



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:43 PM UTC

PDB ID : 4EOB / pdb\_00004eob  
Title : Structure of the type VI peptidoglycan amidase effector Tse1 from *Pseudomonas aeruginosa*  
Authors : Chou, S.; Mougous, J.D.  
Deposited on : 2012-04-13  
Resolution : 2.61 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>.

---

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

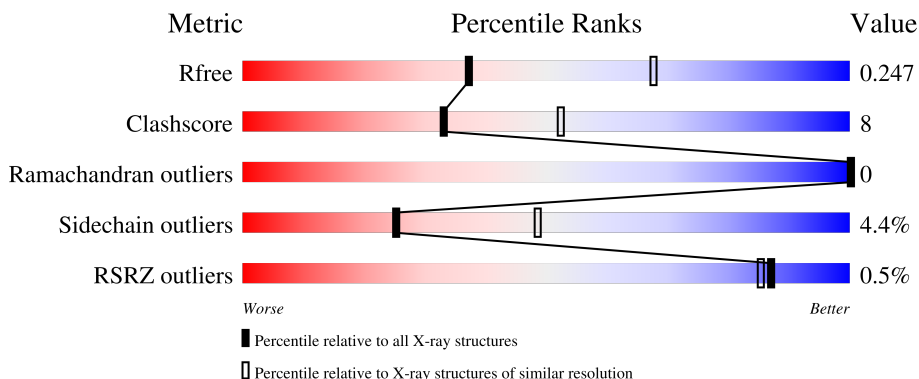
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.61 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	4951 (2.64-2.60)
Clashscore	190562	5303 (2.64-2.60)
Ramachandran outliers	187476	5217 (2.64-2.60)
Sidechain outliers	187428	5217 (2.64-2.60)
RSRZ outliers	180081	4950 (2.64-2.60)

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	162	 72% 17% • 9%
1	B	162	 76% 13% • 10%
1	C	162	 74% 15% • 9%
1	D	162	 75% 14% • 9%

## 2 Entry composition i

There are 2 unique types of molecules in this entry. The entry contains 4522 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 type VI amidase effector Tse1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	147	1091	682	193	207	9	0	0	0
1	B	146	1084	676	194	205	9	0	0	0
1	C	148	1089	683	190	207	9	0	0	0
1	D	147	1097	685	196	207	9	0	0	0

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	155	LEU	-	expression tag	UNP Q9I2Q1
A	156	GLU	-	expression tag	UNP Q9I2Q1
A	157	HIS	-	expression tag	UNP Q9I2Q1
A	158	HIS	-	expression tag	UNP Q9I2Q1
A	159	HIS	-	expression tag	UNP Q9I2Q1
A	160	HIS	-	expression tag	UNP Q9I2Q1
A	161	HIS	-	expression tag	UNP Q9I2Q1
A	162	HIS	-	expression tag	UNP Q9I2Q1
B	155	LEU	-	expression tag	UNP Q9I2Q1
B	156	GLU	-	expression tag	UNP Q9I2Q1
B	157	HIS	-	expression tag	UNP Q9I2Q1
B	158	HIS	-	expression tag	UNP Q9I2Q1
B	159	HIS	-	expression tag	UNP Q9I2Q1
B	160	HIS	-	expression tag	UNP Q9I2Q1
B	161	HIS	-	expression tag	UNP Q9I2Q1
B	162	HIS	-	expression tag	UNP Q9I2Q1
C	155	LEU	-	expression tag	UNP Q9I2Q1
C	156	GLU	-	expression tag	UNP Q9I2Q1
C	157	HIS	-	expression tag	UNP Q9I2Q1
C	158	HIS	-	expression tag	UNP Q9I2Q1
C	159	HIS	-	expression tag	UNP Q9I2Q1

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
C	160	HIS	-	expression tag	UNP Q9I2Q1
C	161	HIS	-	expression tag	UNP Q9I2Q1
C	162	HIS	-	expression tag	UNP Q9I2Q1
D	155	LEU	-	expression tag	UNP Q9I2Q1
D	156	GLU	-	expression tag	UNP Q9I2Q1
D	157	HIS	-	expression tag	UNP Q9I2Q1
D	158	HIS	-	expression tag	UNP Q9I2Q1
D	159	HIS	-	expression tag	UNP Q9I2Q1
D	160	HIS	-	expression tag	UNP Q9I2Q1
D	161	HIS	-	expression tag	UNP Q9I2Q1
D	162	HIS	-	expression tag	UNP Q9I2Q1

- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	41	Total O 41 41	0	0
2	B	29	Total O 29 29	0	0
2	C	42	Total O 42 42	0	0
2	D	49	Total O 49 49	0	0



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	38.66Å 107.58Å 84.40Å 90.00° 94.23° 90.00°	Depositor
Resolution (Å)	45.32 – 2.61 45.32 – 2.61	Depositor EDS
% Data completeness (in resolution range)	98.4 (45.32-2.61) 93.5 (45.32-2.61)	Depositor EDS
$R_{merge}$	0.23	Depositor
$R_{sym}$	0.23	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.21 (at 2.61Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, $R_{free}$	0.186 , 0.244 0.191 , 0.247	Depositor DCC
$R_{free}$ test set	2005 reflections (9.71%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.5	Xtrriage
Anisotropy	0.619	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 38.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	4522	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.15% 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	0.51	0/1113	0.89	2/1509 (0.1%)
1	B	0.52	0/1106	0.92	1/1500 (0.1%)
1	C	0.57	0/1111	0.89	3/1508 (0.2%)
1	D	0.50	0/1119	0.88	1/1516 (0.1%)
All	All	0.53	0/4449	0.90	7/6033 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	43	VAL	N-CA-C	6.17	114.20	107.60
1	A	98	GLY	CA-C-N	6.10	126.42	119.83
1	A	98	GLY	C-N-CA	6.10	126.42	119.83
1	B	108	CYS	N-CA-C	5.66	116.87	108.60
1	C	98	GLY	CA-C-N	5.23	125.53	119.93
1	C	98	GLY	C-N-CA	5.23	125.53	119.93
1	D	87	ARG	N-CA-C	-5.04	105.44	111.03

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	1091	0	1063	20	0
1	B	1084	0	1049	15	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1089	0	1057	16	0
1	D	1097	0	1074	17	0
2	A	41	0	0	4	0
2	B	29	0	0	3	0
2	C	42	0	0	3	0
2	D	49	0	0	7	0
All	All	4522	0	4243	67	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 (67) 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:47:ARG:O	2:A:223:HOH:O	2.05	0.74
1:A:134:ASP:OD1	1:A:137:ARG:NH2	2.23	0.71
1:A:144:SER:O	2:A:241:HOH:O	2.07	0.70
1:C:55:ASP:OD1	1:C:85:LYS:NZ	2.26	0.68
1:A:120:SER:HB2	1:A:124:LYS:HB2	1.77	0.67
1:B:34:VAL:HG22	1:B:53:MET:HE1	1.79	0.64
1:C:125:SER:HB3	1:C:128:GLN:HG3	1.80	0.63
1:D:55:ASP:O	1:D:59:GLN:HG2	2.00	0.61
1:B:146:ALA:HB3	1:B:147:SER:HA	1.82	0.60
1:A:132:ARG:HA	1:A:135:ARG:HD2	1.83	0.59
1:D:30:CYS:SG	2:D:241:HOH:O	2.16	0.59
1:D:91:HIS:HA	2:D:241:HOH:O	2.02	0.59
1:A:34:VAL:CG2	1:A:53:MET:HE1	2.33	0.59
1:B:4:LEU:N	2:B:221:HOH:O	2.37	0.57
1:A:107:MET:HA	1:A:125:SER:HA	1.87	0.56
1:D:117:VAL:O	2:D:214:HOH:O	2.17	0.55
1:B:125:SER:HB3	1:B:128:GLN:HG3	1.88	0.55
1:C:137:ARG:NE	2:C:220:HOH:O	2.38	0.54
1:D:26:ASN:OD1	2:D:225:HOH:O	2.19	0.54
1:D:4:LEU:HB3	1:D:75:ALA:O	2.08	0.53
1:D:54:VAL:HG12	1:D:85:LYS:HE3	1.91	0.53
1:D:92:VAL:N	2:D:241:HOH:O	2.23	0.53
1:C:12:CYS:HB3	1:C:109:TRP:CD2	2.44	0.52
1:B:44:PRO:O	2:B:217:HOH:O	2.20	0.49
1:C:125:SER:H	1:C:128:GLN:HE21	1.61	0.49
1:A:3:SER:O	2:A:222:HOH:O	2.20	0.48
1:B:77:GLY:O	1:B:147:SER:N	2.44	0.48

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:63:LYS:HG2	1:B:141:TYR:CE1	2.47	0.48
1:A:149:SER:O	1:A:149:SER:OG	2.27	0.48
1:B:145:LEU:HD21	1:C:144:SER:HA	1.96	0.47
1:B:147:SER:HB2	2:B:226:HOH:O	2.14	0.47
1:A:116:ALA:O	1:A:124:LYS:NZ	2.47	0.47
1:D:91:HIS:HB3	1:D:130:TRP:CZ2	2.50	0.46
1:D:4:LEU:HD23	1:D:76:GLN:HA	1.98	0.46
1:D:20:TYR:HD2	1:D:21:LEU:HD12	1.80	0.46
1:D:137:ARG:HD2	2:D:242:HOH:O	2.16	0.45
1:B:21:LEU:HD23	1:B:21:LEU:HA	1.79	0.45
1:D:116:ALA:O	1:D:124:LYS:NZ	2.50	0.45
1:A:12:CYS:HB3	1:A:109:TRP:CD2	2.52	0.45
1:C:4:LEU:HD22	1:C:149:SER:O	2.17	0.44
1:C:110:CYS:N	2:C:230:HOH:O	2.51	0.44
1:C:120:SER:OG	1:C:124:LYS:HB2	2.17	0.44
1:D:82:ALA:O	1:D:92:VAL:HA	2.18	0.44
1:D:137:ARG:NH1	2:D:242:HOH:O	2.10	0.43
1:A:15:SER:HA	1:A:18:LYS:HG3	2.01	0.43
1:C:94:VAL:N	2:C:230:HOH:O	2.32	0.42
1:C:108:CYS:HB3	1:C:126:VAL:HG23	2.01	0.42
1:C:41:LEU:HD22	1:C:147:SER:HB3	2.01	0.42
1:A:34:VAL:HG22	1:A:53:MET:HE1	2.02	0.42
1:A:65:ALA:HB3	1:A:69:GLU:OE2	2.19	0.42
1:B:95:VAL:HG13	1:B:106:PRO:HB2	2.01	0.42
1:A:49:ASN:O	1:A:53:MET:HG3	2.20	0.42
1:C:125:SER:H	1:C:128:GLN:NE2	2.18	0.42
1:D:12:CYS:HB3	1:D:109:TRP:CD2	2.55	0.42
1:D:30:CYS:SG	1:D:31:SER:N	2.93	0.41
1:B:54:VAL:HG11	1:B:85:LYS:HG3	2.02	0.41
1:C:135:ARG:O	1:C:138:LEU:HD12	2.21	0.41
1:A:33:PHE:O	1:A:37:VAL:HG23	2.19	0.41
1:A:45:MET:HE2	1:A:45:MET:HB2	1.88	0.41
1:A:104:LYS:NZ	2:A:234:HOH:O	2.22	0.41
1:C:12:CYS:HB3	1:C:109:TRP:CE3	2.56	0.41
1:B:132:ARG:H	1:B:132:ARG:HG2	1.65	0.41
1:B:34:VAL:CG2	1:B:53:MET:HE1	2.49	0.41
1:A:132:ARG:HA	1:A:135:ARG:CD	2.50	0.40
1:B:119:GLN:O	1:B:124:LYS:HD2	2.21	0.40
1:C:43:VAL:HA	1:C:44:PRO:HD3	1.97	0.40
1:A:43:VAL:HA	1:A:44:PRO:HD3	1.95	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	145/162 (90%)	140 (97%)	5 (3%)	0	100	100
1	B	144/162 (89%)	136 (94%)	8 (6%)	0	100	100
1	C	146/162 (90%)	142 (97%)	4 (3%)	0	100	100
1	D	145/162 (90%)	140 (97%)	5 (3%)	0	100	100
All	All	580/648 (90%)	558 (96%)	22 (4%)	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	113/128 (88%)	110 (97%)	3 (3%)	39	65
1	B	111/128 (87%)	107 (96%)	4 (4%)	31	56
1	C	112/128 (88%)	105 (94%)	7 (6%)	16	34
1	D	114/128 (89%)	108 (95%)	6 (5%)	20	41
All	All	450/512 (88%)	430 (96%)	20 (4%)	25	48

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	21	LEU
1	A	34	VAL

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	A	125	SER
1	B	17	ASP
1	B	34	VAL
1	B	102	ARG
1	B	145	LEU
1	C	8	ILE
1	C	21	LEU
1	C	85	LYS
1	C	88	THR
1	C	97	SER
1	C	126	VAL
1	C	150	LEU
1	D	21	LEU
1	D	31	SER
1	D	72	GLN
1	D	117	VAL
1	D	129	VAL
1	D	133	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	6	GLN
1	C	10	ASN
1	C	91	HIS
1	C	128	GLN
1	D	139	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, 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	147/162 (90%)	-0.20	0 <a href="#">100</a> <a href="#">100</a>	16, 27, 38, 48	0
1	B	146/162 (90%)	-0.01	2 (1%) <a href="#">73</a> <a href="#">70</a>	16, 27, 42, 59	0
1	C	148/162 (91%)	-0.13	1 (0%) <a href="#">84</a> <a href="#">82</a>	17, 25, 34, 49	0
1	D	147/162 (90%)	-0.19	0 <a href="#">100</a> <a href="#">100</a>	16, 26, 39, 65	0
All	All	588/648 (90%)	-0.13	3 (0%) <a href="#">87</a> <a href="#">85</a>	16, 26, 40, 65	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	150	LEU	2.5
1	B	149	SER	2.1
1	B	146	ALA	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.