Full wwPDB X-ray Structure Validation Report (i)

Sep 3, 2023 – 08:51 PM EDT

PDB ID	:	3SBX
Title	:	Crystal structure of a putative uncharacterized protein from Mycobacterium marinum bound to adenosine 5'-monophosphate AMP
Authors	:	Seattle Structural Genomics Center for Infectious Disease (SSGCID)
Deposited on	:	2011-06-06
Resolution	:	2.50 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 (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:

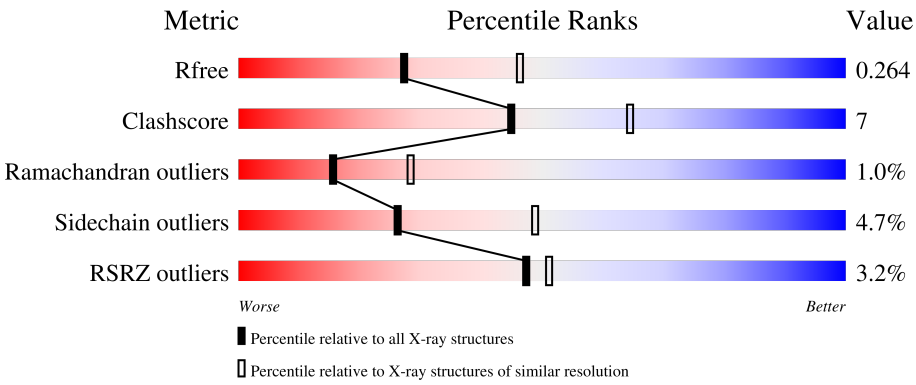
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

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 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	189	%, 80%, 13%, • 6%
1	B	189	%, 76%, 17%, • 6%
1	C	189	10%, 81%, 11%, • 6%
1	D	189	79%, 13%, • 6%
1	E	189	9%, 76%, 16%, • 6%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	F	189	2% 75% 16% • 6%
1	G	189	% 80% 12% • 6%
1	H	189	2% 79% 13% • 6%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	AMP	A	188	-	-	-	X
2	AMP	G	188	-	-	-	X
2	AMP	H	188	-	-	X	-

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 10827 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 Putative uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	177	1324	845	227	245	7	0	1	0
			Total	C	N	O	S			
1	B	177	1296	825	225	239	7	0	0	0
			Total	C	N	O	S			
1	C	177	1313	836	226	244	7	0	0	0
			Total	C	N	O	S			
1	D	177	1320	840	229	244	7	0	0	0
			Total	C	N	O	S			
1	E	177	1272	811	218	237	6	0	0	0
			Total	C	N	O	S			
1	F	177	1323	844	231	240	8	0	1	0
			Total	C	N	O	S			
1	G	177	1306	831	224	244	7	0	0	0
			Total	C	N	O	S			
1	H	177	1311	835	226	243	7	0	1	0

There are 32 discrepancies between the modelled and reference sequences:

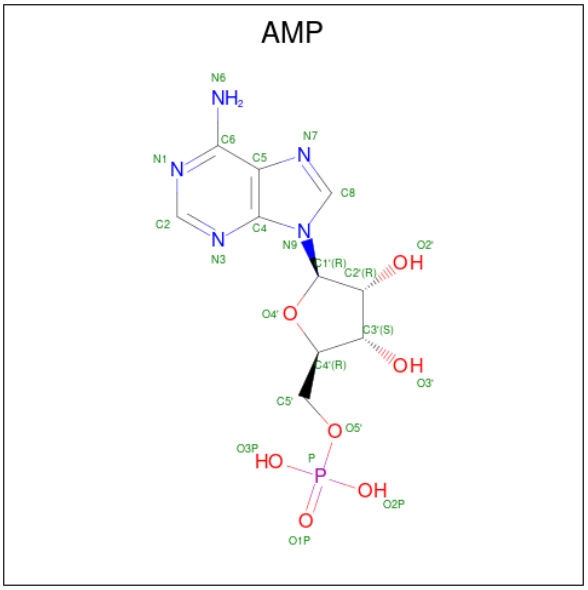
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP B2HS63
A	-1	PRO	-	expression tag	UNP B2HS63
A	0	GLY	-	expression tag	UNP B2HS63
A	1	SER	-	expression tag	UNP B2HS63
B	-2	GLY	-	expression tag	UNP B2HS63
B	-1	PRO	-	expression tag	UNP B2HS63
B	0	GLY	-	expression tag	UNP B2HS63
B	1	SER	-	expression tag	UNP B2HS63
C	-2	GLY	-	expression tag	UNP B2HS63
C	-1	PRO	-	expression tag	UNP B2HS63
C	0	GLY	-	expression tag	UNP B2HS63
C	1	SER	-	expression tag	UNP B2HS63
D	-2	GLY	-	expression tag	UNP B2HS63

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
D	-1	PRO	-	expression tag	UNP B2HS63
D	0	GLY	-	expression tag	UNP B2HS63
D	1	SER	-	expression tag	UNP B2HS63
E	-2	GLY	-	expression tag	UNP B2HS63
E	-1	PRO	-	expression tag	UNP B2HS63
E	0	GLY	-	expression tag	UNP B2HS63
E	1	SER	-	expression tag	UNP B2HS63
F	-2	GLY	-	expression tag	UNP B2HS63
F	-1	PRO	-	expression tag	UNP B2HS63
F	0	GLY	-	expression tag	UNP B2HS63
F	1	SER	-	expression tag	UNP B2HS63
G	-2	GLY	-	expression tag	UNP B2HS63
G	-1	PRO	-	expression tag	UNP B2HS63
G	0	GLY	-	expression tag	UNP B2HS63
G	1	SER	-	expression tag	UNP B2HS63
H	-2	GLY	-	expression tag	UNP B2HS63
H	-1	PRO	-	expression tag	UNP B2HS63
H	0	GLY	-	expression tag	UNP B2HS63
H	1	SER	-	expression tag	UNP B2HS63

- Molecule 2 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: $C_{10}H_{14}N_5O_7P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	23	10	5	7	1	0	0
			Total	C	N	O	P		
2	B	1	23	10	5	7	1	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	C	1	23	10	5	7	1	0	0
			Total	C	N	O	P		
2	D	1	23	10	5	7	1	0	0
			Total	C	N	O	P		
2	E	1	23	10	5	7	1	0	0
			Total	C	N	O	P		
2	F	1	23	10	5	7	1	0	0
			Total	C	N	O	P		
2	G	1	23	10	5	7	1	0	0
			Total	C	N	O	P		
2	H	1	23	10	5	7	1	0	0

- Molecule 3 is water.

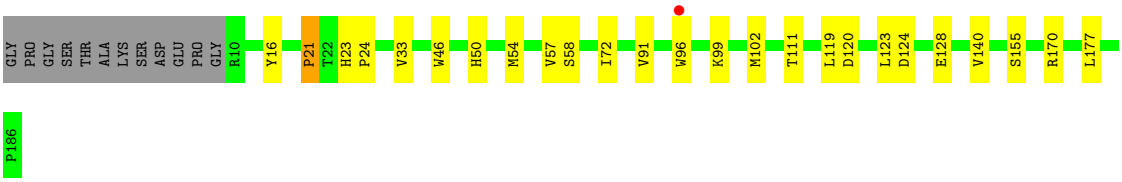
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	20	20	20	0	0
			Total	O		
3	B	23	23	23	0	0
			Total	O		
3	C	24	24	24	0	0
			Total	O		
3	D	30	30	30	0	0
			Total	O		
3	E	13	13	13	0	0
			Total	O		
3	F	17	17	17	0	0
			Total	O		
3	G	27	27	27	0	0
			Total	O		
3	H	24	24	24	0	0

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.

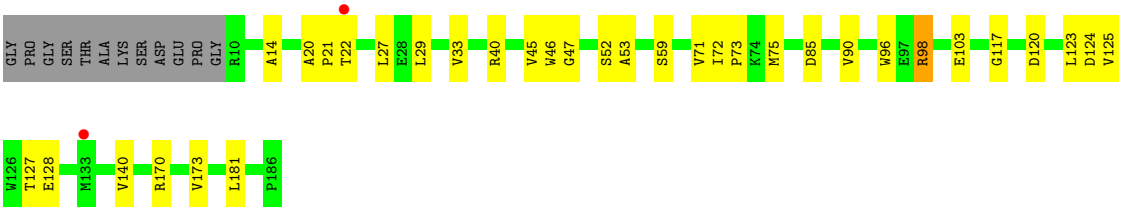
• Molecule 1: Putative uncharacterized protein

Chain A:



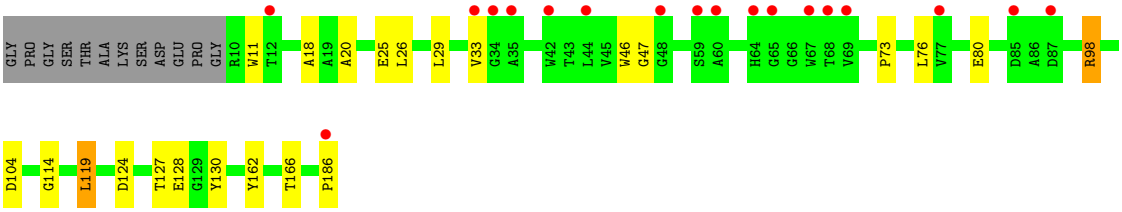
• Molecule 1: Putative uncharacterized protein

Chain B:



• Molecule 1: Putative uncharacterized protein

Chain C:

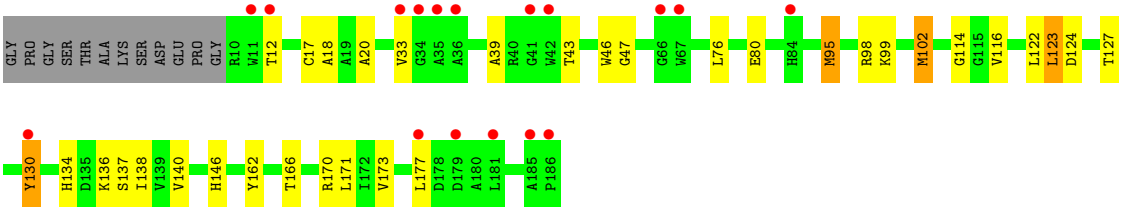


• Molecule 1: Putative uncharacterized protein

Chain D:

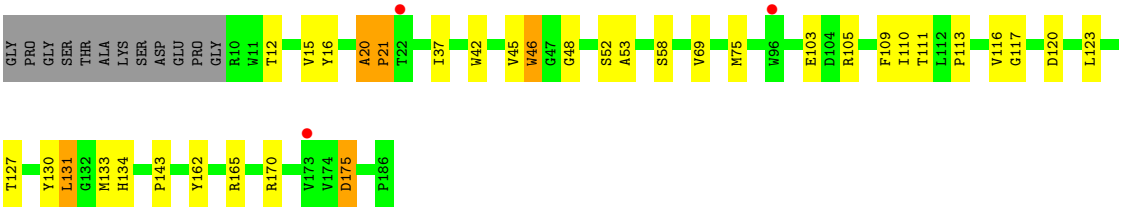
• Molecule 1: Putative uncharacterized protein

Chain E:



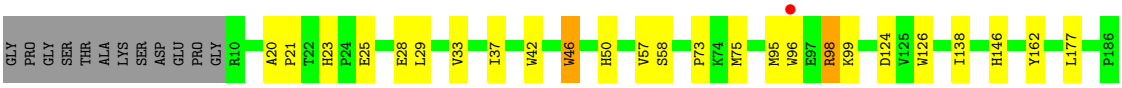
• Molecule 1: Putative uncharacterized protein

Chain F:



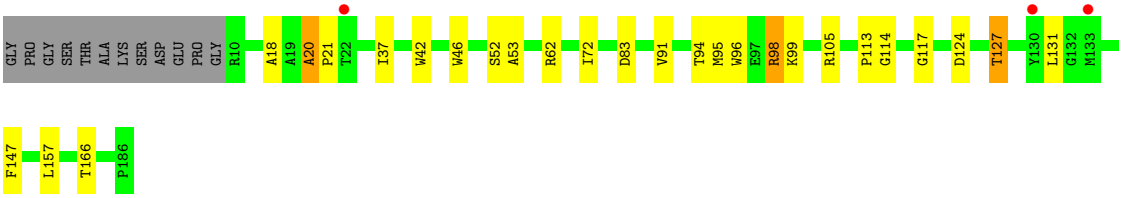
• Molecule 1: Putative uncharacterized protein

Chain G:



• Molecule 1: Putative uncharacterized protein

Chain H:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	67.24Å 80.12Å 85.69Å 106.70° 90.13° 98.81°	Depositor
Resolution (Å)	50.00 – 2.50 46.36 – 2.50	Depositor EDS
% Data completeness (in resolution range)	90.5 (50.00-2.50) 90.5 (46.36-2.50)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.43 (at 2.51Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.242 , 0.288 0.252 , 0.264	Depositor DCC
R_{free} test set	2689 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å^2)	35.4	Xtriage
Anisotropy	0.054	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 35.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	10827	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 10.13% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: AMP

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	0.44	0/1362	0.56	0/1869
1	B	0.47	0/1328	0.60	0/1822
1	C	0.44	0/1346	0.56	0/1845
1	D	0.45	0/1353	0.60	0/1853
1	E	0.41	0/1305	0.53	0/1795
1	F	0.46	0/1361	0.58	0/1864
1	G	0.45	0/1338	0.58	0/1835
1	H	0.42	0/1347	0.59	0/1848
All	All	0.44	0/10740	0.58	0/14731

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

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	21	PRO	Peptide

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	1324	0	1264	13	0
1	B	1296	0	1237	24	0
1	C	1313	0	1259	10	0
1	D	1320	0	1272	18	0
1	E	1272	0	1180	21	0
1	F	1323	0	1266	25	0
1	G	1306	0	1244	17	0
1	H	1311	0	1252	23	0
2	A	23	0	12	2	0
2	B	23	0	12	6	0
2	C	23	0	12	0	0
2	D	23	0	12	2	0
2	E	23	0	12	2	0
2	F	23	0	12	5	0
2	G	23	0	12	5	0
2	H	23	0	12	8	0
3	A	20	0	0	0	0
3	B	23	0	0	2	0
3	C	24	0	0	0	0
3	D	30	0	0	1	0
3	E	13	0	0	2	0
3	F	17	0	0	0	0
3	G	27	0	0	0	0
3	H	24	0	0	0	0
All	All	10827	0	10070	135	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 7.

All (135) 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)
2:A:188:AMP:N7	1:B:127:THR:HG21	1.64	1.12
1:H:117:GLY:HA3	2:H:188:AMP:H5'2	1.44	0.94
1:F:117:GLY:HA2	2:F:188:AMP:C8	2.05	0.92

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:117:GLY:HA2	2:F:188:AMP:H8	1.50	0.77
2:A:188:AMP:N7	1:B:127:THR:CG2	2.47	0.75
2:G:188:AMP:N7	1:H:127:THR:HG21	2.01	0.75
1:H:20:ALA:HB3	1:H:21:PRO:HD3	1.67	0.74
1:F:117:GLY:CA	2:F:188:AMP:C8	2.73	0.72
1:B:117:GLY:HA3	2:B:188:AMP:H5'2	1.73	0.71
1:F:127:THR:O	1:F:131:LEU:HB2	1.92	0.70
1:B:120:ASP:OD2	3:B:202:HOH:O	2.09	0.68
1:G:73:PRO:HD3	1:G:98:ARG:HG3	1.75	0.68
1:F:117:GLY:CA	2:F:188:AMP:H8	2.05	0.67
1:C:76:LEU:HB3	1:C:80:GLU:HG3	1.78	0.66
1:F:134:HIS:O	1:F:170:ARG:NH1	2.29	0.65
1:G:96:TRP:HB2	1:H:96:TRP:HB3	1.78	0.63
1:G:50:HIS:CG	1:G:50:HIS:O	2.51	0.63
1:D:117:GLY:HA2	2:D:188:AMP:C8	2.35	0.61
1:F:143:PRO:HA	1:F:175:ASP:HB2	1.82	0.61
1:B:14:ALA:HA	1:B:45:VAL:O	2.00	0.61
1:D:111:THR:HG21	1:D:122:LEU:HD22	1.83	0.60
1:E:134:HIS:HE1	1:E:138:ILE:HD11	1.66	0.60
1:D:88:GLU:CD	1:D:105:ARG:HH22	2.05	0.59
1:H:18:ALA:HB1	1:H:21:PRO:HD2	1.85	0.58
1:B:98:ARG:NH1	2:B:188:AMP:O2'	2.28	0.58
1:A:99:LYS:HE3	1:A:124:ASP:OD2	2.04	0.57
1:D:33:VAL:HG21	1:D:112:LEU:HD21	1.87	0.56
1:C:127:THR:HA	1:C:130:TYR:CE2	2.40	0.56
2:G:188:AMP:C8	1:H:127:THR:HG21	2.40	0.56
1:B:103:GLU:HG2	1:B:125:VAL:HG23	1.87	0.56
1:D:45:VAL:HG22	1:D:69:VAL:HB	1.88	0.55
1:H:113:PRO:HA	1:H:147:PHE:CZ	2.41	0.55
1:A:99:LYS:NZ	1:A:120:ASP:OD2	2.37	0.55
1:G:99:LYS:HE2	2:G:188:AMP:N1	2.21	0.55
1:B:117:GLY:HA2	2:B:188:AMP:C8	2.42	0.55
1:A:119:LEU:HD23	1:B:123:LEU:HD21	1.87	0.54
1:H:117:GLY:HA3	2:H:188:AMP:C5'	2.28	0.54
1:E:134:HIS:HB2	1:E:136:LYS:HG3	1.90	0.53
1:B:22:THR:HB	1:B:27:LEU:HD11	1.89	0.53
1:G:20:ALA:HB1	1:G:21:PRO:HD2	1.91	0.53
1:B:52:SER:OG	1:B:53:ALA:N	2.41	0.53
1:F:52:SER:OG	1:F:53:ALA:N	2.40	0.53
1:F:12:THR:CG2	1:F:45:VAL:HG23	2.40	0.52
1:D:18:ALA:HB2	1:D:114:GLY:HA2	1.90	0.52

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:119:LEU:O	1:D:123:LEU:HG	2.10	0.52
1:E:162:TYR:HA	1:F:21:PRO:HG3	1.92	0.52
1:H:117:GLY:CA	2:H:188:AMP:H5'2	2.30	0.52
1:E:18:ALA:HB2	1:E:114:GLY:HA2	1.91	0.52
1:E:98:ARG:O	1:E:102:MET:HB2	2.09	0.52
1:H:95:MET:HE2	2:H:188:AMP:C6	2.45	0.52
1:A:33:VAL:HG22	1:A:177:LEU:HD13	1.92	0.51
1:E:134:HIS:O	1:E:170:ARG:NH2	2.44	0.51
1:H:18:ALA:HB2	1:H:114:GLY:HA2	1.92	0.50
1:E:95:MET:HG2	2:E:188:AMP:C6	2.47	0.50
1:G:37:ILE:HG23	1:G:42:TRP:HB2	1.94	0.50
1:A:123:LEU:HD12	1:B:123:LEU:HD22	1.94	0.50
1:F:127:THR:HA	1:F:130:TYR:CE2	2.47	0.49
1:A:96[B]:TRP:HB2	1:B:96:TRP:HB3	1.93	0.49
1:C:73:PRO:HD3	1:C:98:ARG:HG3	1.95	0.49
1:B:98:ARG:NH1	2:B:188:AMP:N3	2.61	0.49
1:E:76:LEU:HB3	1:E:80:GLU:HG3	1.95	0.48
1:F:103:GLU:HA	1:F:109:PHE:CZ	2.49	0.48
1:G:23:HIS:HB3	1:G:25:GLU:OE1	2.14	0.48
1:A:96[A]:TRP:HB3	1:B:96:TRP:HB3	1.96	0.47
1:B:29:LEU:O	1:B:33:VAL:HG23	2.14	0.47
1:C:119:LEU:HD23	1:D:123:LEU:CD1	2.44	0.47
1:H:98:ARG:NH1	2:H:188:AMP:O2'	2.40	0.47
1:E:116:VAL:N	3:E:197:HOH:O	2.48	0.47
1:G:99:LYS:HG3	2:G:188:AMP:C2	2.49	0.47
1:G:57:VAL:HG13	1:G:58:SER:N	2.30	0.47
1:H:52:SER:OG	1:H:53:ALA:N	2.47	0.47
1:B:140:VAL:HB	1:B:173:VAL:HG22	1.97	0.47
1:E:39:ALA:HA	3:E:193:HOH:O	2.13	0.47
1:B:170:ARG:NH1	3:B:192:HOH:O	2.47	0.46
1:F:103:GLU:HA	1:F:109:PHE:HZ	1.80	0.46
1:A:111:THR:HB	1:A:140:VAL:HG22	1.98	0.46
1:E:12:THR:HG23	1:E:43:THR:HB	1.96	0.46
1:D:74:LYS:HD3	1:D:93:GLU:HA	1.97	0.46
1:E:76:LEU:HD21	1:F:131:LEU:HG	1.98	0.46
1:B:124:ASP:O	1:B:128:GLU:HG3	2.15	0.46
1:E:99:LYS:HE2	2:E:188:AMP:N1	2.32	0.45
1:E:33:VAL:HG22	1:E:177:LEU:HD13	1.97	0.45
1:F:15:VAL:HA	1:F:110:ILE:O	2.17	0.45
1:E:140:VAL:HB	1:E:173:VAL:HG22	1.99	0.45
1:G:146:HIS:CE1	1:H:157:LEU:HD22	2.51	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:16:TYR:HE1	1:A:102:MET:CE	2.29	0.45
1:C:11:TRP:CE2	1:C:186:PRO:HD3	2.52	0.45
1:D:88:GLU:OE1	1:D:105:ARG:NH2	2.47	0.45
1:G:29:LEU:O	1:G:33:VAL:HG23	2.18	0.44
1:H:94:THR:HB	1:H:96:TRP:HE3	1.81	0.44
1:E:123:LEU:HD22	1:F:123:LEU:HD22	1.99	0.44
1:D:26:LEU:HD13	1:D:113:PRO:HB2	2.00	0.44
1:H:117:GLY:HA2	2:H:188:AMP:C8	2.52	0.44
1:F:16:TYR:HB2	1:F:111:THR:HG23	2.00	0.44
1:A:54:MET:O	1:A:57:VAL:HG12	2.18	0.44
1:B:71:VAL:HG22	1:B:90:VAL:CG1	2.48	0.44
1:F:69:VAL:HG11	1:F:105:ARG:HE	1.82	0.44
1:E:47:GLY:N	1:E:102:MET:HE3	2.33	0.43
1:E:127:THR:HA	1:E:130:TYR:CD2	2.53	0.43
1:H:72:ILE:O	1:H:91:VAL:HA	2.19	0.43
1:F:20:ALA:HB3	1:F:21:PRO:HD3	2.01	0.43
1:H:99:LYS:HG3	2:H:188:AMP:C2	2.53	0.43
1:D:168:MET:HB3	3:D:200:HOH:O	2.19	0.43
1:B:40:ARG:CZ	1:B:181:LEU:HD13	2.49	0.42
1:C:119:LEU:HD23	1:D:123:LEU:HD11	2.00	0.42
1:E:146:HIS:HE1	1:F:162:TYR:CE2	2.37	0.42
1:F:46:TRP:CE2	1:F:58:SER:HB3	2.54	0.42
1:G:46:TRP:CE2	1:G:58:SER:HB3	2.54	0.42
1:G:162:TYR:HA	1:H:21:PRO:HG3	2.01	0.42
1:D:46:TRP:CE2	1:D:58:SER:HB3	2.55	0.42
1:F:37:ILE:O	1:F:42:TRP:HB2	2.20	0.42
1:C:18:ALA:HB2	1:C:114:GLY:HA2	2.02	0.42
1:E:127:THR:HG22	1:F:116:VAL:HG13	2.02	0.42
1:H:99:LYS:HE2	2:H:188:AMP:N1	2.35	0.42
1:A:72:ILE:O	1:A:91:VAL:HA	2.19	0.42
1:E:122:LEU:HD11	1:E:171:LEU:HD11	2.01	0.42
1:G:33:VAL:HG22	1:G:177:LEU:HD13	2.02	0.41
1:D:17:CYS:HB3	1:D:112:LEU:HB2	2.03	0.41
1:C:25:GLU:HG2	1:C:26:LEU:N	2.36	0.41
1:D:153:TRP:CZ2	1:D:157:LEU:HD11	2.55	0.41
1:D:117:GLY:CA	2:D:188:AMP:C8	3.02	0.41
1:F:117:GLY:HA3	2:F:188:AMP:H8	1.84	0.41
1:G:95:MET:HE3	1:H:131:LEU:HD12	2.02	0.41
1:B:117:GLY:HA2	2:B:188:AMP:H8	1.82	0.41
1:B:117:GLY:CA	2:B:188:AMP:H8	2.34	0.41
1:G:126:TRP:HA	1:G:138:ILE:HD13	2.03	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:37:ILE:HG23	1:H:42:TRP:HB2	2.03	0.41
1:H:62:ARG:NH1	1:H:83:ASP:OD2	2.47	0.41
1:F:46:TRP:CE2	1:F:48:GLY:HA2	2.56	0.40
1:A:170:ARG:HA	1:A:170:ARG:HD2	1.82	0.40
1:G:99:LYS:HG3	2:G:188:AMP:H2	1.87	0.40
1:B:72:ILE:HG13	1:B:73:PRO:HD2	2.04	0.40
1:A:23:HIS:HA	1:A:24:PRO:HD2	2.00	0.40
1:C:29:LEU:O	1:C:33:VAL:HG23	2.20	0.40
1:C:162:TYR:CE1	1:D:26:LEU:HD22	2.57	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	176/189 (93%)	169 (96%)	6 (3%)	1 (1%)	25	43
1	B	175/189 (93%)	166 (95%)	6 (3%)	3 (2%)	9	16
1	C	175/189 (93%)	170 (97%)	3 (2%)	2 (1%)	14	26
1	D	175/189 (93%)	169 (97%)	3 (2%)	3 (2%)	9	16
1	E	175/189 (93%)	169 (97%)	5 (3%)	1 (1%)	25	43
1	F	176/189 (93%)	165 (94%)	8 (4%)	3 (2%)	9	16
1	G	175/189 (93%)	169 (97%)	6 (3%)	0	100	100
1	H	176/189 (93%)	169 (96%)	6 (3%)	1 (1%)	25	43
All	All	1403/1512 (93%)	1346 (96%)	43 (3%)	14 (1%)	15	28

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	21	PRO

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	47	GLY
1	H	20	ALA
1	B	21	PRO
1	B	47	GLY
1	F	21	PRO
1	D	20	ALA
1	E	20	ALA
1	F	20	ALA
1	C	20	ALA
1	B	20	ALA
1	F	113	PRO
1	D	185	ALA
1	D	113	PRO

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	129/142 (91%)	124 (96%)	5 (4%)	32	57
1	B	124/142 (87%)	119 (96%)	5 (4%)	31	56
1	C	128/142 (90%)	121 (94%)	7 (6%)	21	41
1	D	129/142 (91%)	126 (98%)	3 (2%)	50	76
1	E	117/142 (82%)	108 (92%)	9 (8%)	13	25
1	F	127/142 (89%)	120 (94%)	7 (6%)	21	41
1	G	126/142 (89%)	121 (96%)	5 (4%)	31	56
1	H	127/142 (89%)	120 (94%)	7 (6%)	21	41
All	All	1007/1136 (89%)	959 (95%)	48 (5%)	26	48

All (48) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	TRP
1	A	50	HIS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	58	SER
1	A	128	GLU
1	A	155	SER
1	B	46	TRP
1	B	59	SER
1	B	75	MET
1	B	85	ASP
1	B	98	ARG
1	C	46	TRP
1	C	98	ARG
1	C	104	ASP
1	C	119	LEU
1	C	124	ASP
1	C	128	GLU
1	C	166	THR
1	D	46	TRP
1	D	133	MET
1	D	175	ASP
1	E	17	CYS
1	E	46	TRP
1	E	95	MET
1	E	102	MET
1	E	123	LEU
1	E	124	ASP
1	E	130	TYR
1	E	137	SER
1	E	166	THR
1	F	46	TRP
1	F	75	MET
1	F	120	ASP
1	F	131	LEU
1	F	133	MET
1	F	165	ARG
1	F	175	ASP
1	G	28	GLU
1	G	46	TRP
1	G	75	MET
1	G	98	ARG
1	G	124	ASP
1	H	46	TRP
1	H	98	ARG
1	H	105[A]	ARG

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	H	105[B]	ARG
1	H	124	ASP
1	H	127	THR
1	H	166	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	146	HIS
1	G	146	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

8 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	$\#\|Z\| > 2$
2	AMP	C	188	-	22,25,25	1.17	2 (9%)	25,38,38	1.45	4 (16%)
2	AMP	H	188	-	22,25,25	1.03	2 (9%)	25,38,38	1.32	2 (8%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	AMP	F	188	-	22,25,25	1.21	3 (13%)	25,38,38	1.47	3 (12%)
2	AMP	B	188	-	22,25,25	1.14	2 (9%)	25,38,38	1.48	3 (12%)
2	AMP	A	188	-	22,25,25	0.98	1 (4%)	25,38,38	1.47	4 (16%)
2	AMP	E	188	-	22,25,25	1.14	3 (13%)	25,38,38	1.48	3 (12%)
2	AMP	G	188	-	22,25,25	1.04	1 (4%)	25,38,38	1.48	4 (16%)
2	AMP	D	188	-	22,25,25	1.07	2 (9%)	25,38,38	1.33	3 (12%)

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	AMP	C	188	-	-	0/6/26/26	0/3/3/3
2	AMP	H	188	-	-	2/6/26/26	0/3/3/3
2	AMP	F	188	-	-	3/6/26/26	0/3/3/3
2	AMP	B	188	-	-	5/6/26/26	0/3/3/3
2	AMP	A	188	-	-	3/6/26/26	0/3/3/3
2	AMP	E	188	-	-	3/6/26/26	0/3/3/3
2	AMP	G	188	-	-	3/6/26/26	0/3/3/3
2	AMP	D	188	-	-	3/6/26/26	0/3/3/3

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	188	AMP	C5-C4	2.90	1.48	1.40
2	C	188	AMP	C5-C4	2.82	1.48	1.40
2	B	188	AMP	C5-C4	2.68	1.48	1.40
2	E	188	AMP	C5-C4	2.56	1.47	1.40
2	G	188	AMP	C5-C4	2.55	1.47	1.40
2	D	188	AMP	C5-C4	2.45	1.47	1.40
2	H	188	AMP	C5-C4	2.44	1.47	1.40
2	A	188	AMP	C5-C4	2.41	1.47	1.40
2	E	188	AMP	O4'-C1'	2.33	1.44	1.41
2	D	188	AMP	C2-N3	2.27	1.35	1.32
2	F	188	AMP	O4'-C1'	2.25	1.44	1.41
2	B	188	AMP	C2-N3	2.18	1.35	1.32
2	F	188	AMP	C2-N3	2.04	1.35	1.32
2	E	188	AMP	C2-N3	2.04	1.35	1.32

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	188	AMP	O4'-C1'	2.02	1.43	1.41
2	H	188	AMP	O4'-C1'	2.01	1.43	1.41

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	188	AMP	N3-C2-N1	-3.67	122.95	128.68
2	E	188	AMP	N3-C2-N1	-3.21	123.66	128.68
2	B	188	AMP	N3-C2-N1	-3.15	123.75	128.68
2	D	188	AMP	C4-C5-N7	-3.10	106.17	109.40
2	G	188	AMP	C4-C5-N7	-3.10	106.17	109.40
2	G	188	AMP	O4'-C1'-C2'	-3.06	102.45	106.93
2	C	188	AMP	C4-C5-N7	-3.06	106.22	109.40
2	A	188	AMP	C4-C5-N7	-3.04	106.23	109.40
2	E	188	AMP	C4-C5-N7	-3.02	106.25	109.40
2	F	188	AMP	N3-C2-N1	-2.95	124.06	128.68
2	H	188	AMP	N3-C2-N1	-2.94	124.09	128.68
2	G	188	AMP	N3-C2-N1	-2.93	124.09	128.68
2	D	188	AMP	N3-C2-N1	-2.88	124.17	128.68
2	B	188	AMP	O5'-P-O1P	-2.88	98.38	106.47
2	C	188	AMP	O4'-C1'-C2'	-2.84	102.78	106.93
2	F	188	AMP	C4-C5-N7	-2.76	106.53	109.40
2	A	188	AMP	N3-C2-N1	-2.74	124.40	128.68
2	H	188	AMP	C4-C5-N7	-2.66	106.63	109.40
2	B	188	AMP	C4-C5-N7	-2.57	106.72	109.40
2	F	188	AMP	O4'-C1'-C2'	-2.30	103.56	106.93
2	A	188	AMP	O4'-C1'-C2'	-2.27	103.60	106.93
2	C	188	AMP	C2-N1-C6	2.06	122.28	118.75
2	D	188	AMP	O4'-C1'-C2'	-2.04	103.94	106.93
2	E	188	AMP	O3P-P-O5'	-2.04	101.31	106.73
2	A	188	AMP	O3P-P-O2P	2.03	115.39	107.64
2	G	188	AMP	O5'-P-O1P	-2.02	100.80	106.47

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	188	AMP	C5'-O5'-P-O2P
2	A	188	AMP	C5'-O5'-P-O3P
2	B	188	AMP	C5'-O5'-P-O1P
2	B	188	AMP	C5'-O5'-P-O2P
2	B	188	AMP	C5'-O5'-P-O3P

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
2	B	188	AMP	O4'-C4'-C5'-O5'
2	B	188	AMP	C3'-C4'-C5'-O5'
2	D	188	AMP	C5'-O5'-P-O1P
2	D	188	AMP	C5'-O5'-P-O3P
2	E	188	AMP	C5'-O5'-P-O3P
2	F	188	AMP	C5'-O5'-P-O2P
2	F	188	AMP	C5'-O5'-P-O3P
2	G	188	AMP	C5'-O5'-P-O2P
2	G	188	AMP	C5'-O5'-P-O3P
2	H	188	AMP	O4'-C4'-C5'-O5'
2	H	188	AMP	C3'-C4'-C5'-O5'
2	A	188	AMP	C5'-O5'-P-O1P
2	E	188	AMP	C5'-O5'-P-O1P
2	F	188	AMP	C5'-O5'-P-O1P
2	G	188	AMP	C5'-O5'-P-O1P
2	E	188	AMP	C5'-O5'-P-O2P
2	D	188	AMP	C5'-O5'-P-O2P

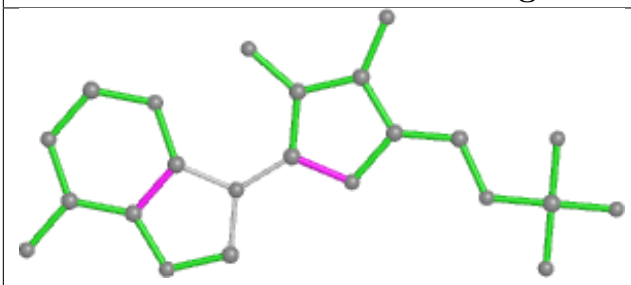
There are no ring outliers.

7 monomers are involved in 30 short contacts:

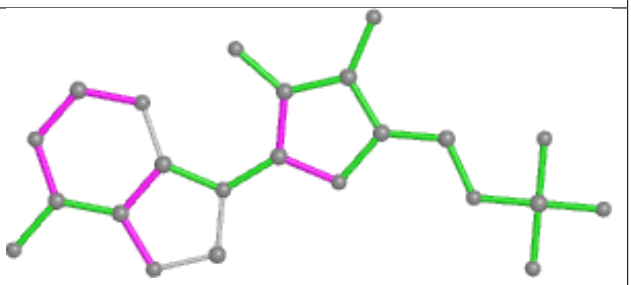
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	H	188	AMP	8	0
2	F	188	AMP	5	0
2	B	188	AMP	6	0
2	A	188	AMP	2	0
2	E	188	AMP	2	0
2	G	188	AMP	5	0
2	D	188	AMP	2	0

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.

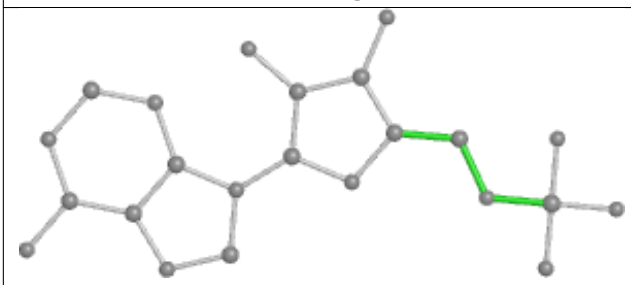
Ligand AMP C 188



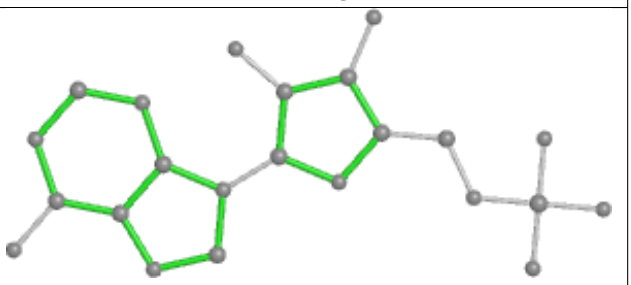
Bond lengths



Bond angles

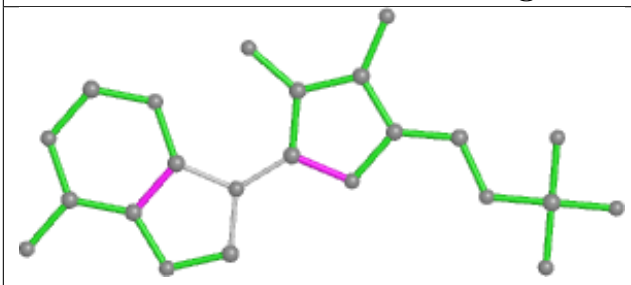


Torsions

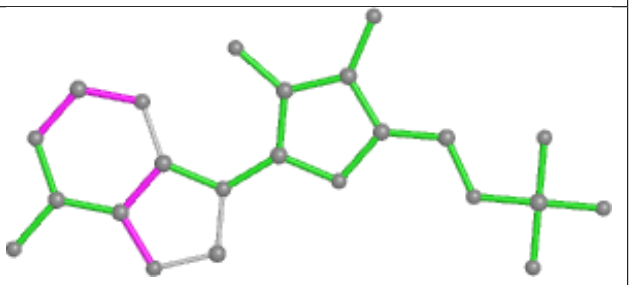


Rings

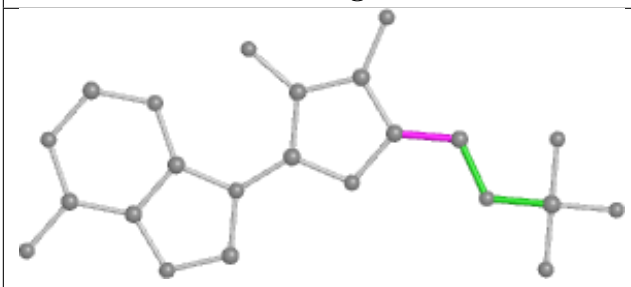
Ligand AMP H 188



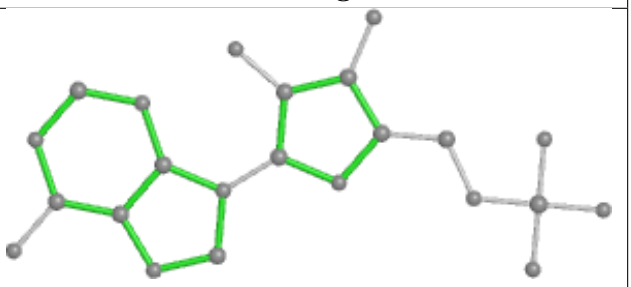
Bond lengths



Bond angles

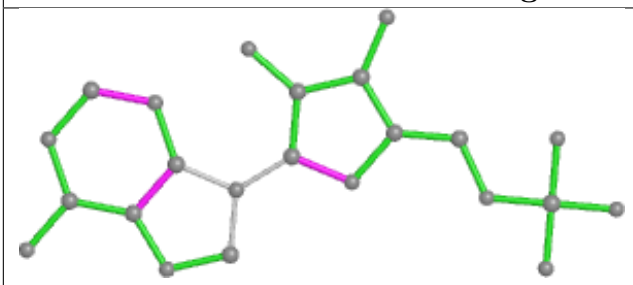


Torsions

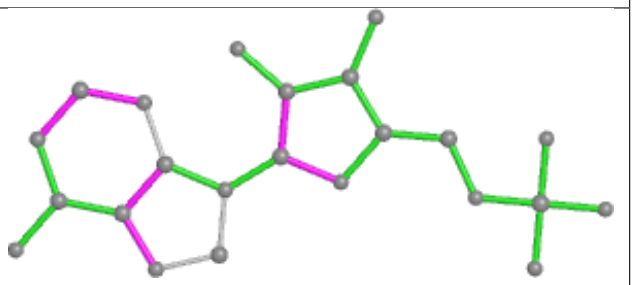


Rings

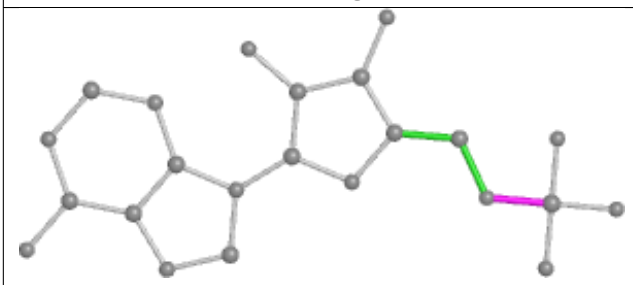
Ligand AMP F 188



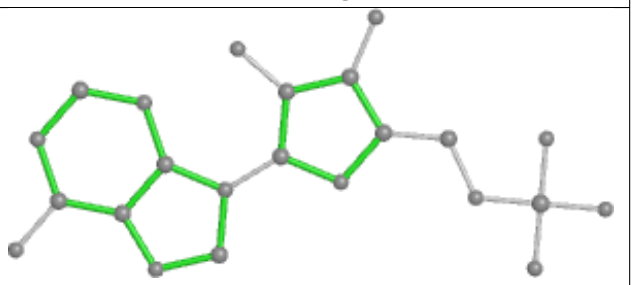
Bond lengths



Bond angles

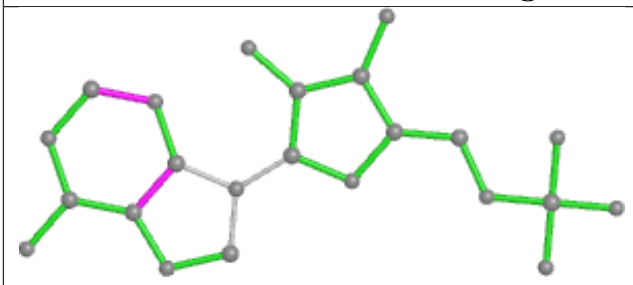


Torsions

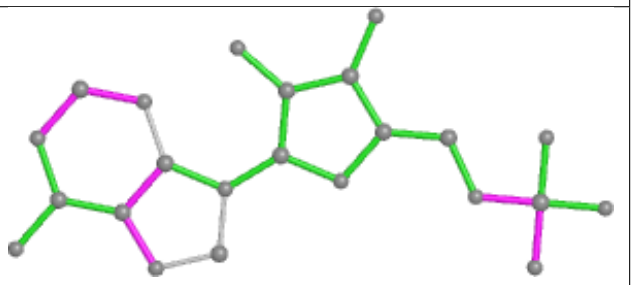


Rings

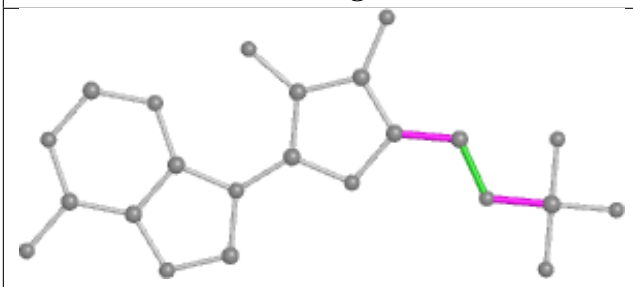
Ligand AMP B 188



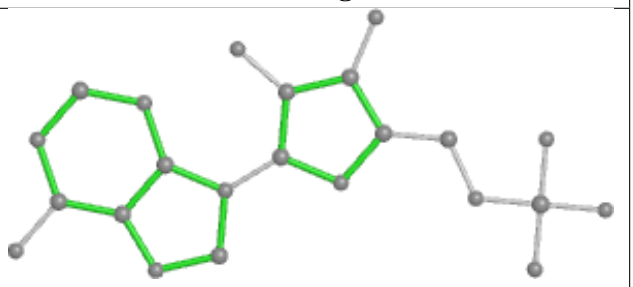
Bond lengths



Bond angles

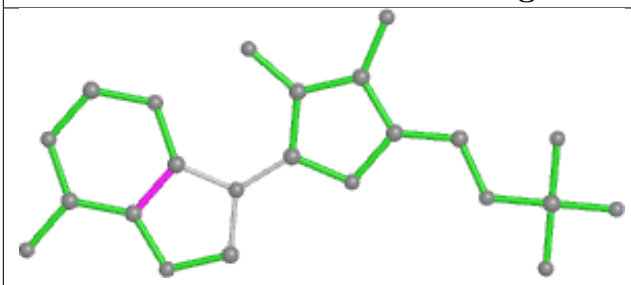


Torsions

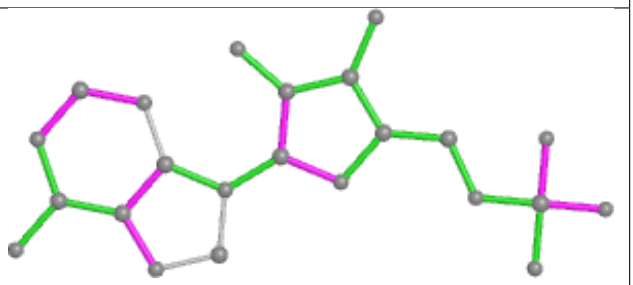


Rings

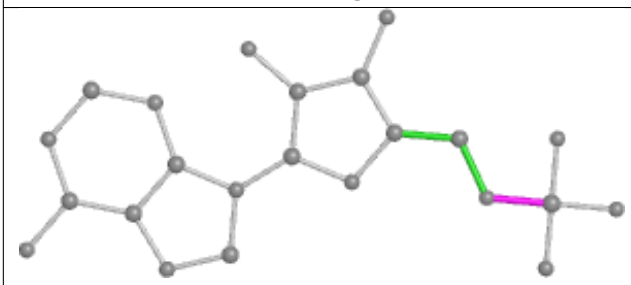
Ligand AMP A 188



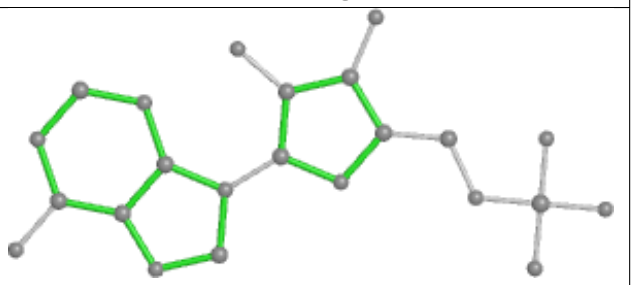
Bond lengths



Bond angles

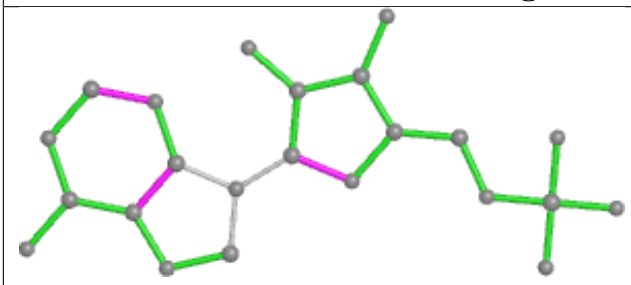


Torsions

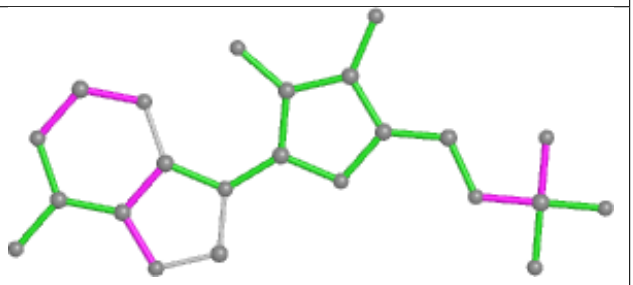


Rings

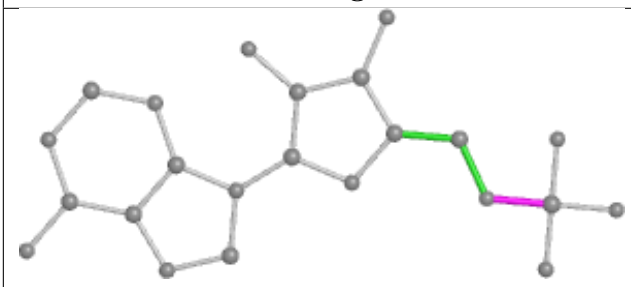
Ligand AMP E 188



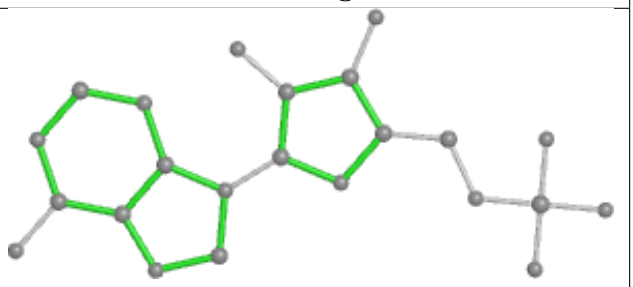
Bond lengths



Bond angles

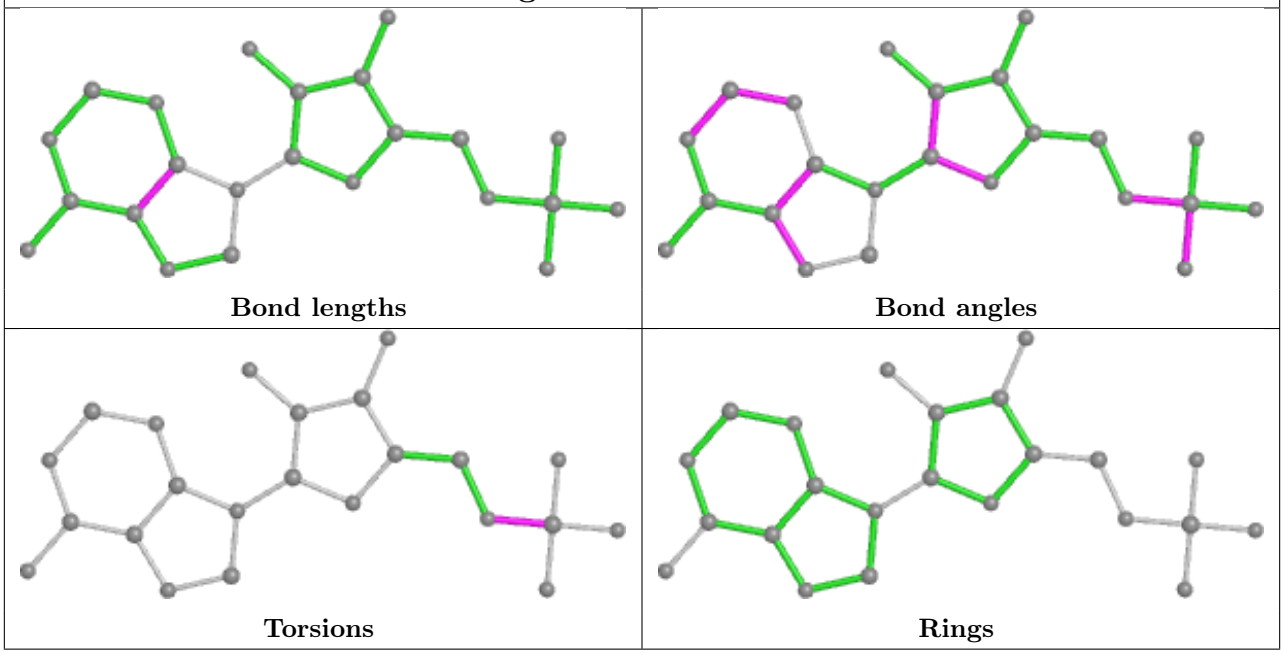


Torsions

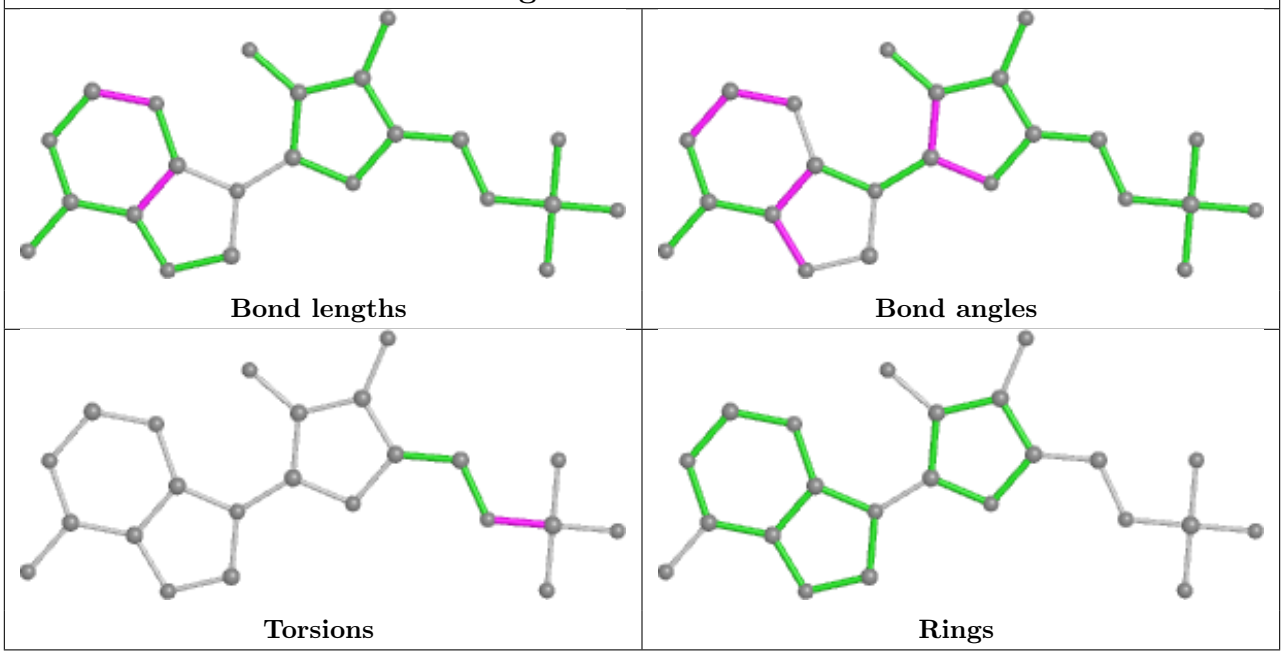


Rings

Ligand AMP G 188



Ligand AMP D 188



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	177/189 (93%)	0.15	1 (0%) 89 90	19, 31, 45, 58	0
1	B	177/189 (93%)	0.17	2 (1%) 80 82	17, 33, 48, 55	0
1	C	177/189 (93%)	0.63	18 (10%) 6 6	23, 36, 52, 58	0
1	D	177/189 (93%)	0.19	0 100 100	17, 32, 45, 58	0
1	E	177/189 (93%)	0.58	17 (9%) 8 7	26, 45, 67, 73	0
1	F	177/189 (93%)	0.31	3 (1%) 70 72	15, 33, 51, 58	0
1	G	177/189 (93%)	0.18	1 (0%) 89 90	16, 30, 43, 55	0
1	H	177/189 (93%)	0.24	3 (1%) 70 72	19, 35, 50, 60	0
All	All	1416/1512 (93%)	0.31	45 (3%) 47 51	15, 34, 53, 73	0

All (45) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	67	TRP	4.9
1	C	35	ALA	4.3
1	E	66	GLY	3.9
1	F	96[A]	TRP	3.7
1	C	67	TRP	3.6
1	E	12	THR	3.3
1	H	22	THR	3.3
1	E	42	TRP	3.2
1	H	130	TYR	3.1
1	E	186	PRO	3.1
1	C	44	LEU	3.1
1	F	173	VAL	3.1
1	B	22	THR	2.9
1	E	130	TYR	2.8
1	E	35	ALA	2.8
1	A	96[A]	TRP	2.8

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	85	ASP	2.6
1	E	185	ALA	2.6
1	E	33	VAL	2.5
1	E	179	ASP	2.5
1	C	12	THR	2.5
1	C	33	VAL	2.5
1	C	69	VAL	2.5
1	C	42	TRP	2.3
1	C	87	ASP	2.3
1	C	64	HIS	2.3
1	E	181	LEU	2.3
1	C	60	ALA	2.2
1	C	68	THR	2.2
1	E	36	ALA	2.2
1	C	48	GLY	2.2
1	C	77	VAL	2.2
1	C	34	GLY	2.2
1	G	96	TRP	2.2
1	F	22	THR	2.1
1	E	41	GLY	2.1
1	B	133	MET	2.1
1	C	186	PRO	2.1
1	E	34	GLY	2.1
1	E	84	HIS	2.1
1	E	177	LEU	2.1
1	C	65	GLY	2.1
1	H	133	MET	2.1
1	E	11	TRP	2.1
1	C	59	SER	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 monosaccharides in this entry.

6.4 Ligands (i)

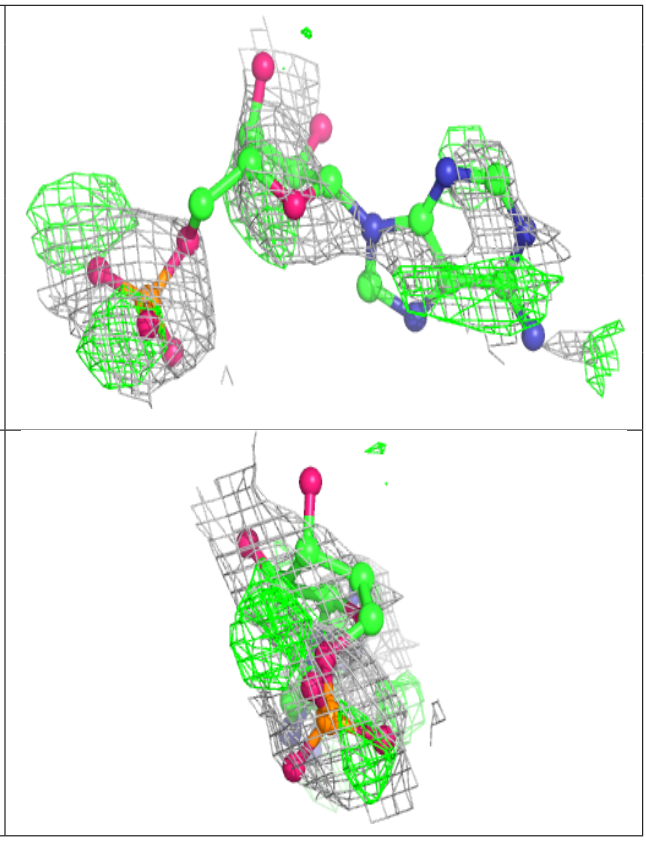
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	AMP	G	188	23/23	0.70	0.50	28,37,40,40	23
2	AMP	A	188	23/23	0.71	0.47	24,31,34,34	23
2	AMP	H	188	23/23	0.87	0.37	6,23,26,27	23
2	AMP	F	188	23/23	0.90	0.18	29,39,44,44	0
2	AMP	B	188	23/23	0.91	0.24	15,35,38,39	23
2	AMP	E	188	23/23	0.93	0.22	20,35,39,39	23
2	AMP	C	188	23/23	0.94	0.18	19,29,32,33	0
2	AMP	D	188	23/23	0.94	0.17	29,31,33,34	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.

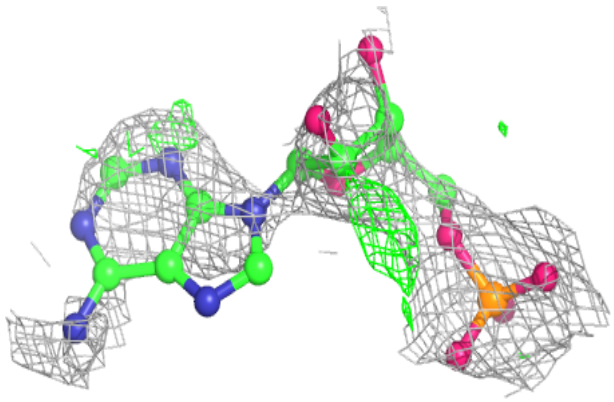
Electron density around AMP G 188:

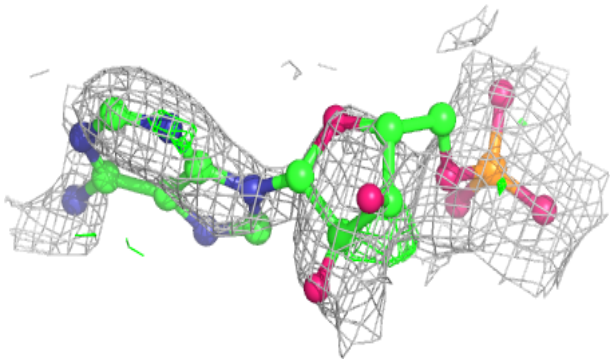
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

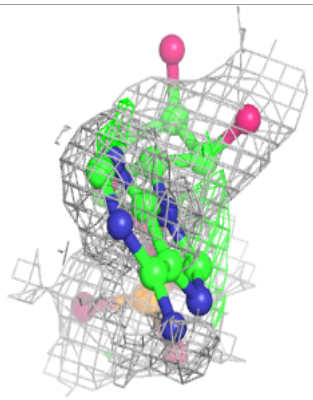


Electron density around AMP A 188:

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

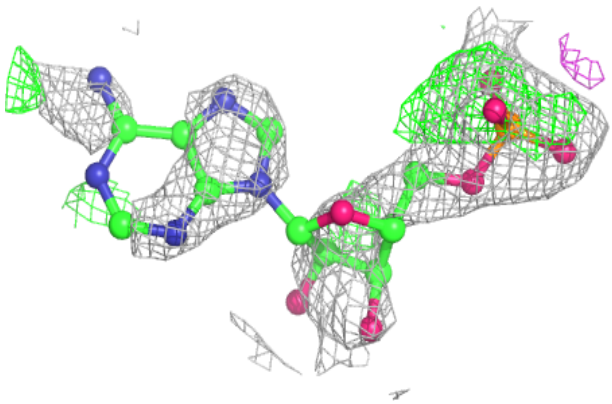


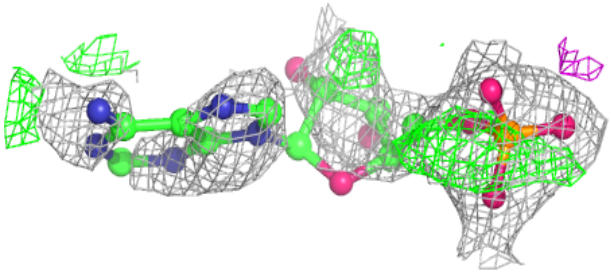


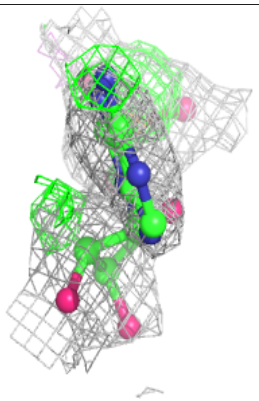


Electron density around AMP H 188:

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

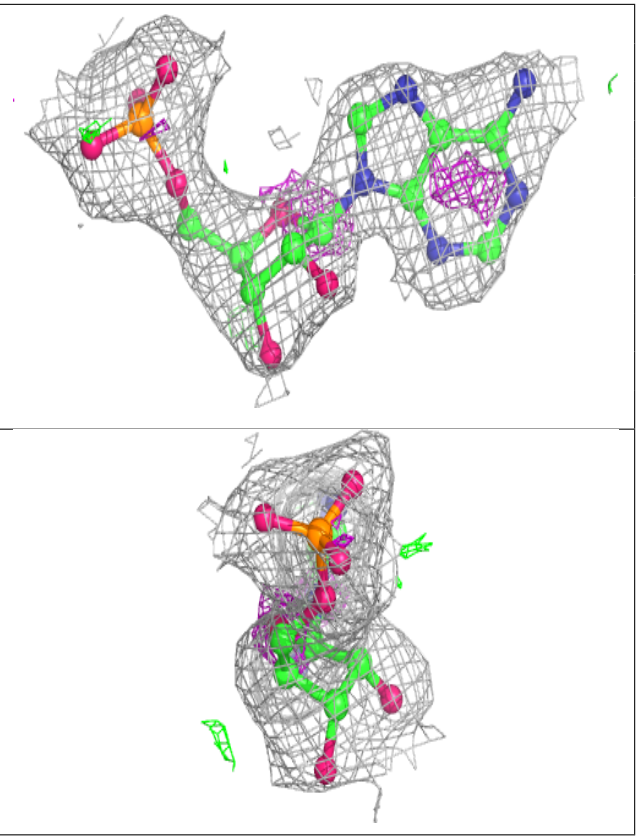






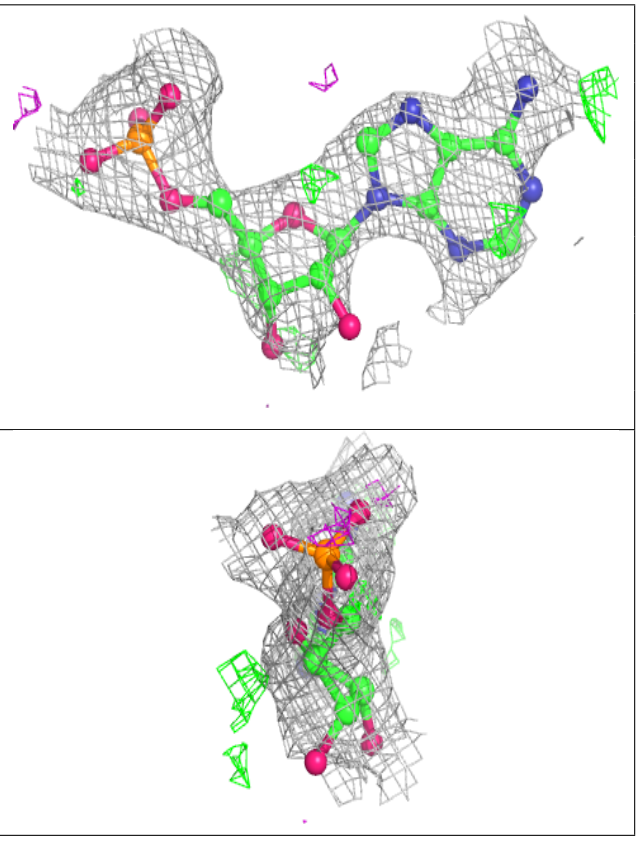
Electron density around AMP F 188:

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



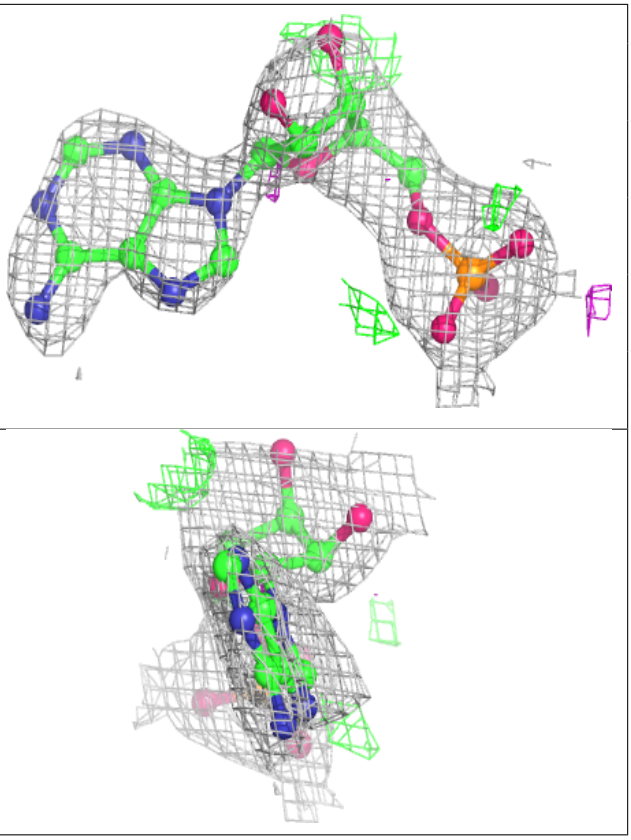
Electron density around AMP B 188:

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



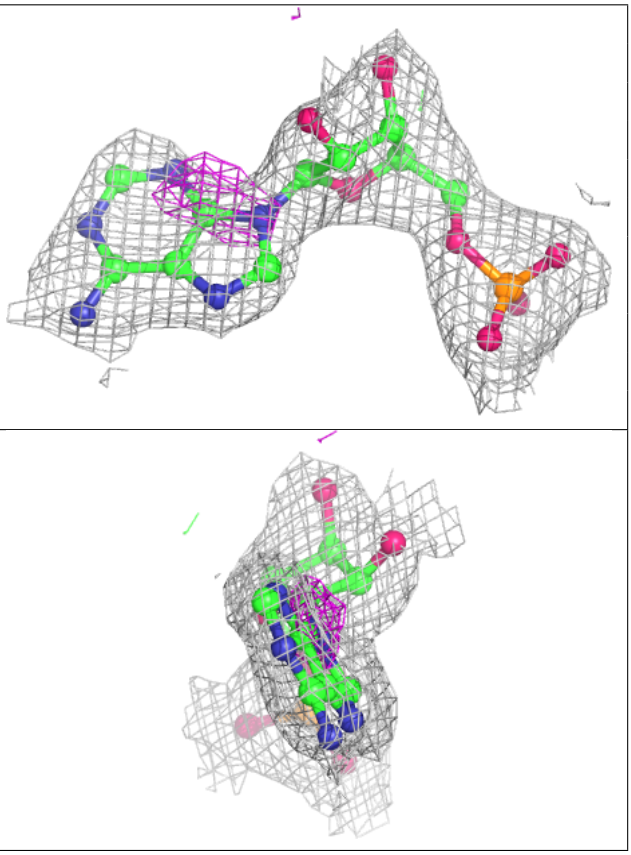
Electron density around AMP E 188:

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



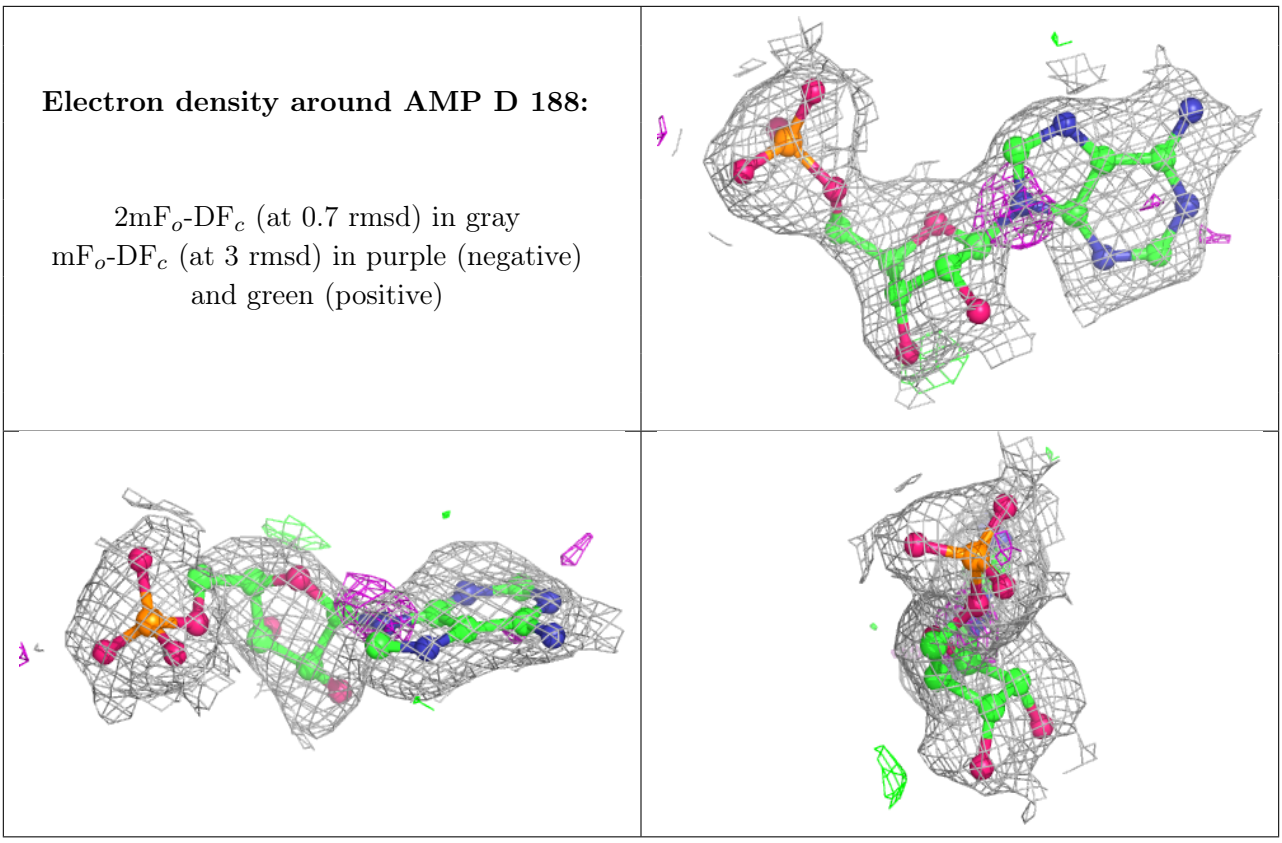
Electron density around AMP C 188:

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



Electron density around AMP D 188:

$2mF_o$-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.