



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 04:05 PM UTC

PDB ID : 4TLA / pdb_00004tla
Title : Crystal structure of N-terminal C1 domain of KaiC
Authors : Abe, J.; Hiyama, T.B.; Mukaiyama, A.; Son, S.; Akiyama, S.
Deposited on : 2014-05-29
Resolution : 1.80 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

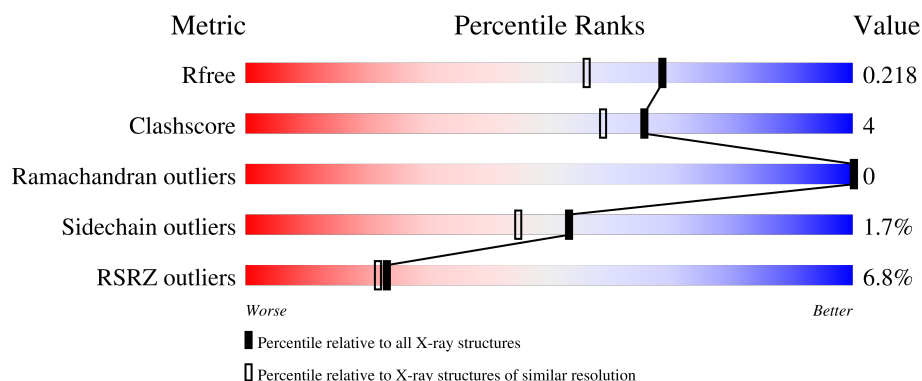
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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	7662 (1.80-1.80)
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)
RSRZ outliers	180081	7663 (1.80-1.80)

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

Mol	Chain	Length	Quality of chain
1	A	253	
1	B	253	
1	C	253	
1	D	253	
1	E	253	

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Mol	Chain	Length	Quality of chain
1	F	253	2% 80% 8% • 11%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 11899 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.

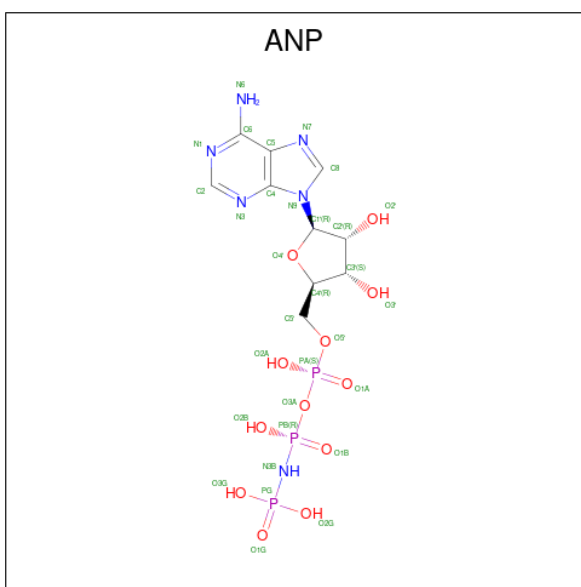
- Molecule 1 is a protein called Circadian clock protein kinase KaiC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	216	Total	C	N	O	S	0	5	0
			1750	1111	306	329	4			
1	B	216	Total	C	N	O	S	0	9	0
			1771	1122	307	337	5			
1	C	227	Total	C	N	O	S	0	8	0
			1866	1186	326	349	5			
1	D	229	Total	C	N	O	S	0	5	0
			1845	1174	318	349	4			
1	E	236	Total	C	N	O	S	0	3	0
			1887	1200	327	356	4			
1	F	224	Total	C	N	O	S	0	4	0
			1807	1154	311	338	4			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	48	THR	SER	engineered mutation	UNP Q79PF4
B	48	THR	SER	engineered mutation	UNP Q79PF4
C	48	THR	SER	engineered mutation	UNP Q79PF4
D	48	THR	SER	engineered mutation	UNP Q79PF4
E	48	THR	SER	engineered mutation	UNP Q79PF4
F	48	THR	SER	engineered mutation	UNP Q79PF4

- Molecule 2 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (CCD ID: ANP) (formula: C₁₀H₁₇N₆O₁₂P₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	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 MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mg	0	0
			1	1		
3	B	1	Total	Mg	0	0
			1	1		
3	C	1	Total	Mg	0	0
			1	1		
3	D	1	Total	Mg	0	0
			1	1		
3	E	1	Total	Mg	0	0
			1	1		
3	F	1	Total	Mg	0	0
			1	1		

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

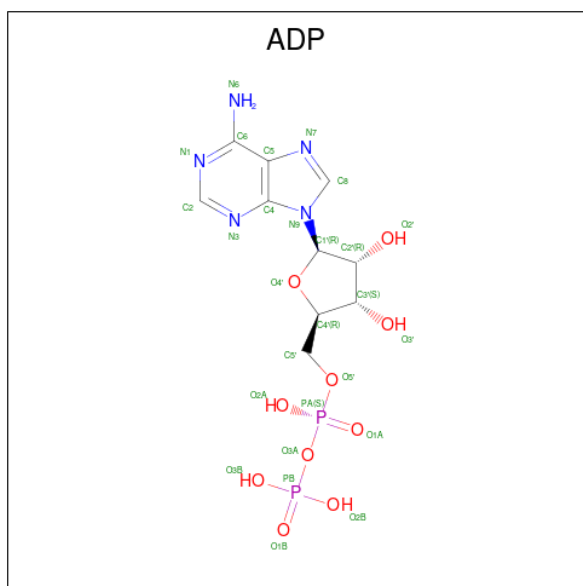
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cl	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Cl	0	0
			1	1		
4	C	1	Total	Cl	0	0
			1	1		
4	D	1	Total	Cl	0	0
			1	1		
4	E	1	Total	Cl	0	0
			1	1		
4	F	1	Total	Cl	0	0
			1	1		

- Molecule 5 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



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

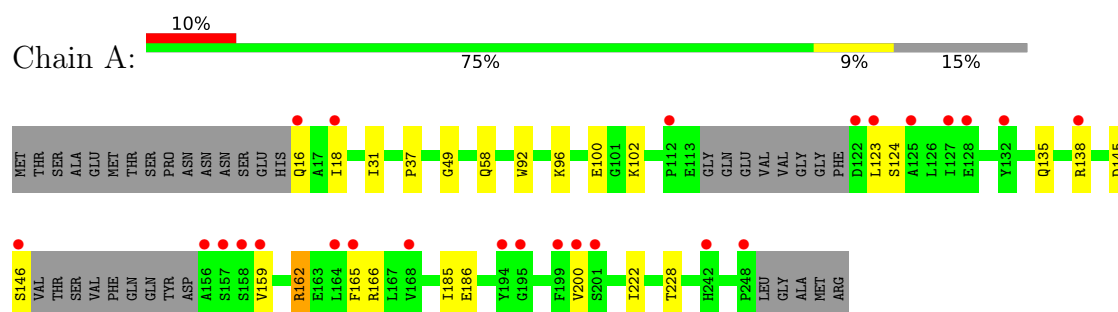
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	96	Total 96	O 96	0	0
6	B	119	Total 119	O 119	0	0
6	C	121	Total 121	O 121	0	0
6	D	160	Total 160	O 160	0	0
6	E	140	Total 140	O 140	0	0
6	F	155	Total 155	O 155	0	0

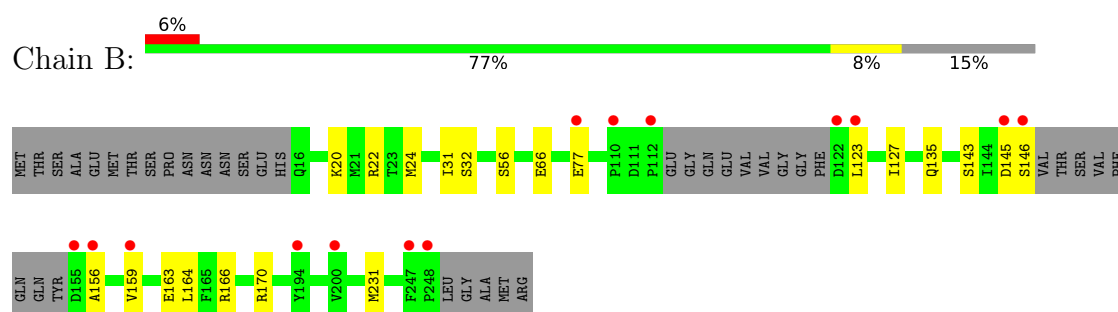
3 Residue-property plots [i](#)

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.

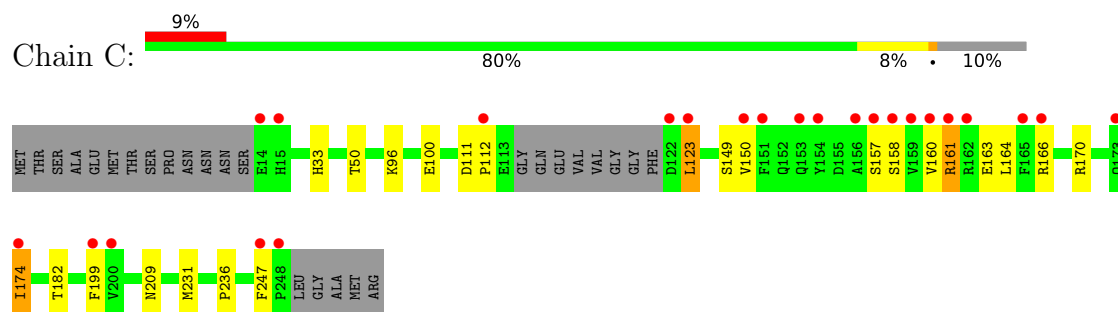
- Molecule 1: Circadian clock protein kinase KaiC



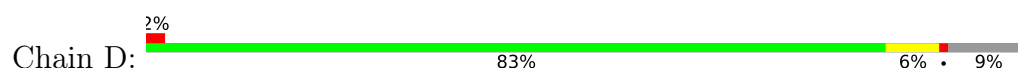
- Molecule 1: Circadian clock protein kinase KaiC

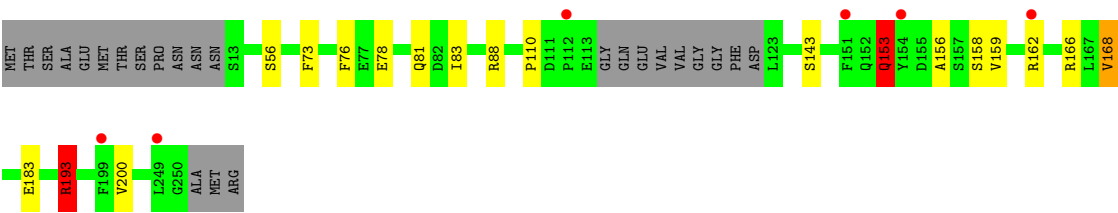


- Molecule 1: Circadian clock protein kinase KaiC

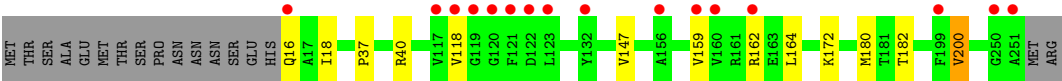
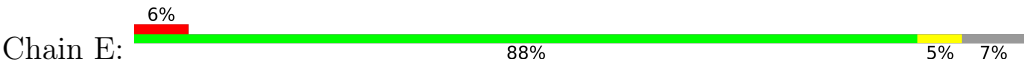


- Molecule 1: Circadian clock protein kinase KaiC

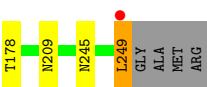
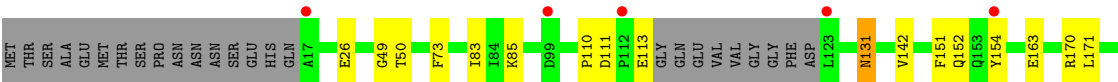
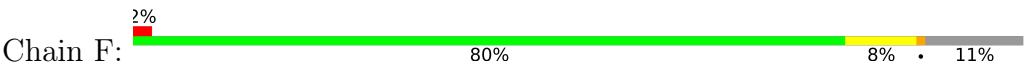




● Molecule 1: Circadian clock protein kinase KaiC



● Molecule 1: Circadian clock protein kinase KaiC



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	79.78Å 133.59Å 153.98Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.88 – 1.80 38.88 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.3 (38.88-1.80) 99.3 (38.88-1.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.81 (at 1.81Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, R_{free}	0.177 , 0.217 0.181 , 0.218	Depositor DCC
R_{free} test set	7606 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	29.6	Xtriage
Anisotropy	0.039	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 45.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	11899	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.87% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CL, ADP, ANP, MG

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	0/1783	0.81	0/2401
1	B	0.70	0/1811	0.80	0/2439
1	C	0.62	0/1910	0.81	0/2575
1	D	0.72	0/1889	0.86	2/2549 (0.1%)
1	E	0.74	0/1920	0.88	0/2592
1	F	0.76	0/1844	0.84	0/2490
All	All	0.70	0/11157	0.83	2/15046 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	153	GLN	N-CA-C	-5.76	105.09	111.71
1	D	193	ARG	N-CA-C	5.15	116.89	111.28

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1750	0	1771	17	0
1	B	1771	0	1779	15	0
1	C	1866	0	1888	16	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	1845	0	1862	12	0
1	E	1887	0	1897	11	0
1	F	1807	0	1834	15	0
2	A	31	0	13	1	0
2	F	31	0	13	2	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
5	B	27	0	12	0	0
5	C	27	0	12	0	0
5	D	27	0	12	1	0
5	E	27	0	12	0	0
6	A	96	0	0	1	0
6	B	119	0	0	3	0
6	C	121	0	0	1	0
6	D	160	0	0	4	0
6	E	140	0	0	0	0
6	F	155	0	0	0	0
All	All	11899	0	11105	84	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 4.

All (84) 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:123:LEU:HB3	1:C:163:GLU:HG2	1.46	0.94
1:F:142:VAL:HB	1:F:178[B]:THR:HG22	1.53	0.89
1:B:22:ARG:NH1	6:B:509:HOH:O	2.12	0.82
1:E:147:VAL:HG21	1:E:180:MET:HE3	1.66	0.76
1:D:183:GLU:OE2	6:D:483:HOH:O	2.03	0.76
1:C:231[B]:MET:SD	6:C:491:HOH:O	2.48	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:138:ARG:O	1:A:138:ARG:HG3	1.89	0.71
1:D:153:GLN:CG	1:D:193:ARG:HH22	2.06	0.68
1:F:49:GLY:H	2:F:301:ANP:HNB1	1.40	0.67
1:A:162:ARG:HH11	1:A:162:ARG:HG2	1.58	0.67
1:F:171:LEU:HD13	1:F:178[B]:THR:HG21	1.77	0.66
1:E:180:MET:HE2	1:E:200:VAL:HG21	1.79	0.64
1:A:18:ILE:HG22	1:F:85:LYS:HE3	1.80	0.62
1:B:135:GLN:NE2	6:B:401:HOH:O	2.33	0.61
1:A:18:ILE:HD13	1:A:37:PRO:HB3	1.82	0.60
1:B:145[A]:ASP:OD1	6:B:506:HOH:O	2.14	0.60
1:A:124:SER:OG	1:A:166:ARG:NH2	2.31	0.60
1:C:157:SER:O	1:C:160:VAL:HG12	2.03	0.58
1:D:153:GLN:HG2	1:D:193:ARG:HH22	1.70	0.57
1:C:170:ARG:O	1:C:174:ILE:HG13	2.05	0.56
1:A:58:GLN:HG2	1:A:92:TRP:CH2	2.42	0.55
1:C:158:SER:HA	1:C:161:ARG:HG3	1.90	0.54
1:D:158:SER:O	1:D:162:ARG:HG3	2.08	0.53
1:B:24:MET:HG3	1:B:66:GLU:HG3	1.92	0.52
1:B:156:ALA:HB3	1:B:159:VAL:HG23	1.92	0.52
1:B:31:ILE:HG22	1:B:231[B]:MET:SD	2.50	0.51
1:F:49:GLY:N	2:F:301:ANP:HNB1	2.09	0.51
1:A:165:PHE:CE1	1:F:110:PRO:HG2	2.47	0.50
1:F:73:PHE:CE1	1:F:83[B]:ILE:HD13	2.47	0.49
1:B:56[A]:SER:HB2	1:B:143:SER:HB3	1.94	0.49
1:E:18:ILE:HD12	1:E:37:PRO:HB3	1.93	0.49
1:E:40:ARG:HG2	1:E:172[B]:LYS:HE2	1.95	0.49
1:E:164:LEU:HD11	1:E:180:MET:HE1	1.94	0.49
1:B:123:LEU:HD22	1:B:163:GLU:HB3	1.95	0.48
1:D:88:ARG:NH1	6:D:514:HOH:O	2.45	0.48
1:A:100:GLU:OE1	1:A:102:LYS:NZ	2.46	0.48
1:A:31:ILE:HG22	1:A:222:ILE:HD12	1.95	0.48
1:A:49:GLY:H	2:A:301:ANP:HNB1	1.60	0.47
1:F:111:ASP:OD1	1:F:113:GLU:HG2	2.14	0.47
1:B:56[B]:SER:HB3	1:B:143:SER:HB3	1.95	0.47
1:C:33:HIS:NE2	1:C:231[B]:MET:HE2	2.30	0.47
1:C:161:ARG:HB3	1:C:199:PHE:CZ	2.49	0.46
1:F:152:GLN:HB3	1:F:154:TYR:CE2	2.51	0.46
1:B:20:LYS:NZ	1:B:32:SER:O	2.44	0.45
1:E:147:VAL:CG2	1:E:180:MET:HE3	2.44	0.45
1:E:159:VAL:HA	1:E:162:ARG:HH21	1.82	0.45
1:F:249:LEU:HD23	1:F:249:LEU:HA	1.79	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:76:PHE:O	1:D:110:PRO:HD3	2.17	0.44
1:F:111:ASP:CG	1:F:113:GLU:HG2	2.42	0.44
1:C:149:SER:HB3	6:D:560:HOH:O	2.17	0.44
1:A:18:ILE:HD11	1:A:228:THR:HG21	1.99	0.44
1:C:161:ARG:O	1:C:164:LEU:HB3	2.17	0.44
1:E:180:MET:CE	1:E:200:VAL:HG21	2.47	0.43
1:B:159:VAL:O	1:B:163:GLU:HG2	2.18	0.43
1:A:165:PHE:HB2	1:A:200:VAL:HG21	2.00	0.43
1:B:145[A]:ASP:HA	1:B:146[A]:SER:HA	1.64	0.43
1:C:163:GLU:OE1	1:C:166:ARG:NH1	2.30	0.43
1:C:163:GLU:CD	1:C:166:ARG:HE	2.27	0.43
1:D:168:VAL:HG11	1:D:200:VAL:O	2.19	0.43
1:F:50:THR:HG22	1:F:209:ASN:HB2	2.00	0.43
1:D:153:GLN:HG2	1:D:193:ARG:NH2	2.33	0.43
1:E:180:MET:HE3	1:E:180:MET:HB3	1.79	0.42
1:A:123:LEU:HD12	1:A:123:LEU:HA	1.71	0.42
1:C:236:PRO:HG2	1:C:247:PHE:CE1	2.55	0.42
1:F:151:PHE:HE1	1:F:163:GLU:OE1	2.01	0.42
1:A:96:LYS:NZ	6:A:445:HOH:O	2.53	0.42
1:C:111:ASP:OD1	1:C:112:PRO:HD2	2.20	0.42
1:C:96:LYS:HE2	1:C:100:GLU:OE1	2.20	0.41
1:F:131:ASN:OD1	1:F:170:ARG:HD2	2.20	0.41
1:E:180:MET:HE2	1:E:200:VAL:CG2	2.49	0.41
1:A:185:ILE:HD12	1:A:186:GLU:HG2	2.02	0.41
1:C:50:THR:HG22	1:C:209:ASN:HB2	2.03	0.41
1:D:56[A]:SER:HB2	1:D:143:SER:HB3	2.03	0.41
1:A:145[B]:ASP:HA	1:A:146[B]:SER:HA	1.65	0.41
1:D:156:ALA:HB3	1:D:159:VAL:HG23	2.01	0.41
1:B:127:ILE:CG2	1:B:170:ARG:HG2	2.51	0.41
1:C:112:PRO:O	1:D:166:ARG:HG3	2.21	0.41
1:B:123:LEU:HD23	1:B:166:ARG:HH11	1.86	0.41
1:E:159:VAL:HG22	1:E:162:ARG:HH21	1.87	0.41
1:F:26:GLU:OE1	1:F:245:ASN:ND2	2.55	0.41
1:D:73:PHE:CE2	1:D:83[B]:ILE:HD13	2.56	0.40
1:A:16:GLN:HG2	1:A:16:GLN:O	2.20	0.40
1:B:164:LEU:HA	1:B:164:LEU:HD23	1.75	0.40
5:D:301:ADP:H5'1	6:D:546:HOH:O	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	214/253 (85%)	208 (97%)	6 (3%)	0	100	100
1	B	218/253 (86%)	214 (98%)	4 (2%)	0	100	100
1	C	231/253 (91%)	225 (97%)	6 (3%)	0	100	100
1	D	230/253 (91%)	226 (98%)	4 (2%)	0	100	100
1	E	237/253 (94%)	233 (98%)	4 (2%)	0	100	100
1	F	224/253 (88%)	222 (99%)	2 (1%)	0	100	100
All	All	1354/1518 (89%)	1328 (98%)	26 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	191/217 (88%)	188 (98%)	3 (2%)	55	47
1	B	195/217 (90%)	193 (99%)	2 (1%)	68	64
1	C	205/217 (94%)	200 (98%)	5 (2%)	43	31
1	D	203/217 (94%)	198 (98%)	5 (2%)	42	30
1	E	204/217 (94%)	200 (98%)	4 (2%)	48	38
1	F	198/217 (91%)	196 (99%)	2 (1%)	68	64
All	All	1196/1302 (92%)	1175 (98%)	21 (2%)	53	43

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	135	GLN
1	A	159	VAL
1	A	162	ARG
1	B	77[A]	GLU
1	B	77[B]	GLU
1	C	123	LEU
1	C	150	VAL
1	C	161	ARG
1	C	174	ILE
1	C	182	THR
1	D	78	GLU
1	D	81	GLN
1	D	153	GLN
1	D	168	VAL
1	D	193	ARG
1	E	16	GLN
1	E	118	VAL
1	E	182	THR
1	E	200	VAL
1	F	131	ASN
1	F	249	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	245	ASN
1	C	131	ASN
1	D	173	GLN
1	E	153	GLN
1	F	135	GLN
1	F	203	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 12 are monoatomic - leaving 6 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	ADP	D	301	3	28,29,29	1.37	4 (14%)	43,45,45	2.02	11 (25%)
5	ADP	E	301	3	28,29,29	1.49	5 (17%)	43,45,45	1.95	13 (30%)
5	ADP	B	301	3	28,29,29	1.39	3 (10%)	43,45,45	1.96	12 (27%)
2	ANP	A	301	3	33,33,33	1.78	6 (18%)	45,52,52	0.95	3 (6%)
2	ANP	F	301	3	33,33,33	1.47	2 (6%)	45,52,52	1.71	4 (8%)
5	ADP	C	301	3	28,29,29	1.39	4 (14%)	43,45,45	1.97	12 (27%)

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	ADP	D	301	3	-	6/16/32/32	0/3/3/3
5	ADP	E	301	3	-	2/16/32/32	0/3/3/3
5	ADP	B	301	3	-	7/16/32/32	0/3/3/3
2	ANP	A	301	3	-	6/18/38/38	0/3/3/3
2	ANP	F	301	3	-	7/18/38/38	0/3/3/3
5	ADP	C	301	3	-	3/16/32/32	0/3/3/3

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	ANP	PG-O1G	8.03	1.58	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	301	ANP	PG-O1G	6.68	1.56	1.46
5	C	301	ADP	C5-C4	3.95	1.46	1.39
5	D	301	ADP	C5-C4	3.95	1.46	1.39
5	B	301	ADP	C5-C4	3.89	1.46	1.39
5	E	301	ADP	C5-C4	3.74	1.45	1.39
2	A	301	ANP	PB-O1B	3.57	1.51	1.46
5	E	301	ADP	PA-O3A	3.47	1.63	1.59
2	F	301	ANP	PB-O3A	3.21	1.63	1.59
5	E	301	ADP	C5-C6	3.18	1.49	1.41
5	D	301	ADP	C8-N7	3.15	1.37	1.31
5	B	301	ADP	C8-N7	2.95	1.37	1.31
5	B	301	ADP	C5-C6	2.84	1.48	1.41
5	E	301	ADP	C8-N7	2.72	1.36	1.31
5	C	301	ADP	C8-N7	2.68	1.36	1.31
5	D	301	ADP	C5-C6	2.59	1.48	1.41
2	A	301	ANP	PG-N3B	2.40	1.69	1.63
5	C	301	ADP	C4-N9	-2.38	1.32	1.37
2	A	301	ANP	PG-O2G	-2.37	1.50	1.56
2	A	301	ANP	PA-O3A	-2.34	1.57	1.59
5	C	301	ADP	C5-C6	2.32	1.47	1.41
2	A	301	ANP	PB-O2B	-2.31	1.50	1.56
5	D	301	ADP	C4-N9	-2.26	1.33	1.37
5	E	301	ADP	C5-N7	-2.05	1.35	1.39

All (55) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	301	ANP	O1G-PG-N3B	-9.57	97.67	111.77
5	C	301	ADP	C4-N9-C8	4.98	110.96	105.74
5	D	301	ADP	C4-N9-C8	4.79	110.77	105.74
5	B	301	ADP	N3-C2-N1	-4.78	121.35	128.58
5	B	301	ADP	C5-C4-N3	-4.62	120.36	126.72
5	E	301	ADP	C5-C4-N3	-4.60	120.39	126.72
5	D	301	ADP	C5-C4-N3	-4.53	120.48	126.72
5	E	301	ADP	N3-C2-N1	-4.47	121.82	128.58
5	C	301	ADP	N3-C2-N1	-4.46	121.83	128.58
5	D	301	ADP	N3-C2-N1	-4.46	121.84	128.58
5	B	301	ADP	C2-N3-C4	4.00	121.61	111.83
5	C	301	ADP	N3-C4-N9	3.93	133.86	127.17
5	E	301	ADP	C2-N3-C4	3.91	121.39	111.83
5	D	301	ADP	C2-N3-C4	3.89	121.34	111.83
5	D	301	ADP	N3-C4-N9	3.85	133.72	127.17

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	301	ADP	C5'-C4'-C3'	-3.84	101.39	115.21
5	C	301	ADP	C5-C4-N3	-3.68	121.65	126.72
5	E	301	ADP	N3-C4-N9	3.65	133.37	127.17
5	B	301	ADP	N3-C4-N9	3.64	133.35	127.17
5	D	301	ADP	N9-C8-N7	-3.58	108.86	113.94
2	A	301	ANP	O1B-PB-N3B	3.55	117.00	111.77
2	A	301	ANP	O1G-PG-N3B	-3.49	106.63	111.77
5	E	301	ADP	C4-N9-C8	3.42	109.33	105.74
5	E	301	ADP	C6-C5-N7	3.37	138.59	132.09
5	E	301	ADP	C4-C5-N7	-3.32	106.78	110.58
5	C	301	ADP	N9-C8-N7	-3.29	109.27	113.94
5	C	301	ADP	C2-N3-C4	3.19	119.62	111.83
5	B	301	ADP	C4-N9-C8	3.16	109.06	105.74
2	F	301	ANP	O2B-PB-O1B	3.16	116.66	109.87
5	D	301	ADP	C6-C5-N7	3.13	138.12	132.09
5	D	301	ADP	C4-C5-N7	-3.02	107.13	110.58
5	B	301	ADP	C6-C5-N7	2.82	137.53	132.09
5	E	301	ADP	N9-C8-N7	-2.82	109.94	113.94
5	B	301	ADP	C4-C5-N7	-2.78	107.41	110.58
5	C	301	ADP	C2-N1-C6	2.75	123.25	118.73
5	E	301	ADP	C5-N7-C8	2.72	107.72	103.45
5	C	301	ADP	C4-N9-C1'	-2.66	120.40	126.63
5	B	301	ADP	C2-N1-C6	2.66	123.10	118.73
5	D	301	ADP	C5'-C4'-C3'	-2.56	105.99	115.21
5	C	301	ADP	N6-C6-N1	2.55	124.06	118.38
5	D	301	ADP	C5-N7-C8	2.53	107.43	103.45
5	E	301	ADP	C2-N1-C6	2.51	122.85	118.73
5	C	301	ADP	C5'-C4'-C3'	-2.49	106.25	115.21
5	D	301	ADP	C4-N9-C1'	-2.34	121.15	126.63
5	B	301	ADP	N9-C8-N7	-2.34	110.62	113.94
2	A	301	ANP	O3G-PG-O1G	-2.23	107.86	113.45
5	E	301	ADP	C4-N9-C1'	-2.17	121.55	126.63
5	C	301	ADP	C5-C6-N6	-2.16	117.93	123.29
2	F	301	ANP	O2A-PA-O1A	2.15	122.46	112.44
5	E	301	ADP	O3B-PB-O2B	2.15	115.85	107.80
5	B	301	ADP	C4-N9-C1'	-2.15	121.61	126.63
5	C	301	ADP	C5-N7-C8	2.05	106.67	103.45
5	E	301	ADP	O3'-C3'-C4'	-2.03	105.26	111.08
2	F	301	ANP	O2G-PG-O3G	2.01	113.00	107.59
5	B	301	ADP	C5-N7-C8	2.01	106.61	103.45

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	ANP	PB-N3B-PG-O1G
2	A	301	ANP	PA-O3A-PB-O2B
2	A	301	ANP	C5'-O5'-PA-O1A
2	F	301	ANP	PB-N3B-PG-O1G
2	F	301	ANP	PG-N3B-PB-O1B
2	F	301	ANP	PA-O3A-PB-O2B
2	F	301	ANP	C5'-O5'-PA-O1A
2	F	301	ANP	C5'-O5'-PA-O3A
5	B	301	ADP	PA-O3A-PB-O2B
5	B	301	ADP	C5'-O5'-PA-O1A
5	B	301	ADP	C5'-O5'-PA-O3A
5	D	301	ADP	PA-O3A-PB-O2B
5	D	301	ADP	C5'-O5'-PA-O3A
5	D	301	ADP	C3'-C4'-C5'-O5'
5	D	301	ADP	O4'-C4'-C5'-O5'
5	B	301	ADP	O4'-C4'-C5'-O5'
5	B	301	ADP	C3'-C4'-C5'-O5'
2	A	301	ANP	C5'-O5'-PA-O2A
2	A	301	ANP	C5'-O5'-PA-O3A
2	F	301	ANP	C5'-O5'-PA-O2A
5	B	301	ADP	C5'-O5'-PA-O2A
5	D	301	ADP	C5'-O5'-PA-O1A
5	D	301	ADP	C5'-O5'-PA-O2A
5	C	301	ADP	PA-O3A-PB-O1B
5	E	301	ADP	PA-O3A-PB-O1B
5	B	301	ADP	PA-O3A-PB-O3B
5	C	301	ADP	PA-O3A-PB-O2B
5	C	301	ADP	PA-O3A-PB-O3B
5	E	301	ADP	PA-O3A-PB-O2B
2	A	301	ANP	PA-O3A-PB-O1B
2	F	301	ANP	PA-O3A-PB-O1B

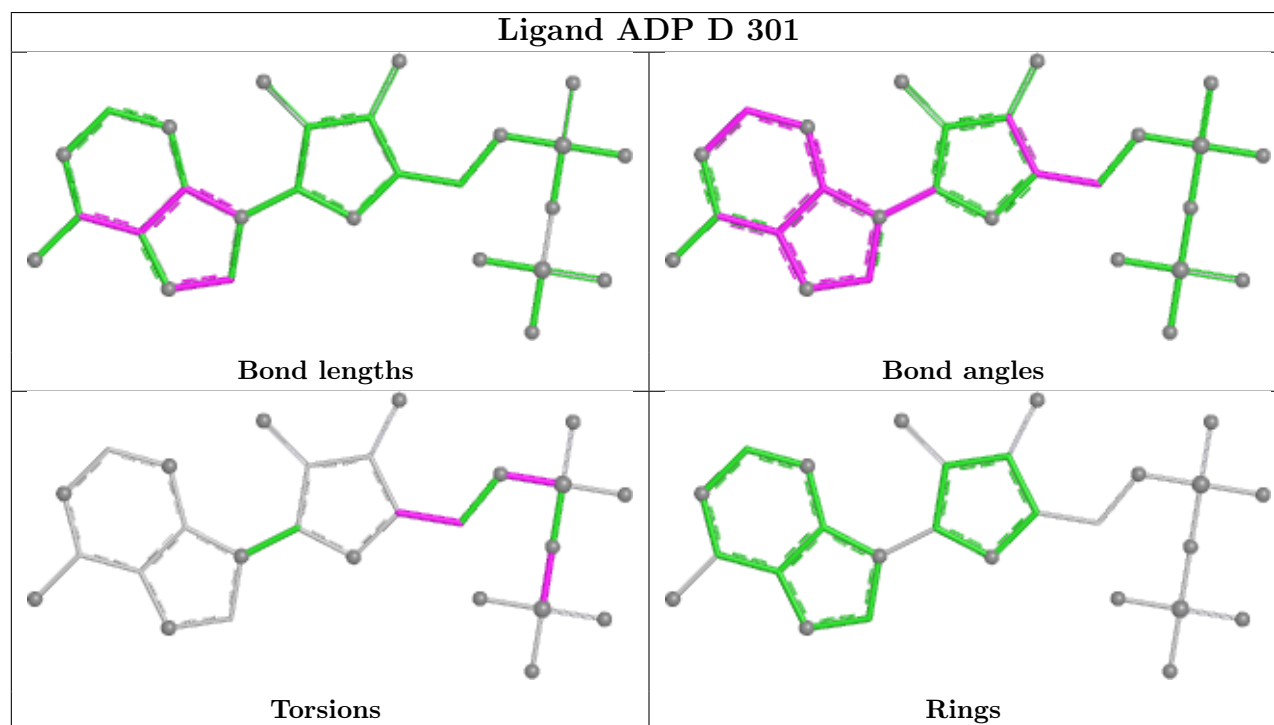
There are no ring outliers.

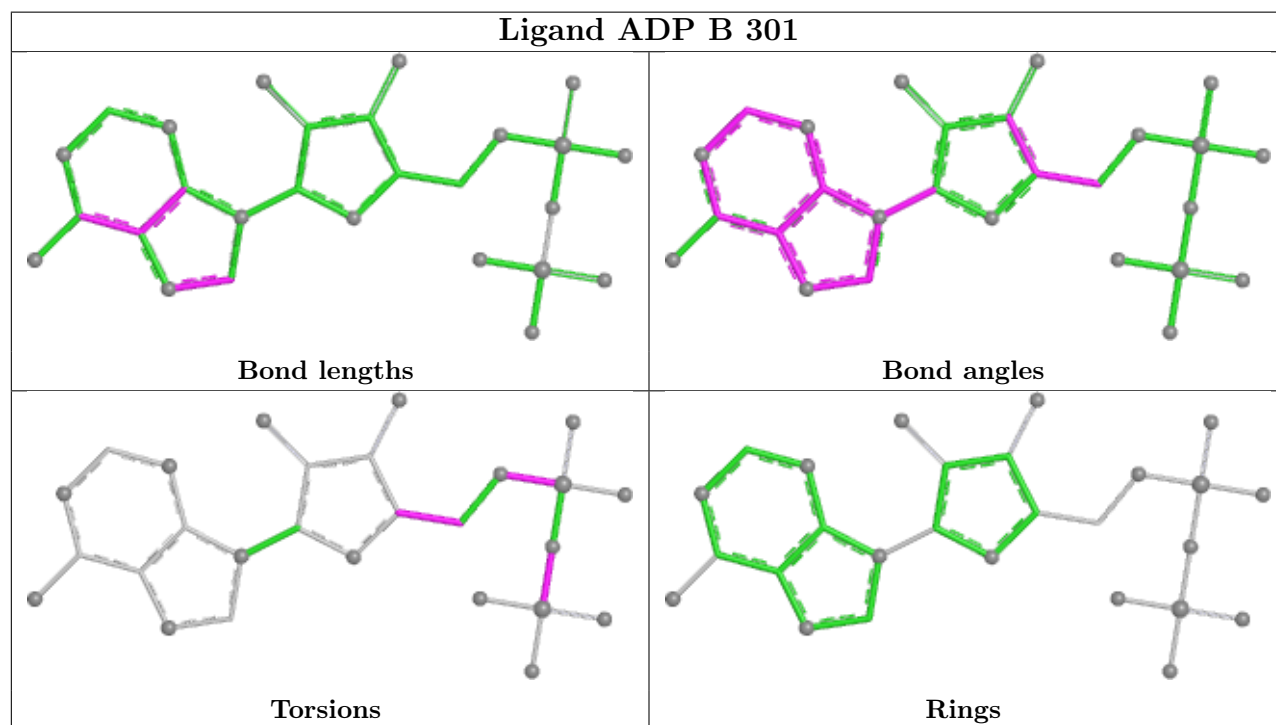
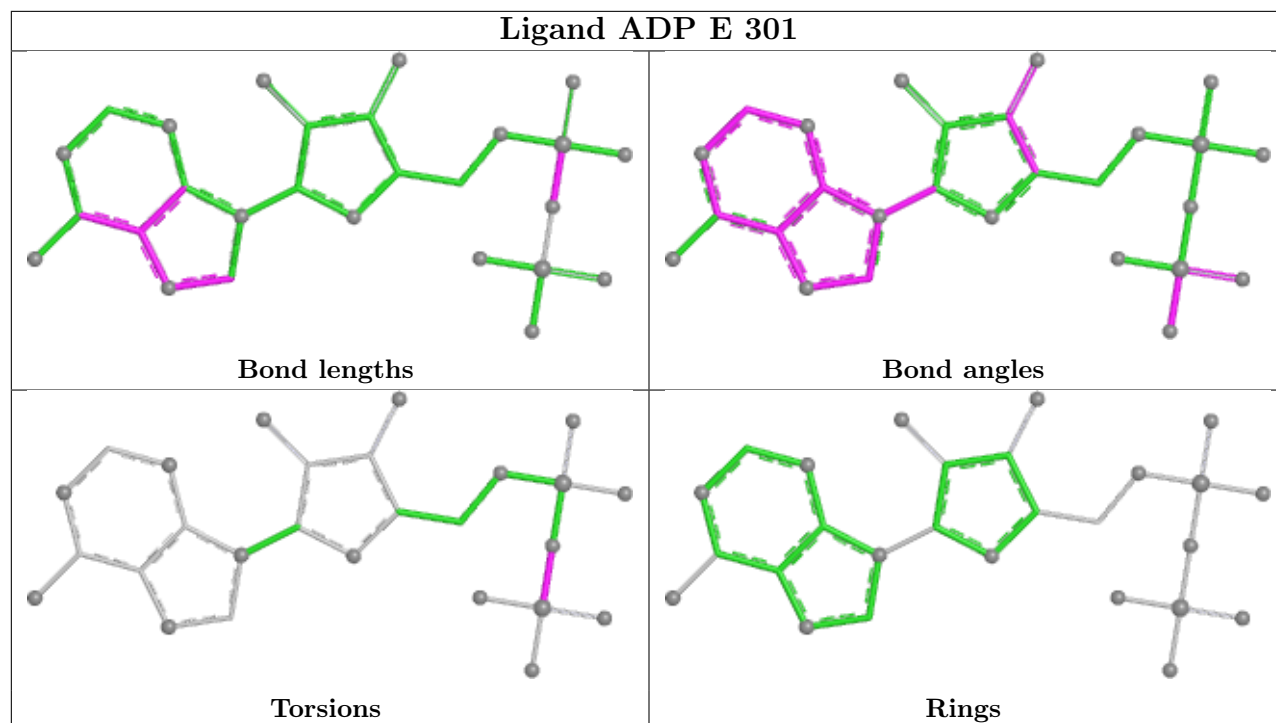
3 monomers are involved in 4 short contacts:

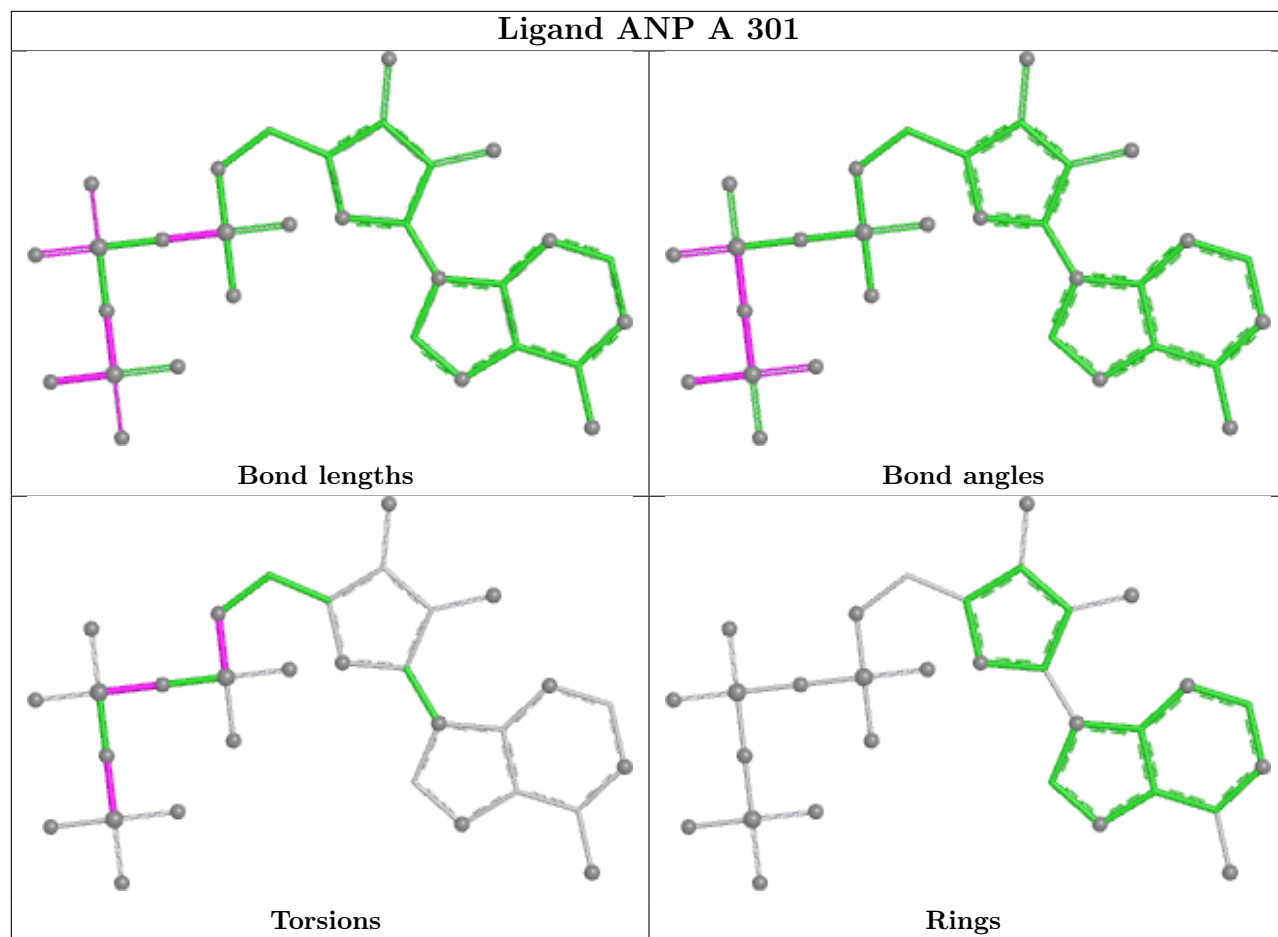
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	301	ADP	1	0
2	A	301	ANP	1	0
2	F	301	ANP	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

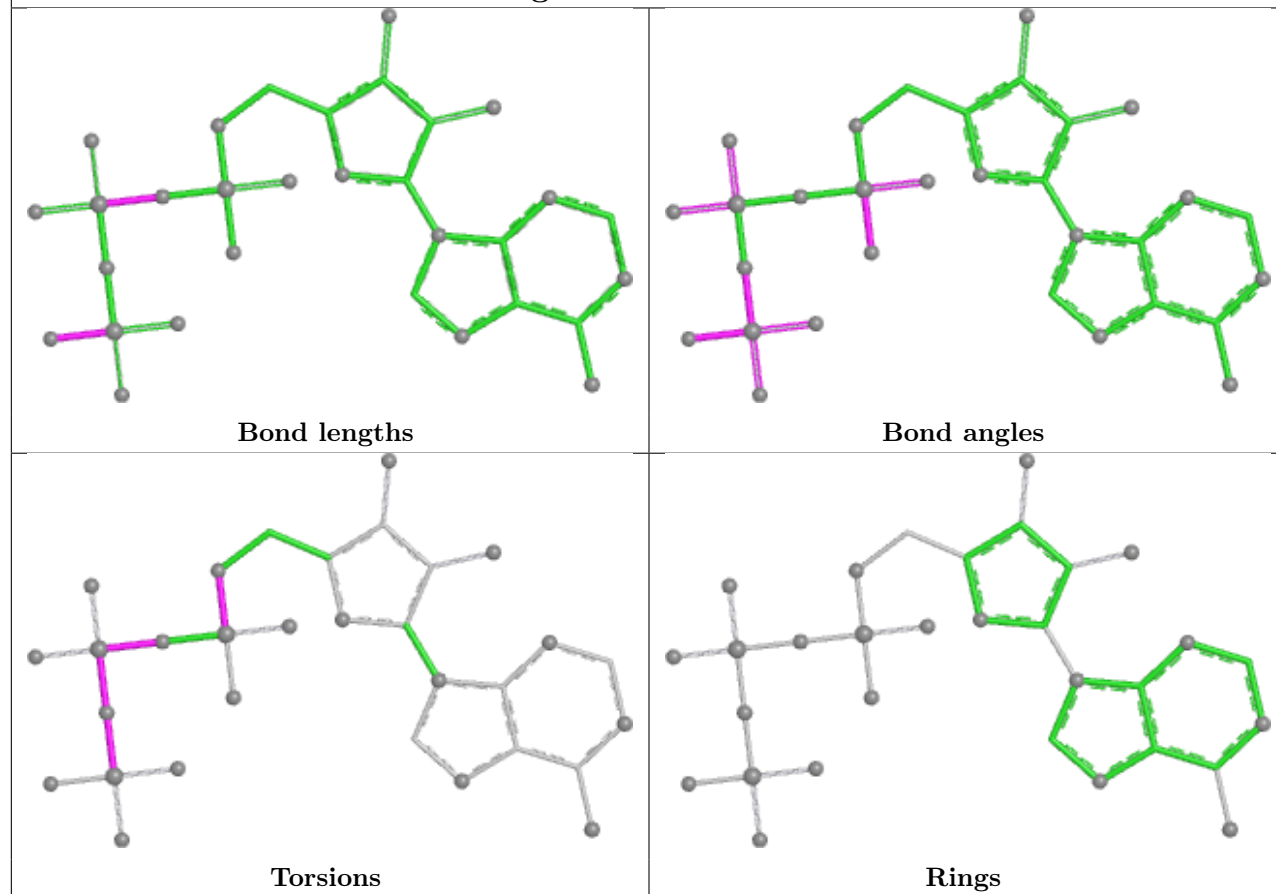
bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



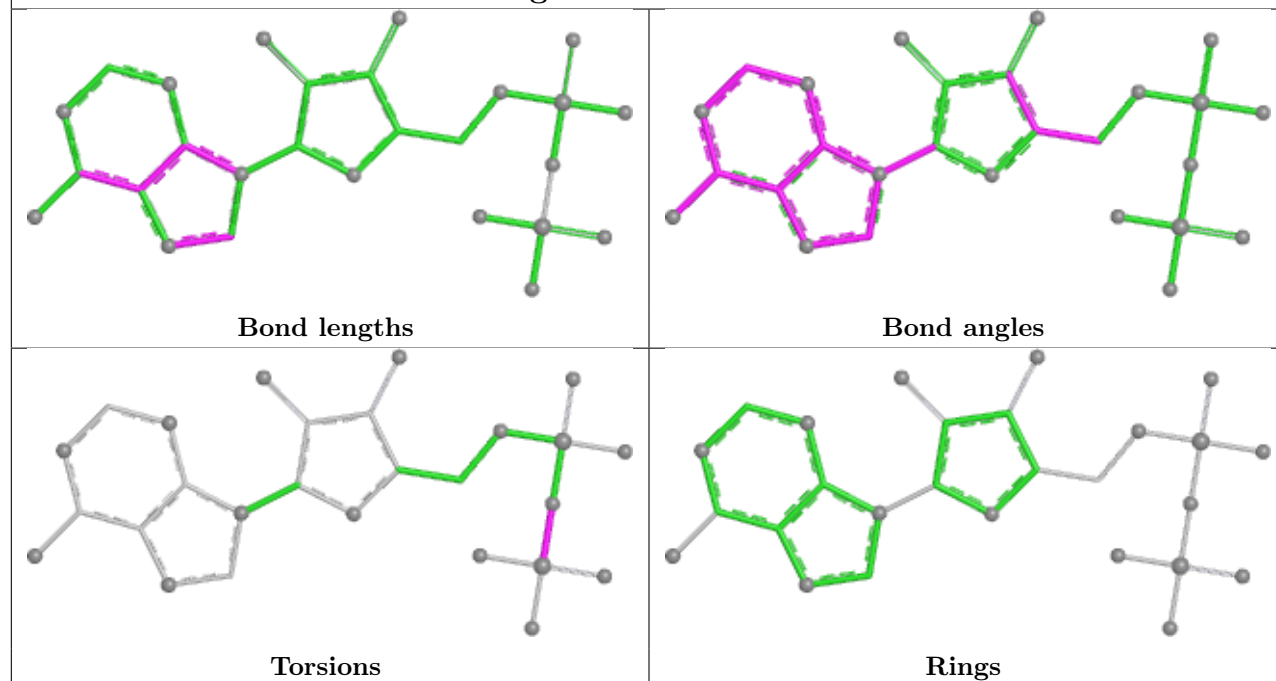




Ligand ANP F 301



Ligand ADP C 301



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	216/253 (85%)	0.62	25 (11%) 9 8	20, 43, 81, 128	5 (2%)
1	B	216/253 (85%)	0.29	14 (6%) 25 23	17, 36, 66, 106	9 (4%)
1	C	227/253 (89%)	0.46	24 (10%) 11 9	12, 37, 83, 115	8 (3%)
1	D	229/253 (90%)	0.10	6 (2%) 57 57	17, 33, 66, 101	5 (2%)
1	E	236/253 (93%)	0.27	16 (6%) 23 22	11, 33, 74, 122	3 (1%)
1	F	224/253 (88%)	0.04	6 (2%) 56 56	12, 33, 60, 100	4 (1%)
All	All	1348/1518 (88%)	0.29	91 (6%) 23 22	11, 36, 72, 128	34 (2%)

All (91) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	247	PHE	6.8
1	C	160	VAL	5.5
1	E	118	VAL	5.4
1	F	154	TYR	5.2
1	D	249	LEU	5.1
1	C	248	PRO	5.0
1	A	156	ALA	5.0
1	C	157	SER	5.0
1	E	132	TYR	4.9
1	E	120	GLY	4.8
1	E	160	VAL	4.8
1	A	123	LEU	4.4
1	A	18	ILE	4.4
1	E	199	PHE	4.4
1	C	165	PHE	4.3
1	E	121	PHE	4.2
1	B	248	PRO	4.2
1	E	117	VAL	4.1
1	C	154	TYR	4.1

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Mol	Chain	Res	Type	RSRZ
1	C	159	VAL	4.1
1	A	112	PRO	4.1
1	A	165	PHE	4.0
1	B	110	PRO	4.0
1	C	199	PHE	4.0
1	C	153	GLN	4.0
1	F	112	PRO	4.0
1	B	123	LEU	3.8
1	E	123	LEU	3.6
1	C	156	ALA	3.4
1	C	123	LEU	3.4
1	E	251	ALA	3.3
1	A	16	GLN	3.2
1	A	159	VAL	3.2
1	E	119	GLY	3.2
1	A	248	PRO	3.1
1	B	159	VAL	2.9
1	C	200	VAL	2.9
1	A	164	LEU	2.9
1	C	151	PHE	2.8
1	A	168	VAL	2.8
1	A	200	VAL	2.8
1	B	112	PRO	2.8
1	A	132	TYR	2.8
1	E	162	ARG	2.8
1	F	123	LEU	2.7
1	C	122	ASP	2.7
1	D	162	ARG	2.7
1	A	157	SER	2.7
1	B	122	ASP	2.7
1	A	146[A]	SER	2.6
1	C	158	SER	2.6
1	A	122	ASP	2.6
1	A	199	PHE	2.6
1	B	200	VAL	2.6
1	C	14	GLU	2.6
1	C	173	GLN	2.6
1	E	156	ALA	2.6
1	C	161	ARG	2.5
1	C	112	PRO	2.5
1	B	156	ALA	2.5
1	E	159	VAL	2.5

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Mol	Chain	Res	Type	RSRZ
1	D	154	TYR	2.5
1	F	17	ALA	2.5
1	A	194	TYR	2.4
1	A	242	HIS	2.4
1	A	158	SER	2.4
1	F	249	LEU	2.4
1	B	145[A]	ASP	2.4
1	A	195	GLY	2.4
1	B	146[A]	SER	2.4
1	B	194	TYR	2.4
1	B	77[A]	GLU	2.4
1	C	150	VAL	2.3
1	A	125	ALA	2.3
1	D	112	PRO	2.3
1	E	250	GLY	2.3
1	A	128	GLU	2.2
1	E	16	GLN	2.2
1	F	99	ASP	2.2
1	E	122	ASP	2.2
1	C	166	ARG	2.1
1	C	174	ILE	2.1
1	B	247	PHE	2.0
1	B	155	ASP	2.0
1	A	201	SER	2.0
1	A	127	ILE	2.0
1	C	15	HIS	2.0
1	D	151	PHE	2.0
1	D	199	PHE	2.0
1	A	138	ARG	2.0
1	C	162	ARG	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

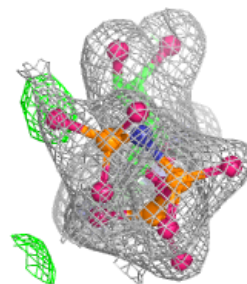
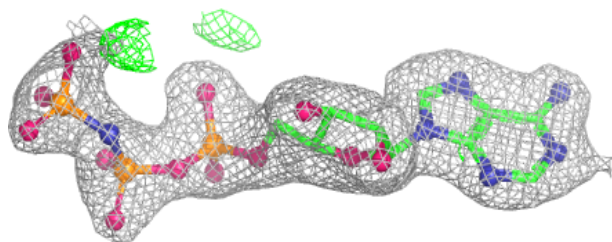
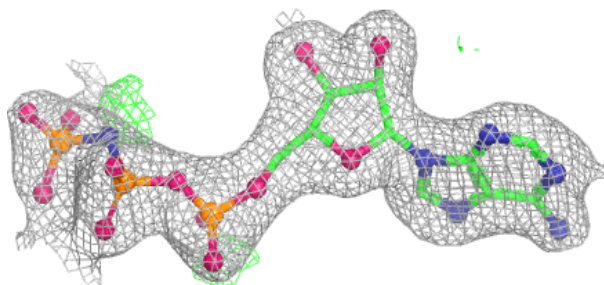
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	ANP	A	301	31/31	0.97	0.07	28,34,45,60	3
2	ANP	F	301	31/31	0.97	0.06	22,30,35,38	3
3	MG	A	302	1/1	0.98	0.09	48,48,48,48	0
3	MG	B	302	1/1	0.98	0.08	35,35,35,35	0
4	CL	B	303	1/1	0.98	0.08	33,33,33,33	0
5	ADP	B	301	27/27	0.98	0.06	26,29,33,38	0
5	ADP	D	301	27/27	0.98	0.05	22,26,30,38	0
5	ADP	E	301	27/27	0.98	0.05	20,25,30,36	0
4	CL	A	303	1/1	0.99	0.03	34,34,34,34	0
3	MG	C	302	1/1	0.99	0.03	31,31,31,31	0
4	CL	C	303	1/1	0.99	0.03	30,30,30,30	0
4	CL	D	303	1/1	0.99	0.03	27,27,27,27	0
4	CL	E	303	1/1	0.99	0.04	30,30,30,30	0
4	CL	F	303	1/1	0.99	0.04	29,29,29,29	0
3	MG	D	302	1/1	0.99	0.02	29,29,29,29	0
5	ADP	C	301	27/27	0.99	0.04	22,27,31,33	0
3	MG	E	302	1/1	0.99	0.01	27,27,27,27	0
3	MG	F	302	1/1	0.99	0.05	31,31,31,31	0

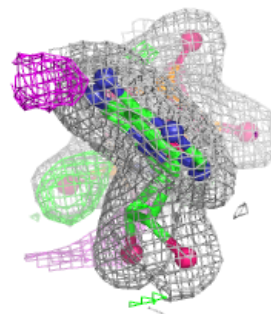
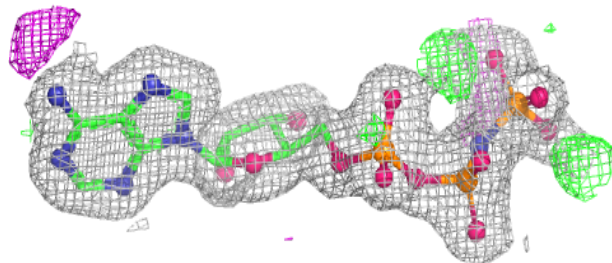
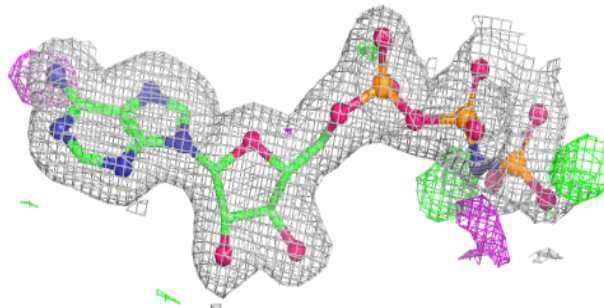
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ANP A 301:

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

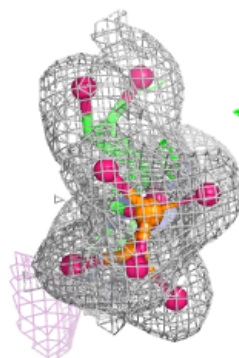
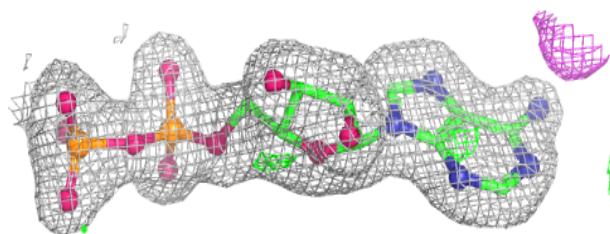
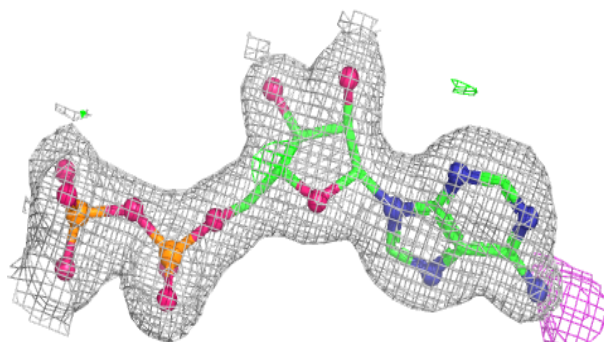
**Electron density around ANP F 301:**

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

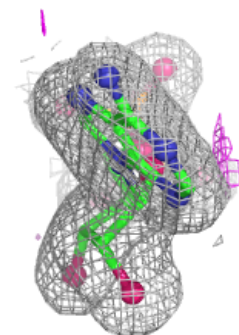
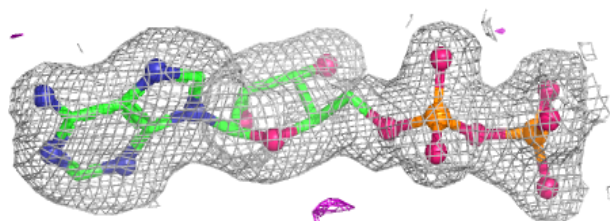
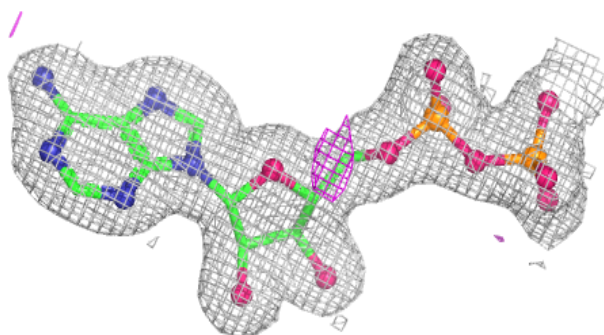


Electron density around ADP B 301:

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

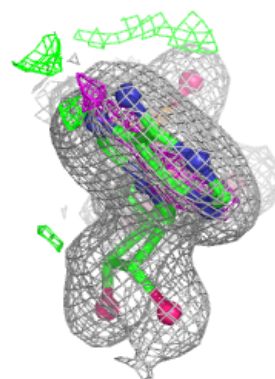
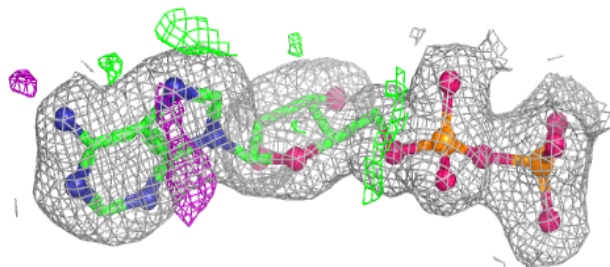
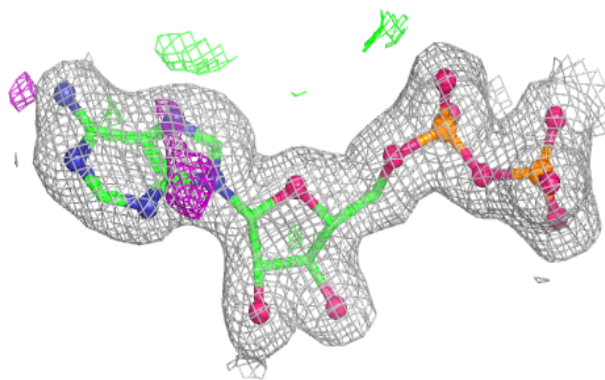
**Electron density around ADP D 301:**

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

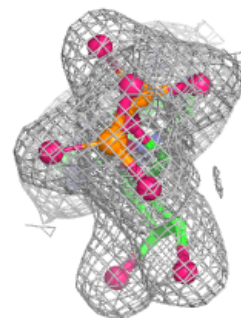
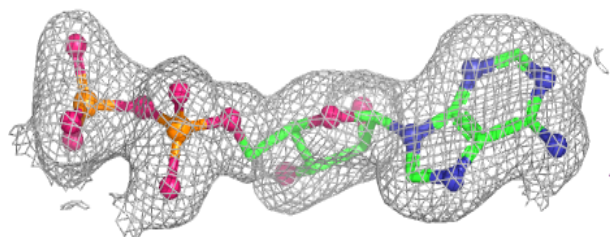
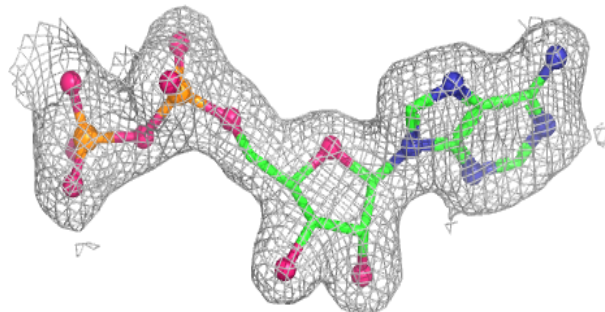


Electron density around ADP E 301:

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

**Electron density around ADP C 301:**

$2mF_o-DF_c$ (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.