272	SER	4.5
1	B	518	ALA	4.5
1	B	254	ARG	4.4
1	B	171[A]	MET	4.2
1	A	345	ASN	4.1
1	B	250	ASP	4.0
1	B	252	THR	3.9
1	A	517	GLN	3.8
1	A	251	HIS	3.8
1	B	528	GLU	3.8

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Mol	Chain	Res	Type	RSRZ
1	A	253	GLY	3.5
1	B	436	ASP	3.5
1	A	252	THR	3.4
1	B	517	GLN	3.4
1	B	516	THR	3.2
1	A	436	ASP	3.2
1	A	320	GLY	3.2
1	A	254	ARG	3.1
1	B	526	ARG	3.1
1	A	346	THR	3.1
1	B	378	SER	3.0
1	B	520	ASP	3.0
1	A	504	ILE	3.0
1	B	401	ASP	2.9
1	A	170[A]	ALA	2.9
1	B	400	THR	2.9
1	A	347	GLY	2.8
1	A	401	ASP	2.8
1	B	251	HIS	2.7
1	B	274	ARG	2.7
1	B	320	GLY	2.6
1	A	437	GLY	2.6
1	A	220	ILE	2.6
1	A	423	ILE	2.6
1	A	373	ASN	2.4
1	B	438	PRO	2.4
1	B	377	LYS	2.4
1	B	253	GLY	2.3
1	B	405	VAL	2.3
1	A	377	LYS	2.3
1	B	220	ILE	2.3
1	B	345	ASN	2.3
1	B	359	VAL	2.3
1	A	520	ASP	2.2
1	B	219	LEU	2.2
1	B	282	VAL	2.2
1	B	355	GLN	2.2
1	A	584	ARG	2.1
1	A	172	GLY	2.1
1	A	353	ASP	2.1
1	A	435	THR	2.1
1	B	441	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	280	LEU	2.1
1	B	215	ARG	2.0
1	B	586	GLY	2.0
1	B	346	THR	2.0
1	B	498	ILE	2.0
2	C	7	A	2.0

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

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

## 5.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.4 Ligands [i](#)

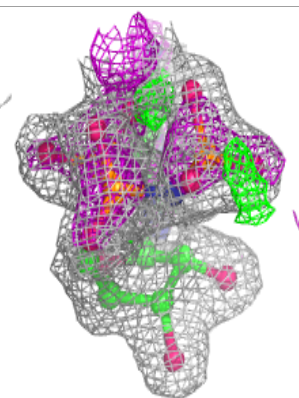
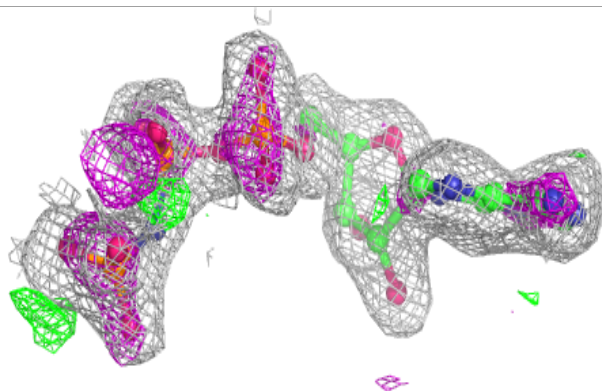
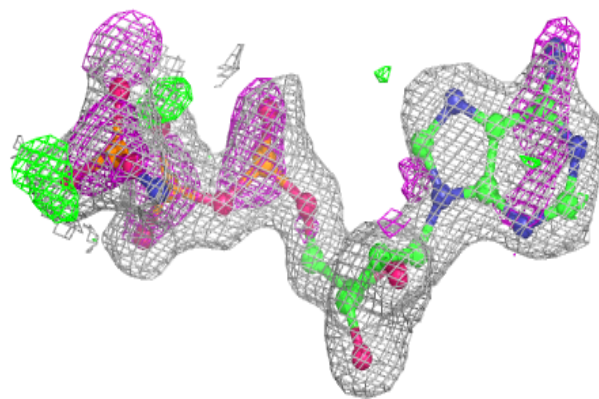
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
5	GOL	A	1621	6/6	0.91	0.17	26,29,30,33	0
5	GOL	B	1621	6/6	0.91	0.11	32,33,34,34	0
3	ANP	A	1619	31/31	0.95	0.13	12,23,32,32	0
3	ANP	B	1619	31/31	0.95	0.13	15,26,33,33	0
6	CL	A	1622	1/1	0.97	0.10	21,21,21,21	0
4	MN	A	1620	1/1	0.98	0.04	14,14,14,14	0
6	CL	B	1622	1/1	0.98	0.05	23,23,23,23	0
4	MN	B	1620	1/1	0.99	0.04	18,18,18,18	0

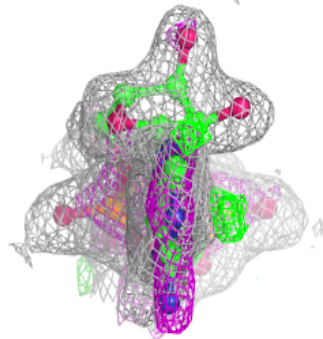
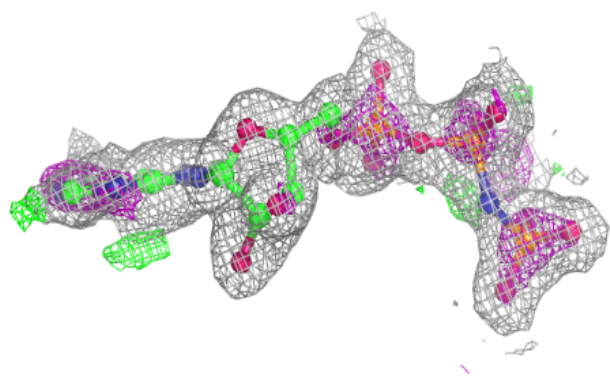
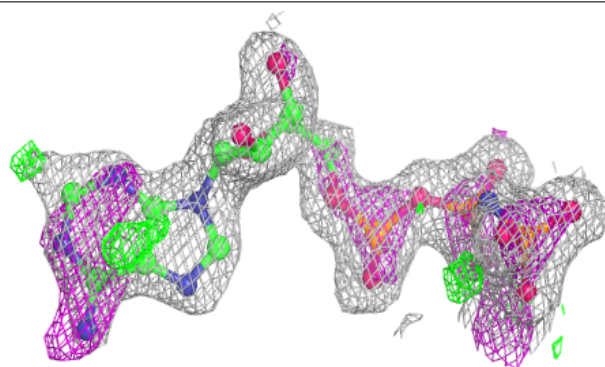
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around ANP A 1619:**

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

**Electron density around ANP B 1619:**

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



## 5.5 Other polymers [i](#)

There are no such residues in this entry.