



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 23, 2020 – 09:24 am BST

PDB ID : 1GQQ  
Title : MURC - Crystal structure of the apo-enzyme from Haemophilus influenzae  
Authors : Skarzynski, T.; Cleasby, A.; Domenici, E.; Gevi, M.; Shaw, J.  
Deposited on : 2001-12-03  
Resolution : 3.10 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto: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.

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

MolProbity : 4.02b-467  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
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) : 2.11

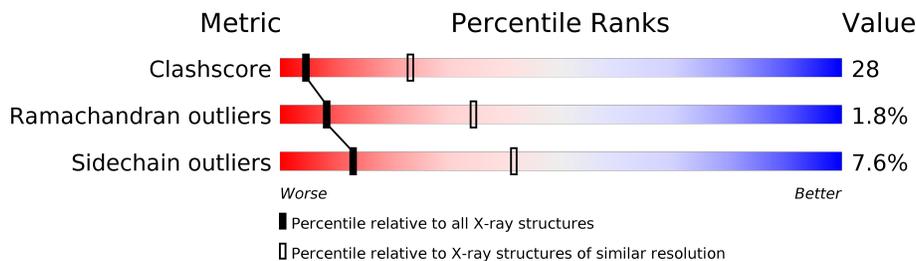
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.10 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	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)

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  $\geq 3$ , 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 was not executed.

Mol	Chain	Length	Quality of chain
1	A	475	
1	B	475	

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 6578 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 UDP-N-ACETYLMURAMATE-L-ALANINE LIGASE.

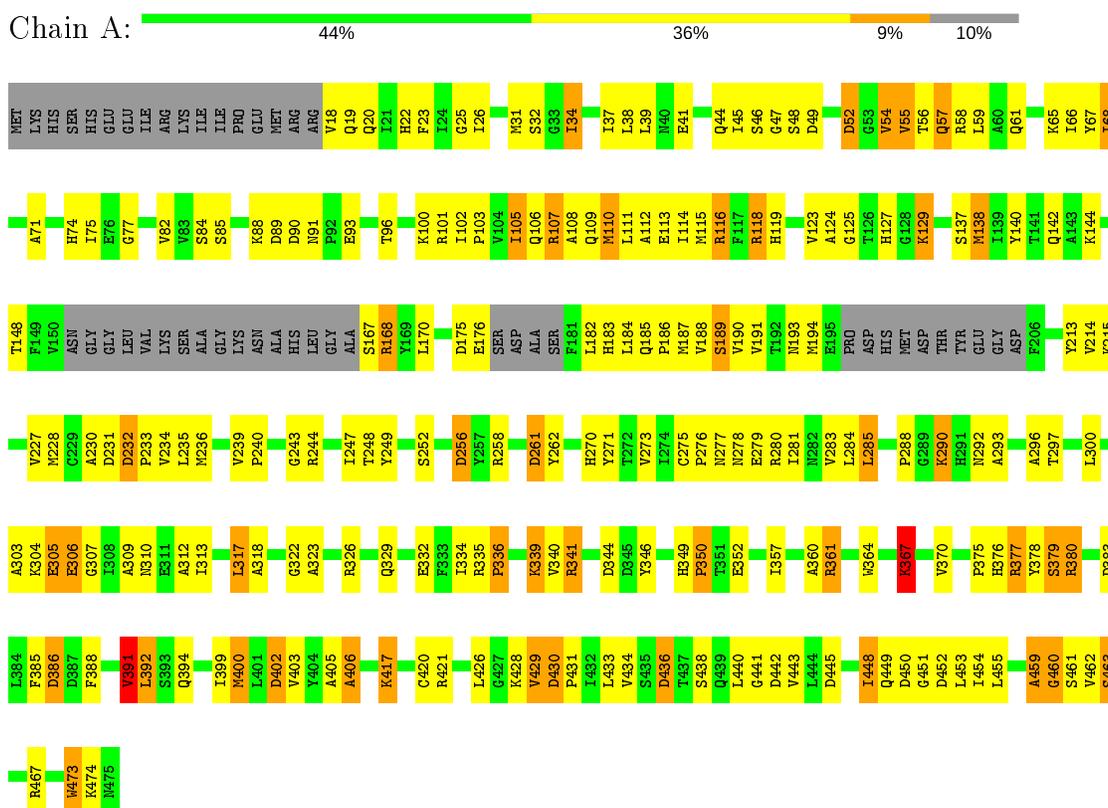
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	428	Total 3292	C 2081	N 573	O 623	S 15	0	0	0
1	B	427	Total 3286	C 2078	N 572	O 621	S 15	0	0	0

### 3 Residue-property plots

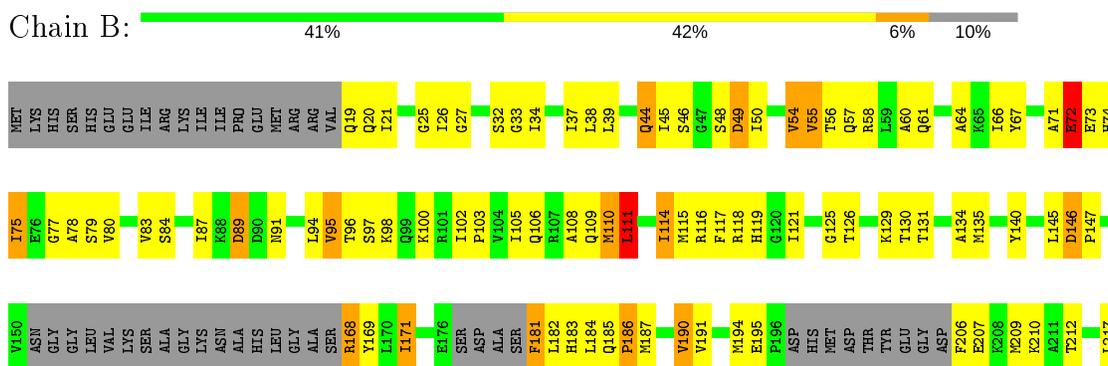
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according 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 was not executed.

- Molecule 1: UDP-N-ACETYLMURAMATE-L-ALANINE LIGASE



- Molecule 1: UDP-N-ACETYLMURAMATE-L-ALANINE LIGASE



H218	M219	L220	P221	F222	L225	A226	V227	M228	C229	A230	D231	D232	P233	V234	L235	M236	E237	L238	V239	P240	K241	V242	G243	R244	Q245	V246	I247	T248	Y249	S252	E253	Q254	A255	D256	Y257	R258	I259	E260	D261	Y262	E263	Q264	T265	G266	F267	Q268	G269	H270	Y271	I274	C275	P276	M277	M278	E279	R280
L281	M282	V283	L284	L285	M286	V287	P288	H291	M292	A293	L294	M295	A296	T297	A298	K304	E306	E306	G307	I308	A309	I313	L314	E315	A316	I317	A318	D319	F320	R326	F327	D328	R335	P336	M337	G338	K339	V340	R341	D344	D345	Y346	G347	H348	V353	G354	V355	T356	I357	K358	G363					
M364	G365	D366	K367	R368	I369	V370	F375	H376	R377	R382	D883	L384	F385	D386	F387	F388	V389	D396	A397	L398	D402	V403	Y404	I411	V412	D415	S416	K417	R421	S422	I423	R424	M425	I426	G427	K428	V429	D430	P431	I432	I433	V434	S435	D436	D445	Q446	I447	I448	Q449	D450	G451					
D452	L453	I454	L455	S461	V462	S463	K464	I465	S466	R467	G468	L469	N475																																											

## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	65.51Å 99.48Å 180.59Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.88 – 3.10	Depositor
% Data completeness (in resolution range)	100.0 (19.88-3.10)	Depositor
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.239 , 0.286	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	6578	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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	1.33	17/3346 (0.5%)	1.38	35/4525 (0.8%)
1	B	1.00	2/3341 (0.1%)	1.17	22/4519 (0.5%)
All	All	1.18	19/6687 (0.3%)	1.28	57/9044 (0.6%)

The worst 5 of 19 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	68	ILE	CA-CB	-8.14	1.36	1.54
1	A	430	ASP	CB-CG	8.01	1.68	1.51
1	A	429	VAL	CB-CG1	-7.79	1.36	1.52
1	A	367	LYS	CE-NZ	6.82	1.66	1.49
1	B	417	LYS	CD-CE	6.52	1.67	1.51

The worst 5 of 57 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	344	ASP	CB-CG-OD1	-10.40	108.94	118.30
1	A	386	ASP	CB-CG-OD2	10.04	127.34	118.30
1	A	344	ASP	CB-CG-OD2	9.77	127.10	118.30
1	B	382	ARG	NE-CZ-NH1	-9.39	115.61	120.30
1	A	474	LYS	CD-CE-NZ	-8.13	93.00	111.70

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	3292	0	3295	165	0
1	B	3286	0	3288	213	0
All	All	6578	0	6583	372	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 28.

The worst 5 of 372 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:105:ILE:HD11	1:A:110:MET:HG2	1.23	1.16
1:A:417:LYS:N	1:A:417:LYS:HD3	1.66	1.08
1:B:39:LEU:HD13	1:B:45:ILE:HG12	1.42	1.02
1:B:287:VAL:HG12	1:B:288:PRO:HD2	1.39	0.99
1:B:80:VAL:HG21	1:B:105:ILE:HD12	1.44	0.98

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	420/475 (88%)	384 (91%)	30 (7%)	6 (1%)	11 40
1	B	419/475 (88%)	376 (90%)	34 (8%)	9 (2%)	7 30
All	All	839/950 (88%)	760 (91%)	64 (8%)	15 (2%)	8 34

5 of 15 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	89	ASP
1	B	55	VAL
1	B	72	GLU

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Mol	Chain	Res	Type
1	B	253	GLU
1	B	219	ASN

### 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	349/387 (90%)	325 (93%)	24 (7%)	15	45
1	B	348/387 (90%)	319 (92%)	29 (8%)	11	38
All	All	697/774 (90%)	644 (92%)	53 (8%)	13	41

5 of 53 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	467	ARG
1	B	75	ILE
1	B	426	LEU
1	B	32	SER
1	B	50	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	446	GLN
1	B	20	GLN
1	B	449	GLN
1	A	449	GLN
1	B	19	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 carbohydrates in this entry.

#### 5.6 Ligand geometry [i](#)

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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.