



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 06:39 PM UTC

PDB ID : 4WD9 / pdb_00004wd9
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 Full wwPDB X-ray Structure Validation 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
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

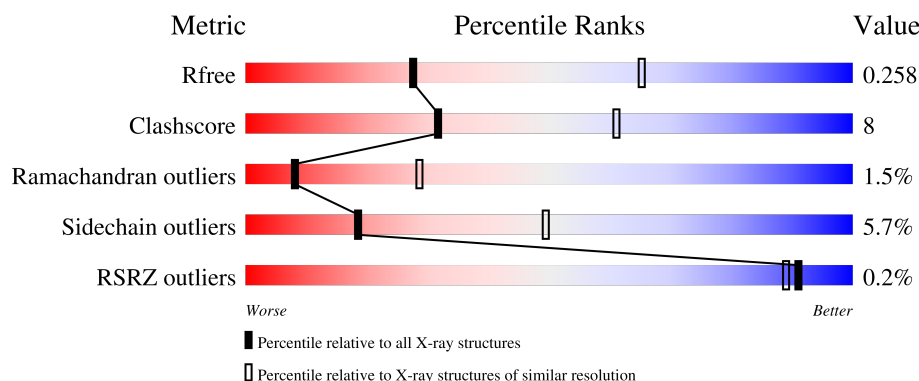
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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}	180053	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (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 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	1006	 73% 20% . .
1	B	1006	 70% 23% . .

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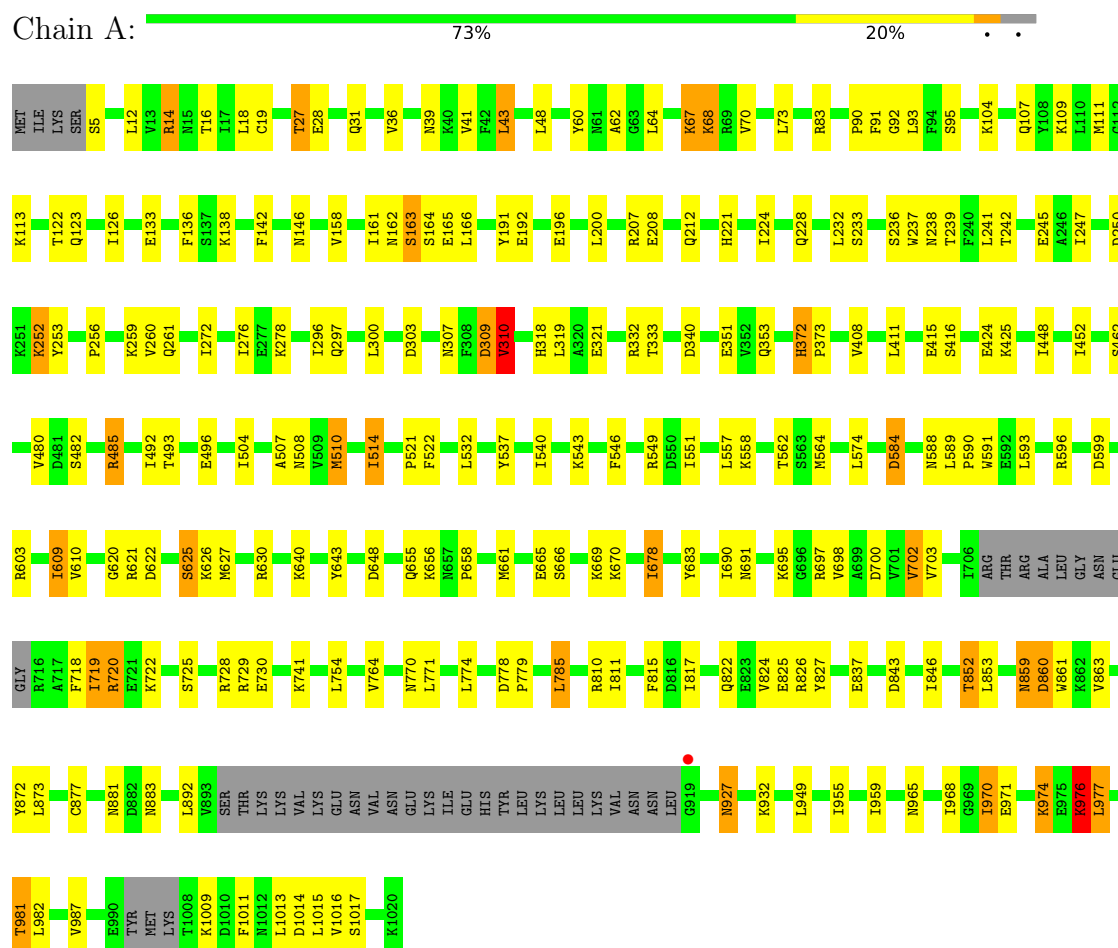
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Chain	Residue	Modelled	Actual	Comment	Reference
B	1020	LYS	-	expression tag	UNP P20103

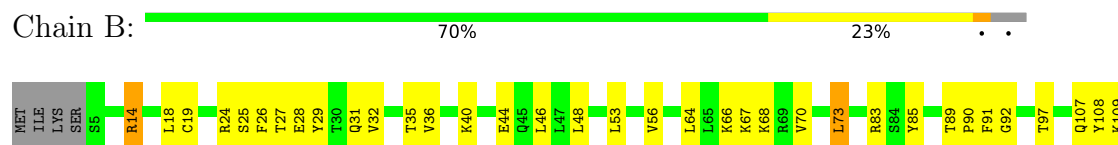
3 Residue-property plots [i](#)

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: 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 34.46 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.7 (34.46-2.90) 99.7 (34.46-2.90)	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 0.200 , 0.258	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)	0.31 , 25.6	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	0.95	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	0.63	0/8222	0.99	14/11077 (0.1%)
1	B	0.60	1/8201 (0.0%)	0.96	9/11049 (0.1%)
All	All	0.62	1/16423 (0.0%)	0.98	23/22126 (0.1%)

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	B	255	ILE	CA-CB	5.17	1.57	1.54

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	372	HIS	CA-C-N	14.96	138.54	119.84
1	A	372	HIS	C-N-CA	14.96	138.54	119.84
1	A	310	VAL	N-CA-C	-6.84	106.82	113.53
1	A	164	SER	N-CA-C	-6.64	103.22	112.25
1	B	852	THR	CA-C-N	6.54	129.57	120.29
1	B	852	THR	C-N-CA	6.54	129.57	120.29
1	A	974	LYS	N-CA-C	-6.17	105.60	113.01
1	A	372	HIS	C-N-CD	-6.17	99.71	125.00
1	A	68	LYS	N-CA-C	-5.86	106.77	114.04
1	B	600	TYR	CA-C-N	-5.83	118.25	123.33
1	B	600	TYR	C-N-CA	-5.83	118.25	123.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	971	GLU	N-CA-C	-5.80	100.25	109.59
1	B	853	LEU	N-CA-C	5.74	117.62	111.36
1	A	514	ILE	N-CA-C	5.71	116.38	108.84
1	B	883	ASN	N-CA-C	-5.55	108.30	114.62
1	A	703	VAL	N-CA-C	5.54	113.97	107.77
1	A	976	LYS	N-CA-C	-5.36	106.58	113.01
1	A	142	PHE	N-CA-C	5.22	118.07	109.72
1	B	407	ASN	N-CA-C	5.19	117.75	109.81
1	A	584	ASP	N-CA-C	-5.15	107.52	112.97
1	B	371	ASN	CA-C-N	-5.14	116.84	123.16
1	B	371	ASN	C-N-CA	-5.14	116.84	123.16
1	A	1011	PHE	N-CA-C	-5.08	106.82	112.57

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	372	HIS	Peptide
1	A	778	ASP	Peptide
1	B	64	LEU	Peptide
1	B	778	ASP	Peptide

5.2 Too-close contacts ⓘ

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	127	0
1	B	8040	0	8045	138	0
All	All	16101	0	16105	261	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.

All (261) 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
1:A:48:LEU:HD22	1:A:93:LEU:HG	1.66	0.75
1:B:332:ARG:NH2	1:B:340:ASP:OD2	2.21	0.74
1:B:190:LYS:NZ	1:B:192:GLU:OE2	2.21	0.72
1:A:625:SER:O	1:A:627:MET:N	2.22	0.71
1:A:136:PHE:HD2	1:A:247:ILE:HD12	1.56	0.69
1:B:107:GLN:HB3	1:B:307:ASN:HB2	1.74	0.69
1:B:1010:ASP:N	1:B:1010:ASP:OD2	2.26	0.69
1:A:18:LEU:HD21	1:A:41:VAL:HG11	1.76	0.68
1:B:133:GLU:OE2	1:B:228:GLN:NE2	2.26	0.68
1:B:110:LEU:HB2	1:B:692:LYS:HG3	1.76	0.67
1:A:351:GLU:OE2	1:A:549:ARG:NH1	2.28	0.66
1:B:761:GLN:HG2	1:B:771:LEU:HD21	1.77	0.66
1:B:66:LYS:HD3	1:B:68:LYS:HE3	1.76	0.66
1:B:882:ASP:O	1:B:883:ASN:ND2	2.29	0.66
1:A:1013:LEU:O	1:A:1015:LEU:N	2.29	0.66
1:B:319:LEU:HD22	1:B:609:ILE:HD12	1.77	0.66
1:B:859:ASN:CG	1:B:860:ASP:H	2.05	0.64
1:B:123:GLN:HG3	1:B:504:ILE:HG22	1.80	0.62
1:A:846:ILE:HG22	1:A:927:ASN:HB2	1.81	0.62
1:B:83:ARG:HD2	1:B:83:ARG:O	1.98	0.61
1:B:248:ASP:HB3	1:B:254:ILE:HD11	1.81	0.61
1:A:408:VAL:HG12	1:A:603:ARG:HB3	1.81	0.61
1:B:827:TYR:O	1:B:832:THR:HB	2.00	0.60
1:A:39:ASN:O	1:A:43:LEU:HD22	2.01	0.60
1:A:551:ILE:HD11	1:A:722:LYS:HD2	1.83	0.60
1:B:24:ARG:HD3	1:B:35:THR:HG21	1.83	0.60
1:B:588:ASN:HB3	1:B:593:LEU:HD11	1.84	0.60
1:B:624:ASN:HB3	1:B:627:MET:HB3	1.84	0.59
1:A:729:ARG:NH2	1:A:825:GLU:OE2	2.34	0.59
1:A:318:HIS:NE2	1:A:415:GLU:OE2	2.31	0.59
1:A:496:GLU:OE2	1:A:562:THR:N	2.28	0.59
1:A:853:LEU:O	1:A:859:ASN:ND2	2.33	0.58
1:B:128:LEU:HD11	1:B:132:MET:HE3	1.86	0.58
1:B:474:SER:O	1:B:478:THR:HG23	2.03	0.58
1:A:771:LEU:HD13	1:A:785:LEU:HD21	1.85	0.58
1:A:19:CYS:SG	1:A:695:LYS:HB3	2.44	0.57
1:B:795:ALA:O	1:B:799:ILE:HG12	2.04	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:333:THR:OG1	1:A:584:ASP:OD2	2.17	0.57
1:B:448:ILE:HG12	1:B:610:VAL:HB	1.87	0.57
1:A:256:PRO:HA	1:A:259:LYS:HD3	1.87	0.56
1:A:730:GLU:OE2	1:B:807:ARG:NH1	2.38	0.56
1:A:83:ARG:HD2	1:A:83:ARG:O	2.05	0.56
1:A:319:LEU:HD22	1:A:609:ILE:HD12	1.88	0.56
1:A:514:ILE:HD12	1:A:514:ILE:H	1.70	0.55
1:A:859:ASN:CG	1:A:860:ASP:H	2.14	0.55
1:B:245:GLU:HA	1:B:254:ILE:CD1	2.36	0.55
1:B:858:ASN:OD1	1:B:859:ASN:ND2	2.36	0.55
1:B:484:GLU:O	1:B:488:GLU:HG3	2.07	0.55
1:A:146:ASN:HB3	1:A:521:PRO:O	2.07	0.55
1:B:140:LEU:HD21	1:B:247:ILE:HD13	1.88	0.55
1:B:267:TYR:HB2	1:B:282:ILE:HD11	1.89	0.55
1:B:547:TYR:OH	1:B:720:ARG:HG3	2.07	0.55
1:B:620:GLY:O	1:B:622:ASP:N	2.40	0.55
1:A:507:ALA:O	1:A:510:MET:HG2	2.07	0.55
1:A:162:ASN:HD22	1:A:221:HIS:CE1	2.17	0.55
1:A:877:CYS:SG	1:A:932:LYS:HG3	2.47	0.55
1:A:353:GLN:HB2	1:A:537:TYR:CZ	2.41	0.54
1:B:860:ASP:CB	1:B:861:TRP:HA	2.37	0.54
1:B:640:LYS:NZ	1:B:656:LYS:HD2	2.22	0.54
1:A:859:ASN:ND2	1:A:861:TRP:O	2.41	0.53
1:B:422:ASP:OD2	1:B:423:LEU:N	2.41	0.53
1:A:250:ASP:HB3	1:A:252:LYS:HE3	1.91	0.53
1:A:977:LEU:O	1:A:981:THR:HG23	2.08	0.53
1:A:136:PHE:CD2	1:A:247:ILE:HD12	2.41	0.52
1:A:93:LEU:HA	1:A:300:LEU:HD11	1.91	0.52
1:B:26:PHE:CG	1:B:32:VAL:HG22	2.44	0.52
1:B:440:LYS:HE2	1:B:689:ILE:HG12	1.92	0.52
1:B:890:LEU:HD23	1:B:983:GLN:HA	1.91	0.52
1:B:159:TYR:HE2	1:B:161:ILE:HD11	1.75	0.52
1:B:192:GLU:H	1:B:192:GLU:CD	2.18	0.52
1:B:598:PHE:O	1:B:617:LYS:NZ	2.38	0.52
1:B:879:PHE:CD2	1:B:886:ILE:HG12	2.44	0.52
1:B:931:LEU:O	1:B:935:ILE:HG13	2.10	0.52
1:A:822:GLN:NE2	1:A:837:GLU:OE2	2.41	0.51
1:A:589:LEU:HD22	1:A:589:LEU:H	1.76	0.51
1:A:5:SER:N	1:A:321:GLU:OE2	2.44	0.51
1:A:196:GLU:O	1:A:200:LEU:HG	2.10	0.51
1:A:640:LYS:HD2	1:A:656:LYS:NZ	2.25	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:507:ALA:O	1:B:510:MET:HG2	2.11	0.50
1:B:619:TRP:CE3	1:B:677:PHE:HB3	2.47	0.50
1:B:206:TYR:HD1	1:B:209:LEU:HD12	1.77	0.50
1:B:1008:THR:N	1:B:1010:ASP:OD2	2.45	0.50
1:B:119:ARG:HB2	1:B:297:GLN:HB2	1.93	0.50
1:B:416:SER:HA	1:B:419:GLN:HG2	1.94	0.50
1:A:351:GLU:HG3	1:A:720:ARG:HB3	1.94	0.50
1:B:603:ARG:HD3	1:B:682:GLU:OE2	2.12	0.49
1:A:27:THR:HG23	1:A:658:PRO:HG2	1.93	0.49
1:B:253:TYR:C	1:B:256:PRO:HD2	2.37	0.49
1:B:162:ASN:HD22	1:B:162:ASN:C	2.18	0.49
1:A:448:ILE:HG12	1:A:610:VAL:HB	1.95	0.49
1:B:422:ASP:OD1	1:B:425:LYS:HD2	2.12	0.49
1:A:564:MET:HE2	1:A:564:MET:HA	1.94	0.49
1:A:965:ASN:HD22	1:A:970:ILE:HG23	1.78	0.49
1:A:485:ARG:HA	1:A:485:ARG:HD3	1.56	0.49
1:B:617:LYS:HG2	1:B:677:PHE:CD1	2.48	0.48
1:A:599:ASP:OD2	1:B:397:SER:OG	2.16	0.48
1:A:817:ILE:HB	1:B:817:ILE:HB	1.94	0.48
1:A:122:THR:HG23	1:A:232:LEU:HD22	1.96	0.48
1:B:56:VAL:HG12	1:B:73:LEU:HD13	1.95	0.48
1:B:655:GLN:HA	1:B:661:MET:HE3	1.94	0.48
1:A:67:LYS:HA	1:A:70:VAL:HG23	1.95	0.48
1:A:113:LYS:N	1:A:303:ASP:OD1	2.40	0.48
1:A:133:GLU:OE2	1:A:228:GLN:NE2	2.47	0.48
1:B:196:GLU:O	1:B:200:LEU:HG	2.14	0.48
1:B:411:LEU:HD12	1:B:611:ILE:HG13	1.95	0.48
1:B:510:MET:HG3	1:B:511:HIS:N	2.28	0.48
1:A:192:GLU:OE1	1:A:207:ARG:NH2	2.47	0.48
1:B:740:LEU:HD23	1:B:817:ILE:HG12	1.96	0.48
1:B:353:GLN:OE1	1:B:355:THR:OG1	2.32	0.47
1:A:588:ASN:HB3	1:A:593:LEU:HD11	1.95	0.47
1:A:690:ILE:HG22	1:A:697:ARG:HB2	1.97	0.47
1:B:66:LYS:HG2	1:B:68:LYS:HG2	1.97	0.47
1:B:669:LYS:HA	1:B:672:SER:HB2	1.94	0.47
1:B:640:LYS:HZ2	1:B:656:LYS:HD2	1.80	0.47
1:B:633:ILE:O	1:B:638:ILE:HG12	2.15	0.47
1:A:224:ILE:HG23	1:A:228:GLN:NE2	2.30	0.47
1:A:666:SER:O	1:A:670:LYS:HG3	2.14	0.47
1:A:256:PRO:O	1:A:260:VAL:HG23	2.16	0.47
1:B:18:LEU:HD13	1:B:85:TYR:CZ	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:843:ASP:O	1:A:846:ILE:HG12	2.14	0.46
1:B:245:GLU:HA	1:B:254:ILE:HD13	1.98	0.46
1:A:826:ARG:HD3	1:A:827:TYR:CE2	2.50	0.46
1:B:761:GLN:HG2	1:B:771:LEU:CD2	2.44	0.46
1:A:522:PHE:CZ	1:A:574:LEU:HD11	2.50	0.46
1:B:29:TYR:CE2	1:B:659:LEU:HD22	2.51	0.46
1:B:671:SER:HB2	1:B:676:ASP:HB3	1.98	0.46
1:B:716:ARG:HB3	1:B:718:PHE:CZ	2.50	0.46
1:B:535:ASN:HD22	1:B:551:ILE:HD11	1.81	0.46
1:B:14:ARG:HD3	1:B:700:ASP:OD1	2.16	0.46
1:B:630:ARG:HH21	1:B:661:MET:HG3	1.80	0.45
1:A:620:GLY:O	1:A:622:ASP:N	2.49	0.45
1:A:237:TRP:O	1:A:241:LEU:HG	2.17	0.45
1:A:810:ARG:HG3	1:B:151:PHE:CE1	2.52	0.45
1:A:825:GLU:CD	1:A:825:GLU:H	2.23	0.45
1:B:351:GLU:HG3	1:B:720:ARG:HB3	1.98	0.45
1:A:161:ILE:HG13	1:A:162:ASN:N	2.31	0.45
1:B:163:SER:OG	1:B:165:GLU:N	2.50	0.45
1:B:1013:LEU:O	1:B:1015:LEU:N	2.50	0.45
1:B:245:GLU:HA	1:B:254:ILE:HD11	1.98	0.45
1:B:253:TYR:O	1:B:256:PRO:HD2	2.17	0.45
1:B:843:ASP:O	1:B:847:ILE:HG12	2.16	0.45
1:A:655:GLN:HA	1:A:661:MET:HE3	1.99	0.45
1:A:741:LYS:O	1:A:815:PHE:HA	2.17	0.45
1:B:19:CYS:SG	1:B:695:LYS:HB3	2.57	0.45
1:A:729:ARG:HH22	1:A:825:GLU:CD	2.25	0.44
1:B:540:ILE:HG23	1:B:544:GLU:HA	1.99	0.44
1:B:860:ASP:OD1	1:B:861:TRP:HA	2.18	0.44
1:B:859:ASN:CG	1:B:860:ASP:N	2.74	0.44
1:A:872:TYR:HB2	1:A:982:LEU:HD11	1.98	0.44
1:B:108:TYR:HA	1:B:306:ILE:HD12	1.99	0.44
1:B:796:TYR:CZ	1:B:800:LEU:HD22	2.52	0.44
1:B:980:TYR:O	1:B:984:ARG:NH1	2.47	0.44
1:A:319:LEU:HD22	1:A:609:ILE:HG21	1.99	0.44
1:B:89:THR:HA	1:B:90:PRO:HD2	1.82	0.44
1:A:16:THR:HG23	1:A:18:LEU:O	2.18	0.44
1:A:138:LYS:HA	1:A:191:TYR:CG	2.53	0.44
1:A:1009:LYS:HD2	1:A:1009:LYS:N	2.33	0.44
1:A:725:SER:OG	1:A:728:ARG:HG3	2.18	0.44
1:A:754:LEU:CD2	1:A:852:THR:HG23	2.48	0.44
1:B:122:THR:HG22	1:B:126:ILE:HD12	2.00	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:859:ASN:OD1	1:A:860:ASP:N	2.33	0.44
1:A:16:THR:HG22	1:A:698:VAL:H	1.82	0.44
1:A:60:TYR:C	1:A:62:ALA:H	2.25	0.44
1:A:90:PRO:HA	1:A:95:SER:OG	2.18	0.44
1:A:643:TYR:CE2	1:A:683:TYR:HD2	2.36	0.44
1:B:83:ARG:HD2	1:B:83:ARG:C	2.43	0.44
1:B:620:GLY:C	1:B:622:ASP:H	2.25	0.44
1:A:14:ARG:HD3	1:A:700:ASP:OD1	2.17	0.43
1:A:12:LEU:HB2	1:A:702:VAL:HG13	1.99	0.43
1:A:492:ILE:HD13	1:A:558:LYS:HE3	2.00	0.43
1:B:109:LYS:HB2	1:B:111:MET:HE2	2.00	0.43
1:A:83:ARG:NH2	1:A:91:PHE:HB3	2.33	0.43
1:A:236:SER:HB3	1:A:239:THR:OG1	2.18	0.43
1:A:242:THR:O	1:A:245:GLU:HB2	2.17	0.43
1:B:185:GLU:OE1	1:B:532:LEU:HD21	2.19	0.43
1:A:296:ILE:HD13	1:A:296:ILE:HA	1.79	0.43
1:B:926:LYS:HB2	1:B:928:PHE:CD1	2.53	0.43
1:A:256:PRO:O	1:A:259:LYS:HB2	2.19	0.43
1:A:754:LEU:HD23	1:A:754:LEU:HA	1.83	0.43
1:B:67:LYS:HA	1:B:70:VAL:HG23	2.00	0.43
1:B:464:ARG:NH1	1:B:508:ASN:O	2.52	0.43
1:A:859:ASN:CG	1:A:860:ASP:N	2.77	0.43
1:B:283:TYR:O	1:B:287:SER:OG	2.21	0.43
1:B:522:PHE:CE2	1:B:574:LEU:HD11	2.54	0.43
1:B:14:ARG:HG2	1:B:90:PRO:HG3	2.01	0.43
1:A:859:ASN:O	1:A:860:ASP:HB2	2.19	0.43
1:B:567:LYS:HA	1:B:570:PHE:HE1	1.83	0.43
1:B:640:LYS:HD2	1:B:656:LYS:NZ	2.33	0.42
1:A:297:GLN:OE1	1:A:508:ASN:HB3	2.19	0.42
1:B:982:LEU:HA	1:B:982:LEU:HD23	1.75	0.42
1:B:498:VAL:O	1:B:521:PRO:HA	2.19	0.42
1:B:678:ILE:HD12	1:B:678:ILE:HA	1.84	0.42
1:A:892:LEU:HD23	1:A:892:LEU:HA	1.83	0.42
1:B:472:LEU:HD23	1:B:472:LEU:HA	1.73	0.42
1:B:853:LEU:HA	1:B:853:LEU:HD12	1.84	0.42
1:A:192:GLU:OE1	1:A:207:ARG:NH1	2.53	0.42
1:A:278:LYS:HA	1:A:278:LYS:HD3	1.85	0.42
1:B:493:THR:HB	1:B:557:LEU:HD23	2.01	0.42
1:A:493:THR:HB	1:A:557:LEU:HD23	2.01	0.42
1:B:760:ILE:HG12	1:B:799:ILE:HD12	2.02	0.42
1:A:241:LEU:HD11	1:A:261:GLN:OE1	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:678:ILE:HD12	1:A:678:ILE:HA	1.98	0.42
1:A:955:ILE:O	1:A:959:ILE:HG13	2.20	0.42
1:B:716:ARG:HD3	1:B:716:ARG:HA	1.76	0.42
1:B:927:ASN:OD1	1:B:927:ASN:N	2.52	0.42
1:B:1020:LYS:HB3	1:B:1020:LYS:HE2	1.60	0.42
1:A:510:MET:HE3	1:A:510:MET:HB2	1.88	0.42
1:A:974:LYS:O	1:A:977:LEU:HB3	2.20	0.42
1:A:309:ASP:HB3	1:A:310:VAL:H	1.63	0.41
1:A:774:LEU:HD12	1:A:774:LEU:HA	1.93	0.41
1:B:541:ASP:OD2	1:B:545:LYS:HB2	2.20	0.41
1:A:253:TYR:O	1:A:256:PRO:HD2	2.20	0.41
1:A:411:LEU:HD23	1:A:411:LEU:HA	1.81	0.41
1:A:109:LYS:HB2	1:A:111:MET:HE2	2.03	0.41
1:A:551:ILE:CD1	1:A:722:LYS:HD2	2.48	0.41
1:B:325:ASN:HB3	1:B:418:TYR:HB3	2.01	0.41
1:A:28:GLU:O	1:A:31:GLN:HB3	2.20	0.41
1:A:549:ARG:HH22	1:A:718:PHE:HB3	1.85	0.41
1:A:640:LYS:HD2	1:A:656:LYS:HZ2	1.84	0.41
1:B:877:CYS:SG	1:B:932:LYS:HG2	2.60	0.41
1:B:46:LEU:HD11	1:B:53:LEU:HD23	2.03	0.41
1:B:561:ILE:HD13	1:B:570:PHE:CZ	2.56	0.41
1:A:208:GLU:O	1:A:212:GLN:HG3	2.21	0.41
1:A:332:ARG:NH2	1:A:340:ASP:OD2	2.54	0.41
1:B:309:ASP:HB3	1:B:310:VAL:H	1.58	0.41
1:B:331:ARG:HH22	1:B:423:LEU:CD1	2.34	0.41
1:A:238:ASN:O	1:A:242:THR:HG23	2.20	0.41
1:A:272:ILE:HD12	1:A:272:ILE:H	1.86	0.41
1:A:543:LYS:HD3	1:A:543:LYS:HA	1.91	0.41
1:B:28:GLU:O	1:B:31:GLN:HB3	2.20	0.41
1:B:376:ASP:OD1	1:B:376:ASP:N	2.47	0.41
1:B:522:PHE:CZ	1:B:574:LEU:HD11	2.55	0.41
1:A:109:LYS:HG2	1:A:691:ASN:OD1	2.20	0.41
1:A:976:LYS:HB2	1:A:976:LYS:HE2	1.86	0.41
1:B:283:TYR:O	1:B:287:SER:N	2.42	0.41
1:B:416:SER:HA	1:B:419:GLN:HE21	1.86	0.41
1:A:540:ILE:HD13	1:A:546:PHE:HA	2.03	0.40
1:A:665:GLU:O	1:A:669:LYS:HG3	2.21	0.40
1:A:982:LEU:HD12	1:A:982:LEU:HA	1.97	0.40
1:B:545:LYS:HE3	1:B:545:LYS:HB3	1.68	0.40
1:B:692:LYS:HB3	1:B:693:GLY:H	1.68	0.40
1:B:739:TYR:CE2	1:B:818:SER:HB2	2.56	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:233:SER:HB2	1:A:514:ILE:HD11	2.03	0.40
1:B:424:GLU:O	1:B:426:LYS:HG3	2.22	0.40
1:B:800:LEU:O	1:B:804:LYS:HG3	2.22	0.40
1:A:424:GLU:HG2	1:A:425:LYS:HG3	2.02	0.40
1:A:590:PRO:HD2	1:A:591:TRP:CE3	2.56	0.40
1:B:90:PRO:O	1:B:91:PHE:HB2	2.21	0.40
1:B:213:TYR:CE2	1:B:1013:LEU:HB2	2.56	0.40
1:A:123:GLN:HG3	1:A:504:ILE:HG22	2.03	0.40
1:A:163:SER:C	1:A:165:GLU:H	2.29	0.40
1:A:166:LEU:HD12	1:A:166:LEU:HA	1.79	0.40
1:B:245:GLU:HG2	1:B:254:ILE:HD13	2.03	0.40
1:B:248:ASP:OD2	1:B:254:ILE:HG13	2.21	0.40
1:B:561:ILE:HD13	1:B:570:PHE:CE1	2.56	0.40
1:B:850:LEU:O	1:B:854:ILE:HG13	2.21	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	957/1006 (95%)	890 (93%)	52 (5%)	15 (2%)	7	27
1	B	954/1006 (95%)	884 (93%)	56 (6%)	14 (2%)	8	28
All	All	1911/2012 (95%)	1774 (93%)	108 (6%)	29 (2%)	8	28

All (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

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Mol	Chain	Res	Type
1	A	779	PRO
1	A	1014	ASP
1	B	163	SER
1	B	309	ASP
1	B	719	ILE
1	B	779	PRO
1	A	92	GLY
1	A	621	ARG
1	A	625	SER
1	A	859	ASN
1	A	881	ASN
1	A	883	ASN
1	B	92	GLY
1	B	348	VAL
1	B	425	LYS
1	B	621	ARG
1	B	1014	ASP
1	A	860	ASP
1	B	347	GLY
1	A	163	SER
1	B	423	LEU
1	B	925	ASP
1	A	720	ARG
1	B	625	SER
1	B	970	ILE

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%)	860 (95%)	47 (5%)	21	52
1	B	905/947 (96%)	849 (94%)	56 (6%)	16	46
All	All	1812/1894 (96%)	1709 (94%)	103 (6%)	18	49

All (103) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	ARG
1	A	27	THR
1	A	36	VAL
1	A	43	LEU
1	A	64	LEU
1	A	67	LYS
1	A	68	LYS
1	A	73	LEU
1	A	104	LYS
1	A	126	ILE
1	A	158	VAL
1	A	252	LYS
1	A	276	ILE
1	A	310	VAL
1	A	416	SER
1	A	452	ILE
1	A	462	SER
1	A	480	VAL
1	A	482	SER
1	A	485	ARG
1	A	510	MET
1	A	532	LEU
1	A	596	ARG
1	A	609	ILE
1	A	630	ARG
1	A	648	ASP
1	A	678	ILE
1	A	702	VAL
1	A	719	ILE
1	A	764	VAL
1	A	770	ASN
1	A	785	LEU
1	A	811	ILE
1	A	824	VAL
1	A	852	THR
1	A	863	VAL
1	A	873	LEU
1	A	927	ASN
1	A	949	LEU
1	A	968	ILE
1	A	970	ILE
1	A	976	LYS
1	A	977	LEU

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Mol	Chain	Res	Type
1	A	981	THR
1	A	987	VAL
1	A	1016	VAL
1	A	1017	SER
1	B	14	ARG
1	B	25	SER
1	B	27	THR
1	B	36	VAL
1	B	40	LYS
1	B	48	LEU
1	B	73	LEU
1	B	97	THR
1	B	126	ILE
1	B	134	VAL
1	B	190	LYS
1	B	198	VAL
1	B	239	THR
1	B	268	SER
1	B	284	GLN
1	B	287	SER
1	B	300	LEU
1	B	310	VAL
1	B	348	VAL
1	B	408	VAL
1	B	412	ASP
1	B	421	MET
1	B	452	ILE
1	B	462	SER
1	B	480	VAL
1	B	481	ASP
1	B	482	SER
1	B	483	VAL
1	B	520	LEU
1	B	540	ILE
1	B	545	LYS
1	B	605	VAL
1	B	609	ILE
1	B	651	VAL
1	B	676	ASP
1	B	702	VAL
1	B	706	ILE
1	B	719	ILE

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Mol	Chain	Res	Type
1	B	726	VAL
1	B	729	ARG
1	B	770	ASN
1	B	785	LEU
1	B	811	ILE
1	B	824	VAL
1	B	832	THR
1	B	850	LEU
1	B	860	ASP
1	B	863	VAL
1	B	869	LEU
1	B	887	LEU
1	B	927	ASN
1	B	977	LEU
1	B	987	VAL
1	B	1010	ASP
1	B	1013	LEU
1	B	1016	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	9	GLN
1	A	31	GLN
1	A	162	ASN
1	A	178	GLN
1	A	228	GLN
1	A	294	ASN
1	A	880	GLN
1	B	9	GLN
1	B	15	ASN
1	B	178	GLN
1	B	220	ASN
1	B	288	GLN
1	B	407	ASN
1	B	634	GLN
1	B	761	GLN
1	B	880	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 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	965/1006 (95%)	-0.71	1 (0%) 92 90	7, 23, 52, 84	0
1	B	962/1006 (95%)	-0.66	2 (0%) 91 89	5, 25, 65, 96	0
All	All	1927/2012 (95%)	-0.69	3 (0%) 91 89	5, 24, 58, 96	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	923	PHE	4.2
1	A	919	GLY	2.3
1	B	427	SER	2.1

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.