



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 30, 2023 – 06:29 AM EDT

PDB ID : 3OHN  
Title : Crystal structure of the FimD translocation domain  
Authors : Wang, T.; Li, H.  
Deposited on : 2010-08-17  
Resolution : 3.01 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.

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) : 1.13  
EDS : 2.35  
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) : 2.35

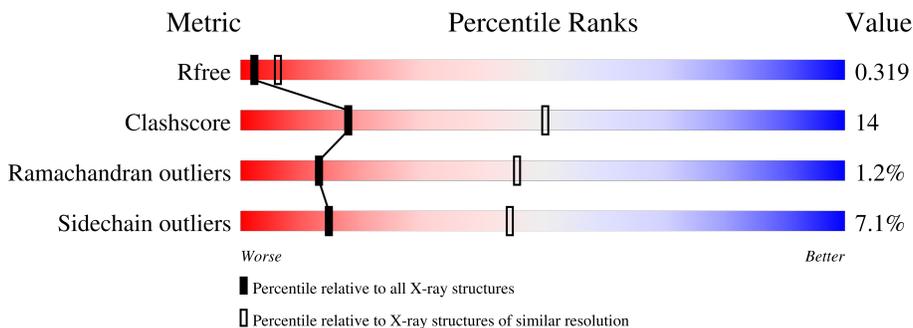
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.01 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	2399 (3.04-3.00)
Clashscore	141614	2734 (3.04-3.00)
Ramachandran outliers	138981	2640 (3.04-3.00)
Sidechain outliers	138945	2643 (3.04-3.00)

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 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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	558	67% (green), 14% (yellow), 16% (grey), 3% (orange), 2% (red)
1	B	558	60% (green), 19% (yellow), 17% (grey), 2% (orange), 1% (red)

## 2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 7246 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 Outer membrane usher protein FimD.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	468	3636	2271	640	719	6	0	0	0
1	B	463	3610	2259	634	711	6	0	0	0

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	664	GLY	-	expression tag	UNP C8U0R5
A	665	GLY	-	expression tag	UNP C8U0R5
A	666	PRO	-	expression tag	UNP C8U0R5
A	667	VAL	-	expression tag	UNP C8U0R5
A	668	ALA	-	expression tag	UNP C8U0R5
A	669	THR	-	expression tag	UNP C8U0R5
A	670	LEU	-	expression tag	UNP C8U0R5
A	671	VAL	-	expression tag	UNP C8U0R5
A	672	PRO	-	expression tag	UNP C8U0R5
A	673	ARG	-	expression tag	UNP C8U0R5
A	674	GLY	-	expression tag	UNP C8U0R5
A	675	SER	-	expression tag	UNP C8U0R5
A	676	HIS	-	expression tag	UNP C8U0R5
A	677	HIS	-	expression tag	UNP C8U0R5
A	678	HIS	-	expression tag	UNP C8U0R5
A	679	HIS	-	expression tag	UNP C8U0R5
A	680	HIS	-	expression tag	UNP C8U0R5
A	681	HIS	-	expression tag	UNP C8U0R5
B	664	GLY	-	expression tag	UNP C8U0R5
B	665	GLY	-	expression tag	UNP C8U0R5
B	666	PRO	-	expression tag	UNP C8U0R5
B	667	VAL	-	expression tag	UNP C8U0R5
B	668	ALA	-	expression tag	UNP C8U0R5
B	669	THR	-	expression tag	UNP C8U0R5
B	670	LEU	-	expression tag	UNP C8U0R5

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Chain	Residue	Modelled	Actual	Comment	Reference
B	671	VAL	-	expression tag	UNP C8U0R5
B	672	PRO	-	expression tag	UNP C8U0R5
B	673	ARG	-	expression tag	UNP C8U0R5
B	674	GLY	-	expression tag	UNP C8U0R5
B	675	SER	-	expression tag	UNP C8U0R5
B	676	HIS	-	expression tag	UNP C8U0R5
B	677	HIS	-	expression tag	UNP C8U0R5
B	678	HIS	-	expression tag	UNP C8U0R5
B	679	HIS	-	expression tag	UNP C8U0R5
B	680	HIS	-	expression tag	UNP C8U0R5
B	681	HIS	-	expression tag	UNP C8U0R5



LEU  
VAL  
PRO  
ARG  
GLY  
SER  
HIS  
HIS  
HIS  
HIS  
HIS

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	50.02Å 87.13Å 95.88Å 63.92° 88.43° 76.94°	Depositor
Resolution (Å)	28.89 – 3.01 28.89 – 3.01	Depositor EDS
% Data completeness (in resolution range)	98.0 (28.89-3.01) 98.2 (28.89-3.01)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.95 (at 3.00Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.6.1_357)	Depositor
R, $R_{free}$	0.230 , 0.305 0.309 , 0.319	Depositor DCC
$R_{free}$ test set	1371 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	57.4	Xtrriage
Anisotropy	0.629	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 36.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.85	EDS
Total number of atoms	7246	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	61.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.62% 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	0.52	0/3715	0.57	3/5038 (0.1%)
1	B	0.80	5/3689 (0.1%)	0.64	4/5002 (0.1%)
All	All	0.67	5/7404 (0.1%)	0.60	7/10040 (0.1%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	414	VAL	CB-CG1	-7.25	1.37	1.52
1	B	366	TYR	CD2-CE2	-5.90	1.30	1.39
1	B	366	TYR	CE1-CZ	-5.50	1.31	1.38
1	B	366	TYR	CE2-CZ	-5.42	1.31	1.38
1	B	366	TYR	CD1-CE1	-5.32	1.31	1.39

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	612	GLY	N-CA-C	-8.56	91.71	113.10
1	A	310	THR	N-CA-C	6.87	129.55	111.00
1	B	140	GLY	N-CA-C	-6.76	96.19	113.10
1	A	347	LYS	C-N-CD	-6.38	106.56	120.60
1	B	613	GLY	N-CA-C	-6.24	97.51	113.10

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	3636	0	3426	63	0
1	B	3610	0	3402	130	0
All	All	7246	0	6828	192	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 14.

The worst 5 of 192 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:628:TYR:CE2	1:B:630:GLY:N	1.87	1.38
1:B:142:LEU:HD12	1:B:143:ASN:N	1.39	1.36
1:B:141:LEU:HD12	1:B:142:LEU:N	1.43	1.30
1:B:365:ILE:HD12	1:B:365:ILE:O	1.35	1.24
1:B:141:LEU:HD12	1:B:141:LEU:C	1.53	1.21

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	456/558 (82%)	422 (92%)	29 (6%)	5 (1%)	14	48
1	B	449/558 (80%)	409 (91%)	34 (8%)	6 (1%)	12	43
All	All	905/1116 (81%)	831 (92%)	63 (7%)	11 (1%)	13	46

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	155	ILE
1	A	592	VAL
1	B	451	ARG

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Mol	Chain	Res	Type
1	A	348	PRO
1	A	541	TRP

### 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	381/457 (83%)	360 (94%)	21 (6%)	21	55
1	B	378/457 (83%)	345 (91%)	33 (9%)	10	35
All	All	759/914 (83%)	705 (93%)	54 (7%)	14	44

5 of 54 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	287	ILE
1	B	365	ILE
1	B	596	LEU
1	B	309	SER
1	B	356	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 19 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	485	GLN
1	B	505	GLN
1	B	518	GLN
1	B	504	HIS
1	B	145	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 monosaccharides 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

### 6.1 Protein, DNA and RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.