



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 13, 2020 – 11:55 am BST

PDB ID : 3VZ8  
Title : Crystal Structure Analysis of the Mini-chaperonin variant with Leu 185, Val 186, Pro 187, Arg 188 and Ser 190 replaced with all Gly  
Authors : Saijo, S.; Sato, T.  
Deposited on : 2012-10-09  
Resolution : 1.90 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

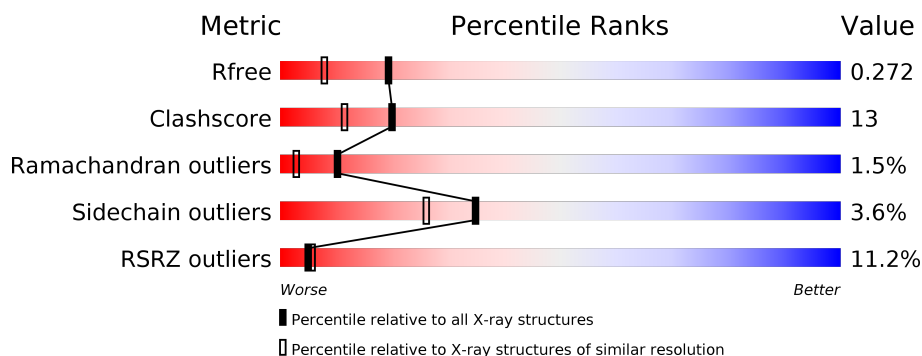
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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	199	<div> <div>10%</div> <div>70%</div> <div>21%</div> <div>• 7%</div> </div>
1	B	199	<div> <div>13%</div> <div>65%</div> <div>24%</div> <div>• • 7%</div> </div>
1	C	199	<div> <div>8%</div> <div>76%</div> <div>15%</div> <div>• 7%</div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4396 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 60 kDa chaperonin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	185	Total	C	N	O	S	0	0	0
			1401	881	240	275	5			
1	B	185	Total	C	N	O	S	0	0	0
			1401	881	240	275	5			
1	C	185	Total	C	N	O	S	0	0	0
			1401	881	240	275	5			

There are 39 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	178	HIS	-	EXPRESSION TAG	UNP P0A6F5
A	179	HIS	-	EXPRESSION TAG	UNP P0A6F5
A	180	HIS	-	EXPRESSION TAG	UNP P0A6F5
A	181	HIS	-	EXPRESSION TAG	UNP P0A6F5
A	182	HIS	-	EXPRESSION TAG	UNP P0A6F5
A	183	HIS	-	EXPRESSION TAG	UNP P0A6F5
A	184	GLY	-	SEE REMARK 999	UNP P0A6F5
A	185	GLY	-	SEE REMARK 999	UNP P0A6F5
A	186	GLY	-	SEE REMARK 999	UNP P0A6F5
A	187	GLY	-	SEE REMARK 999	UNP P0A6F5
A	188	GLY	-	SEE REMARK 999	UNP P0A6F5
A	189	GLY	-	SEE REMARK 999	UNP P0A6F5
A	190	GLY	-	SEE REMARK 999	UNP P0A6F5
B	178	HIS	-	EXPRESSION TAG	UNP P0A6F5
B	179	HIS	-	EXPRESSION TAG	UNP P0A6F5
B	180	HIS	-	EXPRESSION TAG	UNP P0A6F5
B	181	HIS	-	EXPRESSION TAG	UNP P0A6F5
B	182	HIS	-	EXPRESSION TAG	UNP P0A6F5
B	183	HIS	-	EXPRESSION TAG	UNP P0A6F5
B	184	GLY	-	SEE REMARK 999	UNP P0A6F5
B	185	GLY	-	SEE REMARK 999	UNP P0A6F5
B	186	GLY	-	SEE REMARK 999	UNP P0A6F5
B	187	GLY	-	SEE REMARK 999	UNP P0A6F5

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Chain	Residue	Modelled	Actual	Comment	Reference
B	188	GLY	-	SEE REMARK 999	UNP P0A6F5
B	189	GLY	-	SEE REMARK 999	UNP P0A6F5
B	190	GLY	-	SEE REMARK 999	UNP P0A6F5
C	178	HIS	-	EXPRESSION TAG	UNP P0A6F5
C	179	HIS	-	EXPRESSION TAG	UNP P0A6F5
C	180	HIS	-	EXPRESSION TAG	UNP P0A6F5
C	181	HIS	-	EXPRESSION TAG	UNP P0A6F5
C	182	HIS	-	EXPRESSION TAG	UNP P0A6F5
C	183	HIS	-	EXPRESSION TAG	UNP P0A6F5
C	184	GLY	-	SEE REMARK 999	UNP P0A6F5
C	185	GLY	-	SEE REMARK 999	UNP P0A6F5
C	186	GLY	-	SEE REMARK 999	UNP P0A6F5
C	187	GLY	-	SEE REMARK 999	UNP P0A6F5
C	188	GLY	-	SEE REMARK 999	UNP P0A6F5
C	189	GLY	-	SEE REMARK 999	UNP P0A6F5
C	190	GLY	-	SEE REMARK 999	UNP P0A6F5

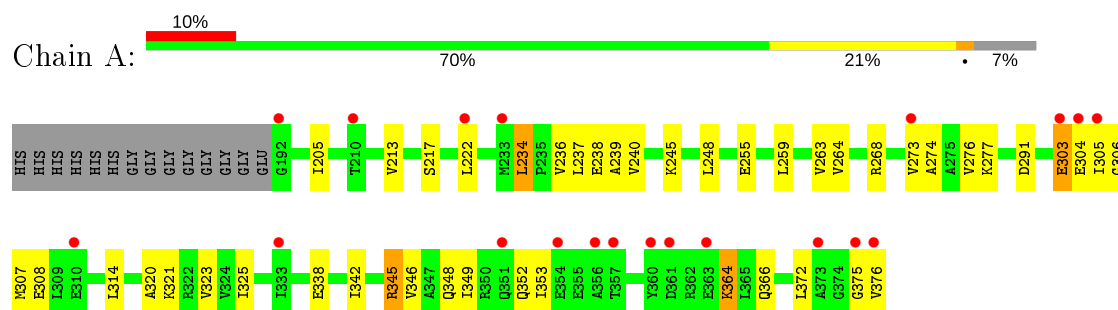
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	62	Total O 62 62	0	0
2	B	64	Total O 64 64	0	0
2	C	67	Total O 67 67	0	0

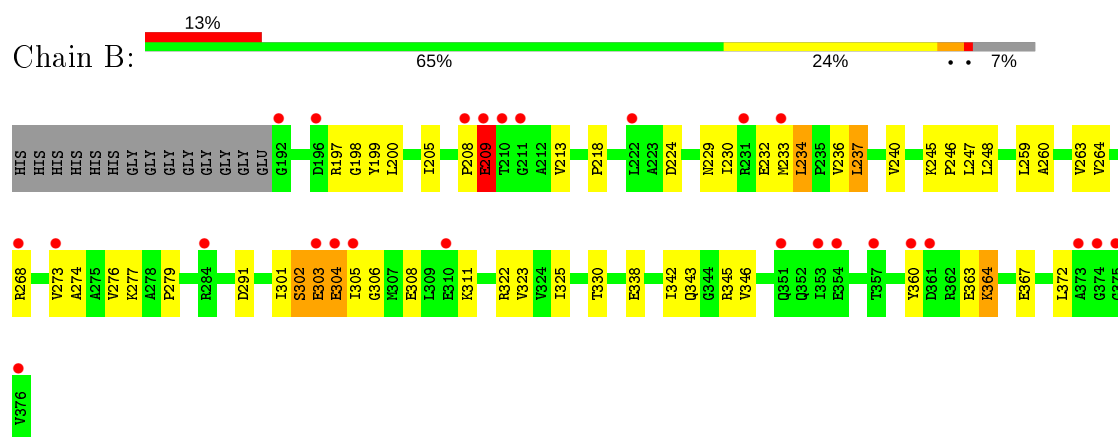
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

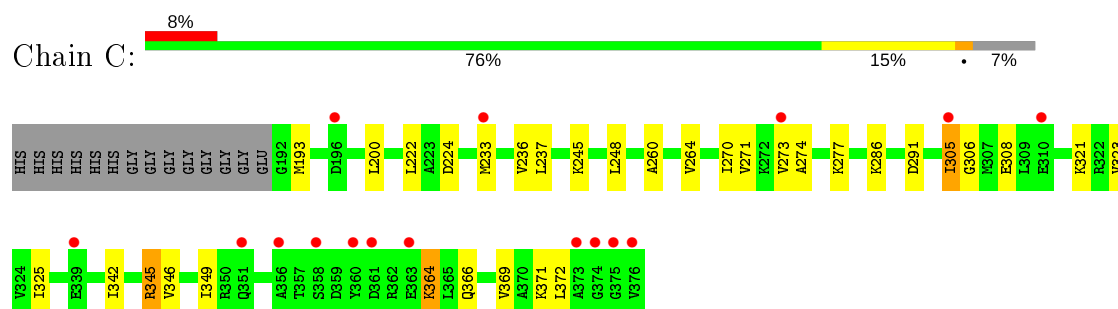
- Molecule 1: 60 kDa chaperonin



- Molecule 1: 60 kDa chaperonin



- Molecule 1: 60 kDa chaperonin



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	95.06Å 38.01Å 102.20Å 90.00° 116.23° 90.00°	Depositor
Resolution (Å)	47.51 – 1.90 47.51 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.4 (47.51-1.90) 99.5 (47.51-1.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.24 (at 1.90Å)	Xtriage
Refinement program	CNS 1.3	Depositor
R, $R_{free}$	0.263 , 0.272 0.263 , 0.272	Depositor DCC
$R_{free}$ test set	2605 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	22.8	Xtriage
Anisotropy	0.222	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 53.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.015 for h,-k,-h-l	Xtriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	4396	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.54% 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	0.34	0/1413	0.64	0/1903
1	B	0.33	0/1413	0.64	0/1903
1	C	0.32	0/1413	0.63	0/1903
All	All	0.33	0/4239	0.64	0/5709

There are no bond length outliers.

There are no bond angle outliers.

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	1401	0	1455	37	0
1	B	1401	0	1455	42	0
1	C	1401	0	1455	29	0
2	A	62	0	0	3	0
2	B	64	0	0	1	0
2	C	67	0	0	1	0
All	All	4396	0	4365	108	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 13.

The worst 5 of 108 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:C:364:LYS:HA	1:C:364:LYS:NZ	1.94	0.82
1:B:200:LEU:HD21	1:B:277:LYS:HG3	1.63	0.80
1:B:198:GLY:O	1:B:276:VAL:HG23	1.82	0.79
1:C:224:ASP:OD1	1:C:286:LYS:HD3	1.84	0.78
1:A:364:LYS:NZ	1:A:364:LYS:HA	2.01	0.76

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	183/199 (92%)	178 (97%)	4 (2%)	1 (0%)	29	18
1	B	183/199 (92%)	170 (93%)	8 (4%)	5 (3%)	5	1
1	C	183/199 (92%)	174 (95%)	7 (4%)	2 (1%)	14	5
All	All	549/597 (92%)	522 (95%)	19 (4%)	8 (2%)	10	3

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	302	SER
1	C	305	ILE
1	B	305	ILE
1	B	209	GLU
1	C	306	GLY

### 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	147/154 (96%)	140 (95%)	7 (5%)	25	16
1	B	147/154 (96%)	141 (96%)	6 (4%)	30	21
1	C	147/154 (96%)	144 (98%)	3 (2%)	55	51
All	All	441/462 (96%)	425 (96%)	16 (4%)	35	26

5 of 16 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	199	TYR
1	B	209	GLU
1	B	364	LYS
1	A	366	GLN
1	C	345	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	265	ASN
1	B	319	GLN
1	B	366	GLN
1	A	343	GLN
1	B	343	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 carbohydrates in this entry.

## 5.6 Ligand geometry

There are no ligands in this entry.

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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	185/199 (92%)	0.78	20 (10%) 5 6	12, 22, 47, 54	4 (2%)
1	B	185/199 (92%)	0.86	26 (14%) 2 2	13, 24, 52, 61	4 (2%)
1	C	185/199 (92%)	0.71	16 (8%) 10 12	11, 22, 40, 62	4 (2%)
All	All	555/597 (92%)	0.78	62 (11%) 5 6	11, 23, 47, 62	12 (2%)

The worst 5 of 62 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	376	VAL	7.4
1	C	305	ILE	7.1
1	C	375	GLY	6.7
1	C	374	GLY	6.6
1	A	376	VAL	6.6

### 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.