



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 15, 2024 – 05:15 AM EST

PDB ID : 3OD9  
Title : Crystal structure of PliI-Ah, periplasmic lysozyme inhibitor of I-type lysozyme from *Aeromonas hydrophyla*  
Authors : Leysen, S.; Van Herreweghe, J.M.; Callewaert, L.; Heirbaut, M.; Buntinx, P.; Michiels, C.W.; Strelkov, S.V.  
Deposited on : 2010-08-11  
Resolution : 1.41 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  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

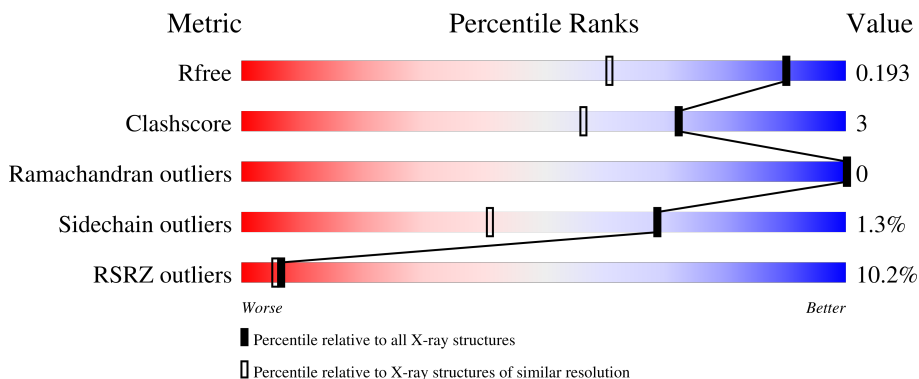
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.41 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	2579 (1.44-1.40)
Clashscore	141614	2696 (1.44-1.40)
Ramachandran outliers	138981	2632 (1.44-1.40)
Sidechain outliers	138945	2631 (1.44-1.40)
RSRZ outliers	127900	2528 (1.44-1.40)

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	135	 4% 86% 10%
1	B	135	 12% 83% 5% 11%
1	C	135	 12% 78% 10% 11%

## 2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 3336 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 Putative exported protein.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace	
			Total	C	N				O
1	A	122	943	597	152	194	0	5	0
1	B	120	929	590	155	184	0	2	0
1	C	120	918	580	153	185	0	2	0

There are 27 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	19	MET	-	initiating methionine	UNP A0KHJ5
A	146	LEU	-	expression tag	UNP A0KHJ5
A	147	GLU	-	expression tag	UNP A0KHJ5
A	148	HIS	-	expression tag	UNP A0KHJ5
A	149	HIS	-	expression tag	UNP A0KHJ5
A	150	HIS	-	expression tag	UNP A0KHJ5
A	151	HIS	-	expression tag	UNP A0KHJ5
A	152	HIS	-	expression tag	UNP A0KHJ5
A	153	HIS	-	expression tag	UNP A0KHJ5
B	19	MET	-	initiating methionine	UNP A0KHJ5
B	146	LEU	-	expression tag	UNP A0KHJ5
B	147	GLU	-	expression tag	UNP A0KHJ5
B	148	HIS	-	expression tag	UNP A0KHJ5
B	149	HIS	-	expression tag	UNP A0KHJ5
B	150	HIS	-	expression tag	UNP A0KHJ5
B	151	HIS	-	expression tag	UNP A0KHJ5
B	152	HIS	-	expression tag	UNP A0KHJ5
B	153	HIS	-	expression tag	UNP A0KHJ5
C	19	MET	-	initiating methionine	UNP A0KHJ5
C	146	LEU	-	expression tag	UNP A0KHJ5
C	147	GLU	-	expression tag	UNP A0KHJ5
C	148	HIS	-	expression tag	UNP A0KHJ5
C	149	HIS	-	expression tag	UNP A0KHJ5

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Chain	Residue	Modelled	Actual	Comment	Reference
C	150	HIS	-	expression tag	UNP A0KHJ5
C	151	HIS	-	expression tag	UNP A0KHJ5
C	152	HIS	-	expression tag	UNP A0KHJ5
C	153	HIS	-	expression tag	UNP A0KHJ5

- Molecule 2 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total K 1 1	0	0
2	B	1	Total K 1 1	0	0

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	6	Total Na 6 6	0	0
3	B	1	Total Na 1 1	0	0
3	C	3	Total Na 3 3	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	216	Total O 216 216	0	0
4	B	156	Total O 156 156	0	0
4	C	162	Total O 162 162	0	0



## 4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	103.02Å 60.33Å 82.19Å 90.00° 115.65° 90.00°	Depositor
Resolution (Å)	46.44 – 1.41 46.43 – 1.41	Depositor EDS
% Data completeness (in resolution range)	91.0 (46.44-1.41) 91.0 (46.43-1.41)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.69 (at 1.41Å)	Xtrriage
Refinement program	PHENIX 1.5_2	Depositor
R, $R_{free}$	0.161 , 0.197 0.154 , 0.193	Depositor DCC
$R_{free}$ test set	4014 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	16.4	Xtrriage
Anisotropy	0.477	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 60.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.017 for $1/2^*h+3/2^*k, 1/2^*h-1/2^*k, -1/2^*h-1/2^*k-l$ 0.014 for $1/2^*h-3/2^*k, -1/2^*h-1/2^*k, -1/2^*h+1/2^*k-l$	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	3336	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	29.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.41% 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: K, NA

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	0.35	0/975	0.56	0/1323
1	B	0.32	0/955	0.56	0/1295
1	C	0.31	0/941	0.51	0/1276
All	All	0.33	0/2871	0.54	0/3894

There are no bond length outliers.

There are no bond angle outliers.

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	943	0	932	3	0
1	B	929	0	926	5	0
1	C	918	0	905	11	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	6	0	0	0	0
3	B	1	0	0	0	0
3	C	3	0	0	0	0
4	A	216	0	0	1	0
4	B	156	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	C	162	0	0	2	0
All	All	3336	0	2763	19	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 3.

All (19) 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:C:25:LYS:HE3	1:C:27:LEU:HD21	1.68	0.75
1:C:114:THR:O	1:C:115:LEU:HD23	1.99	0.63
1:A:71:LYS:HD3	4:A:472:HOH:O	2.01	0.59
1:C:138:GLN:HG2	4:C:628:HOH:O	2.04	0.57
1:C:131:ALA:HB3	1:C:134:GLU:HG3	1.89	0.55
1:B:131:ALA:HB3	1:B:134:GLU:HG3	1.92	0.52
1:A:131:ALA:HB3	1:A:134:GLU:HG3	1.96	0.48
1:A:81:GLU:OE2	1:A:83:LYS:HE3	2.15	0.47
1:C:115:LEU:HD22	1:C:121:LEU:HD13	1.98	0.46
1:C:114:THR:C	1:C:115:LEU:HD23	2.37	0.45
1:B:35[A]:VAL:HG11	1:B:95:LEU:HD22	1.99	0.44
1:B:35[A]:VAL:HG21	1:B:115:LEU:HD13	2.00	0.43
1:C:115:LEU:HD22	1:C:121:LEU:CD1	2.49	0.43
1:C:23:PHE:HB3	1:C:39:GLU:HG3	2.00	0.42
1:B:90:ASP:O	1:B:91:LYS:HB2	2.20	0.42
1:C:29:LEU:HD21	1:C:115:LEU:HD12	2.02	0.41
1:C:81:GLU:CD	1:C:83:LYS:HE2	2.40	0.41
1:B:29:LEU:HD21	1:B:115:LEU:HD12	2.03	0.40
1:C:46:SER:HB3	4:C:490:HOH:O	2.19	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	125/135 (93%)	123 (98%)	2 (2%)	0	100	100
1	B	119/135 (88%)	118 (99%)	1 (1%)	0	100	100
1	C	120/135 (89%)	119 (99%)	1 (1%)	0	100	100
All	All	364/405 (90%)	360 (99%)	4 (1%)	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	107/114 (94%)	106 (99%)	1 (1%)	78	56
1	B	104/114 (91%)	103 (99%)	1 (1%)	76	52
1	C	102/114 (90%)	100 (98%)	2 (2%)	55	22
All	All	313/342 (92%)	309 (99%)	4 (1%)	69	41

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	115	LEU
1	B	115	LEU
1	C	65	ASP
1	C	115	LEU

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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 12 are monoatomic - leaving 0 for Mogul analysis.

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	122/135 (90%)	0.20	5 (4%) 37 37	14, 21, 40, 52	0
1	B	120/135 (88%)	0.77	16 (13%) 3 2	15, 27, 52, 60	0
1	C	120/135 (88%)	0.62	16 (13%) 3 2	17, 28, 49, 57	0
All	All	362/405 (89%)	0.53	37 (10%) 6 5	14, 25, 49, 60	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	103	GLY	8.2
1	B	102	ALA	8.2
1	B	118	GLN	6.8
1	B	106	SER	6.3
1	B	101	SER	6.2
1	B	133	ASN	5.5
1	C	138	GLN	5.5
1	C	89	GLY	5.4
1	B	131	ALA	5.4
1	B	142	THR	5.4
1	A	133	ASN	5.0
1	C	137	ILE	4.9
1	B	143	PRO	4.8
1	C	124	PHE	4.7
1	B	107	TYR	4.4
1	A	142	THR	4.3
1	C	91	LYS	4.2
1	C	133[A]	ASN	3.6
1	C	87	LEU	3.4
1	A	21	ASP	3.4
1	C	135	ASP	3.4
1	B	119	GLU	3.4
1	B	22	GLY	3.0

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Mol	Chain	Res	Type	RSRZ
1	C	85	LEU	2.8
1	B	76	ASP	2.7
1	B	132	PRO	2.6
1	C	119	GLU	2.6
1	B	117	PRO	2.5
1	C	84	LEU	2.5
1	C	86	ASP	2.5
1	C	139	ALA	2.3
1	C	88	ASN	2.3
1	C	140	LEU	2.2
1	A	131	ALA	2.2
1	B	116	ASN	2.2
1	A	61	GLN	2.1
1	C	141	LYS	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
3	NA	A	8	1/1	0.87	0.12	57,57,57,57	0
2	K	B	1	1/1	0.88	0.15	36,36,36,36	1
3	NA	C	7	1/1	0.88	0.10	60,60,60,60	0
3	NA	A	11	1/1	0.90	0.11	44,44,44,44	0
3	NA	A	9	1/1	0.90	0.14	66,66,66,66	0
3	NA	C	6	1/1	0.93	0.11	23,23,23,23	1
3	NA	A	10	1/1	0.93	0.13	32,32,32,32	1
3	NA	B	3	1/1	0.97	0.10	23,23,23,23	1
3	NA	A	12	1/1	0.98	0.13	42,42,42,42	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	NA	C	5	1/1	0.99	0.10	25,25,25,25	0
2	K	A	2	1/1	0.99	0.13	16,16,16,16	1
3	NA	A	4	1/1	0.99	0.18	15,15,15,15	1

## 6.5 Other polymers [i](#)

There are no such residues in this entry.