



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 16, 2023 – 09:25 pm GMT

PDB ID : 2YJ5  
Title : Conformational changes in the catalytic domain of the CPx-ATPase CopB- B upon nucleotide binding  
Authors : Voellmecke, C.; Schlicker, C.; Luebben, M.; Hofmann, E.  
Deposited on : 2011-05-18  
Resolution : 2.40 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

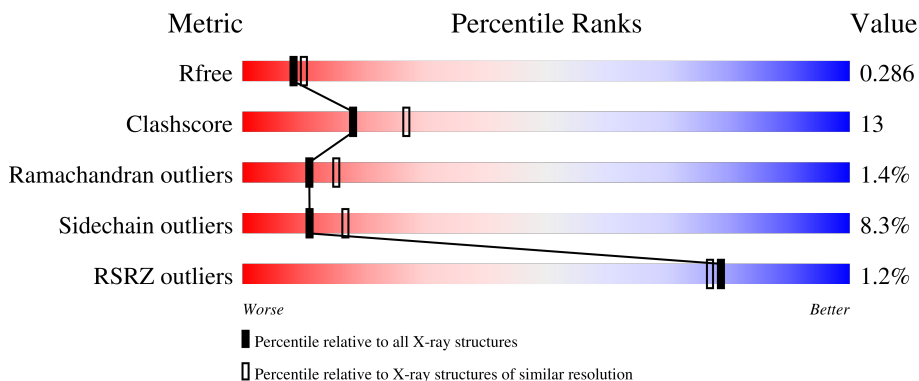
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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  $\geq 3$ , 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  $\leq 5\%$ . 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	263	<p>0% 67% 22% 6% .</p>
1	B	263	<p>2% 73% 18% 5% .</p>

## 2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 3808 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.

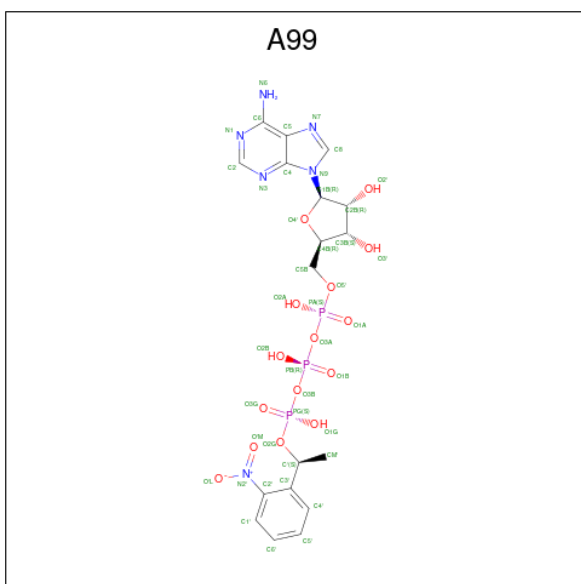
- Molecule 1 is a protein called COPPER-TRANSPORTING ATPASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	246	Total 1792	C 1141	N 300	O 347	S 4	0	0	0
1	B	252	Total 1902	C 1218	N 316	O 364	S 4	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

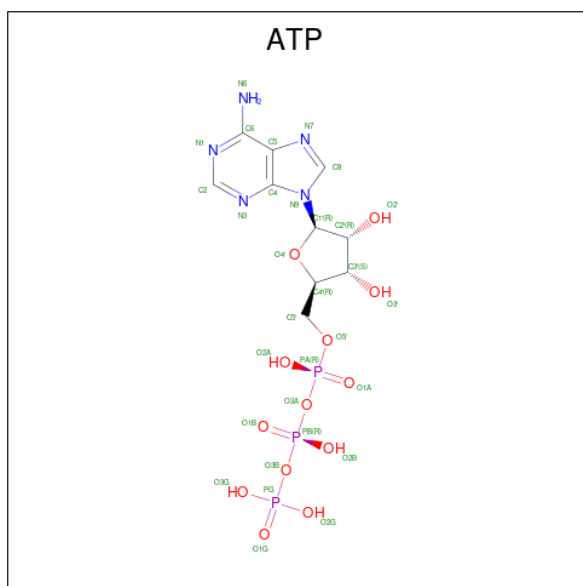
Chain	Residue	Modelled	Actual	Comment	Reference
A	416	ASN	ASP	engineered mutation	UNP Q97UU7
B	416	ASN	ASP	engineered mutation	UNP Q97UU7

- Molecule 2 is 5'-O-[(S)-hydroxy{[(R)-hydroxy{(S)-hydroxy[(1S)-1-(2-nitrophenyl)ethoxy]phosphoryl}oxy)phosphoryl]oxy}phosphoryl]adenosine (three-letter code: A99) (formula:  $C_{18}H_{23}N_6O_{15}P_3$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	42	18	6	15	3	0	0

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula:  $C_{10}H_{16}N_5O_{13}P_3$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	B	1	31	10	5	13	3	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	19	Total O 19 19	0	0
4	B	22	Total O 22 22	0	0



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	54.02Å 76.18Å 137.64Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.06 – 2.40 44.07 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.6 (44.06-2.40) 99.6 (44.07-2.40)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.70 (at 2.39Å)	Xtrriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, $R_{free}$	0.237 , 0.286 0.231 , 0.286	Depositor DCC
$R_{free}$ test set	1143 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	45.8	Xtrriage
Anisotropy	0.190	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 56.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	3808	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	50.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.37% 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 [i](#)

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

Bond lengths and bond angles in the following residue types are not validated in this section: ATP, A99

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	0/1810	0.56	0/2451
1	B	0.49	0/1922	0.61	0/2591
All	All	0.47	0/3732	0.59	0/5042

There are no bond length outliers.

There are no bond angle outliers.

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	1792	0	1780	52	0
1	B	1902	0	1982	47	0
2	A	42	0	20	4	0
3	B	31	0	12	0	0
4	A	19	0	0	0	0
4	B	22	0	0	0	0
All	All	3808	0	3794	101	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 13.

All (101) 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:537:ILE:HG21	1:A:557:ILE:HD13	1.54	0.87
1:B:605:MET:CE	1:B:625:ILE:HG13	2.08	0.83
1:A:527:LEU:O	1:A:531:LYS:HG2	1.78	0.82
1:B:532:ASN:O	1:B:534:GLY:N	2.14	0.80
1:B:605:MET:HE2	1:B:625:ILE:HG13	1.67	0.76
1:B:466:LYS:HB3	1:B:466:LYS:NZ	2.00	0.76
1:A:494:LYS:H	1:A:494:LYS:HD3	1.48	0.76
1:A:398:ILE:HD13	1:A:618:ILE:HG12	1.75	0.69
1:A:444:VAL:HG12	1:A:481:VAL:CG1	2.22	0.68
1:A:530:LEU:O	1:A:534:GLY:HA2	1.93	0.68
1:B:523:LEU:O	1:B:523:LEU:HG	1.94	0.67
1:A:494:LYS:H	1:A:494:LYS:CD	2.07	0.66
1:A:569:LYS:O	1:A:573:ILE:HD13	1.94	0.66
1:A:493:LYS:HB2	1:A:494:LYS:HD3	1.80	0.64
1:A:494:LYS:HG3	2:A:1636:A99:H1B	1.78	0.64
1:B:605:MET:HE1	1:B:625:ILE:HG13	1.79	0.63
1:A:537:ILE:CG2	1:A:557:ILE:HD13	2.29	0.63
1:A:449:SER:O	1:A:454:LYS:HE2	1.98	0.62
1:B:478:GLY:O	1:B:479:ILE:HD12	2.00	0.61
1:B:421:LEU:HD21	1:B:526:TYR:OH	2.00	0.61
1:B:436:LEU:HD11	1:B:440:TYR:CZ	2.35	0.61
1:A:425:THR:O	1:A:425:THR:HG23	2.01	0.60
1:B:532:ASN:OD1	1:B:532:ASN:C	2.40	0.60
1:A:410:ILE:HD11	1:A:601:VAL:HG12	1.82	0.59
1:A:631:LEU:HD22	1:A:631:LEU:O	2.02	0.59
1:B:501:ILE:HB	1:B:513:PHE:HB2	1.85	0.59
1:B:479:ILE:HG22	1:B:480:GLY:N	2.18	0.59
1:B:466:LYS:HB3	1:B:466:LYS:HZ3	1.67	0.59
1:B:528:GLU:O	1:B:532:ASN:HB3	2.03	0.59
1:B:568:ASP:O	1:B:572:ILE:HG13	2.04	0.58
1:A:572:ILE:O	1:A:576:LEU:HD12	2.04	0.57
1:B:530:LEU:O	1:B:534:GLY:HA2	2.03	0.57
1:B:505:ILE:HD12	1:B:510:ILE:HG12	1.85	0.57
1:B:611:ILE:CG2	1:B:615:VAL:HB	2.35	0.57
1:B:481:VAL:HG22	1:B:482:ARG:N	2.20	0.56
1:A:494:LYS:HD3	1:A:494:LYS:N	2.20	0.56
1:A:584:LEU:HD23	1:A:585:MET:N	2.21	0.56
1:B:533:GLU:O	1:B:534:GLY:C	2.45	0.55
1:B:482:ARG:HG2	1:B:483:GLY:N	2.21	0.55
1:B:437:SER:OG	1:B:510:ILE:HD13	2.06	0.55
1:A:391:MET:HA	1:A:391:MET:CE	2.38	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:541:SER:HB3	1:A:548:VAL:HG21	1.89	0.54
1:A:498:ASN:HB2	1:A:500:ASP:H	1.73	0.53
1:A:618:ILE:C	1:A:619:ILE:HD12	2.29	0.53
1:B:527:LEU:HG	1:B:531:LYS:HE2	1.90	0.53
1:A:568:ASP:O	1:A:572:ILE:HG13	2.10	0.51
1:A:588:ASP:H	1:A:592:ASP:CG	2.12	0.51
2:A:1636:A99:HM'A	2:A:1636:A99:O3G	2.11	0.51
1:B:611:ILE:H	1:B:611:ILE:HD12	1.76	0.51
1:A:494:LYS:HG3	2:A:1636:A99:C1B	2.40	0.51
1:B:500:ASP:O	1:B:501:ILE:HD13	2.11	0.50
1:B:450:HIS:CE1	1:B:452:ILE:HG12	2.45	0.50
1:B:466:LYS:HB3	1:B:466:LYS:HZ2	1.74	0.50
1:B:634:ASN:O	1:B:635:ARG:HB2	2.12	0.50
1:A:573:ILE:O	1:A:577:LYS:HG3	2.12	0.49
1:B:476:ILE:HG23	1:B:476:ILE:O	2.12	0.49
1:A:573:ILE:HG22	1:A:598:LEU:HD22	1.96	0.48
1:A:482:ARG:HG2	1:A:483:GLY:N	2.27	0.48
1:B:529:LYS:HE3	1:B:529:LYS:HB2	1.73	0.47
1:B:574:GLU:HG2	1:B:598:LEU:HD13	1.95	0.47
1:B:518:VAL:HA	1:B:519:PRO:HD3	1.66	0.47
1:B:481:VAL:HG22	1:B:482:ARG:H	1.78	0.47
1:A:391:MET:HA	1:A:391:MET:HE3	1.96	0.47
1:A:398:ILE:CD1	1:A:618:ILE:HG12	2.43	0.46
1:B:473:PHE:CE1	1:B:481:VAL:CG2	2.98	0.46
1:A:494:LYS:CD	1:A:494:LYS:N	2.76	0.46
1:A:532:ASN:HD22	1:A:633:LYS:HB2	1.81	0.46
1:A:429:THR:HG21	1:A:516:SER:HB2	1.98	0.46
1:A:416:ASN:ND2	1:A:592:ASP:OD2	2.49	0.46
1:A:391:MET:HE3	1:A:394:LYS:HD3	1.97	0.45
1:A:618:ILE:O	1:A:619:ILE:HD12	2.16	0.45
1:B:403:VAL:O	1:B:407:ILE:HG13	2.17	0.45
1:B:436:LEU:HD11	1:B:440:TYR:CE2	2.52	0.45
1:B:605:MET:HG2	1:B:620:LEU:HD23	1.99	0.45
1:A:430:GLN:HG3	1:A:431:PHE:N	2.31	0.44
1:B:490:ILE:N	1:B:490:ILE:HD13	2.32	0.44
1:A:402:ASN:O	1:A:406:LYS:HG3	2.18	0.44
1:A:517:ASP:OD1	1:A:518:VAL:N	2.48	0.43
1:A:590:VAL:CG1	1:A:591:ASN:N	2.82	0.43
1:B:633:LYS:O	1:B:635:ARG:HD3	2.18	0.43
1:B:531:LYS:HB2	1:B:531:LYS:HE3	1.46	0.43
1:B:611:ILE:HG21	1:B:615:VAL:HB	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:387:LEU:HD12	1:A:387:LEU:HA	1.72	0.43
1:A:573:ILE:HD12	1:A:573:ILE:N	2.34	0.43
1:A:495:ALA:HB3	1:A:498:ASN:HD22	1.84	0.43
1:A:590:VAL:HG12	1:A:591:ASN:N	2.33	0.43
1:A:543:ASP:OD2	1:A:547:LYS:HD3	2.19	0.43
1:B:403:VAL:HG23	1:B:404:TYR:N	2.34	0.43
1:A:585:MET:HE2	1:A:596:LEU:HA	1.99	0.42
1:B:392:LEU:HA	1:B:392:LEU:HD23	1.73	0.42
1:A:510:ILE:HD12	1:A:511:ALA:N	2.34	0.42
1:B:467:ILE:O	1:B:468:LEU:HD23	2.19	0.42
2:A:1636:A99:HM'	2:A:1636:A99:N2'	2.34	0.42
1:B:528:GLU:HG2	1:B:633:LYS:HE2	2.02	0.42
1:A:444:VAL:HG12	1:A:481:VAL:HG11	2.01	0.41
1:B:478:GLY:C	1:B:479:ILE:HD12	2.40	0.41
1:B:452:ILE:HD12	1:B:515:ILE:HD12	2.02	0.41
1:A:584:LEU:HD23	1:A:584:LEU:C	2.41	0.41
1:A:475:GLU:C	1:A:476:ILE:HG13	2.41	0.41
1:A:573:ILE:N	1:A:573:ILE:CD1	2.84	0.41
1:A:570:VAL:HG22	1:A:598:LEU:HD12	2.03	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	242/263 (92%)	219 (90%)	21 (9%)	2 (1%)	19	29
1	B	250/263 (95%)	231 (92%)	14 (6%)	5 (2%)	7	9
All	All	492/526 (94%)	450 (92%)	35 (7%)	7 (1%)	11	15

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	533	GLU
1	A	400	ASN
1	B	476	ILE
1	B	522	ASN
1	B	534	GLY
1	A	401	SER
1	B	611	ILE

### 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	182/226 (80%)	166 (91%)	16 (9%)	10	15
1	B	205/226 (91%)	189 (92%)	16 (8%)	12	19
All	All	387/452 (86%)	355 (92%)	32 (8%)	11	17

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	391	MET
1	A	430	GLN
1	A	476	ILE
1	A	494	LYS
1	A	497	ASN
1	A	498	ASN
1	A	522	ASN
1	A	550	GLU
1	A	576	LEU
1	A	586	ILE
1	A	590	VAL
1	A	598	LEU
1	A	601	VAL
1	A	620	LEU
1	A	631	LEU
1	A	635	ARG
1	B	429	THR

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Mol	Chain	Res	Type
1	B	435	SER
1	B	466	LYS
1	B	472	ASP
1	B	482	ARG
1	B	497	ASN
1	B	518	VAL
1	B	523	LEU
1	B	524	LYS
1	B	528	GLU
1	B	529	LYS
1	B	530	LEU
1	B	532	ASN
1	B	591	ASN
1	B	601	VAL
1	B	615	VAL

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

Mol	Chain	Res	Type
1	A	498	ASN
1	A	563	ASN
1	B	430	GLN
1	B	514	ASN
1	B	558	GLN
1	B	579	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	ATP	B	1636	-	26,33,33	0.98	2 (7%)	31,52,52	1.34	4 (12%)
2	A99	A	1636	-	37,45,45	1.79	5 (13%)	40,69,69	1.63	6 (15%)

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
3	ATP	B	1636	-	-	2/18/38/38	0/3/3/3
2	A99	A	1636	-	-	7/29/51/51	0/4/4/4

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1636	A99	C2'-C3'	8.71	1.51	1.39
2	A	1636	A99	C5-C4	2.67	1.48	1.40
3	B	1636	ATP	C5-C4	2.42	1.47	1.40
2	A	1636	A99	O4'-C1B	2.40	1.44	1.41
2	A	1636	A99	O2G-C'	-2.30	1.43	1.46
3	B	1636	ATP	C2-N3	2.10	1.35	1.32
2	A	1636	A99	C2-N3	2.08	1.35	1.32

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1636	A99	C4-C5-N7	-3.89	105.34	109.40
2	A	1636	A99	PG-O3B-PB	-3.78	119.86	132.83
2	A	1636	A99	PB-O3A-PA	-3.54	120.66	132.83
3	B	1636	ATP	N3-C2-N1	-3.38	123.40	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1636	A99	C1'-C2'-C3'	-3.35	118.06	121.35
2	A	1636	A99	N3-C2-N1	-3.31	123.50	128.68
3	B	1636	ATP	C4-C5-N7	-2.79	106.49	109.40
3	B	1636	ATP	PA-O3A-PB	-2.49	124.27	132.83
3	B	1636	ATP	C3'-C2'-C1'	2.44	104.65	100.98
2	A	1636	A99	CM'-C'-C3'	2.24	116.56	112.68

There are no chirality outliers.

All (9) torsion outliers are listed below:

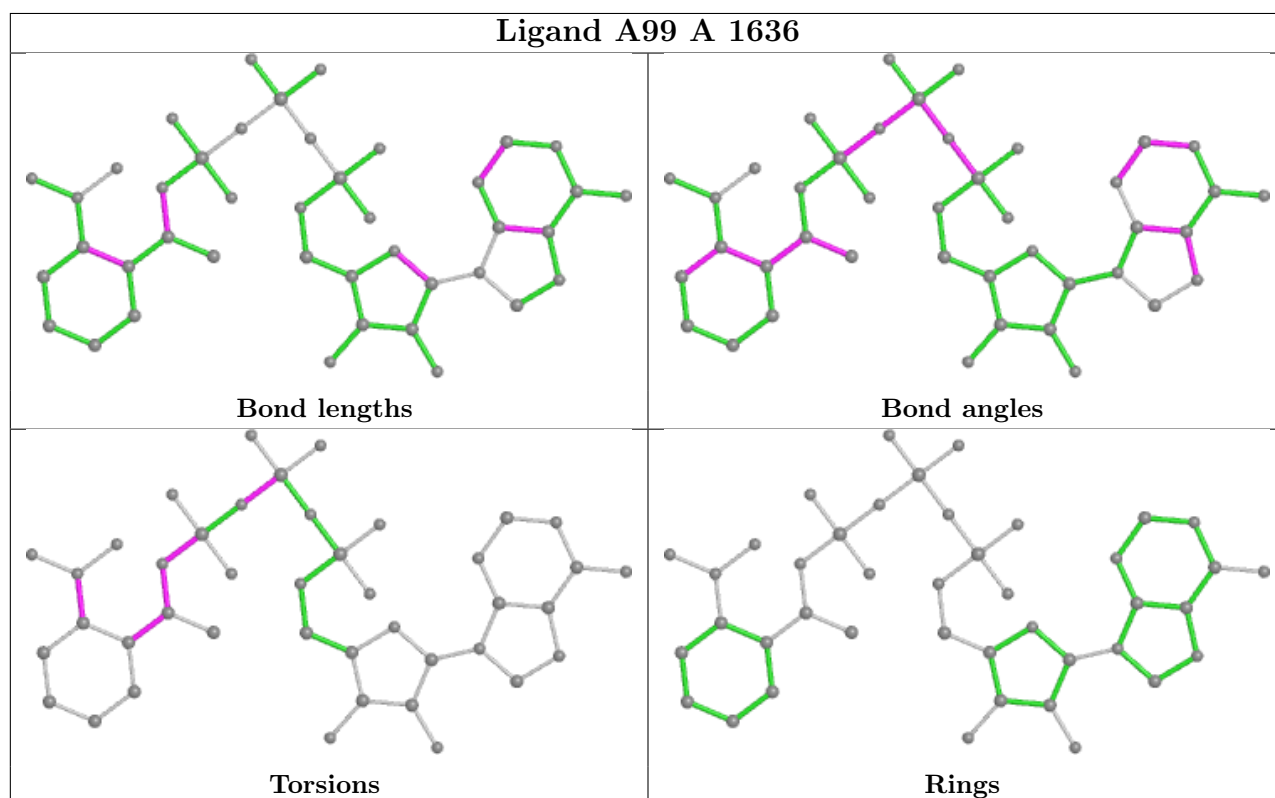
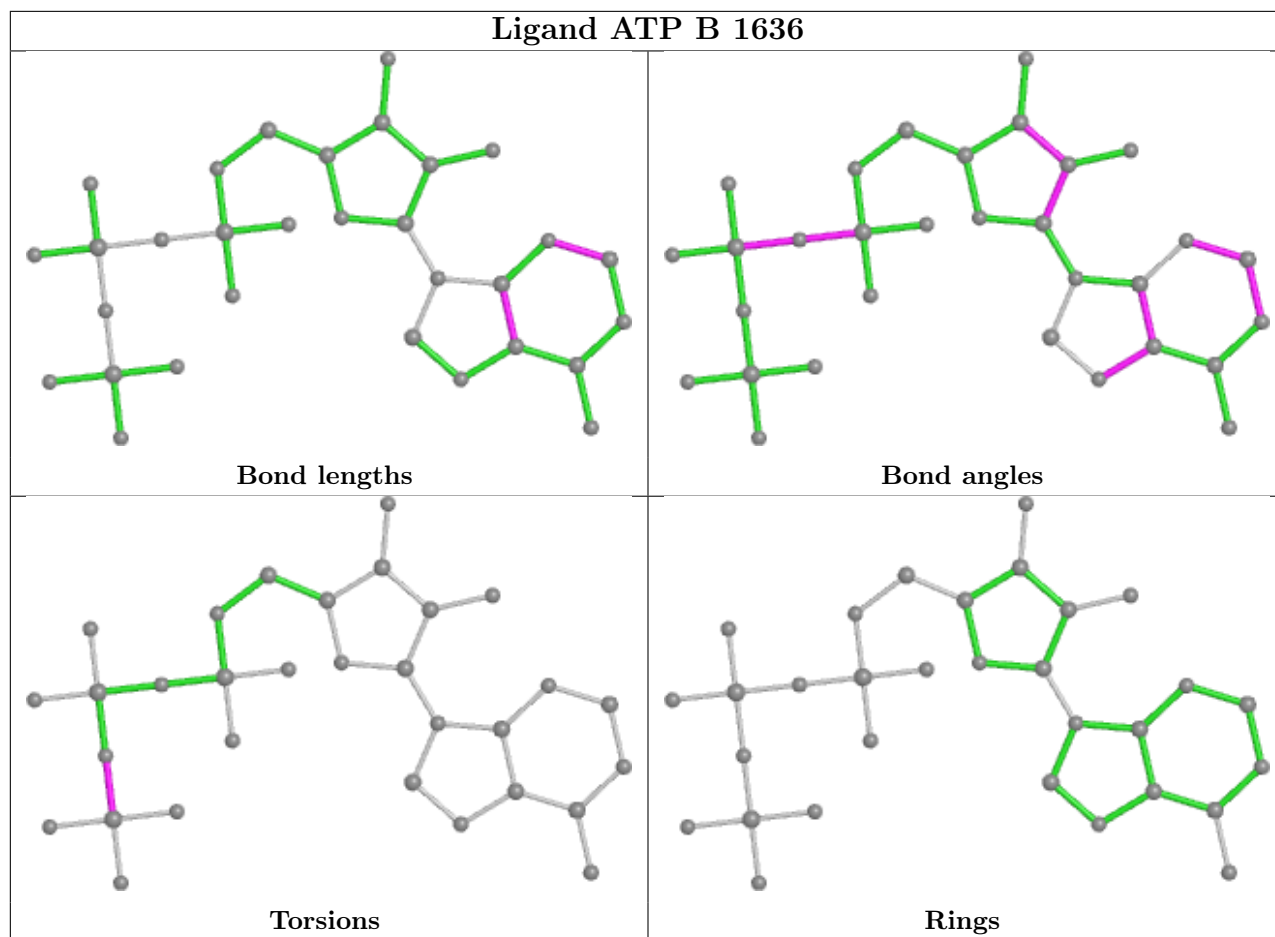
Mol	Chain	Res	Type	Atoms
2	A	1636	A99	CM'-C'-O2G-PG
2	A	1636	A99	CM'-C'-C3'-C2'
2	A	1636	A99	CM'-C'-C3'-C4'
2	A	1636	A99	C1'-C2'-N2'-O'M
2	A	1636	A99	C3'-C2'-N2'-O'M
3	B	1636	ATP	PB-O3B-PG-O3G
2	A	1636	A99	PG-O3B-PB-O2B
3	B	1636	ATP	PB-O3B-PG-O1G
2	A	1636	A99	C'-O2G-PG-O3B

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1636	A99	4	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 [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, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	246/263 (93%)	-0.22	2 (0%) 86 84	17, 56, 87, 93	0
1	B	252/263 (95%)	-0.34	4 (1%) 72 70	24, 45, 67, 85	0
All	All	498/526 (94%)	-0.28	6 (1%) 79 77	17, 49, 83, 93	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	612	SER	4.9
1	B	590	VAL	4.0
1	B	611	ILE	3.9
1	A	566	PRO	2.6
1	A	570	VAL	2.2
1	B	610	ASP	2.2

### 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](#)

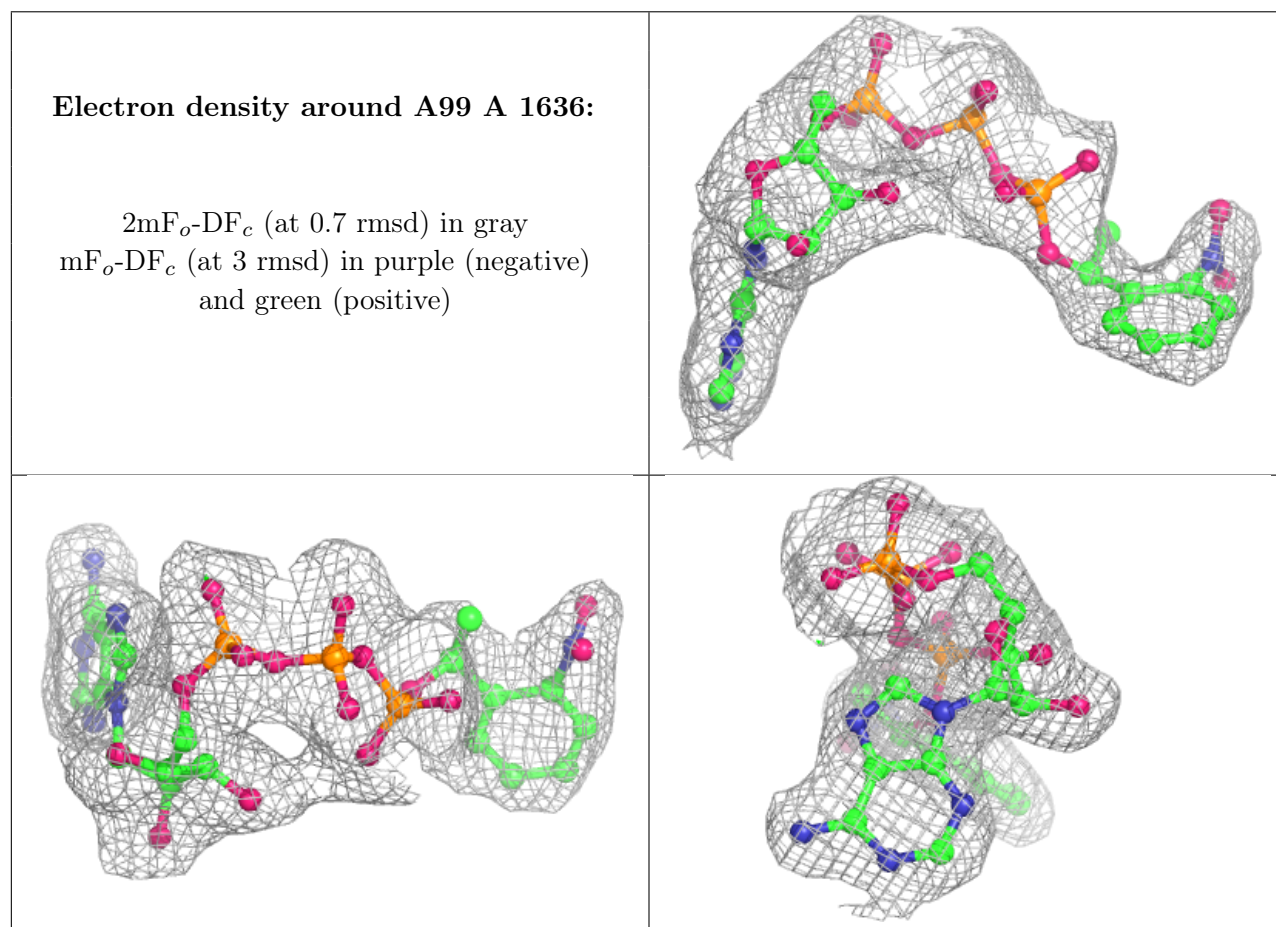
There are no monosaccharides in this entry.

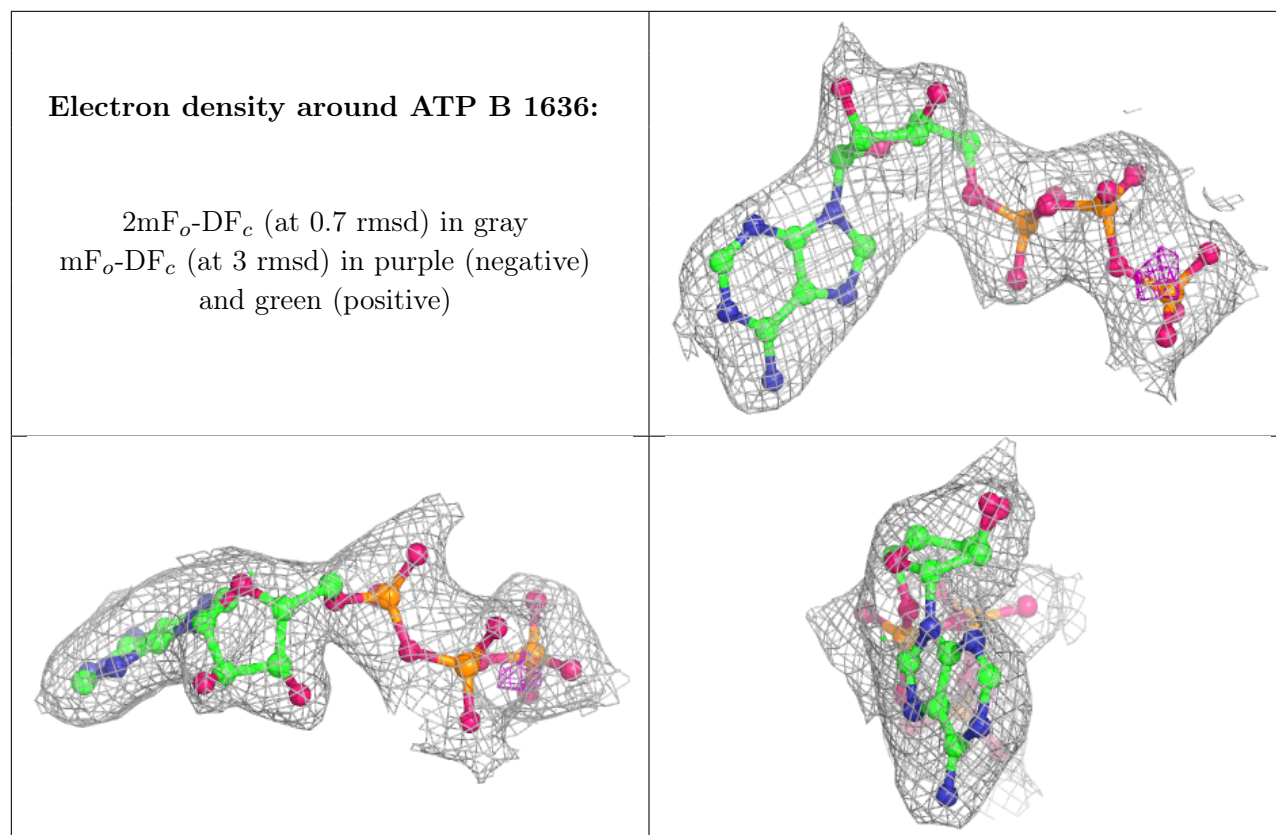
### 6.4 Ligands [i](#)

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, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q < 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	A99	A	1636	42/42	0.92	0.12	35,57,71,80	0
3	ATP	B	1636	31/31	0.95	0.11	44,55,61,62	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.





## 6.5 Other polymers [i](#)

There are no such residues in this entry.