



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 13, 2024 – 06:03 AM EDT

PDB ID : 4ESR  
Title : Molecular and Structural Characterization of the SH3 Domain of AHI-1 in Regulation of Cellular Resistance of BCR-ABL+ Chronic Myeloid Leukemia Cells to Tyrosine Kinase Inhibitors  
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Deposited on : 2012-04-23  
Resolution : 1.53 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
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.36.2
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)	:	2.36.2

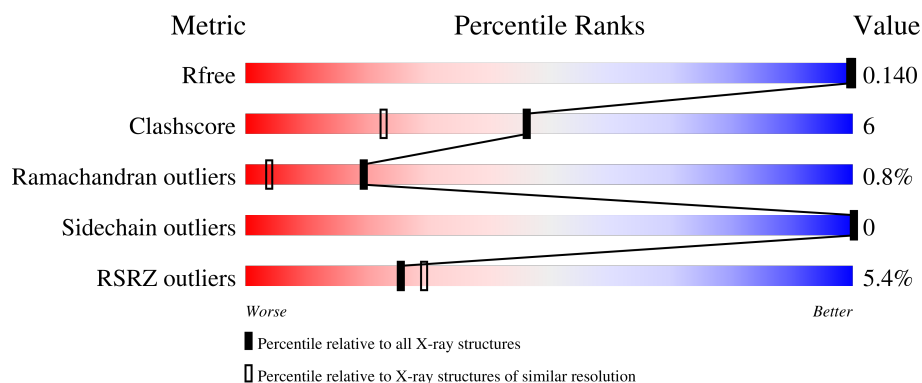
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.53 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	2556 (1.56-1.52)
Clashscore	141614	2634 (1.56-1.52)
Ramachandran outliers	138981	2580 (1.56-1.52)
Sidechain outliers	138945	2577 (1.56-1.52)
RSRZ outliers	127900	2524 (1.56-1.52)

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	69	
1	B	69	

## 2 Entry composition [i](#)

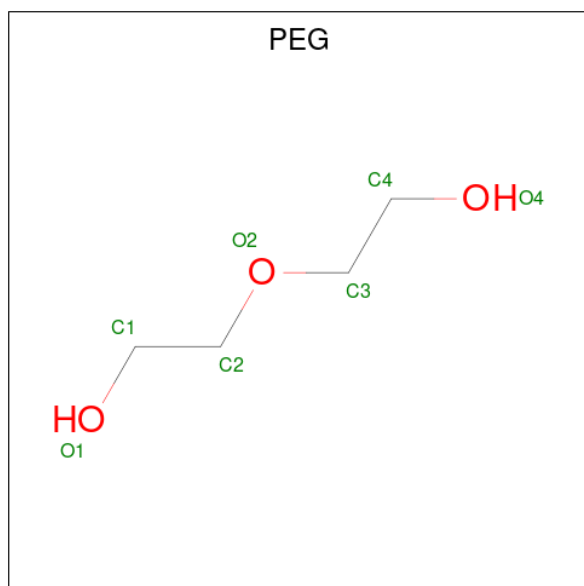
There are 3 unique types of molecules in this entry. The entry contains 1310 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Jouberin.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	A	65	Total	C	N	O	0	9	0
			591	379	95	117			
1	B	64	Total	C	N	O	0	3	0
			532	343	83	106			

- Molecule 2 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			7	4	3		
2	B	1	Total	C	O	0	0
			7	4	3		
2	B	1	Total	C	O	0	0
			7	4	3		

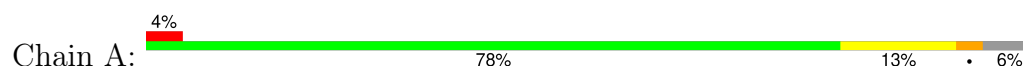
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	99	Total 99	O 99	0	0
3	B	67	Total 67	O 67	0	0

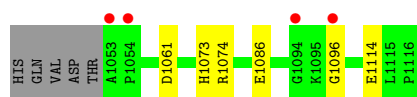
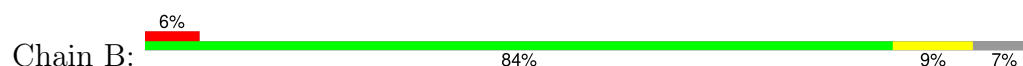
### 3 Residue-property plots [i](#)

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: Jouberein



#### • Molecule 1: Jouberein



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	68.14Å 68.14Å 98.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 1.53 39.91 – 1.53	Depositor EDS
% Data completeness (in resolution range)	97.4 (50.00-1.53) 97.4 (39.91-1.53)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	9.62 (at 1.53Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.124 , 0.139 0.129 , 0.140	Depositor DCC
$R_{free}$ test set	1739 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	17.1	Xtriage
Anisotropy	0.399	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 52.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	1310	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.80% 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: PEG

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	1.44	4/614 (0.7%)	1.11	2/836 (0.2%)
1	B	1.48	4/554 (0.7%)	1.08	2/756 (0.3%)
All	All	1.46	8/1168 (0.7%)	1.10	4/1592 (0.3%)

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 (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	1114	GLU	CB-CG	-13.72	1.26	1.52
1	A	1114	GLU	CD-OE2	-11.39	1.13	1.25
1	B	1114	GLU	CD-OE1	-7.73	1.17	1.25
1	A	1086[A]	GLU	CD-OE1	7.12	1.33	1.25
1	A	1086[B]	GLU	CD-OE1	7.12	1.33	1.25
1	B	1086[A]	GLU	CD-OE2	5.64	1.31	1.25
1	B	1086[B]	GLU	CD-OE2	5.64	1.31	1.25
1	A	1059	LEU	CB-CG	-5.38	1.36	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	1061	ASP	CB-CG-OD1	6.50	124.14	118.30
1	A	1066	ARG	NE-CZ-NH1	-6.29	117.16	120.30
1	B	1074	ARG	NE-CZ-NH1	5.93	123.26	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1114	GLU	OE1-CD-OE2	5.56	129.97	123.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1074	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	591	0	542	12	0
1	B	532	0	483	2	0
2	B	21	0	29	1	1
3	A	99	0	0	8	1
3	B	67	0	0	4	0
All	All	1310	0	1054	14	1

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 6.

All (14) 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:1054[B]:PRO:HB2	3:A:1291:HOH:O	1.40	1.19
1:A:1098[B]:GLU:OE2	3:A:1288:HOH:O	1.71	1.05
1:A:1052[B]:THR:CB	3:A:1290:HOH:O	2.15	0.95
1:A:1054[B]:PRO:CB	3:A:1291:HOH:O	2.05	0.85
2:B:1203:PEG:O4	3:B:1365:HOH:O	1.95	0.83
1:A:1095[A]:LYS:CE	3:B:1363:HOH:O	2.54	0.55
1:A:1052[B]:THR:CA	3:A:1290:HOH:O	2.51	0.50
1:A:1054[B]:PRO:HB3	3:A:1291:HOH:O	1.96	0.46
1:A:1054[B]:PRO:HA	1:B:1096:GLY:O	2.17	0.45
1:A:1095[A]:LYS:HE3	3:B:1363:HOH:O	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1095[B]:LYS:NZ	3:A:1273:HOH:O	2.47	0.44
1:A:1055[B]:THR:OG1	1:A:1109[B]:GLU:OE2	2.36	0.43
1:A:1086[A]:GLU:OE1	3:A:1292:HOH:O	2.20	0.43
1:B:1073:HIS:HD2	3:B:1317:HOH:O	2.03	0.41

All (1) 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)
2:B:1202:PEG:O1	3:A:1258:HOH:O[5_545]	1.96	0.24

## 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	71/69 (103%)	68 (96%)	1 (1%)	2 (3%)	5	0
1	B	65/69 (94%)	64 (98%)	1 (2%)	0	100	100
All	All	136/138 (99%)	132 (97%)	2 (2%)	2 (2%)	19	1

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1055[A]	THR
1	A	1055[B]	THR

### 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	61/59 (103%)	61 (100%)	0	100	100
1	B	55/59 (93%)	55 (100%)	0	100	100
All	All	116/118 (98%)	116 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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	1073	HIS
1	B	1097	GLN
1	B	1113	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 ⓘ

There are no monosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

3 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	PEG	B	1202	-	6,6,6	1.04	1 (16%)	5,5,5	1.21	0
2	PEG	B	1201	-	6,6,6	1.00	0	5,5,5	1.45	1 (20%)
2	PEG	B	1203	-	6,6,6	0.77	0	5,5,5	1.44	1 (20%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PEG	B	1202	-	-	2/4/4/4	-
2	PEG	B	1201	-	-	2/4/4/4	-
2	PEG	B	1203	-	-	2/4/4/4	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1202	PEG	C2-C1	2.03	1.60	1.49

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1203	PEG	C3-O2-C2	-2.62	101.78	113.26
2	B	1201	PEG	O2-C2-C1	-2.41	99.49	110.11

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1201	PEG	O2-C3-C4-O4
2	B	1202	PEG	O2-C3-C4-O4
2	B	1201	PEG	C4-C3-O2-C2
2	B	1203	PEG	O1-C1-C2-O2
2	B	1202	PEG	C4-C3-O2-C2
2	B	1203	PEG	C4-C3-O2-C2

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1202	PEG	0	1
2	B	1203	PEG	1	0

## 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	65/69 (94%)	-0.52	3 (4%) 32 36	12, 17, 27, 37	0
1	B	64/69 (92%)	-0.35	4 (6%) 20 23	14, 21, 36, 42	0
All	All	129/138 (93%)	-0.43	7 (5%) 25 29	12, 19, 35, 42	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1053	ALA	6.2
1	B	1054	PRO	2.9
1	A	1053[A]	ALA	2.7
1	A	1052[A]	THR	2.4
1	A	1054[A]	PRO	2.4
1	B	1094	GLY	2.3
1	B	1096	GLY	2.3

### 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( $\text{\AA}^2$ )	Q<0.9
2	PEG	B	1203	7/7	0.86	0.44	21,28,35,42	7
2	PEG	B	1202	7/7	0.91	0.10	32,43,50,53	0
2	PEG	B	1201	7/7	0.94	0.09	38,40,43,45	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.