



# wwPDB X-ray Structure Validation Summary Report (i)

Feb 26, 2014 – 06:25 PM GMT

PDB ID : 1ZY1  
Title : X-ray structure of peptide deformylase from Arabidopsis thaliana (AtPDF1A)  
in complex with Met-Ala-Ser  
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Deposited on : 2005-06-09  
Resolution : 3.00 Å(reported)

This is a wwPDB 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 <http://wwpdb.org/ValidationPDFNotes.html>

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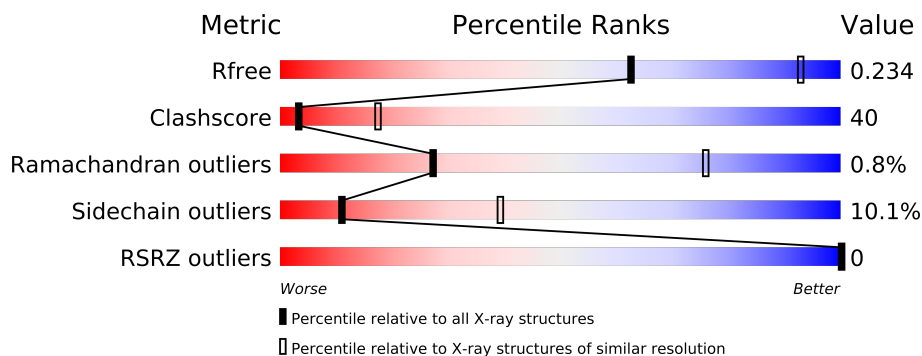
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance


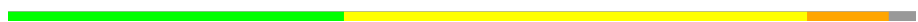


The reported resolution of this entry is 3.00 Å.

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))
$R_{free}$	66092	1216 (3.00-3.00)
Clashscore	79885	1594 (3.00-3.00)
Ramachandran outliers	78287	1537 (3.00-3.00)
Sidechain outliers	78261	1540 (3.00-3.00)
RSRZ outliers	66119	1217 (3.00-3.00)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	197	
1	B	197	
2	D	3	
2	E	3	

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3056 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Peptide deformylase, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	191	Total	C	N	O	S	0	0	0
			1478	934	259	277	8			
1	B	191	Total	C	N	O	S	0	0	0
			1470	929	260	273	8			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	INITIATING METHIONINE	UNP Q9FV53
A	191	SER	-	EXPRESSION TAG	UNP Q9FV53
A	192	HIS	-	EXPRESSION TAG	UNP Q9FV53
A	193	HIS	-	EXPRESSION TAG	UNP Q9FV53
A	194	HIS	-	EXPRESSION TAG	UNP Q9FV53
A	195	HIS	-	EXPRESSION TAG	UNP Q9FV53
A	196	HIS	-	EXPRESSION TAG	UNP Q9FV53
A	197	HIS	-	EXPRESSION TAG	UNP Q9FV53
B	1	MET	-	INITIATING METHIONINE	UNP Q9FV53
B	191	SER	-	EXPRESSION TAG	UNP Q9FV53
B	192	HIS	-	EXPRESSION TAG	UNP Q9FV53
B	193	HIS	-	EXPRESSION TAG	UNP Q9FV53
B	194	HIS	-	EXPRESSION TAG	UNP Q9FV53
B	195	HIS	-	EXPRESSION TAG	UNP Q9FV53
B	196	HIS	-	EXPRESSION TAG	UNP Q9FV53
B	197	HIS	-	EXPRESSION TAG	UNP Q9FV53

- Molecule 2 is a protein called tripeptide fragment.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	3	Total	C	N	O	S	0	0	0
			20	11	3	5	1			
2	E	3	Total	C	N	O	S	0	0	0
			20	11	3	5	1			

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total 1	Zn 1	0	0
3	A	1	Total 1	Zn 1	0	0

- Molecule 4 is water.

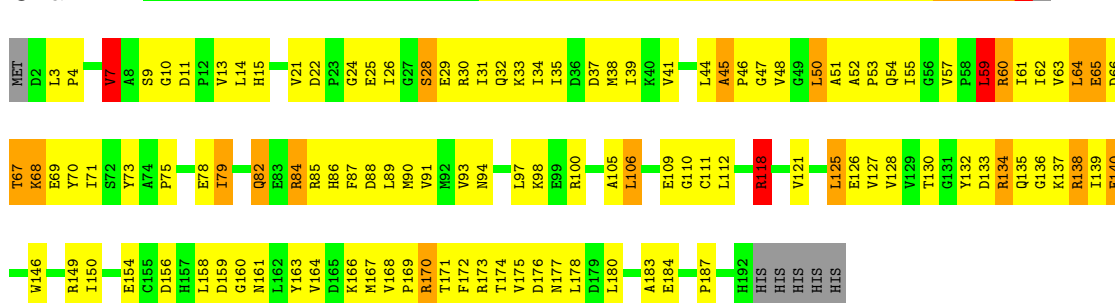
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	30	Total 30	O 30	0	0
4	B	35	Total 35	O 35	0	0
4	D	1	Total 1	O 1	0	0

### 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 errors 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: Peptide deformylase, mitochondrial

Chain A:



- Molecule 1: Peptide deformylase, mitochondrial

Chain B:



- Molecule 2: tripeptide fragment

Chain D:



- Molecule 2: tripeptide fragment

Chain E:



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	51.60Å 76.30Å 109.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 3.00 46.66 – 2.98	Depositor EDS
% Data completeness (in resolution range)	97.2 (30.00-3.00) 99.4 (46.66-2.98)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	0.09	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.19 (at 2.96Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.226 , 0.256 0.237 , 0.234	Depositor DCC
$R_{free}$ test set	455 reflections (5.00%)	DCC
Wilson B-factor (Å <sup>2</sup> )	57.1	Xtriage
Anisotropy	0.713	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 39.6	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	1 of 9219 reflections (0.011%)	Xtriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	3056	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.66% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

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	1.18	15/1505 (1.0%)	1.31	24/2040 (1.2%)
1	B	1.13	13/1497 (0.9%)	1.16	25/2032 (1.2%)
2	D	0.85	0/19	0.57	0/22
2	E	1.81	1/19 (5.3%)	2.11	1/22 (4.5%)
All	All	1.16	29/3040 (1.0%)	1.24	50/4116 (1.2%)

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	B	0	1

The worst 5 of 29 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	70	TYR	CE1-CZ	-17.20	1.16	1.38
1	A	70	TYR	CE1-CZ	-16.66	1.16	1.38
1	A	70	TYR	CE2-CZ	-16.65	1.17	1.38
1	B	70	TYR	CE2-CZ	-16.27	1.17	1.38
1	A	70	TYR	CG-CD2	-15.09	1.19	1.39

The worst 5 of 50 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	85	ARG	NE-CZ-NH1	21.11	130.85	120.30
1	A	85	ARG	NE-CZ-NH2	-16.01	112.29	120.30
1	A	118	ARG	NE-CZ-NH2	15.57	128.08	120.30
1	B	118	ARG	NE-CZ-NH1	14.52	127.56	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	170	ARG	NE-CZ-NH1	-13.85	113.38	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	118	ARG	Sidechain

## 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1478	0	1463	128	0
1	B	1470	0	1451	122	0
2	D	20	0	21	7	0
2	E	20	0	21	5	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	30	0	0	3	0
4	B	35	0	0	1	0
4	D	1	0	0	0	0
All	All	3056	0	2956	239	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 40.

The worst 5 of 239 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:7:VAL:CG2	1:B:14:LEU:HD11	1.82	1.09
1:B:7:VAL:HG21	1:B:14:LEU:HD11	1.51	0.92
1:B:65:GLU:HB2	1:B:89:LEU:HA	1.53	0.89
1:A:130:THR:HG22	1:A:140:GLU:HG3	1.58	0.86
1:A:78:GLU:HG2	1:A:82:GLN:HE21	1.41	0.85

There are no symmetry-related clashes.



## 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	189/197 (96%)	171 (90%)	16 (8%)	2 (1%)	21	67
1	B	189/197 (96%)	170 (90%)	18 (10%)	1 (0%)	38	84
2	D	1/3 (33%)	1 (100%)	0	0	100	100
2	E	1/3 (33%)	1 (100%)	0	0	100	100
All	All	380/400 (95%)	343 (90%)	34 (9%)	3 (1%)	27	76

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	28	SER
1	B	46	PRO
1	A	46	PRO

### 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	157/170 (92%)	140 (89%)	17 (11%)	9	35
1	B	155/170 (91%)	142 (92%)	13 (8%)	16	51
2	D	2/2 (100%)	2 (100%)	0	100	100
2	E	2/2 (100%)	0	2 (100%)	0	0
All	All	316/344 (92%)	284 (90%)	32 (10%)	11	39

5 of 32 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	135	GLN

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Mol	Chain	Res	Type
1	B	19	ARG
1	B	192	HIS
1	A	184	GLU
1	B	50	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	HIS
1	A	82	GLN
1	A	135	GLN
1	B	15	HIS

### 5.3.3 RNA ⓘ

There are no RNA chains 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 ⓘ

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 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 ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

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	191/197 (96%)	-0.18	0 100 100	29, 48, 70, 89	0
1	B	191/197 (96%)	-0.15	0 100 100	32, 49, 76, 90	0
2	D	3/3 (100%)	0.04	0 100 100	42, 42, 44, 45	0
2	E	3/3 (100%)	0.12	0 100 100	56, 56, 62, 66	0
All	All	388/400 (97%)	-0.16	0 100 100	29, 48, 75, 90	0

There are no RSRZ outliers to report.

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

There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

### 6.4 Ligands ⓘ

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	RSR	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
3	ZN	B	198	1/1	0.11	-2.91	42,42,42,42	0
3	ZN	A	198	1/1	0.10	-2.97	38,38,38,38	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.