



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 4, 2017 – 09:44 PM EDT

PDB ID : 1ZVF
Title : The crystal structure of 3-hydroxyanthranilate 3,4-dioxygenase from *Saccharomyces cerevisiae*
Authors : Li, X.; Guo, M.; Teng, M.; Niu, L.
Deposited on : unknown
Resolution : 2.41 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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	:	rb-20030345
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)	:	rb-20030345

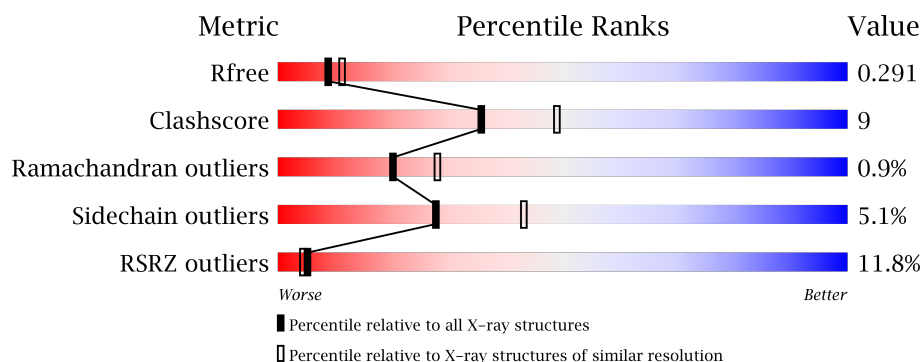
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.41 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	3709 (2.44-2.40)
Clashscore	112137	4241 (2.44-2.40)
Ramachandran outliers	110173	4178 (2.44-2.40)
Sidechain outliers	110143	4179 (2.44-2.40)
RSRZ outliers	101464	3740 (2.44-2.40)

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	176	<div> <div>11%</div> <div> <div></div> <div>84%</div> <div>15%</div> <div>.</div> </div> </div>
1	B	176	<div> <div>13%</div> <div> <div></div> <div>70%</div> <div>24%</div> <div>..</div> </div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2874 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 3-hydroxyanthranilate 3,4-dioxygenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	176	Total	C	N	O	S	0	1	0
			1425	904	243	268	10			
1	B	172	Total	C	N	O	S	0	0	0
			1385	880	234	262	9			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	ALA	-	EXPRESSION TAG	UNP P47096
A	47	ASP	GLY	SEE REMARK 999	UNP P47096
B	0	ALA	-	EXPRESSION TAG	UNP P47096
B	47	ASP	GLY	SEE REMARK 999	UNP P47096

- Molecule 2 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	2	Total	Ni	0	0
			2	2		
2	A	2	Total	Ni	0	0
			2	2		

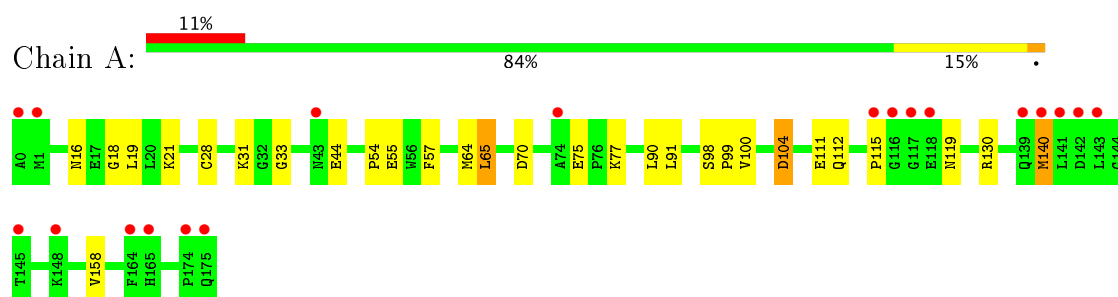
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	27	Total	O	0	0
			27	27		
3	B	33	Total	O	0	0
			33	33		

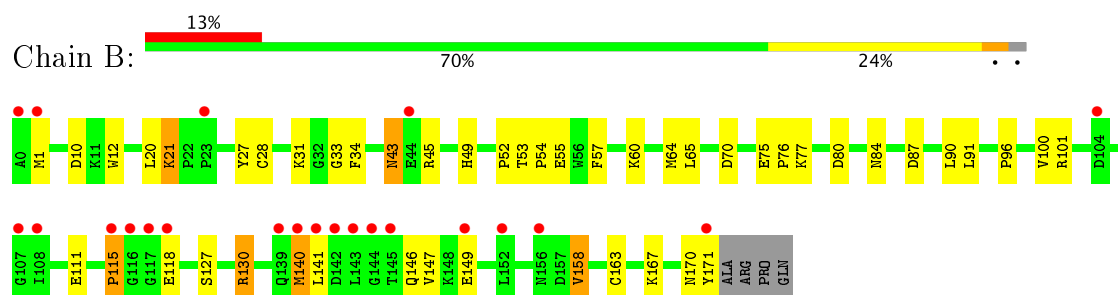
3 Residue-property plots [i](#)

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: 3-hydroxyanthranilate 3,4-dioxygenase



- Molecule 1: 3-hydroxyanthranilate 3,4-dioxygenase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	41.10 Å 66.19 Å 130.19 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.41 19.67 – 2.41	Depositor EDS
% Data completeness (in resolution range)	93.4 (20.00-2.41) 93.4 (19.67-2.41)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	8.70 (at 2.41 Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.217 , 0.268 0.231 , 0.291	Depositor DCC
R_{free} test set	975 reflections (7.85%)	DCC
Wilson B-factor (Å ²)	44.8	Xtriage
Anisotropy	0.246	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 41.7	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	0.93	EDS
Total number of atoms	2874	wwPDB-VP
Average B, all atoms (Å ²)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.59% of the height of the origin peak. No significant pseudotranslation is detected.*

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

5.1 Standard geometry

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

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	0.53	0/1461	0.64	0/1983
1	B	0.53	0/1420	0.66	2/1928 (0.1%)
All	All	0.53	0/2881	0.65	2/3911 (0.1%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	91	LEU	CA-CB-CG	5.24	127.35	115.30
1	B	130	ARG	NE-CZ-NH1	5.09	122.84	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-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 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	1425	0	1385	14	0
1	B	1385	0	1344	40	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	27	0	0	1	0
3	B	33	0	0	6	0
All	All	2874	0	2729	51	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 9.

All (51) 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:171:TYR:HA	3:B:212:HOH:O	1.55	1.05
1:B:127:SER:H	1:B:170:ASN:HD21	1.25	0.84
1:B:140:MET:HA	1:B:140:MET:CE	2.14	0.77
1:B:10:ASP:OD2	1:B:60:LYS:NZ	2.19	0.74
1:B:158:VAL:HG22	3:B:220:HOH:O	1.89	0.73
1:A:65:LEU:HB3	1:A:100:VAL:HB	1.72	0.72
1:B:140:MET:HA	1:B:140:MET:HE3	1.75	0.68
1:A:18:GLY:HA2	1:A:21:LYS:HD2	1.81	0.63
1:B:64:MET:HE1	3:B:235:HOH:O	2.00	0.62
1:B:127:SER:H	1:B:170:ASN:ND2	1.96	0.61
1:B:130:ARG:CG	1:B:130:ARG:HH11	2.14	0.60
1:B:43:ASN:C	1:B:43:ASN:HD22	2.06	0.57
1:A:28:CYS:SG	1:A:31:LYS:HG3	2.45	0.57
1:B:65:LEU:HB3	1:B:100:VAL:HB	1.88	0.56
1:B:130:ARG:HG2	1:B:130:ARG:HH11	1.71	0.55
1:A:119:ASN:HD21	1:A:140:MET:HG2	1.72	0.55
1:B:28:CYS:HB2	1:B:31:LYS:HE3	1.89	0.54
1:B:20:LEU:HB3	3:B:210:HOH:O	2.07	0.53
1:A:55:GLU:HG2	1:A:111:GLU:HG2	1.93	0.51
1:B:146:GLN:HA	1:B:149:GLU:HG2	1.91	0.51
1:B:140:MET:HA	1:B:140:MET:HE2	1.91	0.49
1:A:119:ASN:ND2	1:A:140:MET:HG2	2.27	0.49
1:B:163:CYS:O	1:B:167:LYS:HA	2.12	0.49
1:B:28:CYS:CB	1:B:31:LYS:HE3	2.43	0.49
1:B:20:LEU:CB	3:B:210:HOH:O	2.60	0.49
1:B:65:LEU:HD11	1:B:80:ASP:HB3	1.96	0.48
1:B:12:TRP:CZ2	1:B:27:TYR:CD1	3.02	0.48
1:B:55:GLU:HG2	1:B:111:GLU:HG2	1.96	0.48
1:B:43:ASN:C	1:B:43:ASN:ND2	2.68	0.47
1:A:44:GLU:N	3:A:228:HOH:O	2.43	0.47
1:A:54:PRO:HG2	1:B:33:GLY:HA3	1.96	0.47
1:B:130:ARG:CG	1:B:130:ARG:NH1	2.78	0.46
1:A:57:PHE:HB3	1:A:64:MET:HE3	1.96	0.46
1:B:115:PRO:HG2	1:B:118:GLU:HG3	1.98	0.46
1:B:84:ASN:O	1:B:87:ASP:HB2	2.16	0.46
1:B:70:ASP:HB3	1:B:77:LYS:HB2	1.98	0.45
1:B:140:MET:O	1:B:140:MET:HG3	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:49:HIS:O	1:B:96:PRO:HA	2.17	0.44
1:B:147:VAL:O	1:B:147:VAL:HG12	2.18	0.43
1:B:64:MET:HE1	1:B:101:ARG:HH22	1.84	0.43
1:A:16:ASN:HB3	1:A:19:LEU:HD12	2.00	0.43
1:B:53:THR:HB	1:B:54:PRO:CD	2.49	0.43
1:B:75:GLU:HB3	1:B:76:PRO:HD2	2.01	0.42
1:B:57:PHE:CD1	1:B:64:MET:HE3	2.56	0.41
1:B:52:PRO:CG	1:B:118:GLU:HB3	2.51	0.41
1:A:98:SER:HA	1:A:99:PRO:HD3	1.85	0.41
1:B:21:LYS:HA	3:B:213:HOH:O	2.19	0.41
1:B:52:PRO:HG3	1:B:118:GLU:HB3	2.02	0.41
1:A:112:GLN:OE1	1:B:34:PHE:HE1	2.04	0.40
1:A:70:ASP:HB3	1:A:77:LYS:HB2	2.02	0.40
1:A:33:GLY:HA3	1:B:54:PRO:HG2	2.03	0.40

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	175/176 (99%)	169 (97%)	4 (2%)	2 (1%)	17	23
1	B	170/176 (97%)	160 (94%)	9 (5%)	1 (1%)	28	40
All	All	345/352 (98%)	329 (95%)	13 (4%)	3 (1%)	20	28

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	104	ASP
1	A	115	PRO
1	B	115	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	160/159 (101%)	152 (95%)	8 (5%)	28	44
1	B	156/159 (98%)	148 (95%)	8 (5%)	28	43
All	All	316/318 (99%)	300 (95%)	16 (5%)	28	43

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	65	LEU
1	A	75	GLU
1	A	90	LEU
1	A	91	LEU
1	A	104	ASP
1	A	130	ARG
1	A	140	MET
1	A	158	VAL
1	B	1	MET
1	B	21	LYS
1	B	43	ASN
1	B	45	ARG
1	B	90	LEU
1	B	140	MET
1	B	141	LEU
1	B	158	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	119	ASN
1	B	16	ASN
1	B	43	ASN
1	B	134	HIS
1	B	170	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](#)

Of 4 ligands modelled in this entry, 4 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.

No monomer is involved in short contacts.

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 ⓘ

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, 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	176/176 (100%)	0.51	19 (10%) 6 5	34, 45, 68, 78	0
1	B	172/176 (97%)	0.57	22 (12%) 4 3	33, 43, 69, 120	0
All	All	348/352 (98%)	0.54	41 (11%) 5 4	33, 44, 69, 120	0

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	144	GLY	7.1
1	B	152	LEU	6.8
1	B	140	MET	6.6
1	A	141	LEU	6.2
1	A	118	GLU	5.8
1	B	143	LEU	5.6
1	A	117	GLY	5.0
1	B	117	GLY	4.7
1	B	44	GLU	4.6
1	B	116	GLY	4.5
1	B	23	PRO	4.4
1	B	139	GLN	4.2
1	A	143	LEU	4.1
1	A	174	PRO	3.8
1	A	142	ASP	3.8
1	A	139	GLN	3.7
1	A	164	PHE	3.6
1	B	171	TYR	3.5
1	A	145	THR	3.4
1	A	148	LYS	3.4
1	A	116	GLY	3.3
1	A	140	MET	3.2
1	B	115	PRO	3.0
1	A	115	PRO	2.9

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Mol	Chain	Res	Type	RSRZ
1	B	104	ASP	2.9
1	B	156	ASN	2.8
1	B	145	THR	2.8
1	A	74	ALA	2.7
1	A	43	ASN	2.6
1	A	175	GLN	2.6
1	B	142	ASP	2.6
1	B	108	ILE	2.6
1	A	165	HIS	2.6
1	B	141	LEU	2.5
1	A	0	ALA	2.4
1	A	1	MET	2.3
1	B	1	MET	2.3
1	B	107	GLY	2.2
1	B	0	ALA	2.2
1	B	149	GLU	2.1
1	B	118	GLU	2.1

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 carbohydrates in this entry.

6.4 Ligands [i](#)

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, 95th 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	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	NI	B	204	1/1	1.00	0.11	-0.89	39,39,39,39	0
2	NI	A	203	1/1	1.00	0.07	-1.51	42,42,42,42	0
2	NI	B	202	1/1	0.99	0.16	-	42,42,42,42	0
2	NI	A	201	1/1	0.97	0.18	-	36,36,36,36	0

6.5 Other polymers

There are no such residues in this entry.