



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 23, 2024 – 12:16 PM JST

PDB ID : 8YJN  
Title : Structure of E. coli glycyI radical enzyme YbiW with bound glycerol  
Authors : Xue, B.; Wei, Y.; Robinson, R.C.; Yew, W.S.; Zhang, Y.  
Deposited on : 2024-03-02  
Resolution : 2.42 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](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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (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

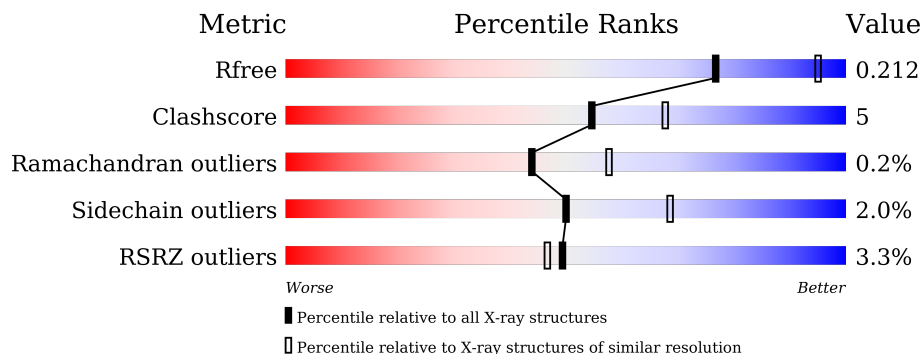
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.42 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	5670 (2.44-2.40)
Clashscore	180529	6299 (2.44-2.40)
Ramachandran outliers	177936	6232 (2.44-2.40)
Sidechain outliers	177891	6233 (2.44-2.40)
RSRZ outliers	164620	5670 (2.44-2.40)

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  $\geq 3$ , 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	826	

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 6679 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 Probable dehydratase YbiW.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	808	6314	3980	1112	1192	30	0	0	0

There are 19 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-15	MET	-	initiating methionine	UNP P75793
A	-14	GLY	-	expression tag	UNP P75793
A	-13	SER	-	expression tag	UNP P75793
A	-12	SER	-	expression tag	UNP P75793
A	-11	HIS	-	expression tag	UNP P75793
A	-10	HIS	-	expression tag	UNP P75793
A	-9	HIS	-	expression tag	UNP P75793
A	-8	HIS	-	expression tag	UNP P75793
A	-7	HIS	-	expression tag	UNP P75793
A	-6	HIS	-	expression tag	UNP P75793
A	-5	SER	-	expression tag	UNP P75793
A	-4	GLN	-	expression tag	UNP P75793
A	-3	SER	-	expression tag	UNP P75793
A	-2	GLY	-	expression tag	UNP P75793
A	-1	SER	-	expression tag	UNP P75793
A	0	GLY	-	expression tag	UNP P75793
A	114	ALA	GLU	conflict	UNP P75793
A	115	ALA	GLU	conflict	UNP P75793
A	117	ALA	LYS	conflict	UNP P75793

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 6 3 3	0	0

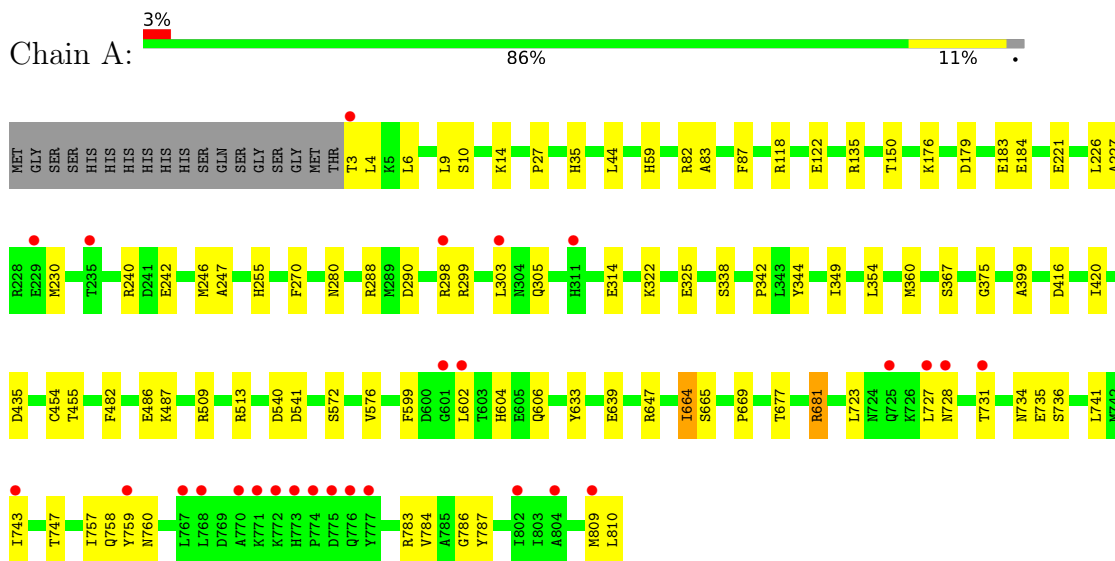
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	359	Total O 359 359	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: Probable dehydratase YbiW



## 4 Data and refinement statistics i

Property	Value	Source
Space group	F 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	114.93Å 207.04Å 210.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.84 – 2.42 38.84 – 2.42	Depositor EDS
% Data completeness (in resolution range)	99.9 (38.84-2.42) 99.8 (38.84-2.42)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.03 (at 2.42Å)	Xtrriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, $R_{free}$	0.174 , 0.213 0.174 , 0.212	Depositor DCC
$R_{free}$ test set	2380 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.5	Xtrriage
Anisotropy	0.658	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 40.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.007 for -h,l,k	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	6679	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	44.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.28% 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: GOL

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	0.41	0/6446	0.60	0/8745

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	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	513	ARG	Sidechain
1	A	783	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	6314	0	6216	59	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	6	0	8	0	0
3	A	359	0	0	0	0
All	All	6679	0	6224	59	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 5.

All (59) 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:A:298:ARG:NH1	1:A:303:LEU:HD11	1.78	0.98
1:A:298:ARG:NH1	1:A:303:LEU:CD1	2.31	0.93
1:A:758:GLN:HE22	1:A:786:GLY:H	1.32	0.77
1:A:298:ARG:HH11	1:A:303:LEU:HD11	1.50	0.75
1:A:240:ARG:HG2	1:A:240:ARG:HH11	1.55	0.71
1:A:298:ARG:HH12	1:A:303:LEU:CD1	2.03	0.68
1:A:743:ILE:O	1:A:747:THR:HG22	1.95	0.66
1:A:298:ARG:NH1	1:A:303:LEU:HD12	2.09	0.66
1:A:298:ARG:HH11	1:A:303:LEU:CD1	2.09	0.64
1:A:727:LEU:HB3	1:A:731:THR:HG21	1.81	0.63
1:A:298:ARG:HH12	1:A:303:LEU:HD11	1.59	0.62
1:A:664:ILE:HG23	1:A:787:TYR:CE1	2.39	0.57
1:A:509:ARG:HG2	1:A:639:GLU:CG	2.34	0.57
1:A:734:ASN:OD1	1:A:735:GLU:N	2.37	0.57
1:A:6:LEU:HD22	1:A:375:GLY:HA3	1.87	0.56
1:A:150:THR:HG21	1:A:482:PHE:HE2	1.71	0.55
1:A:9:LEU:O	1:A:14:LYS:HE3	2.06	0.55
1:A:540:ASP:HB3	1:A:541:ASP:OD1	2.07	0.54
1:A:118:ARG:O	1:A:122:GLU:HG3	2.08	0.53
1:A:741:LEU:HD11	1:A:759:TYR:CE2	2.44	0.52
1:A:10:SER:O	1:A:14:LYS:HG3	2.09	0.51
1:A:758:GLN:HE22	1:A:786:GLY:N	2.03	0.51
1:A:727:LEU:HB3	1:A:731:THR:CG2	2.40	0.51
1:A:82:ARG:HG2	1:A:325:GLU:HA	1.92	0.50
1:A:664:ILE:HG23	1:A:787:TYR:HE1	1.78	0.49
1:A:227:ALA:HB3	1:A:247:ALA:HB2	1.96	0.48
1:A:3:THR:HG23	1:A:3:THR:O	2.14	0.47
1:A:664:ILE:HG22	1:A:665:SER:N	2.30	0.47
1:A:290:ASP:HB3	1:A:349:ILE:HG22	1.96	0.47
1:A:664:ILE:HG22	1:A:665:SER:H	1.79	0.47
1:A:599:PHE:HA	1:A:604:HIS:HB3	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:809:MET:HE3	1:A:810:LEU:N	2.30	0.47
1:A:226:LEU:O	1:A:230:MET:HG3	2.15	0.47
1:A:572:SER:O	1:A:576:VAL:HG13	2.14	0.47
1:A:242:GLU:O	1:A:246:MET:HG3	2.15	0.46
1:A:87:PHE:CD1	1:A:280:ASN:HB3	2.51	0.46
1:A:179:ASP:O	1:A:183:GLU:HG3	2.15	0.46
1:A:342:PRO:HG2	1:A:344:TYR:CZ	2.52	0.45
1:A:221:GLU:OE2	1:A:255:HIS:NE2	2.44	0.45
1:A:360:MET:HE2	1:A:360:MET:HB2	1.85	0.44
1:A:27:PRO:HG2	1:A:83:ALA:HB2	1.99	0.44
1:A:665:SER:O	1:A:669:PRO:HD2	2.18	0.44
1:A:602:LEU:O	1:A:606:GLN:HG3	2.18	0.44
1:A:728:ASN:O	1:A:731:THR:HG22	2.17	0.43
1:A:354:LEU:HD12	1:A:354:LEU:HA	1.88	0.43
1:A:176:LYS:HE3	1:A:184:GLU:OE1	2.19	0.42
1:A:35:HIS:ND1	1:A:59:HIS:HA	2.34	0.42
1:A:240:ARG:HG2	1:A:240:ARG:NH1	2.27	0.42
1:A:322:LYS:HA	1:A:322:LYS:HD2	1.79	0.42
1:A:723:LEU:HD23	1:A:757:ILE:HD12	2.02	0.42
1:A:299:ARG:HA	1:A:303:LEU:HB2	2.00	0.42
1:A:288:ARG:HH11	1:A:435:ASP:HA	1.84	0.41
1:A:4:LEU:HD11	1:A:399:ALA:HB1	2.01	0.41
1:A:298:ARG:HH12	1:A:303:LEU:HD12	1.78	0.41
1:A:486:GLU:HG3	1:A:487:LYS:HG2	2.02	0.41
1:A:509:ARG:HG2	1:A:639:GLU:HG2	2.03	0.41
1:A:677:THR:OG1	1:A:681:ARG:HB3	2.21	0.41
1:A:416:ASP:HB3	1:A:420:ILE:HD12	2.03	0.40
1:A:44:LEU:HD23	1:A:44:LEU:HA	1.78	0.40

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	806/826 (98%)	782 (97%)	22 (3%)	2 (0%)	44 58

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	664	ILE
1	A	784	VAL

### 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	666/681 (98%)	653 (98%)	13 (2%)	50 68

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	135	ARG
1	A	270	PHE
1	A	305	GLN
1	A	314	GLU
1	A	338	SER
1	A	367	SER
1	A	454	CYS
1	A	455	THR
1	A	633	TYR
1	A	647	ARG
1	A	681	ARG
1	A	736	SER
1	A	760	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	305	GLN

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Mol	Chain	Res	Type
1	A	642	GLN
1	A	760	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](#)

1 ligand is modelled in this entry.

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	$\# Z  > 2$
2	GOL	A	901	-	5,5,5	0.09	0	5,5,5	0.29	0

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
2	GOL	A	901	-	-	1/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	901	GOL	C1-C2-C3-O3

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

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	808/826 (97%)	-0.26	27 (3%) 49 47	26, 42, 69, 94	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	771	LYS	4.1
1	A	602	LEU	3.6
1	A	3	THR	3.3
1	A	298	ARG	3.2
1	A	809	MET	3.2
1	A	777	TYR	3.2
1	A	311	HIS	2.8
1	A	743	ILE	2.8
1	A	727	LEU	2.7
1	A	773	HIS	2.7
1	A	802	ILE	2.7
1	A	768	LEU	2.5
1	A	772	LYS	2.5
1	A	776	GLN	2.4
1	A	759	TYR	2.3
1	A	725	GLN	2.3
1	A	804	ALA	2.3
1	A	775	ASP	2.2
1	A	770	ALA	2.2
1	A	774	PRO	2.2
1	A	235	THR	2.1
1	A	767	LEU	2.1
1	A	731	THR	2.1
1	A	728	ASN	2.1
1	A	601	GLY	2.1
1	A	229	GLU	2.0
1	A	303	LEU	2.0

## 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
2	GOL	A	901	6/6	0.93	0.10	36,38,43,45	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.