



wwPDB X-ray Structure Validation Summary Report ⓘ

Apr 25, 2026 – 06:26 AM EDT

PDB ID : 2FIQ / pdb_00002fiq
Title : Crystal structure of putative tagatose 6-phosphate kinase
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Research Center for Structural Genomics (NYSGXRC)
Deposited on : 2005-12-30
Resolution : 2.25 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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
Mogul	:	2022.3.0, CSD as543be (2022)
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

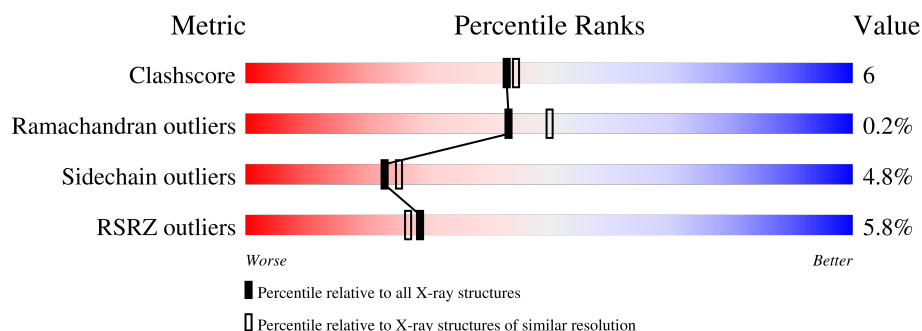
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	420	4% 84% 12% • •
1	B	420	4% 79% 15% • •
1	C	420	2% 86% 10% • •
1	D	420	12% 82% 13% • •

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 13793 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 putative tagatose 6-phosphate kinase 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	410	Total	C	N	O	S	Se	0	3	0
			3270	2074	570	607	9	10			
1	B	408	Total	C	N	O	S	Se	0	3	0
			3242	2058	565	601	8	10			
1	C	410	Total	C	N	O	S	Se	0	7	0
			3285	2084	576	606	9	10			
1	D	409	Total	C	N	O	S	Se	4	4	0
			3272	2075	572	606	9	10			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	MET	modified residue	UNP P37191
A	59	MSE	MET	modified residue	UNP P37191
A	103	MSE	MET	modified residue	UNP P37191
A	127	MSE	MET	modified residue	UNP P37191
A	252	MSE	MET	modified residue	UNP P37191
A	319	MSE	MET	modified residue	UNP P37191
A	365	MSE	MET	modified residue	UNP P37191
A	366	MSE	MET	modified residue	UNP P37191
A	378	MSE	MET	modified residue	UNP P37191
A	404	MSE	MET	modified residue	UNP P37191
B	1	MSE	MET	modified residue	UNP P37191
B	59	MSE	MET	modified residue	UNP P37191
B	103	MSE	MET	modified residue	UNP P37191
B	127	MSE	MET	modified residue	UNP P37191
B	252	MSE	MET	modified residue	UNP P37191
B	319	MSE	MET	modified residue	UNP P37191
B	365	MSE	MET	modified residue	UNP P37191
B	366	MSE	MET	modified residue	UNP P37191
B	378	MSE	MET	modified residue	UNP P37191
B	404	MSE	MET	modified residue	UNP P37191
C	1	MSE	MET	modified residue	UNP P37191

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Chain	Residue	Modelled	Actual	Comment	Reference
C	59	MSE	MET	modified residue	UNP P37191
C	103	MSE	MET	modified residue	UNP P37191
C	127	MSE	MET	modified residue	UNP P37191
C	252	MSE	MET	modified residue	UNP P37191
C	319	MSE	MET	modified residue	UNP P37191
C	365	MSE	MET	modified residue	UNP P37191
C	366	MSE	MET	modified residue	UNP P37191
C	378	MSE	MET	modified residue	UNP P37191
C	404	MSE	MET	modified residue	UNP P37191
D	1	MSE	MET	modified residue	UNP P37191
D	59	MSE	MET	modified residue	UNP P37191
D	103	MSE	MET	modified residue	UNP P37191
D	127	MSE	MET	modified residue	UNP P37191
D	252	MSE	MET	modified residue	UNP P37191
D	319	MSE	MET	modified residue	UNP P37191
D	365	MSE	MET	modified residue	UNP P37191
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D	378	MSE	MET	modified residue	UNP P37191
D	404	MSE	MET	modified residue	UNP P37191

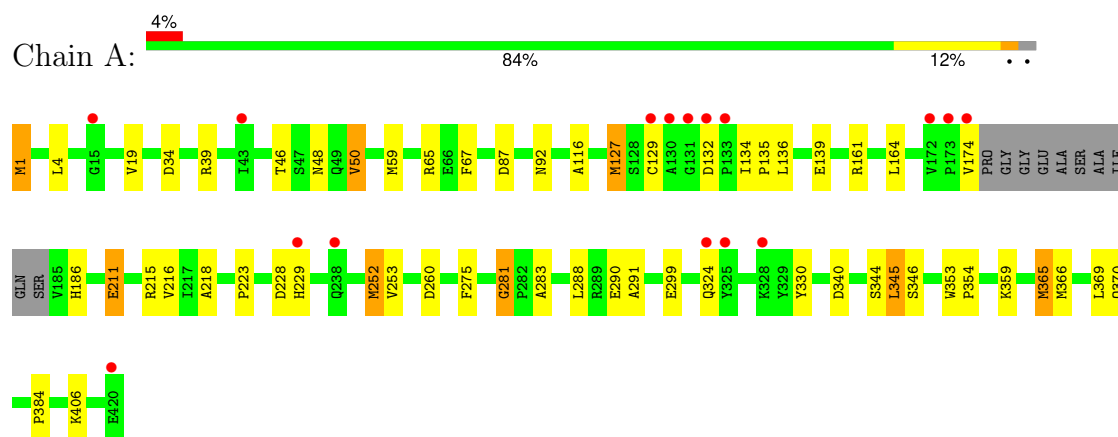
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	211	Total O 211 211	0	0
2	B	139	Total O 139 139	0	0
2	C	174	Total O 174 174	0	0
2	D	200	Total O 200 200	0	0

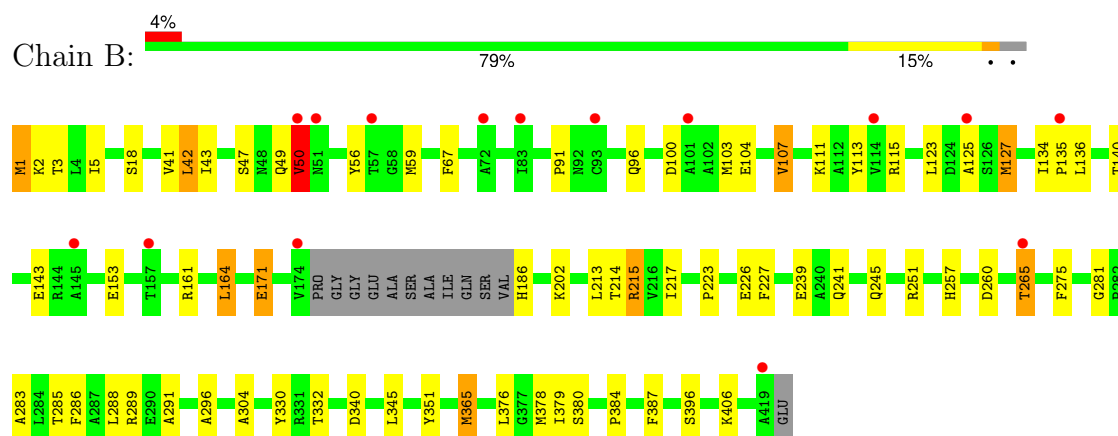
3 Residue-property plots [i](#)

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.

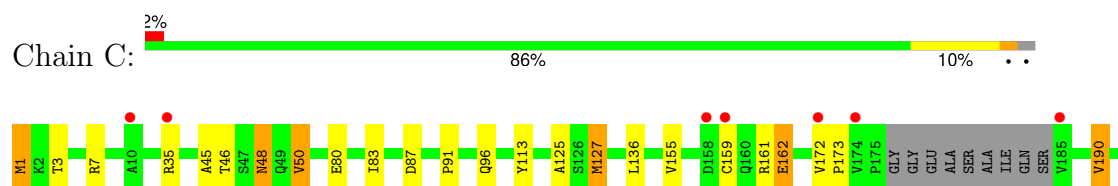
- Molecule 1: putative tagatose 6-phosphate kinase 1



- Molecule 1: putative tagatose 6-phosphate kinase 1

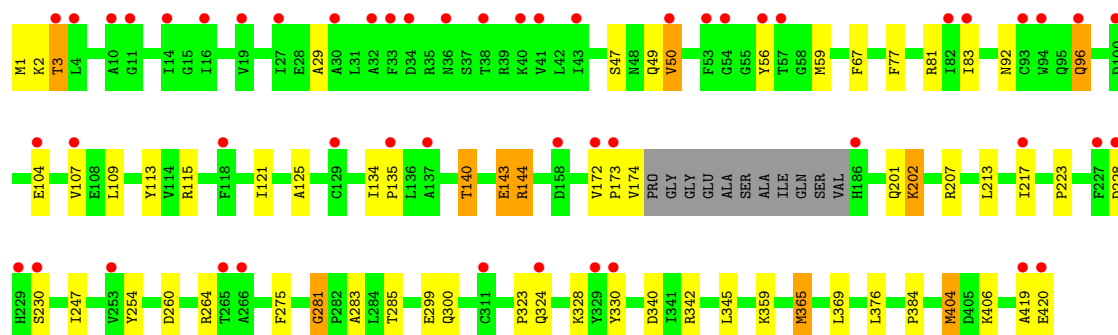
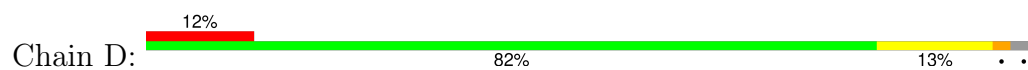


- Molecule 1: putative tagatose 6-phosphate kinase 1





- Molecule 1: putative tagatose 6-phosphate kinase 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	92.35Å 100.00Å 206.55Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.25 50.00 – 2.25	Depositor EDS
% Data completeness (in resolution range)	97.7 (50.00-2.25) 92.5 (50.00-2.25)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.05	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.47 (at 2.24Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.187 , 0.233 0.184 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	32.4	Xtriage
Anisotropy	0.482	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 48.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	13793	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.24% 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	0.80	2/3331 (0.1%)	0.91	3/4505 (0.1%)
1	B	0.77	3/3303 (0.1%)	0.93	2/4468 (0.0%)
1	C	0.78	0/3347	0.95	3/4528 (0.1%)
1	D	0.82	3/3333 (0.1%)	0.94	4/4506 (0.1%)
All	All	0.79	8/13314 (0.1%)	0.93	12/18007 (0.1%)

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	252	MSE	SE-CE	-9.44	1.67	1.95
1	B	365	MSE	SE-CE	-7.62	1.72	1.95
1	D	404	MSE	SE-CE	-6.89	1.74	1.95
1	D	207	ARG	C-O	6.11	1.32	1.24
1	D	115	ARG	CZ-NH1	5.43	1.40	1.32

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	365	MSE	CG-SE-CE	-8.22	80.84	98.92
1	C	404	MSE	CG-SE-CE	6.84	113.98	98.92
1	C	365	MSE	CG-SE-CE	-5.94	85.86	98.92
1	D	2	LYS	N-CA-C	-5.46	105.49	111.82
1	A	281	GLY	CA-C-N	5.30	125.36	119.32

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	3270	0	3228	36	0
1	B	3242	0	3203	47	0
1	C	3285	0	3249	37	0
1	D	3272	0	3231	43	0
2	A	211	0	0	2	0
2	B	139	0	0	2	0
2	C	174	0	0	4	0
2	D	200	0	0	5	0
All	All	13793	0	12911	160	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.

The worst 5 of 160 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:59:MSE:HE1	1:B:67:PHE:HB2	1.38	1.05
1:B:296:ALA:HA	1:B:365:MSE:HE2	1.42	1.00
1:D:59:MSE:HE1	1:D:67:PHE:CB	1.92	0.99
1:C:91:PRO:HD2	1:C:127:MSE:HE1	1.44	0.98
1:A:59:MSE:HE1	1:A:67:PHE:HB2	1.45	0.98

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	409/420 (97%)	399 (98%)	9 (2%)	1 (0%)	43 50
1	B	406/420 (97%)	394 (97%)	11 (3%)	1 (0%)	43 50

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	411/420 (98%)	399 (97%)	11 (3%)	1 (0%)	43	50
1	D	409/420 (97%)	403 (98%)	5 (1%)	1 (0%)	43	50
All	All	1635/1680 (97%)	1595 (98%)	36 (2%)	4 (0%)	43	50

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	281	GLY
1	A	281	GLY
1	B	281	GLY
1	C	281	GLY

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	346/339 (102%)	333 (96%)	13 (4%)	29	36
1	B	343/339 (101%)	318 (93%)	25 (7%)	13	12
1	C	348/339 (103%)	333 (96%)	15 (4%)	26	31
1	D	346/339 (102%)	330 (95%)	16 (5%)	24	28
All	All	1383/1356 (102%)	1314 (95%)	69 (5%)	23	24

5 of 69 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	104	GLU
1	D	121	ILE
1	D	342	ARG
1	B	164	LEU
1	B	143	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	335	ASN
1	D	36	ASN
1	B	335	ASN
1	B	370	GLN
1	C	48	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 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 [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, 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	400/420 (95%)	0.62	16 (4%) 42 42	18, 37, 47, 54	3 (0%)
1	B	398/420 (94%)	0.80	15 (3%) 44 44	18, 37, 47, 54	2 (0%)
1	C	400/420 (95%)	0.54	10 (2%) 58 59	15, 36, 46, 56	5 (1%)
1	D	399/420 (95%)	1.00	52 (13%) 7 6	17, 36, 46, 58	5 (1%)
All	All	1597/1680 (95%)	0.74	93 (5%) 29 27	15, 37, 47, 58	15 (0%)

The worst 5 of 93 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	173	PRO	4.3
1	D	56	TYR	3.5
1	A	324[A]	GLN	3.5
1	D	54	GLY	3.3
1	D	94	TRP	3.3

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 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.