

wwPDB X-ray Structure Validation Summary Report (i)

Nov 3, 2023 – 02:04 AM EDT

PDB ID	:	3VVM
Title	:	Crystal structure of G52A-P55G mutant of L-serine-O-acetyltransferase found
		in D-cycloserine biosynthetic pathway
Authors	:	Oda, K.; Matoba, Y.; Kumagai, T.; Noda, M.; Sugiyama, M.
Deposited on		
Resolution	:	1.70 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 https://www.wwpdb.org/validation/2017/XrayValidationReportHelp with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (1)) were used in the production of this report:

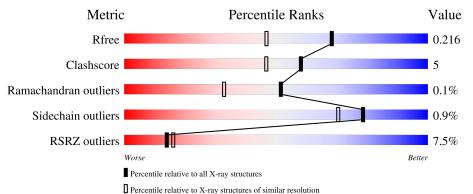
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure: $X\text{-}RAY \, DIFFRACTION$

The reported resolution of this entry is 1.70 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	$egin{array}{c} { m Whole \ archive} \ (\#{ m Entries}) \end{array}$	${f Similar\ resolution}\ (\#{ m Entries,\ resolution\ range}({ m \AA}))$
R _{free}	130704	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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 >=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 <=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	А	394	8%	12%	7%
1	В	394	<mark>6%</mark> 86%	8%	6%



2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 5988 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.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace	
1	Δ	368	Total	С	Ν	0	\mathbf{S}	0	0	0
	A	300	2785	1748	505	517	15	0		0
1	Р	369	Total C N O S	S	0	0	0			
1	D	509	2789	1750	506	518	15	0	0	0

• Molecule 1 is a protein called Homoserine O-acetyltransferase.

Chain	Residue	Modelled	Actual	Comment	Reference
А	-19	MET	-	expression tag	UNP D2Z028
А	-18	GLY	-	expression tag	UNP D2Z028
А	-17	SER	-	expression tag	UNP D2Z028
А	-16	SER	-	expression tag	UNP D2Z028
А	-15	HIS	-	expression tag	UNP D2Z028
А	-14	HIS	-	expression tag	UNP D2Z028
А	-13	HIS	-	expression tag	UNP D2Z028
А	-12	HIS	-	expression tag	UNP D2Z028
А	-11	HIS	-	expression tag	UNP D2Z028
А	-10	HIS	-	expression tag	UNP D2Z028
А	-9	SER	-	expression tag	UNP D2Z028
А	-8	SER	-	expression tag	UNP D2Z028
А	-7	GLY	-	expression tag	UNP D2Z028
А	-6	LEU	-	expression tag	UNP D2Z028
А	-5	VAL	-	expression tag	UNP D2Z028
А	-4	PRO	-	expression tag	UNP D2Z028
А	-3	ARG	-	expression tag	UNP D2Z028
А	-2	GLY	-	expression tag	UNP D2Z028
А	-1	SER	-	expression tag	UNP D2Z028
А	0	HIS	-	expression tag	UNP D2Z028
А	52	ALA	GLY	engineered mutation	UNP D2Z028
А	55	GLY	PRO	engineered mutation	UNP D2Z028
В	-19	MET	-	expression tag	UNP D2Z028
В	-18	GLY	-	expression tag	UNP D2Z028
В	-17	SER	-	expression tag	UNP D2Z028

There are 44 discrepancies between the modelled and reference sequences:

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Chain	Residue	Modelled	Actual	Comment	Reference
В	-16	SER	-	expression tag	UNP D2Z028
В	-15	HIS	-	expression tag	UNP D2Z028
В	-14	HIS	-	expression tag	UNP D2Z028
В	-13	HIS	-	expression tag	UNP D2Z028
В	-12	HIS	-	expression tag	UNP D2Z028
В	-11	HIS	-	expression tag	UNP D2Z028
В	-10	HIS	-	expression tag	UNP D2Z028
В	-9	SER	-	expression tag	UNP D2Z028
В	-8	SER	-	expression tag	UNP D2Z028
В	-7	GLY	-	expression tag	UNP D2Z028
В	-6	LEU	-	expression tag	UNP D2Z028
В	-5	VAL	-	expression tag	UNP D2Z028
В	-4	PRO	-	expression tag	UNP D2Z028
В	-3	ARG	-	expression tag	UNP D2Z028
В	-2	GLY	-	expression tag	UNP D2Z028
В	-1	SER	-	expression tag	UNP D2Z028
В	0	HIS	-	expression tag	UNP D2Z028
В	52	ALA	GLY	engineered mutation	UNP D2Z028
В	55	GLY	PRO	engineered mutation	UNP D2Z028

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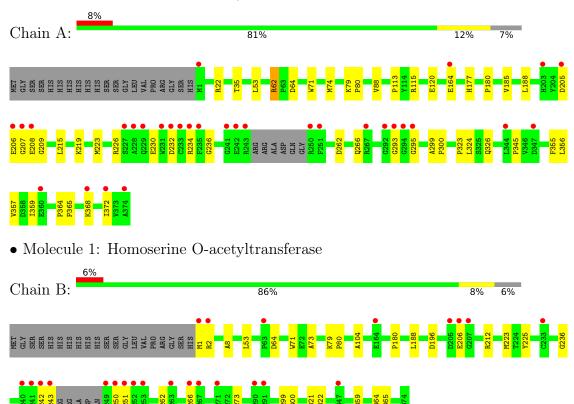
• Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	А	182	Total O 182 182	0	0
2	В	232	Total O 232 232	0	0



3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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: Homoserine O-acetyltransferase



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants	46.56Å 102.33Å 147.30Å	Depositor
a, b, c, α , β , γ	90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.00 - 1.70	Depositor
Resolution (A)	24.00 - 1.70	EDS
% Data completeness	98.5 (24.00-1.70)	Depositor
(in resolution range)	99.8 (24.00-1.70)	EDS
R _{merge}	0.06	Depositor
R _{sym}	(Not available)	Depositor
$< I/\sigma(I) > 1$	$3.79 (at 1.70 \text{\AA})$	Xtriage
Refinement program	CNS 1.2	Depositor
D D.	0.192 , 0.214	Depositor
R, R_{free}	0.193 , 0.216	DCC
R_{free} test set	3954 reflections $(5.04%)$	wwPDB-VP
Wilson B-factor $(Å^2)$	17.6	Xtriage
Anisotropy	0.595	Xtriage
Bulk solvent $k_{sol}(e/Å^3), B_{sol}(Å^2)$	0.37 , 42.2	EDS
L-test for twinning ²	$ \langle L \rangle = 0.49, \langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5988	wwPDB-VP
Average B, all atoms $(Å^2)$	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: The largest off-origin peak in the Patterson function is 3.83% of the height of the origin peak. No significant pseudotranslation is detected.

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.



¹Intensities estimated from amplitudes.

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		
	Ullaill	RMSZ	# Z > 5	RMSZ	# Z > 5	
1	А	0.28	0/2853	0.56	0/3865	
1	В	0.29	0/2857	0.59	0/3870	
All	All	0.29	0/5710	0.58	0/7735	

There are no bond length outliers.

There are no bond angle outliers.

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	А	2785	0	2706	33	0
1	В	2789	0	2709	26	0
2	А	182	0	0	0	0
2	В	232	0	0	0	0
All	All	5988	0	5415	53	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 5.

The worst 5 of 53 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:A:180:PRO:HG3	1:B:236:GLY:O	1.82	0.80	



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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:368:LYS:O	1:A:372:ILE:HD13	1.94	0.68
1:A:230:GLU:O	1:A:234:ARG:HG3	1.94	0.67
1:B:250:ARG:HG3	1:B:251:PHE:HD1	1.59	0.67
1:A:226:ARG:NH1	1:A:234:ARG:HH12	1.93	0.67

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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	Perce	ntiles
1	А	364/394~(92%)	350~(96%)	13~(4%)	1 (0%)	41	24
1	В	365/394~(93%)	353~(97%)	12 (3%)	0	100	100
All	All	729/788~(92%)	703~(96%)	25~(3%)	1 (0%)	51	33

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	А	208	GLU

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	А	280/301~(93%)	276~(99%)	4 (1%)	67 53

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Mol	Chain	Analysed	Rotameric	Outliers	Percer	ntiles		
1	В	280/301~(93%)	279 (100%)	1 (0%)	91	87		
All	All	560/602~(93%)	555~(99%)	5 (1%)	78	70		

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All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	А	62	ARG
1	А	71	TRP
1	А	164	GLU
1	А	177	HIS
1	В	71	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	А	201	GLN
1	А	266	GLN
1	В	229	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 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 (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^{th} 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	$\langle RSRZ \rangle$	#RSRZ>2	2	$\mathbf{OWAB}(\mathrm{\AA}^2)$	Q < 0.9
1	А	368/394~(93%)	0.43	31 (8%) 11	12	11, 20, 39, 51	0
1	В	369/394~(93%)	0.22	24 (6%) 18	21	10, 17, 35, 58	0
All	All	737/788~(93%)	0.33	55 (7%) 14	16	10, 18, 38, 58	0

The worst 5 of 55 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	В	251	PHE	11.0
1	В	1	MET	9.2
1	А	1	MET	7.4
1	В	242	GLU	7.1
1	А	294	GLY	6.1

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 monosaccharides 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.

