



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 14, 2023 – 03:14 pm GMT

PDB ID : 8AER
Title : Malonyl-CoA reductase from *Chloroflexus aurantiacus* - C-terminal Y731A variant
Authors : Kabasakal, B.V.; Murray, J.W.
Deposited on : 2022-07-13
Resolution : 1.77 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

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ 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 ⓘ](#)) 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

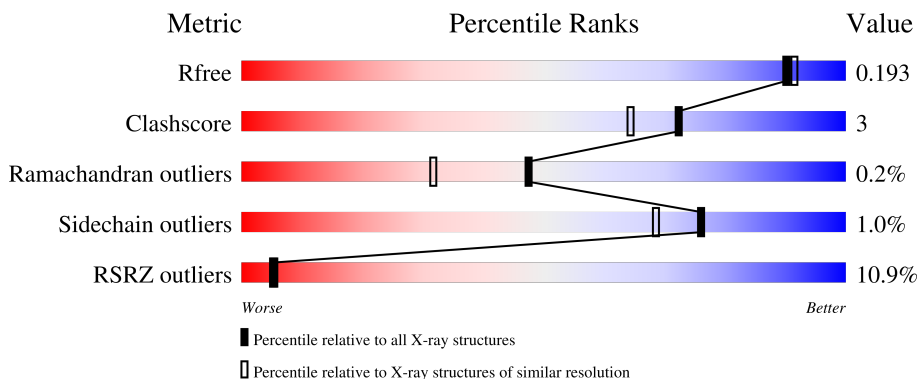
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.77 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}	130704	9185 (1.80-1.76)
Clashscore	141614	10184 (1.80-1.76)
Ramachandran outliers	138981	10051 (1.80-1.76)
Sidechain outliers	138945	10050 (1.80-1.76)
RSRZ outliers	127900	9032 (1.80-1.76)

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 $\leq 5\%$. 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	670	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 5240 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 Short-chain dehydrogenase/reductase SDR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	626	4806	3023	868	896	19	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	731	ALA	TYR	variant	UNP A9WIU3

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Mg	0	0
			2	2		

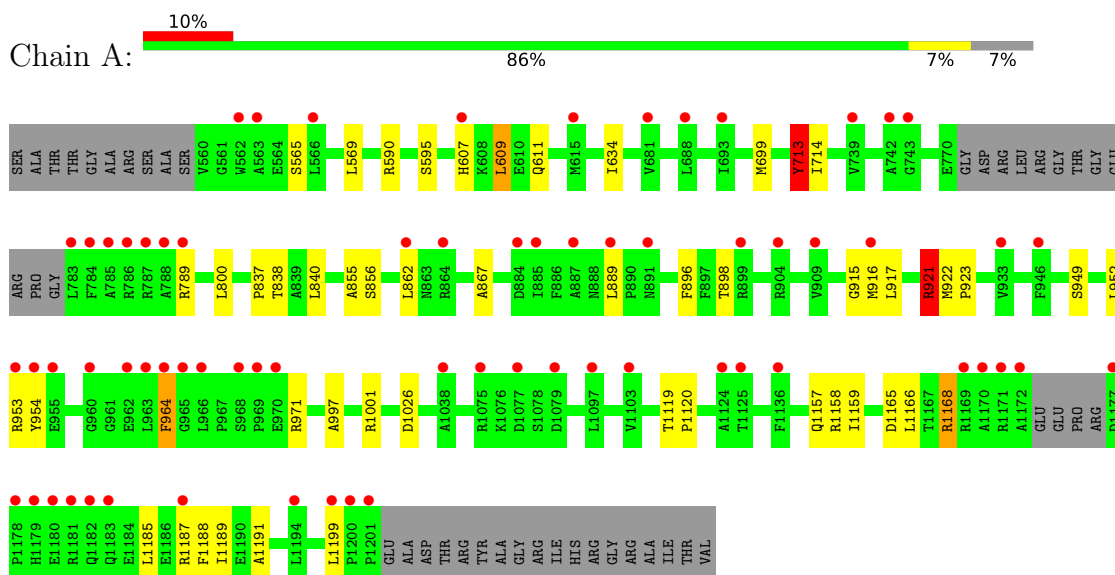
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	432	Total	O	0	0
			432	432		

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: Short-chain dehydrogenase/reductase SDR



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	101.71Å 124.51Å 74.68Å 90.00° 105.09° 90.00°	Depositor
Resolution (Å)	48.00 – 1.77 48.00 – 1.77	Depositor EDS
% Data completeness (in resolution range)	96.2 (48.00-1.77) 96.2 (48.00-1.77)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.53 (at 1.77Å)	Xtrriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.174 , 0.196 0.172 , 0.193	Depositor DCC
R_{free} test set	4118 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å ²)	34.2	Xtrriage
Anisotropy	0.135	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 44.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	5240	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.15% 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 [i](#)

5.1 Standard geometry [i](#)

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

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	0.38	0/4894	0.67	4/6642 (0.1%)

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	3

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	921	ARG	CB-CG-CD	-8.62	89.20	111.60
1	A	713	TYR	CB-CG-CD2	-6.99	116.81	121.00
1	A	609	LEU	CA-CB-CG	6.05	129.22	115.30
1	A	921	ARG	CA-CB-CG	6.02	126.65	113.40

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1168	ARG	Sidechain
1	A	713	TYR	Sidechain
1	A	921	ARG	Sidechain

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	4806	0	4828	33	0
2	A	2	0	0	0	0
3	A	432	0	0	2	0
All	All	5240	0	4828	33	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 3.

All (33) 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:964:PHE:HE2	1:A:1191:ALA:HB2	1.51	0.74
1:A:915:GLY:O	1:A:953:ARG:NH1	2.26	0.69
1:A:921:ARG:NH1	3:A:1401:HOH:O	2.04	0.63
1:A:862:LEU:HD13	1:A:867:ALA:HB2	1.82	0.61
1:A:569:LEU:HB3	1:A:595:SER:HB2	1.90	0.54
1:A:800:LEU:HD13	1:A:862:LEU:HD23	1.91	0.52
1:A:997:ALA:HA	1:A:1001:ARG:HD3	1.91	0.52
1:A:607:HIS:CD2	1:A:611:GLN:NE2	2.78	0.51
1:A:1168:ARG:HH22	1:A:1187:ARG:HE	1.58	0.51
1:A:1119:THR:HB	1:A:1120:PRO:HD2	1.93	0.49
1:A:837:PRO:HD2	1:A:840:LEU:HD12	1.95	0.48
1:A:964:PHE:CE2	1:A:1191:ALA:HB2	2.41	0.48
1:A:609:LEU:HG	1:A:634:ILE:HB	1.98	0.46
1:A:862:LEU:HD12	1:A:889:LEU:HD21	1.97	0.46
1:A:923:PRO:HG3	1:A:949:SER:CB	2.45	0.46
1:A:1157:GLN:HB3	1:A:1159:ILE:HD11	1.97	0.45
1:A:971:ARG:HG2	1:A:1199:LEU:HA	1.98	0.45
1:A:1185:LEU:O	1:A:1189:ILE:HG12	2.17	0.45
1:A:964:PHE:HE2	1:A:1191:ALA:CB	2.27	0.43
1:A:607:HIS:CD2	1:A:611:GLN:HE21	2.37	0.43
1:A:1026:ASP:N	1:A:1026:ASP:OD1	2.53	0.42
1:A:952:LEU:HB3	1:A:954:TYR:HD2	1.85	0.42
1:A:1168:ARG:NH2	1:A:1187:ARG:HE	2.17	0.42
1:A:856:SER:OG	1:A:896:PHE:HA	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:917:LEU:HD11	1:A:922:MET:HG2	2.01	0.42
1:A:838:THR:HG23	3:A:1637:HOH:O	2.19	0.42
1:A:921:ARG:HE	1:A:921:ARG:HB2	1.22	0.42
1:A:855:ALA:HB2	1:A:898:THR:HG23	2.02	0.42
1:A:699:MET:HG3	1:A:714:ILE:HD13	2.02	0.41
1:A:916:MET:HG3	1:A:954:TYR:CZ	2.56	0.41
1:A:1119:THR:OG1	1:A:1165:ASP:HA	2.21	0.40
1:A:952:LEU:HB3	1:A:954:TYR:CD2	2.57	0.40
1:A:1166:LEU:HD21	1:A:1188:PHE:CD1	2.57	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	620/670 (92%)	607 (98%)	12 (2%)	1 (0%)	47 32

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	565	SER

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	498/532 (94%)	493 (99%)	5 (1%)	76 68

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

Mol	Chain	Res	Type
1	A	590	ARG
1	A	713	TYR
1	A	789	ARG
1	A	964	PHE
1	A	1158	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	611	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](#)

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.

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	626/670 (93%)	0.53	68 (10%) 5 5	25, 40, 72, 129	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1178	PRO	11.2
1	A	1201	PRO	10.4
1	A	963	LEU	9.2
1	A	1200	PRO	9.1
1	A	784	PHE	8.5
1	A	964	PHE	8.5
1	A	783	LEU	7.7
1	A	1177	ASP	7.2
1	A	1179	HIS	6.9
1	A	785	ALA	6.0
1	A	1172	ALA	5.4
1	A	1171	ARG	5.0
1	A	962	GLU	4.3
1	A	969	PRO	4.2
1	A	1180	GLU	4.1
1	A	970	GLU	4.1
1	A	1199	LEU	4.0
1	A	1170	ALA	4.0
1	A	1077	ASP	3.8
1	A	889	LEU	3.6
1	A	954	TYR	3.5
1	A	1187	ARG	3.4
1	A	966	LEU	3.3
1	A	786	ARG	3.2
1	A	885	ILE	3.1
1	A	1183	GLN	3.1
1	A	864	ARG	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	1169	ARG	3.1
1	A	789	ARG	3.0
1	A	1125	THR	3.0
1	A	1124	ALA	2.9
1	A	787	ARG	2.9
1	A	899	ARG	2.9
1	A	1097	LEU	2.8
1	A	909	VAL	2.8
1	A	607	HIS	2.7
1	A	1181	ARG	2.7
1	A	891	ASN	2.5
1	A	1075	ARG	2.4
1	A	933	VAL	2.4
1	A	1136	PHE	2.4
1	A	953	ARG	2.4
1	A	965	GLY	2.4
1	A	688	LEU	2.3
1	A	946	PHE	2.3
1	A	960	GLY	2.3
1	A	884	ASP	2.3
1	A	563	ALA	2.3
1	A	681	VAL	2.3
1	A	904	ARG	2.3
1	A	739	VAL	2.3
1	A	887	ALA	2.3
1	A	955	GLU	2.3
1	A	1038	ALA	2.2
1	A	566	LEU	2.2
1	A	615	MET	2.2
1	A	1182	GLN	2.2
1	A	743	GLY	2.2
1	A	968	SER	2.1
1	A	693	ILE	2.1
1	A	862	LEU	2.1
1	A	1194	LEU	2.1
1	A	742	ALA	2.1
1	A	1103	VAL	2.0
1	A	562	TRP	2.0
1	A	1079	ASP	2.0
1	A	916	MET	2.0
1	A	788	ALA	2.0

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](#)

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. 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	B-factors(\AA^2)	Q<0.9
2	MG	A	1302	1/1	0.75	0.06	60,60,60,60	0
2	MG	A	1301	1/1	0.85	0.14	55,55,55,55	0

6.5 Other polymers [i](#)

There are no such residues in this entry.