



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 06:58 AM UTC

PDB ID : 5TZ5 / pdb_00005tz5
Title : Crystal Structure of CurK Dehydratase H996F Inactive Mutant
Authors : Dodge, G.J.; Smith, J.L.
Deposited on : 2016-11-21
Resolution : 1.43 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

<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>.

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

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

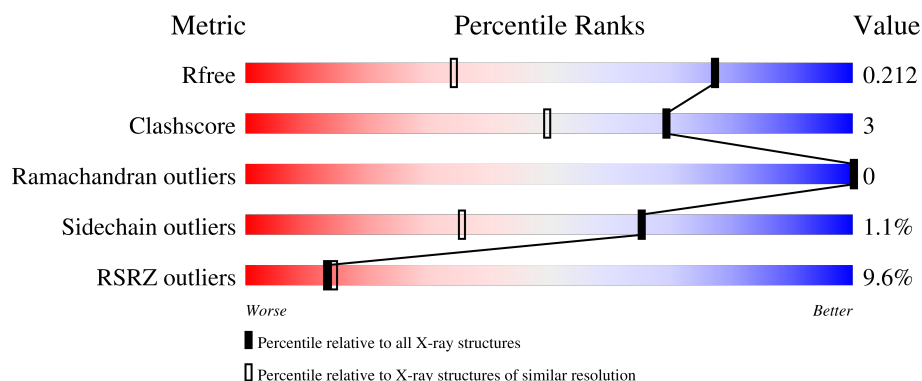
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.43 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}	180053	4041 (1.44-1.40)
Clashscore	190562	4154 (1.44-1.40)
Ramachandran outliers	187476	4083 (1.44-1.40)
Sidechain outliers	187428	4082 (1.44-1.40)
RSRZ outliers	180081	4039 (1.44-1.40)

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 ≥ 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	296	9% 87% 8% 5%
1	B	296	9% 86% 8% 6%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4612 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 CurK.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	281	Total	C	N	O	S	0	5	0
			2233	1419	375	438	1			
1	B	279	Total	C	N	O	S	4	3	0
			2211	1409	373	428	1			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	955	SER	-	expression tag	UNP F4Y425
A	956	ASN	-	expression tag	UNP F4Y425
A	957	ALA	-	expression tag	UNP F4Y425
A	996	PHE	HIS	engineered mutation	UNP F4Y425
B	955	SER	-	expression tag	UNP F4Y425
B	956	ASN	-	expression tag	UNP F4Y425
B	957	ALA	-	expression tag	UNP F4Y425
B	996	PHE	HIS	engineered mutation	UNP F4Y425

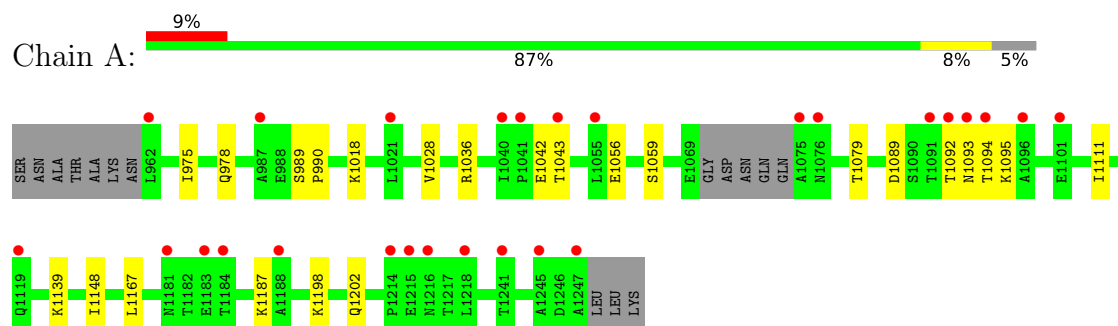
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	105	Total	O	0	0
			105	105		
2	B	63	Total	O	0	0
			63	63		

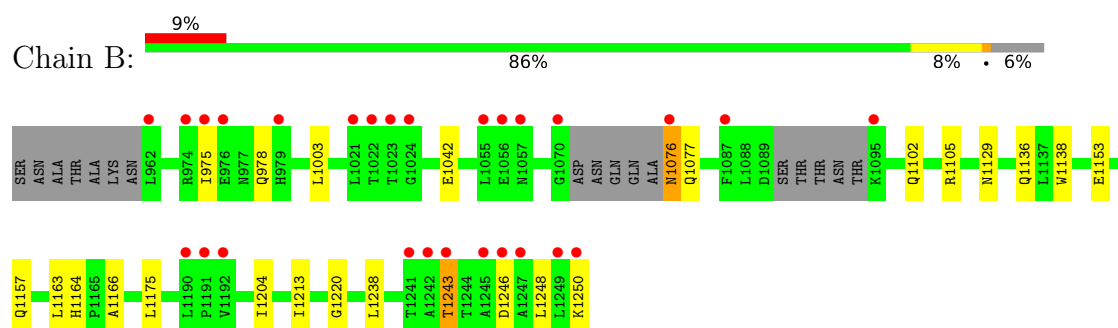
3 Residue-property plots [i](#)

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 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.

• Molecule 1: CurK



• Molecule 1: CurK



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	38.11Å 94.57Å 152.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.15 – 1.43 40.15 – 1.43	Depositor EDS
% Data completeness (in resolution range)	97.2 (40.15-1.43) 97.2 (40.15-1.43)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.93 (at 1.43Å)	Xtriage
Refinement program	PHENIX 1.10_2155	Depositor
R, R_{free}	0.187 , 0.211 0.190 , 0.212	Depositor DCC
R_{free} test set	4989 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å ²)	19.4	Xtriage
Anisotropy	0.044	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 32.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	4612	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.07% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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](#)

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	0.71	0/2270	0.85	3/3082 (0.1%)
1	B	0.63	1/2247 (0.0%)	0.74	2/3046 (0.1%)
All	All	0.67	1/4517 (0.0%)	0.80	5/6128 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	1243	THR	CB-CG2	-5.15	1.35	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1093	ASN	N-CA-C	7.38	122.34	111.34
1	A	1092	THR	N-CA-C	-7.24	99.17	109.96
1	B	1243	THR	CB-CA-C	-7.05	106.17	116.53
1	B	1243	THR	CA-C-O	6.09	122.17	118.33
1	A	1089	ASP	O-C-N	-5.71	115.93	123.13

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	2233	0	2237	12	0
1	B	2211	0	2223	19	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	105	0	0	0	0
2	B	63	0	0	1	0
All	All	4612	0	4460	31	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 3.

All (31) 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:B:1164:HIS:HD2	1:B:1166:ALA:H	1.12	0.97
1:A:1042:GLU:HG2	1:A:1043:THR:HG23	1.50	0.93
1:B:1129[B]:ASN:ND2	1:B:1153:GLU:OE2	2.10	0.85
1:B:1102:GLN:OE1	1:B:1105:ARG:NH2	2.14	0.75
1:B:1042:GLU:OE1	2:B:1301:HOH:O	2.05	0.73
1:B:1175:LEU:HD11	1:B:1238:LEU:HD21	1.71	0.71
1:B:1164:HIS:CD2	1:B:1166:ALA:H	2.03	0.67
1:B:1213:ILE:HD13	1:B:1220:GLY:HA3	1.77	0.67
1:A:1018:LYS:HE3	1:A:1202:GLN:NE2	2.12	0.65
1:B:1136:GLN:HE21	1:B:1138:TRP:HE1	1.44	0.64
1:B:1175:LEU:HD21	1:B:1238:LEU:HD23	1.83	0.59
1:A:1056:GLU:HG2	1:A:1059:SER:HB3	1.83	0.59
1:B:1163:LEU:HD21	1:B:1204:ILE:HD12	1.85	0.59
1:A:1036:ARG:HD2	1:A:1079:THR:CG2	2.35	0.57
1:B:1157:GLN:OE1	1:B:1164:HIS:HE1	1.88	0.56
1:B:1003:LEU:HD21	1:B:1248:LEU:HB3	1.91	0.52
1:B:1164:HIS:HD2	1:B:1166:ALA:N	1.95	0.52
1:A:1148:ILE:HG22	1:A:1167[B]:LEU:HD11	1.93	0.50
1:B:975:ILE:HG22	1:B:978:GLN:HB2	1.93	0.50
1:B:1246[B]:ASP:O	1:B:1250:LYS:HG2	2.12	0.49
1:B:1246[A]:ASP:O	1:B:1250:LYS:HG2	2.13	0.47
1:A:1018:LYS:HE3	1:A:1202:GLN:HE22	1.80	0.47
1:A:1028:VAL:HG22	1:A:1198:LYS:HE3	1.96	0.47
1:A:1202:GLN:HA	1:A:1202:GLN:OE1	2.18	0.43
1:A:1111:ILE:HD11	1:A:1139:LYS:HE2	2.01	0.43
1:B:1076:ASN:HB2	1:B:1077:GLN:H	1.56	0.42
1:A:989:SER:HA	1:A:990:PRO:C	2.44	0.42
1:A:975:ILE:CG2	1:A:978:GLN:HB3	2.50	0.42
1:A:1148:ILE:HG22	1:A:1167[B]:LEU:CD1	2.50	0.41
1:B:975:ILE:CG2	1:B:978:GLN:HB2	2.50	0.41
1:B:1076:ASN:OD1	1:B:1076:ASN:N	2.53	0.41

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	282/296 (95%)	276 (98%)	6 (2%)	0	100	100
1	B	276/296 (93%)	268 (97%)	8 (3%)	0	100	100
All	All	558/592 (94%)	544 (98%)	14 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	243/250 (97%)	240 (99%)	3 (1%)	63	32
1	B	239/250 (96%)	237 (99%)	2 (1%)	73	47
All	All	482/500 (96%)	477 (99%)	5 (1%)	65	39

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1094	THR
1	A	1095	LYS
1	A	1187	LYS
1	B	1076	ASN
1	B	1243	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	978	GLN
1	A	1026	GLN
1	A	1058	ASN
1	A	1104	GLN
1	A	1115	GLN
1	A	1162	GLN
1	B	979	HIS
1	B	1000	ASN
1	B	1019	ASN
1	B	1104	GLN
1	B	1118	GLN
1	B	1136	GLN
1	B	1164	HIS

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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 ⓘ

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, 95th 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 ²)	Q < 0.9
1	A	281/296 (94%)	0.40	27 (9%)	13 14	7, 22, 53, 87	7 (2%)
1	B	279/296 (94%)	0.55	27 (9%)	13 14	11, 26, 49, 81	7 (2%)
All	All	560/592 (94%)	0.47	54 (9%)	13 14	7, 24, 51, 87	14 (2%)

All (54) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1075	ALA	6.5
1	A	1092	THR	4.7
1	A	1094	THR	4.6
1	B	1190	LEU	4.0
1	B	1250	LYS	3.9
1	B	1247	ALA	3.6
1	A	1021	LEU	3.5
1	A	1181	ASN	3.5
1	B	1087	PHE	3.5
1	A	1245	ALA	3.4
1	B	1243	THR	3.4
1	A	1091	THR	3.3
1	A	1247	ALA	3.2
1	B	975	ILE	3.1
1	A	1184	THR	3.1
1	B	1056	GLU	3.1
1	A	1041	PRO	3.1
1	B	962	LEU	3.1
1	B	1022	THR	3.0
1	A	1216	ASN	2.9
1	B	1057	ASN	2.9
1	A	1076	ASN	2.8
1	B	1095	LYS	2.8
1	B	1024	GLY	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	962	LEU	2.8
1	B	1192	VAL	2.8
1	B	1249	LEU	2.8
1	B	1076	ASN	2.8
1	A	1055	LEU	2.7
1	B	1070	GLY	2.7
1	B	1241	THR	2.6
1	B	1021	LEU	2.6
1	B	1023	THR	2.6
1	B	1055	LEU	2.6
1	A	1119	GLN	2.5
1	B	1191	PRO	2.4
1	B	1246[A]	ASP	2.3
1	A	1093	ASN	2.3
1	A	1188	ALA	2.3
1	B	1245	ALA	2.3
1	A	987	ALA	2.3
1	A	1214	PRO	2.2
1	A	1241	THR	2.2
1	B	976	GLU	2.2
1	A	1043	THR	2.2
1	B	974	ARG	2.2
1	A	1101	GLU	2.2
1	A	1183	GLU	2.2
1	B	1242	ALA	2.1
1	B	979	HIS	2.1
1	A	1215	GLU	2.1
1	A	1040	ILE	2.0
1	A	1096	ALA	2.0
1	A	1218	LEU	2.0

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.