



# wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 11, 2019 – 01:09 PM EST

PDB ID : 6V1V  
Title : VIP3B (VIP3B\_2160) adapted for crystallization  
Authors : Evdokimov, A.G.; Zheng, M.; Moshiri, F.; Haas, J.; Lowder, C.  
Deposited on : 2019-11-21  
Resolution : 3.19 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	:	2.4
Percentile statistics	:	20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac	:	5.8.0158
CCP4	:	7.0 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.4

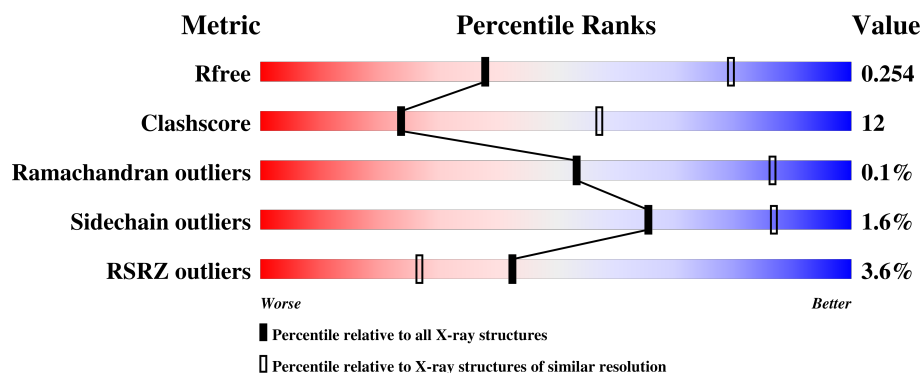
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.19 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))
$R_{free}$	111664	1235 (3.20-3.16)
Clashscore	122126	1362 (3.20-3.16)
Ramachandran outliers	120053	1340 (3.20-3.16)
Sidechain outliers	120020	1339 (3.20-3.16)
RSRZ outliers	108989	1193 (3.20-3.16)

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. 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	796	<div> <div>2%</div> <div>74% 20% 6%</div> </div>
1	B	796	<div> <div>5%</div> <div>73% 20% 6%</div> </div>
1	C	796	<div> <div>3%</div> <div>70% 22% 7%</div> </div>
1	D	796	<div> <div>4%</div> <div>69% 22% 8%</div> </div>

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 23683 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 Vegetative insecticidal protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	752	Total	C	N	O	S	0	0	0
			6002	3826	976	1185	15			
1	B	750	Total	C	N	O	S	0	0	0
			5985	3816	972	1182	15			
1	C	739	Total	C	N	O	S	0	0	0
			5874	3747	955	1157	15			
1	D	731	Total	C	N	O	S	0	0	0
			5822	3718	946	1143	15			

There are 112 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-9	MET	-	initiating methionine	UNP A0A290WPI2
A	-8	GLY	-	expression tag	UNP A0A290WPI2
A	-7	SER	-	expression tag	UNP A0A290WPI2
A	-6	SER	-	expression tag	UNP A0A290WPI2
A	-5	HIS	-	expression tag	UNP A0A290WPI2
A	-4	HIS	-	expression tag	UNP A0A290WPI2
A	-3	HIS	-	expression tag	UNP A0A290WPI2
A	-2	HIS	-	expression tag	UNP A0A290WPI2
A	-1	HIS	-	expression tag	UNP A0A290WPI2
A	0	HIS	-	expression tag	UNP A0A290WPI2
A	1	HIS	-	expression tag	UNP A0A290WPI2
A	?	-	TRP	deletion	UNP A0A290WPI2
A	?	-	LYS	deletion	UNP A0A290WPI2
A	?	-	GLU	deletion	UNP A0A290WPI2
A	?	-	LYS	deletion	UNP A0A290WPI2
A	?	-	SER	deletion	UNP A0A290WPI2
A	?	-	CYS	deletion	UNP A0A290WPI2
A	?	-	GLU	deletion	UNP A0A290WPI2
A	?	-	GLU	deletion	UNP A0A290WPI2
A	466	SER	ASP	engineered mutation	UNP A0A290WPI2
A	514	ALA	GLU	engineered mutation	UNP A0A290WPI2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	515	ALA	LYS	engineered mutation	UNP A0A290WPI2
A	517	ALA	GLN	engineered mutation	UNP A0A290WPI2
A	518	ALA	LYS	engineered mutation	UNP A0A290WPI2
A	?	-	ASP	deletion	UNP A0A290WPI2
A	?	-	THR	deletion	UNP A0A290WPI2
A	?	-	ILE	deletion	UNP A0A290WPI2
A	?	-	LYS	deletion	UNP A0A290WPI2
B	-9	MET	-	initiating methionine	UNP A0A290WPI2
B	-8	GLY	-	expression tag	UNP A0A290WPI2
B	-7	SER	-	expression tag	UNP A0A290WPI2
B	-6	SER	-	expression tag	UNP A0A290WPI2
B	-5	HIS	-	expression tag	UNP A0A290WPI2
B	-4	HIS	-	expression tag	UNP A0A290WPI2
B	-3	HIS	-	expression tag	UNP A0A290WPI2
B	-2	HIS	-	expression tag	UNP A0A290WPI2
B	-1	HIS	-	expression tag	UNP A0A290WPI2
B	0	HIS	-	expression tag	UNP A0A290WPI2
B	1	HIS	-	expression tag	UNP A0A290WPI2
B	?	-	TRP	deletion	UNP A0A290WPI2
B	?	-	LYS	deletion	UNP A0A290WPI2
B	?	-	GLU	deletion	UNP A0A290WPI2
B	?	-	LYS	deletion	UNP A0A290WPI2
B	?	-	SER	deletion	UNP A0A290WPI2
B	?	-	CYS	deletion	UNP A0A290WPI2
B	?	-	GLU	deletion	UNP A0A290WPI2
B	?	-	GLU	deletion	UNP A0A290WPI2
B	466	SER	ASP	engineered mutation	UNP A0A290WPI2
B	514	ALA	GLU	engineered mutation	UNP A0A290WPI2
B	515	ALA	LYS	engineered mutation	UNP A0A290WPI2
B	517	ALA	GLN	engineered mutation	UNP A0A290WPI2
B	518	ALA	LYS	engineered mutation	UNP A0A290WPI2
B	?	-	ASP	deletion	UNP A0A290WPI2
B	?	-	THR	deletion	UNP A0A290WPI2
B	?	-	ILE	deletion	UNP A0A290WPI2
B	?	-	LYS	deletion	UNP A0A290WPI2
C	-9	MET	-	initiating methionine	UNP A0A290WPI2
C	-8	GLY	-	expression tag	UNP A0A290WPI2
C	-7	SER	-	expression tag	UNP A0A290WPI2
C	-6	SER	-	expression tag	UNP A0A290WPI2
C	-5	HIS	-	expression tag	UNP A0A290WPI2
C	-4	HIS	-	expression tag	UNP A0A290WPI2
C	-3	HIS	-	expression tag	UNP A0A290WPI2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-2	HIS	-	expression tag	UNP A0A290WPI2
C	-1	HIS	-	expression tag	UNP A0A290WPI2
C	0	HIS	-	expression tag	UNP A0A290WPI2
C	1	HIS	-	expression tag	UNP A0A290WPI2
C	?	-	TRP	deletion	UNP A0A290WPI2
C	?	-	LYS	deletion	UNP A0A290WPI2
C	?	-	GLU	deletion	UNP A0A290WPI2
C	?	-	LYS	deletion	UNP A0A290WPI2
C	?	-	SER	deletion	UNP A0A290WPI2
C	?	-	CYS	deletion	UNP A0A290WPI2
C	?	-	GLU	deletion	UNP A0A290WPI2
C	?	-	GLU	deletion	UNP A0A290WPI2
C	466	SER	ASP	engineered mutation	UNP A0A290WPI2
C	514	ALA	GLU	engineered mutation	UNP A0A290WPI2
C	515	ALA	LYS	engineered mutation	UNP A0A290WPI2
C	517	ALA	GLN	engineered mutation	UNP A0A290WPI2
C	518	ALA	LYS	engineered mutation	UNP A0A290WPI2
C	?	-	ASP	deletion	UNP A0A290WPI2
C	?	-	THR	deletion	UNP A0A290WPI2
C	?	-	ILE	deletion	UNP A0A290WPI2
C	?	-	LYS	deletion	UNP A0A290WPI2
D	-9	MET	-	initiating methionine	UNP A0A290WPI2
D	-8	GLY	-	expression tag	UNP A0A290WPI2
D	-7	SER	-	expression tag	UNP A0A290WPI2
D	-6	SER	-	expression tag	UNP A0A290WPI2
D	-5	HIS	-	expression tag	UNP A0A290WPI2
D	-4	HIS	-	expression tag	UNP A0A290WPI2
D	-3	HIS	-	expression tag	UNP A0A290WPI2
D	-2	HIS	-	expression tag	UNP A0A290WPI2
D	-1	HIS	-	expression tag	UNP A0A290WPI2
D	0	HIS	-	expression tag	UNP A0A290WPI2
D	1	HIS	-	expression tag	UNP A0A290WPI2
D	?	-	TRP	deletion	UNP A0A290WPI2
D	?	-	LYS	deletion	UNP A0A290WPI2
D	?	-	GLU	deletion	UNP A0A290WPI2
D	?	-	LYS	deletion	UNP A0A290WPI2
D	?	-	SER	deletion	UNP A0A290WPI2
D	?	-	CYS	deletion	UNP A0A290WPI2
D	?	-	GLU	deletion	UNP A0A290WPI2
D	?	-	GLU	deletion	UNP A0A290WPI2
D	466	SER	ASP	engineered mutation	UNP A0A290WPI2
D	514	ALA	GLU	engineered mutation	UNP A0A290WPI2

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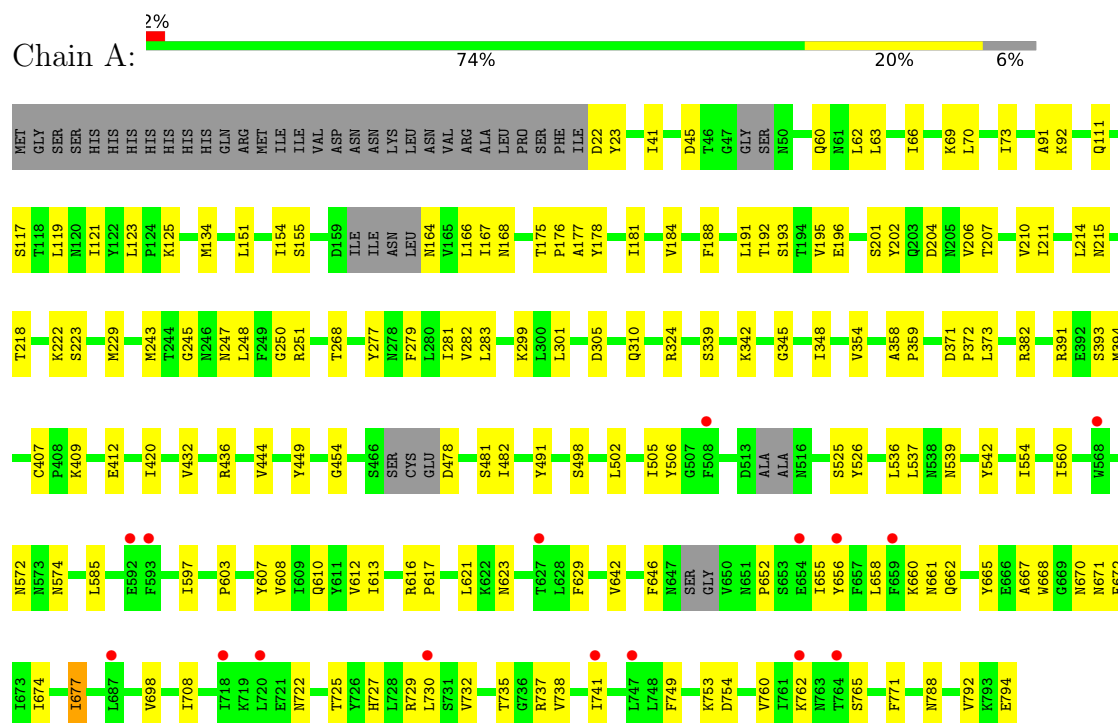
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Chain	Residue	Modelled	Actual	Comment	Reference
D	515	ALA	LYS	engineered mutation	UNP A0A290WPI2
D	517	ALA	GLN	engineered mutation	UNP A0A290WPI2
D	518	ALA	LYS	engineered mutation	UNP A0A290WPI2
D	?	-	ASP	deletion	UNP A0A290WPI2
D	?	-	THR	deletion	UNP A0A290WPI2
D	?	-	ILE	deletion	UNP A0A290WPI2
D	?	-	LYS	deletion	UNP A0A290WPI2

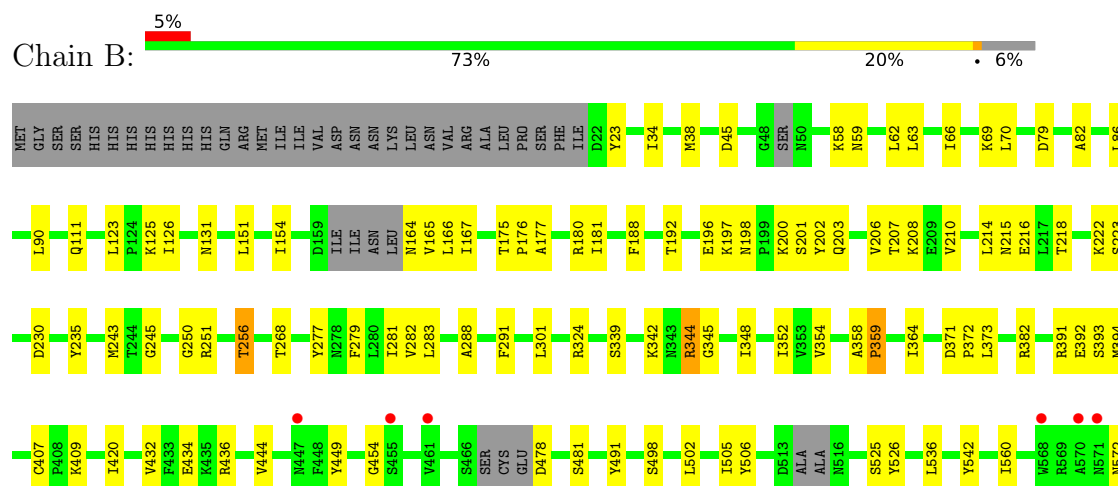
### 3 Residue-property plots

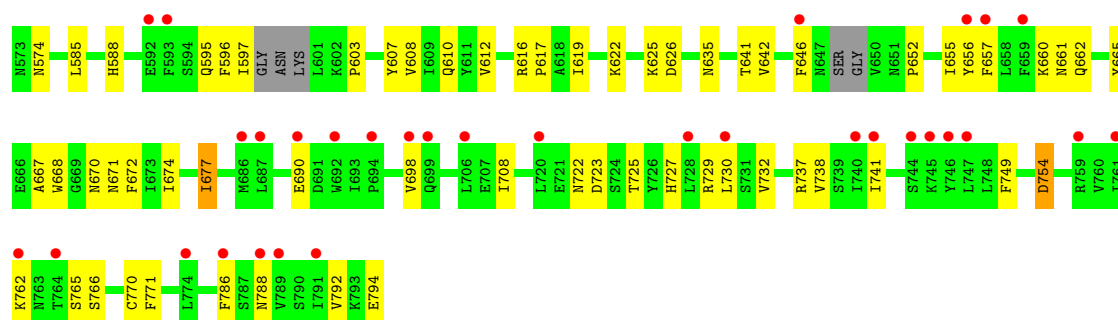
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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: Vegetative insecticidal protein

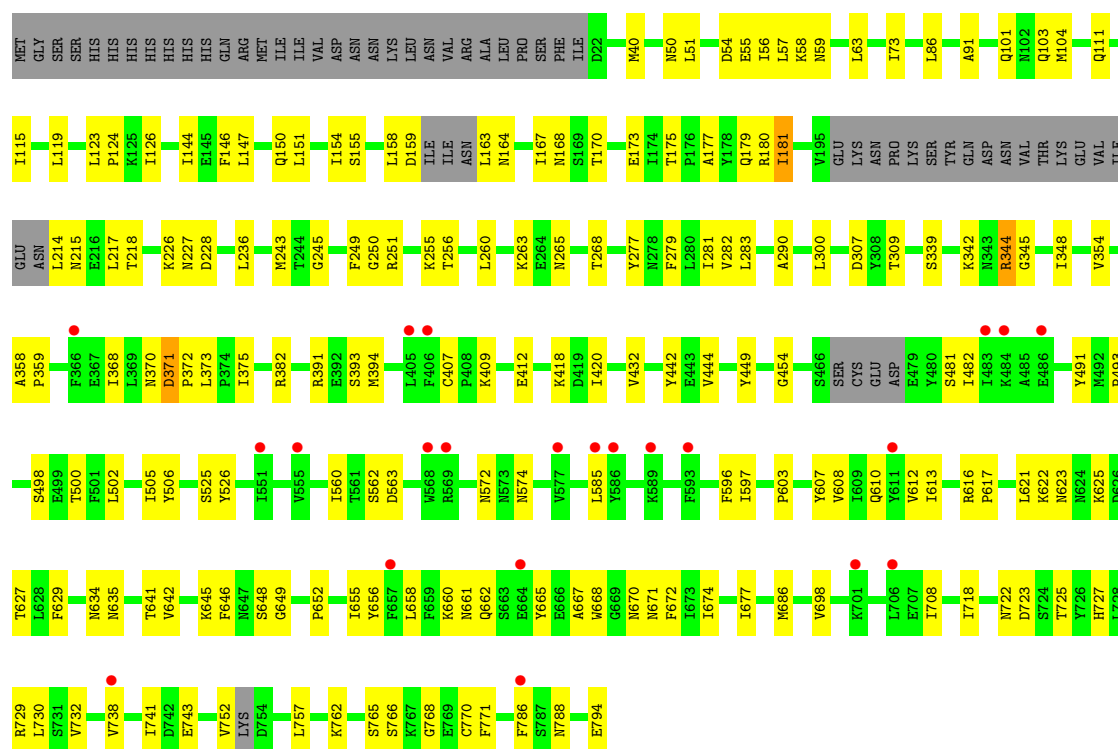


#### • Molecule 1: Vegetative insecticidal protein

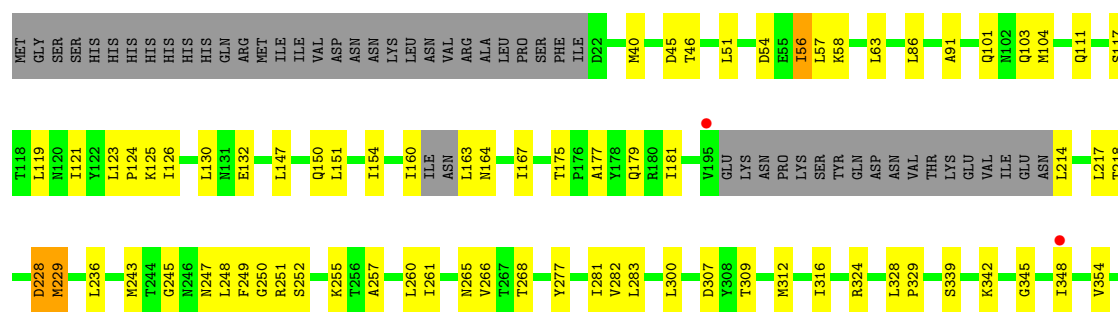




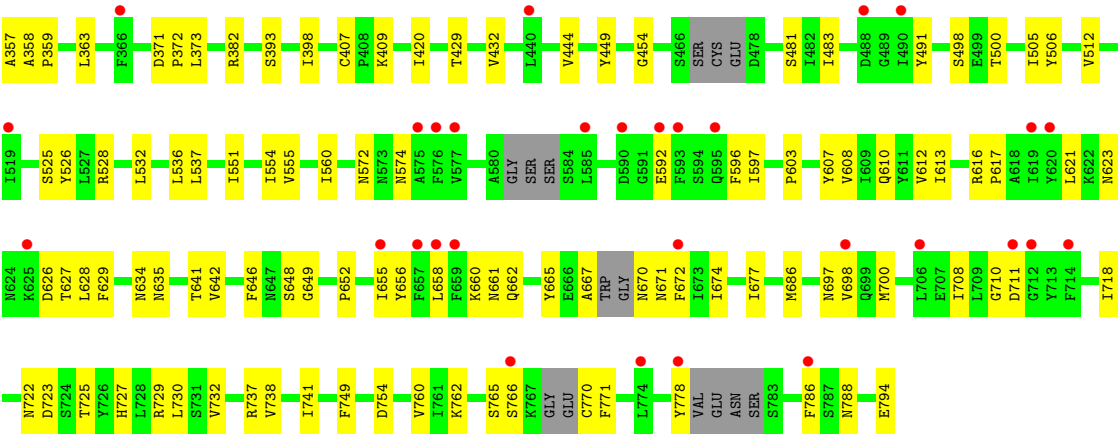
• Molecule 1: Vegetative insecticidal protein



• Molecule 1: Vegetative insecticidal protein







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	106.49Å 106.54Å 117.73Å 96.13° 70.93° 69.52°	Depositor
Resolution (Å)	49.89 – 3.19 49.84 – 3.19	Depositor EDS
% Data completeness (in resolution range)	98.3 (49.89-3.19) 98.3 (49.84-3.19)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.64 (at 3.19Å)	Xtriage
Refinement program	REFMAC 5.8.0257	Depositor
R, $R_{free}$	0.218 , 0.259 0.215 , 0.254	Depositor DCC
$R_{free}$ test set	3538 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	102.1	Xtriage
Anisotropy	0.053	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 58.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	23683	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	117.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.26% 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

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	0.59	0/6105	0.79	0/8254
1	B	0.59	0/6087	0.80	0/8229
1	C	0.59	0/5976	0.80	0/8082
1	D	0.59	0/5919	0.81	1/7999 (0.0%)
All	All	0.59	0/24087	0.80	1/32564 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	228	ASP	CB-CA-C	5.03	120.45	110.40

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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	6002	0	5970	119	0
1	B	5985	0	5950	142	0
1	C	5874	0	5847	171	0
1	D	5822	0	5811	170	0
All	All	23683	0	23578	567	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 12.

The worst 5 of 567 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:D:554:ILE:HG12	1:D:674:ILE:HG23	1.14	1.08
1:C:371:ASP:CB	1:C:372:PRO:HD3	1.83	1.07
1:C:371:ASP:HB3	1:C:372:PRO:HD3	1.09	1.04
1:B:652:PRO:HA	1:B:655:ILE:HD11	1.45	0.99
1:C:371:ASP:HB3	1:C:372:PRO:CD	1.91	0.99

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	740/796 (93%)	691 (93%)	48 (6%)	1 (0%)	53	86
1	B	736/796 (92%)	693 (94%)	43 (6%)	0	100	100
1	C	729/796 (92%)	682 (94%)	46 (6%)	1 (0%)	53	86
1	D	715/796 (90%)	673 (94%)	41 (6%)	1 (0%)	53	86
All	All	2920/3184 (92%)	2739 (94%)	178 (6%)	3 (0%)	53	86

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	371	ASP
1	D	229	MET
1	A	204	ASP

### 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	680/718 (95%)	670 (98%)	10 (2%)	67	88
1	B	678/718 (94%)	667 (98%)	11 (2%)	65	87
1	C	663/718 (92%)	650 (98%)	13 (2%)	58	83
1	D	658/718 (92%)	650 (99%)	8 (1%)	74	90
All	All	2679/2872 (93%)	2637 (98%)	42 (2%)	65	87

5 of 42 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	498	SER
1	C	215	ASN
1	D	551	ILE
1	B	677	ILE
1	C	40	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	623	ASN
1	C	101	GLN
1	D	574	ASN
1	B	670	ASN
1	C	102	ASN

### 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 [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	752/796 (94%)	-0.02	16 (2%) 63 48	58, 106, 163, 202	0
1	B	750/796 (94%)	0.07	38 (5%) 28 15	59, 109, 183, 251	0
1	C	739/796 (92%)	-0.03	22 (2%) 50 34	63, 118, 172, 221	0
1	D	731/796 (91%)	0.13	32 (4%) 34 20	64, 118, 176, 230	0
All	All	2972/3184 (93%)	0.04	108 (3%) 42 27	58, 112, 174, 251	0

The worst 5 of 108 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	577	VAL	6.2
1	D	585	LEU	6.1
1	B	786	PHE	5.0
1	D	659	PHE	4.7
1	D	657	PHE	4.7

### 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.