



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 17, 2024 – 02:33 PM EDT

PDB ID : 3A07  
Title : Crystal Structure of Actinohivin; Potent anti-HIV Protein  
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Deposited on : 2009-03-04  
Resolution : 1.19 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)	:	1.20.1
EDS	:	2.37.1
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)	:	2.37.1

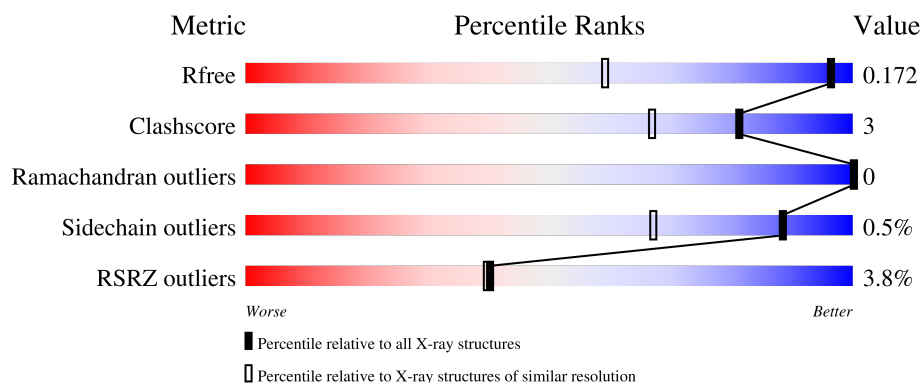
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.19 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	1223 (1.22-1.18)
Clashscore	141614	1286 (1.22-1.18)
Ramachandran outliers	138981	1240 (1.22-1.18)
Sidechain outliers	138945	1239 (1.22-1.18)
RSRZ outliers	127900	1200 (1.22-1.18)

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	118	<div> <div>5%</div> <div> <div></div> <div>86%</div> <div>12%</div> <div>..</div> </div> </div>
1	B	118	<div> <div>3%</div> <div> <div></div> <div>88%</div> <div>11%</div> <div>.</div> </div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2146 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 Actinohivin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	116	Total	C	N	O	S	0	0	0
			906	562	162	180	2			
1	B	118	Total	C	N	O	S	0	0	0
			917	568	164	183	2			

- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	3	Total	Na	0	0
			3	3		
2	B	3	Total	Na	0	0
			3	3		


- Molecule 3 is water.

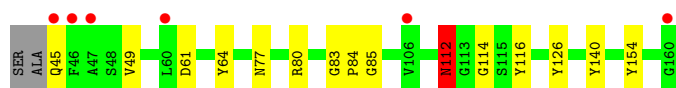
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	317	Total	O	0	0
			317	317		

### 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: Actinohivin

Chain A: 



#### • Molecule 1: Actinohivin

Chain B: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	47.35Å 51.63Å 175.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	27.30 – 1.19 27.30 – 1.19	Depositor EDS
% Data completeness (in resolution range)	96.8 (27.30-1.19) 96.8 (27.30-1.19)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.86 (at 1.19Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, $R_{free}$	0.149 , 0.163 0.158 , 0.172	Depositor DCC
$R_{free}$ test set	3404 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	9.2	Xtriage
Anisotropy	0.049	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.42 , 43.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	2146	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	9.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.95% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 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	1.47	7/929 (0.8%)	1.33	9/1266 (0.7%)
1	B	1.45	13/940 (1.4%)	1.29	7/1281 (0.5%)
All	All	1.46	20/1869 (1.1%)	1.31	16/2547 (0.6%)

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	B	0	2

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	102	TYR	CD2-CE2	8.78	1.52	1.39
1	B	102	TYR	CE2-CZ	-7.41	1.28	1.38
1	A	49	VAL	CB-CG2	-6.46	1.39	1.52
1	B	131	GLU	CD-OE2	6.37	1.32	1.25
1	B	154	TYR	CE2-CZ	-6.12	1.30	1.38
1	A	116	TYR	CE1-CZ	-6.05	1.30	1.38
1	B	116	TYR	CD2-CE2	6.03	1.48	1.39
1	B	64	TYR	CE2-CZ	-5.82	1.30	1.38
1	A	116	TYR	CD2-CE2	5.79	1.48	1.39
1	B	102	TYR	CD1-CE1	5.78	1.48	1.39
1	A	154	TYR	CZ-OH	5.69	1.47	1.37
1	B	145	TYR	CE2-CZ	-5.66	1.31	1.38
1	A	112	ASN	CG-ND2	-5.36	1.19	1.32
1	A	85	GLY	N-CA	-5.32	1.38	1.46
1	B	116	TYR	CE1-CZ	-5.31	1.31	1.38
1	B	122	TYR	CE2-CZ	-5.28	1.31	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	154	TYR	CD1-CE1	5.23	1.47	1.39
1	A	77	ASN	CB-CG	-5.11	1.39	1.51
1	B	80	ARG	CG-CD	-5.08	1.39	1.51
1	B	64	TYR	CE1-CZ	-5.02	1.32	1.38

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	80	ARG	NE-CZ-NH1	10.99	125.80	120.30
1	B	80	ARG	NE-CZ-NH2	-9.08	115.76	120.30
1	B	96	ARG	NE-CZ-NH1	8.61	124.61	120.30
1	B	102	TYR	CB-CG-CD2	-7.59	116.44	121.00
1	B	96	ARG	NE-CZ-NH2	-6.73	116.94	120.30
1	A	64	TYR	CB-CG-CD1	-6.24	117.26	121.00
1	A	126	TYR	CB-CG-CD2	6.21	124.73	121.00
1	A	61	ASP	CB-CG-OD1	5.84	123.56	118.30
1	A	80	ARG	NE-CZ-NH1	5.79	123.19	120.30
1	A	140	TYR	CZ-CE2-CD2	-5.51	114.84	119.80
1	B	154	TYR	CD1-CE1-CZ	-5.38	114.96	119.80
1	A	140	TYR	CB-CG-CD2	-5.37	117.78	121.00
1	A	116	TYR	CZ-CE2-CD2	-5.11	115.20	119.80
1	A	116	TYR	CE1-CZ-CE2	5.11	127.97	119.80
1	B	102	TYR	CE1-CZ-CE2	5.06	127.89	119.80
1	A	84	PRO	C-N-CA	-5.04	111.73	122.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	126	TYR	Sidechain
1	B	154	TYR	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	906	0	827	4	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	917	0	837	5	0
2	A	3	0	0	0	0
2	B	3	0	0	0	0
3	B	317	0	0	5	3
All	All	2146	0	1664	9	3

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 (9) 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:B:111:CYS:HB3	3:B:239:HOH:O	1.36	1.22
1:B:118:LYS:HE2	3:B:338:HOH:O	1.48	1.11
1:A:112:ASN:HD22	1:A:114:GLY:H	1.44	0.64
1:B:160:GLY:HA3	3:B:289:HOH:O	2.00	0.59
1:A:112:ASN:ND2	1:A:114:GLY:H	2.02	0.58
1:A:45:GLN:HG3	1:A:83:GLY:O	2.04	0.58
1:A:112:ASN:HD22	1:A:112:ASN:C	2.15	0.50
1:B:160:GLY:C	3:B:289:HOH:O	2.57	0.42
1:B:43:SER:N	3:B:428:HOH:O	2.53	0.41

All (3) 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:A:45:GLN:NE2	3:B:264:HOH:O[7_545]	1.94	0.26
3:B:189:HOH:O	3:B:189:HOH:O[4_566]	2.05	0.15
3:B:31:HOH:O	3:B:289:HOH:O[4_566]	2.19	0.01

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	114/118 (97%)	113 (99%)	1 (1%)	0	100	100
1	B	116/118 (98%)	115 (99%)	1 (1%)	0	100	100
All	All	230/236 (98%)	228 (99%)	2 (1%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains ⓘ

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	93/94 (99%)	92 (99%)	1 (1%)	73	41
1	B	94/94 (100%)	94 (100%)	0	100	100
All	All	187/188 (100%)	186 (100%)	1 (0%)	88	67

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	112	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	45	GLN
1	A	112	ASN
1	A	128	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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 6 ligands modelled in this entry, 6 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	116/118 (98%)	0.28	6 (5%) 27 26	5, 7, 14, 32	0
1	B	118/118 (100%)	0.15	3 (2%) 57 56	5, 7, 12, 16	0
All	All	234/236 (99%)	0.21	9 (3%) 40 40	5, 7, 14, 32	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	45	GLN	3.2
1	B	160	GLY	3.1
1	B	43	SER	3.0
1	A	46	PHE	2.6
1	A	60	LEU	2.2
1	A	160	GLY	2.2
1	A	106	VAL	2.1
1	A	47	ALA	2.1
1	B	144	VAL	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
2	NA	A	2	1/1	0.99	0.04	12,12,12,12	0
2	NA	A	3	1/1	0.99	0.04	13,13,13,13	0
2	NA	B	4	1/1	0.99	0.04	12,12,12,12	0
2	NA	B	5	1/1	0.99	0.04	11,11,11,11	0
2	NA	A	1	1/1	1.00	0.08	12,12,12,12	0
2	NA	B	6	1/1	1.00	0.04	12,12,12,12	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.