



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 14, 2020 – 10:11 am BST

PDB ID : 2CCH  
Title : The crystal structure of CDK2 cyclin A in complex with a substrate peptide derived from CDC modified with a gamma-linked ATP analogue  
Authors : Cheng, K.Y.; Noble, M.E.M.; Skamnaki, V.; Brown, N.R.; Lowe, E.D.; Kontogiannis, L.; Shen, K.; Cole, P.A.; Siligardi, G.; Johnson, L.N.  
Deposited on : 2006-01-16  
Resolution : 1.70 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
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) : 2.11

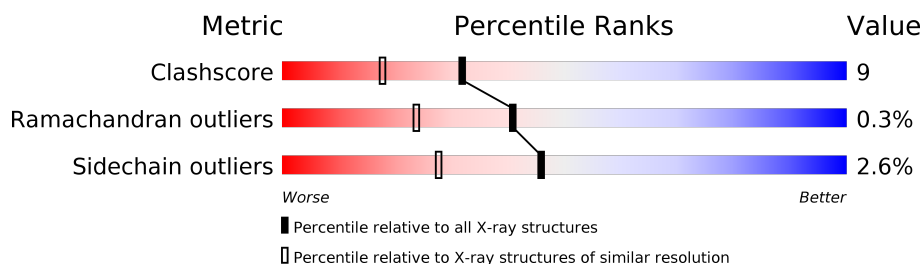
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)

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

Mol	Chain	Length	Quality of chain
1	A	299	
1	C	299	
2	B	260	
2	D	260	
3	E	12	
3	F	12	

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 10526 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 CELL DIVISION PROTEIN KINASE 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	297	Total	C	N	O	P	S	0	9	0
			2460	1592	415	443	1	9			
1	C	297	Total	C	N	O	P	S	0	3	0
			2408	1560	407	431	1	9			

- Molecule 2 is a protein called CYCLIN A2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	260	Total	C	N	O	S		0	11	0
			2180	1407	354	405	14				
2	D	256	Total	C	N	O	S		0	3	0
			2088	1351	340	384	13				

- Molecule 3 is a protein called CELL DIVISION CONTROL PROTEIN 6 HOMOLOG.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	E	12	Total	C	N	O	0	0	0
			102	64	22	16			
3	F	12	Total	C	N	O	0	0	0
			102	64	22	16			

- Molecule 4 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula:  $C_{10}H_{16}N_5O_{13}P_3$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total 62	C 20	N 10	O 26	P 6	0	1
4	C	1	Total 62	C 20	N 10	O 26	P 6	0	1

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

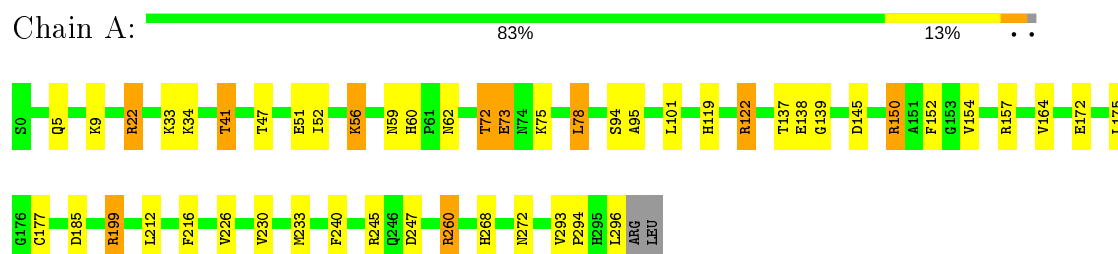
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	390	Total	O	0	0
			390	390		
7	B	327	Total	O	0	0
			327	327		
7	C	144	Total	O	0	0
			144	144		
7	D	160	Total	O	0	0
			160	160		
7	E	17	Total	O	0	0
			17	17		
7	F	7	Total	O	0	0
			7	7		

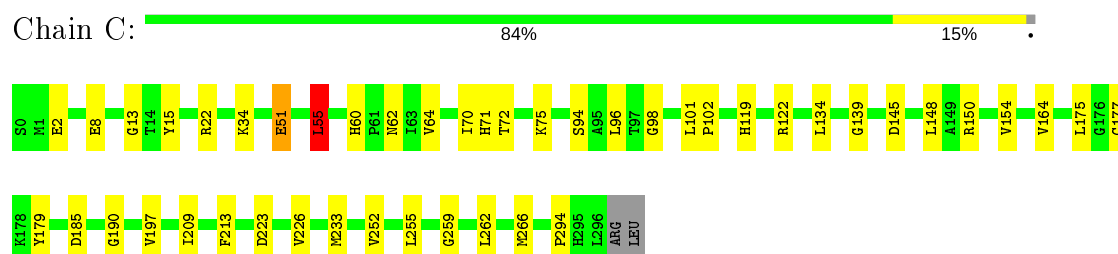
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

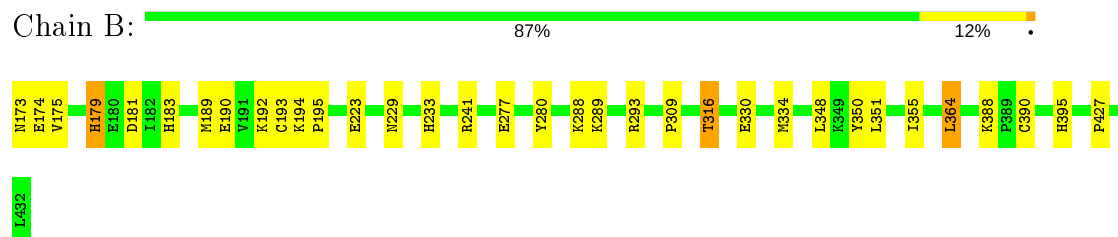
#### • Molecule 1: CELL DIVISION PROTEIN KINASE 2



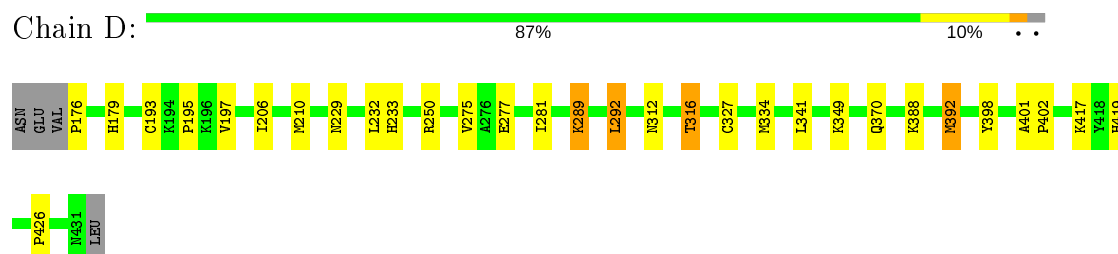
#### • Molecule 1: CELL DIVISION PROTEIN KINASE 2



#### • Molecule 2: CYCLIN A2



#### • Molecule 2: CYCLIN A2



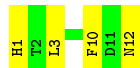
- Molecule 3: CELL DIVISION CONTROL PROTEIN 6 HOMOLOG

Chain E:  92% 8%



- Molecule 3: CELL DIVISION CONTROL PROTEIN 6 HOMOLOG

Chain F:  67% 33%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	74.53Å 114.48Å 181.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	96.67 – 1.70 57.57 – 1.70	Depositor EDS
% Data completeness (in resolution range)	98.2 (96.67-1.70) 98.0 (57.57-1.70)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.06 (at 1.70Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, $R_{free}$	0.148 , 0.182 0.204 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	23.1	Xtriage
Anisotropy	0.102	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 52.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	10526	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.62% of the height of the origin peak. No significant pseudotranslation is detected.*

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

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



## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: TPO, GOL, SO4, ATP

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	0.94	6/2511 (0.2%)	1.12	14/3407 (0.4%)
1	C	0.70	3/2458 (0.1%)	0.72	1/3335 (0.0%)
2	B	0.85	1/2230 (0.0%)	0.82	4/3027 (0.1%)
2	D	0.66	0/2138	0.69	0/2902
3	E	0.85	0/103	0.79	0/136
3	F	0.69	0/103	0.80	0/136
All	All	0.80	10/9543 (0.1%)	0.86	19/12943 (0.1%)

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	C	0	1
2	B	1	0
All	All	1	1

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	245	ARG	CZ-NH1	7.63	1.43	1.33
1	C	51	GLU	CD-OE2	-7.39	1.17	1.25
2	B	316	THR	CB-CG2	-6.40	1.31	1.52
1	A	150	ARG	CB-CG	-5.95	1.36	1.52
1	C	2	GLU	CG-CD	5.84	1.60	1.51
1	A	157	ARG	CB-CG	-5.65	1.37	1.52
1	C	8	GLU	CB-CG	-5.54	1.41	1.52
1	A	260	ARG	CG-CD	5.31	1.65	1.51
1	A	51	GLU	CD-OE2	-5.19	1.20	1.25
1	A	260	ARG	CB-CG	-5.07	1.38	1.52

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	199	ARG	NE-CZ-NH2	-21.27	109.66	120.30
1	A	260	ARG	NE-CZ-NH2	-20.14	110.23	120.30
1	A	199	ARG	NE-CZ-NH1	16.23	128.41	120.30
1	A	260	ARG	NE-CZ-NH1	15.46	128.03	120.30
1	A	245	ARG	NE-CZ-NH2	-8.46	116.07	120.30
2	B	241	ARG	NE-CZ-NH2	-8.05	116.28	120.30
1	A	22	ARG	NE-CZ-NH1	7.75	124.18	120.30
1	A	22	ARG	NE-CZ-NH2	-6.66	116.97	120.30
1	A	199	ARG	CG-CD-NE	-6.65	97.83	111.80
2	B	364	LEU	CB-CG-CD1	6.45	121.97	111.00
1	A	199	ARG	CD-NE-CZ	6.24	132.34	123.60
2	B	241	ARG	NE-CZ-NH1	5.84	123.22	120.30
1	C	55	LEU	CB-CG-CD1	5.77	120.81	111.00
1	A	78	LEU	CB-CG-CD2	5.67	120.64	111.00
1	A	247	ASP	CB-CG-OD2	-5.67	113.20	118.30
2	B	181	ASP	CB-CG-OD2	-5.61	113.25	118.30
1	A	150	ARG	CA-CB-CG	5.48	125.45	113.40
1	A	150	ARG	CG-CD-NE	5.28	122.89	111.80
1	A	240	PHE	CB-CG-CD1	5.20	124.44	120.80

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	B	316	THR	CB

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	71	HIS	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	2460	0	2484	57	0
1	C	2408	0	2441	35	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	2180	0	2189	33	0
2	D	2088	0	2106	46	0
3	E	102	0	108	1	0
3	F	102	0	108	7	0
4	A	62	0	24	7	0
4	C	62	0	24	4	0
5	A	5	0	0	1	0
6	A	12	0	15	0	0
7	A	390	0	0	23	1
7	B	327	0	0	12	0
7	C	144	0	0	5	0
7	D	160	0	0	12	0
7	E	17	0	0	0	0
7	F	7	0	0	0	0
All	All	10526	0	9499	170	1

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 9.

All (170) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:177[A]:CYS:HB3	7:A:2213:HOH:O	1.35	1.25
1:C:64:VAL:HB	7:C:2065:HOH:O	1.43	1.16
1:A:177[B]:CYS:HB2	7:A:2213:HOH:O	1.54	1.07
1:A:175:LEU:HD13	1:A:233:MET:CE	1.93	0.99
2:D:334:MET:HG2	7:D:2105:HOH:O	1.61	0.99
1:A:101:LEU:HB3	7:A:2143:HOH:O	1.62	0.98
1:A:94:SER:O	1:A:199:ARG:HD3	1.66	0.95
1:A:230:VAL:HG23	1:A:233:MET:HE1	1.53	0.91
2:D:334:MET:HE3	7:D:2105:HOH:O	1.71	0.90
1:C:145[B]:ASP:OD2	4:C:1297[B]:ATP:C5'	2.19	0.89
1:A:101:LEU:HD12	7:A:2039:HOH:O	1.72	0.89
1:C:190:GLY:HA2	1:C:266:MET:HE3	1.58	0.86
1:A:175:LEU:HD13	1:A:233:MET:HE3	1.58	0.84
1:C:154:VAL:O	2:D:316:THR:HG23	1.77	0.84
1:A:60:HIS:HD2	1:A:62:ASN:H	1.26	0.82
1:A:154:VAL:O	2:B:316:THR:HG23	1.80	0.81
5:A:1298:SO4:O3	7:A:2386:HOH:O	1.98	0.80
1:A:101:LEU:HB3	7:A:2041:HOH:O	1.82	0.79
2:B:193[B]:CYS:HB3	7:B:2130:HOH:O	1.80	0.79

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:316:THR:HG21	7:B:2025:HOH:O	1.83	0.78
1:C:190:GLY:HA2	1:C:266:MET:CE	2.14	0.77
2:D:316:THR:HG21	7:D:2008:HOH:O	1.82	0.77
1:A:175:LEU:HD13	1:A:233:MET:HE1	1.66	0.76
2:B:195:PRO:HD3	7:B:2127:HOH:O	1.85	0.76
1:A:172:GLU:O	1:A:177[B]:CYS:SG	2.43	0.75
2:D:197:VAL:N	7:D:2021:HOH:O	2.19	0.74
1:A:60:HIS:CD2	1:A:62:ASN:H	2.06	0.74
1:A:59:ASN:ND2	7:A:2076:HOH:O	2.20	0.73
1:A:230:VAL:HG23	1:A:233:MET:CE	2.17	0.73
2:B:350:TYR:HB2	2:B:355[B]:ILE:HD11	1.73	0.70
2:D:229:ASN:HD22	2:D:334:MET:CE	2.04	0.70
1:A:22:ARG:HD3	7:A:2007:HOH:O	1.92	0.69
1:C:154:VAL:O	2:D:316:THR:CG2	2.39	0.69
2:D:210:MET:CE	2:D:250:ARG:HB2	2.23	0.69
1:C:64:VAL:HG21	1:C:134:LEU:HD12	1.74	0.68
2:B:229:ASN:HD22	2:B:334[A]:MET:CE	2.06	0.68
2:D:232:LEU:C	2:D:232:LEU:HD13	2.14	0.68
1:A:175:LEU:CD1	1:A:233:MET:CE	2.72	0.68
4:A:1297[B]:ATP:H3'	7:A:2379:HOH:O	1.93	0.68
1:C:60:HIS:HD2	1:C:62:ASN:H	1.41	0.67
1:C:190:GLY:CA	1:C:266:MET:HE3	2.24	0.67
1:A:94:SER:O	1:A:199:ARG:CD	2.41	0.66
2:D:210:MET:CE	3:F:10:PHE:HB3	2.25	0.66
2:D:229:ASN:HD22	2:D:334:MET:HE1	1.61	0.64
1:C:51:GLU:OE2	7:C:2052:HOH:O	2.15	0.64
1:A:41:THR:HG22	2:B:288:LYS:HE2	1.80	0.63
1:A:95:ALA:HA	1:A:199:ARG:HD2	1.80	0.63
1:A:268:HIS:ND1	7:A:2338:HOH:O	2.31	0.63
1:C:60:HIS:CD2	1:C:62:ASN:H	2.18	0.62
2:B:229:ASN:HD22	2:B:334[A]:MET:HE2	1.65	0.62
4:A:1297[B]:ATP:O1G	7:A:2380:HOH:O	2.16	0.61
1:A:119:HIS:HD2	7:B:2062:HOH:O	1.82	0.60
1:A:272[B]:ASN:OD1	2:B:175:VAL:HB	2.00	0.60
1:A:175:LEU:CD1	1:A:233:MET:HE1	2.30	0.60
1:A:101:LEU:HD13	7:A:2041:HOH:O	2.02	0.59
2:B:355[B]:ILE:HD13	2:B:390:CYS:SG	2.43	0.59
2:D:210:MET:HE1	2:D:250:ARG:CB	2.33	0.59
1:C:145[B]:ASP:OD2	4:C:1297[B]:ATP:O5'	2.21	0.59
1:C:34:LYS:HE2	1:C:75:LYS:HD3	1.83	0.59
2:D:388:LYS:O	2:D:392:MET:HG2	2.03	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:175:LEU:CD1	1:A:233:MET:HE3	2.30	0.59
1:C:145[B]:ASP:OD2	4:C:1297[B]:ATP:H5'1	2.02	0.58
1:A:33:LYS:NZ	7:A:2037:HOH:O	2.36	0.58
2:D:210:MET:CE	2:D:250:ARG:CB	2.82	0.58
1:A:101:LEU:CB	7:A:2041:HOH:O	2.44	0.57
2:B:395:HIS:HE1	2:B:427:PRO:O	1.87	0.57
2:B:193[B]:CYS:SG	2:B:309:PRO:HD2	2.45	0.57
2:D:232:LEU:CD1	2:D:341:LEU:HD13	2.34	0.57
2:D:232:LEU:HD11	2:D:341:LEU:HD13	1.86	0.57
2:B:189:MET:O	2:B:193[B]:CYS:SG	2.64	0.56
1:C:70:ILE:HG22	1:C:72:THR:OG1	2.06	0.56
1:A:145[B]:ASP:CG	4:A:1297[B]:ATP:O2B	2.45	0.55
2:B:183:HIS:HD2	7:B:2072:HOH:O	1.88	0.55
1:C:22:ARG:HD3	7:C:2030:HOH:O	2.06	0.55
2:D:277:GLU:OE1	3:F:1:HIS:HE1	1.89	0.55
1:A:34:LYS:HZ1	1:A:75:LYS:HE3	1.71	0.55
1:C:139:GLY:HA2	1:C:294:PRO:HD3	1.88	0.54
4:A:1297[B]:ATP:C3'	7:A:2379:HOH:O	2.51	0.54
2:D:210:MET:HE3	2:D:250:ARG:HB2	1.90	0.54
2:D:289:LYS:HE2	7:D:2080:HOH:O	2.08	0.54
2:D:210:MET:HE3	3:F:10:PHE:HB3	1.89	0.54
1:A:230:VAL:O	1:A:233:MET:HE2	2.08	0.53
1:C:119:HIS:HD2	7:C:2136:HOH:O	1.90	0.53
1:A:212[B]:LEU:HG	1:A:216:PHE:CZ	2.45	0.53
1:A:145[B]:ASP:OD2	4:A:1297[B]:ATP:O3B	2.27	0.52
2:D:289:LYS:HD3	7:D:2084:HOH:O	2.10	0.52
2:B:277:GLU:OE1	3:E:1:HIS:HE1	1.91	0.52
1:C:197:VAL:HG11	1:C:252:VAL:CG1	2.40	0.52
1:A:73:GLU:N	7:A:2102:HOH:O	2.42	0.52
2:D:210:MET:HE2	3:F:10:PHE:HB3	1.92	0.52
2:B:229:ASN:HD22	2:B:334[B]:MET:CE	2.23	0.51
2:D:176:PRO:HA	2:D:179:HIS:CG	2.47	0.50
2:B:233:HIS:HE1	7:B:2220:HOH:O	1.93	0.50
2:B:233:HIS:HD2	7:B:2193:HOH:O	1.94	0.50
1:C:223:ASP:OD1	1:C:226:VAL:HG12	2.11	0.50
1:C:252:VAL:HG12	1:C:255:LEU:HB2	1.94	0.50
1:A:119:HIS:HE1	1:A:185:ASP:OD2	1.94	0.49
2:B:229:ASN:HD22	2:B:334[A]:MET:HE1	1.75	0.49
1:A:52:ILE:O	1:A:56:LYS:HG3	2.11	0.49
1:C:177[B]:CYS:SG	1:C:179:TYR:O	2.67	0.49
2:D:232:LEU:CD1	2:D:341:LEU:CD1	2.90	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:101:LEU:HG	7:A:2142:HOH:O	2.13	0.49
1:C:94:SER:O	1:C:98:GLY:N	2.44	0.49
2:B:190:GLU:HA	2:B:193[B]:CYS:SG	2.53	0.49
2:B:223:GLU:OE1	7:B:2108:HOH:O	2.20	0.49
1:C:175:LEU:HB3	1:C:233:MET:HE3	1.95	0.48
2:B:194:LYS:HE2	2:B:351:LEU:HD23	1.94	0.48
2:B:289:LYS:HE2	2:B:293:ARG:CZ	2.43	0.48
1:A:145[B]:ASP:OD2	4:A:1297[B]:ATP:PB	2.72	0.48
1:A:47[B]:THR:HG23	7:A:2054:HOH:O	2.13	0.48
1:C:145[B]:ASP:OD2	4:C:1297[B]:ATP:H5'2	2.09	0.48
1:C:175:LEU:HD13	1:C:233:MET:CE	2.43	0.48
2:B:192:LYS:O	7:B:2080:HOH:O	2.20	0.47
2:D:327[B]:CYS:HB3	2:D:419:HIS:CE1	2.49	0.47
1:A:101:LEU:CD1	7:A:2039:HOH:O	2.46	0.47
1:A:139:GLY:HA2	1:A:294:PRO:HD3	1.96	0.47
1:A:175:LEU:HB3	1:A:233:MET:HE3	1.97	0.47
1:A:101:LEU:CD1	7:A:2041:HOH:O	2.61	0.47
2:B:174:GLU:OE2	2:B:179:HIS:HE1	1.97	0.47
1:A:145[B]:ASP:OD1	4:A:1297[B]:ATP:O2B	2.31	0.47
2:B:229:ASN:HD22	2:B:334[B]:MET:HE3	1.80	0.47
1:A:34:LYS:HE2	1:A:75:LYS:HD3	1.97	0.47
2:D:193[B]:CYS:SG	2:D:193[B]:CYS:O	2.73	0.46
2:D:232:LEU:HD11	2:D:341:LEU:CD1	2.45	0.46
2:D:233:HIS:HE1	7:D:2115:HOH:O	1.98	0.46
1:A:47[B]:THR:HG22	7:A:2052:HOH:O	2.15	0.46
2:D:210:MET:HE2	3:F:10:PHE:CG	2.51	0.46
2:B:330:GLU:O	2:B:334[A]:MET:HG3	2.15	0.45
2:B:174:GLU:OE2	2:B:179:HIS:CE1	2.69	0.45
1:C:175:LEU:HD13	1:C:233:MET:HE1	1.98	0.45
1:C:262:LEU:O	1:C:266:MET:HG3	2.17	0.45
1:A:137:THR:HG22	1:A:296:LEU:HD12	1.99	0.45
1:A:34:LYS:HZ3	1:A:75:LYS:HG2	1.83	0.44
2:D:232:LEU:HD13	2:D:232:LEU:O	2.16	0.44
1:A:5:GLN:HG2	7:A:2007:HOH:O	2.16	0.44
1:C:13:GLY:N	1:C:15:TYR:CE2	2.86	0.44
1:C:209:ILE:HD11	1:C:213:PHE:CE1	2.52	0.44
2:D:176:PRO:HA	2:D:179:HIS:ND1	2.33	0.44
2:D:233:HIS:HD2	7:D:2102:HOH:O	2.00	0.44
2:D:275:VAL:HG21	2:D:292:LEU:HD11	1.99	0.44
1:A:137:THR:HA	1:A:296:LEU:HD11	2.00	0.43
1:A:22:ARG:HH11	1:A:22:ARG:HG3	1.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:281:ILE:HD11	3:F:3:LEU:HD23	2.00	0.43
1:C:255:LEU:HG	1:C:259:GLY:HA3	2.00	0.43
2:D:195:PRO:HD3	7:D:2049:HOH:O	2.18	0.43
2:D:210:MET:HE1	2:D:250:ARG:HB3	2.01	0.43
2:D:334:MET:CE	7:D:2105:HOH:O	2.47	0.43
1:C:51:GLU:O	1:C:55:LEU:HB2	2.19	0.42
2:D:289:LYS:NZ	7:D:2080:HOH:O	2.52	0.42
1:A:137:THR:HG22	1:A:296:LEU:CD1	2.50	0.42
2:B:388:LYS:NZ	7:B:2273:HOH:O	2.53	0.42
1:C:145[B]:ASP:OD1	7:C:2094:HOH:O	2.22	0.42
1:A:72:THR:O	1:A:73:GLU:HB2	2.20	0.42
2:B:183:HIS:HE1	7:B:2201:HOH:O	2.03	0.41
2:D:206:ILE:HG22	2:D:210:MET:HE1	2.03	0.41
1:A:230:VAL:CG2	1:A:233:MET:CE	2.93	0.41
2:D:206:ILE:HA	2:D:210:MET:SD	2.60	0.41
2:D:401:ALA:N	2:D:402:PRO:CD	2.84	0.41
2:D:349:LYS:NZ	7:D:2126:HOH:O	2.54	0.41
2:B:280:TYR:C	2:B:280:TYR:CD2	2.94	0.41
2:B:194:LYS:HE2	2:B:351:LEU:HA	2.03	0.41
2:D:232:LEU:C	2:D:232:LEU:CD1	2.85	0.41
1:A:138:GLU:HG3	7:A:2162:HOH:O	2.20	0.41
2:B:334[B]:MET:HE3	7:B:2220:HOH:O	2.19	0.41
1:A:122:ARG:HA	1:A:152:PHE:CE1	2.56	0.40
2:D:312:ASN:O	2:D:316:THR:HB	2.21	0.40
1:C:101:LEU:N	1:C:102:PRO:CD	2.84	0.40
1:C:119:HIS:HE1	1:C:185:ASP:OD2	2.04	0.40
2:D:210:MET:HE2	3:F:10:PHE:CB	2.51	0.40
2:D:398:TYR:CD2	2:D:426:PRO:HB3	2.56	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:A:2235:HOH:O	7:A:2386:HOH:O[4_555]	1.99	0.21

## 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	304/299 (102%)	297 (98%)	5 (2%)	2 (1%)	22	8
1	C	297/299 (99%)	287 (97%)	9 (3%)	1 (0%)	41	24
2	B	269/260 (104%)	267 (99%)	2 (1%)	0	100	100
2	D	257/260 (99%)	255 (99%)	2 (1%)	0	100	100
3	E	10/12 (83%)	10 (100%)	0	0	100	100
3	F	10/12 (83%)	9 (90%)	1 (10%)	0	100	100
All	All	1147/1142 (100%)	1125 (98%)	19 (2%)	3 (0%)	41	24

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	73	GLU
1	A	164	VAL
1	C	164	VAL

### 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	271/263 (103%)	261 (96%)	10 (4%)	34	15
1	C	264/263 (100%)	259 (98%)	5 (2%)	57	41
2	B	245/234 (105%)	240 (98%)	5 (2%)	55	38
2	D	233/234 (100%)	227 (97%)	6 (3%)	46	28

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	E	11/11 (100%)	11 (100%)	0	100	100
3	F	11/11 (100%)	10 (91%)	1 (9%)	9	2
All	All	1035/1016 (102%)	1008 (97%)	27 (3%)	46	28

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	LYS
1	A	41	THR
1	A	56	LYS
1	A	72	THR
1	A	78	LEU
1	A	122	ARG
1	A	150	ARG
1	A	226	VAL
1	A	260	ARG
1	A	293	VAL
2	B	173	ASN
2	B	179	HIS
2	B	348[A]	LEU
2	B	348[B]	LEU
2	B	364	LEU
1	C	55	LEU
1	C	96	LEU
1	C	122	ARG
1	C	148	LEU
1	C	150	ARG
2	D	289	LYS
2	D	292	LEU
2	D	316	THR
2	D	370	GLN
2	D	392	MET
2	D	417	LYS
3	F	12	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	59	ASN
1	A	60	HIS

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Mol	Chain	Res	Type
1	A	119	HIS
2	B	173	ASN
2	B	179	HIS
2	B	183	HIS
2	B	229	ASN
2	B	233	HIS
2	B	296	HIS
2	B	317	GLN
2	B	395	HIS
2	B	425	ASN
1	C	60	HIS
1	C	113	GLN
1	C	119	HIS
2	D	183	HIS
2	D	233	HIS
2	D	296	HIS
2	D	317	GLN
2	D	395	HIS
2	D	425	ASN
3	E	1	HIS
3	F	1	HIS

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	$\# Z  > 2$
1	TPO	A	160	1	8,10,11	0.83	0	10,14,16	0.76	0
1	TPO	C	160	1	8,10,11	1.26	1 (12%)	10,14,16	1.11	1 (10%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	TPO	A	160	1	-	0/9/11/13	-
1	TPO	C	160	1	-	0/9/11/13	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	160	TPO	P-OG1	2.59	1.64	1.59

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	C	160	TPO	P-OG1-CB	-2.10	116.88	123.21

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

7 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	$\# Z  > 2$
6	GOL	A	1299	-	5,5,5	1.18	0	5,5,5	0.51	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	ATP	A	1297[B]	1	26,33,33	1.09	3 (11%)	31,52,52	1.67	5 (16%)
4	ATP	A	1297[A]	-	26,33,33	1.01	2 (7%)	31,52,52	1.42	4 (12%)
4	ATP	C	1297[A]	-	26,33,33	0.94	1 (3%)	31,52,52	1.54	6 (19%)
6	GOL	A	1300	-	5,5,5	0.49	0	5,5,5	0.45	0
4	ATP	C	1297[B]	-	26,33,33	1.00	2 (7%)	31,52,52	1.43	5 (16%)
5	SO4	A	1298	-	4,4,4	0.43	0	6,6,6	0.70	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
6	GOL	A	1299	-	-	0/4/4/4	-
4	ATP	A	1297[B]	1	-	0/18/38/38	0/3/3/3
4	ATP	A	1297[A]	-	-	5/18/38/38	0/3/3/3
4	ATP	C	1297[A]	-	-	3/18/38/38	0/3/3/3
6	GOL	A	1300	-	-	0/4/4/4	-
4	ATP	C	1297[B]	-	-	7/18/38/38	0/3/3/3

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1297[B]	ATP	C5-C4	2.67	1.48	1.40
4	C	1297[B]	ATP	C5-C4	2.63	1.47	1.40
4	C	1297[A]	ATP	C5-C4	2.62	1.47	1.40
4	A	1297[A]	ATP	C5-C4	2.62	1.47	1.40
4	A	1297[B]	ATP	O4'-C1'	2.60	1.44	1.41
4	A	1297[B]	ATP	C2-N3	2.43	1.36	1.32
4	C	1297[B]	ATP	O4'-C1'	2.31	1.44	1.41
4	A	1297[A]	ATP	O4'-C1'	2.17	1.44	1.41

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1297[B]	ATP	PA-O3A-PB	-4.79	116.40	132.83
4	A	1297[B]	ATP	PB-O3B-PG	-4.30	118.06	132.83
4	C	1297[A]	ATP	PA-O3A-PB	-3.38	121.22	132.83
4	C	1297[B]	ATP	N3-C2-N1	-3.29	123.54	128.68
4	C	1297[A]	ATP	N3-C2-N1	-3.27	123.56	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1297[A]	ATP	N3-C2-N1	-3.11	123.82	128.68
4	A	1297[A]	ATP	C4-C5-N7	-3.08	106.19	109.40
4	C	1297[A]	ATP	PB-O3B-PG	-3.02	122.45	132.83
4	A	1297[A]	ATP	PB-O3B-PG	-2.98	122.62	132.83
4	A	1297[B]	ATP	N3-C2-N1	-2.95	124.07	128.68
4	C	1297[B]	ATP	C3'-C2'-C1'	2.76	105.14	100.98
4	A	1297[A]	ATP	PA-O3A-PB	-2.69	123.60	132.83
4	C	1297[A]	ATP	C3'-C2'-C1'	2.64	104.95	100.98
4	C	1297[A]	ATP	C4-C5-N7	-2.61	106.68	109.40
4	C	1297[B]	ATP	PB-O3B-PG	-2.59	123.94	132.83
4	A	1297[B]	ATP	C4-C5-N7	-2.34	106.97	109.40
4	A	1297[B]	ATP	C2'-C3'-C4'	2.26	107.04	102.64
4	C	1297[B]	ATP	C4-C5-N7	-2.25	107.05	109.40
4	C	1297[A]	ATP	C1'-N9-C4	-2.14	122.88	126.64
4	C	1297[B]	ATP	PA-O3A-PB	-2.06	125.75	132.83

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1297[A]	ATP	C5'-O5'-PA-O2A
4	C	1297[A]	ATP	PB-O3A-PA-O5'
4	C	1297[A]	ATP	O4'-C4'-C5'-O5'
4	C	1297[A]	ATP	C3'-C4'-C5'-O5'
4	C	1297[B]	ATP	PB-O3B-PG-O3G
4	C	1297[B]	ATP	C5'-O5'-PA-O3A
4	C	1297[B]	ATP	C3'-C4'-C5'-O5'
4	C	1297[B]	ATP	O4'-C4'-C5'-O5'
4	A	1297[A]	ATP	PB-O3A-PA-O5'
4	C	1297[B]	ATP	C4'-C5'-O5'-PA
4	A	1297[A]	ATP	C5'-O5'-PA-O3A
4	A	1297[A]	ATP	C5'-O5'-PA-O1A
4	C	1297[B]	ATP	C5'-O5'-PA-O1A
4	A	1297[A]	ATP	O4'-C4'-C5'-O5'
4	C	1297[B]	ATP	PB-O3B-PG-O1G

There are no ring outliers.

3 monomers are involved in 12 short contacts:

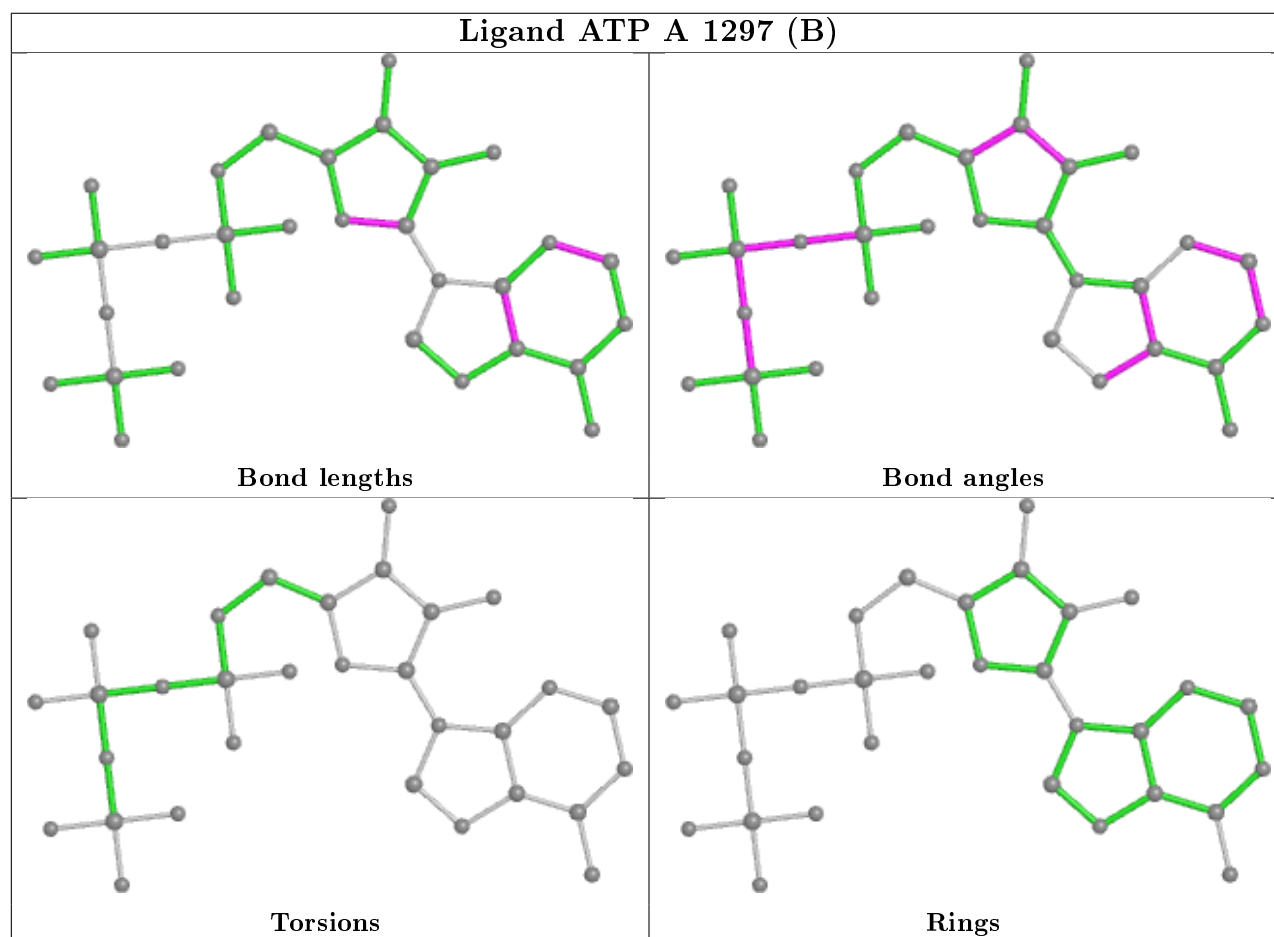
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1297[B]	ATP	7	0

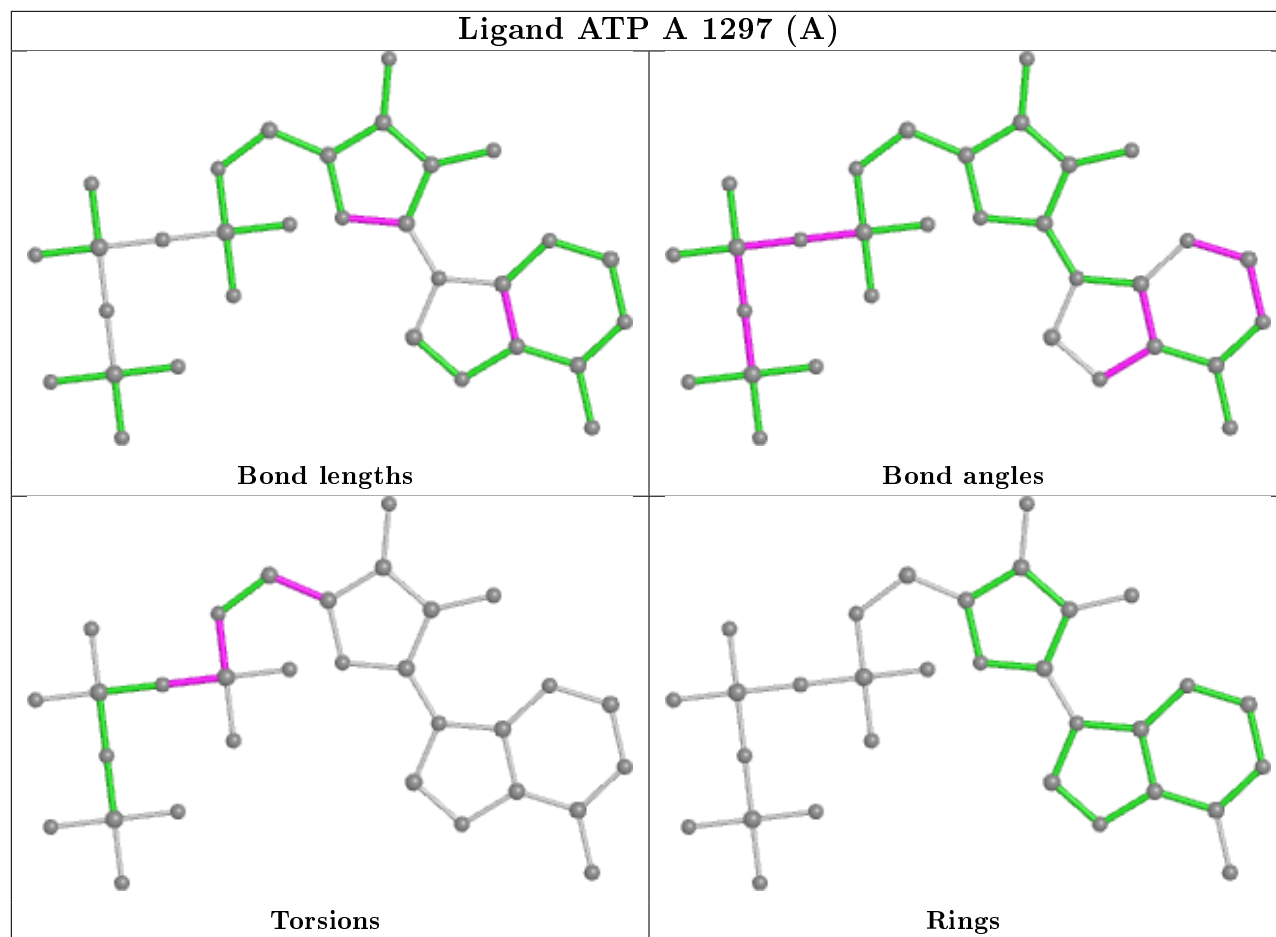
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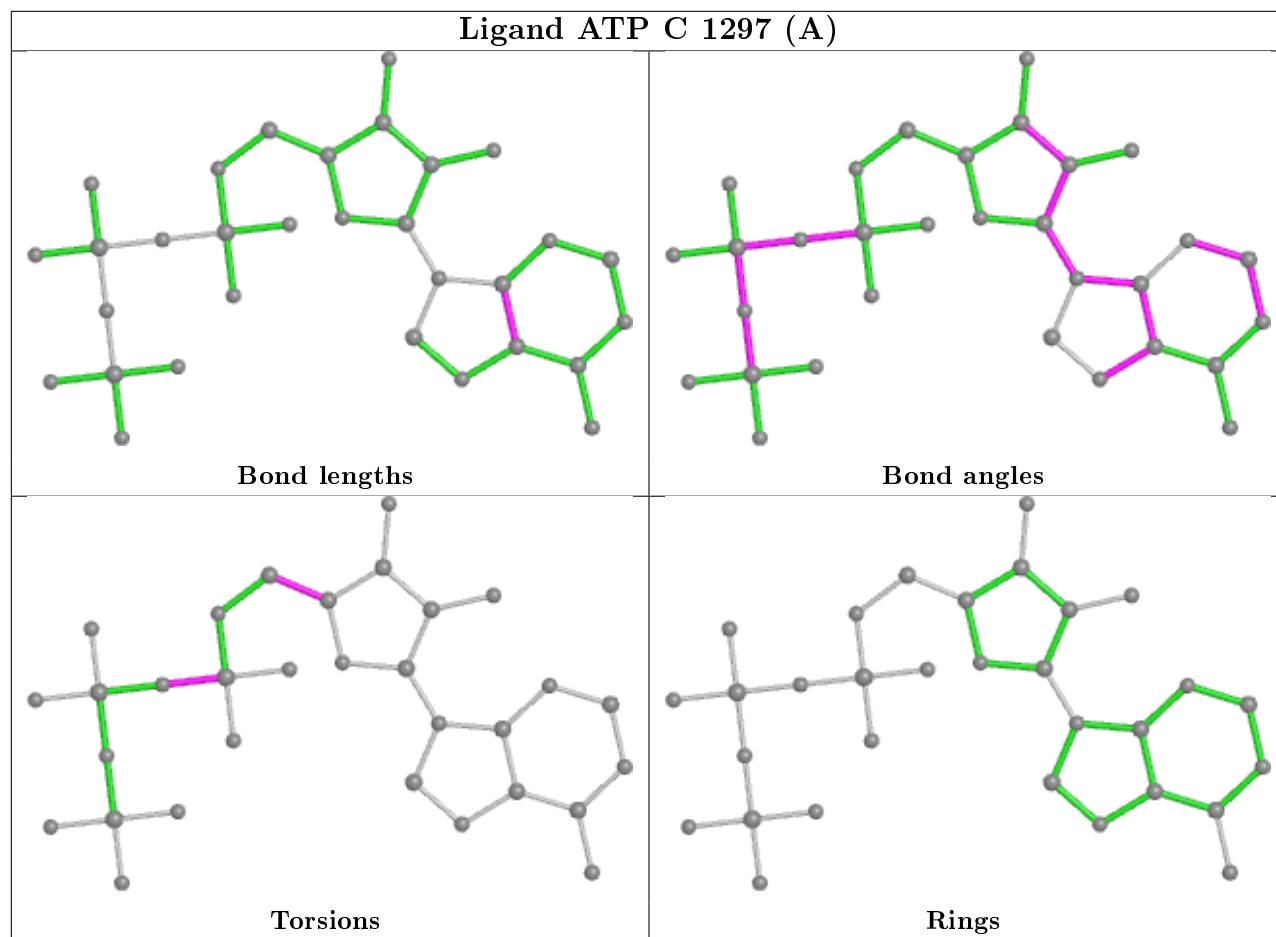
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	1297[B]	ATP	4	0
5	A	1298	SO4	1	0

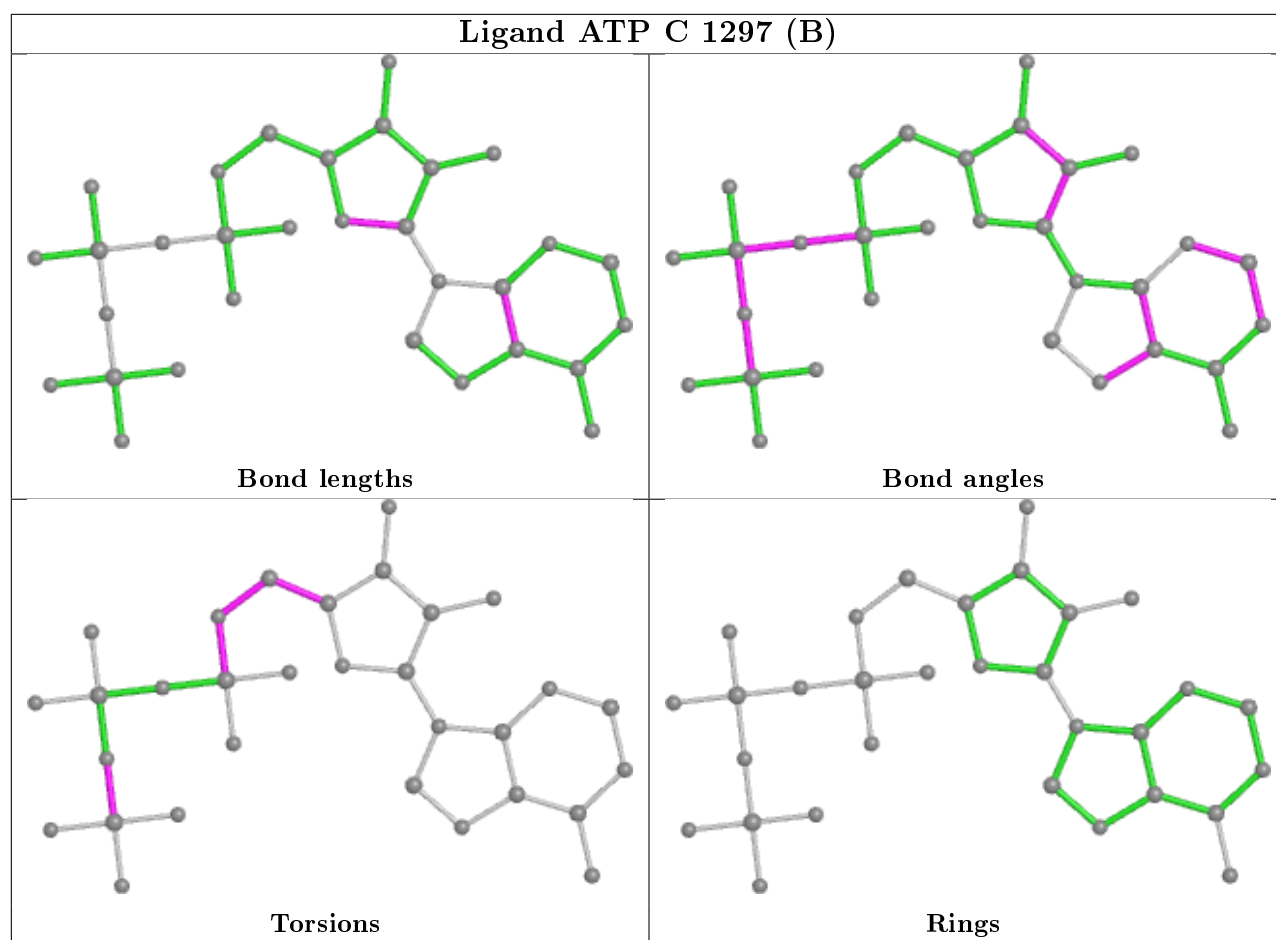
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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











## 5.7 Other polymers [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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

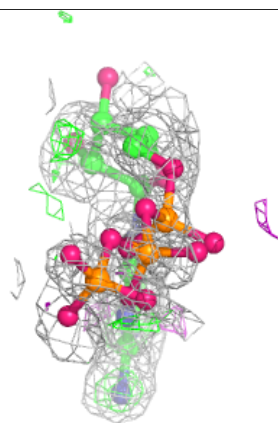
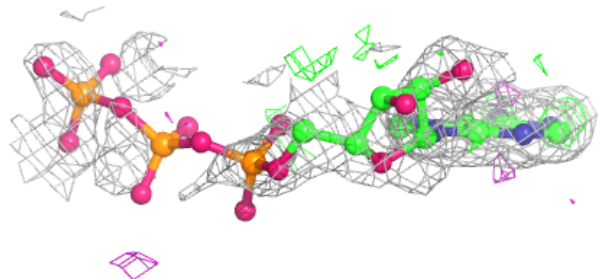
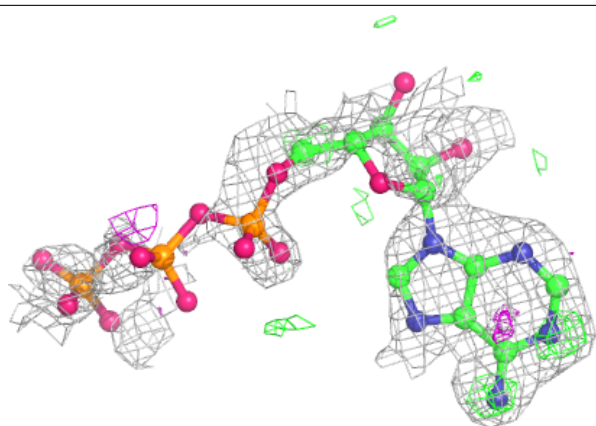
### 6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

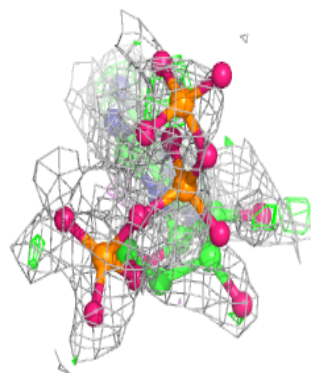
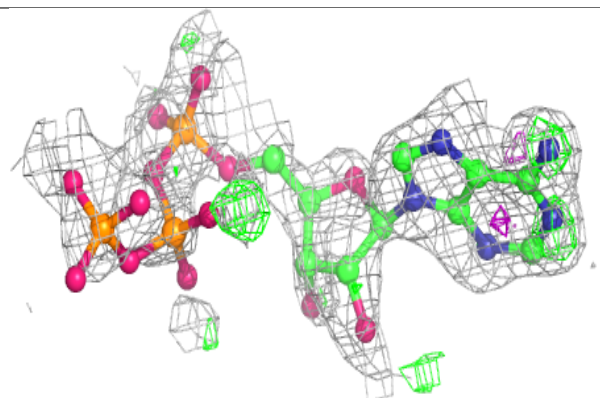
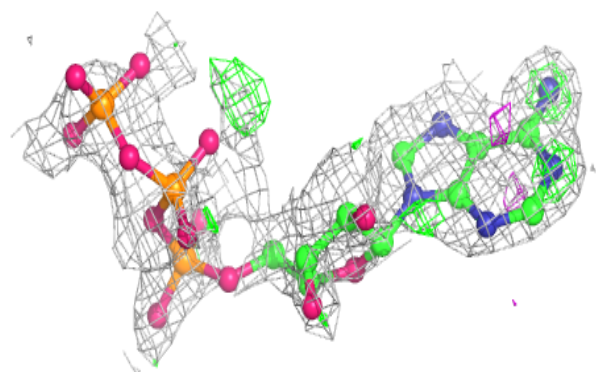
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around ATP A 1297 (B):**

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

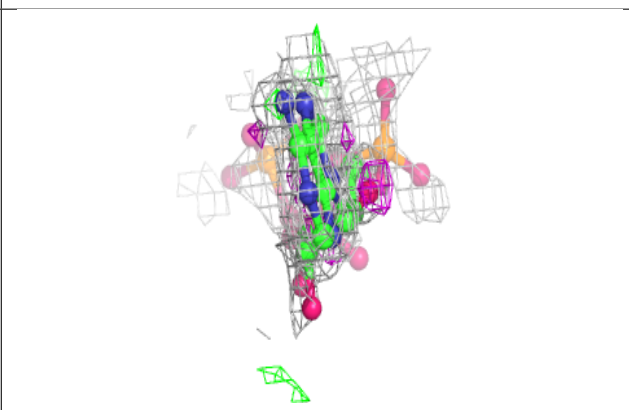
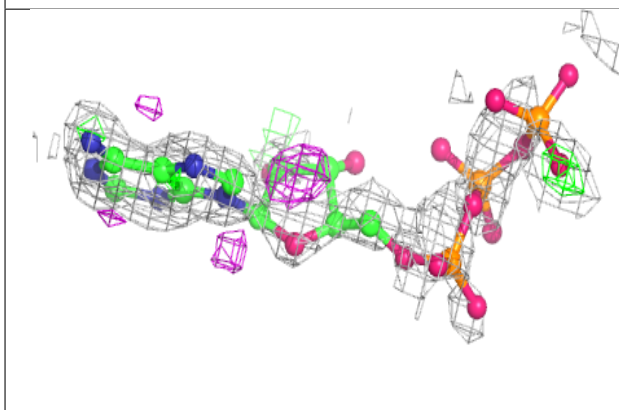
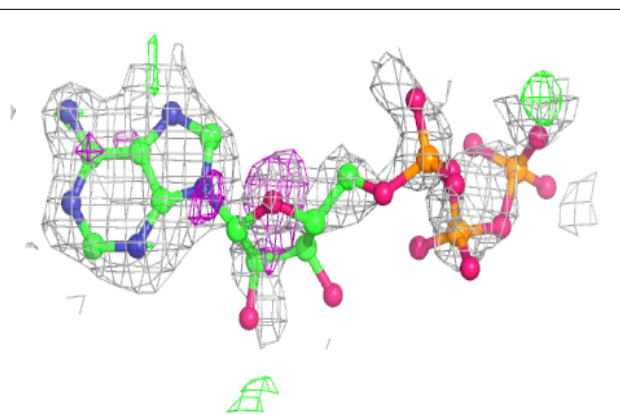
**Electron density around ATP A 1297 (A):**

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

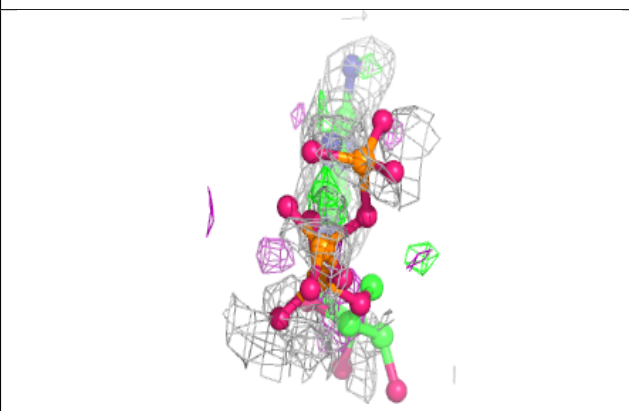
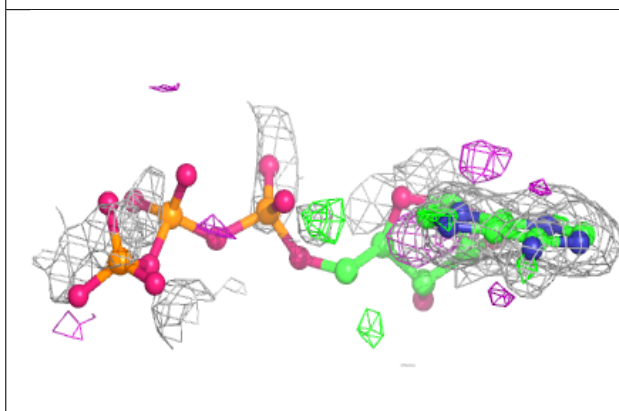
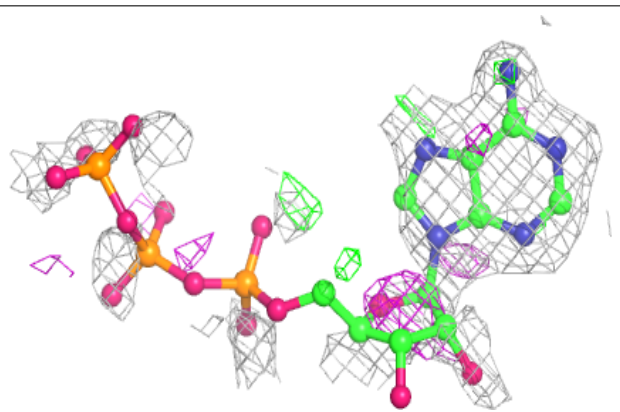


**Electron density around ATP C 1297 (A):**

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

**Electron density around ATP C 1297 (B):**

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



## 6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.