



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2018 – 04:22 pm GMT

PDB ID : 2AH6
Title : Crystal structure of a putative cobalamin adenosyltransferase (bh1595) from bacillus halodurans c-125 at 1.60 Å resolution
Authors : Joint Center for Structural Genomics (JCSG)
Deposited on : 2005-07-27
Resolution : 1.60 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.7.3 (157068), CSD as539be (2018)
Xtriage (Phenix) : 1.13
EDS : trunk30967
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac : 5.8.0158
CCP4 : 7.0 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk30967

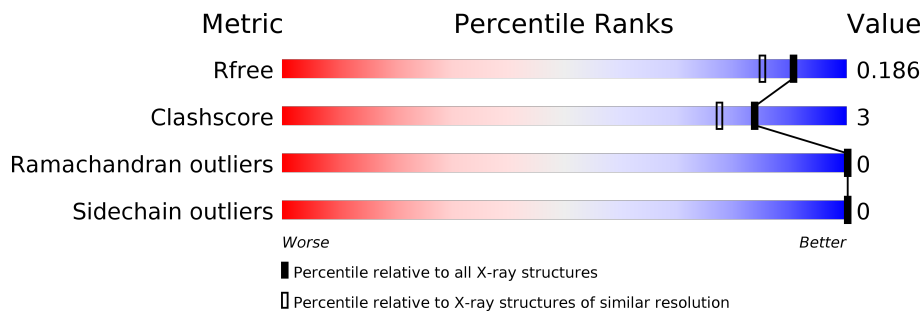
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.60 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))
R_{free}	111664	2957 (1.60-1.60)
Clashscore	122126	3202 (1.60-1.60)
Ramachandran outliers	120053	3117 (1.60-1.60)
Sidechain outliers	120020	3116 (1.60-1.60)

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 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	208	68% (green), 27% (grey), 5% (yellow), 0% (orange), 0% (red)
1	B	208	75% (green), 22% (grey), 3% (yellow), 0% (orange), 0% (red)
1	C	208	75% (green), 22% (grey), 3% (yellow), 0% (orange), 0% (red)

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4371 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 BH1595, unknown conserved protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	151	1212	769	211	229	2	1	0	4	0
1	B	162	1303	831	222	247	2	1	0	4	0
1	C	162	1283	818	218	244	2	1	0	6	0

There are 45 discrepancies between the modelled and reference sequences:

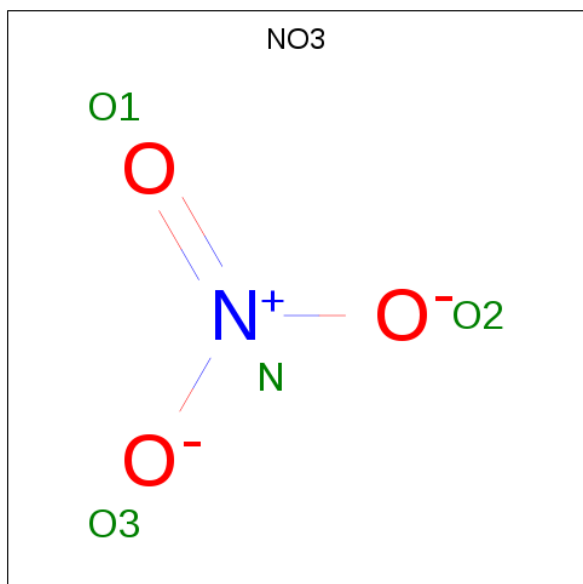
Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	MSE	-	MODIFIED RESIDUE	UNP Q9KCH6
A	-10	GLY	-	LEADER SEQUENCE	UNP Q9KCH6
A	-9	SER	-	LEADER SEQUENCE	UNP Q9KCH6
A	-8	ASP	-	LEADER SEQUENCE	UNP Q9KCH6
A	-7	LYS	-	LEADER SEQUENCE	UNP Q9KCH6
A	-6	ILE	-	LEADER SEQUENCE	UNP Q9KCH6
A	-5	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
A	-4	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
A	-3	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
A	-2	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
A	-1	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
A	0	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
A	1	MSE	MET	MODIFIED RESIDUE	UNP Q9KCH6
A	42	SER	LEU	SEE REMARK 999	UNP Q9KCH6
A	75	MSE	MET	MODIFIED RESIDUE	UNP Q9KCH6
B	-11	MSE	-	MODIFIED RESIDUE	UNP Q9KCH6
B	-10	GLY	-	LEADER SEQUENCE	UNP Q9KCH6
B	-9	SER	-	LEADER SEQUENCE	UNP Q9KCH6
B	-8	ASP	-	LEADER SEQUENCE	UNP Q9KCH6
B	-7	LYS	-	LEADER SEQUENCE	UNP Q9KCH6
B	-6	ILE	-	LEADER SEQUENCE	UNP Q9KCH6
B	-5	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
B	-4	HIS	-	LEADER SEQUENCE	UNP Q9KCH6

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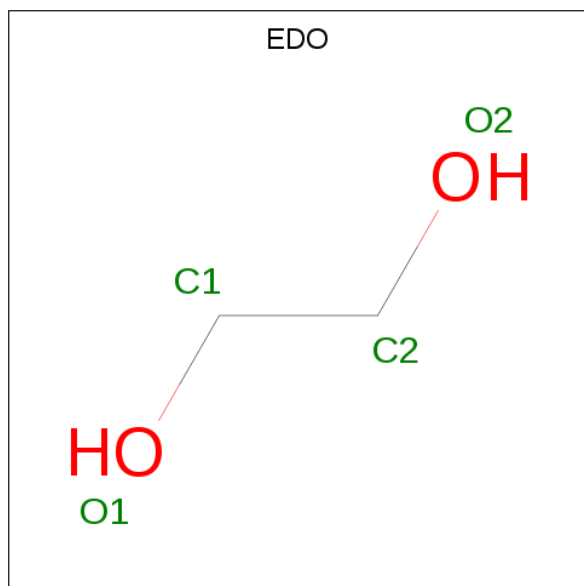
Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
B	-2	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
B	-1	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
B	0	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
B	1	MSE	MET	MODIFIED RESIDUE	UNP Q9KCH6
B	42	SER	LEU	SEE REMARK 999	UNP Q9KCH6
B	75	MSE	MET	MODIFIED RESIDUE	UNP Q9KCH6
C	-11	MSE	-	MODIFIED RESIDUE	UNP Q9KCH6
C	-10	GLY	-	LEADER SEQUENCE	UNP Q9KCH6
C	-9	SER	-	LEADER SEQUENCE	UNP Q9KCH6
C	-8	ASP	-	LEADER SEQUENCE	UNP Q9KCH6
C	-7	LYS	-	LEADER SEQUENCE	UNP Q9KCH6
C	-6	ILE	-	LEADER SEQUENCE	UNP Q9KCH6
C	-5	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
C	-4	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
C	-3	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
C	-2	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
C	-1	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
C	0	HIS	-	LEADER SEQUENCE	UNP Q9KCH6
C	1	MSE	MET	MODIFIED RESIDUE	UNP Q9KCH6
C	42	SER	LEU	SEE REMARK 999	UNP Q9KCH6
C	75	MSE	MET	MODIFIED RESIDUE	UNP Q9KCH6

- Molecule 2 is NITRATE ION (three-letter code: NO3) (formula: NO₃).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total N O 4 1 3	0	0
2	C	1	Total N O 4 1 3	0	0
2	C	1	Total N O 4 1 3	0	0

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	179	Total O 179 179	0	0
4	B	206	Total O 206 206	0	0
4	C	164	Total O 164 164	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	53.61Å 84.38Å 113.48Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.02 – 1.60 29.02 – 1.60	Depositor EDS
% Data completeness (in resolution range)	99.8 (29.02-1.60) 99.8 (29.02-1.60)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.75 (at 1.60Å)	Xtrriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.150 , 0.179 0.162 , 0.186	Depositor DCC
R_{free} test set	3503 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å ²)	24.4	Xtrriage
Anisotropy	0.092	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 44.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	4371	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.24% 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: EDO, NO3

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	0.77	0/1243	0.81	1/1680 (0.1%)
1	B	0.80	0/1337	0.83	0/1806
1	C	0.69	0/1319	0.76	1/1787 (0.1%)
All	All	0.75	0/3899	0.80	2/5273 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	97	ARG	NE-CZ-NH1	5.36	122.98	120.30
1	C	56	ARG	NE-CZ-NH1	5.06	122.83	120.30

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	1212	0	1179	11	0
1	B	1303	0	1290	5	0
1	C	1283	0	1241	4	0
2	B	4	0	0	0	0
2	C	8	0	0	0	0
3	B	12	0	18	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	179	0	0	5	0
4	B	206	0	0	2	0
4	C	164	0	0	0	0
All	All	4371	0	3728	20	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 (20) 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:92:ASP:OD2	3:B:200:EDO:H22	1.92	0.69
3:B:199:EDO:H22	4:B:302:HOH:O	1.95	0.65
1:C:108:LEU:HD11	1:C:112:ILE:HG12	1.85	0.58
1:A:162:PHE:CD2	1:A:166[B]:ARG:NH1	2.76	0.54
1:C:55:ILE:HD13	1:C:164[B]:VAL:HG13	1.90	0.54
1:B:156:ARG:HD3	4:B:369:HOH:O	2.09	0.53
1:A:142[A]:GLN:NE2	1:B:23:ASP:OD2	2.43	0.52
1:A:127[A]:ARG:HD2	1:A:162:PHE:HB2	1.90	0.52
1:B:92:ASP:OD2	3:B:200:EDO:C2	2.57	0.51
1:A:127[B]:ARG:HH21	1:A:127[B]:ARG:HG2	1.76	0.49
1:A:131:ARG:HD3	4:A:328:HOH:O	2.11	0.49
1:A:127[B]:ARG:NH1	4:A:271:HOH:O	2.46	0.48
1:A:91:VAL:HG13	1:A:156:ARG:HG3	1.95	0.48
1:A:127[A]:ARG:NH1	4:A:328:HOH:O	2.46	0.48
1:C:160:TYR:CZ	1:C:164[B]:VAL:HG21	2.49	0.47
1:A:166[B]:ARG:NH2	4:A:226:HOH:O	2.47	0.47
1:A:142[A]:GLN:NE2	4:A:314:HOH:O	2.50	0.45
1:B:125:VAL:O	1:B:129[A]:ILE:HG12	2.15	0.45
1:C:108:LEU:HD11	1:C:112:ILE:CG1	2.45	0.45
1:A:124:HIS:ND1	1:A:127[B]:ARG:NH1	2.68	0.42

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	151/208 (73%)	149 (99%)	2 (1%)	0	100	100
1	B	164/208 (79%)	164 (100%)	0	0	100	100
1	C	165/208 (79%)	162 (98%)	3 (2%)	0	100	100
All	All	480/624 (77%)	475 (99%)	5 (1%)	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	126/175 (72%)	126 (100%)	0	100	100
1	B	136/175 (78%)	136 (100%)	0	100	100
1	C	131/175 (75%)	131 (100%)	0	100	100
All	All	393/525 (75%)	393 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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](#)

6 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NO3	B	197	-	1,3,3	2.77	1 (100%)	0,3,3	0.00	-
3	EDO	B	198	-	3,3,3	0.78	0	2,2,2	0.15	0
3	EDO	B	199	-	3,3,3	0.23	0	2,2,2	0.64	0
3	EDO	B	200	-	3,3,3	0.70	0	2,2,2	0.27	0
2	NO3	C	197	-	1,3,3	3.52	1 (100%)	0,3,3	0.00	-
2	NO3	C	198	-	1,3,3	3.99	1 (100%)	0,3,3	0.00	-

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NO3	B	197	-	-	0/0/0/0	0/0/0/0
3	EDO	B	198	-	-	0/1/1/1	0/0/0/0
3	EDO	B	199	-	-	0/1/1/1	0/0/0/0
3	EDO	B	200	-	-	0/1/1/1	0/0/0/0
2	NO3	C	197	-	-	0/0/0/0	0/0/0/0
2	NO3	C	198	-	-	0/0/0/0	0/0/0/0

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	197	NO3	O1-N	2.77	1.37	1.24
2	C	197	NO3	O1-N	3.52	1.40	1.24
2	C	198	NO3	O1-N	3.99	1.43	1.24

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	199	EDO	1	0
3	B	200	EDO	2	0

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](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.