wwPDB X-ray Structure Validation Summary Report (i)

Mar 6, 2026 – 02:06 PM UTC

PDB ID	:	3X1K / pdb_00003x1k
Title	:	crystal structure of Phosphoapantetheine adenylyltransferase PPAT/CoaD with AMP-PNP from Pseudomonas aerugonosa
Authors	:	Chatterjee, R.; Datta, S.
Deposited on	:	2014-11-20
Resolution	:	2.55 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (i)) were used in the production of this report:

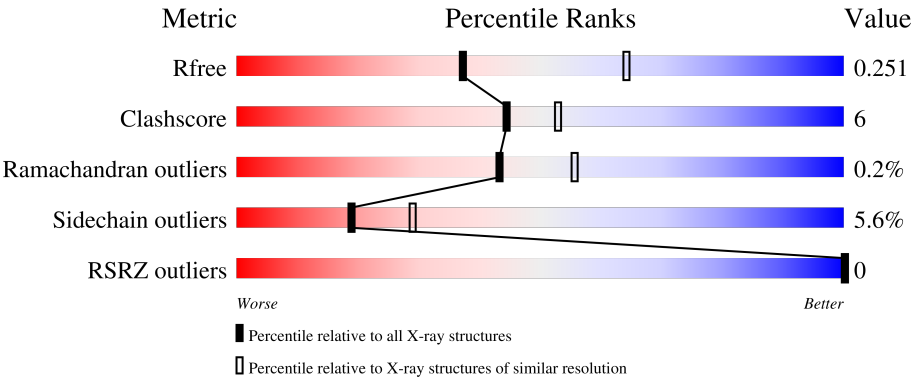
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal 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 (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.55 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.



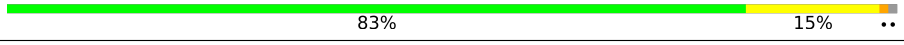
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1091 (2.54-2.54)
Clashscore	190562	1120 (2.54-2.54)
Ramachandran outliers	187476	1106 (2.54-2.54)
Sidechain outliers	187428	1106 (2.54-2.54)
RSRZ outliers	180081	1091 (2.54-2.54)

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

Mol	Chain	Length	Quality of chain
1	A	159	81% 17%
1	B	159	79% 18%
1	C	159	79% 18%
1	D	159	82% 15%
1	E	159	81% 16%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	F	159	

2 Entry composition (i)

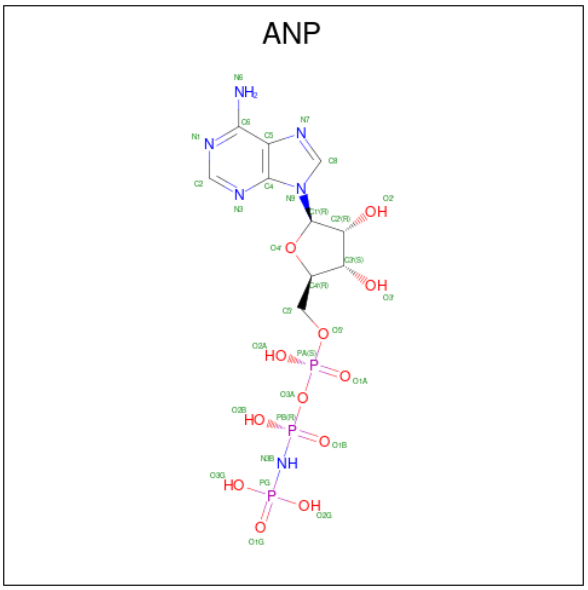
There are 7 unique types of molecules in this entry. The entry contains 7865 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Phosphopantetheine adenylyltransferase.

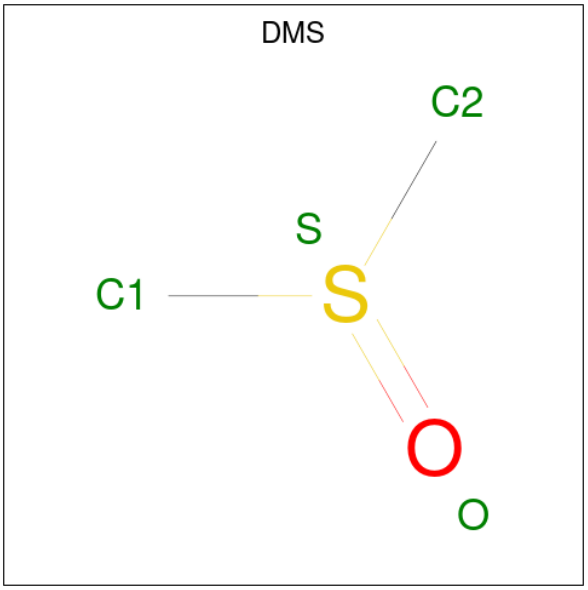
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	157	Total	C	N	O	S	0	1	0
			1244	800	216	226	2			
1	B	157	Total	C	N	O	S	0	1	0
			1244	800	216	226	2			
1	C	157	Total	C	N	O	S	0	0	0
			1236	796	214	224	2			
1	D	158	Total	C	N	O	S	0	0	0
			1244	801	215	225	3			
1	E	157	Total	C	N	O	S	0	0	0
			1236	796	214	224	2			
1	F	158	Total	C	N	O	S	0	1	0
			1254	807	218	226	3			

- Molecule 2 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (CCD ID: ANP) (formula: $C_{10}H_{17}N_6O_{12}P_3$).



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

- Molecule 3 is DIMETHYL SULFOXIDE (CCD ID: DMS) (formula: C_2H_6OS).



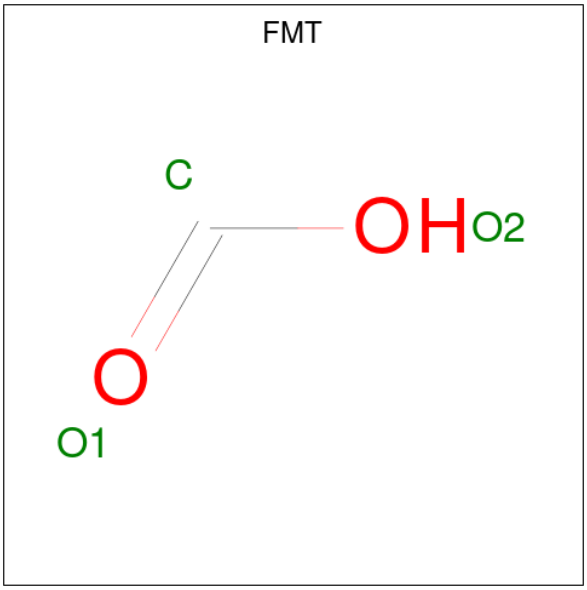
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	O	S	0	0
			4	2	1	1		
3	A	1	Total	C	O	S	0	0
			4	2	1	1		
3	B	1	Total	C	O	S	0	0
			4	2	1	1		
3	B	1	Total	C	O	S	0	0
			4	2	1	1		
3	B	1	Total	C	O	S	0	0
			4	2	1	1		
3	C	1	Total	C	O	S	0	0
			4	2	1	1		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	D	1	Total C O S 4 2 1 1	0	0
3	D	1	Total C O S 4 2 1 1	0	0
3	E	1	Total C O S 4 2 1 1	0	0
3	E	1	Total C O S 4 2 1 1	0	0
3	E	1	Total C O S 4 2 1 1	0	0
3	E	1	Total C O S 4 2 1 1	0	0
3	E	1	Total C O S 4 2 1 1	0	0
3	F	1	Total C O S 4 2 1 1	0	0
3	F	1	Total C O S 4 2 1 1	0	0
3	F	1	Total C O S 4 2 1 1	0	0

- Molecule 4 is FORMIC ACID (CCD ID: FMT) (formula: CH_2O_2).



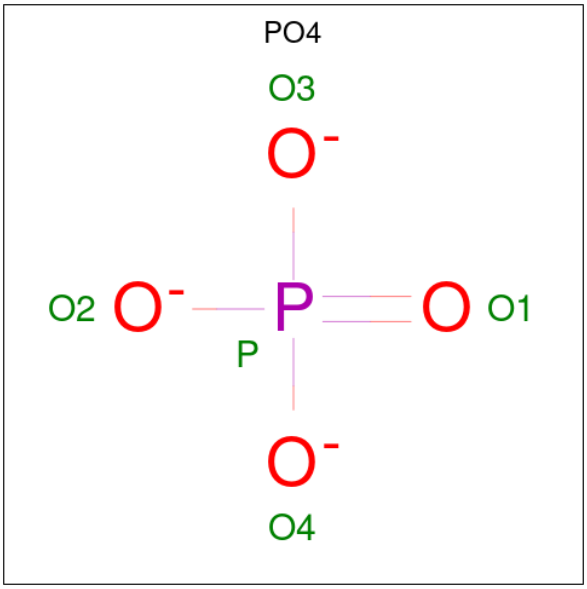
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 3 1 2	0	0

Continued on next page...

Continued from previous page...

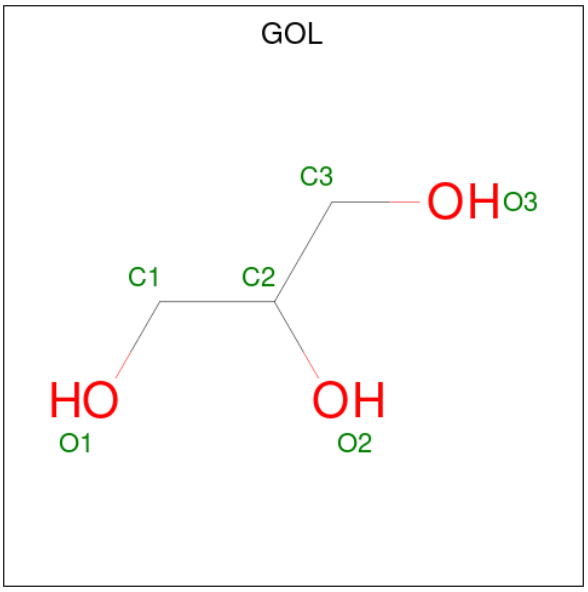
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C O 3 1 2	0	0
4	B	1	Total C O 3 1 2	0	0
4	B	1	Total C O 3 1 2	0	0
4	B	1	Total C O 3 1 2	0	0
4	D	1	Total C O 3 1 2	0	0

- Molecule 5 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total O P 5 4 1	0	0
5	C	1	Total O P 5 4 1	0	0

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 7 is water.

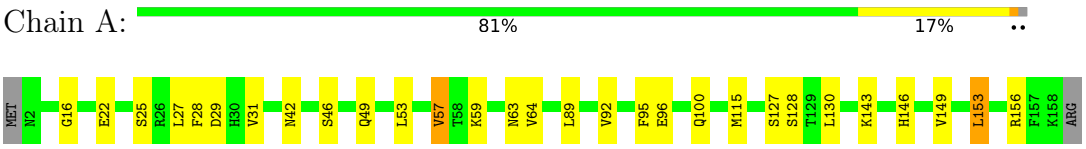
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	23	Total O 23 23	0	0
7	B	31	Total O 31 31	0	0
7	C	19	Total O 19 19	0	0
7	D	21	Total O 21 21	0	0
7	E	14	Total O 14 14	0	0
7	F	9	Total O 9 9	0	0

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.

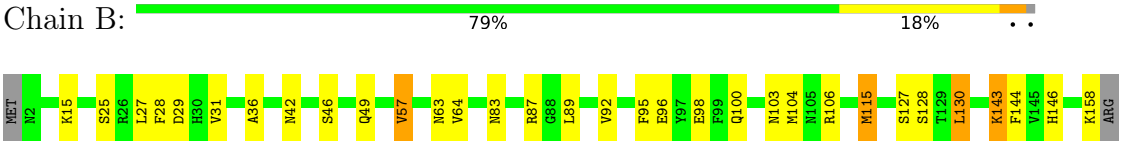
• Molecule 1: Phosphopantetheine adenylyltransferase

Chain A:



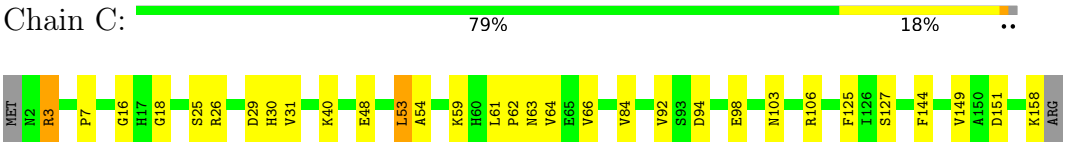
• Molecule 1: Phosphopantetheine adenylyltransferase

Chain B:



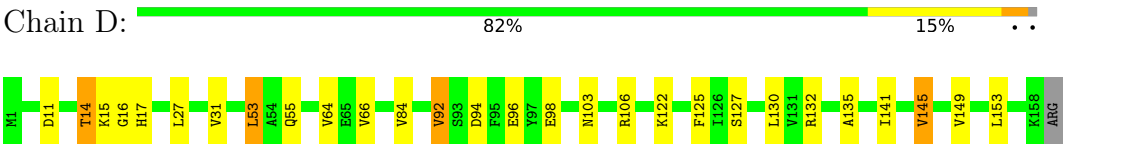
• Molecule 1: Phosphopantetheine adenylyltransferase

Chain C:



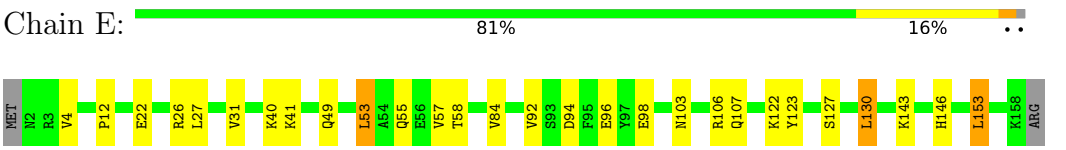
• Molecule 1: Phosphopantetheine adenylyltransferase

Chain D:



• Molecule 1: Phosphopantetheine adenylyltransferase

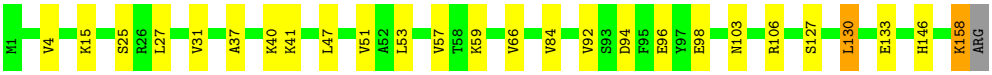
Chain E:



• Molecule 1: Phosphopantetheine adenylyltransferase

Chain F:




M1
V4
K15
S25
R26
L27
V31
A37
K40
K41
L47
V51
A52
L53
V57
T58
K59
V66
V84
V92
S93
D94
F95
E96
Y97
E98
N103
R106
S127
L130
E133
H146
K158
ARG

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	80.33Å 89.79Å 80.31Å 90.00° 98.27° 90.00°	Depositor
Resolution (Å)	39.74 – 2.55 39.74 – 2.55	Depositor EDS
% Data completeness (in resolution range)	98.2 (39.74-2.55) 91.0 (39.74-2.55)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.35 (at 2.54Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, R_{free}	0.190 , 0.245 0.196 , 0.251	Depositor DCC
R_{free} test set	2012 reflections (5.52%)	wwPDB-VP
Wilson B-factor (Å^2)	29.2	Xtriage
Anisotropy	0.213	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 10.8	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.477 for l,-k,h	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	7865	wwPDB-VP
Average B, all atoms (Å^2)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.00% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ANP, PO4, FMT, GOL, DMS

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	0.62	0/1271	0.93	0/1722
1	B	0.63	0/1271	0.90	0/1722
1	C	0.61	0/1263	0.92	2/1710 (0.1%)
1	D	0.59	0/1271	0.93	0/1720
1	E	0.57	0/1263	0.89	1/1710 (0.1%)
1	F	0.58	0/1282	0.87	1/1736 (0.1%)
All	All	0.60	0/7621	0.90	4/10320 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	E	41	LYS	N-CA-C	-5.88	104.98	114.09
1	C	3	ARG	CA-C-N	-5.41	116.12	123.10
1	C	3	ARG	C-N-CA	-5.41	116.12	123.10
1	F	41	LYS	N-CA-C	-5.39	106.08	113.30

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	1244	0	1255	18	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1244	0	1255	21	0
1	C	1236	0	1249	19	0
1	D	1244	0	1261	17	0
1	E	1236	0	1249	17	0
1	F	1254	0	1268	17	0
2	A	31	0	11	1	0
2	B	31	0	11	0	0
2	C	31	0	11	1	0
2	D	31	0	10	1	0
2	E	31	0	11	0	0
2	F	31	0	11	0	0
3	A	8	0	12	1	0
3	B	12	0	18	3	0
3	C	4	0	6	1	0
3	D	8	0	12	0	0
3	E	20	0	30	2	0
3	F	12	0	18	1	0
4	A	3	0	1	0	0
4	B	12	0	4	0	0
4	D	3	0	1	0	0
5	A	5	0	0	0	0
5	C	5	0	0	0	0
6	C	12	0	16	1	0
7	A	23	0	0	0	0
7	B	31	0	0	0	0
7	C	19	0	0	0	0
7	D	21	0	0	0	0
7	E	14	0	0	0	0
7	F	9	0	0	0	0
All	All	7865	0	7720	93	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.

The worst 5 of 93 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:C:18:GLY:HA3	3:C:1002:DMS:H12	1.55	0.87
1:A:92:VAL:HB	1:E:96:GLU:OE1	1.83	0.77
1:F:57:VAL:HG13	1:F:146[B]:HIS:HD2	1.51	0.76
1:B:92:VAL:HB	1:F:96:GLU:OE1	1.91	0.71

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:127:SER:HB3	1:F:130:LEU:HB2	1.73	0.70

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	156/159 (98%)	154 (99%)	0	2 (1%)	9 12
1	B	156/159 (98%)	153 (98%)	1 (1%)	2 (1%)	9 12
1	C	155/159 (98%)	154 (99%)	1 (1%)	0	100 100
1	D	156/159 (98%)	155 (99%)	1 (1%)	0	100 100
1	E	155/159 (98%)	151 (97%)	4 (3%)	0	100 100
1	F	157/159 (99%)	155 (99%)	2 (1%)	0	100 100
All	All	935/954 (98%)	922 (99%)	9 (1%)	4 (0%)	43 39

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	42[A]	ASN
1	A	42[B]	ASN
1	B	42[A]	ASN
1	B	42[B]	ASN

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	134/135 (99%)	126 (94%)	8 (6%)	17	26
1	B	134/135 (99%)	127 (95%)	7 (5%)	21	32
1	C	133/135 (98%)	126 (95%)	7 (5%)	20	31
1	D	134/135 (99%)	125 (93%)	9 (7%)	15	21
1	E	133/135 (98%)	125 (94%)	8 (6%)	17	26
1	F	135/135 (100%)	129 (96%)	6 (4%)	25	38
All	All	803/810 (99%)	758 (94%)	45 (6%)	19	29

5 of 45 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	127	SER
1	E	107	GLN
1	D	145	VAL
1	E	53	LEU
1	E	143	LYS

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

Mol	Chain	Res	Type
1	A	107	GLN
1	E	55	GLN
1	F	42	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

32 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	DMS	F	1004	-	3,3,3	0.53	0	3,3,3	0.56	0
3	DMS	D	1003	-	3,3,3	0.63	0	3,3,3	0.76	0
5	PO4	C	1003	-	4,4,4	1.02	0	6,6,6	0.88	0
2	ANP	E	1001	-	33,33,33	3.45	18 (54%)	45,52,52	2.68	19 (42%)
3	DMS	E	1005	-	3,3,3	0.72	0	3,3,3	0.86	0
6	GOL	C	1005	-	5,5,5	0.43	0	5,5,5	0.44	0
2	ANP	F	1001	-	33,33,33	3.39	19 (57%)	45,52,52	2.78	20 (44%)
3	DMS	E	1002	-	3,3,3	0.61	0	3,3,3	0.45	0
2	ANP	D	1001	-	33,33,33	3.53	20 (60%)	45,52,52	2.63	18 (40%)
3	DMS	E	1006	-	3,3,3	0.71	0	3,3,3	0.43	0
5	PO4	A	1004	-	4,4,4	0.86	0	6,6,6	0.68	0
4	FMT	B	1008	-	2,2,2	0.65	0	1,1,1	0.22	0
3	DMS	D	1002	-	3,3,3	0.73	0	3,3,3	0.25	0
4	FMT	A	1003	-	2,2,2	0.67	0	1,1,1	0.16	0
2	ANP	A	1001	-	33,33,33	3.36	20 (60%)	45,52,52	2.55	15 (33%)
3	DMS	B	1003	-	3,3,3	0.68	0	3,3,3	0.32	0
3	DMS	A	1002	-	3,3,3	0.63	0	3,3,3	0.13	0
3	DMS	E	1004	-	3,3,3	0.60	0	3,3,3	0.80	0
4	FMT	B	1006	-	2,2,2	0.71	0	1,1,1	0.25	0
4	FMT	B	1007	-	2,2,2	0.63	0	1,1,1	0.15	0
3	DMS	B	1004	-	3,3,3	0.69	0	3,3,3	0.56	0
6	GOL	C	1004	-	5,5,5	0.65	0	5,5,5	1.37	1 (20%)
3	DMS	F	1003	-	3,3,3	0.64	0	3,3,3	0.47	0
2	ANP	B	1001	-	33,33,33	3.39	19 (57%)	45,52,52	2.60	16 (35%)
3	DMS	A	1005	-	3,3,3	0.63	0	3,3,3	0.56	0
3	DMS	C	1002	-	3,3,3	0.60	0	3,3,3	1.37	0
2	ANP	C	1001	-	33,33,33	3.31	19 (57%)	45,52,52	2.72	19 (42%)
3	DMS	B	1002	-	3,3,3	0.64	0	3,3,3	0.71	0
4	FMT	D	1004	-	2,2,2	0.70	0	1,1,1	0.19	0
3	DMS	F	1002	-	3,3,3	0.61	0	3,3,3	0.37	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
4	FMT	B	1005	-	2,2,2	0.84	0	1,1,1	0.45	0
3	DMS	E	1003	-	3,3,3	0.66	0	3,3,3	0.69	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
2	ANP	E	1001	-	-	7/18/38/38	0/3/3/3
6	GOL	C	1005	-	-	2/4/4/4	-
2	ANP	F	1001	-	-	2/18/38/38	0/3/3/3
2	ANP	D	1001	-	-	2/18/38/38	0/3/3/3
2	ANP	C	1001	-	-	5/18/38/38	0/3/3/3
6	GOL	C	1004	-	-	4/4/4/4	-
2	ANP	A	1001	-	-	1/18/38/38	0/3/3/3
2	ANP	B	1001	-	-	3/18/38/38	0/3/3/3

The worst 5 of 115 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	1001	ANP	C2'-C3'	-11.71	1.21	1.53
2	F	1001	ANP	C2'-C3'	-11.69	1.21	1.53
2	B	1001	ANP	C2'-C3'	-11.39	1.22	1.53
2	C	1001	ANP	C2'-C3'	-11.36	1.22	1.53
2	A	1001	ANP	C2'-C3'	-11.23	1.22	1.53

The worst 5 of 108 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1001	ANP	C4-N9-C1'	-7.50	109.09	126.63
2	E	1001	ANP	C4-N9-C1'	-7.40	109.32	126.63
2	C	1001	ANP	C4-N9-C1'	-7.28	109.60	126.63
2	B	1001	ANP	C4-N9-C1'	-7.13	109.96	126.63
2	D	1001	ANP	C4-N9-C1'	-6.84	110.64	126.63

There are no chirality outliers.

5 of 26 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	ANP	PG-N3B-PB-O1B
2	B	1001	ANP	PB-N3B-PG-O1G
2	B	1001	ANP	C5'-O5'-PA-O2A
2	B	1001	ANP	C5'-O5'-PA-O3A
2	C	1001	ANP	PB-N3B-PG-O1G

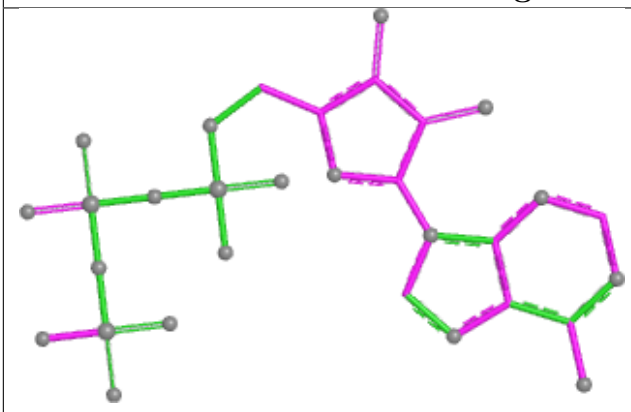
There are no ring outliers.

11 monomers are involved in 12 short contacts:

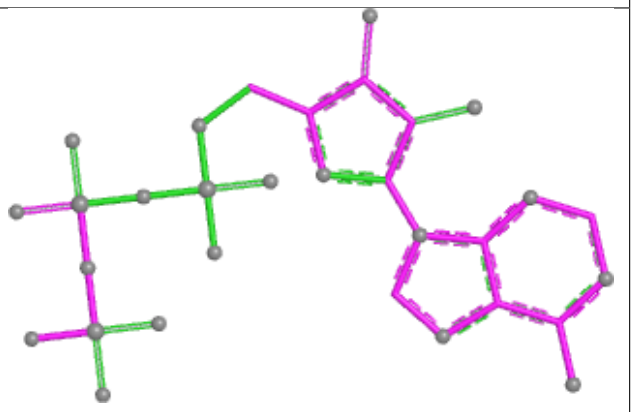
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	F	1004	DMS	1	0
2	D	1001	ANP	1	0
2	A	1001	ANP	1	0
3	E	1004	DMS	1	0
3	B	1004	DMS	2	0
6	C	1004	GOL	1	0
3	A	1005	DMS	1	0
3	C	1002	DMS	1	0
2	C	1001	ANP	1	0
3	B	1002	DMS	1	0
3	E	1003	DMS	1	0

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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

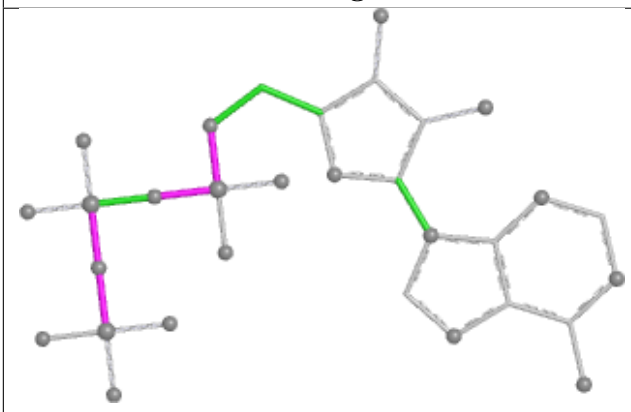
Ligand ANP E 1001



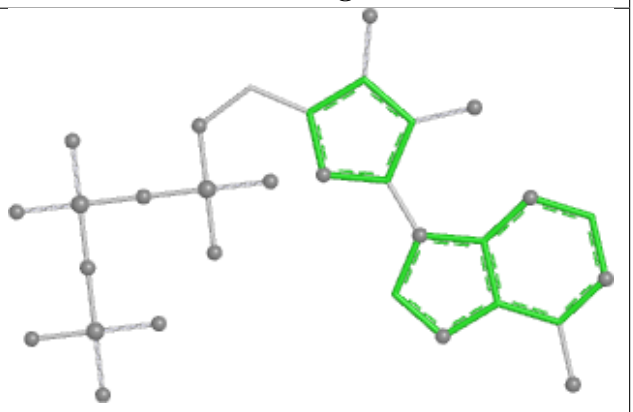
Bond lengths



Bond angles

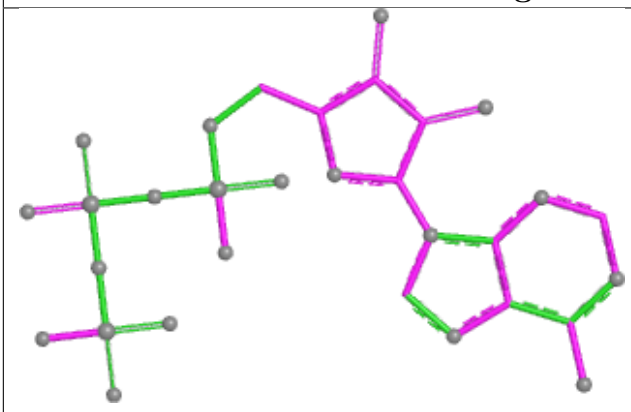


Torsions

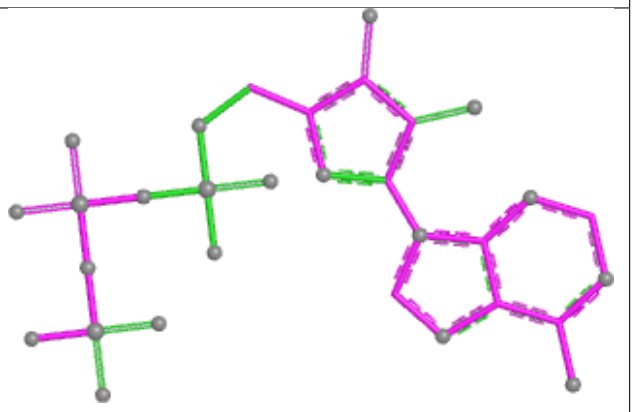


Rings

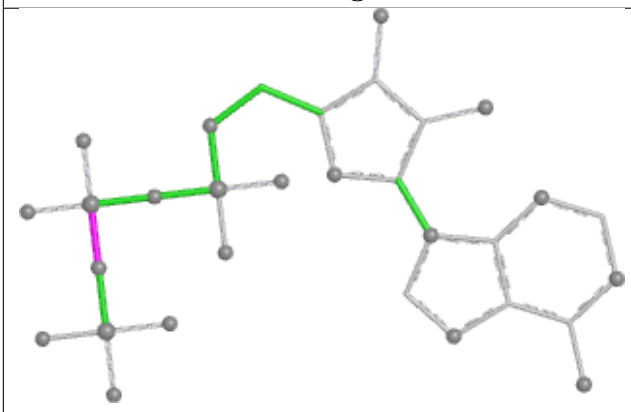
Ligand ANP F 1001



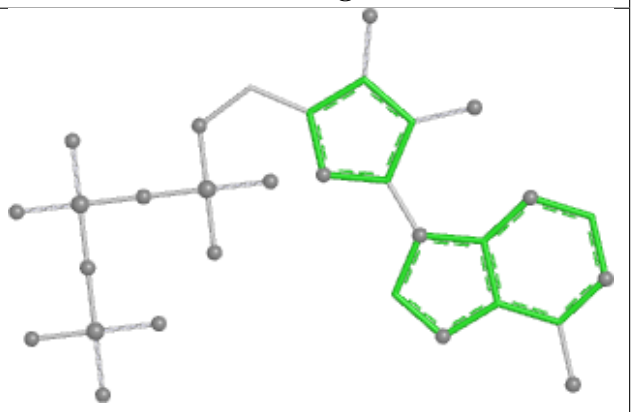
Bond lengths



Bond angles

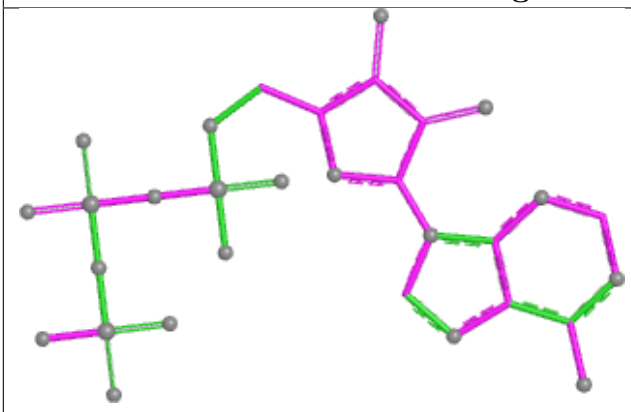


Torsions

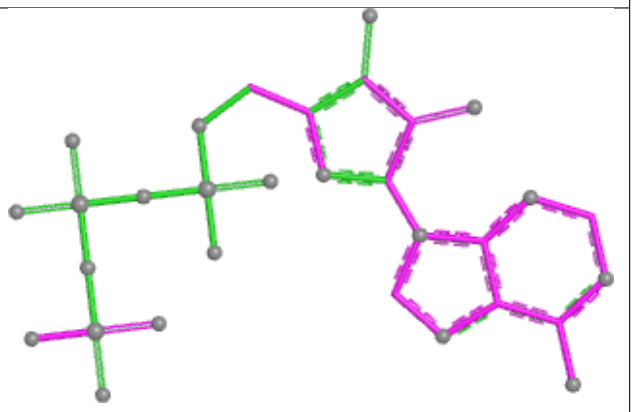


Rings

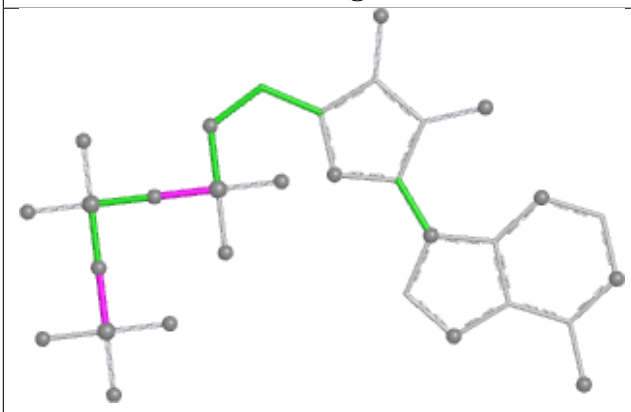
Ligand ANP D 1001



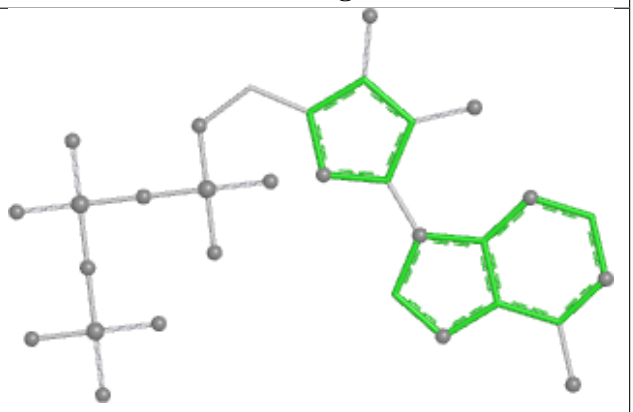
Bond lengths



Bond angles

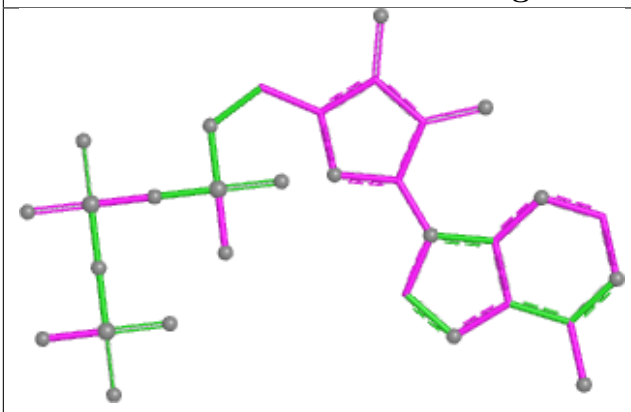


Torsions

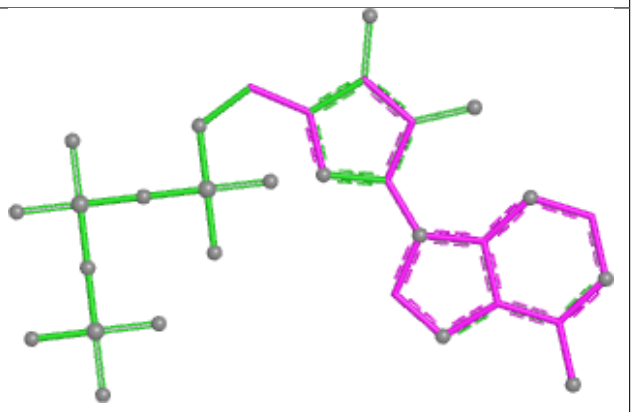


Rings

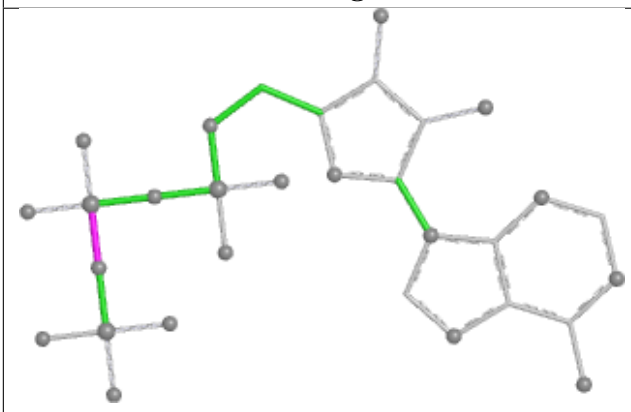
Ligand ANP A 1001



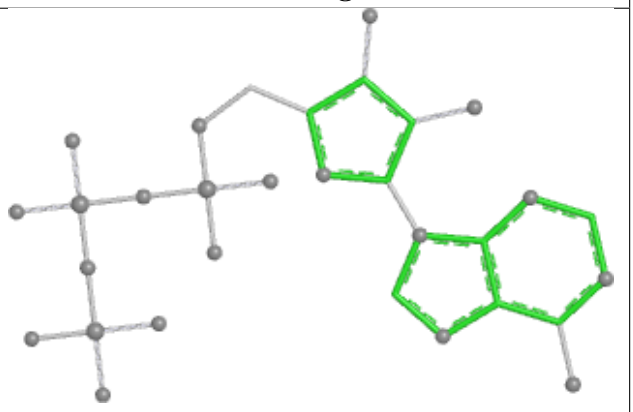
Bond lengths



Bond angles

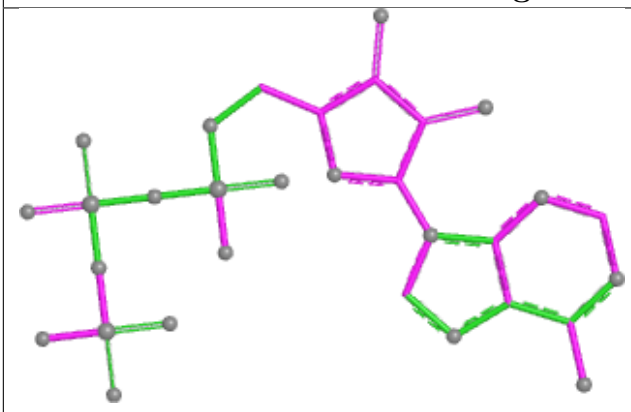


Torsions

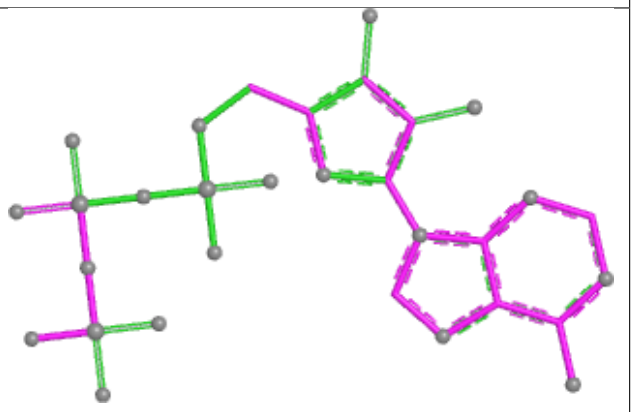


Rings

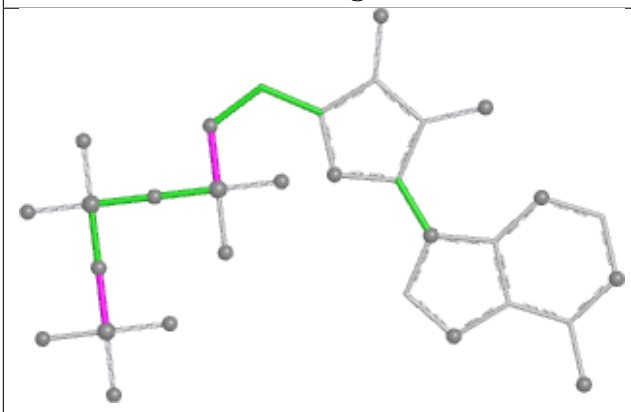
Ligand ANP B 1001



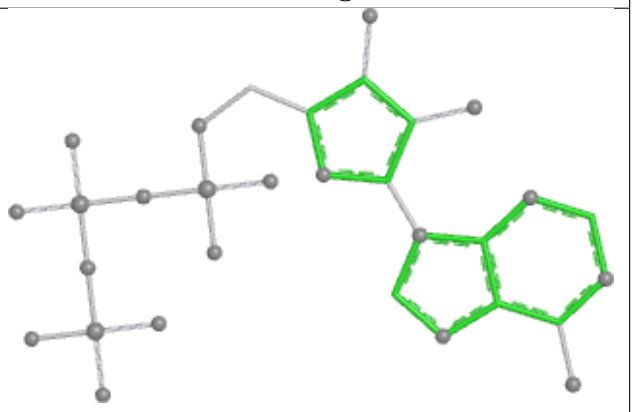
Bond lengths



Bond angles

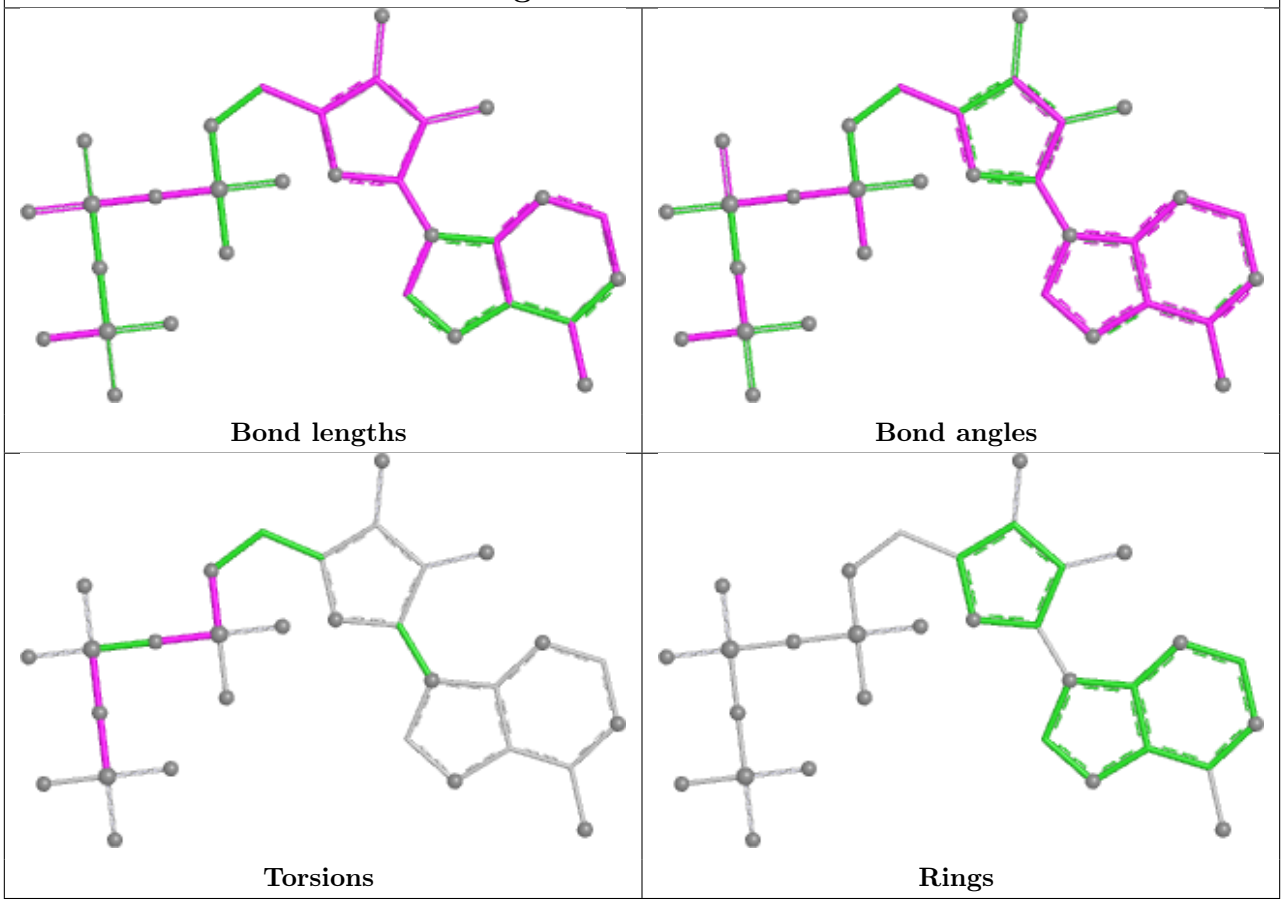


Torsions



Rings

Ligand ANP C 1001



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	157/159 (98%)	-1.56	0	100	100	14, 30, 43, 52	1 (0%)
1	B	157/159 (98%)	-1.55	0	100	100	15, 29, 44, 52	1 (0%)
1	C	157/159 (98%)	-1.51	0	100	100	23, 33, 48, 65	0
1	D	158/159 (99%)	-1.52	0	100	100	21, 34, 54, 63	0
1	E	157/159 (98%)	-1.51	0	100	100	25, 36, 50, 70	0
1	F	158/159 (99%)	-1.50	0	100	100	20, 36, 51, 69	1 (0%)
All	All	944/954 (98%)	-1.53	0	100	100	14, 33, 48, 70	3 (0%)

There are no RSRZ outliers to report.

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

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

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands

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
4	FMT	A	1003	3/3	0.98	0.07	32,32,45,53	0

Continued on next page...

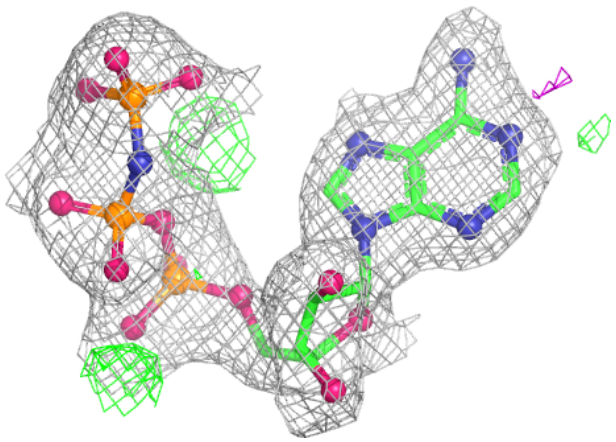
Continued from previous page...

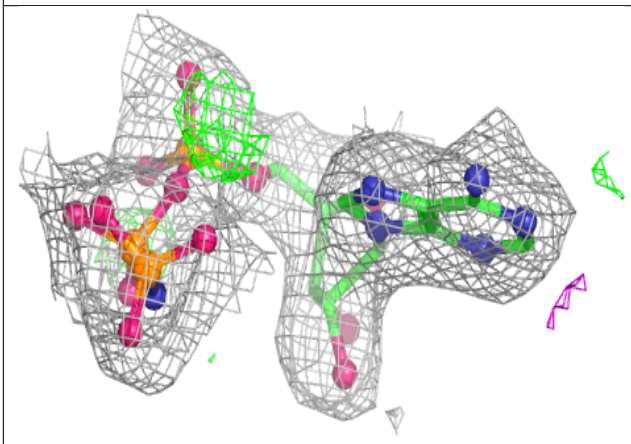
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	FMT	B	1005	3/3	0.98	0.04	39,39,42,48	0
4	FMT	B	1007	3/3	0.98	0.05	43,43,47,49	0
4	FMT	D	1004	3/3	0.98	0.05	49,49,50,53	0
6	GOL	C	1005	6/6	0.98	0.05	47,49,53,55	0
3	DMS	A	1002	4/4	0.99	0.05	38,45,50,52	0
3	DMS	A	1005	4/4	0.99	0.04	40,46,50,51	0
3	DMS	B	1004	4/4	0.99	0.04	35,36,52,53	0
3	DMS	C	1002	4/4	0.99	0.04	36,39,46,54	0
3	DMS	D	1003	4/4	0.99	0.04	41,47,51,54	0
3	DMS	D	1002	4/4	0.99	0.05	31,32,33,38	0
3	DMS	E	1005	4/4	0.99	0.06	41,43,43,54	0
3	DMS	E	1002	4/4	0.99	0.11	30,37,38,38	4
3	DMS	F	1003	4/4	0.99	0.05	30,31,36,45	0
3	DMS	F	1004	4/4	0.99	0.04	42,46,56,63	0
2	ANP	A	1001	31/31	0.99	0.03	25,31,51,55	0
2	ANP	C	1001	31/31	0.99	0.03	26,33,52,62	0
4	FMT	B	1006	3/3	0.99	0.04	37,37,43,50	0
2	ANP	D	1001	31/31	0.99	0.04	26,32,51,70	0
2	ANP	E	1001	31/31	0.99	0.03	31,40,63,72	0
5	PO4	A	1004	5/5	0.99	0.05	48,48,63,75	0
6	GOL	C	1004	6/6	0.99	0.04	25,30,42,43	0
2	ANP	F	1001	31/31	0.99	0.03	32,39,59,66	0
4	FMT	B	1008	3/3	1.00	0.01	33,33,34,37	0
3	DMS	B	1003	4/4	1.00	0.03	27,37,42,43	0
3	DMS	E	1003	4/4	1.00	0.04	33,50,52,57	0
3	DMS	E	1004	4/4	1.00	0.04	38,39,40,59	0
2	ANP	B	1001	31/31	1.00	0.03	25,31,51,56	0
3	DMS	B	1002	4/4	1.00	0.03	31,33,37,43	0
5	PO4	C	1003	5/5	1.00	0.06	39,43,51,60	0
3	DMS	F	1002	4/4	1.00	0.04	33,37,43,44	0
3	DMS	E	1006	4/4	1.00	0.03	32,37,48,50	0

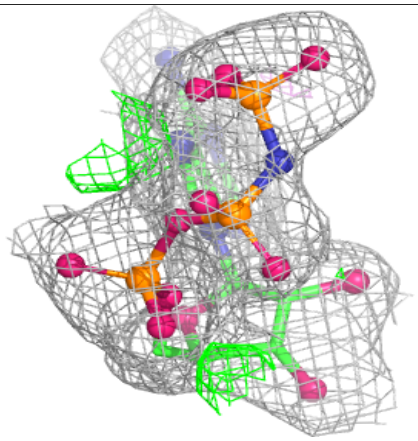
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ANP A 1001:

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

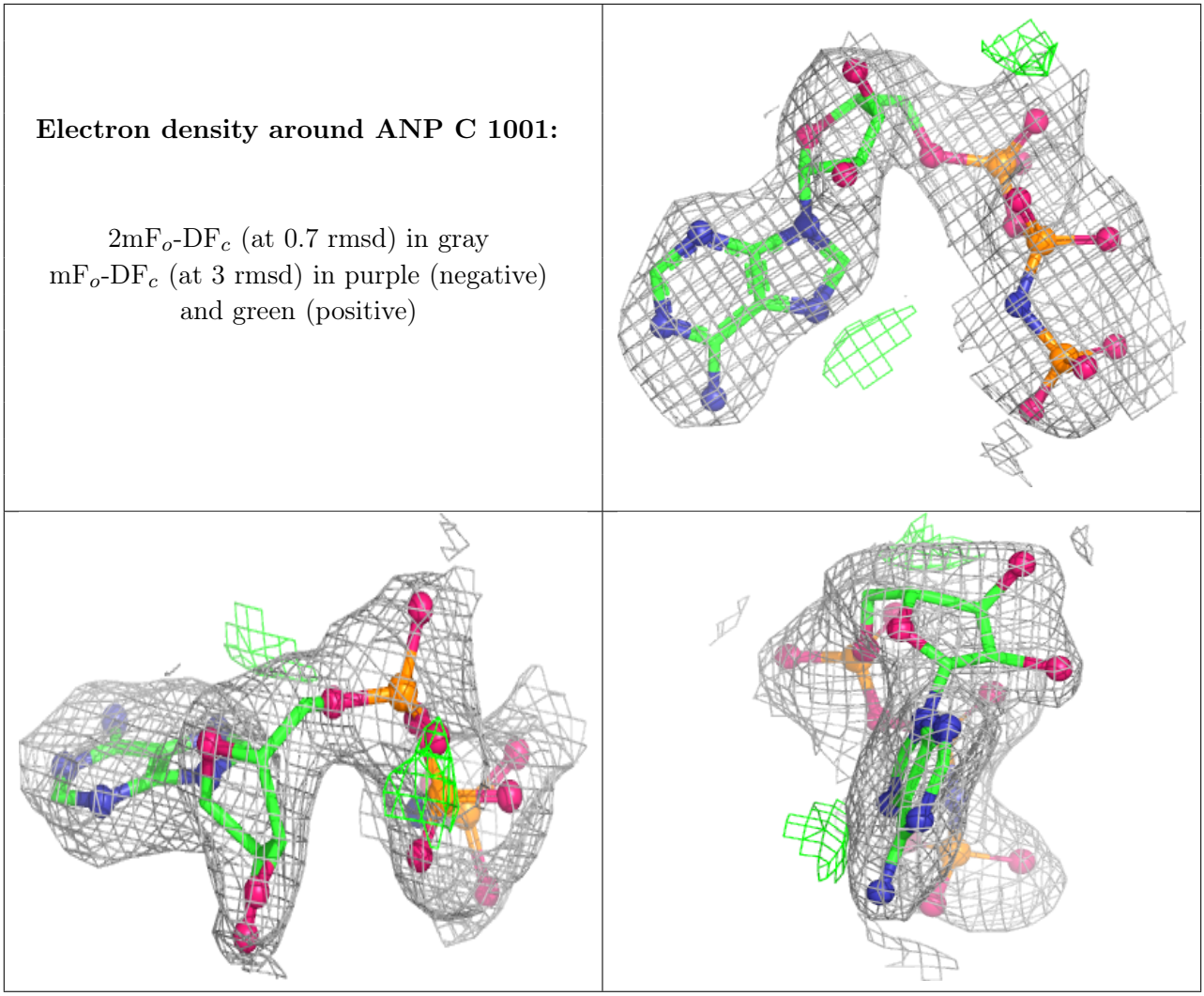






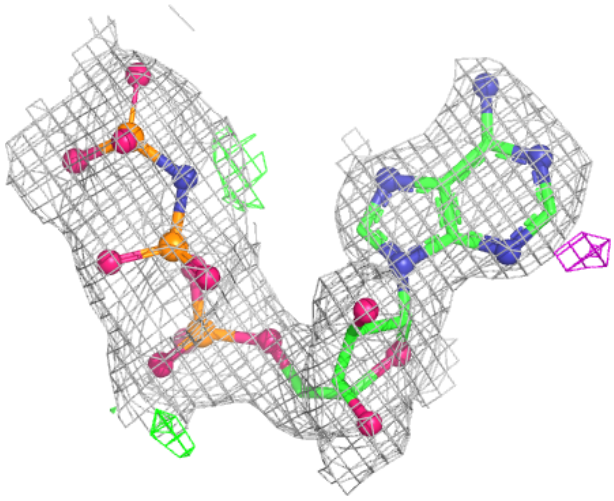
Electron density around ANP C 1001:

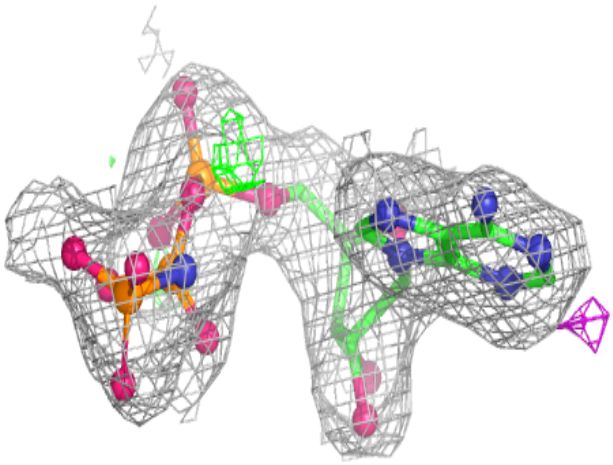
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

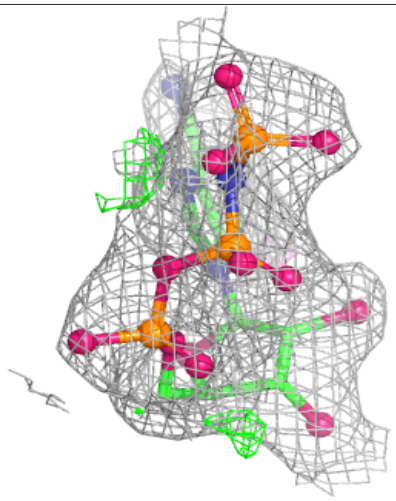


Electron density around ANP D 1001:

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

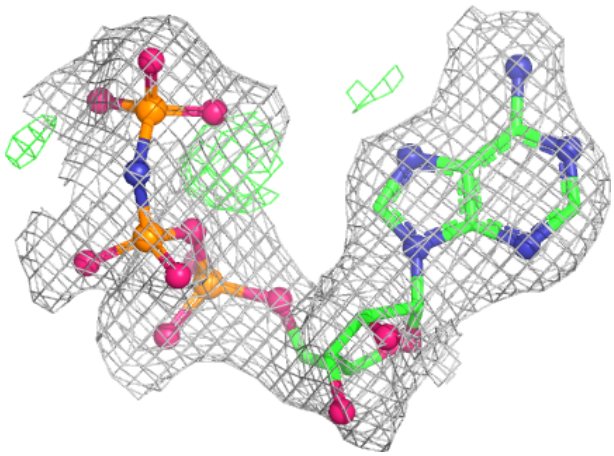


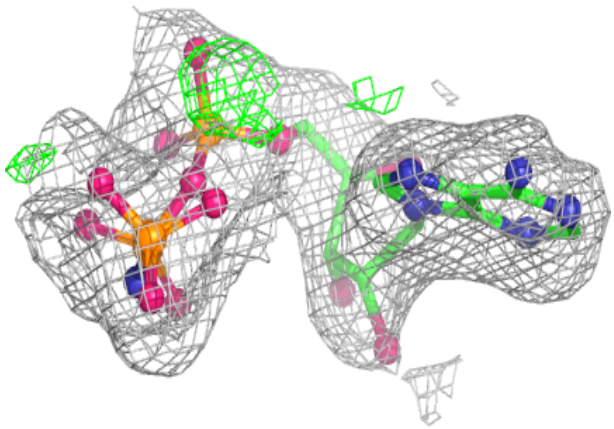


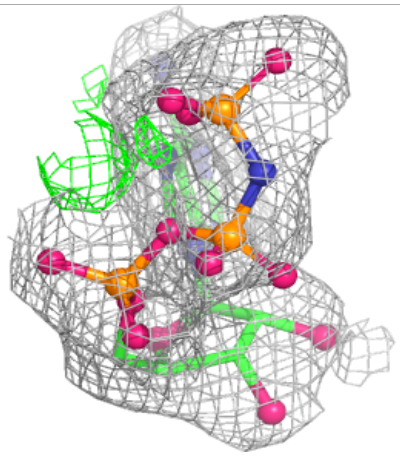


Electron density around ANP E 1001:

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

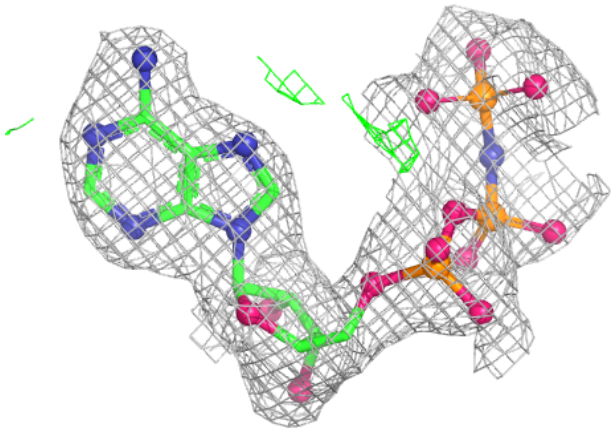


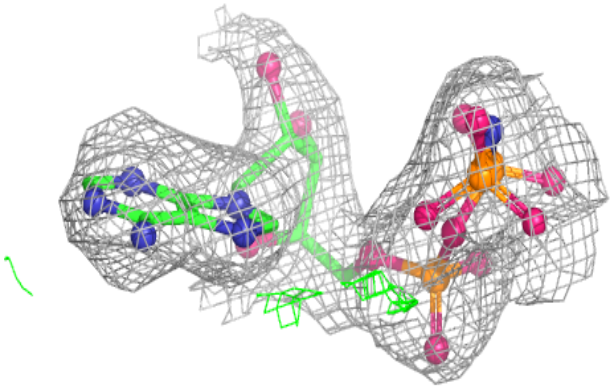


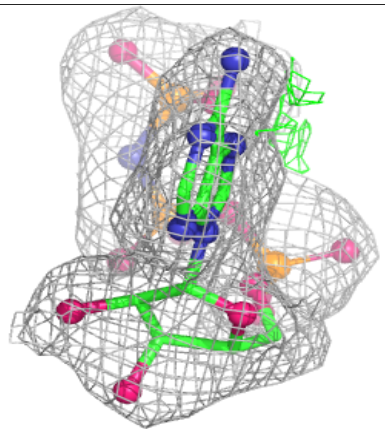


Electron density around ANP F 1001:

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

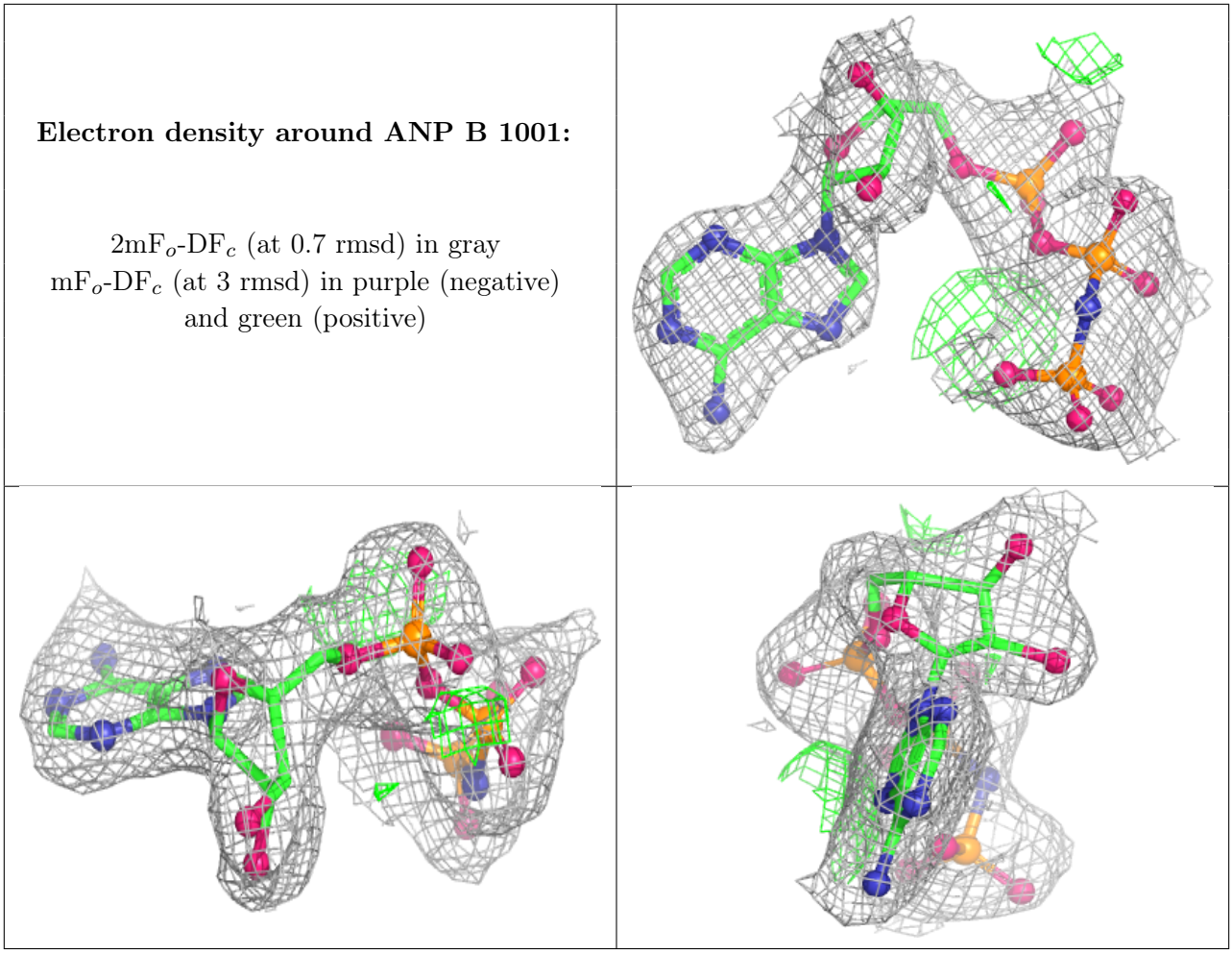






Electron density around ANP B 1001:

$2mF_o$-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.