



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 14, 2017 – 01:22 am GMT

PDB ID : 3BAN  
Title : The crystal structure of mannonate dehydratase from *Streptococcus suis* serotype2  
Authors : Peng, H.; Zhang, Q.M.; Gao, F.; Liu, Y.W.; Qi, J.X.; Gao, G.F.  
Deposited on : 2007-11-08  
Resolution : 2.90 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

<http://wwpdb.org/validation/2016/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)	:	1.9-1692
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

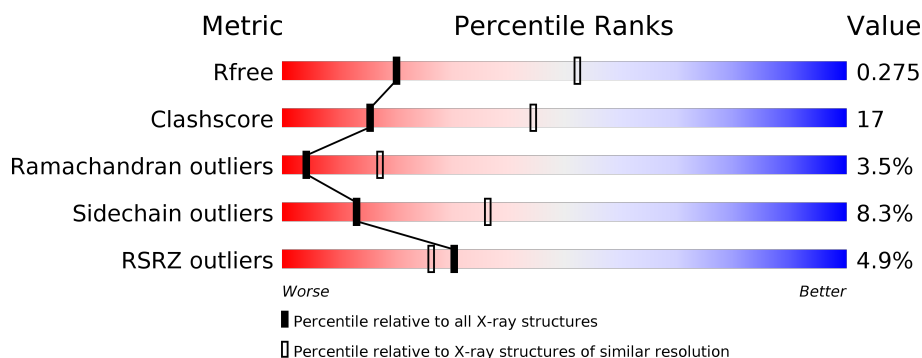
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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	1586 (2.90-2.90)
Clashscore	112137	1807 (2.90-2.90)
Ramachandran outliers	110173	1768 (2.90-2.90)
Sidechain outliers	110143	1770 (2.90-2.90)
RSRZ outliers	101464	1596 (2.90-2.90)

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	386	<div> <div>4%</div> <div> <div></div> <div>56%</div> <div>28%</div> <div>6% • 10%</div> </div> </div>
1	B	386	<div> <div>4%</div> <div> <div></div> <div>59%</div> <div>28%</div> <div>• • 10%</div> </div> </div>

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 5471 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 D-mannonate dehydratase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	349	Total	C	N	O	S	0	0	0
			2738	1745	465	514	14			
1	B	349	Total	C	N	O	S	0	0	0
			2733	1742	465	513	13			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	EXPRESSION TAG	UNP A4VVI4
A	2	GLY	-	EXPRESSION TAG	UNP A4VVI4
A	3	SER	-	EXPRESSION TAG	UNP A4VVI4
A	4	SER	-	EXPRESSION TAG	UNP A4VVI4
A	5	HIS	-	EXPRESSION TAG	UNP A4VVI4
A	6	HIS	-	EXPRESSION TAG	UNP A4VVI4
A	7	HIS	-	EXPRESSION TAG	UNP A4VVI4
A	8	HIS	-	EXPRESSION TAG	UNP A4VVI4
A	9	HIS	-	EXPRESSION TAG	UNP A4VVI4
A	10	HIS	-	EXPRESSION TAG	UNP A4VVI4
A	11	SER	-	EXPRESSION TAG	UNP A4VVI4
A	12	SER	-	EXPRESSION TAG	UNP A4VVI4
A	13	GLY	-	EXPRESSION TAG	UNP A4VVI4
A	14	LEU	-	EXPRESSION TAG	UNP A4VVI4
A	15	VAL	-	EXPRESSION TAG	UNP A4VVI4
A	16	PRO	-	EXPRESSION TAG	UNP A4VVI4
A	17	ARG	-	EXPRESSION TAG	UNP A4VVI4
A	18	GLY	-	EXPRESSION TAG	UNP A4VVI4
A	19	SER	-	EXPRESSION TAG	UNP A4VVI4
A	20	HIS	-	EXPRESSION TAG	UNP A4VVI4
B	1	MET	-	EXPRESSION TAG	UNP A4VVI4
B	2	GLY	-	EXPRESSION TAG	UNP A4VVI4
B	3	SER	-	EXPRESSION TAG	UNP A4VVI4
B	4	SER	-	EXPRESSION TAG	UNP A4VVI4
B	5	HIS	-	EXPRESSION TAG	UNP A4VVI4

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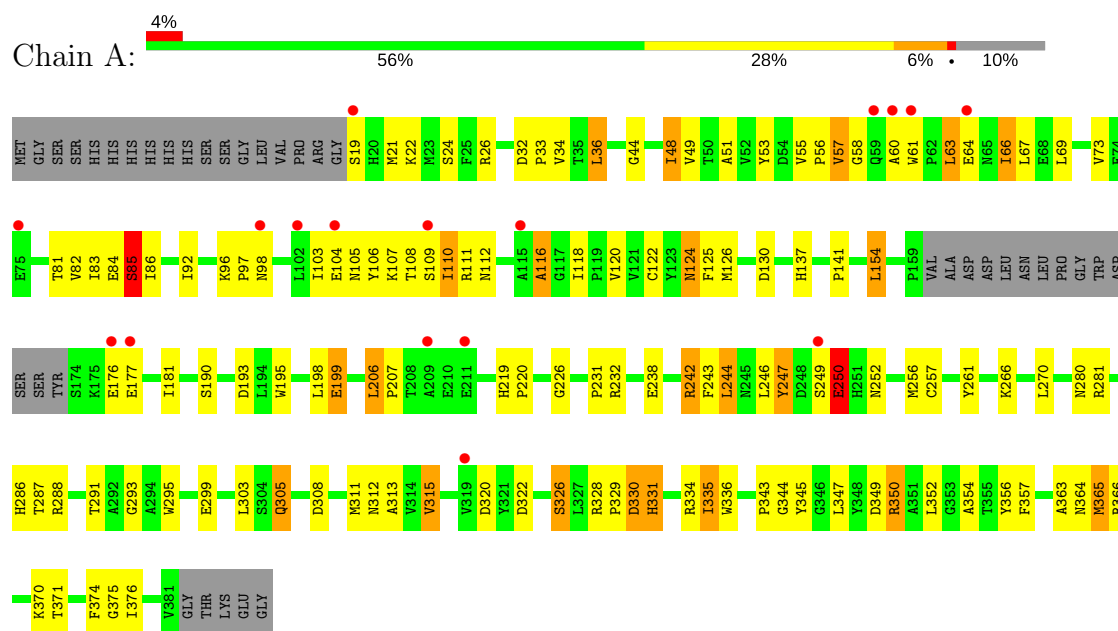
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Chain	Residue	Modelled	Actual	Comment	Reference
B	6	HIS	-	EXPRESSION TAG	UNP A4VVI4
B	7	HIS	-	EXPRESSION TAG	UNP A4VVI4
B	8	HIS	-	EXPRESSION TAG	UNP A4VVI4
B	9	HIS	-	EXPRESSION TAG	UNP A4VVI4
B	10	HIS	-	EXPRESSION TAG	UNP A4VVI4
B	11	SER	-	EXPRESSION TAG	UNP A4VVI4
B	12	SER	-	EXPRESSION TAG	UNP A4VVI4
B	13	GLY	-	EXPRESSION TAG	UNP A4VVI4
B	14	LEU	-	EXPRESSION TAG	UNP A4VVI4
B	15	VAL	-	EXPRESSION TAG	UNP A4VVI4
B	16	PRO	-	EXPRESSION TAG	UNP A4VVI4
B	17	ARG	-	EXPRESSION TAG	UNP A4VVI4
B	18	GLY	-	EXPRESSION TAG	UNP A4VVI4
B	19	SER	-	EXPRESSION TAG	UNP A4VVI4
B	20	HIS	-	EXPRESSION TAG	UNP A4VVI4

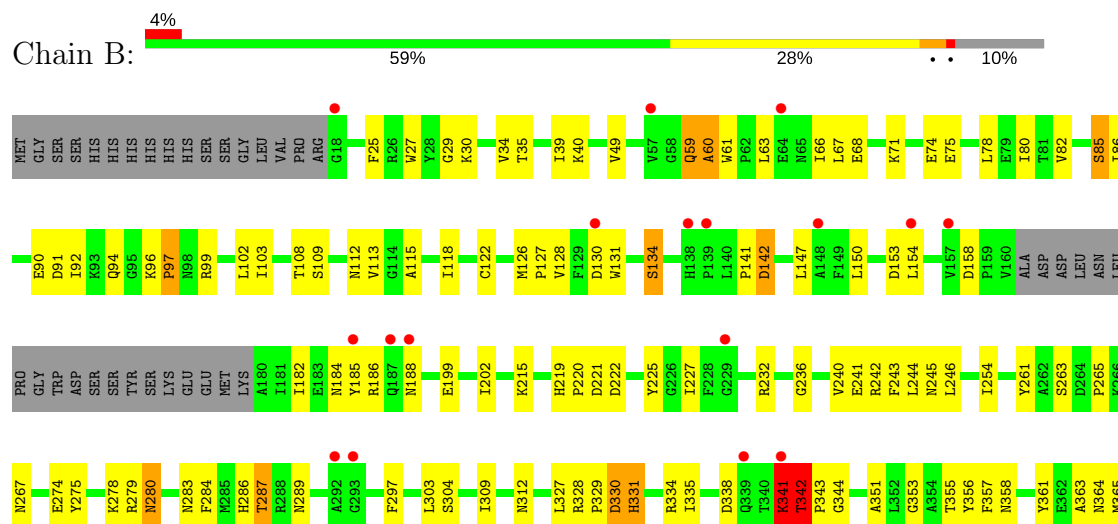
### 3 Residue-property plots

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: D-mannonate dehydratase



#### • Molecule 1: D-mannonate dehydratase



K366					
A367					
T371					
A378					
T383					
K384					
E386					
GLY					

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	105.69Å 105.69Å 159.57Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.06 – 2.90 44.06 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.8 (44.06-2.90) 99.8 (44.06-2.90)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.44 (at 2.90Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.234 , 0.286 0.230 , 0.275	Depositor DCC
$R_{free}$ test set	1063 reflections (5.42%)	DCC
Wilson B-factor (Å <sup>2</sup> )	51.9	Xtriage
Anisotropy	0.199	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 38.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.43$ , $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.89	EDS
Total number of atoms	5471	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.48% 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	0.68	2/2805 (0.1%)	0.77	0/3808
1	B	0.68	0/2800	0.81	0/3802
All	All	0.68	2/5605 (0.0%)	0.79	0/7610

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	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	250	GLU	CG-CD	6.01	1.60	1.51
1	A	250	GLU	CB-CG	5.46	1.62	1.52

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	85	SER	Peptide

### 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	2738	0	2676	100	0
1	B	2733	0	2679	83	0
All	All	5471	0	5355	179	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 17.

The worst 5 of 179 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:250:GLU:HG2	1:A:280:ASN:HD22	1.16	1.06
1:B:199:GLU:HB2	1:B:246:LEU:CD2	1.92	0.98
1:B:182:ILE:HG22	1:B:186:ARG:HD2	1.49	0.94
1:A:57:VAL:HG13	1:A:58:GLY:H	1.37	0.90
1:B:61:TRP:O	1:B:112:ASN:ND2	2.06	0.88

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	345/386 (89%)	295 (86%)	40 (12%)	10 (3%)	5	21
1	B	345/386 (89%)	290 (84%)	41 (12%)	14 (4%)	3	13
All	All	690/772 (89%)	585 (85%)	81 (12%)	24 (4%)	4	17

5 of 24 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	57	VAL
1	A	116	ALA
1	A	343	PRO

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Mol	Chain	Res	Type
1	B	97	PRO
1	B	128	VAL

### 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	288/321 (90%)	260 (90%)	28 (10%)	9	29
1	B	288/321 (90%)	268 (93%)	20 (7%)	18	46
All	All	576/642 (90%)	528 (92%)	48 (8%)	13	36

5 of 48 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	305	GLN
1	A	350	ARG
1	B	341	LYS
1	A	315	VAL
1	A	330	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	324	GLN
1	A	358	ASN
1	B	286	HIS
1	A	298	GLN
1	A	312	ASN

### 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	349/386 (90%)	0.15	17 (4%) 30 26	21, 42, 62, 69	0
1	B	349/386 (90%)	0.12	17 (4%) 30 26	19, 38, 64, 82	0
All	All	698/772 (90%)	0.14	34 (4%) 30 26	19, 40, 62, 82	0

The worst 5 of 34 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	293	GLY	9.8
1	B	339	GLN	4.0
1	A	60	ALA	3.8
1	B	187	GLN	3.8
1	B	138	HIS	3.8

### 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.