



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 09:54 PM UTC

PDB ID : 3DNE / pdb\_00003dne  
Title : cAMP-dependent protein kinase PKA catalytic subunit with PKI-5-24  
Authors : Schiffer, A.; Wendt, K.U.  
Deposited on : 2008-07-02  
Resolution : 2.00 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	:	4-5-2 with Phenix2.0
Mogul	:	NOT EXECUTED
Xtriage (Phenix)	:	2.0
EDS	:	NOT EXECUTED
Buster-report	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

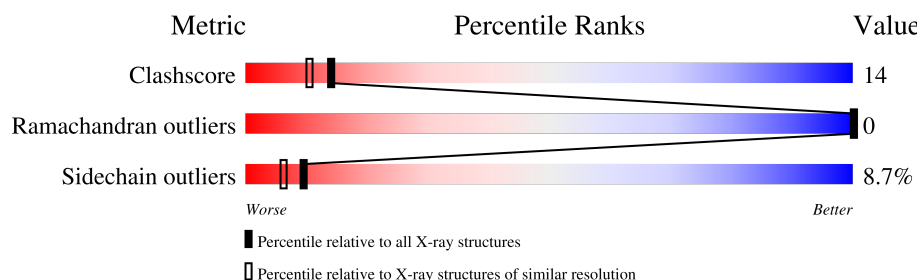
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.00 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	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)

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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	350	
2	I	20	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 3313 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 cAMP-dependent protein kinase catalytic subunit alpha.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	A	338	2795	1811	467	506	2	9	0	0	0

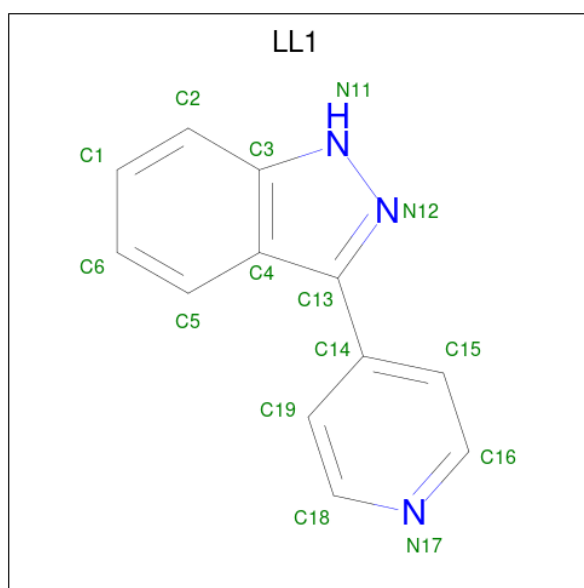
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	286	ASP	ASN	SEE REMARK 999	UNP P00517

- Molecule 2 is a protein called cAMP-dependent protein kinase inhibitor alpha.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	I	20	157	94	32	31	0	0	0

- Molecule 3 is 3-pyridin-4-yl-1H-indazole (CCD ID: LL1) (formula: C<sub>12</sub>H<sub>9</sub>N<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			15	12	3		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	316	Total	O	0	0
			316	316		
4	I	30	Total	O	0	0
			30	30		

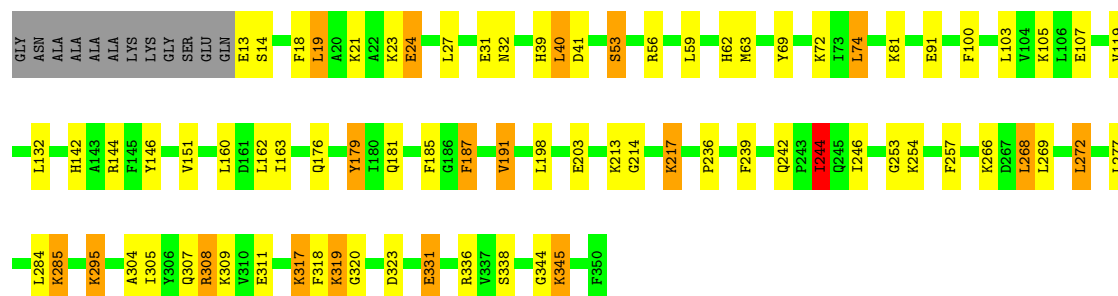
### 3 Residue-property plots [i](#)

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. 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.

Note EDS was not executed.

- Molecule 1: cAMP-dependent protein kinase catalytic subunit alpha

Chain A: 



- Molecule 2: cAMP-dependent protein kinase inhibitor alpha

Chain I: 



## 4 Data and refinement statistics

EDS was not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	72.84Å 75.44Å 79.76Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	18.86 – 2.00	Depositor
% Data completeness (in resolution range)	98.7 (18.86-2.00)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.28 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.176 , 0.230	Depositor
Wilson B-factor (Å <sup>2</sup> )	27.8	Xtriage
Anisotropy	0.025	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.023 for k,h,-l	Xtriage
Total number of atoms	3313	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.76% 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, SEP, LL1

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	1.39	6/2845 (0.2%)	1.26	15/3832 (0.4%)
2	I	1.63	2/159 (1.3%)	1.69	3/212 (1.4%)
All	All	1.40	8/3004 (0.3%)	1.28	18/4044 (0.4%)

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	I	13	SER	N-CA	6.22	1.53	1.45
1	A	119	VAL	CA-CB	5.92	1.61	1.54
2	I	15	ARG	CD-NE	-5.88	1.38	1.46
1	A	305	ILE	N-CA	5.83	1.53	1.46
1	A	179	TYR	N-CA	5.74	1.52	1.45
1	A	217	LYS	CD-CE	5.61	1.69	1.52
1	A	187	PHE	N-CA	5.32	1.52	1.46
1	A	151	VAL	CA-CB	5.08	1.60	1.54

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	I	15	ARG	NE-CZ-NH2	-12.04	108.36	119.20
1	A	244	ILE	CB-CA-C	-7.15	102.68	112.04
1	A	214	GLY	N-CA-C	-7.09	103.00	112.14
1	A	277	LEU	N-CA-C	6.74	120.38	111.75
1	A	191	VAL	CB-CA-C	-6.56	99.10	110.65
2	I	15	ARG	NE-CZ-NH1	6.48	127.98	121.50
1	A	254	LYS	N-CA-C	5.85	117.94	108.41
2	I	15	ARG	CG-CD-NE	-5.81	99.22	112.00
1	A	242	GLN	CA-C-N	5.52	125.61	119.32
1	A	242	GLN	C-N-CA	5.52	125.61	119.32
1	A	100	PHE	CA-C-N	-5.50	113.95	119.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	100	PHE	C-N-CA	-5.50	113.95	119.56
1	A	24	GLU	CB-CA-C	-5.27	102.60	110.88
1	A	266	LYS	CG-CD-CE	5.13	123.09	111.30
1	A	257	PHE	CA-C-N	-5.08	114.71	119.89
1	A	257	PHE	C-N-CA	-5.08	114.71	119.89
1	A	132	LEU	N-CA-C	5.08	116.50	111.07
1	A	308	ARG	NE-CZ-NH1	-5.07	116.43	121.50

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2795	0	2770	80	0
2	I	157	0	146	8	0
3	A	15	0	9	0	0
4	A	316	0	0	30	0
4	I	30	0	0	3	0
All	All	3313	0	2925	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 14.

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:A:217:LYS:CE	4:A:642:HOH:O	1.78	1.27
1:A:31:GLU:HG3	4:A:617:HOH:O	1.35	1.21
2:I:23:HIS:HE1	4:I:54:HOH:O	1.29	1.10
1:A:163:ILE:HG12	1:A:217:LYS:HD3	1.36	1.05
1:A:295:LYS:HE3	1:A:295:LYS:H	0.95	1.05
1:A:295:LYS:HE3	1:A:295:LYS:N	1.79	0.96
1:A:331:GLU:HG3	4:A:623:HOH:O	1.65	0.95
1:A:39:HIS:HD2	1:A:41:ASP:H	1.05	0.93

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:105:LYS:HG3	4:A:618:HOH:O	1.69	0.92
1:A:217:LYS:HE2	4:A:642:HOH:O	1.55	0.88
1:A:295:LYS:H	1:A:295:LYS:CE	1.86	0.87
1:A:323:ASP:CG	4:A:631:HOH:O	2.18	0.87
1:A:39:HIS:CD2	1:A:41:ASP:H	1.93	0.86
1:A:285:LYS:HD2	1:A:285:LYS:H	1.39	0.85
1:A:308:ARG:NH1	4:A:492:HOH:O	2.03	0.85
1:A:203:GLU:OE2	2:I:15:ARG:HD3	1.78	0.83
1:A:285:LYS:H	1:A:285:LYS:CD	1.94	0.80
1:A:345:LYS:H	1:A:345:LYS:CD	1.94	0.80
1:A:307:GLN:NE2	1:A:309:LYS:HE2	1.98	0.78
1:A:246:ILE:HD11	2:I:15:ARG:HD2	1.70	0.73
1:A:23:LYS:HD2	4:A:407:HOH:O	1.89	0.73
1:A:345:LYS:H	1:A:345:LYS:HD3	1.54	0.72
1:A:317:LYS:HD3	1:A:319:LYS:HE2	1.73	0.71
1:A:319:LYS:N	1:A:319:LYS:HD3	2.05	0.71
1:A:244:ILE:HG12	4:A:425:HOH:O	1.90	0.70
2:I:23:HIS:CE1	4:I:54:HOH:O	2.14	0.70
1:A:307:GLN:NE2	1:A:309:LYS:CE	2.54	0.70
1:A:23:LYS:CD	4:A:407:HOH:O	2.40	0.70
1:A:320:GLY:N	4:A:615:HOH:O	2.24	0.69
1:A:176:GLN:HA	1:A:318:PHE:CE1	2.28	0.68
1:A:142:HIS:CD2	1:A:146:TYR:CE2	2.83	0.67
1:A:285:LYS:HD2	1:A:285:LYS:N	2.09	0.66
1:A:217:LYS:CD	4:A:642:HOH:O	2.25	0.66
1:A:53:SER:O	4:A:455:HOH:O	2.15	0.65
1:A:142:HIS:NE2	1:A:146:TYR:CE2	2.71	0.59
1:A:320:GLY:HA3	4:A:624:HOH:O	2.02	0.58
1:A:176:GLN:HA	1:A:318:PHE:CZ	2.38	0.58
1:A:307:GLN:HE22	1:A:309:LYS:HE2	1.66	0.58
1:A:217:LYS:HD2	4:A:642:HOH:O	1.94	0.57
1:A:217:LYS:HE3	4:A:642:HOH:O	1.71	0.57
1:A:163:ILE:HG12	1:A:217:LYS:CD	2.23	0.56
1:A:336:ARG:NH2	1:A:338:SEP:O1P	2.39	0.55
1:A:345:LYS:HD3	1:A:345:LYS:N	2.20	0.54
2:I:18:ARG:NH2	4:I:44:HOH:O	2.39	0.54
1:A:13:GLU:HG3	1:A:14:SER:N	2.26	0.51
1:A:344:GLY:N	1:A:345:LYS:HE3	2.28	0.49
1:A:345:LYS:CD	1:A:345:LYS:N	2.71	0.49
1:A:40:LEU:HD22	4:A:547:HOH:O	2.12	0.48
1:A:69:TYR:HE1	1:A:107:GLU:HG3	1.79	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:307:GLN:O	1:A:308:ARG:HB2	2.12	0.48
1:A:39:HIS:HD2	1:A:41:ASP:N	1.90	0.48
1:A:187:PHE:HE2	2:I:21:ALA:HB1	1.79	0.48
1:A:91:GLU:OE2	4:A:354:HOH:O	2.19	0.48
1:A:144:ARG:HD2	4:A:541:HOH:O	2.15	0.47
1:A:304:ALA:HA	1:A:309:LYS:HG3	1.96	0.47
1:A:236:PRO:HG2	1:A:239:PHE:HB3	1.97	0.47
1:A:18:PHE:HD2	1:A:19:LEU:HD13	1.80	0.46
1:A:268:LEU:HD22	1:A:272:LEU:HD22	1.97	0.46
1:A:319:LYS:HB2	4:A:631:HOH:O	2.16	0.46
1:A:103:LEU:HD22	1:A:185:PHE:HZ	1.80	0.46
1:A:307:GLN:HB2	1:A:309:LYS:HG2	1.96	0.46
1:A:336:ARG:HH22	1:A:338:SEP:P	2.38	0.46
1:A:163:ILE:CG1	1:A:217:LYS:HD3	2.26	0.46
1:A:307:GLN:NE2	1:A:309:LYS:HE3	2.30	0.46
1:A:176:GLN:HG2	1:A:318:PHE:CE1	2.52	0.45
1:A:203:GLU:OE2	2:I:15:ARG:CD	2.58	0.45
1:A:331:GLU:CG	4:A:623:HOH:O	2.41	0.45
1:A:284:LEU:HB3	1:A:285:LYS:HD2	1.98	0.45
1:A:253:GLY:N	4:A:638:HOH:O	2.45	0.44
1:A:81:LYS:NZ	4:A:515:HOH:O	2.52	0.43
1:A:103:LEU:HD22	1:A:185:PHE:CZ	2.54	0.43
2:I:7:TYR:CZ	2:I:11:ILE:HG13	2.54	0.43
1:A:319:LYS:HD3	4:A:631:HOH:O	2.19	0.42
1:A:62:HIS:CE1	4:A:490:HOH:O	2.71	0.42
1:A:308:ARG:HH11	1:A:308:ARG:HD3	1.54	0.42
1:A:23:LYS:NZ	4:A:407:HOH:O	2.36	0.42
1:A:23:LYS:CE	4:A:407:HOH:O	2.67	0.42
1:A:24:GLU:HG2	4:A:663:HOH:O	2.20	0.42
1:A:179:TYR:CZ	1:A:308:ARG:HA	2.55	0.42
1:A:304:ALA:CA	1:A:309:LYS:HG3	2.50	0.41
1:A:56:ARG:HD2	4:A:409:HOH:O	2.21	0.41
1:A:62:HIS:HE1	4:A:490:HOH:O	2.03	0.41
1:A:72:LYS:HG2	1:A:74:LEU:HD13	2.03	0.40
1:A:285:LYS:H	1:A:285:LYS:CE	2.34	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	334/350 (95%)	326 (98%)	8 (2%)	0	100	100
2	I	18/20 (90%)	18 (100%)	0	0	100	100
All	All	352/370 (95%)	344 (98%)	8 (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	297/303 (98%)	271 (91%)	26 (9%)	9	6
2	I	15/15 (100%)	14 (93%)	1 (7%)	15	11
All	All	312/318 (98%)	285 (91%)	27 (9%)	9	6

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

Mol	Chain	Res	Type
1	A	19	LEU
1	A	21	LYS
1	A	27	LEU
1	A	32	ASN
1	A	40	LEU
1	A	53	SER
1	A	59	LEU
1	A	63	MET

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Mol	Chain	Res	Type
1	A	74	LEU
1	A	160	LEU
1	A	162	LEU
1	A	181	GLN
1	A	191	VAL
1	A	198	LEU
1	A	213	LYS
1	A	244	ILE
1	A	268	LEU
1	A	269	LEU
1	A	272	LEU
1	A	285	LYS
1	A	295	LYS
1	A	311	GLU
1	A	317	LYS
1	A	319	LYS
1	A	331	GLU
1	A	345	LYS
2	I	24	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	32	ASN
1	A	39	HIS
1	A	62	HIS
1	A	77	GLN
1	A	113	ASN
1	A	242	GLN
1	A	307	GLN
2	I	20	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

Mogul was not executed - this section is therefore empty.

## 5.5 Carbohydrates [i](#)

Mogul was not executed - this section is therefore empty.

## 5.6 Ligand geometry [i](#)

Mogul was not executed - this section is therefore empty.

## 5.7 Other polymers [i](#)

Mogul was not executed - this section is therefore empty.

## 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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.