



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 03:21 AM UTC

PDB ID : 1ARB / pdb\_00001arb  
Title : THE PRIMARY STRUCTURE AND STRUCTURAL CHARACTERISTICS OF ACHROMOBACTER LYTICUS PROTEASE I, A LYSINE-SPECIFIC SERINE PROTEASE  
Authors : Kitagawa, Y.; Katsube, Y.  
Deposited on : 1993-04-15  
Resolution : 1.20 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) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

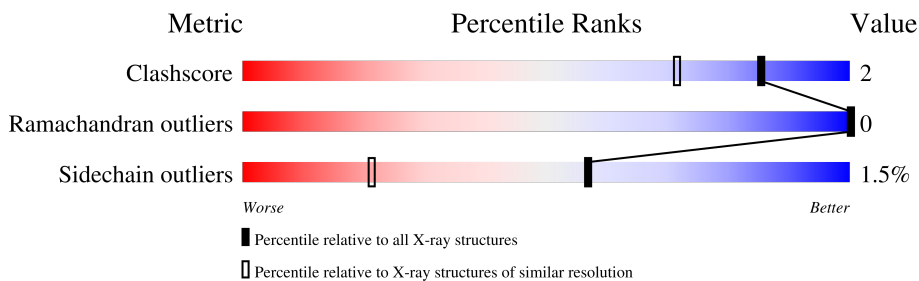
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.20 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))
Clashscore	190562	1265 (1.20-1.20)
Ramachandran outliers	187476	1226 (1.20-1.20)
Sidechain outliers	187428	1226 (1.20-1.20)

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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	268	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2077 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 ACHROMOBACTER PROTEASE I.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	263	1924	1178	349	388	9	0	0	0

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	153	Total	O	0	0
			153	153		

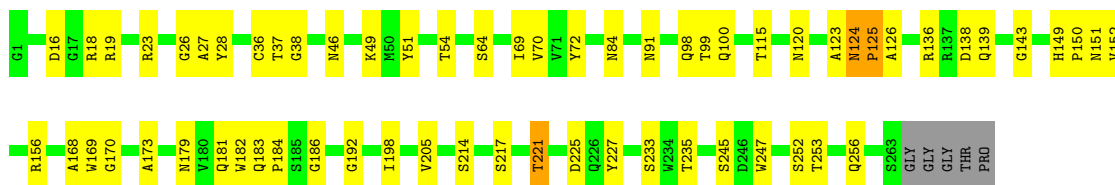
### 3 Residue-property plots [i](#)

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. 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. 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.

Note EDS was not executed.

- Molecule 1: ACHROMOBACTER PROTEASE I

Chain A:  75% 22%



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	39.54Å 40.36Å 43.93Å 114.80° 113.73° 74.00°	Depositor
Resolution (Å)	(Not available) – 1.20	Depositor
% Data completeness (in resolution range)	(Not available) ((Not available)-1.20)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, $R_{free}$	0.149 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	2077	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	13.0	wwPDB-VP

## 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	1.79	20/1971 (1.0%)	1.95	36/2688 (1.3%)

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	1

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	136	ARG	NE-CZ	7.98	1.41	1.33
1	A	38	GLY	C-O	7.69	1.31	1.23
1	A	54	THR	C-O	6.90	1.31	1.23
1	A	69	ILE	CA-CB	6.43	1.60	1.54
1	A	143	GLY	C-O	6.01	1.30	1.23
1	A	235	THR	C-O	5.93	1.31	1.24
1	A	149	HIS	CA-C	-5.88	1.46	1.52
1	A	150	PRO	C-O	5.81	1.30	1.23
1	A	100	GLN	CA-CB	-5.72	1.43	1.53
1	A	186	GLY	C-O	-5.57	1.16	1.23
1	A	205	VAL	C-O	5.52	1.30	1.24
1	A	27	ALA	CA-C	5.27	1.59	1.52
1	A	26	GLY	N-CA	5.16	1.50	1.45
1	A	64	SER	CA-CB	5.15	1.61	1.53
1	A	225	ASP	N-CA	5.14	1.52	1.45
1	A	115	THR	C-O	5.11	1.29	1.23
1	A	36	CYS	C-O	5.11	1.29	1.23
1	A	139	GLN	C-O	5.05	1.30	1.23
1	A	183	GLN	N-CA	5.01	1.52	1.45
1	A	37	THR	CA-CB	5.01	1.62	1.53

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	151	ASN	CA-CB-CG	-11.65	100.95	112.60
1	A	91	ASN	OD1-CG-ND2	-10.39	112.21	122.60
1	A	70	VAL	O-C-N	8.20	132.05	123.20
1	A	123	ALA	O-C-N	6.88	131.48	122.95
1	A	91	ASN	CB-CG-OD1	6.74	134.27	120.80
1	A	192	GLY	CA-C-O	6.73	126.82	119.55
1	A	46	ASN	OD1-CG-ND2	6.72	129.32	122.60
1	A	233	SER	CA-C-N	6.45	128.82	120.44
1	A	233	SER	C-N-CA	6.45	128.82	120.44
1	A	38	GLY	O-C-N	-6.19	116.73	123.29
1	A	23	ARG	CD-NE-CZ	5.87	132.61	124.40
1	A	256	GLN	OE1-CD-NE2	-5.76	116.84	122.60
1	A	184	PRO	CA-C-O	-5.75	110.81	119.55
1	A	136	ARG	NH1-CZ-NH2	5.66	126.65	119.30
1	A	120	ASN	OD1-CG-ND2	-5.64	116.96	122.60
1	A	179	ASN	CA-CB-CG	-5.57	107.03	112.60
1	A	84	ASN	OD1-CG-ND2	5.56	128.16	122.60
1	A	253	THR	CA-CB-OG1	-5.55	101.27	109.60
1	A	168	ALA	N-CA-C	-5.44	102.47	110.52
1	A	125	PRO	CB-CA-C	5.41	120.65	112.21
1	A	170	GLY	N-CA-C	-5.36	107.95	114.92
1	A	169	TRP	CA-C-O	-5.30	115.18	120.96
1	A	247	TRP	CG-CD2-CE3	-5.29	128.61	133.90
1	A	98	GLN	OE1-CD-NE2	-5.28	117.32	122.60
1	A	221	THR	CA-CB-OG1	-5.27	101.70	109.60
1	A	217	SER	CA-CB-OG	-5.26	100.58	111.10
1	A	245	SER	N-CA-C	5.26	117.42	111.11
1	A	16	ASP	O-C-N	5.25	129.33	122.87
1	A	138	ASP	CA-CB-CG	-5.23	107.37	112.60
1	A	16	ASP	CA-CB-CG	5.21	117.81	112.60
1	A	18	ARG	CD-NE-CZ	-5.20	117.12	124.40
1	A	19	ARG	CD-NE-CZ	-5.17	117.16	124.40
1	A	214	SER	N-CA-C	5.14	117.34	110.35
1	A	28	TYR	CA-C-O	5.12	126.86	121.33
1	A	182	TRP	CE2-CD2-CG	-5.12	101.06	107.20
1	A	173	ALA	O-C-N	5.11	129.13	122.89

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	156	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	1924	0	1796	8	0
2	A	153	0	0	0	0
All	All	2077	0	1796	8	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 2.

All (8) 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:124:ASN:ND2	1:A:126:ALA:H	1.99	0.60
1:A:124:ASN:HD22	1:A:126:ALA:H	1.50	0.60
1:A:124:ASN:HD22	1:A:124:ASN:C	2.12	0.57
1:A:49:LYS:HD3	1:A:51:TYR:CZ	2.47	0.49
1:A:198:ILE:HB	1:A:227:TYR:CE2	2.50	0.47
1:A:124:ASN:HD22	1:A:125:PRO:N	2.14	0.46
1:A:72:TYR:CD1	1:A:99:THR:HG22	2.50	0.46
1:A:181:GLN:HE22	1:A:221:THR:HA	1.82	0.44

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	261/268 (97%)	256 (98%)	5 (2%)	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	202/204 (99%)	199 (98%)	3 (2%)	57	21

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	124	ASN
1	A	152	VAL
1	A	252	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	7	ASN
1	A	42	ASN
1	A	74	ASN
1	A	76	GLN
1	A	124	ASN
1	A	140	ASN
1	A	181	GLN
1	A	183	GLN
1	A	208	GLN

### 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

### 6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.