



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 09:33 PM GMT

PDB ID : 1PKJ
Title : Structural basis for recognition and catalysis by the bifunctional dCTP deaminase and dUTPase from *Methanococcus jannaschii*
Authors : Huffman, J.L.; Li, H.; White, R.H.; Tainer, J.A.
Deposited on : 2003-06-05
Resolution : 2.10 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

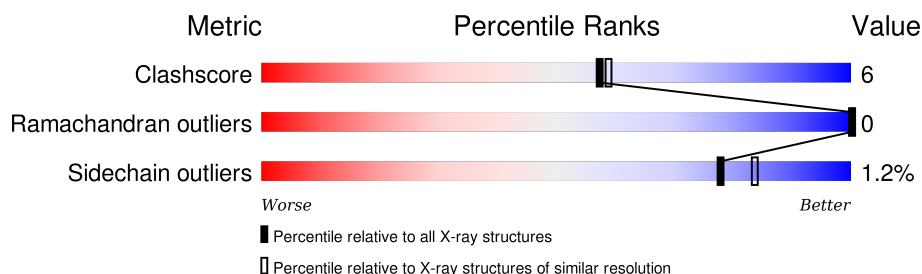
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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	102246	4460 (2.10-2.10)
Ramachandran outliers	100387	4413 (2.10-2.10)
Sidechain outliers	100360	4414 (2.10-2.10)

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 ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	204	 75% 12% • 12%
1	B	204	 74% 12% 14%

2 Entry composition [i](#)

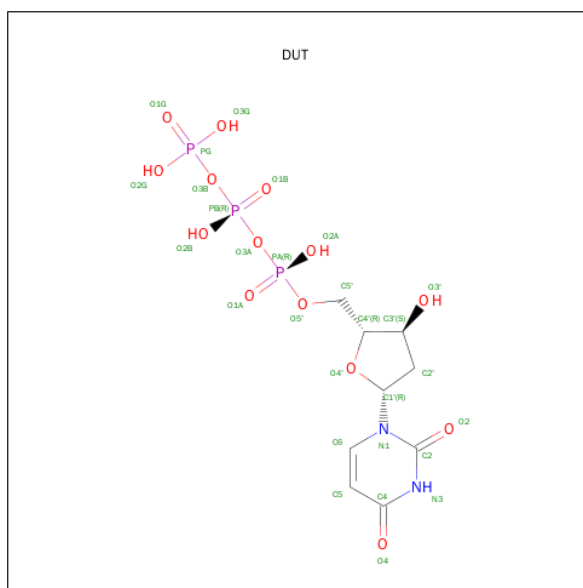
There are 4 unique types of molecules in this entry. The entry contains 3161 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Bifunctional deaminase/diphosphatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	180	Total	C	N	O	S	0	0	0
			1456	943	232	278	3			
1	B	175	Total	C	N	O	S	0	0	0
			1414	918	224	269	3			

- Molecule 2 is DEOXYURIDINE-5'-TRIPHOSPHATE (three-letter code: DUT) (formula: $C_9H_{15}N_2O_{14}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	N	O	P	0	0
			28	9	2	14	3		

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is water.

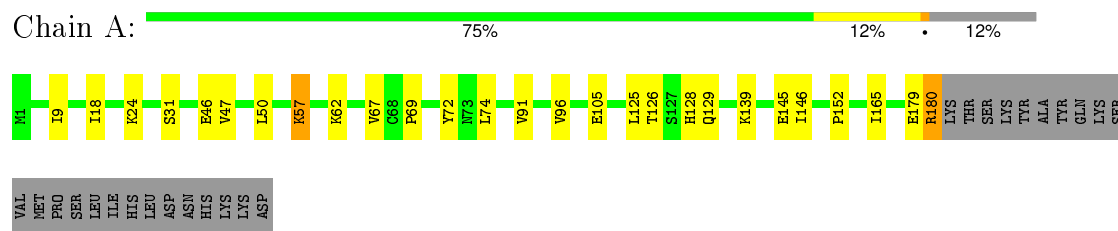
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	133	Total	O	0	0
			133	133		
4	B	122	Total	O	0	0
			122	122		

3 Residue-property plots [i](#)

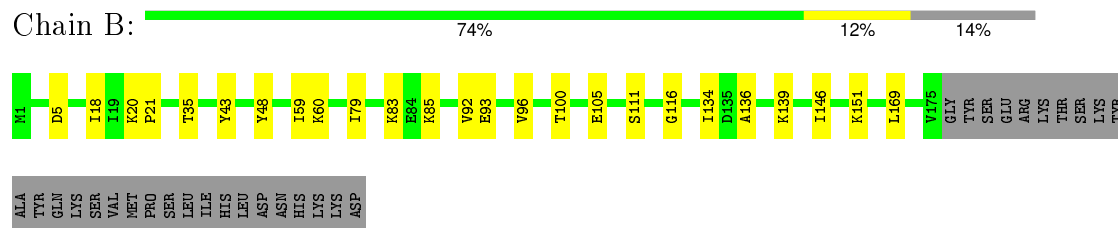
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according 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.

Note EDS was not executed.

- Molecule 1: Bifunctional deaminase/diphosphatase



- Molecule 1: Bifunctional deaminase/diphosphatase



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 21 3	Depositor
Cell constants a, b, c, α , β , γ	110.74Å 110.74Å 110.74Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.14 – 2.10	Depositor
% Data completeness (in resolution range)	97.0 (20.14-2.10)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.193 , 0.233	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3161	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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

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	0.36	0/1485	0.60	0/2008
1	B	0.34	0/1442	0.60	0/1951
All	All	0.35	0/2927	0.60	0/3959

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

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	1456	0	1467	21	0
1	B	1414	0	1431	18	0
2	B	28	0	11	1	0
3	A	4	0	6	0	0
3	B	4	0	6	0	0
4	A	133	0	0	3	0
4	B	122	0	0	2	0
All	All	3161	0	2921	35	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 6.

All (35) 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:105:GLU:HG2	1:A:139:LYS:HG2	1.54	0.88
1:A:18:ILE:HB	1:A:105:GLU:HB2	1.58	0.86
1:A:129:GLN:HB2	4:A:508:HOH:O	1.89	0.72
1:B:18:ILE:HB	1:B:105:GLU:HB2	1.72	0.71
1:A:31:SER:HB3	1:A:165:ILE:HD13	1.78	0.66
1:A:46:GLU:HG2	1:A:47:VAL:HG13	1.78	0.64
1:A:180:ARG:HH12	1:B:60:LYS:HB2	1.66	0.60
1:B:111:SER:HB2	1:B:169:LEU:HD21	1.88	0.55
1:A:57:LYS:HD3	1:A:57:LYS:N	2.23	0.54
1:B:79:ILE:HG22	1:B:83:LYS:HE3	1.91	0.52
1:A:74:LEU:HD13	1:A:91:VAL:HG12	1.92	0.51
1:B:43:TYR:HD2	1:B:48:TYR:HH	1.60	0.48
1:A:179:GLU:HG2	1:B:59:ILE:CD1	2.43	0.48
1:A:125:LEU:C	1:A:125:LEU:HD13	2.34	0.47
1:B:151:LYS:HE3	4:B:509:HOH:O	2.14	0.47
1:B:79:ILE:CG2	1:B:83:LYS:HE3	2.45	0.46
1:A:129:GLN:HE22	1:A:145:GLU:HB3	1.81	0.46
1:B:134:ILE:HG23	2:B:250:DUT:H2'2	1.98	0.45
1:A:129:GLN:NE2	4:A:508:HOH:O	2.46	0.45
1:B:35:THR:O	1:B:100:THR:HA	2.17	0.45
1:B:96:VAL:HG13	1:B:146:ILE:HB	1.99	0.44
1:A:62:LYS:HG3	4:A:534:HOH:O	2.17	0.44
1:A:62:LYS:NZ	1:A:62:LYS:HB3	2.32	0.44
1:A:96:VAL:HG13	1:A:146:ILE:HB	2.00	0.43
1:B:105:GLU:HG2	1:B:139:LYS:HG2	2.00	0.43
1:A:180:ARG:HH12	1:B:60:LYS:CB	2.32	0.43
1:A:67:VAL:O	1:A:152:PRO:HA	2.18	0.42
1:A:50:LEU:HD22	1:B:85:LYS:HE3	2.01	0.42
1:A:9:ILE:HD12	1:A:24:LYS:HE2	2.01	0.41
1:B:136:ALA:HB2	1:B:169:LEU:HD11	2.03	0.41
1:B:116:GLY:HA3	4:B:351:HOH:O	2.20	0.41
1:B:92:VAL:HG22	1:B:93:GLU:N	2.36	0.41
1:A:126:THR:O	1:A:146:ILE:HA	2.21	0.41
1:A:69:PRO:O	1:A:72:TYR:HB2	2.21	0.41
1:B:20:LYS:HA	1:B:21:PRO:HA	1.94	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	178/204 (87%)	173 (97%)	5 (3%)	0	100	100
1	B	173/204 (85%)	168 (97%)	5 (3%)	0	100	100
All	All	351/408 (86%)	341 (97%)	10 (3%)	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	163/186 (88%)	160 (98%)	3 (2%)	66	72
1	B	159/186 (86%)	158 (99%)	1 (1%)	90	94
All	All	322/372 (87%)	318 (99%)	4 (1%)	78	84

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	57	LYS
1	A	128	HIS
1	A	180	ARG
1	B	5	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	73	ASN
1	A	101	ASN
1	A	113	GLN
1	A	115	GLN
1	A	129	GLN
1	A	158	ASN
1	B	55	ASN
1	B	73	ASN
1	B	101	ASN
1	B	113	GLN
1	B	115	GLN
1	B	158	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

3 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	EDO	A	298	-	3,3,3	0.65	0	2,2,2	0.28	0
2	DUT	B	250	-	20,29,29	2.34	9 (45%)	32,45,45	2.68	5 (15%)
3	EDO	B	299	-	3,3,3	0.64	0	2,2,2	0.28	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
3	EDO	A	298	-	-	0/1/1/1	0/0/0/0
2	DUT	B	250	-	-	0/18/34/34	0/2/2/2
3	EDO	B	299	-	-	0/1/1/1	0/0/0/0

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	250	DUT	PB-O2B	2.10	1.63	1.54
2	B	250	DUT	PA-O2A	2.43	1.65	1.54
2	B	250	DUT	PG-O3G	2.76	1.64	1.54
2	B	250	DUT	PG-O2G	2.98	1.65	1.54
2	B	250	DUT	PA-O1A	3.48	1.63	1.51
2	B	250	DUT	C6-N1	3.76	1.41	1.35
2	B	250	DUT	PB-O1B	3.84	1.65	1.51
2	B	250	DUT	C4-N3	4.12	1.40	1.33
2	B	250	DUT	PG-O1G	4.18	1.64	1.51

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	250	DUT	PB-O3B-PG	-4.22	118.53	132.67
2	B	250	DUT	C5-C4-N3	-3.14	115.05	123.12
2	B	250	DUT	O4'-C1'-N1	3.36	113.53	107.72
2	B	250	DUT	PB-O3A-PA	3.91	143.71	132.73
2	B	250	DUT	C4-N3-C2	12.35	126.37	114.14

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	250	DUT	1	0

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](#)

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates [i](#)

EDS was not executed - this section will therefore be empty.

6.4 Ligands [i](#)

EDS was not executed - this section will therefore be empty.

6.5 Other polymers [i](#)

EDS was not executed - this section will therefore be empty.