



# wwPDB X-ray Structure Validation Summary Report ⓘ

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PDB ID : 3VJJ  
Title : Crystal Structure Analysis of the P9-1  
Authors : Akita, F.; Higashiura, A.; Suzuki, M.; Tsukihara, T.; Nakagawa, A.; Omura, T.  
Deposited on : 2011-10-24  
Resolution : 3.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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.

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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 : 2.11  
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) : 2.11

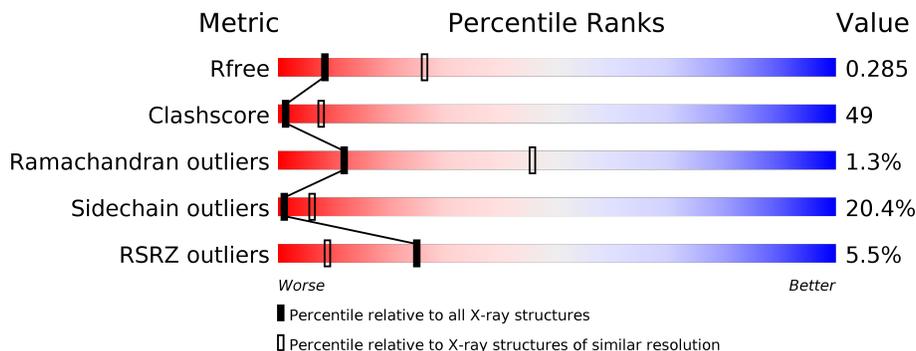
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.00 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	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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 on 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	368	 4% 25% 38% 11% • 25%
1	B	368	 5% 25% 39% 10% 27%

## 2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 4475 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 P9-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	277	Total	C	N	O	S	0	0	0
			2265	1459	372	427	7			
1	B	270	Total	C	N	O	S	0	0	0
			2210	1428	364	411	7			

There are 44 discrepancies between the modelled and reference sequences:

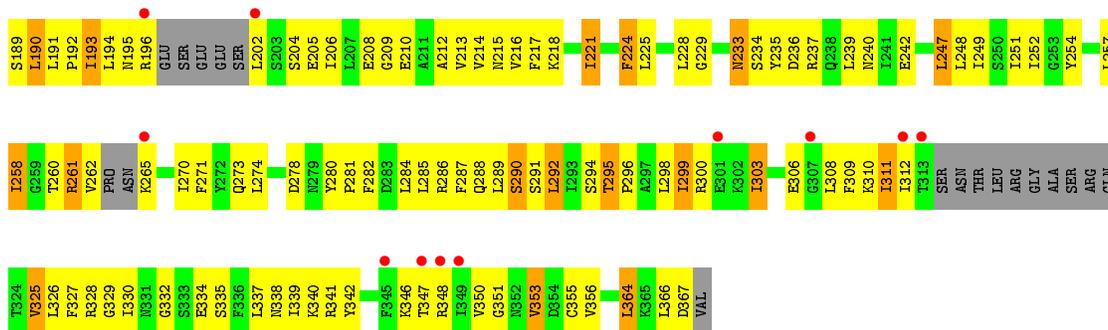
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	EXPRESSION TAG	UNP Q913E4
A	2	SER	-	EXPRESSION TAG	UNP Q913E4
A	3	TYR	-	EXPRESSION TAG	UNP Q913E4
A	4	TYR	-	EXPRESSION TAG	UNP Q913E4
A	5	HIS	-	EXPRESSION TAG	UNP Q913E4
A	6	HIS	-	EXPRESSION TAG	UNP Q913E4
A	7	HIS	-	EXPRESSION TAG	UNP Q913E4
A	8	HIS	-	EXPRESSION TAG	UNP Q913E4
A	9	HIS	-	EXPRESSION TAG	UNP Q913E4
A	10	HIS	-	EXPRESSION TAG	UNP Q913E4
A	11	LEU	-	EXPRESSION TAG	UNP Q913E4
A	12	GLY	-	EXPRESSION TAG	UNP Q913E4
A	13	SER	-	EXPRESSION TAG	UNP Q913E4
A	14	THR	-	EXPRESSION TAG	UNP Q913E4
A	15	SER	-	EXPRESSION TAG	UNP Q913E4
A	16	LEU	-	EXPRESSION TAG	UNP Q913E4
A	17	TYR	-	EXPRESSION TAG	UNP Q913E4
A	18	LYS	-	EXPRESSION TAG	UNP Q913E4
A	19	LYS	-	EXPRESSION TAG	UNP Q913E4
A	20	ALA	-	EXPRESSION TAG	UNP Q913E4
A	21	GLY	-	EXPRESSION TAG	UNP Q913E4
A	346	LYS	ARG	CONFLICT	UNP Q913E4
B	1	MET	-	EXPRESSION TAG	UNP Q913E4
B	2	SER	-	EXPRESSION TAG	UNP Q913E4
B	3	TYR	-	EXPRESSION TAG	UNP Q913E4

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Chain	Residue	Modelled	Actual	Comment	Reference
B	4	TYR	-	EXPRESSION TAG	UNP Q913E4
B	5	HIS	-	EXPRESSION TAG	UNP Q913E4
B	6	HIS	-	EXPRESSION TAG	UNP Q913E4
B	7	HIS	-	EXPRESSION TAG	UNP Q913E4
B	8	HIS	-	EXPRESSION TAG	UNP Q913E4
B	9	HIS	-	EXPRESSION TAG	UNP Q913E4
B	10	HIS	-	EXPRESSION TAG	UNP Q913E4
B	11	LEU	-	EXPRESSION TAG	UNP Q913E4
B	12	GLY	-	EXPRESSION TAG	UNP Q913E4
B	13	SER	-	EXPRESSION TAG	UNP Q913E4
B	14	THR	-	EXPRESSION TAG	UNP Q913E4
B	15	SER	-	EXPRESSION TAG	UNP Q913E4
B	16	LEU	-	EXPRESSION TAG	UNP Q913E4
B	17	TYR	-	EXPRESSION TAG	UNP Q913E4
B	18	LYS	-	EXPRESSION TAG	UNP Q913E4
B	19	LYS	-	EXPRESSION TAG	UNP Q913E4
B	20	ALA	-	EXPRESSION TAG	UNP Q913E4
B	21	GLY	-	EXPRESSION TAG	UNP Q913E4
B	346	LYS	ARG	CONFLICT	UNP Q913E4





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 4 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	127.28Å 127.28Å 143.23Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.18 – 3.00 42.18 – 3.00	Depositor EDS
% Data completeness (in resolution range)	94.6 (42.18-3.00) 93.6 (42.18-3.00)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.33 (at 3.01Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.7_650)	Depositor
R, $R_{free}$	0.243 , 0.293 0.239 , 0.285	Depositor DCC
$R_{free}$ test set	974 reflections (4.25%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	94.8	Xtrriage
Anisotropy	0.580	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 89.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	4475	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	116.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.08% 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	0.70	1/2306 (0.0%)	0.87	7/3106 (0.2%)
1	B	0.56	0/2247	0.84	3/3021 (0.1%)
All	All	0.63	1/4553 (0.0%)	0.86	10/6127 (0.2%)

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	1
All	All	0	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	41	LYS	C-N	18.06	1.75	1.34

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	261	ARG	NE-CZ-NH1	13.60	127.10	120.30
1	B	261	ARG	NE-CZ-NH2	12.38	126.49	120.30
1	A	261	ARG	NE-CZ-NH2	-12.34	114.13	120.30
1	B	261	ARG	NE-CZ-NH1	-11.62	114.49	120.30
1	A	41	LYS	C-N-CA	6.88	138.89	121.70

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	182	GLU	Peptide
1	A	201	SER	Peptide
1	B	182	GLU	Peptide

## 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	2265	0	2296	231	0
1	B	2210	0	2251	215	2
All	All	4475	0	4547	438	2

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 49.

The worst 5 of 438 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:41:LYS:C	1:A:63:THR:N	1.75	1.38
1:A:201:SER:H	1:A:202:LEU:HD22	1.16	1.05
1:A:97:SER:HB3	1:A:99:LEU:H	1.22	1.03
1:B:97:SER:HB3	1:B:99:LEU:H	1.19	1.02
1:A:353:VAL:O	1:A:356:VAL:HG12	1.62	0.98

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:204:SER:OG	1:B:215:ASN:OD1[8_555]	2.01	0.19
1:B:105:ASP:OD1	1:B:208:GLU:OE2[8_555]	2.16	0.04

## 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	271/368 (74%)	243 (90%)	23 (8%)	5 (2%)	8	37
1	B	258/368 (70%)	238 (92%)	18 (7%)	2 (1%)	19	57
All	All	529/736 (72%)	481 (91%)	41 (8%)	7 (1%)	12	45

5 of 7 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	262	VAL
1	A	349	ILE
1	B	96	TYR
1	A	69	LEU
1	A	96	TYR

### 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	258/342 (75%)	204 (79%)	54 (21%)	1	5
1	B	251/342 (73%)	201 (80%)	50 (20%)	1	7
All	All	509/684 (74%)	405 (80%)	104 (20%)	1	6

5 of 104 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	311	ILE

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Mol	Chain	Res	Type
1	B	75	GLU
1	B	311	ILE
1	A	325	VAL
1	A	347	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	233	ASN
1	B	233	ASN
1	B	101	ASN
1	A	101	ASN
1	B	168	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 carbohydrates 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	277/368 (75%)	0.13	13 (4%) 31 11	65, 113, 177, 227	0
1	B	270/368 (73%)	0.21	17 (6%) 20 6	61, 109, 167, 223	0
All	All	547/736 (74%)	0.17	30 (5%) 25 9	61, 111, 174, 227	0

The worst 5 of 30 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	349	ILE	5.0
1	B	345	PHE	5.0
1	B	123	ASN	4.6
1	B	265	LYS	4.6
1	B	202	LEU	4.5

### 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 carbohydrates 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.