



wwPDB X-ray Structure Validation Summary Report ⓘ

May 22, 2020 – 09:28 am BST

PDB ID : 4WD9
Title : Crystal structure of tRNA-dependent lantibiotic dehydratase NisB in complex with NisA leader peptide
Authors : Hao, Y.; Nair, S.K.
Deposited on : 2014-09-08
Resolution : 2.90 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

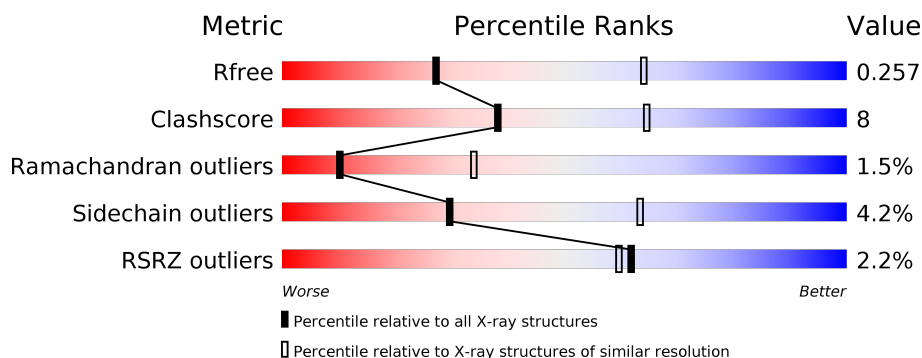
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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}	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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 on 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	1006	<div> <div>%</div> <div> <div></div> <div>75%</div> <div>19%</div> <div>• •</div> </div> </div>
1	B	1006	<div> <div>3%</div> <div> <div></div> <div>73%</div> <div>21%</div> <div>• •</div> </div> </div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 16101 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 Nisin biosynthesis protein NisB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	965	Total	C	N	O	S	0	0	0
			8061	5201	1319	1520	21			
1	B	962	Total	C	N	O	S	0	0	0
			8040	5190	1315	1514	21			

There are 26 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1008	THR	-	expression tag	UNP P20103
A	1009	LYS	-	expression tag	UNP P20103
A	1010	ASP	-	expression tag	UNP P20103
A	1011	PHE	-	expression tag	UNP P20103
A	1012	ASN	-	expression tag	UNP P20103
A	1013	LEU	-	expression tag	UNP P20103
A	1014	ASP	-	expression tag	UNP P20103
A	1015	LEU	-	expression tag	UNP P20103
A	1016	VAL	-	expression tag	UNP P20103
A	1017	SER	-	expression tag	UNP P20103
A	1018	VAL	-	expression tag	UNP P20103
A	1019	SER	-	expression tag	UNP P20103
A	1020	LYS	-	expression tag	UNP P20103
B	1008	THR	-	expression tag	UNP P20103
B	1009	LYS	-	expression tag	UNP P20103
B	1010	ASP	-	expression tag	UNP P20103
B	1011	PHE	-	expression tag	UNP P20103
B	1012	ASN	-	expression tag	UNP P20103
B	1013	LEU	-	expression tag	UNP P20103
B	1014	ASP	-	expression tag	UNP P20103
B	1015	LEU	-	expression tag	UNP P20103
B	1016	VAL	-	expression tag	UNP P20103
B	1017	SER	-	expression tag	UNP P20103
B	1018	VAL	-	expression tag	UNP P20103
B	1019	SER	-	expression tag	UNP P20103

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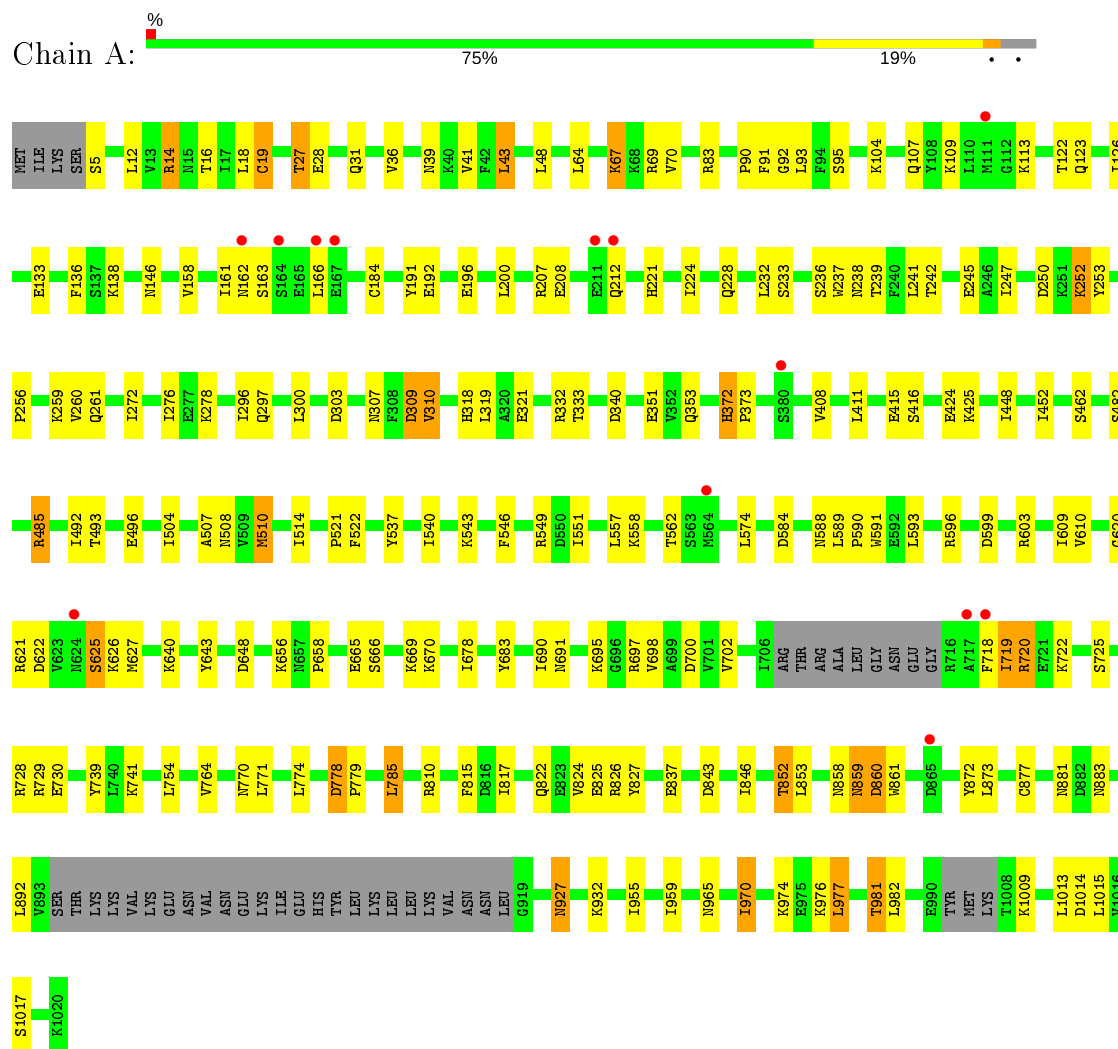
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Chain	Residue	Modelled	Actual	Comment	Reference
B	1020	LYS	-	expression tag	UNP P20103

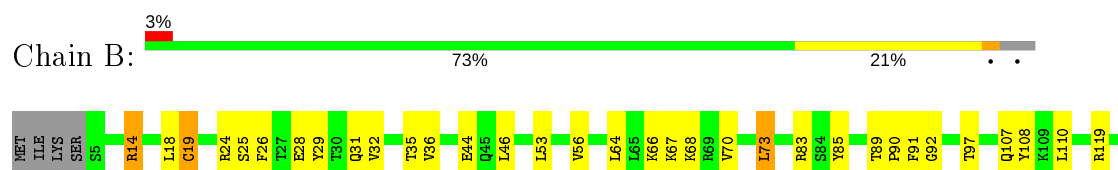
3 Residue-property plots

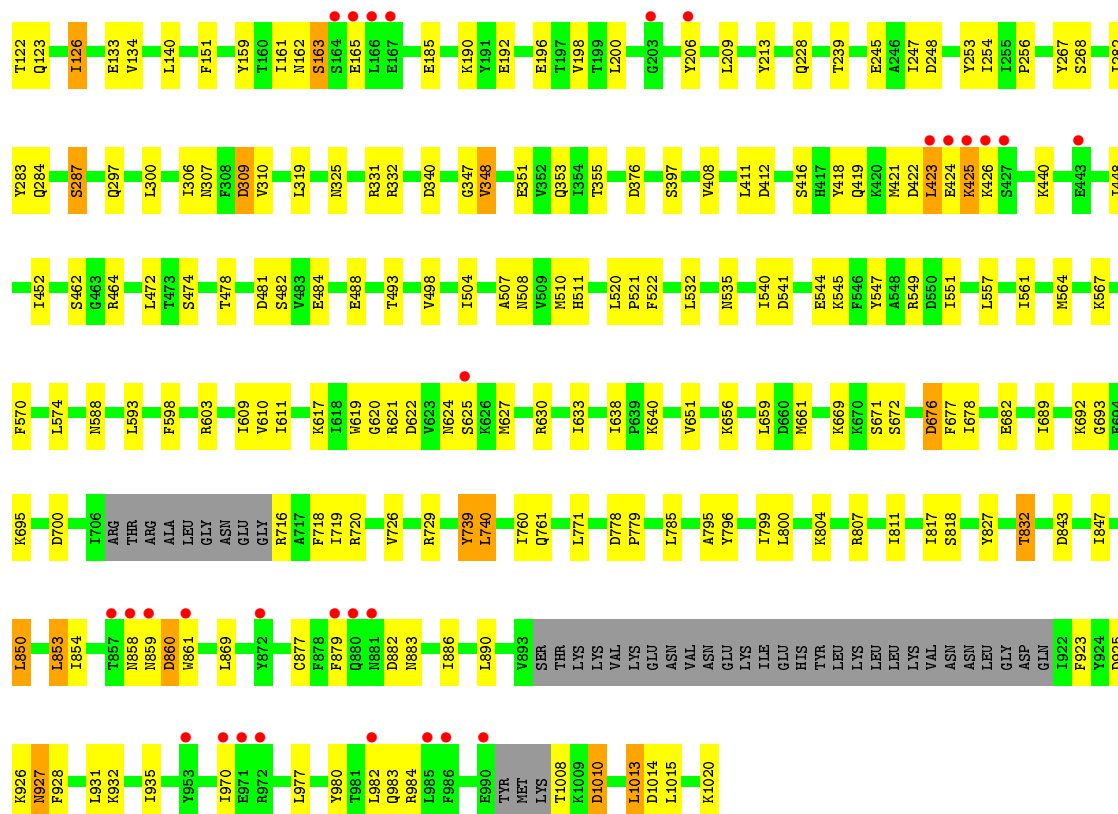
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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: Nisin biosynthesis protein NisB



- Molecule 1: Nisin biosynthesis protein NisB





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	98.50Å 107.28Å 135.73Å 90.00° 109.92° 90.00°	Depositor
Resolution (Å)	34.46 – 2.90 39.54 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.7 (34.46-2.90) 99.8 (39.54-2.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.91 (at 2.90Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.9_1692)	Depositor
R, R_{free}	0.194 , 0.257 0.197 , 0.257	Depositor DCC
R_{free} test set	2945 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	69.7	Xtriage
Anisotropy	0.353	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 28.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.014 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	16101	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.96% 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

5.1 Standard geometry

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	0.53	1/8222 (0.0%)	0.68	2/11077 (0.0%)
1	B	0.51	0/8201	0.66	2/11049 (0.0%)
All	All	0.52	1/16423 (0.0%)	0.67	4/22126 (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	2
1	B	0	2
All	All	0	4

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	184	CYS	CB-SG	-5.13	1.73	1.81

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	372	HIS	C-N-CD	-9.49	99.71	120.60
1	B	853	LEU	CB-CG-CD1	-6.34	100.22	111.00
1	A	778	ASP	C-N-CD	-5.76	107.94	120.60
1	B	740	LEU	CA-CB-CG	5.01	126.83	115.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	372	HIS	Peptide

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Mol	Chain	Res	Type	Group
1	A	778	ASP	Peptide
1	B	64	LEU	Peptide
1	B	778	ASP	Peptide

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	8061	0	8060	119	0
1	B	8040	0	8045	131	0
All	All	16101	0	16105	246	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 8.

The worst 5 of 246 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:351:GLU:OE2	1:B:549:ARG:NH1	2.12	0.81
1:A:107:GLN:HB3	1:A:307:ASN:HB2	1.60	0.81
1:B:297:GLN:OE1	1:B:464:ARG:NH2	2.15	0.80
1:B:44:GLU:OE2	1:B:267:TYR:OH	2.00	0.77
1:A:162:ASN:HD22	1:A:221:HIS:HE1	1.30	0.77

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	957/1006 (95%)	890 (93%)	52 (5%)	15 (2%)	9	32
1	B	954/1006 (95%)	884 (93%)	56 (6%)	14 (2%)	10	34
All	All	1911/2012 (95%)	1774 (93%)	108 (6%)	29 (2%)	10	34

5 of 29 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	309	ASP
1	A	373	PRO
1	A	626	LYS
1	A	719	ILE
1	A	779	PRO

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	907/947 (96%)	871 (96%)	36 (4%)	31	65
1	B	905/947 (96%)	864 (96%)	41 (4%)	27	61
All	All	1812/1894 (96%)	1735 (96%)	77 (4%)	30	63

5 of 77 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	981	THR
1	B	134	VAL
1	B	869	LEU
1	A	1017	SER
1	B	36	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	228	GLN

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Mol	Chain	Res	Type
1	B	945	GLN
1	B	761	GLN
1	A	228	GLN
1	B	883	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 carbohydrates 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	965/1006 (95%)	-0.05	13 (1%) 77 77	7, 23, 52, 84	0
1	B	962/1006 (95%)	-0.02	29 (3%) 50 45	5, 25, 65, 96	0
All	All	1927/2012 (95%)	-0.03	42 (2%) 62 59	5, 24, 58, 96	0

The worst 5 of 42 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	166	LEU	5.5
1	B	423	LEU	5.5
1	B	424	GLU	4.6
1	B	990	GLU	4.2
1	B	166	LEU	3.7

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 carbohydrates 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.