



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 13, 2017 – 03:24 pm GMT

PDB ID : 2R6I
Title : Crystal structure of Atu1473 protein, a putative chaperone from *Agrobacterium tumefaciens*
Authors : Osipiuk, J.; Xu, X.; Zheng, H.; Savchenko, A.; Edwards, A.M.; Joachimiak, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on : 2007-09-05
Resolution : 2.59 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

A user guide is available at

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949

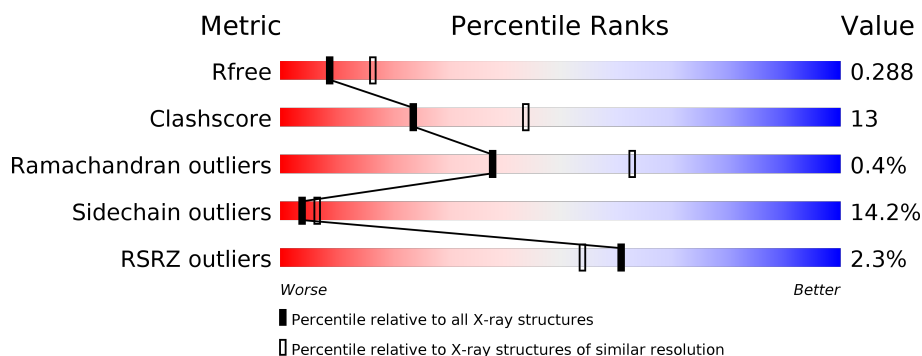
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.59 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}	100719	2542 (2.60-2.60)
Clashscore	112137	2895 (2.60-2.60)
Ramachandran outliers	110173	2848 (2.60-2.60)
Sidechain outliers	110143	2848 (2.60-2.60)
RSRZ outliers	101464	2550 (2.60-2.60)

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 ≥ 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	284	<div> <div>3%</div> <div> <div></div> <div>68%</div> <div>22%</div> <div>5%</div> <div>6%</div> </div> </div>
1	B	284	<div> <div>%</div> <div> <div></div> <div>65%</div> <div>21%</div> <div>7%</div> <div>6%</div> </div> </div>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4242 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 Uncharacterized protein Atu1473.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	268	Total	C	N	O	S	Se	0	1	0
			2106	1336	360	403	1	6			
1	B	268	Total	C	N	O	S	Se	0	1	0
			2106	1336	360	403	1	6			

There are 46 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MSE	-	EXPRESSION TAG	UNP Q8UFC5
A	-19	GLY	-	EXPRESSION TAG	UNP Q8UFC5
A	-18	SER	-	EXPRESSION TAG	UNP Q8UFC5
A	-17	SER	-	EXPRESSION TAG	UNP Q8UFC5
A	-16	HIS	-	EXPRESSION TAG	UNP Q8UFC5
A	-15	HIS	-	EXPRESSION TAG	UNP Q8UFC5
A	-14	HIS	-	EXPRESSION TAG	UNP Q8UFC5
A	-13	HIS	-	EXPRESSION TAG	UNP Q8UFC5
A	-12	HIS	-	EXPRESSION TAG	UNP Q8UFC5
A	-11	HIS	-	EXPRESSION TAG	UNP Q8UFC5
A	-10	SER	-	EXPRESSION TAG	UNP Q8UFC5
A	-9	SER	-	EXPRESSION TAG	UNP Q8UFC5
A	-8	GLY	-	EXPRESSION TAG	UNP Q8UFC5
A	-7	ARG	-	EXPRESSION TAG	UNP Q8UFC5
A	-6	GLU	-	EXPRESSION TAG	UNP Q8UFC5
A	-5	ASN	-	EXPRESSION TAG	UNP Q8UFC5
A	-4	LEU	-	EXPRESSION TAG	UNP Q8UFC5
A	-3	TYR	-	EXPRESSION TAG	UNP Q8UFC5
A	-2	PHE	-	EXPRESSION TAG	UNP Q8UFC5
A	-1	GLN	-	EXPRESSION TAG	UNP Q8UFC5
A	0	GLY	-	EXPRESSION TAG	UNP Q8UFC5
A	262	GLY	-	EXPRESSION TAG	UNP Q8UFC5
A	263	SER	-	EXPRESSION TAG	UNP Q8UFC5
B	-20	MSE	-	EXPRESSION TAG	UNP Q8UFC5
B	-19	GLY	-	EXPRESSION TAG	UNP Q8UFC5

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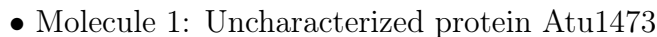
Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	SER	-	EXPRESSION TAG	UNP Q8UFC5
B	-17	SER	-	EXPRESSION TAG	UNP Q8UFC5
B	-16	HIS	-	EXPRESSION TAG	UNP Q8UFC5
B	-15	HIS	-	EXPRESSION TAG	UNP Q8UFC5
B	-14	HIS	-	EXPRESSION TAG	UNP Q8UFC5
B	-13	HIS	-	EXPRESSION TAG	UNP Q8UFC5
B	-12	HIS	-	EXPRESSION TAG	UNP Q8UFC5
B	-11	HIS	-	EXPRESSION TAG	UNP Q8UFC5
B	-10	SER	-	EXPRESSION TAG	UNP Q8UFC5
B	-9	SER	-	EXPRESSION TAG	UNP Q8UFC5
B	-8	GLY	-	EXPRESSION TAG	UNP Q8UFC5
B	-7	ARG	-	EXPRESSION TAG	UNP Q8UFC5
B	-6	GLU	-	EXPRESSION TAG	UNP Q8UFC5
B	-5	ASN	-	EXPRESSION TAG	UNP Q8UFC5
B	-4	LEU	-	EXPRESSION TAG	UNP Q8UFC5
B	-3	TYR	-	EXPRESSION TAG	UNP Q8UFC5
B	-2	PHE	-	EXPRESSION TAG	UNP Q8UFC5
B	-1	GLN	-	EXPRESSION TAG	UNP Q8UFC5
B	0	GLY	-	EXPRESSION TAG	UNP Q8UFC5
B	262	GLY	-	EXPRESSION TAG	UNP Q8UFC5
B	263	SER	-	EXPRESSION TAG	UNP Q8UFC5

- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	13	Total O 13 13	0	0
2	B	17	Total O 17 17	0	0

i

- Molecule 1: Uncharacterized protein Atu1473



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	86.30Å 108.11Å 142.39Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.80 – 2.59 38.82 – 2.59	Depositor EDS
% Data completeness (in resolution range)	99.3 (38.80-2.59) 99.3 (38.82-2.59)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.91 (at 2.58Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.240 , 0.289 0.237 , 0.288	Depositor DCC
R_{free} test set	1082 reflections (5.42%)	DCC
Wilson B-factor (Å ²)	45.5	Xtriage
Anisotropy	0.352	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 41.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4242	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 57.29 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 2.4169e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

²Theoretical 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	0.68	1/2145 (0.0%)	0.77	0/2913
1	B	0.78	2/2145 (0.1%)	0.85	5/2913 (0.2%)
All	All	0.73	3/4290 (0.1%)	0.81	5/5826 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	163	VAL	CB-CG1	5.95	1.65	1.52
1	B	164	MSE	SE-CE	5.78	2.29	1.95
1	A	161	GLU	CG-CD	5.20	1.59	1.51

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	8	LEU	CA-CB-CG	5.51	127.98	115.30
1	B	56	LEU	CA-CB-CG	5.50	127.96	115.30
1	B	76	ARG	NE-CZ-NH1	-5.23	117.68	120.30
1	B	104	ILE	N-CA-C	5.16	124.92	111.00
1	B	222	ALA	N-CA-C	-5.00	97.49	111.00

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	2106	0	2101	50	0
1	B	2106	0	2101	58	0
2	A	13	0	0	2	0
2	B	17	0	0	4	0
All	All	4242	0	4202	106	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 106 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:164:MSE:SE	1:B:164:MSE:CE	2.29	1.30
1:B:22:GLN:O	1:B:26:GLN:NE2	1.96	0.96
1:B:26:GLN:HE21	1:B:26:GLN:H	1.15	0.89
1:A:160:VAL:HG13	1:A:165:HIS:HB3	1.56	0.88
1:A:160:VAL:HG13	1:A:165:HIS:CB	2.05	0.87

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	267/284 (94%)	249 (93%)	17 (6%)	1 (0%)	38	63
1	B	267/284 (94%)	245 (92%)	21 (8%)	1 (0%)	38	63
All	All	534/568 (94%)	494 (92%)	38 (7%)	2 (0%)	38	63

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	164	MSE

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Mol	Chain	Res	Type
1	A	164	MSE

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	223/228 (98%)	195 (87%)	28 (13%)	5	9
1	B	223/228 (98%)	187 (84%)	36 (16%)	3	4
All	All	446/456 (98%)	382 (86%)	64 (14%)	4	6

5 of 64 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	-5	ASN
1	B	26	GLN
1	B	247	LEU
1	B	-4	LEU
1	B	12	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 11 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	255	ASN
1	B	-5	ASN
1	B	165	HIS
1	A	232	GLN
1	B	26	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, 95th 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 ²)	Q<0.9
1	A	262/284 (92%)	0.26	8 (3%) 49 41	29, 44, 56, 63	0
1	B	262/284 (92%)	0.23	4 (1%) 74 69	25, 40, 52, 62	0
All	All	524/568 (92%)	0.25	12 (2%) 61 54	25, 42, 56, 63	0

The worst 5 of 12 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	230	ALA	4.8
1	B	234	GLY	4.2
1	B	230	ALA	3.9
1	B	235	GLU	3.8
1	A	235	GLU	3.5

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.