



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 12:51 AM UTC

PDB ID : 6WNS / pdb_00006wns
Title : The structure of a CoA-dependent acyl-homoserine lactone synthase, MesI
Authors : Dong, S.-H.; Nair, S.K.
Deposited on : 2020-04-23
Resolution : 1.93 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	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

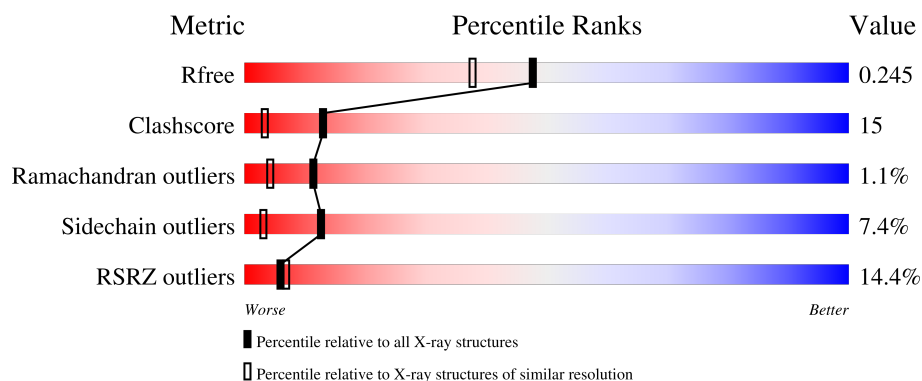
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.93 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}	180053	1452 (1.94-1.94)
Clashscore	190562	1494 (1.94-1.94)
Ramachandran outliers	187476	1479 (1.94-1.94)
Sidechain outliers	187428	1479 (1.94-1.94)
RSRZ outliers	180081	1453 (1.94-1.94)

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	204	14% 57% 29% 8% .

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1668 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 Acyl-homoserine-lactone synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	195	Total	C	N	O	S	0	0	0
			1558	1009	275	270	4			

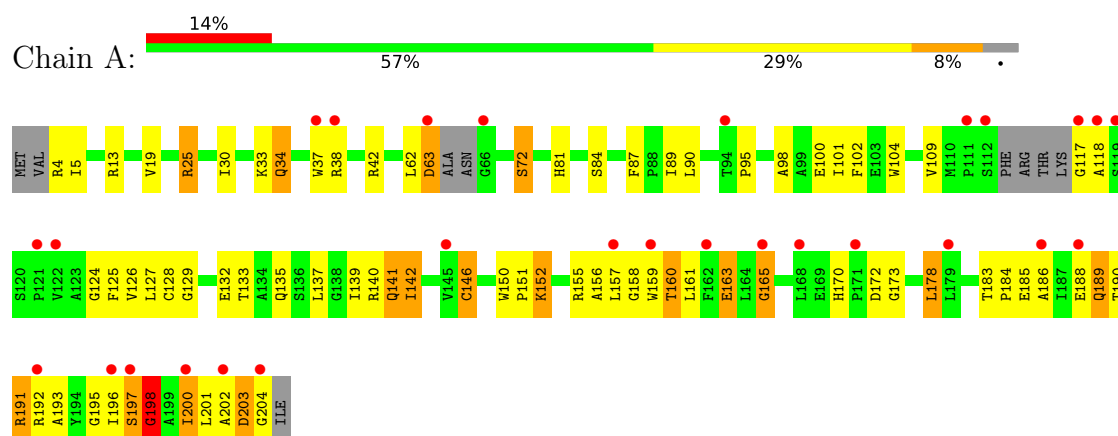
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	110	Total	O	0	0
			110	110		

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: Acyl-homoserine-lactone synthase



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	65.67Å 65.67Å 113.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	56.80 – 1.93 56.80 – 1.93	Depositor EDS
% Data completeness (in resolution range)	99.7 (56.80-1.93) 99.8 (56.80-1.93)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.24 (at 1.92Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.215 , 0.235 0.222 , 0.245	Depositor DCC
R_{free} test set	987 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	49.7	Xtriage
Anisotropy	0.044	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 55.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	1668	wwPDB-VP
Average B, all atoms (Å ²)	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.99% 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

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	1.52	23/1595 (1.4%)	1.48	13/2165 (0.6%)

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 (23) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	142	ILE	C-O	10.72	1.35	1.24
1	A	186	ALA	C-O	9.71	1.35	1.24
1	A	198	GLY	C-O	7.87	1.34	1.23
1	A	190	THR	C-O	7.36	1.32	1.24
1	A	159	TRP	C-O	7.31	1.32	1.24
1	A	193	ALA	C-O	7.27	1.32	1.24
1	A	109	VAL	C-O	7.12	1.31	1.24
1	A	63	ASP	C-O	7.04	1.37	1.23
1	A	191	ARG	C-O	6.63	1.32	1.24
1	A	188	GLU	C-O	6.62	1.31	1.24
1	A	165	GLY	CA-C	6.58	1.59	1.51
1	A	160	THR	C-O	6.50	1.31	1.24
1	A	142	ILE	C-N	6.46	1.42	1.33
1	A	124	GLY	C-O	6.43	1.32	1.23
1	A	140	ARG	C-O	6.12	1.31	1.24
1	A	192	ARG	C-O	6.05	1.31	1.24
1	A	188	GLU	CD-OE2	5.68	1.36	1.25
1	A	163	GLU	CD-OE2	5.67	1.36	1.25
1	A	133	THR	C-O	5.55	1.30	1.24
1	A	137	LEU	C-O	5.37	1.31	1.23

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	188	GLU	CD-OE1	5.35	1.35	1.25
1	A	141	GLN	C-O	5.27	1.30	1.23
1	A	146	CYS	C-O	5.12	1.30	1.23

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	160	THR	CB-CA-C	7.36	122.11	110.19
1	A	62	LEU	CA-C-O	-7.10	112.58	121.46
1	A	202	ALA	CA-C-N	5.69	130.21	120.71
1	A	202	ALA	C-N-CA	5.69	130.21	120.71
1	A	183	THR	CB-CA-C	5.61	117.29	108.88
1	A	200	ILE	N-CA-C	-5.59	106.75	111.56
1	A	184	PRO	O-C-N	5.46	128.78	122.17
1	A	142	ILE	O-C-N	5.37	128.76	123.18
1	A	203	ASP	CA-CB-CG	5.24	117.84	112.60
1	A	42	ARG	CA-C-N	5.21	124.88	119.56
1	A	42	ARG	C-N-CA	5.21	124.88	119.56
1	A	95	PRO	N-CA-CB	5.14	106.07	103.19
1	A	19	VAL	N-CA-C	-5.08	105.54	110.42

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	165	GLY	Mainchain

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	1558	0	1579	47	0
2	A	110	0	0	19	0
All	All	1668	0	1579	47	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 15.

All (47) 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:101:ILE:HG23	2:A:304:HOH:O	1.52	1.08
1:A:125:PHE:O	2:A:301:HOH:O	1.94	0.86
1:A:37:TRP:CZ3	1:A:38:ARG:HD3	2.15	0.82
1:A:125:PHE:C	2:A:301:HOH:O	2.23	0.81
1:A:128:CYS:N	2:A:301:HOH:O	2.17	0.76
1:A:141:GLN:C	2:A:304:HOH:O	2.27	0.76
1:A:4:ARG:N	2:A:305:HOH:O	2.19	0.75
1:A:126:VAL:C	2:A:301:HOH:O	2.33	0.71
1:A:152:LYS:N	1:A:152:LYS:HD3	2.08	0.66
1:A:89:ILE:HG22	2:A:360:HOH:O	1.96	0.66
1:A:34:GLN:NE2	2:A:308:HOH:O	2.29	0.63
1:A:155:ARG:C	2:A:302:HOH:O	2.43	0.62
1:A:117:GLY:O	2:A:303:HOH:O	2.16	0.60
1:A:203:ASP:O	1:A:204:GLY:C	2.44	0.60
1:A:197:SER:O	1:A:198:GLY:O	2.19	0.59
1:A:141:GLN:O	2:A:304:HOH:O	2.17	0.57
1:A:132:GLU:HB3	1:A:201:LEU:HD11	1.87	0.57
1:A:37:TRP:CZ3	1:A:38:ARG:CD	2.89	0.56
1:A:63:ASP:OD1	1:A:63:ASP:C	2.49	0.56
1:A:87:PHE:HB3	1:A:90:LEU:HD12	1.87	0.56
1:A:146:CYS:SG	1:A:178:LEU:HD22	2.47	0.55
1:A:156:ALA:C	2:A:302:HOH:O	2.51	0.54
1:A:30:ILE:O	1:A:34:GLN:HG2	2.10	0.52
1:A:25:ARG:HH11	1:A:25:ARG:CG	2.23	0.51
1:A:155:ARG:NH2	1:A:163:GLU:OE1	2.43	0.51
1:A:158:GLY:N	2:A:302:HOH:O	1.99	0.51
1:A:157:LEU:O	1:A:189:GLN:HB3	2.11	0.50
1:A:191:ARG:NE	2:A:307:HOH:O	2.23	0.48
1:A:81:HIS:CE1	1:A:84:SER:HB3	2.49	0.48
1:A:157:LEU:N	2:A:302:HOH:O	2.47	0.48
1:A:170:HIS:HB3	1:A:173:GLY:O	2.14	0.47
1:A:150:TRP:N	1:A:151:PRO:CD	2.78	0.47
1:A:191:ARG:O	1:A:195:GLY:N	2.48	0.47
1:A:34:GLN:HE21	1:A:34:GLN:HB3	1.45	0.47
1:A:127:LEU:N	2:A:301:HOH:O	2.48	0.46
1:A:102:PHE:CG	1:A:139:ILE:HD13	2.51	0.46
1:A:151:PRO:HG3	1:A:178:LEU:HD21	1.98	0.45
1:A:170:HIS:CD2	1:A:172:ASP:H	2.35	0.45
1:A:13:ARG:NE	2:A:312:HOH:O	2.40	0.45
1:A:5:ILE:HG13	1:A:129:GLY:HA3	2.01	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:196:ILE:C	1:A:196:ILE:HD12	2.44	0.42
1:A:98:ALA:HB3	1:A:101:ILE:HG13	2.03	0.41
1:A:161:LEU:C	1:A:161:LEU:HD12	2.46	0.41
1:A:142:ILE:N	2:A:304:HOH:O	2.50	0.41
1:A:72:SER:HB3	1:A:104:TRP:HE1	1.86	0.40
1:A:191:ARG:NH2	1:A:200:ILE:HG13	2.36	0.40
1:A:161:LEU:HD13	1:A:178:LEU:HG	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	189/204 (93%)	178 (94%)	9 (5%)	2 (1%)	11 4

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	198	GLY
1	A	118	ALA

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	162/170 (95%)	150 (93%)	12 (7%)	13 3

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ARG
1	A	33	LYS
1	A	34	GLN
1	A	72	SER
1	A	100	GLU
1	A	135	GLN
1	A	152	LYS
1	A	160	THR
1	A	178	LEU
1	A	185	GLU
1	A	189	GLN
1	A	197	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	135	GLN
1	A	170	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

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 ⓘ

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	195/204 (95%)	0.86	28 (14%) 6 7	35, 69, 118, 176	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	196	ILE	4.7
1	A	37	TRP	4.6
1	A	112	SER	3.8
1	A	118	ALA	3.4
1	A	157	LEU	3.3
1	A	38	ARG	3.3
1	A	117	GLY	3.2
1	A	66	GLY	3.2
1	A	197	SER	3.0
1	A	119	SER	2.8
1	A	121	PRO	2.8
1	A	159	TRP	2.6
1	A	179	LEU	2.6
1	A	192	ARG	2.5
1	A	111	PRO	2.5
1	A	162	PHE	2.5
1	A	200	ILE	2.5
1	A	186	ALA	2.5
1	A	63	ASP	2.4
1	A	204	GLY	2.3
1	A	168	LEU	2.3
1	A	171	PRO	2.3
1	A	94	THR	2.3
1	A	188	GLU	2.1
1	A	145	VAL	2.1
1	A	202	ALA	2.1
1	A	165	GLY	2.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	122	VAL	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 oligosaccharides 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.