



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 18, 2023 – 09:10 am GMT

PDB ID : 4B17
Title : Crystal structure of C2498 2'-O-ribose methyltransferase RlmM from Escherichia coli in complex with S-adenosylmethionine
Authors : Punekar, A.S.; Shepherd, T.R.; Liljeruhm, J.; Forster, A.C.; Selmer, M.
Deposited on : 2012-07-07
Resolution : 2.60 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
Xtrriage (Phenix) : 1.13
EDS : **FAILED**
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

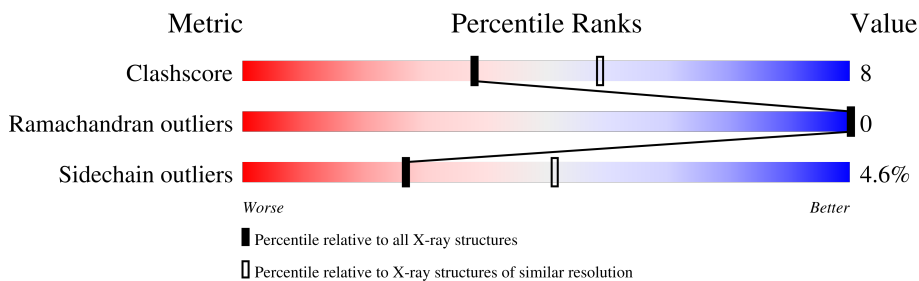
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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))
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)

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 $\leq 5\%$

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	375	79% 15% • 5%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	EDO	A	1361	-	-	X	-
4	EDO	A	1363	-	-	X	-
4	EDO	A	1366	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 3078 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 RIBOSOMAL RNA LARGE SUBUNIT METHYLTRANSFERASE M.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	357	2888	1850	502	514	22	0	1	0

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	367	SER	-	expression tag	UNP P0ADR6
A	368	LYS	-	expression tag	UNP P0ADR6
A	369	GLY	-	expression tag	UNP P0ADR6
A	370	HIS	-	expression tag	UNP P0ADR6
A	371	HIS	-	expression tag	UNP P0ADR6
A	372	HIS	-	expression tag	UNP P0ADR6
A	373	HIS	-	expression tag	UNP P0ADR6
A	374	HIS	-	expression tag	UNP P0ADR6
A	375	HIS	-	expression tag	UNP P0ADR6

- Molecule 2 is S-ADENOSYLMETHIONINE (three-letter code: SAM) (formula: C₁₅H₂₂N₆O₅S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
2	A	1	27	15	6	5	1	0	0

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	6	3	3	0	0
3	A	1	6	3	3	0	0

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total O S 5 4 1	0	0
5	A	1	Total O S 5 4 1	0	0
5	A	1	Total O S 5 4 1	0	0
5	A	1	Total O S 5 4 1	0	0

- Molecule 6 is water.


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	87	Total O 87 87	0	0

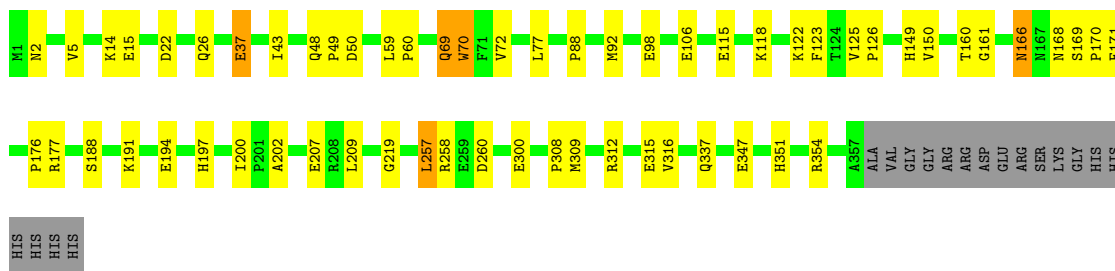
3 Residue-property plots

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. 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. 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.

Note EDS failed to run properly.

- Molecule 1: RIBOSOMAL RNA LARGE SUBUNIT METHYLTRANSFERASE M

Chain A:  79% 15% 5%



4 Data and refinement statistics i

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	92.26Å 92.26Å 83.56Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	28.87 – 2.60	Depositor
% Data completeness (in resolution range)	99.8 (28.87-2.60)	Depositor
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.42 (at 2.61Å)	Xtrriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.161 , 0.196	Depositor
Wilson B-factor (Å ²)	31.0	Xtrriage
Anisotropy	0.176	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.043 for -h,-k,l	Xtrriage
Total number of atoms	3078	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.56% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CSS, GOL, EDO, SO4, SAM

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	0.40	0/2956	0.54	0/4006

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	A	2888	0	2849	45	1
2	A	27	0	22	4	0
3	A	12	0	16	0	0
4	A	44	0	66	12	0
5	A	20	0	0	0	0
6	A	87	0	0	1	1
All	All	3078	0	2953	45	1

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 8.

All (45) 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:115:GLU:HB2	4:A:1361:EDO:H21	1.29	1.07
1:A:309:MET:HB2	4:A:1363:EDO:H12	1.47	0.93
1:A:260:ASP:H	4:A:1364:EDO:H22	1.36	0.90
1:A:77:LEU:HD12	1:A:92[B]:MET:SD	2.20	0.81
1:A:309:MET:H	4:A:1363:EDO:H12	1.50	0.76
1:A:115:GLU:HB2	4:A:1361:EDO:C2	2.15	0.73
1:A:309:MET:N	4:A:1363:EDO:H12	2.08	0.68
1:A:69:GLN:HE21	1:A:70:TRP:H	1.44	0.66
1:A:260:ASP:HA	2:A:1358:SAM:H2	1.78	0.66
1:A:69:GLN:HE22	1:A:168:ASN:HB2	1.61	0.64
1:A:166:ASN:HD22	1:A:166:ASN:H	1.48	0.62
1:A:309:MET:H	4:A:1363:EDO:C1	2.14	0.60
1:A:69:GLN:HE22	1:A:169:SER:H	1.48	0.60
1:A:69:GLN:NE2	1:A:169:SER:H	2.01	0.58
1:A:77:LEU:HB2	1:A:92[B]:MET:CE	2.35	0.56
1:A:59:LEU:HD12	1:A:60:PRO:HD2	1.88	0.56
1:A:200:ILE:O	4:A:1366:EDO:O2	2.25	0.55
1:A:188:SER:OG	2:A:1358:SAM:OXT	2.26	0.54
1:A:337:GLN:HG3	6:A:2086:HOH:O	2.07	0.53
1:A:106:GLU:OE1	1:A:149:HIS:HD2	1.92	0.52
1:A:176:PRO:HG2	1:A:194:GLU:HG3	1.92	0.52
1:A:72:VAL:O	1:A:161:GLY:HA3	2.10	0.52
1:A:309:MET:CB	4:A:1363:EDO:H12	2.30	0.52
1:A:197:HIS:HA	4:A:1366:EDO:H12	1.93	0.50
1:A:191:LYS:NZ	1:A:347:GLU:OE2	2.42	0.49
1:A:15:GLU:OE2	1:A:312:ARG:HD2	2.13	0.48
1:A:309:MET:HB2	4:A:1363:EDO:C1	2.30	0.48
1:A:308:PRO:HD3	1:A:315:GLU:HG2	1.96	0.47
1:A:260:ASP:HA	2:A:1358:SAM:C2	2.44	0.47
1:A:48:GLN:HA	1:A:49:PRO:HD3	1.79	0.46
1:A:166:ASN:H	1:A:166:ASN:ND2	2.12	0.45
1:A:118:LYS:O	1:A:122:LYS:HG3	2.17	0.44
1:A:123:PHE:O	1:A:126:PRO:HD2	2.18	0.43
1:A:125:VAL:HB	1:A:126:PRO:HD3	2.00	0.43
1:A:257:LEU:HD12	1:A:257:LEU:HA	1.87	0.43
1:A:202:ALA:HB2	4:A:1366:EDO:H22	2.01	0.43
1:A:219:GLY:O	2:A:1358:SAM:HB1	2.19	0.42
1:A:258:ARG:HE	1:A:258:ARG:HB3	1.72	0.42
1:A:300:GLU:OE1	1:A:351:HIS:HE1	2.03	0.41
1:A:5:VAL:HG22	1:A:43:ILE:HG12	2.03	0.41
1:A:77:LEU:HD11	1:A:88:PRO:HB2	2.02	0.41
1:A:337:GLN:HE21	1:A:351:HIS:HD2	1.67	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:170:PRO:HG2	1:A:171:PHE:CE2	2.56	0.41
1:A:22:ASP:O	1:A:26:GLN:HG3	2.22	0.40
1:A:150:VAL:HG13	1:A:160:THR:HG22	2.02	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:37:GLU:OE2	6:A:2066:HOH:O[4_557]	2.19	0.01

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	355/375 (95%)	343 (97%)	12 (3%)	0	100 100

There are no Ramachandran outliers to report.

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	305/318 (96%)	291 (95%)	14 (5%)	27 51

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	ASN
1	A	14	LYS
1	A	37	GLU
1	A	50	ASP
1	A	69	GLN
1	A	70	TRP
1	A	98	GLU
1	A	166	ASN
1	A	177	ARG
1	A	207	GLU
1	A	209	LEU
1	A	257	LEU
1	A	316	VAL
1	A	354	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2	ASN
1	A	26	GLN
1	A	69	GLN
1	A	149	HIS
1	A	166	ASN
1	A	246	GLN
1	A	343	HIS
1	A	351	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

1 non-standard protein/DNA/RNA residue is modelled in this entry.

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.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

18 ligands are modelled in this entry.

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

EDS failed to run properly - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

6.4 Ligands

EDS failed to run properly - this section is therefore empty.

6.5 Other polymers

EDS failed to run properly - this section is therefore empty.