



Full wwPDB NMR Structure Validation Report ⓘ

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PDB ID : 1Q3T / pdb_00001q3t
Title : Solution structure and function of an essential CMP kinase of *Streptococcus pneumoniae*
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This is a Full wwPDB NMR Structure Validation Report for a publicly released PDB entry.

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

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
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

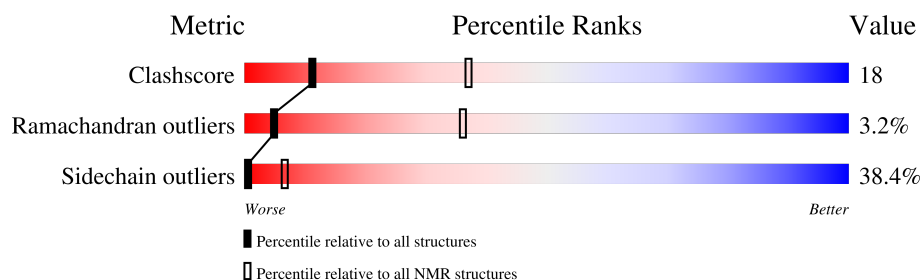
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	229148	14424
Ramachandran outliers	224038	12848
Sidechain outliers	223484	12823

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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	236	

2 Ensemble composition and analysis ⓘ

This entry contains 1 models. Identification of well-defined residues and clustering analysis are not possible.

3 Entry composition

There is only 1 type of molecule in this entry. The entry contains 3482 atoms, of which 1754 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Cytidylate kinase.

Mol	Chain	Residues	Atoms						Trace
1	A	223	Total	C	H	N	O	S	0
			3482	1083	1754	296	344	5	

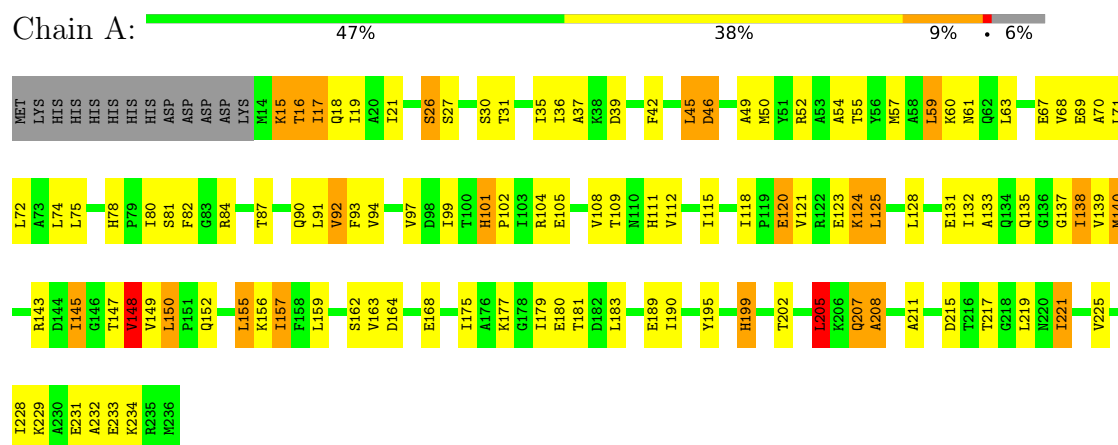
There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	expression tag	UNP Q97PK6
A	2	LYS	-	expression tag	UNP Q97PK6
A	3	HIS	-	expression tag	UNP Q97PK6
A	4	HIS	-	expression tag	UNP Q97PK6
A	5	HIS	-	expression tag	UNP Q97PK6
A	6	HIS	-	expression tag	UNP Q97PK6
A	7	HIS	-	expression tag	UNP Q97PK6
A	8	HIS	-	expression tag	UNP Q97PK6
A	9	ASP	-	expression tag	UNP Q97PK6
A	10	ASP	-	expression tag	UNP Q97PK6
A	11	ASP	-	expression tag	UNP Q97PK6
A	12	ASP	-	expression tag	UNP Q97PK6
A	13	LYS	-	expression tag	UNP Q97PK6

4 Residue-property plots [i](#)

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

• Molecule 1: Cytidylate kinase



5 Refinement protocol and experimental data overview ⓘ

The models were refined using the following method: *simulated annealing*.

Of the 20 calculated structures, 1 were deposited, based on the following criterion: *MINIMIZED AVERAGE STRUCTURE*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
CNX	refinement	2000
CNX	structure solution	2000

No chemical shift data was provided.

6 Model quality

6.1 Standard geometry

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	1728	1754	1753	63
All	All	1728	1754	1753	63

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 18.

All clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:67:GLU:CG	1:A:70:ALA:HB3	0.80	2.06
1:A:82:PHE:CE1	1:A:92:VAL:HG22	0.76	2.15
1:A:208:ALA:HB3	1:A:211:ALA:HB2	0.74	1.57
1:A:145:ILE:HG22	1:A:150:LEU:HD23	0.71	1.63
1:A:16:THR:HG22	1:A:137:GLY:HA3	0.71	1.62
1:A:57:MET:HE3	1:A:78:HIS:CE1	0.70	2.22
1:A:80:ILE:HG12	1:A:94:VAL:HG23	0.67	1.64
1:A:45:LEU:HD12	1:A:46:ASP:N	0.65	2.07
1:A:37:ALA:HB1	1:A:42:PHE:O	0.64	1.93
1:A:17:ILE:HD13	1:A:17:ILE:N	0.60	2.11
1:A:75:LEU:HD22	1:A:125:LEU:HD21	0.59	1.73
1:A:138:ILE:HD11	1:A:140:MET:SD	0.59	2.37
1:A:155:LEU:CD2	1:A:232:ALA:HB2	0.58	2.29
1:A:52:ARG:HD3	1:A:108:VAL:HG11	0.56	1.77
1:A:67:GLU:HG2	1:A:70:ALA:HB3	0.56	1.78

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Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:19:ILE:HD13	1:A:155:LEU:CB	0.55	2.32
1:A:57:MET:HE2	1:A:94:VAL:HG22	0.55	1.77
1:A:156:LYS:C	1:A:157:ILE:HD13	0.54	2.28
1:A:18:GLN:HG2	1:A:133:ALA:HB1	0.54	1.78
1:A:59:LEU:HD21	1:A:111:HIS:CG	0.54	2.37
1:A:61:ASN:O	1:A:63:LEU:HD22	0.54	2.02
1:A:19:ILE:HB	1:A:139:VAL:HG12	0.54	1.79
1:A:18:GLN:CG	1:A:133:ALA:HB1	0.52	2.33
1:A:19:ILE:HD13	1:A:155:LEU:HB3	0.52	1.81
1:A:31:THR:HG21	1:A:221:ILE:HG21	0.52	1.81
1:A:54:ALA:HB2	1:A:125:LEU:HD11	0.52	1.81
1:A:19:ILE:HG22	1:A:19:ILE:O	0.50	2.05
1:A:63:LEU:HD12	1:A:67:GLU:HG2	0.50	1.84
1:A:155:LEU:HD21	1:A:232:ALA:HB2	0.49	1.83
1:A:36:ILE:HD11	1:A:228:ILE:HG21	0.49	1.82
1:A:72:LEU:HD22	1:A:120:GLU:HG2	0.48	1.86
1:A:72:LEU:HD11	1:A:124:LYS:HD2	0.48	1.86
1:A:138:ILE:C	1:A:138:ILE:HD12	0.47	2.34
1:A:147:THR:O	1:A:148:VAL:HG13	0.47	2.09
1:A:155:LEU:HD21	1:A:232:ALA:CB	0.46	2.40
1:A:63:LEU:HD11	1:A:67:GLU:OE2	0.46	2.10
1:A:93:PHE:CD1	1:A:93:PHE:N	0.46	2.83
1:A:150:LEU:HD13	1:A:156:LYS:HB3	0.45	1.88
1:A:155:LEU:HD21	1:A:232:ALA:CA	0.45	2.42
1:A:49:ALA:CB	1:A:82:PHE:CZ	0.45	3.00
1:A:195:TYR:CE2	1:A:199:HIS:ND1	0.45	2.85
1:A:36:ILE:HD11	1:A:228:ILE:CG2	0.44	2.41
1:A:45:LEU:HD12	1:A:45:LEU:C	0.44	2.38
1:A:52:ARG:CG	1:A:108:VAL:HG11	0.44	2.42
1:A:133:ALA:HB2	1:A:138:ILE:HG12	0.44	1.90
1:A:157:ILE:HD13	1:A:157:ILE:N	0.43	2.28
1:A:49:ALA:HB3	1:A:82:PHE:CZ	0.43	2.48
1:A:72:LEU:HD22	1:A:120:GLU:CG	0.43	2.43
1:A:16:THR:HG22	1:A:137:GLY:CA	0.43	2.41
1:A:52:ARG:CD	1:A:108:VAL:HG11	0.43	2.42
1:A:68:VAL:HG23	1:A:118:ILE:HG21	0.43	1.90
1:A:35:ILE:CD1	1:A:225:VAL:HG21	0.42	2.45
1:A:45:LEU:CD2	1:A:140:MET:HE3	0.42	2.44
1:A:147:THR:C	1:A:148:VAL:HG22	0.42	2.39
1:A:68:VAL:HG13	1:A:69:GLU:N	0.42	2.29
1:A:42:PHE:CD1	1:A:137:GLY:CA	0.41	3.03
1:A:139:VAL:HG23	1:A:139:VAL:O	0.41	2.14

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Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:35:ILE:HD12	1:A:225:VAL:HG21	0.41	1.93
1:A:101:HIS:N	1:A:102:PRO:CD	0.41	2.84
1:A:42:PHE:CD1	1:A:137:GLY:HA2	0.41	2.51
1:A:63:LEU:HB3	1:A:71:LEU:HD13	0.41	1.93
1:A:74:LEU:CD2	1:A:78:HIS:NE2	0.40	2.84
1:A:205:LEU:N	1:A:205:LEU:CD1	0.40	2.85

6.3 Torsion angles [i](#)

6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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	221/236 (94%)	189 (86%)	25 (11%)	7 (3%)	5	36
All	All	221/236 (94%)	189 (86%)	25 (11%)	7 (3%)	5	36

All 7 Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
1	A	15	LYS
1	A	26	SER
1	A	104	ARG
1	A	148	VAL
1	A	205	LEU
1	A	207	GLN
1	A	208	ALA

6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	185/198 (93%)	114 (62%)	71 (38%)	0	7
All	All	185/198 (93%)	114 (62%)	71 (38%)	0	7

All 71 residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
1	A	15	LYS
1	A	16	THR
1	A	17	ILE
1	A	21	ILE
1	A	26	SER
1	A	27	SER
1	A	30	SER
1	A	39	ASP
1	A	45	LEU
1	A	46	ASP
1	A	50	MET
1	A	55	THR
1	A	59	LEU
1	A	60	LYS
1	A	81	SER
1	A	84	ARG
1	A	87	THR
1	A	90	GLN
1	A	91	LEU
1	A	92	VAL
1	A	97	VAL
1	A	99	ILE
1	A	101	HIS
1	A	105	GLU
1	A	109	THR
1	A	112	VAL
1	A	115	ILE
1	A	120	GLU
1	A	121	VAL
1	A	123	GLU
1	A	124	LYS
1	A	125	LEU
1	A	128	LEU
1	A	131	GLU
1	A	132	ILE
1	A	135	GLN

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Mol	Chain	Res	Type
1	A	138	ILE
1	A	140	MET
1	A	143	ARG
1	A	145	ILE
1	A	148	VAL
1	A	149	VAL
1	A	150	LEU
1	A	152	GLN
1	A	155	LEU
1	A	157	ILE
1	A	159	LEU
1	A	162	SER
1	A	163	VAL
1	A	164	ASP
1	A	168	GLU
1	A	175	ILE
1	A	177	LYS
1	A	179	ILE
1	A	180	GLU
1	A	181	THR
1	A	183	LEU
1	A	189	GLU
1	A	190	ILE
1	A	199	HIS
1	A	202	THR
1	A	205	LEU
1	A	207	GLN
1	A	215	ASP
1	A	217	THR
1	A	219	LEU
1	A	221	ILE
1	A	229	LYS
1	A	231	GLU
1	A	233	GLU
1	A	234	LYS

6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.6 Ligand geometry [i](#)

There are no ligands in this entry.

6.7 Other polymers [i](#)

There are no such molecules in this entry.

6.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided