



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 15, 2020 – 04:33 am BST

PDB ID : 1U0U  
Title : An Aldol Switch Discovered in Stilbene Synthases Mediates Cyclization Specificity of Type III Polyketide Synthases: Pine stilbene synthase structure  
Authors : Austin, M.B.; Bowman, M.E.; Ferrer, J.-L.; Schroder, J.; Noel, J.P.  
Deposited on : 2004-07-14  
Resolution : 2.11 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

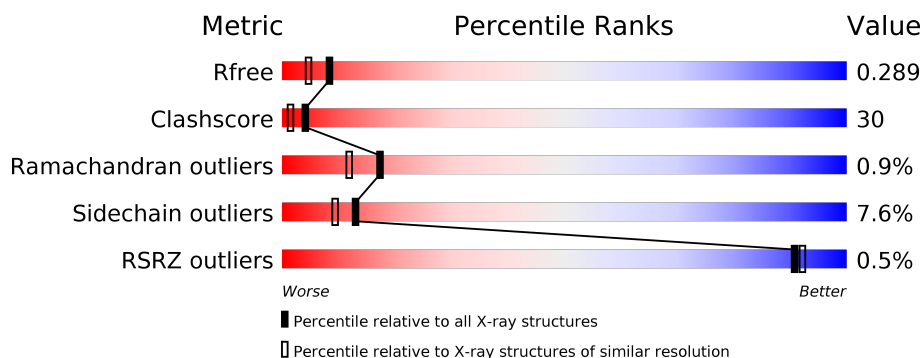
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.11 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	6241 (2.14-2.10)
Clashscore	141614	6778 (2.14-2.10)
Ramachandran outliers	138981	6705 (2.14-2.10)
Sidechain outliers	138945	6706 (2.14-2.10)
RSRZ outliers	127900	6112 (2.14-2.10)

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	397	<div> <div>%</div> <div> <div></div> <div>55%</div> <div>38%</div> <div>• •</div> </div> </div>
1	B	397	<div> <div>%</div> <div> <div></div> <div>54%</div> <div>40%</div> <div>• •</div> </div> </div>
1	C	397	<div> <div></div> <div> <div>51%</div> <div>41%</div> <div>6%</div> <div>•</div> </div> </div>
1	D	397	<div> <div></div> <div> <div>55%</div> <div>38%</div> <div>5%</div> <div>•</div> </div> </div>
1	E	397	<div> <div>%</div> <div> <div></div> <div>49%</div> <div>44%</div> <div>5%</div> <div>• •</div> </div> </div>
1	F	397	<div> <div>%</div> <div> <div></div> <div>50%</div> <div>42%</div> <div>5%</div> <div>• •</div> </div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 19745 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 Dihydropinosylvin synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	389	Total	C	N	O	S	0	0	0
			2979	1890	514	558	17			
1	B	389	Total	C	N	O	S	0	0	0
			2979	1890	514	558	17			
1	C	389	Total	C	N	O	S	0	0	0
			2979	1890	514	558	17			
1	D	389	Total	C	N	O	S	0	0	0
			2979	1890	514	558	17			
1	E	389	Total	C	N	O	S	0	0	0
			2979	1890	514	558	17			
1	F	389	Total	C	N	O	S	0	0	0
			2979	1890	514	558	17			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	CLONING ARTIFACT	UNP Q02323
A	-2	SER	-	CLONING ARTIFACT	UNP Q02323
A	-1	HIS	-	CLONING ARTIFACT	UNP Q02323
A	0	GLY	-	CLONING ARTIFACT	UNP Q02323
B	-3	GLY	-	CLONING ARTIFACT	UNP Q02323
B	-2	SER	-	CLONING ARTIFACT	UNP Q02323
B	-1	HIS	-	CLONING ARTIFACT	UNP Q02323
B	0	GLY	-	CLONING ARTIFACT	UNP Q02323
C	-3	GLY	-	CLONING ARTIFACT	UNP Q02323
C	-2	SER	-	CLONING ARTIFACT	UNP Q02323
C	-1	HIS	-	CLONING ARTIFACT	UNP Q02323
C	0	GLY	-	CLONING ARTIFACT	UNP Q02323
D	-3	GLY	-	CLONING ARTIFACT	UNP Q02323
D	-2	SER	-	CLONING ARTIFACT	UNP Q02323
D	-1	HIS	-	CLONING ARTIFACT	UNP Q02323
D	0	GLY	-	CLONING ARTIFACT	UNP Q02323
E	-3	GLY	-	CLONING ARTIFACT	UNP Q02323

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-2	SER	-	CLONING ARTIFACT	UNP Q02323
E	-1	HIS	-	CLONING ARTIFACT	UNP Q02323
E	0	GLY	-	CLONING ARTIFACT	UNP Q02323
F	-3	GLY	-	CLONING ARTIFACT	UNP Q02323
F	-2	SER	-	CLONING ARTIFACT	UNP Q02323
F	-1	HIS	-	CLONING ARTIFACT	UNP Q02323
F	0	GLY	-	CLONING ARTIFACT	UNP Q02323

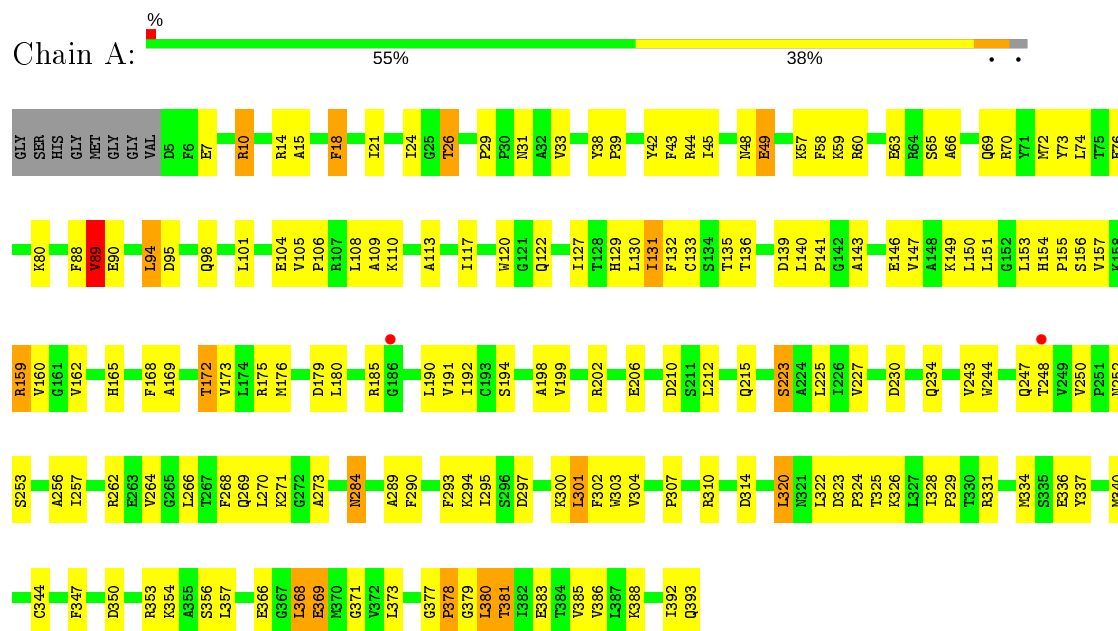
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	305	Total O 305 305	0	0
2	B	342	Total O 342 342	0	0
2	C	369	Total O 369 369	0	0
2	D	309	Total O 309 309	0	0
2	E	267	Total O 267 267	0	0
2	F	279	Total O 279 279	0	0

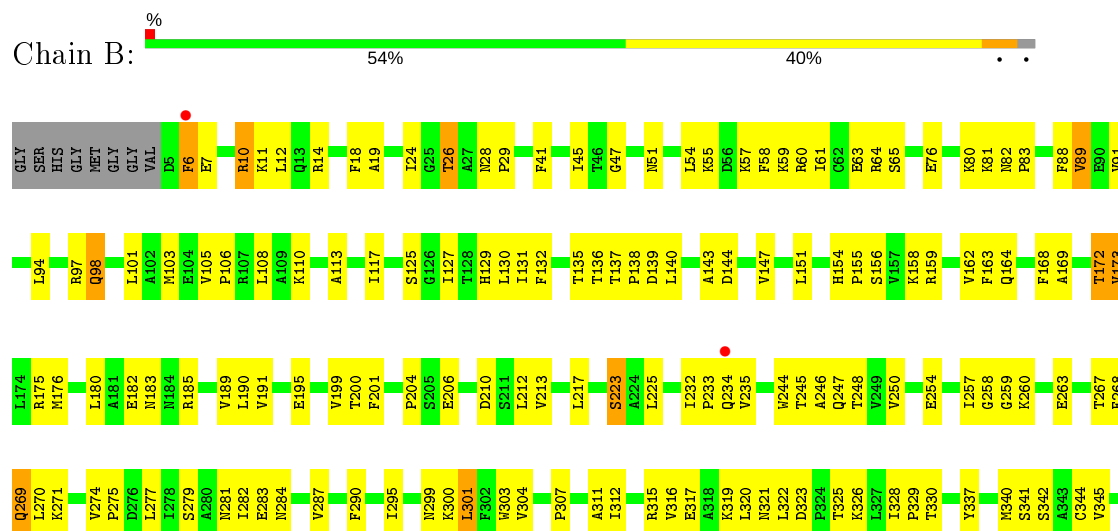
### 3 Residue-property plots

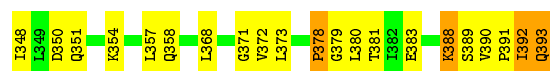
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are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



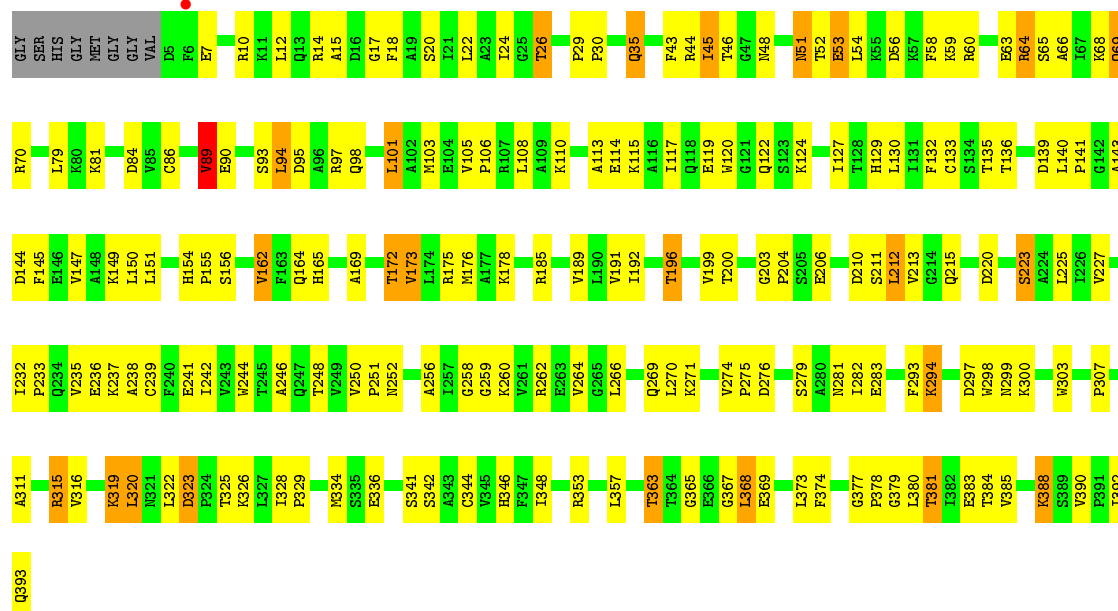
#### • Molecule 1: Dihydropinosylvin synthase





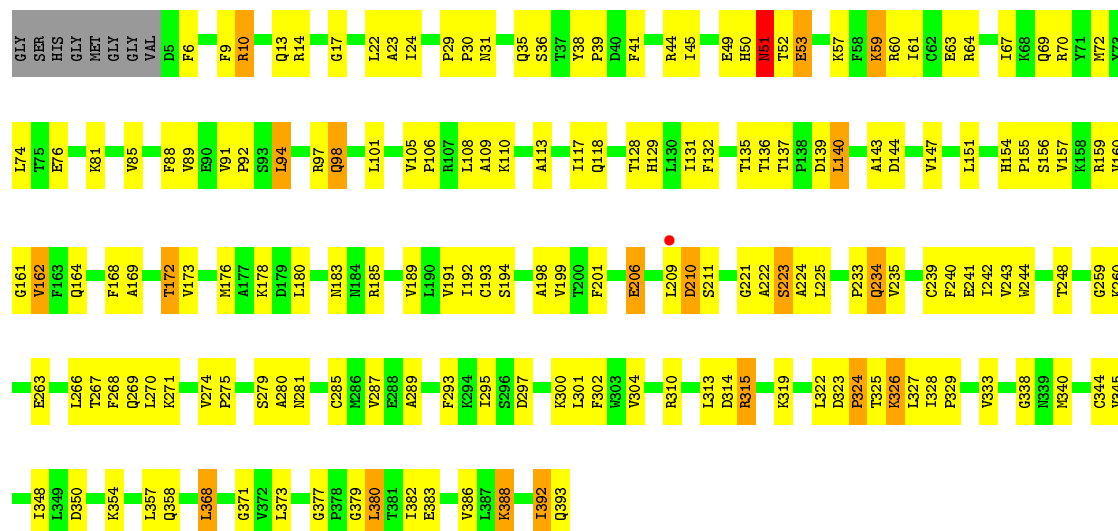
• Molecule 1: Dihydropinosylvin synthase

Chain C: 51% 41% 6%



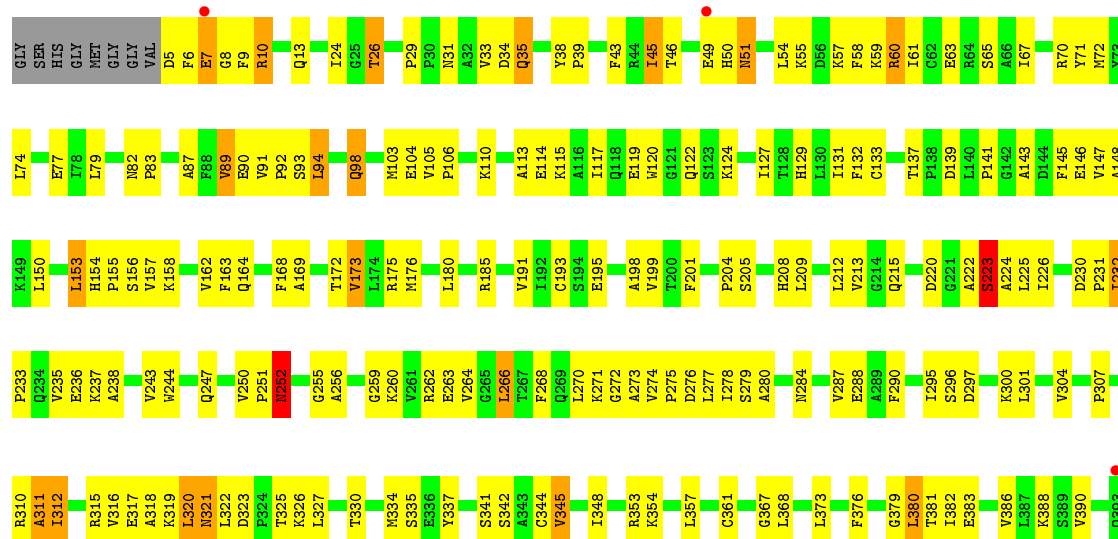
• Molecule 1: Dihydropinosylvin synthase

Chain D: 55% 38% 5%

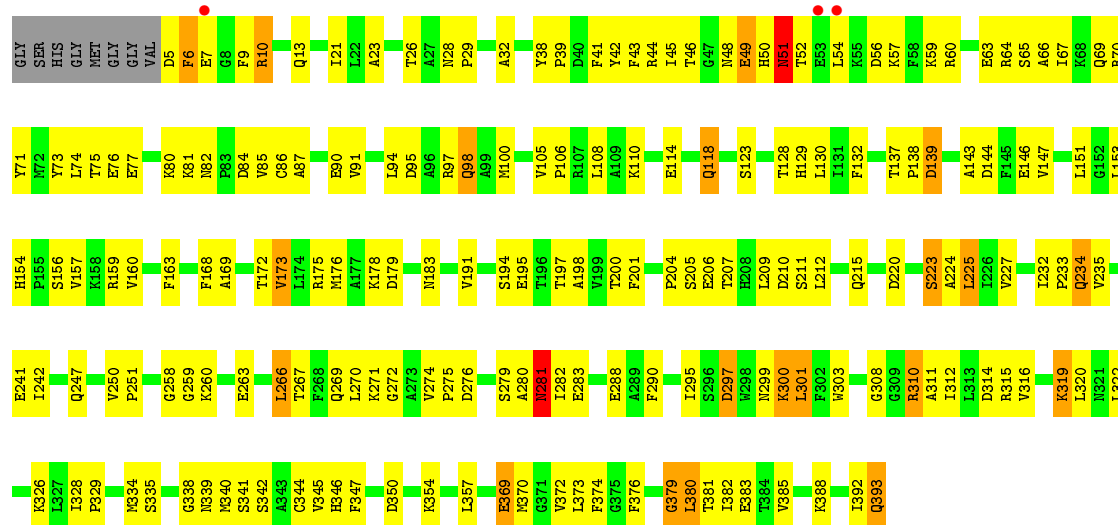


• Molecule 1: Dihydropinosylvin synthase

Chain E: 49% 44% 5%



### • Molecule 1: Dihydropinosylvin synthase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	57.22Å 361.29Å 57.32Å 90.00° 98.39° 90.00°	Depositor
Resolution (Å)	54.10 – 2.11 54.10 – 2.11	Depositor EDS
% Data completeness (in resolution range)	78.7 (54.10-2.11) 78.8 (54.10-2.11)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.06 (at 2.10Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.225 , 0.289 0.225 , 0.289	Depositor DCC
$R_{free}$ test set	5163 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	31.7	Xtriage
Anisotropy	0.305	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 45.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.45$ , $\langle L^2 \rangle = 0.27$	Xtriage
Estimated twinning fraction	0.229 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	19745	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.66% 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	0.65	1/3039 (0.0%)	0.65	0/4115
1	B	0.67	1/3039 (0.0%)	0.67	0/4115
1	C	0.66	1/3039 (0.0%)	0.67	0/4115
1	D	0.65	1/3039 (0.0%)	0.66	1/4115 (0.0%)
1	E	0.68	1/3039 (0.0%)	0.65	1/4115 (0.0%)
1	F	0.63	1/3039 (0.0%)	0.65	1/4115 (0.0%)
All	All	0.66	6/18234 (0.0%)	0.66	3/24690 (0.0%)

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	223	SER	CB-OG	31.06	1.82	1.42
1	B	223	SER	CB-OG	28.79	1.79	1.42
1	A	223	SER	CB-OG	28.24	1.78	1.42
1	C	223	SER	CB-OG	28.12	1.78	1.42
1	D	223	SER	CB-OG	27.31	1.77	1.42

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	380	LEU	CA-CB-CG	6.69	130.68	115.30
1	E	380	LEU	CA-CB-CG	5.26	127.41	115.30
1	F	380	LEU	CA-CB-CG	5.12	127.07	115.30

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	2979	0	2987	182	0
1	B	2979	0	2987	174	0
1	C	2979	0	2987	206	0
1	D	2979	0	2987	180	0
1	E	2979	0	2987	209	0
1	F	2979	0	2987	176	0
2	A	305	0	0	12	0
2	B	342	0	0	17	0
2	C	369	0	0	18	0
2	D	309	0	0	14	0
2	E	267	0	0	13	0
2	F	279	0	0	9	0
All	All	19745	0	17922	1067	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 30.

The worst 5 of 1067 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:F:223:SER:CB	1:F:223:SER:OG	1.77	1.30
1:C:223:SER:OG	1:C:223:SER:CB	1.78	1.30
1:A:223:SER:CB	1:A:223:SER:OG	1.79	1.30
1:D:223:SER:OG	1:D:223:SER:CB	1.77	1.29
1:B:223:SER:CB	1:B:223:SER:OG	1.79	1.29

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	387/397 (98%)	359 (93%)	25 (6%)	3 (1%)	19	14
1	B	387/397 (98%)	359 (93%)	26 (7%)	2 (0%)	29	25
1	C	387/397 (98%)	361 (93%)	24 (6%)	2 (0%)	29	25
1	D	387/397 (98%)	358 (92%)	24 (6%)	5 (1%)	12	7
1	E	387/397 (98%)	344 (89%)	36 (9%)	7 (2%)	8	3
1	F	387/397 (98%)	358 (92%)	26 (7%)	3 (1%)	19	14
All	All	2322/2382 (98%)	2139 (92%)	161 (7%)	22 (1%)	17	12

5 of 22 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	281	ASN
1	A	89	VAL
1	D	17	GLY
1	D	280	ALA
1	D	326	LYS

### 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	321/325 (99%)	294 (92%)	27 (8%)	11	7
1	B	321/325 (99%)	303 (94%)	18 (6%)	21	18
1	C	321/325 (99%)	287 (89%)	34 (11%)	6	3
1	D	321/325 (99%)	298 (93%)	23 (7%)	14	11
1	E	321/325 (99%)	301 (94%)	20 (6%)	18	15
1	F	321/325 (99%)	296 (92%)	25 (8%)	12	9
All	All	1926/1950 (99%)	1779 (92%)	147 (8%)	13	9

5 of 147 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	200	THR

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Mol	Chain	Res	Type
1	D	53	GLU
1	F	234	GLN
1	C	276	ASP
1	C	357	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 76 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	13	GLN
1	D	154	HIS
1	F	183	ASN
1	D	28	ASN
1	D	98	GLN

### 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 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	389/397 (97%)	-0.23	2 (0%) 91 92	20, 32, 48, 70	0
1	B	389/397 (97%)	-0.24	2 (0%) 91 92	18, 30, 47, 68	0
1	C	389/397 (97%)	-0.32	1 (0%) 94 95	16, 29, 48, 66	0
1	D	389/397 (97%)	-0.23	1 (0%) 94 95	17, 32, 50, 64	0
1	E	389/397 (97%)	-0.13	3 (0%) 86 88	22, 36, 51, 66	0
1	F	389/397 (97%)	-0.13	3 (0%) 86 88	20, 36, 53, 67	0
All	All	2334/2382 (97%)	-0.21	12 (0%) 91 92	16, 32, 50, 70	0

The worst 5 of 12 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	53	GLU	2.9
1	F	54	LEU	2.7
1	E	7	GLU	2.7
1	C	6	PHE	2.6
1	D	209	LEU	2.5

### 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.