



# wwPDB X-ray Structure Validation Summary Report ⓘ

Sep 16, 2024 – 10:21 am BST

PDB ID : 8PRU  
Title : Engineered form of T thermophiles AHIR  
Authors : Roberts, M.; Powell, A.; Lewis, C.; Sinclair, J.  
Deposited on : 2023-07-12  
Resolution : 2.00 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)

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>.

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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 : 1.8.4, CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.002 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.38.2

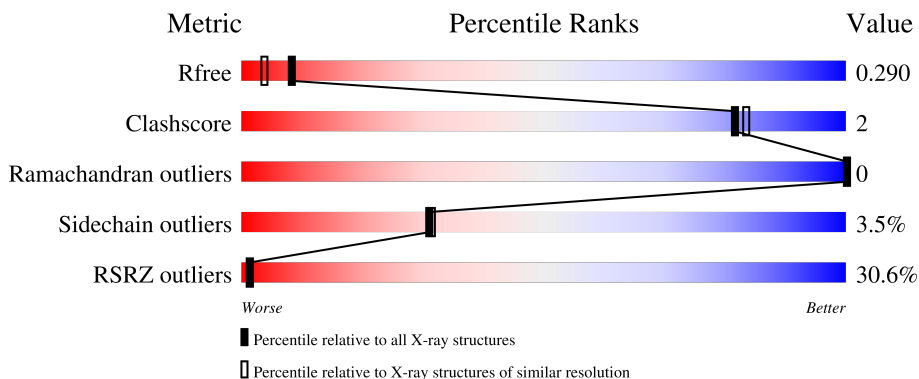
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.00 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.



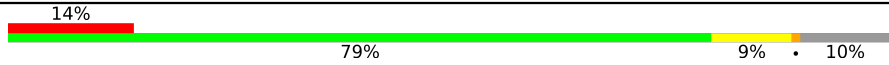
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	9409 (2.00-2.00)
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)
RSRZ outliers	164620	9409 (2.00-2.00)

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  $\leq 5\%$ . 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	346	
1	B	346	
1	C	346	
1	D	346	
1	E	346	

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Mol	Chain	Length	Quality of chain
1	F	346	 <p>A horizontal bar chart representing the quality of the chain. The bar is divided into four segments: a red segment on the left labeled '14%', a large green segment labeled '79%', a yellow segment labeled '9%', and a grey segment on the far right labeled '10%'.</p>

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 29262 atoms, of which 14526 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 Ketol-acid reductoisomerase (NADP(+)).

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	311	4831	1530	2421	426	444	10	49	0	0
1	B	311	4831	1530	2421	426	444	10	49	0	0
1	C	311	4831	1530	2421	426	444	10	49	0	0
1	D	311	4831	1530	2421	426	444	10	49	0	0
1	E	311	4831	1530	2421	426	444	10	49	0	0
1	F	311	4831	1530	2421	426	444	10	49	0	0

There are 126 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	MET	-	initiating methionine	UNP Q72JC8
A	-2	THR	-	expression tag	UNP Q72JC8
A	-1	GLY	-	expression tag	UNP Q72JC8
A	0	THR	-	expression tag	UNP Q72JC8
A	141	GLY	-	insertion	UNP Q72JC8
A	142	GLY	-	insertion	UNP Q72JC8
A	143	GLY	-	insertion	UNP Q72JC8
A	144	SER	-	insertion	UNP Q72JC8
A	145	ASN	-	insertion	UNP Q72JC8
A	146	TRP	-	insertion	UNP Q72JC8
A	147	SER	-	insertion	UNP Q72JC8
A	148	HIS	-	insertion	UNP Q72JC8
A	149	PRO	-	insertion	UNP Q72JC8
A	151	PHE	-	insertion	UNP Q72JC8
A	152	GLU	-	insertion	UNP Q72JC8
A	154	ARG	-	insertion	UNP Q72JC8
A	155	PRO	-	insertion	UNP Q72JC8

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Chain	Residue	Modelled	Actual	Comment	Reference
A	156	PRO	-	insertion	UNP Q72JC8
A	157	GLY	-	insertion	UNP Q72JC8
A	341	ARG	-	expression tag	UNP Q72JC8
A	342	SER	-	expression tag	UNP Q72JC8
B	-3	MET	-	initiating methionine	UNP Q72JC8
B	-2	THR	-	expression tag	UNP Q72JC8
B	-1	GLY	-	expression tag	UNP Q72JC8
B	0	THR	-	expression tag	UNP Q72JC8
B	141	GLY	-	insertion	UNP Q72JC8
B	142	GLY	-	insertion	UNP Q72JC8
B	143	GLY	-	insertion	UNP Q72JC8
B	144	SER	-	insertion	UNP Q72JC8
B	145	ASN	-	insertion	UNP Q72JC8
B	146	TRP	-	insertion	UNP Q72JC8
B	147	SER	-	insertion	UNP Q72JC8
B	148	HIS	-	insertion	UNP Q72JC8
B	149	PRO	-	insertion	UNP Q72JC8
B	151	PHE	-	insertion	UNP Q72JC8
B	152	GLU	-	insertion	UNP Q72JC8
B	154	ARG	-	insertion	UNP Q72JC8
B	155	PRO	-	insertion	UNP Q72JC8
B	156	PRO	-	insertion	UNP Q72JC8
B	157	GLY	-	insertion	UNP Q72JC8
B	341	ARG	-	expression tag	UNP Q72JC8
B	342	SER	-	expression tag	UNP Q72JC8
C	-3	MET	-	initiating methionine	UNP Q72JC8
C	-2	THR	-	expression tag	UNP Q72JC8
C	-1	GLY	-	expression tag	UNP Q72JC8
C	0	THR	-	expression tag	UNP Q72JC8
C	141	GLY	-	insertion	UNP Q72JC8
C	142	GLY	-	insertion	UNP Q72JC8
C	143	GLY	-	insertion	UNP Q72JC8
C	144	SER	-	insertion	UNP Q72JC8
C	145	ASN	-	insertion	UNP Q72JC8
C	146	TRP	-	insertion	UNP Q72JC8
C	147	SER	-	insertion	UNP Q72JC8
C	148	HIS	-	insertion	UNP Q72JC8
C	149	PRO	-	insertion	UNP Q72JC8
C	151	PHE	-	insertion	UNP Q72JC8
C	152	GLU	-	insertion	UNP Q72JC8
C	154	ARG	-	insertion	UNP Q72JC8
C	155	PRO	-	insertion	UNP Q72JC8

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Chain	Residue	Modelled	Actual	Comment	Reference
C	156	PRO	-	insertion	UNP Q72JC8
C	157	GLY	-	insertion	UNP Q72JC8
C	341	ARG	-	expression tag	UNP Q72JC8
C	342	SER	-	expression tag	UNP Q72JC8
D	-3	MET	-	initiating methionine	UNP Q72JC8
D	-2	THR	-	expression tag	UNP Q72JC8
D	-1	GLY	-	expression tag	UNP Q72JC8
D	0	THR	-	expression tag	UNP Q72JC8
D	141	GLY	-	insertion	UNP Q72JC8
D	142	GLY	-	insertion	UNP Q72JC8
D	143	GLY	-	insertion	UNP Q72JC8
D	144	SER	-	insertion	UNP Q72JC8
D	145	ASN	-	insertion	UNP Q72JC8
D	146	TRP	-	insertion	UNP Q72JC8
D	147	SER	-	insertion	UNP Q72JC8
D	148	HIS	-	insertion	UNP Q72JC8
D	149	PRO	-	insertion	UNP Q72JC8
D	151	PHE	-	insertion	UNP Q72JC8
D	152	GLU	-	insertion	UNP Q72JC8
D	154	ARG	-	insertion	UNP Q72JC8
D	155	PRO	-	insertion	UNP Q72JC8
D	156	PRO	-	insertion	UNP Q72JC8
D	157	GLY	-	insertion	UNP Q72JC8
D	341	ARG	-	expression tag	UNP Q72JC8
D	342	SER	-	expression tag	UNP Q72JC8
E	-3	MET	-	initiating methionine	UNP Q72JC8
E	-2	THR	-	expression tag	UNP Q72JC8
E	-1	GLY	-	expression tag	UNP Q72JC8
E	0	THR	-	expression tag	UNP Q72JC8
E	141	GLY	-	insertion	UNP Q72JC8
E	142	GLY	-	insertion	UNP Q72JC8
E	143	GLY	-	insertion	UNP Q72JC8
E	144	SER	-	insertion	UNP Q72JC8
E	145	ASN	-	insertion	UNP Q72JC8
E	146	TRP	-	insertion	UNP Q72JC8
E	147	SER	-	insertion	UNP Q72JC8
E	148	HIS	-	insertion	UNP Q72JC8
E	149	PRO	-	insertion	UNP Q72JC8
E	151	PHE	-	insertion	UNP Q72JC8
E	152	GLU	-	insertion	UNP Q72JC8
E	154	ARG	-	insertion	UNP Q72JC8
E	155	PRO	-	insertion	UNP Q72JC8

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Chain	Residue	Modelled	Actual	Comment	Reference
E	156	PRO	-	insertion	UNP Q72JC8
E	157	GLY	-	insertion	UNP Q72JC8
E	341	ARG	-	expression tag	UNP Q72JC8
E	342	SER	-	expression tag	UNP Q72JC8
F	-3	MET	-	initiating methionine	UNP Q72JC8
F	-2	THR	-	expression tag	UNP Q72JC8
F	-1	GLY	-	expression tag	UNP Q72JC8
F	0	THR	-	expression tag	UNP Q72JC8
F	141	GLY	-	insertion	UNP Q72JC8
F	142	GLY	-	insertion	UNP Q72JC8
F	143	GLY	-	insertion	UNP Q72JC8
F	144	SER	-	insertion	UNP Q72JC8
F	145	ASN	-	insertion	UNP Q72JC8
F	146	TRP	-	insertion	UNP Q72JC8
F	147	SER	-	insertion	UNP Q72JC8
F	148	HIS	-	insertion	UNP Q72JC8
F	149	PRO	-	insertion	UNP Q72JC8
F	151	PHE	-	insertion	UNP Q72JC8
F	152	GLU	-	insertion	UNP Q72JC8
F	154	ARG	-	insertion	UNP Q72JC8
F	155	PRO	-	insertion	UNP Q72JC8
F	156	PRO	-	insertion	UNP Q72JC8
F	157	GLY	-	insertion	UNP Q72JC8
F	341	ARG	-	expression tag	UNP Q72JC8
F	342	SER	-	expression tag	UNP Q72JC8

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

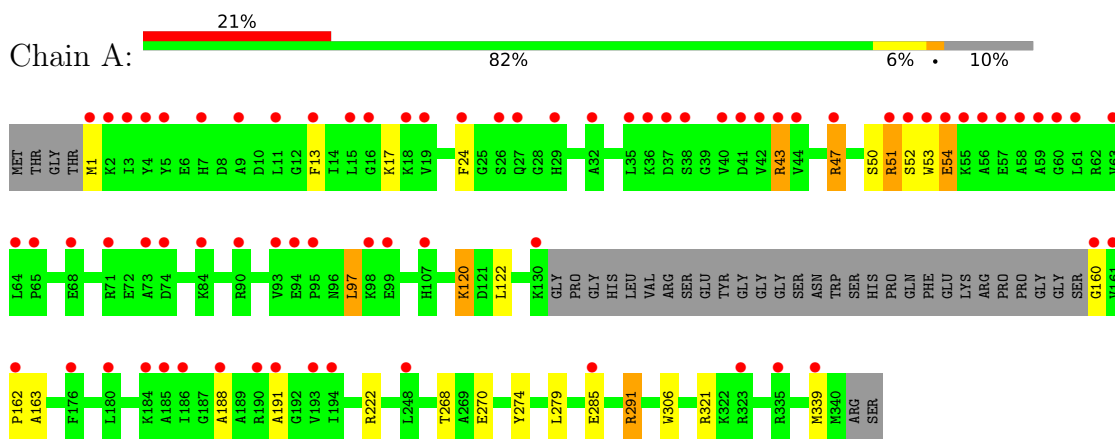
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	35	Total	O	0	0
			35	35		
4	B	36	Total	O	0	0
			36	36		
4	C	43	Total	O	0	0
			43	43		
4	D	42	Total	O	0	0
			42	42		
4	E	43	Total	O	0	0
			43	43		
4	F	52	Total	O	0	0
			52	52		



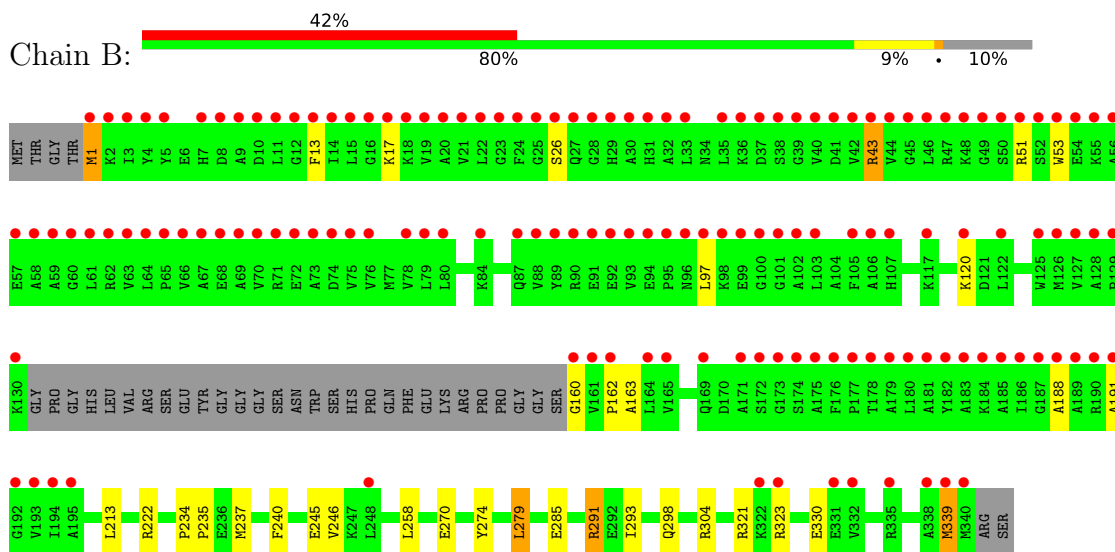
### 3 Residue-property plots [i](#)

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.

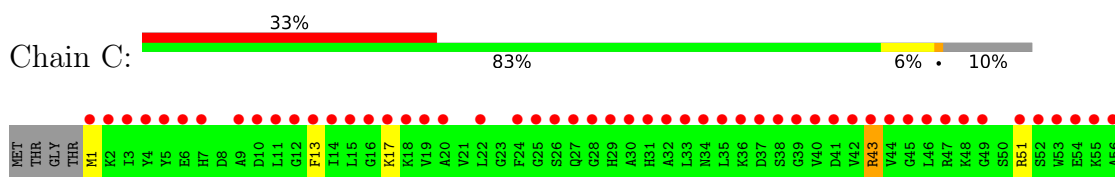
- Molecule 1: Ketol-acid reductoisomerase (NADP(+))

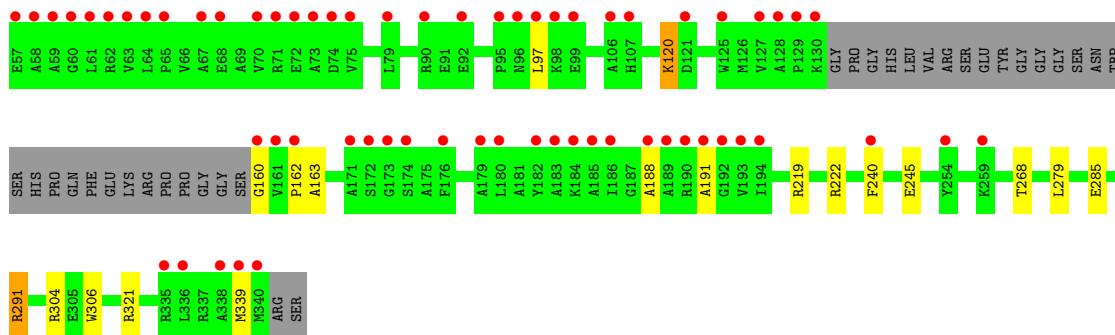


- Molecule 1: Ketol-acid reductoisomerase (NADP(+))

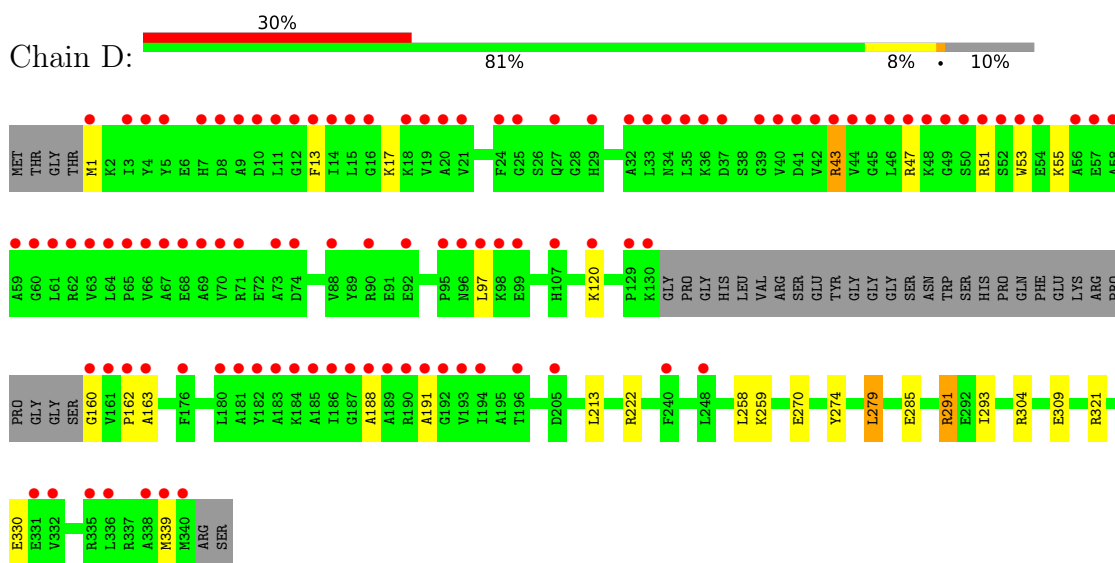


- Molecule 1: Ketol-acid reductoisomerase (NADP(+))

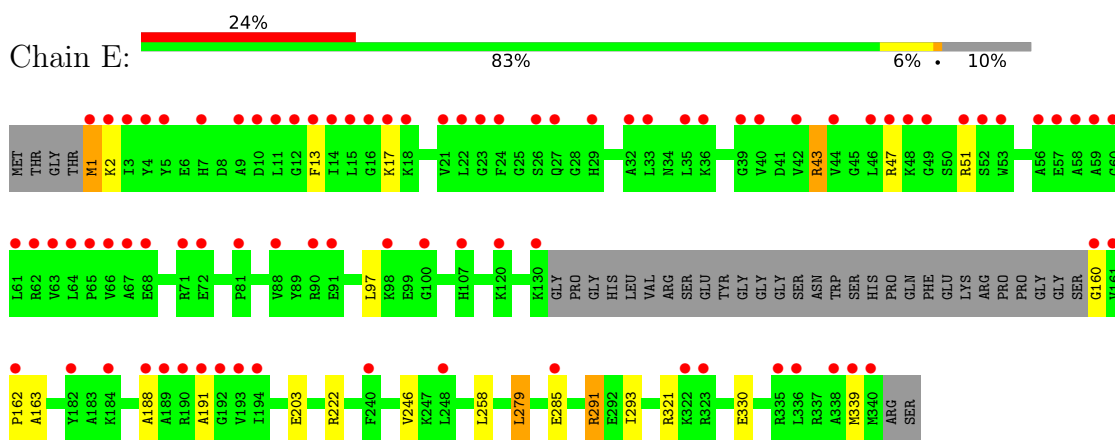


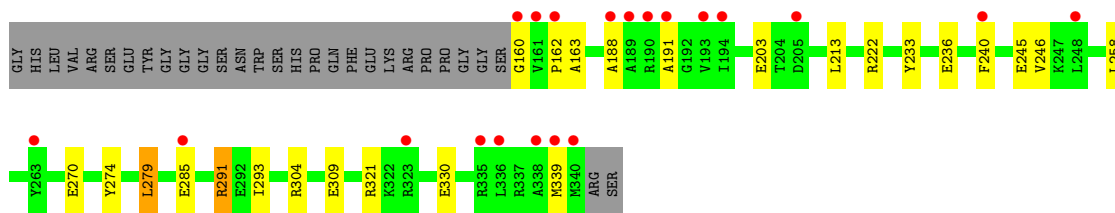


• Molecule 1: Ketol-acid reductoisomerase (NADP(+))



• Molecule 1: Ketol-acid reductoisomerase (NADP(+))





## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	136.03Å 142.72Å 126.13Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	63.06 – 2.00 63.06 – 2.00	Depositor EDS
% Data completeness (in resolution range)	97.5 (63.06-2.00) 97.5 (63.06-2.00)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.62 (at 2.00Å)	Xtrriage
Refinement program	REFMAC 5.8.0411	Depositor
R, $R_{free}$	0.259 , 0.288 0.262 , 0.290	Depositor DCC
$R_{free}$ test set	8775 reflections (5.40%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.9	Xtrriage
Anisotropy	0.534	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 39.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.008 for k,h,-l	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	29262	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	48.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, MG

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	0.52	0/2457	0.76	1/3318 (0.0%)
1	B	0.47	0/2457	0.75	2/3318 (0.1%)
1	C	0.52	0/2457	0.77	3/3318 (0.1%)
1	D	0.50	0/2457	0.73	1/3318 (0.0%)
1	E	0.52	1/2457 (0.0%)	0.75	1/3318 (0.0%)
1	F	0.57	3/2457 (0.1%)	0.75	1/3318 (0.0%)
All	All	0.52	4/14742 (0.0%)	0.75	9/19908 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	4
1	B	0	5
1	C	0	4
1	D	0	6
1	E	0	6
1	F	0	7
All	All	0	32

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	54	GLU	CD-OE1	6.45	1.32	1.25
1	F	203	GLU	CD-OE1	-5.62	1.19	1.25
1	F	83	GLU	CD-OE2	5.58	1.31	1.25
1	E	203	GLU	CD-OE2	5.44	1.31	1.25

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	291	ARG	NE-CZ-NH2	-12.35	114.13	120.30
1	B	291	ARG	NE-CZ-NH2	-10.87	114.87	120.30
1	E	291	ARG	NE-CZ-NH2	-8.74	115.93	120.30
1	A	291	ARG	NE-CZ-NH2	-8.59	116.01	120.30
1	B	291	ARG	NE-CZ-NH1	8.29	124.45	120.30

There are no chirality outliers.

5 of 32 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	222	ARG	Sidechain
1	A	291	ARG	Sidechain
1	A	321	ARG	Sidechain
1	A	43	ARG	Sidechain
1	B	43	ARG	Sidechain

## 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	2410	2421	2414	12	1
1	B	2410	2421	2414	20	0
1	C	2410	2421	2414	8	1
1	D	2410	2421	2414	13	0
1	E	2410	2421	2414	12	0
1	F	2410	2421	2414	21	0
2	A	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
3	B	10	0	0	0	0
3	C	5	0	0	0	0
3	D	5	0	0	0	0
4	A	35	0	0	1	0
4	B	36	0	0	0	0
4	C	43	0	0	0	0
4	D	42	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	E	43	0	0	0	0
4	F	52	0	0	0	0
All	All	14736	14526	14484	69	2

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 2.

The worst 5 of 69 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:339:MET:HE2	1:F:3:ILE:HD13	1.68	0.75
1:D:13:PHE:O	1:D:17:LYS:HE3	1.96	0.66
1:B:258:LEU:HB2	1:F:330:GLU:OE1	1.99	0.62
1:A:13:PHE:O	1:A:17:LYS:HE3	2.03	0.59
1:A:120:LYS:HD2	4:A:502:HOH:O	2.01	0.58

All (2) 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:C:268:THR:HG1	1:C:306:TRP:HE1[2_555]	1.28	0.32
1:A:268:THR:HG1	1:A:306:TRP:HE1[2_555]	1.33	0.27

## 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	307/346 (89%)	290 (94%)	17 (6%)	0	100	100
1	B	307/346 (89%)	290 (94%)	17 (6%)	0	100	100
1	C	307/346 (89%)	290 (94%)	17 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	307/346 (89%)	290 (94%)	17 (6%)	0	100	100
1	E	307/346 (89%)	290 (94%)	17 (6%)	0	100	100
1	F	307/346 (89%)	290 (94%)	17 (6%)	0	100	100
All	All	1842/2076 (89%)	1740 (94%)	102 (6%)	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	243/270 (90%)	233 (96%)	10 (4%)	26	25
1	B	243/270 (90%)	234 (96%)	9 (4%)	29	29
1	C	243/270 (90%)	235 (97%)	8 (3%)	33	33
1	D	243/270 (90%)	233 (96%)	10 (4%)	26	25
1	E	243/270 (90%)	237 (98%)	6 (2%)	42	45
1	F	243/270 (90%)	235 (97%)	8 (3%)	33	33
All	All	1458/1620 (90%)	1407 (96%)	51 (4%)	31	31

5 of 51 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	43	ARG
1	D	285	GLU
1	F	285	GLU
1	D	51	ARG
1	D	120	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.



### 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](#)

Of 9 ligands modelled in this entry, 5 are monoatomic - leaving 4 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	$\# Z  > 2$
3	SO4	C	402	-	4,4,4	0.34	0	6,6,6	0.22	0
3	SO4	D	402	-	4,4,4	0.30	0	6,6,6	0.23	0
3	SO4	B	402	-	4,4,4	0.33	0	6,6,6	0.10	0
3	SO4	B	401	-	4,4,4	0.37	0	6,6,6	0.14	0

There are no bond length outliers.

There are no bond angle outliers.

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 [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	311/346 (89%)	1.16	73 (23%) <b>2</b> <b>2</b>	22, 39, 71, 93	0
1	B	311/346 (89%)	2.01	147 (47%) <b>0</b> <b>1</b>	21, 54, 113, 134	0
1	C	311/346 (89%)	1.51	115 (36%) <b>1</b> <b>1</b>	18, 43, 88, 103	0
1	D	311/346 (89%)	1.47	105 (33%) <b>1</b> <b>1</b>	18, 41, 84, 102	0
1	E	311/346 (89%)	1.18	84 (27%) <b>2</b> <b>2</b>	19, 38, 76, 95	0
1	F	311/346 (89%)	0.91	47 (15%) <b>6</b> <b>5</b>	18, 37, 62, 93	0
All	All	1866/2076 (89%)	1.37	571 (30%) <b>1</b> <b>1</b>	18, 41, 90, 134	0

The worst 5 of 571 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	13	PHE	6.7
1	B	14	ILE	6.7
1	B	11	LEU	6.6
1	C	14	ILE	6.6
1	B	191	ALA	6.5

### 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 monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	SO4	B	401	5/5	0.79	0.11	66,71,78,78	0
3	SO4	B	402	5/5	0.81	0.12	63,64,74,78	0
3	SO4	D	402	5/5	0.85	0.09	63,63,70,77	0
3	SO4	C	402	5/5	0.90	0.07	50,56,59,65	0
2	MG	A	401	1/1	0.92	0.40	42,42,42,42	0
2	MG	F	401	1/1	0.92	0.36	43,43,43,43	0
2	MG	C	401	1/1	0.93	0.38	42,42,42,42	0
2	MG	E	401	1/1	0.97	0.38	41,41,41,41	0
2	MG	D	401	1/1	0.97	0.16	38,38,38,38	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.