



wwPDB X-ray Structure Validation Summary Report

Mar 1, 2014 – 04:17 AM GMT

PDB ID : 2III
Title : Crystal structure of Acetamidase (10172637) from Bacillus Halodurans at 1.95 Å resolution
Authors : Joint Center for Structural Genomics (JCSG)
Deposited on : 2006-09-27
Resolution : 1.95 Å(reported)

This is a wwPDB validation summary 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/ValidationPDFNotes.html>

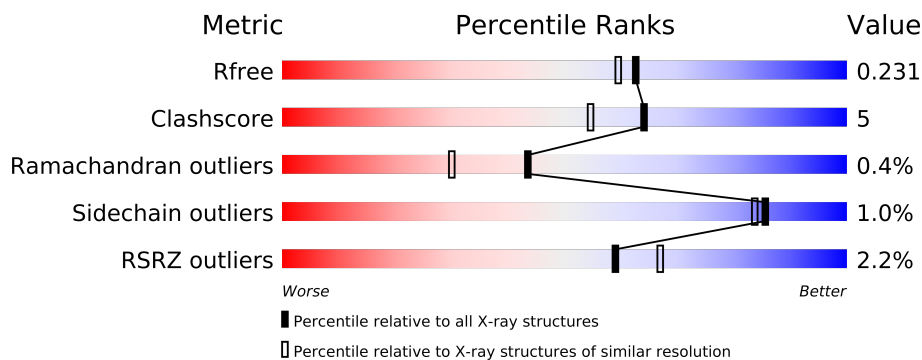
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 1.95 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}	66092	1321 (1.96-1.96)
Clashscore	79885	1488 (1.96-1.96)
Ramachandran outliers	78287	1475 (1.96-1.96)
Sidechain outliers	78261	1475 (1.96-1.96)
RSRZ outliers	66119	1321 (1.96-1.96)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	301	
1	B	301	
1	C	301	
1	D	301	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 9233 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Acetamidase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	297	Total	C	N	O	S	Se	0	2	0
			2198	1395	363	428	3	9			
1	B	296	Total	C	N	O	S	Se	0	3	1
			2192	1393	358	429	3	9			
1	C	296	Total	C	N	O	S	Se	0	1	0
			2196	1392	360	432	3	9			
1	D	297	Total	C	N	O	S	Se	0	0	0
			2189	1388	357	431	3	10			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	LEADER SEQUENCE	UNP Q9KGN3
A	1	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	13	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	73	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	89	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	130	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	186	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	213	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	226	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	245	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
A	262	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	0	GLY	-	LEADER SEQUENCE	UNP Q9KGN3
B	1	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	13	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	73	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	89	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	130	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	186	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	213	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	226	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
B	245	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3

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Chain	Residue	Modelled	Actual	Comment	Reference
B	262	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	0	GLY	-	LEADER SEQUENCE	UNP Q9KGN3
C	1	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	13	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	73	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	89	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	130	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	186	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	213	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	226	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	245	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
C	262	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	0	GLY	-	LEADER SEQUENCE	UNP Q9KGN3
D	1	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	13	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	73	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	89	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	130	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	186	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	213	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	226	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	245	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3
D	262	MSE	MET	MODIFIED RESIDUE	UNP Q9KGN3

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	5	Total Ca 5 5	0	0
2	A	2	Total Ca 2 2	0	0
2	D	3	Total Ca 3 3	0	0
2	C	5	Total Ca 5 5	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	115	Total O 115 115	0	0

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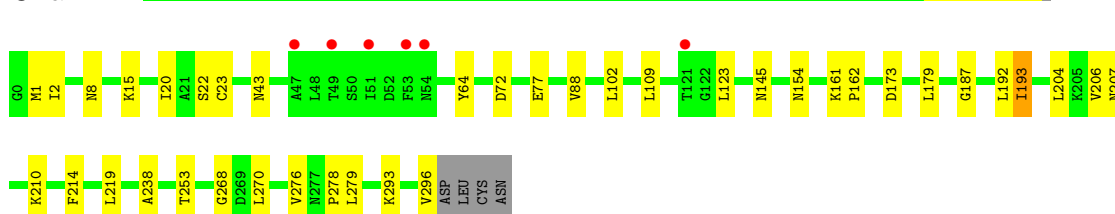
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	104	Total 104	O 104	0	0
3	C	106	Total 106	O 106	0	0
3	D	118	Total 118	O 118	0	0

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

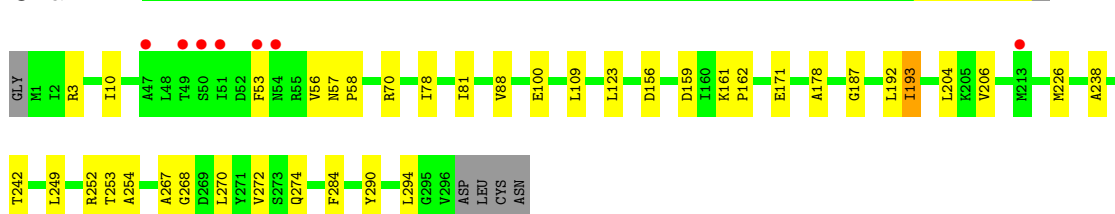
- Molecule 1: Acetamidase

Chain A:



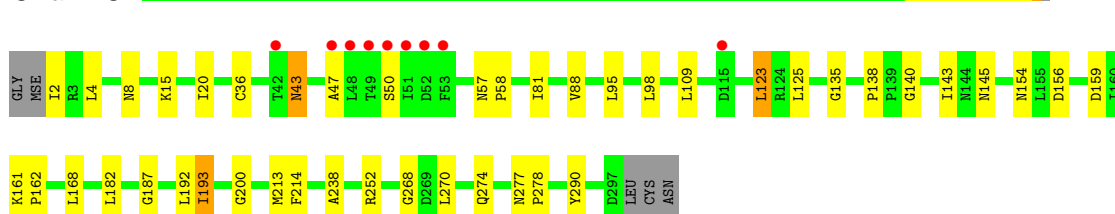
- Molecule 1: Acetamidase

Chain B:



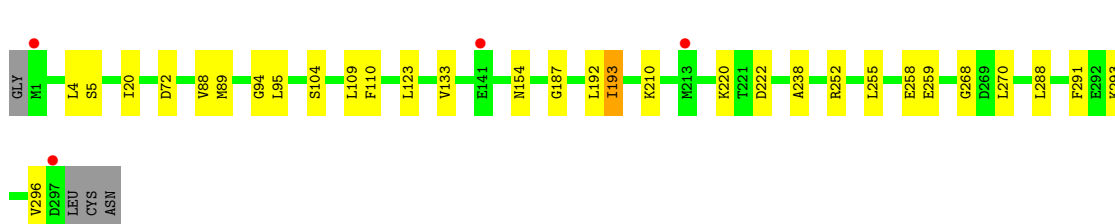
- Molecule 1: Acetamidase

Chain C:



- Molecule 1: Acetamidase

Chain D:



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	43.76Å 69.61Å 94.98Å 73.95° 88.91° 86.63°	Depositor
Resolution (Å)	28.89 – 1.95 28.89 – 1.95	Depositor EDS
% Data completeness (in resolution range)	90.2 (28.89-1.95) 90.2 (28.89-1.95)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.36 (at 1.95Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.175 , 0.228 0.179 , 0.231	Depositor DCC
R_{free} test set	3594 reflections (5.34%)	DCC
Wilson B-factor (Å ²)	18.7	Xtriage
Anisotropy	0.313	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 36.1	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 70888 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9233	wwPDB-VP
Average B, all atoms (Å ²)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.88% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality

5.1 Standard geometry

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

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	0.65	0/2231	0.73	1/3019 (0.0%)
1	B	0.64	0/2229	0.71	1/3018 (0.0%)
1	C	0.62	0/2227	0.69	0/3016
1	D	0.66	0/2217	0.72	0/3002
All	All	0.64	0/8904	0.71	2/12055 (0.0%)

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	1	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	173	ASP	CB-CG-OD1	5.72	123.44	118.30
1	B	249	LEU	CA-CB-CG	5.27	127.42	115.30

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	1	MSE	CA

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2198	0	2224	30	0
1	B	2192	0	2214	27	0
1	C	2196	0	2205	31	0
1	D	2189	0	2198	21	0
2	A	2	0	0	0	0
2	B	5	0	0	0	0
2	C	5	0	0	0	0
2	D	3	0	0	0	0
3	A	115	0	0	0	0
3	B	104	0	0	1	0
3	C	106	0	0	2	0
3	D	118	0	0	1	0
All	All	9233	0	8841	95	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 5.

The worst 5 of 95 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:88:VAL:HG22	1:A:109:LEU:CD2	1.91	1.00
1:A:88:VAL:HG22	1:A:109:LEU:HD23	1.44	0.96
1:D:88:VAL:HG22	1:D:109:LEU:HD23	1.60	0.82
1:C:4:LEU:HD23	1:C:20:ILE:HD11	1.65	0.77
1:A:123:LEU:HD23	1:D:293:LYS:HD3	1.65	0.77

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

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	297/301 (99%)	287 (97%)	8 (3%)	2 (1%)	30	15
1	B	297/301 (99%)	285 (96%)	11 (4%)	1 (0%)	50	38
1	C	295/301 (98%)	285 (97%)	9 (3%)	1 (0%)	50	38
1	D	295/301 (98%)	285 (97%)	9 (3%)	1 (0%)	50	38
All	All	1184/1204 (98%)	1142 (96%)	37 (3%)	5 (0%)	43	30

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	193	ILE
1	B	193	ILE
1	C	193	ILE
1	D	193	ILE
1	A	1	MSE

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	237/234 (101%)	234 (99%)	3 (1%)	80	76
1	B	237/234 (101%)	236 (100%)	1 (0%)	95	94
1	C	237/234 (101%)	234 (99%)	3 (1%)	80	76
1	D	236/234 (101%)	234 (99%)	2 (1%)	89	88
All	All	947/936 (101%)	938 (99%)	9 (1%)	85	84

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	43	ASN
1	D	222	ASP
1	C	214	PHE
1	A	214	PHE
1	C	123	LEU

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

5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

Of 15 ligands modelled in this entry, 15 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.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

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	297/301 (98%)	-0.11	6 (2%) 62 70	6, 14, 25, 35	0
1	B	296/301 (98%)	-0.09	7 (2%) 56 64	9, 16, 26, 44	0
1	C	296/301 (98%)	-0.02	9 (3%) 48 55	8, 16, 30, 39	0
1	D	297/301 (98%)	-0.22	4 (1%) 74 82	6, 13, 25, 46	0
All	All	1186/1204 (98%)	-0.11	26 (2%) 59 67	6, 15, 27, 46	0

The worst 5 of 26 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	47	ALA	4.6
1	C	51	ILE	4.6
1	D	1	MSE	3.8
1	C	53	PHE	3.8
1	C	48	LEU	3.6

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

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

6.3 Carbohydrates

There are no carbohydrates in this entry.

6.4 Ligands

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	RSR	LLDF	B-factors(\AA^2)	Q<0.9
2	CA	D	401	1/1	0.10	-0.56	13,13,13,13	0
2	CA	C	403	1/1	0.07	-0.78	31,31,31,31	0
2	CA	D	400	1/1	0.09	-0.99	16,16,16,16	0
2	CA	B	402	1/1	0.06	-1.05	30,30,30,30	0
2	CA	C	400	1/1	0.09	-1.12	21,21,21,21	0
2	CA	B	400	1/1	0.07	-1.37	17,17,17,17	0
2	CA	B	401	1/1	0.09	-1.93	15,15,15,15	0
2	CA	C	404	1/1	0.04	-1.96	28,28,28,28	0
2	CA	D	402	1/1	0.03	-2.23	19,19,19,19	0
2	CA	A	400	1/1	0.05	-2.62	15,15,15,15	0
2	CA	C	401	1/1	0.07	-2.91	18,18,18,18	0
2	CA	C	402	1/1	0.05	-3.00	16,16,16,16	0
2	CA	A	401	1/1	0.07	-3.07	13,13,13,13	0
2	CA	B	403	1/1	0.03	-4.20	19,19,19,19	0
2	CA	B	404	1/1	0.02	-5.35	19,19,19,19	0

6.5 Other polymers ⓘ

There are no such residues in this entry.