



# wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 7, 2023 – 05:23 AM EST

PDB ID : 1F3W  
Title : RECOMBINANT RABBIT MUSCLE PYRUVATE KINASE  
Authors : Wooll, J.O.; Friesen, R.H.E.; White, M.A.; Watowich, S.J.; Fox, R.O.; Lee, J.C.; Czerwinski, E.W.  
Deposited on : 2000-06-06  
Resolution : 3.00 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](mailto:validation@mail.wwpdb.org)

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<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 : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

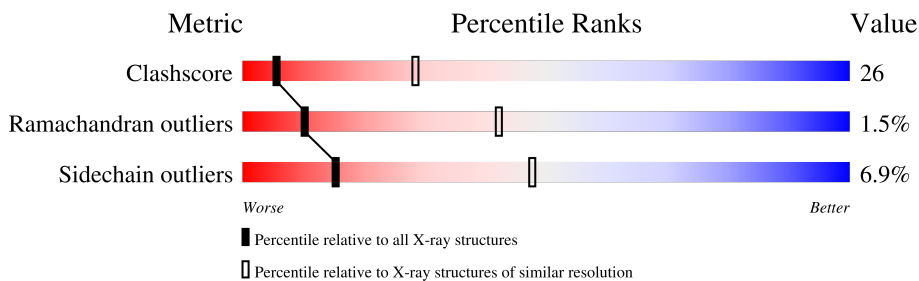
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.00 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	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)

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	530	
1	B	530	
1	C	530	
1	D	530	
1	E	530	
1	F	530	
1	G	530	
1	H	530	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	PYR	A	541	-	X	-	-
4	PYR	B	542	-	X	-	-
4	PYR	C	543	-	X	-	-
4	PYR	D	544	-	X	-	-
4	PYR	E	545	-	X	-	-
4	PYR	F	546	-	X	-	-
4	PYR	G	547	-	X	-	-
4	PYR	H	548	-	X	-	-

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 31728 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 PYRUVATE KINASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	519	3958	2484	704	742	28	0	0	0
1	B	519	3958	2484	704	742	28	0	0	0
1	C	519	3958	2484	704	742	28	0	0	0
1	D	519	3958	2484	704	742	28	0	0	0
1	E	519	3958	2484	704	742	28	0	0	0
1	F	519	3958	2484	704	742	28	0	0	0
1	G	519	3958	2484	704	742	28	0	0	0
1	H	519	3958	2484	704	742	28	0	0	0

- Molecule 2 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total 1	K 1	0	0
2	B	1	Total 1	K 1	0	0
2	C	1	Total 1	K 1	0	0
2	D	1	Total 1	K 1	0	0
2	E	1	Total 1	K 1	0	0
2	F	1	Total 1	K 1	0	0

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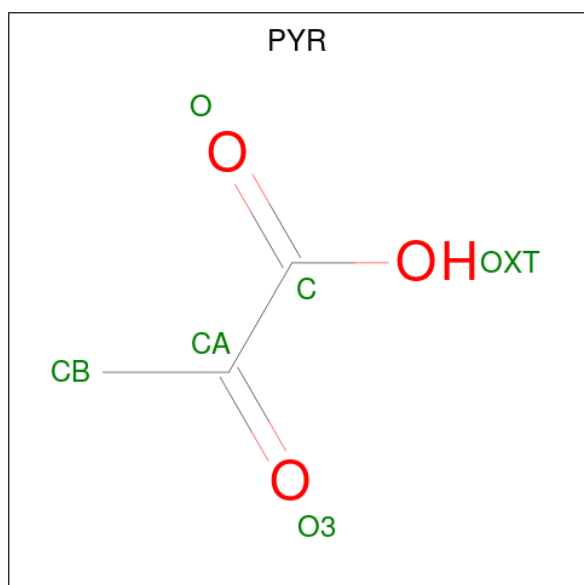
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	G	1	Total K 1 1	0	0
2	H	1	Total K 1 1	0	0

- Molecule 3 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mn 1 1	0	0
3	B	1	Total Mn 1 1	0	0
3	C	1	Total Mn 1 1	0	0
3	D	1	Total Mn 1 1	0	0
3	E	1	Total Mn 1 1	0	0
3	F	1	Total Mn 1 1	0	0
3	G	1	Total Mn 1 1	0	0
3	H	1	Total Mn 1 1	0	0

- Molecule 4 is PYRUVIC ACID (three-letter code: PYR) (formula: C<sub>3</sub>H<sub>4</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 6	C 3	O 3	0	0
4	B	1	Total 6	C 3	O 3	0	0
4	C	1	Total 6	C 3	O 3	0	0
4	D	1	Total 6	C 3	O 3	0	0
4	E	1	Total 6	C 3	O 3	0	0
4	F	1	Total 6	C 3	O 3	0	0
4	G	1	Total 6	C 3	O 3	0	0
4	H	1	Total 6	C 3	O 3	0	0

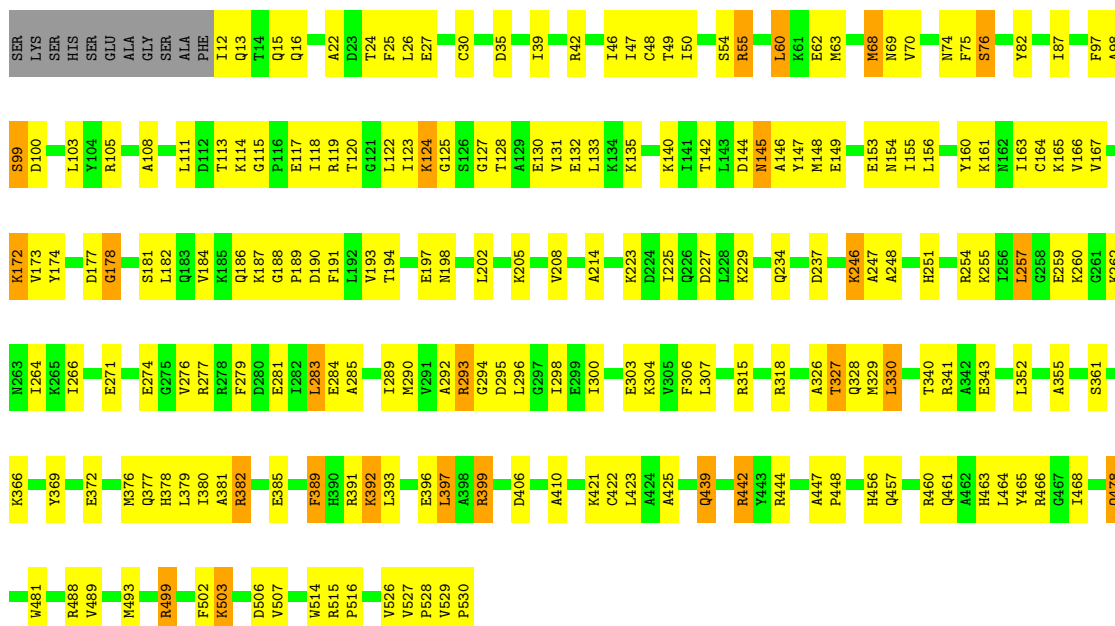
### 3 Residue-property plots

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.

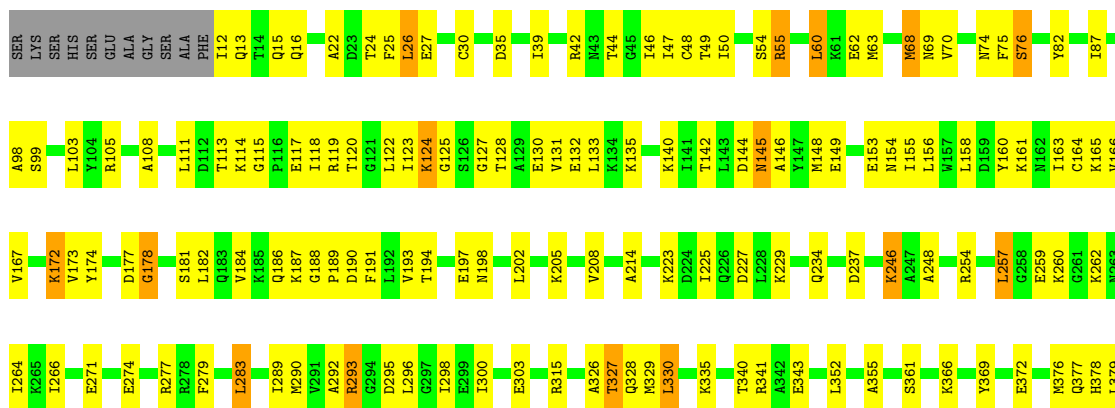
- Molecule 1: PYRUVATE KINASE

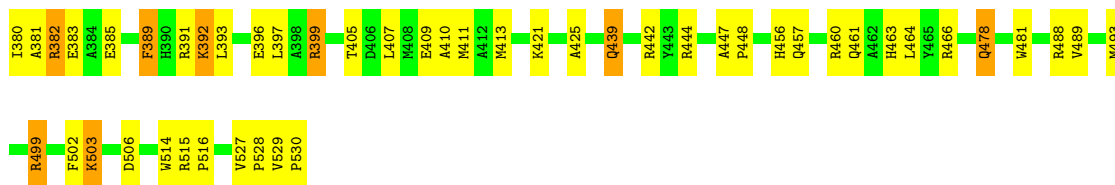
Chain A: 



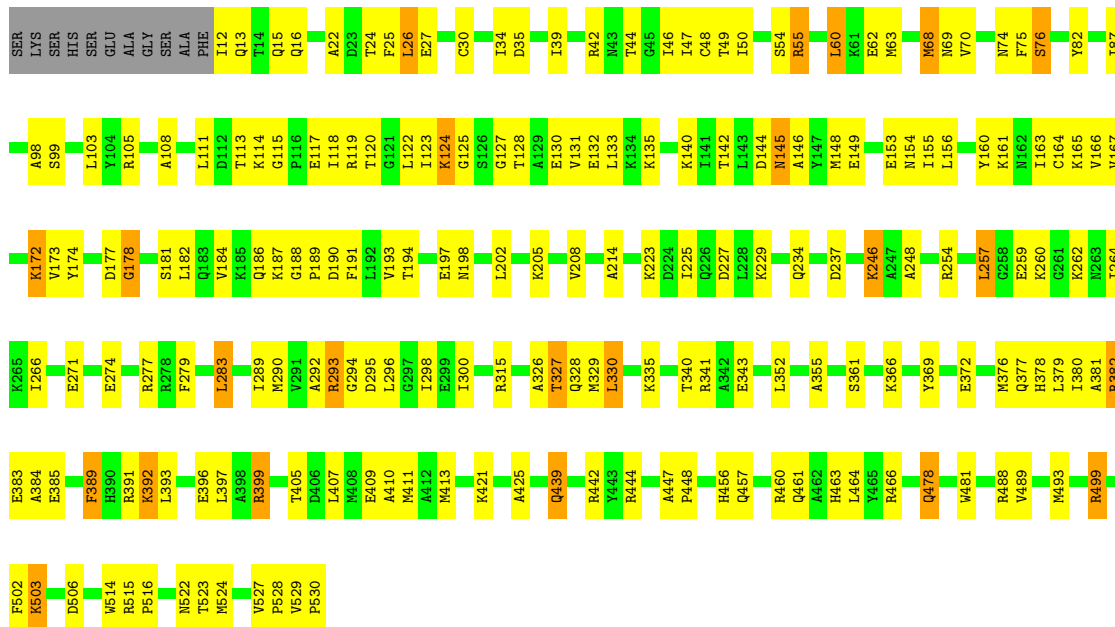
- Molecule 1: PYRUVATE KINASE

Chain B: 

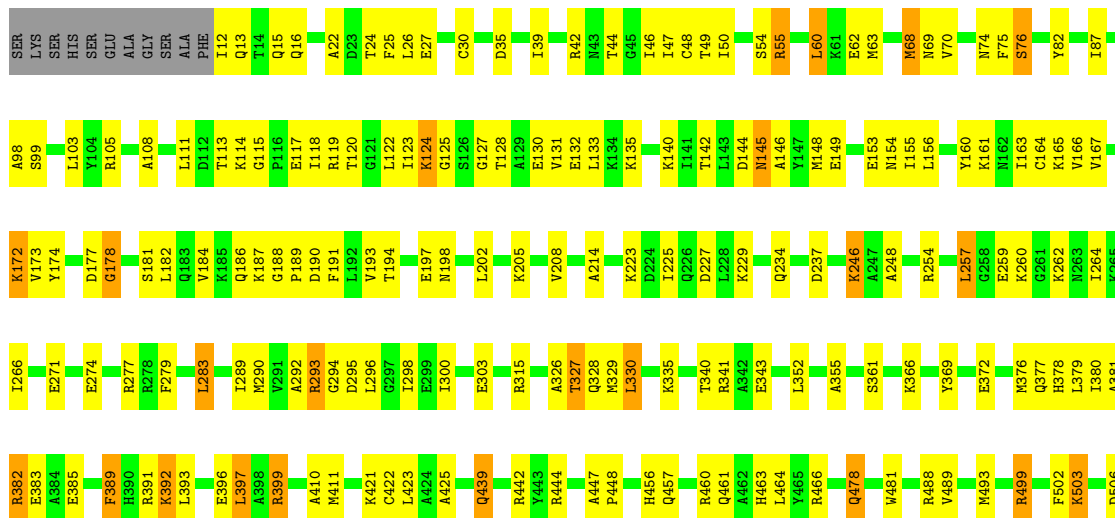




• Molecule 1: PYRUVATE KINASE



• Molecule 1: PYRUVATE KINASE

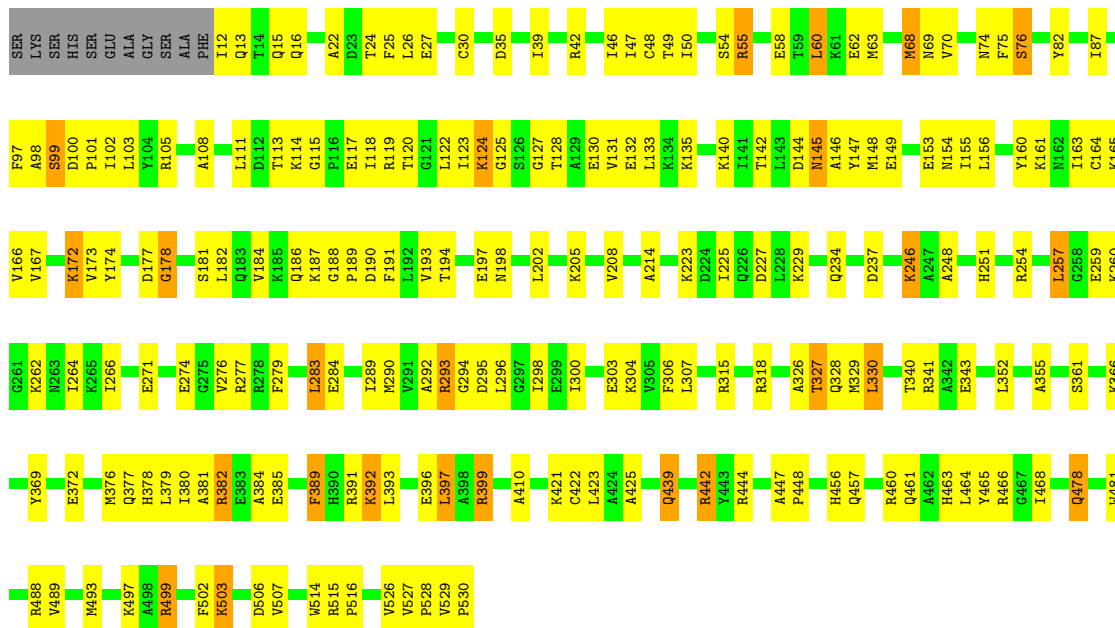






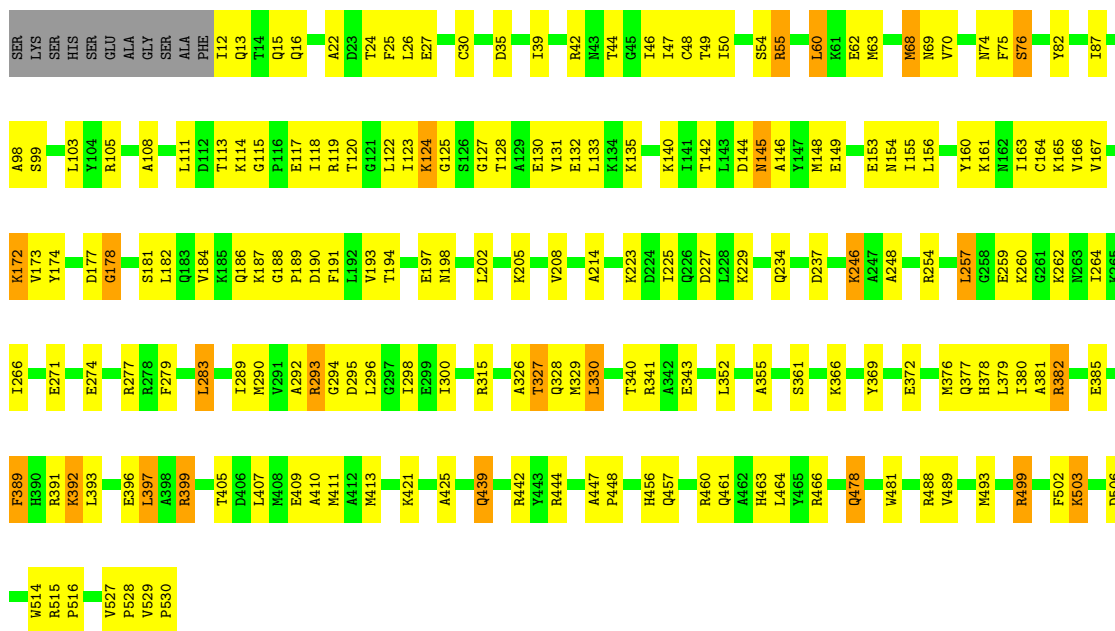
- Molecule 1: PYRUVATE KINASE

Chain E: 59% 34% 5%

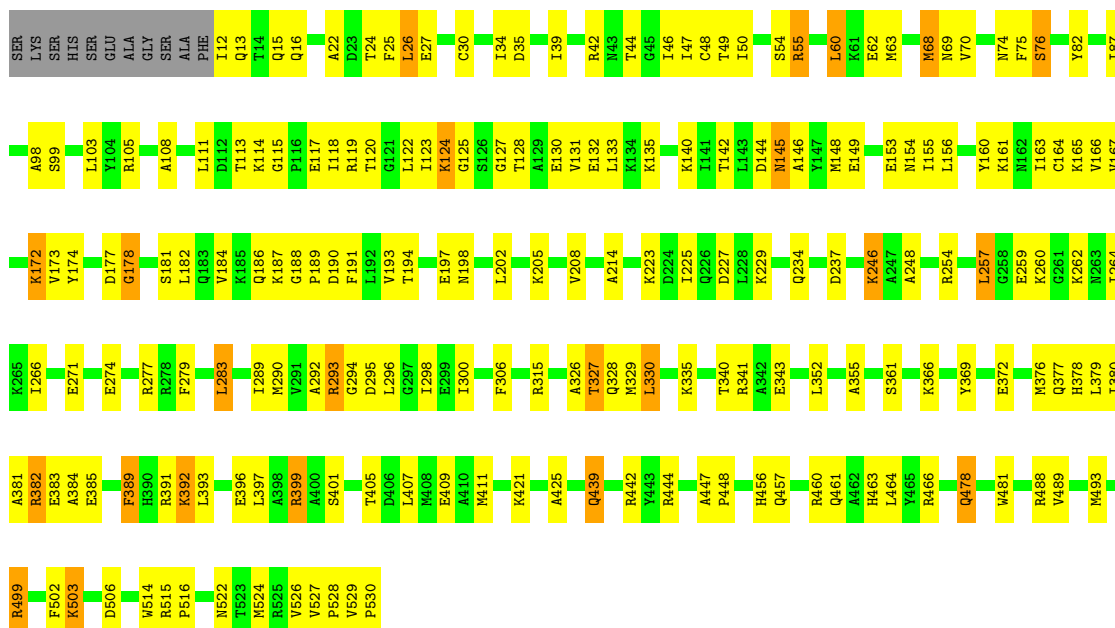


- Molecule 1: PYRUVATE KINASE

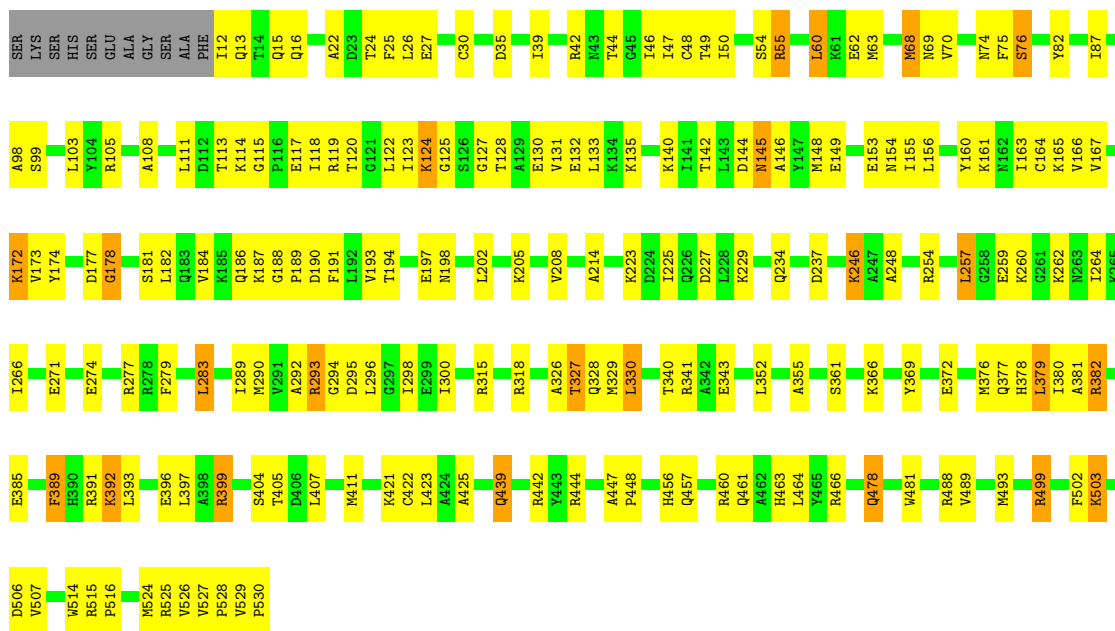
Chain F: 62% 32% 6%



- Molecule 1: PYRUVATE KINASE



• Molecule 1: PYRUVATE KINASE



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	79.00Å 105.40Å 143.50Å 95.90° 92.80° 111.90°	Depositor
Resolution (Å)	52.00 – 3.00	Depositor
% Data completeness (in resolution range)	97.1 (52.00-3.00)	Depositor
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.238 , 0.257	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	31728	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	46.0	wwPDB-VP

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: K, MN, PYR

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	0.37	0/4021	0.61	0/5430
1	B	0.38	0/4021	0.61	0/5430
1	C	0.37	0/4021	0.61	0/5430
1	D	0.38	0/4021	0.61	0/5430
1	E	0.38	0/4021	0.61	0/5430
1	F	0.38	0/4021	0.61	0/5430
1	G	0.38	0/4021	0.61	0/5430
1	H	0.38	0/4021	0.62	0/5430
All	All	0.38	0/32168	0.61	0/43440

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 [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	3958	0	4008	249	15
1	B	3958	0	4008	220	0
1	C	3958	0	4008	240	0
1	D	3958	0	4008	225	0
1	E	3958	0	4007	257	15

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	3958	0	4008	215	0
1	G	3958	0	4008	248	0
1	H	3958	0	4008	226	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
4	A	6	0	0	0	0
4	B	6	0	0	0	0
4	C	6	0	0	0	0
4	D	6	0	0	0	0
4	E	6	0	0	0	0
4	F	6	0	0	0	0
4	G	6	0	0	0	0
4	H	6	0	0	0	0
All	All	31728	0	32063	1640	15

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 26.

The worst 5 of 1640 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:G:407:LEU:HD22	1:H:526:VAL:HG11	1.20	1.12
1:D:493:MET:HE2	1:D:530:PRO:HD2	1.37	1.06
1:E:526:VAL:HG23	1:F:411:MET:SD	1.96	1.05
1:A:526:VAL:HG23	1:B:411:MET:SD	1.96	1.05
1:F:493:MET:HE2	1:F:530:PRO:HD2	1.37	1.04

The worst 5 of 15 symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:99:SER:OG	1:E:284:GLU:CB[1_455]	0.86	1.34
1:A:99:SER:CB	1:E:284:GLU:CB[1_455]	1.02	1.18
1:A:147:TYR:CE1	1:E:147:TYR:CE1[1_565]	1.33	0.87
1:A:99:SER:CB	1:E:284:GLU:CG[1_455]	1.40	0.80
1:A:99:SER:OG	1:E:284:GLU:CA[1_455]	1.77	0.43

## 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	517/530 (98%)	476 (92%)	33 (6%)	8 (2%)	10	42
1	B	517/530 (98%)	476 (92%)	33 (6%)	8 (2%)	10	42
1	C	517/530 (98%)	476 (92%)	33 (6%)	8 (2%)	10	42
1	D	517/530 (98%)	476 (92%)	33 (6%)	8 (2%)	10	42
1	E	517/530 (98%)	476 (92%)	33 (6%)	8 (2%)	10	42
1	F	517/530 (98%)	476 (92%)	33 (6%)	8 (2%)	10	42
1	G	517/530 (98%)	476 (92%)	33 (6%)	8 (2%)	10	42
1	H	517/530 (98%)	476 (92%)	33 (6%)	8 (2%)	10	42
All	All	4136/4240 (98%)	3808 (92%)	264 (6%)	64 (2%)	10	42

5 of 64 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	124	LYS
1	B	124	LYS
1	C	124	LYS
1	D	124	LYS
1	E	124	LYS

### 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	420/433 (97%)	391 (93%)	29 (7%)	15	48
1	B	420/433 (97%)	391 (93%)	29 (7%)	15	48
1	C	420/433 (97%)	391 (93%)	29 (7%)	15	48
1	D	420/433 (97%)	391 (93%)	29 (7%)	15	48
1	E	420/433 (97%)	391 (93%)	29 (7%)	15	48
1	F	420/433 (97%)	391 (93%)	29 (7%)	15	48
1	G	420/433 (97%)	391 (93%)	29 (7%)	15	48
1	H	420/433 (97%)	391 (93%)	29 (7%)	15	48
All	All	3360/3464 (97%)	3128 (93%)	232 (7%)	15	48

5 of 232 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	503	LYS
1	H	389	PHE
1	E	499	ARG
1	H	379	LEU
1	G	478	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 112 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	145	ASN
1	H	478	GLN
1	F	145	ASN
1	H	463	HIS
1	H	145	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 24 ligands modelled in this entry, 16 are monoatomic - leaving 8 for Mogul analysis.

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
4	PYR	H	548	3	5,5,5	5.47	4 (80%)	3,6,6	4.54	2 (66%)
4	PYR	C	543	3	5,5,5	5.48	4 (80%)	3,6,6	4.54	2 (66%)
4	PYR	D	544	3	5,5,5	5.48	4 (80%)	3,6,6	4.54	2 (66%)
4	PYR	F	546	3	5,5,5	5.47	4 (80%)	3,6,6	4.53	2 (66%)
4	PYR	A	541	3	5,5,5	5.48	4 (80%)	3,6,6	4.54	2 (66%)
4	PYR	G	547	3	5,5,5	5.49	4 (80%)	3,6,6	4.54	2 (66%)
4	PYR	E	545	3	5,5,5	5.46	4 (80%)	3,6,6	4.52	2 (66%)
4	PYR	B	542	3	5,5,5	5.49	4 (80%)	3,6,6	4.54	2 (66%)

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
4	PYR	H	548	3	-	0/4/4/4	-
4	PYR	C	543	3	-	0/4/4/4	-
4	PYR	D	544	3	-	0/4/4/4	-
4	PYR	F	546	3	-	0/4/4/4	-
4	PYR	A	541	3	-	0/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PYR	G	547	3	-	0/4/4/4	-
4	PYR	E	545	3	-	0/4/4/4	-
4	PYR	B	542	3	-	0/4/4/4	-

The worst 5 of 32 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	543	PYR	CB-CA	8.58	1.67	1.50
4	F	546	PYR	CB-CA	8.57	1.67	1.50
4	B	542	PYR	CB-CA	8.56	1.67	1.50
4	A	541	PYR	CB-CA	8.54	1.67	1.50
4	D	544	PYR	CB-CA	8.53	1.67	1.50

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	543	PYR	O3-CA-CB	-7.51	103.07	119.73
4	B	542	PYR	O3-CA-CB	-7.51	103.08	119.73
4	G	547	PYR	O3-CA-CB	-7.51	103.08	119.73
4	D	544	PYR	O3-CA-CB	-7.51	103.09	119.73
4	H	548	PYR	O3-CA-CB	-7.50	103.10	119.73

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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

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.