



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 12:00 AM UTC

PDB ID : 6A4E / pdb\_00006a4e  
Title : Two linked uridine bound Oligoribonuclease (ORN) from *Colwellia psychrerythraea* strain 34H  
Authors : Lee, C.W.; Park, S.; Lee, J.H.  
Deposited on : 2018-06-19  
Resolution : 2.45 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 : 4-5-2 with Phenix2.0  
Xtrriage (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

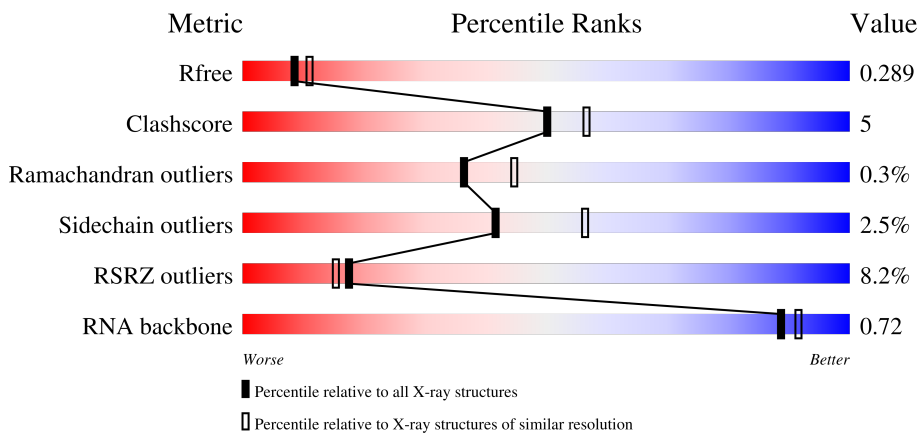
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.45 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	1190 (2.46-2.46)
Clashscore	190562	1229 (2.46-2.46)
Ramachandran outliers	187476	1218 (2.46-2.46)
Sidechain outliers	187428	1218 (2.46-2.46)
RSRZ outliers	180081	1190 (2.46-2.46)
RNA backbone	3983	1023 (2.72-2.20)

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	181	 4% 87% 12%
1	C	181	 12% 81% 18%
2	B	5	 20% 20% 60%
2	D	5	 20% 20% 60%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 3030 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 Oligoribonuclease.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	181	1444	918	243	275	8	0	0	0
1	C	181	1444	918	243	275	8	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	163	ALA	ASP	engineered mutation	UNP Q47VZ4
C	163	ALA	ASP	engineered mutation	UNP Q47VZ4

- Molecule 2 is a RNA chain called RNA (5'-R(P\*UP\*UP\*UP\*UP\*U)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	B	2	40	18	4	16	2	0	0	0
2	D	2	40	18	4	16	2	0	0	0

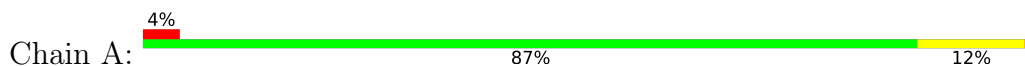
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	39	Total 39 O 39	0	0
3	C	22	Total 22 O 22	0	0
3	D	1	Total 1 O 1	0	0

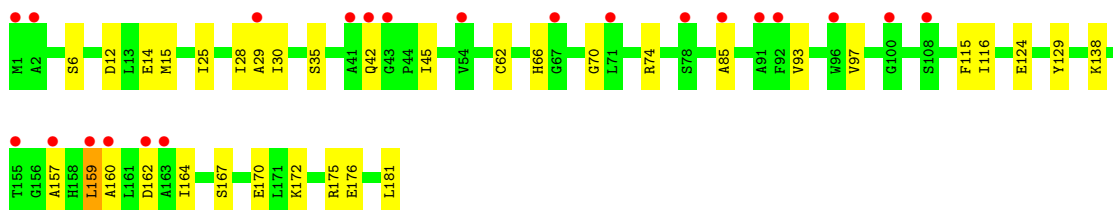
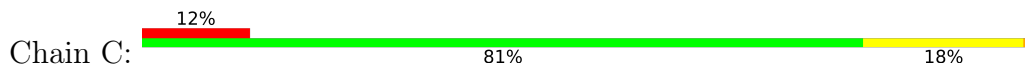
### 3 Residue-property plots [i](#)

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: Oligoribonuclease



- Molecule 1: Oligoribonuclease



- Molecule 2: RNA (5'-R(P\*UP\*UP\*UP\*UP\*U)-3')



- Molecule 2: RNA (5'-R(P\*UP\*UP\*UP\*UP\*U)-3')



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	59.67Å 59.67Å 236.20Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.34 – 2.45 47.34 – 2.45	Depositor EDS
% Data completeness (in resolution range)	96.0 (47.34-2.45) 96.0 (47.34-2.45)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	9.88 (at 2.45Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.237 , 0.276 0.249 , 0.289	Depositor DCC
$R_{free}$ test set	927 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	54.0	Xtrriage
Anisotropy	0.186	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 47.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.034 for -h,-k,l	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	3030	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	63.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.11% 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](#)

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	0.60	0/1474	0.89	1/1996 (0.1%)
1	C	0.53	0/1474	0.91	1/1996 (0.1%)
2	B	0.34	0/43	0.60	0/64
2	D	0.45	0/43	0.88	0/64
All	All	0.56	0/3034	0.89	2/4120 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	30	ILE	N-CA-C	5.76	116.29	107.77
1	A	164	ILE	CB-CA-C	-5.41	105.04	111.97

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	1444	0	1430	12	0
1	C	1444	0	1430	19	0
2	B	40	0	21	1	0
2	D	40	0	21	1	0
3	A	39	0	0	2	0
3	C	22	0	0	0	0
3	D	1	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	3030	0	2902	31	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 (31) 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:7:ASN:O	3:A:201:HOH:O	2.08	0.72
1:C:29:ALA:HB2	1:C:160:ALA:HB1	1.84	0.59
1:A:155:THR:O	3:A:202:HOH:O	2.18	0.56
1:A:36:GLU:O	1:A:175:ARG:NH1	2.36	0.56
1:A:155:THR:N	1:A:166:GLU:OE1	2.36	0.56
1:A:15:MET:O	1:A:66:HIS:HE1	1.89	0.55
1:A:155:THR:HG22	1:A:156:GLY:H	1.72	0.54
1:A:116:ILE:HG22	1:A:124:GLU:HB2	1.93	0.51
1:C:70:GLY:O	1:C:74:ARG:HG3	2.11	0.51
1:C:116:ILE:HG22	1:C:124:GLU:HB2	1.92	0.51
1:C:129:TYR:OH	2:B:1:U:OP2	2.26	0.50
1:C:62:CYS:O	1:C:66:HIS:HB2	2.13	0.49
1:C:6:SER:HB2	1:C:35:SER:HB3	1.94	0.49
1:C:42:GLN:NE2	1:C:45:ILE:HD11	2.29	0.47
1:C:172:LYS:O	1:C:176:GLU:HG3	2.16	0.46
1:A:4:ASN:HB3	1:A:7:ASN:OD1	2.16	0.46
1:A:30:ILE:HD11	1:A:89:SER:HB3	1.99	0.45
1:C:14:GLU:OE1	1:C:66:HIS:HE1	1.99	0.45
1:A:155:THR:HG22	1:A:156:GLY:N	2.32	0.45
1:A:59:ASN:HB3	1:A:62:CYS:SG	2.58	0.43
1:C:12:ASP:OD1	3:D:101:HOH:O	2.21	0.43
1:C:25:ILE:HD11	1:C:115:PHE:HB3	2.01	0.43
1:C:157:ALA:HB1	1:C:162:ASP:OD2	2.18	0.43
1:C:15:MET:SD	2:D:2:U:H4'	2.59	0.42
1:C:28:ILE:HD12	1:C:85:ALA:HB1	2.00	0.42
1:C:181:LEU:HA	1:C:181:LEU:HD23	1.72	0.42
1:C:138:LYS:HE3	1:C:170:GLU:OE2	2.19	0.42
1:C:164:ILE:O	1:C:167:SER:N	2.52	0.41
1:A:158:HIS:HB3	1:A:162:ASP:OD2	2.20	0.41
1:C:159:LEU:HB2	1:C:162:ASP:CG	2.45	0.41
1:C:175:ARG:HE	1:C:181:LEU:CD1	2.35	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	179/181 (99%)	172 (96%)	6 (3%)	1 (1%)	21	27
1	C	179/181 (99%)	172 (96%)	7 (4%)	0	100	100
All	All	358/362 (99%)	344 (96%)	13 (4%)	1 (0%)	36	45

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	59	ASN

### 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	160/160 (100%)	155 (97%)	5 (3%)	35	50
1	C	160/160 (100%)	157 (98%)	3 (2%)	50	64
All	All	320/320 (100%)	312 (98%)	8 (2%)	42	56

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	45	ILE
1	A	53	ASP
1	A	63	ILE
1	A	93	VAL
1	A	138	LYS

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Mol	Chain	Res	Type
1	C	93	VAL
1	C	97	VAL
1	C	159	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	66	HIS
1	A	107	ASN
1	C	42	GLN
1	C	50	GLN
1	C	65	HIS
1	C	158	HIS

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	B	1/5 (20%)	0	0
2	D	1/5 (20%)	0	0
All	All	2/10 (20%)	0	0

There are no RNA backbone outliers to report.

There are no RNA pucker outliers to report.

## 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, 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	181/181 (100%)	0.53	8 (4%) 39 38	40, 55, 72, 88	0
1	C	181/181 (100%)	0.92	22 (12%) 8 7	42, 70, 93, 110	0
2	B	2/5 (40%)	0.67	0 100 100	66, 66, 66, 75	0
2	D	2/5 (40%)	1.04	0 100 100	73, 73, 73, 88	0
All	All	366/372 (98%)	0.73	30 (8%) 17 15	40, 60, 88, 110	0

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	2	ALA	5.5
1	C	85	ALA	4.5
1	C	163	ALA	3.0
1	C	43	GLY	3.0
1	C	91	ALA	2.9
1	C	29	ALA	2.8
1	C	2	ALA	2.7
1	C	96	TRP	2.7
1	C	67	GLY	2.6
1	A	158	HIS	2.6
1	C	160	ALA	2.6
1	C	108	SER	2.6
1	C	155	THR	2.6
1	A	3	GLY	2.5
1	A	67	GLY	2.4
1	C	71	LEU	2.4
1	A	174	TYR	2.4
1	C	54	VAL	2.4
1	C	159	LEU	2.3
1	C	42	GLN	2.3
1	A	125	ASP	2.3

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Mol	Chain	Res	Type	RSRZ
1	C	1	MET	2.3
1	C	92	PHE	2.3
1	A	173	VAL	2.2
1	C	41	ALA	2.2
1	C	100	GLY	2.2
1	C	78	SER	2.1
1	C	157	ALA	2.1
1	A	75	CYS	2.0
1	C	162	ASP	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 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.